

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
PILLINGS POND DAM (MA.) (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV AUG 78

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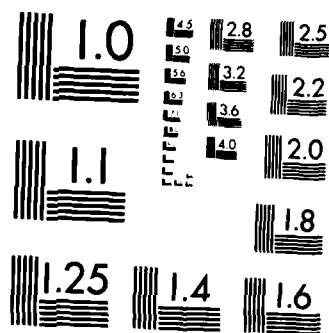
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AD-A154 732

COASTAL BASIN
LYNNFIELD, MASSACHUSETTS

PILLINGS POND DAM

MA 00239

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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



AUGUST 1978

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Coastal Basin Lynnfield, Massachusetts Unnamed tributary of the Saugus River		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is a broad, low-earth structure which is intergral with a modern, two-lane highway. The dam-highway structure is about 200 feet long and stands about 8 feet above streambed. The dam fall within the dmall size and significant hazard classification. No loss of human life should be expected if failure of the dam occurs.		



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

REPLY TO
ATTENTION OF:

NEDED

Honorable Michael S. Dukakis
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor Dukakis:

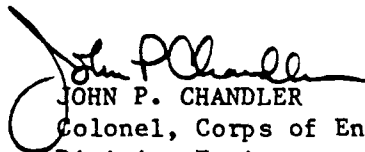
I am forwarding to you a copy of the Pillings Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, the Town Lynnfield, Town Hall, Lynnfield, Massachusetts 01940.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,


JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

PILLINGS POND DAM

MA 00239

COASTAL BASIN
LYNNFIELD, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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Justification	
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NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification No.: MA 00239
Name of Dam: Pillings Pond Dam
Town: Lynnfield, Massachusetts
County and State: Essex County, Massachusetts
Stream: Unnamed tributary of the Saugus River
Date of Inspection: June 15, 1978

BRIEF ASSESSMENT

The Pillings Pond Dam is a broad, low earth structure which is integral with a modern, two-lane highway. The dam-highway structure is about 200 feet long and stands about 8 feet above streambed. The structure is in good condition. The reservoir is used for recreation. There are numerous houses on its periphery. There is a small spillway and channel leading to a culvert under the highway. Beyond the highway is a small dam and pond, a watercourse beyond the pond leading to a culvert under another highway, and thence into a large marsh.

This dam falls within the small size and significant hazard classification, and thus hydraulically analyzed using one-half the probable maximum flood. Reservoir storage will reduce a flow of 850 cfs to a test flood of 740 cfs. The spillway can pass, before overtopping, about 80 cfs (about 10 percent of the test flood). As the test flood would overtop the dam by less than one foot, the dam can be considered safe from failure due to overtopping.

A failure of the dam coincident with full spillway discharge could result in a flow of about 1,800 cfs which would overtop and probably destroy a small privately-owned pond dam and possibly cause flooding in low-lying dwellings. No loss of human life should be expected.

Additional investigations or major modifications are not required. However, remedial measures that should be implemented by the owner within 24 months after receipt of this Phase I Inspection Report are described in Section 7.

The owner should institute a program of periodic inspection and maintenance procedures, make any needed repairs, and develop a flood warning system.

A handwritten signature in dark ink, appearing to read "Gustav A. Diezemann". The signature is fluid and cursive, with a long horizontal stroke at the end.

Gustav A. Diezemann, P. E.

New York State Lic. 027062

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



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

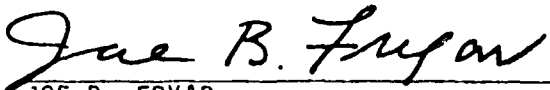


FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division



SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:



JOE B. FRYAR
Chief, Engineering Division

SEP 21 1971

PREFACE

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

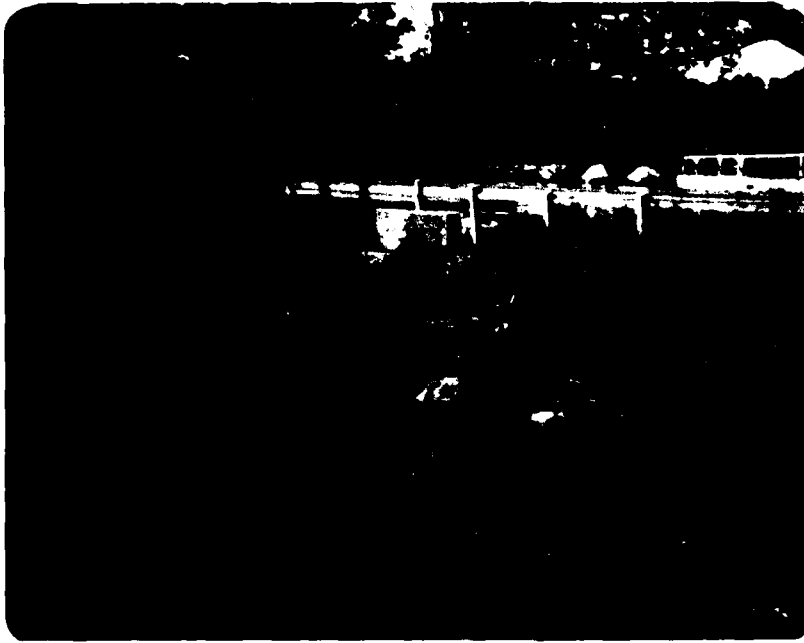
In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection, along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while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

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

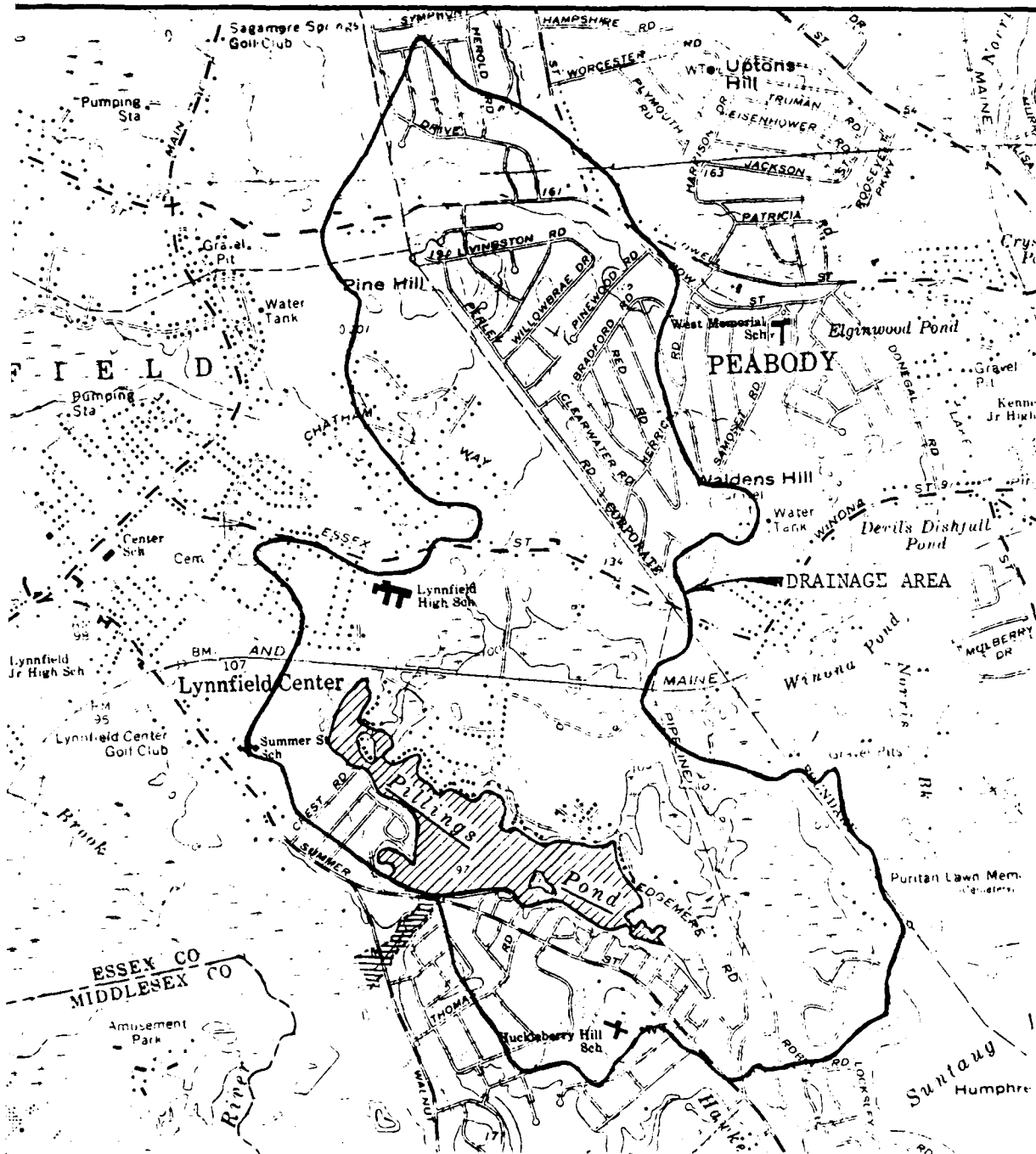
Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because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

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OVERVIEW PHOTO



PILLINGS POND

READING, MASS.-N.H.
Scale 1:24000

PHASE I INSPECTION REPORT

PILLINGS POND 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 the inspection of dams within the New England Region. Chas. T. Main, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed were issued to Chas. T. Main, Inc. under a letter of May 3, 1978, from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-D328 has been assigned by the Corps of Engineers for this work.

b. Purpose.

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

(2) Encourage and 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. The Pillings Pond Dam is in the Town of Lynnfield, Essex County, Massachusetts. The small stream on which it is located is unnamed on U.S.G.S. maps. It discharges into the Saugus River.

b. Description of Dam and Appurtenances. The dam is an earthfill structure, about 8 feet high and about 200 feet long. It has a concrete overflow section 6.5 feet wide and 2 feet high. The dam is wide with a modern, two-lane highway - Summer Street - on its crest. A culvert under Summer Street discharges into a small pond.

INSPECTION CHECK LIST

: WILLINGS ROADDATE JUNE 15, 1978

: FEATURE _____

NAME _____

AREA EVALUATED	CONDITION
<u>EMBANKMENT</u>	
t Elevation	99 ±
ent Pool Elevation	97 ±
ace Cracks	NONE
ment Condition	GOOD
ment of Settlement of Crest	NONE
ral Movement	NONE
ical Alignment	OK
zontal Alignment	OK
ition at Abutment and at Concrete ructures	N/A
ocations of Movement of Structural ems on Slopes	N/A
passing on Slopes	OK
ghing or Erosion of Slopes or utments	NONE
: Slope Protection - Riprap ilures	SLIGHT
ual Movement or Cracking at or ar Toes	NONE
ual Embankment or Downstream epage	NOT VISIBLE
ng or Boils	NONE
idation Drainage Features	N/A
Drains	N/A
 ruments on System	

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

JECT DILLINGS POND

DATE JUNE 15, 1973

TIME 2:00 P.M.

WEATHER SUNNY & MILD

W.S. ELEV. 97 U.S. _____ DN.S

ITY:

J. Goodrich

D. Fischer

PROJECT FEATURE

INSPECTED BY

REMARKS

/

APPENDIX A

(3) Around the clock surveillance should be provided by the owner during periods of unusually heavy precipitation.

(4) The owner should develop a formal warning system with local officials for alerting downstream residents in case of emergency.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

- a. Condition. The condition of the Pillings Pond Dam and spillway structure is good.
- b. Adequacy of Information. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and engineering judgment.
- c. Urgency. The required repair and maintenance work should be accomplished within two years of the receipt of this report by the owner.
- d. Need for Additional Investigation. There is no need for additional investigation.

7.2 Recommendations

Additional engineering investigations or major modifications to the dam are not required.

7.3 Remedial Measures

- a. Alternatives. Not applicable.
- b. Operation and Maintenance Procedures.
 - (1) The owner of the dam should develop and implement procedures which would include annual inspection of the dam and the initiation of repairs, as required.
 - (2) The slots in the spillway structure should be permanently filled in to prevent vandals or unknowledgeable people from placing flashboards in the slots and thus decreasing the flood storage capacity by eliminating the spilling capacity without overtopping.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. Nothing was noted which would indicate that the dam is unstable.

b. Design and Construction Data. No design nor construction data are known to exist.

c. Operating Records. Not applicable.

d. Post Construction Changes. No data concerning any post construction changes are known to exist.

e. Seismic Stability. The dam is located in Seismic Zone 3. Because of its configuration and condition and the low head of water retained, a seismic analysis is not considered warranted.

SECTION 5

HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data. The hydraulic/hydrologic analysis was made in accordance with "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations", "Estimating Effect of Surcharge Storage on Maximum Probable Discharges", and "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs" as furnished by the New England Division, Corps of Engineers and "Recommended Guidelines for Safety Inspection of Dams" as issued by the Department of the Army, Office of the Chief of Engineers.

U.S.G.S. Quadrangle maps were used to determine reservoir and drainage areas. Where practicable, spillway dimensions were obtained by direct measurement. Hydraulic coefficients were assigned on the basis of experience and engineering judgment.

b. Experience Data. No specific experience data with respect to the hydraulic/hydrological characteristics of the project are known to exist.

c. Visual Observations. Dam is integral with highway. It is impossible to determine accurately where the dam ends and natural banks begin. The assumed effective length of discharge is 200 feet. A stone-paved channel, about 12 feet wide, carries overflow from spillway to culvert under Summer Street. There is a small pond beyond Summer Street. Its level is about 2 to 3 feet below that of Pillings Pond.

d. Overtopping Potential. A Probable Maximum Flood (PMF) of 1,700 cfs was determined. Owing to its small size and significant hazard classification, one-half the PMF was used in the determination of the Peak Outflow (or test flood) of 740 cfs. The spillway capacity before overtopping is about 80 cfs and the test flood would cause the dam to overtop by less than one foot. The dam would undoubtedly survive such an overtopping.

A Peak Failure Outflow resulting from a 45-foot breach in the dam would be 1,712 cfs which, when combined with the spillway capability at maximum pond, gives a total failure flow of about 1800 cfs. The small dam below Pillings Pond would be overtopped and probably destroyed. There is also the possibility of flooding of Walnut Street and the few structures beyond it. Thereafter, the flow will dissipate in the broad marsh adjacent to Walnut Street.

The areas of impact are shown on the location map.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

Other than letting the reservoir discharge over the fixed crest spillway, there are no operating procedures.

4.2 Maintenance of Dam

There appear to be no definite maintenance procedures of the dam in effect.

4.3 Maintenance of Operating Facilities

Not applicable.

4.4 Warning System

There is no warning system.

4.5 Evaluation

There appears to be a lack of regular operational procedures. Recommendations for improving these conditions are given in Section 7.3.

itself is not a factor in evaluating the dam. The watercourse below the dam is inhabited to the extent that property, but probably not life, would be in jeopardy if the dam failed.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The Phase I visual inspection of the Pillings Pond Dam occurred on June 15, 1978. The Pillings Pond Dam is a low, highway embankment, the two-lane, modern highway being known as Summer Street.

b. Dam. The fill section is quite wide with respect to the height and it is impossible to determine accurately what is fill and what are natural abutments. The downstream slope is overgrown with low bushes and trees, the upstream with grass. Some of the riprap on the downstream slope appears to have moved. There is a guard rail and curbing on either side of the highway in the area of the culvert under the dam. There is no evidence of misalignment, settlement or other distress and the dam appears to be in good condition.

c. Appurtenant Structures. The appurtenant structures comprise a weir, channel and culvert under the dam. The weir is a concrete structure with a 2 foot high by 6.5 foot wide opening with stoplog slots. The weir discharges into a stone-in-mortar channel leading to a concrete culvert under the dam. Apart from minor spalling, the weir is in good condition as is the channel in spite of some growth in the joints. The highway culvert also appears to be in good condition.

d. Reservoir Area. The banks are flat and wooded. The lake is used for recreational purposes and there are several houses on the periphery. There appears to be little likelihood of landslides or other sudden increase of sediment load in the reservoir.

e. Downstream Channel. Downstream of the dam is a small pond behind a low earthfill structure with a 2-foot diameter sluice. Beyond this structure is a natural wooded watercourse with some dwellings on the banks. After passing through a culvert under another highway, Walnut Street, the stream discharges into a broad, flat marsh.

3.2 Evaluation

The visual inspection indicates that the Pillings Pond Dam, which is really a highway embankment rather than a true dam, is in good condition as are the weir, channel and culvert. The reservoir

SECTION 2
ENGINEERING DATA

2.1 Design

There are no known existing design data.

2.2 Construction

The Pillings Pond dam was built around 1900. There are no detailed construction records available.

2.3 Operation

There is no formal operation of the dam. The fixed spillway crest controls the water level of the reservoir.

2.4 Evaluation

a. Availability. There are no engineering data available.

b. Adequacy. The lack of in-depth engineering data does not allow for a definitive review. Therefore, the adequacy of this dam, structurally and hydraulically, cannot be assessed from the standpoint of review of design calculations, but must be based primarily on the visual inspection, past performance history, and sound hydrologic and hydraulic engineering judgment.

c. Validity. N/A

g. Dam

- | | | |
|------|-----------------|-------------------------------|
| (1) | Type | Earthfill |
| (2) | Length | 200 $\pm$ feet |
| (3) | Height | 8 $\pm$ feet |
| (4) | Top Width | Varies, integral with highway |
| (5) | Side slope | Unknown |
| (6) | Zoning | Unknown |
| (7) | Impervious core | Unknown |
| (8) | Cutoff | Unknown |
| (9) | Grout curtain | Unknown |
| (10) | Other | N/A |

h. Spillway

- | | | |
|-----|-----------------|---------------------------|
| (1) | Type | Weir |
| (2) | Length of weir | 6.5 feet |
| (3) | Crest elevation | El. 97 $\pm$ |
| (4) | Gates | None |
| (5) | U/S Channel | N/A |
| (6) | D/S Channel | Riprap channel to culvert |
| (7) | General | N/A |

i. Regulating Outlets. There are no outlet works other than the spillway.

c. Elevation (Feet Above MSL)

(1)	Top of dam	El. 99 ±
(2)	Maximum design surcharge	El. 99 ±
(3)	Full flood control pool	N/A
(4)	Recreation pool	El. 97 ±
(5)	Spillway crest (gated)	El. 97 ± (ungated)
(6)	Upstream portal invert diversion tunnel	N/A
(7)	Streambed at centerline of dam	El. 91 ±
(8)	Maximum tailwater	N/A

d. Reservoir (Feet)

(1)	Length of maximum pool	5,000 ±
(2)	Length of recreation pool	5,000 ±
(3)	Length of flood control pool	N/A

e. Storage (Acre-Feet)

(1)	Recreation pool	330 ±
(2)	Flood control pool	N/A
(3)	Design surcharge	500 ±
(4)	Top of dam	500 ±

f. Reservoir Surface (Acres)

(1)	Top of dam	123 ±
(2)	Maximum pool	123 ±
(3)	Flood control pool	N/A
(4)	Recreation pool	83 ±
(5)	Spillway crest	83 ±

c. Size Classification. Owing to its height of 8 feet and its impoundment of roughly 330 acre feet, the dam falls within the small size classification.

d. Hazard Classification. Owing to the fact that there is a small, privately-owned recreation pond dam which would be destroyed and some houses which may be flooded in the event of a failure of Pillings Pond Dam, the hazard potential classification is considered significant.

e. Ownership. Pillings Pond Dam is owned by the town of Lynnfield.

f. Operator. Mr. A. D. Rodham
Town Hall, Lynnfield, Massachusetts
(617) 334-3128

g. Purpose Of Dam. The reservoir impounded by the dam is presently used for recreation purposes.

h. Design and Construction History. Nothing is known of the design and construction history of this project except that it was constructed about 1900.

i. Normal Operating Procedures. As far as can be determined, there are no operating procedures in effect other than to let the spillway overflow naturally.

1.3 Pertinent Data

a. Drainage Area. The Pillings Pond Dam has a drainage area of about 2.16 square miles of wooded, marshy and residential areas.

b. Discharge at Damsite.

- (1) There are no outlet works.
- (2) The maximum known flood at the damsite is unknown.
- (3) The ungated spillway capacity at maximum pool level, El. 99 $\pm$, is about 80 cfs.
- (4) There is no gated spillway capacity.
- (5) There is no gated spillway capacity.
- (6) The total spillway capacity at maximum pool level, El. 99 $\pm$, is about 80 cfs.

INSPECTION CHECK LIST

PROJECT PILLINGS PONDDATE JUNE 15, 1978

PROJECT FEATURE _____

NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - INTAKE CHANNEL AND</u> <u>INTAKE STRUCTURE</u> 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	NOT APPLICABLE 4

INSPECTION CHECK LIST

PROJECT PILLINGS PONDDATE JUNE 15, 1978

PROJECT FEATURE _____

NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	
General Condition of Concrete	GOOD
Rust or Staining	NONE
Spalling	SOME MINOR SPALLING
Any Visible Reinforcing	NONE
Any Seepage or Efflorescence	NONE
Drain Holes	—
c. Discharge Channel	
General Condition	GOOD
Loose Rock Overhanging Channel	NONE
Trees Overhanging Channel	NONE
Floor of Channel	OK
Other Obstructions	NONE

INSPECTION CHECK LIST

PROJECT PILLINGS PONDDATE JUNE 15, 1978

PROJECT FEATURE _____

NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - CONTROL TOWER</u>	
a. Concrete and Structural	
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

NOT
APPLICABLE

INSPECTION CHECK LIST

PROJECT PILLINGS PONDDATE JUNE 15, 1978

PROJECT FEATURE _____

NAME _____

AREA EVALUATED

CONDITION

OUTLET WORKS - OUTLET STRUCTURE AND
OUTLET CHANNEL

General Condition of Concrete

Rust or Staining

Spalling

Erosion or Cavitation

Visible Reinforcing

Any Seepage or Efflorescence

Condition at Joints

Drain holes

Channel

Loose Rock or Trees Overhanging
Channel

Condition of Discharge Channel

*NOT
APPLICABLE*

INSPECTION CHECK LIST

PROJECT PILLINGS POND

DATE JUNE 15, 1978

PROJECT FEATURE _____

NAME

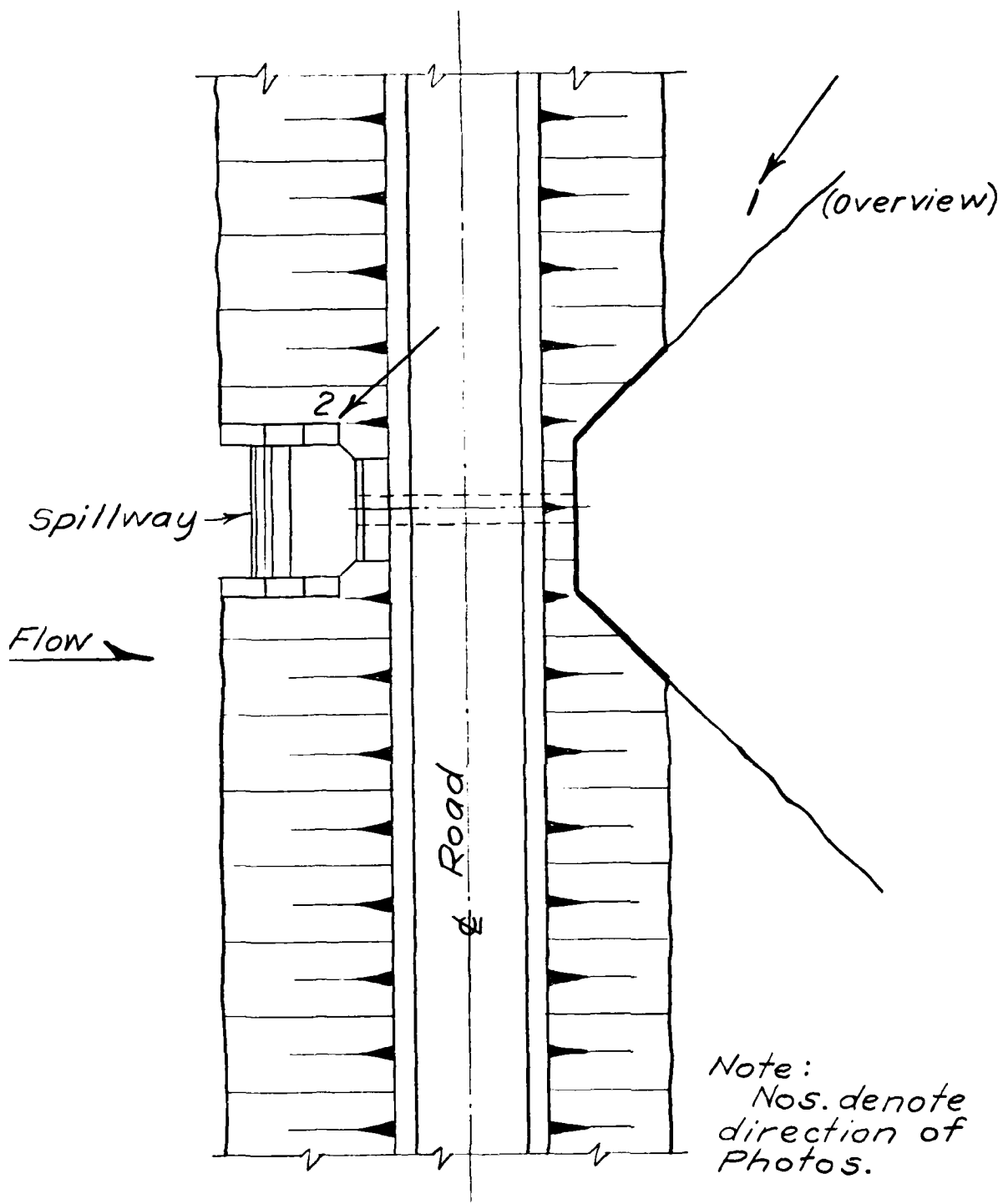
AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SERVICE BRIDGE</u> a. Super Structure Bearings Anchor Bolts Bridge Seat Longitudinal Members Under Side of Deck Secondary Bracing Deck Drainage System Railings Expansion Joints Paint b. Abutment & Piers General Condition of Concrete Alignment of Abutment Approach to Bridge Condition of Seat & Backwall	NOT APPLICABLE

9

APPENDIX B

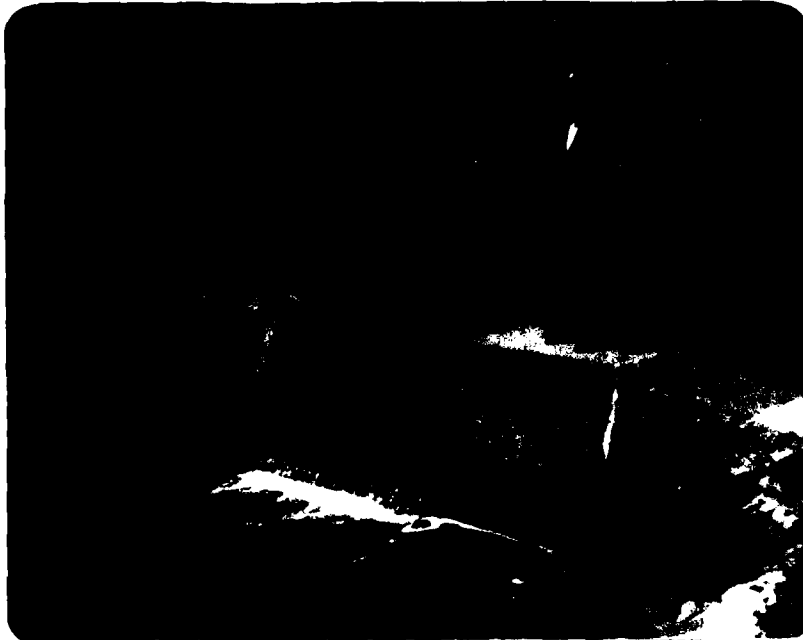
No records of the design and construction
of this project were located.

APPENDIX C



Note:
Nos. denote
direction of
Photos.

PLAN
PILLINGS POND



2

Downstream View of Spillway Weir
from Left Bank

PILLINGS POND

APPENDIX D

1 of 9

Job No. 1345-065 Sheet 1 of 9

PILLINGS POND

By VEITCH

Date 19 JULY 1978

Ckd.

Rev.

1700

= 1010 CFS

PILLINGS POND CLASSIFICATION - S/SM. SIGNIFICANT HAZARD / SMALL S.
RECOMMENDED DESIGN FLOOD (P. D-12 RECOMMENDED GUIDELINES FOR
SAFETY INSPECTION OF DAMS) IS 100YR TO 1/2 PMF.

100YR FLOOD = 145 CFS

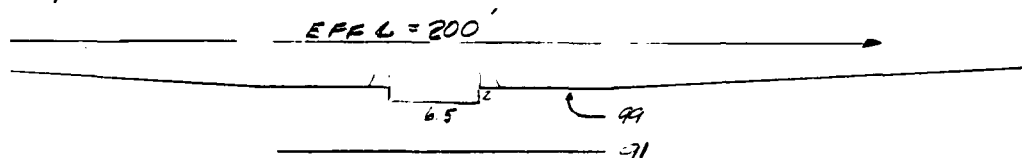
PMF = 505 CFS

850

500 CFS

RESERVOIR AREA = 83 AC

WAY:



WEDGE HT. = 2.9' to PASS Q_{P1}

$$P_1 = \frac{83(2.9)12}{768} = 3.76''$$

$$500(1 - \frac{3.76}{19}) = 401 \text{ CFS.}$$

CURVE SURCHARGE HT. FOR $Q_{P2} = 2.7'$

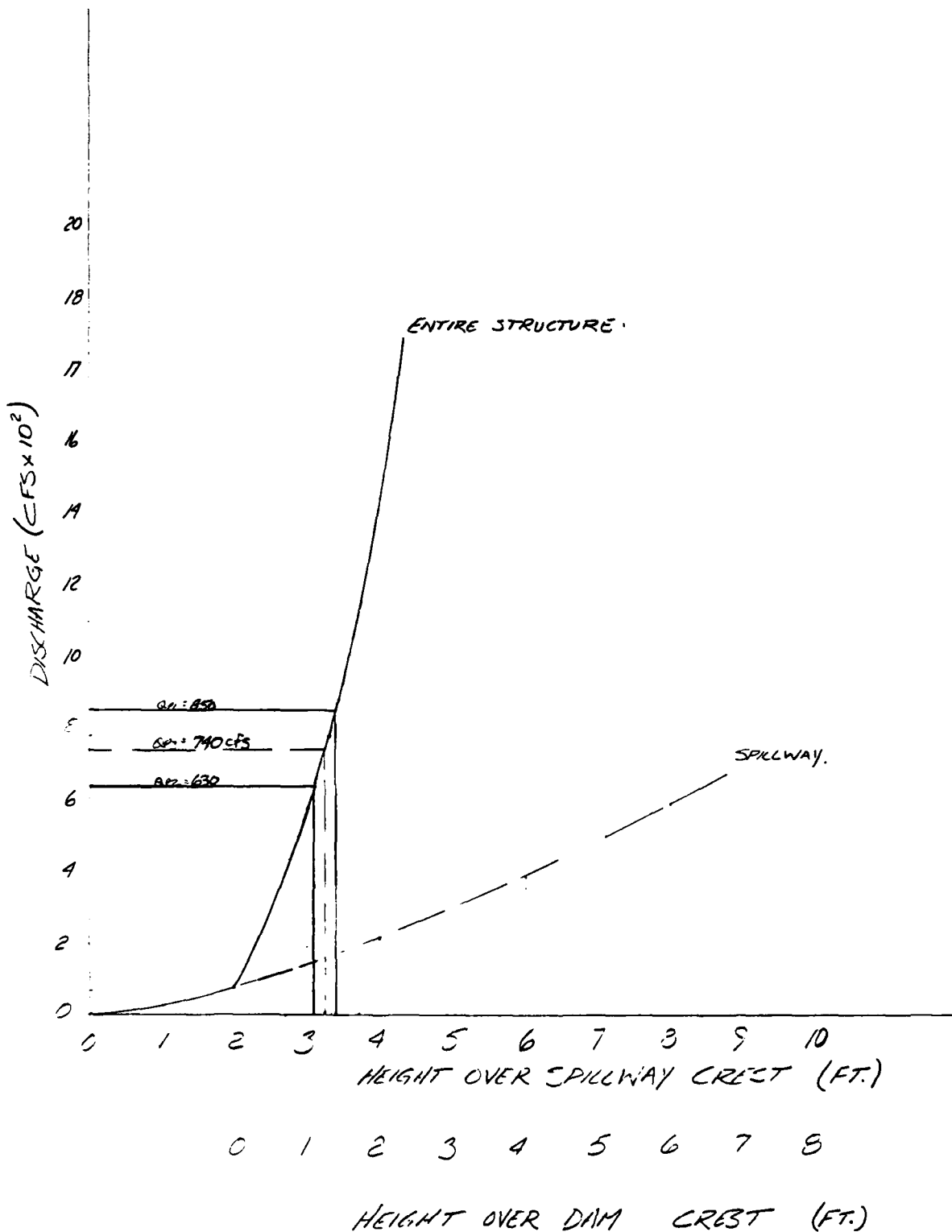
$$P_2 = \frac{83(2.7)12}{768} = 3.50''$$

$$P_3 = 3.63''$$

$$\text{WEDGE FROM } STOR_3 = \frac{768(3.63)}{12(83)} = 2.80'$$

CURVE $Q_{P3} = 435 \text{ CFS.}$

Client C O F E Job No. 1345-065 Sheet 2 of 9
 Subject PILLINGS POND By J. VEITCH Date 19 JULY 1978
 Ckd. _____ Rev. _____



MAIN

Client C of E Job No. 1345-065 Sheet 3 of 9
 Subject FILLINGS POND By J. VEITCH Date 3 AUG 1978
 Ckd. _____ Rev. _____

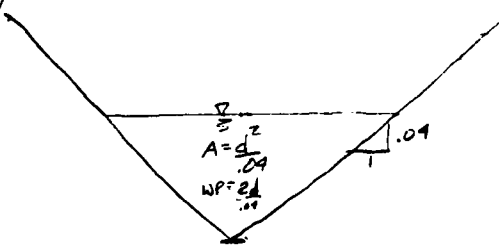
DOWNSTREAM CHANNEL

$S = .02$ MANNING $n = .03$

CROSS SECTION (pool)

$$Q = \frac{1.49}{n} A R^{.67} S^{1/2}$$

d	Q
2	702.4
4	4467.2
6	



100

95

$1712 = Q$ $d = 2.9' \Rightarrow$ ave $cl = 98'$
 through recreation pool

Walnut St. on GRADE - ASSUME NO EFFECT.

Client C of E
Subject PILLING POND

Job No. 1345-065 Sheet 4 of 9
By J. VEITEN Date 22 AUG. 1978
Ckd. _____ Rev. _____

DRAINAGE AREA: $2.16 \text{ mi}^2 = 1383 \text{ AC.}$

$$Q_{\max} = 858.32 - 92.786 \ln X \quad X = 2.16 \text{ mi}^2$$
$$= 787 \frac{\text{cfs}}{\text{mi}^2}$$

$$Q = 787 \frac{\text{cfs}}{\text{mi}^2} (2.16 \text{ mi}^2) = 1700 \text{ cfs.}$$

$$\frac{1}{2} \text{ PMF} = 850 \text{ cfs.}$$

USING PREVIOUS RATING CURVES

$$S = 3.4' \quad \text{STOR}_1 = \frac{(3.4)(12) 83}{1383} = 2.45''$$

$$Q_{P2} = 850 \left(1 - \frac{2.45'}{9.5'}\right) = 630 \text{ cfs.} \quad S_1 = 3.10'$$

$$\text{STOR}_2 = \frac{3.10(12) 83}{1383} = 2.23' \quad \text{STOR}_{\text{AVE}} = 2.34''$$

$$\text{SURCHARGE FROM STOR}_3 = \frac{1383(2.34)}{12(83)} = 3.25'$$

$$\underline{Q_{P3} = 740 \text{ cfs.}}$$

CASE I PEAK OUTFLOW = 740 cfs.

CASE II PEAK FAILURE OUTFLOW $W_b = 45'$ $y_b = 8'$

$$Q_{PI} = \frac{8}{27} (45) \sqrt{32.2} (8)^{1.5} + 75 \text{ cfs.}$$

$$\underline{\underline{= 1787 \text{ cfs.}}}$$

Client COF EJob No. 1345-065 Sheet 5 of 9Subject PILLINGS PONDBy J. VEITEN Date 24 AUG. 1978

Ckd. _____

Rev. _____

CASE II. P.F.O.

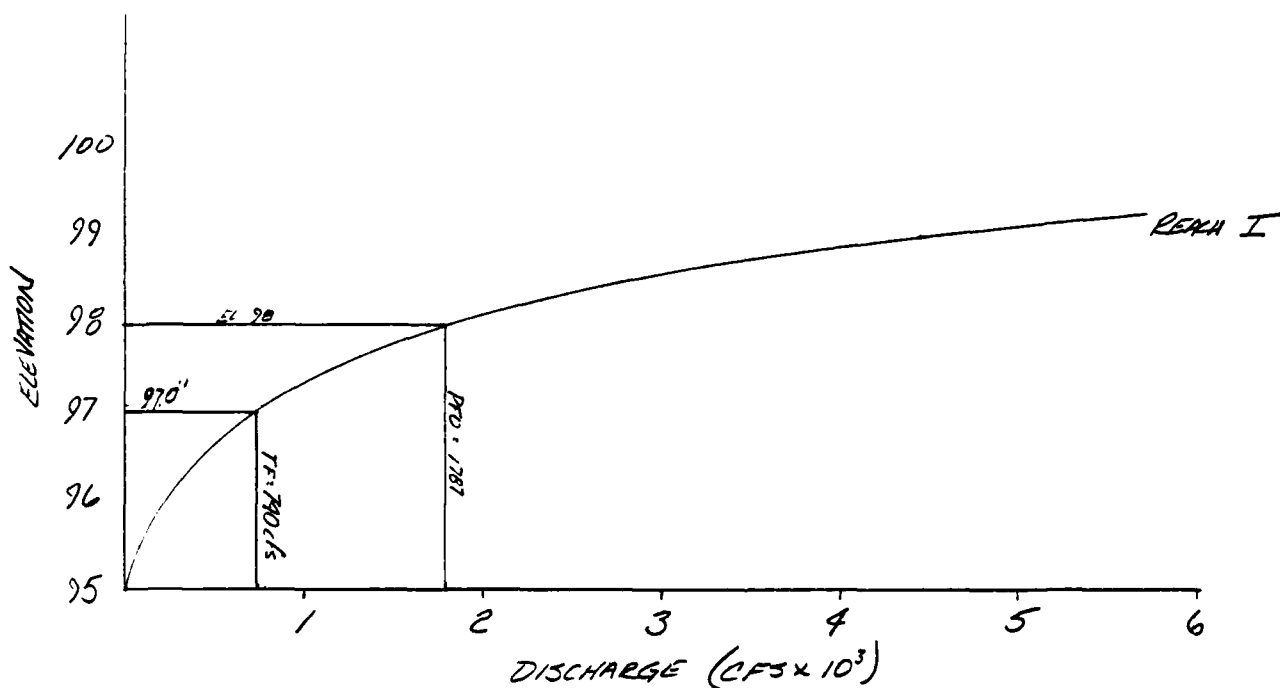
Assuming culvert under SUMMER St Plugged

water el over board created weir (assuming $V=0$) R&C EL 200
400'

$$H = \sqrt[1.5]{\frac{1.787}{225(400)}} = 1.58'$$

∴ WATER EL ACROSS ROAD 201.6'

DOWNSTREAM CHANNEL:



EL. ≈ 98.0' through lower POND/CHANNEL.

Client C of EJob No. 1345-065 Sheet 6 of 9Subject PILLINGS PONDBy J. VEITCHDate 2 AUG. 1978

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Rev. _____

REACH II. $n = .03$
 $S = .025$

A	WP.	$R^{.67}$	Q
90. - 350	190	1.89	5060
87.5 - 100	80	1.16	910
82.5 - 863	265	2.2	

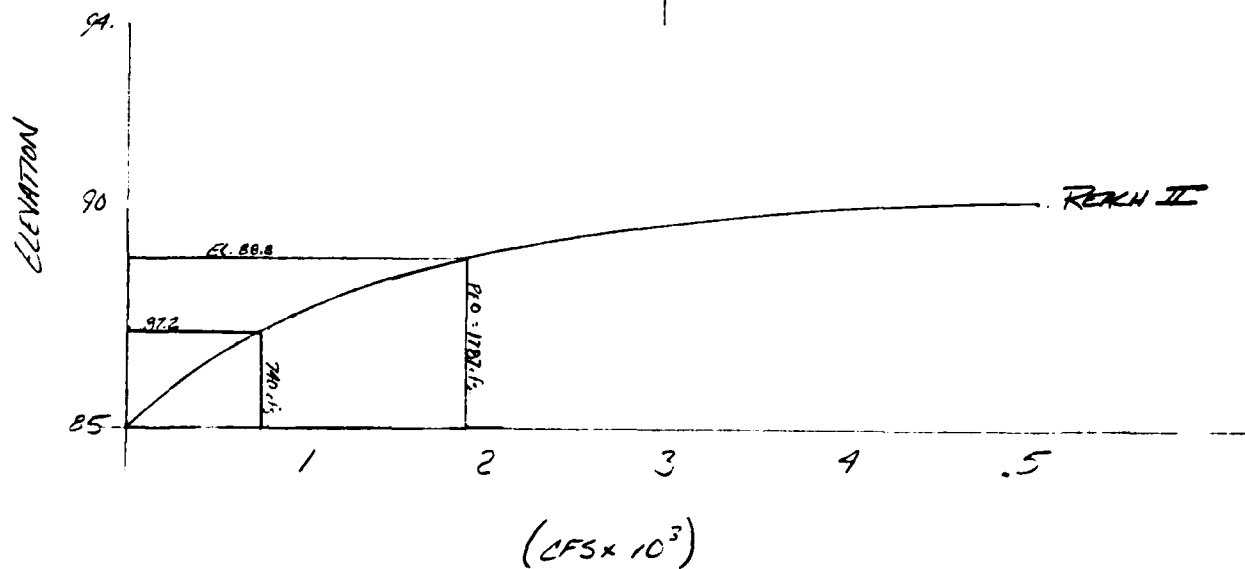
$$A = \frac{d^2}{.1}$$

$$WP = 2 \frac{d}{.1}$$

L.O.

AVE x section.

1" = 200' —
 1" = 20' ↓



ASSUMING NO STORAGE THROUGH REC. POOL
 $Q = 1787$ cfs EL. 88.8' to Walnut Rd.

Some slight property - ACROSS Walnut St. directly into large SWAMP - NON
 flooding in Reach II no danger to life

Client C of E. Job No. 1345-065 Sheet 7 of 9
Subject - DILLINGS POND - By J. VETTER Date 24 AUG. 1978
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REACH II. USING REACH RATING CURVE PP. 4

EL. 88.8' Q = 1787 cfs.

CASE I. PEAK OUTFLOW (TEST FLOOD)

Q = 740 cfs. REACH I. 97.0'

REACH II Q = 740 EL. 87.2

Client C of E Job No. 1345-065 Sheet 8 of 9
Subject PILLINGS POND By VEITCH Date 9 AUG 1978
Ckd. _____ Rev. _____

CASE I. $Q = 740$ CFS.

EL. THROUGH REACH I = 97.0'

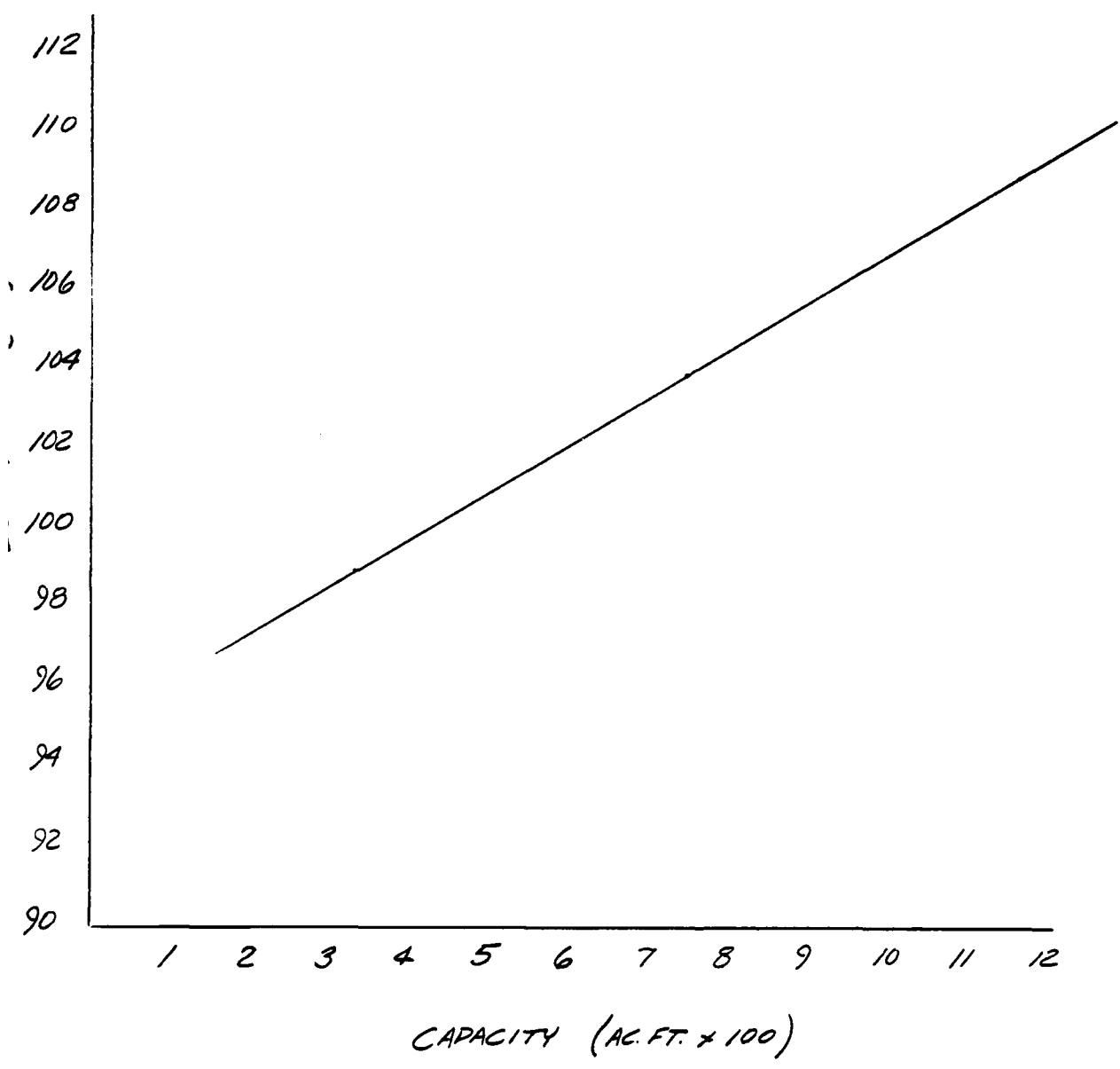
REACH II = 87.2' from curve.

from USGS quad sheets: No hazard potential to life in either case.

There are low lying homes near the recreation pool, could be possible flooding damage during PEAK FAILURE OUTFLOW.

Walnut St. flooded + possibly a few low lying homes.

Client C. O. E Job No. 1345-065 Sheet 9 of 9
Subject PILLINGS POND - By J. VEITCH Date 22 AUG. 1978
CAPACITY CURVE Ckd. _____ Rev. _____



APPENDIX E
INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

STATE	COUNTY	CITY	ZIP	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE
MA	009	07		PILLINGS POND DAM	4231.5	7101.5	08SEP78

POPULAR NAME	NAME OF IMPONDMENT
	PILLINGS POND

REGION	RIVER OR STREAM	NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	POPULATION
01 06	TR SAUGUS RIVER	LYNNFIELD	10800

TYPE OF DAM	YEAR COMPLETED	PURPOSES	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES (ACRE-FT.)	DIST UMN	FED R	PRV/PEO	8CS A	VER/DATE
REGPG	1900	H	10	400	N	N	N	N	30AUG78

REMARKS

D/S	SPILLWAY	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CY)	POWER CAPACITY (KW)	INSTALLED	PROPOSED	NO.	LENGTH WITH LOCKS (FT.)	LENGTH WITHOUT LOCKS (FT.)
1	150 U	75	3100						

OWNER	ENGINEERING BY	CONSTRUCTION BY
UNKNOWN		

DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE	AUTHORITY FOR INSPECTION
CHAS. T. MAIN, INC.	15 JUN 78	P.L. 92-367

REMARKS

END

FILMED

7-85

DTIC