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LAKE WYOLA (MA 00510) (U) CORPS OF ENGINEERS WALTHAM
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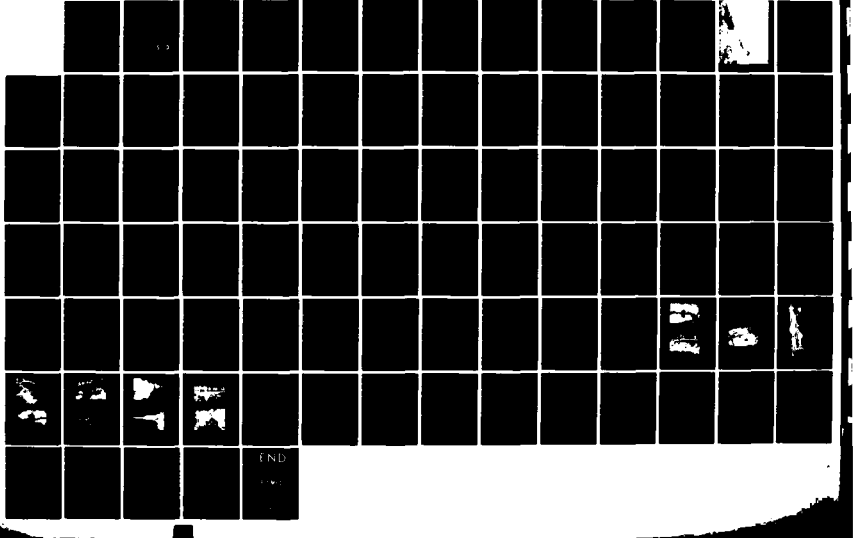

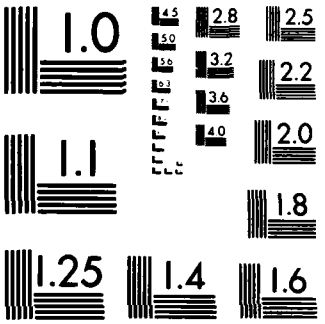

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CONNECTICUT RIVER BASIN

SHUTESBURY, MASSACHUSETTS

LAKE WYOLA

MA 00510

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

MARCH 1979

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

REPLY TO
ATTENTION OF

NEDED

JUN 04 1979

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

I am forwarding to you a copy of the Lake Wyola 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 Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Town of Shutesbury, Conservation Commission, Town Hall, Shutesbury, Massachusetts 01072.

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 Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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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,
Connecticut River Basin
Shutesbury, Massachusetts
Sawmill River

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

THe dam is a 232 ft. long, 14 ft. high masonry embankment with a concrete spillway. The visual inspection did not disclose anu findings that indicate an immediate unsafe condition. The dam has a size classification of intermediate and a hazard condition of significant. The dam is generally in good condition. It is felt however, that certain items which are generally normal maintenance and operational procedures need attention.

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NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

Identification No.: 00510 MA

Name of Dam: Lake Wyola

Town: Shutesbury

County and State: Franklin County, Massachusetts

Stream: Sawmill River

Date of Inspection: November 27, 1978

The dam is a 232 foot long, 14 foot high masonry embankment dam with a concrete spillway. The dam was originally constructed in 1883 and its primary purpose now is for recreation. The dam is owned, operated and maintained by the Town of Shutesbury Conservation Commission.

The visual inspection did not disclose any findings that indicate an immediate unsafe condition.

The dam has a size classification of intermediate and a hazard condition of significant. Based on Corps guidelines, the test flood is one half the probable maximum flood. The spillway for this dam is not capable of passing this flood without overtopping the dam by about 3 feet.

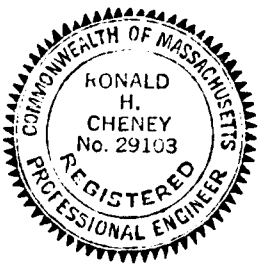
Indepth engineering data was not available and assessment is based primarily on visual inspection, past performance history, and hydrologic and hydraulic assumptions.

This dam is in generally good condition. It is felt however, that certain items which are generally normal

maintenance and operational procedures need attention. These include removal of vegetation surrounding the dam, placement of riprap on the discharge channel banks and floor, monitoring of wet areas, and establishment of a formal warning system.

The dam's spillway can pass only 16 percent of the 2870 cfs test flood outflow. The owner should engage the services of a competent consulting engineer to further evaluate the potential for overtopping and the adequacy of the spillway.

The above problems do not represent an immediate threat to the dam; however, the normal maintenance and operational procedures should be carried out by the owner over the next 2 years after receipt of this Phase I Inspection Report. The evaluation of the spillway should be carried out by the owner within one year after receipt of this Phase I Inspection Report.



Ronald H. Cheney

Ronald H. Cheney, P.E.
Associate

Hayden, Harding & Buchanan, Inc.
Boston, Massachusetts

This Phase I Inspection Report on Lake Wyola 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.

Joseph W. Finegan

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

Joseph A. McElroy

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
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Chief, Structural Section
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APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

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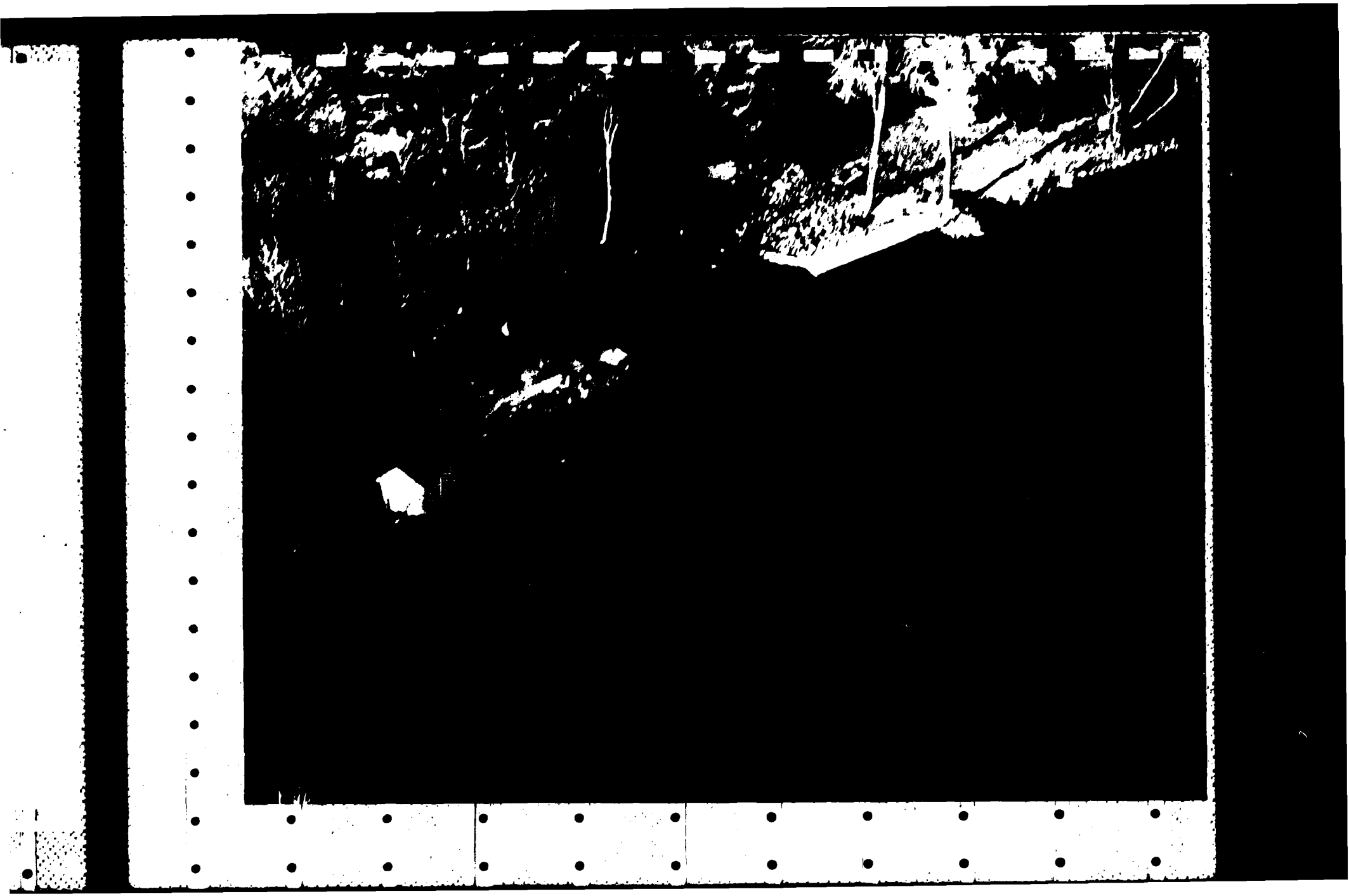

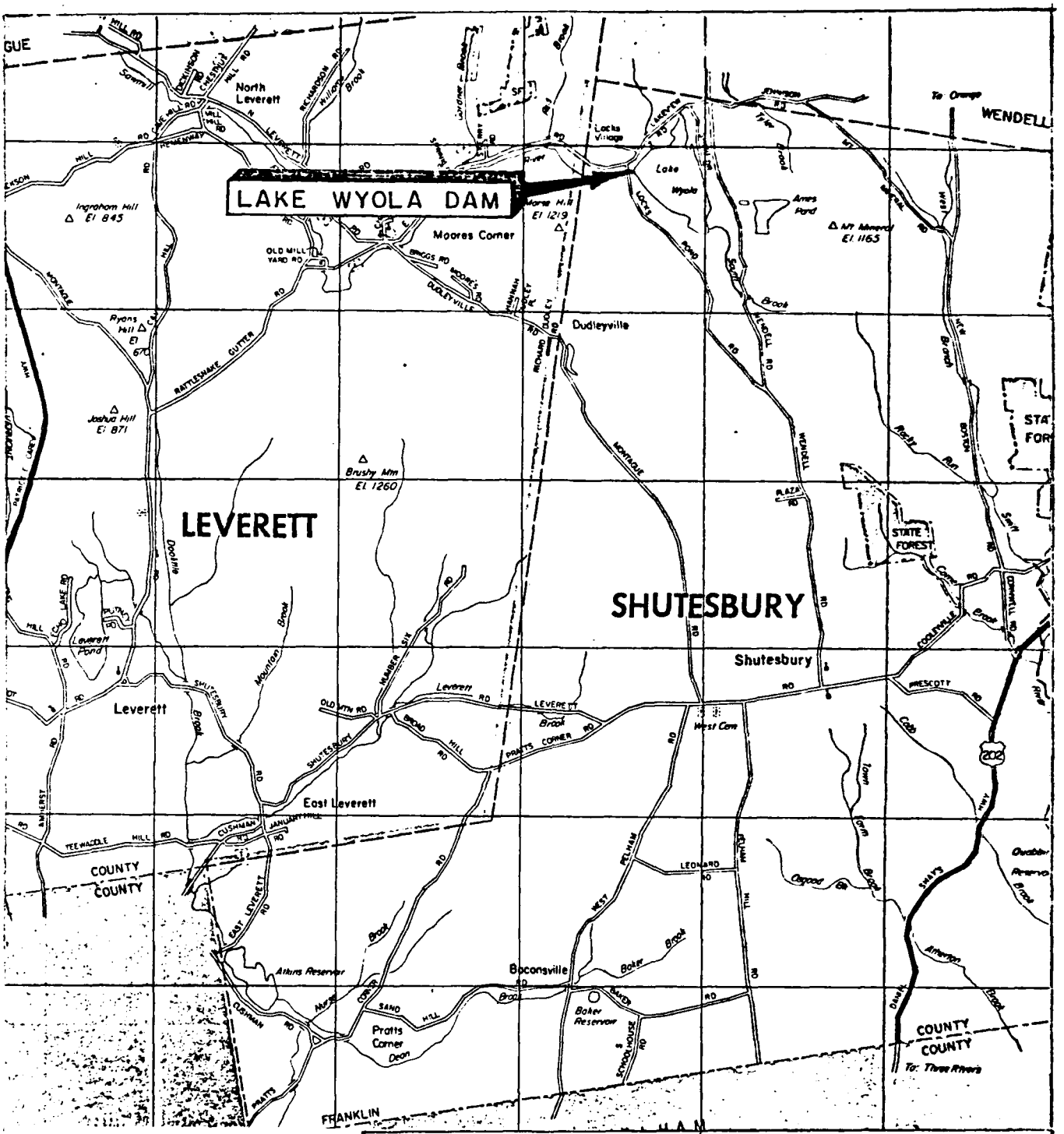

HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LAKE WYOLA DAM

SHUTESBURY MASSACHUSETTS

SCALE 1" = 5280'

DATE FEBRUARY, 1979

PHASE I
NATIONAL DAM INSPECTION PROGRAM
NAME OF DAM: LAKE WYOLA

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. Hayden, Harding & Buchanan, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued Hayden, Harding & Buchanan, Inc. under a letter of 28 November 1978 from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW 33-79-C-0012 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

Lake Wyola is located in the Town of Shutesbury, in Franklin County Massachusetts. The lake is fed primarily by Skerry Brook, Tyler Brook, Plymton Brook and South Brook. The dam is located at the western shore of the lake near the community of Locks Village. The dam is shown on the Millers Falls Quadrangle, Massachusetts-Franklin County and has the coordinates of North 42° 30' 06", West 72° 26' 12".

b. Description of Dam and Appurtenances

The dam is comprised of an 82 foot long concrete spillway, a 150 ± foot stone masonry embankment, a wood frame gate house, and an outlet structure. There is also an old blocked up sluiceway contained within the embankment.The concrete spillway contains three sections and is

stepped. The right most section is 14 feet long and 1.0± feet below the top of the dam, the adjacent section is 20 feet long and 1.7± feet below the top and the 48 foot long section which is adjacent to the embankment is 3.2± feet below the top of the dam. The 2 outer sections have a plan width of about 7 feet, and the 48 foot long section has a plan width of about 18 feet. The downstream face of the spillway is rock filled. The masonry embankment is made up of 3 components. These are a central inner core wall, 16 inches thick of cemented split stone, a sand filled upstream section and a masonry downstream wall. The downstream wall has a top plan width of 7 feet and a bottom width of 10 feet and the upstream sand filling has a top plan width of 12 feet and a bottom width of 25 feet. The upstream sand filling is lined with riprap and has a typical height of about 14 feet. The gate house contains the controls for the 2 underlying sluiceway gates. The gates are steel gates with wooden shafts and the sluiceway is a 3.5 foot by 3.5 foot culvert of stone masonry. The intake is located about 20 feet upstream of the crest and has a timber grill. About 200 feet downstream of the dam is an 8 foot diameter culvert which carries water below Locks Pond Road.

c. Size Classification

The dam is classified as intermediate in size according to its storage capacity of 1565 acre feet.

d. Hazard Classification

The dam has a hazard classification of significant. At least seven habited structures located along the downstream Sawmill River could be damaged if the dam failed and loss of life could occur.

e. Ownership

The dam is owned by the Town of Shutesbury, Conservation Commission, Town Hall, Shutesbury, Massachusetts 01072.

f. Operator

The caretaker of the dam is Mr. Raymond Moriarty, the chairman of the Shutesbury Conservation Commission. His address is Old Lock's Pond Road, Lake Wyola, Shutesbury, MA 01072. Telephone- (413) 367-2670.

g. Purpose of Dam

The major purpose of the dam is for recreation. The stone culvert outlet is used to control the level of Lake Wyola. Earlier the dam serviced Lake Wyola which was used as a reservoir for the downstream mills.

h. Design and Construction History

The dam was originally designed and built in 1883. A plan of this original structure was found in the Franklin County Plan Book, Volume 3, Page 139, located in the Franklin

Commissioners office, Greenfield, Massachusetts. The old gate located near the left embankment is not shown on these original plans and was sealed in the early 1900's. The original dam was damaged by the flood of 1938 and later rebuilt.

i. Normal Operational Procedures

There is no formal operational procedure. The caretaker regulates the level of Lake Wyola on a daily basis and keeps records in a logbook located in the gate house. The lake is generally kept higher in the late spring and summer and lower in the fall and winter. If weather reports project heavy rain the caretaker opens the gates and lowers the level of the lake.

1.3 Pertinent Data

a. Drainage Areas

The drainage area of 4122 acres (6.44 s.m.) consists of wooded, hilly rural land. Several roads pass through the drainage area. Most development consists of homes surrounding the lake, (about 175 structures). Most other homes are scattered along Locks Village Road and West Road to the north of the lake. The major drainage path is Plympton Brook. It has a length of 3.2 miles and a change in elevation of about 320 feet and passes through several small ponds.

Below the dam, the outlet brooks follow a narrow valley parallel to North Leverett Road. Homes are scattered along the road, most are well above the brook, with the exception of several homes just below the dam.

b. Discharge at Dam Site

There are two outlet conduits in the dam. The principal outlet is a 3.5 foot square stone culvert with manually controlled sluice gates. The inlet has a wooden debris screen. Its capacity will vary from 15 to 224 cfs. Under tailwater conditions flow could stop. The second outlet is a three foot square stone culvert which appears to have been closed off with concrete. Some seepage has been noticed coming from this outlet. Both outlets have approximate invert elevations of 819.

The maximum known flood occurred in 1938. Part of the dam was washed out. The dam was repaired to its present form in the early 1940's. It was able to pass storm runoff from the 1955 floods without being damaged. In both cases, the amount of storm runoff at the dam was not measured.

The spillway is ungated. Assuming only the 48' and 20' sections of spillway acting as true spillways and water to elevation 832± the spillway capacity is about 450 cfs.

c. Elevation (ft. above MSL)

(1) Streambed at centerline of dam----------(USGS) 819±

(2) Maximum tailwater----------836.75

(3) Upstream portal invert diversion tunnel--------none

(4) Recreation pool----------830

(5) Full flood control pool---------- N/A

(6) Spillway crest (ungated)----------830

(7) Design surcharge (Original Design)----------unknown

(8) Top Dam----------833±

(9) Test flood design surcharge----------836±

d. Reservoir

(1) Length of maximum pool----------3700'

(2) Length of recreation pool----------3600'

(3) Length of flood control pool---------- N/A

e. Storage (acre feet)

(1) Recreation pool----------1144

(2) Spillway crest pool----------1144

(3) Top of dam----------1703

(4) Flood control pool----------1703

(5) Test flood pool---------- N/A

f. Reservoir Surface (acres)

(1) Recreation pool----------104

(2) Spillway crest----------104

(3) Top dam----------140

(4) Flood control pool----------N/A

(5) Test flood pool----------176

g. Dam

(1) Type----------Gravity, stone and concrete masonry and earth dike

(2) Length----------230'±

(3) Height----------14 feet

(4) Top Width----------21 feet

(5) Side Slopes----------approximately vertical D/S, 2:1 above water U/S

(6) Zoning----------dry masonry, cemented core, sand fill

(7) Impervious Core----------cemented stone

(8) Cutoff----------unknown

(9) Grout curtain----------unknown

h. Diversion and Regulating Tunnel----------none

i. Spillway

(1) Type----------broad crested

(2) Length of weir----------48' lower, 20' upper

(3) Crest elevation----------830'lower, 831.5'upper

(4) Gates----------none

(5) U/S Channel----------4:1 concrete/stone

(6) D/S Channel----------11:1 concrete/stone, 3:1 stone

j. Regulating Outlets

There is one regulating outlet. It is composed of two manually operated, wooden sluice gates on a 3.5 foot square stone conduit, passing beneath the approximate center line of the dam. A wood framed building encloses the operating

mechanisms. One gate has a rack and pinion control while the other is lever operated. The upstream invert is at approximate elevation 821.

SECTION 2
ENGINEERING DATA

2.1 Design

The origianl dam at Lake Wyola was designed in 1883 and was called Locks Pond Reservoir Dam. The original plan was found at the Franklin County Commissioners office. This dam was damaged by the flood of 1938 and was repaired in about 1940. Indepth calculations for either design were not discovered.

2.2 Construction

Specifications for the original 1883 dam are included with the original plan. No other construction data was discovered. A further description is included in Section 6.1.b.

2.3 Operation

The dam is maintained and operated by the Conservation Commission of the Town of Shutesbury. No formal operational manual for the dam exists.

2.4 Evaluation

a. Availability

The original dam plans and specifications were made available at the Franklin County Commissioners office, Greenfield, Massachusetts. State Inspection Reports for the years of 1970, 1973 and 1976 were made available at the Department of Environmental Quality Engineering Division of Waterways office in Boston, Massachusetts.

b. Adequacy

The lack of indepth engineering data does not allow for a definitive review. Therefore the adequacy of this dam, structurally and hydraulically, can not be assessed from the standpoint of review of design calculations, but must be based primarily on the visual inspection, past performance history, and hydrologic and hydraulic assumptions.

c. Validity

The field investigation indicates changes in features from the 1883 plans. The plan and cross sectional sketches from the 1973 State Inspection Report agree with the features encountered during the field investigation.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General

The Phase I Inspection of this dam was made on November 27, 1978. The water behind the dam at that time was within about 2 inches of the lowest spillway (48 foot section) section.

b. Dam

Visual inspection of the dam indicated it is in generally good condition.

Only the upper few feet of the upstream slope was visible at the time of inspection. Exposed portions of the upstream slope were covered with riprap and in some areas, brush was growing through the riprap.

The crest of the dam is shown in Photo 7. No evidence of vertical or horizontal misalignment of the dam could be discerned from the crest.

The downstream face of the dam consists of hand placed, typically flat, dry stone masonry in good condition.

The downstream face is at a slight angle with the vertical as shown in Photo 13. Several large trees were observed growing near the downstream face as shown in photos 4 and 5.

c. Appurtenant Structures

Structures along the dam include (1) a spillway section near the right abutment, (2) an operating sluiceway near the center of the dam, (3) an inoperative sluiceway near the left abutment and (4) a gatehouse.

The concrete covered masonry spillway was in good condition with only minor spalling. Some trees having diameters to 2 feet were observed adjacent to the spillway. A pool of unfrozen water at the base of the spillway, shown in photo 2, indicates water is seeping from the base of the spillway. Seepage was observed through riprap downstream of the concrete spillway.

Water was flowing from the operative sluiceway at the time of inspection. Some debris was observed downstream of the outlet.

The inoperative sluiceway is shown in a panaromic view, photos 4 and 5. Water was observed on the floor of the inoperative sluiceway. This water did not appear to be flowing, but a pool of water was observed downstream of the sluiceway, as shown in photo 6, indicating there is seepage from the inoperative sluiceway.

An inspection report of the dam , dated November 7, 1973, indicated the dam to be in satisfactory condition. The following wet areas were noted in the inspection report: (1) standing water inside the inoperative sluiceway,

(2) standing water in the old channel below the inoperative sluiceway, and (3) standing water in the channel below the spillway. These areas correspond to the wet areas observed during the present visual investigation. Apparently the wet areas have existed for at least five years. The wooden gatehouse was observed to be in good condition. The 2 steel gates were in working order.

d. Reservoir Area

The general area surrounding the reservoir is wooded and hilly. The shoreline is populated by small cottages. A more detailed description of the drainage area is included in Section 1.3 of this report. The amount of siltation within the reservoir is unknown.

e. Downstream Channel

The downstream channel is rock lined and wooded. The discharge channels of the spillway, operative sluiceway, and inoperative sluiceway, converge to form the downstream channel as shown in photo 3. The channel (Sawmill River) is diverted below Locks Pond Road by way of an 8 foot diameter culvert. The section of the spillway discharge channel immediately opposite the concrete apron has been eroded slightly and portions of the channel floor contain only a thin layer of stone.

3.2 Evaluation

Visual inspection indicates the dam and appurtenant structures to be in generally good condition. Significant findings which could, in the long term, cause problems are growth of vegetation on the upstream slope; growth of large trees near the downstream face of the dam; and lack of sufficient riprap on the downstream banks and floor of the discharge channel.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedure

The dam and it's outlet structure controls the water within Lake Wyola. The operator regulates the sluice gate in an attempt to maintain the water level of the lake at just over the spillway during the summer and just below the spillway during the winter. There is no formal operational procedure, however, the operator lives nearby the structure and uses his "good judgement" regarding lake and weather conditions in order to maintain the proper water level and remove surface oil caused by power boats from the lake. A log is kept to outline the daily gate activity.

4.2 Maintenance of Dam

Lake Wyola Dam is maintained by the Conservation Commission of the Town of Shutesbury. They review State reports and are responsible for instituting the recommended repairs and maintenance outlined within. Recent repairs consisted of removal of upstream tree growth and the pouring of concrete to improve the condition of the spillway. No written formal maintenance plan was disclosed for this dam.

4.3 Maintenance of Operating Facilities

The caretaker operates the outlet gates on a daily basis. No written formal maintenance plan is used less

his judgement on the performance of the facilities. The hand operated wooden shafted steel gates were in working condition.

4.4 Description of Warning Systems

There are no warning systems associated with this dam.

4.5 Evaluation

Although there is no formal operational procedure for the dam, the constant attention by the caretaker assures that the dam is in relatively good condition. The dam should be inspected every two years by qualified personnel who can identify conditions of concern which if left unchecked could jeopardize the safety of the dam.

SECTION 5
HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General

The dam has a concrete spillway with concrete end walls over the stone block masonry construction of an earlier dam. The top of dam is about 21 feet across and is earth and masonry fill. This fill extends back into the lake. The downstream face of the dam is vertical, unmortared masonry stone construction. The dam is about 14 feet high and extends across a 200 foot wide "valley" through which the outlet stream flows. The dam was apparently built originally for service to downstream mills. It is now employed basically for recreational uses since there are numerous homes and summer cottages around the lake. The dam has low surcharge storage and low spillage capacity.

b. Design Data

Nothing is known about the hydraulic design of the present dam or the original 1883 dam. Due to its location (narrow channel blocking off a large swamp-pond fed by brooks and streams) it was built at a convenient site. Many homes abutting the lake are almost at the elevation of the top of the dam.

c. Experience Data

Part of the 1883 dam was damaged in 1938. Repairs were made about 1940 to modify the dam to its present condition. Nothing is known about the severity of the 1938 or 1955 floods in this area.

d. Visual Observations

Visual observations indicated that the road culvert downstream of the dam would cause a backwater condition.

e. Overtopping Potential

The dam was investigated using ½ PMF criteria. This was based upon the intermidiate size classification (14 foot hydraulic height and 1565 a-f storage) and significant hazard potential (7 inhabitable structures immediately below dam).

Flow through the 3.5 stone culvert would be insignificant. Flow over the spillway would be about 450cfs. This dam has a significant overtopping potential due to its low spillway capacity. To pass the test flood inflow of 4200 cfs, the dam would be overtopped by about 3 feet. The 8 foot diameter roadway culvert below the dam will cause a backwater condition to develop (capacity 600±cfs) which will increase flooding near the dam. At ½ PMF condition, the test flood outflow will be 2870 cfs.

This increase of water surface to 3 feet above crest of dam would have serious effects on upstream lakefront property. Serious flooding to both property and septic tanks and/or leaching fields could occur, with potential polluting of the lake ensuing.

f. Dam Failure Analysis

If the dam were to fail, with the water level at the top of the dam, the resulting outflow would be 4933. cfs. This flow would either overtop the downstream road embankment or wash it out. Between the dam and road embankment it appears that one house might have minor flooding (1 to 2 feet of water) and one home could have major damage (6 to 7 feet of water). In any case, loss of life is possible. Near the Red Brook confluence, it appears that two more homes could have major damage (4 feet of water). Loss of life could occur at both homes.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

The visual inspection did not disclose any immediate stability problems of the dam or of the appurtenent structures.

b. Design and Construction Data

Specifications of the dam from the "Franklin County Plan Book" dated November 17, 1883 indicate the dam consists of a stone wall at the downstream end and a sand filling at the upstream end.

These specifications indicate the following :

1) The dam is 12 feet high, 35 feet wide at the bottom, and 20 feet wide at the top.
2) The stone wall has an average width at the bottom of 10 feet and a top width of 7 feet. The stone wall is laid on hardpan.
3) The sand filling is 12 feet wide at the top and 25 feet wide at the bottom. The upstream slope is covered with riprap.
4) There is a second wall upstream of the main stone wall composed of cemented split stone 16 inches thick.

c. Operating Records

No operating records were made available.

d. Post-construction Changes

The inoperative sluiceway, near the left abutment, has been sealed since the early 1900's. Major repairs were made following the damage from the flood of 1938. Concrete was poured downstream of the spillway in 1969 to correct seepage problems.

e. Seismic Stability

The dam is located in Seismic Zone 2 according to USCE guidelines and does not require special analysis for seismic stability.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

The visual inspection indicates the dam to be in generally good condition. However, the spillway is not capable of passing the test flood and the dam would be overtopped.

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.

c. Urgency

The problems associated with the remedial measures of Section 7.3 should be carried out by the owner within two years of receipt of this Phase I Inpsection Report. The recommendations of Section 7.2 should be carried out by the owner within one year of receipt of this Phase I Inpsection Report.

d. Necessity of Additional Investigations

No additional investigation is needed to complete the Phase I Inspection.

7.2 Recommendations

This dam's spillway does not have the capacity to pass the 1/2 PMF test flood. The owner should engage the services of a competent Consulting Engineer to further evaluate the potential for overtopping and the adequacy of the spillway.

7.3 Remedial Measures

a. Operating and Maintenance Procedures

(1) Vegetation on the upstream slope should be removed. All trees within 20± feet of the downstream face should be removed. These trees are shown by Photos 1,3,4,5,7,8, & 13 and their approximate locations are indicated on the Plan view in Appendix B of this report.

(2) The wet areas noted in this inspection report should be observed during routine maintenance to determine evidences of soil transport.

(3) Riprap should be placed on the discharge channel opposite the spillway apron and on the channel floor for a downstream distance of 20 feet.

(4) This dam should be inspected every two years by qualified personnel who can identify areas of concern which, if left unchecked could jeopardize the safety of the dam.

(5) A formal warning system should be developed for warning downstream residents in case of emergency.

7.4 Alternatives

As an alternative to the recommendations in Section 7.2, the owner could operate the lake at a lower level to insure adequate storage. This level would need to be determined by an indepth hydrologic investigation by an engineer.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Lake Wyola

DATE Nov. 27, 1978

TIME 9:15 AM

WEATHER cloudy 20°

W.S. ELEV. 830.8+ U.S. ____ DN.S.

PARTY:

1.	Ron H. Cheney	H H & B	
2.	David Vine	H H & B	
3.	Daniel P. LaGatta	GEI	
4.	Tom Keller	GEI	
5.	Raymond Moriarty	Shutesbury	
6.			
7.			
8.			
9.			
10.			

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Embankment Dam	Daniel P. LaGatta	
2.	Spillway	Ron H. Cheney	
3.	Intake Structure and Gatehouse	Ron H. Cheney	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

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PERIODIC INSPECTION CHECKLIST

PROJECT Lake Wyola DATE Nov. 27, 1978

PROJECT FEATURE Stone Wall/Earth Dam NAME Ron Cheney

DISCIPLINE Structural Engineer NAME Daniel P. LaGatta
Geotechnical Engineer

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	833
Current Pool Elevation	A few inches below top of spillway.
Maximum Impoundment to Date	Unknown
Surface Cracks	None of significance observed.
Pavement Condition	No pavement.
Movement or Settlement of Crest	None observed.
Lateral Movement	None observed.
Vertical Alignment	No vertical misalignment observed.
Horizontal Alignment	No horizontal misalignment observed.
Condition at Abutment and at Concrete Structures	Good.
Indications of Movement of Structural Items on Slopes	None observed.
Trespassing on Slopes	None of significance.
Sloughing or Erosion of Slopes or Abutments	None of significance.
Rock Slope Protection - Riprap Failures	Small brush in riprap on upstream face.
Unusual Movement or Cracking at or Near Toes	None observed.
Unusual Embankment or Downstream Seepage	Seepage observed through riprap downstream of spillway section; seepage observed about 10' downstream of inoperative outlet channel (see text).
Piping or Boils	None observed.
Foundation Drainage Features	None found.
Toe Drains	None found.
Instrumentation System	None found.
Vegetation	Trees to 24" diam. next to downstream face of dam.

PERIODIC INSPECTION CHECKLIST

PROJECT Lake Wyola DATE Nov, 27, 1978

PROJECT FEATURE Intake Structure NAME Ron H. Cheney

DISCIPLINE Structural Engineer NAME Daniel P. LaGatta
Geotechnical Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	There is no intake channel for this facility.
a. Approach Channel	
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	The intake structure is located approximately 20' upstream of the dam. It was under water during inspection and could not be observed.
Condition of Concrete	
Stop Logs and Slots	

PERIODIC INSPECTION CHECKLIST

PROJECT Lake Wyola — DATE Nov. 27, 1978

PROJECT FEATURE Outlet Works — NAME Ron H. Cheney

DISCIPLINE Structural Engineer — NAME Daniel P. LaGatta

Geotechnical Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	There is an 11½ ft. x 9½ ft. wood gatehouse on a concrete base located at the center of the embankment. Visual Inspection indicated the concrete and gatehouse to be in good condition, with no signs of poor alignment or weathering.
a. Concrete and Structural	
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	Slide gates are manually operated with rack and pinion control. Gate was operated during our inspection and appeared to be in good condition.
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECKLIST

PROJECT Lake Wyola DATE Nov. 27, 1978

PROJECT FEATURE Outlet Works NAME Ron H. Cheney

DISCIPLINE Structural Engineer NAME Daniel P. LaGatta

Geotechnical Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	There is no transition and conduit for this facility.
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECKLIST

PROJECT Lake Wyola — DATE Nov. 27, 1978

PROJECT FEATURE – Outlet Works — NAME Ron H. Cheney

DISCIPLINE Structural Engineer / Geotechnical Engineer — NAME Daniel P. LaGatta

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	The outlet structure is comprised of the gatehouse and slide gates and the 3½ ' x 3½' masonry outlet box. All appear to be in good condition.
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	None observed.
Channel	
Loose Rock or Trees Overhanging Channel	None - Some debris near exit box.
Condition of Discharge Channel	Good.

PERIODIC INSPECTION CHECKLIST

PROJECT Lake Wyola DATE Nov. 27, 1978

PROJECT FEATURE Spillway NAME Ron.H. Cheney

DISCIPLINE Structural Engineer NAME Daniel P. LaGatta

Geotechnical Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	There is no approach channel for this facility.
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	There is a concrete wall between the dam embankment and the spillway. There is a stone wall at the right edge of the spillway. Both appear to be in good condition with only minor weathering. The spillway had some spalling of the concrete.
General Condition of Concrete	
Rust or Staining	
Spalling	
Any Visible Reinforcing	
Any Seepage or Efflorescence	
Drain Holes	
c. Discharge Channel	There is rock fill downstream of the spillway. There are several trees to 24 " diameter located downstream of the spillway. Some large stones are in the channel. The general condition of the floor was good.
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Channel	
Other Obstructions	

PERIODIC INSPECTION CHECKLIST

PROJECT Lake Wyola DATE Nov. 27, 1978

PROJECT FEATURE Service Bridge NAME Ron H. Cheney

DISCIPLINE Structural Engineer NAME Daniel P. LaGatta

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	There is no service bridge for this facility.
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Underside 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

ENGINEERING DATA

LIST OF AVAILABLE ENGINEERING DATA

Original Plan and Specifications Dated 1883

Location: Franklin County Commissioners Office
Main Street
Greenfield, Massachusetts 01301

No additional information was located

The Commonwealth of Massachusetts

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.
DIVISION OF WATERWAYS

100 Nashua Street, Boston 02114

Town of Shutesbury
Town Hall
Shutesbury, Ma.
Conservation Commission
ATTN: Mr. R. Moriarty

February 15, 1977

Re: Inspection Dam #2-6-272-2
Lock's Pond or Lake Wyola Dam
Shutesbury, Ma.

Dear Sir:

On May 12, 1976, an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be the Town of Shutesbury. If this information is incorrect, will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is ~~conditionally~~ F.C.R. safe. The following conditions were noted that require attention:

Brush and trees at base of dam and upstream slope should be removed. Minor spalli. of concrete on the northerly abutment and training wall, surface cracks in the concrete apron around base of gate house. These conditions should be corrected.

We call these conditions to your attention before they become seriou and more expensive to correct. With any correspondence please include the number of the dam as indicated above.

Very truly yours,

John D. Hannon, P.E.
Chief Engineer

JDH: mailed 2-16-77
NAE Dist 2
DDE Dist 2

INSPECTION REPORT - DAMS AND RESERVOIRS

(1) LOCATION:

City/Town Shutesbury. County Franklin. Dam No. 2-6-272-2.

Name of Dam: Lock's Pond or Lake Wyola Dam.

Topo Sheet No. 13C. Coordinates: Mass. Rect. N 548,500, E 347,400.

Inspected by: Harold T. Shumway, On May 12,1976. Date Last Inspection 11-7-73

(2) OWNER/S: As of May 12, 1976

per: Assessors____, Reg. of Deeds____, Prev. Insp. X, Per. Contact X.

	Name	St. & No.	City/Town	State	Tel. No.
1.	Town of Shutesbury Conservation Commission	Town Hall	Shutesbury	Mass	
2.					
3.					

CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name	St. & No.	City/Town	State	Tel. No.
Mr. Raymond Moriarty, Chairman Shutesbury Conservation Commission	Old Lock's Pond Road	Lake Wyola, Shutesbury, Mass.		

(4) DATA:

No. of Pictures Taken None. Sketches See description of Dam.

Plans, Where Franklin County Commissioners Office files - Plan Book Page 139 - Nov. 17, 1883 Plan.

(5) DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor____.
2. Moderate____.
3. Severe____.
4. Disastrous X.

Comments: Approx. 366 million gallons impoundment - would be confined to narrow valley for several miles - valley has 2 small settlement plus individual houses.

*This rating may change as land use changes (future development).

OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Northerly end of dam - chute spillway 48'W.x 1'H - additional 20'of width-1'Higher-total drop of 7'

Controls None, TYPE: _____.

Automatic____. Manual____. Operative Yes____, No____.

Comments: Minor spalling of northerly abutment - minor spalling o crest lip

No. 2 Location and Type: 70'from south end of dam - 3.5x3.5stone masonry slu

Controls yes, Type: 2 wood slidegates - steel slides- one gate ha and pinion controls-other raised by lever.

Automatic____. Manual X. Operative Yes X, No____.

Comments: All controls operable per caretaker of dam.

No. 3 Location and Type: _____

Controls____, Type: _____.

Automatic____. Manual____. Operative Yes____, No____.

Comments: _____

Drawdown present Yes X, No____. Operative Yes X, No____.
Comments: See No. 2 above.

---

7. DAM UPSTREAM FACE: Slope 2:1, Depth Water at Dam 10'-12'.

Material: Turf____. Brush & Trees X. Rock fill X. Masonry____. Wood____.

Other Slope covered with cobble stones.

Condition: 1. Good____. 3. Major Repairs____.

2. Minor Repairs X. 4. Urgent Repairs____.

Comments: Minor brush growth on rock covered slope-

---

8. DAM DOWNSTREAM FACE: Slope Vertical.

Material: Turf____. Brush & Trees____. Rock Fill____. Dry stone Masonry X. Wood____.

Other Massive stone in wall.

Condition: 1. Good____. 3. Major Repairs____.

2. Minor Repairs____. 4. Urgent Repairs____.

Comments: Some tree growth close to toe of wall - A few of these have cut down since last inspection.

9. EMERGENCY SPILLWAY: Available yes. Needed ____.

Height Above Normal Water 1 Ft. above elevation principal overflow spillwa

Width 20 Ft. Height 0.7 Ft. Material concrete.

Condition: 1. Good ____. 3. Major Repairs ____.

2. Minor Repairs X. 4. Urgent Repairs ____.

Comments: A few misplaced stones in paving in channel below conc. crest on northerly end.

10. WATER LEVEL AT TIME OF INSPECTION: 2 Ft. Above ____. Below X.

Top Dam X F.L. Principal Spillway ____.

Other ____.

Normal Freeboard 3 Ft.+

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Minor brush growth on upstream slope.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam None found.

Cracked or Damaged Masonry yes -Minor surface cracks in base of gate house apron. Minor spalling of northerly spillway flood training wall

Evidence of Seepage Minor seepage noted in channel of old sluiceway on sou en

Evidence of Piping None found.

Leaks None found.

Erosion Minor erosion of channel below spillway.

Trash and/or Debris Impeding Flow None found.

Clogged or Blocked Spillway None found.

Other ____.

OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed X
3. Conditionally safe - major repairs needed_____
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list_____

REMARKS AND RECOMMENDATIONS: (Fully Explain)

Mr. Raymond Moriarty, caretaker of the dam, was present during th inspection. This dam appears to receive constant attention and except f a light growth of brush on the upstream slope, minor spalling of concret on the northerly abutment and flood training wall, and surface cracks in the concrete apron around base of gate house, is in good condition. The usual minor seepage areas found in past inspections are evident, but do appear to have increased any in size. Some of the large trees growing a base of dam have been cut since last inspection and others are scheduled to be cut this season per the caretaker.

Dam appears sound and safe with only routine minor maintenance re needed.

HTS/bk

FILE

INSPECTION REPORT - DAMS AND RESERVOIRS

(1.) LOCATION:

~~City~~/Town Shutesbury. County Franklin. Dam No. 2-6-272-2

Name of Dam Lock's Pond or Lake Wyola Dam.

Topo Sheet No. 13C. Coordinates: Mass. Rect. N 548,500, E 347,400.

Inspected by: R. C. Salls, P.E., On Nov. 7, 1973. Date Last Inspection 1970

(2.) OWNER/S: As of November 1972

per: Assessors X, Reg. of Deeds ____, Prev. Insp. ____, Per. Contact ____.

1. Town of Shutesbury
Conservation Commission, Town Hall, Shutesbury, Mass.
Name | St. & No. | City/Town | State | Tel. No.

2. ____
Name | St. & No. | City/Town | State | Tel. No.

3. ____
Name | St. & No. | City/Town | State | Tel. No.

(3.) CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Mr. Raymond Moriarty, Chairman
Shutesbury Conservation Commission, Old Lock Pond Rd., Lake Wyola, Shutesbury, M
Name | St. & No. | City/Town | State | Tel. No.
Tel.: 367-2670

(4.) DATA:

No. of Pictures Taken None. Sketches See description of Dam.
Plans, Where Franklin County Commissioners Office Plan Bk. 3, Page 139 - Nov. 17, 1883 Plan.

(5.) DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor ____.
2. Moderate ____.
3. Severe ____.
4. Disastrous X.

Comments: Large impoundment would be confined to narrow valley for several miles valley has 2 small settlements plus individual houses.

*This rating may change as land use changes (future development).

(6.) OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: 48' wide X 1' high chute spillway with additional 2' of width 1' higher. Total drop 7' - concrete

Controls No, TYPE: _____

Automatic _____. Manual _____. Operative Yes _____, No _____.

Comments: _____

No. 2 Location and Type: Waste sluiceway 70' from south end - 3.5 X 3.5 stone masonry sluice

Controls Yes, Type: 2 wooden slide gates - steel slides - one gate rack and pinion controls - one raised by lever

Automatic _____. Manual X. Operative Yes X, No _____.

Comments: Gate open at time of inspection. Both gate stems new 4" timber - all appeared in good condition

No. 3 Location and Type: _____

Controls _____, Type: _____

Automatic _____. Manual _____. Operative Yes _____, No _____.

Comments: _____

Drawdown present Yes X, No _____. Operative Yes X, No _____.

Comments: See No. 2 above

(7.) DAM UPSTREAM FACE: Slope 2:1, Depth Water at Dam 10 - 12 ft.

Material: Turf _____. Brush & Trees _____. Rock fill X. Masonry _____. Wood

Other Slope covered with cobblestones.

Condition: 1. Good _____. 3. Major Repairs _____.

2. Minor Repairs X. 4. Urgent Repairs _____.

Comments: Several small clumps of brush. Some deformation of slope from wave and ice action.

(8.) DAM DOWNSTREAM FACE: Slope Vertical.

Material: Turf _____. Brush & Trees _____. Rock Fill _____. Masonry Dry stone X. Wood

Other Stone in wall massive.

Condition: 1. Good X. 3. Major Repairs _____.

2. Minor Repairs _____. 4. Urgent Repairs _____.

Comments: Some trees growing close to toe of wall.

9. EMERGENCY SPILLWAY: Available Yes. Needed Yes.

Height Above Normal Water 1 Ft. above elevation principal overflow spillway

Width 20 Ft. Height 0.7 Ft. Material concrete.

Condition: 1. Good X. 3. Major Repairs ____.

2. Minor Repairs ____. 4. Urgent Repairs ____.

Comments: ____

10. WATER LEVEL AT TIME OF INSPECTION: 3 Ft. Above ____. Below X.

Top Dam X ____ F.L. Principal Spillway ____.

Other When water is at elevation of principal spillway.

Normal Freeboard 3 Ft. ±

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Some minor brush on top and upstream slope few trees near south and north end dam.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam None noted.

Cracked or Damaged Masonry None noted.

Evidence of Seepage Very slow seepage under concrete block in old sluiceway 40'± from south end. Slow seepage from under apron spillway at north end.

Evidence of Piping Standing water in old channel below blocked spillway and in channel below overflow.

Leaks See above.

Erosion None noted.

Trash and/or Debris Impeding Flow None.

Clogged or Blocked Spillway No.

Other ____.

(12.) OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed X
3. Conditionally safe - major repairs needed_____
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list_____

(13.) REMARKS AND RECOMMENDATIONS: (Fully Explain)

At the time of this inspection, the water level was about 0.6 foot below the elevation of the overflow spillway and one of the drawdown sluiceway gates was open. There was some slow seepage from an old sluiceway about 40 feet from the south end. This sluiceway has been blocked with a concrete plug about 8 feet i No flow could be seen here but the old channel below this spillway had standing water. Similarly, there was seepage from under the apron of the overflow spill and water was standing in the channel below the spillway but no noticeable flow was observed. This seemed to be a normal condition of little consequence.

The concrete masonry overflow spillway appears to be in good condition, its overa width is 82 feet with the elevation of the 48 foot wide normal water level spill section 3 feet below the top of the dam, the elevation of the 20 foot wide emergency section 2 feet below the top and the 14 foot wide emergency section on the northerly end 1.3 feet below the top of the dam. There is a concrete apron down stream of the 7 foot crest which drops 1.5 foot in 11 feet which appears to have been placed recently. At the end of the apron there is a rock fill to the runof channel. The caretaker, Mr. Moriarty, told us that just before the Department assumed responsibility for inspection of dams, that 14 yards of concrete had bee poured to correct seepage and leakage under the spillway.

The sluiceway gates appeared to be in good condition. The 4" X 6" timber gate stems are relatively new and both gates are operable. The caretaker maintains a log of gate operations in gate house and water is drawn down whenever rain and increased runoff is anticipated.

Except for minor brush growth and the presence of some large trees at the ends o the dam, this structure appears to be satisfactory at this time. Alignment and grade are good and the embankment's top is covered with concrete and hard-packed gravel. The owners intend to cut the trees located adjacent to the south end of the dam.

RCS/js/vk

DISTRICT 2

Submitted by R. C. Salls, P.E. Dam No. 2-6-272-2

Date November 7, 1973 Town Shutesbury

Name of Dam Lock's Pond or Lake Wyola Dam

Location: Topo Sheet No. 13 C Mass. Rect. Coordinates N 548,500 E 347,400

Provide 8½" x 11" in clear copy of topo map with location of Dam clearly indicated.

At Lock's Village in northwesterly corner Shutesbury just easterly of junction of Lakeview Drive and Lock's Pond Rd.

---

2. Year built Rebuilt after 1938 flood / Existed in 1883 Year/s of subsequent repairs 1969

---

3. Purpose of Dam: Water Supply _____ Recreational Now

Flood Control _____ Irrigation _____ Other Former reservoir fo mill ponds on Sawmill River

---

4. Drainage Area: 8 sq. mi. _____ acres.

Type: City, Bus. & Ind. _____ Dense Res. _____ Suburban _____ Rural, Farm 15%

Wood & Scrub Land 85% Slope: Steep 60% Med. 30% Slight 10%

---

5. Normal Ponding Area: 75 Acres; Ave. Depth Max. depth 40 ft. Say 12-15

Impoundment: 366.6 million gals.; 1125 acre ft.

Silted in: Yes _____ No _____ Approx. Amount Storage Area _____

---

6. No. and type of dwellings located adjacent to pond or reservoir _____

i.e. summer homes etc. 75± cottages on shore. More just off shore.

---

7. Dimensions of Dam: Length 229'± Max. Height 14' at sluiceway

Freeboard 3

Slopes: Upstream Face 2:1 stone paved slope

Downstream Face Dry stone retaining wall vertical

Width across top 12 to 21 ft.

Dam No. 2-6-272-2

8.

Classification of Dam by Material:

Earth Backing	X	Conc. Masonry Spillway	X	Stone Masonry Face wall	X
Timber		Rockfill		Other	

8A.

Dam Type: Gravity X Straight ____ Curved, Arched X Other ____

Overflow ____ Non-overflow X

9.

A. Description of present land usage downstream of dam:

85 to 90 % rural; 10 to 15 % urban Village of Montague

B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure? Yes ____ No X

C. Character Downstream Valley: Narrow X Wide ____ Developed 5

Rural 85 to 90% Urban 10 to 15%

10.

Risk to life and property in event of complete failure.

No. of people 8

No. of homes 16+

No. of businesses 2 - General Stores

No. of industries 2 Type Saw mills, furniture factory

No. of utilities 2 Type Electrical and telephone pole line

Railroads None

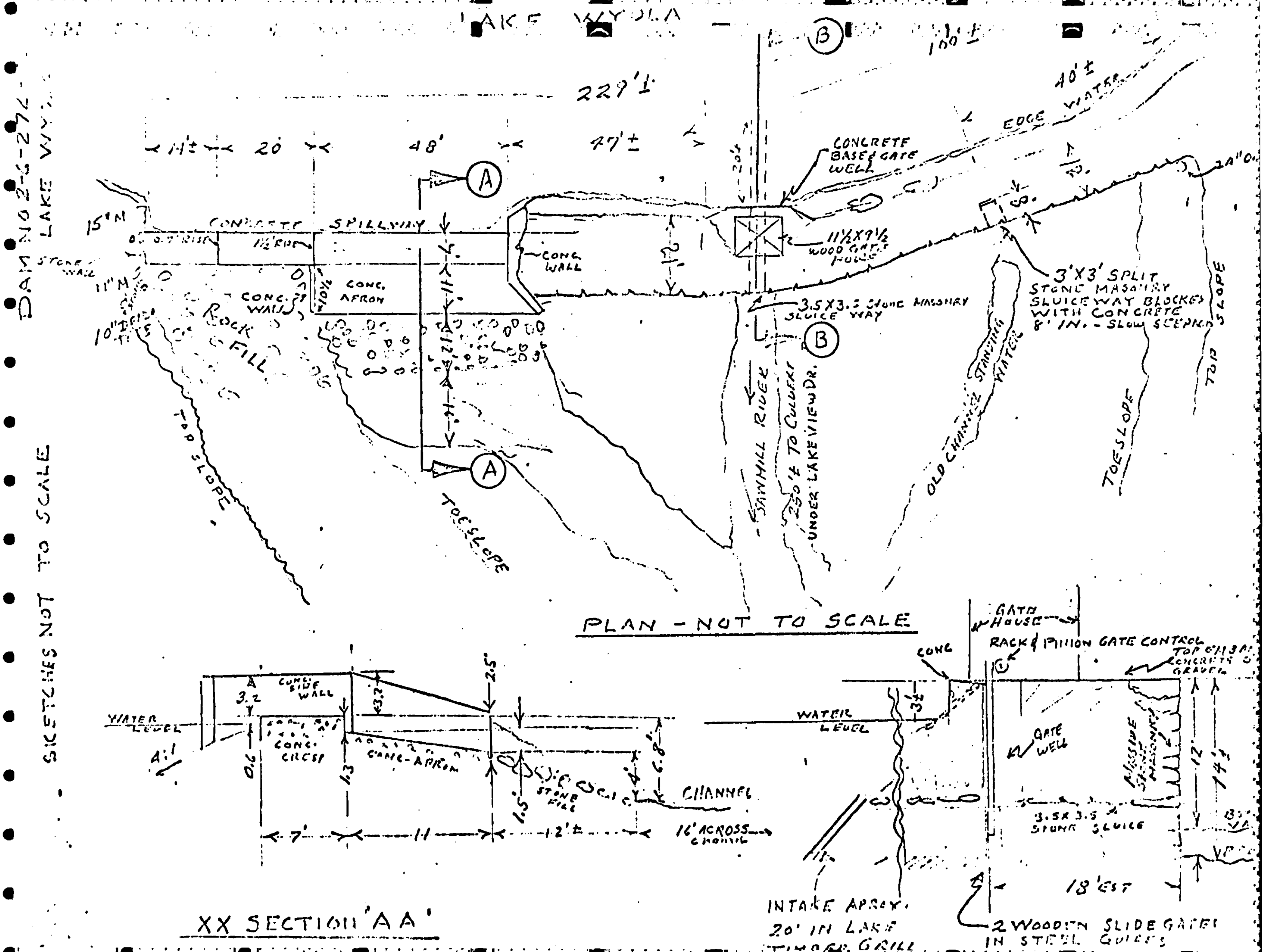
Other dams Dan E. Glazier Dam, No. 2-6-154-3, and Lucius Graves Dam, No. 2-6-154-2, Leverett, C. J. Billing & Sons Upper Dam, No. 2-6 Lower No. 2-6-192-4, Stratton Dam, No. 2-6-192-3, and Alexand

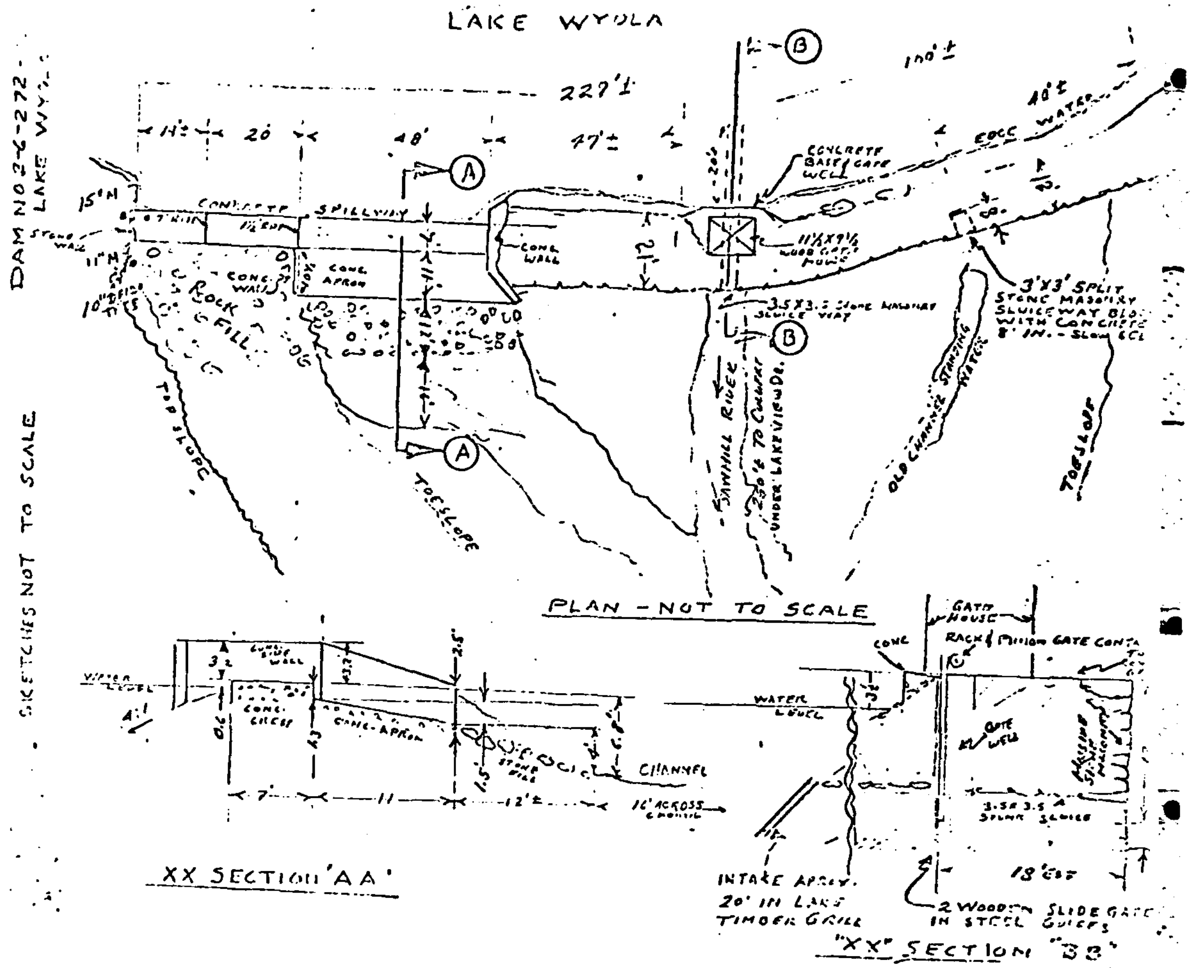
Other Dam, No. 2-6-192-9, in Montague, plus several other breached structures.
Sawmill River continues through Montague Center.

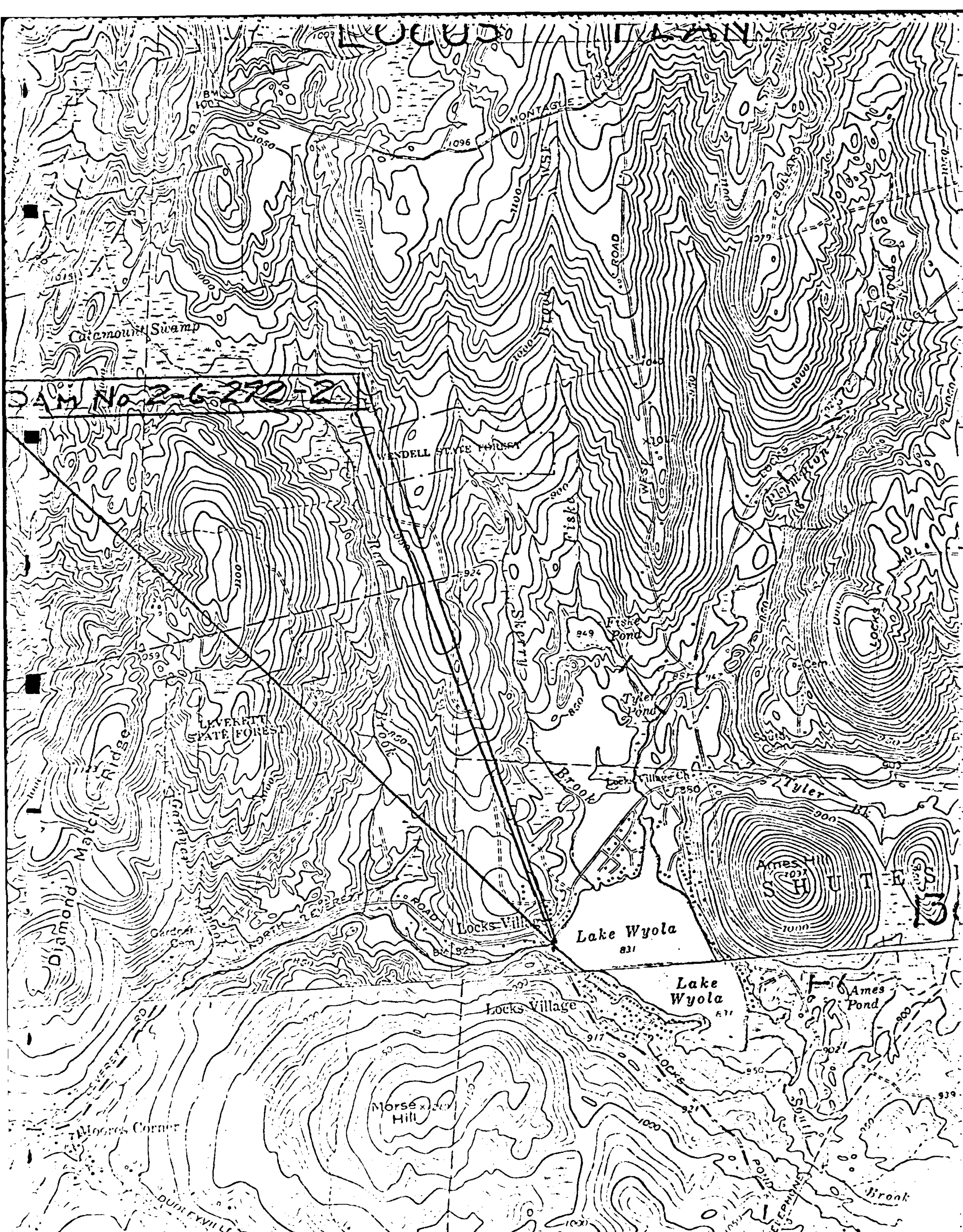
11.

Attach Sketch of dam to this form showing section and plan on 8½" x 11" sheet.

RCS/vk
Attachments
Locus Plan
Sketches


DAM NO 2-G-274
SKETCHES NOT TO SCALE
LAKE WYLIE
229'±
14'± 20 48' 47'±
100'±
40'±
EDGE WATER
CONCRETE BASE & GATE WELL
11½X9½ WOOD GATE HOUSE
CONCRETE SPILLWAY
1½' RISE
CONC. WALL
CONC. APRON
CONC. WALL
ROCK FILL
TOE SLOPE
TOP SLOPE
3.5X3.5 STONE MASONRY SLUICE WAY
250'± TO CULVERT UNDER LAKEVIEW DR.
SAWHILL RIVER
OLD CHANNEL STANDING WATER
3'X3' SPLIT STONE MASONRY SLUICEWAY BLOCKED WITH CONCRETE 8' IN. - SLOW SEEPING
PLAN - NOT TO SCALE
WATER LEVEL
CONC. SIDE WALL
CONC. CREST
CONC. APRON
STONE FILL
CHANNEL
16' ACROSS CHANNEL
XX SECTION 'AA'
GATE HOUSE
RACK & PINION GATE CONTROL
TOP OF DAM CONCRETE GRAVEL
CONC
GATE WELL
MASSIVE STONE MASONRY
3.5X3.5 STONE SLUICE
18' EST
INTAKE APPROX. 20' IN LAKE TIMBER GRILL
2 WOODEN SLIDE GATES IN STEEL GUIDES


LAKE WYLA
DAM NO 2-6-272
SKETCHES NOT TO SCALE
227'±
CONCRETE SPILLWAY
CONC WALL
CONC APRON
ROCK FILL
TOP SLOPE
TOE SLOPE
CONCRETE BASE GATE WELL
EDGE WATER
3'X3' SPLIT STONE MASONRY SLUICEWAY BLO. WITH CONCRETE
SAWMILL RIVER
OLD CHANNEL STANDING WATER
TOE SLOPE
PLAN - NOT TO SCALE
WATER LEVEL
CONC CREST
CONC APRON
CHANNEL
XX SECTION 'AA'
GATE HOUSE
RACK & PINION GATE CONT.
WATER LEVEL
GATE WELL
INTAKE APPROX. 20' IN LAKE TIMBER GRILL
2 WOODEN SLIDE GATE IN STEEL GUIDES
"XX" SECTION "BB"


LOCUS PLAN
DAM No 2-6-272-2
Catamount Swamp
MONTAGUE
WENDELL STATE FOREST
LEVERETT STATE FOREST
Match Ridge
Diamond
Fiske Pond
Tyler Pond
Fiske
Brook
Locks Village Ch
Tyler Br.
Ames Hill
S H U T E S
Lake Wyola
831
Locks Village
NORTH LEVERETT ROAD
Ames Pond
Morse Hill
Moores Corner
DUDLEYVILLE
LOCKS POND
Brook

Number 192

2-6-...

TOWN SHUTESBURY

Name Locks Pond dam Inspection Date 1970

Owner Town of Shutesbury, Park Department

Location

Type of Pond made

Acreage

Drainage Area

Comments

Type of Dam stone masonry with earth fill on the upstream side

Length 200 feet

Height 13 feet

Head of Water

Comments

Type of Spillway

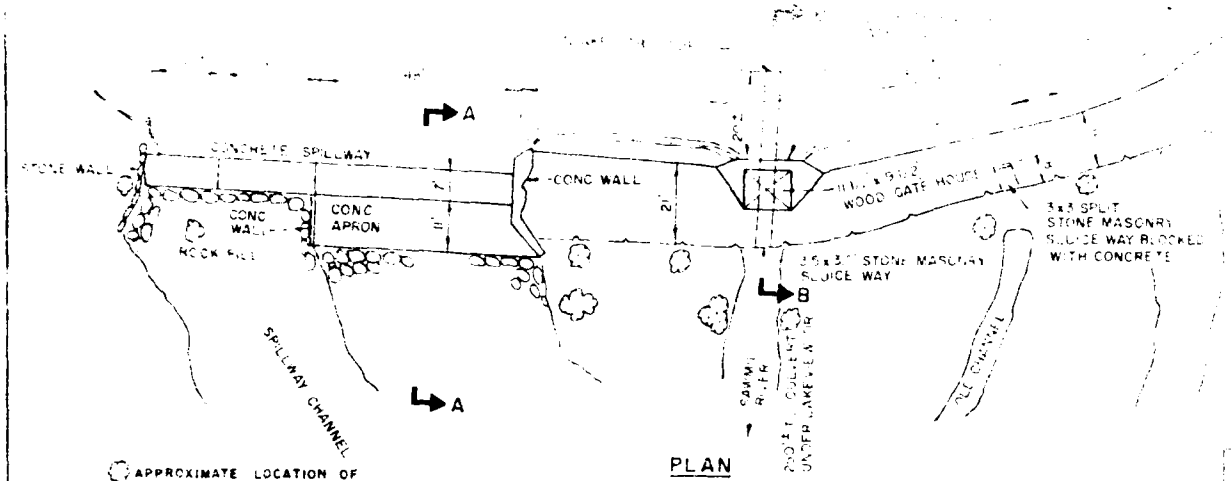
Width

Height

Comments

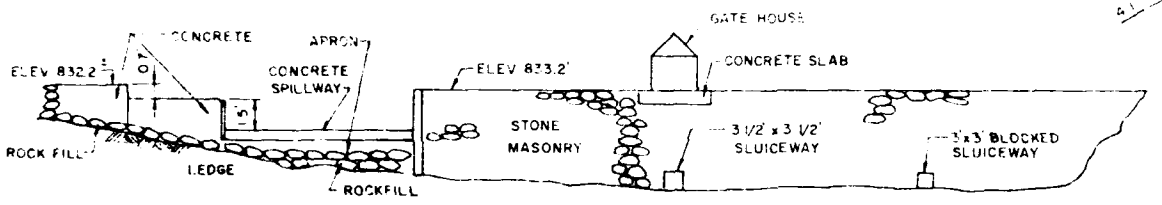
Condition, Previous Report, Dated 1969 This dam is safe

Present Condition

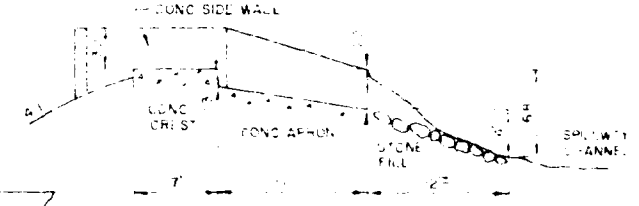


PLAN

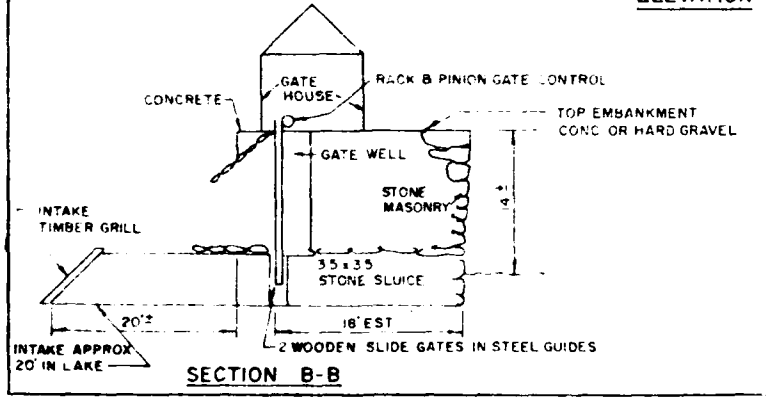
APPROXIMATE LOCATION OF TREES TO BE REMOVED AS PER SECTION 7.3 OF THIS REPORT



ELEVATION



SECTION A-A



SECTION B-B

TAKEN FROM 1972 STATE INSPECTION REPORT SKETCH

HAYDEN, HARDING & BUCHANAN, INC CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

LAKE WYOLA

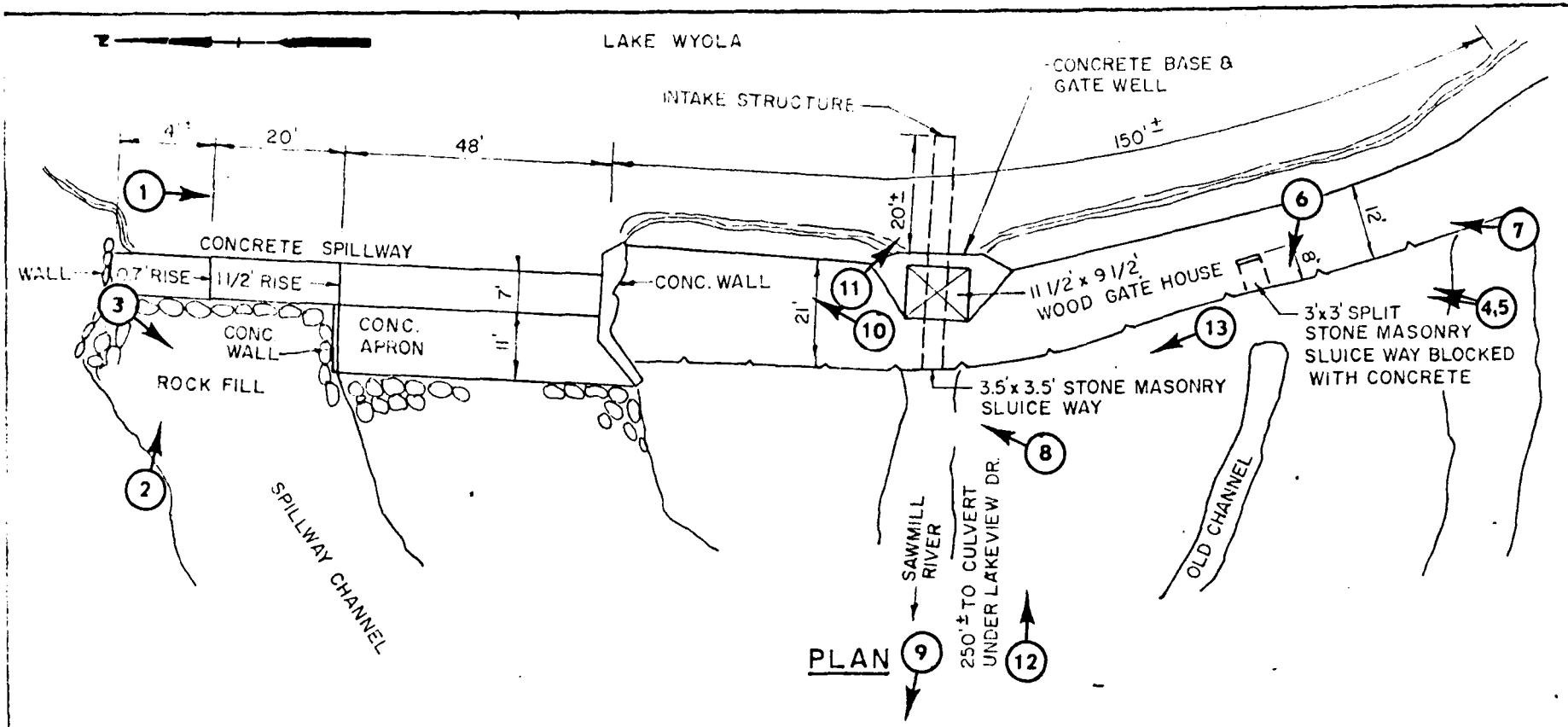
SHUTESBURY MASSACHUSETTS

SCALE NOT TO SCALE

DATE FEBRUARY, 1978

APPENDIX C

PHOTOGRAPHS



HAYDEN, HARDING & BUCHANAN, INC CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION OF PHOTOGRAPHS

LAKE WYOLA

SHUTESBURY MASSACHUSETTS

SCALE NOT TO SCALE

DATE FEBRUARY, 1979

PHOTO NO. 1 - Upstream portion of dam as viewed from right abutment area.

PHOTO NO. 2 - Pool of water at base of spillway. Seepage observed coming from riprap (not frozen).

PHOTO NO. 3 - View of spillway discharge channel. Note trees on bank.

PHOTOS NO. 4 & 5 - Downstream face of dam, from left abutment area showing inoperative sluiceway.

PHOTO NO. 6 - View of wet area in channel downstream of inoperative sluiceway.

PHOTO NO. 7 - Crest of dam as viewed from left abutment area.

PHOTO NO. 8 - View of sluiceway exit box. Note debris lining channel.

PHOTO NO. 9 - View of Sawmill River downstream of Locks Pond Road.

PHOTO NO. 10 - Northeast view of Lake Wyola.

PHOTO NO. 11 - Southeast view of Lake Wyola.

PHOTO NO. 12 - Overall view of downstream face of dam.

PHOTO NO. 13 - Downstream face of dam as viewed from left abutment area showing profile of stone wall. Scale = 6 feet.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

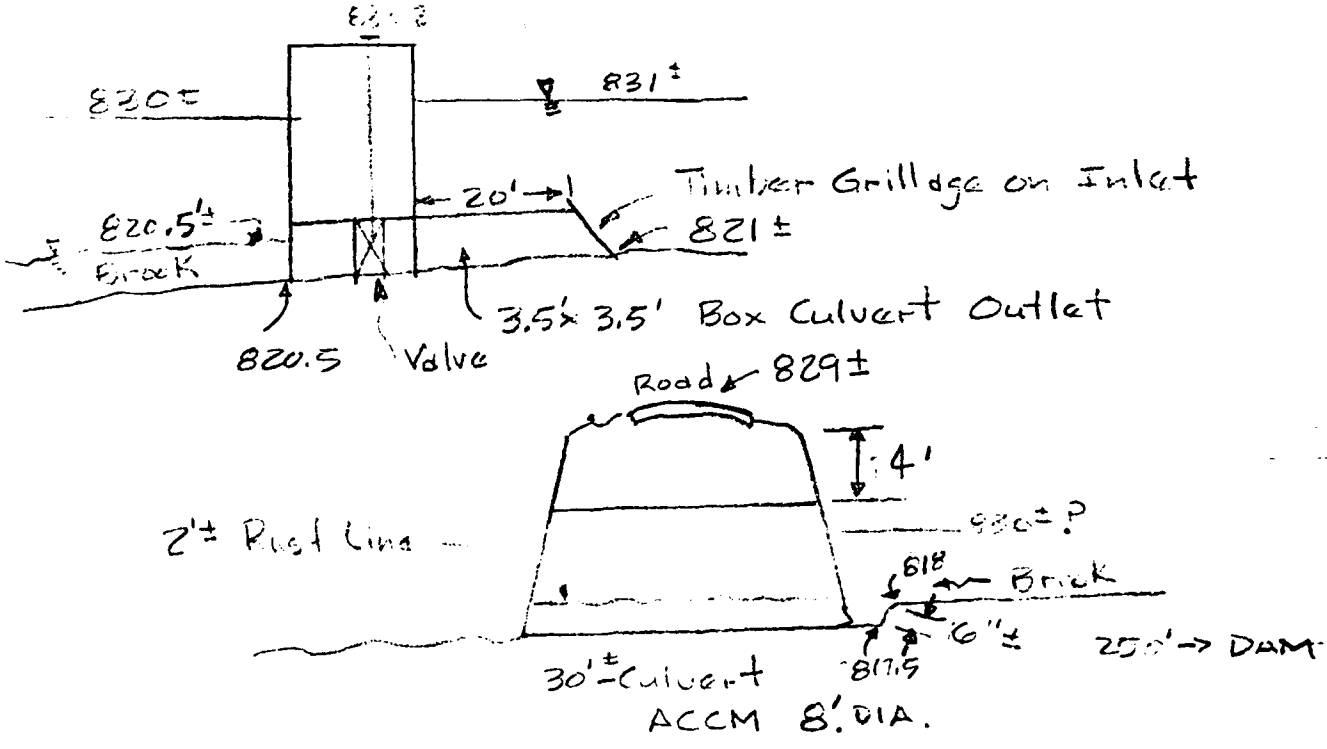
HH&B HAYDEN, HARDING & BUCHANAN, INC
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO. 1 of
JOB Dams
SUBJECT Wyola
CLIENT Corps

BY. FDD

Built 1940± to replace 1883 dam washed-out in 1938.
Hydraulic Height = 14'.
Spillway 229'
Dam Stor = 1350 a/f.
Haz. class = Intermediate.
Drainage Area = 44.86 sq mi, 4119 a., 6.435 sq mi.
Lake Area = 1.33 sq mi, 128. a.
Elev 840 = 2.46, 228. a.
Max flood 1938 washed-out old dam.
Water Elev 831±.

Outlet side 830 along wall - USGS
Top spillway 834±



12/19/78
MI-
BY FDD

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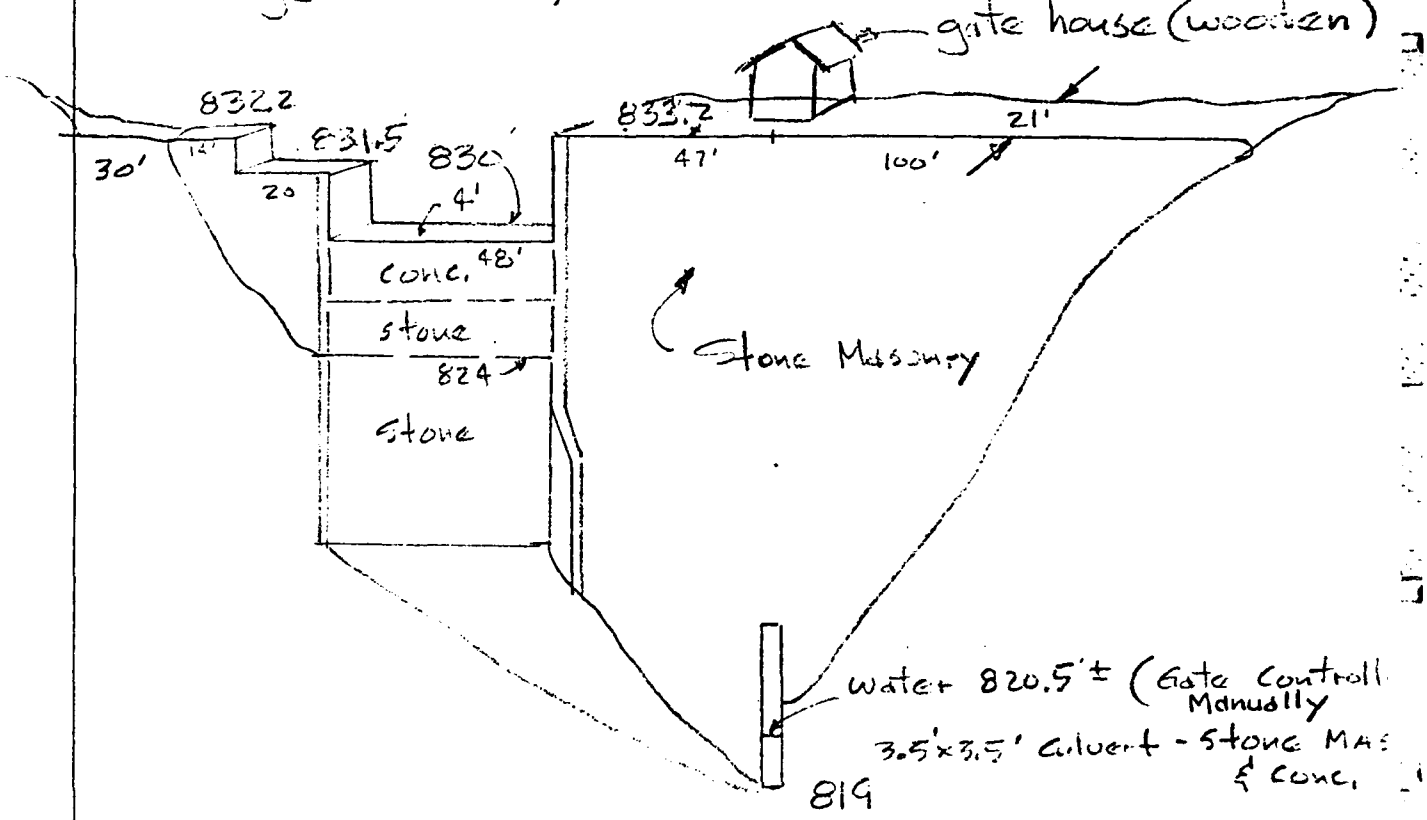
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

JOB Dams
SUBJECT Wyola
CLIENT Corps

Drainage Area 4,119. a



Storage

	ELEV	D	acres	Ave-area	Storage	Accum S
Outlet	819.0	0	83.0±	83.	0 d-f	0
Spillway	830.0	11	124.±	104.	1144.	1144.
	831.0		128.	126.	126.	1270
	831 5	1.5	136	132	198.	1468
	832.2	0.7	137.7	136.8	96	1564.
Top	332.2	1.0	140	138.7	139	1703.
Elev	840.6	6.8	228	184.	1251.	2954.
	837.0	3.8	189	165	718	2421.

SIZE CLASS Intermediate.

Hazard Potential Significant.

Test Flood 1/2 PMF to PMF.

Appears 5 structures near stream USE 1/2 PMF

76,2440 | 2/19/78 | MA | BY: FDD

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 3 of
JOB Dams
SUBJECT Wyola
CLIENT Comps

Drainage Area = 6.44 sq. mi.
PMF = 1300 cfs/s.m. "rolling - flat" (pond-swamp sto

1/2 PMF = 1300 × 6.44 × 1/2 ≅ 4200 cfs

<u>Discharge</u> - Height (flow thru culvert negligible)

Elev	D	L	C	$H^{3/2}$	Q cfs	Q'	Q^T cfs
830	0	–	–	0			
831.5	1.5	48	2.65	1.84	234		= 234
832.2	0.7	20	2.68	0.59	31 +	418	= 449
833.2	1.0	44	2.68	1.0	118 +	856	= 974
836.0	2.8	270	2.63	4.7	3327	"	= 4183 ≅ 4200
837.0	3.8	275	2.63		5358	"	= 6214
838.0	4.8	280	2.63	10.5	7749	"	= 8600

<u>Storage - Discharge</u> (adj for base stor)

Q_{p_1} = 4200. ELEV 836.00.

$Stor_1$ = 1056 a-f × 12"/F × $\frac{1}{4119}$ = 3.08" runoff

$Q_{p_2} = 4200 \times \left(1 - \frac{3.08}{9.5}\right)$ = 2840 cfs

$Elev_2$ = 835.5± $Stor_2$ = 2150 a-f − 1144 = 1006

Av Stor = (1056 + 1006) × 1/2 = 1033 a-f

$Q_{p_3} = 4200\left(1 - \frac{3.01}{9.5}\right)$ = 2870. cfs flows over top of dam

At 8' CMP - Str. R. HW/D = 12/8 = 1.5 Q = 600
water will flow over roadway

78,244.1
12/19/78
WA
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HH&B HAYDEN, HARDING & BUCHANAN, INC
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO. 4 of
JOB Dams
SUBJECT Wyola
CLIENT Corps

Dam Failure Analysis

$S = 1565$ af

$W_b = 140' \times .4 = 56'$

$Q_{P_1} = 8/27 \times 56 \times \sqrt{32.2} \cdot (14)^{3/2} \approx 4933$ cfs $>$ 28[illegible]

Sta 9+00 $S = 0.01$ ft/ft

narrow stream, rocky btm - sides wooded
flood plain $n = 0.06$.

$D = 10'$ $WP = 250$ $A = 860$ $R = 3.44$

$V = \frac{1.486}{.06}(.01)^{1/2}(3.44)^{.67} = 2.48(2.29) = 5.67$

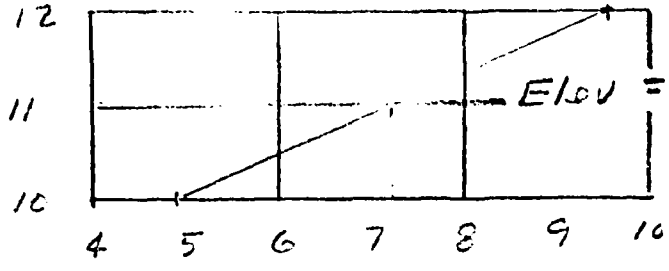
$Q = 4880$ cfs $<$ reqd

$D = 12'$ $WP = 300$ $A = 860 + 520$ $R = 4.6$

$V = 2.48(2.78) = 6.89$

$Q = 9514$ cfs $>$ reqd

D



See culvert backwater - next sheet.

Sta 2400 At Culvert Q ≈ 600 cfs

$Q_{road} = 4933 - 600 = 4333$ cfs

D = 4' S = 0.01 n = .11 WP = 180' A = 360 R = 2

$V = \frac{1.486}{.06}(.1)(1.59) = 4$ fps

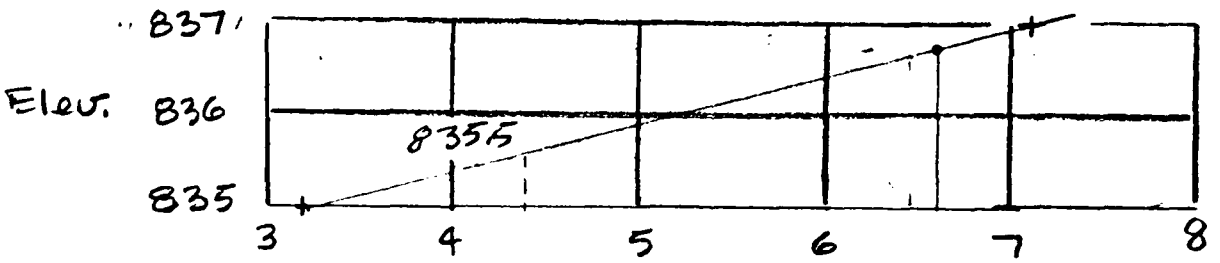
Q = 1418 cfs

D = 6' WP = 260' A = 360 + 320 = 680. R = 2.62. V = 4.7.

Q = 3211.

D = 8' WP = 330' A = 680 + 520 = 1200 R = 3.6 V = 5.9.

Q = 7067.



Q × 1000 cfs

Elev 835.5, Q = 4933 cfs

Storage = $V_1 = \frac{2200 + 1700}{2}(700)\left(\frac{1}{43560}\right) = 23.3$ af OK

$Q_{P_2} = 4933\left(1 - \frac{23.3}{1570}\right) \cong 4860$ cfs

$V_2 = \frac{2200 + 900}{2}(700)\left(\frac{1}{43560}\right) \cong 25$ af

$(V_1 + V_2)\left(\frac{1}{2}\right) = 24.2$

$Q_{P_3} = 4933\left(1 - \frac{24.2}{1570}\right) = 4857$ cfs

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CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO 6 of
JOB Dams
SUBJECT Wyola
CLIENT Corps

Sta 14+00 $S = 10'/500' = 0.02'/'$

$D = 10'$ $WP = 170'$ $A = 35 \times 20 = 700$ sf $R = 4.12$

$V = \frac{1.486}{.06}(.1414)(2.58) = 3.5(\ ) = 9.$

$Q = 6325$ cfs > reqd 4857

$D = 8'$ $WP = 150$ $A = 550$ sf $R = 3.67$

$V = \frac{1.486}{.06}(2.32)(.1414) = 8.4$

$Q = 4584$ say OK

Elev

$Vol = \frac{550+900}{2} \times \frac{500}{43560} = 8.3$ a-f

$Q_{P_2} = 4857\left(1 - \frac{8.3}{1570}\right) = 4831$ cfs

Between Dam & Sta 14+00 5 homes would be damaged — loss of life could result.
Below 14+00 homes are above stream bed & stream flood plain widens out. Just prior to its junction with Red Brook, 2 more homes are close to the stream. They would be damaged and loss of life could occur, at sta 32+00±.

NO. 78.244.1
2/19/78
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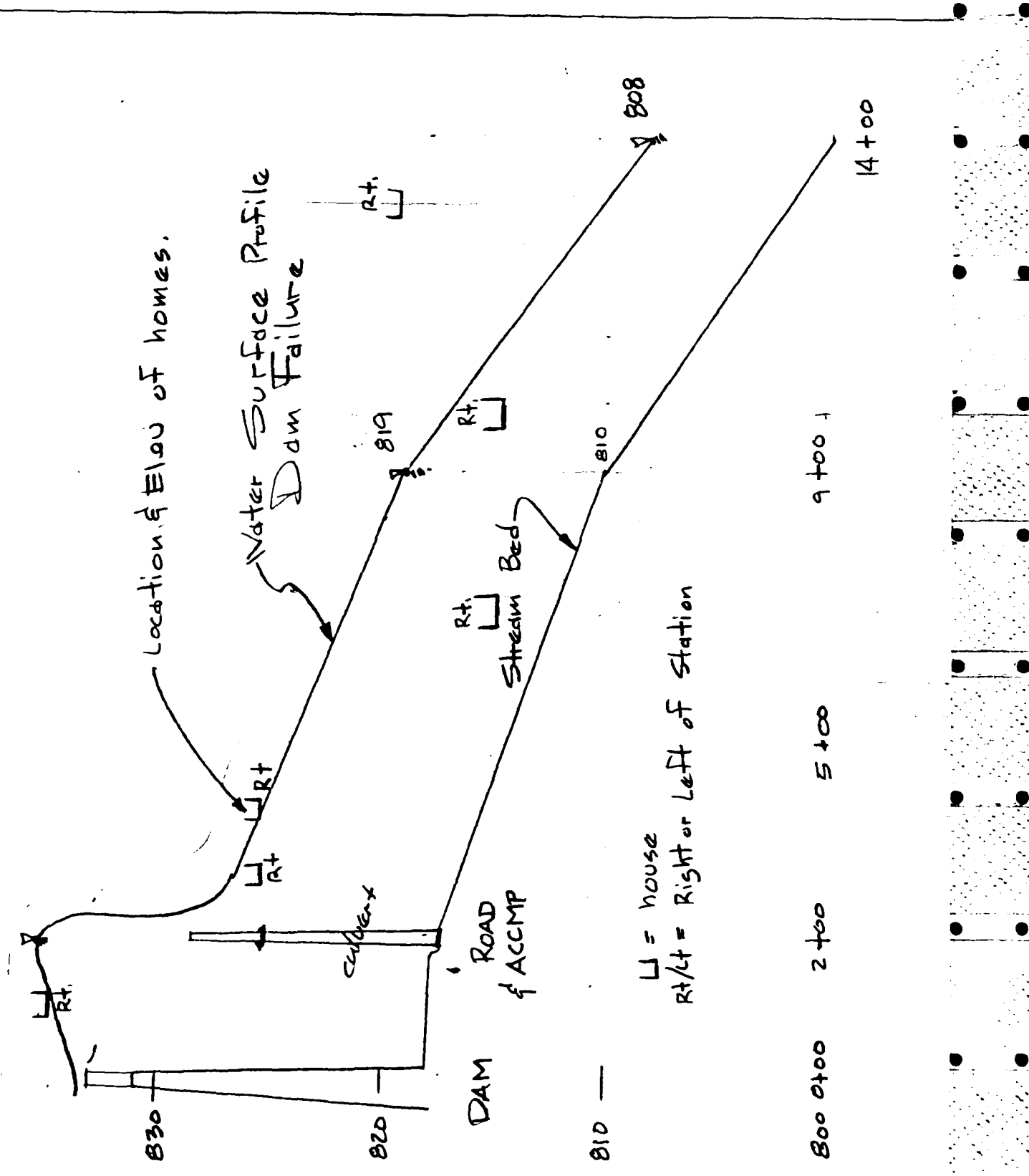
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 7 of
JOB Dams
SUBJECT Wyola
CLIENT Corps



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E 12/17/78
MA
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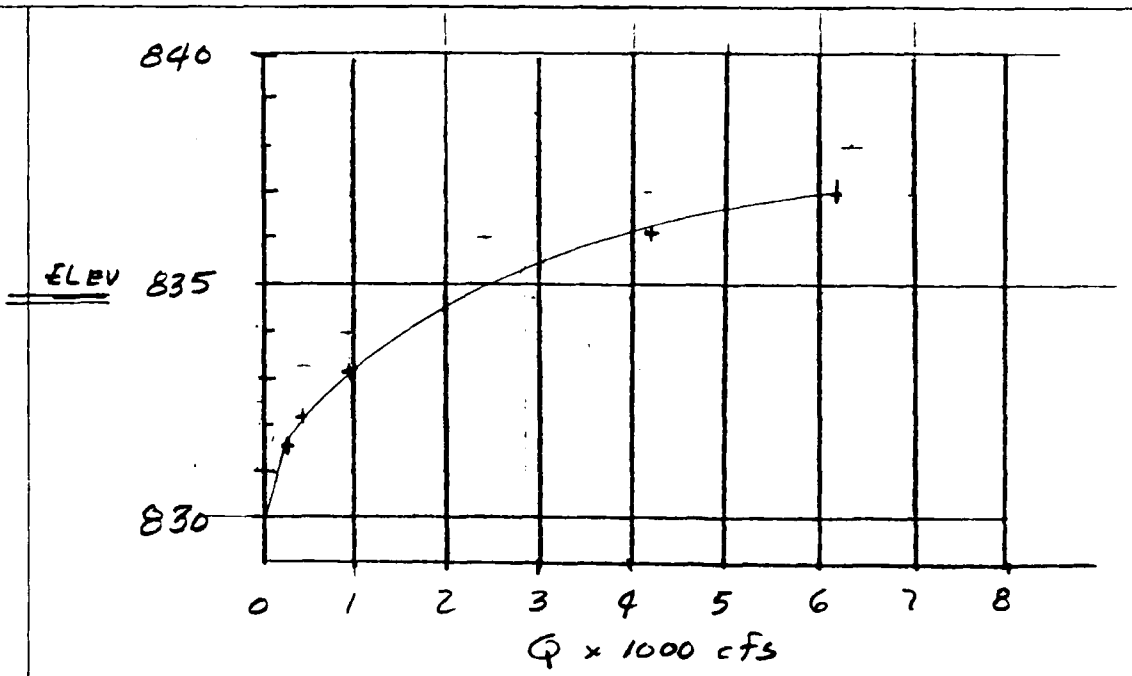
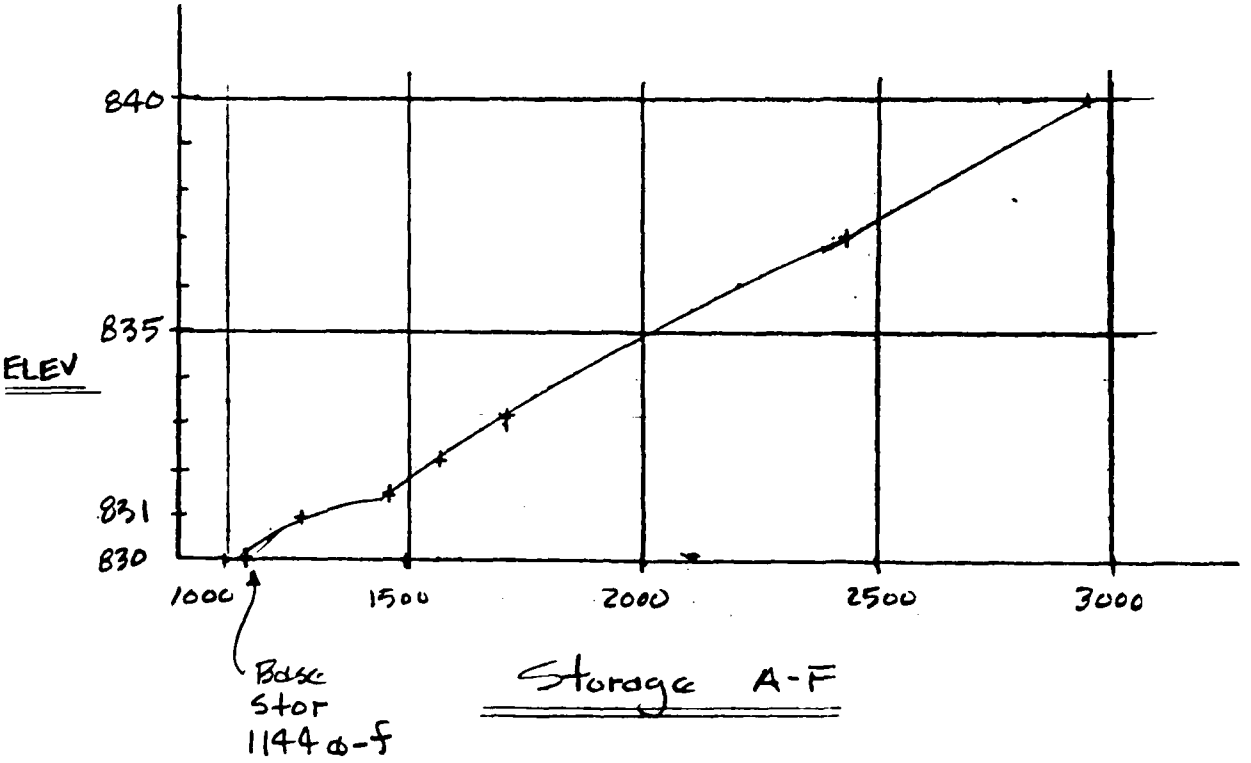
BOSTON, MASSACHUSETTS

JOB Dams SHEET NO. 8 of
SUBJECT Wyo
CLIENT corps



Discharge



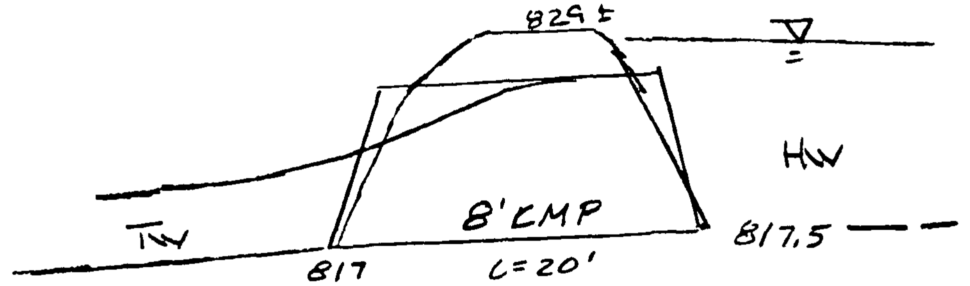
Storage A-F

NO. 78,249.1
3/16/79
MA
BY FOD

HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

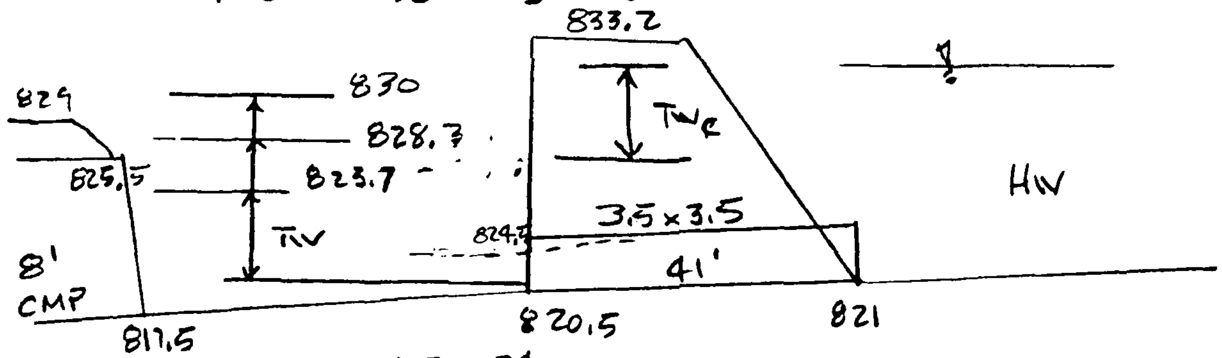
SHEET NO. 9
JOB Dams
SUBJECT Wyola
CLIENT Corp

Discharge Thru 3.5'x3.5' culvert



$K_e = .9$

Res EL	Q	To Pipe Q'	HW/D	D	El	MAX' EL	HW/D	Qp	Qrd
833.2	975	1100	3	24	841	830	1.56	600	500±
832.2	450	600	1.35		828.3				
831.5	200	300	0.77	6.16	823.7				
	200	150	.5	4	821.5				
		175	.6	5	822.5				



n = .024

EL	HW-TW=H	3'-6" CMP	H	ELEV	EL'	Q 36" (n=024)	Q (n=015)
833.2	3.2	125	6'	836 >	833.2	0	
832.2	4.0	150	9	837 >	832.2	0	
831.5	6.8	100	3.8	827.5 <	831.5	>100	
	10	150	8	829.5 <	831.5	>150	
	9	175	11	831.5 =	831.5	175±	280

Inlet Control	HW/D	Qp (n=.024)	Q' (n=.015)
830	2.6	140	224
828	2.0	110	176
825	1.14	60	96
824	0.86	42	67
822	0.29	9	15

NO. 78.244.1
3/16/79
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BY 1st DD

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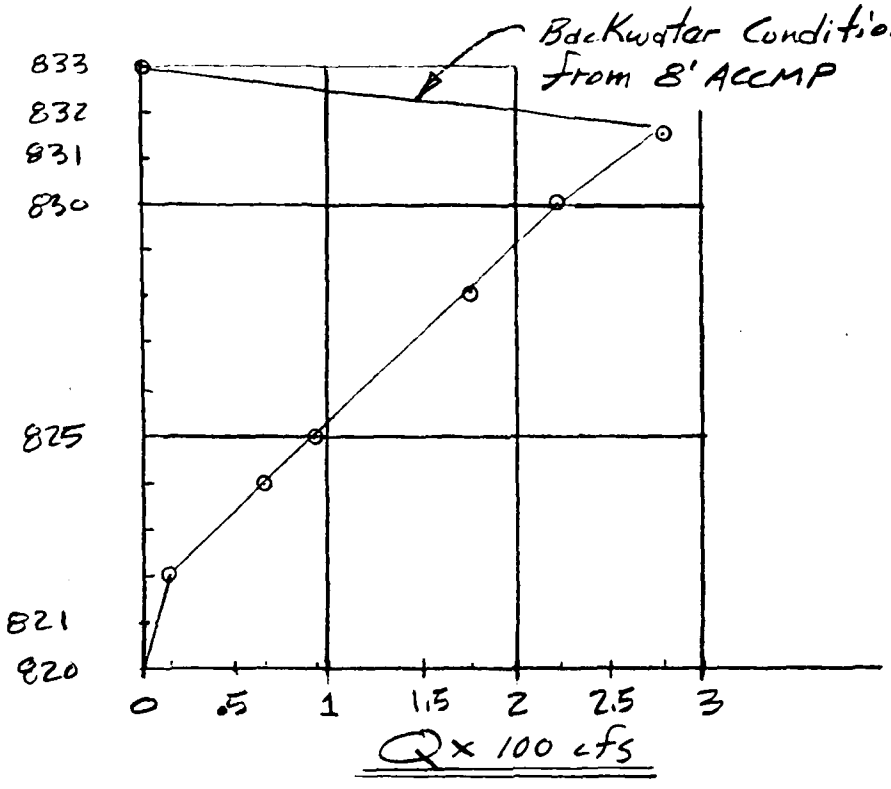
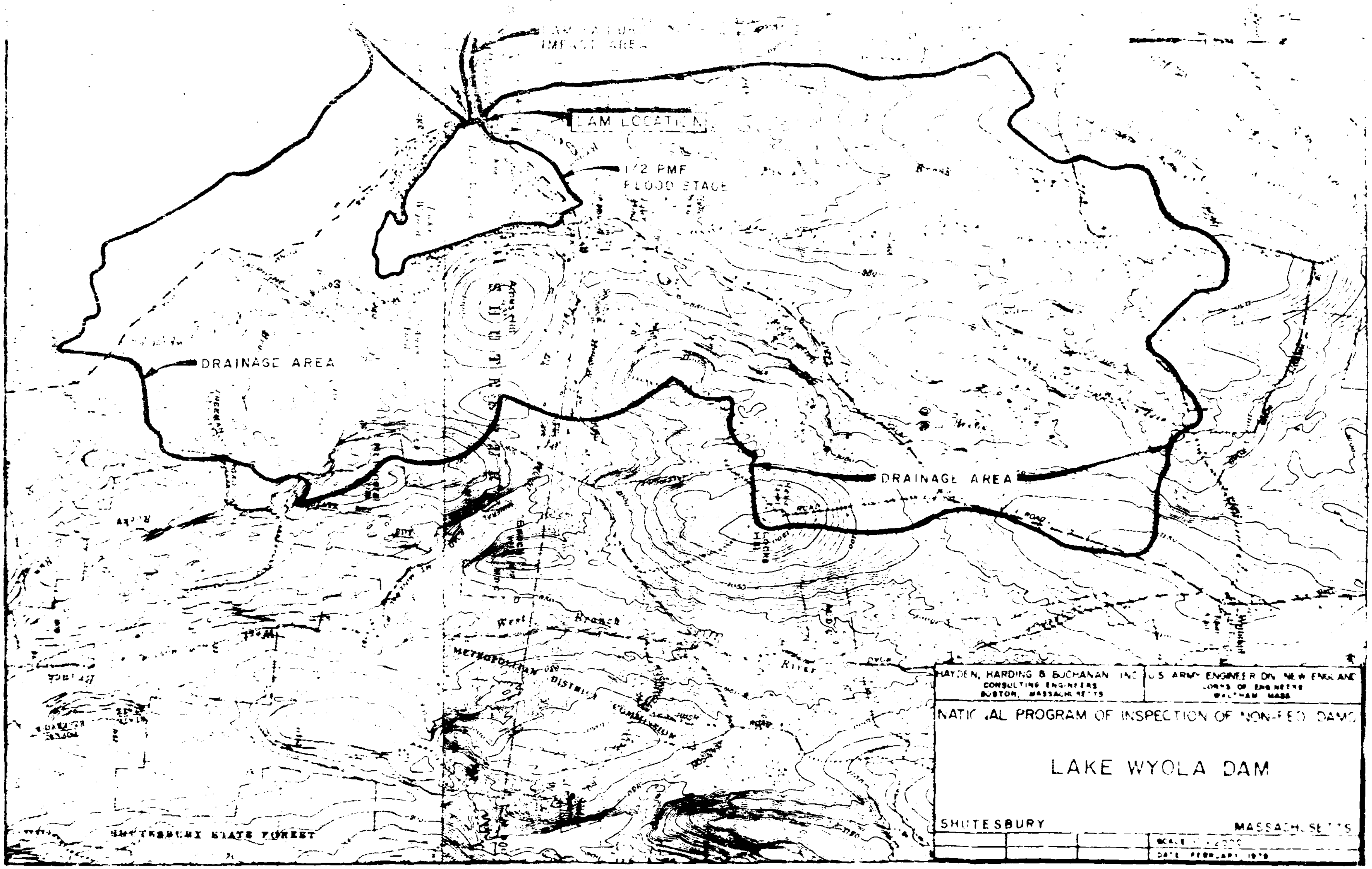
BOSTON MASSACHUSETTS

SHEET NO. 10
JOB Dams
SUBJECT Wyola
CLIENT Corps

3.5 x 3.5 Culvert Discharge



Actual flow will vary. Grille clogging will significantly reduce outflow. Backwater from 8' ACCMP will reduce flow. Assumes valve fully open.



HAYDEN, HARDING & BUCHANAN INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LAKE WYOLA DAM

SHUTESBURY MASSACHUSETTS

DATE FEBRUARY 1979

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

(1) STATE	(2) IDENTITY NUMBER	(3) DIVISION	(4) STATE	(5) COUNTY	(6) CONGR DIST.	(7) STATE	(8) COUNTY	(9) CONGR DIST.	(9) NAME	(10) LATITUDE (NORTH)	(11) LONGITUDE (WEST)	(12) REPORT DATE DAY	MO	YR
MA	510	NED	MA	011	01				LAKE WYOLA DAM	4230.1	7226.2	23	FEB	79

(13) POPULAR NAME	(14) NAME OF IMPOUNDMENT
LOCKS POND	LAKE WYOLA

(15) REGION	(16) BASIN	(17) RIVER OR STREAM	(18) NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	(19) DIST FROM DAM (MI.)	(20) POPULATION
01	08	SAWMILL RIVER	SHUTESBURY	0	600

(21) TYPE OF DAM	(22) YEAR COMPLETED	(23) PURPOSES	(24) STRUCTURAL HEIGHT (FT.)	(25) HYDRAULIC HEIGHT (FT.)	(26) IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	NORMAL (ACRE-FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
REERPGCT	1883	R	14	14	1703	1144	NED	N	N	N	N	07MAR79

(28) REMARKS

(29) D/S HAS.	(30) SPILLWAY CREST LENGTH	(31) TYPE	(32) WIDTH (FT.)	(33) MAXIMUM DISCHARGE (FT.)	(34) VOLUME OF DAM (CY)	(35) POWER CAPACITY INSTALLED (MW)	(36) PROPOSED (MW)	(37) NAVIGATION LOCKS NO.	(38) LENGTH (FT.)	(39) WIDTH (FT.)	(40) LENGTH (FT.)	(41) WIDTH (FT.)	(42) LENGTH (FT.)	(43) WIDTH (FT.)	(44) LENGTH (FT.)	(45) WIDTH (FT.)
2	229	U	68	450												

(46) OWNER	(47) ENGINEERING BY	(48) CONSTRUCTION BY
TOWN OF SHUTESBURY	UNKNOWN	UNKNOWN

(49) REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

(50) INSPECTION BY	(51) INSPECTION DATE DAY	MO	YR	(52) AUTHORITY FOR INSPECTION
HAYDEN HARDING + BUCHANAN, INC	27	NOV	78	PUBLIC LAW 92-367

(53) REMARKS

END

FILMED

8-85

DTIC