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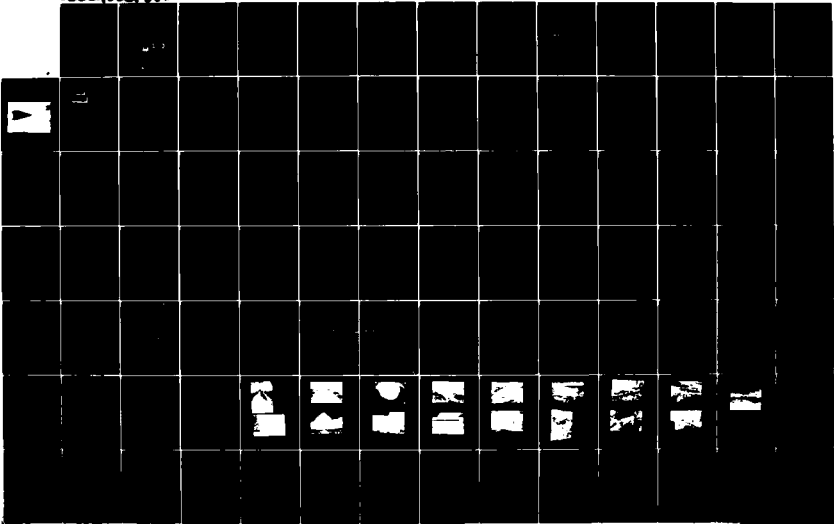
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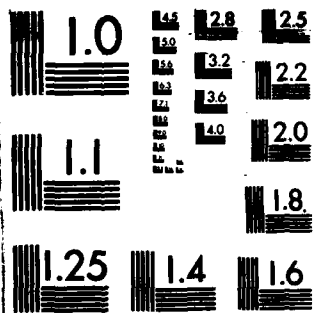
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**HOUSATONIC RIVER BASIN
DALTON, MASSACHUSETTS**

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AD-A155 385

**EGYPT RESERVOIR DAM
MA 01063**

**PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM**



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**DEPARTMENT OF THE ARMY
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MARCH, 1981

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER MA 01063	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Egypt Reservoir 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 March 1981
		13. NUMBER OF PAGES 55
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, Housatonic River Basin Dalton, Massachusetts Egypt Brook		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is an earth embankment dam about 370 ft. long with a maximum hydraulic height of 34 ft. The dam forms a water supply reservoir with a normal storage of 24 acre ft. The visual inspection indicated that the dam is in poor condition. It is small in size with a high hazard potential. A major breach of the dam could cause appreciable damage to property and loss of more than a few lives.		



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

JUN 15 1981

REPLY TO
 ATTENTION OF:

NEDED-E

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

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Dear Governor King:

Inclosed is a copy of the Egypt Reservoir Dam (MA-01063) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis. A brief assessment is included at the beginning of the report.

The preliminary hydrologic analysis has indicated that the spillway capacity for the Egypt Reservoir Dam would likely be exceeded by floods greater than 25 percent of the Probable Maximum Flood (PMF). Our screening criteria specifies that a dam of this class which does not have sufficient spillway capacity to discharge fifty percent of the PMF, should be adjudged as having a seriously inadequate spillway and the dam assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The term "unsafe" applied to a dam because of an inadequate spillway does not indicate the same degree of emergency as that term would if applied because of structural deficiency. It does indicate, however, that a severe storm may cause overtopping and possible failure of the dam, with significant damage and potential loss of life downstream.

It is recommended that within twelve months from the date of this report the owner of the dam engage the services of a professional or consulting engineer to determine by more sophisticated methods and procedures the magnitude of the spillway deficiency. Based on this determination, appropriate remedial mitigating measures should be designed and completed within 24 months of this date of notification. In the interim a detailed emergency operation plan and warning system should be promptly developed. During periods of unusually heavy precipitation, round-the-clock surveillance should be provided.

NEDED-E

Honorable Edward J. King

I have approved the report and support the findings and recommendations described in Section 7, with qualifications as noted above. I request that you keep me informed of the actions taken to implement these recommendations since this follow-up is an important part of the non-Federal Dam Inspection Program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. This report has also been furnished to the owner of the project, Board of Commissioners, Dalton Fire District, Dalton, MA.

Copies of this report will be made available to the public, upon request to this office, under the Freedom of Information Act, 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 the cooperation extended in carrying out this program.

Sincerely,



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

EGYPT RESERVOIR DAM

MA 01063

HOUSATONIC RIVER BASIN
DALTON, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No. MA 01063
Name of Dam: EGYPT RESERVOIR DAM
Town: DALTON
County and State: BERKSHIRE, MASSACHUSETTS
Stream: EGYPT BROOK
Date of Inspection: 12 NOVEMBER 1980; 8 DECEMBER 1980

BRIEF ASSESSMENT

Egypt Reservoir Dam is an earth embankment dam approximately 370 feet long, with a maximum hydraulic height of 34 feet. There is a 28-foot wide concrete chute spillway at the easterly abutment.

The dam forms a water supply reservoir with a normal storage of 24 acre-feet. The dam was constructed around 1894 and has not undergone any major repairs or reconstruction.

The visual inspection indicates that the dam is in poor condition. The concrete spillway works are deteriorated and require major reconstruction. The downstream slope of the embankment shows evidence of instability and requires attention.

Because the dam has a small size and high hazard potential classification, the test flood selected is the $\frac{1}{2}$ Probable Maximum Flood ($\frac{1}{2}$ PMF). The test flood inflow for Egypt Reservoir, having a drainage area of 0.85 square miles, was estimated to be 1050 cfs. Effects of reservoir storage would not significantly reduce the test flood. This flow would cause the dam to overtop by about $\frac{1}{2}$ foot. Spillway capacity at the low point in the top of dam is 510 cfs which is 49% of the test flood outflow.

A major breach of the dam could cause appreciable property damage and loss of more than a few lives in the downstream area at Holiday Road and at Route 9.

A number of recommendations are given for implementation by the owner. These recommendations should be implemented within 12 months of receipt of this Phase I Inspection Report.

Recommendations in general are as follows:

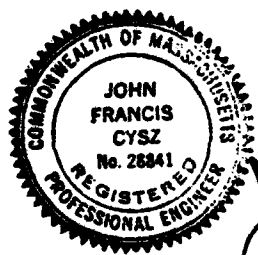
Retain a qualified Registered Professional Engineer to:

- Design and supervise the reconstruction of the entire spillway works.
- Perform a detailed hydrologic and hydraulic analysis to determine the requirements and methods for increasing the project discharge capacity.
- Evaluate methods for increasing the stability of the downstream slope.

Egypt Reservoir Dam

- Investigate possible embankment seepage and evaluate the need for a drainage system and protection.
- Design repairs to the gatehouse and conduits.
- Design procedures and supervise removal of trees at the toe of the dam and along the walls of the spillway works.
- Measure depths of water in existing peizometer tubes and establish program to record data for future reference.
- Design an improved all-weather access road.
- Design means to extend the riprap on the upstream slope.

In addition the owner should implement the recommended remedial program listed in Section 7.3 including establishment of a formal written program for operation and maintenance, establishment of a formal written surveillance and downstream warning program, securing the gatehouse, control of burrowing animal population, and clearing of the spillway discharge channel. A qualified Registered Professional Engineer should be engaged to make a comprehensive technical inspection of the dam once a year.



John F. Cysz
 Project Manager
 MA P.E. No. 28841

John F. Cysz

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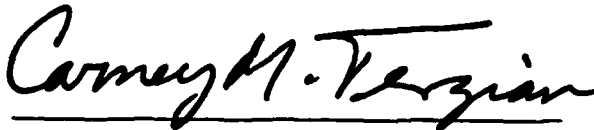
This Phase I Inspection Report on Egypt Reservoir Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.



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

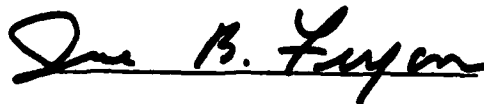


ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division



CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:



JOE B. FRYAR
Chief, Engineering Division

PREFACE

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

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

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

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

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.

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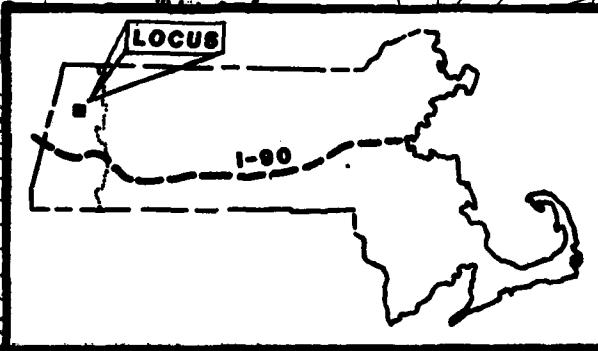
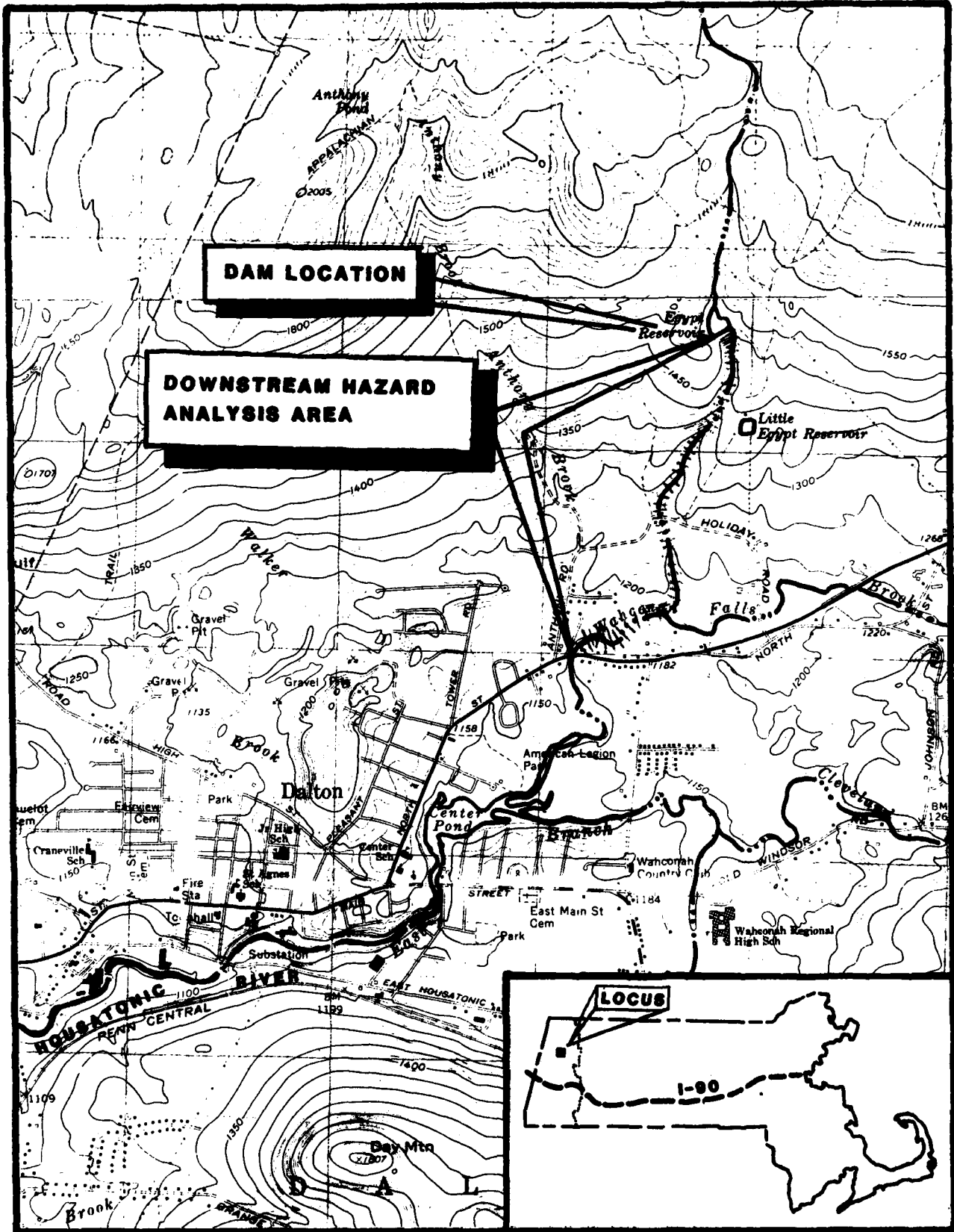
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OVERVIEW OF EGYPT RESERVOIR DAM



EGYPT RESERVOIR DAM
DALTON, MASS.
 Identification No. MA 01063



LOCATION PLAN
 Pittsfield East Quadrangle
 1:25000

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NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
EGYPT RESERVOIR DAM
SECTION I - 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 Inspection of Dams within the New England region. Robert G. Brown & Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the Commonwealth of Massachusetts and State of Vermont. Authorization and notice to proceed were issued to Robert G. Brown & Associates, Inc. under a letter of 23 October 1980 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract Number DACW33-81-C-0004 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

- (1) To perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten public safety and thus permit correction in a timely manner by non-Federal interests.
- (2) To encourage and prepare 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

Egypt Reservoir Dam is located in the Town of Dalton, Massachusetts. The dam is on Egypt Brook approximately one mile upstream from the stream's confluence with Wahconah Falls Brook. The dam impounds Egypt Reservoir which is a water supply for the Town of Dalton. Egypt Reservoir Dam is shown on the USGS Pittsfield East, Mass. quadrangle at latitude 42° 29.9' and longitude 73° 08.4'. Access to the damsite is from an un-named road off Holiday Road. Egypt Reservoir is also called Town Supply No. 2.

b. Description of Dam and Appurtenances

Egypt Reservoir Dam is an earth embankment dam, approximately 370 feet long, with a maximum hydraulic height of 34 feet, measured from the top of the dam to the outlet of the 12-inch conduit. The top of the dam has a width of about 6 feet. The upstream slope is relatively level for 10 feet, dropping about 2½ feet to the top of the riprap. The riprap slopes about 3H to 1V. The downstream slope is generally 1½H to 1V with a small area near the top center being slightly steeper. The dam is believed to have a core wall made of 3-inch plank piling surrounded by gravel rubble. The upstream slope is protected with placed cobbles and small boulders (see Photograph 1, Appendix C) up to an elevation within about 2.5 feet of the top of the dam.

The remainder of the embankment is vegetated with the exception of an area at the downstream toe east of center, where there is some boulder fill (see Photograph 12, Appendix C). There are 5 capped piezometers (rusted) on the top and downstream slope of the dam about at the center. The dam embankment joins a natural wooded slope at the west end. There is a concrete chute spillway with a 28-foot wide stone slab crest at the easterly abutment. The concrete spillway channel drops at a grade of 12% for 60 feet beyond the spillway crest and then steepens to a 25% slope for a distance of about 30 feet. The spillway chute then drops abruptly at a slope of about 1H to 1V. There is a 20-foot long concrete discharge apron at the end of the spillway chute. There are large segments of broken concrete at the discharge apron but no end sills or blocks. Discharge from the concrete apron flows into boulder area in woods downstream of the dam.

Access to the dam is by an unimproved woods road at the east abutment. There is no spillway bridge and there are no spillway gates or flashboards. There is a wooden gatehouse set over a 4-foot diameter grouted stone manhole which contains a gate valve. The gate valve is operated by a steel shaft which has guides embedded in the side of the stone manhole (see Photographs 4 and 5, Appendix C). The gate shaft is turned by a tee-bar handle in the gatehouse. The gatehouse floor is partially grated. The grating and the sides of the gatehouse have been vandalized. The gate valve is used to regulate outflow through a 12-inch cast iron pipe conduit. This conduit passes through the embankment and discharges at the toe of the dam. There is no headwall or other visible support for the end of the conduit (see Photograph 14, Appendix C). There is also a 10-inch conduit to the east which has a trickle flow. The purpose of this conduit could not be confirmed (see Photographs 13 and 14, Appendix C). The intake structure was submerged and was not visible.

c. Size Classification

The dam has a maximum hydraulic height of 34 feet and storage at the top of dam of 33 acre-feet.

According to criteria as given in the Recommended Guidelines for Safety Inspection of Dams (height 25 to 40 feet) the structure is classified as small size because of its height.

d. Hazard Classification

The dam is in a high hazard category because a major breach of the dam would cause excessive damage and loss of more than a few lives would be likely (see Section 5.5).

e. Ownership

The dam has been owned since its construction by:

Board of Commissioners
Dalton Fire District
Town Hall
Dalton, MA 01226
Tel: (413) 684-0727

The land underlying and surrounding the dam and reservoir is reported to be privately owned. The Fire District has the right to draw water from the brook.

f. Operator

Overall operation of the water system is assigned to the Superintendent of the Dalton Fire District:

Mr. Wallace Pero
Dalton Fire District
Flansburg Avenue (office)
Dalton, MA 01226
Tel: (413) 684-0727

g. Purpose of Dam

Egypt Reservoir Dam impounds Egypt Reservoir which is a domestic water supply for the Town of Dalton. The reservoir reportedly has a useable storage of approximately 24 acre-feet.

h. Design and Construction History

The dam was constructed in 1894 for the Dalton Fire District. The contractor is unknown. According to records of the Fire District, Mr. D.H. Tower was the engineer on the project. There are no construction records other than a copy of a report dated October, 1894 by Mr. G.A. Murdock, engineer for the Berkshire County Commissioners. Fire District Records are kept at the offices of Water Commissioner Mr. Arthur E. Crane, Crane & Company, 30 South Street, Dalton, MA 01226, Tel: (413) 684-2600. A print of the construction plans is also on file. A copy of an unknown reproduction of this plan is attached in Appendix B-3.

The Fire District has no records of any repairs or modifications to the dam. According to State and County Dam Inspection Reports, repairs to the concrete floor and walls of the spillway were performed in 1946 and 1961. Additional repairs to the spillway are scheduled for the summer of 1981.

There are several discrepancies between the present configuration of the dam and the original construction plan, which suggest changes during or after construction. These include the extension downstream of the dam embankment and spillway chute at the east abutment; different alignment of the two conduits through the dam; and no headwall at the outlet of the conduits. There is no visual evidence of a masonry wall called for at the westerly abutment. (See Section 6.3). There are no records of when these changes were made.

i. Normal Operation Procedures

Fire District personnel reportedly visit the dam on the average of once a week; more often when operation requires. Daily visits are made to the filtration plant located 1500 feet downstream of the dam. Access to the damsite is up a steep dirt road which is impassable during certain seasons of the year. Normal operation consists of regulating the flow of water through the 12-inch diameter, westerly conduit to Egypt Brook. A diversion structure on the brook about 500 feet downstream of the dam directs the water through an 8" diameter pipe to the filtration plant and distribution system.

The 12-inch westerly conduit is controlled by a gate valve operated by a fixed shaft tee-bar gate key located in the gatehouse at the top of the dam. The gate is normally left open about one-third. Little operation is usually required. There is no provision for flashboards at the spillway.

There is also a 10-inch conduit through the dam, and shown on the 1894 plan (shown as 12-inch on plan). The purpose and means of controlling this conduit is unknown.

Normal maintenance consists of mowing and cutting brush on the embankment once a year. No fertilizing is performed. There is no written operation or maintenance plan.

There are no gages or flowmeters on Egypt Reservoir. A flowmeter at the filtration plant measures water use from the combined water supplies from all three town reservoirs, Egypt Reservoir, Anthony Brook Reservoir, and Windsor Reservoir.

There are no formal plans for emergency preparedness nor a downstream warning system.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area contributing to Egypt Reservoir is 0.85 square miles. The drainage area is oriented with its long axis in a north/south direction and has a length of approximately 1.4 miles and an average width of approximately 0.6 miles. The entire watershed lies in the Town of Dalton. Approximately 20% of the watershed is in Town Forest. The remainder is privately owned. The drainage area is drained by Egypt Brook and several small un-named tributaries.

Virtually the entire watershed is heavily wooded and undeveloped. A pole line runs northwesterly through the lower end of the watershed. Topography is generally steep and mountainous, with elevations ranging from 1435 at the toe of the dam to about 2250 on Weston Mountain. The dam lies within a small stream valley in the uplands marginal to the Housatonic basin of the Western New England Region. The damsite is probably underlain by a fairly deep mantle of glacial till which conceals the bedrock; however, no detailed soils data was available.

Other than some marsh at the headwaters of the drainage area, Egypt Reservoir is the only significant water body in the watershed. The reservoir covers an area of about 2½ acres which is less than one percent of the total watershed.

b. Discharge at Damsite

Discharges at the damsite are over the concrete spillway and through the 12-inch regulating outlet (westerly conduit).

The concrete spillway is 28 feet long and is 3.2 feet below the top of the dam. The 12-inch cast iron conduit through the dam is controlled from the top of the dam by a gate valve. There are no flashboards. The elevation datum used in this report is interpolated from the top of dam elevation of 1470 NGVD shown on the USGS Pittsfield East quadrangle. The low point of the embankment (top of dam) is 1469 NGVD.

(1) Outlet Works -

- (a) 12-inch cast iron pipe conduit (westerly), invert elevation of outlet - 1436.5 discharge capacity - 17 cfs at 1470 NGVD.
- (b) 10-inch cast iron pipe conduit (easterly), through the dam, purpose and means of control unknown, invert elevation of outlet - 1436.8 NGVD. (Pipe stamped with date 1894). Capacity - 12 cfs @ 1470 NGVD.

(2) Maximum Flood at Damsite - unknown.

- 1216
- (3) Ungated Spillway Capacity at Top of Dam (low point of embankment)- 510 cfs at 1469 NGVD.
 - (4) Ungated Spillway Capacity at Test Flood Elevation - 695 cfs at 1470.5 NGVD.
 - (5) Gated Spillway Capacity at Normal Pool Elevation - not applicable.
 - (6) Gated Spillway Capacity at Test Flood Elevation - not applicable.
 - (7) Total Spillway Capacity at Test Flood Elevation - 695 cfs at 1470.5 NGVD.
 - (8) Total Project Discharge at Top of Dam - 510 cfs at 1469 NGVD.
 - (9) Total Project Discharge at Test Flood Elevation - 1050 cfs at 1470.5 NGVD.
- c. Elevation (feet above NGVD)
- (1) Streambed at Toe of Dam - 1436.5 NGVD.
 - (2) Bottom of Cutoff - unknown.
 - (3) Maximum Tailwater - unknown.
 - (4) Normal Pool - 1466.8 NGVD.
 - (5) Full Flood Control Pool - not applicable.
 - (6) Spillway Crest - 1466.8 NGVD.
 - (7) Design Surcharge (Original Design) - unknown.
 - (8) Top of Dam - 1469 NGVD at low point, 1470 NGVD average.
 - (9) Test Flood Surcharge - 1470.5 NGVD.
- d. Reservoir (length in feet)
- (1) Normal Pool - 400.
 - (2) Flood Control Pool - not applicable.
 - (3) Spillway Crest Pool - 400.
 - (4) Top of Dam - 420.
 - (5) Test Flood Pool - 425.
- e. Storage (acre-feet)
- (1) Normal Pool - 24 acre-feet.
 - (2) Flood Control Pool - not applicable.

- 1/1/71
- (3) Spillway Crest Pool - 24 acre-feet.
 - (4) Top of Dam - 33 acre-feet.
 - (5) Test Flood Pool - 34 acre-feet.
- f. Reservoir Surface (acres)
- (1) Normal Pool - 2.5 acres.
 - (2) Flood Control Pool - not applicable.
 - (3) Spillway Crest - 2.5 acres.
 - (4) Top of Dam - 2.8 acres.
 - (5) Test Flood Pool - 2.9 acres.
- g. Dam
- (1) Type - earth embankment/gravity.
 - (2) Length - 370 feet.
 - (3) Height - 34 feet.
 - (4) Top Width - 6 feet (16 feet at top of riprap).
 - (5) Side Slopes - downstream 1.5H:1V earth embankment,
upstream 3H:1V with riprap at and below water line.
 - (6) Zoning - Gravel Rubble Core and 3" Plank Piling shown on 1894
plan, unspecified embankment materials upstream and
downstream of core.
 - (7) Impervious Core - (see "Zoning" above).
 - (8) Cutoff - 3" Plank Piling.
 - (9) Grout curtain - unknown.
- h. Diversion and Regulating Tunnel - not applicable.
- i. Spillway
- (1) Type - concrete training walls and stone slabs on crest of overflow weir.
 - (2) Length of Weir - 28 feet.
 - (3) Crest Elevation (no flashboards) - 1466.8 NGVD.
 - (4) Gates - none.
 - (5) U/S Channel - Egypt Reservoir with gravel and cobble floor of approach.
 - (6) D/S Channel - Concrete spillway chute 21 to 28 feet wide, 90 feet
long, sloped 12 to 25 percent, with concrete apron at toe of 9 foot
high drop wall; discharges to Egypt Brook.

(7) General - Spillway chute shown on 1894 plan is only 24 feet long.

j. Regulating Outlets

(1) Invert - 1436.5 NGVD.

(2) Size - 12-inch diameter

(3) Description - cast iron pipe conduit through dam with outlet to Egypt Brook 20 feet beyond toe of dam.

(4) Control Mechanism - gate valve operated by Fixed Shaft Tee-Bar located in gatehouse on top of dam.

(5) Other - A 10-inch diameter cast iron pipe, invert elevation 1436.8 NGVD, also outlets to brook at toe of dam; purpose and control mechanism is unknown.

SECTION 2
ENGINEERING DATA

2.1 DESIGN DATA

A print of what is reported to be the original construction plan is on file with the Dalton Fire District. There are several discrepancies between the present configuration of the dam and the original plan.

No other design data was available.

2.2 CONSTRUCTION DATA

No construction data were available other than a copy of a report on the construction to the Berkshire County Commissioners from their engineer, Mr. G.A. Murdock. A copy of this report is on file with the Fire District.

There are no Fire District records of any repairs or modifications to the dam. County and State Inspection Reports refer to repairs to the concrete spillway in 1946 and 1961.

A report dated September 25, 1979 was prepared for the Dalton Fire District by their engineers, Tighe & Bond, of Easthampton, Mass. The report outlined several options for repairs, improvements or replacement of Egypt Reservoir Dam. A topographic survey and cross sections were performed as part of this work. A decision on proceeding with repairs is pending receipt of this Phase I Inspection Report.

2.3 OPERATION DATA

Fire District personnel reportedly visit the dam on the average of once a week; more often when operation requires. Daily visits are made to the filtration plant located 1500 feet downstream of the dam. Access to the damsite is up a steep dirt road which is impassable during certain seasons of the year. Normal operation consists of regulating the flow of water through the 12-inch diameter conduit to Egypt Brook. A diversion structure on the brook about 500 feet downstream of the dam directs the water through an 8" diameter pipe to the filtration plant and distribution system.

The 12-inch conduit is controlled by a gate valve operated by a fixed shaft tee-bar gate key located in the gatehouse at the top of the dam. The gate is normally left open about one-third. Little operation is usually required. There is no provision for flashboards at the spillway.

There is also a 10-inch conduit through the dam, and shown on the 1894 plan (shown as 12-inch pipe on plan). The purpose and means of controlling this conduit is unknown.

Normal maintenance consists of mowing and cutting brush on the embankment once a year. No fertilizing is performed. There is no written operation or maintenance plan.

2.4 EVALUATION OF DATA

a. Availability

The Engineering Data described in this section are available from Dalton Fire District Records, which are kept at the office of Water Commissioner Arthur E. Crane, Crane & Company, 30 South Street, Dalton, MA 01226.

County Inspection Reports are available from the Berkshire County Commissioners, Berkshire County Courthouse, Pittsfield, MA 01201.

Massachusetts Department of Public Works Inspection Reports are available at District 1 Headquarters, Pittsfield-Lenox Road, Lenox, MA 01240.

Copies of selected records are included in Appendix B.

b. Adequacy

The final assessments and recommendations of this investigation are based on the visual inspection and the hydrologic and hydraulic calculations.

c. Validity

There are significant discrepancies between the original plan and the present configuration of the dam, indicating changes were made during or after construction. No record of these changes was found (see Section 6.3).

SECTION 3
VISUAL INSPECTION

3.1 FINDINGS

a. General

Inspection of Egypt Reservoir Dam was begun on November 28, 1980 and completed on December 8, 1980. The weather on the first day was cold and rainy. The weather on the second day was clear. At the time of inspection, the water level in the reservoir was about 8 feet below the top of dam. Therefore, the upstream slope could only be viewed above this water level.

b. Dam

Egypt Reservoir Dam is an earth embankment dam having a length of approximately 370 feet and a maximum hydraulic height of about 34 feet. The axis of the dam is oriented in a generally east/west direction. The concrete chute spillway is located at the easterly abutment. The general layout of Egypt Reservoir Dam is shown in Appendix B. Photographs showing features and conditions are shown in Appendix C.

The downstream slope is unusually steep (1½H to 1V) for a vegetated earth embankment. There are undulations which appear to be evidence of down-slope movements. These areas do not appear to have been active within the recent past. The undulations and irregularities are particularly pronounced near the center. The piezometer tubes may be related to slope activity or seepage in this area but this could not be confirmed. There is a slight downstream bulge in the crest of the dam approximately 125 feet west of the spillway (see Photograph 3, Appendix C). This bulge lines up with an area of dumped boulders at the downstream toe. The bulge also corresponds to a slight sag in the crest. A few animal burrows were noted in the downstream slope and there is evidence of recent cutting of trees at the toe. The vegetation on the slopes appears maintained. There is an active ant hill to the east of the gatehouse and there are some shallow localized depressions in the crest in the vicinity of the gatehouse. The largest depression is about 4" deep and 3 feet by 2 feet in size. There is settlement and possible erosion which is now grassed over near the base of the gatehouse.

The 3-inch plank piling core wall noted on a tracing of the 1894 plan was in no place visible during this inspection. There is a 6-inch deep wave bench above the riprap on the upstream slope. The stone riprap generally is in good condition.

The downstream area where the embankment joins the natural slope at the west is soft, however, this may be due to surface drainage. The downstream slope of the embankment near the spillway chute is less steep than the rest of the downstream slope. The embankment slope is undulating and irregular in this area and appears to be random dumped fill. There are three projections of the concrete spillway chute which tie into the embankment.

There are medium size trees growing in the downstream toe in the area of the outlet conduits. There is evidence of recent cutting of trees in this area. The downstream toe of the dam at the outlets and to the east is very soft and muddy. This condition could be as a result of embankment seepage or conduit discharge. There is also a wet area (with 3 gpm clear flow) at the downstream end of the boulder fill area at the toe.

The concrete spillway and stone crest are in poor condition. The walls of the spillway chute are cracked, tipped and eroded and the floor is cracked, uplifted and undermined (see Photographs 6, 7, 8, 9, 10, 11; Appendix C).

A stone wall retains the natural slope to the east at the upstream end of the spillway. There are trees growing close to the east chute wall. A 5" x 5" drain exits on the easterly spillway chute wall (see Photograph 7, Appendix C) downstream of the spillway crest. There is a clear flow of water from a northeast direction (abutment). A 1½-inch diameter pipe with no flow can be seen entering the drain hole from the north. The discharge apron at the end of the spillway chute is in poor condition and has eroded and undermined walls and masses of broken concrete (see Photographs 10, 16; Appendix C). There are two 8-inch cast iron drains from the north at the elevation of the discharge apron. The drains are both dry (see Photograph 10, Appendix C).

Flows from the spillway discharge apron pass into a bouldered, wooded area (see Photograph 16, Appendix C). There is some erosion at the transition between the concrete of the discharge apron and boulder discharge channel.

c. Appurtenant Structures

The gatehouse has been vandalized and is in poor condition. A tee-bar handle is attached to a steel shaft anchored into the side of the 4-foot diameter grouted stone manhole. The shaft turns a gate valve on the 12-inch outlet conduit at the bottom of the stone manhole. The gate valve is reported to be operable, but was not operated during this inspection. The gate shaft is rusted as is the steel ladder in the side of the manhole. There is debris in the manhole bottom and there is water about 21 feet from the top of the manhole (see Photograph 5, Appendix C). The safety of the manhole steps is questionable.

There is a 12-inch conduit which passes through the dam and is controlled by the gate valve at the bottom of the stone manhole. This conduit is used for releasing flows from the reservoir. The inlet for the conduit was submerged and not visible for inspection. The outlet end of the conduit rests on the ground for about 20 feet and is cracked and leaking (see Photograph 15, Appendix C). There is a 10-inch conduit about 5 feet to the east of the regulating outlet. The means of controlling this conduit are unknown. There is about 1 quart per minute flow from this conduit. The end of this conduit also rests on the ground (see Photograph 14, Appendix C). This pipe is shown on the 1894 plan (as being 12") but its purpose could not be confirmed. It may have been intended as a future direct water supply intake.

At present there is no water supply intake at this dam. Water is released from the reservoir into Egypt Brook and diverted into Lower Egypt Reservoir where it is taken into the town distribution system after treatment.

d. Reservoir Area

The normal reservoir surface is about 2.5 acres. The shoreline is wooded and has no structures (see Overview Photograph).

The natural slope to the east of the spillway approach channel is steep and is retained by a stone retaining wall. There are trees on this slope in close proximity to the retaining wall. There is no evidence of any recent slope instability in this area.

e. Downstream Channel

The discharge channels for the spillway and for the outlet conduit flow join about 100 feet downstream of the toe of dam. Both channels are cobble and boulder bottomed. There are trees growing near both channels (see Photograph 16, Appendix C).

Water supply flows released from Egypt Reservoir are brought into the Little Egypt Reservoir (Reservoir No. 1) which is the main distributing reservoir for the Dalton Fire District. Flood-flows bypass Little Egypt and enter Wahconah Falls Brook approximately 4500 feet downstream of Egypt Reservoir (see Location Map).

3.2 EVALUATION

Based on the visual inspection, Egypt Reservoir Dam is in poor condition. The deterioration of the spillway works is a serious deficiency because of the potential for undermining of the earth embankment during conditions of high discharge. Trees growing near the spillway approach channel and near the walls of the spillway chute should be cut back.

The portion of the upstream slope which could be observed at the time of inspection is in generally good condition with the exception of the 6" wave bench at the top of the cobble and small boulder riprap.

The downstream slope is unusually steep for a vegetated earth embankment in this climate. Although the exact nature of the embankment materials are not known, there is evidence that there has been downslope movements in the past. Even though there is no evidence of recent slides on the downstream slope, the stability of this slope is questionable, particularly with respect to shallow slides.

The soft area where the downstream embankment slope joins the natural slope at the west abutment should be observed during dry weather to determine if the wetness could be embankment seepage. The reproduction of the 1894 plan shows a wall, presumably masonry, at the west abutment but no evidence of this wall was noted.

The area of dumped boulders may represent a disposal area for large rocks separated from the earth fill during construction of the embankment. The boulders obscure a large section of the downstream toe near the highest part of the embankment. The embankment beneath the boulders should be investigated further for seepage or other possible hidden problems. The location and condition of the plank piling core wall in the embankment should be confirmed.

Trees growing at the downstream toe of the embankment should be removed.

The gatehouse requires reconstruction. This should be done in a manner which will minimize vandalism. The guides for the gate valve shaft should be individually checked to insure firm embedment in the sides of the stone manhole. The steel gate shaft and steel steps in the manhole sides require maintenance to insure continued serviceability. The manhole bottom should be cleaned out and the body of the gate valve checked closely for unusual leakage or damage.

The purpose of the easterly conduit is not known. It may be capped at its upstream end. The source of seepage out of this conduit requires further investigation. The westerly conduit, which is regulated by the gate valve, is cracked and is leaking near its outlet. The ground in this area is very soft. There are no headwalls or other discharge structures for either the easterly or westerly conduits. The reproduction of the original construction plan indicates that both conduits are supported by piers of unknown type and calls for a common headwall at the downstream ends of the conduits. The plan shows no anti-seep collars for either conduit but indicates that the pipes pass through the timber plank core wall.

Access to the damsite requires improvement. At present, the road is impassable for at least part of the year. A complete listing of Recommendations and Remedial Measures are given in Section 7.

SECTION 4
OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 OPERATIONAL PROCEDURES

a. General

Operational procedures for the project are not formally established but are based on the experience of the operating personnel.

b. Description of any Warning System in Effect

There is no written surveillance or warning system in effect. According to the Superintendent of the Dalton Fire District, the dam is visited weekly. Access to the site may not be possible or slowed during severe storms.

4.2 MAINTENANCE PROCEDURES

a. General

There is no formal maintenance manual for the project. Maintenance is carried out as needed.

b. Operating Facilities

Mowing and cutting of brush from embankments is done annually; usually in the summer. The 12-inch westerly outlet is used to regulate flow into Egypt Brook. This is done by operating the tee-bar handle in the wooden gatehouse at the crest of the dam. A downstream diversion carries the water to Little Egypt Reservoir.

4.3 EVALUATION

A formal written operational and maintenance plan including an annual comprehensive technical inspection by a qualified Registered Professional Engineer, should be developed to insure that problems that are encountered can be remedied within a reasonable period of time. A formal written surveillance and downstream warning (emergency preparedness) plan should be established for this structure.

SECTION 5
EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 GENERAL

The total drainage area contributing to Egypt Reservoir is about 0.85 square miles. The watershed is drained by two main streams which enter at the north end of the reservoir.

The watershed terrain is generally rolling and mountainous and is wooded. There is no development in the drainage area except for a power line.

Elevations in the watershed range from 1470 at the top of dam to elevation 2250 MSL. The normal reservoir surface area of Egypt Reservoir is 2½ acres which is less than 1 percent of the total drainage area.

The drainage area has its long axis in a north/south direction and has an average length of 1.4 miles and an average width of 0.6 miles.

5.2 DESIGN DATA

No hydraulic or hydrologic design data or criteria were available.

5.3 EXPERIENCE DATA

The dam was constructed about 90 years ago and has withstood all floods experienced in the drainage area.

No flood records are available for this drainage area; however, the greatest flood peak discharges on the East Branch of the Housatonic River (drainage area 57.1 square miles) were 6,000 cfs in 1936, 6,400 cfs in 1938 and 5,700 cfs on December 31, 1948.

According to the Superintendent of the Dalton Fire District there is no record of the dam being overtopped.

5.4 TEST FLOOD ANALYSIS

Egypt Reservoir Dam is classified as small size having a hydraulic height of 34 feet and a top of dam storage of 24 acre-feet. The dam was determined to have a high hazard classification. Using the Recommended Guidelines for Safety Inspection of Dams, the test flood range is 50% to 100% of the Probable Maximum Flood (PMF). The ½ PMF was selected as the test flood because the storage is small.

The Probable Maximum Flood was estimated using methods contained in "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations" issued by the New England Division Corps of Engineers. The curve for mountainous terrain was used in this estimate.

The ½ PMF test flood inflow from the 0.85 square mile drainage area was estimated to be 1050 cfs. Storage effects would not significantly attenuate the test flood peak.

During test flood conditions water would rise to elevation 1470.5 which is about 0.5 feet above the average top of dam, and about 1.5 feet above the low point near the center of the dam. Water would be passing through the spillway at a depth of 4 feet and at a flow rate of 745 cfs. Spillway capacity at the low point in top of the dam is 510 cfs which is 49 percent of the test flood outflow.

This analysis assumes that the regulating conduit is open and that the reservoir is at the spillway crest at the start of the test flood. The discharge capacity of the conduit is approximately 17 cfs which is less than 2 percent of the test flood outflow.

Overtopping could cause erosion of the embankment which could lead to a breach of the dam.

5.5 DAM FAILURE ANALYSIS

The impact of failure of the dam was assessed using Corps of Engineers "Rule of Thumb" Guidance for Estimating Downstream Dam Failure Hydrographs. The estimate assumes:

- a. the reservoir surface is at the top of the dam at the time of the breach, and
- b. a breach of 40% of the dam length at mid-height occurs (76 feet).

The estimated discharge resulting from the breach would be approximately 25,000 cfs. The major damage center is along Route 9 about 1.1 miles downstream of the damsite. The existing bridge opening at Route 9 is small and is also constricted with a gravel deposit. The gravel deposit is removed periodically. There are 4 to 6 homes in this area which have floor elevations at approximately the same elevation as the road. Prior to the breach, water would be about 9 feet below the level of Route 9. After the breach, water would rise to approximately 3 to 4 feet above the level of Route 9.

There is one home on Holiday Road 0.6 miles downstream of the damsite. This home has a floor elevation about 6 feet above the channel. Prior to the breach, water would be flowing in the channel and over Holiday Road at an elevation about 1 foot below the floor level of this house. After the breach the water would rise to about 3 feet above the floor level.

Because a major breach of the dam could cause a large amount of property damage as a result of impact and flooding and because of the potential for loss of more than a few lives, Egypt Reservoir Dam is classified as High Hazard.

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SECTION 6
EVALUATION OF STRUCTURAL STABILITY

6.1 VISUAL OBSERVATIONS

The most significant visual observations regarding the structural stability of this dam are the deteriorated condition of the spillway works, irregularities in the dam crest and the undulating and steep (1.5V:1H) downstream slope of the embankment. (Refer to Description in Section 3.) There are wet areas at the downstream toe which may represent embankment seepage.

There are trees growing at the toe of the dam and along the easterly wall of the spillway chute.

6.2 DESIGN AND CONSTRUCTION DATA

No design or construction records other than an unknown reproduction of an 1894 construction plan were available.

A 1979 plan entitled "Topography, Egypt Dam; Dalton, Mass." prepared for Tighe and Bond; Easthampton, MA was provided by the owner.

6.3 POST-CONSTRUCTION CHANGES

The conditions observed in the field vary from information on the 1894 plan in the following manner:

- a. Spillway chute channel extends further downstream.
- b. There is no headwall visible at the outlet of the two cast iron conduits.
- c. There is no transition wall visible between the embankment and the westerly abutment.
- d. The embankment toe west of the spillway channel extends further downstream.

A 3-inch plank piling core wall is shown on the reproduction of the original construction plan; however, the existence of this wall could not be confirmed by the visual inspection.

The reasons for the differences between the existing dam and the 1894 plan could not be confirmed during this inspection.

6.4 SEISMIC STABILITY

The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines, does not warrant seismic analysis.

SECTION 7
ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition

The Phase I visual inspection of Egypt Reservoir Dam indicates that the dam is in poor condition and there are deficiencies which pose a hazard to the structure.

The downstream embankment is unusually steep and shows evidence of instability. The adequacy of the spillway was tested and it was determined that the dam cannot pass the test flood without overtopping.

b. Adequacy of Information

The lack of in-depth engineering data did not allow for a definitive review. Therefore, the condition of this dam could not be assessed from the standpoint of reviewing design and construction data but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency

The recommendations and remedial measures described in Paragraphs 7.2 and 7.3 should be implemented by the owner within 12 months after receipt of the Phase I Inspection Report.

7.2 RECOMMENDATIONS

The owner should retain a qualified Registered Professional Engineer to:

- (1) Design and supervise the reconstruction of the entire spillway works. This design should consider the existence of seepage flows from the easterly abutment. The design study should evaluate any feasible alternatives to the existing chute spillway.
- (2) Perform a detailed hydrologic and hydraulic analysis to determine the requirements and methods for increasing the project discharge capacity. Adjustments of the embankment crest elevation should be in accordance with the detailed study.
- (3) Evaluate methods for increasing the stability of the downstream slope. Vegetated slopes steeper than 2½V to 1H should be used only if the fill materials are well draining and if the strength properties are known. Slope stability studies should consider safety against surface slides. The engineer should investigate the depressions near the gatehouse and design any necessary repairs.
- (4) Investigate possible embankment seepage near the westerly end of the dam and along the toe. This investigation should include the dumped boulder area west of the spillway chute. An evaluation should also be made of the need for a drainage system along the dam toe. The location of the plank core wall should be determined during this investigation.

- (5) Design repairs to the gatehouse and the 12-inch regulating outlet conduit and appurtenances. The condition and purpose of the existing 10-inch conduit east of the regulating conduit should be determined. If the easterly conduit is to be maintained, then consideration should be given to the addition of a valve and associated operating mechanism on the upstream end of the conduit. If the conduit is to be abandoned, then a method to permanently seal the conduit should be designed.
- (6) Design procedures and supervise removal of trees, including backfilling of resulting depressions with appropriate material, at the following locations:
 - a. at the toe of the dam and for at least 75 feet downstream.
 - b. within 25 feet of spillway approach channel and spillway chute walls.
- (7) Design an improved, all weather access road. A convenient means of access to the gatehouse should be a consideration.
- (8) Design a means to extend the slope protection on the upstream face to a higher elevation above the normal reservoir level.
- (9) Measure water depths in the existing piezometer tubes and establish a method and schedule to record water levels in the piezometers and reservoir.

The owner should carry out all the designs and recommendations made by the engineer. Work should be performed under the supervision of the engineer.

7.3 REMEDIAL MEASURES

a. Operation and Maintenance Procedures

The owner should implement the following remedial measures:

- (1) Establish a formal written program for operation and maintenance.
- (2) Provide round-the-clock surveillance during periods of unusually heavy precipitation.
- (3) Develop a formal written program for warning downstream residents in case of emergency (emergency preparedness program).
- (4) Secure the gatehouse to protect regulating mechanisms against vandalism.
- (5) Fill in all animal burrows and implement program to control burrowing animal population at damsite.
- (6) Remove trees for 25 feet each side of channel beyond spillway discharge apron.

- (7) Engage a qualified Registered Professional Engineer to make a comprehensive technical inspection once a year after recommendations of Section 7.2 are implemented. Until repairs are made, the dam should be inspected frequently by owner and changes in conditions reported to the engineer.
- (8) Measure depths of any water in existing piezometer tubes according to methods and schedule specified by the engineer.

7.4 ALTERNATIVES

There are no practical alternatives to the above recommendations.

APPENDIX A

VISUAL INSPECTION CHECKLIST

Egypt Reservoir Dam

VISUAL INSPECTION PARTY ORGANIZATION
NATIONAL DAM INSPECTION PROGRAM

DAM: Egypt Reservoir Dam MA 01063
DATE: 28 November 1980 / 8 December 1980
TIME: 1:30 p.m.
WEATHER: Drizzle - 40°F (11/28/80); clear (12/8/80)
W.S. ELEV. 1461.6 U.S. 1436 DN.S.
ELEV. DATUM: NGVD Interpolated from USGS Quadrangle

INSPECTION PARTY:

1. J. F. Cysz, P.E. (11/28/80; 12/8/80)
2. J. E. Walsh, P.E. (11/28/80)
3. K. N. Hendrickson, P.E. (12/8/80)
4. L. D. Zwingelstein) (11/3/80; measurements)
5. H. T. Shumway)
6. _____

OTHERS PRESENT DURING INSPECTION:

1. W. Pero (notified but not in attendance)
2. _____
3. _____
4. _____

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VISUAL INSPECTION CHECKLIST

DAM: Egypt Reservoir Dam MA 01063 DATE: November 28, 1980

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Crest Elevation	1470
Current Pool Elevation	1461.6
Maximum Impoundment to Date	Not known.
Surface Cracks	None observed.
Pavement Condition	No pavement
Movement or Settlement of Crest	Yes, 1' low area near gatehouse.
Lateral Movement	Yes, slight (1-2') bulge in crest toward d/s area 125' east of gatehouse.
Vertical Alignment	Crest varies, general slope to upstream, low area near gatehouse.
Horizontal Alignment	Bulge as noted above.
Condition at Abutment and at Concrete Structures	Poor - voiding near cracked and separated segment of concrete training wall for spillway approach channel.
Indications of Movement of Structural Items on Slopes	Yes - movements in spillway walls for both approach channel and discharge channel.
Trespassing on Slopes	Animal burrows
Vegetation on Slopes	Grass, moss, brush and trees previously cut. Some large trees remain at toe.
Sloughing or Erosion of Slopes or Abutments	Yes - evidence of previous downslope movements, downstream slope is 1½H to 1V. Piezometers installed in area of apparent movement. Wave bench w/ 6" undercut on u/s face,

VISUAL INSPECTION CHECKLIST

DAM: Egypt Reservoir Dam NA 01063 DATE: November 28, 1980

AREA EVALUATED

CONDITION

DAM EMBANKMENT (cont'd.)

Sloughing or Erosion of Slopes or
Abutments (cont'd.)

old erosion gullies on d/s slope
now vegetated. Depression near
gatehouse (see sketch). (Localized
areas on downstream slope are
steeper than 1½H to 1V.)

Rock Slope Protection - Riprap
Failures

Riprap OK on u/s face below normal
pool. Wave bench above riprap.

Unusual Movement or Cracking at
or near Toes

No cracking observed. May be slope
movements as described above.

Unusual Embankment or Downstream
Seepage

Wet area at toe, maybe surface drain-
age and/or backwater from conduit
discharge.

Piping or Boils

None observed.

Foundation Drainage Features

Possible old rock toe. No outlets or
flow observed. Two 8" drains noted
beneath spillway chute - no flow
(spillway dry).

Toe Drains

None observed.

Instrumentation System

Yes - 5 - 1½" capped, steel pipe
piezometers.

VISUAL INSPECTION CHECKLIST

DAM: Egypt Reservoir Dam MA 01063 DATE: November 28, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - INTAKE CHANNEL
AND INTAKE STRUCTURE

Intake structure for outlet conduits
not visible.

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

Condition of Concrete

Stop Logs and Slots

VISUAL INSPECTION CHECKLIST

DAM: Egypt Reservoir Dam MA 01063

DATE: November 28, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - CONTROL TOWER

7½' x 7½' wooden structure on top of round stone masonry manhole, 4' I.D. gatehouse has steel grate over ½ of its floor - remainder of floor is open to manhole.

a. Concrete and Structural

General Condition

Stone masonry manhole is fair, wooden superstructure is poor - door and sides missing, sills rotted.

Condition of Joints

Masonry joints satisfactory with minor cracking on inside of manhole. Mortar missing from joints on outside of manhole.

Spalling

As noted above.

Visible Reinforcing

Not applicable - no reinforced concrete

Rusting or Staining of Concrete

Not applicable.

Any Seepage or Efflorescence

None observed.

Joint Alignment

Satisfactory

Unusual Seepage or Leaks in Gate Chamber

Water 21 feet down from top of manhole.

Cracks

Minor in masonry joints between stone.

Rusting or Corrosion of Steel

Yes, rebar manhole steps, stem guides, and gate stem. Safety of steps is questionable.

b. Mechanical and Electrical

Air Vents

Sides missing on wooden gatehouse.

Float Wells

None

Crane Hoist

None

Elevator

None

VISUAL INSPECTION CHECKLIST

DAM: Egypt Reservoir Dam MA 01063 DATE: November 28, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - CONTROL TOWER (cont'd)

Hydraulic System	None.
Service Gates	One gate operated by T-bar stem. Stem is rusted and stem guides are weakly embedded (loose) in sides of stone masonry manhole. Stem is straight - debris, planks in bottom of manhole, gate is not visible. There are 2 outlet conduits. 1-10"; 1-12" (which is open). Flow is through 12".
Emergency Gates	None
Lightning Protection System	None
Emergency Power System	None
Wiring and Lighting System in Gate Chamber	None

VISUAL INSPECTION CHECKLIST

DAM: Egypt Reservoir Dam MA 01063

DATE: November 28, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - TRANSITION AND CONDUIT

General Condition of Concrete

Rust or Staining on Concrete

Spalling

Erosion or Cavitation

Cracking

Alignment of Monoliths

Alignment of Joints

Numbering of Monoliths

There are 2 CIP outlet conduits visible from the downstream toe. 1 - 12" with 4" depth of flow. 1 - 10" east of 12" has trickle flow.

There is standing water at bottom of gate manhole, transition between gate and conduit cannot be seen.

VISUAL INSPECTION CHECKLIST

DAM: Egypt Reservoir Dam MA 01063 DATE: November 28, 1980

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u></p>	<p>Note: 10" & 12" CIP outlets from d/s toe of dam on ground. Pipes are not supported on cradles or bents. Outlet pipes have no earth cover or headwalls. Pipes have caulked b & s joints. 12" pipe is cracked on westerly side and is leaking.</p> <p>Pipes discharge into natural channel.</p>
General Condition of Concrete	No concrete
Rust or Staining	Not applicable.
Spalling	Not applicable.
Erosion or Cavitation	Not applicable.
Visible Reinforcing	Not applicable.
Any Seepage or Efflorescence	Not applicable.
Condition at Joints	See Note.
Drain Holes	Not applicable.
Channel	
Loose Rock or Trees Overhanging Channel	Trees
Condition of Discharge Channel	Boulders, forest debris.

1/11

VISUAL INSPECTION CHECKLIST

JAM: Egypt Reservoir Dam MA 01063

DATE: November 28, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - SPILLWAY WEIR,
APPROACH AND DISCHARGE CHANNELS

a. Approach Channel

General Condition	Poor
Loose Rock Overhanging Channel	No
Trees Overhanging Channel	Yes, on east side.
Floor of Approach Channel	Sand, gravel and boulders. Vegetation on east side in channel.

b. Weir and Training Walls

General Condition of Concrete	Poor, spillway floor cracked, uplifted and undermined, walls cracked and displaced.
Rust or Staining	Yes
Spalling	Yes, severe
Any Visible Reinforcing	None observed.
Any Seepage or Efflorescence	Yes
Drain Holes	Yes, 5" x 5" drain through spillway wall, with flow from northeast. 1½" steel pipe from north joins 5" x 5" drain. No flow in 1½" steel pipe. Also 2 - 8" drains beneath spillway chute outlet onto spillway discharge apron - no flow from 8" drains.

c. Discharge Channel

General Condition	20'± concrete apron and concrete retaining/training walls discharge to natural channel. Retaining walls are cracked, eroded, spalled and undermined. General condition - poor.
-------------------	--

VISUAL INSPECTION CHECKLIST

DAM: Egypt Reservoir Dam MA 01063

DATE: November 28, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - SPILLWAY WEIR,
APPROACH AND DISCHARGE CHANNELS (cont'd.)

Loose Rock Overhanging
Channel

None

Trees Overhanging Channel

Yes

Floor of Channel

Large boulders

Other Obstructions

Forest

VISUAL INSPECTION CHECKLIST

DAM: Egypt Reservoir Dam MA 01063 DATE: November 28, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - SERVICE BRIDGE

There is no service bridge. Access to control tower would be difficult during periods of high spillway flows.

a. Super Structure

Bearings

Anchor Bolts

Bridge Seat

Longitudinal Members

Under Side of Deck

Secondary Bracing

Deck

Drainage System

Railings

Expansion Joints

Paint

b. Abutment & Piers

General Condition of Concrete

Alignment of Abutment

Approach to Bridge

Condition of Seat & Backwall

APPENDIX B

ENGINEERING DATA

	<u>Page Number</u>
LIST OF AVAILABLE DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS	B-1
PREVIOUS INSPECTION REPORTS	B-2 to B-11
PLANS, SECTIONS AND PROFILES	B-12 to B-17
BORING LOGS	B-18

Egypt Reservoir Dam

1/11

LIST OF AVAILABLE DESIGN,
CONSTRUCTION AND MAINTENANCE RECORDS

A. PLANS AND SPECIFICATIONS

A print of what is reported to be the original 1894 construction plan is on file with the owner, Dalton Fire District at the office of Water Commissioner Arthur E. Crane, Crane & Company, 30 South Street, Dalton, MA. A copy of an unknown reproduction of the original plan was provided and is included in Appendix B-3. No specifications were available.

B. DESIGN RECORDS

No design records were available.

C. CONSTRUCTION RECORDS

A report to the Berkshire County Commissioners regarding construction of the dam is available from the owners.

D. MAINTENANCE

No records of previous maintenance were available from the owner. In 1979, the owner's engineer prepared a topographic survey of the existing dam and a report outlining several options for repairs, improvements or replacement of the dam. This material is available from the owner and the engineer, Tighe & Bond, of Easthampton, MA.

PREVIOUS INSPECTION REPORTS

- A. Inspections of dams were performed by the Massachusetts Department of Public Works, District 1, and reports are on file at District 1 Headquarters, Pittsfield-Lenox Road, Lenox, MA - Latest Report, Description of Dam, and selected correspondence are attached.

- B. Earlier inspections of dams were performed by the Berkshire County Engineer for the County Commissioners, and reports are filed at the County Engineer's office, County Court House, Pittsfield, MA - Latest Report is attached.

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: ~~County~~/Town DALTON Dam No. 1-2-70-6
 Name of Dam Town Supply #2 Inspected by RDJordan-RSpaniol
 Date of Inspection 5/23/78
 Previous Inspection _____

2. Owner/s per: Assessors _____ Personal Contact _____
 Reg. of Deeds _____

1. Dalton Fire District Dalton, MA
 Name Dalton Fire District St. & No. _____ City/Town/State _____ Tel. No. _____
 2. _____
 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.

Wallace Pero Dalton Fire District Dalton
 Name Wallace Pero St. & No. _____ City/Town/State _____ Tel. No. _____

4. No. of Pictures taken 2

5. Degree of Hazard: (If dam should fail completely)*

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

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

6. Outlet Control: Automatic _____ Manual X
 Operative X Yes _____ No _____

Comments: _____

7. Upstream Face of Dam:

Condition: 1. Good _____ 2. Minor Repairs X
 3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

L-168-A

DAM NO. 1-2-70-6

8. Downstream Face of Dam:

Condition: 1. Good X 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

9. Emergency Spillway

Condition: 1. Good _____ 2. Minor Repairs X _____
3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

10. Water level at time of inspection 6' above _____ below X
top of dam X
principal spillway _____
other _____

11. Summary of Deficiencies Noted:

- _____ Growth (Trees & Brush) on Embankment _____
- _____ Animal Burrows and Washouts _____
- _____ Damage to slopes or top of dam _____
- X Cracked or damaged masonry _____
- _____ Evidence of seepage _____
- _____ Evidence of piping _____
- _____ Erosion _____
- _____ Leaks _____
- _____ Trash and/or debris impeding flow _____
- _____ Clogged or blocked spillway _____
- _____ Other _____

- 3 -

12. Remarks & Recommendations; (Fully Explain)
PREVIOUS INSPECTION DATE:

The embankment of this earthen structure is in good shape. The slopes are clear of brush and no settlement or sloughing was noted.

Some areas of seepage were noted at the toe but they are not abnormal and have not increased in size over the years.

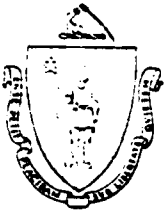
The owners should be advised to repair the concrete over flow spillway as it continues to deteriorate. Several joints in the floor slabs have large cracks & spalls allowing water to flow under the floor. The right wall is badly damaged on the upstream end and several cracks and spalls were noted in both walls. I advised Mr. Pero, Water Supt. to repair the spillway to avoid more costly repairs in the future.

Except for the damaged concrete in the spillway, the dam appears to be in good condition.

Fore location see Topo Sheet 5-A.

13. Overall Condition:

1. Safe _____
2. Minor repairs needed _____
3. Conditionally safe - major repairs needed _____
4. Unsafe _____
5. Reservoir impoundment no longer exists (explain)
Recommend removal from inspection list _____



The Commonwealth of Massachusetts

LISTED SURVEY
REC'D 6/22/76

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

100 Nashua Street, Boston 02114

June 11, 1976

Dalton Fire District
Dalton
Massachusetts

RE: Inspection Dam #1-2-70-6
Dalton
Town Supply #2 Dam

Gentlemen:

On November 25, 1975, an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be Dalton Fire District. 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 safe; however the following conditions were noted that require attention:

Concrete spillway in need of repairs.

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,

DAVID STANLEY
Commissioner

A.Mc:eh

DESCRIPTION OF DAM

DISTRICT ONESubmitted by R D JordanDam No. 1-2-70-6

Date _____

City/Town DALTONName of Dam Town Supply #2 (Egypt)1. Location: Topo Sheet No. 5-A

Provide 8-1/2" x 11" in clear copy of topo map with location of Dam clearly indicated.

2. Year built: 1885 Year/s of subsequent repairs 19613. Purpose of Dam: Water Supply Recreational _____
Irrigation _____ Other _____4. Drainage Area: 1 sq. mi. _____ acres.5. Normal Ponding Area: _____ Acres; Avg. Depth _____
Impoundment: 800 gals; _____ acre ft.6. No. and type of dwellings located adjacent to pond or reservoir _____
i.e. summer homes etc. _____7. Dimensions of Dam: Length 340' Max. Height 20'
Slopes: Upstream Face earth
Downstream Face earth 1/1
Width across top 15'8. Classification of Dam by Material:
Earth Conc. Masonry _____ Stone Masonry _____
Timber _____ Rockfill _____ Other _____9. A. Description of present land usage downstream of dam: _____
100 % rural; _____ % 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 _____

10. Risk to life and property in event of complete failure.

No. of people None.

No. of homes ".

No. of Businesses ".

No. of Industries ".

Type _____.

No. of Utilities ".

Type _____.

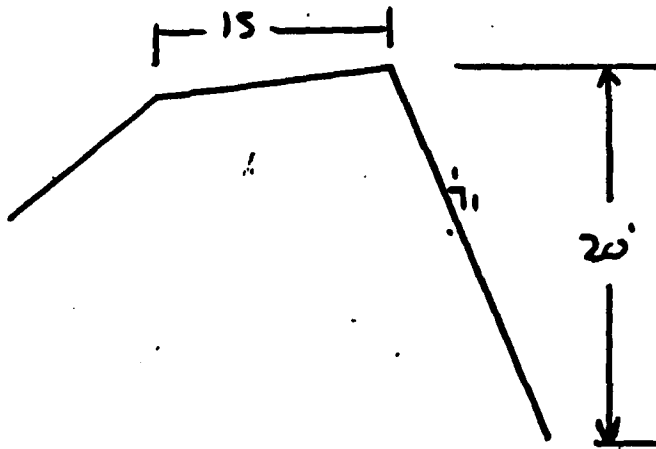
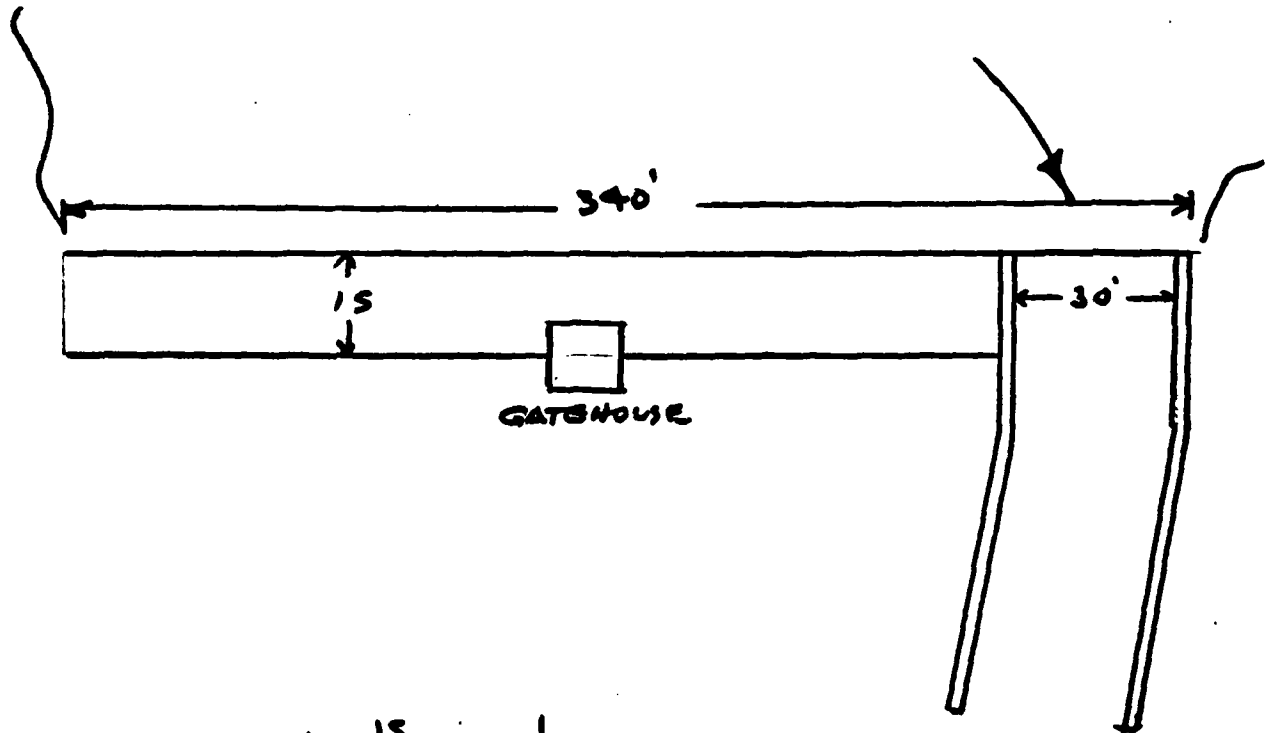
Railroads ".

Other dams ".

Other Center Pond.

11. Attach Sketch of dam to this form showing section and plan on 8-1/2" x 11" sheet.

LOWN SUPPLY #2 (EGYPT)
1-2-70-6



DAM FREEBOARD - 4'



B-10

(County of Berkshire Engineering Department)

INSPECTION OF DAMS

Dam #6-10

City or Town of Dalton Date June 10, 1971

Name of Dam Town Supply #2 - Egypt Inspector H. Northrup
P. Fezzie

Owner Dalton Fire District Address Town Hall - Dalton

Caretaker Wallace Pero Address 19 Chestnut Street - Dalton

Location on north Mountain - north of Holiday Road

Type of Dimensions earth embankment - 340' long - 20' high

Spillway, type and size 20' wide paved overflow - 3' freeboard

Outlets, type and size 12" CI pipe and gate

Flashboards, type and height none

Date Built 1885 Condition good, except as noted

When last repaired 1961 By whose orders owner

Nature of Repairs walls and part of spillway - floor pointed

Purpose of Dam Town water supply

Approximate storage of water 8 MG

Approximate area of water shed 1 square mile, mostly spring fed

Possible damage due to failure of dam to property below

Remarks outlet partially open - water at spillway level - spillway walls cracked -

holes in floor of spillway overflow entire embankment overgrown with brush

Recommendations clear brush - repair concrete as needed

17/10

A. SKETCHES COMPILED DURING PHASE I INSPECTION SHOWING
GENERAL LAYOUT OF DAM, TYPICAL SECTIONS AND DETAILS
OF SIGNIFICANT FEATURES:

Figure 1. General Plan of Damsite

Figure 2. Profile and Spillway Section

Figure 3. Typical Section

B. RECORD PLANS:

Copy of unknown reproduction of 1894 construction
plan. (2 sections)

EGYPT RESERVOIR

4 DIA. MORTARED STONE MASONRY MANHOLE WITH EMBEDDED STEEL STEPS

Steel valve stem in guides at side of manhole guides are loose. Top of manhole is open, 21' down to water in bottom of manhole

WOOD FRAME GATE HOUSE

7 1/2' x 7 1/2' open on 2 sides

Settlement of crest around gatehouse

LARGE COBBLE AND SMALL BOULDER RIPRAP, 3:1

6" WAVE BENCH ABOVE RIPRAP

Spillway Crest Pool

4" Deep Depression 3' x 2' Area

ANIMAL BURROW

1 1/2" PIEZOMETERS (5)

6" deep depression 1' x 1' area

Downstream slope steep undulating and irregular

Soft area

12" CP — cracked and leaking Westery Conduit

10" CP Easterly Conduit (1/4 gpm)

Note: Both outlet pipes are laid on the ground. There are no headwalls or aprons.

Area of soft muddy ground

LIVE TREES AND STUMPS AT TOE OF EMBANKMENT

Area of dumped boulders

Bulge in crest NATURAL SLOPE

Low area in crest

DRY LAID STONE RETAINING WALL

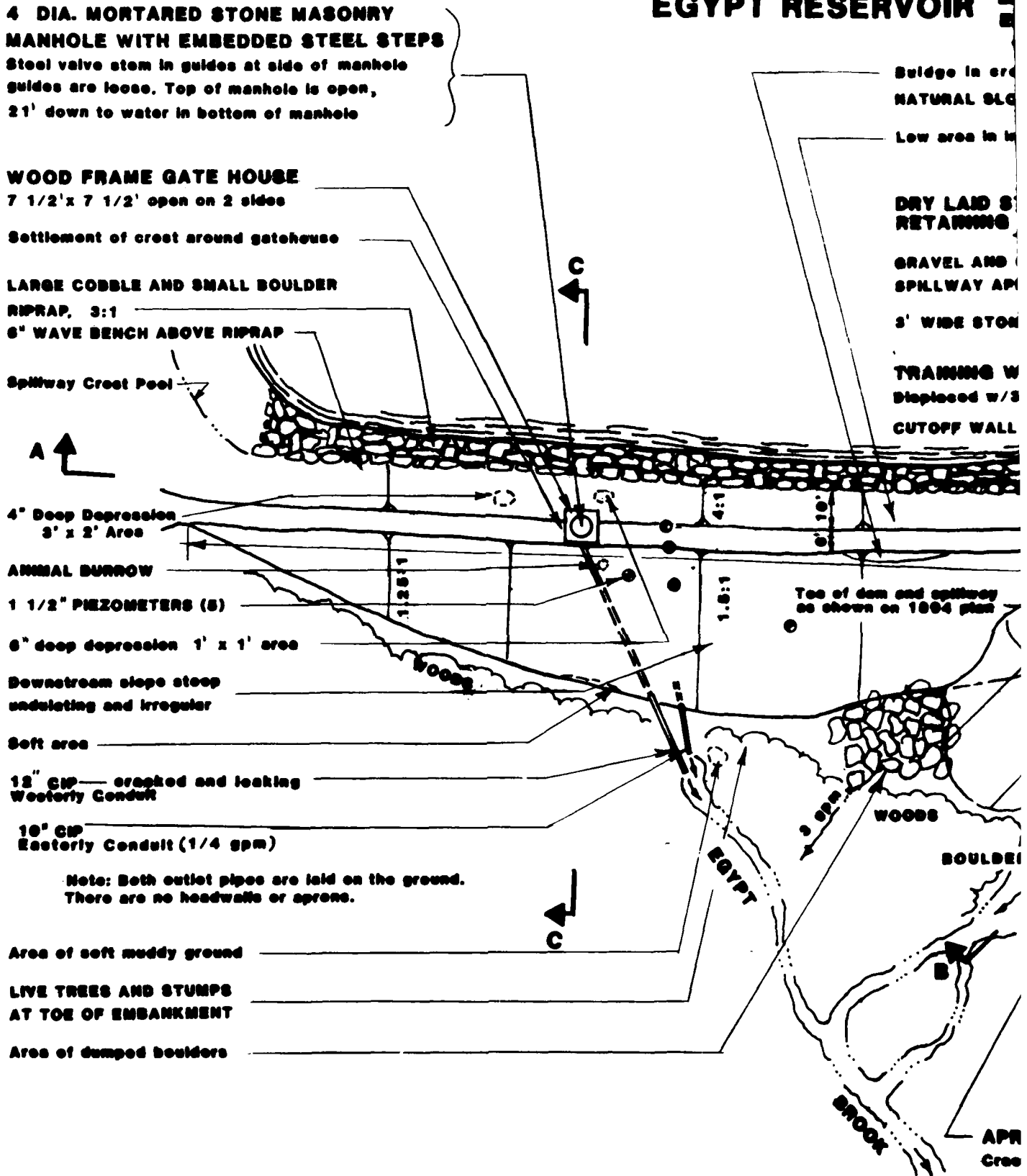
GRAVEL AND SAND SPILLWAY APRON

3' WIDE STONE

TRAINING WALL Displaced w/3

CUTOFF WALL

Toe of dam and spillway as shown on 1894 plan



VOIR EL 1481.8 in Nov. 1980
 EL 1488.8 NGVD SPILLWAY CREST

Bulge in crest toward downstream
 NATURAL SLOPE STEEP AND WOODED

Low area in in crest

**DRY LAID STONE
 RETAINING WALL**

GRAVEL AND COBBLE FLOOR OF
 SPILLWAY APPROACH CHANNEL

3' WIDE STONE SLAB AT CREST

TRAINING WALL
 Displaced w/3"-6" crack

CUTOFF WALL

340'±

and spillway
 in 1984 plan

WOODS

BOULDERS

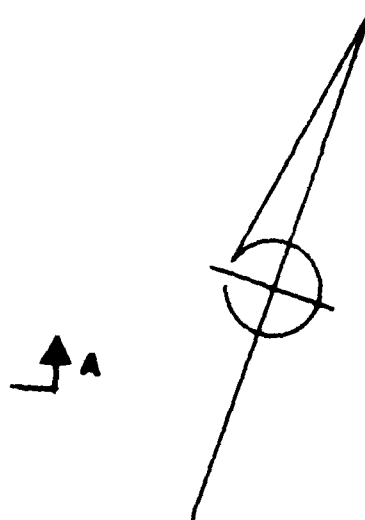
3" DRAIN HOLE WITH
 CLEAR FLOW FROM
 NORTH EAST. 1 1/2"
 PIPE ENTERING FROM
 NORTH

6" DRAINS

APRON

Cracked, with separated masses of concrete

NOTE: Elevation Datum is based on elevation
 of top of Egypt Reservoir Dam as shown
 on USGS Pittsfield East, Mass. Quadrangle
 Top EL. 1470 NGVD



SPILLWAY CHUTE
 Walls cracked,
 eroded, displaced, and
 separated from floor.
 Floor is cracked,
 undermined, uplifted

**APPENDIX B FIGURE 1
 GENERAL PLAN**

DEPARTMENT OF THE ARMY
 NEW ENGLAND DIVISION
 CORPS OF ENGINEERS

ROBERT G. BROWN & ASSOCIATES, INC.
 Pittsfield, Massachusetts

NATIONAL PROGRAM FOR
 INSPECTION OF NON-FEDERAL DAMS
EGYPT RESERVOIR DAM

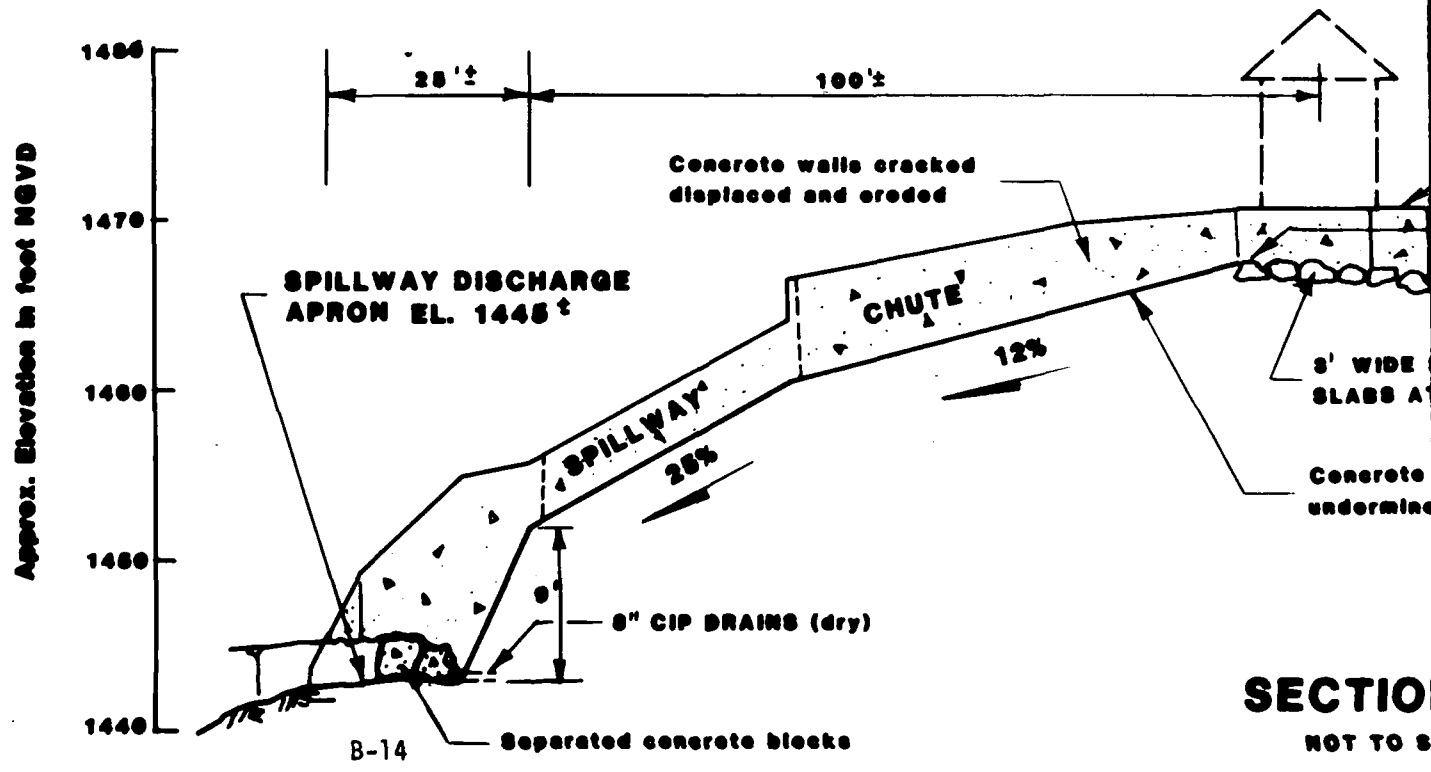
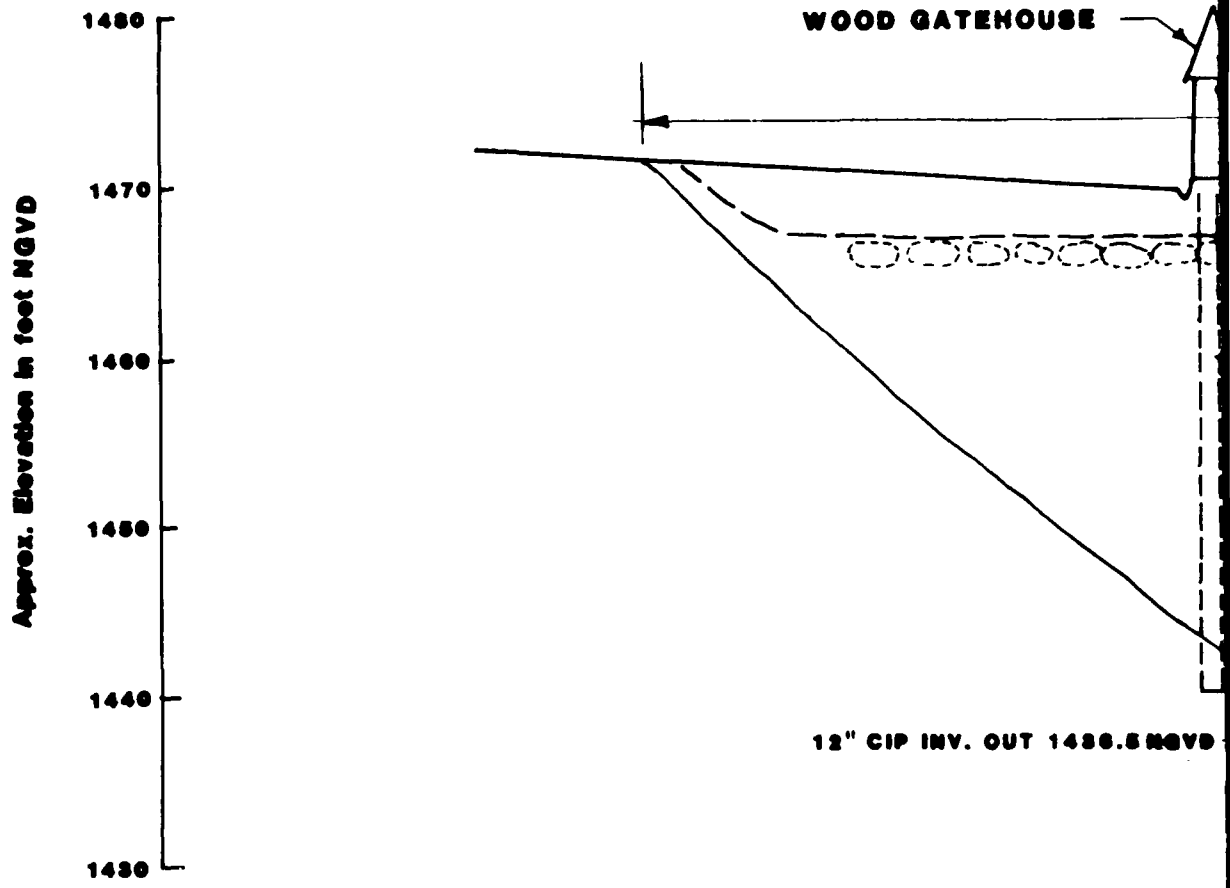
MA 01063

EGYPT BROOK

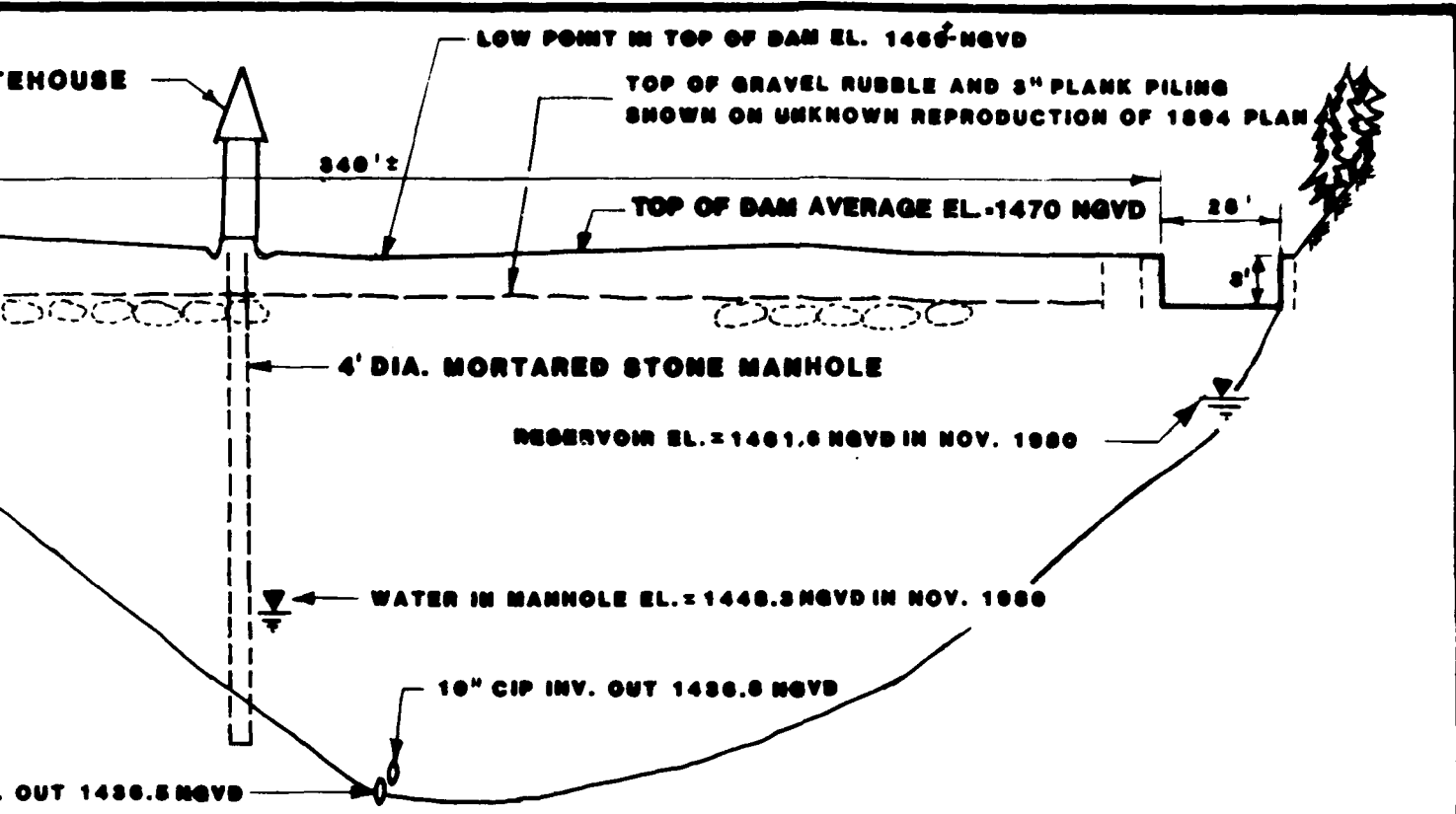
DALTON

MASSACHUSETTS

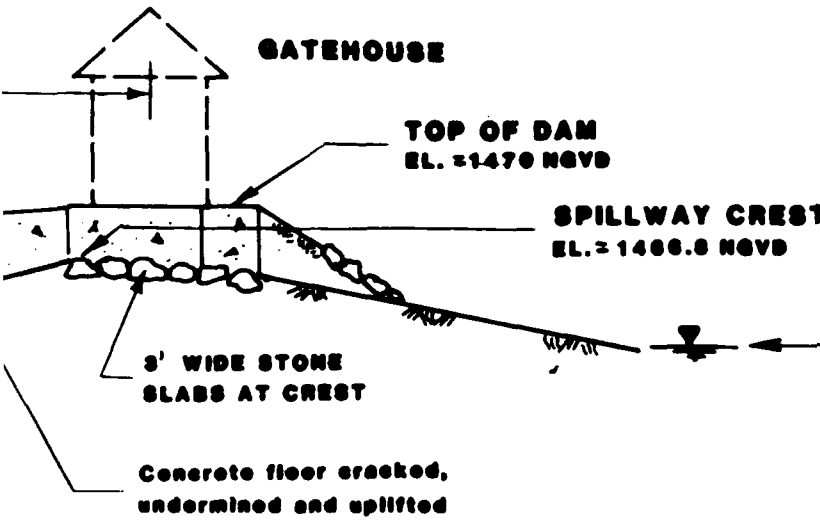
SCALE: NOT TO SCALE | DATE: JAN 1981



SECTION
NOT TO S



SECTION A-A
NOT TO SCALE



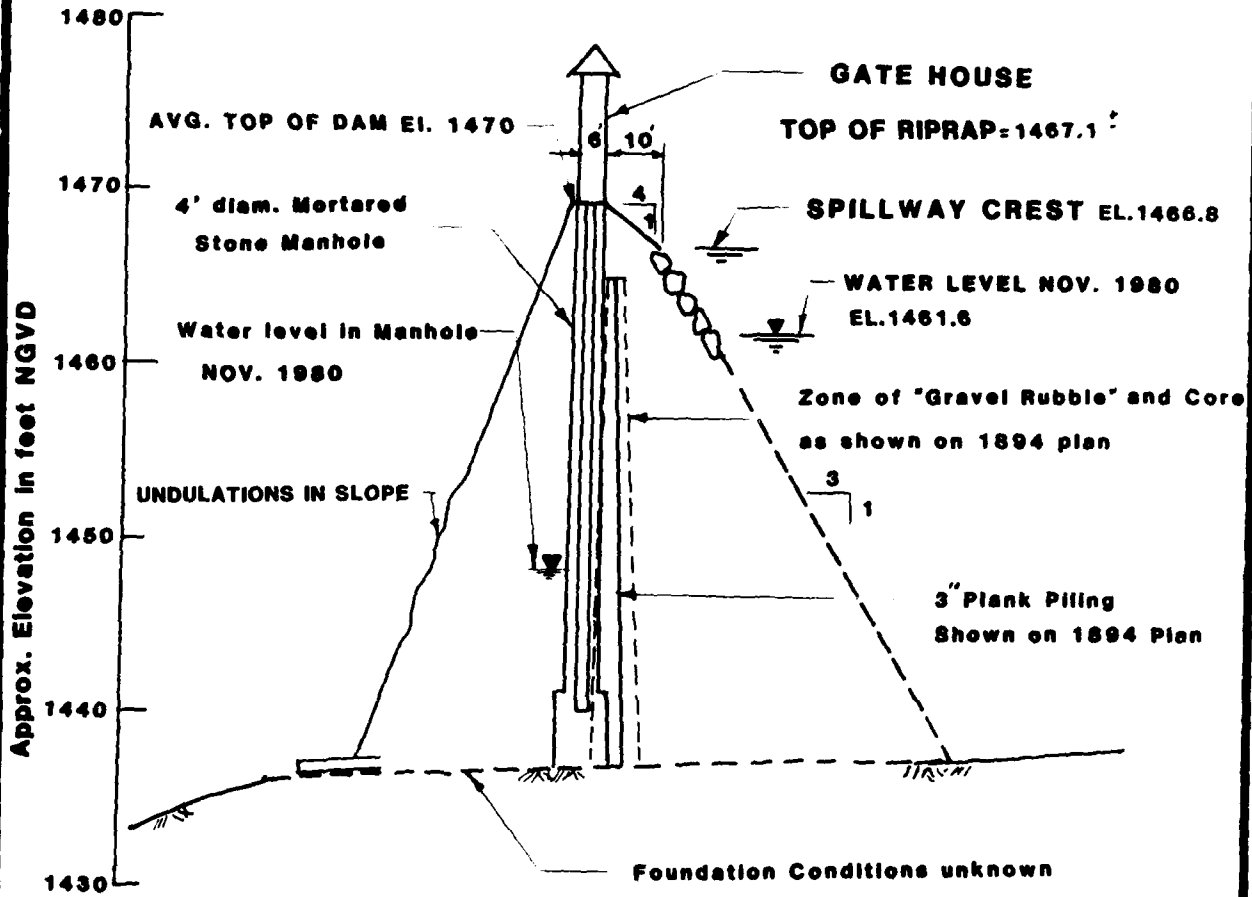
NOTE: Elevation datum is based elevation of Top of Egypt Reservoir Dam as shown on USGS Pittsfield East, Mass. Quadrangle

SECTION B-B
NOT TO SCALE

APPENDIX B FIGURE 2

EGYPT RESERVOIR DAM

NOTE: Elevation datum is taken from elevation of top of Egypt Reservoir Dam as shown on USGS Pittsfield East, Mass. Quadrangle



SECTION C-C
NOT TO SCALE

APPENDIX B FIGURE 3

B-15

EGYPT RESERVOIR DAM

WICKLE

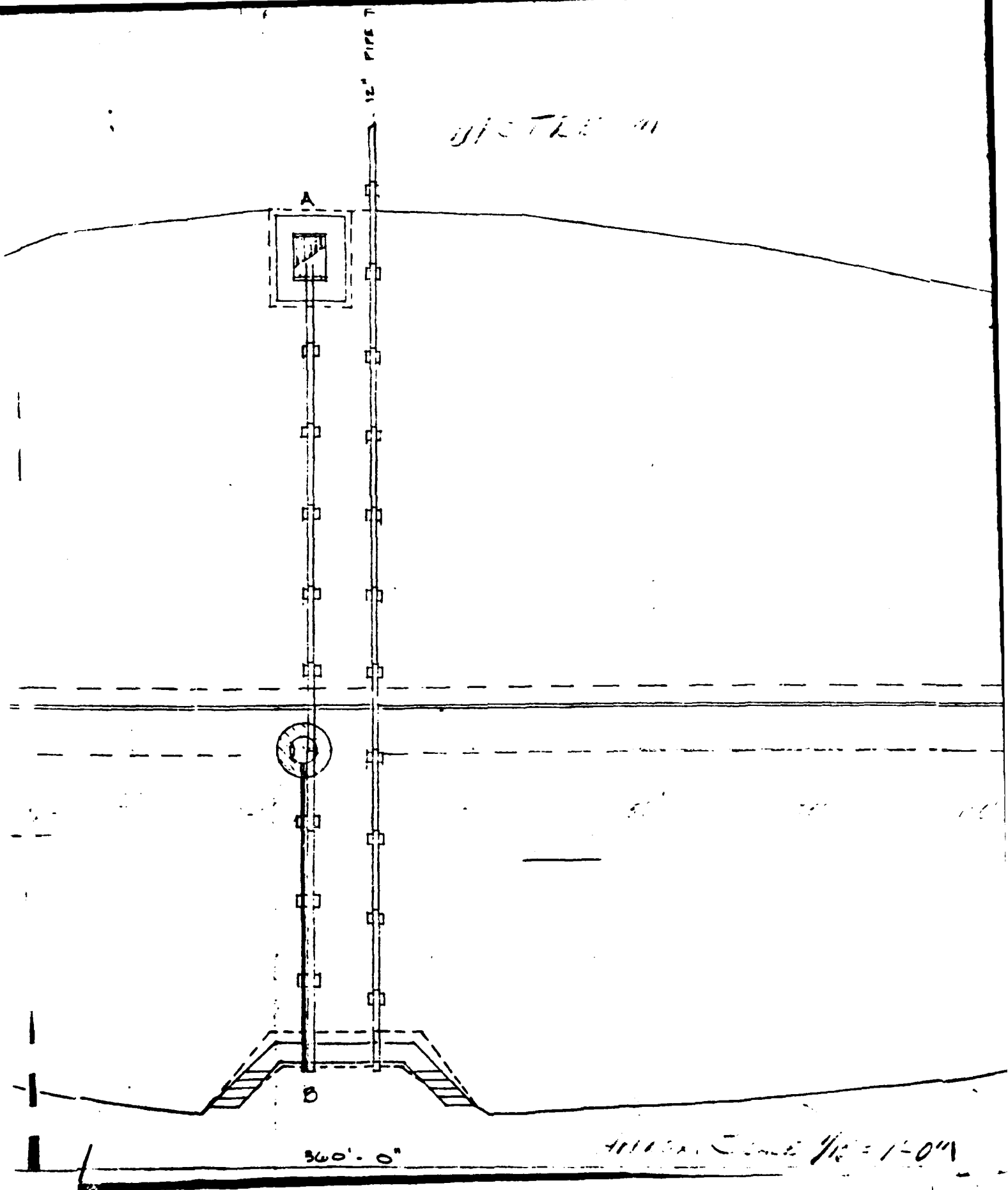
12" PIPE

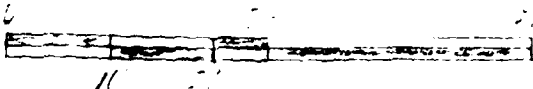
A

B

360' - 0"

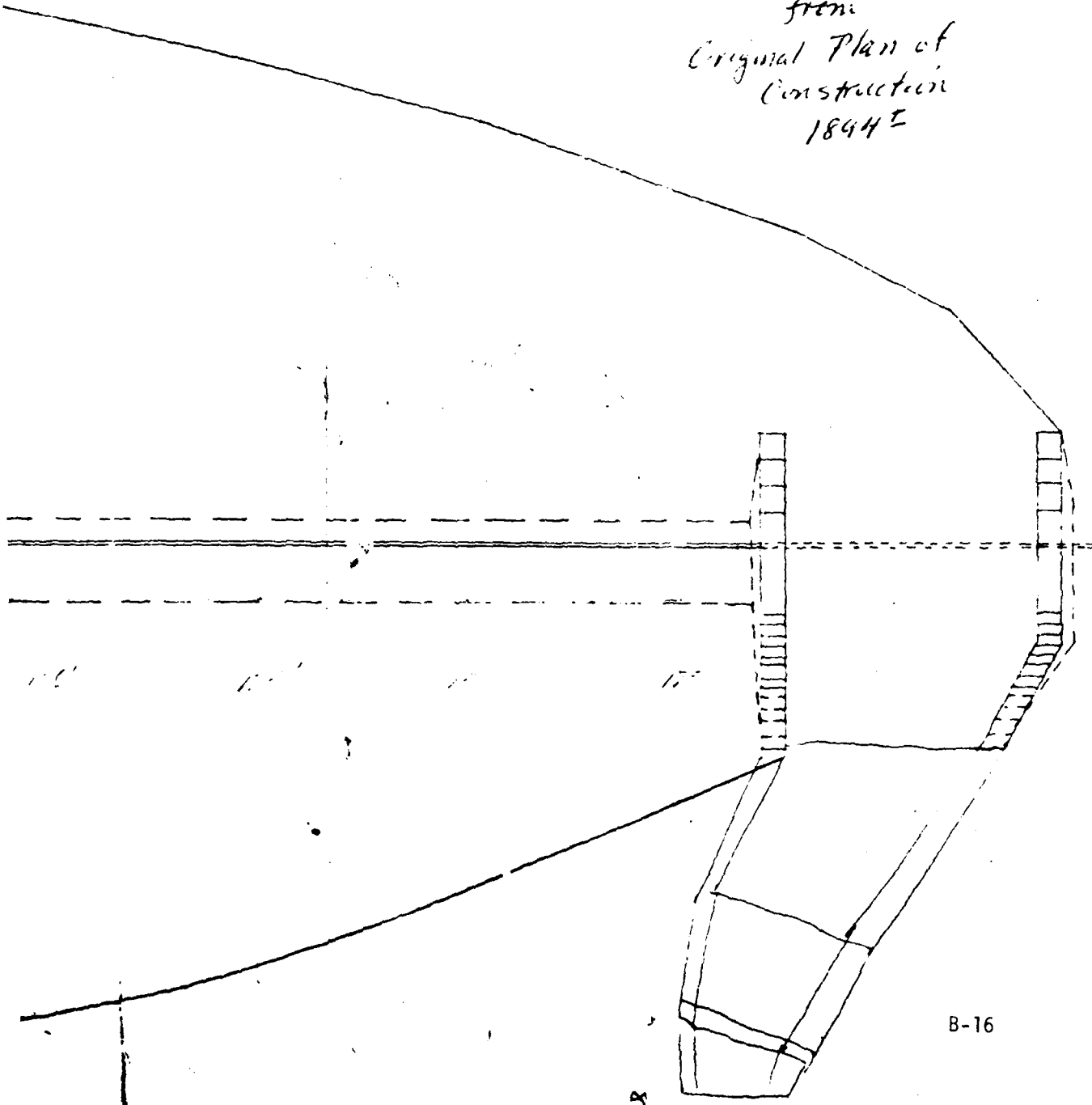
411' 0" LONG 1/2" = 1'-0"





100 200 300

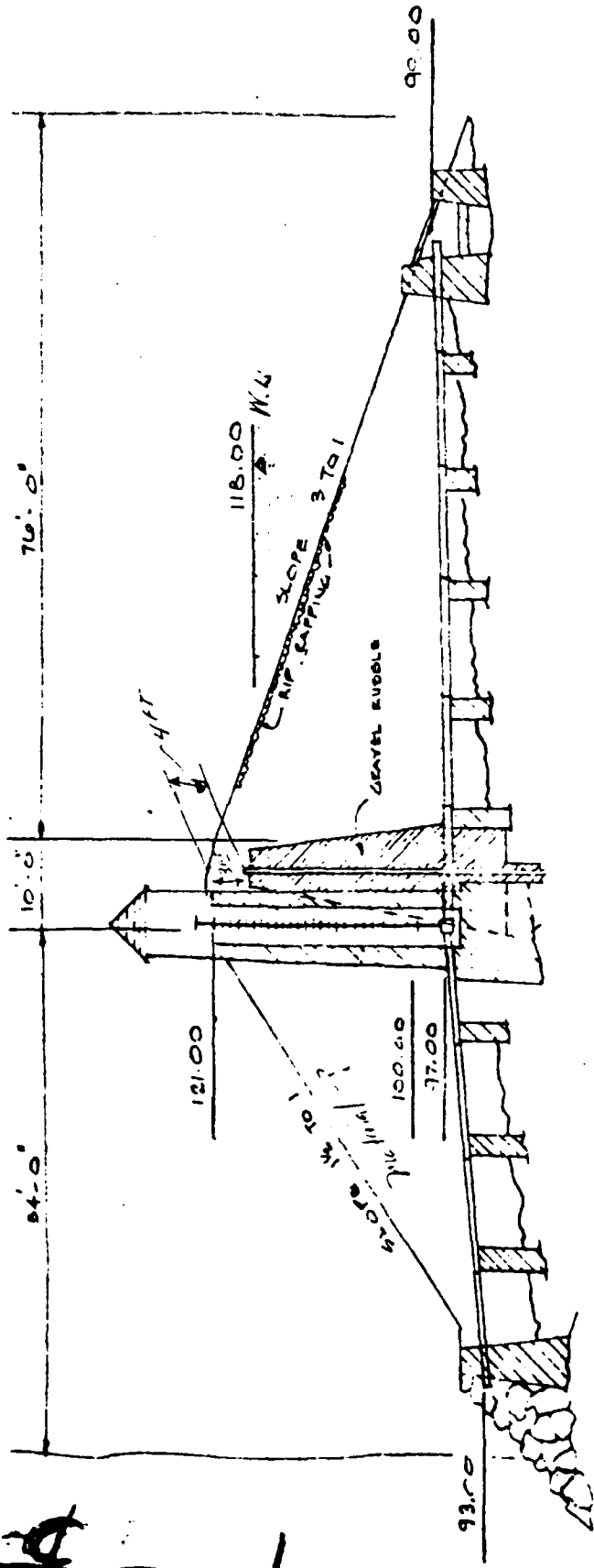
Unknown reproduction
from
Original Plan of
Construction
1844^E



100 150 200 250 300 350 400 450 500

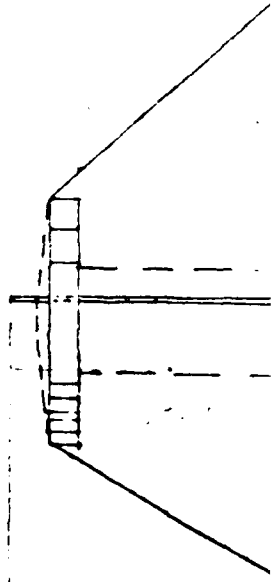
B-16

2



SECTION THROUGH A-B

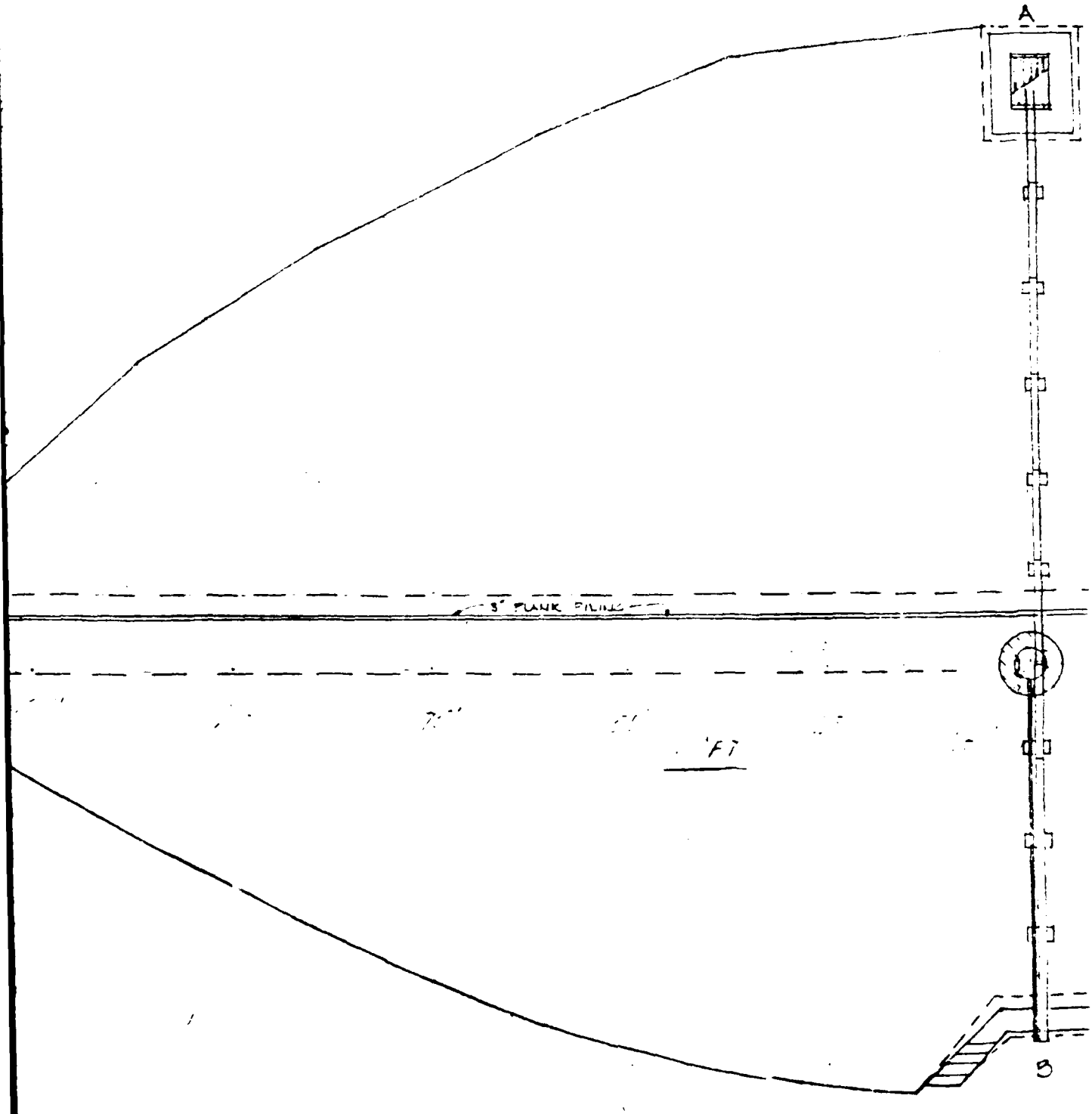
Handwritten notes or annotations, possibly including a scale or reference.



Handwritten numbers and symbols, including 'D-21' and '66'.

1/1/11

3



5" PLANK PILING

FT

B-17

360

2



TYPICAL BORING LOGS

None available.

Egypt Reservoir 1

1/1/61

APPENDIX C

PHOTOGRAPHS

	<u>Page Number</u>
Photograph Index	C-1
Photographs	C-2 to C-10

Egypt Reservoir Dam

EGYPT RESERVOIR

4 DIA. MORTARED STONE MASONRY MANHOLE WITH EMBEDDED STEEL STEPS
 (2" round stem in guides at side of manhole to stir and loose. Top of manhole is open, 2' down to water in bottom of manhole)

WOOD FRAME GATE HOUSE
 7 1/2' x 7 1/2' open on 2 sides

Settlement of crest around gatehouse

LARGE COBBLE AND SMALL BOULDER RIPRAP, 3:1

6" WAVE BENCH ABOVE RIPRAP

Spillway Crest Pool

A ↗

4" Deep Depression
 3' x 2' Area

ANIMAL BURROW

1 1/2" PIEZOMETERS (5)

6" deep depression 1' x 1' area

Downstream slope steep undulating and irregular

Soft area

12" CIP — cracked and leaking
 Westerly Conduit

10" CIP
 Easterly Conduit (1/4 gpm)

Note: Both outlet pipes are laid on the ground.
 There are no headwalls or aprons.

Area of soft muddy ground

LIVE TREES AND STUMPS
 AT TOE OF EMBANKMENT

Area of dumped boulders

DRY LANE
 RETAINING WALL

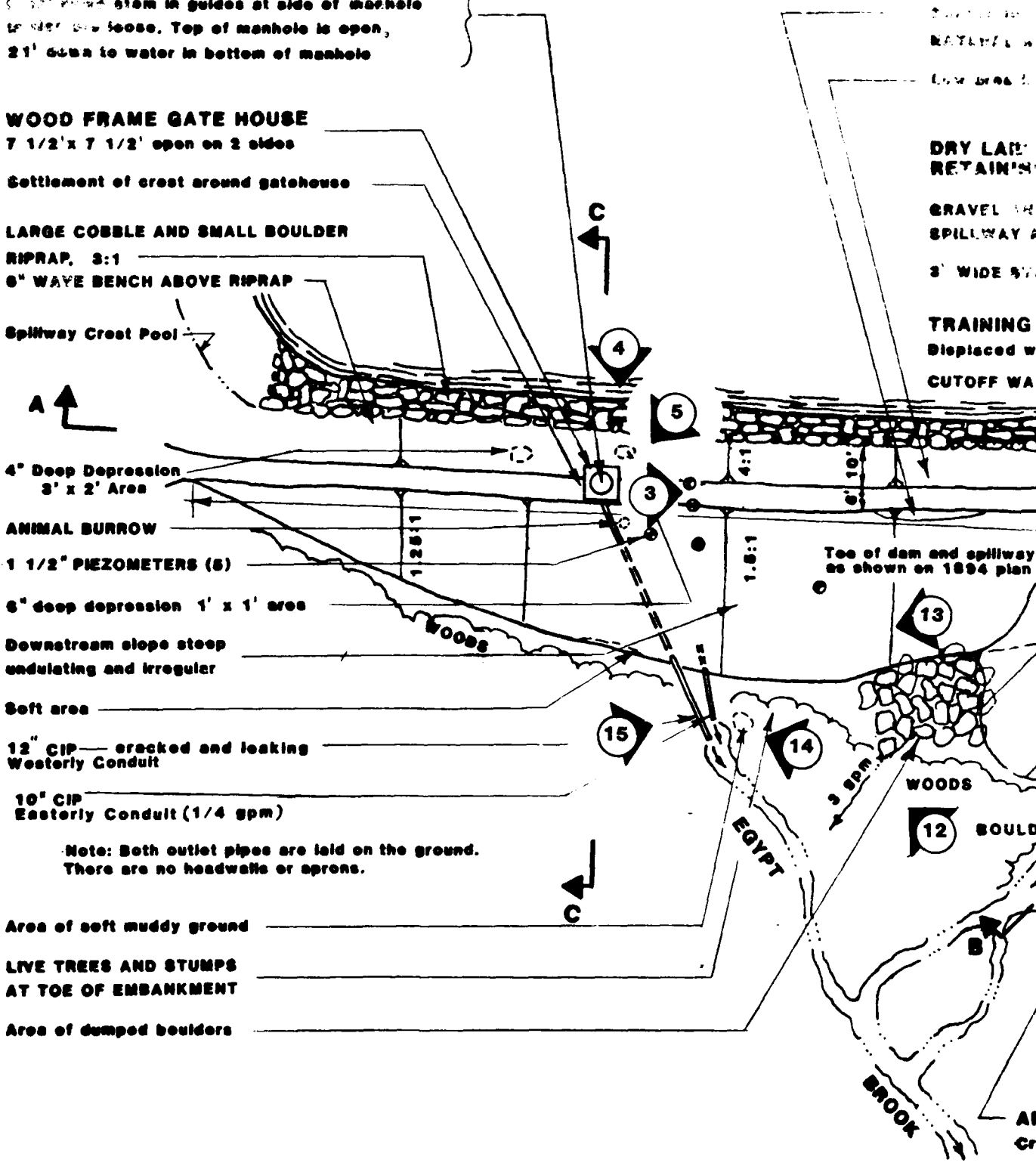
DRY LANE
 RETAINING WALL

GRAVEL
 SPILLWAY

3' WIDE ST.

TRAINING
 Displaced w

CUTOFF WALL



Toe of dam and spillway as shown on 1894 plan

WOODS

WOODS

EGYPT

BOULD

BROOK

AP
 Cri

RESERVOIR EL. 1461.6 in 1980
 EL. 1466.8 HOVD SPILLWAY CREST

Elevation datum is based on elevation
 of the top of Reservoir Dam as shown
 on the 1894 plan. Elevation of the
 top of the spillway crest

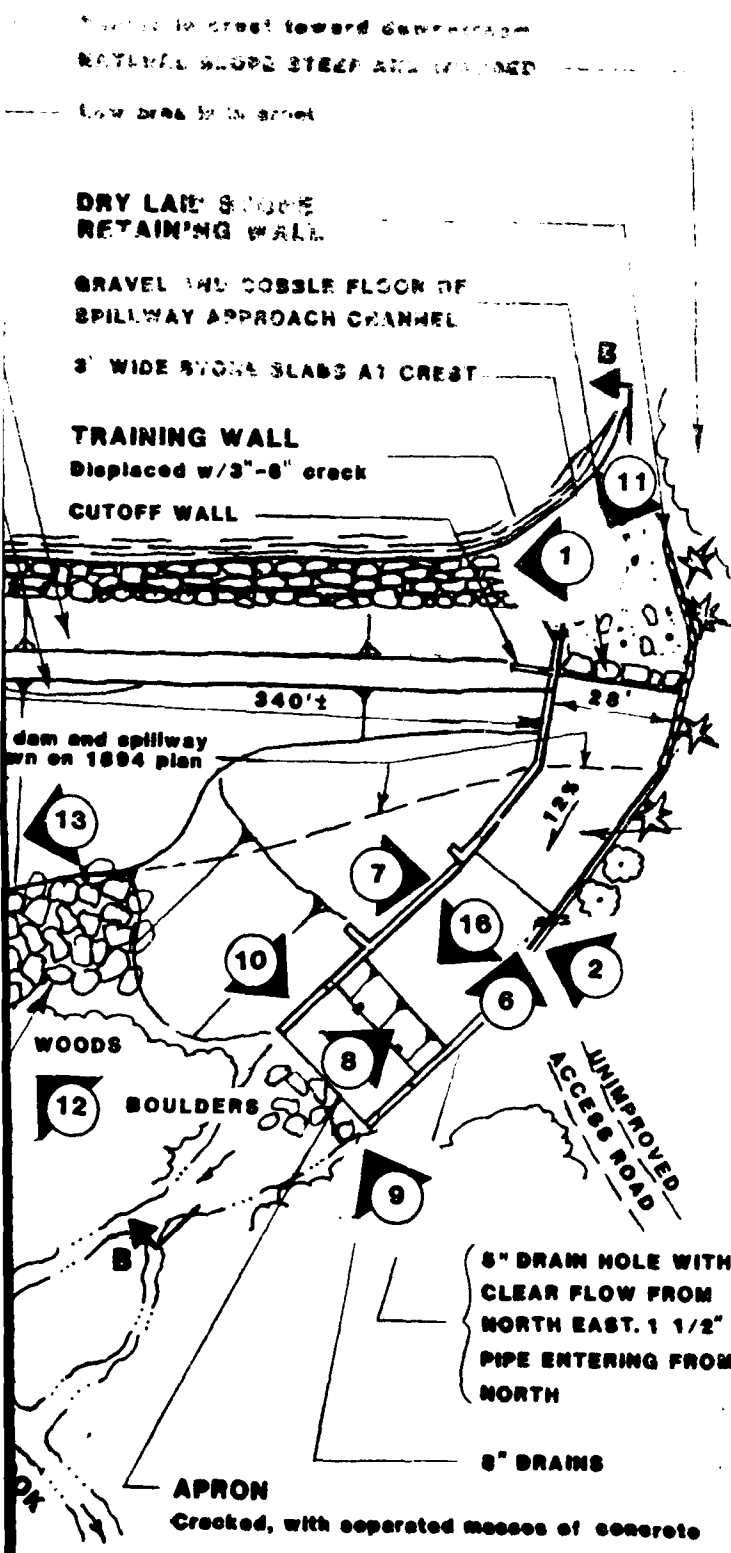
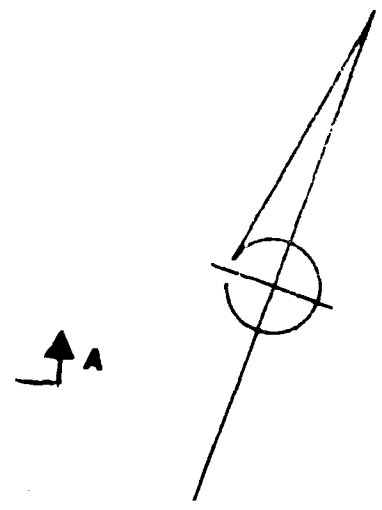


PHOTO NUMBER 17 IS OF
 LITTLE EGYPT RESERVOIR



INDICATES PHOTOGRAPH NUMBER AND
 DIRECTION IN WHICH PHOTOGRAPH
 WAS TAKEN

APPENDIX C-1
PHOTOGRAPH INDEX

DEPARTMENT OF THE ARMY
 NEW ENGLAND DIVISION
 CORPS OF ENGINEERS

ROBERT G. BROWN & ASSOCIATES, INC.
 Pittsfield, Massachusetts

NATIONAL PROGRAM FOR
 INSPECTION OF NON-FEDERAL DAMS
EGYPT RESERVOIR DAM

MA 01063
 EGYPT BROOK

DALTON MASSACHUSETTS

SCALE: NOT TO SCALE DATE: JAN 1981



Photograph 1

View of upstream
slope showing cobble
and small boulder
riprap. Note wave
bench above riprap.



Photograph 2 - Crest looking east showing steep downstream
slope and gatehouse.

C-2

Egypt Reservoir Dam



Photograph 3 - Crest looking east. Note slight downstream bulge in crest beyond piezometers.



Photograph 4 - Upstream end of gatehouse showing recent vandalism.



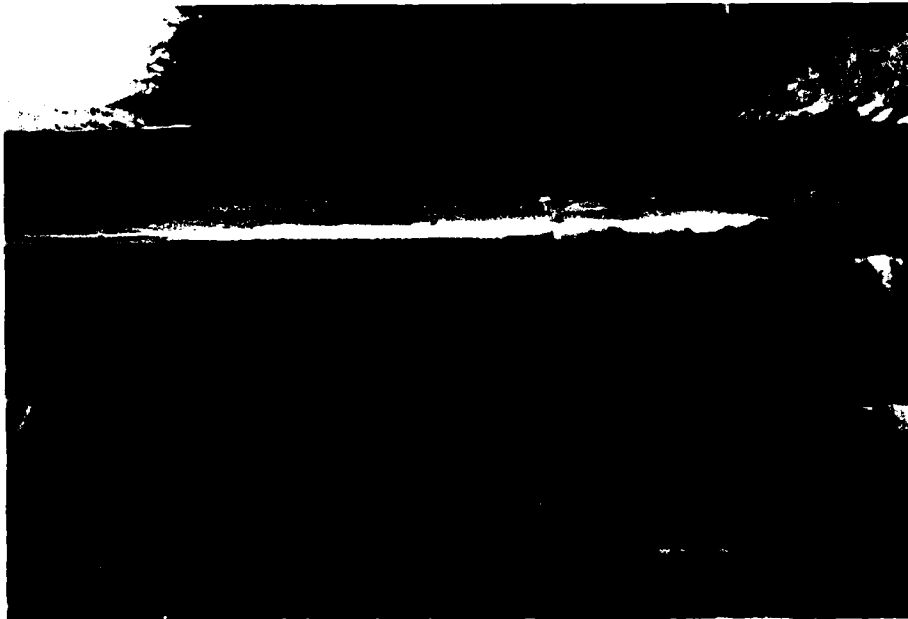
Photograph 5 - View of 4-foot diameter grouted stone manhole with gate shaft for regulating conduit. Safety of steps is questionable.



Photograph 6 - View of westerly wall of spillway channel. Note projections of wall into embankment.



Photograph 7 - View of easterly wall of spillway channel.
Note cracked, undermined and uplifted floor
slabs. Note outlet of 5-inch drain from
easterly slope at hole in upper part of wall.



Photograph 8 - View of spillway channel looking upstream from
dropwall. Note cracked floor and walls.



Photograph 9 - Westerly wall of spillway discharge apron.



Photograph 10 - Easterly wall of spillway discharge apron.
Note 1 of 2 cast iron drains at right side
of photograph.

C-6

Egypt Reservoir Dam



Photograph 11 - Upstream end of westerly spillway wall showing crack and displacement. Note stone slabs on crest.



Photograph 12

Area of dumped
boulders located
to the east of dam
center at toe.

C-7

Egypt Reservoir Dam



Photograph 13 - View of downstream toe showing trees at base of dam and near conduits. Note recently cut tree.



Photograph 14 - Outlet of regulating conduit and conduit to the east. Note that both conduits have no headwalls and rest on the ground.



Photograph 15 - View of crack in regulating outlet conduit. Note leakage from crack.



Photograph 16 - Spillway discharge apron and discharge channel at east end of dam.



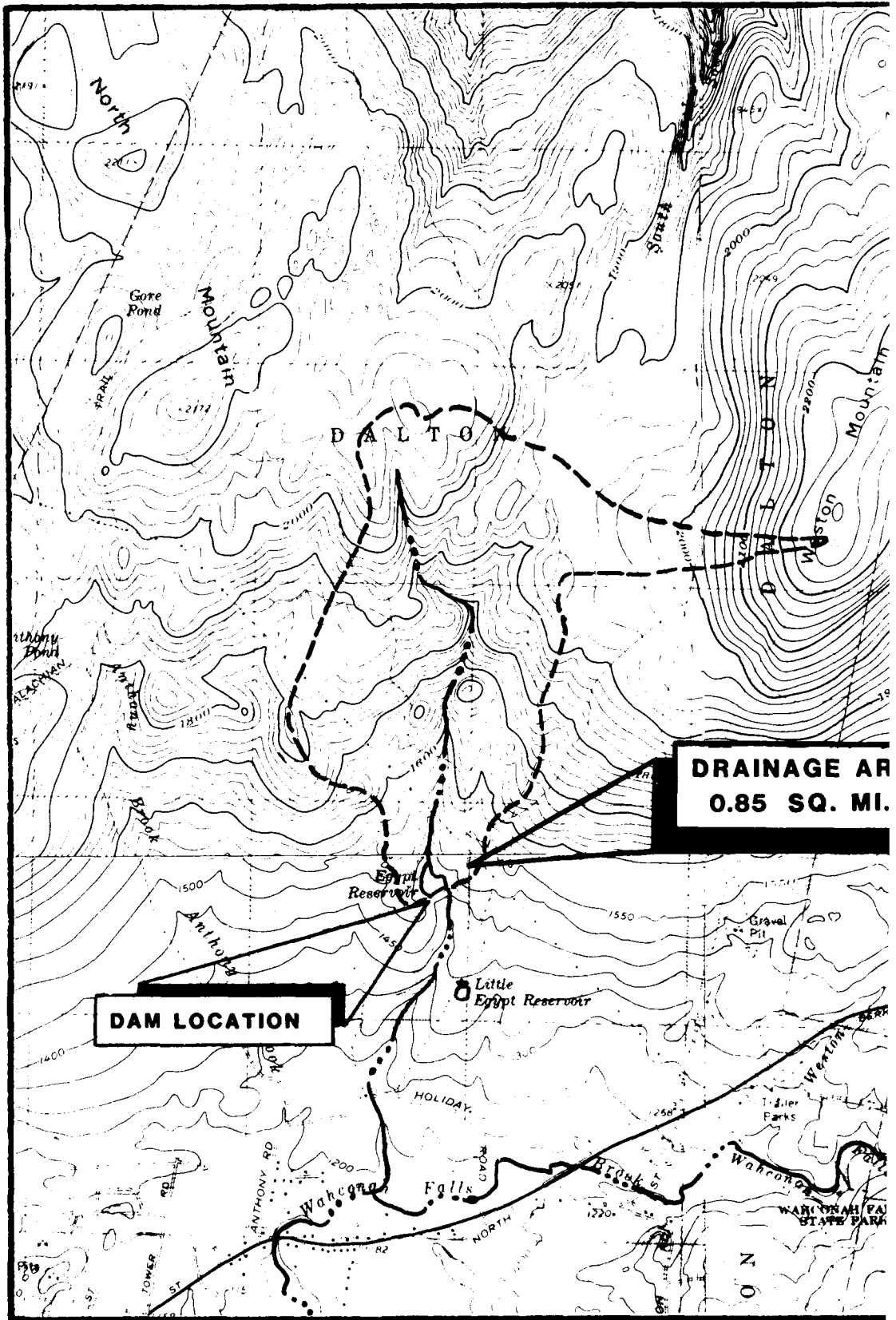
Photograph 17 - View of Lower Egypt Reservoir
(Reservoir 1) looking downstream.
This is the water treatment area
and distributing works for the
Dalton Fire District

APPENDIX D

HYDRAULIC AND HYDROLOGIC COMPUTATIONS

	<u>Page Number</u>
DRAINAGE AREA MAP	D-1
COMPUTATIONS	D-2 to D-13

Egypt Reservoir Dam



**DRAINAGE AREA
0.85 SQ. MI.**

DAM LOCATION

EGYPT RESERVOIR DAM

DALTON, MASS.

Identification No. MA 01063



Pittsfield East Q

DRAINAGE AREA

APPENDIX D-1

1:2500

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB MA C1063 - EGYPT RES
SHEET NO 1 OF 12
CALCULATED BY JW DATE 1/9/81
CHECKED BY dlm DATE 1/17/81
SCALE _____

DETERMINATION OF TEST FLOOD

DRAINAGE AREA = 0.85 SQ MI (545[±] AC)

MOUNTAINOUS TERRAIN

USING NED COE "PRELIMINARY GUIDANCE FOR ESTIMATING MAXIMUM
PROBABLE DISCHARGES IN PHASE 1 DAM SAFETY
INSPECTIONS" MARCH 1978

PMF = 2500 CSM × 0.85 SQ MI = 2125 CFS

SAY 2100 CFS

1/2 PMF = 1050 CFS

HAZARD POTENTIAL CLASSIFICATION: HIGH

SIZE CLASSIFICATION: SMALL (≥ 25 FT AND < 40 FT)

RECOMMENDED TEST FLOOD RANGE:

1/2 PMF TO PMF

USE 1/2 PMF because impoundment small

$Q = CLH^{3/2}$

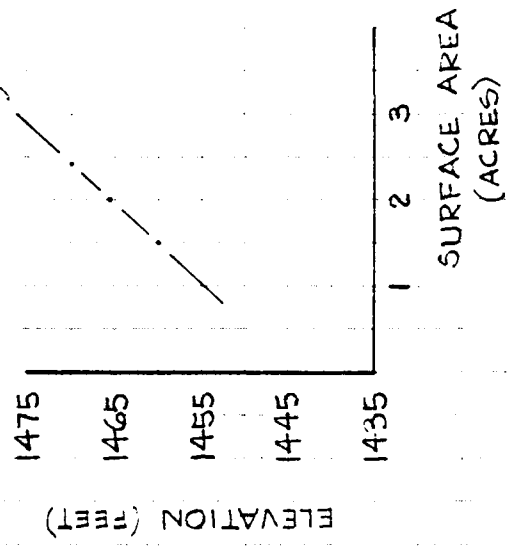
$Q = \frac{C}{C} \sqrt{2gh}$
 $C = (1 + Km + KPL)^{1/2}$

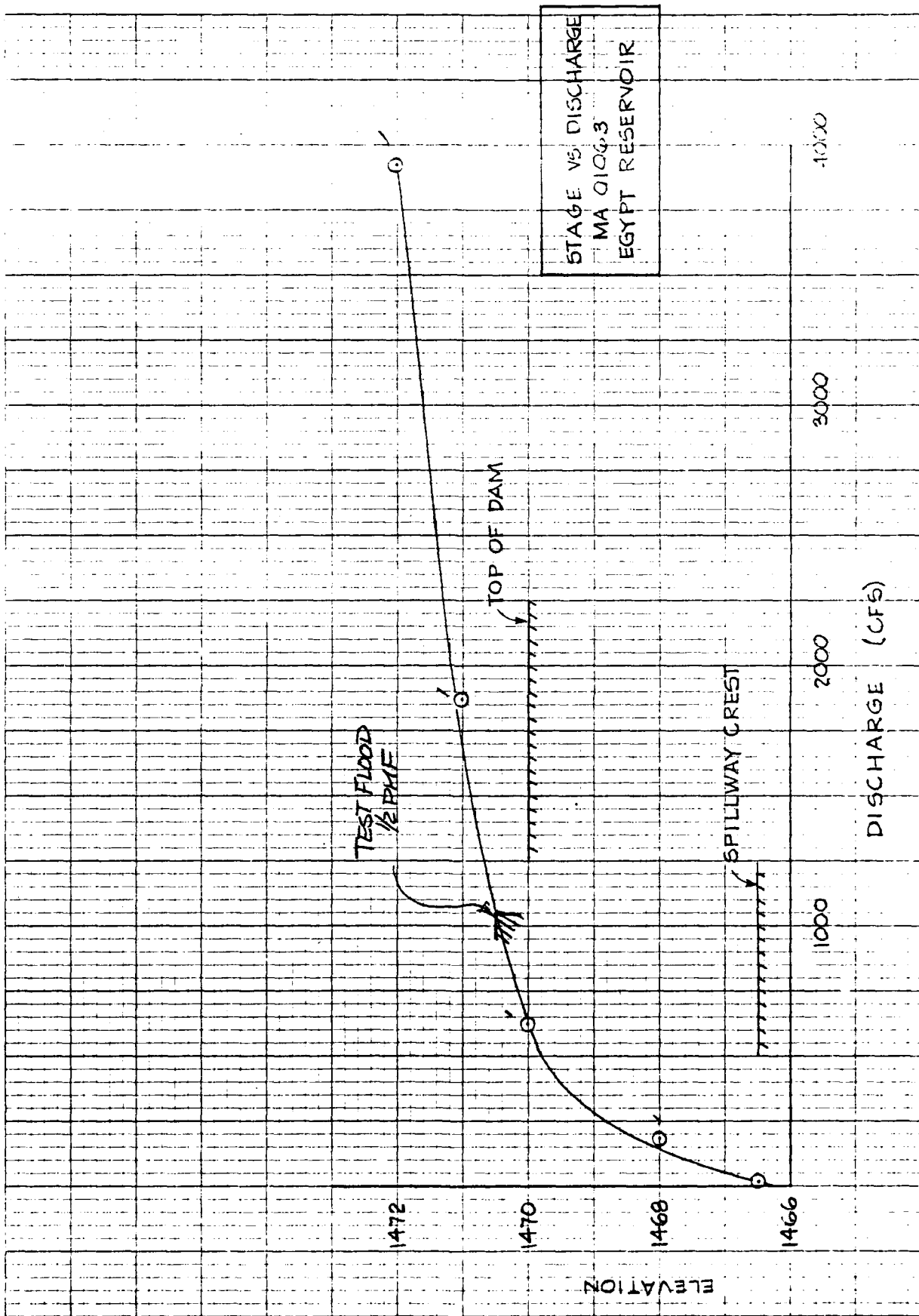
ELEV	SPILLWAY			CONDUIT					FLOW OVER DAM				TOTAL	
	C	L	H	C	a	h	Q	C	Q	H	L	C	Q	Q (CFS)
1466.5	3.1	28	0	2.10	0.79	30±	0	17						17 ✓
1468.0			1.5				160 ✓							177 ✓
1470.0			3.5				570 ✓				2.9	340	0 ✓	570 ✓
1471.0			4.5				830 ✓				"	"	986 ✓	1816 ✓
1472.0			5.5				1120 ✓				"	"	2789 ✓	3909 ✓
1470.5			4.0				695							

Capacity of 10" Conduit - if operable ; a = 0.54 ft²
 $Q \propto a ; Q = \frac{0.54}{0.79} \times 17 \approx 12 \text{ cfs}$

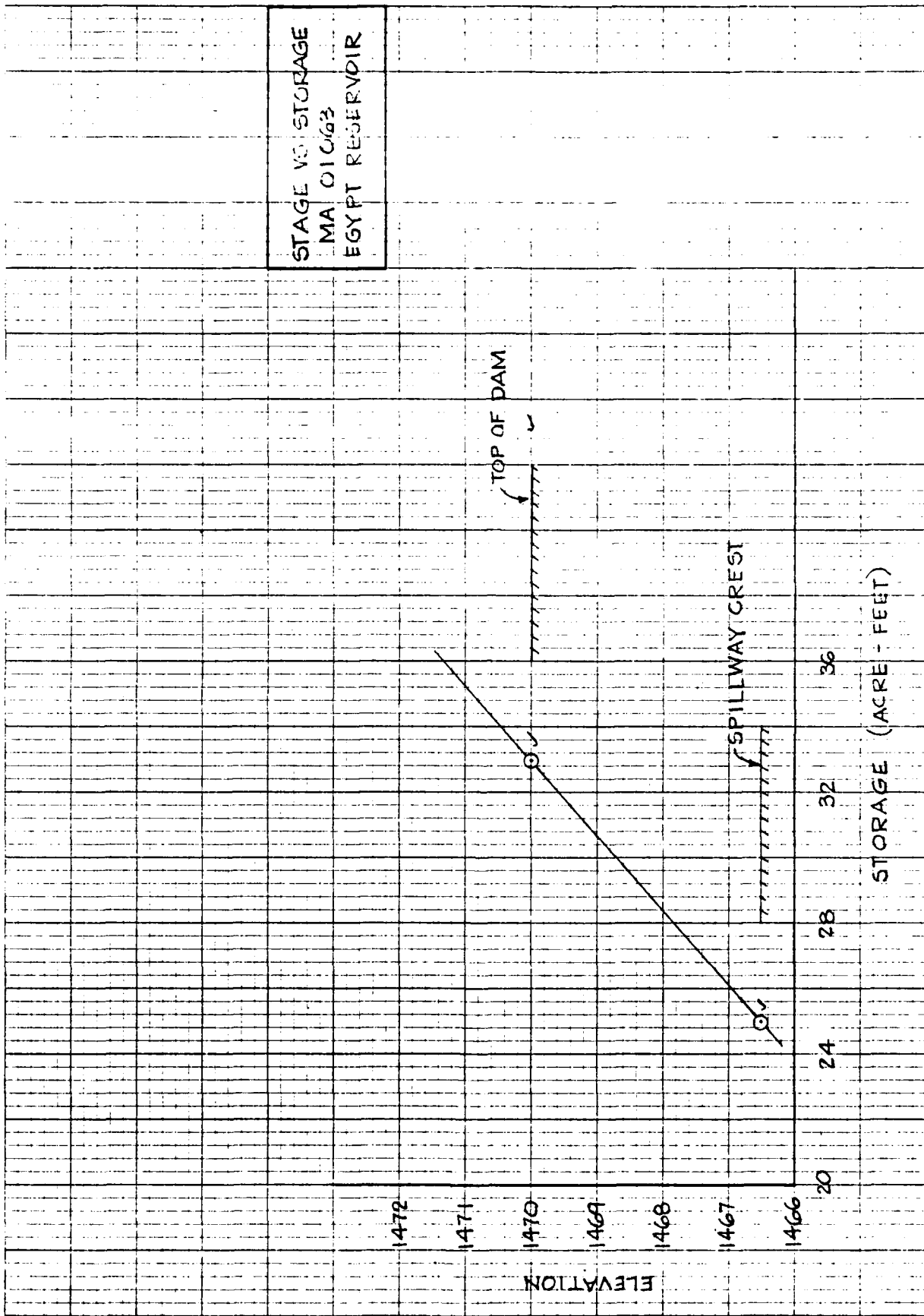
STAGE VS STORAGE

ELEV.	MAX DEPTH (FEET)	STORAGE (ACRE-FEET)
1437 ✓	0 ✓	0 ✓
1460	23 ✓	14 ✓
1466.5	29.5 ✓	25 ✓
1470 ✓	33 ✓	33 ✓





STAGE VS STORAGE
 MA 01063
 EGYPT RESERVOIR



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JTB
JOB MA 01063 EGYPT RESERVOIR
SHEET NO. 5 OF 12
CALCULATED BY JW DATE
CHECKED BY JMC DATE 1/12/11
SCALE

1/2 PMF TEST FLOOD ROUTING

$$Q_{P1} = 1050 \text{ CFS} \checkmark \quad R.O. = 19/2 = 9.5'' \checkmark$$

$$Q_{P1} \rightarrow \text{EL. } 1470.5 \checkmark \rightarrow 34.2 \text{ AC FT} \checkmark$$
$$\text{STORAGE @ } 1466.5 \rightarrow 25.0 \text{ AC FT} \checkmark$$
$$\Delta \text{ STORAGE} = 9.2 \text{ AC FT}$$

$$9.2 \text{ AC FT} \times \frac{1}{.83 \text{ SQ MI} \checkmark} \times \frac{1 \text{ IN SQ MI}}{53.3 \text{ AC FT}} = .21'' \checkmark \quad (\text{STOR } 1)$$

$$Q_{P2} = Q_{P1} \times \left(1 - \frac{\text{STOR } 1}{R.O.}\right)$$

$$Q_{P2} = 1050 \times \left(1 - \frac{.21}{9.5}\right) = 1029 \text{ CFS} \checkmark$$

PMF TEST FLOOD ROUTING

$$Q_{P1} = 2100 \text{ CFS} \checkmark \quad R.O. = 19'' \checkmark$$

$$Q_{P1} \rightarrow \text{EL. } 1471.2 \checkmark \rightarrow 35.7 \text{ AC FT} \checkmark$$
$$\text{STORAGE @ } 1466.5 \rightarrow 25.0 \text{ AC FT}$$
$$\Delta \text{ STORAGE} = 10.7 \text{ AC FT} \checkmark$$

$$10.7 \text{ AC FT} \times \frac{1}{.83 \text{ SQ MI} \checkmark} \times \frac{1 \text{ IN SQ MI}}{53.3 \text{ AC FT} \checkmark} = .24'' \checkmark \quad (\text{STOR } 1)$$

$$Q_{P2} = 2100 \times \left(1 - \frac{.24}{19}\right) \checkmark = 2079 \text{ CFS} \checkmark$$

Note - A available surcharge storage not significant in attenuating peak inflows for floods of this magnitude.

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JOB MA 01063 EGYPT RESERVOIR
SHEET NO. 6 OF 12
CALCULATED BY _____ DATE _____
CHECKED BY Jmc DATE 1/2/21
SCALE _____

- 1) SPILLWAY CAPACITY AT TOP OF DAM (EL. 1470.0)
IS ~~61%~~^{50%} OF 1/2 PMF ROUTED OUTFLOW. ✓ - TEST FLOOD
- 2) 1/2 PMF ROUTED OUTFLOW WOULD OVERTOP DAM
BY APPROXIMATELY 0.5 FEET. ✓
- 3) PMF ROUTED OUTFLOW WOULD OVERTOP DAM
BY APPROXIMATELY 1.2 FEET. ✓

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JOB MA 01063 EGYPT RES.
SHEET NO. 7 OF 12
CALCULATED BY JV DATE _____
CHECKED BY _____ DATE _____
SCALE _____

BREACH ANALYSIS

ASSUME BREACH WIDTH, $W_b = 40\%$ OF CREST LENGTH
AT MIDHEIGHT

$$W_b = 0.4 \times 190' = 76'$$

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

$$y_o = 33' \quad (\text{INVERT OF OUTLET CONDUIT TO TOP OF DAM})$$

$$Q_{PI} = 8/27 (76') (32.2)^{1/2} (33')^{3/2} = 24,223 \text{ CFS}$$

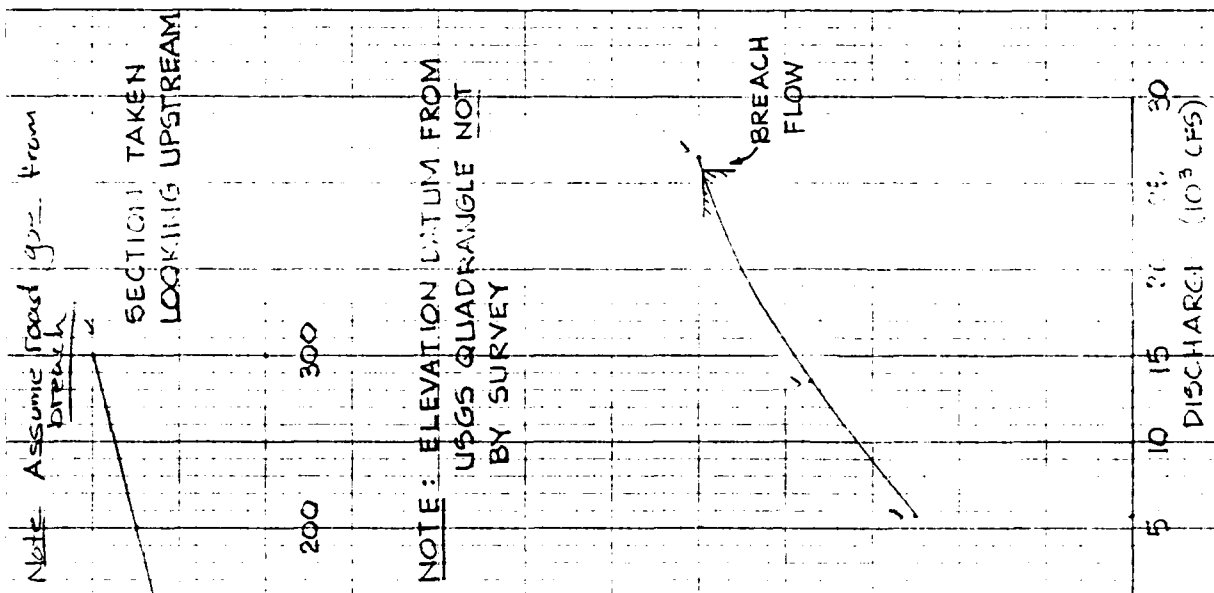
SAY 24,000 CFS

ANTECEDENT DISCHARGE (SPILLWAY CAPACITY AT TOP OF DAM)

$$\begin{aligned} & 610 \text{ - spillway only} \\ & = 627 \text{ CFS - spillway w/ conduit} \end{aligned}$$

TOTAL BREACH PEAK DISCHARGE \approx 25,000 CFS

$$S = 33 \text{ ac-ft}$$



ELEV.	H	A	RW	RH	S	Q	STAGE (FEET)
1240	5	750	300	2.5	0.036	5,609	1245
1242.5	7.5	1400	380	3.68	"	13,561	1243
1245	10	2250	460	4.89	"	26,329	1241
							1239
							1237
							1235

Note: Assume Road goes from breach
 SECTION TAKEN LOOKING UPSTREAM
 NOTE: ELEVATION DATUM FROM USGS QUADRANGLE NOT BY SURVEY
 BREACH FLOW
 DISCHARGE (10³ CFS)
 ROAD U.S.
 HOUSE
 Antecedent Q
 4' x 5' CMP
 n = 0.07
 $Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$
 VALLEY SECTION NORTH OF HOLIDAY ROAD 3000' DOWNSTREAM
 Antecedent Condition: Q = 610 cfs
 Q culv = 100 cfs
 (Over road = 510 cfs (weir))
 $Q = CLH^{3/2}, C = 3.3, L = 200$
 $H = \left[\frac{510}{3.3(200)} \right]^{2/3} = 0.84$ Over road
 1/12/88

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JOB EGYPT Reservoir
 SHEET NO. 9 OF 12
 CALCULATED BY J-C DATE 6/20/80
 CHECKED BY Jmc DATE 7/2/80
 SCALE JW 1/4" = 1'

Analyze Bridge Crossing at Rt 9 near Anthony St.
 Approx. 6000 D/s of Dam

Note there are several homes in this area near Wahconah Brook. The area has had a history of stream bank erosion problems. Rip-rap has been installed to protect property adjacent to brook. Bridge opening collects gravel deposits which are periodically removed by MDPW.

Assume bridge opening clear for analysis

Analyze opening as open channel to bottom of stringers, then consider orifice flow for full bridge opening flow and weir flow for over road flow.

Note Neighbor says road raised from previous grade during highway reconstruction.

Elev.	Area	Wp	R _H	Q cfs
1138	0 ✓			0
1142	212 ✓	69'	3.07'	1120 ✓

S = 0.007
 n = 0.05

$Q = \frac{1.49}{n} A S^{1/2} R_H^{2/3}$

note center pier

Orifice flow $Q = 8CA\sqrt{gh}$ use C = 0.6

Elev.	Area	C	gh	Q
1151	424 ✓	0.6	5 ✓	4550 ✓
1154	" ✓	"	7 ✓	5384 ✓
1156	" ✓	"	8 ✓	5756 ✓

Estimated.

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JOB EGYPT Reservoir
 SHEET NO 10 OF 12
 CALCULATED BY JFC DATE 6/20/80
 CHECKED BY JMC DATE 7/2/81
 SCALE JW 1/9/81

Road overflow - Consider 800' weir length
 $Q = CLH^{3/2}$, $C = 2.6$

Elev.	C	L	H	Q
1154	2.6	800	3'	10806 ✓
1156	"	"	5'	23255 ✓

Summary of El. v. Discharge

Elev.	Q
1138	0 ✓
1142	1120 ✓
1151	4550 ✓
1154	16190 ✓
1156	29,011 ✓

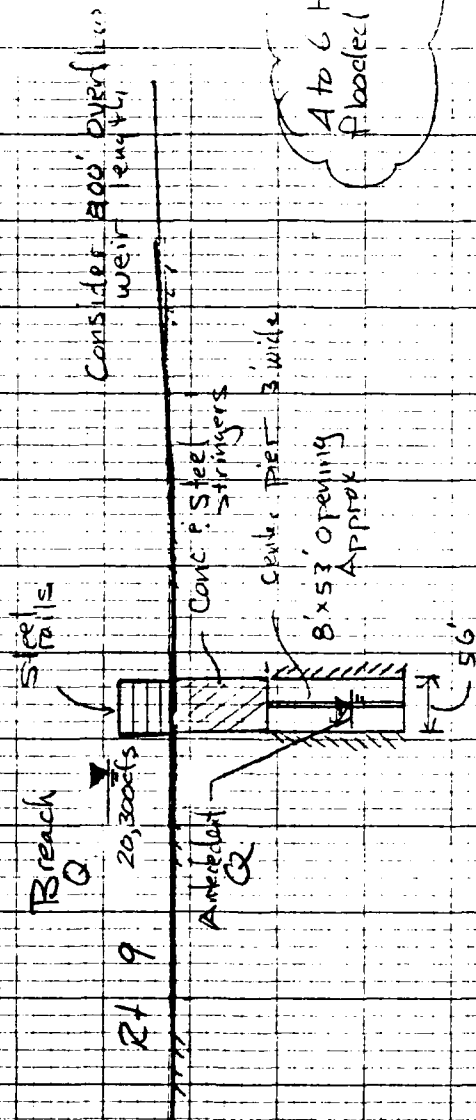
See plot Sht 12.

Note: Below this bridge Wahconah Brook enters
 Center Pond which is start of East Br.
 of Housatonic River.

$V_1 = 14 \times 50 \times \frac{400}{43560} = 6.4 \text{ A.c.ft}$
 $V_2 = 13 \times 50 \times \frac{400}{43560} = 5.9 \text{ A.c.ft}$
 $V_{ave} = \frac{5.9 + 6.4}{2} = 6.2 \text{ A.c.ft}$

$Q_{P2} \text{ Trial} = Q_{P1} (1 - V_1/S)$
 $Q_{P2} \text{ Trial} = 25000 (1 - 6.4/33) = 20,300 \text{ cfs}$
 $Q_{P2} = Q_{P1} (1 - V_{ave}/S)$
 $Q_{P2} = 25000 (1 - 6.2/33) = 20,300 \text{ cfs}$

MA 01063 EGYPT RES.

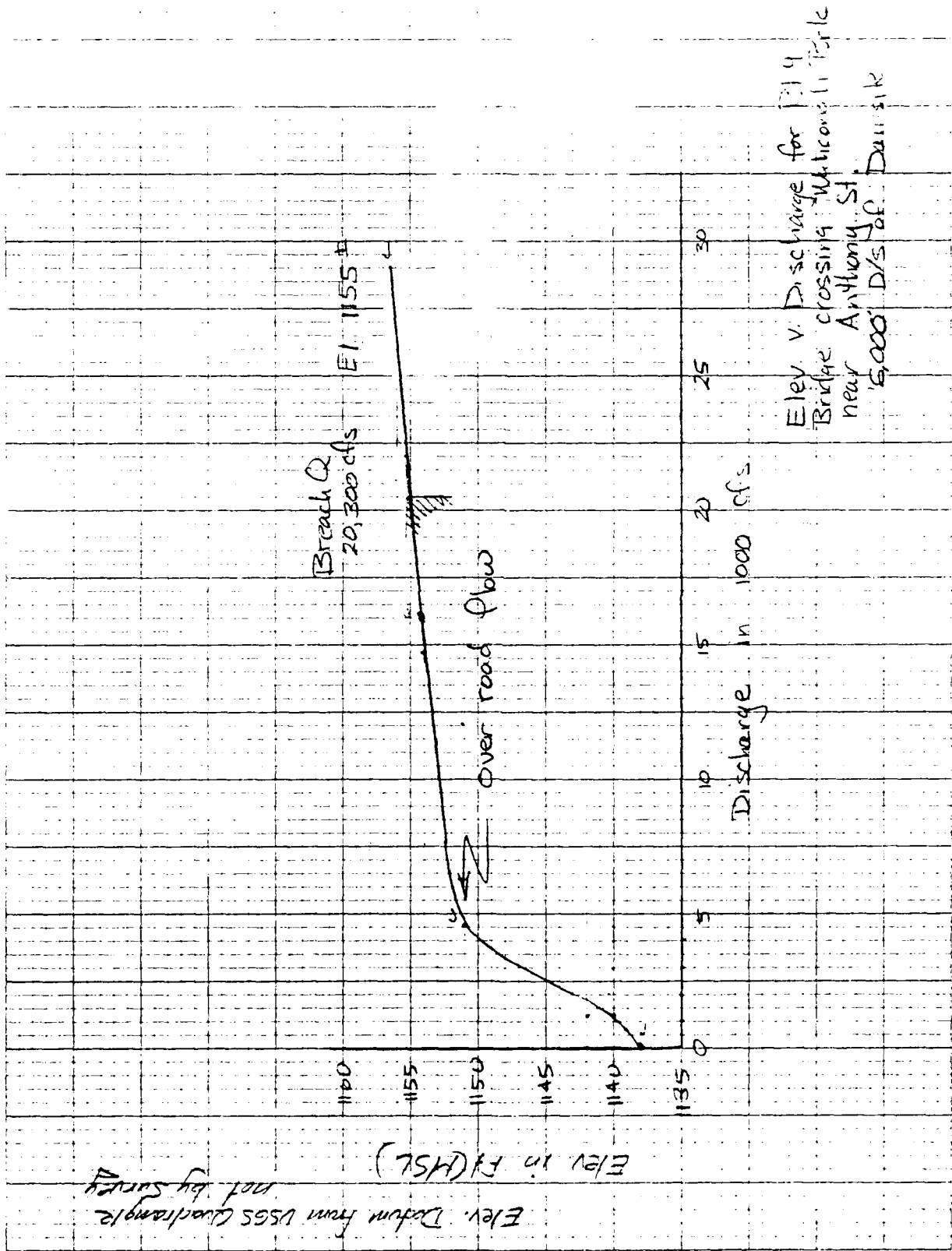


A to 6 Homes
Flooded 3'-5'

Cross Section of Bridge Opening
at Rt. 9 near Anthony P.D.
GOOD'S of Dam Site

Elev. Datum from USGS benchmark
not by survey
Elev. in Ft (MSL)

1" = 200' H
1" = 10' V
Looking D/S



APPENDIX E

**INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS**

Greenwater Pond Dam

NO A 185 385

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
EGYPT RESERVOIR DAM I. IUI CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV MAR 81

2/2

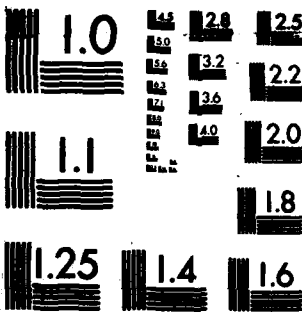
UNCLASSIFIED

F/G 13/13

NI



END
DATE
BY: [unclear] 85



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

NOT AVAILABLE AT THIS TIME

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LMED
— 8

