

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

CONNECTICUT COASTAL AREA  
DARIEN, CONNECTICUT



AD-A142 759

**MATHERS POND DAM  
CT 00054**

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



DTIC FILE COPY

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

**DTIC**  
**ELECTE**  
JUL 05 1984  
**S** **D**

This document has been approved for public release and sale; its distribution is unlimited.

SEPTEMBER 1980

84 07 03 047 E

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00054	2. GOVT ACCESSION NO. <b>AD-A142759</b>	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Conn. Coastal Area Darien, Conn., Mathers Pond 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 Sept. 1980	
	13. NUMBER OF PAGES 70	
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,  Conn. Coastal Area Darien, Conn. Mathers Pond Dam		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Mathers Pond Dam is concrete gravity and an earth embankment approx. 280 ft. long and 18 ft. high. The concrete portion of the dam is 170 ft. long and is 2 ft. wide at the top and 10.5 ft. wide at the bottom. It is keyed into a 13 ft. wide footing of varying depth. The earthen portion of the dam has a concrete core wall that extends a maximum 9 ft. into natural ground. The embankment is 2 ft. higher than the concrete section. The principal spillway is located approx. at the center of the dam and is 5 ft. long and 1 ft. deep. However, the entire concrete portion is considered an emergency spillway.		



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

REPLY TO  
ATTENTION OF:

NEDED

DEC 19 1980

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

Dear Governor Grasso:

Inclosed is a copy of the Mathers Pond Dam (CT-00054) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, Mr. David R. Arnold et al, Darien, Conn.

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

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

Sincerely,

WILLIAM E. HODGSON, JR.  
Colonel, Corps of Engineers  
Acting Division Engineer

Incl  
As stated

MATHERS POND DAM

CT 00054

CONNECTICUT COASTAL AREA

DARIEN, CONNECTICUT

<b>Accession For</b>	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	



PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification Number:	CT 00054
Name:	Mathers Pond Dam
Town:	Darien
County and State:	Fairfield County, Connecticut
Stream:	Tributary to Goodwives River
Date of Inspection:	May 30, 1980

BRIEF ASSESSMENT

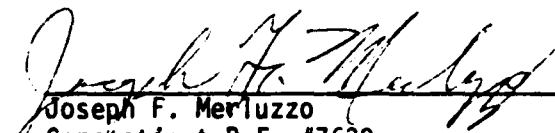
Mathers Pond Dam is concrete gravity and an earth embankment approximately 280 feet long and 18 feet high. The concrete portion of the dam is 170 feet long and is 2 feet wide at the top and 10.5 feet wide at the bottom. It is keyed into a 13-foot wide footing of varying depth. The earthen portion of the dam has a concrete core wall that extends a maximum 9 feet into natural ground. The embankment is 2 feet higher than the concrete section. The principal spillway is located approximately at the center of the dam and is 5 feet long and 1 foot deep. However, the entire concrete portion is considered an emergency spillway. A 12-inch low level discharge pipe passes through the base of the dam and is located below the spillway. The control for this discharge pipe is on the upstream face. The drainage area is 0.5 square miles and the pond has 100 acre-feet of available storage.

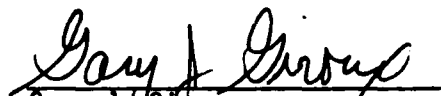
The assessment of the dam is based on the visual inspection, available drawings, past operational performance and hydraulic/hydrologic computations. The dam is judged to be in fair condition with several areas that require attention. These areas include seepage through the dam and at the toe of the dam, vegetation on the embankments and along the toe of the dam and the non-operating status of the discharge pipe.

The dam is classified as small and has a low hazard potential in accordance with guidelines established by the Corps of Engineers. Spillway adequacy analysis was made using a 100-year test flood. Peak inflow to the reservoir is 157 cfs; outflow is attenuated by storage to a peak rate of 145 cfs. The dam is not overtopped by the test flood; spillway capacity with pool at top of dam elevation is 1,496 cfs or approximately 10 times the routed test flood outflow.

It is recommended that the owner engage the services of a qualified registered engineer experienced in the design of dams to investigate the seepage through the dam and the toe; the potential erosion due to water flowing over the emergency spillway portion of the dam; the removal of trees on the downstream embankment and along the toe of the dam; the integrity of the gunite surface and the concrete in the interior of the dam. It is also recommended that the owner clear the downstream channel of debris; maintain the control gate in an operating condition; repair all cracked concrete; replace missing riprap along the toe; and initiate an annual technical inspection.

The owner should implement the recommendations and remedial measures described above and in greater detail in Section 7 within one year after receipt of this Phase I Inspection Report.

  
Joseph F. Merluzzo  
Connecticut P.E. #7639  
Project Manager

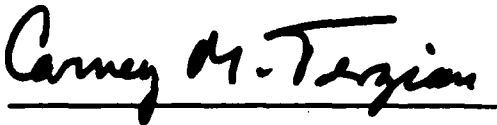
  
Gary J. Giroux  
Connecticut P.E. #11477  
Project Engineer



This Phase I Inspection Report on Mathers 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.



ARAMAST MAHTESIAN, MEMBER  
Geotechnical Engineering Branch  
Engineering Division




CARNEY M. TERZIAN, MEMBER  
Design Branch  
Engineering Division



RICHARD DIBUONO, CHAIRMAN  
Water Control Branch  
Engineering Division

APPROVAL RECOMMENDED:



JOE B. FRYAR  
Chief, Engineering Division

## PREFACE

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

The Phase I Inspection 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 Occupational Safety and Health Administration's (OSHA) rules and regulations is also excluded.

## TABLE OF CONTENTS

	<u>Page</u>
Letter of Transmittal	
Brief Assessment	
Review Board Page	
Preface . . . . .	i
Table of Contents . . . . .	ii-iv
Overview Photo	
Location Map	
 <u>Section</u>	
1. PROJECT INFORMATION	
1.1 General . . . . .	1
a. Authority . . . . .	1
b. Purpose of Inspection . . . . .	1
1.2 Description of Project . . . . .	2
a. Location . . . . .	2
b. Description of Dam and Appurtenances . . . . .	2
c. Size Classification . . . . .	3
d. Hazard Classification . . . . .	3
e. Ownership . . . . .	3
f. Operator . . . . .	3
g. Purpose of Dam . . . . .	3
h. Design and Construction History . . . . .	4
i. Normal Operational Procedure . . . . .	4
1.3 Pertinent Data . . . . .	4
2. ENGINEERING DATA	
2.1 Design Data . . . . .	9
2.2 Construction Data . . . . .	9
2.3 Operation Data . . . . .	10
2.4 Evaluation of Data . . . . .	10
3. VISUAL INSPECTION	
3.1 Findings . . . . .	11
a. General . . . . .	11
b. Dam . . . . .	11
c. Appurtenant Structures . . . . .	12
d. Reservoir Area . . . . .	13
e. Downstream Channel . . . . .	13

<u>Section</u>	<u>Page</u>
3.2 Evaluation . . . . .	13
4. OPERATIONAL AND MAINTENANCE PROCEDURES	
4.1 Operational Procedures . . . . .	14
a. General . . . . .	14
b. Description of any Warning System in Effect . . . . .	14
4.2 Maintenance Procedures . . . . .	14
a. General . . . . .	14
b. Operating Facilities . . . . .	14
4.3 Evaluation . . . . .	14
5. EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES	
5.1 General . . . . .	15
5.2 Design Data . . . . .	15
5.3 Experience Data . . . . .	16
5.4 Test Flood Analysis . . . . .	16
5.5 Dam Failure Analysis . . . . .	16
6. EVALUATION OF STRUCTURAL STABILITY	
6.1 Visual Observations. . . . .	18
6.2 Design and Construction Data . . . . .	18
6.3 Post-Construction Changes . . . . .	18
6.4 Seismic Stability . . . . .	19
7. ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES	
7.1 Dam Assessment . . . . .	20
a. Condition . . . . .	20
b. Adequacy of Information . . . . .	20
c. Urgency . . . . .	20
7.2 Recommendations . . . . .	20

<u>Section</u>	<u>Page</u>
7.3 Remedial Measures . . . . .	21
a. Operation and Maintenance Procedures . . .	21
7.4 Alternatives . . . . .	21

APPENDICES

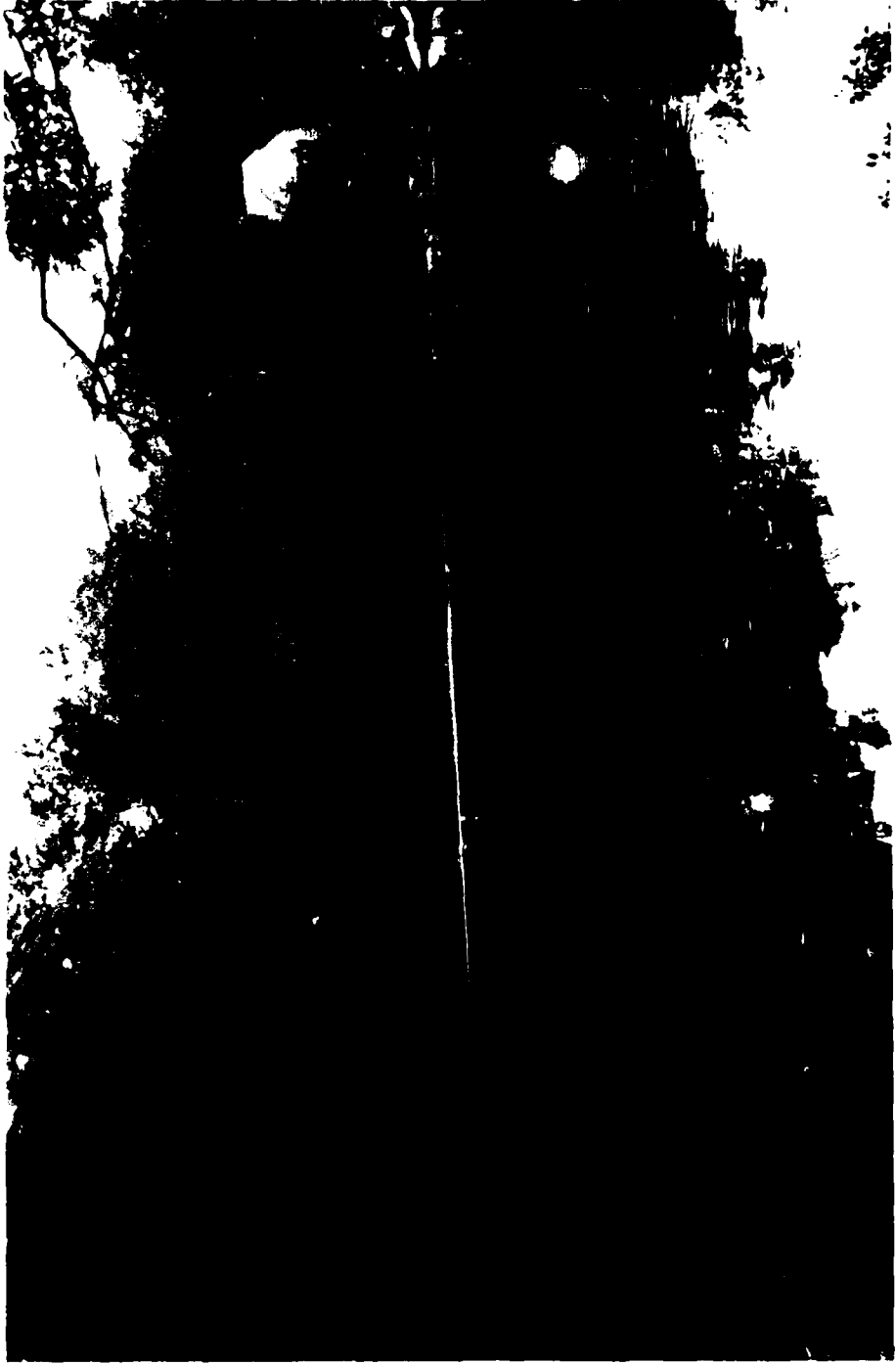
APPENDIX A - Inspection Checklist

APPENDIX B - Engineering Data

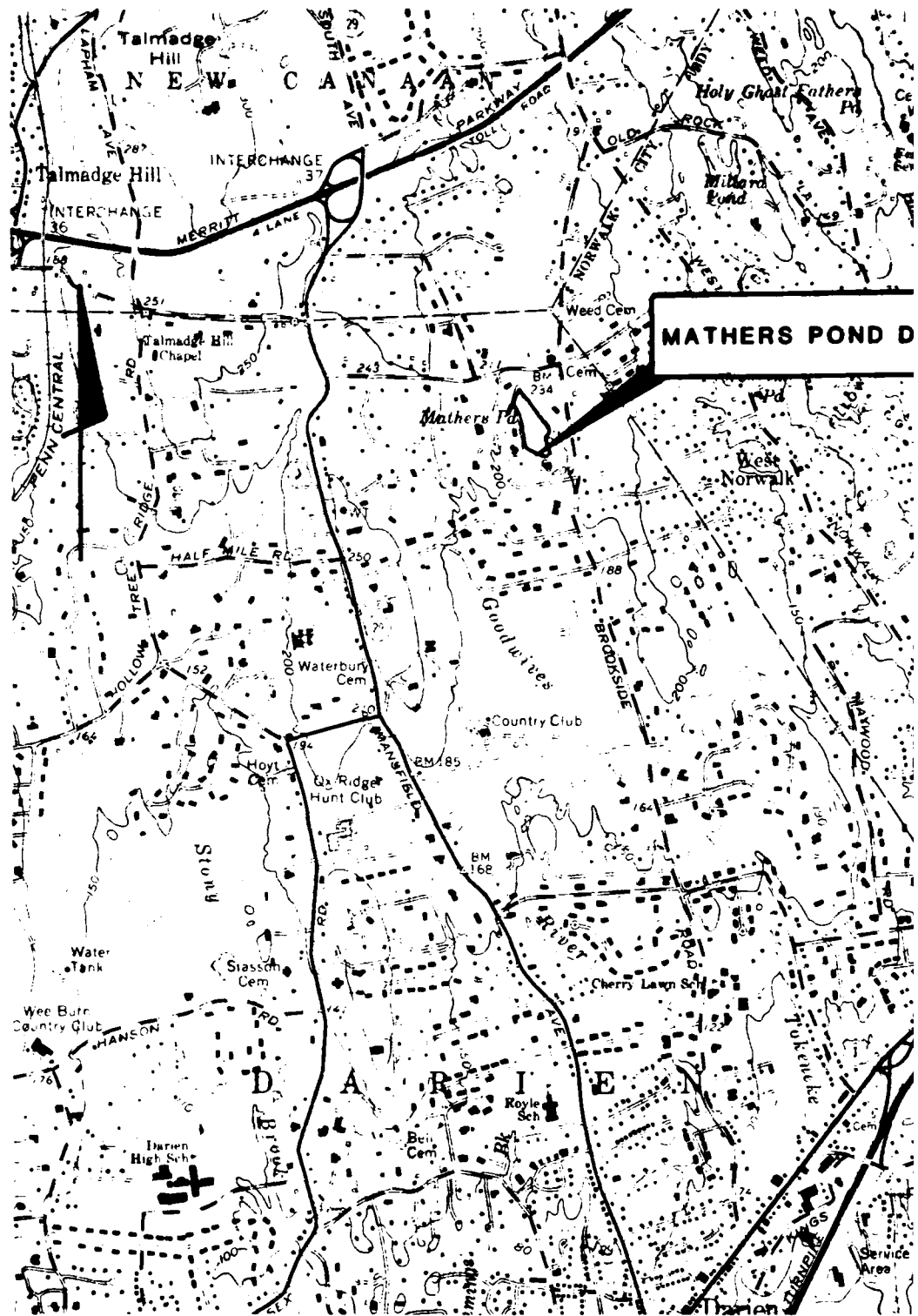
APPENDIX C - Photographs

APPENDIX D - Hydrologic and Hydraulic Computations

APPENDIX E - Information as Contained in the National  
Inventory of Dams



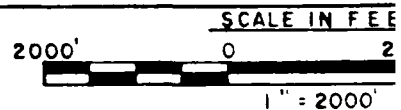
MATHERS POND DAM



**MATHERS POND D**

QUADRANGLE: NORWALK SOUTH, CT

US ARMY, CORPS OF ENGINEERS  
 NEW ENGLAND DIVISION  
 WALTHAM, MASS.



**LOCATION**

PHASE I INSPECTION REPORT  
MATHERS POND DAM CT 00054

SECTION 1 - PROJECT INFORMATION

1.1 General

a. Authority - Public Law 92-367, August 8, 1972 authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Storch Engineers has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Storch Engineers under a letter of March 6, 1980 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-80-C-0035 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection -

(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 - Mathers Pond Dam is located in the northeastern corner of the Town of Darien, Fairfield County, Connecticut approximately 3/4 mile south of the Merritt Parkway (U.S. Route 15) and 1/3 mile south of the intersection of the Darien, Norwalk and New Canaan townlines. The coordinates of the dam are approximately 41°-06.5' north latitude and 73°-28.5' west longitude. The dam is located on a tributary of the Goodwives River and is located approximately 3,000 feet upstream from the confluence with that river.

b. Description of Dam and Appurtenances - Mathers Pond Dam is a concrete gravity and earth embankment dam approximately 280 feet long and 18 feet high.

The concrete gravity portion of the dam is approximately 170 feet long and spans the deepest part of the valley. It is here that the dam is 18 feet high. The top width of the concrete portion is 2 feet and the bottom width is 10.5 feet. The whole structure is keyed into a 13-foot wide footing of varying depth. The entire downstream face of the concrete portion has been resurfaced with gunite.

The earthen embankment portion of the dam is raised 2 feet above the concrete section and has a concrete core wall that extends a maximum 9 feet into natural ground and is keyed into the concrete section.

The principal spillway is located approximately at the center of the dam in the concrete section. This spillway is 5 feet long and 1 foot deep. The entire concrete portion of the dam is an emergency spillway. A 12-inch low level discharge pipe is located below the principal spillway through the base of the dam. Control of the discharge pipe is by means of a gate valve on the upstream face.

c. Size Classification - Mathers Pond Dam has a maximum capacity of 32 acre-feet at the top of the dam and a maximum height of 18 feet. In accordance with the Recommended Guidelines for Safety Inspection of Dams established by the Corps of Engineers, the dam is classified as small (height less than 40 feet, storage less than 1,000 acre-feet).

d. Hazard Classification - Mathers Pond Dam is classified as having a low hazard potential. Failure of the dam with the water level at the top of the dam would result in the inundation of backyards that encroach the brook and damage several roadways, but should not affect any homes. The first floor sills of the homes in the impact area are at least 7 feet above streambed. Estimated flow and water depth just prior to failure (water level at the top of the dam) is 1,486 cfs at 3.8 feet and just after dam failure is 6,420 cfs at 5.4 feet.

e. Ownership - Mathers Pond Dam is owned by seven property owners that abut the pond. Any correspondence or personal contact should be addressed to:

Mr. David R. Arnold  
63 Dorchester Road  
Darien, Connecticut 06820  
(203) 655-7222

or

Mr. Edward R. McPherson, Jr.  
P.O. Box 1054  
Darien, Connecticut 06820  
(203) 655-0656

f. Operator - Operating personnel are under the direction of:

Mr. David R. Arnold  
63 Dorchester Road  
Darien, Connecticut 06820  
(203) 655-7222

g. Purpose of Dam - The dam was constructed to impound Mathers Pond which is used for recreation.

h. Design and Construction History - Mathers Pond Dam was designed by Major William A. Welch, Chief Engineer of the Paltisades Interstate Parkway Commission in 1920. In 1921, the dam was constructed by local labor under supervision of Major Welch.

In 1938, leakage was discovered at the easterly end of dam and concrete was poured to seal it off. This work was done by the Paul Bacco Company under the supervision of Charles Rumpf, P.E. Also at this time, a raised shelf was placed along the downstream toe and the overflow section of the dam underwent modification.

In 1940, the pond was emptied, and an application of pneumatic mortar (gunite) was applied to the entire dam. The original 3' x 3' sluiceway was reduced to a 12-inch pipe opening. Guniting was done by Allied Pneumatic Company under supervision of Mr. Rumpf.

In late 1965, the existing guinte was removed; new mesh installed and a new application of gunite made to the downstream face and over the top of the dam for a distance to cover the horizontal joint created by weir modification. The pond was not dewatered at this time. Work was done by the E.L. Wagner Company under the supervision of Mr. Rumpf.

Subsequent to 1973, a riprap gutter 6 feet wide was placed below the concrete section of the dam. This is intended to protect the toe when water flows over the concrete section of the dam.

i. Normal Operating Procedures - Water level in Mathers Pond is uncontrolled. The gate is inoperable.

### 1.3 Pertinent Data

a. Drainage Area - The Mathers Pond drainage basin is located in the Towns of Darien and New Canaan, Connecticut and is oval in shape with a length of 5,500 feet and a width of 2,000 feet. The area of the drainage

basin is 240 acres (Appendix D -Plate3). Less than 5 percent of the drainage basin is natural storage and more than 60 percent is developed. The remainder is woods or open space. The topography is rolling with elevations ranging from 270 (NGVD) in the northern section to 208 (NGVD) at the spillway crest.

b. Discharge at Damsite - There are no records available for discharge at the dam. All spillway capacities listed below are for the principal and emergency spillways.

(1) Outlet works (conduit) size:	12 inches
Invert elevation (feet above NGVD):	192
Discharge Capacity at top of dam:	25 cfs
(2) Maximum known flood at damsite: (Oct. 1955)	unknown
(3) Ungated spillway capacity at top of dam:	1,496 cfs
Elevation (NGVD):	210
(4) Ungated spillway capacity at test flood elevation:	145 cfs
Elevation (NGVD):	208.45
(5) Gated spillway capacity at normal pool elevation:	N/A
Elevation (NGVD):	N/A
(6) Gated spillway capacity at test flood elevation:	N/A
Elevation:	N/A
(7) Total Spillway capacity at test flood elevation:	145 cfs
Elevation (NGVD):	208.45
(8) Total project discharge at top of dam:	1,521 cfs
Elevation (NGVD):	210

(9) Total project discharge at test flood	
elevation:	170 cfs
Elevation (NGVD):	208.45
c. Elevation (feet above NGVD)	
(1) Streambed at toe of dam:	192
(2) Bottom of cutoff:	unknown
(3) Maximum tailwater:	193.8
(4) Normal pool:	207
(5) Full flood control pool:	N/A
(6) Spillway crest (ungated):	207
(7) Design surcharge (original design):	unknown
(8) Top of dam:	210
(9) Test flood surcharge:	208.45
d. Reservoir (length in feet)	
(1) Normal pool:	900
(2) Flood control pool:	N/A
(3) Spillway crest pool:	900
(4) Top of dam:	910
(5) Test flood pool:	900
e. Storage (acre-feet)	
(1) Normal pool:	15
(2) Flood control pool:	N/A
(3) Spillway crest pool:	15
(4) Top of dam:	32
(5) Test flood pool:	23

f. Reservoir Surface (acres)

(1) Normal pool:	5.0
(2) Flood control pool:	N/A
(3) Spillway crest:	5.0
(4) Test flood pool:	5.75
(5) Top of dam:	6.0

g. Dam

(1) Type:	Concrete gravity	earth embankment
(2) Length:	170 feet	110 feet
(3) Height:	18 feet	5 feet
(4) Top width:	2 feet	4 feet
(5) Side slopes:	1:2-downstream	2:1
(6) Zoning:	none	unknown
(7) Impervious		
Core:	N/A	concrete
(8) Cutoff:	footing depth varies	maximum 9 feet below natural ground
(9) Grout curtain:	unknown	unknown
(10) Other:	N/A	N/A

h. Diversion and Regulating Tunnel

N/A

i. Spillway

(1) Type:	concrete broad crested
(2) Length of weir:	170 feet
(3) Crest elevation (without flashboard):	208
(4) Gates:	N/A
(5) U/S channel:	none

(6) D/S channel: riprapped channel

(7) General: N/A

j. Regulating Outlets

(1) Invert elevation (NGVD): 192

(2) Size: 12 inches

(3) Description: Cast iron pipe

(4) Control Mechanism: Manually operated gate

(5) Other: Gate not operable

## SECTION 2 - ENGINEERING DATA

### 2.1 Design Data

No design computations are available for this dam, however, the following drawings are available:

- (a) Plans for concrete and core wall dams for the Honorable Stephen T. Mather, Darien, Connecticut - William A. Welch, Consulting Engineer, December, 1920 (Appendix B - Plate 1).
- (b) Mather Pond Dam proposed repairs - Thomas E. Golden, Jr., P.E. - Drawings SK-1 and SK-2 (Appendix B - Report by Thomas E. Golden, Jr., P.E.).

### 2.2 Construction Data

The dam was constructed in 1921 by local labor under the direction of William A. Welch. There are no as-built records of the original construction.

In October, 1938, work was done by the Paul Bacco Company under the supervision of Charles Rumpf, P.E. The work done was essentially sealing a leak under the easterly end of the dam with concrete and modifications to the top of dam (overflow section). Records of this work and pictures are available at the Water Resources Unit of the Connecticut Department of Environmental Protection.

In 1940, the pond was emptied and an application of gunite was applied to the entire dam. Also, the original 3' x 3' sluicgate was replaced by a 12-inch diameter pipe. The guniting was done by the Allied Pneumatic Company under the direction of Charles Rumpf, P.E. Records and photos of this work are also available at the above location.



In late 1965, the existing gunite was removed; new mesh installed, and a new application of gunite made to the downstream face and over the top of the dam a distance to cover the horizontal joint created by weir modification. The pond was not dewatered at this time. Work was done by the E.L. Wagner Company under the supervision of Mr. Rumpf. Records are also available at the Connecticut Department of Environmental Protection.

Subsequent to 1973, a riprap gutter, 6 feet wide was placed below the concrete section of the dam. There are no records available for this work.

### 2.3 Operation Data

The pond is used for recreation and is not regulated because the gate does not operate. No operating records for this dam have been maintained.

### 2.4 Evaluation of Data

a. Availability - The information noted above is readily available from the files of the Water Resources Unit - Department of Environmental Protection, State of Connecticut and from the persons noted in Section 1.2.e.

b. Adequacy - The data made available along with the visual inspection, past performance history and hydraulic/hydrologic assumptions were adequate to assess the condition of the facility.

c. Validity - The field inspection revealed that the dam was constructed essentially as the data states, however, some of the information must be verified.

## SECTION 3 - VISUAL INSPECTION

### 3.1 Findings

a. General - The visual inspection was conducted on May 30, 1980 by members of the engineering staff of Storch Engineers and D. Baugh and Associates. The inspection team was accompanied by Mr. Edward McPhearson and Mr. David Arnold who represent the owners of the pond. A copy of the visual inspection checklist is contained in Appendix A of this report. Selected photos of the dam are contained in Appendix C.

In general, the overall condition of the dam and its appurtenant structures is fair.

b. Dam - The dam is a concrete gravity and earth embankment dam. The downstream face of the concrete portion of the dam has been resurfaced with gunite in late 1965. As can be seen, the general condition of this surface is fair (Photo 6). There are areas along the entire face where the gunite is cracked and there are signs of seepage and efflorescence (Photo 3). At several locations, weep holes were installed (Photo 4) and show signs of water seeping from them. These weep holes do not appear on the original drawings and it is not known when they were installed. Also at the time of the latest resurfacing (late 1965), metal pipes were inserted into the dam to relieve leakage pressures (Photo 3). At all locations where there were signs of seepage, the amount was not measurable.

The upstream face of the dam is vertical and the water in the pond was at spillway elevation. Therefore, the upstream face could not be observed (Photo 1).

At several locations along the face of the concrete section, vegetation was growing from the cracks in the gunite (Photo 9).

At the eastern end of the concrete portion of the dam, concrete was poured along the toe at the dam/earth interface. This concrete shows signs of erosion from runoff from the easterly end and from water flowing over the concrete section (Photo 5). Riprap is generally present along the toe of the concrete section with debris and vegetation intermingled with it (Photo 6).

There were several areas below the dam and east of the spillway where water was seeping beneath the dam (Photo 10 - for location of areas see photo location plan). This is the same area in which a correction of a seepage problem was attempted in 1938.

The earth embankment portion of the dam is 2 feet higher than the concrete section and has a concrete core wall extending a maximum 9 feet below natural ground. These embankments are overgrown with brush and trees (Photos 7 and 8) and there is no sign of seepage.

c. Appurtenant Structures - The principal spillway is a 5-foot long 1-foot deep slot in the concrete portion of the dam (Photo 2). The concrete of this spillway and the portion of the face just below the principal spillway is in good condition.

During a major storm, the entire concrete portion of the dam is used as an emergency spillway. The top of the concrete portion is in good condition. The downstream face is in fair condition as described earlier.

At the bottom of the principal spillway there is a scour hole approximately 1-foot deep (Photo 4). The riprap and concrete along the toe of the dam was placed to keep the toe from being undermined when water flows over the emergency spillway. This riprap is in good condition.

The discharge pipe is a 12-inch pipe that outlets at the toe of the dam and just west of the principal spillway (Photo 4). The outlet and channel leading from the pipe should be cleaned. The discharge pipe has a gate on the upstream face of the dam (Photo 2). The gate is not operated out of fear by the owners that once opened they will not be able to close it. Hence, the mechanism is strapped and rendered inoperable.

d. Reservoir Area - The area immediately adjacent to the pond is gently sloped lawn area of the abutting property owners. The shoreline is well kept and shows no signs of sloughing or erosion. A rapid rise in the water level of the pond will not endanger life or property.

e. Downstream Channel - The downstream channel is a natural channel of rock and gravel. The area adjacent to the downstream channel is heavily overgrown with brush and trees.

### 3.2 Evaluation

Overall the general condition of the dam is fair. The visual inspection revealed items that lead to this assessment, such as:

- a. Seepage along the toe
- b. Minor seepage through the dam
- c. Cracks in the concrete surface
- d. Erosion along the eastern toe of the concrete section
- e. Scour at the bottom of the principal spillway
- f. Inoperation of the discharge pipe
- g. Vegetation on the downstream face, earth embankments, along the toe of the dam and downstream channel.

## SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

### 4.1 Operational Procedures

a. General - The operation of this facility is strictly for the purpose of recreation and the water level is kept at the principal crest only because the discharge valve is not operable.

b. Description of Any Warning System in Effect - There is no warning system in effect for this dam.

### 4.2 Maintenance Procedures

a. General - There is no specific maintenance program for this dam; however, there is periodic clearing of the vegetation on the downstream side.

b. Operating Facilities - The gate and the discharge pipe are not operable. The mechanism is strapped and inoperable out of fear that it will not close.

### 4.3 Evaluation

There is no regularly scheduled maintenance program, however, periodic vegetative removal. A systematic and complete maintenance program should be instituted at the dam and a formal warning system should

## SECTION 5 - EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

### 5.1 General

Mathers Pond Dam is a concrete gravity and earth embankment dam approximately 280 feet long and 18 feet high. The concrete portion of the dam is 170 feet long and is 2 feet lower than the earth embankment. There is a 5-foot long, 1-foot deep and 2-foot wide principal spillway at the center of the dam, and the entire concrete portion of the dam is used as an emergency spillway during a major storm. A 12-inch low level discharge pipe passes through the base of the dam with the gate valve on the upstream face of the dam. This valve is inoperable.

The watershed encompasses 240 acres and is 60 percent developed with the remainder wooded or open fields. The topography is rolling with terrain rising only 62 feet above the spillway crest.

The pond has a total capacity of 32 acre-feet when the pond is at the top of the earth embankment and 9.7 acre-feet at the spillway crest. Therefore, there is approximately 17.0 acre-feet (.85 inches) of storage available. The test flood outflow for this dam is 145 cfs and the spillway capacity is 1,486 cfs or approximately 10 times the test flood.

### 5.2 Design Data

No design data for the original dam is available. Hydraulic computations by Mozzochi Associates for the Department of Environmental Protection are found in Appendix B of this report. Independent computations for this dam were also developed and used for this report.

### 5.3 Experience Data

No historical data for recorded discharges or water surface elevation is available for this dam; however, the dam has withstood the floods of the 1930's and 1950's. For the two major storms, August and October of 1955, 15.64 inches and 17.29 inches of rain fell respectively. The exact discharge over the dam is not known.

### 5.4 Test Flood Analysis

Based on the Recommended Guidelines for Safety Inspection of Dams, the dam is classified as a small structure with a low hazard potential. The test flood for these conditions ranges from the 50-year to 100-year flood. The 100-year flood was used for this dam because of the property damage it may inflict (several roadways may be overtopped).

The test flood inflow was calculated using an equation found in the Connecticut Department of Transportation Hydraulics and Drainage Manual (1973). This formula was developed as a fast means for developing flow throughout the State and is based on USGS gaging stations. The test flood inflow by this method is 157 cfs.

The routing procedure was developed by the Corps of Engineers and gives an approximate outflow of 145 cfs. The spillway capacity of the dam is approximately 1,486 cfs or 10 times the test flood outflow. The test flood will overflow the emergency spillway by 0.45 feet.

Storage behind the dam was assumed to begin at the elevation of the spillway crest. Storage was determined by an average area depth analysis. Capacity curves for the spillway assumed a broad crested weir.

### 5.5 Dam Failure Analysis

A dam failure analysis was performed using the Rule of Thumb method in accordance with guidelines established by the Corps of Engineers. Failure

was assumed to occur when the water level in the pond was at the top of the dam.

Downstream conditions are such that first floor elevation of all houses are at least 7 feet above the stream bed. The main channel itself is approximately 2'x6' with most of the capacity in the overbank condition.

The spillway discharge just prior to dam failure is 1,486 cfs and will produce a depth of flow of approximately 3.8 feet several hundred feet downstream from the dam. The calculated dam failure discharge is 6,420 cfs and will produce a depth of flow of approximately 5.4 feet several hundred feet downstream from the dam or an increase in water depth at failure of approximately 1.6 feet. The failure analysis covered a distance of approximately 900 feet downstream where the depth of flow was calculated to be 5.0 feet or an increase in depth of approximately 1.2 feet.

Failure of Mathers Pond Dam should not result in the loss of lives but the flood wave may damage property, several road crossings and inundate a portion of a golf course. Economic loss, however, is not significant and therefore the dam is classified as having a low hazard potential.



## SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

### 6.1 Visual Observations

The general structural stability of the dam is good as evidenced by the vertical, horizontal and lateral alignment. The gunite face on the concrete portion of the dam does show some cracking and efflorescence but this is not indicative of an unstable dam. The earth embankment portions of the dam also show no evidence of instability. The structural stability of the dam, however, can be affected by the items noted in Section 3.2.

### 6.2 Design and Construction Data

The dam was constructed in 1921 from plans prepared by Major William A. Welch, Chief Engineer of the Palisades Interstate Parkway Commission.

The design and construction data consists of plans showing elevations, profiles and sections of the dam. Upon field verification of these plans, they have been used along with the visual inspection to evaluate the dam.

### 6.3 Post-Construction Changes

Post-construction changes are as follows:

- |      |   |
|------|---|
| 1938 | Work was performed under the dam in a sheeted and braced excavation. Leakage had been noticed at the easterly end of the dam and concrete was poured to seal off the leak. The work was done by the Paul Bacco Company under the supervision of Charles Rumpf, P.E. At this time, or subsequently, the stone riprap facing was removed and a raised shelf was placed downstream. In addition, the overflow section underwent modifications. |
| 1940 | The pond was emptied, and an application of pneumatic mortar (gunite) was applied to the entire dam. Also, the original 3' x 3' sluiceway was reduced to a 12-inch pipe opening. Guniting was done by the Allied Pneumatic Company under supervision of Mr. Rumpf.  |

1965 The existing gunite was removed; new mesh installed and a new application of gunite made to the downstream face and over the top of the dam for a distance sufficient to cover the horizontal joint created by weir modification of 1938. The pond was not dewatered at this time. Work was done by the E. L. Wagner Company under the supervision of Mr. Rumpf.

1973 A riprap gutter, 6 feet wide, was placed below the concrete section of the dam. This was intended to protect the toe when the concrete section of the dam is used as a spillway.

#### 6.4 Seismic Stability

The dam is located in Seismic Zone 1 and in accordance with Recommended Phase I Guidelines does not warrant a seismic analysis.

## SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

### 7.1 Dam Assessment

a. Condition - After consideration of the available information, the results of the inspection, contact with the owner and hydraulic/hydrologic computations, the general condition of Mathers Pond Dam is fair.

b. Adequacy of Information - The information available is such that an assessment of the safety of the dam should be based on the available data, the visual inspection results, past operational performance of the dam and its appurtenant structures and computations developed for this report.

c. Urgency - It is considered that the recommendations and remedial measures suggested below be implemented within one year after receipt of this Phase I Inspection Report.

### 7.2 Recommendations

The following recommendations should be carried out under the direction of a qualified registered engineer.

- a. Seepage in the vicinity of the toe of the dam should be investigated further to determine its origin and monitored to determine any change.
- b. Seepage through the face of the dam should be investigated further to determine its origin and monitored to determine any change.
- c. Integrity of the gunite surface should be investigated as well as the concrete in the interior of the dam.
- d. Riprap along the toe of the concrete section should be investigated to determine if it can withstand the pounding of the water over the spillway.

- e. Trees including stumps and root systems should be removed from the toe and embankment slopes and backfilled with proper material.
- f. Evaluate the condition of the blowoff pipe and valve and make it operable.

Any recommendations made by the engineer should be implemented by the owner.

### 7.3 Remedial Measures

- a. Operating and Maintenance Procedures -
  - (1) Clear the downstream channel of debris.
  - (2) Remove the straps from the control mechanism to the gate valve and make sure the valve is operable. Store the control handle at a convenient location.
  - (3) Repair all cracked and spalled concrete.
  - (4) Replace missing riprap along the downstream toe.
  - (5) Institute a program of annual technical inspection by a qualified Engineer.

### 7.4 Alternatives

There are no potential alternatives to the above recommendations.

APPENDIX A  
INSPECTION CHECKLIST

**INSPECTION CHECK LIST**

**PARTY ORGANIZATION**

PROJECT Mathers Pond

DATE 5-30-80

TIME 1:00 p.m.

WEATHER Fair

W.S. ELEV. \_\_\_\_\_ U.S. \_\_\_\_\_ DN.S. \_\_\_\_\_

**PARTY:**

- |                                       |                                 |
|---------------------------------------|---------------------------------|
| 1. <u>J. Schearer, SE, Civil</u>      | 6. <u>E. McPhearson, Owner</u>  |
| 2. <u>K. Pudeler, SE, Civil</u>       | 7. <u>D. Arnold, Owner</u>      |
| 3. <u>G. Giroux, SE, Civil/Hyd.</u>   | 8. <u>J. Pozzato, MA, Mech.</u> |
| 4. <u>M. Haire, DBA, Struct./Geo.</u> | 9. _____                        |
| 5. <u>P. Austin, DBA, Civil</u>       | 10. _____                       |

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Dam Embankment</u>	<u>M. Haire</u> <u>G. Giroux S. Jordan</u>	<u>Good</u>
2. <u>Mechanical - Electrical</u>	<u>J. Pozzato</u>	<u>not operating</u>
3. <u>Spillway Weir</u>	<u>M. Haire</u>	<u>Good</u>
4. <u>Discharge Channel</u>	<u>K. Pudeler</u> <u>P. Austin</u>	<u>Fair</u>
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
9. _____	_____	_____
10. _____	_____	_____

**INSPECTION CHECK LIST**

PROJECT Mathers Pond DATE 5-30-80  
 PROJECT FEATURE \_\_\_\_\_ NAME \_\_\_\_\_  
 DISCIPLINE \_\_\_\_\_ NAME \_\_\_\_\_

AREA EVALUATED	CONDITIONS
<u>DAM EMBANKMENT</u>	
Crest Elevation	Good
Current Pool Elevation	Good
Maximum Impoundment to Date	Good
Surface Cracks	Some - minor
Pavement Condition	N/A
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	Not allowed
Vegetation on Slopes	Minor - vines
Sloughing or Erosion of Slopes or Abutments	None
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None
Unusual Embankment or Downstream Seepage	Minor
Piping or Boils	None
Foundation Drainage Features	Weep holes some water
Toe Drains	Rock at toe
Instrumentation System	None

**INSPECTION CHECK LIST**

PROJECT Mathers Pond

DATE 5-30-80

PROJECT FEATURE \_\_\_\_\_

NAME \_\_\_\_\_

DISCIPLINE \_\_\_\_\_

NAME \_\_\_\_\_

AREA EVALUATED	CONDITION
<p><u>CULLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u></p> <p>a. Approach Channel</p> <p style="padding-left: 40px;">Slope Conditions</p> <p style="padding-left: 40px;">Bottom Conditions</p> <p style="padding-left: 40px;">Rock Slides or Falls</p> <p style="padding-left: 40px;">Log Boom</p> <p style="padding-left: 40px;">Debris</p> <p style="padding-left: 40px;">Condition of Concrete Lining</p> <p style="padding-left: 40px;">Drains or Weep Holes</p> <p>b. Intake Structure</p> <p style="padding-left: 40px;">Condition of Concrete</p> <p style="padding-left: 40px;">Stop Logs and Slots</p>	<p><u>Underwater</u></p>



**INSPECTION CHECK LIST**

PROJECT Mathers Pond

DATE 5-30-80

PROJECT FEATURE \_\_\_\_\_

NAME \_\_\_\_\_

DISCIPLINE \_\_\_\_\_

NAME \_\_\_\_\_

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - CONTROL TOWER</u></p> <p>a. Concrete and Structural</p> <p>    General Condition</p> <p>    Condition of Joints</p> <p>    Spalling</p> <p>    Visible Reinforcing</p> <p>    Rusting or Staining of Concrete</p> <p>    Any Seepage or Efflorescence</p> <p>    Joint Alignment</p> <p>    Unusual Seepage or Leaks in Gate Chamber</p> <p>    Cracks</p> <p>    Rusting or Corrosion of Steel</p> <p>b. Mechanical and Electrical</p> <p>    Air Vents</p> <p>    Float Wells</p> <p>    Crane Hoist</p> <p>    Elevator</p> <p>    Hydraulic System</p> <p>    Service Gates</p> <p>    Emergency Gates</p> <p>    Lightning Protection System</p> <p>    Emergency Power System</p> <p>    Wiring and Lighting System in Gate Chamber</p>	<p>N/A</p> <p>Not operating</p>

INSPECTION CHECK LIST

PROJECT Mathers Pond

DATE 5-30-80

PROJECT FEATURE \_\_\_\_\_

NAME \_\_\_\_\_

DISCIPLINE \_\_\_\_\_

NAME \_\_\_\_\_

AREA EVALUATED

CONDITION

OUTLET WORKS - TRANSITION AND CONDUIT

N/A

General Condition of Concrete

Rust or Staining on Concrete

Spalling

Erosion or Cavitation

Cracking

Alignment of Monoliths

Alignment of Joints

Numbering of Monoliths

**INSPECTION CHECK LIST**

<b>PROJECT</b> <u>Mathers Pond</u>	<b>DATE</b> <u>5-30-80</u>
<b>PROJECT FEATURE</b> _____	<b>NAME</b> _____
<b>DISCIPLINE</b> _____	<b>NAME</b> _____

AREA EVALUATED	CONDITION
----------------	-----------

OUTLET WORKS - SPILLWAY WEIR, APPROACH  
AND DISCHARGE CHANNELS

<p>a. Approach Channel</p> <p style="padding-left: 40px;">General Condition</p> <p style="padding-left: 40px;">Loose Rock Overhanging Channel</p> <p style="padding-left: 40px;">Trees Overhanging Channel</p> <p style="padding-left: 40px;">Floor of Approach Channel</p>	<p>Underwater</p>
<p>b. Weir and Training Walls</p> <p style="padding-left: 40px;">General Condition of Concrete</p> <p style="padding-left: 40px;">Rust or Staining</p> <p style="padding-left: 40px;">Spalling</p> <p style="padding-left: 40px;">Any Visible Reinforcing</p> <p style="padding-left: 40px;">Any Seepage or Efflorescence</p> <p style="padding-left: 40px;">Drain Holes</p>	<p>Good</p> <p>None</p> <p>Minor spalling on face</p> <p>None</p> <p>None</p> <p>None</p>
<p>c. Discharge Channel</p> <p style="padding-left: 40px;">General Condition</p> <p style="padding-left: 40px;">Loose Rock Overhanging Channel</p> <p style="padding-left: 40px;">Trees Overhanging Channel</p> <p style="padding-left: 40px;">Floor of Channel</p> <p style="padding-left: 40px;">Other Obstructions</p>	<p>Fair - overgrown with vege</p> <p>None</p> <p>Some</p> <p>Rock</p> <p>Debris</p>

**INSPECTION CHECK LIST**

PROJECT Mathers Pond

DATE 5-30-8-

PROJECT FEATURE \_\_\_\_\_

NAME \_\_\_\_\_

DISCIPLINE \_\_\_\_\_

NAME \_\_\_\_\_

**AREA EVALUATED**

**CONDITION**

OUTLET WORKS - OUTLET STRUCTURE AND  
OUTLET CHANNEL

General Condition of Concrete

None

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

Some

Condition of Discharge Channel

Fair - needs clearing

**INSPECTION CHECK LIST**

PROJECT Mathers Pond

DATE 5-30-80

PROJECT FEATURE \_\_\_\_\_

NAME \_\_\_\_\_

DISCIPLINE \_\_\_\_\_

NAME \_\_\_\_\_

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - SERVICE BRIDGE</u></p> <p>a. Super Structure</p> <ul style="list-style-type: none"> <li>Bearings</li> <li>Anchor Bolts</li> <li>Bridge Seat</li> <li>Longitudinal Members</li> <li>Under Side of Deck</li> <li>Secondary Bracing</li> <li>Deck</li> <li>Drainage System</li> <li>Railings</li> <li>Expansion Joints</li> <li>Paint</li> </ul> <p>b. Abutment &amp; Piers</p> <ul style="list-style-type: none"> <li>General Condition of Concrete</li> <li>Alignment of Abutment</li> <li>Approach to Bridge</li> <li>Condition of Seat &amp; Backwall</li> </ul>	<p>None</p>

APPENDIX B  
ENGINEERING DATA

Information pertaining to the history, maintenance and modification to  
Mathers Pond Dam as well as copies of past reports are located at:

State of Connecticut  
Department of Environmental Protection  
Water Resources Section  
State Office Building  
Hartford, Connecticut 06115

**MOZZOCHI ASSOCIATES**

**CIVIL ENGINEERS**

GLASTONBURY, CONN. 06033  
517 HEBRON AVENUE  
PHONE 633-9401

PROVIDENCE, R. I. 02903  
169 WEYBOSSET STREET  
PHONE 421-0420

October 14, 1970

PARTNERS

JOHN LUCHS, JR.  
STUART J. BECKERMAN

REPLY TO: Glastonbury

William H. O'Brien, III  
Civil Engineer  
Water Resources Commission  
State Office Building  
Hartford, Connecticut 06115

Re: Mathers Pond Dam  
Darien, Connecticut  
Our File #57-73-91

Dear Mr. O'Brien:

As requested in your letter of authorization, the dam has been checked for spillway adequacy and for safety. Listed below is pertinent information for the structure.

Drainage Area.....	240 Acres
Pond Area.....	5 Acres
Dam.....	Concrete structure
Spillway.....	Trapezoidal notch in top of concrete dam. 5.7'x4.9'(bottom) x 1.0' depth
Spillway capacity (without overtopping)....	18.0 <sup>±</sup> Cfs
Vertical Height of Dam (Max.).....	15' <sup>±</sup> to riprap shelf 20' <sup>±</sup> to valley floor
Length of Concrete Dam.....	165.7' with earth embankments 1' to 2.5' <sup>±</sup> above top of concrete at either end
Draw-down pipe.....	12" tile

The maximum water surface elevation has been computed as follows:

TYPE OF STORM	RAINFALL INTENSITY - 6 hrs.	MAX. W.S. ELEV. ABOVE TOP OF CONC. DAM
1.5 x 100 years storm	7.5"	.75 Ft.
100 " "	5.0	.52 Ft.
50 " "	4.5	.43 Ft.

STATE WATER RESOURCES  
COMMISSION  
RECEIVED

OCT 16 1970

ANSWERED \_\_\_\_\_  
REFERRED \_\_\_\_\_  
FILED \_\_\_\_\_



October 14, 1970

The existing trapezoidal spillway is completely inadequate to handle flood flows. The concrete dam is therefore overtopped and the whole dam acts as a spillway. To eliminate erosion at the downstream toe of the dam, riprap has been placed to form a shelf approximately 12' wide. This in turn drops off to the main valley floor elevation.

Listed below are my recommendations for corrective work to make this a safe structure:


1. Raise elevation of earth embankments at either end of concrete structure to provide a minimum freeboard of 2'-0" above maximum water surface. (this applies to a section removed from the concrete structure at the S.E. corner of pond.)
2. Make top width of earth embankments 10'-0" with 3:1 slopes.
3. Provide protection to earth embankment where it joins concrete structure.
4. Add additional riprap at downstream toe of concrete structure as required.
5. Remove flash board appurtenances on top of concrete dam and plug with concrete.
6. Repair minor spalling on downstream concrete face of dam.
7. Remove all trees and brush from earth embankments.

If you have any questions, please call.

Very truly yours,

MOZZOCHI ASSOCIATES

by

  
John Luchs, Jr., P. E.

JLjr:ed  
file

TABLE OF CONTENTS

Letter of Transmittal.

Report.

Introduction  
The Dam As Designed  
The Present Dam  
Stability Analyses  
Recommended Repair  
Summary.

Exhibits.

1. Drainage Area.
- II. History of the Dam.
- III. Original Design Drawings of W.A. Welch,  
December, 1920.  
  
"Plans for Concrete and Core Wall Dams"  
"Topography of Proposed Lake Site"  
"General Layout at Lake Site Grading & Planting"
- IV. Proposed Repair Work.  
  
SK-1.  
SK-2.
- V. Report of Dr. P. Rutledge, May 15, 1973
- VI. Photographs  
  
A to I.

INTRODUCTION

The Mather Pond Dam was constructed in 1921 by Mr. Stephen Mather on his estate in the northeastern part of Darien. The Dam was designed by Major William A. Welch. Construction was performed by Mr. Mather's superintendent and local labor under the guidance of Major Welch. All of the parties to the original work have passed away and no information is available as to the actual conditions encountered in the original construction of the dam and its foundation, or whether any modifications were made to the original design.

From records of the Towns of Darien and New Canaan, the watershed area of the Dam is shown by Exhibit 1. The area is approximately 240 acres.

Through the assistance and good fortune of Mr. E.R. McPherson, Jr. whose wife, Bertha McPherson is the daughter of Mr. Mather and is also one of the dam owners, the original design drawings have only recently been obtained from the historical records of Major Welch at the Palisades Interstate Parkway Commission where he had been Chief Engineer.

Simultaneously with efforts to trace the original design, or as-built drawings, a review of the history of the dam was made. Mr. McPherson made his files available which proved helpful.

The Water Resources Commission staff has also cooperated in permitting us to review their file on the Dam, including the various reports of their Engineers and Consultants.

From these data, the history of the Mather Pond Dam can be summarized by Exhibit 2.

Subsequent to obtaining the original design drawings, hand probings were made by a laborer in the field in order to verify the existence of the

concrete wing walls of the main dam, core walls of the side earthen dam, and the dam footing. These structures were indicated on drawing M-3 prepared by Major Welch entitled "Plans for Concrete and Core Wall Dams". The probings provided evidence that these structures existed in those areas shown on the drawing. Naturally, the only way to have fully verified this would have been to uncover the structures entirely, which was not feasible. Subsequent to this, elevations were taken at the site.

#### THE DAM AS DESIGNED

The design drawing M-3 prepared by Major Welch indicated a 13' wide footing under the two center dam pours which were 30' long each. The top of the footing was at Elevation 85 and the bottom was to be at Elevation 81, approximately, judging from the main elevation view of the Dam, "if no rock is encountered". Our probings appear to indicate a footing in the area shown on the drawing. However, it cannot be determined what the soil conditions were at the bottom of the footing, nor how the foundation was treated prior to pouring the footing, such as by benching into rock, or the like.

The main section of the dam was planned for vertical joints at 30' intervals. Two V-notch keyways are shown at these vertical joints. Although reference is made to them as "Expansion Joints", no expansion joint material or waterstop was indicated at the joint. Assuming the dam was constructed as shown, the keyways should provide resistance against any tendency to rotate, even assuming the concrete footing did not exist.

Two continuous keyways were designed at the horizontal joint which separates the footing from the stem. This key should provide resistance against any sliding tendency across this plane. No waterstops are shown across this joint, and no seepage is evident.

The design drawings indicate that each gravity dam section was to be formed in its entirety and apparently each 30' section was intended to be poured in one operation thereby eliminating a cold joint which might have been a source of leakage.

Crest control was originally by means of a 120' rectangular weir, one foot deep, which permitted overflow to occur over the entire 120' section. Such an area should have been ample to take substantial flood flow without overtopping the main dam. Photos of the original construction, previously forwarded to the Water Resources Commission, appear to indicate the weir was constructed as designed. Other photos at that time show that large stones were placed on the downstream face of the dam and over the top of the footing as designed. No stone rip-rap was indicated at the earthen side slopes.

A 3' x 3' sluiceway is shown at the base of the dam near the center with a gate valve and control assembly located at the top of the dam.

At each end of the concrete gravity dam were concrete core walls, keyed into the main dam section and covered with earth. Northeast from the gravity dam was an earthen dam with a concrete core wall.

A metal bracket system of supports along the top of the gravity dam provided capability for a wooden walkway raised in height so that one could walk from one side of the dam to the other.

#### THE PRESENT DAM

The existing weir is also one foot deep but is unable to handle more than a moderate to heavy storm. As a result, water tends to overflow the entire 167' dam width on occasion, spilling over on to the unprotected earthen side embankment causing erosion. (Photo A and B)

The upstream face of the dam cannot be viewed since the valve is inoperable and the pond cannot be lowered by this means. Soundings we

have taken indicate a build-up of soil or silt at the upstream face to a depth of perhaps 3' or more. Such a build-up may offer added resistance to possible passage of water under the dam, if it can occur. It may also render the existing gate valve somewhat more inaccessible.

The entire visible surface of the dam is covered with a pneumatically applied coat of mortar. In various locations, metal pipe sections of small diameter have been inserted in the gunite, perhaps to relieve the leakage pressure. (Photo C). It is understood these were installed at the time of the latest application of gunite in late 1965.

A 15' wide shelf of stone, boulders, coarse gravel and the original rip-rap dam facing now exists along the downstream toe of the dam. The water overflowing the weir and the main dam falls onto this shelf and thereupon flows downstream.

There are indications of a joint in the gunite in several places, but it does not continue over the full section of dam, nor does it appear to match the construction joints in the dam. At the eastern end of the dam a slight raised section has been built (Photo D), and the gunite was splayed over the adjacent earth, which may have protected this side and reduced erosion on the eastern side.

At the western end (Photo E), no such raised section was built at the top of the dam, and slight erosion can be seen to have occurred to the top of the earthen embankment of the adjacent core wall which is below the present top of the dam. It would thus appear that the present top of dam is somewhat higher than its original elevation, which would appear to confirm that slight modification may exist to the top of dam surface as well as to the width of the overflow section as originally designed.

At a location about 40' from the western end of the gravity dam, the earthen embankment resembles the design section (Photo F), and no evidence

exists of any overtopping. Statements of the owners confirm that no overtopping of the earthen dam areas containing concrete core walls has ever been observed.

At the eastern end of the dam, about 100' northeast of the exposed concrete, visible evidence of the buried concrete core wall in the side dam can be observed. (Photo G). Tree roots have grown over the concrete core wall and are heavily matted. The embankments appear to be in sound condition and no evidence can be seen of any overtopping in this area.

The original 3' x 3' sluiceway at the base of the dam has been filled with concrete and a 12" pipe installed within it. The wheel handle has been removed from the assembly (Photo H), and it is understood that the original gate valve was replaced about 30 years ago with a suitable valve for the smaller circular pipe opening.

Except for several minor spalled areas, the condition of the 1965 gunite surface appears reasonably good. However, because of the gunite it is not possible to view the concrete dam itself. Efflorescence is noticeable at various locations from seepage, but no evidence of distress is noted at any location.

The stubs of the metal walkway supports still protrude through the gunite at the top of the dam, but appear to present no problem. (Photo I). The walkway was apparently removed in 1938.

#### STABILITY ANALYSES

Theoretical calculations were made of the section of dam as originally designed by Major Welch. The following conditions were investigated:

1. Overturning about the footing base.
2. Overturning about the dam-footing intersection.
3. Sliding along the plane of the footing base.
4. Sliding along the plane of the dam-footing intersection.

For the following reasons these theoretical calculations should be considered no more than a guide to potential stress conditions:

- A. No knowledge is available as to the actual conditions encountered during foundation construction, nor is any likely to be obtained.
- B. It has not been possible to inspect the upstream face of the dam.
- C. The Dam has been standing for more than fifty years, and shows no signs of structural distress even though it has experienced several hurricane storm floods.
- D. Estimation of uplift, ice, and the resistance of the concrete is difficult to adjudge, and the results have little meaning because the dam is obviously stable.

However, under these obvious limitations, stability analyses can be performed as a mathematical exercise, and preliminary results are as follows:

1. Assuming no ice or uplift, no tension is indicated at the footing base, and maximum soil pressure is less than 2T/sf. To the extent that ice or uplift forces might exist, it is possible to show mathematically that some tension could occur at the upstream side of the footing only if the restraint provided by the joint keys mobilizing the mass of the dam and footing could not take place.
2. Assuming no ice or uplift, no tension is indicated above the plane of the dam-footing intersection. To the extent that ice or uplift were possible at that level, tension might tend to exist only to the extent that the keyways were unavailable.
3. Assuming some passive resistance from the gravel shelf, there appears little likelihood of sliding along either the plane of the footing bottom or the dam base.

#### RECOMMENDED REPAIR

With the new information, we comment on the 7 items suggested for repair as outlined in letters of October 14, 1970 and December 5, 1972.

a. ITEMS 1, 2, and 7.

These relate to raising the earth embankments, widening them, and removing various trees. Due to the existence of the concrete core walls, and because no overtopping of the earth embankments has ever been observed, even during the 1955 hurricanes, an expenditure for such work would provide little added effectiveness over the actual condition which has existed for over 50 years. It should be noted that were the soil cover over the core wall to erode, water would tend to be released only to the core wall top. Were the core wall to give way, a release could take place only to the level



of the adjacent ground level, which is about 2.5' below the present invert.

b. ITEMS 3 and 4.

These relate to a remedy for embankment erosion which takes place. There are several possible solutions, however, due to the inaccessibility of the location, a hand placed stone gutter, properly shaped by Sketches SK-1 and SK-2 appears most appropriate at this time. To prevent water flow around the side of the present dam, the top of the section of dam will be raised slightly so that any overflow will run on to the stone gutter. This work is recommended at the west side and will not affect the dam or the pond level.

c. ITEM 5.

The metal sockets protruding from the gunite at the top are remnants of former handrail brackets, and do not relate to the erection of flashboards. No matter how carefully done, removing the breakage of gunite and for this reason no removal is recommended unless a safety consideration governs with which we are not

d. ITEM 6.

Any gunite patching is entirely cosmetic in nature, and there is so little that might be done, it is suggested this be done.

SUMMARY.

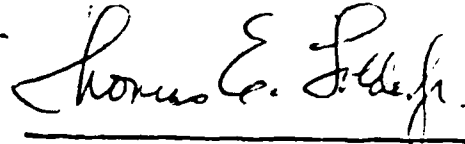
Since the surface of the dam is covered with gunite, it is difficult to observe the dam concrete. We have learned also that an event occurred over 30 years ago which prompted certain repair, and evidence suggests the repair was performed to the complete satisfaction of the Engineer at that time.

In light of these facts, it is suggested that occasional inspections of the dam and its foundation be made. The nature of the 1938 event and the repair was apparently a progressive soil erosion caused by seepage under the dam. Criteria which have been recommended\* in selecting proper materials for masonry dams on varying soil types of foundation materials might

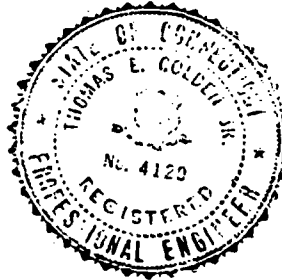
\* Lane, "Security from Underseepage, Masonry Dams on Earth Foundations," ASCE Transactions 1935, Vol 100.

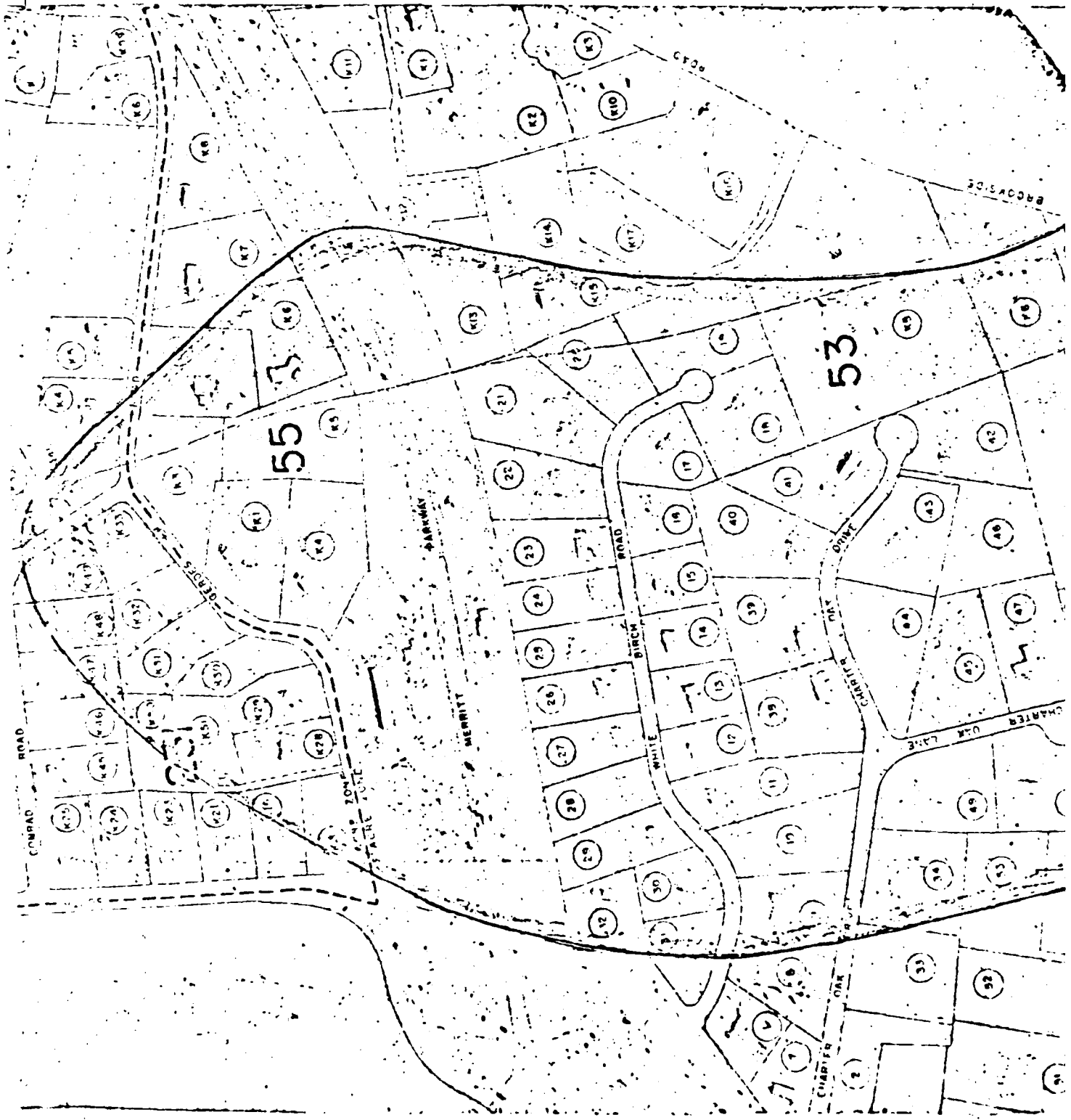
such observation of the shelf area for evidence of seepage.

Very truly yours,



Thomas E. Golden, Jr. P.E.





55

53

CONRAD ROAD

SAGE TONE

SAGE TONE

MERRITT PARKWAY

BIRCH ROAD

WHITE

CHARTER OAK

CHARTER OAK LANE

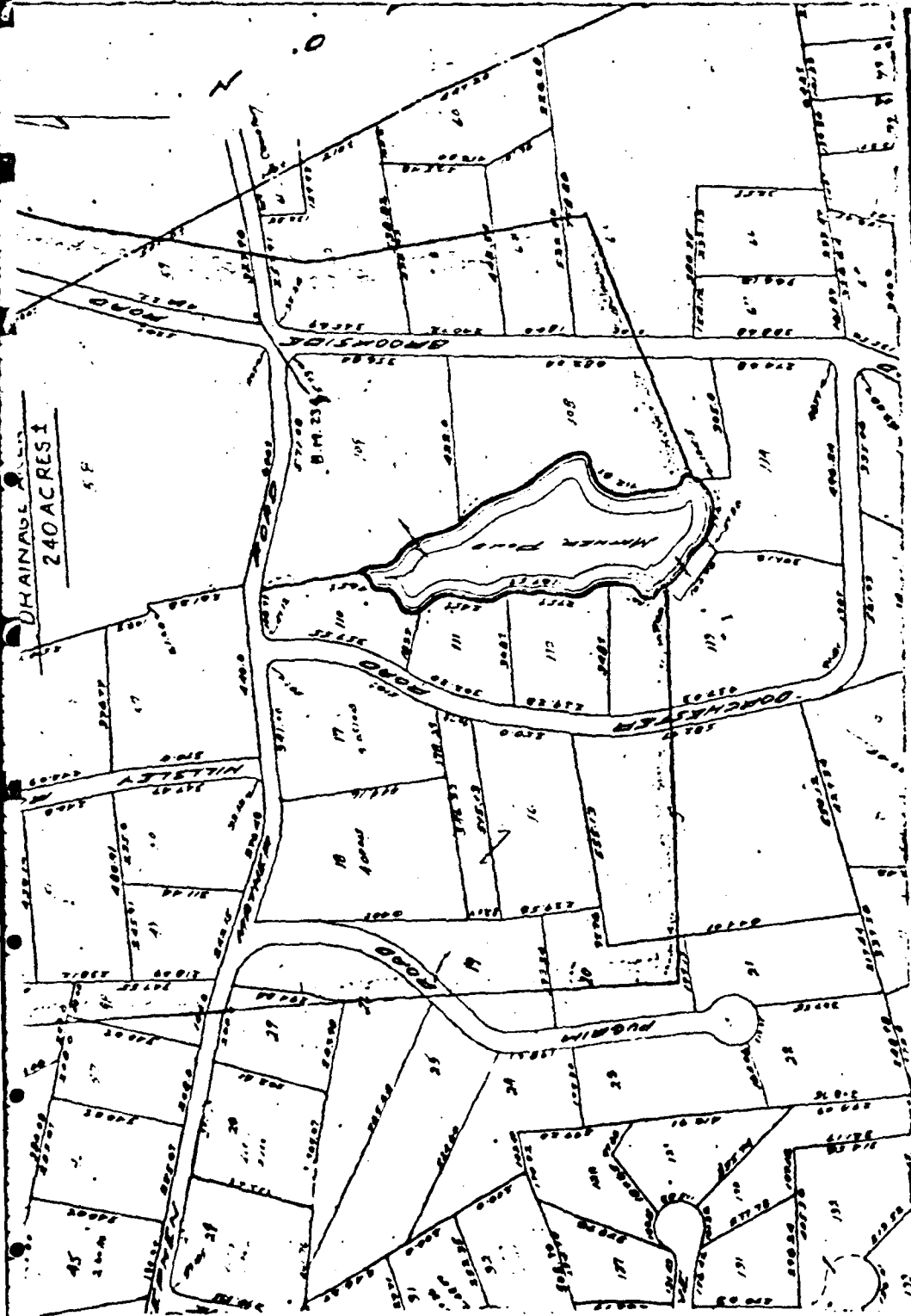
BROOKSIDE

- 41
- 42
- 43
- 44
- 45
- 46
- 47
- 48
- 49
- 50
- 51
- 52
- 53
- 54
- 55
- 56
- 57
- 58
- 59
- 60
- 61
- 62
- 63
- 64
- 65
- 66
- 67
- 68
- 69
- 70
- 71
- 72
- 73
- 74
- 75
- 76
- 77
- 78
- 79
- 80
- 81
- 82
- 83
- 84
- 85
- 86
- 87
- 88
- 89
- 90
- 91
- 92
- 93
- 94
- 95
- 96
- 97
- 98
- 99
- 100



53

DRAINAGE AREA  
240 ACRES ±  
5 F



REVISIONS	THOMAS GOLDEN ASSOCIATES		DRAWING NO. EXHIBIT-I
	ENGINEERS		
	694 POST ROAD DARIEN, CONNECTICUT 06820		
TITLE		MATHER POND DAM- DRAINAGE AREA	
SCALE		DR. BY	
DATE		CK'D. BY	

STANFORD PRODUCTS INC. 6000 WASHINGTON, N.Y.

Exhibit 11.

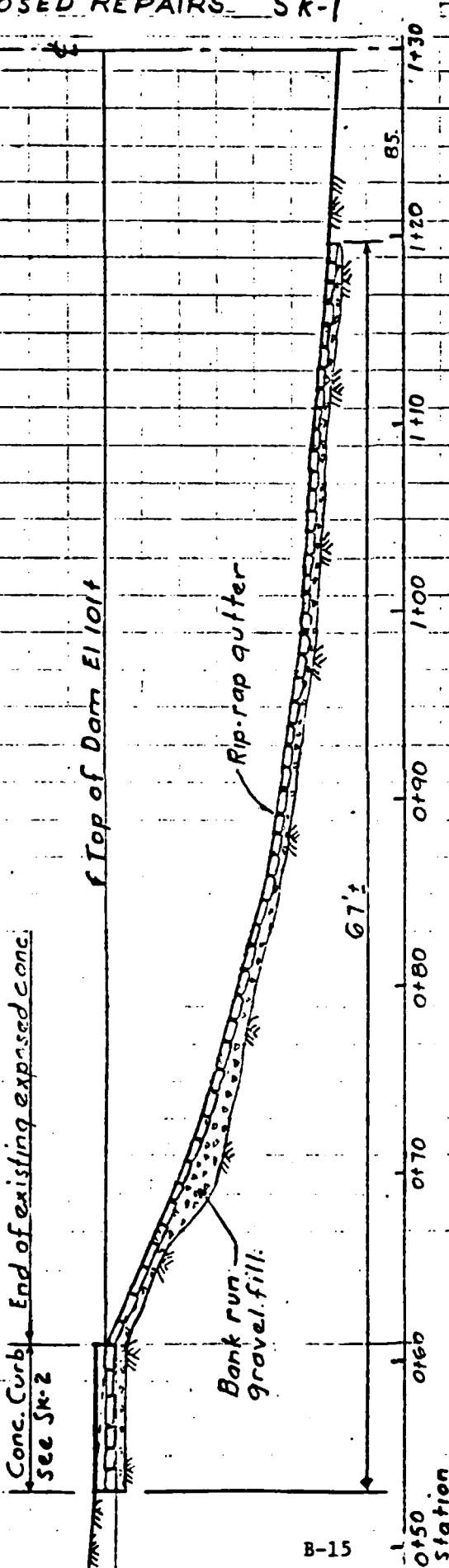
HISTORY OF THE MATHER POND DAM

- 1921 The dam was constructed from plans prepared by Major William A. Welch, Chief Engineer of the Palisades Interstate Parkway Commission.
- 1937 The Merritt Parkway was built within a portion of the watershed.
- 1938 10.35" of rain was recorded at the Stamford Reservoir of the Stamford Water Company during the September hurricane. In only one previous month in the dam's history had this been exceeded. That occurred in September 1934 when 14.09" fell.
- 1938 In October of this year an event was noticed which required repair. Owner's photos which have been filed with the Water Resources Commission indicate work was performed under the dam in a sheeted and braced excavation. It is understood that leakage had been noticed at the easterly end of the dam, and concrete was poured to seal off the leak. The work was done by Paul Bacce Co. under the supervision of Charles Rumpf, P.E. At this time, or subsequently, the stone rip-rap facing was removed and a raised shelf was placed downstream. In addition, the overflow section underwent modification.
- 1940 The pond was emptied, and an application of pneumatic mortar (gunite) was applied to the entire dam. Joints matched the original vertical joints in the dam. From other photos, also on file with the Commission, the original 3' x 3' sluiceway existed at this time but was subsequently reduced to a 12" pipe opening. Guniting was done by Allied Pneumatic Co. under supervision of Mr. Rumpf.
- 1955 Two major storms were recorded. In August, 15.64" fell, and in October, 17.29" fell. The latter was an all-time record.
- 1965 Joseph Cone, Consulting Engineer to the Water Resources Commission submitted a report to them concerning the Dam.
- 1965 In late 1965 a program of repair was undertaken. The existing gunite was removed; new mesh installed, and a new application of gunite made to the downstream face and over the top of the dam a distance to cover the horizontal joint created by weir modification. The pond was not dewatered at this time. Work was done by E.L. Wagner Co under the supervision of Mr. Rumpf.
- 1970 In December, State representatives considered the Cone Report with other Consulting Engineers, Mozzochi Associates. They jointly considered there was no immediate concern over the safety of the structure, but recommended 7 remedial steps.
- 1972 The State advised the Dam owners to perform repair work in accordance with the advice of Mozzochi Associates as noted by their letter report of October 14, 1970.

PROPOSED REPAIRS Sk-1

DATE May 14, 1973

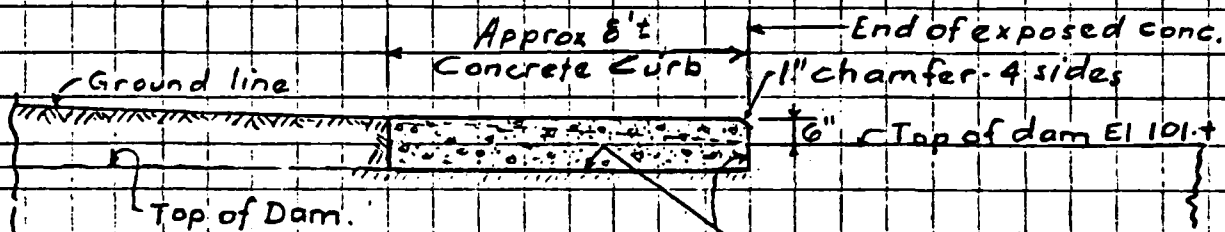
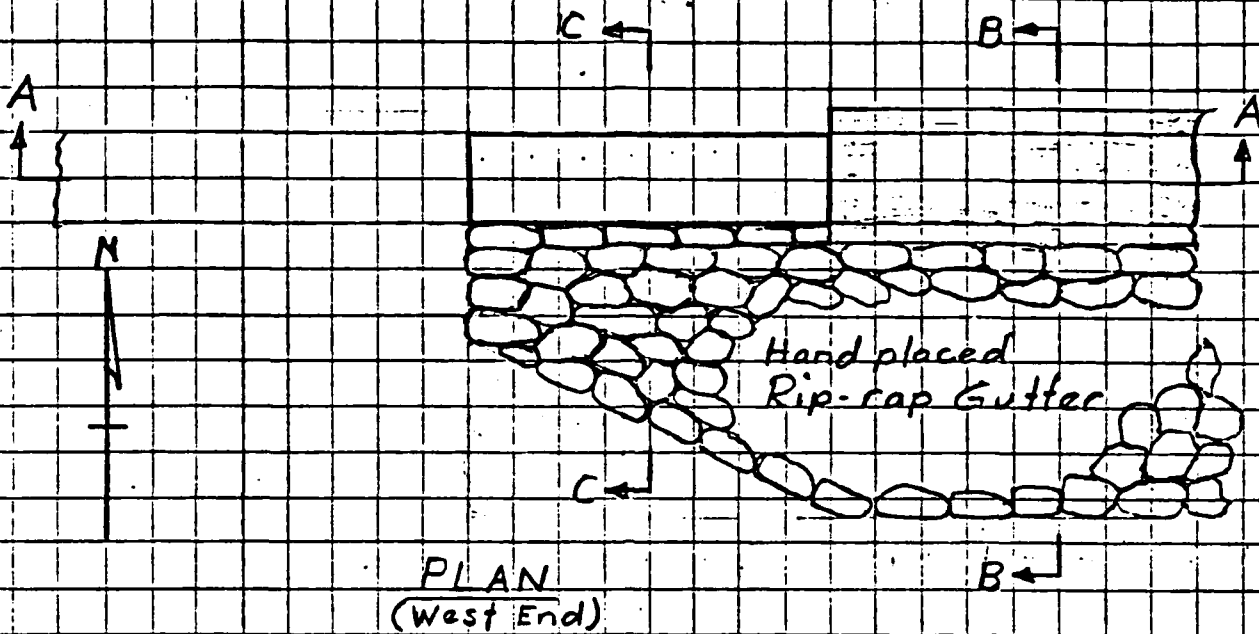
WEST OF & OF DAM  
EAST OF & OF DAM



SECTION THRU GUTTER

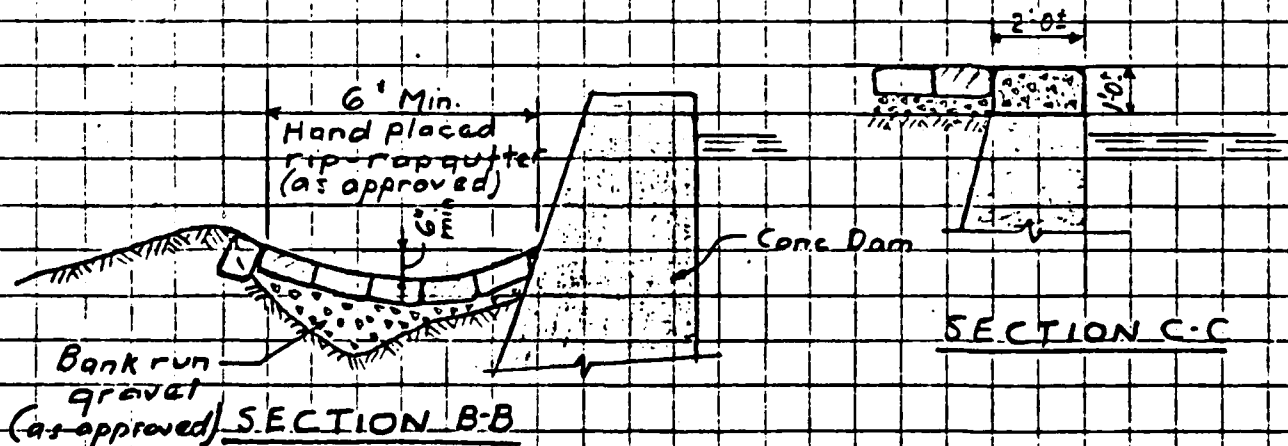
GENERAL NOTES:

1. Clear and grub gutter and work areas.
2. Furnish and install well graded bank run gravel fill and sub-base for rip-rap gutter. (4" Min)
3. Furnish and install hand-placed stone rip-rap gutters from approved material shaped as shown.
4. Stone shall be laid up dry.
5. For other details see Sk-2
6. All disturbed lawn areas shall be re-seeded



SECTION A-A  
Scale  $\frac{1}{4}'' = 1'-0''$

clean existing concrete surface thoroughly and apply bonding compound by "Sika" or equal. To be applied as per manufacturers instructions.





MUESER - RUTLEDGE - WENTWORTH - & - JOHNSTON  
*Consulting Engineers*

WILLIAM H. MUESER  
PHILIP C. RUTLEDGE  
PAUL M. WENTWORTH  
ROBERT C. JOHNSTON  
SALVATORE V. DESIMONE  
JAMES P. COULD  
ELMER A. RICHARDS  
EDMUND M. BURKE  
*Partners*

415 MADISON AVENUE  
NEW YORK, N. Y. 10017  
—  
212 ELDORADO 5-4800  
—  
DANAROMIEL, NEW YORK

JAMES D. PARSONS  
NICHOLAS W. KOZIAKIN  
MAX BERNHEIMER  
GEORGE L. MOORE  
*Senior Associates*

DOMINIC A. ZARRELLA  
PETER H. EDINGER  
CHARLES R. HEIDENGREN  
*Associates*

May 15, 1973

Mr. Thomas E. Golden, Jr.  
Thomas Golden Associates  
694 Post Road  
Darien, Connecticut 06820

Re: Mather Pond Dam  
Darien, Conn.

Dear Mr. Golden:

In accordance with your request the writer has reviewed prints of the original design drawings for the dam prepared by William A. Welch dated December 1920, a series of correspondence from June 1965 thru January 5, 1973 between several engineers and the State of Connecticut Water and Related Resources Division of the Department of Environmental Protection together with your summary of the history of the dam. On May 12, 1973 I inspected the dam with you and one of your associates.

I will not attempt to go into any details of the history of gunite facing repairs to the dam but will concern myself only with the present condition of the dam and my opinions concerning its safety.

All visible evidence indicates that the dam was constructed in accordance with a competent engineering design prepared by Mr. William A. Welch in 1920. I observed the evidence of the concrete core walls in the earth abutments of the dam and in the low earth embankment to the east of the dam. The concrete of the dam itself has been covered by gunite and could not be inspected. However, the gunite on the downstream face shows only a minor amount of cracking with some efflorescence from seepage and a few small spots of dampness which would indicate that the concrete must be effectively intact as a water barrier. The seepage evidences were definitely less than normal in an old concrete dam.

The writer looked particularly for evidences of underseepage in the downstream area below the toe of the dam and downstream from the abutments and could find none except for a small area of dampness a short distance to the left or east of the center of the dam. This area showed no evidences of subsurface erosion or of any significant amount of underseepage and the water present may be back flow from the stream downstream from the dam.

There is a flat crested notch about five feet wide at the center of the concrete dam that serves as a normal flow spillway. For maximum flood flows the entire length of the crest of the concrete dam serves as a spillway. On the right or west side of the dam on the slope up to the abutment there is some erosion of earth downstream from the dam resulting from such overflow waters moving downslope to the stream. No such erosion was observed on the left abutment slope. At the right end of the concrete dam there is some evidence of minor earth erosion that should be corrected to prevent flood water from flowing around the right end of the dam. The writer recommends that the concrete core wall at this location be exposed and its height raised about one foot for a length of five to ten feet to where the existing earth embankment is about this much above the concrete dam crest. The erosion area on the downstream right abutment should be corrected by filling in with a bankrun gravel topped by stone riprap with maximum size stones about twelve inches average dimension. This should serve to prevent future erosion of the abutment soil.

This dam has been standing for over fifty years and has experienced major runoff from several hurricane type storms. In the writer's opinion its condition and appearance are excellent, far better than many old dams the writer has inspected. In view of the long history and the present appearance of the dam there can be no question concerning its structural stability and analyses have little meaning. There is no evidence of detrimental seepage thru or under the dam. Tree roots and shrubs have not affected the abutments or the low embankment to the east of the main dam and the concrete core walls appear to be completely effective. In summary, with the minor repairs recommended herein the writer believes that this dam will be completely safe for many years to come although inspections at five year intervals would be desirable.

We trust that this report will be of assistance to you with the Connecticut Department of Environmental Protection or other

agencies concerned with dam safety.

Very truly yours,

MUESER, RUTLEDGE, WENTWORTH & JOHNSTON

By

*Philip C. Rutledge*  
Philip C. Rutledge



PCR:ig

**MOZZOCHI ASSOCIATES**

**CIVIL ENGINEERS**

July 3, 1973

**PARTNERS**

JOHN LUCHS, JR.  
STUART J. BECKERMAN

POST OFFICE BOX 230  
GLASTONBURY, CONN. 06033  
217 HEBRON AVENUE  
PHONE 633-6401

PROVIDENCE, R. I. 02903  
149 WEYBOSSET STREET  
PHONE 421-0420

REPLY TO: Glastonbury

Mr. Victor F. Galgowski  
Superintendent of Dam Maintenance  
Department of Environmental Protection  
State Office Building  
Hartford, Connecticut 06115

Re: Mathers Pond Dam-Darien  
Our File #57-73-91

Dear Mr. Galgowski:

We have reviewed Mr. Golden's report as requested. I would also like to compliment Mr. Golden on his thorough research and investigation of this particular site. He should be congratulated on his ability to "find" the original drawing of the dam - I never expected to have anyone find them.

On page six of Mr. Golden's report, he replies to my seven (7) original comments of October 14, 1970. Listed below in his same order are my additional comments:

a. Item 1, 2 and 7

Our present practice of requiring a minimum freeboard of 2' above maximum high water is a conservative request. This allows for wave action and should not be compromised. The presence of a core wall (of unknown length and soundness) does not diminish the need for this requirement.

The 10' top width could be reduced somewhat without seriously reducing the safety of the embankment.

Standard operating procedures calls for the removing of trees and brush from earth embankments. The reasons for this are well known.

b. Items 3 and 4

Mr. Golden agrees to raise the embankment adjacent to the concrete structure in this instance. My comment was intended to protect the earth embankment with rip-rap are something similar due to the fact that the dam acts as a spillway with high velocities at this point.

July 3, 1973

b. Items 3 and 4 (cont.)

It is also recommended that the proposed stone gutter be placed on both the East and West side. The conditions are basically the same.

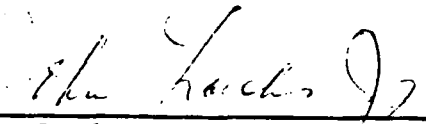
c. Item 5

The deteriorating gunite may be indicative of problem concrete behind it. If Mr. Golden feels this is not needed at this time, I would recommend he provide a schedule when this will be checked.

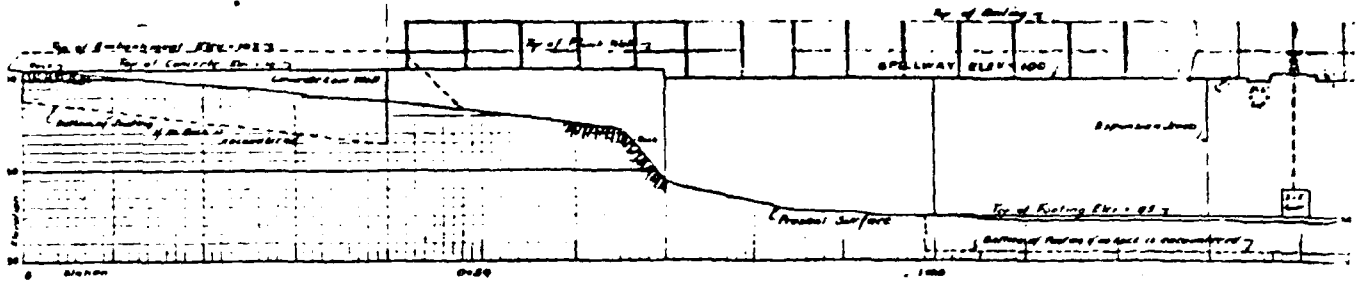
If you have any questions, please call.

Very truly yours

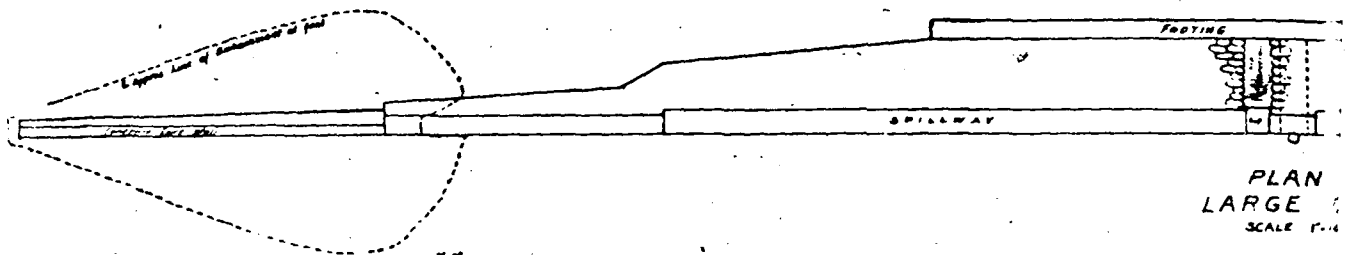
MOZZOCHI ASSOCIATES

  
\_\_\_\_\_  
John Luchs, Jr., P.E.

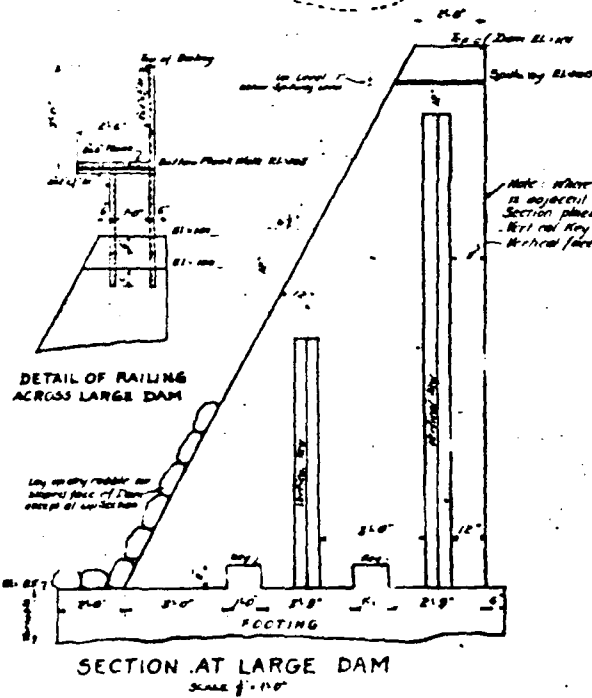
JLjr/ed  
file



ELEVATION AND SECTION OF LARGE DAM SCALE 1/4" = 1'-0"

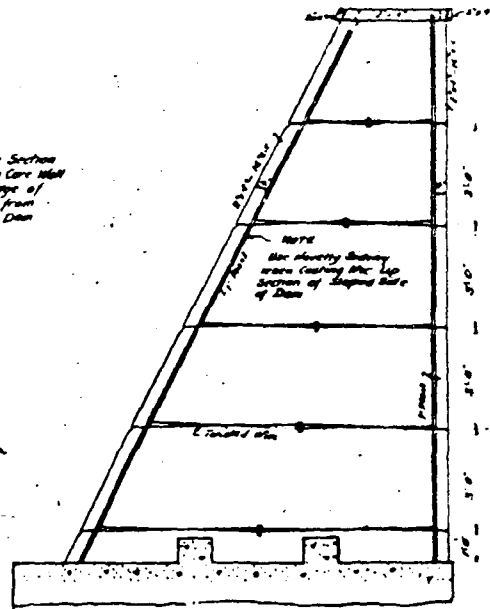


PLAN OF LARGE DAM SCALE 1/4" = 1'-0"

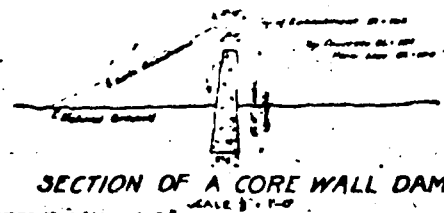


DETAIL OF RAILING ACROSS LARGE DAM

SECTION AT LARGE DAM SCALE 1/4" = 1'-0"



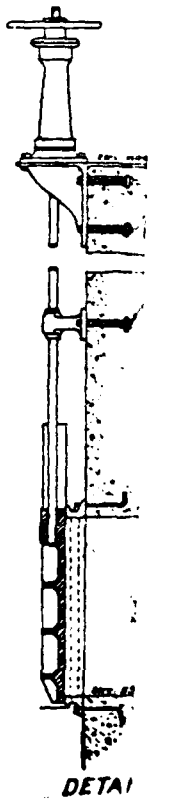
DETAIL OF FORM FOR LARGE DAM



SECTION OF A CORE WALL DAM SCALE 1/4" = 1'-0"



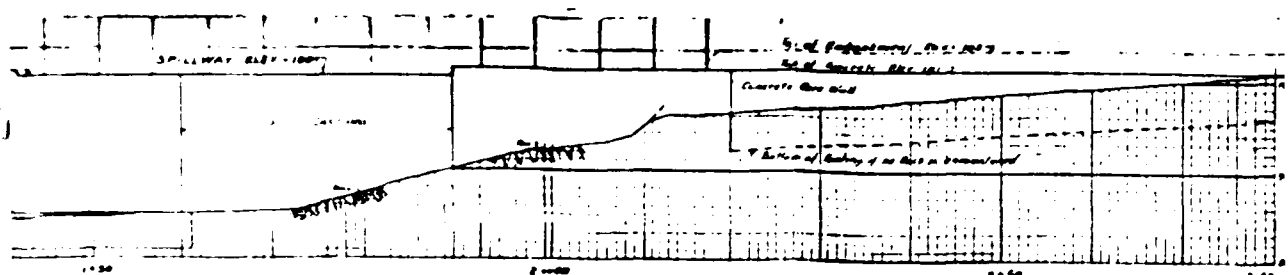
DETAIL OF VERTICAL KEY



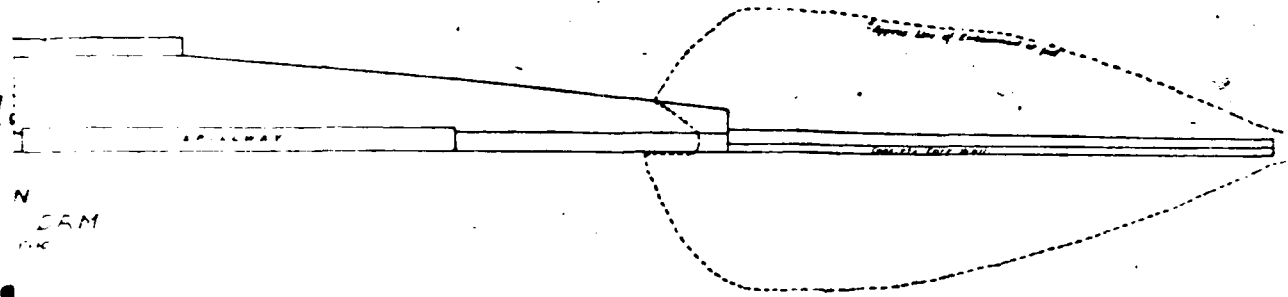
DETAIL

NOTE: POST CONSTRUCTION CHANGES, 1938-TOP OF CONCRETE RAISED TO ELEVATION 101 WITH 5' LONG X 1' DEEP PRINCIPAL SPILLWAY- CREST ELEV. 100

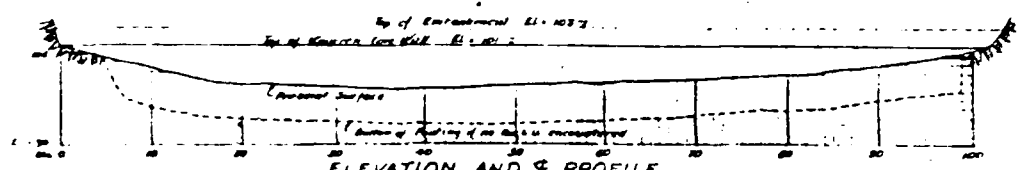
1940-3' X 3' GATE REDUCED TO 12" PIPE ELEV. 100-ELEV. 207 (NGVD)



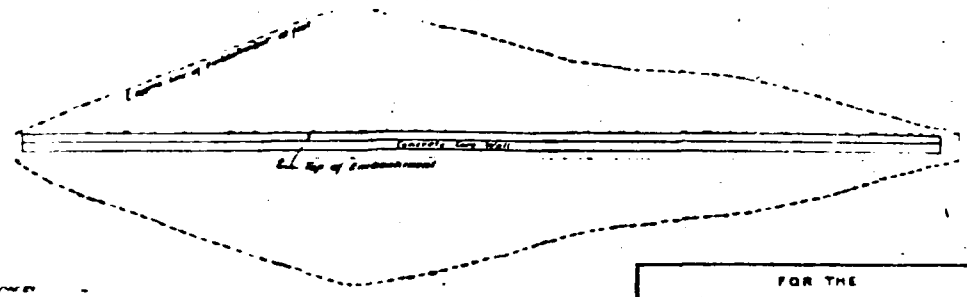
E PROFILE  
DAM  
SCALE 1"=10'



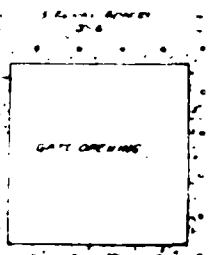
N  
DAM  
SCALE 1"=10'



ELEVATION AND E PROFILE  
CORE WALL (SMALL) DAM  
SCALE 1"=10'



PLAN  
CORE WALL (SMALL) DAM  
SCALE 1"=10'



PLAN OF GATE SETTING

PHOTO REDUCED  
NOT TO SCALE

FOR THE  
**HON. STEPHEN T. MATHER**  
DARIAN, CONN.

PLANS FOR  
CONCRETE AND CORE  
WALL DAMS

SCALE AS SHOWN  
DEC 1920

WILLIAM A. WELCH  
DRAWING ENGINEER

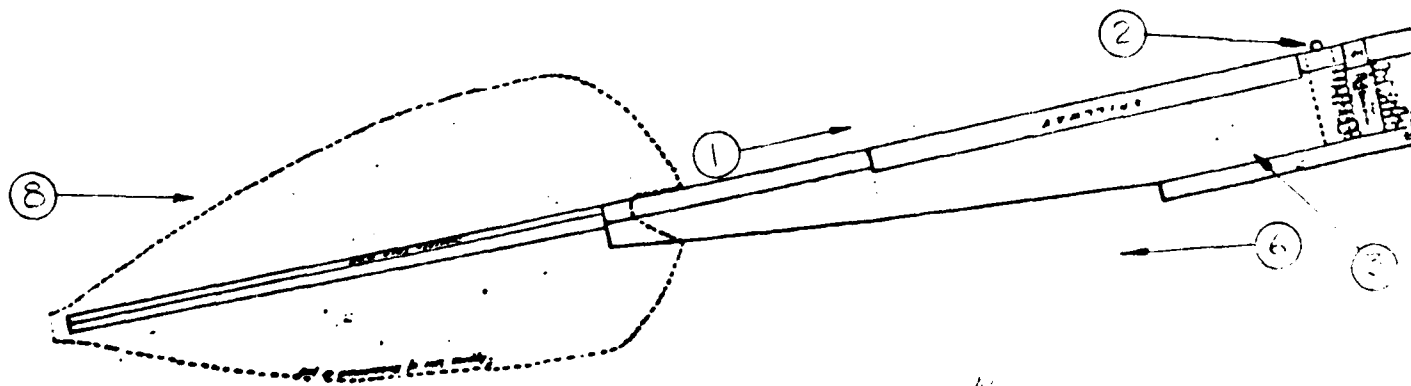
DRAWING NO. M-3-FILE 100

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	US ARMY ENGINE CORPS WALT
NATIONAL PROGRAM OF INSPECTION OF	
<b>MATHERS POND DAM</b>	
	SCALE AS
	DATE <b>SEP</b>

APPENDIX C  
PHOTOGRAPHS

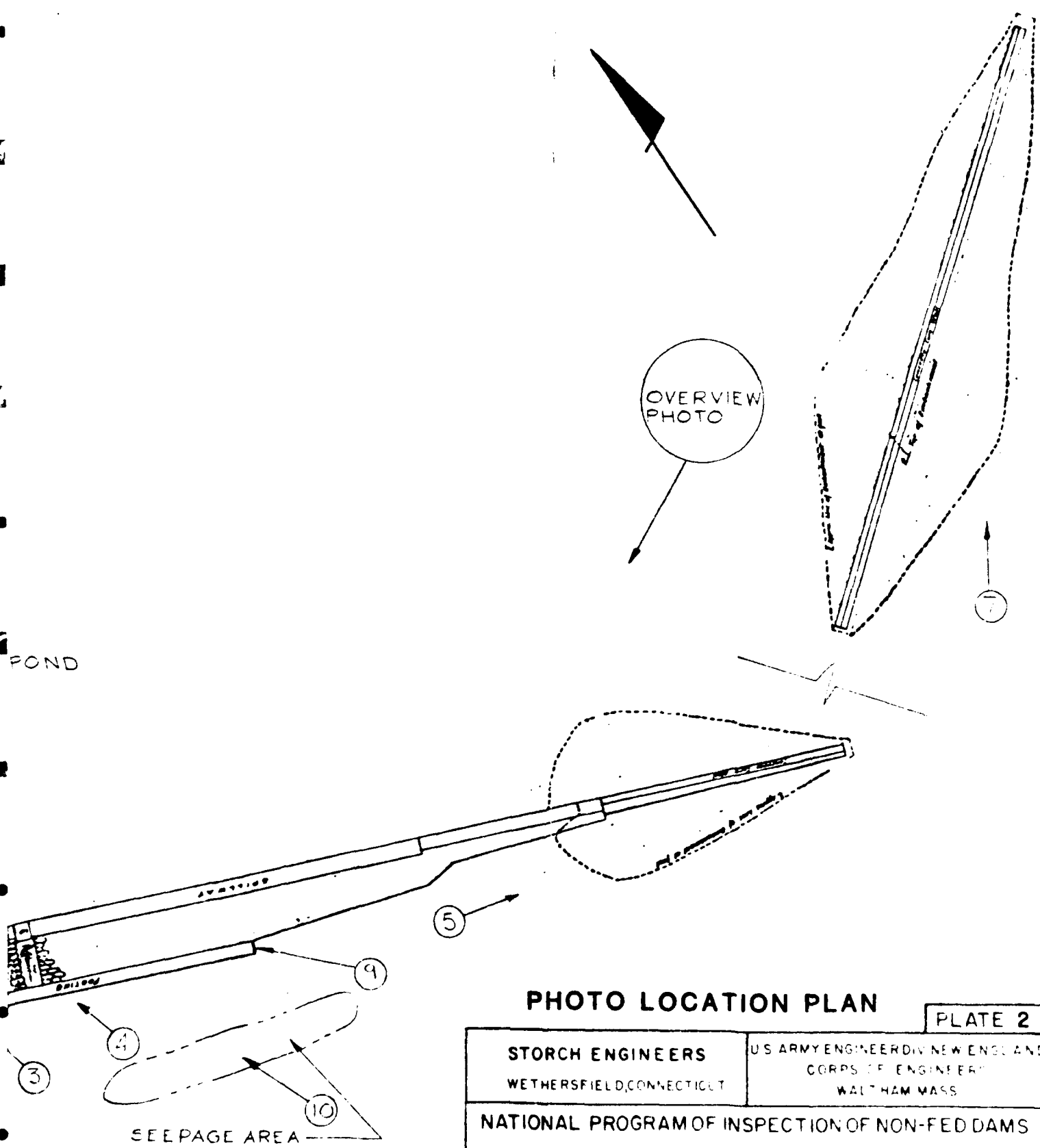


MATHERSON



POND

OVERVIEW PHOTO



### PHOTO LOCATION PLAN

PLATE 2

STORCH ENGINEERS  
WETHERSFIELD, CONNECTICUT

US ARMY ENGINEER DIVISION NEW ENGLAND  
CORPS OF ENGINEERS  
WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

### MATHERS POND DAM

not to scale

2		SCALE AS SHOWN	DATE SEPTEMBER 1980
---	--	----------------	---------------------



PHOTO 2  
SPILLWAY AND VALVE STEM

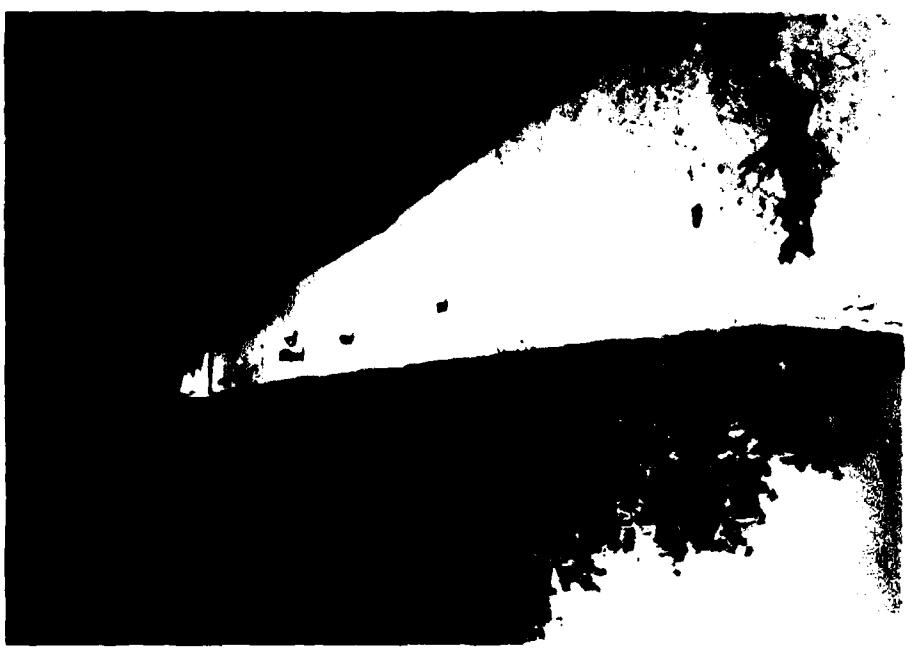


PHOTO 1  
CREST OF DAM LOOKING EAST



PHOTO 3

SEEPAGE THROUGH DOWNSTREAM FACE



PHOTO 4

BLOWOFF PIPE AND SPILLWAY SPLASHPAD



PHOTO 5  
TOE OF DAM - EAST SIDE



PHOTO 6  
DOWNSTREAM FACE AND TOE OF DAM - WEST SIDE



PHOTO 7  
EASTERN EMBANKMENT



PHOTO 8  
WESTERN EMBANKMENT



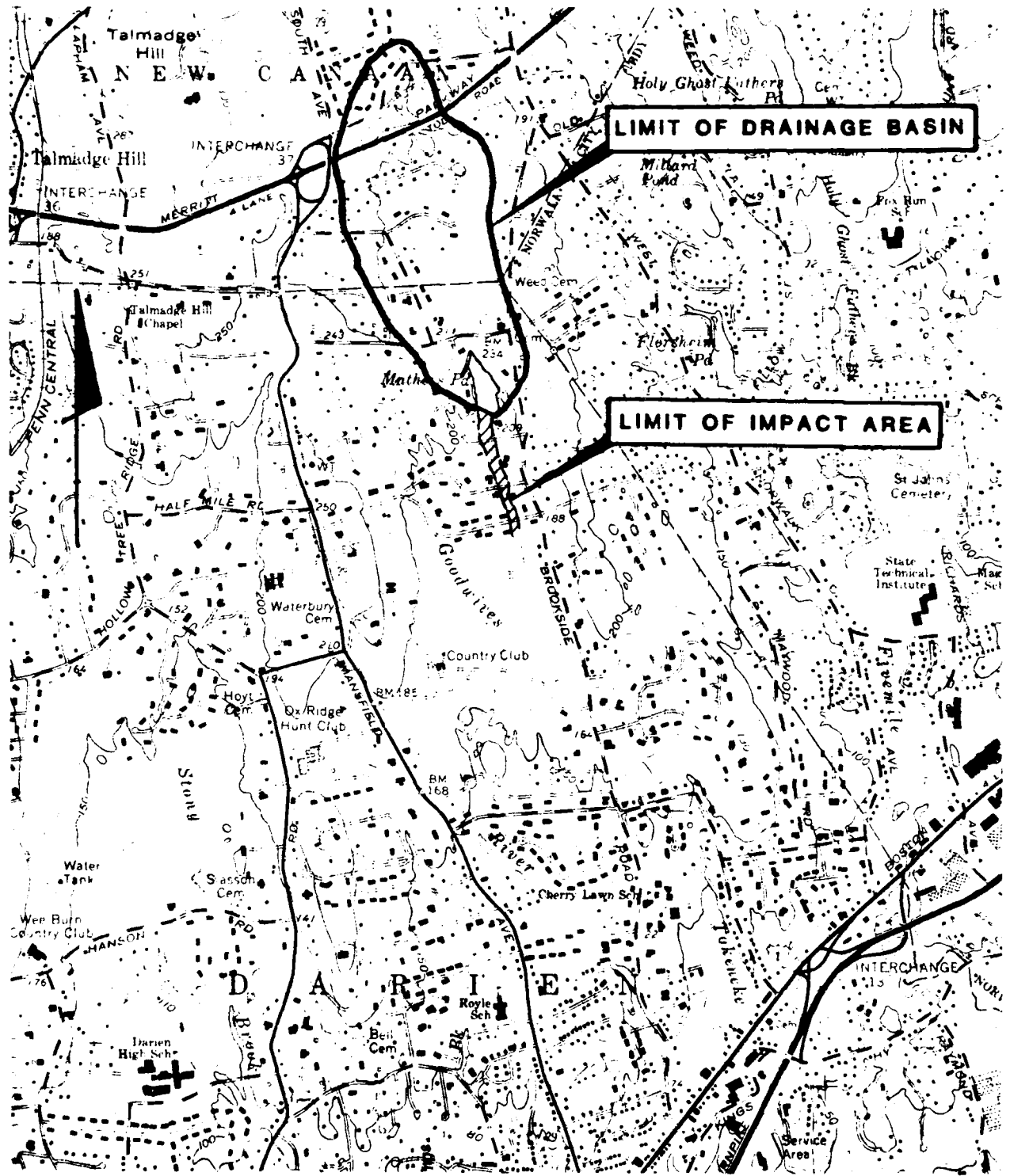
PHOTO 9  
SEEPAGE AND CRACKING - DOWNSTREAM FACE



PHOTO 10  
SEEPAGE UNDER TOE OF DAM

APPENDIX D  
HYDROLOGIC AND HYDRAULIC COMPUTATIONS





**PLATE 3**

<p><b>STORCH ENGINEERS</b> WETHERSFIELD, CONNECTICUT</p>	<p>U.S. ARMY ENGINEER DIVISION NEW ENGLAND CORPS OF ENGINEERS WALTHAM MASS</p>
<p><b>NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS</b>  <b>MATHERS POND DAM</b></p>	
<p><b>scale 1:24000</b></p>	<p>SCALE AS SHOWN DATE <b>SEPTEMBER 1980</b></p>

Determination of Test Flood

NAME OF DAM Mothers Ford Dam

DRAINAGE AREA 240 Acres - 0.375 SM

INFLOW Size - Small Hazard - Low

Use 100 yr freq.

$Q_{100} = 240 A^{.79} *$   $A = DA \text{ in SM}$

$Q_{100} = 240 (.375)^{.79} = 157 \text{ cfs}$

Estimating the effect of surcharge storage on the Maximum Probable Discharges

1.  $Q_{P1} = \underline{157} \text{ cfs}$

2a.  $H_1 = \underline{101.5} \text{ (elev.)}$

b.  $STOR_1 = \underline{0.4}''$

c.  $Q_{P2} = Q_{P1} (1 - STOR_1 / 4.9) = \underline{144} \text{ cfs}$

3a.  $H_2 = \underline{101.45}$   $STOR_2 = \underline{.36}$

b.  $STOR_A = \underline{0.39}''$

$Q_{PA} = 157 (1 - .29 / 4.9) = \underline{145} \text{ cfs}$

$H_A = \underline{101.45}$   $STOR_A = \underline{0.38}''$

Test Flood = 145 cfs

Capacity of the spillway when the pond elevation is at the top of the dam

$Q = \underline{1486} \text{ cfs or } \underline{1000} \% \text{ of the Test Flood}$

D-1

\* Formula found in Conn DOT Drainage Manual (1972)  
 Based on USGS Gages throughout the State.

**STORCH ENGINEERS**  
 Engineers - Landscape Architects  
 Planners - Environmental Consultants

JOB Phase I Dam Inspection 4463

SHEET NO \_\_\_\_\_ OF \_\_\_\_\_

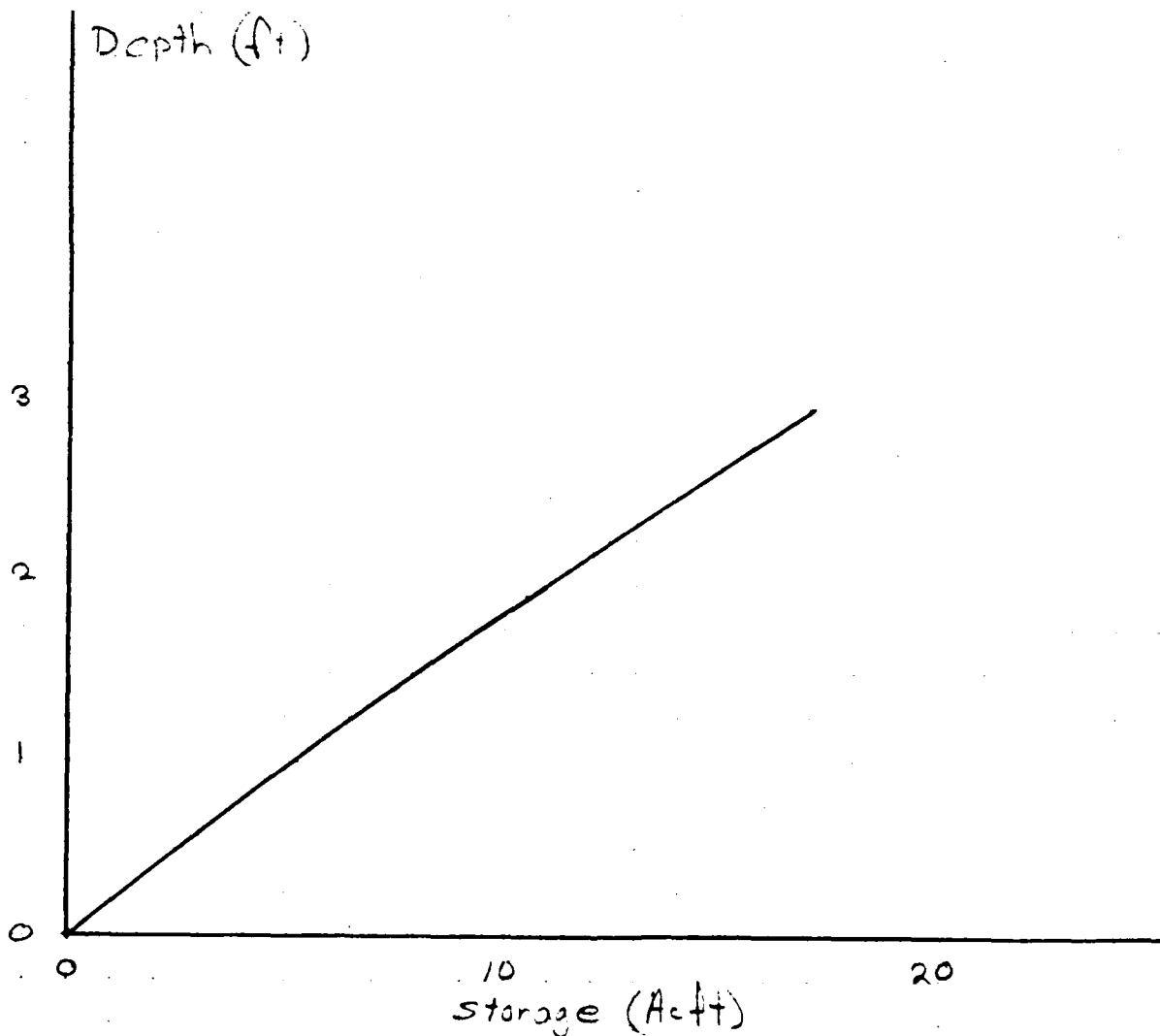
CALCULATED BY B.G. DATE 6/12/90

CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

**AREA - CAPACITY**

Name of Dam: Mistress Ford Dam

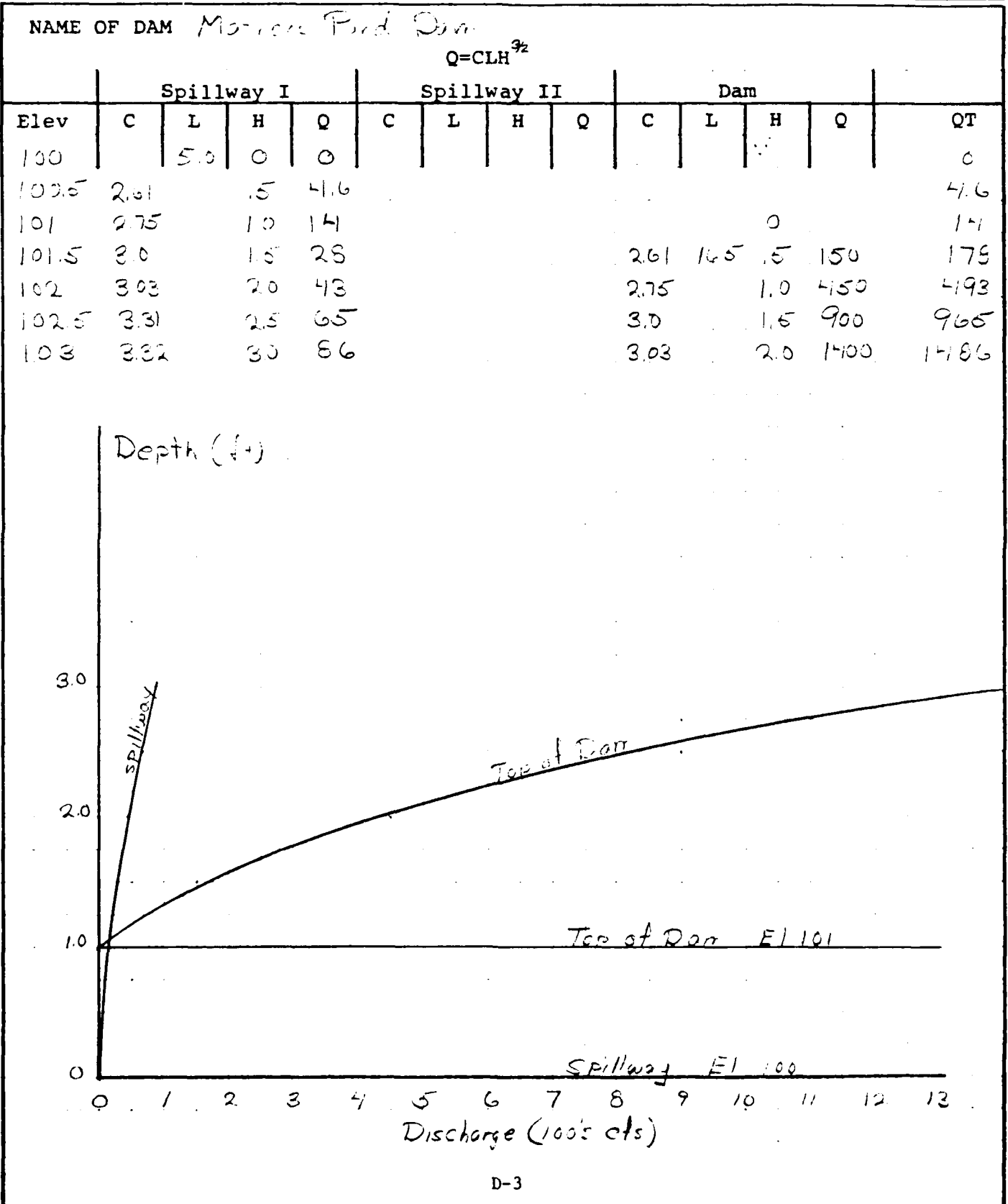
ELEV	DEPTH	AREA	AVG. AREA	VOL	Σ VOL
100		5.0			0
	1.0		5.25	5.25	
101		5.5			5.25
	1.0		5.75	5.75	
102		6.0			11.0
	1.0		6.0	6.0	
103		6.0			17.0



**STORCH ENGINEERS**  
 Engineers - Landscape Architects  
 Planners - Environmental Consultants

SHEET NO \_\_\_\_\_ OF \_\_\_\_\_  
 CALCULATED BY G.J.G. DATE 6/12/50  
 CHECKED BY [Signature] DATE \_\_\_\_\_

**Stage Discharge**



Downstream Hydrographs

"Rule of Thumb" Guidance for Estimating Downstream Failure Hydrographs

NAME OF DAM Mattress Bend Dam

Section I at Dam

1.  $S = \frac{35.0}{8.27} \frac{\text{Acft}}{\text{ft}^3} = 4.22$
2.  $Q_{P1} = 8.27 W_b \sqrt{9} Y^{3/2} = 8.27 (50) \sqrt{22.5} 18^{3/2} = 6420 \text{ cfs}$
3. See Sections

Section II at

- 4a.  $H_2 = \underline{4.2} \quad A_2 = \underline{110 \text{ SF}} \quad L_2 = \underline{400'} \quad V_2 = \underline{10.1}$
- b.  $Q_{P2} = Q_{P1} (1 - V_2/S) = \underline{4290} \text{ cfs}$
- c.  $H_2 = \underline{3.7} \quad A_2 = \underline{850 \text{ SF}}$   
 $A_A = \underline{975 \text{ SF}} \quad V_2 = \underline{8.9}$   
 $Q_{P2} = 6420 (1 - 8.9/22) = 4635 \text{ cfs}$

Section III at

- 4a.  $H_3 = \underline{3.5} \quad A_3 = \underline{850 \text{ SF}} \quad L_3 = \underline{500} \quad V_3 = \underline{9.76}$
- b.  $Q_{P3} = Q_{P2} (1 - V_3/S) = \underline{2676} \text{ cfs}$
- c.  $H_3 = \underline{2.6} \quad A_3 = \underline{560 \text{ SF}}$   
 $A_A = \underline{700 \text{ SF}} \quad V_3 = \underline{8.0}$   
 $Q_{P3} = 2505 (1 - 8.0/23.1) = 3030 \text{ cfs}$

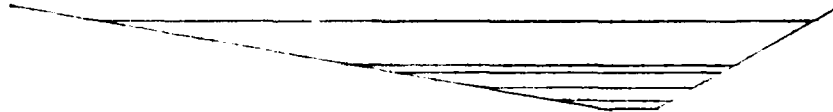
Section IV at

- 4a.  $H_4 = \underline{3.0} \quad A_4 = \underline{\hspace{2cm}} \quad L_4 = \underline{\hspace{2cm}} \quad V_4 = \underline{\hspace{2cm}}$
- b.  $Q_{P4} = Q_{P3} (1 - V_4/S) = \underline{\hspace{2cm}} \text{ cfs}$
- c.  $H_4 = \underline{\hspace{2cm}} \quad A_4 = \underline{\hspace{2cm}}$   
 $A_A = \underline{\hspace{2cm}} \quad V_4 = \underline{\hspace{2cm}}$   
 $Q_{P4} = \underline{\hspace{2cm}}$

**STORCH ENGINEERS/STORCH ASSOCIATES**  
 Engineers - Landscape Architects  
 Planners - Environmental Consultants

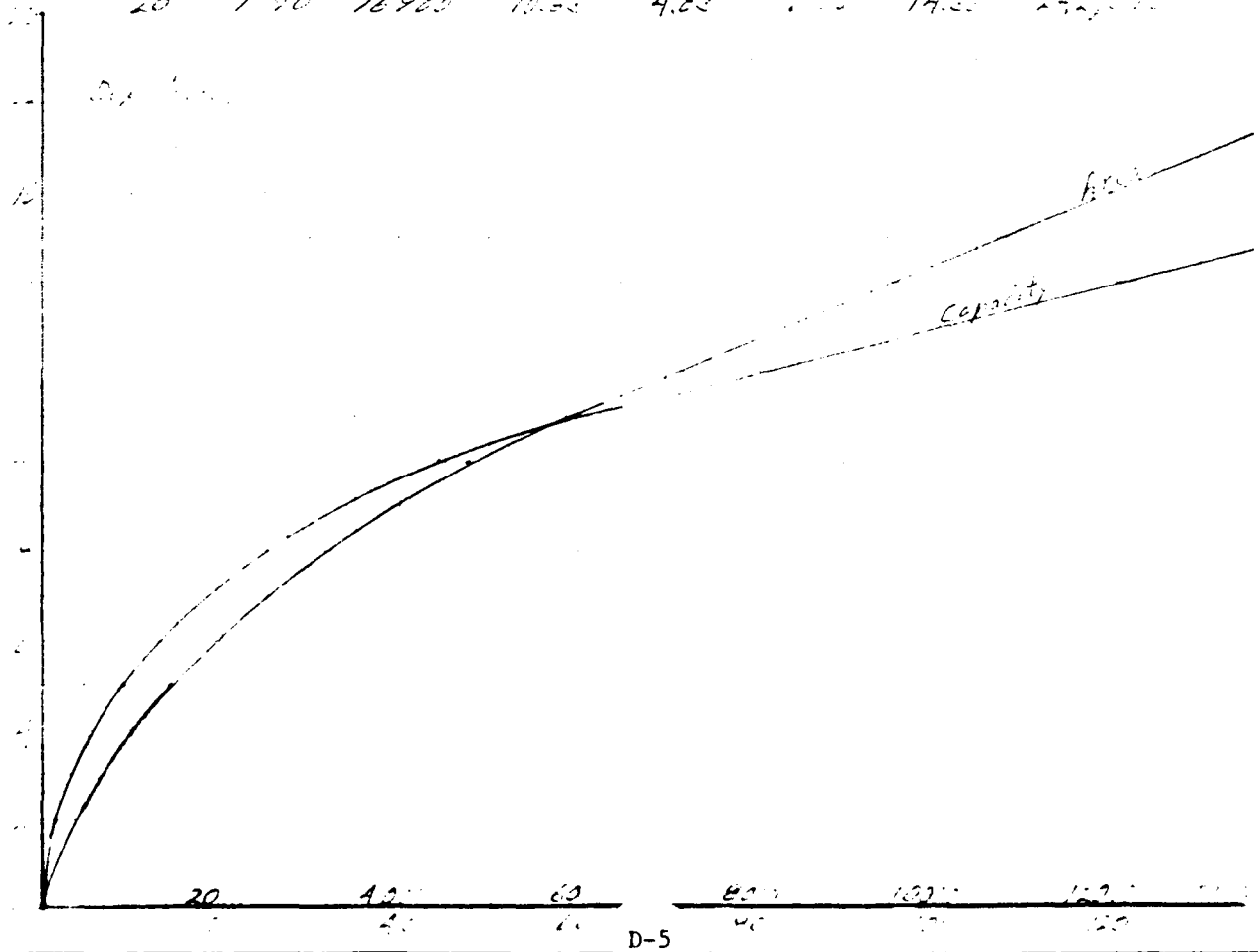
JOB \_\_\_\_\_  
 SHEET NO \_\_\_\_\_ OF \_\_\_\_\_  
 CALCULATED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 SCALE \_\_\_\_\_

Station I 4+00  
 Station II 9+00



$S = 1.0\%$

D	W	H	K	$R^2$	$S^2$	V	Q
2	250	350	1.46	1.25	.100	3.72	1302
5	470	142'	3.33	2.09	.100	6.21	8849
8	720	3280	4.56	2.75	.100	8.17	26,798
10	850	4775	5.58	3.15	.100	9.36	44,684
20	1740	16900	10.33	4.83	.100	14.55	242,575



D-5

Downstream Hydrographs

"Rule of Thumb" Guidance for Estimating Downstream Failure Hydrographs

NAME OF DAM Motson Ford Dam

Section I at Dam Water at Spillway Crest

1.  $S = \frac{15}{8/27 W_b \sqrt{g}} \text{ Acft}$
2.  $Q_{p1} = 8/27 W_b \sqrt{g} Y^{3/2} = 8/27 (50) (22.5) (15)^{3/2} = 4853$
3. See Sections

Section II at

- 4a.  $H_2 = \underline{3.5'}$   $A_2 = \underline{400 SF}$   $L_2 = \underline{300'}$   $V_2 = \underline{6.2}$  Acft
- b.  $Q_{p2} = Q_{p1} (1 - V_2/S) = \underline{2334}$  cfs
- c.  $H_2 = \underline{2.5'}$   $A_2 = \underline{500 SF}$   
 $A_A = \underline{700 SF}$   $V_2 = \underline{4.7}$  Acft  
 $Q_{p2} = 4853 (1 - 4.7/15) = 3320 \text{ cfs}$

Section III at

- 4a.  $H_3 = \underline{3.1}$   $A_3 = \underline{650 SF}$   $L_3 = \underline{300'}$   $V_3 = \underline{4.5}$  Acft
- b.  $Q_{p3} = Q_{p2} (1 - V_3/S) = \underline{1355}$  cfs
- c.  $H_3 = \underline{2.3'}$   $A_3 = \underline{400 SF}$   
 $A_A = \underline{525 SF}$   $V_3 = \underline{3.5}$  Acft  
 $Q_{p3} = 3320 (1 - 3.5/15) = 2115 \text{ cfs}$

Section IV at

- 4a.  $H_4 = \underline{2.6'}$   $A_4 = \underline{300 SF}$   $L_4 = \underline{300'}$   $V_4 = \underline{3.47}$  Acft
- b.  $Q_{p4} = Q_{p3} (1 - V_4/S) = \underline{1025}$  cfs
- c.  $H_4 = \underline{1.8'}$   $A_4 = \underline{350 SF}$   
 $A_A = \underline{525 SF}$   $V_4 = \underline{2.9}$  Acft  
 $Q_{p4} = 2115 (1 - 2.9/15) = 1230 \text{ cfs}$

**Downstream Hydrographs (Continued)**

Section V at

4a.  $H_5 = \underline{41.5'}$        $A_5 = \underline{1250 SF}$      $L_5 = \underline{500'}$        $V_5 = \underline{17.3}$  Acft

b.  $Q_{P5} = Q_{P4} (1 - V_5/S) = \underline{12.2}$  cfs

c.  $H_5 = \underline{41.0'}$        $A_5 = \underline{1000 SF}$   
 $A_A = \underline{1125 SF}$        $V_5 = \underline{12.0}$  Acft

$Q_{P5} = 2035 (1 - 12.9/40.0) = 1281 \text{ cfs}$

Section VI at

4a.  $H_6 = \underline{\hspace{2cm}}$        $A_6 = \underline{\hspace{2cm}}$        $L_6 = \underline{\hspace{2cm}}$        $V_6 = \underline{\hspace{2cm}}$  Acft

b.  $Q_{P6} = Q_{P5} (1 - V_6/S) = \underline{\hspace{2cm}}$  cfs

c.  $H_6 = \underline{\hspace{2cm}}$        $A_6 = \underline{\hspace{2cm}}$   
 $A_A = \underline{\hspace{2cm}}$        $V_6 = \underline{\hspace{2cm}}$  Acft

Section VII at

4a.  $H_7 = \underline{\hspace{2cm}}$        $A_7 = \underline{\hspace{2cm}}$        $L_7 = \underline{\hspace{2cm}}$        $V_7 = \underline{\hspace{2cm}}$  Acft

b.  $Q_{P7} = Q_{P6} (1 - V_7/S) = \underline{\hspace{2cm}}$  cfs

c.  $H_7 = \underline{\hspace{2cm}}$        $A_7 = \underline{\hspace{2cm}}$   
 $A_A = \underline{\hspace{2cm}}$        $V_7 = \underline{\hspace{2cm}}$  Acft

$Q_{P7} =$



APPENDIX E  
INFORMATION AS CONTAINED IN  
THE NATIONAL INVENTORY OF DAMS

U.S. DEPARTMENT OF AGRICULTURE

# INVENTORY OF DAMS IN THE UNITED STATES

STATE	DIVISION	COUNTY	DIST.	CONGR. DIST.	COUNTY DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE
CT	54	NEW	04			MATHERS POND DAM	41 06.5	73 28.5	17 SEP 80

POPULAR NAME	NAME OF IMPROVEMENT			
	MATHERS POND			
REGION BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST FROM DAM (MI.)	POPULATION
A1110	TR GODDARDIVES RIVER	DARFEN	2	20900

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT)	HYDRAULIC HEIGHT (FT)	IMPOUNDING CAPACITIES (ACRE-FT)	DIST OWN	FED R	PHV/FED	SCS A	VER/DATE
RECTPG	1921	P	18	18	32	N	N	N	N	N

REMARKS

D/S HAS CREST LENGTH	SPILLWAY TYPE	WIDTH (FT)	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CY)	POWER CAPACITY (KW)	INSTALLED	PROPOSED	NO.	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)
1	280	170	1445											

OWNER	ENGINEERING BY	CONSTRUCTION BY
DAVID R ARNOLD	MAJ AM A ELCH	UNKNOWN

DESIGN	REGULATORY AGENCY	OPERATION	MAINTENANCE
NONE	CONSTRUCTION	CT DEP	CT DEP

INSPECTION BY	INSPECTION DATE	AUTHORITY FOR INSPECTION
STORCH ENGINEERS	50 MAY 80	PL 92-307

REMARKS

RENDER

RENDER

8