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NATIONAL BUREAU OF STANDARDS-1963-A



AD-A143 405

CONNECTICUT RIVER BASIN
MIDDLETOWN, CONNECTICUT

UPPER MILL POND DAM
CT 00141

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

January, 1981

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00141	2. GOVT ACCESSION NO. AN-A143 405	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Upper Mill Pond Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE January, 1981
		13. NUMBER OF PAGES 25
		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. River Basin Middletwon, Conn. Upper Mill Pond Dam		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Upper Mill Pond Dam is a stone masonry dam approx. 100 ft. long and 15 ft. high. The spillway is 92 ft. long, 9 ft. wide and consists of a masonry broad crested weir. The overall condition of the dam is FAIR. The structural stability of the dam is good as evidenced by its vertical, horizontal and lateral alignment.		

STORCH ENGINEERS

161 MAIN STREET, WETHERSFIELD, CONNECTICUT 06109

(203) 529-7727

January 28, 1981

Mr. E. P. Gould
Department of the Army
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Subject: Dam Inspection Program
Upper Mill Pond Dam
Middletown, Connecticut

Dear Mr. Gould:

Following the field inspection and hydraulic/hydrologic analysis of the subject dam, we conclude that the dam should be reclassified as having a LOW hazard potential.

Please find attached a brief report substantiating our findings.

Very truly yours,

STORCH ENGINEERS

Gary J. Giroux
Gary J. Giroux, P.E.

GJG:11
Attachment



Accession For		
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FLORHAM PARK
NEW JERSEY

WETHERSFIELD
CONNECTICUT

BOSTON
MASSACHUSETTS

NEMPSTEAD
NEW YORK

UPPER MILL POND DAM

CT 00141

CONNECTICUT RIVER BASIN

MIDDLETOWN, CONNECTICUT

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification Number:	CT 00141
Name:	Upper Mill Pond Dam
Town:	Middletown
County and State:	Middlesex County, Connecticut
Stream:	Sumner Brook
Date of Inspection:	October 22, 1980
Owner/Operator:	Fenner America LTD. 400 East Main Street Middletown, Connecticut 06457

DESCRIPTION

Upper Mill Pond Dam is a stone masonry dam approximately 100 feet long and 15 feet high. The spillway is 92 feet long, 9 feet wide and consists of a masonry broad crested weir. The west abutment is a 3-foot high concrete wall and the east abutment is a 1-foot high irregularly shaped concrete platform. A concrete outlet structure with a bar rack is at the edge of the pond adjacent to the east abutment. A 12-inch low-level discharge pipe passes through the dam below the east abutment at 7.5 feet above the toe of the dam. Plan, section and elevation views of the dam are contained in Appendix B.

Upper Mill Pond Dam was constructed around 1900 and was originally used to supply power to the downstream mill. Today, the dam is used for recreational purposes only. The water level is at the spillway crest and can be lowered by opening the low-level discharge gate which was recently made operable by the Middletown Water Department. No specific maintenance program exists for this dam. No design or construction information is available for the dam.

In general, the overall condition of the dam is FAIR. A copy of the visual inspection check list and selected photos are contained in Appendix A and C respectively. The structural stability of the dam is good as evidenced by its vertical, horizontal and lateral alignment. The stone masonry is in good condition although

moss and weeds are growing from the joints. The spillway weir and east abutment are in good condition. The west abutment is badly spalled at its base. The discharge gate inlet structure is badly spalled and the bar rack is cluttered with debris. There is some seepage at the east end of the dam where the stone masonry meets the abutment/ledge interface. Vegetation is growing around this area as well. The ledge continues along the downstream channel bank and there is minor seepage.

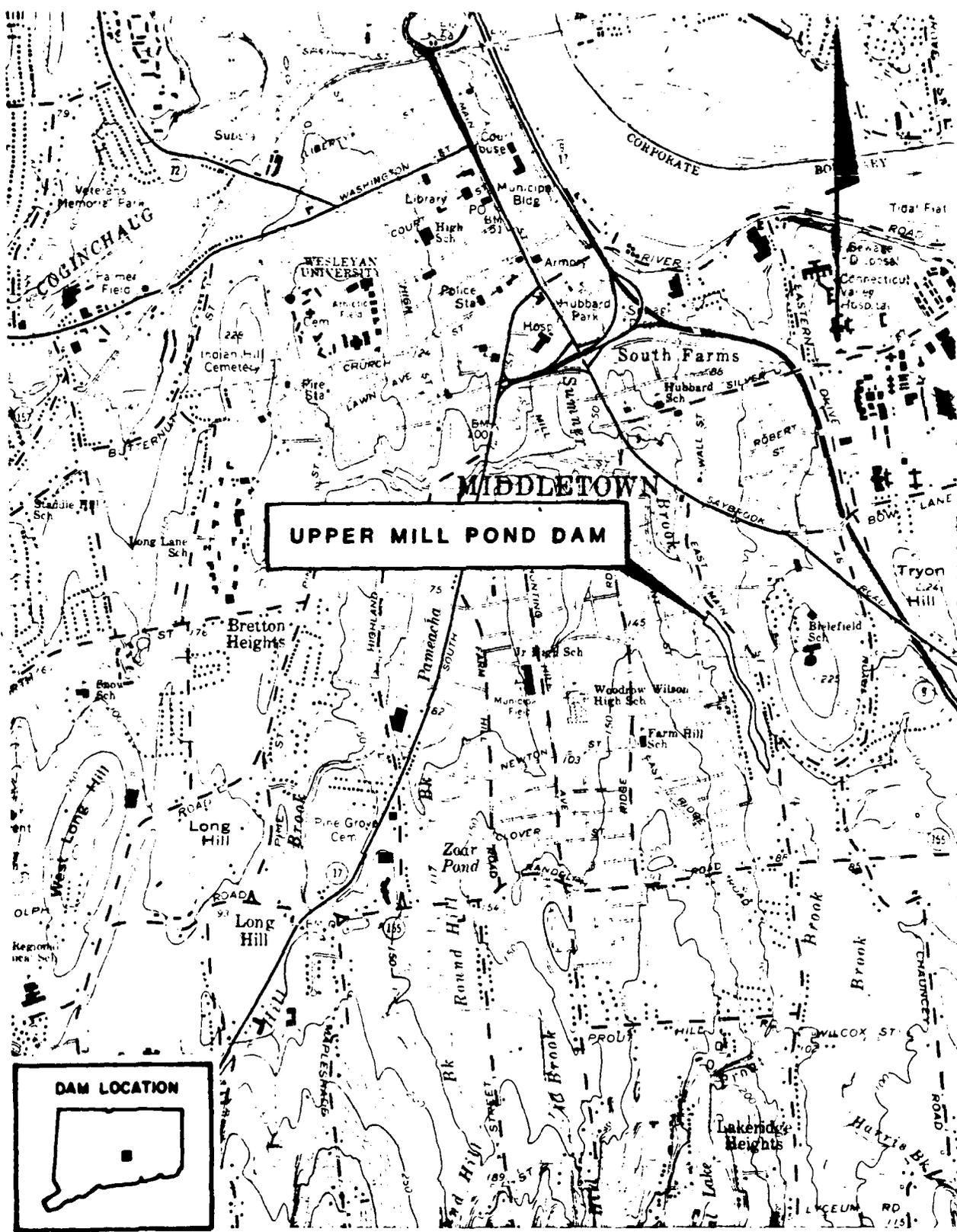
A drainage pipe outlets above the west abutment. There is presently a scour hole at this location. This scour hole has caused the last section of the drainage pipe to collapse into the hole and is undermining the west spillway abutment.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

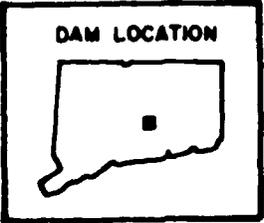
The watershed of Upper Mill Pond Dam encompasses 7.6 square miles of rolling topography that is 25 percent developed. At the spillway elevation, the water surface area and storage capacity is 5 acres and 31 acre-feet respectively. The storage capacity when the water level is at the top of the dam is 36 acre-feet. With a maximum height of 15 feet and a maximum storage capacity of 36 acre-feet, Upper Mill Pond Dam is classified as SMALL in accordance with the Corps of Engineers' Recommend Guidelines for Safety Inspection of Dams.

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. The calculated dam failure discharge is 3,610 cfs. The flood waters were routed through the downstream reaches. Nowhere along the river reach will the failure floodwave endanger human life or cause appreciable property damage. Therefore, the dam is classified as LOW hazard potential in accordance with the guidelines mentioned above.

The test flood for this dam ranges from the 50 year flood to the 100 year flood, with the 50 year flood being used because of the dam's small size. The test flood inflow is 1,250 cfs and the routed test flood outflow is 1,200 cfs. The spillway capacity when the water level in the pond is at the top of the dam is 250 cfs. The test flood will overtop the dam by 1.8 feet. Hydraulic and hydrologic computations are contained in Appendix D.

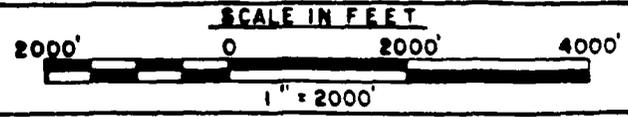


UPPER MILL POND DAM



QUADRANGLE: MIDDLETOWN, CT

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



LOCATION MAP

APPENDIX A
INSPECTION CHECK LIST

**INSPECTION CHECK LIST
PARTY ORGANIZATION**

PROJECT Upper Mill Pond Dam

DATE 10/22/80

TIME 9:30 a.m.

WEATHER Sunny, 50's

W.S. ELEV. _____ **U.S.** _____ **DN.S.** _____

PARTY:

- | | |
|---|---|
| 1. <u>Gary Giroux, S.E., Hyd./Struct.</u> | 6. <u>Michè Pozzato, MA, Mechanical</u> |
| 2. <u>Hermann Hani, S.E., Technician</u> | 7. _____ |
| 3. <u>Ben Cohen, S.E., Civil</u> | 8. _____ |
| 4. <u>Floyd Austin, DBA, Civil</u> | 9. _____ |
| 5. <u>Peter Austin, DBA, Civil</u> | 10. _____ |

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Dam Embankment</u>	<u>F. Austin P. Austin</u>	<u>Fair</u>
2. <u>Mechanical</u>	<u>M. Pozzato G. Giroux</u>	<u>Fair</u>
3. <u>Spillway</u>	<u>B. Cohen G. Giroux</u>	<u>Good</u>
4. <u>Discharge Channel</u>	<u>H. Hani</u>	<u>Good</u>
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
9. _____	_____	_____
10. _____	_____	_____

INSPECTION CHECK LIST

PROJECT Upper Mill Pond Dam **DATE** 10/22/80

PROJECT FEATURE _____ **NAME** _____

DISCIPLINE _____ **NAME** _____

AREA EVALUATED	CONDITIONS
<u>DAM EMBANKMENT</u>	
Crest Elevation	75 (NGVD)
Current Pool Elevation	74.1 (NGVD)
Maximum Impoundment to Date	Unknown
Surface Cracks	None (masonry dam)
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	Concrete spalled at west abutment
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes Vegetation on Slopes Sloughing or Erosion of Slopes or Abutments	Some Brush and small trees Some near west abutment and along east bank of downstream channel
Rock Slope Protection - Riprap Failures	N/A
Unusual Movement or Cracking at or Near Toes	None observed
Unusual Embankment or Downstream Seepage	Substantial at east embankment
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

INSPECTION CHECK LIST

PROJECT Upper Mill Pond Dam

DATE 10/22/80

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

PROJECT Upper Mill Pond Dam

DATE 10/22/80

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	
General Condition	Unknown - underwater
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Some small trees
Floor of Approach Channel	Underwater
b. Weir and Training Walls	
General Condition of Concrete	Poor at west abutment. Good at east abutment
Rust or Staining	None
Spalling	Significant spalling at west abutment
Any Visible Reinforcing	None
Any Seepage or Efflorescence	Some at east abutment
Drain Holes	None
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	Ledge on east bank severly undermined
Trees Overhanging Channel	Some small trees
Floor of Channel	Large rocks, bedrock some brush
Other Obstructions	

INSPECTION CHECK LIST

PROJECT Upper Mill Pond Dam

DATE 10/22/80

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Visible Reinforcing</p> <p>Any Seepage or Efflorescence</p> <p>Condition at Joints</p> <p>Drain holes</p> <p>Channel</p> <p>Loose Rock or Trees Overhanging Channel</p> <p>Condition of Discharge Channel</p>	<p>N/A</p> <p>Outlet pipe discharge into spillway channel</p>

APPENDIX B
ENGINEERING DATA

Any information pertaining to the history, maintenance and past inspection reports are located at:

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

APPENDIX C
PHOTOGRAPHS



UPPER MILL POND DAM



WEST ABUTMENT



SPILLWAY - EAST ABUTMENT



TRAINING WALL - WEST ABUTMENT



TRAINING WALL - WEST ABUTMENT - DRAINAGE PIPE



DOWNSTREAM CHANNEL

APPENDIX D
HYDRAULIC/HYDROLOGIC COMPUTATIONS

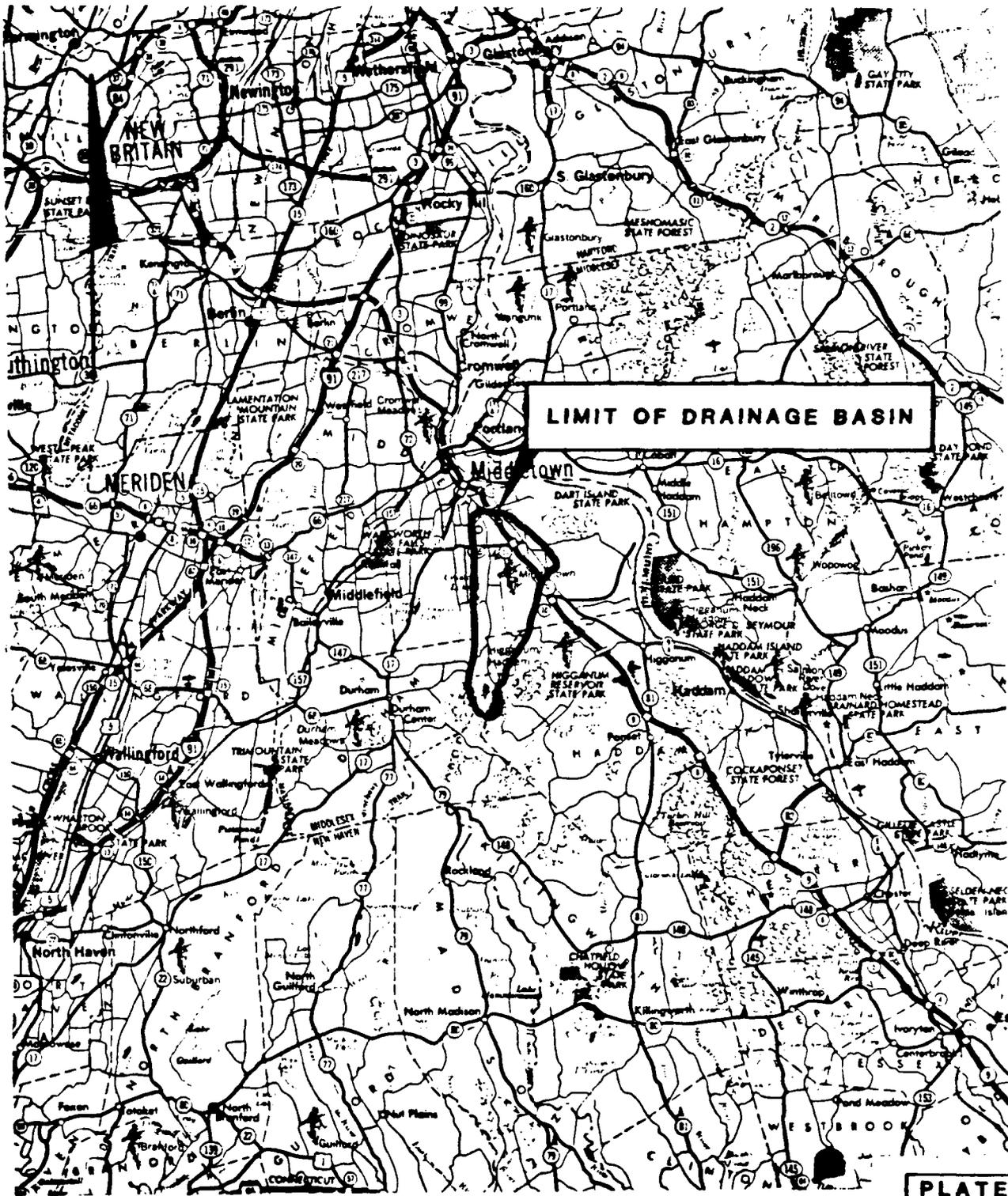


PLATE 2

STORCH ENGINEERS
WETHERSFIELD, CONNECTICUT

U.S. ARMY ENGINEER DIVISION NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

UPPER MILL POND DAM

1 in. = 3.5 mi.

SCALE AS SHOWN

DATE JANUARY, 1981

STORCH ENGINEERS
Engineers - Landscape Architects
Planners - Environmental Consultants

JOB Phase I Dam Inspection - #4463

SHEET NO 1 OF 5

CALCULATED BY BDC DATE 1/9/81

CHECKED BY [Signature] DATE 1/17/81

Determination of Test Flood

NAME OF DAM Upper Mill Pond Dam

DRAINAGE AREA 7.6 SM

INFLOW Size: Small

Hazard: Low

Test Flood: 50 year

$$Q = 252 A^{.79}$$
$$Q = 252 (7.6)^{.79} = 1250 \text{ cfs}$$

Estimating the effect of surcharge storage on the Maximum Test Flood

1. $Q_{p1} = \underline{1250}$ cfs
- 2a. $H_1 = \underline{2.9'}$ (elev.)
- b. $STOR_1 = \underline{0.18''}$
- c. $Q_{p2} = Q_{p1} (1 - STOR_1/4.4) = \underline{1200}$ cfs
- 3a. $H_2 = \underline{2.8'}$ $STOR_2 = \underline{.17''}$
- b. $STOR_A = \underline{.175''}$
- $Q_{PA} = \underline{1200}$ cfs
- $H_A = \underline{2.8'}$ $STOR_A = \underline{.17''}$

Test Flood = 1200 cfs

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

$Q = \underline{250}$ cfs or 21 % of the Test Flood

TORCH ENGINEERS
 Engineers - Landscape Architects
 Planners - Environmental Consultants

JOB Phase I Dam Inspection 4463

SHEET NO 2 OF 5

CALCULATED BY PDC DATE 11/24/80

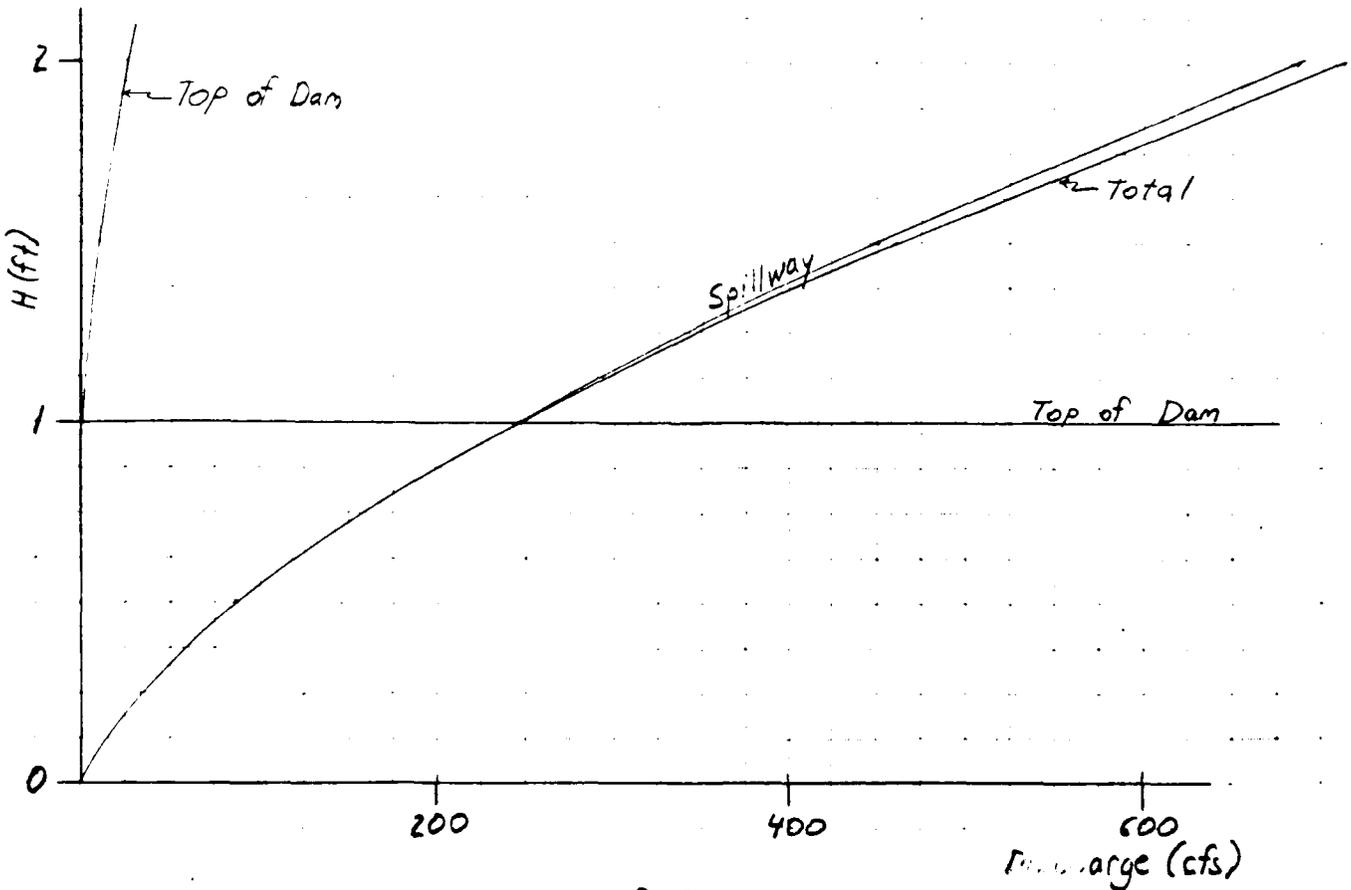
CHECKED BY GJG DATE 11/14/81

Stage Discharge

NAME OF DAM Upper Mill Pond Dam

$Q = CLH^{3/2}$

Elev	Spillway I				Spillway II				Dam				QT
	C	L	H	Q	C	L	H	Q	C	L	H	Q	
		92'	0	0									0
2.63		↓	0.5	86									86
2.68			1.0	247						10'	0	0	247
2.66			1.5	450					2.70	↓	0.5	10	460
2.64		↓	2.0	687					2.63	↓	1.0	26	713



D-2

STORCH ENGINEERS
 Engineers - Landscape Architects
 Planners - Environmental Consultants

JOB Phase I Dam Inspection 4463

SHEET NO 3 OF 5

CALCULATED BY BDC DATE 11/9/81

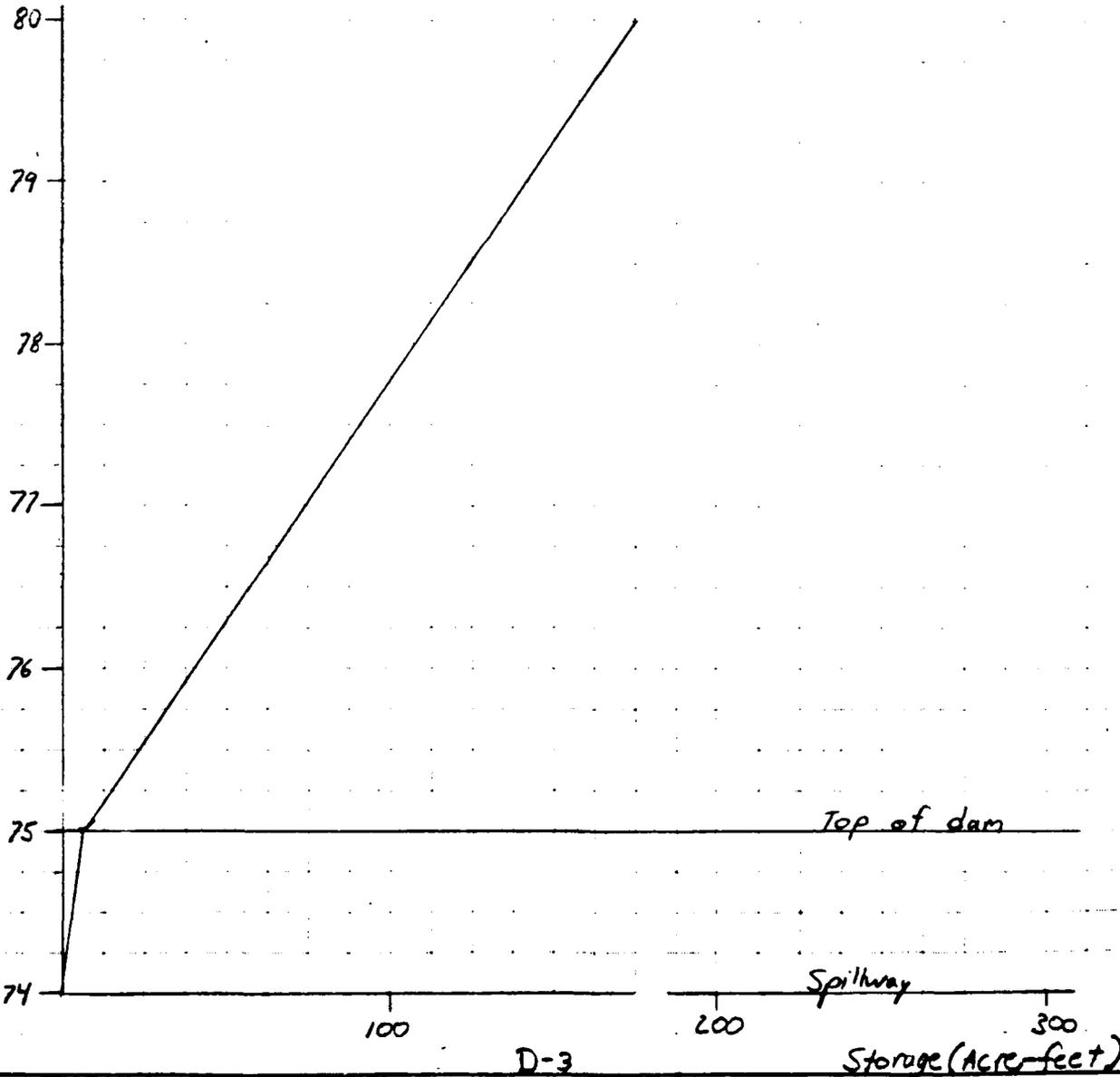
CHECKED BY P.L.G. DATE 11/15/81

AREA - CAPACITY

Name of Dam: Upper Mill Pond Dam

ELEV	DEPTH	AREA	AVG. AREA	VOL	Σ VOL
74		4.7			
75	1.0	4.9	4.8	4.8	4.8
80	5.0	63.4	34.2	171.0	175.8

Elev. (NGVD) Storage below spillway is approximately 31 Acft



D-3

Storage (Acre-feet)

Downstream Hydrographs

"Rule of Thumb" Guidance for Estimating Downstream Failure Hydrographs

NAME OF DAM Upper Mill Pond Dam

Section I at Dam

1. $S = \frac{36}{8.27} \text{ Acft}$
2. $Q_{P1} = \frac{8.27 W_b \sqrt{g}}{Y^{3/2}} = \frac{8.27(37)\sqrt{32.2}}{(15)^{1.5}} = 3,610 \text{ cfs}$
3. See Sections

Section II at

- 4a. $H_2 = \underline{8.9'}$ $A_2 = \underline{510}$ $L_2 = \underline{190}$ $V_2 = \underline{2.2}$ Acft
- b. $Q_{P2} = Q_{P1} (1 - V_2/S) = \underline{3,390}$ cfs
- c. $H_2 = \underline{8.6'}$ $A_2 = \underline{490}$
 $A_A = \underline{500}$ $V_2 = \underline{2.2}$ Acft
 $Q_{P2} = 3,610 (1 - 2.2/36) = 3,390 \text{ cfs}$ $H = 8.6'$

Section III at

- 4a. $H_3 = \underline{8.6'}$ $A_3 = \underline{490}$ $L_3 = \underline{80}$ $V_3 = \underline{0.9}$ Acft
- b. $Q_{P3} = Q_{P2} (1 - V_3/S) = \underline{3,305}$ cfs
- c. $H_3 = \underline{8.5'}$ $A_3 = \underline{470}$
 $A_A = \underline{480}$ $V_3 = \underline{0.9}$ Acft
 $Q_{P3} = 3,390 (1 - 0.9/36) = 3,305 \text{ cfs}$ $H = 8.5'$

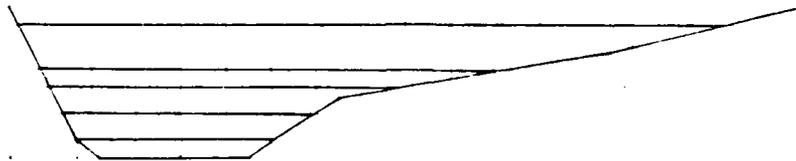
Section IV at

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

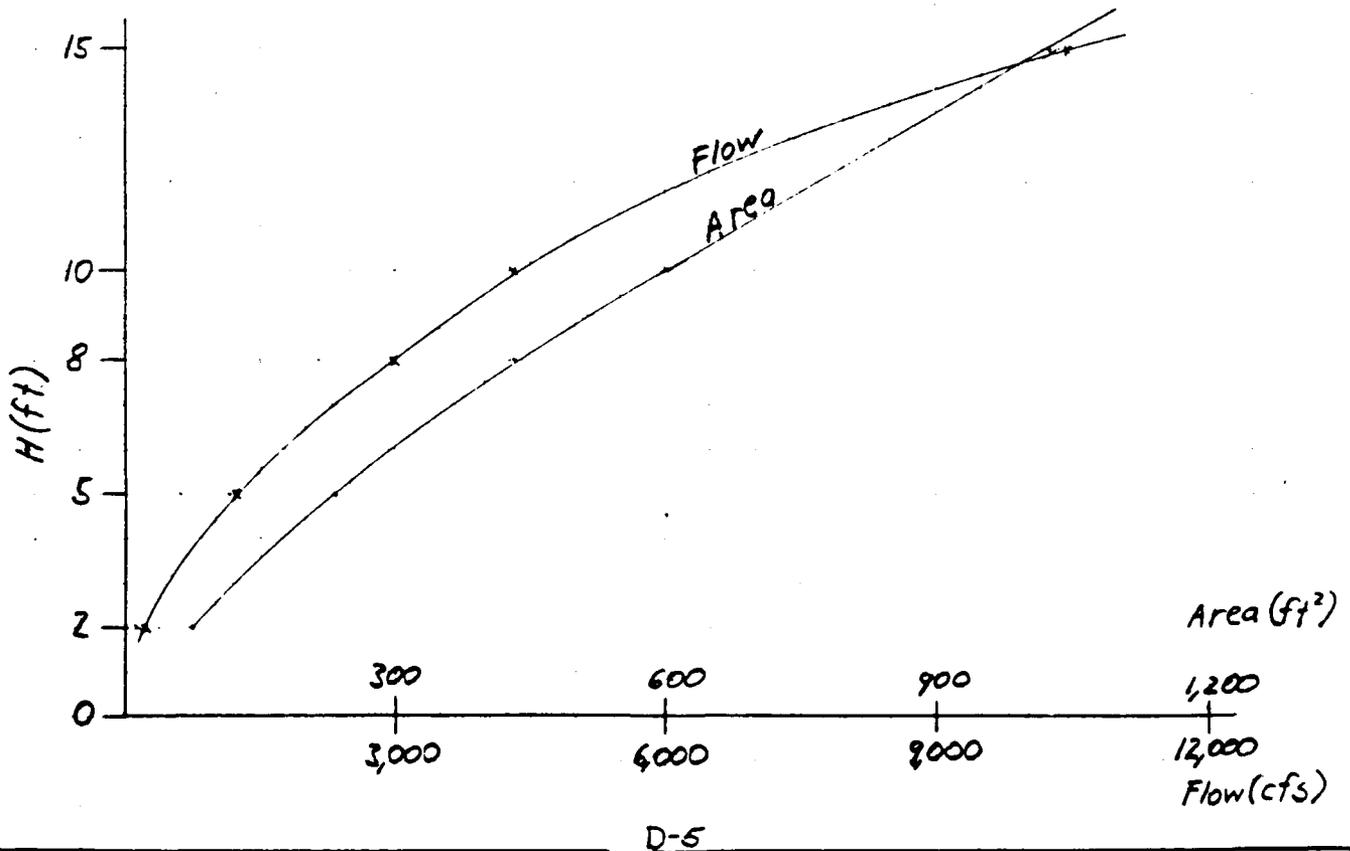
STORCH ENGINEERS - STORCH ASSOCIATES
 Engineers - Landscape architects
 Planners - Environmental Consultants

JOB Upper 1st St. San Jose
 SHEET NO 5 OF 5
 CALCULATED BY RCC DATE 11/21/80
 CHECKED BY SLC DATE 1/22/81
 SCALE Section II, II

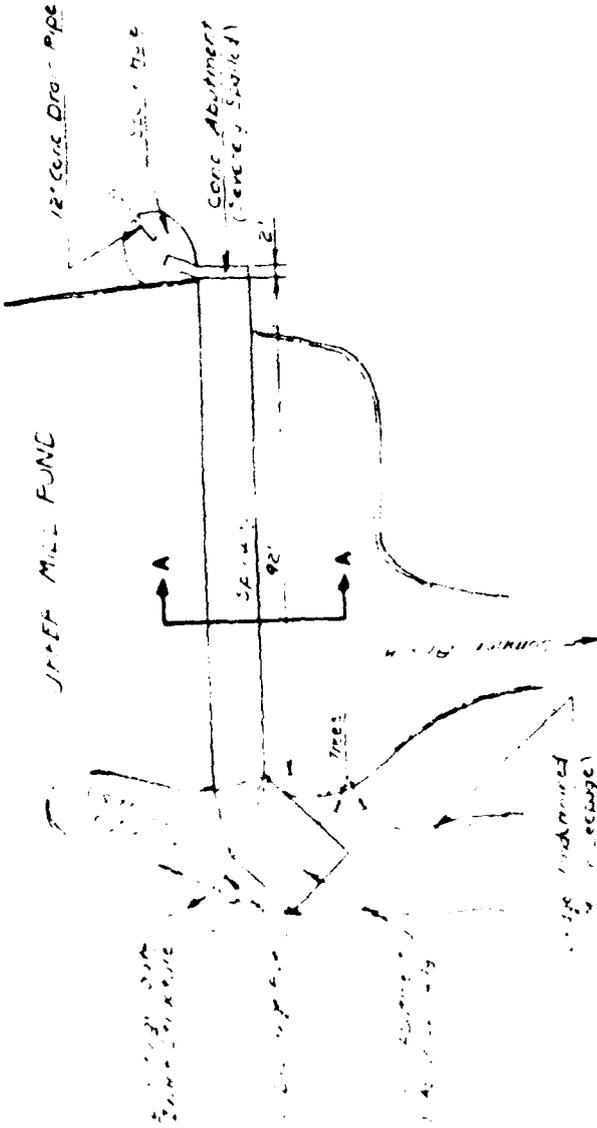
$S = 1.14\%$
 $n = 0.075$



D	WP	A	R	$R^{3/2}$	$S^{1/2}$	V	Q
2	44	77	1.75	1.45	0.107	3.08	237
5	60	233	3.82	2.77	"	5.24	1,221
8	73	433	5.93	3.28	"	6.95	3,010
10	97	603	6.22	3.38	"	7.17	4,324
15	154	1,231	7.99	4.00	"	8.48	10,439

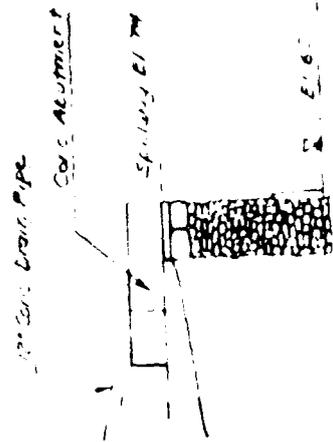


UPPER MILL POND

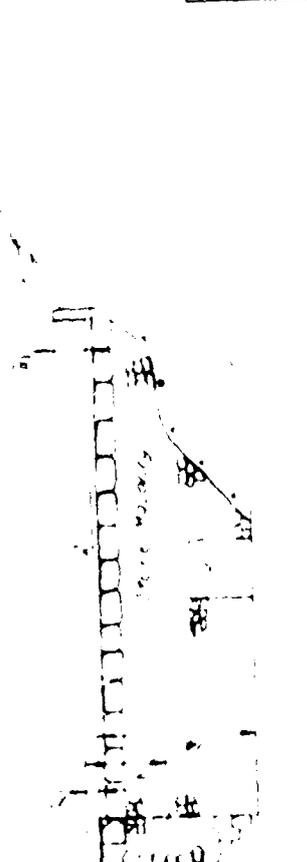


PLAN

SECTION A-A



ELEVATION



NOT TO SCALE

STORCH ENGINEERS
 1000 W. 10th St. S.
 MINNEAPOLIS, MINN.
 NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

PLATE 1

REGISTERED PROFESSIONAL ENGINEERS
 STATE OF MINNESOTA
 LICENSE NO. 10000

UPPER MILL POND DAM

SCALE AS SHOWN
 DATE JANUARY, 1981

END

FILMED

9-2-42