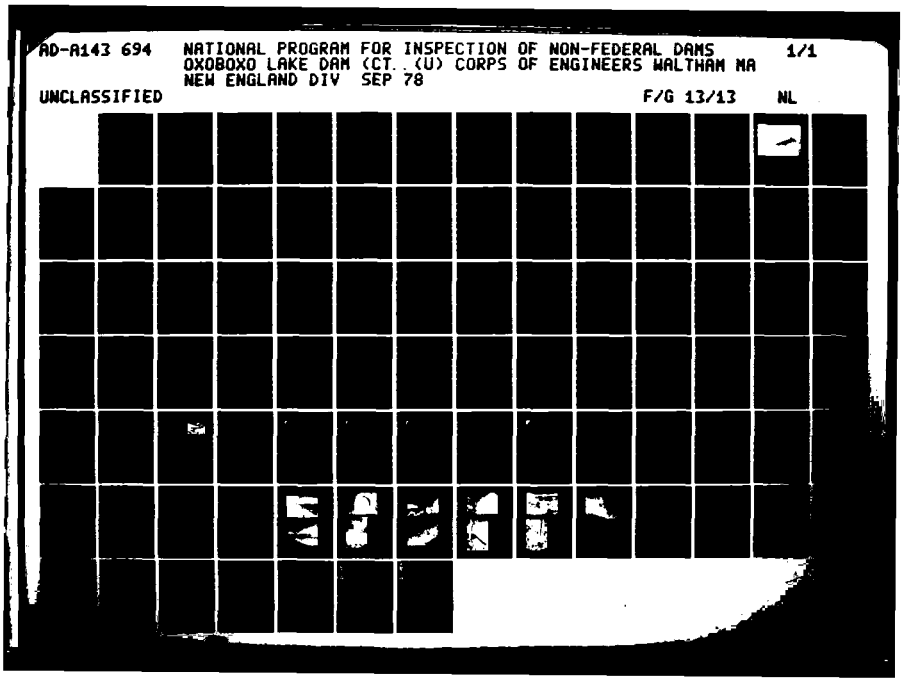
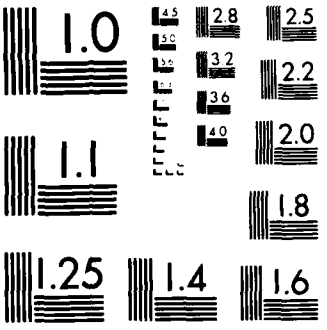
AD-A143 694 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 1/1
OXOBOXO LAKE DAM (CT.. (U) CORPS OF ENGINEERS WALTHAM MA
NEW ENGLAND DIV SEP 78

UNCLASSIFIED F/G 13/13 NL





THAMES RIVER BASIN
MONTVILLE, CONNECTICUT

OXOBOXO LAKE DAM
CT 00238

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

SEPTEMBER 1973

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00238	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Oxoboxo Lake Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE September 1978 13. NUMBER OF PAGES 50
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Thames River Basin
Montville, Conn.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Oxoboxo Lake Dam is an earth dam with vertical masonry facing constructed in the early 1800's and is primarily used for recreation and as a supplemental supply of process water for downstream manufacturing interests. The dam has a maximum height of 26.0 feet and is approximately 166.0 feet long including the spillway. This dam is considered to be in fair condition. A spillway design test flood outflow of 2228 C.F.S. (½ the PMF) will overtop the dam by approximately 2.66 feet.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

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

REPLY TO
ATTENTION OF:

NEDED

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

NOV 17 1978

Dear Governor Grasso:

I am forwarding to you a copy of the Oxoboxo Lake 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 Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, the Montville Realty Corp., c/o Newark Boxboard Co., 17 Blanchard Street, Newark, N.J. 07105.

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 Protection for your cooperation in carrying out this program.

Sincerely yours,

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

OXOBOXO LAKE DAM

CT 00238

THAMES RIVER BASIN
MONTVILLE, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

Identification No.:	CT 00238
Name of Dam:	Oxoboxo Lake Dam
Town:	Montville
County and State:	New London County, Connecticut
Stream:	Oxoboxo Brook
Date of Inspection:	9 June, 1978

BRIEF ASSESSMENT

Oxoboxo Lake Dam is an earth dam with vertical masonry facing constructed in the early 1800's and is primarily used for recreation and as a supplemental supply of process water for downstream manufacturing interests. The dam has a maximum height of 26.0 feet and is approximately 166.0 feet long including the spillway. The top of the embankment has a typical width of 45.0 feet with a grassed surface. The spillway is located on the right abutment of the dam and is a broad crested overflow section with vertical masonry training walls. Spillway discharges flow through a restricted bedrock opening to a rectangular masonry channel and culvert under Oxoboxo Dam Road downstream from the dam. The outlet works is a gated arch masonry conduit located in the center of the dam. There are no plans, specifications or computations available from the Owner, County or State offices regarding the design, construction or repairs of this dam.

Due to its age, Oxoboxo Lake Dam was neither designed nor constructed by approved state of the art methods. Based on the visual inspection at the site, the lack of engineering data available and no operational or maintenance evidence, there are areas of concern which must be corrected to assure the long term performance of this dam. This dam is considered to be in fair condition. There are several visible signs of distress which indicate a potential hazard at this site: seepage at the left abutment interface, outlet conduit within the dam itself and along the spillway training walls, inoperable low-level spillway gates, damaged trash screen at the outlet works, obstructed downstream channels and a general lack of proper and regular maintenance.

Hydraulic analysis indicate that the existing spillway can discharge a maximum flow of 400.0 C.F.S. at Elev. 397.65

(Top of Dam). A spillway design test flood outflow of 2228 C.F.S. (one-hlaf of the probable maximum flood) will overtop the dam by approximately 2.66 feet. Existing freeboard allowance is inadequate for wind generated wave action for frequent storm activity. Due to the potential for overtopping, it is recommended that a definite plan for surveillance and a warning system be developed for use during periods of unusually heavy rans and runoff.

It is recommended that the Owner immediately engage the services of an engineer experienced in the design of dams to accomplish the following: analyze and upgrade the spillway capacity and freeboard requirements with respect to the spillway test flood, drain the impoundment to a reduced level in order to repair the facing and locate the sources of seepage, repair the low level spillway gates and outlet works protective trash screen, and repair the left wingwall. It is recommended that the Owner also begin a regular program of inspection and maintenance including a plan of action for emergency situations.

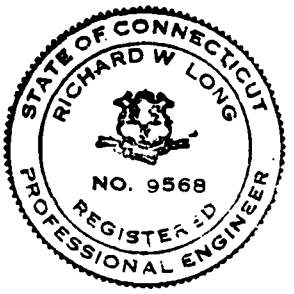
The above recommendations should be implemented within a one year period after receipt of this Phase I Inspection Report. The alternative to these recommendations would be to drain Oxoboxo Lake and maintain the water surface at a reduced level.

C-E MAGUIRE, INC.

by

Richard W. Long

Richard W. Long, P.E.
Vice President



This Phase I Inspection Report on Oxoboxo Lake 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 judgment and practice, and is hereby submitted for approval.

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

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.

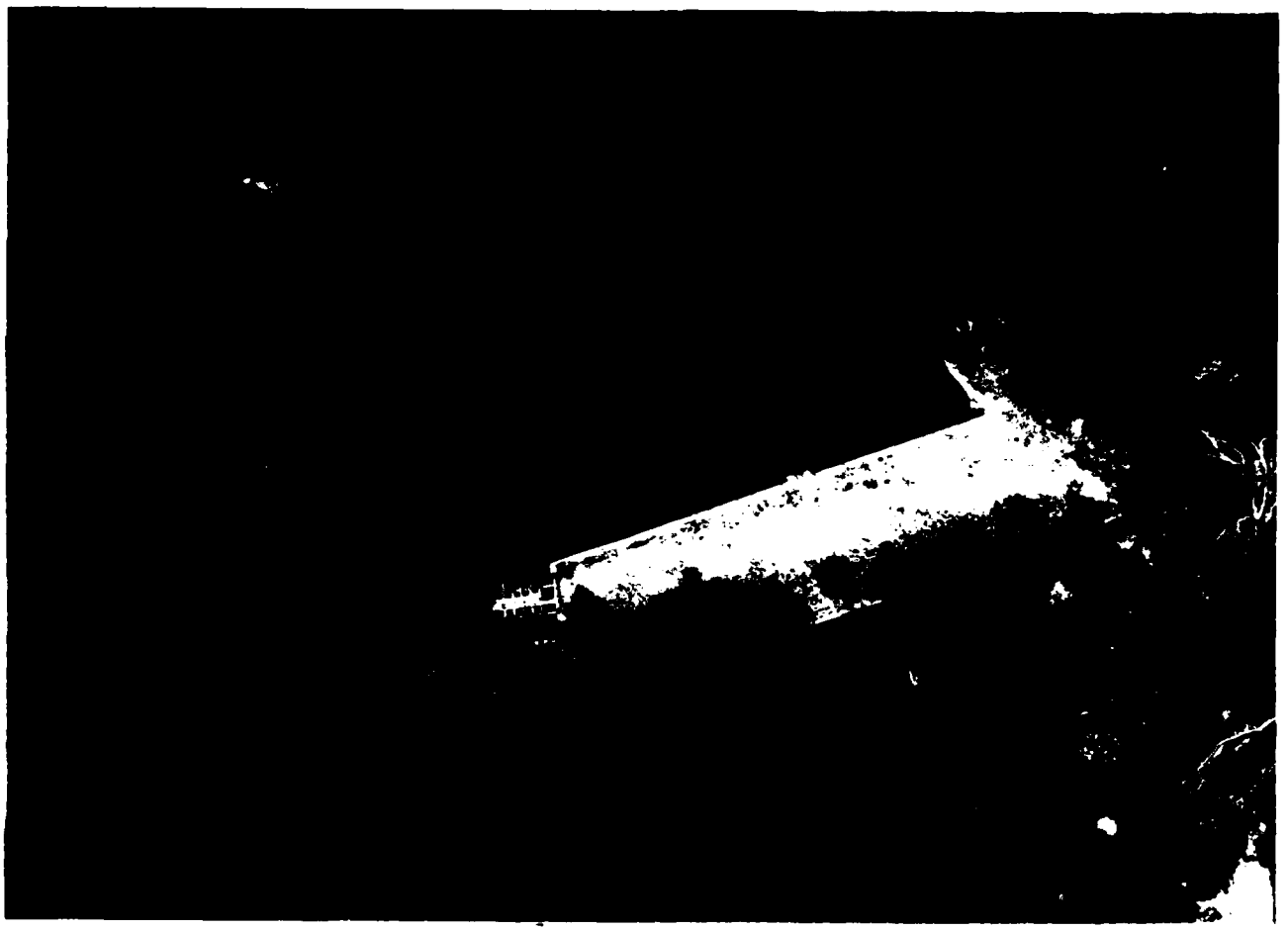
In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving 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.

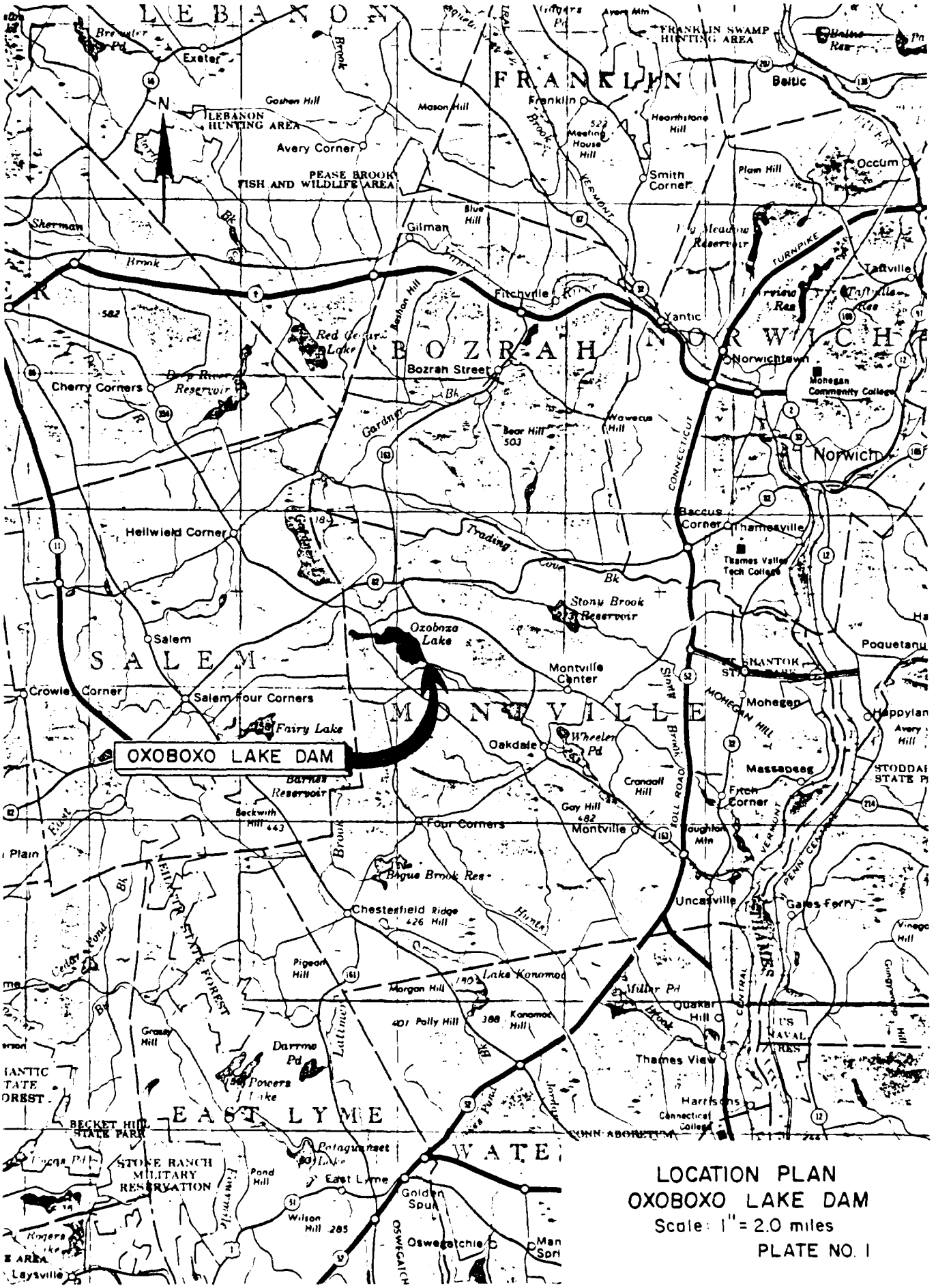
Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because 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 aide 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.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)



C-1 OXOBOXO DAM - LOOKING UPSTREAM



LOCATION PLAN
OXOBOXO LAKE DAM
Scale: 1" = 2.0 miles
PLATE NO. 1

NATIONAL DAM INSPECTION PROGRAM

PHASE 1 - INSPECTION REPORT

NAME OF DAM: OXOBOXO LAKE 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. C-E Maguire, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to C-E Maguire, Inc. under a letter of 26 April, 1978 from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0300 has been assigned by the Corps of Engineers for this work.

b. Purpose:

(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 States 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 PROJECT

a. Location: Oxoboxo Lake Dam is located in New London County, Connecticut, approximately 4.0 miles northwest of the village of Montville, along Route 163. The dam impounds water from Oxoboxo Brook which drains a 3.29 square mile watershed of rolling terrain. Oxoboxo Lake has a surface area of about 157.0 acres. The dam is located in the south east sector of the lake, just north of Oxoboxo Brook Road.

b. Description of Dam and Appurtenances: Oxoboxo Lake Dam is an earth dam with vertical masonry facing spanning a distance of 166.0 feet (including spillway). The top of the embankment has a typical width of 45.0± feet with a grassed surface. The spillway is located on the right abutment of the dam and is a broad crested overflow section with vertical masonry training walls. The spillway crest is extended westerly to exposed bedrock providing additional capacity for increased flows. Two

36 inch, low level, vertical slide gates are located below the spillway crest. Spillway discharges flow through a restricted bedrock opening to a rectangular masonry channel and culvert under Oxoboxo Dam Road downstream from the dam.

The intake gate for the outlet works is located on a pilaster on the upstream face of the embankment at the approximate center of the structure. It is a manually operated vertical slide gate. The outlet through the dam structure is a 3.0 foot x 4.5 foot arch masonry conduit which discharges into a rectangular masonry channel and culvert that flows downstream beneath Oxoboxo Dam Road (See Photo C-1 and Appendix B-3).

c. Size Classification: The dam is classified as intermediate in size because impoundment capacity at crest elevations is 2000 Ac-Ft. which exceeds 1000 Ac-Ft., the minimum criteria for such classification.

d. Hazard Classification: This dam is classified as a significant hazard potential because it is located in a predominantly rural or agricultural area where failure may damage isolated homes, secondary highways (Oxoboxo Dam Road) and interrupt the service of the public utilities adjacent to the highway.

e. Ownership: The dam and water rights are owned presently by the Montville Realty Company and is operated by the Connecticut Paperboard Company, both subsidiaries of the Newark Boxboard Company of Newark, New Jersey. Early records of ownership are vague, but indicate the dam was constructed in the early 1800's. Records also indicate that the dam was owned for an unspecified period by the Continental Can Company, Inc., of Augusta, Georgia, and was sold around 1972 to its present owners.

f. Operator: Mr. L. Duchemin, Maintenance Supervisor
Connecticut Paperboard Company
Uncasville, Connecticut
(203)-848-0681 (home)
(203)-848-1500 (business)

g. Purpose of Dam: Supplemental upstream storage of process water for the Connecticut Paperboard Company, and recreation.

h. Design and Construction History: Records indicate the dam was constructed in the early 1800's. Town annual reports mention the dam was raised 4.0 ft. in height in 1826. No other construction or repair history was found from that event through 1972. In 1972, repair work was undertaken by the Continental Can Company as a result of a letter report on the condition of the dam by Charles T. Main, Inc., Consulting Engineers, Boston, Massachusetts. The actual repair work was accomplished by the Schnip

Company of Norwich, Connecticut in July, 1972, and entailed repointing of the upstream masonry face of the dam. No other modifications or repair have been undertaken.

i. Normal Operational Procedures: Water levels at Oxoboxo Lake Dam are not normally regulated. On occasion, additional flows are released during unusually low flow periods to maintain downstream process water demands.

1.3 PERTINENT DATA

a. Drainage Area: Oxoboxo Brook is a tributary to the Thames River. Oxoboxo Lake Dam is located at the headwaters of Oxoboxo Brook, in New London County. The drainage basin for Oxoboxo Lake is oblong in shape and aligned with its longest axis in an east-west direction. The basin is generally 2.5 miles in length and averages 1.5 miles in width and drains an area of 3.29 square miles. The topography is rolling hills with highest elevations of 600.0 feet and sluggish and swampy brooks ranging in elevation from 450.0 feet to 394.0 feet (Oxoboxo Lake level). These flat slopes and swampy areas of the basin tend to reduce the peaks of surface runoff at Oxoboxo Lake. A general basin map is shown in Appendix D.

b. Discharge at Damsite: Inflow discharge at the dam site is appreciably modified and its peak reduced by storages

in the flat and swampy portions of the drainage basin. It is estimated that the Spillway Design Flood will be equal to one half the probable maximum flood with inflow values of 3290 cfs (1000 CSM) and an outflow of 2278 cfs. Listed below are additional discharge data:

(1) Outlet works 2.9 ft. W x 3.8 ft. H and Invert El. 373.0.

(2) Maximum known flood at damsite - Unknown.

(3) Overflow gated spillway capacity at maximum pool elevation. 400.0 cfs at El. 397.65 (low level spillway gate closed)

(4) Gated outlet capacity at normal pool elevation - (low level spillway gates closed). 240 cfs at El. 394.0.

(5) Gated outlet capacity at maximum pool elevation 270 cfs @ El. 397.65.

(6) Total discharge capacity at maximum pool elevation 670 cfs @ El. 397.65.

c. Elevation (ft. above NGVD)

(1)	Top Dam	397.65
(2)	Maximum pool-design surcharge	3.65 w/o freeboard
(3)	Full flood control pool	397.65
(4)	Recreation pool	394.0

(5)	Spillway crest (gated)	394.0
(6)	Upstream portal invert diversion tunnel.	373.0 (Estimated)
(7)	Streambed at centerline of dam	373.0 U/S-368.0 D/S
(8)	Maximum tailwater	373.0 (Estimated)

d. Reservoir (Feet)

(1)	Length of maximum pool	7000
(2)	Length of recreation pool	7000
(3)	Length of flood control pool	7000

e. Storage (acre-feet)

(1)	Recreation pool	2000 (Estimated)
(2)	Flood control pool	573 (Estimated)
(3)	Surcharge	573
(4)	Top of dam	2573

(5) Flood control pool of 573 Ac-Ft. represents 3.26 inches of runoff from its drainage area of 3.29 sq. miles.

f. Reservoir Surface (Acres)

(1)	Top dam	157
(2)	Maximum pool	157
(3)	Flood-control pool	157
(4)	Recreation pool	157
(5)	Spillway crest	157 @ El. 394

(6) One foot of surcharge storage represents 0.89 inches of runoff from its drainage area of 3.29 sq. miles.

g. Dam

(1)	Type	Earth dam with vertical rubble masonry faces upstream and downstream. The downstream face is inclined 15° from the perpendicular.
(2)	Length	166.0 ft.
(3)	Height	U/S=21.0 ft. D/S=26.0 ft.
(4)	Top Width	45.5-47.3 ft.
(5)	Side Slopes	Upstream vertical; Downstream slightly batter (15° to the vertical)
(6)	Zoning	Unknown
(7)	Impervious Core	Unknown
(8)	Cutoff	Unknown
(9)	Grout curtain	Unknown
(10)	Other	----

h. Spillway

(1)	Type	Overflow spillway with inoperable low level gates

(2)	Length of weir	13.5 ft. with a 18.0 ft. extension
(3)	Crest elevation	394.0
(4)	Gates	Two, 36 inch square (estimated)
(5)	U/S Channel	Natural
(6)	D/S Channel	Bedrock and rectangular masonry channel
(7)	General	---

i. Regulating Outlets

(1)	Invert	373.0
(2)	Size	2.9 Ft. W x 3.8 Ft. H
(3)	Description	Rectangular stone box outlet
(4)	Control Mechanism	Hand operated hoist mechanism
(5)	Other	----

SECTION 2

ENGINEERING DATA

2.1 Design: No data available

2.2 Construction: No data available

2.3 Operation: No data available

2.4 Evaluation:

a. Availability - There is no available data to make an evaluation.

b. Adequacy - N/A

c. Validity - N/A

SECTION 3

VISUAL INSPECTION

3.1 FINDINGS

a. General: Based on the visual inspection and the general appearance of Oxoboxo Lake Dam, it is apparent that this facility has received only intermittent maintenance and attention. Two low level gates at the spillway were inoperable ,and their operating platform seriously deteriorating and in disrepair. The upper supports for the outlet works trash rack were loose and detached which could lead to eventual clogging of the gate and loss of regulation of the water level in the lake. The dam and the immediate downstream area were overgrown with vines, brush and trees. Downstream channels were partially clogged with debris. Although the area was fenced, trespass has occurred. The dam and its appurtenances were in visibly poor condition.

b. Dam: Seepage at the toe of the dam was observed toward the left abutment, at the point indicated on the photo index map for photo C-11. The water was flowing along the ground surface beneath a heavy growth of brush and vines in an area about 10 ft. long and 6 ft. wide. The volume of flow was estimated to be a few gallons per minute (gpm). The seep appears to be related to the contact between the dam and the bedrock at the left abutment.

Seepage on the downstream face of the dam was observed at one point, indicated in photo C-10 (See photo index map for location). The seepage area was about 2.0 ft. wide and was approximately 16.0 ft. below the crest of the downstream stone face, and 4.0 ft. above ground level. The amount of seepage was estimated at less than 1/2 gpm.

Seepage was also found emanating from the roof and walls and from below the downstream end of the outlet tunnel shown in Photos C-4 and C-5. A major seep exists at about the 10 o'clock position (looking downstream) on the arched conduit roof, about 3.0 to 6.0 ft. downstream from the gate at the upstream face of the dam. The estimated volume of flow was about 50 to 100 gpm. This seepage has been previously noted in the inspection report by C.T. Main dated April 21, 1977. Minor seepage was observed at numerous locations on the walls and roof along the entire length of the conduit. The water seeping into the conduit ran along the conduit invert to a point about 4.0 ft. back from the downstream face of the dam. At that point, the flow disappeared into the stonework. Water was observed flowing from the face of the dam at a level below the end of the outlet.

The water from all these seeps appeared clear, with no accumulation of silt or fine sand beneath the points of discharge.

Two depressions were noted in the crest of the earth core of the dam. One of these depressions was bowl shaped approximately 5.0 ft. in diameter and about 6 inches deep. No holes were found in the depression by probing. This is apparently the same depression noted in the above C.T. Main report.

The second depression was located at the corner where the upstream face joins the left spillway training wall. The depression is about 2 ft. x 2 ft. in size and about 6 inches deep in the corner. No holes or loose zones of soil were found in the depression. This depression may be related to seepage between the earth core and the stonework, since seepage was noted on the spillway channel wall about 15.0 ft. downstream from the depression. (See photo C-12).

The mortar in the visible portion of the upstream face is in good condition. The C.T. Main report of June 7, 1972 and subsequent comments indicate the upstream face was repointed to a level 6.0 ft. below the normal reservoir level. At that time, further pointing work below this level was recommended, but apparently not performed. Although not visible for this inspection, the upstream face below the level repaired in 1972 may require repair work.

Brush and several small trees up to 2-3 inches in size were growing on the crest of the dam. The downstream face and

toe of the dam was heavily overgrown with vegetation (See Photo C-8).

The elevation of the stone wing wall of the upstream face on the left abutment was noted to be about 6.0 to 8.0 inches lower than the rest of the upstream face. In the event of very high water, the dam would overtop at this area first, concentrating flow around the west abutment and possibly causing severe erosion. The concrete wing wall adjacent to the stone section has been undermined and considerable material has been eroded from behind the wall (See photo C-9). Although this wall does not effect the immediate structural integrity of the dam, its undermining and erosion is the source for continuing washing action of the lake and could lead to localized erosion of the left abutment area and eventual failure of the structure.

Stone masonry facing for this dam, as observed, was in good condition. No misalignment, or unusual movement was noted. Stone work that was observable was not dislodged or loose from differential settlement. (See photos C-2, C-3, C-4, C-5, C-8).

The bedrock exposed on the right abutment of the dam in gneiss, with bedding which strikes S78½W and dips about 43½ to the east. The gneiss was moderately weathered, and hand specimens could be broken off easily with a geologists

hammer. Separation occurred easily along the bedding planes and small pieces of the gneiss could be crumbled with finger pressure to gravel and sand-sized particles.

The main joint set in the gneiss was near vertical, with a strike of S19½E. A less predominant joint set was also evident, striking S56½W and dipping 61½ to the southeast. Both sets of joints appeared to be closed.

On the left abutment, the exposed bedrock was granite, with tight joints having no apparent preferred orientation.

c. Appurtenant Structures: Seepage was observed at several locations on both the left and right walls of the spillway channel, downstream of the weir section. One of these seeps is shown in Photo C-12. The volume of the seepage was estimated visually to be less than 1 gpm at each seep.

The downstream channel of the outlet works was a rectangular rubble masonry 6.0 ft. W x 4.0 ft(ave.)H section quite obstructed with loose stones, overhanging trees and debris. Approximately 150.0± ft. downstream from the dam, the outlet channel discharges flow through a 5.0 ft. diameter CMP culvert beneath Oxoboxo Dam Road.

The overflow spillway was located on the right abutment of the dam and founded on the exposed bedrock in that location. Two low level gates of unknown size and invert were inoperable and in bad disrepair. The timber superstructure

supporting the gate control mechanism was completely deteriorated and near collapse. (See photo C-2, C-7). The condition of the screens, trash racks and gate guides for these low level outlets were below water and not observable.

A 2.0 inch diameter hole was observed in the concrete apron between the right spillway channel wall and the bedrock on the right abutment. During periods of high water levels, when there are discharges over the weir extension, the water could flow through this opening behind the right training wall and erode the backfill material, endangering the wall.

The gate mechanism for the outlet conduit is located on a pilaster on the upstream face at the approximate center of the dam. The mechanism is somewhat corroded and had been repaired by recent welding, but was operated during the inspection. Guides and trash racks for the gate were not observable; however, what appeared to be an upper support for the trash rack was broken and detached from the masonry.

d. Reservoir: The natural slope on the left abutment of the dam rises about 200 ft. above the reservoir level, with an average inclination of 1.0V to 3.5H for the first 200.0 ft. of vertical rise. The slope is heavily wooded. These heavily overgrown slopes adjacent to the approach to the

dam should preclude sloughs and slides that would cause an overtopping wave to occur. However, this overgrown condition should be monitored closely to prevent wind felled trees from floating to the dam and clogging the spillway opening.

e. Downstream Channel: The downstream channel for the spillway discharges was overgrown and cluttered with debris. It was reported that the intense rainfall that occurred in January, 1978 caused flooding of the Oxoboxo Dam Road below the dam primarily due to clogging from debris in the spillway and outlet works discharge channels. It is unknown if this debris washed over the spillway. It is more likely that the clogging of the downstream channels occurred from debris cast from the roadway.

3.2 EVALUATION: Visual observation made during the course of the inspection indicated several conditions that require attention. Several of the deficiencies observed and discussed above require attention and should be corrected before further deterioration developes a hazardous condition. Recommended measures are discussed in Section 7.

SECTION 4

OPERATIONAL PROCEDURES

4.1 PROCEDURES

a. The storage at Oxoboxo Lake is maintained primarily as a supplemental supply of process water for the Connecticut Paperboard Company complex located downstream from the dam. The impoundment is generally not regulated since normal rainfall will provide adequate process water supply for the downstream mill. During periods of extended dry weather, some water is released; however, since 1972 when the new owner acquired title to the facility, this procedure has not been necessary. Regulation of the water level would also occur to accommodate inspections or repair of the dam or its appurtenant structures if required.

b. No formal emergency procedure for the operation or regulation of the water level was apparent.

4.2 MAINTENANCE OF THE DAM: Regular maintenance or inspections have not occurred for Oxoboxo Lake Dam.

4.3 MAINTENANCE OF THE OPERATING FACILITIES: Regular maintenance or inspection of the operating facilities is lacking. Inoperable gates, broken trash racks, clogged downstream channels increasing flooding potential, seepages and overgrowth of vegetation are visible evidence of the lack of maintenance. The outlet gate is unlocked.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT: No formal warning system has been established. Intense rainfalls are monitored by the maintenance department of the Connecticut Paperboard Company in Uncasville, using local weather forecasts and appropriate action taken as the situation warrants. No emergency action plan to prevent or minimize the impact of dam failure downstream has been developed in case of problems with the dam.

4.5 EVALUATION:

a. This facility has not been monitored nor maintained regularly and therefor has several items in need of immediate attention and repair. Formal and regular programs of inspection, repair and expedient action in case of emergency need to be instituted.

SECTION 5

HYDRAULIC/HYDROLOGIC ANALYSIS

5.1 EVALUATION OF FEATURES

a. Design Data: No design data was available for this watershed or dam. In lieu of existing design information, data was developed from U.S.G.S. topographic mapping of the site. Elevation-storage parameters were approximated. Inflow and outflow discharges were developed using Corps of Engineers criteria to establish spillway capacity and are included in Appendix D of this report. Much of the data used or developed in the analysis was obtained or verified by field measurements at the time of the visual inspection. Surcharge storage was approximated assumming a constant lake surface area above the spillway crest elevation. The dam failure discharge was determined but no profile was developed downstream due to lack of definitive topographic data particularly swamp storage area.

INFLOW, OUTFLOW AND SURCHARGE DATA

FREQUENCY IN YEARS	24-HOUR TOTAL RAINFALL IN INCHES	24-HOUR* EFFECTIVE RAINFALL IN INCHES	MAXIMUM INFLOW IN C.F.S.	MAXIMUM** OUTFLOW IN C.F.S.	SURCHARGE STORAGE IN FEET	SURCHARGE STORAGE ELEVATION
10	5.0	2.6	565	500	4.00	398.00
50	6.5	4.1	900	576	4.15	398.15
100	7.0	4.6	1000	756	4.45	398.45
1/2 MPF = TEST FLOOD	11.9	9.5	3290	2560	6.31	400.31

*Infiltration assumed as 0.1"/hour
**Lake assumed initially full at spillway crest elevation 394.0.
(Top of dam = 397.65.)

NOTES:

1. Q_{10}; Q_{50}; Q_{100}; inflow discharges computed by approximate methodology of Soil Conservation Service.
2. 1/2 MPF and "test flood" computation based on COE instructions and guidelines.
3. Maximum capacity of spillway without overtopping the top of the dam elevation 397.65 is equal to 400 C.F.S.
4. All discharges indicated are dependent upon the continued integrity of upstream storage reservoirs.
5. Surcharge storage is allowed to overtop the dam when exceeding the spillway capacity.

b. Experience Data: No historical data for discharges or water levels have been recorded for Oxoboxo Lake Dam. Flooding of Oxoboxo Dam Road occurred in January, 1978 as noted earlier in this report. It was also noted by representatives of the Owner during the field inspection that splash and wave action frequently occur over the upstream dam face. It was also reported that high water levels cause some ponding on the crest of the dam at a localized sump area on the left abutment.

c. Visual Observations: The following detrimental items were observed, requiring either correction or analysis:

1. Freeboard allowances were inadequate.
2. Downstream discharge channels for the spillway and outlet works are obstructed.
3. Low level gates at the spillway are inoperable and could provide additional discharge capacity for emergency situations.
4. The trash rack for the outlet gate must be inspected and repaired in order to maintain control of the water level.

d. Overtopping Potential: Using the screening criteria established by the Corps of Engineers, the spillway design flow adopted for Oxoboxo Lake Dam is equal to one half the Probable Maximum Flood (PMF). Calculations indicate that water levels for this flow will overtop the crest of the dam by 2.66 ft. It is apparent that the spillway capacity is inadequate and the dam will be overtopped by these

flows. As indicated in Sections 5.1a, even a recurring 50 yr. storm event will produce water surface levels above the crest elevation of the structure, without any consideration of wave surge, ride-up or splash. Water levels associated with a storm event of 10 yr. frequency rise to Elev. 398.00 or .25 feet above the crest, and considering the 7000 ft. fetch of this reservoir, wind generated wave surge and ride up will increase that level further. There is no freeboard allowance.

It is estimated that with a full pond (spillway crest) the outlet works will require 8.0 hours to drawdown the reservoir the first foot of depth. It is, therefore, essential that the low level gates at the spillway be rehabilitated and returned to service.

SECTION 6

STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations: There were no signs of structural instability evident.

b. Design and Construction Data: No such data is available and an evaluation cannot be made.

c. Post-Construction Changes: Information was provided verbally by Mr. Louis Thaisz of Newark Boxboard Co. that the dam was raised 4 ft. in about 1826 to its present height. No specific evidence of the raising or other subsequent changes was observed, except that the top few feet of the downstream stone face was sloped more steeply than the remainder of the face.

d. Seismic Stability: This dam is in seismic zone 1 and hence does not have to be evaluated for seismic stability, according to the "Recommended Guidelines".

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition: Based on the visual inspection, limited records and past operational performance, Oxoboxo Lake Dam is considered to be in fair condition. The following areas of concern must be corrected in order to assure that this facility remain functional and in good condition over a long term.

1. This dam will not pass the Probable Maximum Flood (recommended spillway test flood) without overtopping the dam, and therefore the present spillway capacity is inadequate. The spillway capacity is judged seriously inadequate, as the facility will not accommodate lesser storm events as well.

2. Existing freeboard allowance for wind generated wave action for lesser storm events will overtop the structure and could lead to potential failure if not corrected.

3. Seepage at the left abutment interface, outlet conduit within the dam itself and along the spillway training walls must be monitored and controlled.

4. The trash screen for the outlet gate must be examined and repaired as necessary in order that control of water levels in Oxoboxo Lake can be maintained.

5. Inoperable low-level spillway gates should be programmed for rehabilitation and analysis made of their drawdown capacity.

6. Proper maintenance of the dam and its operational facilities must be started.

b. Adequacy of Information: Design or construction data for this dam is not available. The assessment for this structure therefore is based solely on the visual inspection and review of correspondence files.

c. Urgency: It is considered that the recommendations suggested below be implemented within a one year period of receipt of this Phase I report.

d. Need for Additional Information: There is no evidence that formal engineering analyses were ever performed for this dam. The visual inspection and operational history indicate that attention should be given to the collection of current data in order that the recommendations listed below may be implemented.

7.2 RECOMMENDATIONS

a. Facilities: In view of the concerns for the condition of Oxoboxo Lake Dam, and the lack of engineering back-up data, it is recommended that the following measures be undertaken by the Owner.

1. Engage the services of an engineer experienced in the design of earthen dams to collect, analyze and develop designs to accomplish these recommendations.
2. Analyze and upgrade the spillway capacity and freeboard requirements with resepct to the spillway design test flood.
3. Drain the impoundment, preferrably during a period of minimal downstream demands and recreational use, to expose the stone masonry facing of the structure. Inspect and repair the facing as necessary. Locate the sources of the observed seepage at the left abutment, outlet conduit and spillway and take the necessary steps to correct or control that seepage.
4. While the impoundment level is reduced, examine the outlet gate with particular attention to the trash rack and rehabilitate or replace it as necessary.
5. During this same period of reduced water level, inspect and repair the low level spillway gates to increase the outlet capacity of the dam.

6. Repair and raise the level of the left abutment wing wall to the crest level of the dam.

7.3 REMEDIAL MEASURES

a. Alternatives: As an alternate to the immediate commencement of studies to upgrade the structure, the water surface level for Oxoboxo Lake Dam should be lowered and maintained at a reduced level to provide flood control storage for storm events.

b. Operations and Maintenance Procedures

1. Remove all debris and potential clogging hazards from the downstream channels and roadway culverts of the spillway and outlet works immediately.

2. Develop and implement a regular schedule of inspection and maintenance of the dam and its appurtenances.

3. Remove and control the vegetative growth from the site.

4. Incorporate in the maintenance and inspection program monitoring of the seepage conditions.

5. Develop an "emergency action plan" outlining expedient action to be taken to prevent or minimize problems that may occur in emergency situations.

6. Because of the concerns for this dam and the limited data available, a round the clock surveillance

should be instituted during periods of high precipitation.

APPENDIX A

INSPECTION CHECK LIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT Oxoboxo Lake Dam DATE 9 June 1978

TIME 1000 to 1600

WEATHER Cloudy - rain

W.S. ELEV. _____ U.S. _____ D.S.

PARTY:

1.	R. Long CEM	6.	P. Biscutti, Conn. DEP
2.	A. Reed CEM	7.	S. Khanna CEM
3.	R. Brown CEM	8.	
4.	S. Poulos GEI	9.	
5.	F. Leathers GEI	10.	

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

* 2nd inspection on 5 August, 1978

PERIODIC INSPECTION CHECK LIST

PROJECT Oxoboxo Lake Dam DATE 9 June 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	394 NGVD-from USGS sheet
Current Pool Elevation	394 NGVD
Maximum Impoundment to Date	
Surface Cracks	None observed.
Pavement Condition	No pavement. Gravelly sand and grass.
Movement or Settlement of Crest	Depression near center toward down stream side, but no hole within.
Lateral Movement	None observed.
Vertical Alignment	No unusual misalignment observed.
Horizontal Alignment	No unusual misalignment observed.
Condition at Abutment and at Concrete Structures	Soil adjacent to left spillway wall settled about 6 in. near upstream side. Clear seepage exiting from walls of spillway channel. Hole in top of horizontal apron to right of right spillway wall.
Indications of Movement of Structural Items on Slopes	Some stones missing from top of ds stone face of dam near right side. Wall upstream of left abutment undermined and moved due to erosion
Trespassing on Slopes	Free access, but no observed difficulties.
Sloughing or Erosion of Slopes or Abutments	Upstream of both abutmentsthe natural slopes are severely eroded.
Rock Slope Protection - Riprap Failures	Upstream stone face in good condition (observed only above water level)
Unsusual Movement or Cracking at or near Toes	None observed. Downstream heavily wooded.

PERIODIC INSPECTION CHECK LIST

PROJECT Oxoboxo Lake Dam DATE 9 June 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
Unusual Embankment or Downstream Seepage	Large seep from beneath downstream stone wall on right side. May be related to contact between dam and abutment.
Piping or Boils	None observed.
Foundation Drainage Features	None, except that downstream wall is unmortared stone and drains freely.
Toe Drains	None observed.
Instrumentation System	None observed.
Vegetation	Downstream side of crest and zone downstream of dam was heavily overgrown.

PERIODIC INSPECTION CHECK LIST

PROJECT Oxoboxo Lake Dam DATE 9 June 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	N/A - No Dike
Crest Elevation	
Current Pool Elevation	
Maximum Impoundment	
Surface Cracks	
Pavement Condition	
Movement or Settlement of Crest	
Lateral Movement	
Vertical Alignment	
Horizontal Alignment	
Conditions at Abutment and at Concrete Structures	
Indications of Movement of Structural Items on Slopes	
Soughing 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	

PERIODIC INSPECTION CHECK LIST

PROJECT Oxoboxo Lake Dam DATE 9 June 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	
Slope Conditions	Underwater, not observable
Bottom Conditions	
Rock Slides or Falls	
Log Boom	None
Debris	Underwater not observable.
Condition of Concrete Lining	None
Drains or Weep Holes	None
b. Intake Structure	Stone masonry, good condition, recently pointed.
Condition of Concrete	
Stop Logs and Slots	None
	Trash rack broken and ineffective.

PERIODIC INSPECTION CHECK LIST

PROJECT Oxoboxo Lake Dam DATE 9 June 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	Manually operated vertical lift sluice gate - rusted and unoiled. Mechanism is in an exposed location unprotected. Mechanism rack and pinion has been repaired recently by welding. Pipe wrench used for gate operation. Leakage noted around gate.
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	N/A
Float Wells	N/A
Crane Hoist	N/A
Elevator	N/A
Hydraulic System	N/A
Service Gates	N/A
Emergency Gates	N/A
Lightning Protection System	N/A
Emergency Power System	N/A
Wiring and Lighting System	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT _____ DATE _____

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	Stone conduit through dam (horseshoe shape stone arch)
Rust or Staining of Concrete	None observed.
Spalling	None observed.
Erosion or Cavitation	None observed.
Cracking	None observed.
Alignment of Monoliths	N/A
Alignment of Joints	N/A
Numbering of Monoliths	N/A
Seepage into Conduit	Large number of seeps into conduit through stone arch roof. Largest volumes enter toward upstream end. Seepage flows down and out through floor of conduit.

PERIODIC INSPECTION CHECK LIST

PROJECT Oxoboxo Lake Dam DATE 9 June 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Stone Masonry	Fair to poor.
Rust or Staining	None observed.
Spalling	None observed.
Erosion or Cavitation	None observed.
Visible Reinforcing	None observed.
Any Seepage or Efflorescence	Seepage emanating from joints between stones, below invert of outlet structure.
Condition at Joints	Poor
Drain holes	None observed.
Channel	Rectangular, obstructed with loose stone stone blocks and debris.
Loose Rock or Trees Overhanging Channel	Yes
Condition of Discharge Channel	Poor
	Walls of outlet channel consist of unmortared stone masonry.
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	Located on right abutment of dam. Straight on left side, converging on right.
General Condition	Fair to good.
Loose Rock Overhanging Channel	yes
Trees Overhanging Channel	yes
Floor of Approach Channel	Underwater, cannot observe.

PERIODIC INSPECTION CHECK LIST

PROJECT Oxoboxo Lake Dam DATE 9 June 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
b. Weir	
General Condition of Stone Masonry	Fair to good.
Rust or Staining	Staining noted.
Spalling	Not visible.
Any Visible Reinforcing	N/A
Any Seepage or Efflorescence	Not observable.
Drain Holes	Not observable.
b.' Training Walls	Vertical stone masonry.
General Condition	Fair to good.
Seepage	Seepage noted on both walls
Drain holes	None observed
c. Discharge Channel	Irregular - natural bedrock
General Condition	Good
Loose Rock Overhanging	yes
Trees Overhanging Channel	yes
Floor of Channel	Littered and partially obstructed.
Other Obstructions	Oxoboxo Dam Road culvert.
d. Spillway Gate Control	Two gates are located directly beneath the spillway crest. Gates are operated from a timber structure above the spillway crest by rack and pinion. Gates are not operable. The timber structure above the spillway is decayed and on the verge of collapse.

PERIODIC INSPECTION CHECK LIST

PROJECT Oxoboxo Lake Dam DATE 9 June 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	N/A
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
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	

APPENDIX B

B-1 Record Data Locations

B-2 Existing Inspection Reports

B-3 Sketches

APPENDIX B-1

No design, construction or maintenance documents could be located. Certain correspondence concerning maintenance is available at the office of the Connecticut Department of Environmental Protection, Superintendent of Dam Maintenance, Water Resources Unit, State Office Building, Hartford, Connecticut.

APPENDIX B-2

1. 4 November, 1964 - Water Resources Commission Supervision of Dams - Inventory Sheet

2. 21 April, 1972 - Report of Inspection prepared by Charles T. Main, Inc., Boston, Massachusetts, for Mr. Karl Allen of Continental Can Company, Inc.

3. 7 June, 1972 - Memo from Mr. V. Galgowski, State of Connecticut Water and Related Resources, concerning inspection of repair work.

4. 11 July, 1972 - Transmittal letter from Mr. Karl Allen - Continental Can Company to Mr. William O'Brien, State of Connecticut Water and Related Resources Unit. Includes revised report from Charles T. Main (see no. 2 above) dated 7 July, 1972.

5. 11 December, 1974 - Memo from Robert E. Somicksen, State of Connecticut Water and Related Resources, concerning inspection.

(4) 6

CT 238

No. MV-7

Inventoried By WPS

WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA

Date 4 NOVEMBER 1964

Name of Dam or Pond OXOBOXO LAKE

Code No. T 9.4 OX 6.5

Nearest Street Location OXOBOXO BROOK ROAD

Town MONTVILLE Lat 72-11.6

U.S.G.S. Quad. MONTVILLE

Name of Stream OXOBOXO BROOK Lat 41-29.1

Owner Montville Realty Corp OR 773

Address c/o Newark Bag Board Co
17 Blanchard St
Newark N.J. ~~Conn~~ ~~Chester~~ Fath Chester Fath 07100

Pond Used For RECREATION

Dimensions of Pond: Width 1500 FEET Length 4500 FEET Area 143.4 ACRES

Total Length of Dam 1125 FEET Length of Spillway 6 FEET

Location of Spillway WEST SIDE OF DAM

Height of Pond Above Stream Bed 21 FEET

Height of Embankment Above Spillway 3 FEET

Type of Spillway Construction GATES AT CENTER AND WEST SIDE OF

Type of Dike Construction MASONRY, EARTH CORE

Downstream Conditions WOODS, MONTVILLE

Summary of File Data

18807 Remarks POND WAS PRACTICALLY DRAINED AT DATE OF INSPECTION

Would Failure Cause Damage? YES Class B

6/11/7[illegible]
[illegible] over spillway
gate ok but small
leak though the[illegible]
Dam appears safe,
(AB)

10-7-71 DAM APPEARS
SAFE BRUSH ALONG [illegible]
[illegible] DAM TOE SHOULD
BE REMOVED. [illegible]

[illegible]

SAFE

[illegible] Yes [illegible] Close [illegible]

W. M. HALL
G. R. RICH
W. J. LESSARD
C. A. DAUBER
WM. BAUMRUCKER

MAIN
CHAS. T. MAIN, INC.
Engineers

SOUTHEAST TOWER, PRUDENTIAL CENTER, BOSTON, MASSACHUSETTS 02199 · TELEPHONE 617-262-3200

April 21, 1972 2815-10

SUBJECT: Oxoboxo Dam
Report of Inspection

Mr. Karl Allen
Supervisor, Mill Projects
Paperboard and Kraft Paper Division
Continental Can Company, Inc.
P. O. Box 1425
Augusta, Georgia 30903

Dear Mr. Allen:

We are pleased to report to you herein our findings and recommendations based on the visit to the site and subsequent inspection of the subject dam made on April 13, 1972.

The dam is located on the southerly rim of Oxoboxo Lake and is an earth fill structure about 150 feet in length, approximately 35 feet maximum height, with a crest width of about 35 feet. The upstream face is comprised of vertical masonry of derrick stone size with pointed mortar joints, while the downstream face is also of masonry being somewhat smaller random size cut stone with open joints. The downstream face has a slight batter.

A low level outlet is located at about mid length of the dam, composed of a vertical slide gate and discharge tunnel constructed on a horseshoe shape with cut stone and pointed joints.

At the westerly end of the dam is a gravity type uncontrolled concrete spillway about 12 feet in length. Through this structure are located two low level sluices with gates operated by rack and pinion hoist arrangement.

Bed rock outcrops of massive rock form the abutments at each end of the dam. The concrete spillway and discharge channel are cut through this bed rock.

At the time of the inspection, which was made during a driving rainstorm, the lake was at what was reportedly normal full level. It was further reported by Continental Can maintenance personnel that there was a

slight leak through a mortar joint at the upstream wall located about 5 feet below the water surface and about 25 feet from the west end of the dam. This could not be located or viewed from the top of the dam.

A small leak issuing through the easterly rock face of the spillway discharge channel about 10 feet below crest and 15 feet downstream of the spillway crest is assumed to be caused or directly related to the reported leak mentioned above. As could best be determined the water discharging at this point (a small jet about 1/2 inch in diameter and no significant pressure) appeared to be clear and not transporting any noticeable material from the dam interior.

Survey of the dam crest for sags or areas showing subsidence, an indication of material transport or "piping" through the dam, was carried out. One surface depression was found at a point about 20 feet from the west end of the structure and about 12 feet back of the upstream face. The depression was about 12 inches maximum depth over an area of about 10 square feet. However, maintenance personnel reported that this depression had been in evidence for many years at that location with no change in size or depth. Based on this report it was not considered a result of the leakage mentioned above.

All of the three sluice gates at the dam were reported as being operable. However, it was reported that the capstone and some of the other stonework adjacent to the gate guides showed some sign of movement or displacement whenever the main gate at the center of the structure was operated.

Inspection of the downstream face of the structure showed no evidence of settlement or apparent movement. No leakage was observed through this face and there was no evidence of leakage at the downstream toe of the dam at ground level.

Some outflow was observed at the downstream end of the main gate discharge tunnel. This was initially thought to be due to leakage through the gate or through the gate seals. Inspection within the tunnel disclosed that this was not the case. Observation of the gate from the tunnel showed that the gate appeared to be in good condition with no peripheral leakage noted. However, a significant leak was noted coming through a joint in the stonework on the west wall of the discharge tunnel about three feet above the tunnel floor level and back about five feet from the gate location.

The above noted leak most probably is directly connected to an opening in the upstream face stonework in the vicinity of the west side of the gate. It may actually be related to the loose stonework previously noted with gate operation. Of all of the leakage observed, this is considered to be the most significant.

Some minor seepage was observed through the stonework at the arch roof of the discharge tunnel. This appeared to be attributable to disintegrated or washed out mortar joints between the stonework in the arch and appeared to be a relatively minor problem over local areas only.

Our conclusion based on this inspection is that there appeared to be nothing observed at the dam that would indicate that there were any problems that would warrant any emergency remedial measures. This statement must be qualified by saying that this conclusion is based on field observations only, since we do not have the advantage of any information regarding the actual dam makeup or design, since there were no drawings available showing such information.

We further conclude that at this structure, as at all water retaining structures, steps should be taken to repair all areas where leakage is known to occur and to originate. Also, all areas where soundness of the masonry is questionable due to erosion or displacement of cement mortar joint material or defective stonework should be restored to a sound condition.

Our recommendations as to the type of repairs, location, and sequence of operations would be as follows:

(1) Repair of the upper leak on the front face of the dam could be made as soon as convenient by drawing down the pond to the required level to allow work at the known leak. This drawdown can reportedly be made without undue inconvenience and is reportedly possible by means of operating the main sluice gate.

While the pond is down at this lower level inspection of the mortar joints should be made over the exposed area below normal water level and any necessary repairs made to the stonework and joints.

Repair of the known leak or openings should be done by first removing any loose or deteriorated mortar in the vicinity of the leak. New mortar which should be a dense sand-cement mixture should first of all be rodded back into the joint or openings as far as possible in order to fill any voids caused by piping or displacement of material. Extreme care should be taken to give maximum effort in this step of the work. If the openings are of large extent with regard to depth within the structure, some type of pressure grouting may be required to successfully fill the voids. Final closure and covering of the leak at the face should be done after the adjacent area is cleaned and prepared to receive fresh mortar.

Similar treatment of the discharge points where leakage can be observed at the east wall of the spillway discharge channel, assuming the flow stops with the drawdown of the lake to this level. Otherwise, the repair of these areas should be deferred till a later date as discussed below.

(2) Repair of the loose stonework adjacent to the main gate, and repair of the stonework and joints in the discharge tunnel downstream of the

gate will require that work be done in the day. This will apparently require that the lake be drawn down completely to expose all of the areas and to remove the head on the dam. Coordination of the scheduling of drawdown dates should be accomplished with downstream interests affected by such action.

It is believed that this drawdown could be delayed until the end of the vacation and recreation season, say as soon as possible after Labor Day, in order that there would be no unnecessary problem with summer residents along the lake shore. It appears that as long as the leakage observed, particularly that noted in the discharge tunnel, does not become progressively worse there would be no need to unwater the entire lake before the end of the season. However, to insure that the leak in the tunnel does not become progressively worse and remain unnoticed, we recommend that this area within the tunnel be inspected as frequently as is practical but at least at two week intervals to insure that any worsening of the situation does not go undetected.

Work at the upstream face joints and all necessary joints within the discharge tunnel shall be repaired in the same manner as discussed above, wherein as much mortar or grout as possible is deposited in depth at all open joints or obvious leakage areas.

It is our belief that the above work could be performed by a small masonry contractor, perferably one familiar with water retaining structures, on a per diem basis plus cost of materials used. This would appear to be the best approach from the Continental Can Company point of view particularly where the extent of the scope of work is dependent on findings that can only be assessed after the lake is unwatered.

Insofar as a budget estimate of cost for the work as presently envisioned, we believe that the repair work cost should be in the range of $10,000 to $20,000 maximum unless unforeseen problems arise.

We trust that the enclosed is complete and satisfactory for your present needs and planning. Should any changes in the status of the conditions at the dam occur before the repair work is accomplished, please do not hesitate to call upon us for further review of the situation.

It has been a pleasure to have been of service to you in this assignment.

Very truly yours,

CHAS. T. MAIN, INC.

J. C. Matte

/jmm
cc: Mr. G. E. Prokupek
Mr. J. Ywarsky
Mr. J. B. Creeden (Liberty Mutual)

INTERDEPARTMENT MESSAGE

STD-201 12 69

SAVE TIME: Handwritten messages are acceptable. Use reverse side if you need more space. If typewritten, single space lines.

TO: File	AGENCY: Water & Related Resources	DATE: June 7, 1972
FROM: Victor F. Galgowski, Supt. of Dam Maintenance	AGENCY: Water & Related Resources	TELEPHONE:
SUBJECT:		

On May 23, 1972 the undersigned inspected the repair work being done at the Oxoboxo Lake Dam, Montville.

The following individuals were met at the site:

1. Karl Allen, Project Engineer, Continental Can Co., Inc.
2. Mr. Chapski, Engineer, Chas. T. Main, Inc.
3. Mr. Clark, representing the Schnip Co. Contractors

The lake had been lowered approximately 6 feet. Water depth at the dam varied from 2½ feet to 5 feet. Repair work had started the preceding day and for the most part was being performed from two small rafts. Loose mortar was being removed from the upstream stonework and all joints were being pointed with new mortar.

One opening through a mortar joint in the upstream wall about 5 feet below the normal water level and 25 feet from the west end of the dam will be pressure grouted. Another hole found in the easterly rock face of the spillway wall measuring approximately 1 foot square and 36 inches deep will be filled with concrete.

Inspection of the upstream face did not reveal where the large leak noted in the discharge tunnel might originate. Mr. Clark stated that a diver was going to make more observations the following morning. If the source of this leak is not located, Mr. Allen said his company would draw the lake down completely at the end of the vacation season and make the necessary repairs at that time.

The large capstone located over the main gate will be raised and reset with a epoxy cement.

There was no apparent evidence that the depression in the dam crest and located at the wetern end was caused by "piping action" through the dam.

Workmen at the site stated the gates had been closed the preceding evening. They estimated the water level had risen approximately 3 inches in 18 hours. After

SAVE TIME: If convenient, handwrite reply to sender on this same sheet.

observing the rate of flow into the lake at the north end, it would by my guess that it might take two months to restore the normal water level unless we experience heavy rainfall in this area.

Mr. Allen informed me that his concern was negotiating to sell the lake and water rights. He further stated that he could not assure us that additional repairs would be done by the new owners if the sale is formalized.

I suggest this site be reinspected after Labor Day to determine if additional work is required. With the completion of the present repairs and from the overall appearance of the dam, there does not seem to be any cause for concern over the dam's safety at the present time.

Supt. of Dam Maintenance

VFG:ljg

Mill Operations Division

CONTINENTAL CAN COMPANY, INC.

P O BOX 1425 AUGUSTA GA 30903

404 798 5711

July 11, 1972

Mr. William O'Brien, Civil Engineer
Water and Related Resources Unit
Department of Environmental Protection
Room 225
State Office Building
Hartford, Connecticut 06115

Reference: Oxoboxo Lake Dam, Montville, Connecticut

Dear Mr. O'Brien:

Attached is a copy of Charles T. Main, Inc.'s report dated July 7, 1972. This report covers Phase I repairs made to the dam during the week of May 22 - 26, 1972.

I wish to correct one error in the report. In the second paragraph, the statement is made that the lake level was, "drawn down about 10 feet below normal"...The lake level was actually drawn down 72 inches below the spillway.

Our present plans are to commence Phase II repairs, as outlined in Charles T. Main, Inc.'s report of April 21, 1972, after September 15, 1972. As soon as plans are finalized, your office will be notified.

Very truly yours,

CONTINENTAL CAN COMPANY, INC.

Karl Allen
Senior Project Engineer

Attachment
KA/mmr

cc: G. E. Bessette - 500 New York - w/attach.
H. Brown - 43 New York - w/attach.
J. W. Daniel - 741 Augusta - w/attach.
T. DeYoung - 740 New York - w/attach.
J. G. Lee - 740 New York - w/attach.
R. F. Ludemann - 43 New York - w/attach.
D. M. Ochacher - 43 New York - w/attach.
G. E. Prokupek - 740 New York - w/attach.
L. P. Scoboria - 500 New York - w/attach.
J. Ywarsky - 508 Thames River - w/attach

W. M. HALL
G. R. RICH
W. J. LESTAND
C. A. DAUBER
BAUMRUCKER

MAIN
CHAS. T. MAIN, INC.
Engineers

SOUTHEAST TOWER, PRUDENTIAL CENTER, BOSTON, MASSACHUSETTS 02199 · TELEPHONE 617 262 3200

July 7, 1972 2815-10

SUBJECT: Oxoboxo Dam
Supplementary Inspection Report

Mr. Karl Allen
Supervisor, Mill Projects
Paperboard and Kraft Paper Division
Continental Can Company, Inc.
P. O. Box 1425
Augusta, Georgia 30903

Dear Mr. Allen:

We are pleased to report to you herein our findings based on a visit to the site of the subject dam made on May 22 and 23, 1972. The reader is also referred to the earlier inspection report dated April 21, 1972.

At the time the May inspection was made, a work crew, which had been contracted by Continental Can Company, was in the process of making repairs to the upstream face of the dam. This remedial work consisted of first removing all loose and deteriorated mortar and then applying a sand-cement mixture back into the opened and cleaned-out joints. The crew was in the process of making repairs to the entire exposed front face of the Dam, above the lake level which had been drawn down about 10 feet below normal.

Under the direction of Mr. Allen of Continental Can Co., the lake elevation had been lowered to enable the crew to begin work at the lowest possible location and to trace, if possible, the origin and paths of other documented leakage. The main gate had been closed during the inspection.

All reported leakage associated with the spillway area had stopped. This can be attributed to the lowering of the lake elevation below the point where the observed leakage had originated. However, it was still noted that some outflow was occurring at the downstream end of the main gate discharge tunnel. An inspection of the tunnel and gate area showed that the gate appeared to be in good condition with no major leakage emitting from the seal. The water observed was discharging through an opening located in the stonework on the west wall of the

tunnel above the tunnel floor level and back from the gate. According to Mr. Allen, this was the location of the leak as mentioned and described in the previous inspection report. Also, Mr. Allen indicated that this leakage did not appear as severe as the leakage observed before the lowering of the lake elevation.

The remainder of the inspection consisted of observing the progress and findings of the work crew as it worked its way along the upstream face of the Dam.

As with the earlier inspection, our conclusion based on this inspection is that there appeared to be nothing serious which was observed that would indicate the necessity of emergency remedial measures. However, steps should be taken to repair all areas where leakage was found to occur and to originate. Work which was being done to the upstream face of the Dam appeared to be well supervised and thorough in nature.

With respect to the observed leakage in the discharge tunnel, it is recommended that a work program be initiated to correct the problem based on previous and current observations. This program should be based, in part, on findings associated with the work and experiments which were conducted during the drawdown of the lake.

We trust that the enclosed is complete and satisfactory. Should there be any questions, please do not hesitate to call.

Very truly yours,

CHAS. T. MAIN, INC.

Philip L. Chapski

/jmm

SUGGESTION COMMITTEE SAY: Improve Your Own Condition; Earn Cash and Recognition: Send in a Suggestion!

Interdepartment Message

STD 200 REV 11-73 (Stock No. 6718 Parcel)

SAVE TIME Handwritten messages are acceptable
Use carbon if you really need a copy. If typewritten, ignore faint lines

To	NAME: File	TITLE:	DATE: Dec. 11, 1977
	AGENCY:	ADDRESS:	
From	NAME: Robert E. Lemieux	TITLE: Engineering Intern	TELEPHONE:
	AGENCY: Water & Related Resources	ADDRESS:	

SUBJECT: Crapaxo Lake Dam

I inspected the dam site, to observe the extent of the repair work that has been completed.

The "phase I" repairs as outlined in an inspection report made by Chas. T. Main, inc. dated April 21, 1972 have been completed and the upstream face and top of the upstream masonry wall appear to be in good condition.

"Phase II" as outlined in the same letter does not appear to have been carried out.

There is still a substantial amount of leakage flowing from the main outlet gate channel.

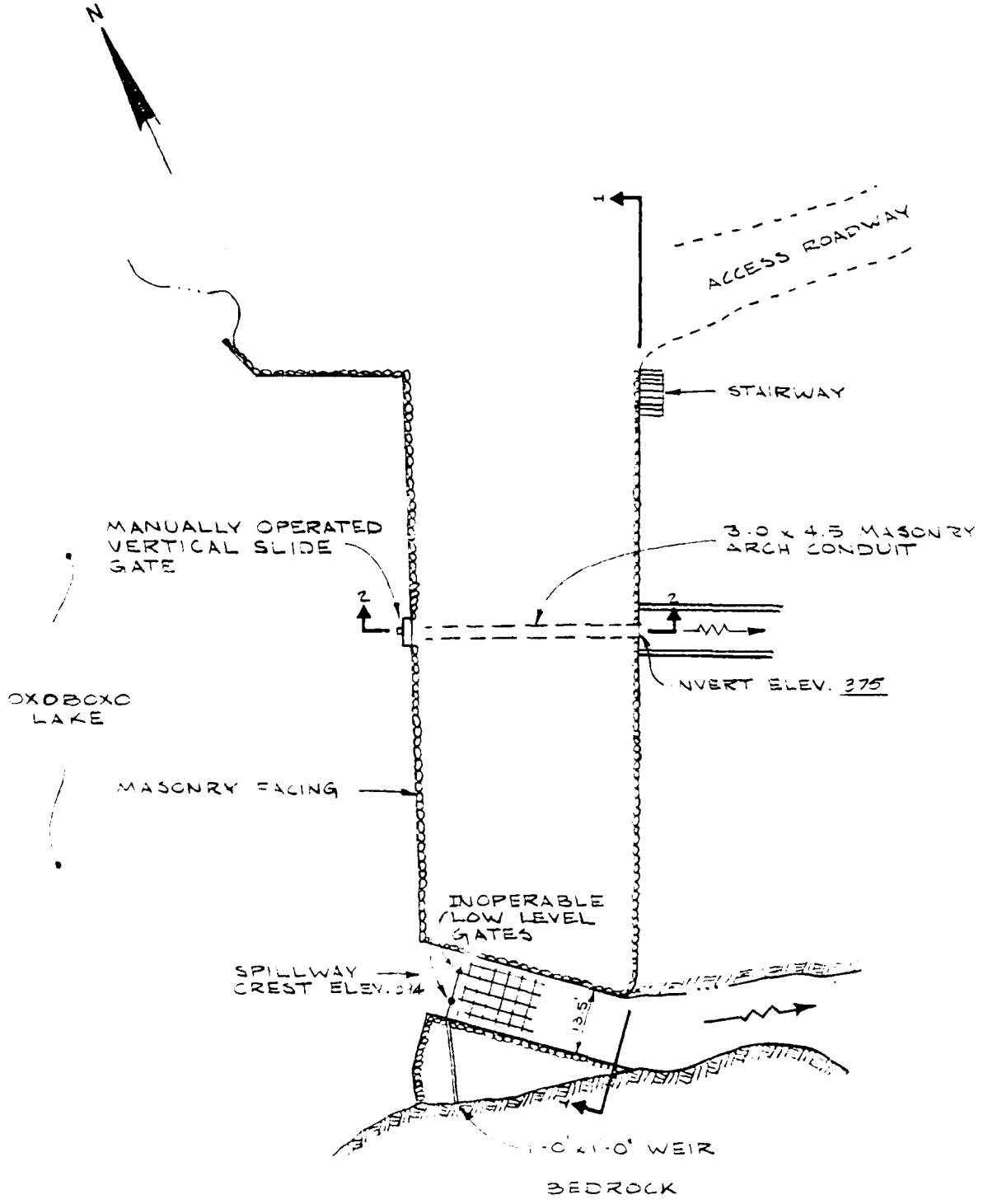
The ownership of the dam changed between the two proposed changes, and this is possibly the reason repairs weren't completed.

No order was issued on this dam, but it should be reinspected within a year

SAVE TIME If convenient, handwrite reply to sender on this same sheet

APPENDIX B-3

Sketches including plan, section, and elevation prepared by C-E Maguire, showing approximate relationship of the various features observed during the field inspection.

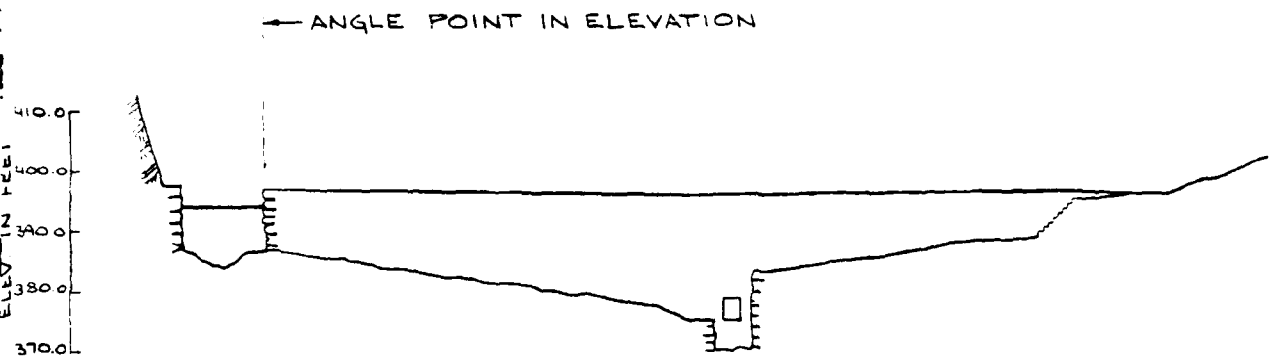


PLAN

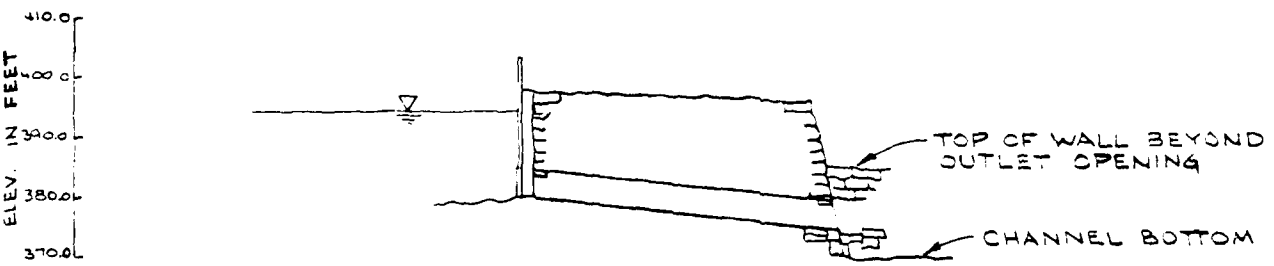
NOTE:
PLAN SHOWN IS APPROXIMATE ONLY.

OXOBOXO LAKE DAM
SCALE: 1" = 30'-0"

3-3
1 OF 1



① ELEVATION AT DOWNSTREAM TOE



② CROSS-SECTION THROUGH GATE AND OUTLET CONDUIT

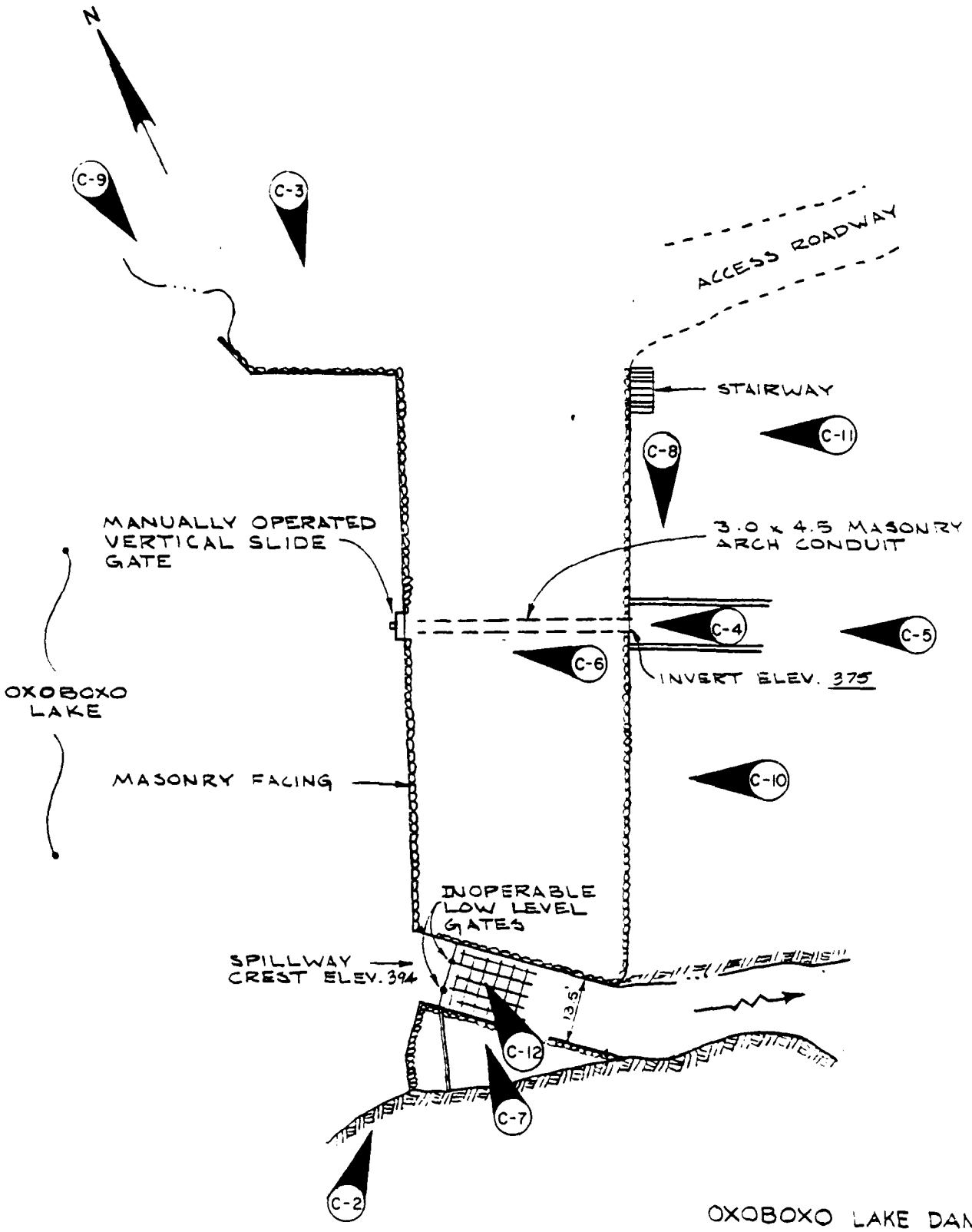
NOTE:
ELEVATION AND SECTION SHOWN ARE APPROXIMATE ONLY

OXOBOXO LAKE DAM
SCALE 1" = 30'-0"

2-2
2 OF 2

APPENDIX C

SELECTED PHOTOS



OXOBOXO LAKE DAM

PLAN

PHOTO INDEX

PLATE NO. 2

C-2 UPSTREAM FACE - LOOKING EAST

C-3 UPSTREAM FACE - LOOKING WEST

C-4 OUTLET CONDUIT

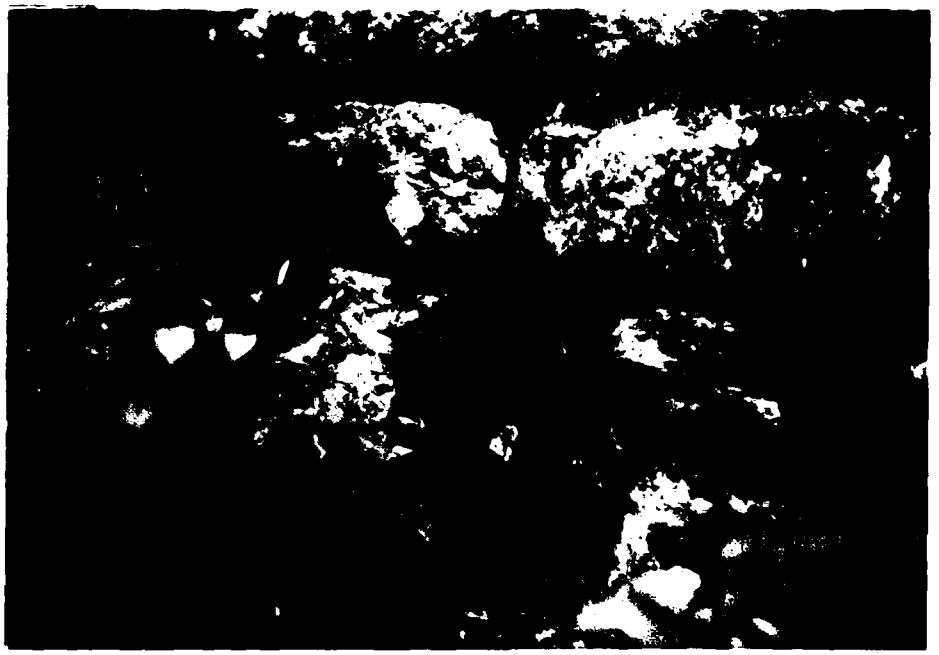
C-5 OUTLET AT DOWNSTREAM FACE OF DAM

C-6 OUTLET CONTROL MECHANISM

C-7 SPILLWAY AND SPILLWAY GATE CONTROL STRUCTURE
(FOREGROUND)

C-8 DOWNSTREAM FACE OF DAM OVERGROWN WITH VEGETATION

C-9 EROSION AND DETERIORATION AT LEFT ABUTMENT WINGWALL



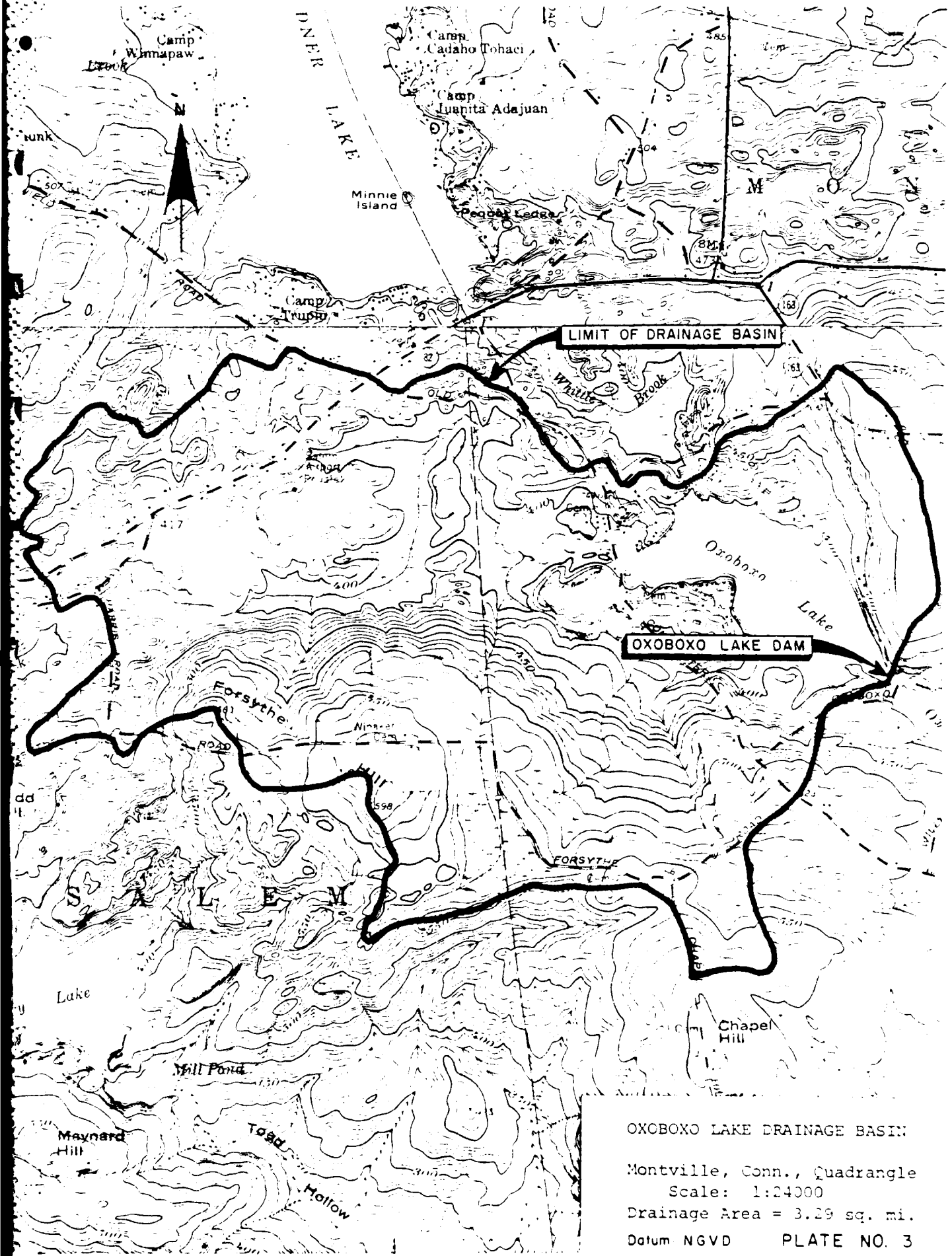
C-10 SEEPAGE THROUGH DOWNSTREAM FACE OF DAM

C-11 SEEPAGE AT LEFT ABUTMENT

C-12 SEEPAGE THROUGH LEFT TRAINING WALL OF SPILLWAY

APPENDIX D

HYDROLOGIC COMPUTATIONS



OXOBOXO LAKE DRAINAGE BASIN

Montville, Conn., Quadrangle
Scale: 1:24000
Drainage Area = 3.29 sq. mi.
Datum NGVD PLATE NO. 3

"Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrograph"

BASIC DATA

Name of dam OXOBOXO LAKE DAM Name of town MONTVILLE CT

Drainage area = 3.29 Sq. Mi. Top of dam 397.65 NGVD (EST.)

Spillway type = BROAD CRESTED Crest of spillway 394.0 NGVD (EST.)

Surface area at crest elevation = 157.0 Acres

Reservoir bottom near dam = 376.75 (Est.)

Assumed side slopes of embankments = 2:1

Depth of reservoir at dam site 21.0 Ft. = y_o = 21.0 ft.

Mid-height elevation of dam = 387.15

Length of dam at crest = 135.0

Length of dam at mid-height = 100.0

40% of dam length at mid-height = W_b = 40.0 ft.

Stream height of dam = 23.0

Hydraulic height of dam = 21.0

Step 1:

Elevation M.S.L.	Estimated Storage In AC-ft.	Remarks
394.0	2000	
396.0	2314	
398.0	2628	
[illegible]	2942	
[illegible]	3256	

Step 2:

$$Q_{pl} = \frac{8}{27} W_b \sqrt{g}\, y_o^{3/2}$$

$$= 1.68\, W_b\, y_o^{3/2} = 6768 \text{ CFS}$$

Say 6770 CFS

A. Size Classification

Height of Dam = 26.0 feet; Hence SMALL

at crest elevation reservoir storage = 2000 AC-ft., hence INTERMEDIATE

adopted size category INTERMEDIATE

B. Hazard Potential

THE DAM IS LOCATED IN A PREDOMINANTLY RURAL AGRICULTURAL AREA WHERE FAILURE OF DAM WILL NOT CAUSE DAMAGE TO LIFE AND MANY HOMES, BUT WILL INVOLVE APPRECIABLE ECONOMIC LOSS OF RECREATIONAL FACILITIES AND USE OF PROCESS WATER DOWNSTREAM. FAILURE IS ALSO LIKELY TO BREACH OXOBOXO BROOK ROAD.

It is estimated from the rule of "thumb" failure hydrograph as follows:

Category	Loss of Life	Economic Loss
		Homes = NO
SIGNIFICANT	NO	Buildings = NO
		Farms = YES
		Miscellaneous = YES
		Highways or roads = YES

C. Hazard | Size | "Test Flood" or Spillway Design Flood

Hazard	Size	"Test Flood" or Spillway Design Flood
SIGNIFICANT	INTERMEDIATE	½ PMF TO PMF

Adopted S.D.F. test flood = ½ PMF

Adopted value of test flood due to watershed characteristics = 1000 CFS

Computing Maximum Probable Discharges - Inflow and Outflow Values Date of Inspection: 6/9/78

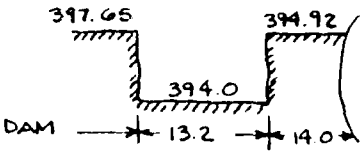
Name of Dam OXOBOXO LAKE DAM ; Location of Dam OXOBOXO BROOK Town MONTVILLE, CT

Watershed Characterization ROLLING HILLS WITH SWAMPS

Adopted "test" flood = HALF PMF = 1000 CSM = 3290 C.F.S.

D.A. = Drainage Area = 3.29 Square Miles = Acres

S.A. = Surface Area of Reservoir = 0.245 Square Miles = 157 Acres



Shape and Type of Spillway = FREE OVERFLOW SHARP CRESTED

B = Width of Spillway = VARIES - ADOPTED ON SKETCH feet; C = Coefficient of Discharge = (3.33 − Friction) = 3.00

Maximum Capacity of Spillway Without Overstopping = 400 C.F.S. = % of test flood

Top of Dam Elevation = 397.65 ; Spillway Crest Elevation = 394.0

Length of Dam= 166 feet

Name of Dam	Test Flood Qp_1 CSM	Test Flood Qp_1 CFS	Inflow Characteristics h_1 in feet	Inflow Characteristics S_1 in inc.	Outflow Characteristics First Approximation Qp_2 CFS	h_2 in feet	S_2 in inc.	Outflow Characteristics Second Approximation S_3 in inc	h_3 in ft.	Qp_3 CFS	Outflow Characteristics Third Approximation S_4 in inc.	h_4 in ft.	Qp_4 CFS
1	2	3	4	5	6	7	8	9	10	11	12	13	14
OXOBOXO LAKE DAM	1000	3290	6.83	6.10	3290	6.83	6.10	5.18	5.80	1975	5.64	6.31	2560

Qp = Discharge; h = Surcharge Height S = Storage in inches

Overtopping Potential

Spillway crest elevation = 394.00 M.S.L.

Top of dam elevation = 397.65 M.S.L.

Maximum discharge capacity of Spillway without overtopping = 400 C.F.S.

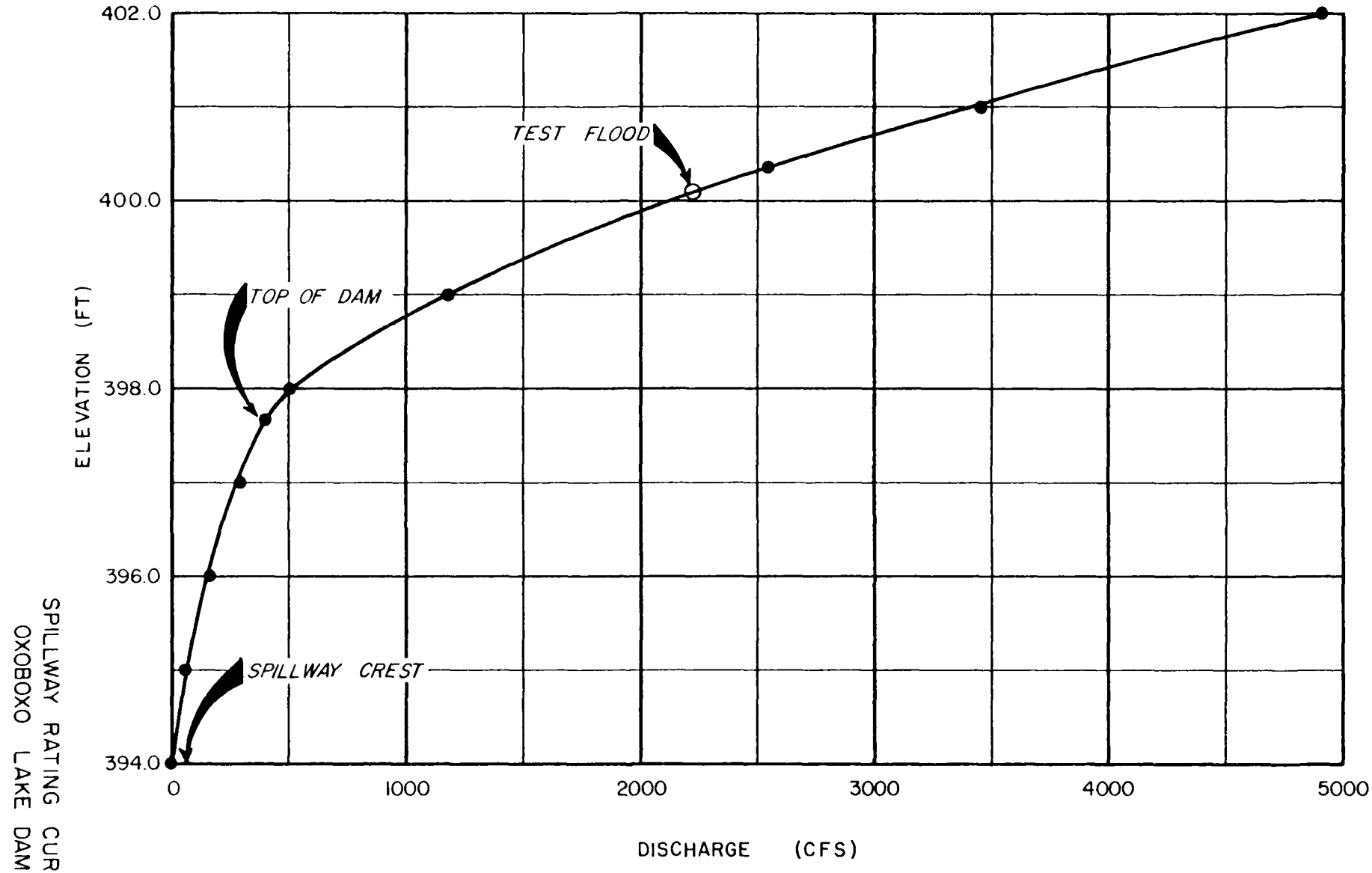
"Test flood" outflow discharge = 2560 C.F.S.

% of "Test flood" carried by Spillway without overtopping = 16% 1

"Test flood" outflow discharge which flows over the dam = 2160 C.F.S.

= 84 % of "Test flood" 2

1 + 2 = 100%



SPILLWAY RATING CURVE
OXOBOXO LAKE DAM

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
CT 284	NED	CT	011	02				OXOBOXO LAKE DAM	4129.1	7211.6	15	AUG	78

POPULAR NAME	NAME OF IMPOUNDMENT
	OXOBOXO LAKE

REGION/BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI.)	POPULATION
01 07	OXOBOXO BROOK	OAKDALE	2	5000

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
REPG	1810	RS	27	26	2573	2000	NED	N	N	N	N	07AUG78

REMARKS

NID HAS	SPILLWAY LENGTH (FT.)	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CU. YD.)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
1	166	U	15	400	6700											

OWNER	ENGINEERING BY	CONSTRUCTION BY
MONTVILLE REALTY CORP	NONE	NONE

REGULATORY AGENCY

DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	CONN PAPERBOARD CO	STATE OF CT

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
C-E MAGUIRE, INC	09	JUN	78	PL 92-367

REMARKS

END

FILMED

END

FILMED