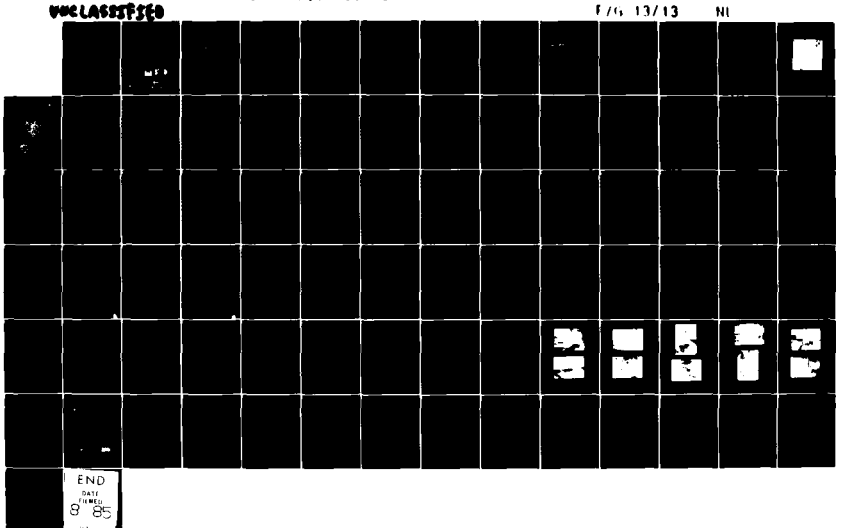
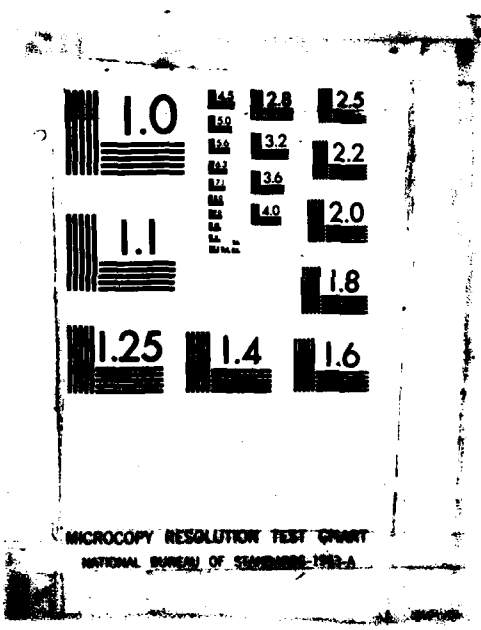
AD A155 731 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS MT 1/1
HOLYOKE COLLEGE UP.. (U) ARMY CORPS OF ENGINEERS WALTHAM MA
NEW ENGLAND DIV OCT 80

UNCLASSIFIED F/G 13/13 NL



END
DATE FILMED
8 85


1.0
1.1
1.25
1.4
1.6
2.0
2.2
2.5
2.8
3.2
3.6
4.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

CONNECTICUT RIVER BASIN
SOUTH HADLEY, MASSACHUSETTS

MT. HOLYOKE COLLEGE UPPER DAM
MA 00583

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02254

OCTOBER 1978

DISCLAIMER NOTICE

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

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER: MA 00583	2. GOVT ACCESSION NO.: AD-A155 731
	3. RECIPIENT'S CATALOG NUMBER:
4. TITLE (and Subtitle): Mt. Holyoke College Upper 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: October 1980 13. NUMBER OF PAGES: 75
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,

Connecticut River Basin
South Hadley, Massachusetts
Stony Brook, tributary of the Connecticut River

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

The dam is a 160 ft. long stone masonry-concrete dam built in 1900 and used primarily for recreation. It has a height of 19.6 ft. There are deficiencies which must be corrected to assure the continued performance of this dam. The dam in generally fair condition. The dam has been classified as small in size and has a hazard potential of high. It is recommended that the owner employ a qualified engineer to investigate the seepage at the downstream toe near the left abutment.

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 02254

REPLY TO
ATTENTION OF:

MAR 17 1981

NEDED

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

Dear Governor King:

Inclosed is a copy of the Mt. Holyoke College Upper Dam (MA-00583) 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, Trustees of Mt. Holyoke College, South Hadley, MA..

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,

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

Incl
As stated

MT. HOLYOKE COLLEGE UPPER DAM

MA 00583

CONNECTICUT RIVER BASIN
SOUTH HADLEY, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION
PROGRAM

NATIONAL DAM INSPECTION
PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

Identification No.: MA00583

Name of Dam: Mt. Holyoke College Upper Dam

Town: South Hadley

County and State: Hampshire County, Massachusetts

Stream: Stony Brook, tributary of the Connecticut River

Date of Inspection: July 16, 1980

Mt. Holyoke College Upper Dam is a 160-foot long stone masonry-concrete dam built in 1900 and used primarily for recreation. The dam has a maximum height of 19.6 feet and consists of a main spillway, two side channel spillways and an outlet. The top of the dam is at Elevation (El) 202.9, (National Geodetic Vertical Datum of 1929). The main spillway is a broad crested weir, 39.4 feet long, with the crest at El 199.0. The side channel spillways are both broad crested weirs, 28 and 24 feet long, with the crest at El 199.0. The outlet is 2.8 feet wide by 2.5 feet high, and is controlled by two separate slide gates. The downstream invert of the outlet is at El 183.4. The outlet works are located on the left abutment of the dam. There is also an inoperable mud gate on the face of the dam.

There are deficiencies which must be corrected to assure the continued performance of this dam. This conclusion is based on the visual inspection of the site and a review of the available data. Generally the dam is in fair condition.

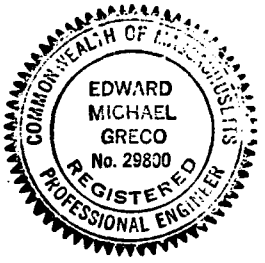
The following deficiencies were observed at the site: seepage at the toe of the dam near the low level outlet; erosion from foot traffic at the left abutment; and a growth of brush and trees in the spillway side channel.

Based on Corps of Engineers' guidelines, the dam has been classified in the small size and high hazard categories. A test

flood equal to 1/2 the probable maximum flood (PMF) was used to evaluate the capacity of the spillway. The drainage area for Mt. Holyoke Upper Pond is 18.8 square miles. The test flood inflow is calculated to be 4,465 cubic feet per second (cfs). The test flood outflow is 4,436 cfs, resulting in a pond level at El 204.3. The test flood would overtop the dam by 1.4 feet. Hydraulic analyses indicate that the spillways without stoplogs can discharge 2,550 cfs, or 58 percent of the test flood outflow before the dam is overtopped. With stoplogs, the spillways can discharge 2,000 cfs or 45 percent of the test flood outflow before the dam is overtopped.

It is recommended that the Owner employ a qualified registered professional engineer to investigate the seepage at the downstream toe near the left abutment. In addition, the Owner should repair the deficiencies listed above, as described in Section 7.3. The owner should also implement a program of annual technical inspections, a plan for surveillance of the dam during and after periods of heavy rainfall, and a plan for notifying downstream residents in the event of an emergency at the dam.

The measures outlined above and in Section 7 should be implemented by the Owner within a period of 1 year after receipt of this Phase I Inspection Report.



Edward M. Greco, P.E.
Project Manager
Metcalf & Eddy, Inc.

Massachusetts Registration
No. 29800

Approved by:

Stephen L. Bishop, P.E.
Vice President
Metcalf & Eddy, Inc.

Massachusetts Registration
No. 19703

This Phase I Inspection Report on Mt. Holyoke College Upper Dam (MA-00583) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

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

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

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

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

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

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

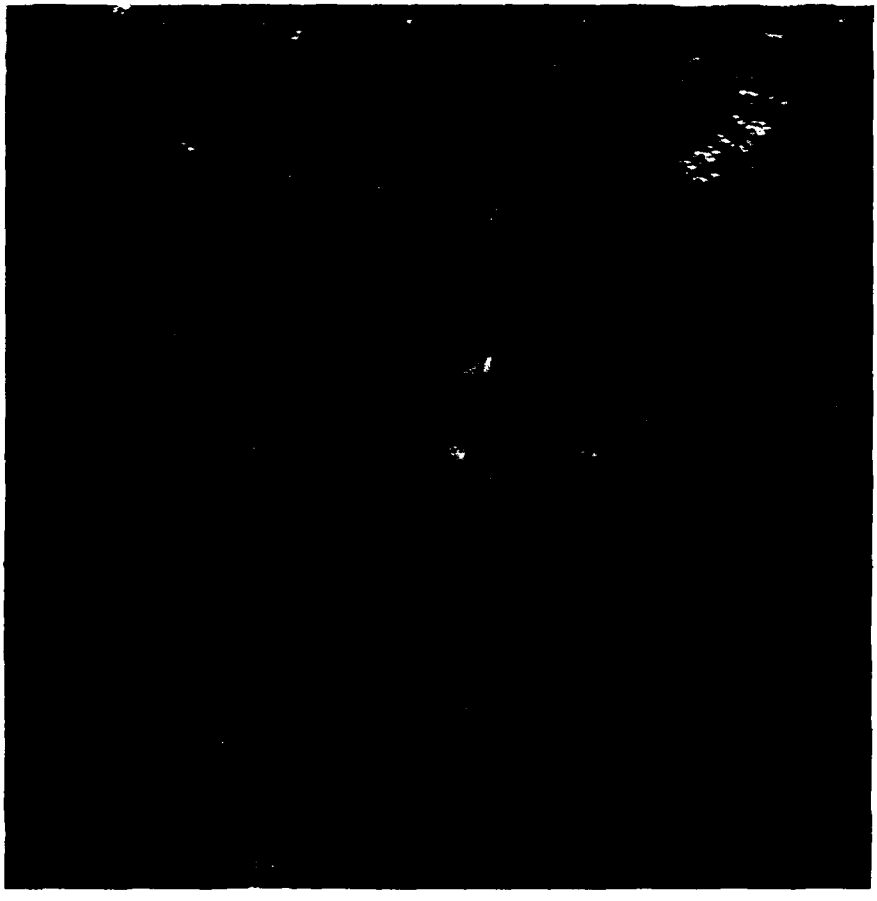
The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project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

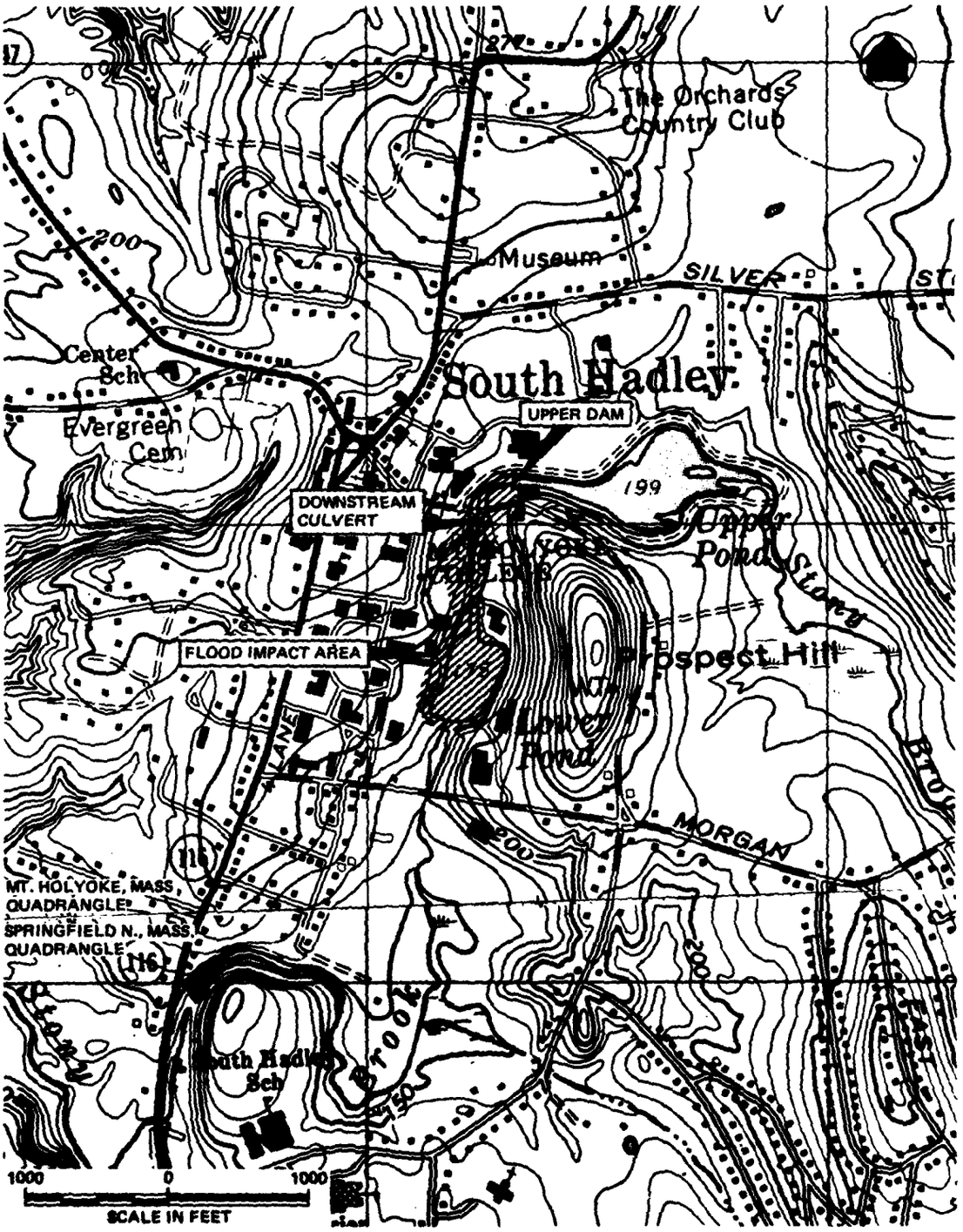
MT. HOLYOKE COLLEGE UPPER DAM

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

OVERVIEW
MT. HOLYOKE COLLEGE UPPER DAM
SOUTH HADLEY, MASSACHUSETTS





LOCATION MAP – MT. HOLYOKE COLLEGE UPPER DAM

NATIONAL DAM INSPECTION
PROGRAM

PHASE I INSPECTION REPORT

MT. HOLYOKE COLLEGE UPPER 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. Metcalf & Eddy, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Contract No. DACW 33-80-C-0054, dated April 18, 1980, 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 quickly initiate effective dam safety programs for non-Federal dams.

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

1.2 Description of Project

a. Location. The dam is located on Stony Brook about 3.5 miles upstream of the confluence with the Connecticut River, in the Connecticut River Basin. The dam is in the Town of South Hadley, Hampshire County, Massachusetts (see Location Map). The coordinates of this location are Latitude 42 deg. 15.5 min. north and Longitude 72 deg. 34.2 min. west.

b. Description of Dam and Appurtenances. Mt. Holyoke College Upper Dam is a 160-foot long, stone masonry-concrete dam with a maximum height of 19.6 feet (see Plan

of Dam and Sections in Appendix B and photographs in Appendix C). The top of the dam is 7.8 feet wide and varies from El 202.9 to 203.0. The upstream face is submerged. The downstream face is a vertical wall covered with gunite. The main spillway, located in the middle of the dam, is a 39.4-foot long, broad-crested concrete weir. The approach channel is submerged. The crest of the spillway is at El 199.0. The discharge channel below the main spillway is about 25 feet wide. The right side of the channel is formed by the natural side slopes of the terrain. The left side is a vertical stone masonry wall 7 feet high which is covered with gunite and extends for a distance of 15 feet downstream of the dam. The floor of the channel is rock, covered with some gravel and slopes at 0.4 percent.

The side channel spillways, located on the right side of the dam, are 28 and 24 feet long respectively and are separated from the main spillway by a 13.5 foot wide concrete pier. The two side channel spillways are separated from each other by a 5.6 foot wide concrete pier.

Both spillways are broad crested, concrete weirs. Wooden flashboards 1.4 feet high are mounted with steel pins on the crest of the side channel spillways. The crests of the side channel spillways are at El 198.1 and the top of the flashboards is at El 199.5. The length of the flashboards are 28 and 24 feet respectively.

The discharge channel below the side channel spillways is approximately 22 feet wide. The right side is 4.5 foot high stone-masonry wall for a distance of 60 feet and the left side is a rock outcrop. The floor of the channel is bedrock. The discharge flows a distance of 100 feet before it joins with the main spillway discharge channel.

The low-level outlet for the dam is at 2.8-feet wide by 2.5-feet high and is located at the left abutment of the dam. The upstream invert of the outlet is at El 187.1. Flow into the outlet is controlled by two slide gates. The outlet pipe discharges at El 183.4 to the main spillway channel.

A mud gate which is located at the left hand side of the spillway is inoperable. The invert is at El 186.5 and the dimensions are 3.0 feet high by 3.5 feet wide.

c. Size Classification. Mt. Holyoke College Upper Dam has a maximum height of 19.6 feet and a maximum storage capacity of 96 acre-feet. These place the dam in the "small" size category which corresponds to a height of 25 to 40 feet or a storage capacity of 50 to 1,000 acre-feet.

d. Hazard Classification. There are two dams; 3 bridges; and 10 buildings, all a part of the Mt. Holyoke College Campus, located downstream of the dam (see Flood Impact Area shown on the Location Map). In the event of an assumed failure of the dam, severe damage would occur to the bridges and to the student center nearest the stream as well as an adjoining parking lot. The ground elevation at the student center ranges from El 181.0 to El 185.0. At the arched culvert, which is about 300 feet downstream, an assumed dam failure would increase the water surface elevation from El 177.9 to El 188.8. This is a sudden rise of 10.9 feet. Damage to the two lower dams would depend on their ability to pass the flow. To pass the failure flow of the upstream dam, water at the Middle Dam will rise to El 186.0, 6 feet above the crest of the spillway. This will cause severe damage to the gate house, the access bridge to the gate house and the parking lot. Therefore, more than a few lives could possibly be lost. Accordingly, the dam has been placed in the "high" hazard category.

e. Ownership. The dam is owned by the Trustees of Mt. Holyoke College, South Hadley, Massachusetts 01075. Mr. Wayne Gass (telephone 413-538-2000) granted permission to enter the property and inspect the dam.

f. Operator. The dam is operated by personnel from the Operation and Maintenace Department of Mt. Holyoke College.

g. Purpose of the Dam. The water in the Upper Pond is currently used for canoeing and skating by students of Mt. Holyoke College.

h. Design and Construction. Construction of Mt. Holyoke College Upper Dam was completed in 1900.

The only drawings available, which are dated October 1955, show the 24 foot side channel spillway. Drawings dated June 1956 show the flashboard detail for the side channel spillways.

Previous inspection reports indicate that since construction the dam has been in fair condition. Repairs have been made such as covering the stone masonry and concrete surface with gunite, and repairing the slide gates.

i. Normal Operating Procedures. Personnel from Mt. Holyoke College reportedly visit the dam weekly. At that time, they inspect the general condition of the dam. The flashboards are operated to maintain the lake at El 199. The low-level outlet is not operated on any regular basis.

1.3 Pertinent Data

a. Drainage Area. The drainage area which is approximately 12,000-acres (18.8 square mile) consists of gently rolling land (see Figure D-1 in Appendix). The drainage area includes drainage from Stony Brook and Muddy Brook. About 7.2 percent of the drainage area is ponds and swamps. In general, the undeveloped portions of the drainage area consist of woodland and open fields. Moderate residential development occurs along the major roadways. A part of Westover Air Force Base occupies the southwest corner of the drainage area.

b. Discharge. Discharge from Mt. Holyoke College Upper Dam flows over the main spillway and the side channel spillways into an unlined discharge channel. Water also discharges from the outlet into the main discharge channel.

(1) Outlet: Size - (2.5 ft. x 2.8 ft.) Invert El. - 183.4. Capacity: 125 cfs at El 199.0.

(2) Maximum known flood at damsite a short distance downstream of Mt. Holyoke College Upper Dam: August 1955, 1920 CFS, 19.2 sq. mi.

(3) Ungated spillway capacity at top of dam:
2,550 cfs at El 202.9 (without flashboards)
2,000 cfs at El 202.9 (with flashboards)

(4) Ungated spillway capacity at test flood elevation:
El 204.3
3,860 cfs at El 204.3 without flashboards
3,270 cfs at El 204.3 with flashboards

(5) Gated spillway capacity at normal pool elevation:
N/A

(6) Gated spillway capacity at test flood elevation:
N/A

(7) Total spillway capacity at test flood elevation:
3,860 cfs at El 204.3 (without flashboards).
3,270 cfs at El 204.3 (with flashboards).

(8) Total project discharge at top of dam elevation:
2,550 at El 202.9 (without flashboards)
2,000 at El 202.9 (with flashboards)

(9) Total project discharge at test flood elevation:
4,436 cfs at El 204.3 (without flashboards)
4,438 cfs at El 204.7 (with flashboards)

c. Elevation (feet above National Geodetic Vertical Datum of 1929 (NGVD)). A benchmark was established at El 199.0 on the main spillway weir crest. This elevation was estimated from a United States Geological Survey (U.S.G.S.) topographic map.

(1) Streambed at toe of dam: 183.4

(2) Bottom of cutoff: unknown

(3) Maximum tailwater: unknown

(4) Normal pool: 199.0

(5) Full flood control pool: N/A

(6) Spillway crest: 199.5 (side spillways)
199.0 (main spillway)

(7) Design surcharge (Original design): unknown

(8) Top of dam: 202.9 to 203.0

(9) Test flood surcharge: 204.3

d. Reservoir (Length in feet)

(1) Normal pool: 1,820

(2) Flood control pool: N/A

(3) Spillway crest pool: 1,820

(4) Top of dam: 1,820

(5) Test flood pool: 1,820

e. Storage (acre-feet)

(1) Normal Pool: 58 at El 199.0

(2) Flood control pool: N/A

(3) Spillway crest pool: 58 at El 199.0

(4) Top of dam: 96.4 at El 202.9

(5) Test flood pool: 111.0 at El 204.3

f. Reservoir surface (acres)

*(1) Normal pool: 10

*(2) Flood-control pool: N/A

(3) Spillway crest: 10

*(4) Test flood pool: 10

*(5) Top of dam: 10

g. Dam

(1) Type: concrete - stone masonry

(2) Length: 160 ft.

(3) Height: 19.6 ft.

(4) Top width: 7.8 ft.

(5) Side slopes: u/s submerged, d/s - vertical

(6) Zoning: unknown

(7) Impervious core: unknown

(8) Cutoff: unknown

(9) Grout curtain: unknown

(10) Other: covered with gunite

h. Diversion and Regulating Tunnel - N/A

*Based on the assumption that the surface area will not significantly increase with changes in pool elevation form 199.0 to 204.3.

i. Main Spillway

(1) Type: Broad crested weir

(2) Length of weir: 39.4 ft

(3) Crest elevation: 199.0

(4) Gates: N/A

(5) Upstream Channel: submerged

(6) Downstream Channel: bedrock

j. Side Channel Spillways

(1) Type: Broad Crested Weirs

(2) Length of weir: 28 ft, 24 ft

(3) Crest elevation (with and without flashboards):
With flashboards 199.5
Without flashboards 198.1

(4) Gates: N/A

(5) Upstream channel: submerged

(6) Downstream channel: bedrock, overgrown with brush

k. Regulating Outlets

Low Level Outlet

(1) Invert El: 187.1

(2) Size: 2.5 ft x 2.8 ft

(3) Description: stone masonry box channel

(4) Control mechanism: two slide gates

l. Mud Gate

(1) Invert El: 186.5

(2) Size: 3.0 ft x 3.5 ft

(3) Description: stone masonry box channel

(4) Control mechanism: slide gate (inoperable)

SECTION 2

ENGINEERING DATA

2.1 General. The engineering data available for this Phase I inspection are past inspection reports and drawings of the flashboard detail and proposed alterations dated October 1955 and June 1956. The drawings were obtained from Mt. Holyoke College.

There are no other drawings, specifications, or computations available from the Owner, State, or County agencies. Copies of previous inspection reports dated 1965 to 1976 are included in Appendix B. The most recent inspection was conducted in 1976 by the Massachusetts Department of Public Works. A copy of that report is also given in Appendix B.

We acknowledge the assistance and cooperation of personnel from the Massachusetts Department of Environmental Quality Engineering, Division of Waterways; the Massachusetts Department of Public Works; and the Hampshire County Engineers Office. In addition, we acknowledge the assistance of Mr. Wayne Gass and Mr. Harry Brock, of Mt. Holyoke College, who provided information on the history and operation of the dam.

2.2 Construction Records. There are no construction records or as-built drawings available for the dam or appurtenances. Previous inspection reports provided some construction information, and a summary of repairs and post-construction changes at the site.

2.3 Operating Records. No operating records are available, and there is no daily record kept of the elevation of the pool or rainfall at the dam site.

2.4 Evaluation

a. Availability. There is limited engineering data available for this dam.

b. Adequacy. The lack of detailed hydraulic, structural and construction data did not allow for a definitive review. Therefore, the evaluation of the adequacy of this dam is based on the visual inspection, past performance history, and engineering judgment.

c. Validity. Comparison of the available drawings with the field survey conducted during the Phase I inspection indicates that the available information is valid.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The Phase I Inspection of the upper dam at Mt. Holyoke College was performed on July 16, 1980. A copy of the inspection checklist is included in Appendix A. Previous inspections were conducted from 1965 to 1976. Copies of those reports are given in Appendix B. Selected photographs taken during our Visual Inspection are included in Appendix C.

b. Dam. The dam is a concrete-masonry structure with a spillway, two side channel spillways, an outlet, and a mud gate. Evidence of seepage was noted in one location near the low level outlet at the bottom of the left abutment wall. The seepage is clear and flowing at approximately one gpm (see Photo No. 1).

The concrete surface on the abutments was covered with gunite in 1979. There are no visible cracks, spalling or efflorescence (see Photo No. 2).

The stone masonry on the vertical face of the spillway was also covered with gunite. Therefore, the surface of the masonry is not visible. However, the gunite is in good condition. (See Photo No. 3).

Moderate erosion from foot traffic was noted on the left side slope where it joins with the concrete abutment of the dam.

Brush and trees up to two feet in diameter are growing around the abutments of the dam (see Photo No. 4).

c. Appurtenant Structures. The main spillway is a broad crested weir without flashboards. At the time of the inspection, water was discharging over the spillway, so the weir and downstream toe could not be examined. The concrete on the crest of the spillway was covered with moss but otherwise was clear of debris (see Photo No. 5).

The side channel spillway is divided into two sections by a concrete pier. The spillways are both broad crested weirs with wooden flashboards. At the time of the inspection, water was leaking through the spaces in between the flashboards and the spillway, but not over the crest of flashboards. The concrete on the crest of the spillways was in good condition. The flashboards were in fair condition. There is no access walkway to the flashboards and the flashboards can only be removed when there is no flow over the spillways. The crests of the spillways were clear of debris (see Photo No. 6).

The operable portions of the outlet were visible during inspection. There are two slide gates which must be operated to open the outlet. The first or upstream of the two gates was under repair at the time of inspection and therefore was not operable. The second gate was open and reported to be in good operating condition (see Photo No. 7).

A stone masonry outlet conduit is in the left abutment of the dam. The stone masonry is in fair condition. The discharge end of the outlet is clear of debris and a moderate amount of flow was discharging at the time of inspection (see Photo No. 8).

A 3.0 foot high by 3.0 foot wide mud gate is located on the face of the dam in the lower left hand corner. The gate is inoperable.

d. Reservoir Area. The reservoir area is moderately developed.

The area around the Upper Pond is owned by Mt. Holyoke College. Two dormitories are located adjacent to the pond. Most of the land is wooded with gentle slopes. Future development in the reservoir area would be limited.

e. Downstream Channel. Both the main spillway and outlet discharge into the downstream channel. The stone masonry wall that forms the left side of the main channel is covered with gunite. The right side is an earth slope. The floor of the channel is bedrock. There is a slight accumulation of wood and debris in the floor of the channel (see Photo No. 4).

There is a large tree located in the left downstream abutment of the main channel, just above the low level outlet (see Photo No. 8).

Vegetation and trees are overhanging the sides of the channel.

The side channel spillways discharge into a separate channel that joins with the main discharge channel 25 feet downstream of the dam. The upper part of the left sidewall of the channel is formed by the concrete abutment. The remainder of the left side wall is cut out of bedrock. The right side wall is stone masonry. Both the stone and mortar appear to be in good condition. The floor of the channel is bedrock. Directly downstream of the weirs, the channel bottom is covered with vegetation, mostly in the form of brush.

Vegetation and trees up to 12 inches in diameter overhang the side channel, especially on the right side (see Photo No. 9).

About 300 feet downstream of the dam, a road embankment across the channel restricts the flow from the dam. Water flows through the embankment in a 15.5 ft wide by 15 ft high arched culvert (see Photo No. 10). Water flows an additional 1,000 feet beyond the culvert before reaching lower Mt. Holyoke Pond.

3.2 Evaluation. The visual inspection indicates that the dam is in fair condition. The stated deficiencies which must be corrected to assure the continued performance of this dam and measures to improve these conditions are outlined in Section 7.

SECTION 4

OPERATING AND MAINTENANCE PROCEDURES

4.1 Operating Procedures

a. General. There are no regular operating procedures for this dam. Personnel from Mt. Holyoke College reportedly visit the dam once a week to check the site.

b. Warning System. There is no written warning system in effect at this dam. In case of an emergency at the structure, campus security would reportedly be instructed to warn South Hadley police officials.

4.2 Maintenance Procedures

a. General. The dam is generally adequately maintained. The operations and maintenance department is responsible for maintenance of the facility. Periodic inspections have been conducted in the past. Typical maintenance procedures have included repair of cracked or missing concrete or mortar, clearing bush and trees from the slope and discharge channel, clearing debris from the spillway and outlet intakes, repairing the outlet gates and covering the surface with gunite.

b. Operating Facilities. Maintenance of the operating facilities at the dam consists of a periodic inspection. There is no established procedure for maintenance. In 1978, the downstream outlet gate was rebuilt. The operating condition of the outlet works is checked periodically by the Owner.

4.3 Evaluation. There are no regular programs of maintenance or technical inspections at the dam. There are also no written plans for surveillance of the dam during periods of heavy rainfall, or for warning people in downstream areas in the event of an emergency at the dam. The lack of standard operating and maintenance procedures is undesirable, considering that the dam is in the "high" hazard category. These programs should be implemented as recommended in Section 7.3.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General. Mt. Holyoke Upper Dam has an 18.8-square mile drainage area, about 7.2 percent of which is ponds and swamps (see Figure D-1, Drainage Area Map). The land is gently rolling and moderately developed.

Upper Mt. Holyoke Pond has a surface area of approximately 10 acres, and a maximum storage capacity of 96.5 acre-feet at El 202.9

The low-level outlet can discharge a flow of 125.2 cfs when the pond is at El 199.0. At this pond elevation and with no additional inflow, the outlet can lower the pond by 1 foot in about 1.0 hour.

5.2 Design Data. There are no hydraulic or hydrologic computations available for the design of the spillway at Mt. Holyoke Upper Dam.

5.3 Experience Data. There are no records kept of the operating history of this day and there is no information available for either the 1938 or 1955 storms.

5.4 Test Flood Analysis. Mt. Holyoke College Upper Dam has been classified in the "small" size and "high" hazard categories. According to the Corps of Engineers guidelines, a test flood ranging between the 1/2 PMF (Probable Maximum Flood) and the full PMF should be used to evaluate the capacity of the spillway. The 1/2 PMF was chosen on the basis of the size of the dam and the small storage capacity.

The PMF for the Upper Pond watershed was calculated to be 475 cfs per square mile of drainage area. This calculation is based on an average slope of .38 percent in the drainage area, the pond-plus-swamp area to drainage area ratio of 7.2 percent, and the U.S. Army Corps of Engineers' guide curves for Maximum Probable Flood Peak Flow Rates (dated December 1977). For this analysis, the peak flow rate was determined to be slightly below the guide curve for flat and coastal topography.

Applying the 1/2 PMF rate to the 18.8 square mile drainage area results in a peak test flood inflow of 4,465 cfs. By adjusting the test flood inflow for surcharge storage, the peak test flood outflow was calculated to be 4,436 cfs (236 cfs per square mile).

Without flashboards, the pond level would rise to El 204.3 With flashboards, the pond would rise to El 204.7.

Hydraulic analyses indicate that the combined spillways without flashboards can discharge 2,550 cfs or 58 percent of the test flood outflow with the pond at El 202.9, which is the low point on top of the dam. With flashboards, the spillways could discharge 2,000 cfs, or 45 percent of the outflow before the dam is overtopped.

Table 5-1 below summarizes operating conditions during the test flood.

TABLE 5-1.

	Flashboards in place	Flashboards removed
Maximum height of water above dam, ft:	1.8	1.4
Discharge over spillways (combined), cfs:	3,670	3,860
Discharge over dam, cfs:	4,438	4,436
Depth at critical flow, ft:	1.06	.82
Velocity at critical flow, fps:	5.8	5.1

5.5 Dam Failure Analysis. The peak discharge rate due to failure of the dam during dry weather flow was calculated to be 1,200 cfs with the pond at El 199.0. This calculation is based on a average head of 12.5 feet and an assumed 15.8-foot wide breach occurring in the face of the main spillway. At the arched culvert, which is about 300 feet downstream, an assumed dam failure would increase the water surface elevation from ±El 177.9 to ±El 188.8. This would produce a downstream flood wave 10.9 feet deep as compared to dry weather channel flow zero feet deep prior to failure.

The peak discharge rate during wet weather flow prior due to failure of the dam was calculated to be 280 cfs with the pond at El 202.9. This is due to the tailwater effect resulting from the flow being restricted by the culvert

through the downstream roadway embankment. This calculation is based on a maximum head of 4.8 feet and an assumed 15.8 foot wide breach occurring in the face of the dam. At the arched culvert, which is about 300 feet downstream, failure of the dam would produce a downstream flood wave 22.4 feet deep as compared to channel flow 20.2 feet deep prior to failure.

There is one arched culvert directly downstream of the upper dam. The streambed at the bottom of the culvert is at El 177.9. Discharge due to failure of the dam during the storm could result in flooding the roadway and possibly washing out the culvert during both dry and wet weather.

There are two dams downstream of Mt. Holyoke College Upper Dam. The normal pool elevation of the Middle Dam is at El 180.2 and the normal pool elevation of the Lower Dam is at 175.0. Discharge due to failure of the upper dam could result in the possible failure of the middle dam and the lower dam.

There are 10 buildings, all part of the Mt. Holyoke College Campus, directly downstream of the Upper Dam. Due to the proximity of the Upper, Middle and Lower Dams, these buildings are adjacent to the Middle and Lower Ponds.

The first floor of the student center is about ten feet above the bottom of the channel. An adjoining parking lot is about five feet above the bottom of the channel. In the event of an assumed failure of the dam, severe damage could occur to the building and parking lot. Therefore, it is likely that failure of the dam would result in appreciable property damage and possible loss of a few lives in the areas downstream of the dam. Accordingly, the Mt. Holyoke Collece Upper Dam has been placed in the "high" hazard category.

SECTION 6

STRUCTURAL STABILITY

6.1 Visual Observations. The evaluation of the structural stability of Mt. Holyoke College Upper Dam is based on a review of previous inspection reports, a review of available drawings, and the visual inspection conducted on July 16, 1980.

As discussed in Section 3, Visual Inspection, the dam is in fair condition.

Seepage was observed along the bottom of the dam, in the left hand corner, near the low level outlet.

Areas of erosion were observed on the left abutment. The erosion appears to be caused by foot traffic along the slope.

6.2 Design and Construction Data. Construction of Mt. Holyoke College Upper Dam was completed in 1900. Computations for design of the dam, spillway and outlet are not available.

Drawings showing the proposed or as-built construction of the dam are not available. There are drawings of the proposed alterations to the side channel spillway and the flashboard detail at the side channel spillway of the upper pond. The drawings are dated October, 1955 and June, 1956 respectively.

Specifications for construction of the dam are not available.

There is no information on the shear strength or permeability of the soil and/or rock materials of the dam.

6.3 Post-Construction Changes. Since the original construction of the dam, several changes and repairs have been made.

1956 The 24 foot wide side channel spillway was added. Flashboards were installed in both the 24 foot and 28 foot wide spillways.

1978 The downstream low level outlet gate for the low level outlet was rebuilt.

1979 The entire surface of the stone masonry and concrete abutments was covered with gunite.

6.4 Seismic Stability. The dam is located in Seismic Zone No. 1, and in accordance with Corps of Engineers' guidelines does not warrant further seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. As a result of the visual inspection, the review of available data, and limited information on operation and maintenance, the dam is considered to be in fair condition. The following deficiencies must be corrected to assure the continued performance of this dam: seepage at the left corner of the dam; erosion on the left abutment; accumulation of debris in the downstream channel; and brush in the side spillway channel.

The upstream slide gate on the low level outlet is under repair. The downstream slide gate is reported to be in good working order.

The peak test flood (1/2 PMF) outflow is estimated to be 4,436 cfs with the pond at El 204.3 (assuming the flashboards are released). The test flood would overtop the low point on the dam by 1.4 feet. Hydraulic analyses indicate that the spillway (without flashboards) can discharge 2,550 cfs or 58 percent of the test flood outflow before the dam is overtopped. With the flashboards in place, the spillway can discharge 2,000 cfs or 45 percent of the test flood outflow before the dam is overtopped.

b. Adequacy. The lack of detailed design and construction data did not allow for a definitive review. Therefore, the evaluation of this dam is based on a review of the available data, the visual inspection, past performance and engineering judgment.

c. Urgency. The recommendations and remedial measures outlined below should be implemented by the Owner within 1 year after receipt of this Phase I Inspection Report.

7.2 Recommendations. It is recommended that the Owner employ a qualified registered engineer to:

a. Evaluate the seepage noted at the toe of the dam and design seepage control measures, if necessary.

b. Investigate the condition of the mudgate to ascertain the reason for its inoperability and repair if necessary.

The Owner should implement the recommendations of the Engineer.

7.3 Remedial Measures

a. Operating and Maintenance Procedures. It is recommended that the Owner accomplish the following:

(1) Clear trees, brush and roots from the dam abutments, to a distance of 25 feet from the toe of the dam. All excavations or holes remaining after removal of stumps and roots should be backfilled with select material.

(2) To prevent continued erosion, fill in and protect eroded areas on the left abutment.

(3) Complete repairs to the operating mechanism on the upstream outlet gate.

(4) Remove all brush, trees, and debris in the spillway discharge channel.

(5) Institute a definite written plan for surveillance of the dam and spillway during and after periods of heavy rainfall and a plan to warn people in downstream areas in the event of an emergency at the dam.

(6) Implement a systematic program of maintenance inspections. As a minimum, the inspection program should consist of a monthly inspection of the dam and appurtenances and be supplemented by additional inspections during and after severe storms. All repairs and maintenance should be undertaken in compliance with all applicable State regulations. The maintenance program should include removal of any debris caught on the spillway weir to prevent clogging of the spillway.

(7) Institute a program of technical inspections on an annual basis.

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

APPENDIX A

PERIODIC INSPECTION CHECKLIST

MT. HOLYOKE COLLEGE UPPER DAM

PERIODIC INSPECTION

PARTY ORGANIZATION

PROJECT MT. HOLYOKE UPPER DAM

DATE July 16,1980

TIME 9:45 A.M.

WEATHER Clear,Hot

W.S. ELEV. 199.1 U.S. 180.2 DN.S.

PARTY:

1. Bill Checchi Metcalf & Eddy,Inc. - Geotechnical
2. Frank Gordon Metcalf & Eddy,Inc. - Geotechnical
3. Scott Nagel Metcalf & Eddy,Inc. - Geotechnical
4. Marie Nowak Metcalf & Eddy,Inc. - Hydraulics
5. Ed Greco Metcalf & Eddy,Inc. - Geotechnical
6.
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam/Spillway	M. Nowak/S.Nagel/E.Greco	
2.			
3.			
4.			
5.			

PERIODIC INSPECTION CHECK LIST

PROJECT MT. HOLYOKE UPPER DAM DATE July 16, 1980

PROJECT FEATURE Dam NAME Marie Nowak

DISCIPLINE Geotechnical NAME Scott Nagel

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	203.0
Current Pool Elevation	199.1
Maximum Impoundment to Date	Unknown
Surface Cracks	None visible, surface was covered with gunite.
Pavement Condition	Not applicable
Movement or Settlement of Crest	None visible
Lateral Movement	None visible
Vertical Alignment	Level
Horizontal Alignment	Straight, there is a turn before the side spillway.
Condition at Abutment and at Concrete Structures	It joins with the streambank on each side. Side spillway discharges on to rock channel.
Indications of Movement of Structural Items on Slopes	None visible
Trespassing on Slopes	Foot traffic at side abutment (opposite spillway) has caused erosion
Sloughing or Erosion of Slopes or Abutments	Minor erosion at side abutment.
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None visible
Unusual Embankment or Downstream Seepage	Submerged, not visible for most of dam. In corner nearest outlet, small 1" diam. flow, appears to be coming through the wall of the dam. Discolored, yellow rock at the discharge.
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None Mud gate (inoperable) on face of dam.
Instrumentation System	None

PERIODIC INSPECTION CHECK LIST

PROJECT MT. HOLYOKE UPPER DAM — DATE July 16, 1980

PROJECT FEATURE Spillways — NAME Marie Nowak

DISCIPLINE Hydraulics — NAME Scott Nagel

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	Spillway is divided into three sections: 1. Round crested with a free overfall 2. Broad crested with flashboards flowing into a natural rock channel. 3. Broad crested with flashboards flowing into a natural rock channel.
a. Approach Channel	
General Condition (submerged by lake)	Free of large debris, but appears to be overgrown with moss, etc.
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Trees along side of pond, but none blocking flow.
Floor of Approach Channel	Not visible, submerged
b. Weir and Training Walls	Stone masonry with gunite cover.
General Condition of Concrete	Walls recently covered with gunite. Spillway concrete is good, covered with moss.
Rust or Staining	None
Spalling	None, abutments all resurfaced with gunite.
Any Visible Reinforcing	No
Any Seepage or Efflorescence	No
Drain Holes	No
c. Discharge Channel	Exposed bedrock channel for side spillway, Main spillway discharges on to bedrock.
General Condition	Channel is mainly rock, with some gravel d/s
Loose Rock Overhanging Channel	No
Trees Overhanging Channel	Trees up to 24"ø, along sides with brush along the slopes. Some dead trees at side; especially a large, dead tree over the left embankment.
Floor of Channel	Mostly exposed bedrock with some gravel.
Other Obstructions	Arched culvert underneath roadway 300 ft. d/s.

PERIODIC INSPECTION CHECK LIST

PROJECT MT. HOLYOKE COLLEGE DATE July 16, 1980

PROJECT FEATURE Inlet NAME Marie Nowak

DISCIPLINE Structural NAME Scott Nagel

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	Submerged
Slope Conditions	Concrete walls
Bottom Conditions	Submerged, not visible
Rock Slides or Falls	None
Log Boom	No
Debris	None
Condition of Concrete Lining	Good, no visible spalling
Drains or Weep Holes	None
b. Intake Structure	
Condition of Concrete	Concrete is in good condition.
Stop Logs and Slots	Slide gate at site is under repair. Operator is missing at this time.

PERIODIC INSPECTION CHECK LIST

PROJECT MT. HOLYOKE UPPER DATE July 16, 1980

PROJECT FEATURE Low Level Outlet NAME Marie Nowak

DISCIPLINE Hydraulics NAME Scott Nagel

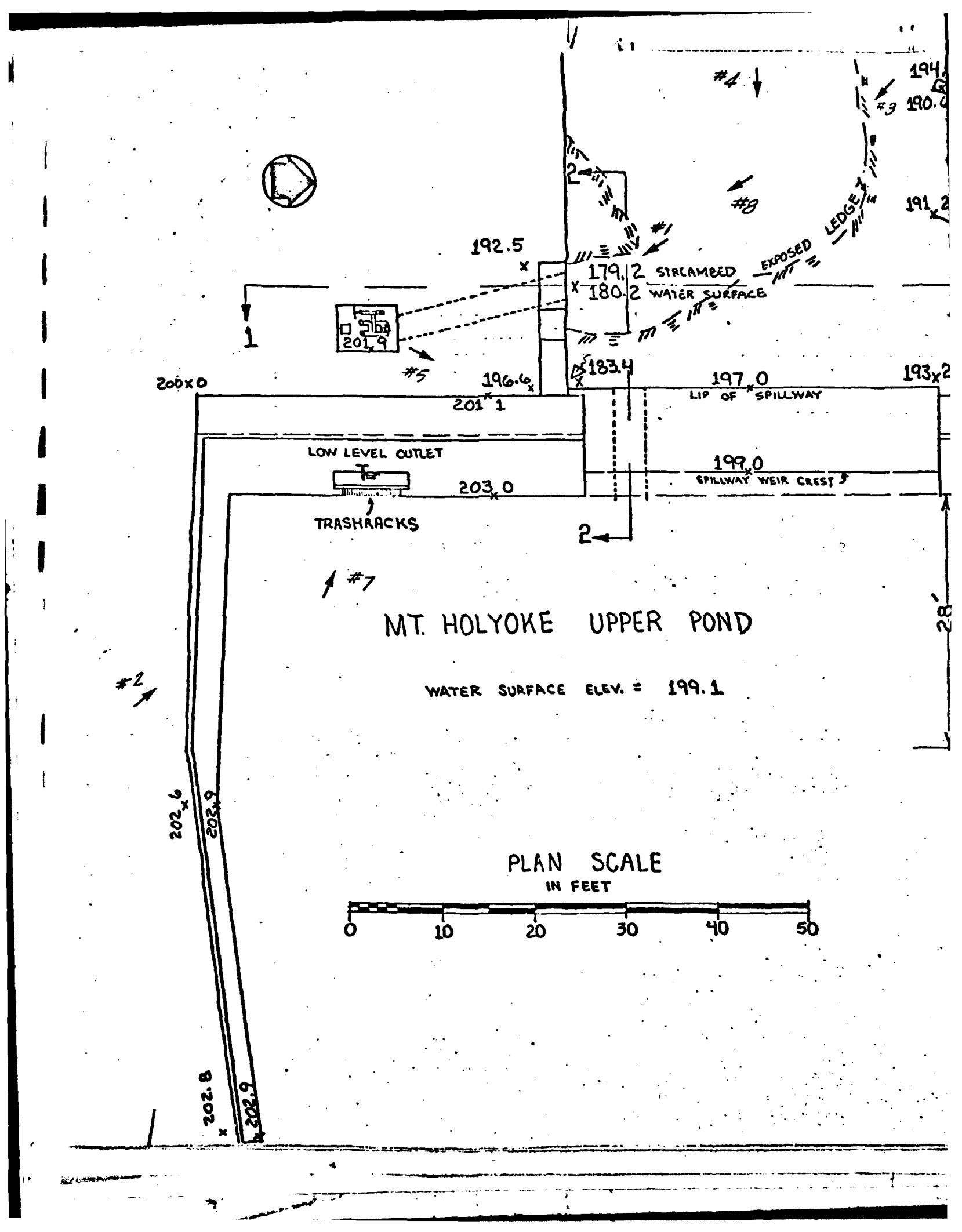
AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Outlet on wall at right angle to dam. Appears to be a box culvert, brick or masonry lined.
General Condition of Concrete	Surface in good condition, covered with gunite*
Rust or Staining	None visible
Spalling	None
Erosion or Cavitation	Outlet has rough edges along the bottom and lower sides.
Visible Reinforcing	None
Any Seepage or Efflorescence	No
Condition at Joints	N/A
Drain Holes	None
Channel	Discharges into spillway channel
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	Same as spillway d/s channel.

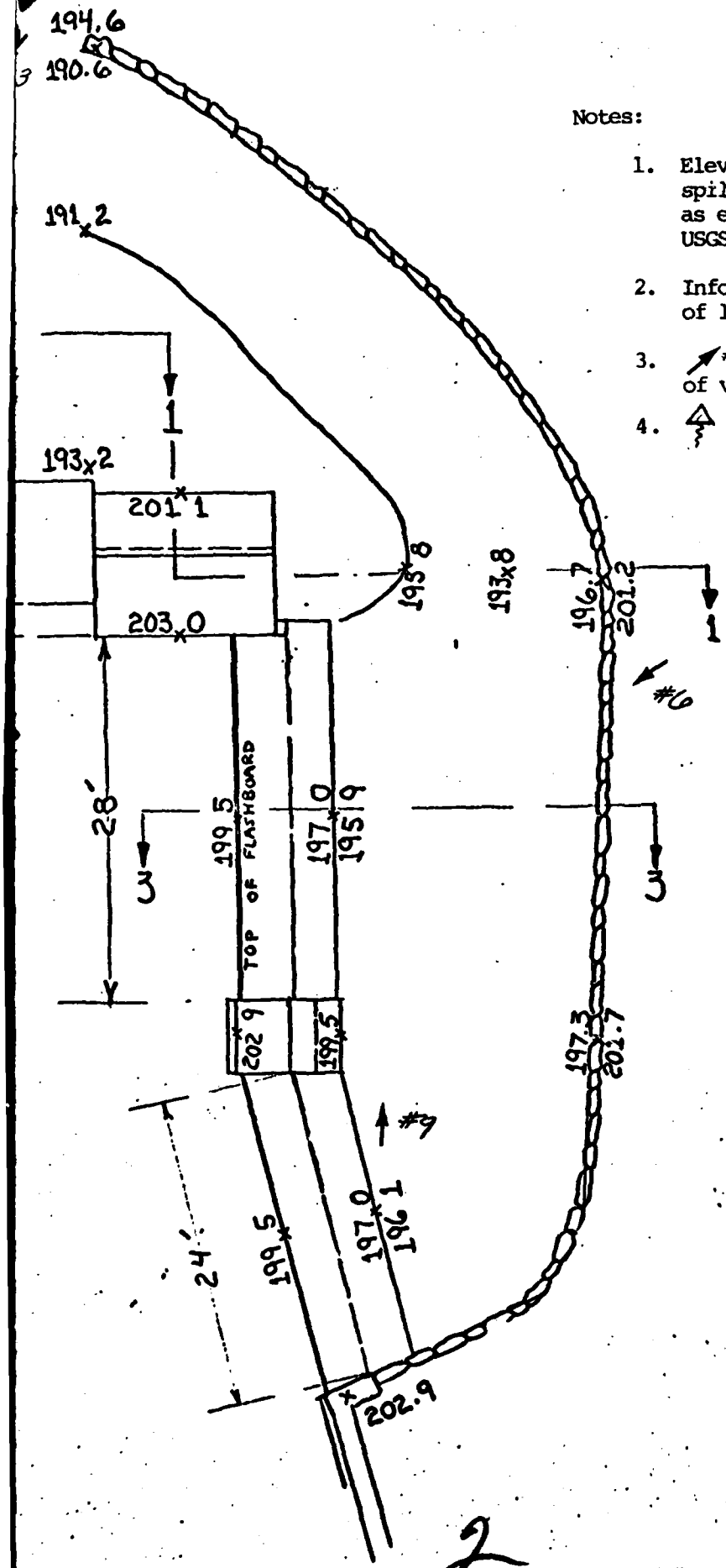
*Main gate is on abutment wall. When gate is opened, water flows through to second gate, approximately 12 ft. away (d/s). This second gate controls the flow into the d/s channel.

The first gate is under repair at this time.

APPENDIX B

PLANS OF DAM AND PREVIOUS INSPECTION REPORTS

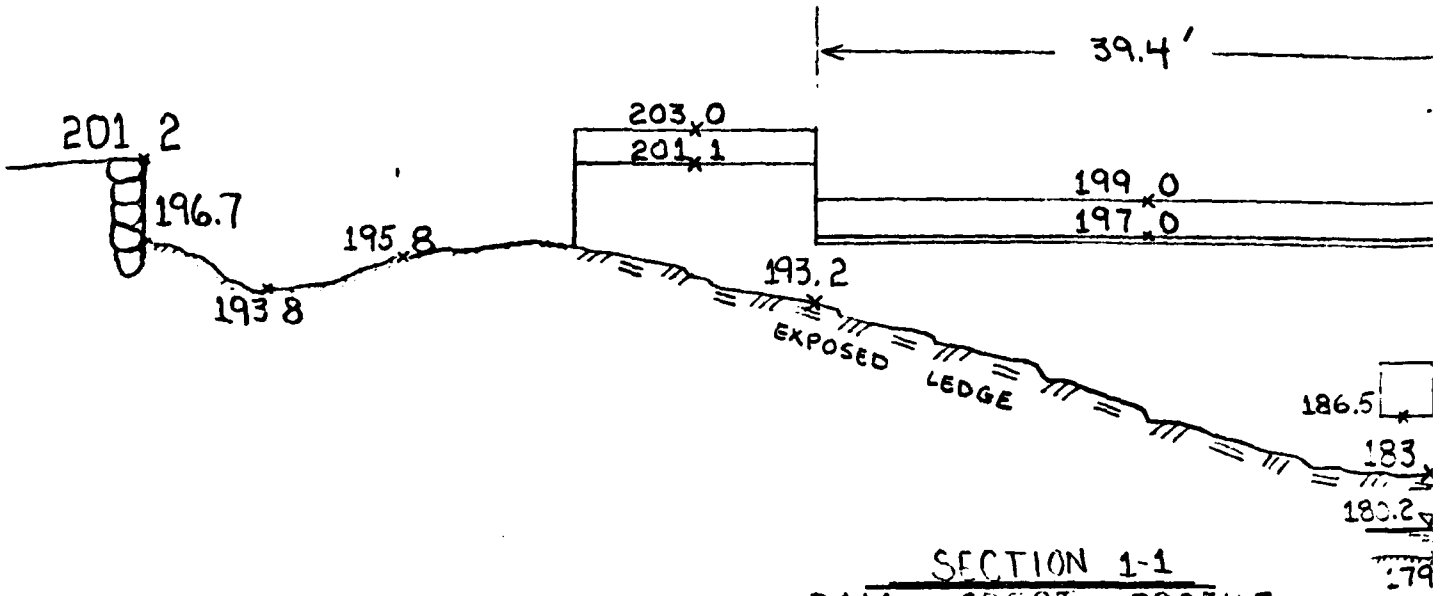

#4
#3
194.
190.0
#8
LEDGE
191.2
192.5
179.2 STREAMBED
180.2 WATER SURFACE
EXPOSED
1
201.9
#5
200x0
196.6
183.4
197.0
LIP OF SPILLWAY
193x2
201.1
LOW LEVEL OUTLET
199.0
SPILLWAY WEIR CREST
203.0
TRASHRACKS
2
#7
MT. HOLYOKE UPPER POND
WATER SURFACE ELEV. = 199.1
#2
202.6
202.9
202.8
202.9
PLAN SCALE
IN FEET
0
10
20
30
40
50



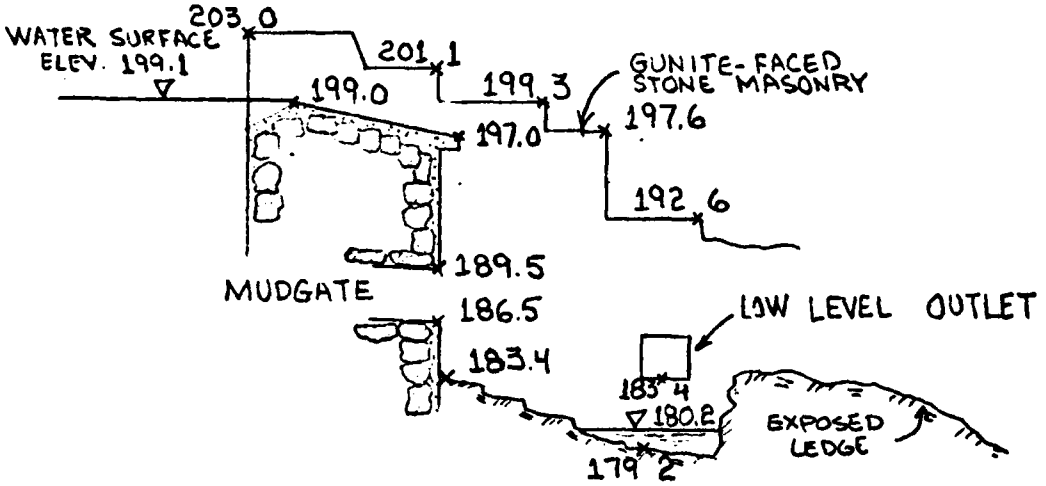
Notes:

1. Elevations shown based on assumed spillway crest elevation of 199.0 (NGVD) as estimated from the Mt. Holyoke, Mass. USGS Quadrangle sheet.
2. Information shown based on field inspection of 16 July 1980.
3. #2 indicates location and direction of view for photographs.
4. indicates seepage

METCALF & EDDY, INC. ENGINEERS BOSTON, MA.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	
MT. HOLYOKE COLLEGE UPPER DAM	
FIGURE B-1 PLAN OF DAM	
TRIBUTARY CONNECTICUT RIVER	MASSACHUSETTS
SCALE: AS SHOWN	DATE: SEPTEMBER, 1980

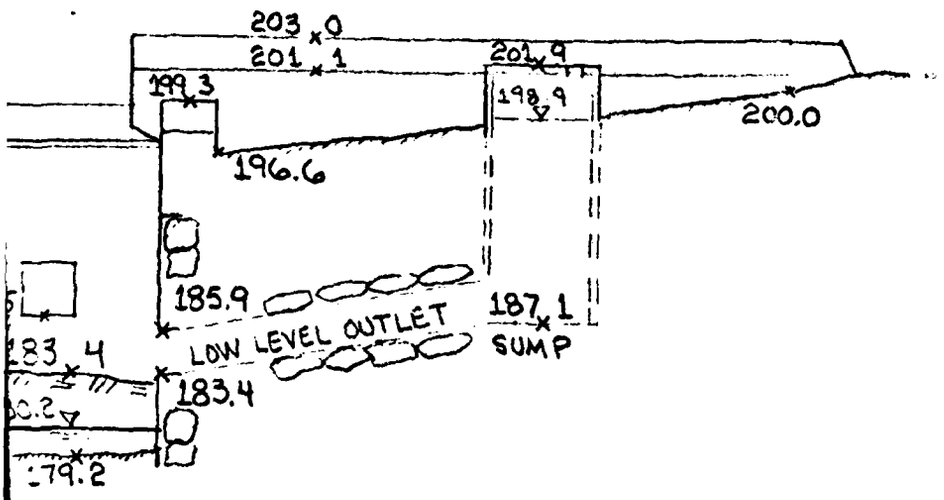


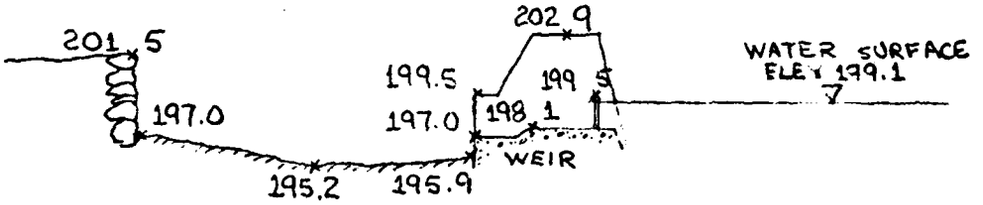
SECTION 1-1
DAM CREST PROFILE
SCALE: 1"=10FT.



SECTION 2-2
MAIN SPILLWAY
SCALE: 1"=10FT.

SCAL
IN FE
0 10





SECTION 3-3

SIDE CHANNEL SPILLWAYS
(TYPICAL)
SCALE: 1"=10 FT.

ALE
FEET
20 30

METCALF & EDDY, INC. ENGINEERS BOSTON, MA.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	
MT. HOLYOKE COLLEGE UPPER DAM	
FIGURE B-2 SECTIONS THROUGH DAM	
TRIBUTARY CONNECTICUT RIVER	MASSACHUSETTS
SCALE: AS SHOWN	DATE: SEPTEMBER, 1980

2

November 7, 1969

Mt. Holyoke College
South Hadley, Mass. 01075

Attention: Mr. Wayne D. Gass, Director of Physical Plant

Gentlemen:

The Engineering Advisor on dams to the Commissioners of Hampshire County has recently inspected the dams at the various ponds on the college campus and has submitted his report to our Board. His report on the Upper Dam and the small so-called Middle Dam is included herewith as follows:

"The left abutment and training wall were noted to be o.k. Some erosion was observed at the waterline area and on the face of the wall at the left end of the main spillway. This erosion is not very deep or serious as yet.

"The drawdown gate appears to be satisfactory. The main spillway itself was observed to be o.k. It has a good crest, no flashboards on the crest, and water level in storage was just above crest elevation. The overhang of the spillway crest was o.k. and the stone face of the dam proper appears to be good.

"At the outlet, from the conduit on the left side of the dam at the lower right corner, stone masonry is now unsupported and failure of the masonry may begin. To protect the stone masonry wall at the outlet of the drawdown conduit, repairs should be made within the next year.

"The stone masonry wall just downstream from the conduit outlet is being damaged by the roots of a large tree. This damage does not endanger the dam proper as yet.

"The twin side spillways containing flashboards to the usual height were observed to be satisfactory. The concrete pier separating the two spillways and the main pier at the right side of the main dam are showing signs of weathering and erosion. This condition is not too bad as yet.

"The basic rock foundation of the dam and side spillways is good.

"The owner of the dam should be advised of the conditions at the drawdown outlet so that repairs to the masonry wall can be made."

Middle Pond

"The dam itself is o.k. The crest is good and water was passing over the crest on the day of inspection.

"The left abutment of this very small dam is in poor condition. Water leaks through and around the abutment. To prevent loss of the abutment, repairs should be made in the near future or a new abutment should be built. The condition as existing is not dangerous to persons and property downstream since the quantity of water stored by the dam is small and could be absorbed easily in lower college pond should the left abutment fail.

"Two large trees at the right abutment are damaging the stone masonry and these trees should be removed if the masonry is to be protected. However, the trees may be of more value than the abutment of this small dam.

"The owner should be advised that if the small pond is to be maintained, the left abutment should be repaired or rebuilt."

None of the maintenance and repair work as contained in the report of the Engineering Advisor is essential to the safety of the dam at Upper Pond, nor to the protection of persons and property at the dam at Middle Pond. Repairing the stone masonry wall at the left side of the dam and in the vicinity of the conduit outlet, will prevent further deterioration of the masonry wall and the possible need for more expensive repairs at a later date at Upper Pond Dam.

Though the left abutment of the small Middle Dam is in very poor condition and could possibly wash out, the amount of water stored is so small that Lower Pond could absorb any released water without any danger to persons and property downstream.

We are sending you the report on the Upper and the Middle Pond dams for your information and any action you wish to take

at this time to protect your investment in these structures.

Any further information desired in connection with these dams, will be furnished by this office upon request.

Very truly yours,

_____

_____

HAMPSHIRE COUNTY COMMISSIONERS

JHB:O

CK FILE

INSPECTION REPORT - DAMS AND RESERVOIRS

(1.) LOCATION:

City/Town South Hadley. County Hampshire. Dam No. 2-8-275-3.

Name of Dam Mt. Holyoke College - Upper Pond.

Topo Sheet No. 11D. Mass. Rect. Coordinates: N 460,300, E 310,000.

Inspected by: H. T. Shumway, On 11-2-73. Date Last Inspection Oct. 1969.

(2.) OWNER/S: As of Oct. 1969

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

	Name	St. & No.	City/Town	State	Tel. No.
1.	Mt. Holyoke College, Att. Dir. of Physical Plant		South Hadley,	Mass.	01075
2.					
3.					

(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.
Director of Physical Plant - Mt. Holyoke College Wayne D. Gass		South Hadley,	Mass.	538-2047

(4.) DATA:

No. of Pictures Taken None. Sketches See description of Dam.
Plans, Where at County Comm. office - Northampton, Mass.

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

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

Comments: could overtop middle and lower dams on campus and Marcalus Dam downstream. Also college dormitories & bridges both public & private would be damaged.

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

(6.) OUTLETS: OUTLET CONTROLS AND DRAWDOWN

Main spillway @ easterly end - concrete crest overflow spil

No. 1 Location and Type: way 39'-6" W.X4'H. with 15'-6" dropwall.

Controls X, TYPE: Provisions for flashboards.

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

Comments: No flashboards in place at time of inspection.

No. 2 Location and Type: East abut. of spillway - 3'X3' sluice - see sketch.

Controls X, Type: Rack and pinion controls - slide gate.

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

Comments: controls operable per college engineer.

No. 3 Location and Type: East end spillway - 3'X3' sluice approx. 2' above bottom pond.

Controls Yes, Type: Slide gate operable when pond partly drawn down by sluice described in No. 2 above.

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

Comments: Controls are usable according to college engineer.

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

Comments: See Numbers 2 and 3 above.

(7.) DAM UPSTREAM FACE: Slope vertical, Depth Water at Dam 7½' Conc.

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

Other ____.

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

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

Comments: ____

(8.) DAM DOWNSTREAM FACE: Slope 3:1 and vertical.

Material: Turf ____. Brush & Trees ____. Rock Fill ____. Conc. Masonry X. Wood ____.

Other dry stone masonry dropwall.

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

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

Comments: Minor spalling of concrete. Some stones missing in side wall below drawdown sluice described in No. 2 above.

(9.) EMERGENCY SPILLWAY: Available Yes (2 spillways). Needed _____.

Height Above Normal Water 1.2'+" Ft. to top flashboards. Level of concrete bottom 25'-6" about 0.5' lower than crest main spillway

Width 30'-6" Ft. Height 5' and 4½ Ft. Material concrete.

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

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

Comments: There are two concrete crest overflow spillways(North spillway) with conc. abuts. and a conc. pier 8'X5'-7"X5'H. between them both have 1½' dropwalls to ledge brook bottom. Both have flashboards installed.

(10.) WATER LEVEL AT TIME OF INSPECTION: 1/4 Ft. Above X. Below _____.

Top Dam _____ F.L. Principal Spillway X.

Other _____.

Normal Freeboard 4 Ft.

(11.) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Minor brush growth on bank of channel runoff from northerly spillways.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam None found.

Cracked or Damaged Masonry spalling of concrete at water line on abutment between east and northerly spillways.

Evidence of Seepage None found.

Evidence of Piping None found.

Leaks Yes - water leaking through 3'X3' stone sluice in east abutment.

Erosion None found.

Trash and/or Debris Impeding Flow None found.

Clogged or Blocked Spillway None found.

Other _____.

(12.) OVERALL CONDITION:

1. Safe X.
2. Minor repairs needed_____.
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)

The grade and alignment of the entire dam is good. The easterly spillway is a concrete capped dry stone masonry dropwall 39'-6" W. with drop of 15'-6" from crest to bottom of wall set on ledge with 4'H. concrete abutments which are also built on ledge.

The northerly spillways are concrete crest overflow spillways with 2:1 aprons and dropwalls of 18" in height set on ledge. These northerly spillways both had flashboards - 2' H. and 2½' H.-set in place at time of inspection. The runoff channel from these spillways has a ledge bottom and left bank. The right side is a grouted stone masonry wall 4' - 6" high. Channel is about 10' to 12' wide and goes back into main stream 20'± below easterly spillway.

Approximately 50% of pond area was dredged out to a depth of 14'± during this past summer according to Holyoke College Engineer Mr. Brock.

Water leaking out of stone 3'X3' sluice leading from concrete gate well house (see sketch) was noted.

Overall appearance of dam is good and dam appears to be safe at this time.

RCS/js/js

DESCRIPTION OF DAM

DISTRICT 2.

Submitted by H. T. Shumway Dam No. 2-8-275-3

Date 11-2-73 City/Town South Hadley
Mt. Holyoke College

Name of Dam Upper Pond

---

1. Location: Topo Sheet No: 11D Mass. Rect. Coordinates N 460,300 E 310,000

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

Located on Stony Brook in the Mt. Holyoke College Campus, north of Park St. and approximately 1000 ft. east of College St. (Rte. 116)

---

2. Year built unknown. Year/s of subsequent repairs 1973

---

3. Purpose of Dam: Water Supply _____ Recreational X
Flood Control _____ Irrigation _____ Other _____

---

4. Drainage Area: 15.8 sq. mi. _____ acres.
Type: City, Bus. & Ind. _____ Dense Res. 10% Suburban _____ Rural, Farm 40%
Wood & Scrub Land 50% Slope: Steep 10% Med. 20% Slight 70%.

---

5. Normal Ponding Area: 10 Acres; Ave. Depth 5'
Impoundment: 16.3 million gals.; 50 acre ft.
Silted in: Yes X No _____ Approx. Amount Storage Area 30%

---

6. No. and type of dwellings located adjacent to pond or reservoir College Campus
i.e. summer homes etc. buildings

---

7. Dimensions of Dam: Length 175'± of concrete structure Max. Height 18' - 6"
Freeboard 3' - 8" on east spillway, 3'-6" on north spillway
Slopes: Upstream Face vertical
Downstream Face 3:1 and vertical
Width across top 1' on crest top (total width 10').

Dam No. 2-8-275-3

8.

Classification of Dam by Material:

Earth _____ Conc. Masonry X Stone Masonry X

Timber _____ Rockfill _____ Other _____

8A.

Dam Type: Gravity X Straight X Curved, Arched _____ Other angle of 45°± between nor and east (main) spillways

Overflow X Non-overflow _____

9.

A. Description of present land usage downstream of dam:

90 % rural; 10 % urban

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 20% Wide 80% Developed 10%

Rural 90% Urban _____

10.

Risk to life and property in event of complete failure.

No. of people 10

No. of homes 1

No. of businesses 1 furniture store

No. of industries 1 Type Paper Mill

No. of utilities 4 Type Electric, gas, sewer, and telephone transmission lines also hydrant and water main

Railroads None

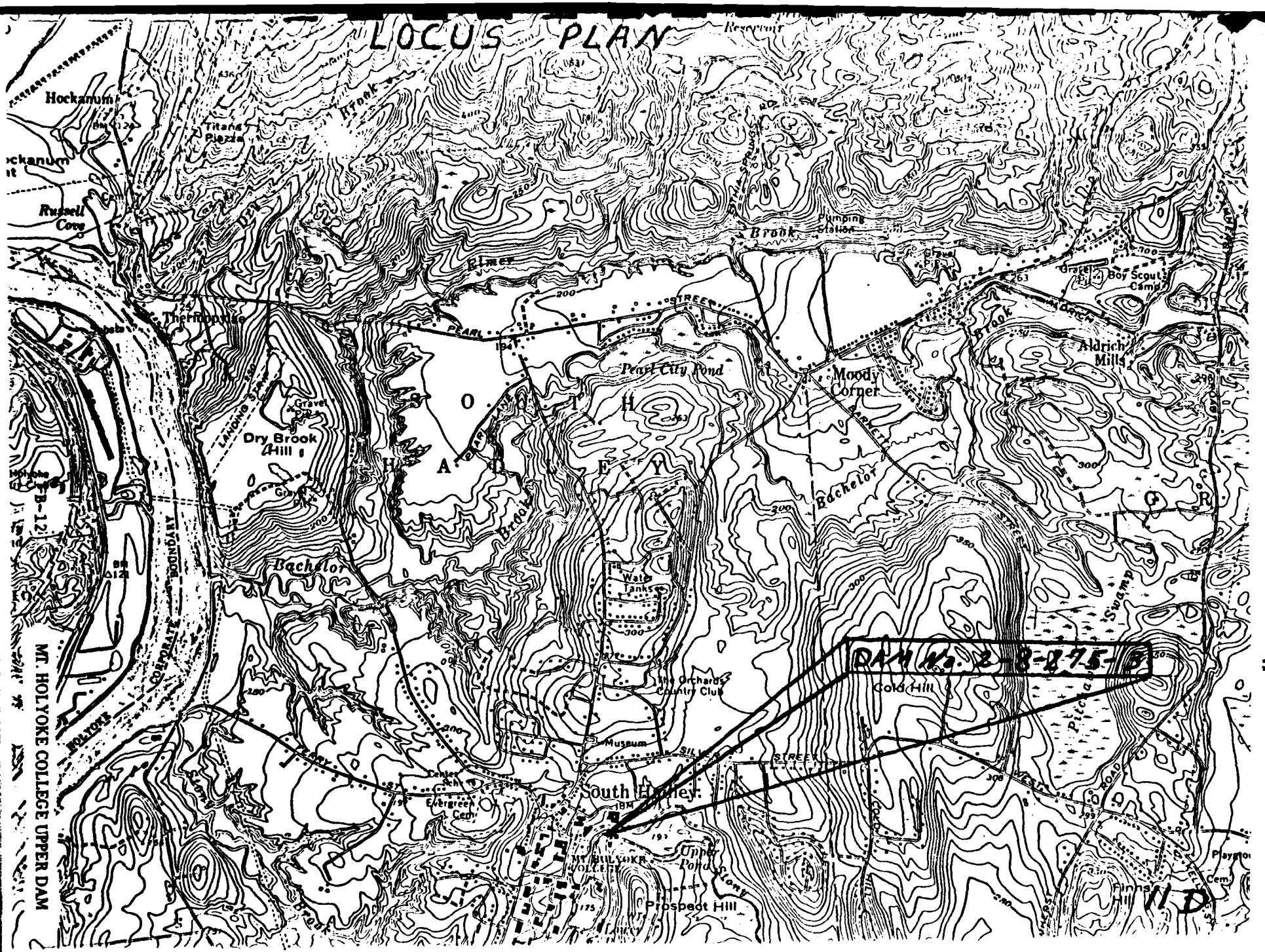
Other dams 3 Middle Dam No. 2-8-275-4, Lower Dam No. 2-8-275-5, and Marcalus Dam No. 2-8-275-6

Other Rte. 116 - Brook crosses under highway also college dormitories downstream

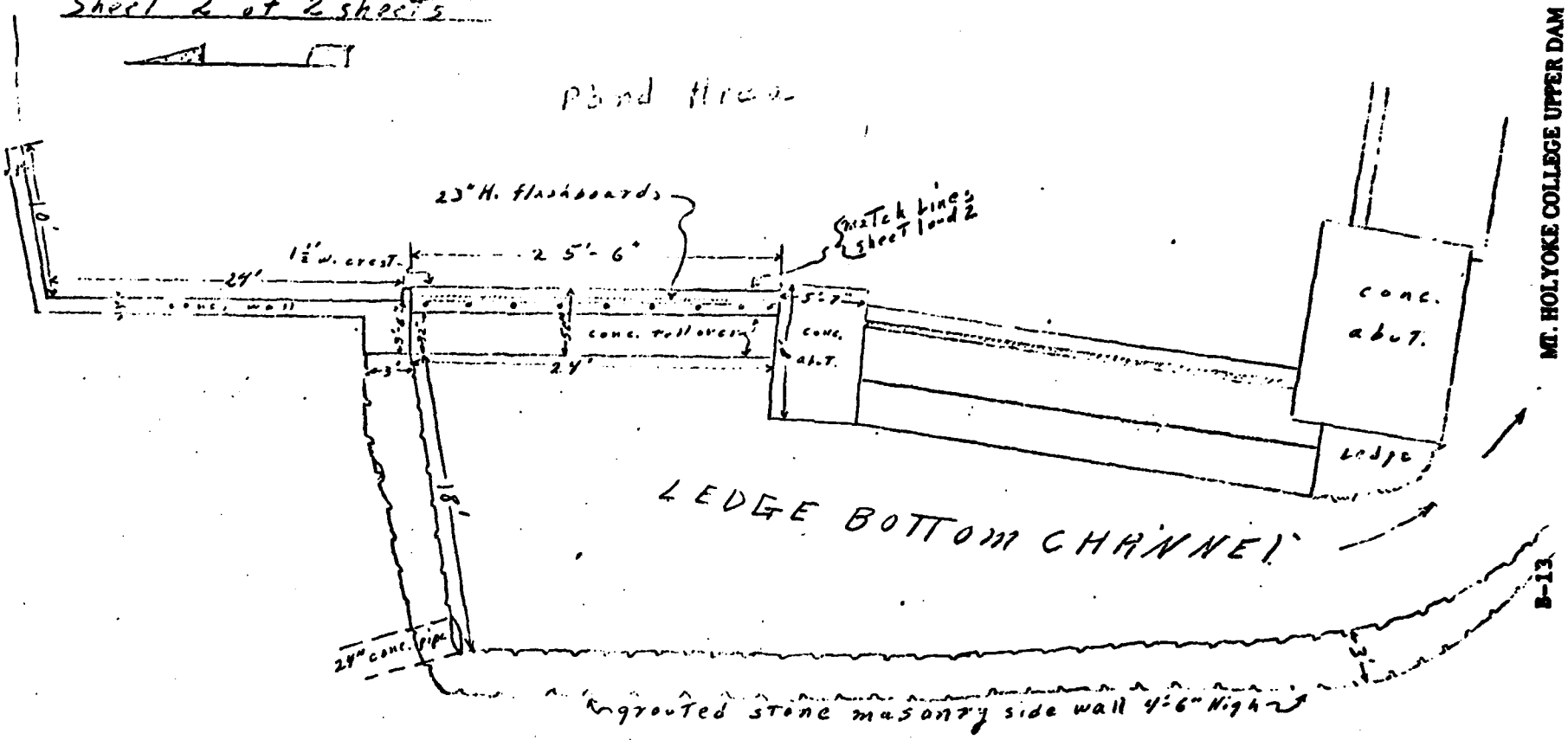
11.

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

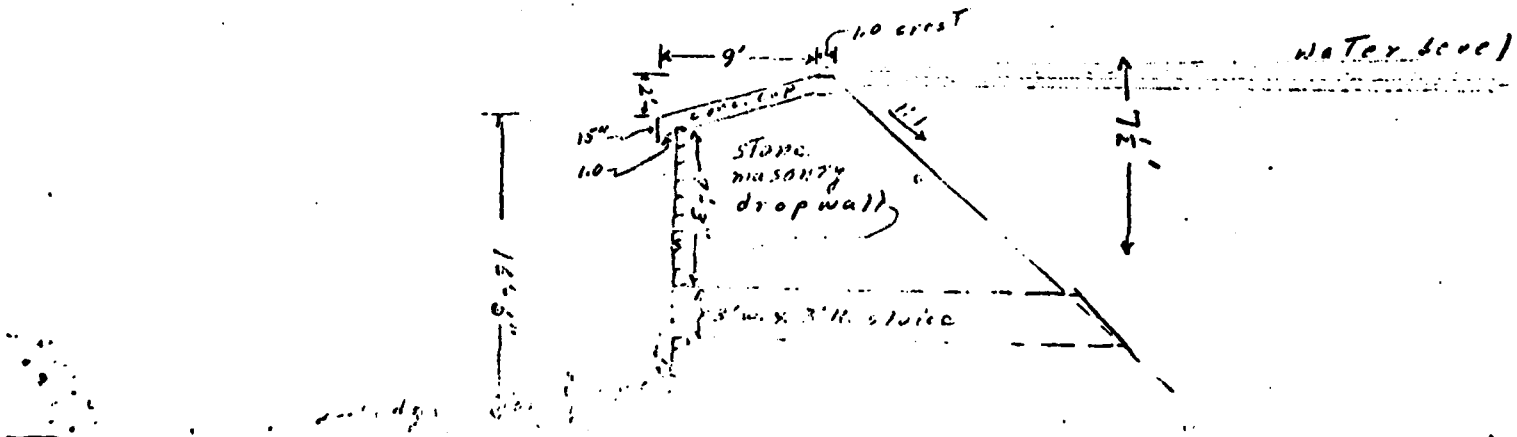
RCS/vk/js
Attachments
Locus Plan
Sketches

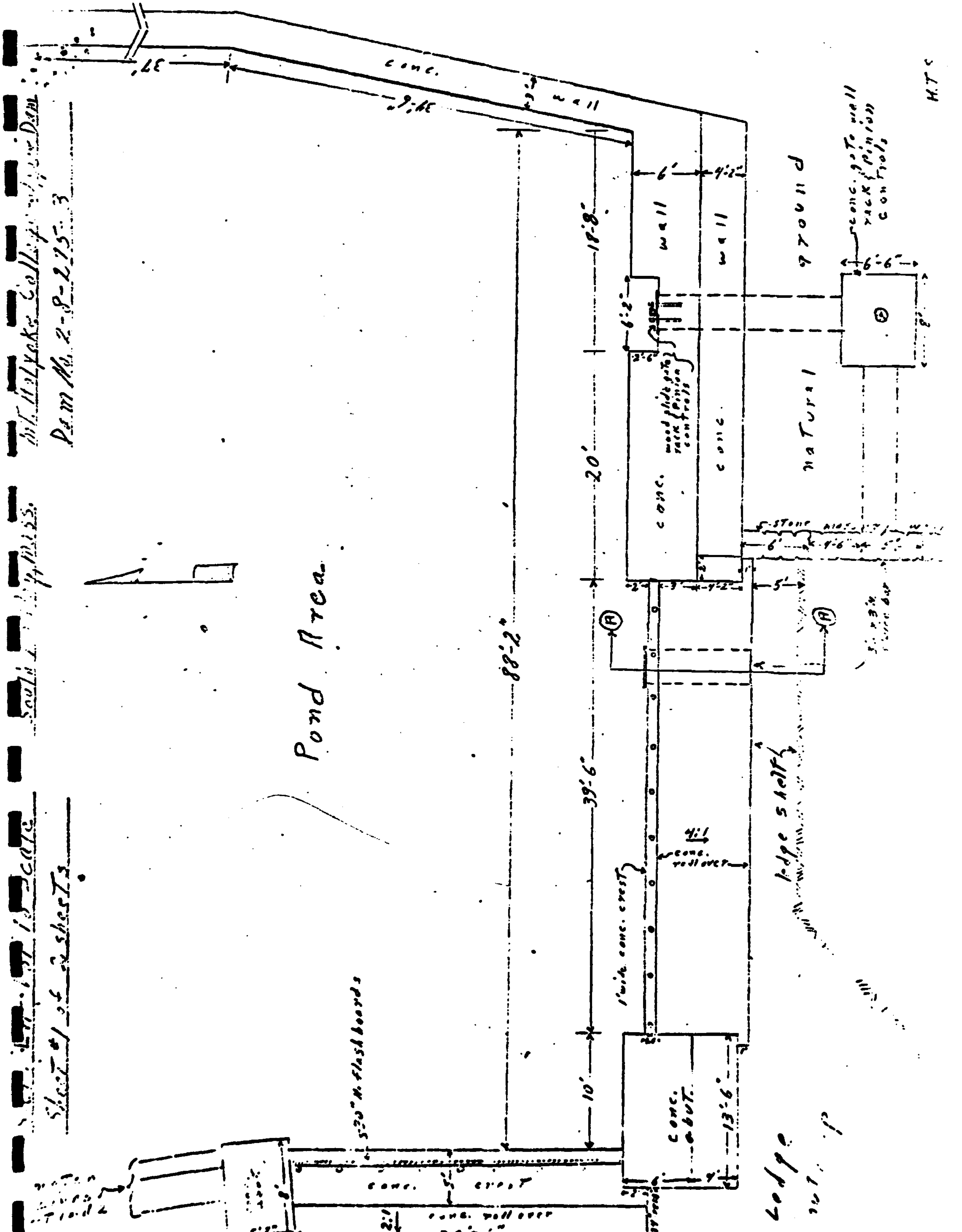

LOCUS PLAN
Hockanum
Titans Pizza
Russell Corp
Elmer Brook
Pumping Station
Gravel Pit
Boy Scout Camp
Aldrich Mills
Pearl City Pond
Moody Corner
Dry Brook
Hill
Bachelor Brook
Bachelor
Water Tanks
The Orchards Country Club
DAM No. 2-8-875-5
Cold Hill
Swamp
Museum
South Hadley
Evergreen Cem.
Mt. Holyoke College
Upper Pond
Prospect Hill
Playground
Cem.
Finns Hill
MT. HOLYOKE COLLEGE UPPER DAM
FB-12

Sheet "2 of 2 sheets



X-section A-A





B-14 MT. HOLYOKE COLLEGE UPPER DAM

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

City/Town South Hadley. County Hampshire. Dam No. 2-8-275-3

Name of Dam Mt. Holyoke College-Upper Pond

Topo Sheet No. 110. Coordinates: Mass. Rect. N 460,300, E 310,000.

Inspected by: Harold T. Shumway, On May 10,1976. Date Last Inspection 11-2-73

2. OWNER/S: As of May 10,1976

per: Assessors_____, Reg. of Deeds_____, Prev. Insp. x, Per. Contact X.

	Name	St. & No.	City/Town	State	Tel. No.
1.	Mt. Holyoke College,Attn.,Director of Physical Plant,		South Hadley,	Mass.	
2.					
3.					

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

Director of Physical Plant-Mt. Holyoke College

Name	St. & No.	City/Town	State	Tel. No.
Wayne D. Gass		South Hadley,	Mass.	538-2047

4. DATA:

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

Plans, Where At County Commissioners Office in Northampton, Mass.

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

1. Minor_____.
2. Moderate_____.
3. Severe X.
4. Disastrous_____.

Comments: Could overtop middle and lower dams on campus and Harcalus Dam down stream. Damage would also occur to college dormitories and public and private roads and bridges. Impoundment is approximately 16 million gallons at normal lev

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

(6.) OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Easterly end of dam-concrete crest over flow spillway 39½'W.X4'H. with 15½'H. drop wall.

Controls Yes, TYPE: Provisions for stoplogs-none in place at inspection.

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

Comments: Slight under cutting of abutments at spillway crest elev. on both ends of spillway.

No. 2 Location and Type: East Abutment of spillway-3' square concrete sluice.

Controls Yes, Type: Slide gate with rack and pinion controls.

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

Comments: Controls chained and pad locked but operable per physical plant personn. Outlet end of sluiceway deteriorating.

No. 3 Location and Type: East end of spillway-3' square sluice box approximately 2' above bottom of pond.

Controls Yes, Type: Slide gate-operable when pond partly drawn down by sluice described in No. 2 above.

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

Comments: Controls are operable per college engineer. Slight seepage noted at outlet end of sluice. Gate stem shows slight rot at top end.

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

Comments: See No.s 2 and 3 above.

(7.) DAM UPSTREAM FACE: Slope Vertical, Depth Water at Dam 7½' ± Concrete.

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

Other ____.

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

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

Comments: Vertical crack noted at union of easterly flood training wall with east end of main dam wall-crack extends completely through wall. Considerable spalling of concrete structures noted.

(8.) DAM DOWNSTREAM FACE: Slope 3:1 and vertical.

Material: Turf ____. Brush & Trees ____. Rock Fill ____. Concrete Masonry X. Wood ____.

Other ____.

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

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

Comments: Minor to severe spalling in several areas-see remarks. Minor brush growth some misplaced stones in easterly side wall below spillway.

(9.) EMERGENCY SPILLWAY: Available Yes. Needed ____.

Height Above Normal Water 2½' ± Ft. 2 ea. spillways to top of flashboards. Level of concrete bottom about 0.5' lower than crest of main spillway.

Width 25'-6" / 30'-6" Ft. Height 5' / 4½' Ft. Material concrete.

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

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

Comments: There are two concrete crest overflow spillways(North spillway) with concrete abutments and a concrete pier 8'X5'-7"X5'H. between them. Both have 1½' drop walls to ledge brook bottom. Both have flash boards installed to a height of 2'

(10.) North abutment breaking up at base. See remarks.

WATER LEVEL AT TIME OF INSPECTION: ½ Ft. Above X. Below ____.

Top Dam ____ F.L. Principal Spillway X.

Other ____.

Normal Freeboard 4 Ft.

(11.) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Yes-minor brush growth in side channel noted.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam See below.

Cracked or Damaged Masonry cracked wall on easterly end of dam-several spalled Yes-areas-stone masonry deteriorating.

Evidence of Seepage Yes-Evidence of seepage at stone sluice in east abutment.

Evidence of Piping None found.

Leaks None found-water over flow prevented close inspection of toe.

Erosion None found.

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)

The grade and alignment of entire dam structure is still good and entire structure appears to be built on ledge. The concrete portions of the dam structure are beginning to wear. Slight under cutting was noted at both ends of main spillway at union of spill way crest with adjoining walls. The outlet end of 3'X3' concrete sluice is spalling and slight seepage were noted. The 3'X3' stone masonry sluice box also showed seepage. A vertical crack was evident at the union of easterly flood training wall with east end of main dam wall. This crack appears to extend completely through the wall but no settlement or misalignment was noted. Considerable spalling of abutment walls and of center pier of notherly spillways was evident. The north abutment of these spillways had severe spalling at the base and the south spillway and south abutment showed extensive spalling. A few misplaced stones were noted in the easterly dry stone masonry retaining wall just down stream of main spillway. A small cavity was also noted in the westerly retaining wall or flood training wall of channel outlet for northerly spillways.

This dam appears to still be sound and safe but many routine maintenance repairs are in need of attention.

HTS/at

The Commonwealth of Massachusetts

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

Mt. Holyoke College
South Hadley, Ma.
ATTN: Wayne D. Gois, Director
Physical Plan

100 Nashua Street. Boston 02114

March 7, 1977

Re: Inspection Dam #2-8-275-3
Mt. Holyoke College - Upper Pond Dam
South Hadley, Ma.

Dear Sir:

On May 10, 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 Mt. Holyoke College - South Hadley, Ma. 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 705 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 safe; however, the following conditions were noted that require attention:

1. Growth: Minor brush growth in side channel noted.
2. Cracked or Damaged Masonry: Cracked wall on easterly end of dam - Several spalled areas - Stone masonry deteriorating.
3. Evidence of Seepage: Seepage at stone sluice in east abutment.
4. Leaks: Water overflow prevented close inspection of toe.

SEE REMARKS AND RECOMMENDATIONS ON REVERSE SIDE.

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

Very truly yours,

John J. [illegible]non, P.E.
Chief [illegible]neer

cc: Francis J. Hoey
Russell Salls
File

MASSACHUSETTS ENGINEERING 1532

REMARKS AND RECOMMENDATIONS

The grade and alignment of entire dam structure is still good and entire structure appears to be built on ledge. The concrete protions of the dam structure are beginning to wear. Slight under cutting was noted at both ends of mail spillway at union of spillway crest with adjoining walls. The outlet end of 3' x 3' concrete sluice is spalling and slight seepage was noted. The 3' x 3' stone masonry sluice box also showed seepage. A vertical crack was evident at the union of easterly flood training wall with east end of main dam wall. This crack appears to extend completely through the wall but no settlement or misalignment was noted. Considerable spalling of abutment walls and of center pier of northerly spillways was evident. The north abutment of these spillways had severs spalling at the base and the south spillway and south abutment showed extensive spalling. A few misplaced stones were noted in the easterly dry stone masonry retaining wall just downstream of main spillway. A small cavity was also noted in the westerly retaining wall or flood training wall of channel outlet for northerly spillways.

This dam appears to still be sound and safe but many routine maintenance repairs are in need of attention.

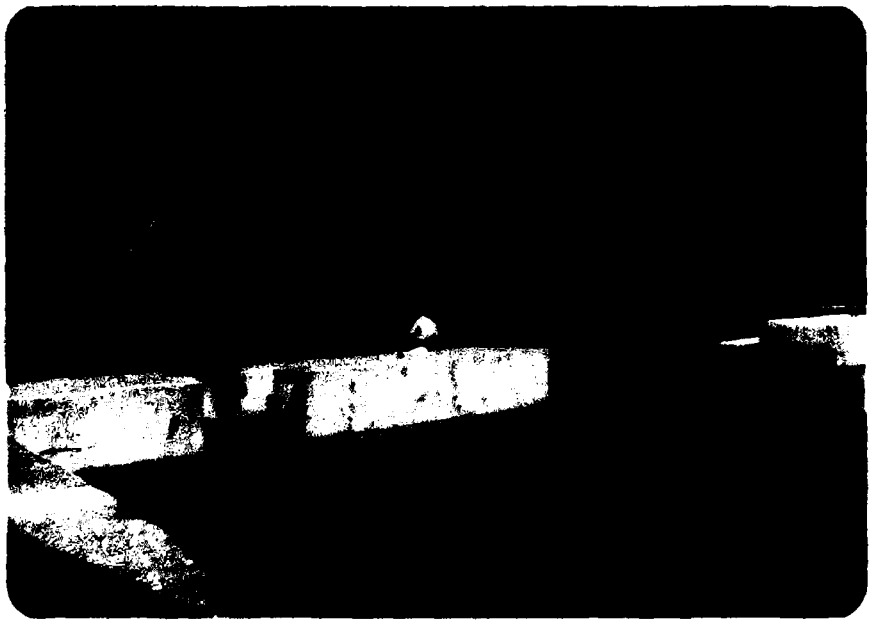
APPENDIX C

PHOTOGRAPHS

Note: Location and direction of photographs shown on Figure B-1 in Appendix B.

MT. HOLYOKE COLLEGE UPPER DAM

NO. 1 VIEW OF DISCHARGE AT LOW LEVEL OUTLET AND SEEPAGE AT LEFT ABUTMENT



NO. 2 UPSTREAM VIEW OF DAM

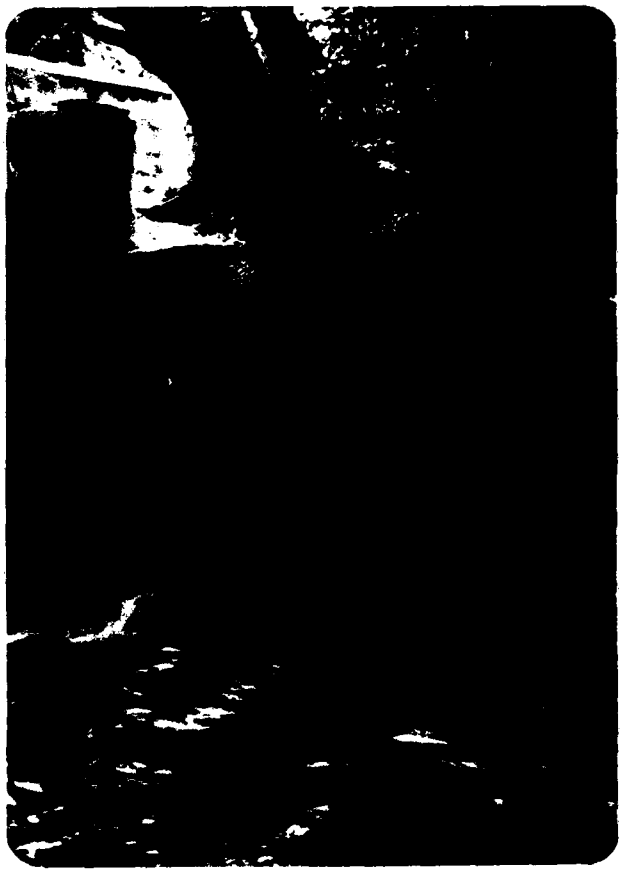
NO. 3 VIEW OF MUD GATE AND LOW LEVEL OUTLET DISCHARGES

NO. 4 DOWNSTREAM VIEW OF SPILLWAY WEIR

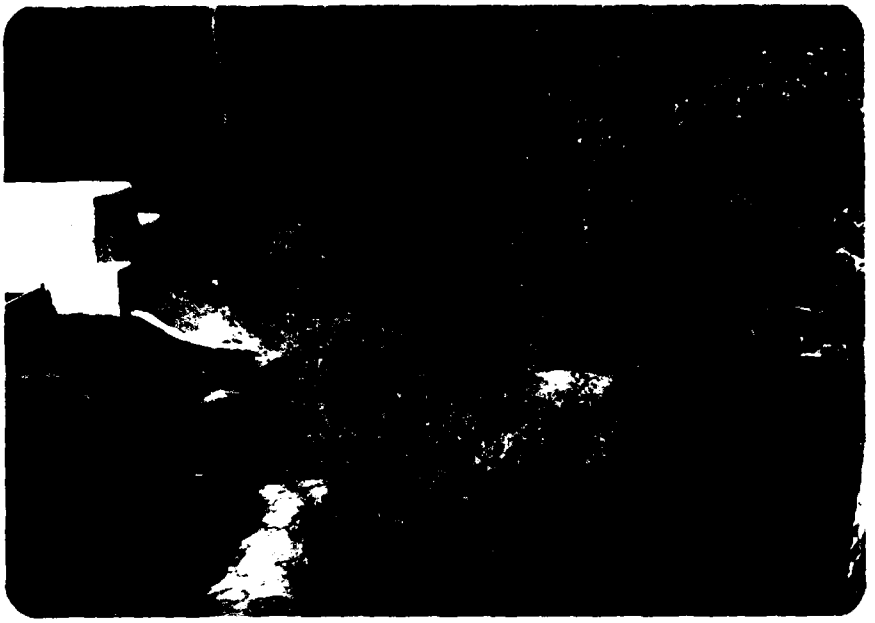
NO. 5 VIEW OF MAIN SPILLWAY

NO. 6 VIEW OF SIDE CHANNEL SPILLWAYS

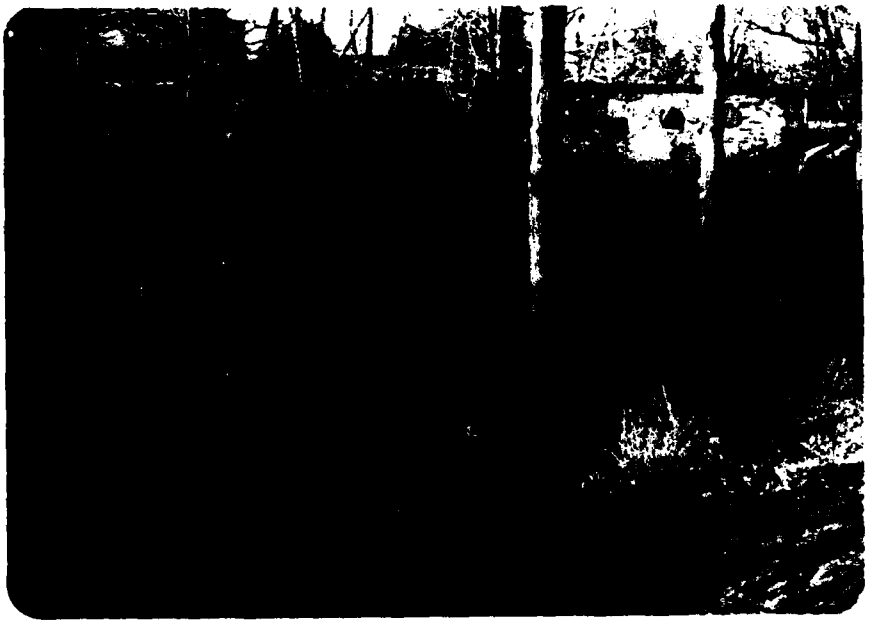
NO. 7 VIEW OF FIRST AND SECOND SLIDE GATE



NO. 8 VIEW OF LOW LEVEL OUTLET DISCHARGE AND LARGE TREE IN ABUTMENT



NO. 9 VIEW OF BRUSH IN SIDE CHANNEL SPILLWAY



NO. 10 VIEW OF DOWNSTREAM CULVERT

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

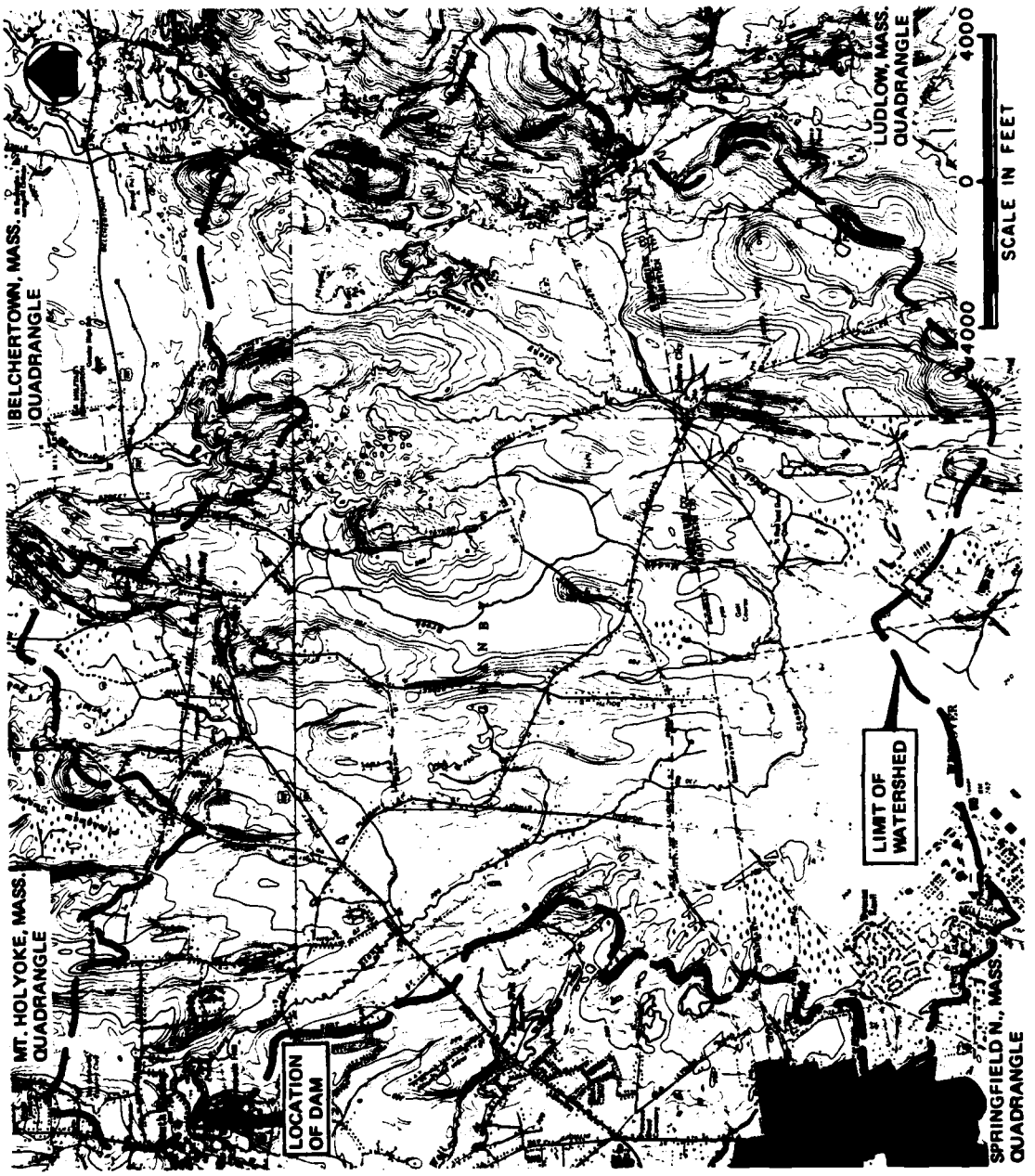


FIG. D-1 DRAINAGE AREA MAP

MT. HOLYOKE COLLEGE UPPER DAM

Project USCE DAM INSP - 9B Acct. No. 6928 Page 1 of 11
Subject MT HOLYOKE UPPER Comptd. By MN Date 8-18-80
Detail HAMPSHIRE Co. MASS Ck'd. By LEB JM Date 9/16/80

I TEST FLOOD, STORAGE & STORAGE FUNCTION

A. THE TOTAL DRAINAGE AREA IS 18.8 SQ MI

B. AREA OF PONDS .08 SQ MI
SWAMPS 1.28 SQ MI
TOTAL 1.36 SQ MI

% of PONDS & SWAMPS $\frac{1.36}{18.8}$ = 7.2%

C. AVERAGE SLOPE of WATERSHED

$\frac{264-214}{12979} = 3.852\times10^{-3}$ $\frac{265-234}{5312} = 5.836\times10^{-3}$

$\frac{260-227}{17708} = 1.864\times10^{-3}$ $\frac{320-248}{12083} = 5.959\times10^{-3}$

$\frac{271-199}{46458} = 1.55\times10^{-3}$

AVE SLOPE = 3.81×10^{-3}
= .381%

D. USING THE USC&E CURVES FOR PEAK FLOW RATES ALONG WITH THE ABOVE INFORMATION, THE PEAK FLOW RATE WAS ESTABLISHED SOMEWHAT BELOW FLAT & COASTAL. THE VALUE USED WAS 475 CFS/SQ MI

SIZE CLASS: SMALL
HAZARD POT: HIGH
} TEST FLOOD IS ½ PMF

E. TEST FLOOD INFLOW = ½ (475)(18.8) = 4465 CFS

F. POND STORAGE
THE POND AREA IS 10 ACRES (.016 SQ MI) at ELEV 199. BASED ON A CONSTANT AREA, STORAGE INCREASES AT 10 AC-FT PER FOOT OF DEPTH INCREASE.

G. THE MAIN SPILLWAY CREST IS AT ELEV 199

H. THE STORAGE FUNCTIONS ARE BASED ON $Q_{OUT} = Q_{IN}[1 - S_{OUT}/R]$

S_{our} = Storage volume in reservoir related to final Q_{our} in terms of inches of rain over the drainage area.

$S(\text{inches}) = 12\,D\,(.016/8.8) = 0.01\,D$; R = 6 HR. RAIN of STORM.

D = Storage depth in ft. above spillway crest in reservoir

STORAGE FUNCTION (½ PMF)

$$F_{½PMF} = 4465 - 470\,S = 4465 - 4.7\,D$$

II. DISCHARGE RATINGS

A. SPILLWAY; BROAD CRESTED WEIR

el. 199′ — 7.8′ →

WEIR LENGTH = 39.4′

$$Q_1 = 3.0LH^{1.5} = 3.0(39.4)H^{1.5}$$

Elev.	Head	Q_1 (cfs)
199.0	0	0.0
199.5	0.5	41.8
200.0	1.0	118.2
200.5	1.5	217.1
201.0	2.0	334.3
201.5	2.5	467.2
202.0	3.0	614.2
202.5	3.5	774.0
203.0	4.0	945.6
204.0	6.0	1321.5
205.0	6.0	1737.2

B. SIDE CHANNEL SPILLWAYS WITH FLASHBOARDS

Use Hazen & Williams Hydraulic Tables, for q values
Top of flashboards at 199.5

There are two side channel spillways, one with a length of 24.0 ft and the other at 28.0 ft.

Q_2 ➡ (24.0′ spillway)
Q_3 ➡ (28.0′ ")

The total discharge will then be

$Q_{TOT} = Q + Q_2 + Q_3$, & $q = 3.33 H^{1.5}$

Elev	Head	q	Q_2	Q_3	Q_{TOT}
199.0	0				0
199.5	0				40
200.0	0.5	1.18	28.	33	180
200.5	1.0	3.33	80	93	390
201.0	1.5	6.12	147	171	650
201.5	2.0	9.42	226	264	960
202.0	2.5	13.16	316	368	1300
202.5	3.0	17.30	415	484	1670
203.0	3.5	21.80	523	610	2079
204.0	4.5	31.79	763	890	2970
205.0	5.5	42.95	1031	1203	3970

C. SIDE CHANNEL SPILLWAY, WITHOUT FLASHBOARDS

EL at ± 198.1

$Q_2 = 3.0\,(24)\,H^{1.5}$

$Q_3 = 3.0\,(28)\,H^{1.5}$

Elev	Head	Q_2	Q_3	Q_{TOT}
198.1	0.0	0	0	0
198.5	0.4	18	21	40
199.0	0.9	61	72	130
199.5	1.4	119	139	300
200.0	1.9	189	220	530
200.5	2.4	268	312	800
201.0	2.9	356	415	1110
201.5	3.4	451	527	1450
202.0	3.9	555	647	1820
202.5	4.4	665	775	2215
203.0	4.9	781	911	2640
204.0	5.9	1032	1204	3560
205.0	6.9	1305	1522	4560

Project USCE DAM INSP. PH 1 Acct. No. J 1928 Page 4 of 11

Subject Mt Holyoke Upper Comptd. By M. Nowak Date 9-12-80

Detail Hampshire Co. MA Ck'd. By Sm. LBS Date 9-16-80

D. CREST FLOW

Low point of dam @ EL ±202.9 length is 80 ft
@ EL ±203.0 length is 51 ft

$Q_3 = 2.7\,(80)\,H^{1.5}$

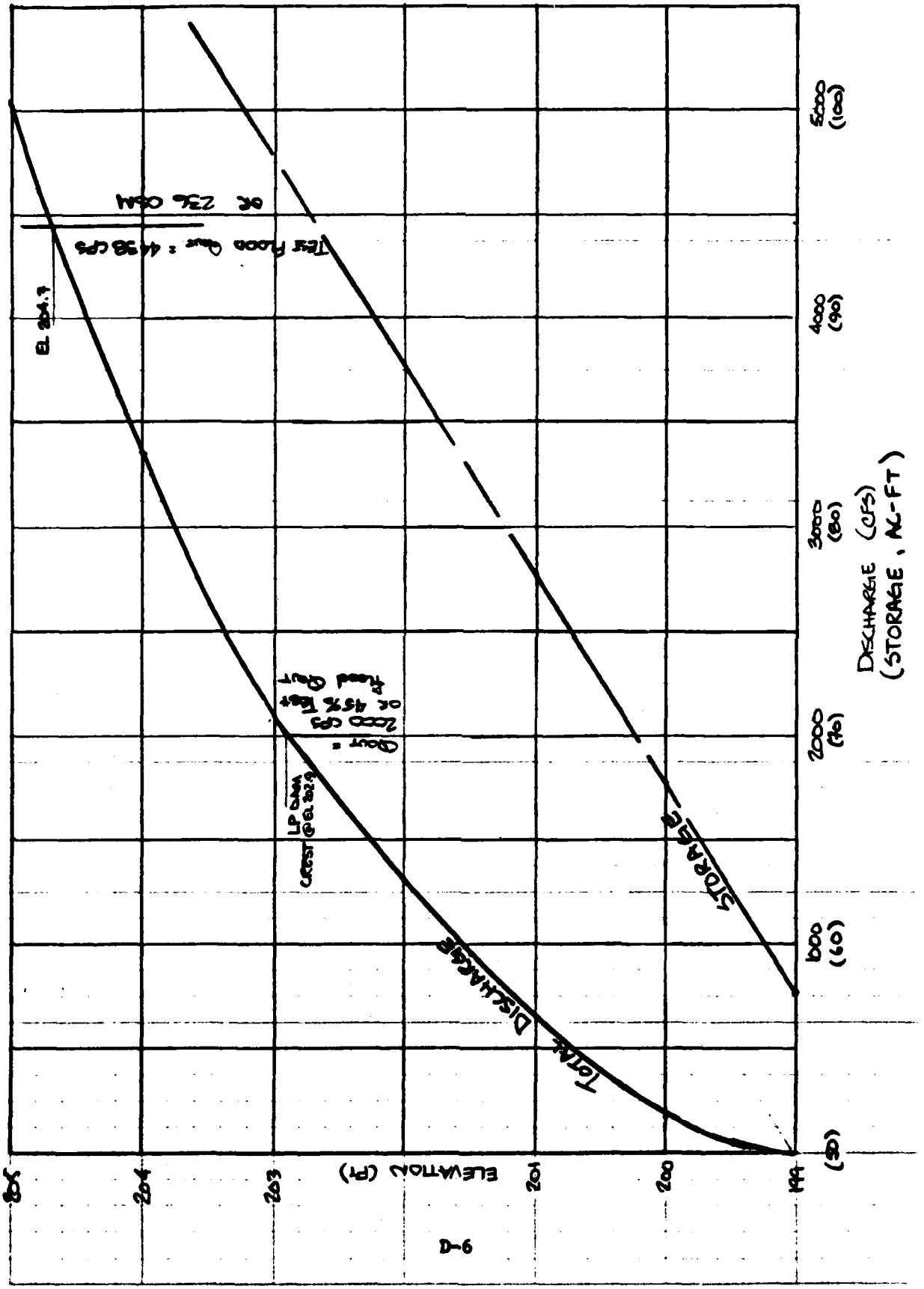
$Q_4 = 2.7\,(51)\,H^{1.5}$

ELEV.	H_3	Q_3	H_4	Q_4	Q_{TOTAL}
202.9	0	0			0
203.0	.1	7	0		7
203.5	.6	100	.5	49	150
204.0	1.1	249	1.0	138	390
204.5	1.6	437	1.5	253	690
205.0	2.1	657	2.0	389	1050

Project USCE DAM INSP, PH 1 - 9B Acct. No. J6928 Page 5 of 11

Subject MT HOLYOKE UPPER Comptd. By M. JAWIAK Date 9-12-80

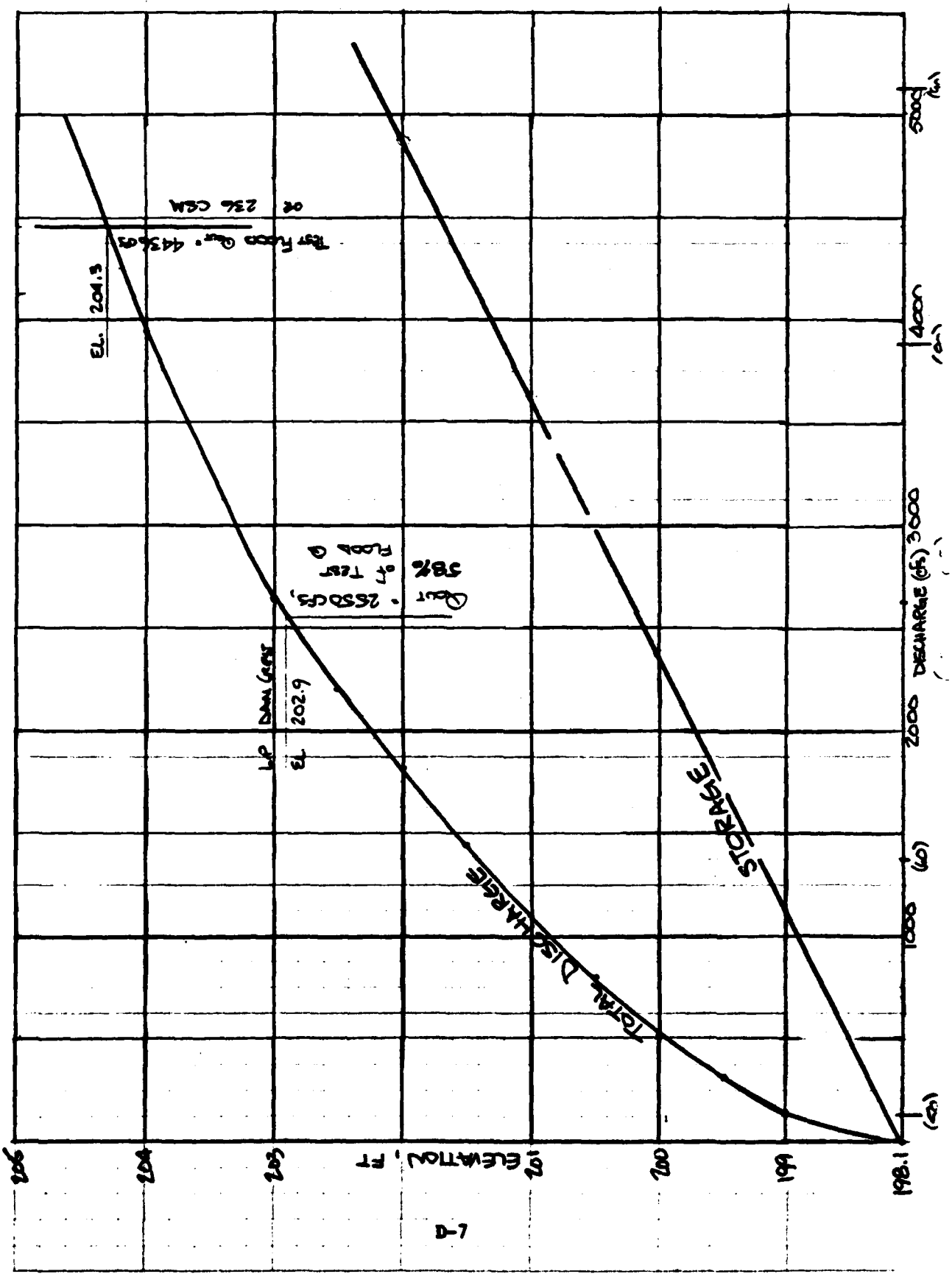
Detail SPILLWAY, WITH FLASHBOARDS Ck'd. By JM. 12/3 Date 9.16-80



Project USCE DAM INSP PH 1 Acct. No. J6928 Page 6 of 11

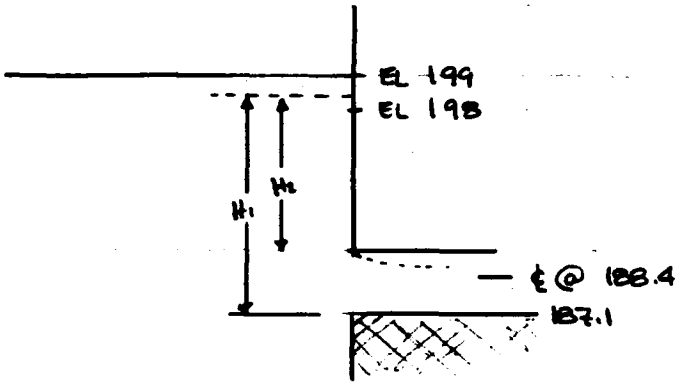
Subject MT HOLYOKE COLLEGE, UPPER Comptd. By M. NOWAK Date 9-12-80

Detail SPILLWAY, WITHOUT FLASHBOARDS Ck'd. By [illegible] LEB Date 9/16/80



III LOW LEVEL OUTLET - A sluiceway with an 11.8' sump and two gates. For lowering the elevation of the pond, the first gate and the second gate will be open. The flow will be controlled at the first gate, discharge coefficient is = 0.7

Size of Conduit: 2.5' x 2.8' = 7.0 SQ FT



TO DRAIN RESERVOIR 1 FT, USE AVERAGE HT OF 198.5

H_1 = 198.5 - 187.1 = 11.4'
H_2 = 198.5 - 189.6 = 8.9'

TO LOWER THE RESERVOIR ELEVATION:

$$Q = \frac{2}{3} C \sqrt{2g} (L)(H_1^{3/2} - H_2^{3/2})$$

$$= \frac{2}{3} (.7) \sqrt{64.4} (11.4^{3/2} - 8.9^{3/2})(2.8)$$

Q = 125.2 CFS ➡ 248 AC-FT/DAY

TIME TO DRAIN THE POND 1 FOOT:

$$\frac{10 \text{ AC-FT}}{248 \text{ AC-FT/DAY}} \times 24 \text{ HRS/DAY} = 1.0 \text{ HR} \quad (58 \text{ MIN})$$

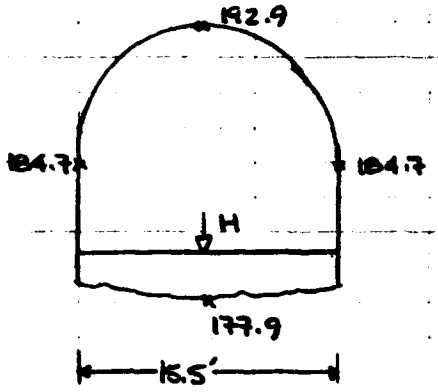
IV

CHANNEL HYDRAULICS - DOWNSTREAM CULVERT

TOP of SIDEWALL ℄ ——— × 202.5

CENTERLINE of ROADWAY ℄ - - - - - - - - × 198.3

BOTTOM of FOOTBRIDGE ℄ ——— × 197.1



AREA of CULVERT = 182 SQ FT
EQUIVALENT ⌀ = 15.2 FT

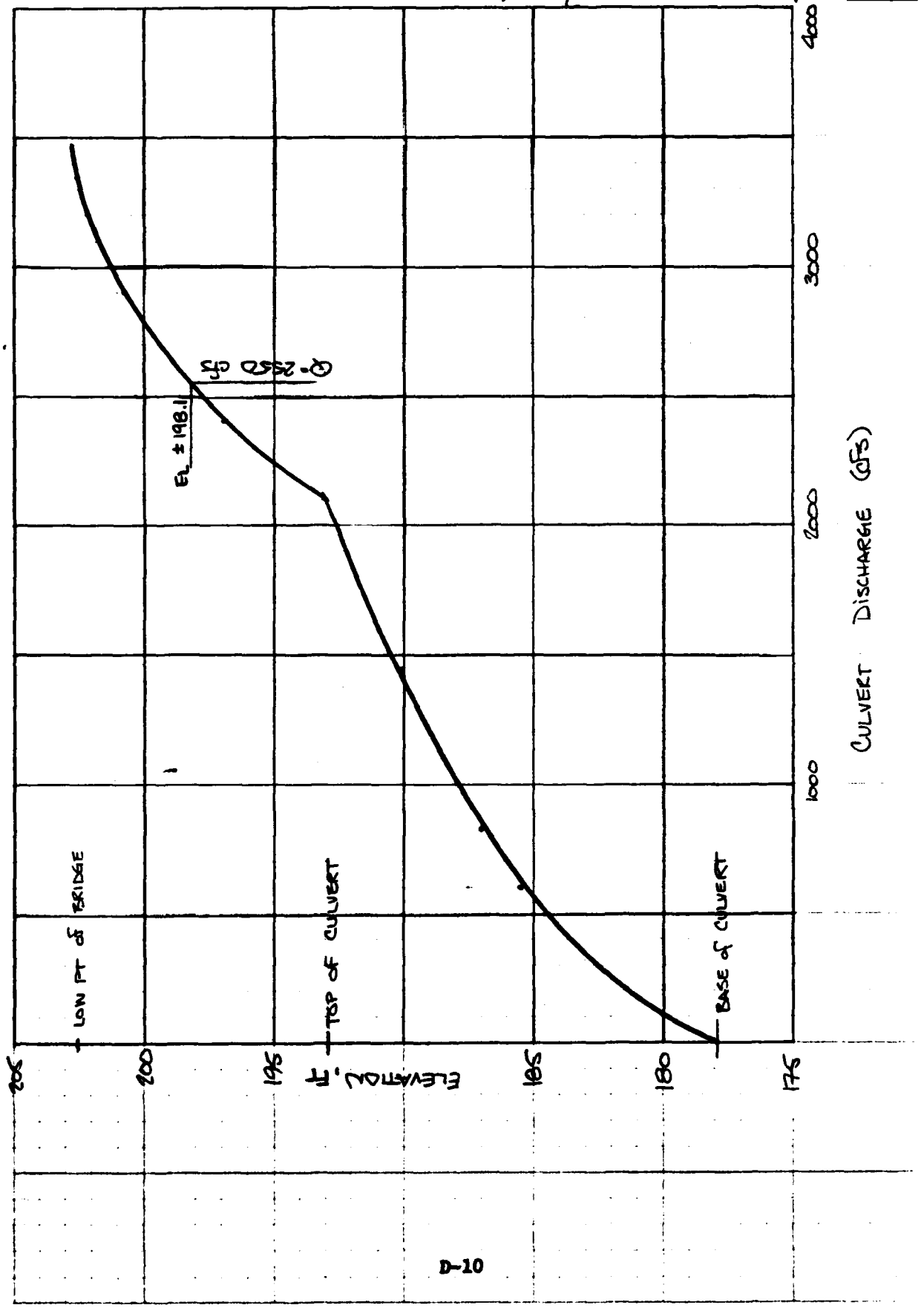
FLOW BASED ON FIG 17-30, P 498 FROM "OPEN CHANNEL HYDRAULICS" by VEN TE CHON

EGEN	H	Q (CFS)
185.5	7.6	600
187.0	9.1	820
190.1	12.2	1450
193.1	15.2	2100
196.9	19.0	2400
200.7	22.8	2900
202.5	24.6	3350

Project USCE DAM INSP, PH 1 GB Acct. No. J 6928 Page 9 of 11

Subject MT HOLYOKE COLLEGE, UPPER Compld. By M. NOWIAK Date 9-12-80

Detail CULVERT DISCHARGE Ck'd. By [illegible] LEB Date 9/16/80



METCALF & EDDY, ENGINEERS

NONREPRODUCIBLE GRID FORM 145

IV FAILURE of DAM - WATER AT SPILLWAY LEVEL (NO DISCHARGE)

POND ELEVATION 199.0
TOE (AVERAGE EL.) 186.5
Y_o = 12.5 FT

DAM LENGTH SUBJECT TO BREACHING 39.4'

W_o = 40% (39.4) = 15.8 FT

PEAK FAILURE FLOW

$$Q_P = 1.68 W_o Y_o^{1.5}$$
$$= 1.68 (15.8)(12.5)^{1.5}$$
$$= 1173 \text{ CFS}$$

STORAGE VOLUME RELEASED
storage above spillway -
storage below spillway 10 (10.0) 1/3 = 33 AC-FT

CHANNEL HYDRAULICS

FAILURE OF THE DAM WILL CAUSE A SUDDEN INCREASE IN ELEVATION AT THE CULVERT

DRY CULVERT INVERT EL 177.9
RISE DUE TO FAILURE EL 188.8

SUDDEN RISE WILL BE ± 10.9 FT AT CULVERT.

VI DAM FAILURE - WATER AT CREST of DAM (EL 202.9)

WITH WATER AT CREST OF DAM, SPILLWAYS ARE DISCHARGING 2550 CFS. DUE TO THE UMITED CAPACITY OF THE DOWNSTREAM CULUERT, WATER WILL BE AT ± EL 198.1 IN THE DOWNSTREAM CHANNEL.

POND ELEVATION: 202.9
TAILWATER ELEVATION: 198.1
4.8 FT

DAM LENGTH SUBJECT TO BREACHING 40% (39.4) = 15.8'

PEAK FAILURE FLOW: $Q_P = 1.68 W_o y_o^{1.5}$

$= 1.68 (15.8)(4.8)^{1.5} = 280$ CFS

ADD 280 CFS TO CONTINUING SPILLWAY DISCHARGE THE PEAK FAILURE FLOW IS 2830 CFS

CHANNEL HYDRAULICS - A DISCHARGE OF 2830 CFS WILL RAISE THE WATER LEVEL TO ± EL 200.3 FROM EL. 198.1, A 2.2 INCREASE

STORAGE VOLUME RELEASED:

storage above spillway, EL 202.9		10(3.9) =	39
storage @ 200.3	EL 200.3	10(1.3) =	-13
volume released			26 Ac-ft

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

MT. HOLYOKE COLLEGE UPPER DAM

INVENTORY OF DAMS IN THE UNITED STATES

ITITY BER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY | MO | YR
3	NED	MA	015	01				MT HOLYOKE COLLEGE UPPER DAM	4215.5	7234.2	160CT80

POPULAR NAME	NAME OF IMPOUNDMENT

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	08	STONY BROOK	SOUTH HADLEY	00	16568

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE–FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE–FT.)
EDT	1900	R	20	20	96	58

DIST	OWN	FED H	PRV/FED	SCS A	VER/DATE
NED	N	N	N	N	

REMARKS
21-EARTH AND STONE MASONRY

D/S HAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	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	160	U	39	945	1250											

OWNER	ENGINEERING BY	CONSTRUCTION BY
MOUNT HOLYOKE COLLEGE	UNKNOWN	UNKNOWN

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	MA DEQE	MA DEQE

INSPECTION BY	INSPECTION DATE DAY | MO | YR	AUTHORITY FOR INSPECTION
METCALF & EDDY	16JUL80	PL 92-367

REMARKS
SIDE CHANNEL SPILLWAYS 31-C 32-52 33-1605


ATE
LMED
8