

AD-A157 233

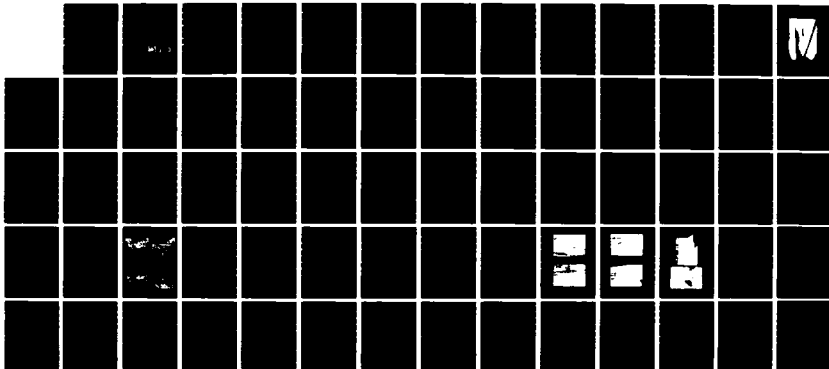
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
JACKSONVILLE POND DAM. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV JAN 81

1/1

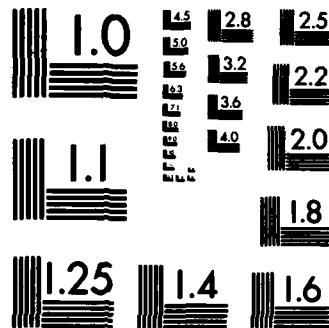
UNCLASSIFIED

F/G 13/13

NL



END



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AD-A157 233

CONNECTICUT RIVER BASIN
WHITINGHAM, VERMONT

2

JACKSONVILLE POND DAM
VT 00148

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

"Original contains color
plates: All DTIC reproductions
will be in black and
white"



DTIC
SELECTE
JUL 17 1985

Handwritten initials and a 'G' stamp.

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

FILE COPY

DISTRIBUTION STATEMENT A

Approved for public release
Distribution Unlimited

JANUARY 1981

85 7 01 064

DISCLAIMER NOTICE

**THIS DOCUMENT IS BEST QUALITY
PRACTICABLE. THE COPY FURNISHED
TO DTIC CONTAINED A SIGNIFICANT
NUMBER OF PAGES WHICH DO NOT
REPRODUCE LEGIBLY.**

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

| REPORT DOCUMENTATION PAGE | | READ INSTRUCTIONS BEFORE COMPLETING FORM |
|---|-----------------------|---|
| 1. REPORT NUMBER VT 00148 | 2. GOVT ACCESSION NO. | 3. RECIPIENT'S CATALOG NUMBER |
| 4. TITLE (and Subtitle) Jacksonville Pond Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS | | 5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT |
| | | 6. PERFORMING ORG. REPORT NUMBER |
| 7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION | | 8. CONTRACT OR GRANT NUMBER(s) |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS | | 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS |
| 11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254 | | 12. REPORT DATE January 1981 |
| | | 13. NUMBER OF PAGES 43 |
| 14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) | | 15. SECURITY CLASS. (of this report) UNCLASSIFIED |
| | | 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE |
| 16. DISTRIBUTION STATEMENT (of this Report) APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED | | |
| 17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) | | |
| 18. SUPPLEMENTARY NOTES Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use coverdate for date of report. | | |
| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Connecticut River Basin Whitingham, VT. Tributary to East Branch North River | | |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is a concrete and stone masonry structure. The dam is judged to be in fair condition. There is no means available for drawing down the pool level if an emergency situation were to occur. It is small in size with a high hazard potential. The test flood is equal to the full PMF. There are various remedial measures which should be undertaken by the owner. | | |



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

NEDED

JUN 16 1961

Honorable Richard A. Snelling
Governor of the State of Vermont
State Capitol
Montpelier, Vermont 05602

Dear Governor Snelling:

Inclosed is a copy of the Jacksonville Pond Dam (VT-00148) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Water Resources, the cooperating agency for the State of Vermont. In addition, a copy of the report has also been furnished the owner, Town of Whitingham, VT.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Water Resources for your cooperation in carrying out this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

Incl
As stated

JACKSONVILLE POND DAM
VT 00148

CONNECTICUT RIVER BASIN
JACKSONVILLE, VT

| | |
|--------------------|-------------------------------------|
| Accession For | |
| DTIS GRA&I | <input checked="" type="checkbox"/> |
| DTIC TAB | <input type="checkbox"/> |
| Unannounced | <input type="checkbox"/> |
| Justification | |
| By _____ | |
| Distribution/ | |
| Availability Codes | |
| Dist | Avail and/or Special |
| A/ | 23 ab |

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION
PROGRAM



NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

IDENTIFICATION NO: VT 00148
NAME OF DAM: Jacksonville Pond Dam
TOWN: Whitingham
COUNTY AND STATE: Windham, Vermont
STREAM: Tributary to East Branch North
River
DATE OF INSPECTION: November 11, 1980

Jacksonville Pond Dam is a concrete and stone masonry structure. The dam is about 80 feet long and has a maximum height of about 14 feet. The central portion of the dam, which also comprises the 33.8-foot long spillway overflow section, is dry stone masonry construction with earthen fill on the upstream side. Concrete abutment and cutoff walls are located at each abutment. There are no operable outlet facilities at the dam. The dam was originally a mill dam, but it is now used as a source of water for fire protection.

Based on visual inspection, the dam is judged to be in fair condition. The long-term stability of the dam could be affected by seepage discharging from beneath the downstream closure of what was apparently a sluiceway at one time, by surface erosion near the concrete walls that extend from the ends of the dam into the abutments, and by surface erosion on the abutment side of the training wall at the left end of the spillway. There is no means available for drawing down the pool level if an emergency situation were to occur.

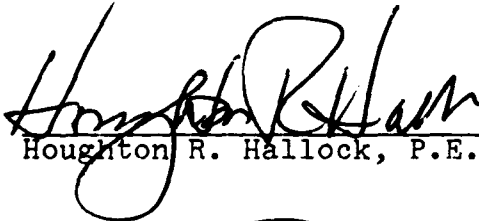
Based on the Recommended Guidelines for Safety Inspection of Dams, prepared by the Corps of Engineers, the dam is classified as "small" in size, with a "high" hazard potential. A test flood equal to the Probable Maximum Flood (PMF) was selected for the analyses

performed for this report. The spillway capacity of Jacksonville Pond Dam is 484 cfs, which is about 4 percent of the routed test flood outflow of 11,150 cfs. The test flood would cause the dam to be overtopped by about 8.9 feet.

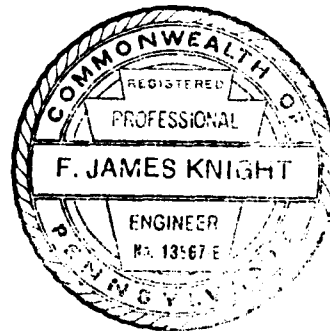
It is recommended that the Owner engage a professional engineer experienced in the design of dams to investigate the seepage at the downstream closure of what was apparently a sluiceway at one time, perform more detailed hydrologic and hydraulic analyses to determine spillway adequacy or the ability of the project to withstand overtopping, and investigate implementation of a low-level drawdown system. In addition, the Owner should make necessary repairs for the deficiencies listed above and should also implement the remedial measures described in Paragraph 7.3.

The measures outlined above, and discussed in detail in Section 7, should be implemented within one year after receipt of this Phase I Inspection Report.

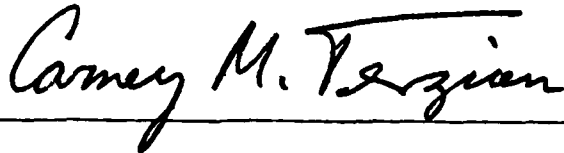
GANNETT FLEMING CORDDRY
AND CARPENTER, INC.


Houghton R. Hallock, P.E.

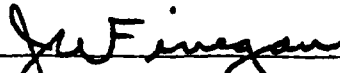

F. James Knight, P.E.
Assistant Vice President
Project Manager



This Phase I Inspection Report on Jacksonville Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.



CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

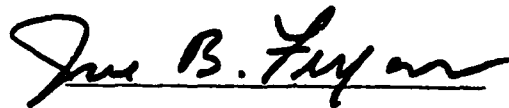


JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division



ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:



JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in Recommended Guidelines for Safety Inspection of Dams, for a Phase I Investigation. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general conditions and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railing and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

TABLE OF CONTENTS

| | <u>Page</u> |
|--|-------------|
| LETTER OF TRANSMITTAL | |
| BRIEF ASSESSMENT | |
| REVIEW BOARD PAGE | |
| PREFACE | 1 |
| TABLE OF CONTENTS | ii |
| OVERVIEW PHOTO | iv |
| LOCATION MAP | v |
| REPORT | |
| SECTION 1 - PROJECT INFORMATION | 1 |
| 1.1 General | 1 |
| 1.2 Description of Project | 1 |
| 1.3 Pertinent Data | 3 |
| SECTION 2 - ENGINEERING DATA | 6 |
| 2.1 Design Data | 6 |
| 2.2 Construction Data | 6 |
| 2.3 Operation Data | 6 |
| 2.4 Evaluation of Data | 6 |
| SECTION 3 - VISUAL INSPECTION | 7 |
| 3.1 Findings | 7 |
| 3.2 Evaluation | 8 |
| SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES | 10 |
| 4.1 Operational Procedures | 10 |
| 4.2 Maintenance Procedures | 10 |
| 4.3 Evaluation | 10 |

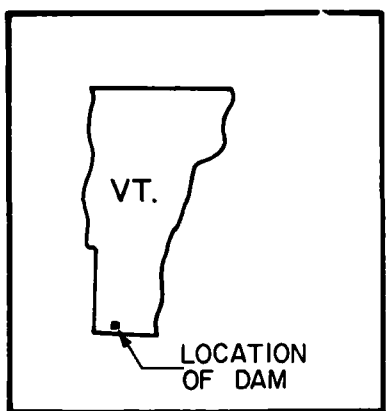
TABLE OF CONTENTS (Continued)

| | <u>Page</u> |
|--|-------------|
| SECTION 5 - EVALUATION OF HYDRAULIC/ HYDROLOGIC FEATURES | 11 |
| 5.1 General | 11 |
| 5.2 Design Data | 11 |
| 5.3 Experience Data | 11 |
| 5.4 Test Flood Analysis | 11 |
| 5.5 Dam Failure Analysis | 12 |
| SECTION 6 - EVALUATION OF STRUCTURAL STABILITY | 13 |
| 6.1 Visual Observations | 13 |
| 6.2 Design and Construction Data | 13 |
| 6.3 Post-Construction Changes | 13 |
| 6.4 Seismic Stability | 13 |
| SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES | 14 |
| 7.1 Dam Assessment | 14 |
| 7.2 Recommendations | 14 |
| 7.3 Remedial Measures | 15 |
| 7.4 Alternatives | 15 |
| APPENDIXES | |
| APPENDIX A - INSPECTION CHECKLIST | |
| APPENDIX B - ENGINEERING DATA | |
| APPENDIX C - PHOTOGRAPHS | |
| APPENDIX D - HYDROLOGIC AND HYDRAULIC COMPUTATIONS | |
| APPENDIX E - INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS | |

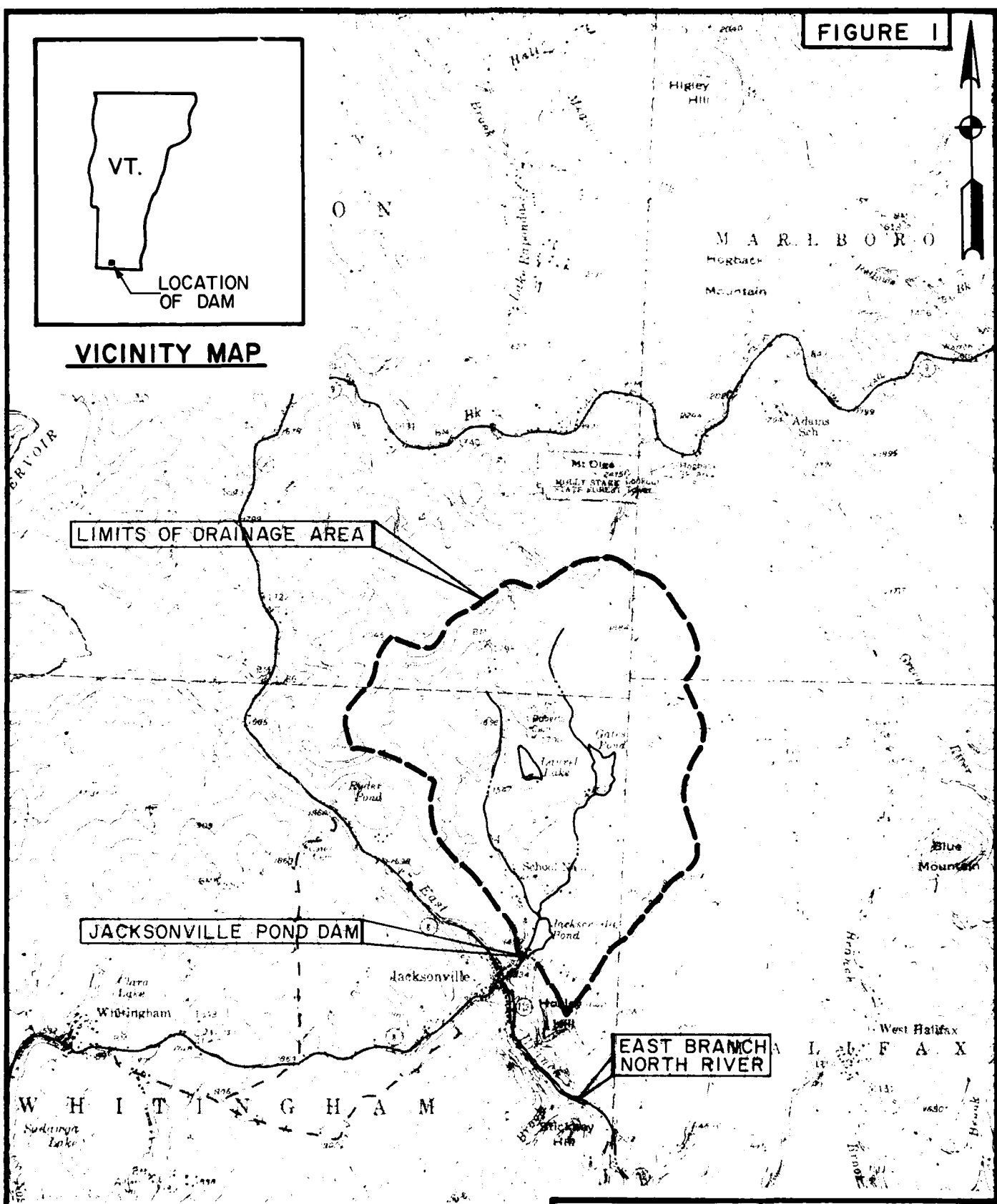
Jacksonville Pond Dam



Overview



VICINITY MAP



NOTES:

- 1. DAM SHOWN ON USGS QUADRANGLE WILMINGTON, VT.
- 2. DAM LOCATED 5.5 MILES SOUTHEAST OF WILMINGTON, VT.

| | |
|--|---|
| GANNETT FLEMING CORDRY AND CARPENTER, INC. CONSULTING ENGINEERS BOSTON, MASS. | U. S. ARMY ENGINEER DIVISION NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS. |
|--|---|

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
JACKSONVILLE POND DAM
LOCATION MAP
AND DRAINAGE AREA

| | | | |
|--------|---------|----------|--------------------|
| DRAWN | CHECKED | APPROVED | SCALE: 1" = 5208' |
| L.L.R. | D.B.W. | F.J.K. | DATE: 12/80 PAGE V |

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
JACKSONVILLE POND DAM

SECTION 1
PROJECT INFORMATION

1.1 General.

a. Authority. Public Law 92-367, dated August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility for supervising the inspection of dams within the New England Region. Gannett Fleming Corddry and Carpenter, Inc., has been retained by the New England Division to inspect and report on selected dams in the States of Vermont and Massachusetts. Contract No. DACW33-81-C-0013 dated November 5, 1980, has been assigned by the Corps of Engineers for this work.

b. Purpose. The purpose of the inspection and evaluation of non-Federal dams is to accomplish the following:

(1) Identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the states to quickly initiate effective dam safety programs for non-Federal dams.

(3) Update, verify, and complete the National Inventory of Dams.

1.2 Description of Project.

a. Location. The dam is located on an unnamed tributary to the East Branch North River and lies entirely within the Town of Whitingham, Vermont. The North River is a tributary of Deerfield River which, in turn, drains to the Connecticut River. The dam is shown on USGS Quadrangle, Wilmington, VT, at latitude N 42° 48' 20" and longitude W 72° 49' 03". The location is shown on Figure 1, page v.

b. Description of Dam and Appurtenances.

Jacksonville Pond Dam is a concrete and stone masonry structure. The dam is 80 feet long and has a maximum height of about 14 feet. Details of the dam are shown in Appendix B (Figure 2), on the Overview Photograph, and on the photographs in Appendix C. The dam is comprised of concrete abutment and cutoff wall sections on both the east (left) and west (right) abutments. The central portion of the dam, which also comprises the spillway overflow section, is constructed of dry stone masonry with earthen backfill on the upstream side. The downstream face of the dam is vertical. The upstream face is sloped and not visible or measurable because it is beneath the reservoir pool.

The spillway is a flat, broad-crested weir, constructed of dry stone masonry. The crest is 33.8 feet long and 8.7 feet wide. Discharge over the weir falls vertically onto the rock floor of the stream.

There is no operable outlet to release water from the reservoir. The dam originally supplied water to a mill located approximately 200 feet downstream. On the right abutment the top part of what appears to be a former outlet is visible (Photo No. 5). The downstream portion of the opening is covered with debris and the upstream portion is obscured by the reservoir pool. It appears that the opening has been permanently closed. In addition, a 6-inch diameter steel pipe protrudes from the right abutment concrete section (Photo No. 5). There is no flow from the pipe, and the upstream end is obscured by the reservoir. No valve or gate operating mechanisms are present.

c. Size Classification. Size classification is determined in accordance with Corps of Engineer guidelines and is based on either height or storage capacity, whichever gives the larger size category. Jacksonville Pond Dam has a maximum height of 14 feet and a maximum storage capacity of 113 acre-feet. By virtue of the storage capacity, Jacksonville Pond Dam meets the requirements for a "small" size dam.

d. Hazard Classification. The valley downstream of the dam is steep and in places the stream is incised into bedrock (Photo No. 6). Along the right bank a stone masonry retaining wall about 15 feet high supports a roadway fill and narrows the valley somewhat. Approximately 500 feet downstream from the dam, flow enters the East Branch North River. Several dwellings are constructed very close to the stream, and a number of small, private bridges cross the stream. The first floor

levels of about 10 dwellings are about 5 feet above the streambed. It is estimated that failure of the dam could produce stream depths in excess of 6.7 feet and flow velocities in excess of 12.7 feet per second. Failure of the dam would produce significant property damage and probable loss of more than a few lives. Accordingly, the dam has been placed in the "high" hazard category.

e. Ownership. The dam is owned by the Town of Whitingham. Mr. Finck, Chairman of the Board of Selectmen (802-368-2838) granted permission to enter the property and inspect the dam. Selectman John Brigham accompanied the inspection team.

f. Operator. The dam is operated by personnel from the town under direction of the Board of Selectmen.

g. Purpose of Dam. Jacksonville Pond Dam was originally constructed to supply water to drive a mill. It has long since ceased to serve this purpose. Its only current use is fire protection. The town occasionally fills their tank truck from the reservoir and does have pumping equipment and transmission hose for use in fighting fires in the Village of Jacksonville.

h. Design and Construction History. No historical data concerning Jacksonville Pond Dam is available. Its original construction date is unknown. A report of inspection dated October 10, 1978, is on file in the office of the Vermont Dam Safety Engineer. It notes that dates of 1910 and 1924 are visible on concrete cutoff walls. These dates were observed at the time of this inspection. The 1978 report noted some concrete deterioration in the right abutment section near the now-closed outlet. This condition has subsequently been repaired. No other information concerning Jacksonville Pond Dam is available.

i. Normal Operational Procedures. There are no formal operating procedures. Pool level is controlled by flow over the spillway crest.

1.3 Pertinent Data.

a. Drainage Area. The drainage area for Jacksonville Pond is 5.29 square miles. The terrain is mountainous and is mostly wooded. Two small ponds, Laurel Lake and Gates Pond, are located upstream within the drainage area.

b. Discharge at the Dam. There are no operable outlet facilities for the pond. Normal discharge flows over the ungated, 33.8-foot long spillway (Photo Nos. 2 and 3). Flows have not been recorded at this site and, therefore, the maximum flood discharge is unknown. It was reported verbally that flow overtopped the structure and eroded some soil from the right abutment area several years ago. This section has been repaired, and no indication of such damage was observed. Hydraulic calculations indicate the spillway can discharge 484 cfs when the water level is at the top of the abutment sections. During the test flood (PMF) the peak discharge would be 11,160 cfs with the pond 11.8 feet above the spillway crest.

c. Elevation (feet above NGVD).

- (1) Streambed at toe of dam - 1441.2.
- (2) Bottom of cutoff - unknown.
- (3) Maximum tailwater - 1443.0.
- (4) Normal pool - 1452.0.
- (5) Full flood control pool - not applicable.
- (6) Spillway crest - 1452.0.
- (7) Design surcharge (original design) - unknown.
- (8) Top of dam - 1454.9.
- (9) Test flood surcharge - 1463.8.

d. Reservoir (length in feet).

- (1) Normal pool - 1500.
- (2) Flood control pool - not applicable.
- (3) Spillway crest pool - 1500.
- (4) Top of dam - 1500.
- (5) Test flood pool - 1500.

e. Storage (acre-feet).

- (1) Normal pool - 69.
- (2) Flood control pool - not applicable.
- (3) Spillway crest pool - 69.
- (4) Top of dam - 120.
- (5) Test flood pool - 246.

f. Reservoir surface (acres).

- (1) Normal pool - 15.
- (2) Flood control pool - not applicable.
- (3) Spillway crest - 15.
- (4) Test flood pool - 15.
- (5) Top of dam - 15.

g. Dam.

- (1) Type - concrete and stone masonry.
- (2) Length - 80 feet.
- (3) Height - 14 feet.
- (4) Top width - concrete abutment sections - 1.1 feet.
Spillway section - 8.7 feet.
- (5) Side slopes - downstream - vertical.
Upstream - unknown.
- (6) Zoning - unknown.
- (7) Impervious core - unknown.
- (8) Cutoff - unknown.
- (9) Grout curtain - unknown.

h. Diversion and Regulating Tunnel. Not applicable.

i. Spillway.

- (1) Type - broad crested weir, no flashboards.
- (2) Length of weir - 33.8 feet.
- (3) Crest elevation - 1452.0.
- (4) Gates - none.
- (5) Upstream channel - reservoir.
- (6) Downstream channel - natural streambed incised into rock.

j. Regulating Outlets. None.

SECTION 2
ENGINEERING DATA

2.1 Design Data. No engineering data, design drawings or records are known to exist for Jacksonville Pond Dam.

2.2 Construction Data. No construction records are known to exist.

2.3 Operation Data. No operating records are available.

2.4 Evaluation of Data.

a. Availability. There are no engineering data available for this dam.

b. Adequacy. Not applicable.

c. Validity. Not applicable.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. The Phase I inspection of the dam at Jacksonville Pond was performed on November 11, 1980. A copy of the inspection checklist is included in Appendix A. A previous inspection was conducted by the State of Vermont, Water Quality Division, on October 6, 1978. A copy of the inspection report is included in Appendix B. Photographs taken during the current inspection are included in Appendix C. A summary of the results of this visual inspection is included in Appendix B (Figure 3).

b. Dam. The dam is founded on bedrock, which outcrops in the channel at the downstream toe of the dam (Photo No. 3). The left abutment is bedrock up to about the elevation of the crest of the spillway weir, and soil from that elevation to the top of the dam. The soil is retained by a roughly-laid, dry stone masonry wall on the downstream side of the dam (Photo No. 3). The right abutment is soil, which also is retained by a roughly-laid, dry stone masonry wall (Photo No. 2). There was no evidence of seepage from the abutments.

A hole in the training wall at the right end of the spillway that was mentioned as the site of leakage in a 1968 inspection report has been patched, and no seepage was emerging there at the time of the inspection (Photo No. 5).

Minor surface erosion of the abutment soil is occurring at the downstream side of the right abutment, on the upstream side of the concrete wall which extends from the dam into the left abutment, and behind the training wall at the left end of the dam (Photo Nos. 1, 2 and 3).

c. Appurtenant Structures. Discharge from the pond is over a 33.8-foot long, dry stone masonry spillway section (Photo Nos. 2 and 3). There are no flashboards on the spillway. The crest of the spillway appears to be smooth and well-aligned. Because of overflowing conditions at the time of the inspection, the structure could not be examined in detail, but it appeared to be in good condition. Water overflowing the spillway section falls directly on sound bedrock in the stream channel. No cracking, weathering or displacement of the foundation was observed.

There is no operable outlet for the reservoir. A former opening in the right abutment section apparently served at one time as a sluice to supply a mill, but it has been closed and does not now permit release of water (Photo No. 5). The mechanism of closure is unknown, since the upstream end is obscured by the reservoir pool and the downstream end by earthfill. About one gallon per minute of clear seepage was observed at the downstream end of the closure. A 6-inch diameter steel pipe also protrudes from the right abutment section but conducts no water. The condition of its upstream end is unknown.

d. Reservoir Area. The area immediately adjacent to Jacksonville Pond is gently sloping and grass-covered. Heavily wooded, steep areas adjoin this shoreline perimeter. A roadway embankment with a bridge opening is located in the reservoir area about 40 feet upstream from the dam (Photo No. 4). The size of the bridge opening and the elevations of the roadway and bridge are such that the structures act as flow controls during periods of large discharge.

e. Downstream Channel. The channel below Jacksonville Pond Dam has approximately the same general cross-sectional dimension as the dam for a distance of about 400 feet (Photo No. 6). Trees overhang both sides of the downstream channel. The channel bottom is bedrock with some boulders. The banks of the channel are retained by dry stone masonry walls immediately downstream of the dam. Beginning about 400 feet downstream, the channel gradually widens and side slopes flatten. About 600 feet below the dam, the stream joins the East Branch North River, and the flow direction changes abruptly.

Several small privately owned bridges cross the stream both above and below its confluence with East Branch North River. Several houses closely border the right bank of East Branch North River. The downstream area is shown in Appendix D (Figure 5).

3.2 Evaluation.

On the basis of the visual inspection, the dam is judged to be in fair condition.

Minor seepage is discharging at the downstream closure of what was apparently a sluiceway at one time. Depending on construction details, this seepage might have an effect on the long-term stability of the right abutment.

Erosion of the soil adjacent to the concrete walls that extend from the ends of the dam into the abutment, and on the abutment side of the training wall at the left end of the dam, might adversely affect the stability of the abutments if it is not controlled.

There is no low-level outlet or other means available for drawing down the pool level. If an emergency situation were to develop, the potential hazard could not be reduced by releasing water from the reservoir.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures.

a. General. The dam is self-regulating and, as such, does not require operation. Personnel from the Town of Whitingham reportedly visit the dam regularly, although there is no formally established schedule for such visits. Members of the Board of Selectmen pass by and observe the dam on a regular basis.

b. Description of any Warning System in Effect. No formal warning system is in effect.

4.2 Maintenance Procedures.

a. General. Several modifications and repairs have apparently taken place, but no formal history or record is available. Minor concrete deterioration noted in the 1978 inspection report has been repaired. Deficiencies have been corrected as they occurred. Generally, the dam is well-maintained.

b. Operating Facilities. No operating facilities exist. An old outlet opening and a 6-inch diameter pipe, both in the right abutment section, have been closed for many years and are no longer operable. The means of closure is unknown.

4.3 Evaluation. Maintenance of the dam is adequate. Although personnel of the Town visit the dam regularly, there is no regular program of technical inspection and no written warning system. This is unsatisfactory considering that the dam is in the high hazard category and considering that the dam is in only fair condition. These programs should be implemented by the Owner as recommended in Section 7.3.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General. Jacksonville Pond Dam has a drainage area of 5.29 square miles. The watershed area is mountainous, mostly wooded, and relatively undeveloped. Two lakes are located within the watershed upstream from Jacksonville Pond. Laurel Lake, located 1.3 miles upstream, has a very small watershed, and it has negligible effects on Jacksonville Pond. Gates Pond, situated just east of Laurel Lake, has a significant watershed area, but it has only very slight storage capacity. As a result, Gates Pond also exerts only minimal influence on Jacksonville Pond Dam. Neither Laurel Lake nor Gates Pond were included in the analysis.

 Jacksonville Pond Dam is 13.7 feet high and about 80 feet long. It is an embankment dam with a concrete wall along its upstream side and a dry stone masonry wall along its downstream side. The spillway weir is concrete and is 33.8 feet long. Its width is 8.7 feet. A roadway embankment is located in the reservoir area about 40 feet upstream from the dam. The bridge opening is 17.6 feet wide and 7 feet high. The roadway embankment and the bridge opening act as flow controls for high discharges. The effects of the roadway embankment and the bridge opening were included in the analysis. There is no functional outlet works at the dam. The hydrologic and hydraulic computations performed for this report are included in Appendix D.

5.2 Design Data. There are no hydrologic or hydraulic design data available for the dam.

5.3 Experience Data. There are no records of the maximum discharge at the site. It was reported that "the dam has been overtopped on at least one occasion, and that significant erosion damage occurred from the overtopping."

5.4 Test Flood Analysis. Jacksonville Pond Dam is in the "small" size category and in the "high" hazard category. In accordance with Corps of Engineers' guidelines, a spillway design flood ranging between the one-half Probable Maximum Flood (PMF) and the full PMF should be used to evaluate the spillway. In the following analysis, the PMF was used as the test flood. Conditions for the

one-half PMF were also checked. The test flood (PMF) inflow of 11,638 cfs is based on a watershed area of 5.29 square miles in mountainous terrain. The test flood was routed through Jacksonville Pond. The rating curve used for the dam was a combined curve that accounted for the effects of the upstream roadway embankment and for the roadways that are adjacent to each end of the dam. The routed test flood outflow was determined in accordance with Corps of Engineer Guidance for Estimating Effect of Surcharge Storage on Maximum Probable Discharges. The routing was started with the pool level at the crest of the spillway. The routed test flood outflow was determined to be 11,150 cfs. With the pool level at the top of the dam, the maximum capacity of the spillway is about 484 cfs, which is approximately 4 percent of the routed test flood outflow. The test flood would cause the dam to be overtopped by about 8.9 feet. The depth of overtopping was also checked for the one-half PMF; it was determined to be about 5.2 feet of overtopping.

5.5 Dam Failure Analysis. The impact of failure of the dam was assessed using the "Rule of Thumb" Guidance for Estimating Downstream Dam Failure Hydrographs prepared by the Corps of Engineers. The breach discharge was estimated with the water surface at the crest of the dam and a breach width equal to 40 percent of the mid-height length of the dam. The maximum breach discharge was determined to be 2,728 cfs. The downstream stage was estimated in three reaches.

At the location of the primary damage center, which is in Jacksonville along the East Branch North River, the flood stage resulting from dam failure would be about 6.7 feet. The stage just prior to failure, with the spillway discharging its maximum capacity of 484 cfs, would be about 2.7 feet. Since the first floor levels of about 10 dwellings in this area are about 5 feet above the streambed, the result of dam failure would be severe damage and probable loss of more than a few lives. For this reason, the dam has been placed in the "high" hazard category. The probable flood impact area is shown in Appendix D (Figure 5).

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations. The evaluation of the structural stability of Jacksonville Pond Dam is based on visual observations, there being no available drawings or calculations. As discussed in Section 3, Visual Inspection, the dam is considered to be in fair condition. No structural distress, cracking, or misalignment was observed.

Minor seepage is discharging at the downstream closure of what was apparently a sluiceway at one time. Depending on construction details, this seepage might have an effect on the long-term stability of the right abutment.

Erosion of the soil next to the concrete walls that extend from the ends of the dam into the abutment, and on the abutment side of the training wall at the left end of the dam, might adversely affect the stability of the abutments if it is not controlled.

6.2 Design and Construction Data. No design or construction data for Jacksonville Pond Dam are available.

6.3 Post-Construction Changes. Several generations of concrete work are evident in the abutment sections and cutoff walls. Two of the sections are dated 1910 and 1924. A laid-up stone wall on the right, and a concrete headwall, are believed to have been modified in the early 1960's. No records are maintained and no accurate history of post-construction changes is available.

6.4 Seismic Stability. The dam is located in Seismic Zone 2, and in accordance with Phase I guidelines, does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. The visual examination indicates that the dam is in fair condition. The major concerns with respect to the integrity of the dam are:

1) Minor seepage discharging from beneath the downstream closure of what was apparently a sluiceway at one time. Depending on construction details, this seepage might have an effect on the long-term stability of the right abutment.

2) Erosion of the soil next to the concrete walls that extend from the ends of the dam into the abutments and on the abutment side of the training wall at the left end of the overflow spillway. This erosion might adversely affect the stability of the abutments if it is not controlled.

3) Hydraulic analyses indicate that the spillway can discharge 484 cfs with the pool level at the top of the dam. The test flood (PMF) outflow would cause the dam to be overtopped by 8.9 feet. The spillway can discharge about 4 percent of the routed test flood outflow before the dam is overtopped. If the dam were to fail, there would be severe property damage and probable loss of more than a few lives.

4) There is no means available for drawing down the pool level if an emergency situation were to occur.

b. Adequacy of Information. The available information is such that the assessment of this dam must be based primarily on the results of the visual inspection.

c. Urgency. The Owner should implement the recommendations and remedial measures of Paragraphs 7.2 and 7.3 within one year after receipt of this Phase I report.

7.2 Recommendations.

The following investigations and needed corrections should be carried out under the direction of a registered engineer qualified in the design and construction of dams:

1) Investigate the minor seepage at the downstream closure of what was apparently a sluiceway at one time, and design and construct any necessary corrective measures.

2) Perform more detailed hydrologic and hydraulic analyses to determine spillway adequacy or the ability of the project to withstand overtopping.

3) Investigate implementation of a low-level drawdown system.

7.3 Remedial Measures

a. Operating and Maintenance Procedures. The Owner should:

1) Visually inspect the dam once each month.

2) Engage a registered engineer qualified in the design and construction of dams to make a comprehensive technical inspection of the dam once every two years.

3) Establish a surveillance program for use during and after heavy rainfall and a warning program to follow in case of emergency conditions.

4) Repair erosion adjacent to the concrete walls that extend from the ends of the dam into the abutments and at the left end of the spillway.

7.4 Alternatives. There are no practical alternatives to the above recommendations.

APPENDIX A
INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT Jacksonville Pond Dam VT 00148 DATE November 11, 1980

TIME a.m.

WEATHER Partly cloudy, cold, breezy

W.S. ELEV. 1452.3 U.S. 1441.5 DN.S.

PARTY:

- | | |
|-----------------------------------|-----------|
| 1. <u>F. James Knight (GFCC)</u> | 6. _____ |
| 2. <u>Ronald Hirschfeld (GEI)</u> | 7. _____ |
| 3. <u>Dennis Mehue (BAI)</u> | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

| | PROJECT FEATURE | INSPECTED BY | REMARKS |
|-----|---------------------------|-------------------|---------|
| 1. | <u>Geotechnical</u> | <u>Hirschfeld</u> | |
| 2. | <u>Physical/Hydrology</u> | <u>Knight</u> | |
| 3. | <u>Dimensional</u> | <u>Mehue</u> | |
| 4. | _____ | _____ | _____ |
| 5. | _____ | _____ | _____ |
| 6. | _____ | _____ | _____ |
| 7. | _____ | _____ | _____ |
| 8. | _____ | _____ | _____ |
| 9. | _____ | _____ | _____ |
| 10. | _____ | _____ | _____ |

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT

DATE November 11, 1980

PROJECT FEATURE Dam

NAME Knight

DISCIPLINE _____

NAME Hirschfeld

| AREA EVALUATED | CONDITIONS |
|---|--|
| <u>DAM EMBANKMENT</u> | |
| Crest Elevation | 1454.9 |
| Current Pool Elevation | 1452.0 |
| Maximum Impoundment to Date | Unknown. |
| Surface Cracks | None apparent. |
| Pavement Condition | Dry stone masonry wall on downstream side of embankment. |
| Movement or Settlement of Crest | None apparent. |
| Lateral Movement | None apparent. |
| Vertical Alignment | No deficiencies. |
| Horizontal Alignment | No deficiencies. |
| Condition at Abutment and at Concrete Structures | Minor surface erosion at right abutment and behind concrete walls. |
| Indications of Movement of Structural Items on Slopes | None. |
| Trespassing on Slopes | None. |
| Sloughing or Erosion of Slopes or Abutments | Minor surface erosion at right abutment. |
| Rock Slope Protection - Riprap Failures | None. |
| Unusual Movement or Cracking at or Near Toe | None. |
| Unusual Embankment or Downstream Seepage | 1 gpm clear seepage at old sluiceway location. |
| Piping or Boils | None. |
| Foundation Drainage Features | Not applicable. |
| Toe Drains | Not applicable. |
| Instrumentation System | Not applicable. |
| Vegetation | Not applicable. |

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT

DATE November 11, 1980

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

| AREA EVALUATED | CONDITIONS |
|---|----------------|
| <p><u>DIKE EMBANKMENT</u></p> <p>Crest Elevation</p> <p>Current Pool Elevation</p> <p>Maximum Impoundment to Date</p> <p>Surface Cracks</p> <p>Pavement Condition</p> <p>Movement or Settlement of Crest</p> <p>Lateral Movement</p> <p>Vertical Alignment</p> <p>Horizontal Alignment</p> <p>Condition at Abutment and at Concrete Structures</p> <p>Indications of Movement of Structural Items on Slopes</p> <p>Trespassing on Slopes</p> <p>Sloughing or Erosion of Slopes or Abutments</p> <p>Rock Slope Protection - Riprap Failures</p> <p>Unusual Movement or Cracking at or Near Toes</p> <p>Unusual Embankment or Downstream Seepage</p> <p>Piping or Boils</p> <p>Foundation Drainage Features</p> <p>Toe Drains</p> <p>Instrumentation System</p> <p>Vegetation</p> | <p>No dike</p> |

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT

DATE November 11, 1980

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

| AREA EVALUATED | CONDITIONS |
|---|-----------------------|
| <p><u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u></p> <p>a. Approach Channel</p> <p style="padding-left: 40px;">Slope Conditions</p> <p style="padding-left: 40px;">Bottom Conditions</p> <p style="padding-left: 40px;">Rock Slides or Falls</p> <p style="padding-left: 40px;">Log Boom</p> <p style="padding-left: 40px;">Debris</p> <p style="padding-left: 40px;">Condition of Concrete Lining</p> <p style="padding-left: 40px;">Drains or Weep Holes</p> <p>b. Intake Structure</p> <p style="padding-left: 40px;">Condition of Concrete</p> <p style="padding-left: 40px;">Stop Logs and Slots</p> | <p>Not applicable</p> |

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT

DATE November 11, 1980

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

| AREA EVALUATED | CONDITIONS |
|--|-----------------------|
| <p><u>OUTLET WORKS - CONTROL TOWER</u></p> <p>a. Concrete and Structural</p> <p> General Condition</p> <p> Condition of Joints</p> <p> Spalling</p> <p> Visible Reinforcing</p> <p> Rusting or Staining of Concrete</p> <p> Any Seepage or Efflorescence</p> <p> Joint Alignment</p> <p> Unusual Seepage or Leaks in Gate Chamber</p> <p> Cracks</p> <p> Rusting or Corrosion of Steel</p> <p>b. Mechanical and Electrical</p> <p> Air Vents</p> <p> Float Wells</p> <p> Crane Hoist</p> <p> Elevator</p> <p> Hydraulic System</p> <p> Service Gates</p> <p> Emergency Gates</p> <p> Lightning Protection System</p> <p> Emergency Power System</p> <p> Wiring and Lighting System</p> | <p>Not applicable</p> |

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT

DATE November 11, 1980

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

| AREA EVALUATED | CONDITIONS |
|--|-----------------------|
| <p><u>OUTLET WORKS - TRANSITION AND CONDUIT</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining on Concrete</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Cracking</p> <p>Alignment of Monoliths</p> <p>Alignment of Joints</p> <p>Numbering of Monoliths</p> | <p>Not applicable</p> |

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT

DATE November 11, 1980

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

| AREA EVALUATED | CONDITIONS |
|---|-----------------------|
| <p><u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Visible Reinforcing</p> <p>Any Seepage or Efflorescence</p> <p>Condition at Joints</p> <p>Drain Holes</p> <p>Channel</p> <p> Loose Rock or Trees Overhanging Channel</p> <p>Condition of Discharge Channel</p> | <p>Not applicable</p> |

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT

DATE November 11, 1980

PROJECT FEATURE Spillway

NAME Knight

DISCIPLINE _____

NAME Hirschfeld

| AREA EVALUATED | CONDITIONS |
|--|---|
| <p><u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u></p> | |
| <p>a. Approach Channel</p> <p> General Condition</p> <p> Loose Rock Overhanging Channel</p> <p> Trees Overhanging Channel</p> <p> Floor of Approach Channel</p> | <p>Good. Highway bridge crosses channel immediately upstream of dam.</p> <p>None</p> <p>None</p> <p>Not visible beneath water surface</p> |
| <p>b. Weir and Training Walls</p> <p> General Condition of Concrete</p> <p> Rust or Staining</p> <p> Spalling</p> <p> Any Visible Reinforcing</p> <p> Any Seepage or Efflorescence</p> <p> Drain Holes</p> | <p>Good</p> <p>None</p> <p>None</p> <p>None</p> <p>Minor efflorescence</p> <p>None</p> |
| <p>c. Discharge Channel</p> <p> General Condition</p> <p> Loose Rock Overhanging Channel</p> <p> Trees Overhanging Channel</p> <p> Floor of Channel</p> <p> Other Obstructions</p> <p> Other Comments</p> | <p>Good</p> <p>None</p> <p>Trees overhang channel</p> <p>Bedrock, with some boulders</p> <p>Concrete and masonry walls on sides of channel (remnants of foundation of mill)</p> |

APPENDIX B
ENGINEERING DATA

Public Service [Commission] Board

Hearing on Safety of
Jacksonville Prod. Dev.

01-19-49

PSC Case # 2447

Microfilm in Public

Records Division

133 State St. basement

Microfilm in Box PU-211

Locator ~~221~~

C-7-1

Haywood's report should be
on microfilm also

VERMONT DEPARTMENT OF WATER RESOURCES

INFORMATION SHEET

Name of Dam Jacksonville Pond Town Whitingham

Owner Town of Whitingham Name of Stream East Branch, North R. Tr.

Address Whitingham Classification _____
Vermont

U.S.G.S. Coordinates: Lat. 42° 47' 51" Long. 72° 49' 6"

U.S.G.S. Map Wilmington Aerial Photos Vt-62-11 21-146, 147

U.S.G.S. Elev. @ Spillway 1452

Total Length of Dam _____ Crest Width of Emergency Spillway _____

Width of Top _____ Maximum Height 11'

Spillway Capacity: Principal _____ Emergency _____

Pond Area _____ Drainage Area _____

Pond Volume: Normal Water Level _____ Design High Water Level _____

Maximum Water Depth: Normal Water Level _____ Design High Water Level _____

Storage Before Emergency Spillway is Used _____

Use of Reservoir Recreational

Description of Dam: Stone

Description of Spillway(s):

Designed by _____ Year Built _____

Hearing Date _____ Order Date _____

Additional Remarks:



STATE OF VERMONT

- Department of Fish and Game
- Department of Forests, Parks, and Recreation
- Department of Water Resources
- Environmental Board
- Division of Environmental Engineering
- Division of Environmental Protection
- Natural Resources Conservation Council

| ROUTING AGENCY OF ENVIRONMENTAL CONSERVATION | | |
|--|-------|----------|
| GENERAL | | |
| TO | NOTED | DATE |
| APB | cm | 10/10/78 |
| SIGNATURE | | |
| FILE | | |
| M E M O R A N D U M | | |

Montpelier, Vermont 05602
 Department of Water Resources
 WATER QUALITY DIVISION
 October 10, 1978.

To: File
 From: A. Peter Barranco, Dam Safety Engineer *APB*
 Subject: Jacksonville Pond Dam - Whitingham

On October 6 the writer inspected subject structure. Photos and drawings of the dam are attached.

The dam is an unmortared stone structure built on ledge with concrete abutments at both ends. Overall length is 80'. The overflow section is 34' long and about 11' high at maximum height. A 5' wide sluiceway is located at the right side and is comprised of a rather new (date unknown) concrete wall on the left side, a laid up stone wall on the right and a concrete headwall (built in 1961 or 1967) through which is a 6" I.D. iron pipe. The bottom of the sluice is filled with rock and fill and almost completely blocks a 3' wide opening in the headwall which is probably for a gate. A 3" pipe protrudes from the water on the upstream side of the headwall. The purpose of this pipe is unknown although it may be connected to a gate or to the 6" drain pipe in some fashion.

The dam is in generally good condition (except for the new sluice wall) with no noticeable movement of the vertical downstream face of the overflow section. The concrete walls tying the abutments of the dam into old ground on either side are in fair shape for their age (a 1910 date cut in the right one, a 1924 date in the left one) showing some cracking and leaching but in stable condition.

At the bottom of the new sluice wall adjacent to the 3' wide opening in the headwall, there is a cavity in the concrete about one foot square and a foot deep and a pile of sand and aggregate that has fallen and washed out of it. The concrete is crumbly and appears to have little cement in it. Water is leaking through the cavity and causing the sand and aggregate to wash out. The wall is about 2' thick (from a top measurement) at this point and the cavity is about 7' below pond (and spillway) level. The pond is filled in to about a 2' depth at this point. The failure appear

October 10, 1978

to be localized, however, it may extend below the fill in the bottom of the sluiceway. There is also spalling on the face of the wall and some surface cracking (rebar visible) at the downstream end. Recent surface concrete repairs were noted.

A small amount of water was leaking through the 3' opening in the headwall. The headwall shows significant leaching of lime and horizontal and diagonal cracking. There is a 6" ID iron pipe protruding from the headwall about 7' below its top. There was no flow from this pipe. The dry stone wall on the right side of the sluiceway shows some signs of instability and some backfill behind it has apparently washed through the cracks.

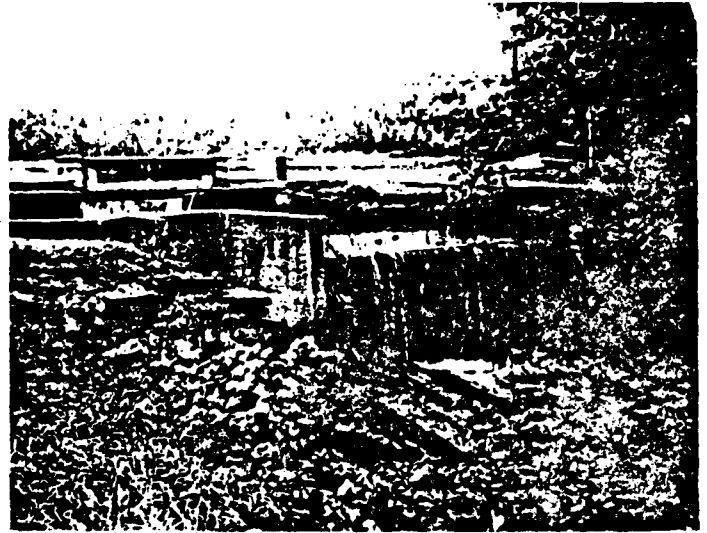
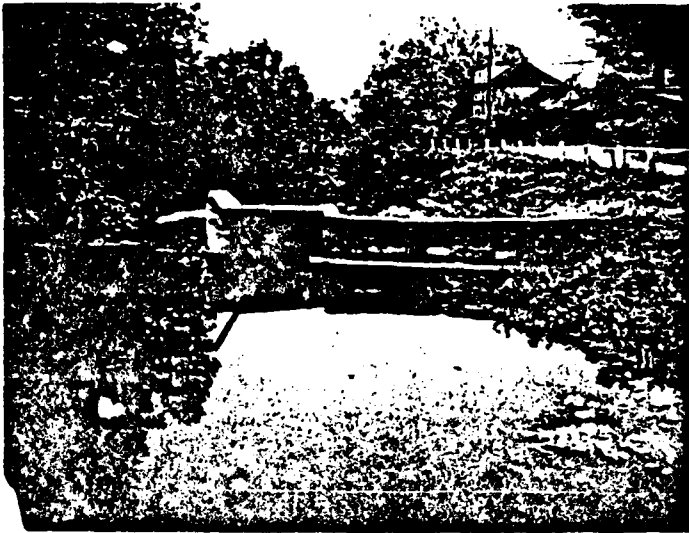
IP
-IP
About 30' upstream of the dam a town road with a concrete box culvert (17' wide x 7'± x 19' long) crosses the pond. The top of the culvert is about 2' above the crest of the dam with the road surface another 2.5' above that. Although it has not been checked, it would appear that this bridge (culvert) rather than the dam controls higher flows. The cavity in the new sluice wall does not appear to be an immediate hazardous situation because it appears to be a localized failure of the concrete, however, it is still a serious defect and should be corrected at once. The concrete in the vicinity should be carefully examined, particularly below grade of the sluice bottom, to determine extent of the problem. If the cavity were to "blow out", it does not appear that it would affect the stability of the dam but would cause a serious leak.

v1

JACKSONVILLE POND DAM

WATTINGHAM

OCTOBER 6, 1978



CAVITY IN WALL



13' WIDE GATE (?) OPENING

RECENT CONG. REPAIR

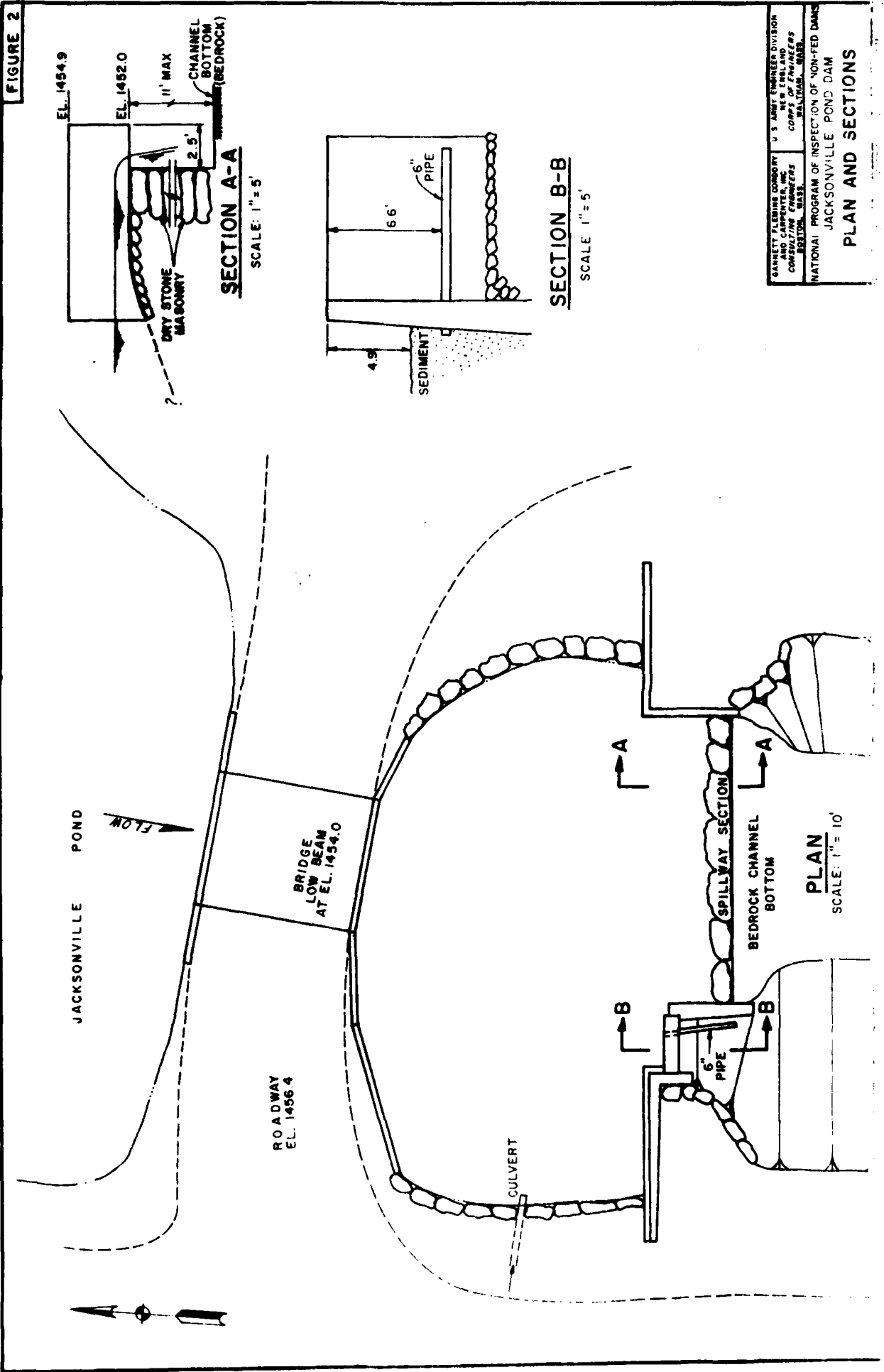
SPALLING CONCRETE



TOP OF 3' WIDE : OPENING AS IS (GATE ?)

CAVITY IN WALL

FIGURE 2

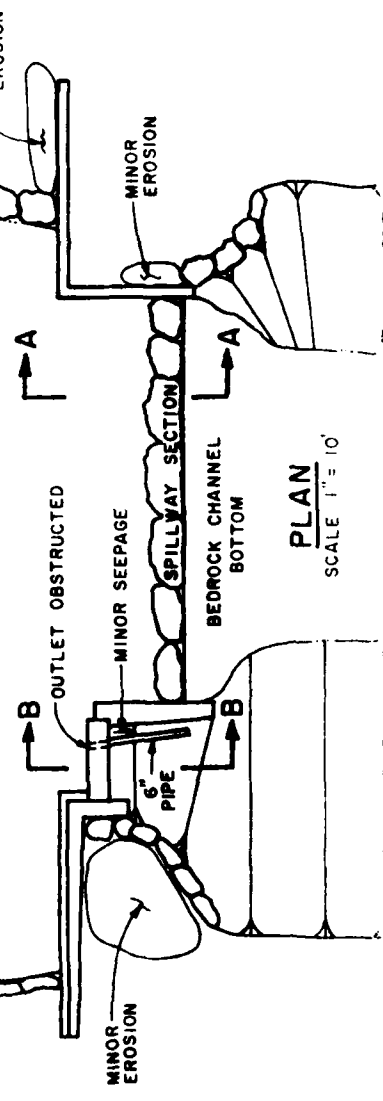
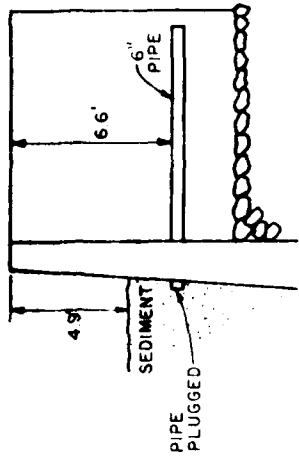
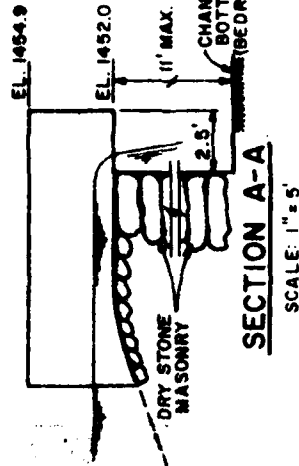
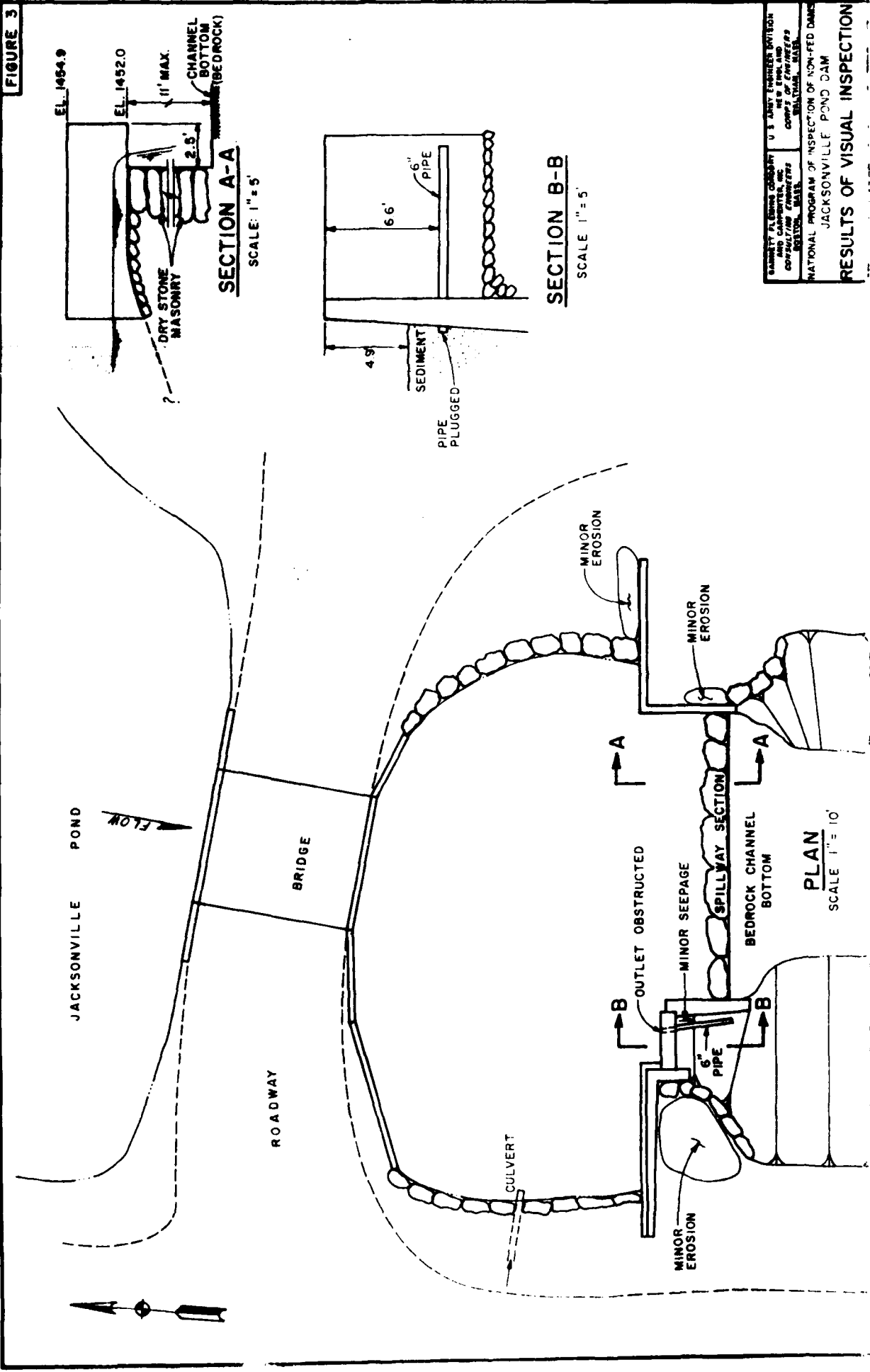


BARNETT FLEMING COMPANY
 AND CARPENTER, INC.
 CONSULTING ENGINEERS
 BOSTON, MASS.

U. S. ARMY ENGINEER DIVISION
 W. S. ENGLAND
 CORPS OF ENGINEERS
 WASHINGTON, D. C.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
 JACKSONVILLE POND DAM
PLAN AND SECTIONS

FIGURE 3

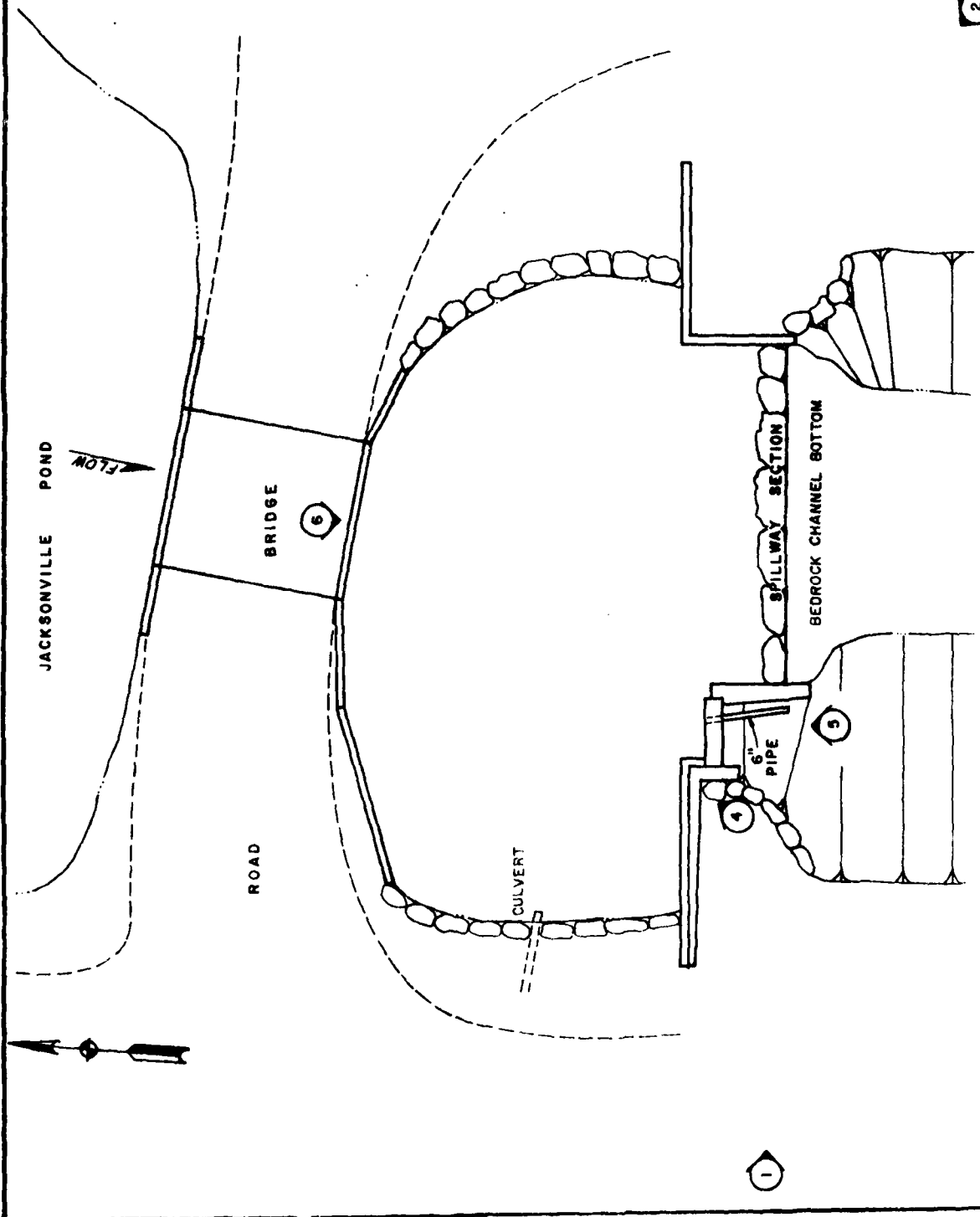


WARRANTY ENGINEERING CORPORATION
1000 W. 10th Street
Wichita, Kansas 67203
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
WALTON, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
JACKSONVILLE POND DAM
RESULTS OF VISUAL INSPECTION

APPENDIX C
PHOTOGRAPHS

FIGURE 4



① DENOTES PHOTO NUMBER AND DIRECTION IN WHICH PHOTO WAS TAKEN.

SAFETY FILMING CHARTER
 AND CHARITABLE, INC.
 1000 STATE STREET
 BOSTON, MASS.

U. S. ARMY ENGINEER DIVISION
 3701 FORT MONROE AVENUE
 CONCORD, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
 JACKSONVILLE POND DAM
 GUIDE TO PHOTOGRAPHS

PLAN

JACKSONVILLE POND DAM



Photo No. 1

View from right abutment
Note minor erosion in area immediately downstream
of cut-off wall



Photo No. 2

View from left abutment
Note large tree and minor erosion downstream
of cut-off wall

JACKSONVILLE POND DAM

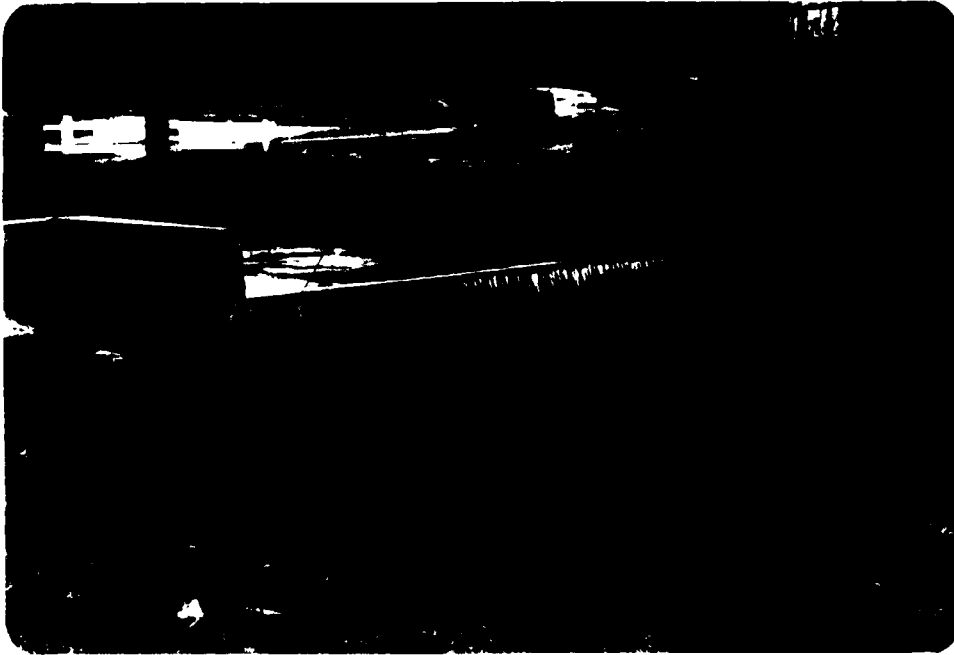


Photo No. 3

View of spillway section



Photo No. 4

View of bridge above dam

JACKSONVILLE POND DAM



Photo No. 5

View of inoperable
outlet facility.
Note concrete repairs
and minor seepage.



Photo No. 6

View of downstream channel.
Note old mill foundations.

APPENDIX D
HYDROLOGIC AND HYDRAULIC COMPUTATIONS

Jacksonville Pond Dam
Basic Data

Drainage Area = 5.29 mi² (determined from 15' USGS Quad)
Watershed Classification : Mountainous (Basin Slope 240 ft/mile)
Size : Small (13.7 feet high ; maximum storage = 120 acre-feet)
Hazard Classification : High hazard
Reservoir surface area = 15 acres (at normal pool)
Storage capacity :
 Spillway crest level (Elev. 1452.0) : 69 acre-ft
 Top of dam level (Elev. 1454.9) : 120 acre-ft
 Top of upstream roadway level (Elev. 1456.4) : 135 acre-ft
Spillway weir : concrete ; 8.7 feet wide
 length = 33.8 feet

Test Flood Inflow

For size (small) and hazard classification (high), the recommended test flood ranges from the 1/2 PMF to the PMF. Because of the number of houses subject to potential flooding (approx. 10) and due to their close proximity to the dam and to the stream, the PMF is selected as the test flood for the analysis.

The effects of 2 upstream lakes, Laurel Lake and Gates Pond, were judged to be of minor significance in the analysis of Jacksonville Pond Dam, and they were not included in the analysis.

Using the curve for mountainous regions and for D.A. = 5.29 mi²:

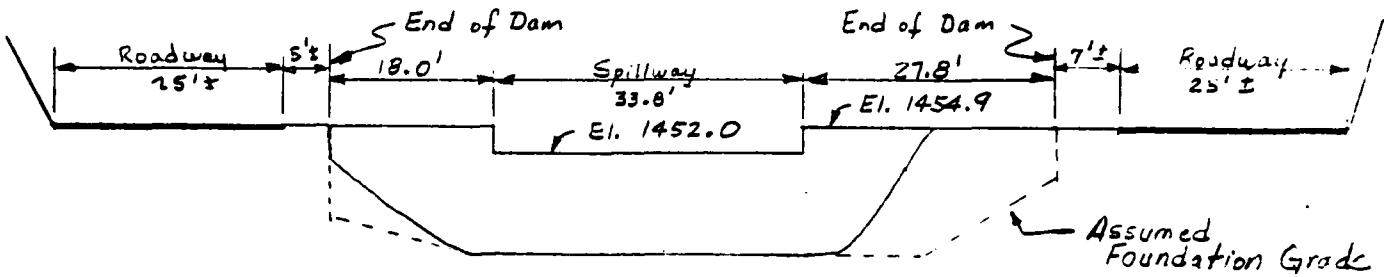
$$\text{Test Flood Inflow} = Q_{P1} = (5.29 \text{ mi}^2) (2200 \text{ cfs/mi}^2)$$
$$Q_{P1} = 11,638 \text{ cfs (PMF)}$$

$$1/2 \text{ PMF} = 5,819 \text{ cfs}$$

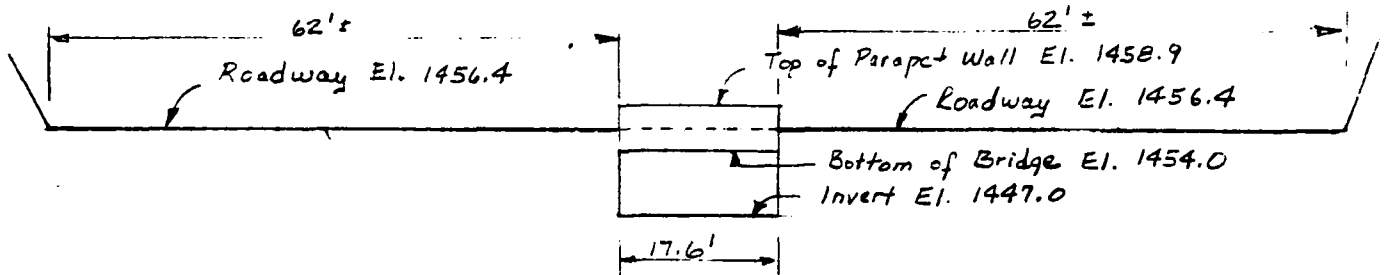
BY OPW DATE 12/80
CHKD BY cut DATE 12/80

SUBJECT Jacksonville Pond Dam
Hydrology and Hydraulics

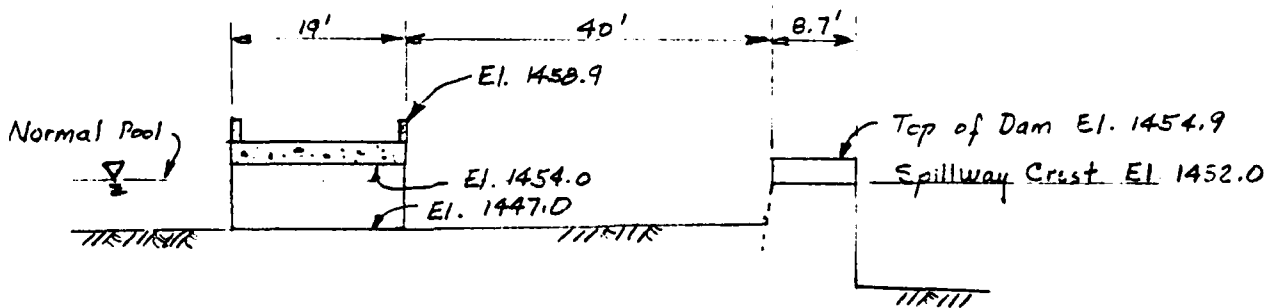
SHEET NO 2 OF 10
JOB NO _____



Profile Along Top of Dam
1" = 20'



Profile - Roadway and Bridge Opening Upstream from Dam
1" = 20'



Section Through Bridge and Spillway
1" = 20'

Note: See Appendix B for plan views of dam and roadway.

Notes on Development of Rating Curve:

1. Spillway controls at low flows
2. Roadway culvert develops pressure flow when pool level at dam exceeds El. 1454.0
3. After pressure flow develops in culvert, differential water levels will exist.
4. Overtopping of dam and 2 adjacent roadways are included in analysis.
5. Overtopping of upstream roadway is included in development of overall rating curve.

Basic Data for Developing Rating Curve:

Spillway:

$$\text{Length} = 33.8' \quad C = 2.9 \quad \text{Crest El.} = 1452.0'$$

$$Q_s = (2.9)(33.8)(H_s)^{3/2}$$

Dam and Two Adjacent Roadways:

$$\text{Total length} = 107.8 \quad C = 2.5 \quad \text{Elevation} = 1454.9$$

$$Q_D = (2.5)(107.8)(H_D)^{3/2}$$

Upstream Roadway Culvert:

$$\text{Area} = 123.2 \text{ ft}^2 \quad \text{Pressure Flow}$$

$$Q_C = (0.7)(123.2) \sqrt{2g h_c} \quad (\text{Orifice eqn.}; C = 0.7)$$

Upstream Roadway Embankment:

$$\text{Length} = 124' \quad C = 2.5 \quad \text{Elevation} = 1456.4$$

$$Q_R = (2.5)(124)(H_R)^{3/2}$$

Rating Curve - Jacksonville Pond Dam

| Pool Elev. @ Dam | Qs | Qo | Qs+D | hc Required | Pool Elev. @ Upstream Side Bridge | Qc | HR | QR | QC+R |
|---------------------|------|------|---------|----------------|---|------|------|-------|---------------|
| 1452.0 | 0 | 0 | 0 | | 1454.2 | 277 | 0 | 0 | 277 |
| 1453.0 | 98 | 0 | 98 | | 1455.4 | 484 | 0 | 0 | 484 |
| 1453.5 | 180 | 0 | 180 | | 1456.2 | 656 | 0 | 0 | 656 |
| 1454.0 | 277 | 0 | 277 | 0.16 | 1456.45 | 719 | 0.05 | 3 | 713 |
| 1454.9 | 484 | 0 | 484 | 0.49 | | | | | |
| 1455.3 | 588 | 68 | 656 | 0.90 | | | | | |
| 1455.4 | 615 | 95 | 710 | 1.05 | | | | | |
| | | | | Triad hc | Triad Elevations | QRc | HR | QR | Triad Gate |
| 1456.0 | 784 | 311 | (1095) | 1.4 | 1457.4 | 819 | 1.0 | 310 | 1129 |
| 1457.0 | 1096 | 820 | (1916) | 1.3 | (1457.3) | 789 | 0.9 | 265 | 1053 |
| 1458.0 | 1441 | 1471 | (2912) | 1.6 | (1458.6) | 875 | 2.2 | 1011 | 1886 |
| 1460.0 | 2218 | 3104 | (5322) | 1.7 | 1458.7 | 902 | 2.3 | 1081 | 1983 |
| 1462.0 | 3100 | 5100 | (8200) | 2.0 | 1460.0 | 979 | 3.6 | 2117 | 3096 |
| 1464.0 | 4075 | 7400 | (11475) | 1.9 | 1459.9 | 954 | 3.5 | 2030 | 2983 |
| | | | | 2.0 | 1462.0 | 979 | 5.6 | 4108 | 5087 |
| | | | | 2.1 | 1462.1 | 1003 | 5.7 | 4219 | 5222 |
| | | | | 2.5 | 1464.5 | 1094 | 8.1 | 7146 | 8240 |
| | | | | 3.0 | 1467.0 | 1200 | 10.6 | 10700 | 11900 |
| | | | | 2.8 | 1466.8 | 1158 | 10.4 | 10397 | 11555 |

* hc required is head on culvert necessary to match Qs+D
 $h_c = Q^2 / 0.98 g A^2$ (From $Q_c = 0.7 A \sqrt{2gh_c}$)

Develop Routing Curve

Based on combined rating curve computations, it appears that the dam would fail before the upstream roadway embankment. For example, when dam is overtopped by 1.1 feet, roadway embankment is overtopped by only 0.9 foot. Visual inspection indicates that the roadway embankment would be more resistant to overtopping because it is paved. If the dam were to fail, it is judged that the sudden drawdown condition that would exist for the downstream side of the roadway would cause failure of the roadway embankment. Storage figures for the routing curve should be adjusted to account for the roadway embankment.

Storage above spillway crest is computed as a vertical prism based on a lake surface area of 15 acres. Computations are started with water at spillway crest level.

$$Q_{p2} = Q_{p1} \left(1 - \frac{Stor}{19} \right) \quad Stor = \text{Storage in inches}$$

$$Stor = \frac{\text{Storage (acre-ft)} \times 12}{5.29 \times 640} = 0.00354 \times \text{Storage (acre-ft)}$$

| Pool Elev. @ Dam | Routing Curve | | | Q _{p2} |
|---------------------|-------------------------|----------------------|------------------|-----------------|
| | Pool Elev. @ Roadway | Storage (acre-ft) | Stor (inches) | |
| 1452.0 | 1452.0 | 0 | 0 | 11638 |
| 1453.0 | 1453.0 | 15 | 0.05 | 11605 |
| 1454.0 | 1454.2 | 33 | 0.12 | 11566 |
| 1455.4 | 1456.5 | 67.5 | 0.24 | 11491 |
| 1457.0 | 1458.6 | 99 | 0.35 | 11424 |
| 1460.0 | 1462.1 | 151.5 | 0.54 | 11309 |
| 1464.0 | 1466.8 | 222 | 0.79 | 11156 |

$$Q_{p1} = 11,638 \text{ cfs}$$

BY DPW DATE 12/80
CHKD BY AM DATE 12/80

SUBJECT Jacksonville Pond Dam
Hydrology and Hydraulics

SHEET NO 6 OF 10
JOB NO _____

Routing Curve for 1/2 PMF Test Flood

$$Q_{P2} = Q_{P1} (1 - \text{Stor}/9.5)$$

$$Q_{P1} = 5819 \text{ cfs}$$

| <u>Routing Curve</u> | | | | |
|-----------------------------|---------------------------------|--------------------------------|--------------------------|-----------------------|
| <u>Pool Elev. @ Dam</u> | <u>Pool Elev. @ Roadway</u> | <u>Storage (acre-feet)</u> | <u>Stor (inches)</u> | <u>Q_{P2}</u> |
| 1452.0 | 1452.0 | 0 | 0 | 5819 |
| 1454.0 | 1454.2 | 33 | 0.12 | 5745 |
| 1457.0 | 1458.6 | 99 | 0.35 | 5605 |
| 1460.0 | 1462.1 | 151.5 | 0.54 | 5488 |
| 1464.0 | 1466.8 | 222 | 0.79 | 5335 |

From Results Shown on Figure 1:

Depth overtopping for 1/2 PMF = 5.2'

Depth overtopping for PMF = 8.9'

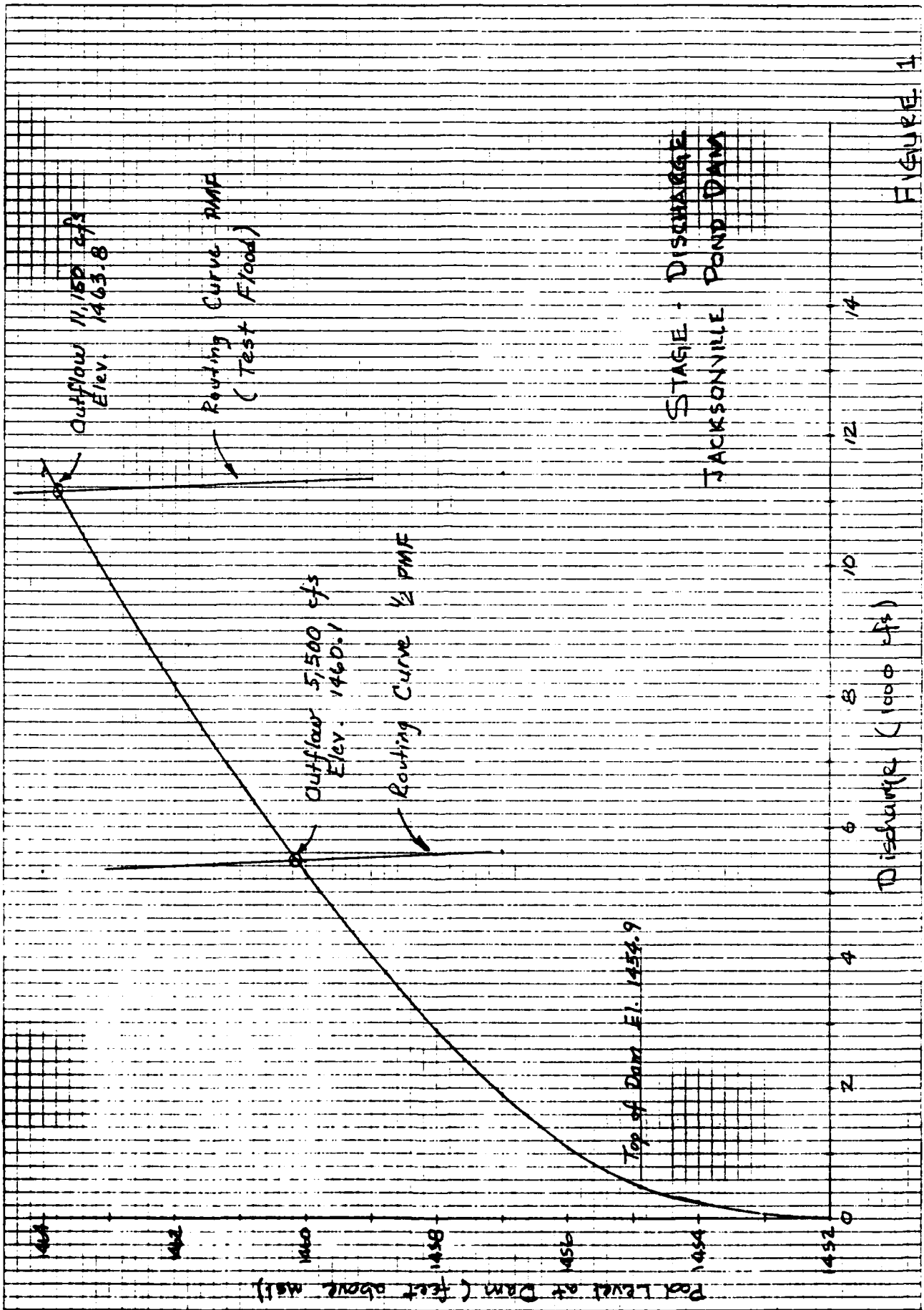


FIGURE 1

Dam Failure Analysis

For failure with pool level at top of dam:
 Storage at time of failure = 120 acre-ft
 Outflow just prior to failure = 484 cfs

Breach outflow:

$$Q_B = \frac{8}{27} W_b \sqrt{g} Y_0^{3/2}$$

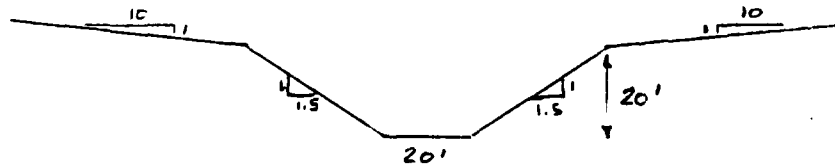
$W_b = 40\%$ of dam length @ midheight = 32 feet

$Y_0 = 13.7$ feet

$$Q_B = \left(\frac{8}{27}\right)(32)(32.2)^{1/2}(13.7)^{3/2} = 2728 \text{ cfs}$$

Breach occurs at spillway section. Since length of spillway = 33.8' and $W_b = 32'$, remaining spillway flow is negligible and $Q_{pi} = Q_B = 2728$ cfs.

Rating Curve: Reach 1



Reach Length = 750'
 $S = 0.105$
 $n_{channel} = 0.05$
 $n_{overbank} = 0.07$

| <u>Stage (ft)</u> | <u>Q (cfs)</u> |
|-------------------|----------------|
| 2 | 631 |
| 3 | 1271 |
| 5 | 3141 |
| 7 | 5831 |
| 10 | 11530 |

Reach Outflow : Reach 1

Pre-failure stage ($Q_{\text{spillway}} = 484 \text{ cfs}$) = 1.7'
 Pre-failure flow area in channel = 38.3 ft²

$Q_{p1} = 2728$ $L = 750'$ $S = 120 \text{ acre-ft}$
 Stage for $Q_{p1} = 4.7'$ Area = 127.1 ft²
 $\Delta \text{ Area} = 127.1 - 38.3 = 88.8 \text{ ft}^2$

$V_1 = (750 \text{ ft})(88.8 \text{ ft}^2) \left(\frac{1 \text{ acre}}{43560 \text{ ft}^2} \right) = 1.5 \text{ acre-ft}$ (Reach length OK)

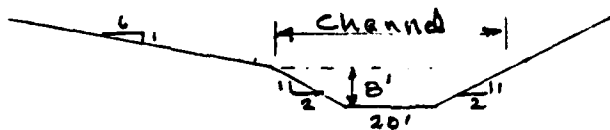
$Q_{p2} = Q_{p1} (1 - V_1/S) = 2728 (1 - 1.5/120) = 2694 \text{ cfs}$

Stage for $Q_{p2} = 4.6'$ Area = 123.7 ft²
 $\Delta \text{ Area} = 123.7 - 38.3 = 85.4 \text{ ft}^2$

$V_2 = \frac{(750)(85.4)}{43560} = 1.5 \text{ acre-ft}$ (same as V_1)

$\therefore Q_{p2} = 2694 \text{ cfs}$

Rating Curve : Reach 2



Reach length = 750'

$S = 0.010$

$n_{\text{channel}} = 0.05$

$n_{\text{overbank}} = 0.07$

| Stage (feet) | Q (cfs) |
|--------------|---------|
| 2 | 531 |
| 5 | 2759 |
| 8 | 6821 |

Reach Outflow: Reach 2

Pre-failure stage ($Q = 484$ cfs) = 1.9' (Area = 45.2 ft²)

$Q_{p1} = 2,694$ cfs (Q_{p2} from reach 1)

Stage for $Q_{p1} = 4.9'$ Area = 146.0 ft²

Δ Area = 146.0 - 45.2 = 100.8 ft²

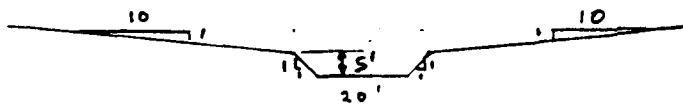
$V_1 = \frac{(750')(100.8)}{43560} = 1.7$ acre-ft (1.7 < $\frac{120}{2}$ Reach length OK)

$Q_{p2} = 2694 (1 - 1.7/120) = 2,656$ cfs

Stage = 4.9' (same as above, so $V_2 = V_1$)

$Q_{p2} = 2,656$ cfs

Rating Curve: Reach 3



$L = 1500'$

$S = 0.025$

$n_{channel} = 0.05$

$n_{overbank} = 0.07$

| Stage (feet) | Q (cfs) |
|--------------|---------|
| 2 | 298 |
| 3 | 588 |
| 5 | 1405 |
| 7 | 2839 |

Reach Outflow: Reach 3

Pre-failure stage ($Q = 484$ cfs) = 2.7' (Area = 61.3 ft²)

$Q_{p1} = 2,656$ cfs (Q_{p2} from reach 2)

Stage for $Q_{p1} = 6.8'$ Area = 211.4 ft²

Δ Area = 211.4 - 61.3 = 150.1 ft²

$V_1 = \frac{(1500)(150.1)}{43560} = 5.2$ acre-ft (5.2 < $\frac{120}{2}$ Reach length OK)

$Q_{p2} = (2656)(1 - 5.2/120) = 2,541$ cfs

0-10

Reach Outflow : Reach 3 Cont'd

Stage for $Q_{p2} = 2541$ cfs is 6.6' Area = 198.6 ft²

$$\Delta \text{Area} = 198.6 - 61.3 = 137.3 \text{ ft}^2$$

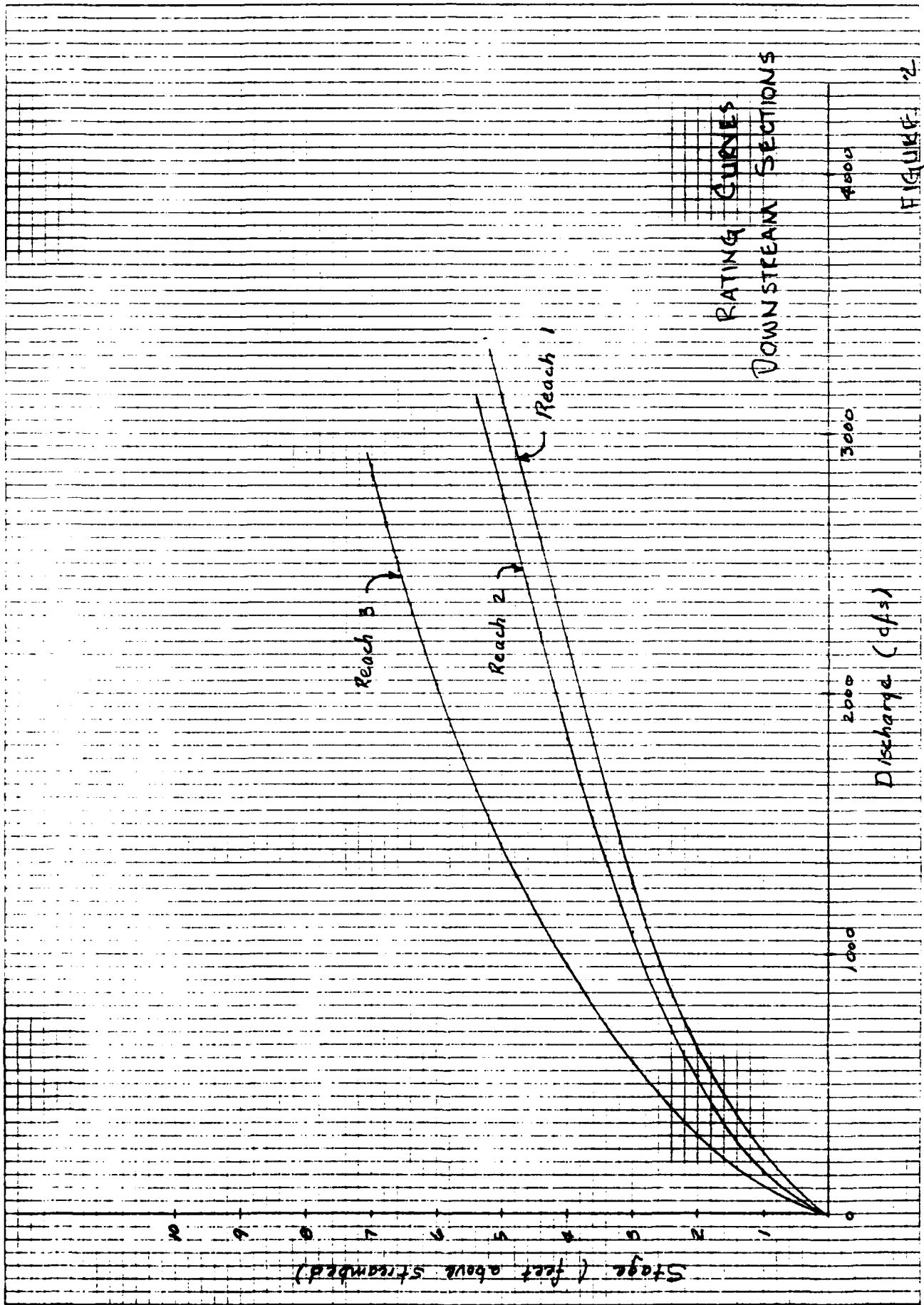
$$V_2 = \frac{(1500)(137.3)}{43560} = 4.7 \text{ acre-ft}$$

$$V_{avg} = \frac{4.7 + 5.2}{2} = 4.95 \text{ acre-ft}$$

$$Q_{p2} = Q_{p1} (1 - V_{avg}/s) = 2656 (1 - 4.95/120)$$

$Q_{p2} = 2546$ cfs
Stage = 6.7 feet

Rise in stage at damage center due to dam failure is 4.0'. Maximum stage during failure is 6.7'. Approximate velocity is 12.7 fps. First floor level of houses is at stage = 5.0 feet. Due to flow depth and velocity, high hazard classification is warranted.



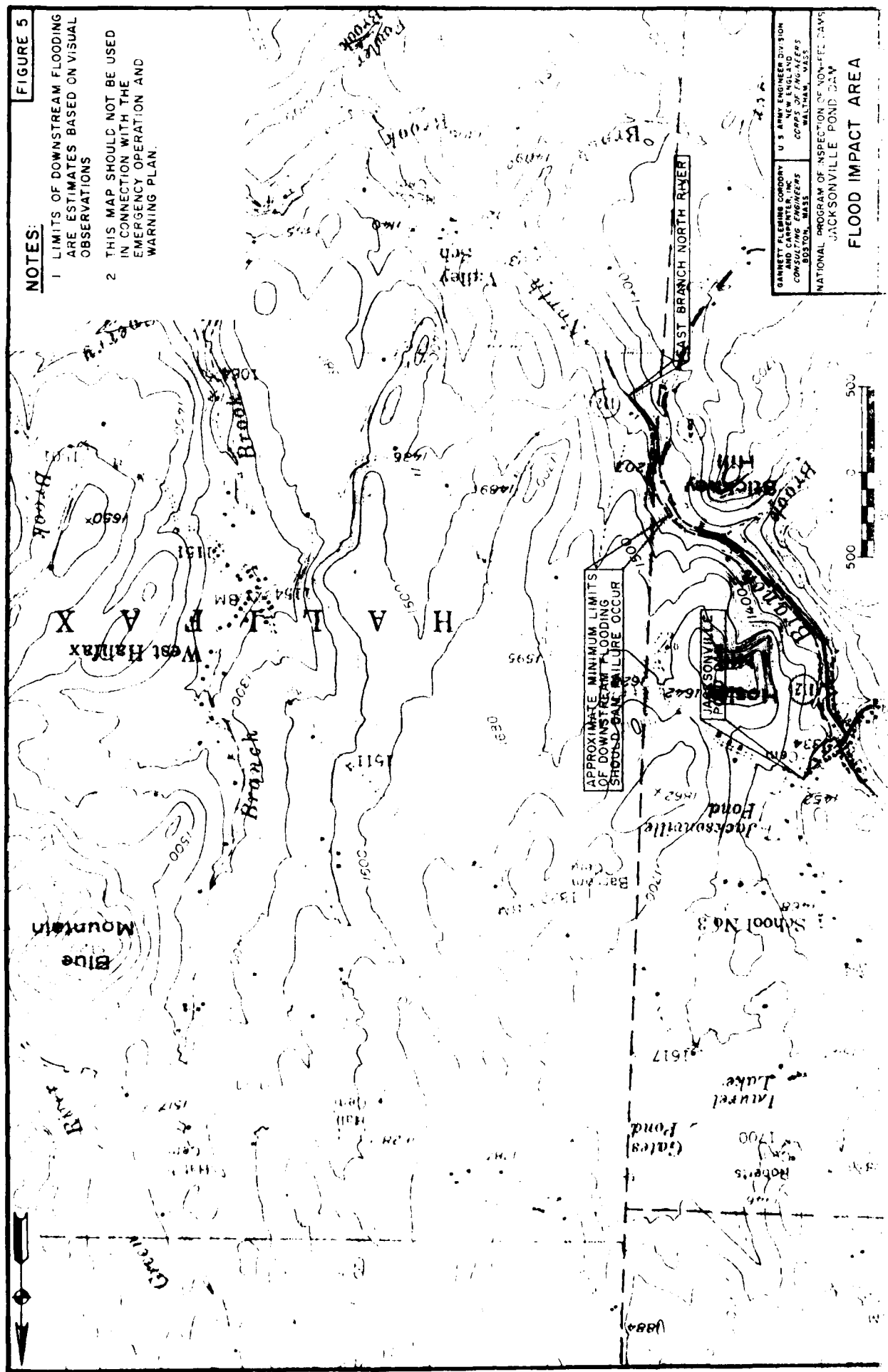
RATING CURVES
DOWNSTREAM SECTIONS

FIGURE 12

FIGURE 5

NOTES:

- 1 LIMITS OF DOWNSTREAM FLOODING ARE ESTIMATES BASED ON VISUAL OBSERVATIONS
- 2 THIS MAP SHOULD NOT BE USED IN CONNECTION WITH THE EMERGENCY OPERATION AND WARNING PLAN.



GANNETT FLEMING CORDERY AND CARPENTER, INC.
 700 STATE STREET
 BOSTON, MASS.

U. S. ARMY ENGINEER DIVISION
 NEW ENGLAND DISTRICT
 CORPUS OF ENGINEERS
 MALDEN, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FEL. DAMS
 JACKSONVILLE POND DAM

FLOOD IMPACT AREA

APPENDIX E
INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

FILMED

9-85

DTIC