

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
LOVEJOY POND DAM ME-0. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV APR 79

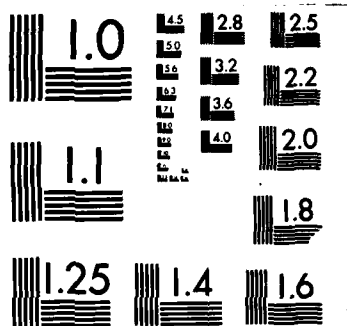
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ANDROSCOGGIN RIVER BASIN
NORTH WAYNE , MAINE

LOVEJOY POND DAM ME-00022

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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

APRIL 1979

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is a dry laid stone masonry and concrete structure. It is about 17 ft. high and about 170 ft. long. The dam is considered to be in poor condition. The dam is classified as intermediate in size having a low hazard potential. There are various remedial measure which must be undertaken by the owner,		



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:

NEDED

OCT 2 1979

Honorable Joseph E. Brennan
Governor of the State of Maine
State Capitol
Augusta, Maine 04330

Dear Governor Brennan:

I am forwarding to you a copy of the Lovejoy Pond Dam 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 Agriculture and the Department of Transportation, cooperating agencies for the State of Maine. In addition, a copy of the report has also been furnished the owner, James Lawrence, Readfield, Maine 04355.

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, the Department of Agriculture and the Department of Transportation for your cooperation in carrying out this program.

Sincerely yours,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

ANDROSCOGGIN RIVER BASIN

NORTH WAYNE, MAINE

LOVEJOY POND DAM

ME-00022

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

ME-00022

LOVEJOY POND DAM

NORTH WAYNE, MAINE

KENNEBEC COUNTY, MAINE

LOVEJOY POND

December 6, 1978 (Field Inspection)

BRIEF ASSESSMENT

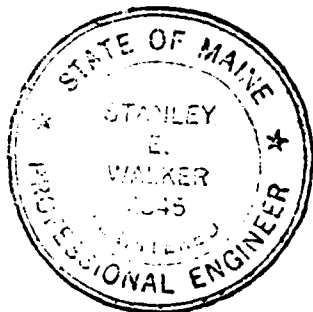
The Lovejoy Pond Dam is a dry-laid stone masonry and concrete structure. The dam is approximately 17 feet high, and about 170 feet long. The dam has a 100-foot long uncontrolled free overfall spillway and six controlled outlets.

Based on the visual inspection the Lovejoy Pond Dam is assessed to be in poor condition. Major concerns regarding the safety of the dam include: collapse of a portion of the downstream stone masonry face, deterioration of concrete surfaces of spillway, wingwalls and gated outlet structure, heavy leakage through stone masonry spillway, and lack of operable outlet works. Based on Corps of Engineers guidelines, the dam is classified as an intermediate size dam having a low hazard potential.

In accordance with Corps of Engineers' guidelines for the determination of spillway adequacy, the test flood is one-half of the Probable Maximum Flood (1/2 PMF). The spillway will pass 1,500 cfs or about 15 percent of the test flood without overtopping. During the test flood, water would overtop the east wingwall by about 5.1 feet and the west wingwall by about 4.1 feet.

The recommendations and items of remedial maintenance and operation presented in Section 7 should be implemented within one year of receipt of this report by the owner. The following should be evaluated by a registered professional engineer: 1) provisions to curtail leakage through the spillway portion of the dam; 2) provisions for rehabilitation of the stone masonry below the spillway crest; 3) provisions for

energy dissipation or scour protection below the spillway and outlets. Remedial maintenance includes: 1) repair spalled and cracked concrete surfaces; 2) clear trees and brush from the masonry portions of the dam; 3) provide around-the-clock surveillance during periods of anticipated high runoff; and, 4) institute a program of annual technical inspections.



EDWARD C. JORDAN CO., INC.

A handwritten signature in black ink, appearing to read "Stanley E. Walker", written over a horizontal line.

Stanley E. Walker, P.E.
Project Officer

This Phase I Inspection Report on Lovejoy 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.

Joseph A. McElroy

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Joseph W. Finegan, Jr.

JOSEPH W. FINEGAN, JR., CHAIRMAN
Chief, Reservoir Control Center
Water Control 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 I investigations. 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 investigation, 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 condition and the downstream damage potential.

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OVERVIEW

Lovejoy Pond Dam

f. Dam Failure Analysis. To determine the hazard classification of the Lovejoy Pond Dam, the impact of hypothetical failure of the dam at maximum pool was assessed. The failure analysis relied upon "rule of thumb" guidelines outlined in an attachment to ETL 1100-2-234. The hazard potential was determined by calculating peak flows which might result downstream of the dam due to a breach of a portion of the spillway section of the dam.

The peak flow at the dam from failure was estimated to be 5,000 cfs which would overtop the highway bridge located about 200 feet below the dam. It would take the reservoir approximately 22 hours to empty. The channel constriction caused by the bridge produces a high tailwater condition which begins to submerge the spillway at discharges greater than about 3,200 cfs (see Appendix D). Just prior to failure, discharge from the dam would be about 1,500 cfs with a water surface elevation at the dam of about 294 feet. The Pickerel Pond-Pocasset Lake impoundment, located about 1000 feet below Lovejoy Pond, would rapidly attenuate the flood wave from failure of Lovejoy Pond Dam. It was estimated that damage caused by increases in the lake level of Pickerel Pond-Pocasset Lake would be minimal. Failure of Lovejoy Pond would pose no hazard to the area downstream of the Pocasset Lake Dam. One house located on the stream between Lovejoy Pond Dam and Pickerel Pond could be flooded to a depth of about 1 foot at the estimated peak flow from failure.

Based on the information discussed above, and the high tailwater condition that would result at the dam, the Lovejoy Pond Dam is classified as having a low hazard potential.

SECTION 5

HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

- a. General. The Lovejoy Pond Dam is a dry-laid stone masonry dam with a concrete capped spillway crest and an uncontrolled, free overfall spillway. Normal water surface elevation of the reservoir corresponds approximately to spillway crest elevation. Approximately 15% of the drainage area above the dam is comprised of lakes and impoundments.
- b. Design Data. No original hydrologic or hydraulic design data were available for review.
- c. Experience Data. No information regarding past overtopping or other specific, notable hydrologic events was disclosed.
- d. Visual Observations. Lake levels of Lovejoy Pond can be regulated by the gated outlet works, stop log bays, and pond drain outlet. Considerable leakage was noted through areas in the stone masonry dam and at the stop logs of the gated outlets. Some scour has occurred at the downstream toe of the dam. Energy dissipation of spillway discharges is provided by the downstream channel.
- e. Test Flood Analysis. Lovejoy Pond is classified as having a low downstream hazard potential. According to Corps of Engineers' "Recommended Guidelines for Safety Inspection of Dams," the test flood is one-half of the probable maximum flood (1/2 PMF). There is no design flood control pool provided by the dam. The drainage area above Lovejoy Pond Dam is approximately 47.5 square miles and is characterized as flat. Using the Corps of Engineers' guidance curves for estimating probable maximum discharges, the 1/2 PMF peak inflow to Lovejoy Pond was computed to be 11,850 cfs. The test flood was routed through Lovejoy Pond yielding a peak outflow of approximately 10,000 cfs. The spillway is capable of discharging 1,490 cfs or approximately 15% of the test flood without overtopping. The test flood would overtop the east wingwall by 5.1 feet and the west wingwall by 4.1 feet.

SECTION 4
OPERATING PROCEDURES

4.1 PROCEDURES

No written operating procedures were disclosed. Lovejoy Pond Dam controls the water surface elevation of Lovejoy Pond. Stop logs are placed or removed to adjust lake levels.

4.2 MAINTENANCE OF DAM

No maintenance program was disclosed. It appears that little or no maintenance of the dam has been performed in recent years.

4.3 MAINTENANCE OF OPERATING FACILITIES

The gated outlet works are in need of repair. The middle of the three gated outlets is closed by an inoperable butterfly gate. The remaining two gated outlets are controlled by stop logs which appear to be in good condition. The low level pond drain outlet operating facility could not be inspected in detail.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

No warning system is known to be in effect.

4.5 EVALUATION

Current maintenance and operating procedures are inadequate. No established surveillance or flood warning system is in effect.

d. Reservoir Area. The reservoir shoreline is virtually entirely forested. There are approximately 40 dwellings on the reservoir shore, predominantly summer camps. Slopes above the reservoir are moderate and the potential for earth slides appear minimal. A natural constriction of the reservoir surface occurs approximately 500 feet upstream of the dam. The width of the reservoir at this constriction is approximately 75 feet.

e. Downstream Channel. The channel of the stream below the Lovejoy Pond Dam is steep and rocky with a scattered light to moderate growth of small trees and brush. A highway bridge, located about 200 feet below the dam, forms a channel constriction (see photograph #2). Within 1000 feet of the dam, the stream discharges into Pickerel Pond. Pickerel Pond-Pocasset Lake, a 3-mile long impoundment with a surface area of 720 acres at normal pool, is located downstream of Lovejoy Pond.

3.2 EVALUATION

Based on the visual inspection findings, the Lovejoy Pond Dam appears to be in poor condition. The concrete spillway crest is badly cracked and sagged with several holes through the concrete. The stone masonry supporting the spillway crest has collapsed in one area. The concrete in the outlet sluiceways and wingwalls is badly spalled and cracked and is in generally poor condition. As outlined in Section 7, rehabilitative construction and maintenance are necessary to assure the long-term safety of the structure.

- (c) The spillway consists of a concrete cap overlying unbound stone masonry. Heavy leakage is occurring through the concrete and the masonry face. The concrete surface is cracked in several areas and there are several holes through the concrete. The supporting masonry has tumbled downstream in one area allowing the crest slab to collapse (see photographs #3 and #7 and overview).
 - (d) The low level pond drain consists of a stone masonry sluiceway which appears to be in good condition. The gated outlet works, located below the spillway, are in poor condition (see photograph #5). The east and west outlet have been closed by stop logs. The concrete is severely spalled, cracked and eroded. Some leakage is occurring into the conduits.
 - (e) The stop log bays, near the east abutment, are true to line and grade and are in good condition.
- (2) Hydraulics - Hydraulic control of the water level in Lovejoy Pond is provided by an uncontrolled, free over-fall spillway, gated outlet works, stop log bays, and a pond drain. At the time of inspection, the reservoir surface was at elevation 301.3+ (MSL) or about 0.5 feet below spillway crest. It appears that there is a natural constriction in the reservoir located about 500 feet upstream of the dam. A bridge constricts the downstream channel about 200 feet below the dam. The bridge opening is approximately 65 feet wide by 10 feet high. Some scour has occurred immediately downstream of the dam, below the spillway and outlets. The spillway lacks an effective energy dissipation device.
- c. Appurtenant Structures. The stop logs and the bays which they close were found to be in good condition. Stop logs must be manually removed since there is no hoisting equipment. There are three gated outlets, two of which are presently closed by stop logs placed on the upstream face of the outlet sluiceway. The middle outlet is closed by a steel butterfly gate. The operating mechanism is no longer attached to the gate stem, rendering this gate inoperable. The pond drain appears to be closed by stop logs, however, a detail inspection could not be made due to the depth of the pond water.

SECTION 3
VISUAL INSPECTION

3.1 FINDINGS

- a. General. The Lovejoy Pond Dam is located in a narrow steep sided valley. It is a stone masonry and concrete structure with a broad crested, uncontrolled, free overfall spillway and six controlled outlets. Its present function is to control the level of Lovejoy Pond for recreational purposes.
- b. Dam.
- (1) Structural - The dam is constructed of dry-laid stone masonry with a concrete crest and upstream face. All the outlet sluiceways are constructed of concrete except the pond drain outlet which is a stone masonry conduit. See Appendices A, B and C for detail inspection notes, sketches and photographs. The inspection resulted in the following major findings:
- (a) The abutments of the dam appear to be in good condition with no evidence of settlement, movement, or leakage observed during the inspection.
- (b) The spillway section of the dam is bordered by concrete wingwalls at each end. The walls were constructed above the dry-laid stone masonry portion of the dam. The masonry appears to be in good condition, however, the concrete walls are in fair to poor condition. The west concrete wall is cracked, spalled, and its junction with the spillway is in poor condition. Some brush is growing in the masonry downstream of the wingwall. The east wingwall is in poor condition. The concrete surface is badly spalled and several holes exist through the wall. Trees and brush are growing in the masonry downstream of the wall (see photograph #3).

SECTION 2
ENGINEERING DATA

2.1 DESIGN

No design data were available for the Lovejoy Pond Dam.

2.2 CONSTRUCTION

No engineering data were available regarding construction of the Lovejoy Pond Dam.

2.3 OPERATION

No engineering operational data were available.

2.4 EVALUATION

- a. Availability. There are no engineering data or plans available that would be useful in evaluating the integrity of Lovejoy Pond Dam.
- b. Adequacy. The lack of 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 and engineering judgment.
- c. Validity. Not applicable.

Description - Stop log outlet bays, gated outlets, pond drain outlet (see photographs #4 and #5.

Control Mechanism - Butterfly gate

The center gated outlet is controlled by a butterfly valve which was designed to be manually operated from the top of the dam. The other two gated outlets are controlled by manually operated stop logs. The controlled outlets are inaccessible during flood conditions. The butterfly valve is considered inoperable at the present time due the lack of operating equipment.

h. Diversion and Regulating Tunnel. Not applicable.

i. Spillway

Type - Uncontrolled, free overfall, broad crested weir.

Length - 100 feet, not including width of the stop log bays.

Crest Elevation - 301.8 feet (MSL).

Gates - Ungated.

Upstream Channel - The approach channel to the spillway was found to be clear and unobstructed (see photograph #1). A natural constriction of the reservoir water surface occurs approximately 500 feet above the dam.

Downstream Channel - The channel of the stream below the Lovejoy Pond Dam is steep and rocky with scattered light to moderate growth of small trees and brush. A highway bridge located about 200 feet below the dam forms a channel constriction (see photograph #2). Within 1000 feet of the dam, the stream discharges into Pickerel Pond. Pickerel Pond-Pocasset Lake, with a surface area of about 720 acres at normal pool, is a 3 mile long impoundment located just downstream of Lovejoy Pond.

j. Regulating Outlets.

Inverts:

Stop log outlet bays - 291.7 (MSL)

Gated outlet works - 294.9 (MSL)

Gated pond drain outlet - 289+ (MSL)

Size: Stop log outlet bays (two) - 3.25 feet x 10 feet (each)
Gated outlet works (three) - 4 feet by 5.5 feet with arch
top (each) outlet
Pond drain - about 1.5 feet square

ITEM	ACRE-FEET
Invert of gated outlet works	1,400
Normal water surface pool	3,540
Top of dam (east wingwall)	4,630
1/2 PMF pool	7,000

f. Reservoir Surface Area.

ITEM	ACRES
Invert of gated outlet works	270
Normal water surface	370
Top of dam (east wingwall)	420
1/2 PMF pool	500

g. Dam.

Type - Dry-laid stone masonry dam with concrete cap forming the spillway crest and wingwalls.

Length - The length between abutments at top of dam is approximately 170 feet.

Height - 17 feet from top of west wingwall to stream bed.

Top Width - See plan and cross-sections in Appendix B-1.

Side Slopes - See plan and cross-sections in Appendix B-1.

Zoning - Unknown

Impervious Core - None

Cutoff - Stone masonry placed on stream bed

Grout Curtain - None

- (4) Stop log bays (with stop logs in place) - 0 cfs at elevation 301.8 ft
- (5) Total project discharge at 1/2 PMF - 10,000 cfs at elevation 309.9 feet.
- (6) Low level pond drain outlet - capacity unknown
- (7) Maximum flood at damsite is unknown.

c. Elevation. Benchmark #3AAM 1963 302, elev. 308.80 ft. MSL, located on the spillway crest east of the stop log bays was used to determine elevations at the damsite.

ITEM	ELEVATION (FEET ABOVE MSL)
Streambed at centerline of dam	289+
Maximum tailwater	Unknown
Normal water surface	301.8
Flood control pool	Not Applicable
1/2 PMF pool	309.9
Spillway crest	301.8
Top of east wingwall	304.8
Top of west wingwall	305.8
Invert of gated outlet works	294.9
Invert of stop log bays	291.7
Approximate invert of pond drain outlet	289+

d. Reservoir Reach.

ITEM	LENGTH (MILES)
Normal water surface pool	2.4
Top of dam (east wingwall)	2.5

e. Reservoir Storage Capacity.

The following capacities refer only to the water impounded by the dam.

f. Operator.

None.

g. Purpose of Dam. The dam was originally used as water power dam for mill complex and is presently being used to control the water level at Lovejoy Pond for recreational purposes.

h. Design and Construction History. There were no design or construction data disclosed.

i. Normal Operating Procedures.

The Lovejoy Pond Dam has no reported formal operating and maintenance program.

1.3 PERTINENT DATA

a. Drainage Area. The drainage area above Lovejoy Pond Dam is about 47 square miles. Approximately 15% of the drainage area consists of lakes and impoundments. The watershed is primarily forested and contains very little urban development.

b. Discharge at Damsite. Releases from Lovejoy Pond Dam can be made at the uncontrolled overflow spillway, two of the three gated outlets, and the two stop log outlet bays. The gated outlet controlled by a steel butterfly valve is considered inoperable. The dam is supplied with a low-level pond drain which cannot be operated until water level in the reservoir is at the invert elevation of the gated outlets. The following pertinent discharges at the dam were estimated.

- (1) Spillway discharge capacity - 1,400 cfs with water surface at elevation 304.8 ft
- (2) Gated outlet works capacity - 190 cfs at each outlet with water surface at elevation 301.8 ft
- (3) Stop log bays (with all stop logs removed) - 300 cfs at each outlet with water surface at elevation 301.8 ft

b. Description of Dam and Appurtenances. The Lovejoy Pond Dam is a dry-laid stone masonry and concrete structure. The dam is approximately 17 feet high, and about 170 feet long. The dam has a 100-foot long uncontrolled free overfall spillway and six controlled outlets. The dam is abutted by an earth embankment at each end.

c. Size Classification. The Lovejoy Pond Dam is classified as an intermediate size dam. It has a storage capacity of about 4600 acre-feet and a height of 17 feet assuming water surface at the top of the west wingwall. According to the Corps of Engineers "Recommended Guidelines for Safety Inspection of Dams," a dam with storage capacity greater than 1000 acre-feet but less than 50,000 acre-feet or a height greater than 40 feet but less than 100 feet is classified as an intermediate size dam. The construction of the dam increased the capacity of an existing natural lake. The capacity given above refers only to the storage impounded by the dam.

d. Hazard Classification. The Lovejoy Pond Dam is classified as having a low hazard potential. The peak flow from hypothetical failure of the dam was computed to be 5,000 cfs based on estimating procedures provided by the Corps of Engineers. The flood wave produced by the failure would be effectively absorbed by the impoundments located downstream of Lovejoy Pond. The increase in lake level at the downstream ponds would not be sufficient to cause extensive flooding along the shores. One house located approximately 400 feet below Lovejoy Pond Dam may be flooded to a depth of about 1 foot by the flood wave. The channel constriction caused by a bridge located 200 feet below the dam results in submergence of the spillway at flows greater than 3,200 cfs.

e. Ownership.

Current: James Lawrence
R.F.D. #1
Readfield, Maine 04355
Tel: 207-685-4273 (Home)
207-622-7391 (Office)

PHASE I INSPECTION REPORT

LOVEJOY POND 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 of 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. Edward C. Jordan Co., Inc. has been retained by the New England Division to inspect and report on selected dams in the states of Maine and New Hampshire. Authorization and notice to proceed were issued to Edward C. Jordan Co., Inc. under a letter of December 1, 1978 from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0017 has been assigned by the Corps of Engineers for this work.

b. Purpose

- (1) To 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) To encourage and prepare the states to initiate effective dam safety programs for non-Federal dams.
- (3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF PROJECT

a. Location. The Lovejoy Pond Dam is located on Lovejoy Stream at the outlet of Lovejoy Pond in the town of North Wayne, Maine. N 44°-21.9', W 70°-01.8'.

SECTION 6
STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observations. Based on the visual observations, the Lovejoy Pond Dam appears to be in poor condition. A portion of the downstream face of the stone masonry which supports the spillway crest has been dislodged, leaving the crest unsupported (see photographs #3 and #7). The concrete surface of the wingwalls, gated outlet sluiceways, and the spillway crest are badly cracked and spalled. Holes exist in the spillway crest and east wingwall. Heavy leakage is occurring through both the spillway crest and the masonry below the crest.
- b. Design and Construction Data. No data concerning original design or construction of the Lovejoy Pond Dam was disclosed in this investigation.
- c. Operating Records. None available.
- d. Post Construction Changes. No known modifications.
- e. Seismic Stability. The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines, does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

- a. Condition. Based on the visual inspection and performance history of the Lovejoy Pond Dam, it is assessed to be in poor condition. The test flood is the 1/2 PMF. The spillway capacity is about 15 percent of the test flood discharge and the dam would be overtopped by about 5.1 feet during the test flood event.

The inspection resulted in the following major concerns:

- (1) The stone masonry which forms the downstream face of the spillway and forms the support for the spillway crest has been dislodged in one area resulting in the collapse of an 8-foot width of the spillway crest at that area (see photographs #3 and #7 and overview).
- (2) The concrete surfaces of the spillway, wingwalls, and gated outlet sluiceways are in poor condition (see photograph #5).
- (3) Heavy leakage is occurring through the masonry below the spillway section of the dam.
- (4) The outlet works which are located in the central portion of the dam beneath the spillway would be inaccessible during flood conditions. Four of these outlets are closed by stop logs and a fifth outlet is closed by an inoperable butterfly gate.

- b. Adequacy of Information. The information available is such that the assessment of the condition of the dam must be based primarily on the visual inspection and engineering judgment.

- c. Urgency. The recommendations and remedial measures outlined in 7.2 and 7.3 below should be implemented within 12 months after receipt of this report by the owner.

- d. Need for Additional Investigation. Additional investigation is not considered necessary for the current assessment.

7.2 RECOMMENDATIONS

The following should be evaluated by a registered professional engineer and implemented as found necessary:

- (1) Curtailment of leakage through the dam.
- (2) Rehabilitation of the stone masonry and the spillway crest.
- (3) Provisions for energy dissipation and scour protection below the spillway and outlets.

7.3 REMEDIAL MEASURES

a. Operating and Maintenance Procedures. A program of regular inspection and maintenance of the dam should be implemented and a record of these activities should be kept. The following specific maintenance and operating procedures should be implemented:

- (1) Repair all spalled and cracked concrete surfaces including reconstruction of the east wingwall and portions of the spillway crest.
- (2) Clear trees and brush from the masonry portions of the dam below the wingwalls.
- (3) Provide around-the-clock surveillance during periods of anticipated high runoff.
- (4) Have inspections of the dam made by a registered professional engineer once every year.

7.4 ALTERNATIVES

An alternative to major repair and reconstruction at the dam would be to remove the structure. The impact of this action should however be evaluated further.

APPENDIX A

VISUAL INSPECTION CHECKLIST
AND
SUPPLEMENTARY INSPECTION NOTES

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Lovejoy Pond Dam

DATE 12/6/78

TIME A.M.

WEATHER Sunny, cool

W.S. ELEV. 301.5 U.S. 289.9 DN.S.

PARTY:

- | | |
|---------------------------|-----------|
| 1. <u>Stephen Cole</u> | 6. _____ |
| 2. <u>John Devine</u> | 7. _____ |
| 3. <u>Scott Decker</u> | 8. _____ |
| 4. <u>John Kimble</u> | 9. _____ |
| 5. <u>Charles Goodwin</u> | 10. _____ |

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Geotechnical</u>	<u>Cole</u>	
2. <u>Structural</u>	<u>Decker, Cole</u>	
3. <u>Hydraulics/Hydrology</u>	<u>Devine</u>	
4. <u>Civil</u>	<u>Decker</u>	
5. <u>Photography</u>	<u>Decker, Devine</u>	
6. <u>Survey</u>	<u>Kimble, Goodwin</u>	
<u>Review Inspection</u>	<u>S. Walker, C. Horstmann</u>	
<u>12/6/78</u>		

NOTE: See Supplementary Inspection Notes Following Checklist

INSPECTION CHECKLIST

PROJECT Lovejoy Pond Dam

DATE 12/6/78

PROJECT FEATURE Embankment

NAME Cole

DISCIPLINE Geotechnical

NAME _____

AREA EVALUATED

CONDITIONS

DAM EMBANKMENT

No embankment, except for backfill at abutments

Crest Elevation	305 \pm
Current Pool Elevation	301.5 \pm
Maximum Impoundment to Date	Unknown
Surface Cracks	None
Pavement Condition	Turf, okay
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Okay
Horizontal Alignment	Okay
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	None
Sloughing or Erosion of Slopes or Abutments	None
Vegetation	

AREA EVALUATED	CONDITIONS
<u>DAM EMBANKMENT</u> (cont.)	
Rock Slope Protection - Riprap Failures	None
Unusual Embankment or Downstream Seepage	None
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

INSPECTION CHECKLIST

PROJECT Lovejoy Pond Dam DATE 12/6/78
 PROJECT FEATURE Intake Channel/Structural NAME Cole, Decker
 DISCIPLINE Structural, Geotechnical NAME Devine
Hydrology/Hydraulics

AREA EVALUATED	CONDITION
----------------	-----------

OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE

a. Approach Channel

Slope Conditions	Flat, okay
Bottom Conditions	Appears clear
Rock Slides or Falls	None
Log Boom	None
Debris	None
Condition of Concrete Lining	None
Drains or Weep Holes	None

b. Intake Structure

Condition of Concrete	Fair
Stop Logs and Slots	Appear okay
Debris Screen	Unknown

INSPECTION CHECKLIST

PROJECT Lovejoy Pond Dam DATE 12/6/78

PROJECT FEATURE Control Tower NAME Cole, Decker

DISCIPLINE Structural, Hydraulics/
Hydrology NAME Devine

AREA EVALUATED	CONDITION
----------------	-----------

<u>OUTLET WORKS - CONTROL TOWER</u>	Consists of dam section in area of outlets
-------------------------------------	--

a. Masonry and Structural

General Condition	Fair to poor
Condition of Joints	Okay
Spalling	Minor spalling
Visible Reinforcing	None
Rusting or Staining of Concrete	None
Any Seepage or Efflorescence	Leakage through cracks
Joint Alignment	Okay
Unusual Seepage or Leaks in Gate Chamber	Not applicable
Cracks	Several cracks in dam surface
Rusting or Corrosion of Steel	None

b. Mechanical and Electrical

Air Vents	N/A
Float Wells	N/A
Gate Hoist	N/A
Elevator	N/A

AREA EVALUATED	CONDITIONS
<u>OUTLET WORKS - CONTROL TOWER (cont.)</u>	
Hydraulic System	N/A
Service Gates	2 stop log bays - good 1 butterfly gate - fair
Emergency Gates	2 stop log closed gate outlets - fair 1 pond drain gate - fair
Lightning Protection System	None
Emergency Power System	None
Wiring and Lighting System	None

INSPECTION CHECKLIST

PROJECT Lovejoy Pond Dam DATE 12/6/78
PROJECT FEATURE Transition & Conduit NAME Cole, Decker
DISCIPLINE Structural, Hydraulics/
Hydrology NAME Devine

AREA EVALUATED	CONDITION		
<u>OUTLET WORKS - TRANSITION AND CONDUIT</u>	Low Level Pond Drain	Middle Level Gated Outlets	Stop Log Bays
General Condition of Concrete		Poor	Good
Rust or Staining on Concrete	Could not inspect conduit in detail.	Lime stain	None
Spalling		severe	Minor
Erosion or Cavitation		Where spalled	Minor
Cracking		Severe on sides	None
Alignment of Monoliths		None	None
Alignment of Joints		None	Good
Numbering of Monoliths		N/A	N/A

PERIODIC INSPECTION CHECKLIST

PROJECT Lovejoy Pond Dam DATE 12/6/78
 PROJECT FEATURE Outlet Structure/Channel NAME Cole, Decker
 DISCIPLINE Geotechnical, Structural NAME Devine
Hydrology/Hydraulics

AREA EVALUATED	CONDITION		
<u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u>	Low Level Pond Drain	Middle Level Gates	Stop Log Bays
General Condition of Concrete	Stone masonry	Fair	Good
Rust or Staining	N/A	Lime stain	None
Spalling	N/A	Severe	Minor
Erosion or Cavitation	None	Some	Minor
Visible Reinforcing	N/A	None	None
Any Seepage or Efflorescence	None	At cracks	None
Condition at Joints	Okay	No joints	Okay
Drain holes	None	None	None
Channel			
Loose Rock or Trees Overhanging Channel	Trees along sides of channel		
Condition of Discharge Channel	Some deep scour, bridge downstream 200 feet		

INSPECTION CHECKLIST

PROJECT Lovejoy Pond Dam DATE 12/6/78
 PROJECT FEATURE Spillway NAME Cole, Decker
 DISCIPLINE Structural, Hydraulics/
Hydrology NAME Devine

AREA EVALUATED

CONDITION

OUTLET WORKS - SPILLWAY WEIR, APPROACH
AND DISCHARGE CHANNELS

a. Approach Channel

General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Appears clear, ice covered (NOTE: Natural channel restriction about 500 feet upstream of dam)

b. Weir and Training Walls

General Condition of Concrete	Poor	NOTE: Crest sags and is cracked. Also has hole through surface.
Rust or Staining	None	
Spalling	Some	
Any Visible Reinforcing	None	
Any Seepage or Efflorescence	Severe leakage	
Drain Holes	None	

c. Discharge Channel

General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Trees along channel
Floor of Channel	Some scour
Other Obstructions	Bridge downstream about 200 feet

INSPECTION CHECKLIST

PROJECT Lovejoy Pond Dam

DATE 12/6/78

PROJECT FEATURE Service Bridge

NAME Decker

DISCIPLINE Civil

NAME _____

AREA EVALUATED

CONDITION

OUTLET WORKS - SERVICE BRIDGE

a. Superstructure

Bearings

Anchor Bolts

Bridge Seat

Longitudinal Members

Under Side of Deck

NO SERVICE BRIDGE

Secondary Bracing

Deck

Drainage System

Railings

Expansion Joints

Paint

b. Abutment & Piers

General Condition of Concrete

Alignment of Abutment

Approach to Bridge

Condition of Seat & Backwall



1

VIEW UPSTREAM



2

VIEW DOWNSTREAM

C-2

Lovejoy Pond Dam

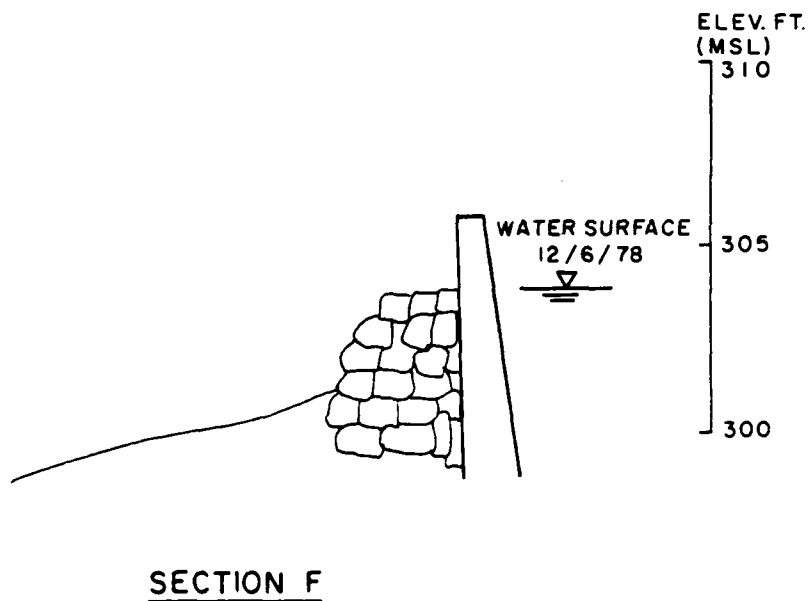
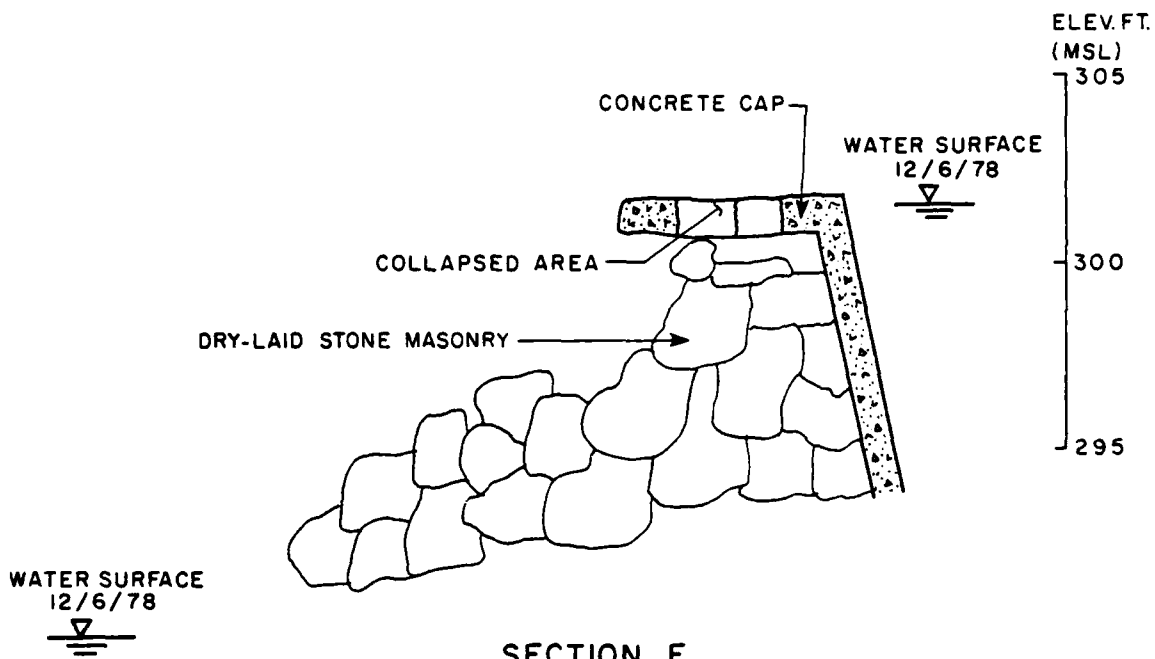
APPENDIX C

PHOTOGRAPHS

The following are photographs referenced in this report. See Sheet B-1 for photograph locations and orientations.

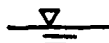
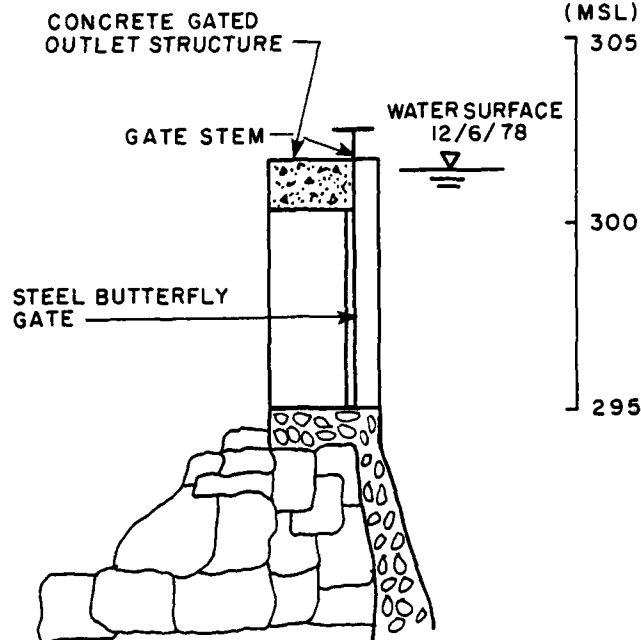
C-1

Lovejoy Pond Dam

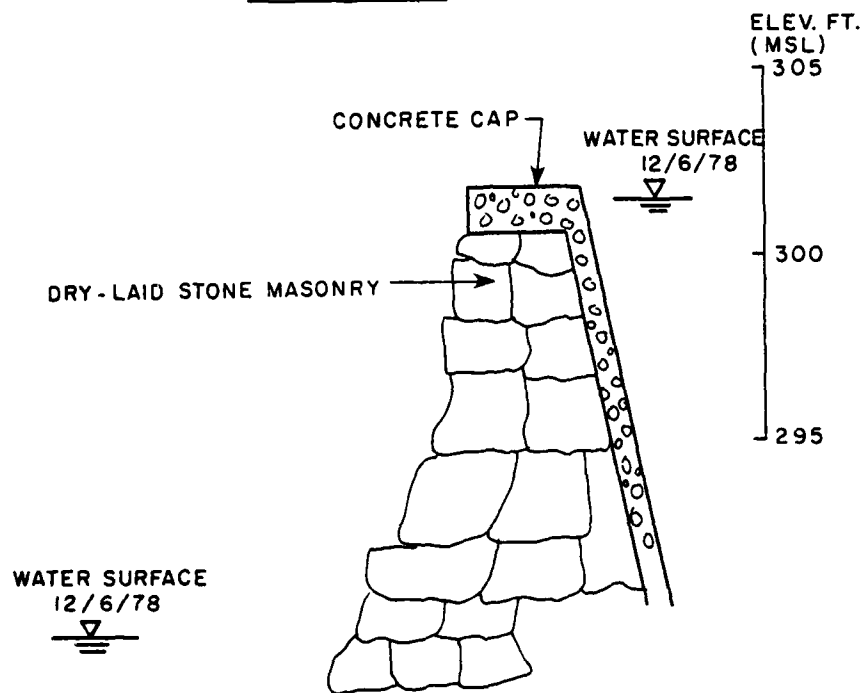


DATE: 12/6/78	BY: [illegible]
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	
LOVEJOY POND DAM	
X-SECTIONS	
LOVEJOY POND	MAINE
2079916	AS SHOWN APRIL 1979


WATER SURFACE
12/6/78

SECTION C

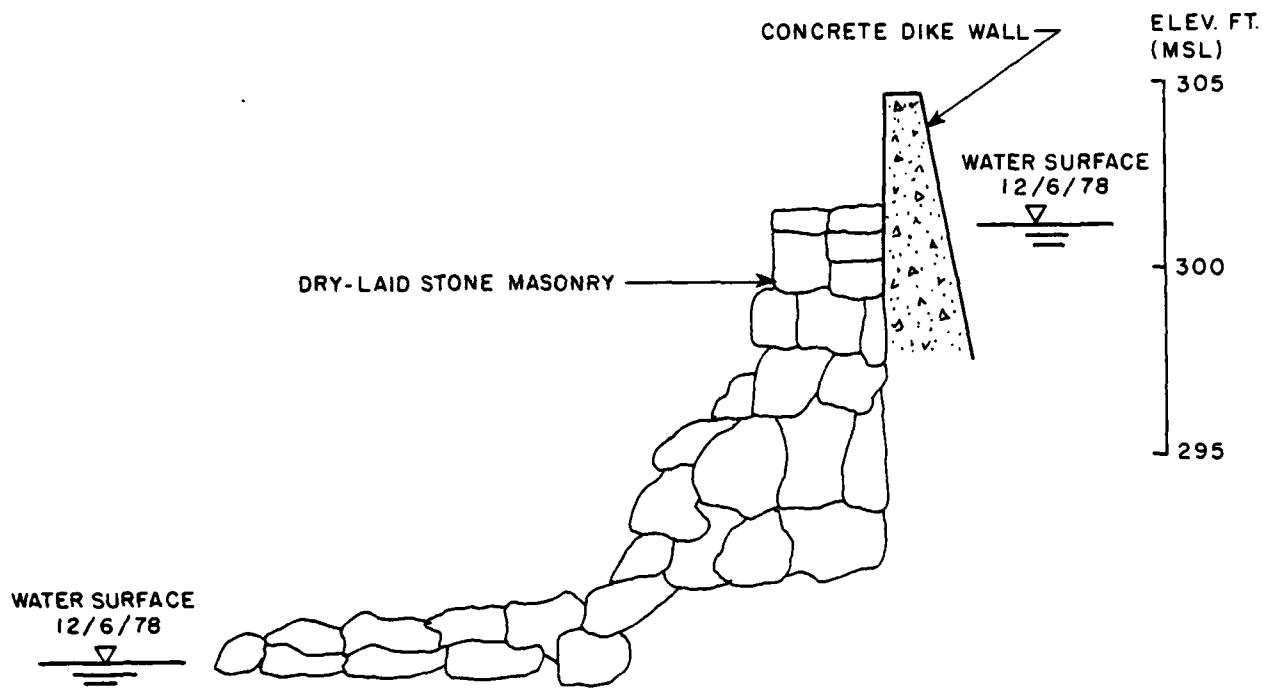


WATER SURFACE
12/6/78

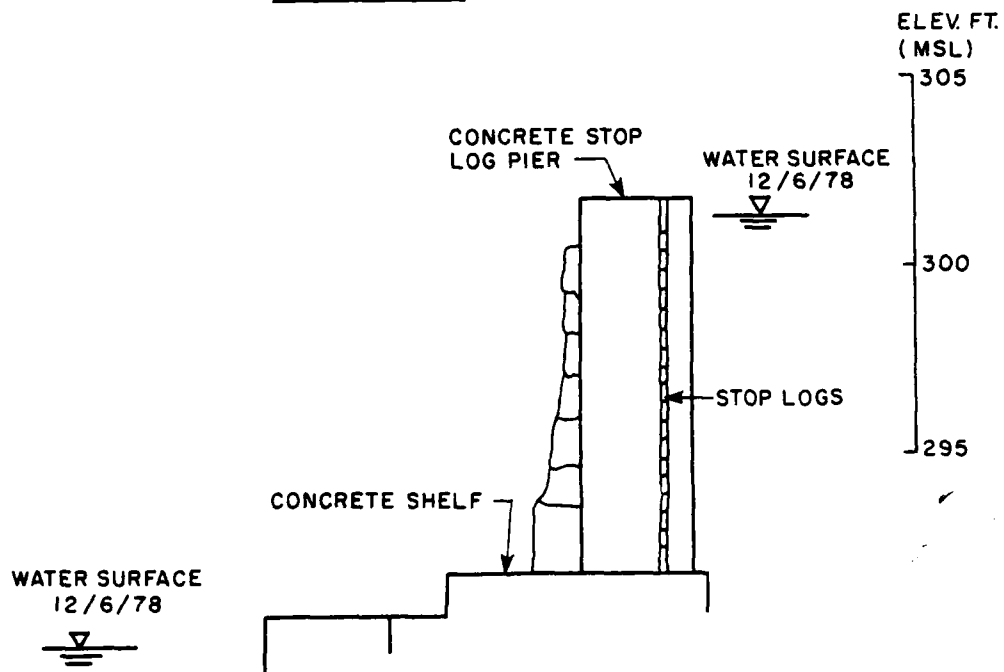


SECTION D

EDWARD J. JORDAN, INC., INC. PORTLAND, MAINE	U.S. ARMY ENGINEER CORPS, NEW ENGLAND DISTRICT ENGINEERS BOSTON, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	
LOVEJOY POND DAM	
X-SECTIONS	
LOVEJOY POND	MAINE
2079916	DATE: AS SHOWN APRIL 1979

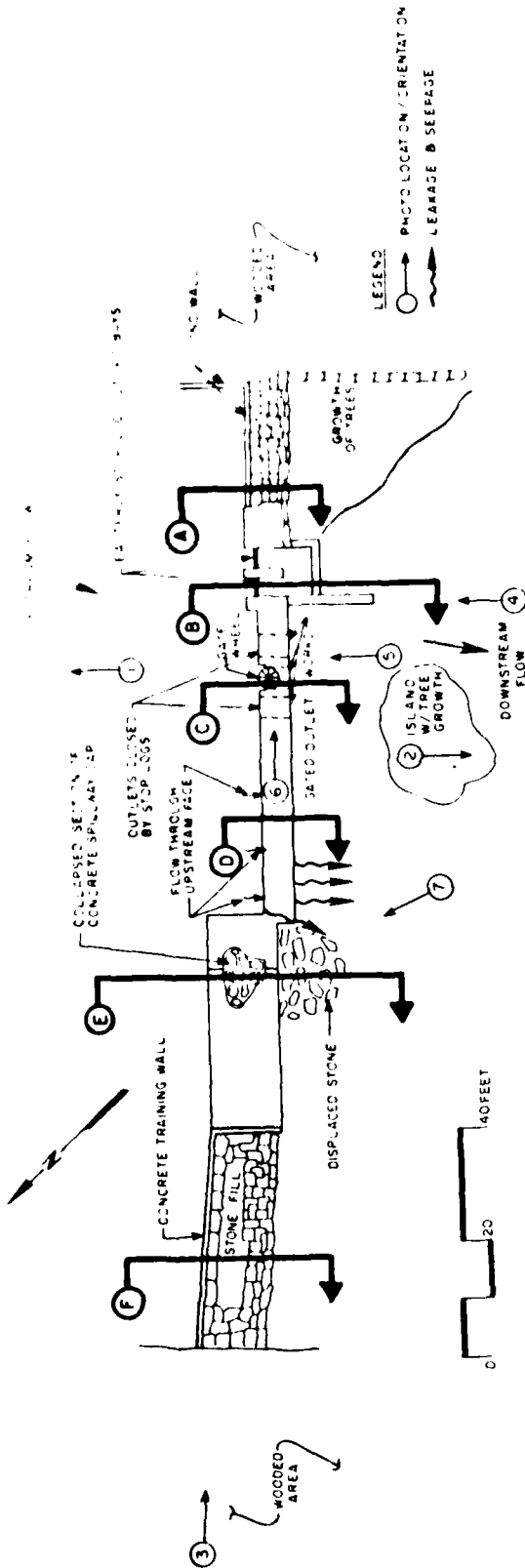


SECTION A

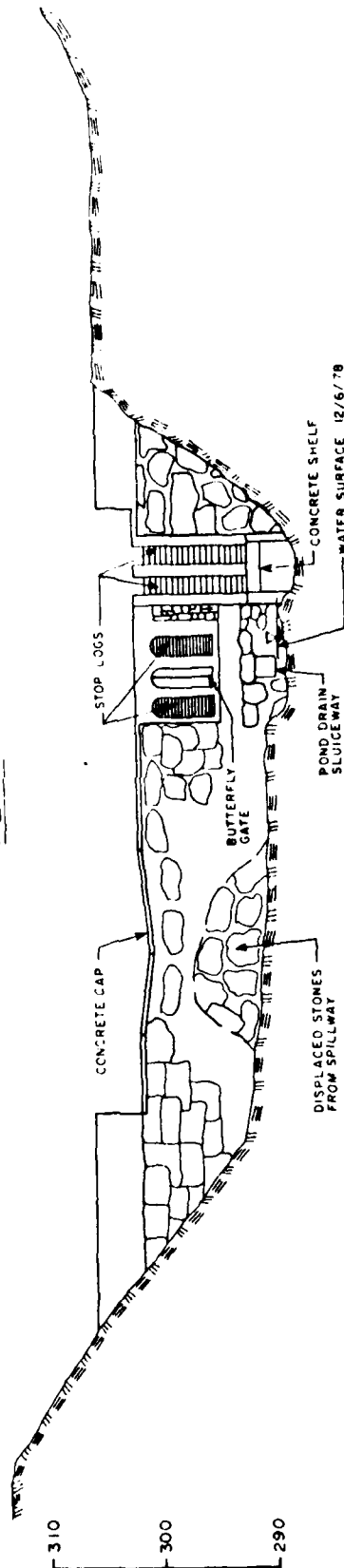


SECTION B

EDWARD J. JORDAN, CO., INC. PORTLAND, MAINE	U.S. ARMY ENGINEERS, NEW ENGLAND DISTRICT MAINTENANCE ENGINEERS BOSTON, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	
LOVEJOY POND DAM	
X-SECTIONS	
LOVEJOY POND	MAINE
2079816	SCALE AS SHOWN DATE APRIL 1979



PLAN



DOWNSTREAM PROFILE

LOVEJOY POND DAM
PLAN & PROFILE
LOVEJOY POND MAINE
12/6/78

APPENDIX B-1

GENERAL PROJECT DATA

- I. The following plan, profile and cross-sections of the dam were developed from a limited stadia survey performed during the visual inspection, field notes taken by inspection team members, and photographs taken during the visual inspection. U.S.G.S. (mean sea level) elevations were obtained from benchmark #3AAM 1963 302, elev. 308.80 ft. MSL, located on the spillway crest east of the stop log bays.

B-1-1

Lovejoy Pond Dam

APPENDIX B
ENGINEERING DATA

This appendix lists the engineering data collected either from project records or other sources of data developed as a result of the visual inspection. The contents of this appendix are listed below.

<u>Appendix</u>	<u>Description</u>
B-1	General Project Data

B-1

Lovejoy Pond Dam

dam structure recently. It appears that no formal plan for operation and maintenance exists for the structure.

A-16

Lovejoy Pond Dam

5. SAFETY AND PERFORMANCE INSTRUMENTATION

There is no safety and performance instrumentation of the dam.

6. RESERVOIR

- a. Shoreline. The reservoir shoreline is primarily forested. There are approximately 40 summer shoreline dwellings. Slopes above high waterline are moderate and the potential for slope failure appeared minimal.
- b. Sedimentation. The extent of sedimentation in the reservoir could not be observed during the field inspection; however, sediment accumulation does not appear to impede flow to the spillway.
- c. Potential Upstream Hazard. Approximately 15 cabins would be flooded along the reservoir shoreline during the 1/2 PMF event.
- d. Watershed Runoff Potential. Because of the relatively large runoff area including lakes and impoundments in the drainage area, and the flat to moderate ground slopes, the watershed runoff potential is considered to be low. No significant changes in watershed runoff potential are expected to occur in the near future.

7. DOWNSTREAM CHANNEL

The channel of the stream below the Lovejoy Pond Dam is steep and rocky with a scattered light to moderate growth of small trees and brush. A highway bridge located about 200 feet below the dam forms a channel constriction (see photograph #2). Within 1000 feet of the dam, the stream discharges into Pickerel Pond. Pickerel Pond-Pocasset Lake is a 3-mile long impoundment located downstream of Lovejoy Pond with a surface area of 720 acres at normal pool (assumed to be spillway crest).

8. OPERATION AND MAINTENANCE FEATURES

- b. Maintenance. Based on the visual inspection it appears that little or no maintenance has been performed on the

- impoundment. These inlets, however, do not appear to be obstructed and the concrete appears to be in good condition.
- b. Operating and Emergency Control Gates. The center outlet of the gated outlet works is closed by a butterfly-type gate. There is no operating equipment available at the dam for opening or closing this gate. The other two outlets are closed by stop logs. There is no equipment at the dam for removal of stop logs, however, the logs could be removed manually when discharges of the spillway were not occurring.
 - c. Conduits, Sluices and Water Passages. The three gated outlet sluiceways are constructed of concrete. The surfaces of the concrete discharge channels were in poor condition with severe spalling and cracking. Some seepage was also occurring through the side walls of the outlet conduits. The stop log bays were found to be in generally good condition. The interior surface of the sluiceway are in good condition with no serious erosion or spalling. The small low-level pond drain outlet is a stone masonry conduit through the bottom of the dam. No leakage was evident through this conduit. No erosion or joint separation was apparent and it appeared that this outlet was in generally good condition.
 - d. Stilling Basin. The stilling basin downstream of the gated outlet works and stop log bays is the stream channel. Fairly heavy scour has occurred downstream of the gated outlet works. The scour was found to have created a depression two to three feet deep immediately downstream of these outlets. No evidence of undermining in the dam structure was observed.
 - e. Approach and Outlet Channels. The gated outlet works approach channel appears to be clear and unobstructed. The impoundment was ice covered and a detailed examination could not be made. The outlet channel is generally unobstructed, however, trees line both sides of the channel and a few trees exist in the channel. A bridge exists approximately 200 feet downstream.
 - f. Drawdown Facilities. The two operable gated outlets, the stop log bays, and the pond drain outlet are capable of providing drawdown of the lake level and complete drainage of the impounded water, if required, under low flow conditions.

- j. Abutments. The abutments of the dam were found to be in generally good condition. No evidence of excessive seepage, settlement or instability was observed.

2. EMBANKMENT STRUCTURES

Not applicable.

3. SPILLWAY STRUCTURES

The spillway consists of narrow crest east and broader crest west sections. The spillway crest consists of a concrete cap constructed on top of the dry-laid stone masonry dam.

- a. Control Gates and Operating Machinery. The spillway section of the dam is uncontrolled.
- b. Unlined Saddle Spillways. None.
- c. Approach and Outlet Channels. The spillway approach channel was found to be clear and unobstructed. The impoundment was ice covered and a detailed inspection of the channel bottom could not be made. The outlet channel is generally clear and unobstructed. Trees lined both banks and some trees were growing in the channel. A bridge exists approximately 200 feet downstream of the dam.
- d. Stilling Basin. The cobble and boulder-lined channel downstream of the dam forms a stilling basin. No serious scour had occurred in the downstream channel below the spillway.

4. OUTLET WORKS

The outlet works consist of three gated outlets (two now closed by stop logs) and two stop log outlet bays. A low level pond drain outlet exists below the gated outlet works. This outlet is apparently closed by stop logs, however, a detailed inspection could not be made due to the level of the water in the impoundment.

- a. Intake Structure. The intake structures for the outlets appear to be in generally good condition. A detailed inspection could not be made due to the presence of ice in the

either end. The junction between the westerly wingwall and the westerly spillway section of the dam shows evidence of some minor movement and erosion. Seepage and leakage is occurring at the junction between the east and west spillway sections of the dam where a crack has developed, apparently due to movement of the westerly spillway section. The junctions between the easterly spillway and the stop log outlet section of the dam were found to be in good condition.

- e. Drains. No drains were found in the downstream face of the dam. Leakage through the dam was coming out at the toe and at points only one to two feet above the toe.
- f. Water Passages. The spillway crest is concrete. Only minor erosion of the crest was observed. However, a substantial hole has occurred in the westerly spillway crest, due to failure of the stone masonry beneath. The interior surfaces of the gated outlet works were found to be in generally poor condition with substantial spalling erosion. The stop log bays were found to be in good condition with no evidence of significant erosion or spalling.
- g. Seepage and Leakage. Substantial leakage was occurring at the downstream toe of the spillway. This leakage appears to be coming from cracks in the spillway crest and the upstream concrete face. Leakage downstream of the junction between the broad west and narrower east spillway sections was estimated to be in excess of 50 gpm. Evidence of previous seepage was noted along the toe of the westerly spillway section. Some seepage was occurring downstream of the easterly wingwall and from the bedrock below the easterly abutment.
- h. Monolith Joints, Construction Joints. The joints between the various concrete elements of the dam are found to be in generally poor to fair condition. Erosion and wear were visible at most joints.
- i. Foundation. It appears that the easterly portion of the dam is founded directly on bedrock. However, no outcrops of bedrock were observed below the westerly section of the dam. The dam does not show evidence of distress due to foundation problems, even though substantial scour has occurred just downstream.

SUPPLEMENTARY INSPECTION NOTES

LOVEJOY POND DAM NORTH WAYNE, MAINE

APPENDIX A

1. CONCRETE AND STONE MASONRY STRUCTURES IN GENERAL

- a. Concrete Surfaces. In general, the surfaces of the concrete at the Lovejoy Pond Dam were found to be in fair to poor condition. Serious spalling has occurred on the downstream face of the structure in the area of the gated outlet works. Substantial cracking has occurred in the spillway crest, and substantial spalling has occurred on the east and west wingwalls of the dam. In one section of the spillway crest the concrete has collapsed and the supporting stone has tumbled.

Stone Masonry Surfaces. The downstream face, both wingwalls and spillway sections of the dam, is constructed of dry-laid stone masonry. The surface of this masonry was found to be generally tight. However, a large area of the westerly spillway has toppled and is now lying downstream of the dam. The remaining masonry in this area is very loose.

- b. Structural Cracking. A number of structural cracks were observed in the outlet sluiceways and in the easterly wingwalls of the dam. The movement of water through the cracks is causing further erosion and deterioration.
- c. Movement, Horizontal and Vertical Alignment. The dam alignment appears generally true to line and grade. However, the westerly spillway section of the dam has sagged as much as six inches and a substantial hole has developed through the surface of the spillway. The downstream face of the dam in this area has toppled and the masonry stones are presently strewn downstream of the spillway face.
- d. Junctions. The junctions between the earthwork bank and the abutments were in good condition at both ends of the dam. There is no evidence of settlement, seepage or erosion at



3

DAM CREST FROM WEST END



4

EASTERLY STOP LOG OUTLET

C-3

Lovejoy Pond Dam



5

GATED OUTLET (CENTER) AND STOP LOG OUTLETS (LEFT & RIGHT)
WITH LOW LEVEL OUTLET AT BOTTOM



6

EAST ABUTMENT

C-4

Lovejoy Pond Dam



7

COLLAPSED AREA - DOWNSTREAM FACE

C-5

Lovejoy Pond Dam

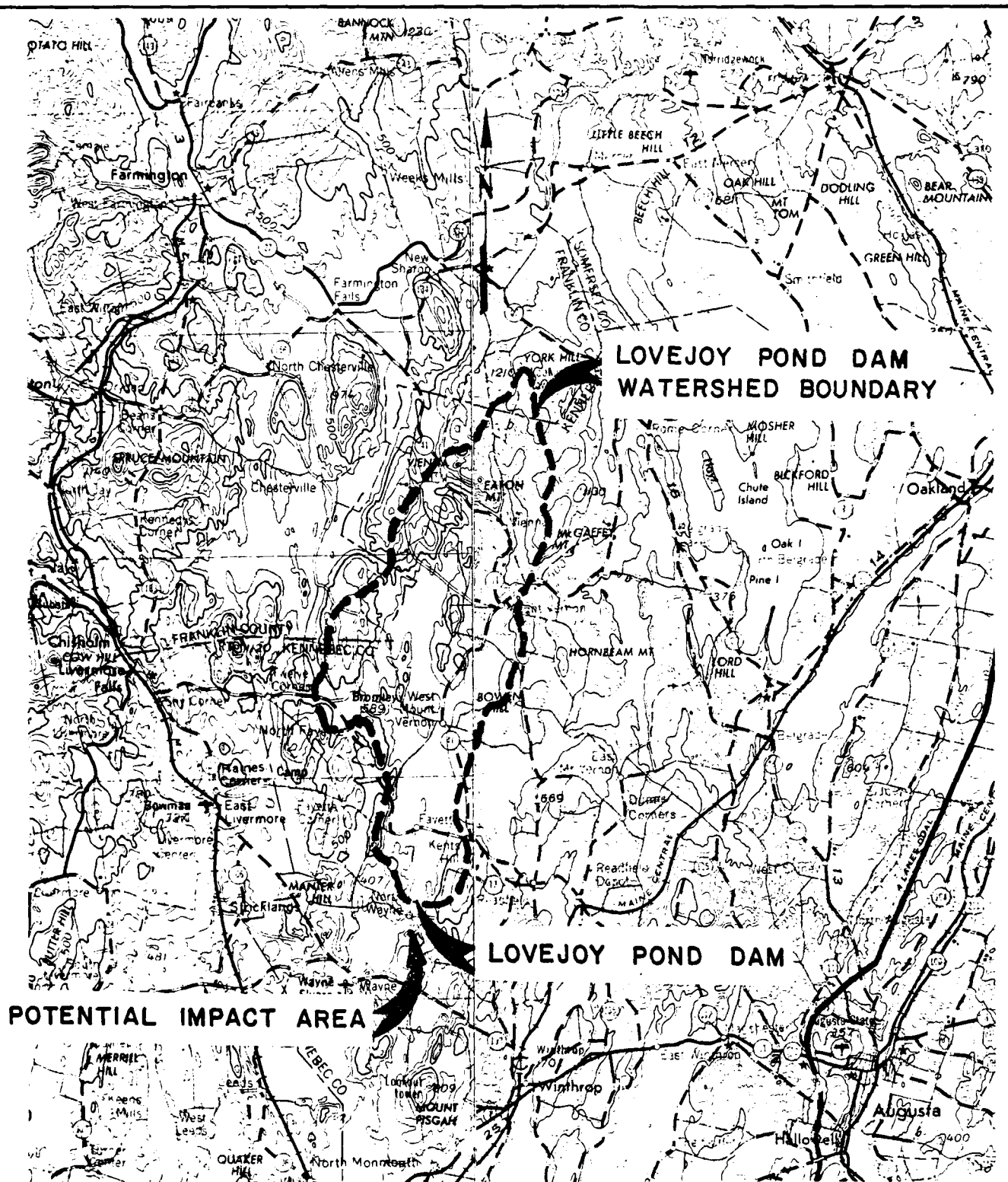
APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

Hydrologic computations pertinent to this investigation are attached.
The following figure shows the watershed at the Lovejoy Pond Dam.

D-1

Lovejoy Pond Dam



POTENTIAL IMPACT AREA

U.S. GEOLOGICAL SURVEY MAP
LEWISTON, ME QUADRANGLE
BANGOR, ME QUADRANGLE

10 5 10 15 MILES

CONRAD, JORDAN, ET AL. PORTLAND, MAINE	U.S. ARMY CORPS OF ENGINEERS PORTLAND DISTRICT MAINE
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	
LOVEJOY POND DAM DRAINAGE AREA MAP	
ANDROSCOGGIN RIVER	ME.
2079916	AS SHOWN APRIL 1979

PROJECT LOVEJOY POND HYDRAULICS	COMP BY	JOB NO.
	JJD	20799-16
	CHK BY BTE	DATE 2-13-78

DISCHARGE CAPACITY

A. SPILLWAY - CONCRETE CAPPED, NON-GATED, FREE OVERFALL SPILLWAY
BREADTH VARIES, ASSUME $C = 2.64$

	SURVEY DATUM (FT)	MSL ELEV (FT)	H	C	L	Q
CREST	100.5	301.8	0	2.64	101.5	0
	101.7	303.0	1.2	2.64	"	352
	102.7	304.0	2.2	"	"	874
TOP OF EAST WINGWALL	103.5	304.8	3.0	"	"	1,392
TOP OF WEST WINGWALL	104.5	305.8	4.0	"	"	2,144
	105.7	307.0	5.2	"	"	3,177
	106.7	308.0	6.2	"	"	4,137
		309.0	7.2	"	"	5,177
	108.7		8.2	"	"	6,292
		311.0	9.2	"	"	7,477
	110.7		10.2	"	"	8,729
	111.7	313.0	11.2	"	"	10,044
		314.0	12.2	"	"	11,419
	113.7	315.0	13.2	"	"	12,851

B. EAST WINGWALL - CREST ELEV = 304.8 FT, BREADTH = 1 FT

	SURVEY DATUM (FT)	MSL ELEV (FT)	H	C ₁	L	Q
	103.5	304.8	0		22.5	0
	104.5	305.8	1.0	2.98	"	67
	105.7	307.0	2.2	3.30	"	242
	106.7	308.0	3.2	3.32	"	428
	107.7		4.2	"	"	643
		310.0	5.2	"	"	886
	109.7		6.2	"	"	1,153
		312.0	7.2	"	"	1,443
	111.7		8.2	"	"	1,754
		314.0	9.2	"	"	2,085
	113.7	315.0	10.2	"	"	2,433

✓ KING & BRATER, "HANDBOOK OF HYDRAULICS", SIXTH EDITION, TABLE 5-3

PROJECT LOVEJOY POND HYDRAULICS	COMP BY	JOB NO.
	JJD	20799-16
	CHK BY BTD	DATE 2-13-78

C. WEST WINGWALL - CREST ELEV = 305.8 FT, "C" VALUES FROM KING & BRATER, "HANDBOOK OF HYDRAULICS" 6th ED. TABLE 5-3, BREADTH = 1 FT

SURVEY DATUM (FT)	MSL ELEV (FT)	H	C	L	(cfs) Q
104.5	305.8	0		39	0
104.7	306.0	0.2	2.69	"	4
105.7		1.2	3.08	"	158
106.7	308.0	2.2	3.30	"	420
107.7		3.2	3.32	"	741
	310.0	4.2	3.32	"	1,115
109.7		5.2	3.32	"	1,535
	312.0	6.2	"	"	1,999
111.7		7.2	"	"	2,501
	314.0	8.2	"	"	3,040
113.7	315.0	9.2	"	"	3,613

D. STOP LOG CONTROLLED OUTLET ($C \approx 2.9$)

SURVEY DATUM	MSL ELEV	H \downarrow		C	L	(cfs) \downarrow	
		(1)	(2)			(1)	(2)
90.4	291.7	0		2.9	6.5	0	0
91.7	293.0	1.3		"	"	28	0
93.7	295.0	3.3		"	"	113	0
	297.0	5.3		"	"	230	0
	299.0	7.3		"	"	372	0
99.7	301.0	9.3		"	"	535	0
100.7	302.0	10.3	0.2	"	"	623	2
102.7	304.0	12.3	2.2	"	"	813	62
	306.0	14.3	4.2	"	"	1,019	162
106.7	308.0	16.3	6.2	"	"	1,241	291
	310.0	18.3	8.2	"	"	1,476	443
	312.0	20.3	10.2	"	"	1,724	614
113.7	315.0	23.3	13.2	"	"	2,120	904

\downarrow (1) = ALL STOP LOGS REMOVED, (2) STOP LOGS IN PLACE, TOP OF STOP LOGS AT ELEV 301.8 FT (NORMAL OPERATING POSITION)

PROJECT LOVEJOY DAM HYDRAULICS	COMP BY JSD	JOB NO. 20799-16
	CHK BY BTR	DATE 2-13-78

E. GATED OUTLET WORKS - THREE GATED OUTLETS, TWO PROVIDED WITH STOP LOGS, ONE WITH A STEEL BUTTERFLY VALVE.
 USE: $Q = CA\sqrt{2gH}$ WITH $C = 0.6$ WHEN WATER SURFACE ELEV EXCEEDS 300.4 FT, OTHERWISE USE $Q = CLH^{3/2}$ WITH $C = 2.6$. EACH OUTLET IS 4 FT WIDE AT THE INVERT.

	SURVEY DATUM	MSL ELEV	H	C	L ORA	Q	
↑ WEIR FLOW	93.6	294.9	0	2.6	12	0	
	94.7	296.0	1.1	2.6	"	36	
	95.7	297.0	2.1	2.6	"	95	
		298.0	3.1	2.6	"	170	
	97.7	299.0	4.1	2.6	"	259	
↓ ORIFICE FLOW	99.7	301.0	3.4	0.6	58.5	519	
	100.5	301.8	4.2	0.6	58.5	577	SPILLWAY CREST
						↓	
						577	

THE GATES PROVIDED WITH STOP LOGS ARE CONSIDERED OPERABLE, HOWEVER, THEY ARE INACCESSIBLE DURING FLOOD FLOWS AND ARE ASSUMED NOT TO ASSIST IN DISCHARGING FLOOD FLOWS.

THE STEEL BUTTERFLY VALVE IS CONSIDERED INOPERABLE.

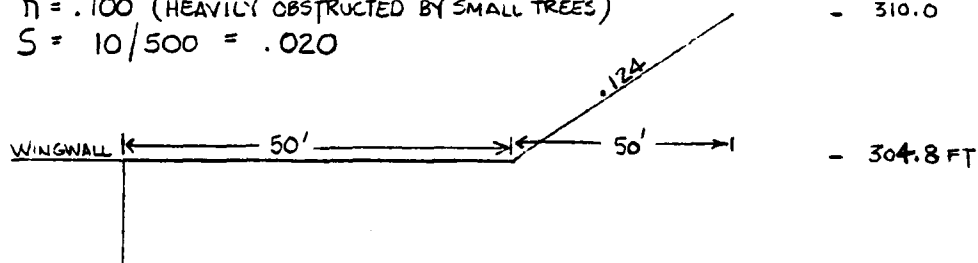
PROJECT LOVEJOY POND HYDRAULICS	COMP BY JJD	JOB NO. 20799-16
	CHK BY BTB	DATE 2-13-79

OVERLAND FLOW

1) EAST END OF DAM

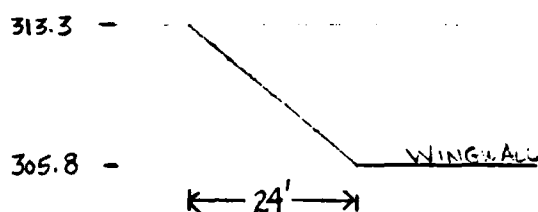
$n = .100$ (HEAVILY OBSTRUCTED BY SMALL TREES)

$S = 10/500 = .020$



W.S. ELEV	$\frac{1.486}{n}$	A	P	R	S	Q
306	14.9	66	60	1.10	.020	148
307	"	130	68	1.91	"	420
308	"	201	76	2.64	"	805
309	"	281	84	3.35	"	1,315
310	"	369	92	4.01	"	1,944
311	"	465	100	4.65	"	2,702

2) WEST END OF DAM



AT ELEV 310.0 FT :

$A = 28$

$Q \approx 100$ cfs

INSIGNIFICANT FLOW

PROJECT
LOVEJOY POND DAM
HYDRAULICS

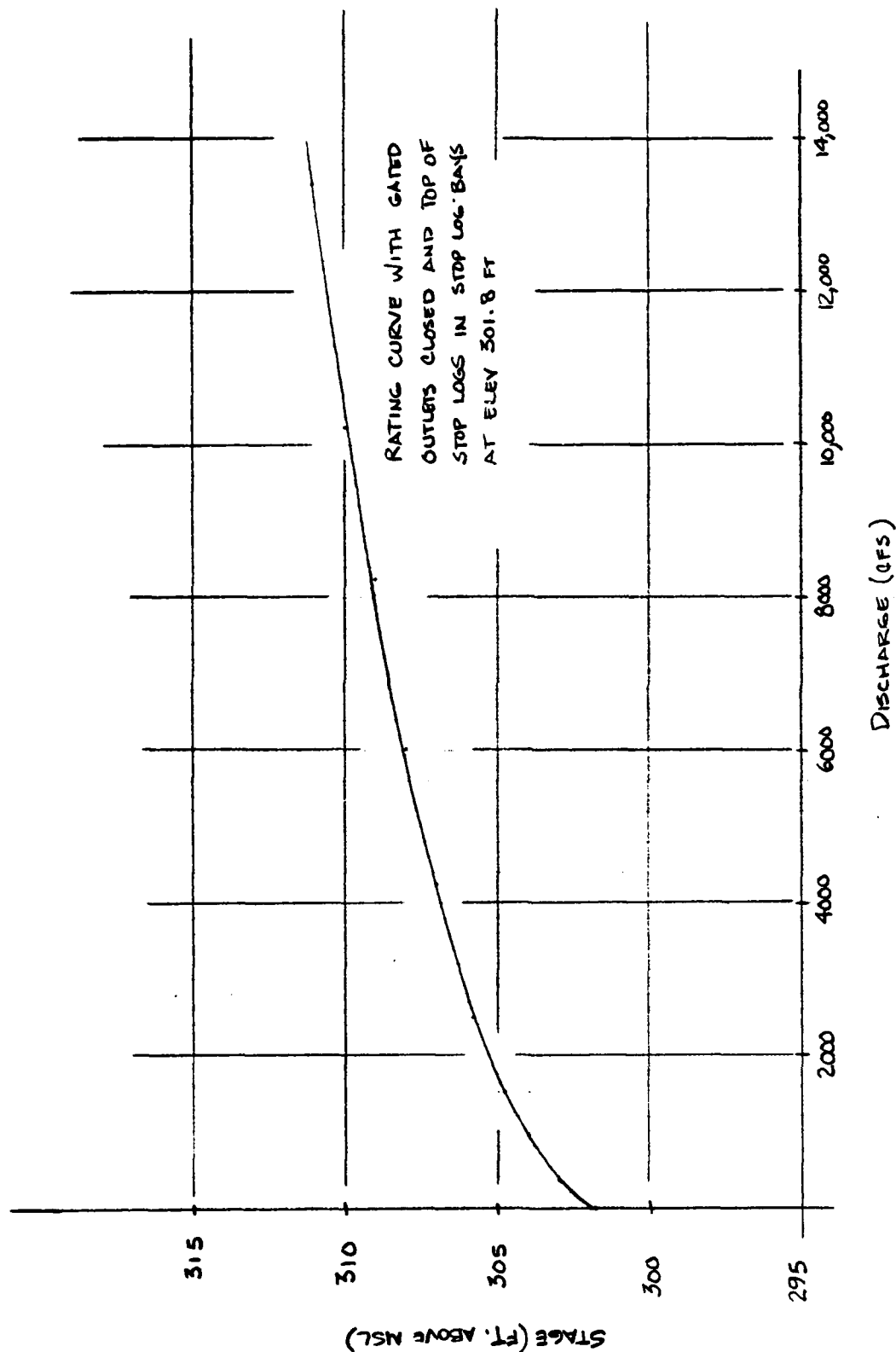
COMP. BY
JJD

JOB NO.
20799-16

CHK. BY
BTE

DATE
4-16-79

RATING CURVE - LOVEJOY POND DAM



PROJECT
LOVEJOY POND
AREA - CAPACITY DATA

COMP. BY
JTD
CHK. BY
BTD

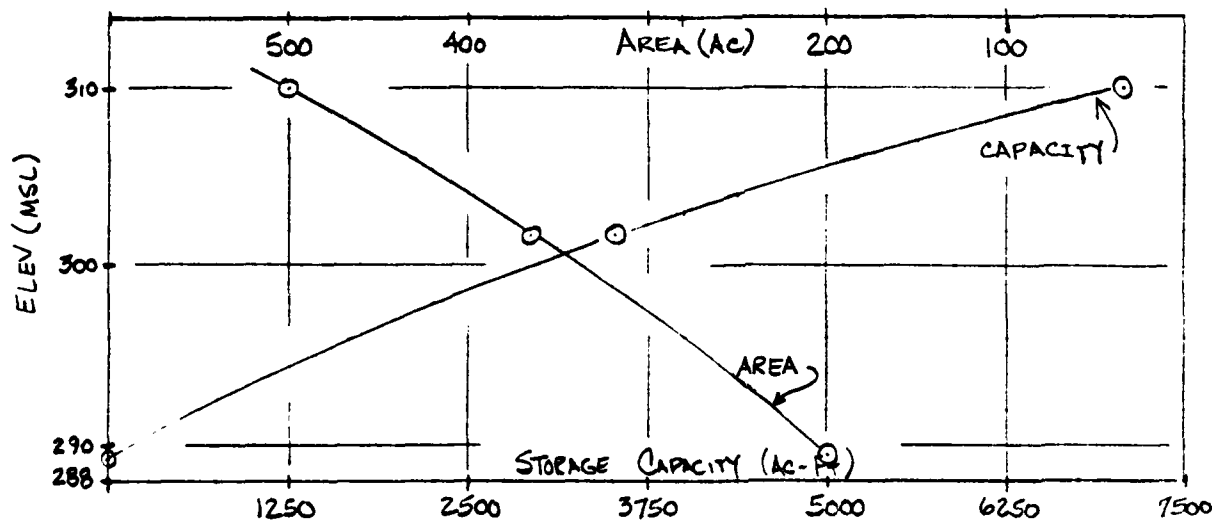
JOB NO.
20799-16
DATE
2-14-79

LOVEJOY POND DAM INCREASED THE CAPACITY OF AN EXISTING LAKE. INFORMATION RECEIVED FROM THE MAINE DEPT. OF INLAND FISHERIES (1940 LAKE SURVEY - REVISED 1953) INDICATES THAT THE ORIGINAL LAKE HAD A SURFACE AREA OF 200 ACRES. THE AREA - CAPACITY DATA GIVEN BELOW REFERS TO THE IMPOUNDED WATER ONLY.

AREA - CAPACITY DATA :

TIE INTO U.S.G.S. MSL ELEV. - BENCHMARK "3AAM1963302" AT EAST END OF SPILLWAY IS AT ELEV. 301.80 MSL (SURVEY DATUM 100.5 FT)

ELEV (FT. ABOVE MSL)	AREA (AC)	AVG. AREA (AC)	DEPTH INTERVAL (FT)	Δ Vol (AC-FT)	Vol (AC-FT)
289.3	200				
		283	12.5	3,538	0
301.8	366				3,538
		433	8.2	3,551	
310.0	500				7,089



OBJECT LOVEJOY POND DAM TEST FLOOD ANALYSIS	COMP BY CJD	JOB NO. 20799-16
	CHK BY PTB	DATE 2-14-79

TEST FLOOD ANALYSIS

DRAINAGE AREA - 47.4 SQUARE MILES (15% OF D.A. IS SURFACE WATER)
 SIZE CLASSIFICATION - INTERMEDIATE
 HAZARD CLASSIFICATION - LOW HAZARD
 DESCRIPTION - FLAT AND COASTAL
 TEST FLOOD - 1/2 PMF

PMF PEAK FLOW RATE = 500 CFS/SQ. MI.
 1/2 PMF PEAK FLOW RATE = 250 CFS/SQ. MI.

1/2 PMF = 11,850 CFS

ELEVATION - DISCHARGE - SURCHARGE STORAGE DATA

(WATER SURFACE ELEV. AT SPILLWAY CREST AT TIME = 0 OF FLOOD HYDROGRAPH)

	MSL ELEV. (FT)	DISCHARGE CAPACITY OF DAM (CFS) ^{1/}	SURCHARGE STORAGE (AC-FT) ^{2/}
	301.8	0	0
	303.0	384	460
	304.0	936	840
EAST WINGWALL	304.8	1,490	1,090
WEST "	305.8	2,490	1,590
	307.0	4,224	2,090
	308.0	6,081	2,520
	309.0	8,241	2,960
	310.0	10,237	3,550
	311.0	13,397	4,460 ^{3/}

GATED OUTLETS ASSUMED TO BE CLOSED

STORAGE CAPACITY AT SPILLWAY CREST (ELEV 301.8) = 3,540 A-F
 EXTRAPOLATED

OBJECT QUEJOY POND DAM TEST FLOOD ANALYSIS - EFFECT OF SURCHARGE STORAGE	COMP BY JSD	JOB NO. 20799-16
	CHK BY PTE	DATE 2-22-79

1/2 PMF PEAK INFLOW = 11,850 CFS = Q_{p1}

SURCHARGE HEIGHT TO PASS 1/2 PMF = 8.7 FT (310.5 FT MSL)

VOLUME OF SURCHARGE :

$$4,190 \text{ A-F} \times \frac{1}{47.4 \text{ MI}^2} \times \frac{1}{640} \times \frac{12}{1} = 1.66 \text{ INCHES}$$

$$Q_{p2} = Q_{p1} \left(1 - \frac{1.66}{9.5} \right)$$

$$Q_{p2} = 11,850 \left(1 - \frac{1.66}{9.5} \right) = 9,784 \text{ CFS}$$

SURCHARGE HEIGHT TO PASS Q_{p2} = 8.0 FT (309.8 FT MSL)

VOLUME OF SURCHARGE :

$$\text{STOR}_2 = 3,432 \text{ A-F} \times \frac{1}{47.4 \text{ MI}^2} \times \frac{12}{640} = 1.36 \text{ INCHES}$$

$$(\text{STOR}_1 + \text{STOR}_2) / 2 = 1.51 \text{ IN.}$$

$$Q_{p3} = 11,850 \left(1 - \frac{1.51}{9.5} \right) = 9,968 \text{ CFS}$$

SURCHARGE HEIGHT TO PASS Q_{p3} = 8.1 FT (309.9 FT MSL)

TEST FLOOD OVERTOPS EAST WINGWALL (EL 304.8 FT) BY 5.1 FT
" " " WEST " (EL 305.8 FT) BY 4.1 FT

SPILLWAY CAN DISCHARGE 15% OF TEST FLOOD ASSUMING
TOP OF DAM AT 304.8 FT.

D-8

IT EDDY TAIL DAM FAILURE ANALYSIS	COMP BY JJD	JOB NO. 20799-16
	CHK BY BTE	DATE 2-14-79

FAILURE ANALYSIS

WATER SURFACE ELEVATION AT TOP OF EAST WINGWALL (ELEV 304.3 FT)

IT WAS ESTIMATED THAT IF DAM FAILURE WERE TO OCCUR, IT WOULD OCCUR BY A BREACH IN THE SPILLWAY SECTION OF THE DAM TO A WIDTH NO GREATER THAN 40 FEET.

(1) STORAGE AT TIME OF FAILURE = 4,630 ACRE-Feet

(2) FAILURE OUTFLOW.

$$Q_{pi} = \frac{8}{27} W_b \sqrt{G} Y_o^{3/2}$$

$$W_b = 40 \text{ FT}$$

$$Y_o = (304.8 - 289.3) = 15.5 \text{ FT}$$

$$= 4,104 \text{ CFS}$$

(3) FLOW JUST BEFORE FAILURE \approx 1,500 CFS

$$\frac{40}{108} \times 1500 = 556 \text{ CFS} \quad \left(\text{ASSUMING 40 FT OF SPILLWAY SECTION FAILS} \right)$$

(4) PEAK OUTFLOW FROM FAILURE, Q_{pi}

$$Q_{pi} = 4104 + (1,500 - 556) \approx 5,000 \text{ CFS}$$

(5) TIME FOR RESERVOIR TO EMPTY, T

$$T = \frac{12.1 S}{\frac{1}{2} Q_{pi}} = \frac{12.1 (4630)}{\frac{1}{2} (5000)} = 22.4 \text{ HOURS}$$

PROJECT

LOVEJOY POND DAM
DAM FAILURE ANALYSIS

COMP BY

JJD

JOB NO.

20799-16

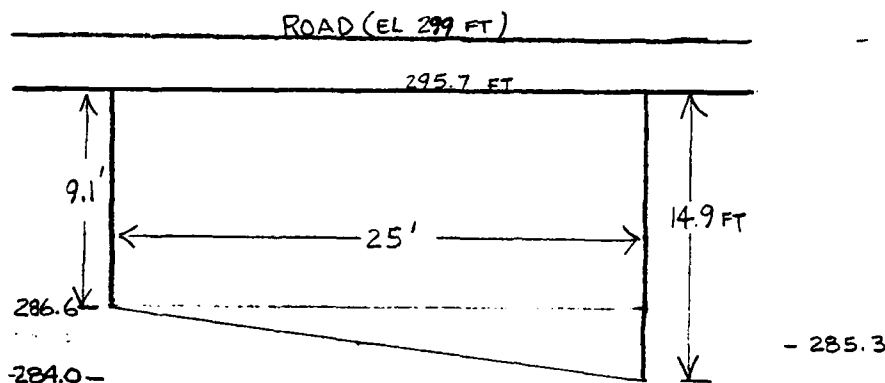
CHK BY

BTD

DATE

2-22-79

CROSS-SECTION #1
(AT BRIDGE LOCATED ~ 200 FEET BELOW DAM)



SLOPE IN THE VICINITY OF THE BRIDGE = .011
"n" VALUE FOR MANNINGS EQUATION = .045

(A) CAPACITY OF BRIDGE CULVERT AT ELEV 295 FT :

1) AREA = $\frac{1}{2}(25)(2.6) + (25)(8.4) = 243 \text{ ft}^2$

2) WETTED PERIMETER, $P = 42$

3) HYDRAULIC RADIUS, $R = 5.79$

4) $\therefore Q = \frac{1.486}{n} A R^{2/3} S^{1/2} = 2,602 \text{ cfs}$

\therefore CULVERT WILL NOT PASS FLOW FROM FAILURE UNDER OPEN-CHANNEL FLOW CONDITIONS

(B) CAPACITY OF BRIDGE CULVERT AT ELEV 299 FT

1) AREA = $\frac{1}{2}(25)(2.6) + (25)(9.1) = 260 \text{ ft}^2$

2) $C = 0.6$

3) $H = (299.0 - 295.7) = 3.3 \text{ FT}$

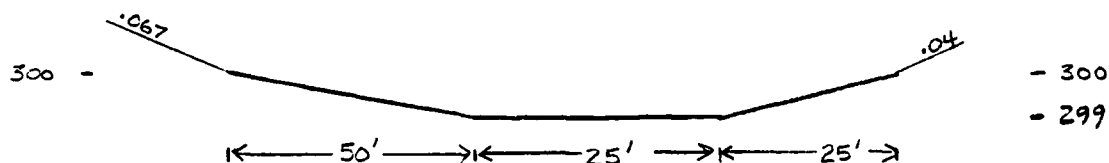
4) $\therefore Q = C A \sqrt{2gH} = 0.6(260)\sqrt{2g(3.3)} = 2,274 \text{ cfs}$
 \therefore PEAK FLOW FROM FAILURE WILL OVERTOP THE BRIDGE

NOTE THAT DECK OF BRIDGE IS ONLY 2.8 FT BELOW SPILLWAY CREST;
THAT IS, A HIGH TAILWATER CONDITION WOULD RESULT DUE TO
BRIDGE CONSTRICTION OF CHANNEL DURING A BREACH OF THE DAM.

PROJECT LOVEJOY POND DAM DAM FAILURE ANALYSIS	COMP BY JSD	JOB NO. 20799-16
	CHK BY BT3	DATE 2-22-79

CROSS-SECTION #1 (CONT)

(BRIDGE CROSS-SECTION INCLUDING OVERFLOW)



AT ELEV 301 : $n = .045$, $S = .011$
 $A = 63$, $P = 100$, $R = .63$, $\therefore Q = 160$ cfs

ELEV 303 :
 $A = 343$, $P = 180$, $R = 1.91$, $\therefore Q = 1,820$ cfs

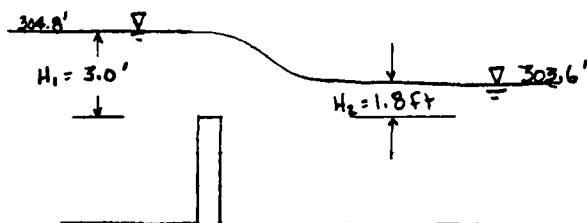
ELEV 304
 $A = 542$, $P = 220$, $R = 2.46$, $\therefore Q = 3,400$ cfs

ELEV AT BRIDGE SECTION TO PASS PEAK FLOW FROM FAILURE = 303.6 FT

HOUSE LOCATED DOWNSTREAM OF BRIDGE ON WEST BANK MAY BE FLOODED TO DEPTH OF 1 TO 2 FEET.

IT IS NOTED THAT THERE WOULD BE HIGH TAILWATER AT THE DAM.
 WATER SURFACE ELEV AT FAILURE = 304.8 FT.

NOTE: WITH DOWNSTREAM WATER SURFACE ELEV. AT 303.6 FT, SPILLWAY IS SUBMERGED (SPILLWAY CREST AT 301.8 FT).



$H_2/H_1 = 0.6$
 FROM FIG 5.5, KING & BRATER, HANDBOOK OF HYDRAULICS,
 IF $H_2/H_1 = 0.6$, $Q/Q_1 \approx .78$

WHERE Q_1 = FREE DISCHARGE

SPILLWAY DISCHARGE RESULTING IN DOWNSTREAM WAT. SURFACE ELEV OF 301.8 IS ABOUT 3,200 CFS. AT FLOWS GREATER THAN THIS, SUBMERGENCE OF THE SPILLWAY EXISTS

PROJECT LOVEJOY POND DAM DAM FAILURE ANALYSIS	COMP BY JJD	JOB NO. 20799-16
	CHK BY BTZ	DATE 2-22-79

CROSS - SECTION #2

BOTH PICKEREL POND AND POCASSET LAKE ARE LOCATED DOWNSTREAM OF LOVEJOY POND. PICKEREL POND AND POCASSET LAKE FORM ONE CONTIGUOUS WATER BODY. THE LAKES ARE FORMED BY A DAM ON POCASSET LAKE WITH NORMAL WATER SURFACE AT ELEV 284 FT.

THE FOLLOWING AREA - CAPACITY DATA WERE DETERMINED FOR THE POCASSET LAKE - PICKEREL POND IMPOUNDMENT.

ELEV	(AC) AREA	AVG. AREA	(FT) DEPTH	(A-F) ΔVol
Spillway crest — 284	716			
		849	6	5,094
290	982			

THE TOTAL IMPOUNDED STORAGE OF LOVEJOY POND AT THE TIME OF FAILURE = 3,500 ACRE- FEET

IF NO WATER IS ALLOWED TO DISCHARGE FROM THE POCASSET LAKE DAM, THE MAXIMUM WATER SURFACE ELEVATION POSSIBLE AT POCASSET LAKE - PICKEREL POND WOULD BE :

$$\left(\frac{4,630}{5,094} \times 6 \right) + 284 \approx 289.5 \text{ FT MSL}$$

RESIDENCES IN THE TOWN OF WAYNE, MAINE WOULD NOT BEGIN TO BE AFFECTED BY HIGH WATER UNTIL APPROX ELEV 291 FT. THERE ARE ONLY 2 TO 4 DWELLINGS ALONG THE LAKE SHORELINE THAT WOULD BE AFFECTED AND THESE TO A DEPTH OF 1 TO 3 FEET. BECAUSE OF POCASSET LAKE - PICKEREL POND IMPOUNDMENT, THERE WOULD BE NO HIGH VELOCITY WAVE MOVING DOWNSTREAM DUE TO FAILURE OF LOVEJOY POND DAM.

THERE ARE 1 OR 2 BUILDINGS VERY CLOSE TO THE POCASSET LAKE DAM WHICH MAY BE INUNDATED TO 2 TO 3 FEET. HOWEVER, DUE TO THE EXTREMELY CONSERVATIVE ASSUMPTIONS USED IN DETERMINING A WATER SURFACE ELEV OF 289.5 FT, NO LOSS OF LIFE OR SIGNIFICANT ECONOMIC LOSS IS EXPECTED AT WAYNE OR AROUND POCASSET LAKE - PICKEREL POND.

THERE IS NO HAZARD BELOW POCASSET LAKE DAM.

APPENDIX E

Information as Contained in the National
Inventory of Dams

INVENTORY OF DAMS IN THE UNITED STATES

STATE	FEDERAL NUMBER	STATE	COUNTY	CONCRETE	DATE	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE
ME	22 NED	ME	011	01		LOVEJOY POND DAM	4421.9	7001.8	19JUL79

POPULAR NAME	NAME OF IMPONDMENT
	LOVEJOY POND

REGION	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	POPULATION
01 03	LOVEJOY STREAM	NORTH WAYNE	600

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES (ACR-FEET)	NEAREST CITY-TOWN-VILLAGE
PGOT		R	17	16	4630	3500

DIS1 OWN FED R PRV/FED 8CS A VER/DATE
NED N N : N 19JUL79

REMARKS
21-STONE MASONRY+CONCRETE

DIS HAS	SPILLWAY LENGTH	SPILLWAY TYPE	WIDTH	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CUY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	LENGTH OF DAM (FT.)	LENGTH OF DAM (M)	NAVIGATION LOCKS
3	170	U	100	1400						

OWNER	ENGINEERING BY	CONSTRUCTION BY
JAMES LAWRENCE		

DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE	INSPECTION DAY	INSPECTION MONTH	INSPECTION YEAR	AUTHORITY FOR INSPECTION
EDWARD C JORDAN CO INC	06DEC78	06	12	78	PUBLIC LAW 92-367 8AUG1972

REMARKS

END

FILMED

8-85

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