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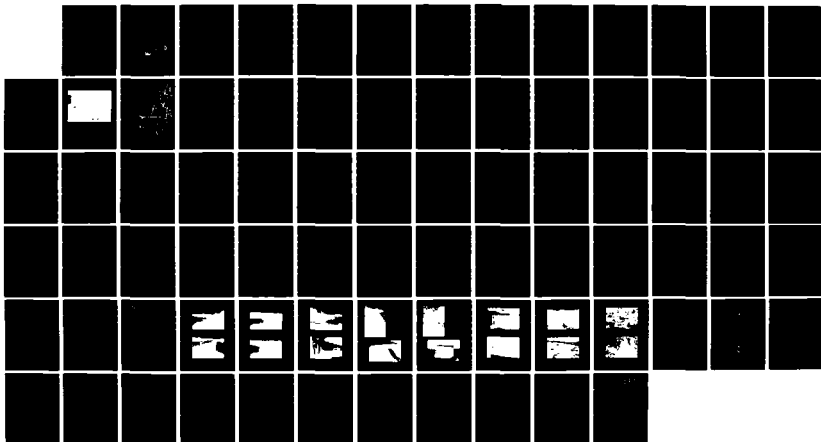
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
CURRAN LOWER RESERVOIR (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV FEB 81

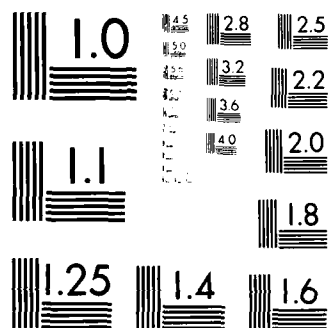
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AD-A156 874

MASS / RI COASTAL BASIN
COVENTRY, RHODE ISLAND

CURRAN LOWER RESERVOIR DAM

RI 00703

PHASE I INSPECTION REPORT NATIONAL DAM INSPECTION PROGRAM



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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Mass/RI Coastal Basin Coventry Rhode Island Clarke Brook		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is a 1100 ft. long earthfill dam with a maximum height of 17 ft. It is small in size with a significant hazard potential. The test flood is equal to the PMF. The dam is in poor condition. There are several areas of concern which must be corrected to assure the long term performance of the dam.		



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

REPLY TO
ATTENTION OF:

NEDED

JUN 10 1981

Honorable J. Joseph Garrahy
Governor of the State of Rhode Island
and Providence Plantations
State House
Providence, Rhode Island 02903

Dear Governor Garrahy:

Inclosed is a copy of the Curran Lower Reservoir Dam (RI-00703) 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 Environmental Management, the owner and the cooperating agency for the State of Rhode Island.

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 Environmental Management for your cooperation in carrying out this program.

Sincerely,

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

Incl
As stated

CURRAN LOWER RESERVOIR DAM

RJ 00703

MA/RI COASTAL BASIN
CRANSTON, RHODE ISLAND

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION REPORT

PHASE 1 INSPECTION REPORT

IDENTIFICATION NO: RI 00703
NAME OF DAM: Curran Lower Reservoir Dam
COUNTY AND STATE: Providence County,
Rhode Island
STREAM: Clarke Brook
DATE OF INSPECTION: 2 December 1980

Brief Assessment

Curran Lower Reservoir is a 1,100 foot long earthfill structure with a maximum height of 17 feet. The dam has an impoundment capacity of 250 acre-feet at the top of dam elevation of 282.5 NGVD and is used for recreation. The earth embankment has an average crest width of 10 feet and an upstream slope of 2:1. The downstream face of the dam has a slope of 2:1. To the left of the outlet a 4 foot high vertical stone masonry wall at the toe forms the right training wall for the spillway discharge channel.

The spillway is located at the left abutment and is a trapezoidal weir with a stone masonry base and concrete cap. The weir is 50 feet long with a crest elevation of 280.0. The spillway discharge channel runs parallel to the toe of the dam to the outlet where it joins Clarke Brook.

The outlet structure is located near the centerline of the dam and is inoperable at the present time. The outlet is a 20 inch cast iron pipe which was operated by a vertical rack and pinion lifting mechanism.

The dam is classified as SMALL in size and a SIGNIFICANT hazard structure in accordance with recommended guidelines established by the Corps of Engineers. Based on the size and hazard classifications, the adopted test flood for this structure is equal to one-half the Probable Maximum Flood (PMF) which is estimated to be 675 CSM, or 900 CFS, from the 1.3 square mile drainage basin. This test flood has a routed outflow discharge equal to 830 CFS and would overtop the dam by 0.2 feet. The maximum spillway capacity is equal to 650 CFS which represents 78% of the test flood outflow.

Based on a visual inspection at the site, the dam is considered to be in POOR condition. There are several areas of concern which must be corrected to assure the long-term performance of this dam. It is recommended that the owner engage the services of a registered engineer experienced in the design of dams to accomplish the following:

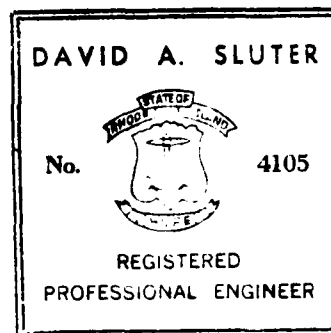
1. Perform a detailed hydrologic/hydraulic investigation to assess further the need for and the means to increase project discharge capacity and the ability of the dam to withstand overtopping.
2. Rehabilitate the outlet structure to provide a means to draw down the reservoir.
3. Repair the erosion areas along the upstream face of the dam at the crest and add or replace riprap as necessary.
4. Remove brush, trees and roots on the dam and up to 20 feet downstream. Backfill the holes with suitable compacted fill.
5. Investigate and recommend methods to control, as necessary, the seepage emanating from the toe of the dam to the left of the outlet structure.

These and other recommendations and remedial measures as described in Section 7 should be implemented by the owner within one year after receipt of this Phase 1 Inspection Report.

NEW ENGLAND ENGINEERING, INC.

BY:

David A. Sluter
David A. Sluter, P. E.
President



This Phase I Inspection Report on Curran Lower Reservoir 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

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Joe Finegan

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

Aramast Mahtesian

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase 1 Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, DC 20314. The purpose of a Phase 1 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 investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase 1 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 the 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 1 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 reasonable 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 condition, and the downstream damage potential.

The Phase 1 Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings 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.

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- c. Seepage at the downstream toe of the dam along the spillway discharge channel and the slightly soft area in the vicinity of Station 5+75 at the toe.
- d. The lack of riprap in some areas along the upstream face and the apparent undermining of the existing riprap.
- e. The low spot near the abandoned gatehouse should be raised to grade and protected against erosion.

dissipators and which are spaced at approximately 50 foot intervals. Brush is growing through the stones along the entire length for the discharge channel. A timber service bridge spans the discharge channel at the right end of the spillway and is in good condition.

2. Outlet. The outlet is a 20 inch diameter cast iron pipe located near the centerline of the dam. Flow was formerly controlled at a granite masonry control structure located 15 feet upstream from the crest of the dam. The outlet control structure is in poor condition with several granite blocks missing and the lifting mechanism which controls the outlet gate is missing (Photo C-10). The outlet at the downstream face of the dam has granite masonry training walls which are in fair condition. Several blocks are missing from these walls as seen on Photo C-9. The outlet gate is presently closed and is inoperable.
3. Abandoned Gate House. An abandoned gate house which formerly controlled the flow to a water supply system is located at Station 3+30. This gate house is in poor condition with many of its stone masonry blocks missing (Photo C-11). The water supply system was shut off in 1946 and the gatehouse has been abandoned since that date. The intake training walls are of stone masonry construction and the right training wall is tilting towards the intake channel (Photo C-12).
- d. Reservoir Area. No specific detrimental features in the reservoir area were observed during the visual inspection.
- e. Downstream Channel. The downstream channel (Photo C-13) consists of the natural streambed. Many trees overhang the channel, and approximately 700 feet downstream the channel is constricted by a culvert under Hope Road. The channel immediately downstream from the outlet is clogged with trees and brush and should be cleared.

3.2 Evaluation

Based on the visual inspection, the following features could adversely affect the future performance of the dam and should be investigated:

- a. The inoperability of the outlet and the lack of draw down capability.
- b. Erosion along the upstream face and crest of the dam which could lead to a breach of the dam.

A 15 foot wide patch has been undertaken on the crest at Station 4+25 as described in the previous section.

3. Downstream Face and Toe. The downstream face and toe of the dam are shown on Photos C-1 and C-7. To the right of the outlet, the downstream face slopes at 2:1 to natural ground. To the left of the outlet, the slope is 2:1 to a 4 foot high vertical stone masonry wall at the toe. This wall forms the right training wall of the spillway discharge channel which runs along the toe from the spillway to the outlet. Seepage along the toe was observed from Station 9+10 to the outlet at Station 4+75. The total seepage was estimated to be 50-75 gpm and was flowing clear. A rusty stain was evident at the toe of the stone masonry wall and the floor of the spillway discharge channel but no evidence of fines being transported was evident (Photo C-15). Seepage was also noted between the stones on the left side of the outlet headwall (Photo C-16). The ground at the toe of the dam at Station 5+75 was slightly soft due to possible seepage through the dam. Brush and small trees cover most of the downstream face of the dam from about Station 4+00 to the spillway.

- c. Appurtenant Structures. See the General Plan in Appendix B for the locations of appurtenant structures on the dam.

1. Spillway and Discharge Channel. The side channel discharge spillway has a trapezoidal, broad-crested weir which is 50 feet long (Photos C-5, C-6, C-8). The concrete training walls are 2.5 feet high and are badly spalled (Photos C-5, C-8). Erosion has cut into the crest approximately 3-4 feet at the right training wall (Photo C-8). The right half of the concrete crest of the weir is spalled along the downstream face and reinforcing is visible near the right training wall (Photo C-6). The spillway discharge channel is 12 feet wide and approximately 400 feet long and runs along the toe of the dam from the spillway to the outlet (Photo C-7). During high flows in the spillway discharge channel, the right training wall, and the dam embankment may be subject to erosion from high velocity water. The left and right training walls are of stone masonry and are 4-6 feet high. The left training wall has stones missing in several places and has collapsed into the channel at three locations. The right training wall is in good condition but has brush growing through the stones in many places. The floor of the channel is stone lined with granite steps which act as energy

SECTION 3

VISUAL INSPECTION

3.1 Findings

- a. General. The Phase 1 visual inspection of the Curran Lower Reservoir Dam was conducted on December 2, 1980 by representatives of New England Engineering, Inc. and Geotechnical Engineers, Inc. A visual checklist and photographic record of that inspection have been included in Appendix A and C, respectively, of this report. At the time of the inspection, the water level was 1.1 feet below the spillway crest.

Based on the visual inspection, the dam at Curran Lower Reservoir is judged to be in POOR condition.

- b. Dam. Curran Lower Reservoir Dam is an earthfill structure with a length of 1,100 feet and a maximum height of 17 feet. The 50 foot long spillway is located at the left abutment and the 20 inch diameter cast iron pipe outlet is located near the centerline of the dam.
 1. Upstream Face. The upstream face of the dam is shown on Photos C-1, C-2, and C-3. Erosion of the upstream face is in progress and could lead to a breach of the dam. There are several areas along the upstream face where erosion has advanced into the crest. Photo C-14 shows the erosion at Station 4+50 which has cut 2-3 feet into the crest. Other areas of serious erosion have occurred at Station 3+25 (Photo C-11), at Station 7+35 and at the right spillway training wall (Photo C-8). An apparent patched zone of the embankment is located at Station 4+25 (Photo C-4). A fill material of widely-graded bank-run gravel was used for this patch, but the procedure used for compaction is not known. Riprap on the upstream face is inconsistent and several areas have little or no riprap. It appears that no filter is present under the riprap and continual erosion of embankment fines has occurred due to wave action causing the riprap to slough away from the crest in some areas and to settle into the crest in others (Photo C-2). Brush and tree stumps to 6 inches in diameter are growing through the riprap.
 2. Crest. The crest of the dam is shown in Photos C-1, C-3, C-4 and is approximately 10 feet wide. Several areas of erosion have cut into the crest as described in the previous section. The crest is about 1 foot lower near the abandoned gatehouse than the adjacent crest (Photo C-11). This zone may be worn by foot traffic and/or erosion due to lack of cover.

SECTION 2
ENGINEERING DATA

2.1 Design

There is no available documentation regarding the design of this facility.

2.2 Construction

No formal records of construction or subsequent repairs are available for this dam.

2.3 Operation

No operational records are maintained. The level of the pond is not generally controlled.

2.4 Evaluation

- a. Availability. There is no information available.
- b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance and sound engineering judgement.
- c. Validity. No data is available.

i. Spillways

- | | |
|--------------------|---|
| 1. Type | Broad-crested with free overflow, vertical fall |
| 2. Length of weir | 50.0 feet |
| 3. Crest elevation | 280.0 feet |
| 4. Gates | None |
| 5. U/S Channel | Natural bed of reservoir |
| 6. D/S Channel | Stone masonry channel to Clarke Brook at dam outlet |
| 7. General | D/S Channel passes under a roadway bridge 700 feet downstream from dam. |

j. Regulating Outlets

- | | |
|----------------------|------------------|
| 1. Invert | 268.9 feet |
| 2. Size | 20 inch diameter |
| 3. Description | Cast iron pipe |
| 4. Control Mechanism | Missing |
| 5. Other | No comment. |

- | | | | |
|----|-----|--|------------------|
| | 3. | Spillway crest pool | 1,300 |
| | 4. | Top of dam | 1,300 |
| | 5. | Test flood pool | 1,300 |
| e. | | <u>Storage (Acre-Feet)</u> | |
| | 1. | Normal pool | 200 |
| | 2. | Flood control pool | N/A |
| | 3. | Spillway crest pool | 200 |
| | 4. | Top of dam | 250 |
| | 5. | Test flood pool | 254 |
| f. | | <u>Reservoir Surface Area (Acres)</u> | |
| | 1. | Normal pool | 20 |
| | 2. | Flood control pool | N/A |
| | 3. | Spillway crest | 20 |
| | 4. | Top of dam | 20 |
| | 5. | Test flood pool | 20 |
| g. | | <u>Dam</u> | |
| | 1. | Type | Earth embankment |
| | 2. | Length | 1,100 feet |
| | 3. | Height | 17 feet maximum |
| | 4. | Top width | 10 feet |
| | 5. | Side slopes | 2:1 U/S; 2:1 D/S |
| | 6. | Zoning | Unknown |
| | 7. | Impervious Core | Unknown |
| | 8. | Cutoff | Unknown |
| | 9. | Grout Curtain | Unknown |
| | 10. | Other | No comment |
| h. | | <u>Diversion and Regulating Tunnel</u> | N/A |

- | | | |
|----|---|---------|
| d. | Discharge capacity
at test flood ele-
vation = 282.7 | 40 CFS |
| 2. | Maximum known flood at
damsite | Unknown |
| 3. | Ungated spillway capa-
city at top of dam | 650 CFS |
| 4. | Ungated spillway capa-
city at test flood ele-
vation | 730 CFS |
| 5. | Gated spillway capacity
at normal pool elevation | N/A |
| 6. | Gated spillway capacity
at test flood elevation | N/A |
| 7. | Total spillway capacity
at test flood elevation | 730 CFS |
| 8. | Total project discharge
at top of dam | 690 CFS |
| 9. | Total project discharge
at test flood elevation | 770 CFS |
| c. | <u>Elevations</u> (Datum assumed at 280.0 for spillway crest
from USGS Quadrangle Sheet) | |
| 1. | Streambed at toe of dam | 265.5 |
| 2. | Bottom of cutoff | Unknown |
| 3. | Maximum tailwater | Unknown |
| 4. | Normal pool | 280.0 |
| 5. | Full flood control pool | N/A |
| 6. | Spillway crest | 280.0 |
| 7. | Design surcharge
(Original Design) | Unknown |
| 8. | Top of dam | 282.5 |
| 9. | Test flood | 282.7 |
| d. | <u>Reservoir Lengths</u> (in feet) | |
| 1. | Normal pool | 1,300 |
| 2. | Flood control pool | N/A |

- e. Ownership. The dam is owned by the State of Rhode Island. The Land Resources Division of the Department of Environmental Management, 83 Park St., Providence, Rhode Island 02903, has jurisdiction over the dam.
- f. Operator. The dam is operated by Mr. Earl Prout, Dams Section, Division of Land Resources, Department of Environmental Management, State of Rhode Island, 83 Park Street, Providence, Rhode Island 02903. Phone number is (401) 277-6820.
- g. Purpose of Dam. The dam is presently used for recreation and was used for water supply until 1946.
- h. Design and Construction History. No records for the original design and construction of the dam are available but it was reportedly constructed in the late 1800's for water supply. The reservoir ceased to be used for water supply in 1946 and the dam was purchased by the State of Rhode Island in 1961.
- i. Normal Operating Procedures. The level of the reservoir is not controlled and the outlet is presently inoperable. Downstream flow results from flow over the uncontrolled spillway.

1.3 Pertinent Data

- a. Drainage Area. The Curran Lower Reservoir Dam drainage basin is generally rectangular in shape with an average length of approximately 1 mile, a width of 1/2 mile and a total drainage area of 1.3 square miles (See Appendix D for the basin map). Approximately 10 percent of the basin is man-made or natural storage. The topography consists of rolling terrain with elevations ranging from a high of 500 feet at Bald Hill to 280 feet at the spillway crest. Basin slopes are considered moderate.
- b. Discharge at Damsite. There are no discharge records available for this dam. Calculated discharge data for the dam is listed below.

1. Outlet Works

- a. Conduit & size 20 inch diameter cast iron pipe. Invert = 268.9
- b. Discharge capacity
with pond at spillway crest elevation
= 280.0 35 CFS
- c. Discharge capacity
with pond at top of dam elevation =
282.5 40 CFS

- b. Description of Dam and Appurtenances. Curran Lower Reservoir Dam is a 1,100 foot long earthfill structure with a maximum height of 17 feet at the outlet. The top of the dam is at elevation 282.5 NGVD and has an average crest width of 10 feet. The earth embankment has an upstream slope of 2:1 and the downstream face slopes at 2:1 to a 4 foot high stone masonry wall to the left of the outlet. This wall forms the right training wall for the spillway discharge channel which runs from the spillway along the toe to the outlet. The side channel discharge spillway is located at the left abutment and has a stone masonry weir with a trapezoidal concrete cap. The weir is 50 feet long and has a crest elevation of 280.0 NGVD.

The low level outlet is located near the centerline of the dam and consists of a 20 inch diameter cast iron pipe. The outlet control structure is located approximately 15 feet upstream from the crest of the dam and is a stone masonry structure. Flows through the outlet were at one time controlled by a vertical rack and pinion lifting mechanism, however, the mechanism is now missing and the outlet is inoperable. An abandoned gate house which formerly served as an intake structure for a water supply system is located approximately 225 feet to the left of the right abutment. The reservoir is no longer used as a source of water supply and the gate house is in disrepair and inoperable.

- c. Size Classification. This dam has an impoundment capacity of 250 Ac-Ft at the top of the dam (elevation 282.5 NGVD) and a maximum height of 17 feet. In accordance with the guidelines established by the Corps of Engineers, this dam is classified as SMALL in size based on its impoundment capacity. Corps of Engineers guidelines specify that dams with impoundment capacities less than 1,000 Ac-Ft and greater than or equal to 50 Ac-Ft or a height of less than 40 feet and greater than or equal to 25 feet be classified as SMALL in size.
- d. Hazard Classification. This dam is classified a SIGNIFICANT hazard potential because its failure could result in a loss of a few lives and inundation of four to five homes downstream of the dam. It is estimated that a dam failure would result in a failure discharge of 4,775 CFS and flooding to a depth of 2-4 feet in the homes located within the prime dam failure impact area. The prefailure discharge of 650 CFS would produce flooding to a depth of 1-2 feet in the affected homes. The dam failure discharge was computed assuming the water level in the reservoir to be equal to the top of dam elevation of 282.5 NGVD at the time of failure. In addition, three bridges located downstream of the dam would be subject to damage from flooding as a result of a dam failure.

NATIONAL DAM INSPECTION PROGRAM

PHASE 1 - INSPECTION PROGRAM

CURRAN LOWER RESERVOIR DAM

SECTION 1

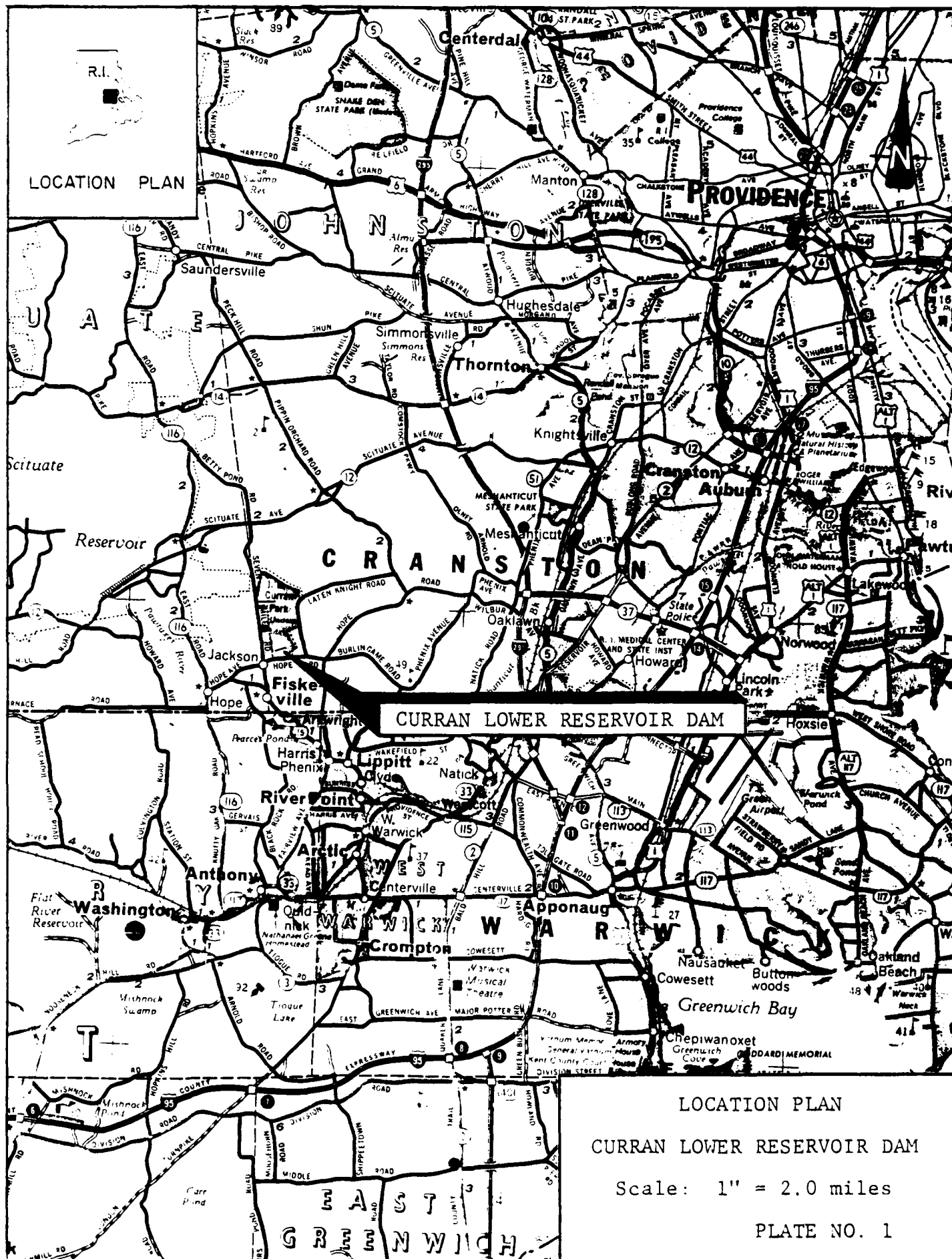
PROJECT INFORMATION

1.1 General

- a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program for dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. New England Engineering, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Rhode Island. Authorization and notice to proceed was issued to New England Engineering, Inc. under a letter from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0007 has been assigned by the Corps of Engineers for this work.
- b. Purpose of Inspection.
 1. Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
 2. Encourage and assist the State to initiate quickly effective dam safety programs for non-Federal dams.
 3. To update, verify, and complete the National Inventory of Dams.

1.2 Description of the Project

- a. Location. Curran Lower Reservoir Dam is located in Cranston, Providence County, Rhode Island on Clarke Brook approximately 4,000 feet upstream from its confluence with the Pawtuxet River. Coordinates of the dam are approximately 41 degrees, 53.8' North Latitude, and 71 degrees, 32.5' West Longitude as shown on the Crompton and North Scituate, Rhode Island USGS Quadrangle sheets. The dam impounds water from Clarke Brook which drains a 1.3 square mile watershed of rolling, wooded terrain. The axis of the reservoir is oriented in a North-South direction with the dam at the southern extremity of the Reservoir.





OVERVIEW PHOTO - Curran Lower Reservoir Dam

December 12, 1980

APPENDICES

APPENDIX A	INSPECTION CHECKLIST
APPENDIX B	ENGINEERING DATA
APPENDIX C	PHOTOGRAPHS
APPENDIX D	HYDROLOGIC & HYDRAULIC COMPUTATIONS
APPENDIX E	INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

- a. General. Curran Lower Reservoir is used as a recreational facility. Operational control is the responsibility of the Owner. The level of the reservoir cannot be controlled because the outlet is inoperable.
- b. Warning System. There is no warning system in effect at Curran Lower Reservoir Dam. There is no formalized emergency action plan for the dam.

4.2 Maintenance Procedures

- a. General. The dam and appurtenances are not maintained.
- b. Operating Facilities. The outlet works are inoperable and the reservoir level cannot be regulated.

4.3 Evaluation

- a. The facility is not regularly maintained, monitored or regulated by the Owner. The outlet works are inoperable due to decay of equipment and structures.
- b. Trees and brush are present over the upstream and downstream faces of the embankment and in the spillway discharge channel. The concrete on the spillway and training walls is badly spalled and in poor condition. Erosion has advanced into the crest at several locations along the upstream face.
- c. There is no regularly scheduled maintenance for this dam. There are numerous maintenance deficiencies as described above. A systematic inspection and rehabilitation program should be developed and implemented. The outlet structure should be rehabilitated so that the reservoir may be regulated, if required.
- d. An emergency action plan should also be developed and implemented that includes procedures to lower the reservoir level, locations of emergency equipment, materials or manpower to reduce or minimize dam failure damage, authorities to be contacted in emergency situations. A program of surveillance during periods of heavy rainfall should be undertaken immediately.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

The dam at Curran Lower Reservoir Dam was reportedly constructed in the late 1800's as a water supply facility. The dam is located on Clarke Brook in the Pawtuxet River Basin. The watershed for the reservoir is 1.3 square miles with approximately 10% of this basin man-made or natural storage.

The dam has a spillway length of 50.0 feet and a maximum height of 17 feet. The total length of the dam is 1,100 feet including the spillway. The reservoir has a storage capacity at the spillway crest of 200 Ac-Ft. Each foot of depth above the spillway level can accommodate 20 Ac-Ft of water equivalent to 0.29 inches of runoff.

It would take 6 hours to lower the reservoir 1 foot based on a surface area of 20 acres and an outflow of 35 CFS. For the 200 Ac-Ft of storage below the spillway it is estimated that it would take 69 hours to drain the reservoir.

5.2 Design Data

Little specific data is available for this watershed or structure. In lieu of existing complete design information, USGS topographic maps (scale 1" = 2,000 feet) were utilized to develop hydrologic parameters such as drainage area, reservoir surface areas, basin slopes, and other runoff characteristics. Elevation-storage relationships for the reservoir were approximated. Some of the pertinent hydraulic data was obtained or confirmed by actual field measurements at the time of the visual inspection. Test flood inflows and outflows and dam failure flows were determined in accordance with the Corps of Engineers guidelines.

5.3 Experience Data

No historical data for recorded discharges is available for this dam.

5.4 Test Flood Analysis

Recommended guidelines for the Safety Inspection of Dams by the Corps of Engineers were used for selection of the Test Flood. This dam is classified under those guidelines as a SIGNIFICANT hazard and SMALL in size. Guidelines indicate that a flood equal to the 100 year flood to one-half the PMF be used as a range of test floods for such a classification. A test flood equal to one-half the PMF was selected because

of the potential for downstream damage. The watershed has a total drainage area equal to 1.3 square miles of which approximately 10% is man-made or natural storage. This drainage area is sparsely populated, fairly wooded, with rolling topography.

A test flood value was selected from the Corps of Engineers PMF curve for a watershed with flat to rolling topography and reduced by 10% for storage within the watershed. The test flood inflow was calculated to be 675 CSM, equal to 900 CFS and was adopted for this analysis. The routed outflow discharge for the test flood inflow was 830 CFS. The spillway and outlet rating curves are illustrated in Appendix D. Flood routing was performed assuming a full reservoir at the spillway crest elevation 280.0 NGVD and the outlet to be closed.

The analysis indicated that the test flood would overtop the dam by approximately 0.1 feet. The maximum outflow capacity of the spillway at the top of dam elevation 280.0 is 650 CFS or 78% of the test flood.

5.5 Dam Failure Analysis

For this analysis a full-depth, partial-width breach was assumed to have occurred in this dam. The adopted breach width of 35.0 feet was based on the dam height and cross section. A dam failure discharge of 4,775 CFS was calculated assuming the reservoir level to be at the top of dam elevation 282.5. The dam failure discharge of 4,775 CFS includes a spillway discharge of 650 CFS and will produce a depth of flooding of 7 feet at the toe of the dam. It is estimated that failure could result in an inundation of 4-5 homes located downstream of the dam to a depth of 2-3 feet and the loss of a few lives. This would be an increase in flooding of 1-2 feet over the prefailure flooding. Four bridges over Clarke Brook downstream of the dam are located within the failure impact area and would be subject to flood damage. The prime impact area that would be subject to damage if the dam were to fail has been delineated on the Dam Failure Impact Area Map in Appendix D. As a result of the failure analysis, the dam has been classified as a SIGNIFICANT hazard structure.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

Visual examination of the geotechnical and structural aspects of the dam do not indicate any immediate stability problems. However, the following features could affect the long-term stability of the dam.

- a. A breach of this dam could occur due to continued erosion of the crest at several locations as described in Section 3.1. The possibility of a breach due to erosion is increased because the riprap on the upstream face seems to be gradually settling into the embankment material. This is due to wave action which displaces the fines under the unfiltered riprap.
- b. The seepage that has been observed at the toe of the dam showed no evidence of carrying fines. However, due to the age of this dam, it is probable that no filter material was placed between the downstream stone wall and the embankment material. The character of the embankment material is not known. The possibility of piping through the dam should be investigated by monitoring the seepage and/or by determining whether the embankment is filtered.
- c. The tree stumps and roots that remain along the upstream crestline and on the downstream slope increase the possibility of piping through the dam as they decay.

6.2 Design and Construction Data

There are no design and construction data available.

6.3 Post-Construction Changes and Previous Inspection Reports

This dam was reported to be in good condition as a result of an inspection by the State of Rhode Island in 1946. A copy of this inspection report is included in Appendix B. Its use as a water supply facility was terminated on August 26, 1946. A subsequent inspection on September 26, 1960, showed that brush and trees had been allowed to grow, and the water supply gate house had begun to deteriorate.

During the present inspection, a 15 foot wide zone in the crest at Station 4+25 appeared to have been patched recently. The material used in the patch was a widely-graded, bank-run silty gravel. No filter had been placed downstream. Grass had been planted and sprouts had begun to show on the day of inspection. This patch was apparently made to correct an eroded zone in the crest.

6.4 Seismic Stability

This dam is located near the boundary between Seismic Zones 1 and 2. Therefore, according to recommended guidelines, a seismic stability analysis is not warranted.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

- a. Condition. Based on the visual inspection, this dam appears to be in POOR condition. Features which could adversely affect the condition of the dam in the future are:
 1. Erosion of the upstream face and crest of the dam.
 2. The inoperable condition of the outlet works and the resulting lack of ability to lower the reservoir level.
 3. Seepage at the toe of the dam along the spillway discharge channel.
- b. Adequacy of Information. The available information is such that the assessment of the condition of the dam must be based on visual observation.
- c. Urgency. Upon receipt of this report the owner should immediately undertake a program of regular surveillance of the dam, especially during periods of heavy precipitation. The erosion of the crest has progressed to a point where a high reservoir level in combination with wave action from high winds could result in a breach of the dam. The remaining recommendations in Section 7.2 should be implemented by the Owner within a period of one year after the receipt of this report.

7.2 Recommendations

The following items should be carried out under the direction of a qualified registered engineer and recommendations resulting should be implemented by the Owner.

- a. Perform a detailed hydrologic/hydraulic investigation to assess further the need for and the means to increase project discharge capacity and the ability of the dam to withstand overtopping.
- b. Investigate the cause of the seepage through the dam and institute a monitoring program as necessary. Design necessary remedial features to ensure that piping is controlled.
- d. Investigate the cause of the inoperable outlet works and repair as necessary.
- e. Design and supervise the repair and replacement of riprap on the upstream face of the embankment.

- f. Investigate and recommend methods to repair cracking and spalling of the concrete along the spillway crest and training walls.
- g. Remove brush, trees, tree stumps and their root systems from crest and embankment to within 20 feet of the toe and from the spillway discharge channel. Fill holes with properly selected and compacted backfill, and provide erosion protection as needed.
- h. Repair the walls of the spillway discharge channel.
- i. Raise the low zone in the crest near the abandoned gatehouse to grade with proper backfill.
- j. Investigate the potential for erosion of the dam embankment along the downstream toe during high flows in the spillway discharge channel and the need for relocating the channel away from the toe of the dam.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

- 1. Develop an "Emergency Action Plan" that will include an effective preplanned downstream warning system, locations of emergency equipment, materials and manpower, authorities to contact and potential areas that require evaluation.
- 2. Maintain slopes of the dam and 20 feet downstream clear of brush and trees by cutting at least annually.
- 3. Clear the downstream channel of trees and brush and dredge out the channel to increase its capacity and to remove the standing water near the outlet.
- 4. Implement a regular maintenance program for the facility.
- 5. Institute a program of annual technical inspection by a qualified registered engineer.
- 6. Undertake a program of regular surveillance especially during and immediately after high intensity rainfall.
- 7. Establish a protective grass cover on all bare or disturbed areas.

7.4 Alternatives

There are no practical alternatives to the above recommendations and remedial measures.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST PARTY ORGANIZATION

PROJECT Curran Lower Reservoir
Cranston, RI RI 703

DATE Dec. 2, 1980

TIME 0745

WEATHER Fair 38°F

W.S. ELEV. 278.9 U.S. 268.6 DN.S.

PARTY:

- | | | |
|-------------------------|---------------|-----------|
| 1. <u>David Sluter</u> | <u>N.E.E.</u> | 6. _____ |
| 2. <u>Stephen Fodor</u> | <u>N.E.E.</u> | 7. _____ |
| 3. <u>Steve Poulos</u> | <u>G.E.I.</u> | 8. _____ |
| 4. _____ | | 9. _____ |
| 5. _____ | | 10. _____ |

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Civil & Structural</u>	<u>S. Fodor</u>	
2. <u>Hydraulics & Hydrology</u>	<u>D. Sluter</u>	
3. <u>Geotechnical</u>	<u>S. Poulos</u>	
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		
9. _____		
10. _____		

PERIODIC INSPECTION CHECKLIST

PROJECT Curran Lower Reservoir Dam DATE Dec. 2, 1980
 PROJECT FEATURE Embankment - Civil NAME Sluter/Fodor
 DISCIPLINE Geotechnical NAME S. Poulos

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	Sta 0+00 is 100 ft rt of rt abutment.
1 Crest Elevation	282.5
2 Current Pool Elevation	278.9
3 Maximum Impoundment to Date	Unknown
4 Surface Cracks	None observed.
5 Pavement Condition	Grassed.
6 Movement or Settlement of Crest	3+35 (centerline of abandoned gatehouse) crest is low about 1' near structure. Sta 4+25 there is a 15-ft-wide repaired section. Fill is slightly silty, gravelly sand. Has been seeded and just beginning to sprout. Sta 7+35, 6" deep by 5 ft wide dip in crest. Low spot at Sta 6+90 approx. 6 in. low. (20 ft to right of intake structure.)
7 Lateral Movement	None observed.
8 Vertical Alignment	See 6.
9 Horizontal Alignment	No alignment observed.
10 Condition at Abutment and at Structures	Sta 3+35 (abandoned gatehouse): highly eroded both sides. Crest is low (see 6), and no surface cover. Sta 6+90 (to right of outlet structure): small dip in crest. Abutments satisfactory.
11 Indications of Movement of Structural Items on Slopes	No movement observable at abandoned gatehouse.
12 Trespassing on Slopes	Free access. Dirt bikes, horses, etc.
13 Sloughing or Erosion of Slopes or Abutments	Rt. abutment: None. Left abutment (left side of spillway): None. Minor erosion on right side of spillway. Sta 7+35: Erosion has cut about 2.5 ft downstream from upstream crestline. Similar less extensive points of erosion at several locations. At Sta 4+50 a spot has eroded 2 ft downstream, 4 ft wide, 2 ft deep, and no riprap is present. Some animal holes present, e.g. @ Sta 4+90, 5 ft down from downstream crestline there is a 6 in. diameter, 5 ft deep hole.
14 Rock Slope Protection - Riprap Failures	From crest to about 3 ft below water. 20 to 300 lb stone. Vertical cut at

PERIODIC INSPECTION CHECKLIST

PROJECT Curran Lower Reservoir Dam DATE Dec. 3, 1980
 PROJECT FEATURE Embankment - Civil NAME Sluter/Fodor
 DISCIPLINE Geotechnical NAME S. Poulos

AREA EVALUATED	CONDITION
14 Rock Slope Protection-Riprap Failures (cont'd)	and above water level. Sta 6+80 to 6+90 riprap absent. Similar on left of outlet at Sta 6+50. Riprap intermittent from Sta 1+00 to Sta 5+00.
15 Unusual Movement or Cracking at or Near Toe	None observed.
16 Unusual Embankment or Downstream Seepage	Sta 5+75: mushy ground downstream from toe. Flow of 50 to 100 gpm at 100 ft downstream from outlet structure. Water in downstream pond is turbid but flowing water is clear. Flow in spillway discharge channel due to seepage through dam at Sta 7+65 to 9+07 is about half of the flow 100 ft downstream. All seepage is clear. Sta 8+13: < 1 gpm from toe of wall. Sta 8+77: 1 to 3 gpm. Sta 8+87: 2-4 gpm. Rusty staining at these seeps. No seepage observed at higher stations than 9+07.
18 Foundation Drainage Features	None.
19 Toe Drains	None.
20 Instrumentation System	None. Vertical stone wall at toe to the left of the outlet structure is 6 ft high. Good condition. Formerly pointed but now has many open voids and serves as toe drain. No evidence of eroded silt downstream.
21 Vegetation	None.
	Crest is grassed, 3-4 ft high brush on downstream slope. Sprouts from stumps to 6 in. diameter along U.S. crestline about 10 ft apart.

PERIODIC INSPECTION CHECKLIST

PROJECT Curtain Lower Reservoir Dam DATE Dec. 2, 1980
 PROJECT FEATURE Embankment - Civil NAME Sluter/Fodor
 DISCIPLINE Geotechnical NAME S. Poulos

AREA EVALUATED	CONDITION
<u>DIKE EMBANKMENT</u> Crest Elevation Current Pool Elevation Maximum Impoundment to Date Surface Cracks Pavement Condition Movement or Settlement of Crest Lateral Movement Vertical Alignment Horizontal Alignment Condition at Abutment and at Concrete Structures Indications of Movement of Structural Items on Slopes Trespassing on Slopes Sloughing or Erosion of Slopes or Abutments Rock Slope Protection - Riprap Failures Unusual Movement or Cracking at or Near Toes Unusual Embankment or Downstream Seepage Piping or Boils Foundation Drainage Features Toe Drains Instrumentation System Vegetation	NONE

PERIODIC INSPECTION CHECKLIST

PROJECT Curran Lower Reservoir Dam DATE Aug. 2, 1980
 PROJECT FEATURE Outlet - Civil/Structural NAME Sluter/Fodor
 DISCIPLINE Geotechnical NAME S.J. Poulos

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u>	Abandoned Gatehouse Intake Structure for Water Supply
a. Approach Channel	
Slope Conditions	N.A. N.A.
Bottom Conditions	Underwater. Underwater.
Rock Slides or Falls	N.A. None.
Log Boom	None. None.
Debris	None. Gate is abandoned and plugged.
Condition of Stone Masonry	Right wingwall seems to be leaning toward intake channel about 5°. Top stone on rt wingwall is moved to left about 3 in.
Drains or Weep Holes	
b. Intake Structure	N.A.
Condition of Stone Wall	Stones in structure Granite walls fair have moved, pointing condition. Pointing is gone. Platform poor. Plugged outlet. has been built on top probably for fishing. Stones on rt side are masonry. Hole 3 ft wide, 2ft high. Poor condition.
Stop Logs and Slots	None None.

PERIODIC INSPECTION CHECKLIST

PROJECT Gurran Lower Reservoir Dam

DATE Dec. 2, 1980

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

AREA EVALUATED

CONDITION

OUTLET WORKS - CONTROL TOWER

None.

a. Concrete and Structural

General Condition

Condition of Joints

Spalling

Visible Reinforcing

Rusting or Staining of Concrete

Any Seepage or Efflorescence

Joint Alignment

Unusual Seepage or Leaks in Gate Chamber

Cracks

Rusting or Corrosion of Steel

b. Mechanical and Electrical

Air Vents

Float Wells

Crane Hoist

Elevator

Hydraulic System

Service Gates

Emergency Gates

Lightning Protection System

Emergency Power System

Wiring and Lighting System

DIVISION OF HARBORS AND RIVERS
SURVEY OF DAMS IN RHODE ISLAND

Pawtuxet River Basin (North Branch)

#198 Spring Lake

Drainage Area 1.3 sq, mi.

February 1948

Spillway 75' x 3' deep, capacity 1500 c.f.s. ~~2~~

Estimated extreme freshet 189 c.f.s.

FEBRUARY 1948



Neatows - high ground

Section A-A

Large Reservoir

note

Gato House

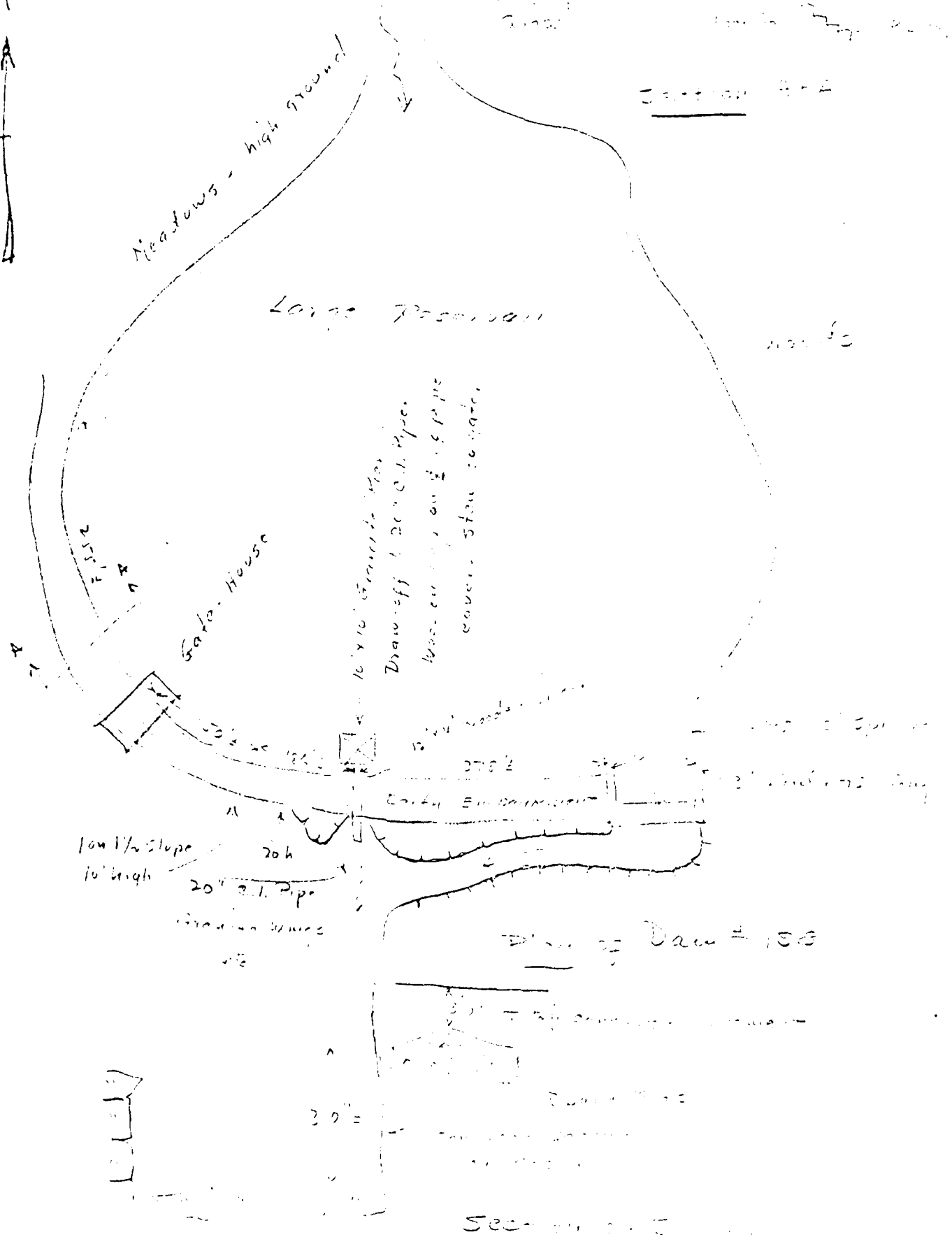
16" x 10" branch line
Draw-off 12" c.i. pipe
was cut off on 1/2 slope
cover, 5 ft. to gate.

low 1/2 slope
10' high
20" c.i. Pipe
Gradient 1:10

Early Embankment

Dam # 100

Section A-A



PRESENT USE

WATER STORAGE 35,000,000 GALG. DRINKING WATER.

POWER: X

BREACHES: X

WHO CONTROLS LEVEL OF WATER, SPILLWAY AND PAWTUCKET VALLEY COMPANY

(Mr. LaValley)

EXISTENCE OF GAGES: X

RECORDS KEPT BY:

WHO WAS CONTACTED AT SITE: X

INSTRUCTIONS LEFT WERE AS FOLLOWS:

SKETCHES OF SPECIAL CONDITIONS AT TIME OF INSPECTION:

INSPECTED BY:

TITLE:

DATE:

R. I. DEPARTMENT OF PUBLIC WORKS
DIVISION OF HARBORS & RIVERS

OFFICIAL INSPECTION REPORT

DATE: 6/25/46

INSPECTED BY: JOHN J. REILY

DAM No 198 NAME: SPRING LAKE

BROOK
BROOK
BROOK CLARKE BROOK

TOWN OR CITY CRANSTON.

ON PAWTUXET NORTH BRANCH

WATERSHED

OWNER PAWTUXET VALLEY WATER CO

ADDRESS: 1072 MAIN ST. WEST WARWICK

TEL. VAL. 0102

IN EMERGENCY CALL (1) ARTHUR O. LAVALLEY

ADDRESS: 80 PARKER ST. WEST WARWICK

TEL. NO. VAL 1527

(2) ALBERT LONGLAIS

ADDRESS: 35 N. PLEASANT ST. WEST WARWICK

TEL. NO. VAL 1341-R

(3)

ADDRESS:

TEL. NO.

SPILLWAY-TYPE CONCRETE GREST AND FACE. STONE APRON IN CANAL ALONG DAM TO BROOK IN FRONT OF DRAW-OFF.

CONDITION: GOOD. BRUSH NEEDS CUTTING BELOW SPILLWAY AND IN CANAL.

DRAW-OFF GATES-NUMBER 1 20" C I.

CONDITION: EXCELLENT. GATE UNDER COVER. ANOTHER 16" C I PIPE LEADS INTO WATER MAINS AND TOWN DISTRIBUTION FROM GATEHOUSE. IT IS 182' BELOW SURFACE TO RESERVOIR TO FL LINE (SEE PLANS)

TRENCH GATES-NUMBER X

CONDITION

EMBANKMENT EARTH

CONDITION: EXCELLENT

APPROACHES OK. NATURAL POND.

EROSION NONE

BRUSH & TREES BELOW SPILLWAY AND IN CANAL. SOME BRUSH IN DAM NEEDS CUTTING SOON.

RIP-RAP FAIR AND GOOD SOD COVER.

State of Rhode Island
INTER-DEPARTMENTAL COMMUNICATION

September 2, 1942

19...

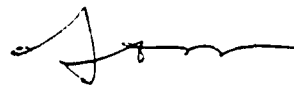
TO Mr. Henry Ise, Chief
DEPT. Harbors & Rivers
FROM Thomas J. Wright, Chief
DEPT. Division of Fish and Game
SUBJECT: INSPECTION REPORT FISKVILLE RESERVOIRS, Cranston, R. I.

Dear Henry:

This will confirm an earlier verbal request I made to Campy relative to an inspection report on the dams of the Fiskeville Reservoirs off Bowen Hill Road in Cranston. We are especially interested in the lower reservoir dam as to its safety in holding water. At present the gates are open.

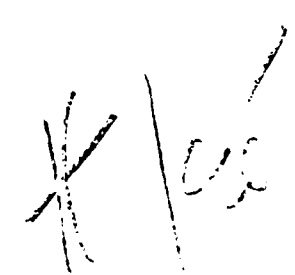
If possible, we would like a written report very soon as appraisers will need one to assist in putting a value on the property. As you probably know, the General Assembly appropriated \$60000 for the purchase of these waters by the State.

Sincerely,



Thomas J. Wright, Chief
Division of Fish and Game

J
W/pa



September 20, 1960

MEMORANDUM

TO: Mr. Thomas J. Wright, Chief
Division of Fish & Game

FROM: Mr. Henry Isé, Chief
Division of Harbors & Rivers

SUBJECT: Spring Lake Dam (R. I. No. 198)
Clarke Brook
North Branch, Pawtuxet River

In compliance with your request, this division made an inspection of Spring Lake Dam (Lower Reservoir) off Seven Mile Road in the town of Scituate, R. I. in company with your Louis Turchetta on September 21, 1960. At the time of the inspection the reservoir was completely drawn down with the draw-off gate open.

The following report was made by our inspecting engineer:

Spillway Concrete spillway and abutment walls in good condition. Brush and small trees in spillway approach and trench should be cut.

Granite Pier (Waste Gate) Gate open, hoisting mechanism appears to be in good operating condition. Gate chamber (granite pier) needs pointing, otherwise it is in excellent condition. Debris in bottom of gate chamber should be removed and hoisting assembly housed. Outlet structure is in excellent condition.

Gate House Apparently used for drawing-off water to service main. It is of masonry construction in good condition. However, the timber gate system has become deteriorated and in need of replacement. Many rocks and boulders were observed at the bottom of the gate well.

Embankments In good condition. Brush and trees should be cut.

Recommendations In general the dam and appurtenant structures are in good condition and would require little cost to put in top operating condition. The waste or draw-off gate structure should be housed to protect not only the hoisting apparatus but also children who might stray too close to the 20' deep well. The gate house for water main should be abandoned if no longer used."

cc. General File

H. Isé

August 27, 1946

✓
Box #133 Spring Lake Pawtuxet Valley Water Company
Box #134 Upper Reservoir Pawtuxet Valley Water Company

I have been advised by Mr. Arthur O LaValley, manager of the Pawtuxet Valley Water Company, that the above reservoirs have been cut off (8-20-46) as a source of water supply for the Pawtuxet Valley and will be kept as stand-by storage, to be used only in cases of emergency. Carr's Pond #134 and a new well-field at Washington, R. I., will be their main source of supply in the future. Three pumps with 500, 600 and 300 gals. per minute will cut in at Washington, R. I., when needed. A well-point system and a gravel vein have been utilized to collect the necessary ground water at Washington, R. I.

JVX

R. I. DEPARTMENT OF PUBLIC WORKS
DIVISION OF HARBORS AND RIVERS

DAM NO. 198

SPECIAL INSPECTION REPORT

INSPECTED BY J. V. KEILY

TOWN - CRANSTON
DAM NO. 198 NAME SPRING LAKE ON BAYVIEW WATERSHED PAWTUXET N 3
OWNER PAWTUXET VALLEY WATER COMPANY
ADDRESS 1072 MAIN STREET, WEST WARWICK, R. I. TEL. VA 0102
REPORT ON—NEW CONSTRUCTION REPAIRS INSPECTION ONLY X
PLANS BY APPROVED CONTRACTOR

TICKLER

INSPECTION REPORT BY JOHN V. KEILY REASON ROUTINE DATE 6/21/46

EMERGENCY:

1. ARTHUR O. LEVALLEY, MANAGER, PAWTUXET WATER COMPANY, OFFICE PHONE VA 0102 (VA 152 HOUSE)
2. ALBERT LANGLAIS, 35 NORTH PLEASANT STREET, WEST WARWICK. TEL. VA 1341-R

SPILLWAY

6/21/46 condition good

LARGE RESERVOIR RETAINED BY EARTH DIKE APPROXIMATELY 1050' LONG WITH MEDIUM GRASS SLOPES; 20' MAXIMUM HEIGHT AND STONE WALL ON DOWN-STREAM FACE AT EAST END OF DAM. EMBANKMENT AND SPILLWAY IN GOOD CONDITION. BRUSH AND SMALL TREES IN SPILLWAY RUN-OFF SHOULD BE CUT. ON AUGUST 1946, THIS DAM WAS PLACED ON "STAND BY" BASIS (WATER FOR PAWTUXET VALLEY TO BE OBTAINED FROM WELLS EXCEPT IN EMERGENCY, WHEN THIS SUPPLY CAN BE CALLED FOR).

TYPE

CONDITION

DRAW-OFF GATES

NUMBER

CONDITION

TRENCHES & WHEELS

EMBANKMENT

TYPE

CONDITION

APPROACHES

EROSION

BRUSHES & TREES

RIPRAP

PRESENT USE

WHO CONTROLS

WHO CONTACTED

AT SITE

INSTRUCTIONS LEFT

IN EMERGENCY
CALL

R. I. DEPARTMENT OF PUBLIC WORKS
DIVISION OF HARBORS AND RIVERS

DAM NO. 198

SPECIAL INSPECTION REPORT

INSPECTED BY A. C. CACCIA

DAM NO 198

NAME SPRING LAKE

(BROOK CLARKE
ON ~~RIVER~~

WATERSHED PAWTUCKET N 8

OWNER STATE DIVISION OF FISH & GAME

(~~ATMOSPHERE~~

ADDRESS

REPORT ON—NEW CONSTRUCTION

REPAIRS

INSPECTION ONLY X

PLANS BY

APPROVED

CONTRACTOR

INSPECTION REPORT BY A. C. CACCIA

REASON CONDITION REPORT PER DATE 9/21/60
REQUEST OF DIV. OF FISH & GAME

TICKLER

SPILLWAY

TYPE

CONDITION

DRAW-OFF GATES

NUMBER

CONDITION

TRENCHES & WHIFELS

EMBANKMENT

TYPE

CONDITION

APPROACHES

EROSION

BRUSHES & TREES

RIPRAP

PRESENT USE

WHO CONTROLS

WHO CONTACTED
AT SITE

INSTRUCTIONS LEFT

IN EMERGENCY
CALL

WRITER MET WITH LOUIS TURCHETTA, CONSERVATION OFFICER, DIVISION OF FISH & GAME AND TOGETHER WE VIEWED THE SITE. AT TIME OF INSPECTION, THE RESERVOIR (SPRING LAKE) WAS COMPLETELY DRAWN DOWN WITH DRAW-OFF GATE OPEN.

SPILLWAY CONCRETE SPILLWAY AND ADJUTMENT WALLS IN GOOD CONDITION. BRUSH AND SMALL TREES IN SPILLWAY APPROACH AND TRENCH SHOULD BE CUT.

GRANITE PIER (WASTE GATE) GATE OPEN, HOISTING MECHANISM APPEARS TO BE IN GOOD OPERATING CONDITION. GATE CHAMBER (GRANITE PIER) NEEDS POINTING, OTHERWISE IT IS IN EXCELLENT CONDITION. DEBRIS IN BOTTOM OF GATE CHAMBER SHOULD BE REMOVED AND HOISTING ASSEMBLY HOUSED. OUTLET STRUCTURE IS IN EXCELLENT CONDITION.

GATE HOUSE APPARENTLY USED FOR DRAWING-OFF WATER TO SERVICE MAIN. IT IS OF MASONRY CONSTRUCTION IN GOOD CONDITION. HOWEVER, THE TIMBER GATE SYSTEM HAS BECOME DETEIORATED AND IN NEED OF REPLACEMENT. MANY ROCKS AND BOULDERS WERE OBSERVED AT THE BOTTOM OF THE GATE WELL.

EMBANKMENTS IN GOOD CONDITION. BRUSH AND TREES SHOULD BE CUT.

RECOMMENDATIONS IN GENERAL THE DAM AND APPURTENANT STRUCTURES ARE IN GOOD CONDITION AND WOULD REQUIRE LITTLE COST TO PUT IN TOP OPERATING CONDITION. THE WASTE OR DRAW-OFF GATE STRUCTURE SHOULD BE HOUSED TO PROTECT NOT ONLY THE HOISTING APPARATUS BUT ALSO CHILDREN WHO MIGHT STRAY TOO CLOSE TO THE 20' DEEP WELL. THE GATE HOUSE FOR WATER MAIN SHOULD BE ABANDONED IF NO LONGER USED.

5 PICTURES TAKEN AT SITE

2 SKETCHES FOR MORE DETAILS

William C. Caccia, Eng.

WCC

APPENDIX B

ENGINEERING DATA

PERIODIC INSPECTION CHECKLIST

PROJECT Arran Lower Reservoir Dam DATE Aug. 2, 1980
 PROJECT FEATURE Bridge - Civil/Structural NAME Sluter/Fodor
 DISCIPLINE Geotechnical NAME S. Poulos

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SERVICE BRIDGE</u>	
a. Super Structure	Timber bridge spanning upstream end of spillway discharge channel.
Bearings	Upstream: Timbers on 6x6 concrete beam. Downstream: timbers on ground.
Anchor Bolts	None.
Bridge Seat	Downstream crest of dam and left training wall of spillway discharge channel.
Longitudinal Members	8 in diameter logs.
Underside of Deck	Good.
Secondary Bracing	2x6 laterals 4' on center; 4x4 posts.
Deck	2x6 boards one in. apart. Broken on upstream end.
Drainage System	N.A.
Railings	3-2x4's on 4x4 posts at 4 ft on center 3 ft high
Expansion Joints	N.A.
Paint	Deck paint worn. Other parts have cuprinol paint.
b. Abutment & Piers	
General Condition of Concrete	N.A.
Alignment of Abutment	N.A.
Approach to Bridge	Crest and 6 ft wide road on left of spillway discharge channel.
Condition of Seat & Backwall	Earth. Good.

PERIODIC INSPECTION CHECKLIST

PROJECT Burrus Lower Reservoir Dam DATE Dec. 2, 1980
 PROJECT FEATURE Spillway - Civil/Structural NAME Sluter/Fodor
 DISCIPLINE Geotechnical NAME S.J. Poulos

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	
General Condition	Fair.
Loose Rock Overhanging Channel	None.
Trees Overhanging Channel	Forested on left side. Formerly trees growing just upstream: from spillway weir to 9 in. size.
Floor of Approach Channel	Cobbles and sand.
b. Weir and Training Walls	
General Condition of Concrete	Poor. Rt training wall joint is out of line 1". Upstream block is to left of downstream block.
Rust or Staining	None.
Spalling	Extensive on both training walls and rt side of spillway weir downstream
Any Visible Reinforcing	4 in. length on downstream side of spillway weir on right side.
Any Seepage or Efflorescence	Downstream face of left training wall has efflorescence and spalling.
Drain Holes	None.
c. Discharge Channel	Side channel discharge from weir.
General Condition	Fair.
Loose Rock Overhanging Channel	Some stones from downstream training wall have fallen into channel.
Trees Overhanging Channel	None. Low brush, to 5 ft high, stump to 4-5 in. size.
Floor of Channel	Stones and three steps 20-500 lb stone. 1500 lb granite stones at steps.
Other Obstructions	None.
Other Comments	Upstream training wall is downstream toe of dam from spillway to intake structure. Wall is 6 ft long and in good condition except that pointing is beginning to break out.

PERIODIC INSPECTION CHECKLIST

PROJECT Curran Lower Reservoir Dam DATE Dec. 2, 1980
 PROJECT FEATURE Outlet - Civil/Structural NAME Sluter/Fodor
 DISCIPLINE Geotechnical NAME S. Poulos

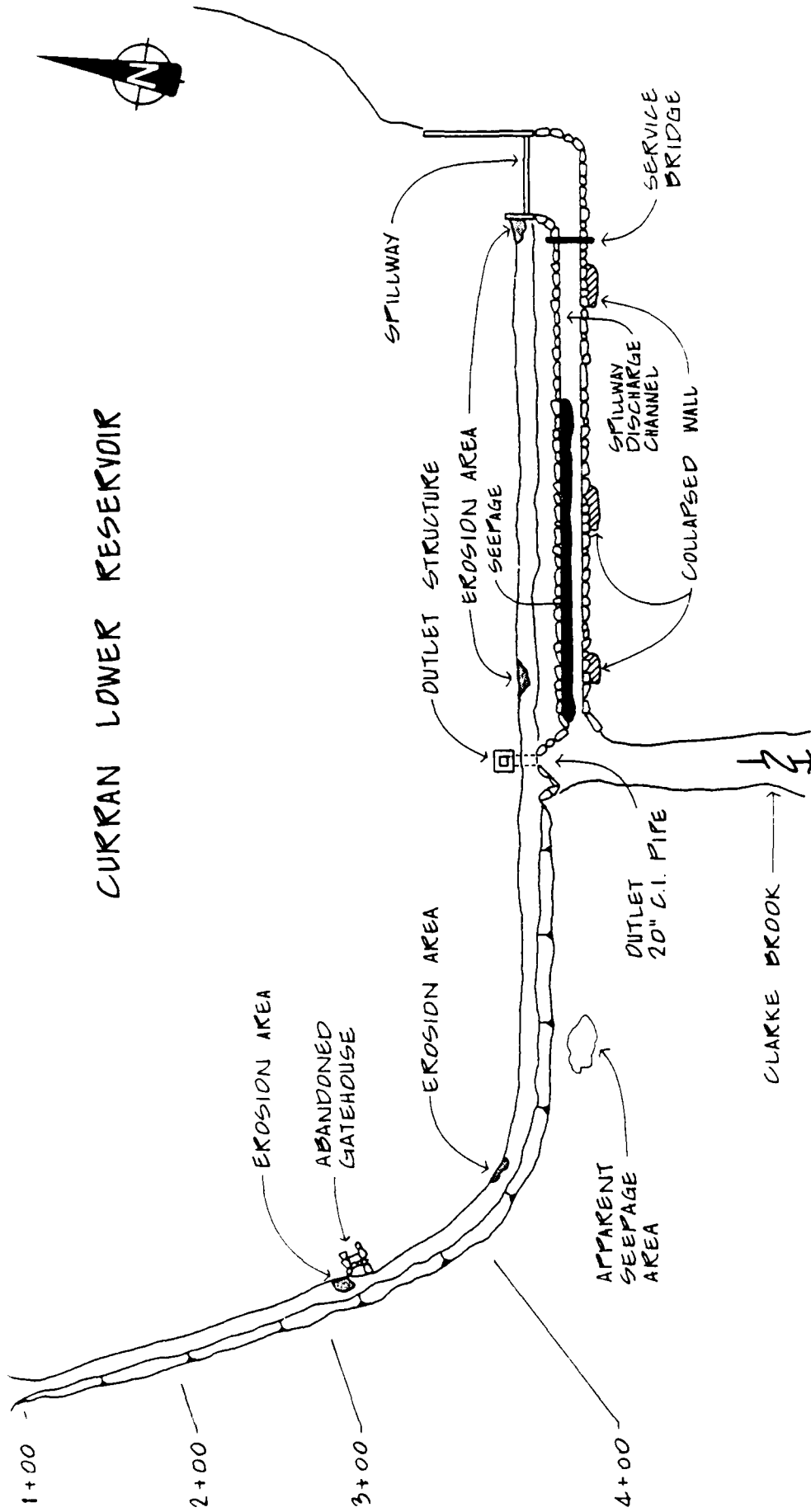
AREA EVALUATED	CONDITION
<u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u>	
General Condition of Granite Masonry	Fair to poor. Blocks of granite have fallen out from wingwalls.
Rust or Staining	N.A.
Spalling	Pointing missing at top of headwall.
Erosion or Cavitation	None.
Visible Reinforcing	N.A.
Any Seepage	Seepage in lower left corner of intersection of headwall and left wingwall at invert of pipe, which is 3 in. above pond level. Seepage is << 1 gpm. Pointing between stones is missing. Conduit invert dripping at 1 1/2 drops/second.
Drain Holes	N.A.
Channel	
Loose Rock or Trees Overhanging Channel	No rock. Forested both sides of pond.
Condition of Discharge Channel	Poor. Brush, trees, debris.

PERIODIC INSPECTION CHECKLIST

PROJECT Curran Lower Reservoir Dam DATE Dec. 2, 1984
 PROJECT FEATURE Outlet - Civil/Structural NAME Sluter/Fodor
 DISCIPLINE Geotechnical NAME S. Poulos

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - TRANSITION AND CONDUIT</u>	20" cast iron pipe. Good condition. Can-not see transition.
General Condition of Concrete	N/A
Rust or Staining on Concrete	N/A
Spalling	N/A
Erosion or Cavitation	N/A
Cracking	N/A
Alignment of Monoliths	N/A
Alignment of Joints	N/A
Numbering of Monoliths	N/A

CURRAN LOWER RESERVOIR



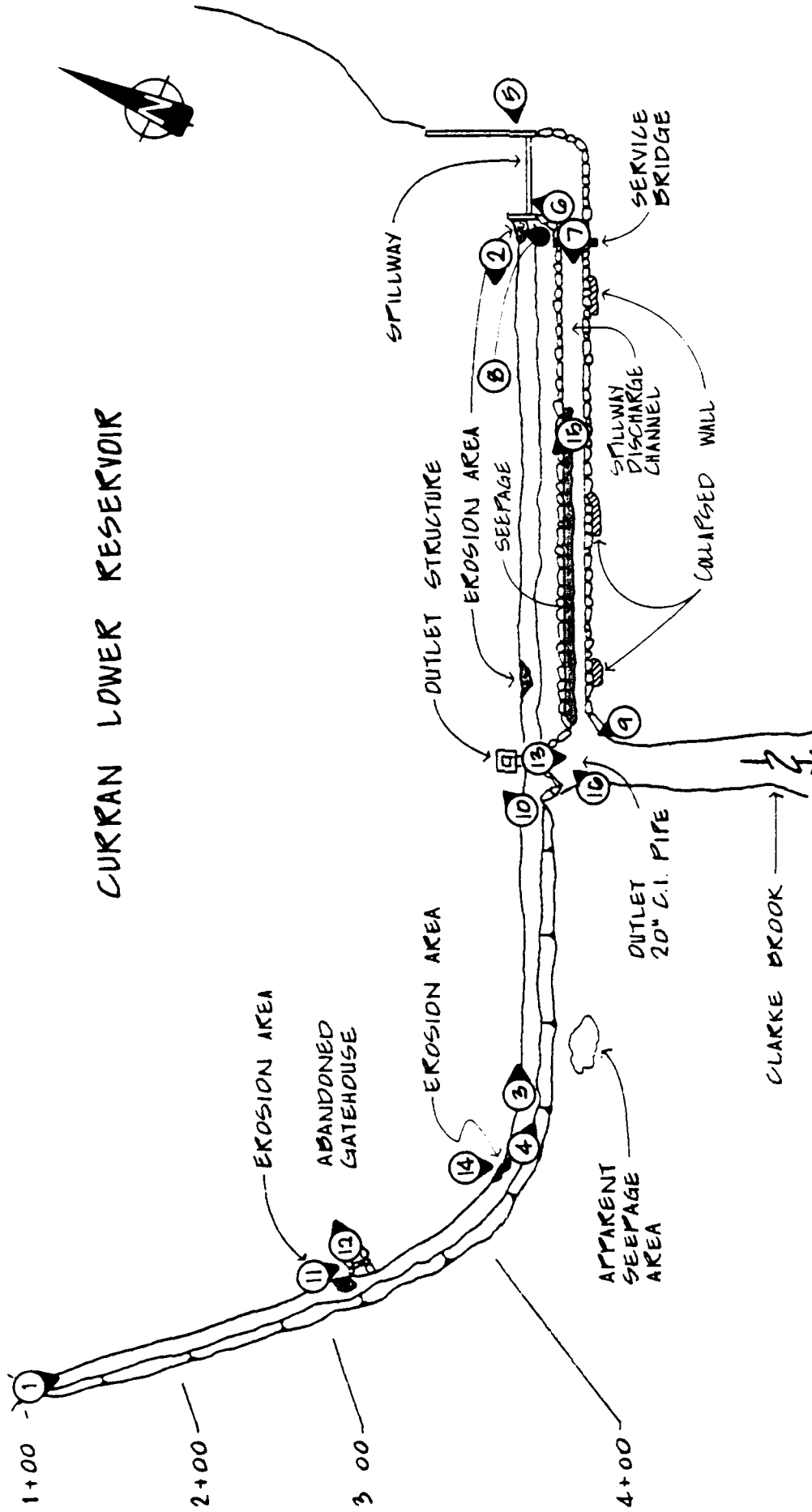
CURRAN LOWER RESERVOIR
DAM - GENERAL PLAN
NO SCALE

5+00 6+00 7+00 8+00 9+00 10+00

APPENDIX C

PHOTOGRAPHS

CURRAN LOWER RESERVOIR



CURRAN LOWER RESERVOIR
DAM - PHOTO INDEX
NO SCALE

OVERVIEW

5+00 6+00 7+00 8+00 9+00 10+00



PHOTO C-1: Crest of the dam from the right abutment.



PHOTO C-2: Upstream face from Station S+00. Note riprap sinking into crest.



PHOTO C-3: Crest and upstream face of the dam
from Station 5+00 looking toward the left abutment.



PHOTO C-4: Bend in crest showing recently repaired
zone at Station 4+25.



PHOTO C-5: Spillway, training walls and crest from the left abutment. Note spalling of concrete on training walls.



PHOTO C-6: Spillway crest at the left end. Note spalling of concrete.



PHOTO C-7: Spillway discharge channel and downstream face of the dam from the service bridge. Note brush on embankment and in channel.

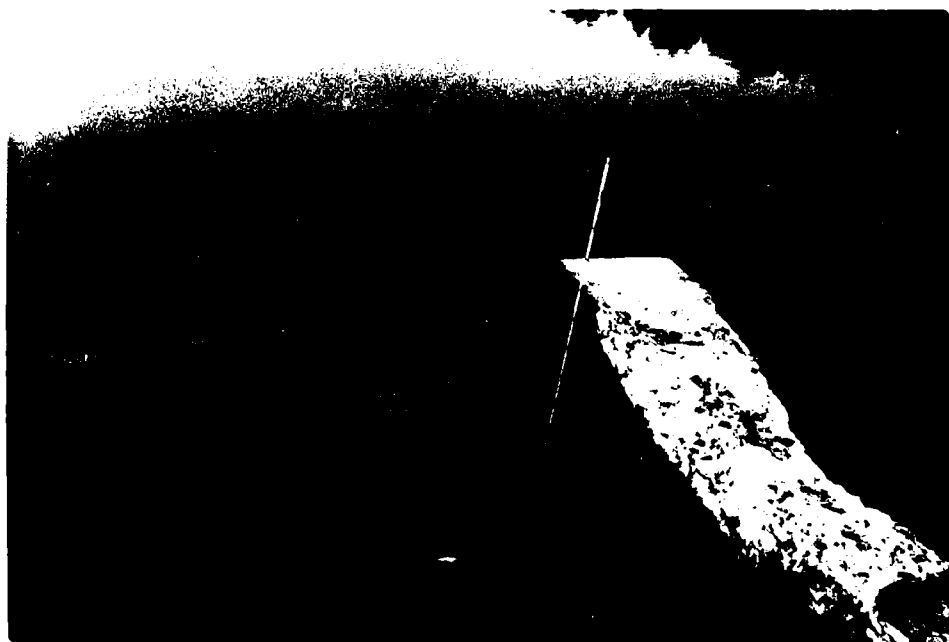


PHOTO C-8: Right spillway training wall. Note spalling of concrete and erosion into the crest.

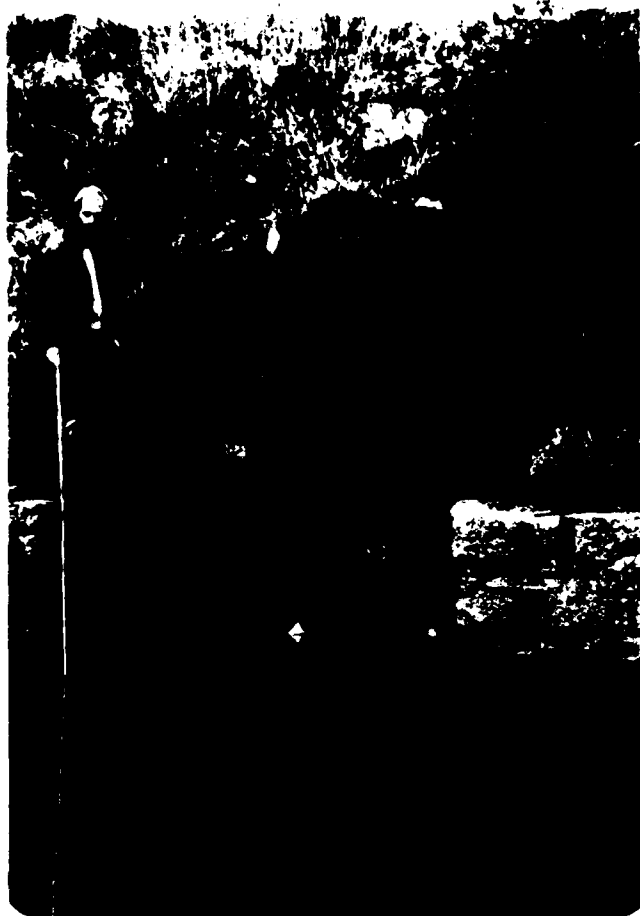


PHOTO C-9: Downstream end of outlet conduit.

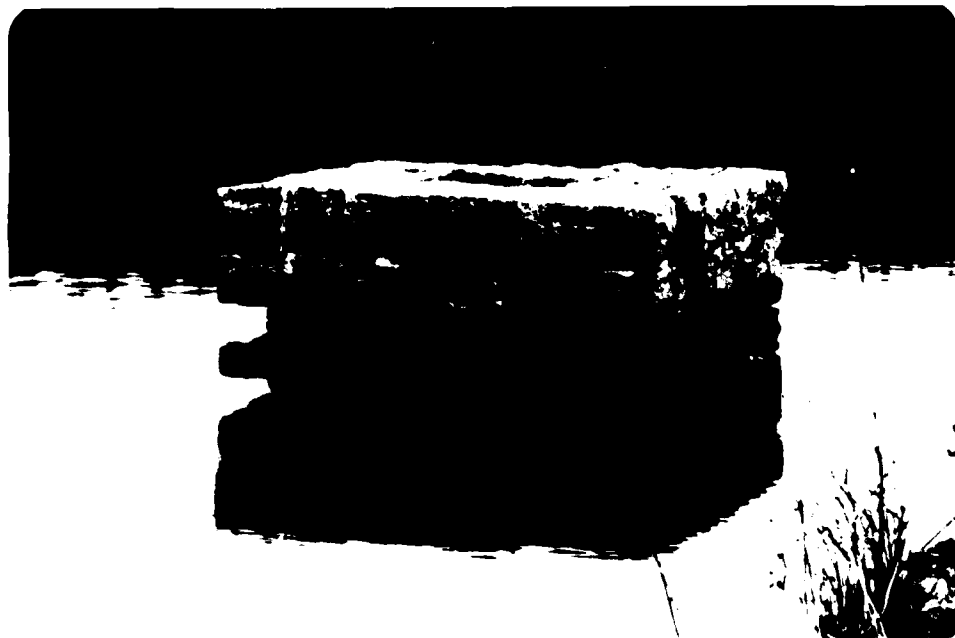


PHOTO C-10: Outlet structure. Note missing stone masonry blocks.



PHOTO C-11: Abandoned gatehouse. Note missing stone masonry blocks and erosion into the crest.



PHOTO C-12: Right intake training wall of abandoned gatehouse. Wall is tilting towards the intake channel.



PHOTO C-13: Downstream channel at the outlet from the crest of the dam.



PHOTO C-14: Erosion into the crest at Station 4+50.



PHOTO C-15: Seepage at the right training wall and floor of the spillway discharge channel at Station 8+15.

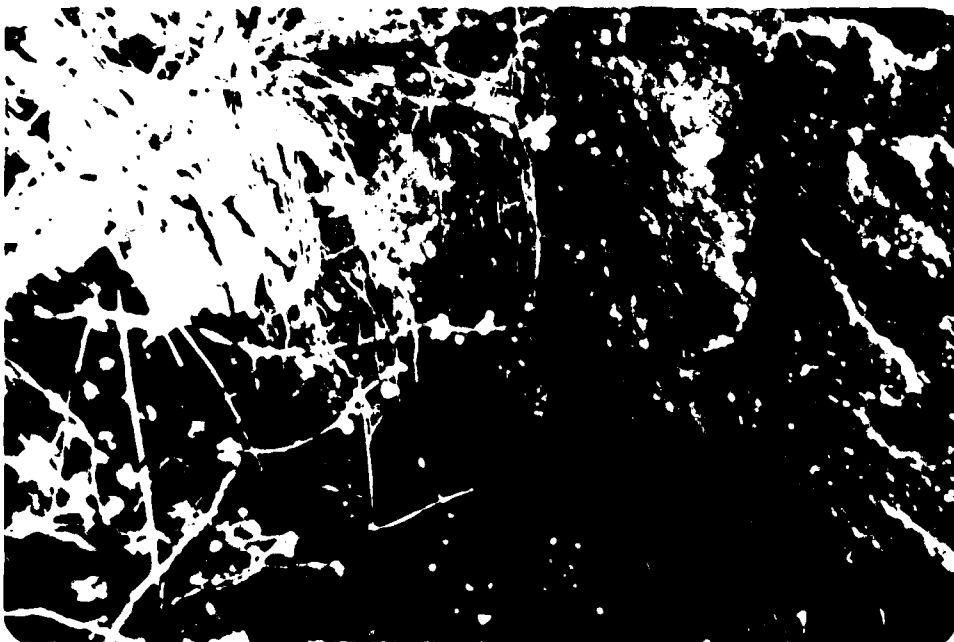
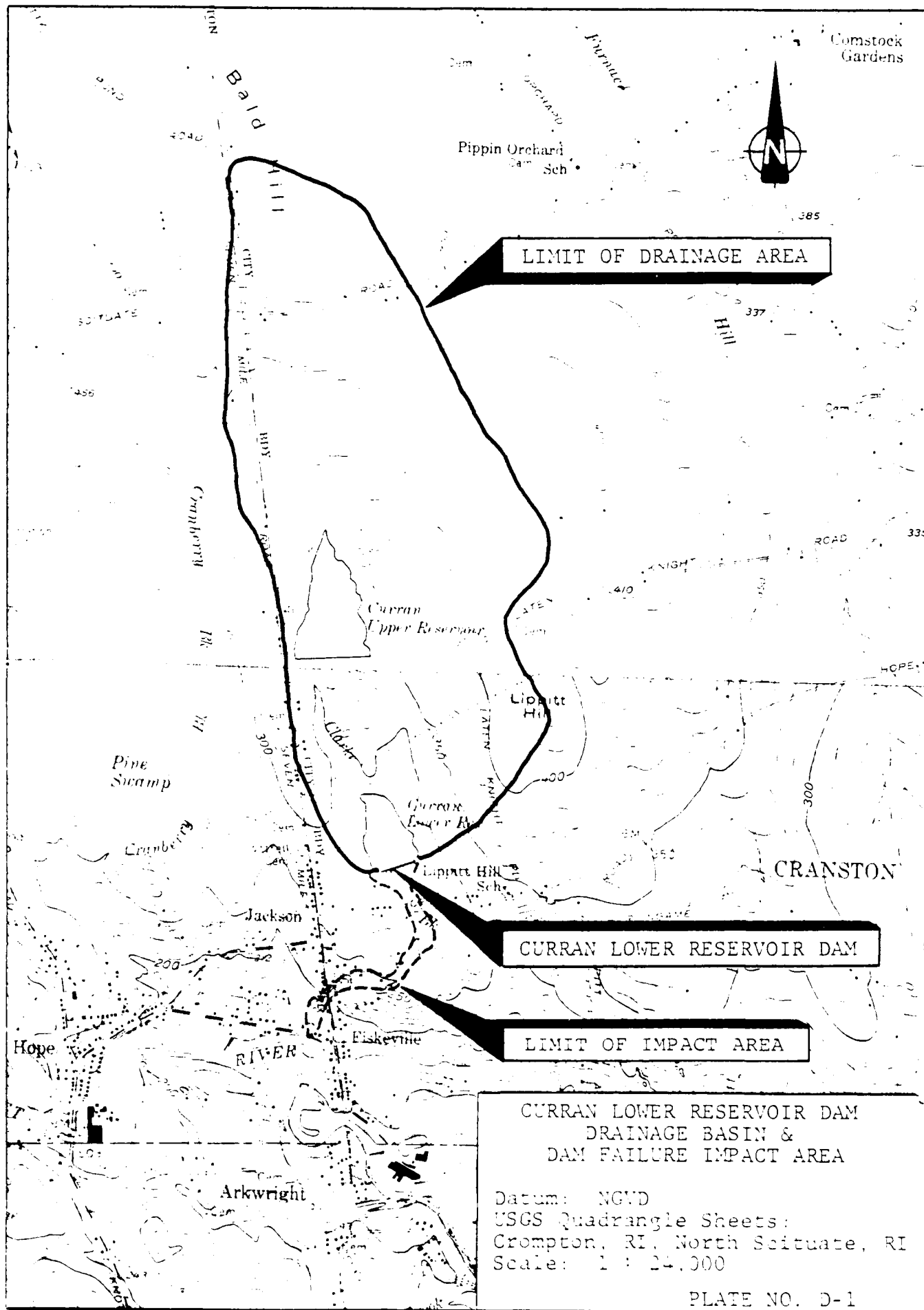


PHOTO C-16: Seepage at the left upstream corner of the headwall at the downstream end of the outlet conduit.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



LIMIT OF DRAINAGE AREA

CURRAN LOWER RESERVOIR DAM

LIMIT OF IMPACT AREA

CURRAN LOWER RESERVOIR DAM
DRAINAGE BASIN &
DAM FAILURE IMPACT AREA

Datum: NGVD
USGS Quadrangle Sheets:
Crompton, RI, North Scituate, RI
Scale: 1 : 24,000

PLATE NO. D-1

Job No. 90107 Sheet 1 of 2
Project CORRAN LOWER RESERVOIR DAM Date 3/25/90
Subject HYDROLOGY/HYDRAULICS By LS Ch'k. by

BASIC DATA

DRAINAGE AREA = 1.3 SQ. MI
SPILLWAY POOL ELEV. = 280.0 NGVD
MAX POOL ELEV. = 282.5

RESERVOIR

@ SPILLWAY POOL - AREA = 20 AC
STORAGE = 200 AC-FT

@ MAX. POOL - AREA = 20 AC
STORAGE = 250 AC-FT

DAM : EARTH EMBANKMENT

MAX HEIGHT = 17 FT
LENGTH = 1100 FT

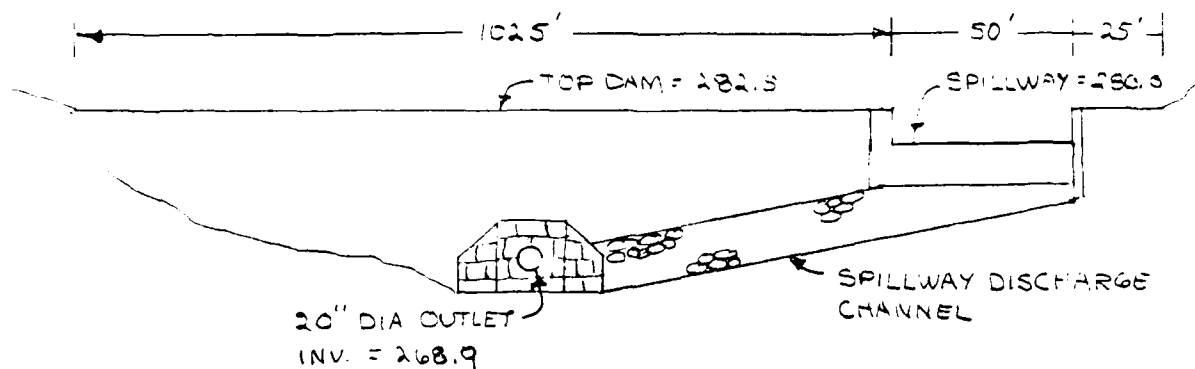
SPILLWAY : CONCRETE, BROADCRESTED, FREE OVERFLOW WEIR

CREST = 280.0 NGVD
LENGTH = 50.0 FT

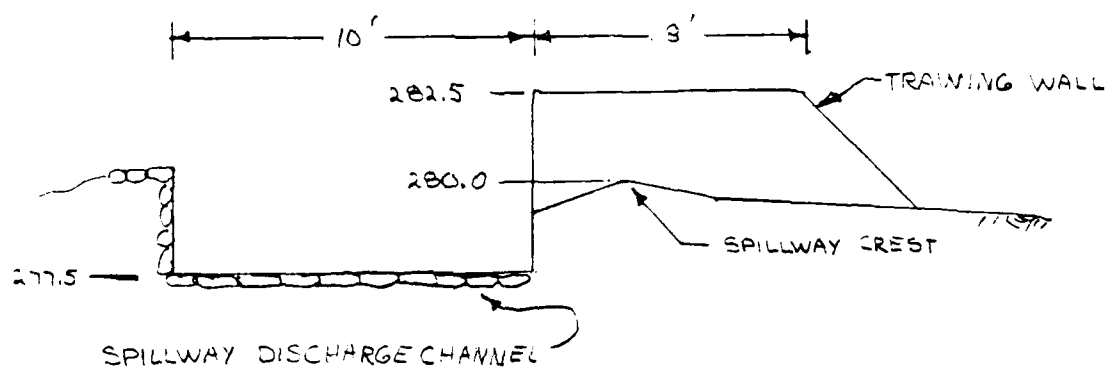
OUTLET : 20 INCH DIA. CAST IRON PIPE

INVERT = 278.9
GATE : UNKNOWN (OPERABLE)

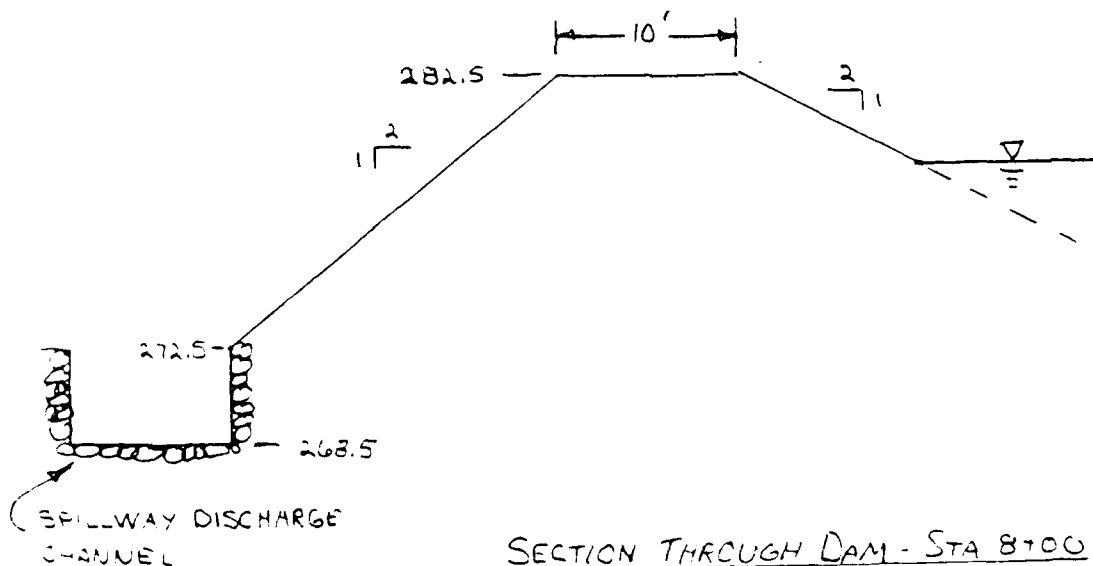
Job No. CUPPES LOWER RESERVOIR DAM 22107 Sheet 2 of 2
 Project _____ Date 2/25/53
 Subject _____ By D.S. Ch'k. by _____



LONGITUDINAL SECTION THRU DAM - LOOKING UPSTREAM



SPILLWAY SECTION



SECTION THROUGH DAM - STA 8+00

Job No. 20107 CURRAN LOWER RESERVOIR DAMSheet 3 of 9

Project _____

Date 2/25/81

Subject _____

By JS Ch'k. by _____CALCULATE TEST FLOOD

CLASSIFICATION : SMALL

HAZZARD : SIGNIFICANT

USE : $1/2$ PMF BASIN SLOPE = FLAT TO MODERATEPMF = 1500 CSM $\rightarrow$ REDUCE 10% FOR STORAGE @
CURRAN UPPER RES.

$$= 1500 \times .9 = 1350 \text{ CSM}$$

$$1/2 \text{ PMF} = 675 \text{ CSM}$$

$$\text{TEST FLOOD} = 1.3 \times 675 = 900 \text{ CFS}$$

CALCULATE DAM RATING CURVE

$$\text{DAM \& SPILLWAY } Q = CLH^{3/2} \quad \text{DAM } C = 2.6 \quad L = 1050 \text{ FT}$$

$$\text{SPILLWAY } C = 3.3 \quad L = 50 \text{ FT}$$

$$\text{OUTLET DISCHARGE} = CA \sqrt{2gh} \quad h \text{ MEAS. FROM E ORIFICE} \quad C = 0.6$$

$$A = 2.2 \text{ SQ FT}$$

ELEV.	H_{spill}	Q_{spill}	H_{dam}	Q_{dam}	H_{out}	Q_{out}	ΣQ	$2Q - Q_{\text{out}}$
280.0	—	—	—	—	10.1	35	35	—
281.0	1.0	165	—	—	11.1	35	200	165
282.0	2.0	470	—	—	12.1	40	505	470
282.5	2.5	650	—	—	12.6	40	690	650
283.0	3.0	860	0.5	965	13.1	40	1365	1325

@ TOP OF DAM = 282.5

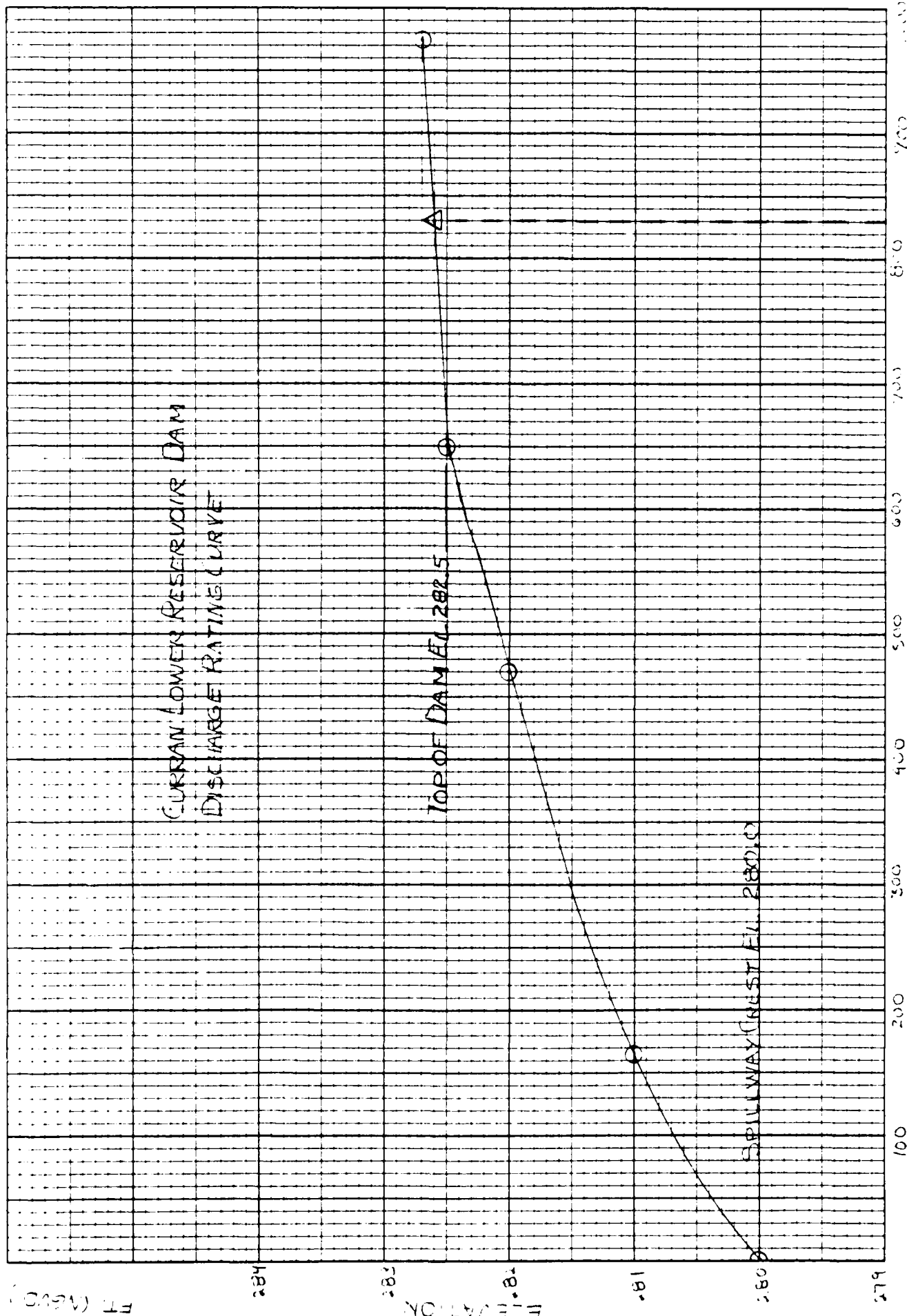
SPILLWAY CAPACITY = 650 CFS

OUTLET CAPACITY = 40 CFS

@ TEST FLOOD = 282.7

SPILLWAY CAPACITY = 730 CFS

OUTLET CAPACITY = 40 CFS



DISCHARGE

CFS

Job No. SOLE 7 SURFACE LOWER RESERVOIRSheet 5 of 9

Project _____

Date 2-21

Subject _____

By Ch'k. byCALCULATE EFFECT OF SURCHARGE STORAGE

PEAK INFLOW = 900 CFS → SURCHARGE = 2.7 FT

$$V_1 = \frac{2.7 \times 20 \text{ AC} \times 12}{1.3 \times 640} = .78 \text{ IN}$$

$$Q_{P1} = \left(1 - \frac{.78}{9.5}\right) 900 = 825 \text{ CFS} \rightarrow \text{SURCHARGE} = 2.6'$$

$$V_2 = \frac{2.6 \times 20 \times 12}{1.3 \times 640} = .75 \quad V_{\text{AVG}} = .765$$

$$Q_{P2} = \left(1 - \frac{.765}{9.5}\right) 900 = 830 \text{ CFS} \quad \text{SURCHARGE} = 2.6'$$

1. SURCHARGE STORAGE WILL REDUCE THE TEST FLOOD DISCHARGE BY 70 CFS OR 8%
2. THE SPILLWAY CAN PASS 650 CFS OR 78% OF THE TEST FLOOD DISCHARGE
3. AT THE TEST FLOOD DISCHARGE OF 830 CFS THE DAM WOULD BE OVERTOPPED BY 0.1 FT.

DAM FAILURE ANALYSIS

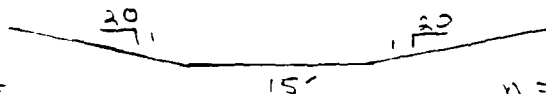
$$\text{DAM FAILURE DISCHARGE} = 8/27 W_0 \sqrt{2} Y_0^{1.5} \quad Y_0 = 17 \text{ FT}$$

USE BREACH WIDTH = 35 FT BASED ON HEIGHT & CROSS SECTION

$$\begin{aligned} Q_{\text{FAIL}} &= 8/27 (35) \sqrt{32.2} 17^{1.5} \\ &= 4125 \text{ CFS} \\ &+ \frac{650 \text{ CFS}}{4775 \text{ CFS}} \quad (\text{SPILL. Q}) \end{aligned}$$

ESTIMATE DOWNSTREAM IMPACTREACH = DAM TO PAWTUCKET RIVER CONFLUENCE $L = 4000 \text{ FT.}$

TYPICAL SECTION



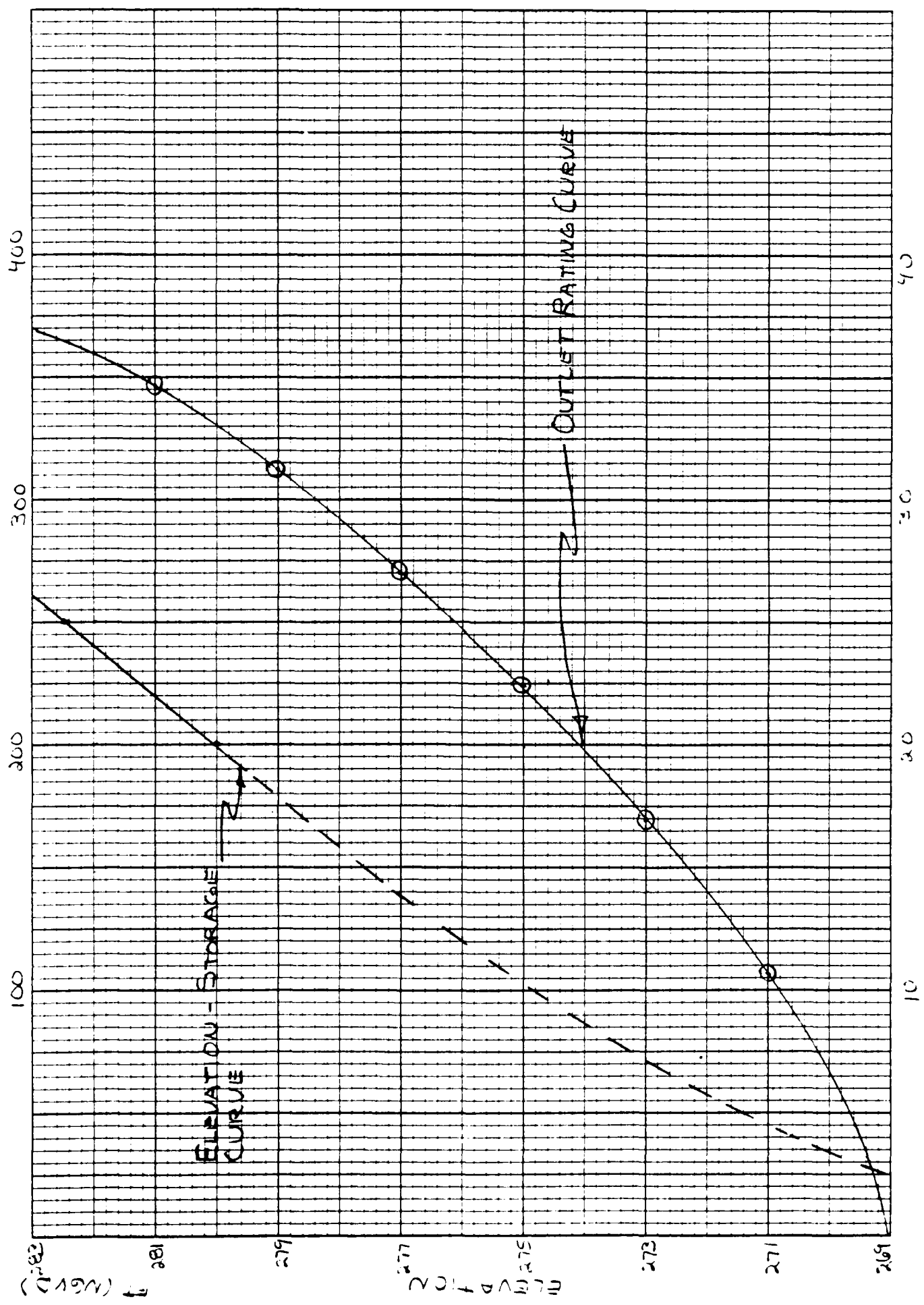
ESTABLISH RATING CURVE

 $n = 0.05$ $S_0 = 0.013$

STAGE	A	$R^{2/3}$	Q
2	110	1.1	410
3	225	1.4	1070
4	380	1.7	2150
5	575	1.9	3750
6	810	2.2	5930

AC-F7

STORAGE



ELEVATION - STORAGE CURVE

OUTLET RATING CURVE

Job No. 80107 CURRAY LOWER REACHES DAM Sheet 7 of 9
 Project _____ Date 2-27-81
 Subject _____ By DS Ch'k. by _____

$$@ Q = 4775, \text{ STAGE} = 5.5 \text{ FT}, \text{ AREA} = 600$$

$$@ Q = 650, \text{ STAGE} = \frac{2.4 \text{ FT}}{3.1 \text{ FT}}, \text{ AREA} = \frac{150}{540} \quad (\text{PRE-FAIL})$$

$$\text{STOR 1} = \frac{3500 \text{ FT} \times 540}{43560} = 43 \text{ AC-FT}$$

$$Q_{P1} = \left(1 - \frac{43}{250}\right) 4775 = 3950 \text{ CFS} \rightarrow \text{STAGE} = 5.1 \text{ FT} \quad \begin{array}{r} A=600 \\ - 150 \\ \hline 450 \end{array}$$

$$\text{STOR 2} = \frac{3500 \times 450}{43560} = 36 \text{ AC-FT} \quad \text{STOR}_{\text{AVG}} = \frac{36+43}{2} = 39.5$$

$$Q_{P2} = \left(1 - \frac{39.5}{250}\right) 4775 = 4020 \text{ CFS}$$

$$\therefore \text{ OUTFLOW FROM REACH} = 4020 \text{ CFS}, \text{ STAGE} = 5.1 \text{ FT.}$$

$$\text{AVG BANK ELEV.} = 2-3 \text{ FT.}$$

$$\therefore \text{ FLOOD PLAINS} = 3-4 \text{ FT. ABOVE CHANNEL INVERT}$$

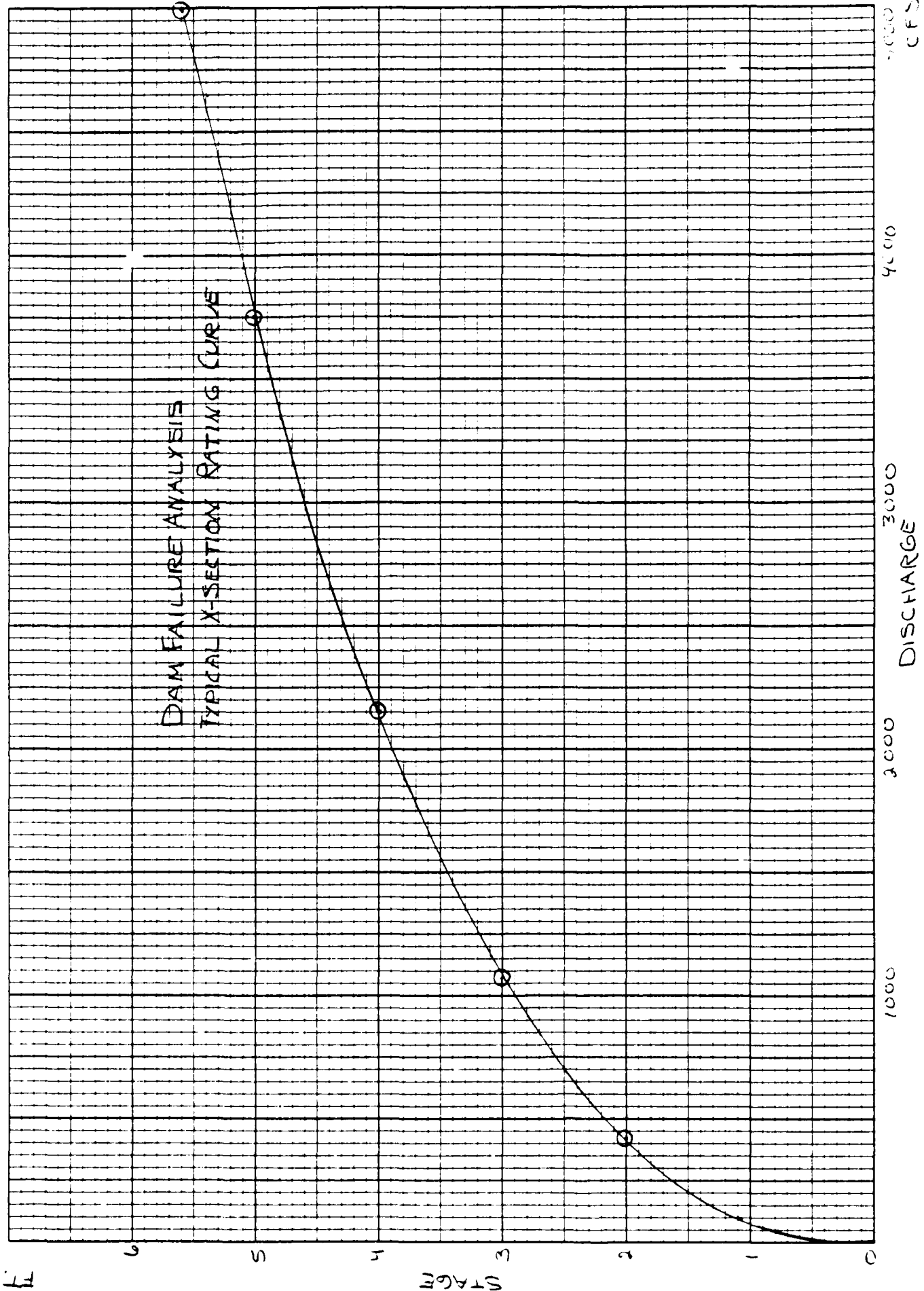
DEPTH OF FLOODING

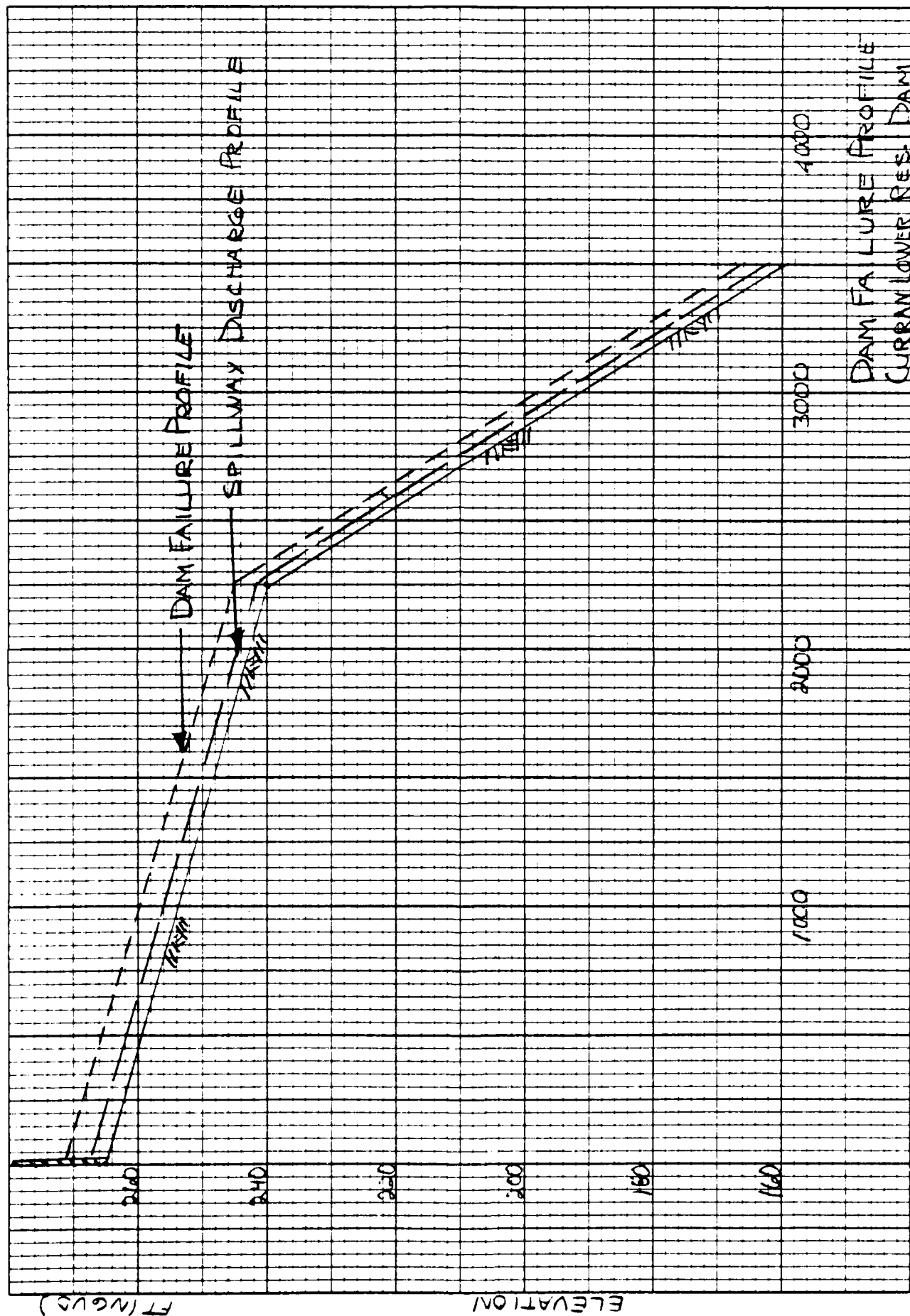
$$\text{PREFAILURE} = 2-3 \text{ FT STAGE} = 1-2 \text{ FT, IN OVERBANKS}$$

$$@ \text{ FAILURE} = 5-6 \text{ FT STAGE} = 2-3 \text{ FT IN OVERBANKS}$$

FLOODING OF HOMES IN IMPACT AREA WOULD INCREASE FROM 1-2 FT PRIOR TO FAILURE TO 2-4 FT POST FAILURE; Q 1-2 FT INCREASE

APPROXIMATELY 4-5 HOMES LOCATED IN IMPACT AREA.





DISTANCE FROM DAM

F7

919

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL
INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

FILMED

8-85

DTIC