

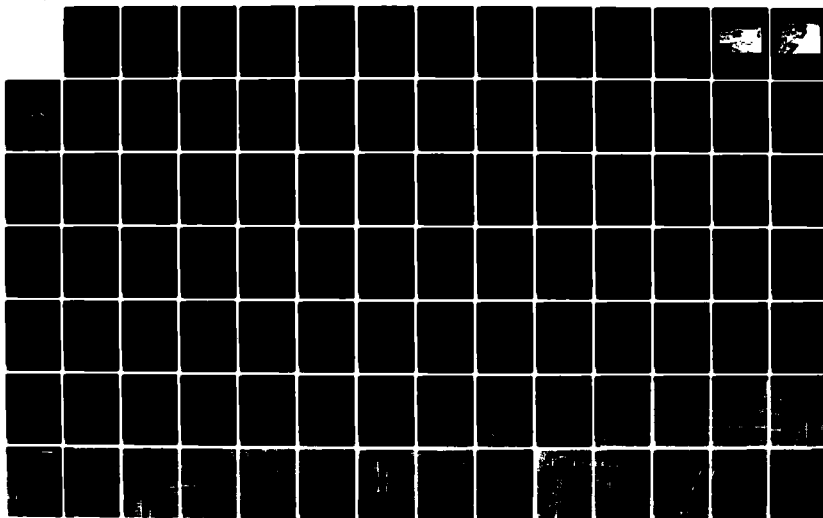
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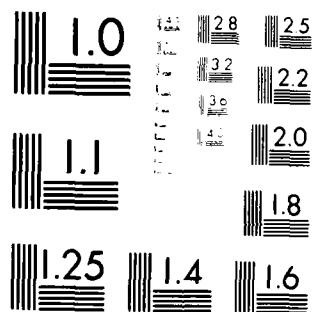
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
PACHAUG POND DAM (CT.) (U) CORPS OF ENGINEERS WALTHAM MA
NEW ENGLAND DIV SEP 78

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**THAMES RIVER BASIN
GRISWOLD, CONNECTICUT**

**PACHAUG POND DAM
CT 00663**

**PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM**



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

SEPTEMBER 1978

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00663	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Pachaug 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 September 1978
		13. NUMBER OF PAGES 90
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, Thames River Basin Griswold, Connecticut		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Pachaug Pond Dam is an earth embankment which has a maximum height of 17.0 ft. and is approximately 770.0 feet long. The dam is considered to be in fair to good condition. A spillway design test flood 24,800 cfs (equal to the PMF) will overtop the dam by approximately 4.0 feet.		

PACHAUG POND DAM

CT 00663

THAMES RIVER BASIN
GRISWOLD, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

APPROVED:

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

DATE: _____

NATIONAL DAM INSPECTION PROGRAM

PHASE 1 - INSPECTION REPORT

IDENTIFICATION NO.: CT00663

NAME OF DAM: PACHAUG POND DAM

TOWN: GRISWOLD

COUNTY AND STATE: NEW LONDON COUNTY, CONNECTICUT

STREAM: PACHAUG RIVER

DATE OF INSPECTION: 22 MAY, 1978

BRIEF ASSESSMENT

Pachaug Pond Dam is an earth embankment dam which was constructed around 1888. The dam has a maximum height of 17.0 feet and is approximately 770.0 feet long. In plan view the dam consists of a 200.0 ft. long straight earth embankment on the left side, a 121.0 ft. long cut stone masonry spillway section and a 450.0 ft. long earth embankment on the right side. Embankment slopes are generally grassed with slopes of 2.0 H to 1.0 V for both upstream and downstream faces. One drawing of recent rehabilitation work at the spillway and gatehouse is the only engineering data available from the Owner or State Offices with regard to the design, construction, or repairs of this dam.

Due to its age, Pachaug Pond Dam was neither designed nor constructed by approved state of the art methods. Based upon the visual inspection at the site, the lack of engineering data available, and no operational or maintenance evidence, there are areas of concern which must be corrected to assure the long term performance of this dam. The dam is considered to be in fair to good condition. The dam embankment has received limited recent maintenance. Erosion from waves or trespass has occurred on the unprotected upstream face. Rotting tree stumps are located on both the upstream and downstream faces. Seepage is emerging at several locations along the downstream toe. Maintenance has been intermittent.

Hydraulic analyses indicate that the existing spillway can discharge a flow of 6400 c.f.s. at Elev. 167.0 (top of Dam). A spillway design test flood of 24,800 c.f.s. (equal to the probable maximum flood) will overtop the dam by approximately 4.0 feet. A storm event with a 50 year recurrence frequency will develop still water surface levels in Pachaug Pond equal to the top of dam disregarding wave surge and ride up. Due to the potential for overtopping, it is recommended that a definite plan for surveillance and a warning system be developed for use during periods of unusually heavy rains and runoff.

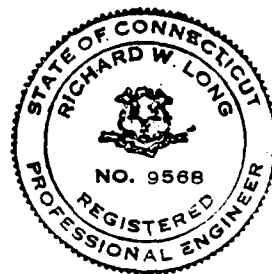
It is recommended that the owner obtain the services of an engineer experienced in the design of earth dams to evaluate and design a seepage monitoring system to effectively collect and monitor these flows; develop a program for the procedure and timely removal of rotting tree stumps and roots along both upstream and downstream slopes of the dam; further, to analyze the embankments with regard to the spillway test flood for slope protection and freeboard allowances. A more detailed investigation should be made of the hydraulic and hydrologic aspects of the site to determine the impact of upstream dam failures and storage at Pachaug Pond because of the large contributing drainage area.

It is suggested that engineering services be obtained in order that the above recommendations be implemented within a 2 year period after receipt of the Phase I Inspection Report. Alternatives to these recommendations would include reducing the Pachaug Pond water levels during periods of intense storm activity or providing additional flood control capacity in the upper basin.

C-E MAGUIRE, INC.

by


Richard W. Long, P.E.
Vice President



This Phase I Inspection Report on Pachaug 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 judgement and practice, and is hereby submitted for approval.

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

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

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

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

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

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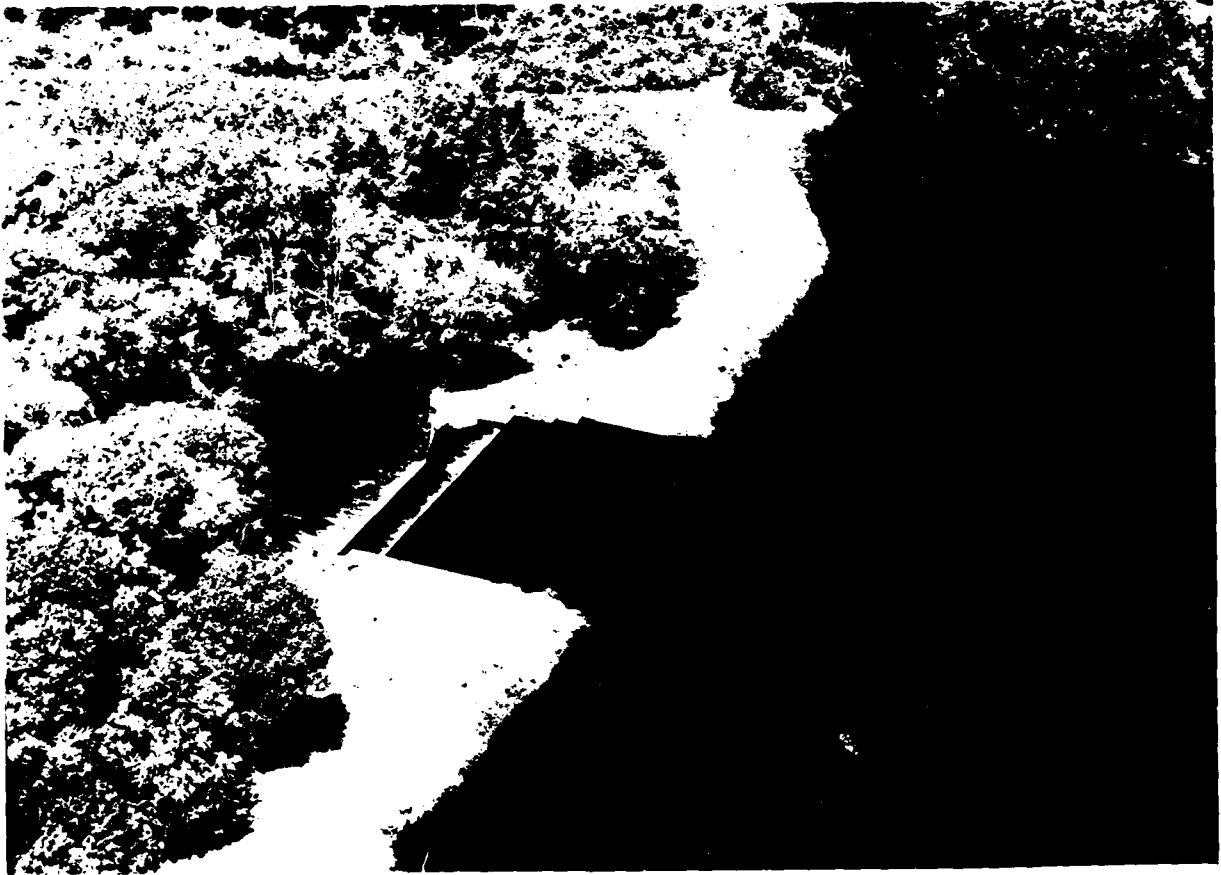
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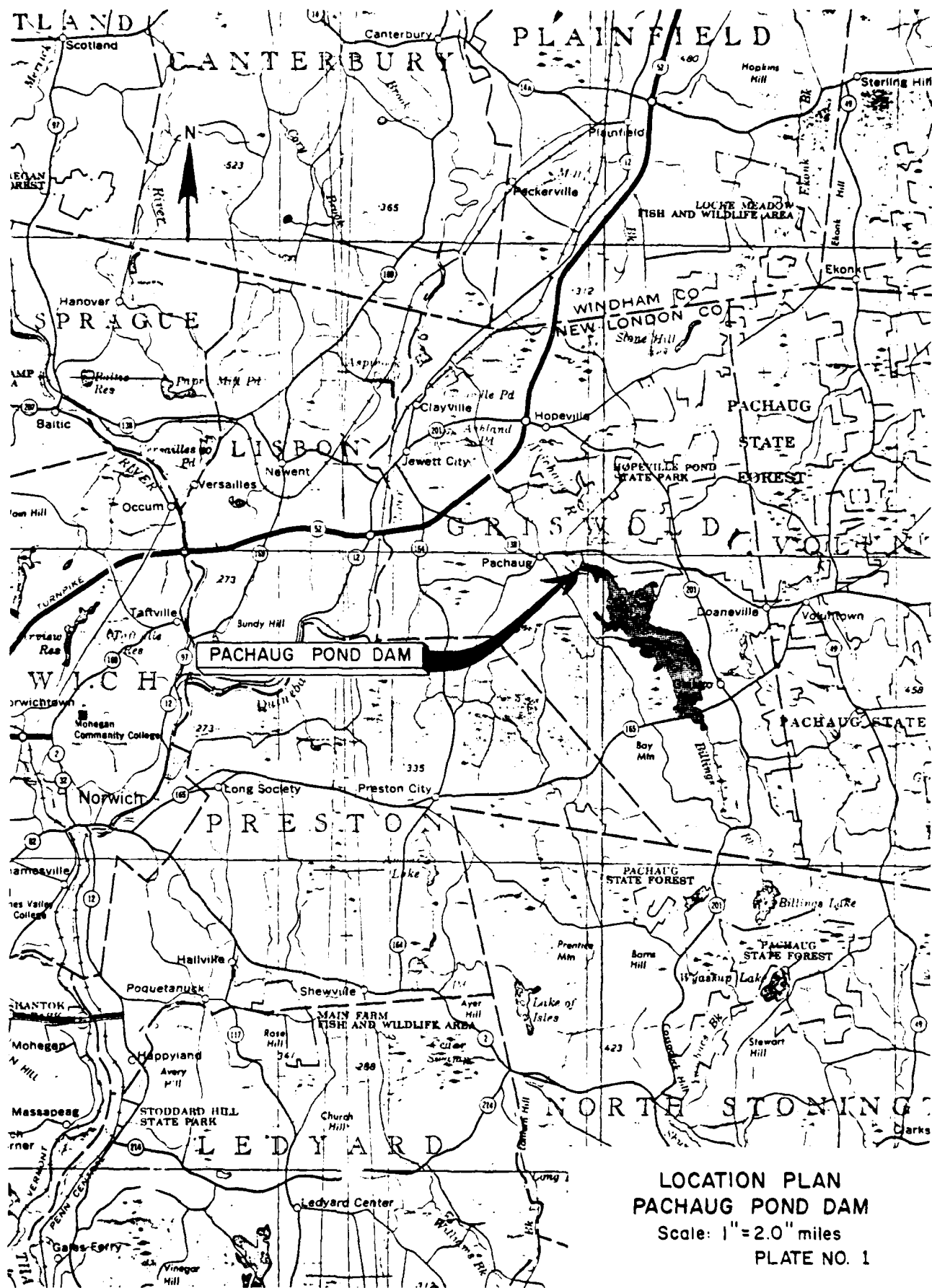
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C-1 PACHAUG POND & DAM - LOOKING UPSTREAM



C-2 PACHAUG POND DAM - LOOKING NORTH



PHASE I INSPECTION REPORT

NAME OF DAM CT 00663

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. C-E Maguire, Inc. 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 was issued to C-E Maguire, Inc. under a letter of 26 April, 1978 from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0300 has been assigned by the Corps of Engineers for this work.
- b. Purpose:
 - (1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which

threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to 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: Pachaug Pond Dam is located in New London County, Connecticut, approximately one (1.0) mile south of Jewett City along Route 138. The dam impounds water from the Pachaug River which drains a 51.0 square mile watershed of rolling, flat terrain. Pachaug Pond is approximately 830 acres in size with an average depth of 18.0 feet. The dam is located at the extreme northern end of the impoundment (See Plate No. 1).
- b. Description of Dam and Appurtenances: The dam is an earth embankment approximately 770.0 ft. in length with an average height of 17.0 ft. The top crest of the dam is 16.0 ft. wide and both upstream and downstream slopes approximate 2.0 H to 1.0 V and are grassed. The spillway is constructed

of cut stone masonry, 121.0 ft. wide with a straight approach channel and a broad, crested weir section (See Photos C-3, C-4). Training walls are grouted masonry and concrete with 6.0 ft. vertical faces. The outlet works consists of a straight, reinforced concrete sluiceway with a 36 in. W x 48 in. H sluice gate outlet operated by a two-speed manual control. The sluiceway, gatehouse and outlet are located adjacent to, and as part of, the easterly spillway training wall. The outlet discharges into a downstream reinforced concrete stilling basin.

- c. Size Classification: The dam is classified as intermediate in size because impoundment at spillway crest elevation is 5982 Ac-Ft which exceeds 1000 Ac-Ft., the lower limit for the intermediate category.
- d. Hazard Classification: This dam is classified as a high hazard structure because it is located where failure may cause serious damage to homes at Griswold and Jewett City, extensive damage to agricultural property, public utilities and Route 138 downstream.
- e. Ownership (past and present): Pachaug Pond Dam

was constructed about 1888 by the Ashland Cotton Company and owned continuously by them until 1925. At that time, the company was purchased by the United Merchants and Manufacturers of New York and was known as the Ashland Corporation. This corporation was liquidated in 1951. The dam at present is owned by the State of Connecticut and managed by the Department of Environmental Protection - Division of Conservation and Preservation (Region No. 4 - District).

- f. Operator: Mr. John Olsen
Director-Region No. 4
Div. of Conservation and Preservation
- and: Mr. Stephan Merchant
Unit Manager
Corner Rt. 201 and Roode Road
Griswold, Connecticut 06351
(203)-376-2920
- g. Purpose Of The Dam: General recreation and flood control.
- h. Design and Construction History: Pachaug Dam was constructed circa 1888 by the Ashland Cotton Company to create Pachaug Pond as a storage reservoir for Hopeville Pond, located further downstream where the power generation equipment was installed. Just prior to 1951, when the Ashland Corporation was liquidated, repairs were concluded at the dam which included a new concrete gate canal,

gates, gatehouse, spiral concrete tailwater sluice and abutment. Seventeen years later, additional repairs to the Pachaug Pond Dam were completed by the C.F.I. Construction Company of Providence, Rhode Island, and involved installation of a new sluice gate and gatehouse, fencing, gratings and general clearing of brush and trees along the embankments. Stone fill was dumped in two localized, eroded areas on the upstream embankment slope in 1977 to protect the dam face against wave action and heavy recreational use.

- i. Normal Operating Procedures: The water level in Pachaug Pond is generally not controlled, but rather the discharges are allowed to pass over the uncontrolled spillway year round. The outlet gate, as a rule, is tested annually for operations to ensure its use in an emergency and for repair situations.

1.3 PERTINENT DATA

- a. Drainage Area: Pachaug River rises on the Eastern Connecticut - Rhode Island border at Beach Pond in heavily wooded, hilly country. From El. 296.0 at Beach Pond, the river meanders a distance of 14.0 miles to its confluence with the Quinebaug River,

near Jewett City at El. 100.0, a drop of about 200.0 ft. The watershed terrain is rolling and hilly with large surface storages in several natural and man-made swamps, lakes and reservoirs. The river flows are controlled to a great extent by a series of thirteen reservoirs with the Pachaug Dam facility located in the lower basin controlling a drainage area of 51 square miles. The storage potential located upstream has a significant potential for modifying the peak flows that occur at Pachaug Pond.

- b. Discharge at Damsite: The U.S. Geologic Survey lists for gauge #01126950 - Pachaug River at Pachaug, Connecticut, the maximum discharge for the period of record (1961-1973) as 1,180 c.f.s. occurring on March 19, 1968. The calculated discharge for the flood of September 21, 1938 at the Pachaug Gauging Station was 1910 c.f.s. Additional discharge data is listed below:

1. Outlet works (conduits) size-36" W x 48" H at El. 146.0
2. Maximum known flood outflow at dams site estimated 1,910 c.f.s. (9/21/1938)

3. Overflow spillway capacity at maximum pool elevation - 6,400 c.f.s. at El. 167.0.
4. Gated outlet capacity at pool elevation with 3.0' x 4.0' gate - 213 c.f.s. at El. 161.0 and tailwater at El. 149.0
5. Gated outlet capacity at maximum pool elevation 261 cfs at 167.0 elevation with tail water at El. 149.0
6. Total discharge capacity at maximum pool elevation 6661 cfs at 167.0 elevation.

c. Elevation (ft. above NGVD)

- | | |
|---|--------------------------------|
| 1. Top Dam | Elev. 167.0 |
| 2. Maximum pool-design surcharge | 6.0 with no free board |
| 3. Full flood control pool | Elev. 167.0 with no free board |
| 4. Recreation pool | Elev. 161.0 |
| 5. Spillway crest | Elev. 161.0 |
| 6. Upstream portal invert in lake structure | Elev. 148.0+ Estimated |
| 7. Streambed at center-line of dam | Elev. 149.0+ |
| 8. Maximum tailwater | Not computed |

d. Reservoir (feet)

- | | |
|------------------------------|--------------------------|
| 1. Length of maximum pool | 15,000 (scaled distance) |
| 2. Length of recreation pool | 15,000 (scaled distance) |
| 3. Design surcharge | 15,000 (scaled distance) |

e. Storage (acre-feet)

- | | |
|--------------------|-----------------------|
| 1. Recreation pool | 5,982
at El. 161.0 |
|--------------------|-----------------------|

- | | | |
|----|--|------------------------|
| 2. | Flood control pool | 4,980
at El. 167.0 |
| 3. | Design surcharge | 4,980
at El. 167.0 |
| 4. | Top of dam | 10,962
at El. 167.0 |
| 5. | The flood control pool of 4980 Ac-Ft represents 1.83 inches of runoff from its drainage area of 51.0 sq. mi. | |

f. Reservoir Surface (acres)

- | | | |
|----|--|-----|
| 1. | Top dam | 830 |
| 2. | Maximum pool | 830 |
| 3. | Flood-control pool | 830 |
| 4. | Recreation pool | 830 |
| 5. | Spillway crest | 830 |
| 6. | One foot of surcharge represents 0.305 inches of runoff from its drainage area of 51.0 sq. mi. | |

g. Dam

- | | | |
|-----|-----------------|----------------------------------|
| 1. | Type | Earth embankment |
| 2. | Length | 770.0 ft. $\pm$ |
| 3. | Height | 17.0 ft. $\pm$ |
| 4. | Top Width | 16.0 ft. $\pm$ |
| 5. | Side Slopes | 1.75 H to 1.0 V
(approximate) |
| 6. | Zoning | unknown |
| 7. | Impervious Core | unknown |
| 8. | Cutoff | unknown |
| 9. | Grout curtain | unknown |
| 10. | Other | N/A |

h. Spillway

1. Type	Rect-uncontrolled straight
2. Length of weir	121.0 ft.
3. Crest elevation	El. 161.0 NGVD
4. Gates	none
5. U/S Channel	straight natural channel
6. D/S Channel	natural irregular channel
7. General	----

i. Regulating Outlets

1. Invert	El. 147.0
2. Size	36" W x 48" H
3. Description	Rectangular Concrete Sluiceway
4. Control Mechanism	Manually operated vertical slide gate
5. Other	----

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The limited information available in the correspondence indicates that the embankment of this dam is constructed of earth, and that the spillway is constructed of grouted masonry. A cross section of the embankment is shown in Appendix B, where it may be seen that the downstream slope is

about 2.0 H : 1.0 V, although there are localized areas that are steeper. The portion of the upstream slope observable above water level is also sloped at about 2.0 H : 1.0 V, although it is locally wave-cut at the water level.

In plan view the dam consists of a 200.0 ft. long straight embankment on the left side, a 121.0 ft. long spillway section, and a 450.0 ft. long embankment on the right side. The right embankment is straight for a distance of 250.0 to 300.0 feet from the right spillway wall. It then gradually curves in a concave downstream direction until it meets the right abutment.

Both abutments apparently consist of soils natural to the site. No bedrock exposures were evident at the abutments at the time of inspection.

2.2 CONSTRUCTION

No information is available regarding the original construction. In 1967, the State of Connecticut reconstructed the gatehouse and other minor repair work. Plans and specifications were prepared by Benjamin H. Palmer, Engineer for the State Board of Fisheries and Game and work was begun in August, 1967, and completed in 1968. A drawing indicating this work is included in the Appendix.

2.3 OPERATION

No continuous record of operation at Pachaug Dam is available.

2.4 EVALUATION

- a. Availability: Little information is available that would be helpful in the evaluation of the condition of the dam.
- b. Adequacy: The available information is not adequate for evaluation of the condition of this dam. Additional data needed include: type and zonation of soils in the embankment; foundation conditions; side slopes at most critical cross sections; and, water levels within the dam.
- c. Validity: Not applicable.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

- a. General: Pachaug Pond Dam appears to be generally in good condition with attention needed for only a few items. Trees and brush were cleared from the embankments and a mature growth of grass covered the structure and its slopes. The spillway and training walls with the exception of those items mentioned in other parts of this report were constructed of cut stone masonry with joints well aligned and pointed. The access road was gated and the gatehouse fenced and locked. An unusual

amount of wear and surface erosion on the earth embankment slopes has apparently occurred from overuse by the public.

b. Dam:

The embankments of this dam appear to have cross sections that are typical for dams of this vintage. Seepage was observed exiting from the downstream side of both the left and the right abutments. When observed, the seepage was found to be clear in all locations.

Based on the approximate observed cross section, the seepage appears to exit on the downstream side of the right embankment at a level higher than would be expected if this dam were homogeneous in cross section and permeability. The exit point at one location is shown on a cross-section sketch in Appendix B, and the seepage pond it creates may be seen in Photo C-11. The person standing on the downstream slope (See Photo C-12) is approximately at the top exit point of the seepage.

On the downstream slope, approximately 50.0 feet to the right of the spillway, there exists a substantial pile of 200 lb. to 1,000 lb. stones with seepage emanating from its base (See Photo C-13).

Correspondence dated September 18, 1975, indicates that a leak existed in the dam "just above and to the right of the outlet." No evidence of a leak existed at the time of the present inspection at this location; however, the pile of rocks mentioned above could represent repair of the previously noted leak.

Seepage exits from the left embankment from a point lower down on the downstream slope than was the case for the right embankment. This seepage collects in a low zone at the toe of the left embankment and is shown in Photo C-8.

Numerous stumps exist on both the upstream and downstream slopes of both the left and right embankments. Two examples are shown in Photo C-9 and Photo C-10. Photo C-9 shows a stump just above the upstream shoreline at the waterline on the right embankment, and Photo C-10 shows a stump just below water level on the downstream slope. The stumps are up to 3.5 feet in height, although most are 1.0 ft. to 2.0 ft. in height. Many stumps are severely rotted.

On the upstream slope of the dam, several low spots or swales were observed. Three are displayed in Photo C-5, which shows two in the foreground filled with rubble. The depression in the rear is an eroded spot on the slope. The origin of the above mentioned swales is not known.

Photos C-5 and C-6, show the upstream slope of the embankments, and demonstrate that no significant slope protection exists, except at the training walls. The slopes are wave cut at the water level.

No animal holes were found in either embankment. One 10 inch deep hole was found at Sta. 3+39 on the right embankment about midway down the downstream slope. This hole appears to have been formed by a rotted stump.

c. Appurtenant Structures

Structurally, the existing spillway and weir appear to be in good condition.

The west spillway training wall needs backfilling and repointing of the masonry.

At the east training wall, some settlement has occurred from surface erosion with seepage at the downstream toe near the base of the wall and needs investigation.

The gatehouse and outlet works recently repaired appear to be in good condition. Provision for removal of the sluice gate for repairs was not apparent.

- d. Reservoir Area: Since the construction of Pachaug Dam, a series of upstream storage ponds and reservoirs have assisted in breaking peak runoff flows from the basin and averaging them out so that their impact at Pachaug is reduced. If it were not for this storage factor, the spillway capacity of the several dams in the Pachaug River would be far too small to pass floods. The safety of this chain of 13 dams is particularly interdependent. The failure of almost any one has the potential to lead to the overtopping and failure of downstream structures. It is, therefore, imperative that they all be kept in excellent repair.
- e. Downstream Channel: The downstream channel is natural and irregular in alignment with trees and

brush overhanging the channel. Because downstream flows pass under Rt. 138 through a culvert, it is essential that all potential clogging by debris be eliminated.

3.2 EVALUATION

Visual observations made during the course of the inspection indicate several detrimental items that require attention. Several of the deficiencies observed and discussed above require action and should receive attention before further deterioration develops a hazardous condition. Recommended measures are discussed in Section 7.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures

1. Normal Operating Procedures: The water level for Pachaug Pond is generally uncontrolled. Normal operating procedure allows all discharges to pass over the uncontrolled spillway with the outlet works closed. The sluice gate for the outlet is tested usually once annually to insure that it remains operable. As a rule, the outlet gate has been opened only for maintenance and repair work.
2. Emergency Operating Procedures: No formal contingency plan for emergency operation or standby exists. The gate stand handle is kept in the gate

tenders residence approximately 1-1/2 miles away with the keys to the locked gatehouse because of vandalism at the dam site. It is assumed that in an emergency situation some direction will be given to the region 4 headquarters (i.e., the gate tender) for regulation of the sluice gate by the Department of Environmental Management in Hartford.

- 4.2 Maintenance of the Dam: Maintenance of the facilities has occurred intermittently by the State of Connecticut through the regional personnel of the Department of Environmental Management. No annual, or regular, program exists.
- 4.3 Maintenance of Operating Facilities: A program for testing the operation of the sluice gate annually is in effect by the regional staff of the Department of Environmental Management.
- 4.4 Description Of Any Warning System In Effect: Unknown.
- 4.5 Evaluation: Pachaug Pond Dam lacks proper maintenance. Its operation, coordinated with other dams in the Pachaug River system, could potentially attenuate flooding.

SECTION 5 - HYDRAULIC/HYDROLOGIC ANALYSIS

5.1 Evaluation of Features

- a. Design Data: No existing design data was obtained. U.S. Coast and Geodetic Survey maps were utilized to develop the hydrologic parameters such as: drainage area; water surface area; runoff and watershed characteristics; downstream channel cross-sections. An Elevation-Area-Storage curve for Pachaug Pond was not available. Surge storage was determined assuming the lake surface area at spillway crest is constant above that elevation. For available information and drawings for the damsite, see Appendix B. Design data developed for this investigation is listed below:

INFLOW, OUTFLOW AND SURCHARGE DATA

FREQUENCY IN YEARS	24-HOUR TOTAL RAINFALL IN INCHES	24-HOUR* EFFEC- TIVE RAINFALL IN INCHES	MAXIMUM INFLOW IN C.F.S.	MAXIMUM** OUTFLOW IN C.F.S.	SURCHARGE STORAGE IN FEET	SURCHARGE STORAGE ELEVATION
10	5.0	2.6	4200	3012	3.63	164.63
50	6.5	4.1	6500	6450	6.1	167.1
100	7.0	4.6	7500	7470	6.60	167.6
1/2 MPF	11.9	9.5	12750	12300	7.9	168.9
TEST FLOOD = M.P.F.	21.4	19.0	25500	24800	10.0	171.0

*Infiltration assumed as 0.1"/hour

**Lake assumed initially full at spillway crest elevation 161.0.
(Top of dam = 167.0.)

NOTES:

1. Q_{10} ; Q_{50} ; Q_{100} ; inflow discharges computed by approximate methodology of Soil Conservation Service.
2. 1/2 MPF and "test flood" computation based on COE instructions and guidelines.
3. Maximum capacity of spillway without overtopping the top of the dam elevation 167.0 is equal to 6400 C.F.S.
4. All discharges indicated are dependent upon the continued integrity of upstream storage reservoirs.
5. Surcharge storage is allowed to overtop the dam when exceeding the spillway capacity.

b. Experience Data

Spillway

Maximum Recorded outflow - 1180 cfs 3/19/68

Maximum known flood outflow - 1910 cfs

9/21/38 (est.)

No records are available for the storm of
1955

Outlet Works

Maximum discharge @ El.161.0 - 213 cfs

Outlet works were replaced by the State of
Connecticut in 1967-68.

c. Visual Observations

1. Consideration should be given to the placement of downstream stone protection at the spillway as an effective energy dissipator.
2. Repair to both training walls is needed and should include backfilling, grouting and re-pointing.
3. It is essential to control trespass on the dam embankment and eliminate excessive wear and erosion.
4. Freeboard allowance is lacking for the spillway design flood as well as lesser storm events. Storm surge and wave ride-up causing

overtopping are a distinct possibility for the combination of moderate intensity storms with accompanying high velocity winds.

5. Calibration of the gate control with the impoundment should be accomplished and the establishment of a daily water surface level record.

d. Overtopping Potential

The spillway capacity is inadequately sized to meet the screening criteria as established by the Corps of Engineers. Analysis of the 100 year storm event indicates that Pachaug Pond water surface levels would rise to within 0.60 ft. of the crest of the existing dam and that any wind generated wave action or ride-up would have the potential to overtop the embankment and lead to failure. As discussed earlier in this report, the spillway capacity of this dam is directly a function of the condition of the upstream storages and should be studied in detail as a system of impoundments.

With water surface levels at spillway crest elevation (161.0) the outlet capacity is 213.0 cfs. At that level, the reservoir capacity is equal to 830 Ac-Ft. for one foot of depth. It would require 46

hours approximately to draw down the water level the first one foot of depth using the outlet works only in an emergency situation.

The maximum spillway discharge capacity is equal to 6400 c.f.s. which represents 25.7% of the "Test Flood" outflow discharge of 24,800 c.f.s. This "Test Flood" discharge would overtop the dam by 4.0 ft. See Appendix D for the Spillway Rating Curve.

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

There were no indications of structural instability based on visual observations. No misalignment, sloughing of slopes, settlement, or movement of structures was observed that would be caused by structural instability.

b. Design and Construction Data

There is no information available about the properties of the soil in the embankment, the foundations or the abutments, which would be needed to help evaluate structural stability.

c. Operating Records

There are no operating records available that pro-

vide any indications regarding the stability of the dam.

d. Post-Construction Changes

Subsequent to construction, trees were allowed to grow on the slopes of the dam. Those trees were subsequently cut down, but the roots were not removed. The roots are now decaying in place and may cause eventual failure by internal erosion (piping).

e. Seismic Stability

The dam is in seismic zone 1 and hence, does not have to be evaluated for seismic stability according to the Recommended Guidelines.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

- a. Condition: Examination of available documents and visual inspection of the Pachaug Pond Dam and appurtenant structures indicate the facility is in fair to good condition and functioning satisfactorily. However, review of the limited data and the visual inspection revealed four areas of concern with respect to the overall long term condition of the dam.

1. Seepage was observed emerging from the downstream slope of the dam embankment at levels higher than usual for a dam of this type. High water levels in the pond could lead to internal erosion and eventual failure, because the seepage is not controlled. The presence of decaying roots on both the upstream and downstream sides increases the probability of failure by internal erosion. There is no evidence of any wing wall or cutoff from the spillway walls into the embankment. Internal erosion could occur at this location, although no leakage was observed at the time of inspection.
2. The upstream face of the dam is not protected by rip rap against wave action except in a few specific locations where erosion has occurred in the past. Lack of such protection could lead to washout of the embankments under a severe combination of storm and waves.
3. The maximum spillway discharge capacity is equal to 6400 c.f.s. which represents 25.7% of the "Test Flood" outflow discharge of

24,800 c.f.s. This "Test Flood" will overtop the dam by 4.0 feet.

4. The dam has an inadequate freeboard allowance which could result in overtopping of the dam from lesser storm events under certain wind speed and directional conditions.

b. Adequacy of Information

The information available is such that the assessment of the condition of the dam must be based primarily on the visual inspection and the past operational performance of the structure.

c. Urgency

The recommendations and remedial measures outlined below should be implemented by the Owner within a two year period.

d. Necessity for Additional Investigations

Additional investigations to further assess the adequacy of the dam and its appurtenances are necessary. Sufficient engineering data must be obtained to implement the recommendations listed below.

7.2 RECOMMENDATIONS

- a. Facilities: In view of the concerns for the long term condition of Pachaug Pond Dam, and the lack of engineering backup data, it is recommended that the following measures be undertaken by the Owner.

1. Obtain the services of an engineer experienced in the design of dams to conduct the investigation.
2. Implement a limited subsurface exploration and testing program to determine the composition of the earth embankment.
3. Design a seepage monitoring and collection system to obtain sufficient data to effectively monitor and control the flows.
4. Include provisions to remove the detrimental effects of rotting roots on both the upstream and downstream slopes of the embankment.
5. Provide slope protection for the upstream face of the dam.
6. Analyze the freeboard allowance with respect to the Spillway Test Flood criteria and institute corrective measures to provide this allowance. Alternative solutions that may be considered are: raising the embankment; lowering the pool to increase flood control storage; enlarging the outlet works to increase the discharges; developing an emergency spillway or providing additional upstream storage. This analysis should include a total basin study to determine the impact of upstream dam failures and stor-

ages at Pachaug Pond because of the large contributing drainage area.

7.3 REMEDIAL MEASURES

- a. Alternatives: Alternatives to the recommendations listed above would be to lower the water levels in Pachaug Pond at the approach of high intensity storms, to increase capacity for flood control or to investigate increasing upstream storage capacity at other facilities to relieve the conditions at Pachaug.
- b. Operations and Maintenance Procedures: While the dam is generally in fair to good condition, it is considered important that the following items be attended to as early as practical:
 1. Develop and initiate a program of continuing maintenance of the dam and its appurtenant structures including the control of vegetation on the dam.
 2. Institute a program of periodic inspections of the dam and its appurtenances with special attention given to monitoring areas of emerging seepage for changes in volume of flow and presence of any suspended solids.
 3. Prepare an emergency action plan to prevent or minimize the impact of failure, listing

the expedient action to be taken and authorities to be contacted.

4. Because present freeboard allowances are marginal and slope protection lacking, implement a short term program of a round the clock surveillance at the dam during periods of high intensity storms until improvements have been made at the site as outlined in 7.2a.6.
5. Consider restricting the public's use of the facility to eliminate further surface erosion from trespass.

APPENDIX A
INSPECTION CHECK LIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT Pachaug Pond Dam DATE 22 May 1973

TIME 0950 - 1600

WEATHER Clear 70°F in sun
Wind 10 MPH

W.S.ELEV. _____ U.S. _____ D.S.

PARTY :

1. <u>R. Long CEM</u>	6. <u>V. Galgowski Conn. DEP</u>
2. <u>S. Poulos GEI</u>	7. <u>S. Merchant Conn. DEP</u>
3. <u>S. Khanna CEM</u>	8. <u>F. Gulliani CEM</u>
4. <u>A. Reed CEM</u>	9. _____
5. <u>R. Brown CEM</u>	10. _____

PROJECT FEATURE	INSPECTED BY	REMARKS
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
9. _____	_____	_____
10. _____	_____	_____

PERIODIC INSPECTION CHECK LIST

PROJECT PACHAUG POND DAM DATE 22 MAY 1976

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Crest Elevation	El. 161 NGVD (From U.S.G.S. Quad Sheet)
Current Pool Elevation	El. 161.2 $\pm$ (Estimated)
Maximum Impoundment to Date	5982 Ac-Ft. (Estimated)
Surface Cracks	None Observed
Pavement Condition	N/A - Gravel Road
Movement or Settlement of Crest	None observed. Too irregular to ascertain
Lateral Movement	None Observed. Too irregular to ascertain
Vertical Alignment	No displacement observed. Several small depressions on upstream face. Surface quite irregular.
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	Condition good at both abutment contacts. Upstream slope to right of right wall of spillway channel is backfilled with stone rubble, possibly to stop erosion.
Indications of Movement of Structural Items on Slopes	One slab of gneiss (cutstone) on crest tilted down, probably due to erosion along path that is parallel to right wall of spillway on downstream slope.
Trespassing on Slopes	Yes - causing some surface erosion Paths adjacent to and near left and right walls of spillway are eroding. Free access
Sloughing or Erosion of Slopes or Abutments	Yes - On upstream face over a distance of 200 ft. to right of spillway. Scales are 1 to 1.5 ft. deep, 3 to 4 ft. wide and 6 to 3 ft. up and down slope, above water level. Two nearest spillway filled with stone rubble.

PERIODIC INSPECTION CHECK LIST

PROJECT PACHAUG POND DAM DATE 22 MAY 1978
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u> (Continued)	
Rock Slope Protection - Riprap Failures	No Rock Slope Protection Localized slough areas filled with stone rubble.
Unusual Movement or Cracking at or near Toes	None observed
Unusual Embankment or Downstream Seepage	Seepage observed at several locations on right and left embankments
Piping or Boils	None Observed
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None
Vegetation	Several old stumps on up and down stream face. Rotting in place.

PERIODIC INSPECTION CHECK LIST

PROJECT Pachaug Pond Dam DATE 22 May 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>DIKE EMBANKMENT</u>	N/A - No dike

PERIODIC INSPECTION CHECK LIST

PROJECT PACHAUG POND DAM DATE 22 MAY 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u> a. Approach Channel Slope Conditions Bottom Conditions Rock Slides or Falls Log Boom Debris Condition of Concrete Lining Drains or Weep Holes b. Intake Structure Condition of Concrete Stop Logs and Slots Screens (Trash Racks)	a. Depth of water precluded proper inspection of these items. Satisfactory Used in concrete slueway to reduce pressure on gate. These items were underwater and therefore unobservable. Unobstructed

PERIODIC INSPECTION CHECK LIST

PROJECT PACHAUG POND DAM DATE 22 MAY 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - Gatehouse	
a. Concrete and Structural	
General Condition	Good
Concition of Joints	Good
Spalling	None Observed
Visible Reinforcing	None Observed
Rusting or Staining of Concrete	None Observed
Any Seepage or Efflorescence	None Observed
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	Gate Well unobservable
Cracks	None Observed
Rusting or Corrosion of Steel	None Observed
b. Mechanical and Electrical	
Air Vents	None
Float Wells	None
Crane Hoist	None (no visible means to remove gate for repairs)
Elevator	N/A
Hydraulic System	Manual operated gate. Handle kept at gate keeper's house (1½ mi. away)
Service Gates	None
Emergency Gates	None
Lightning Protection System	N/A
Emergency Power System	
Wiring and Ligating System	

PERIODIC INSPECTION CHECK LIST

PROJECT Pachaus Pond Dam DATE 22 May 73

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - TRANSITION AND CONDUIT</u>	
General Condition of concrete	Outlet discharges in cistern type structure below water level. Rectangular concrete sluiceway 3.0 ft. by 4.0 ft. not observable.
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECK LIST

PROJECT Pachaug Pond Dam DATE 22 May 1973

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - OUTLET STRUCTURE AND</u> <u>OUTLET CHANNEL</u> General Condition of Concrete Rust or Staining Spalling Erosion or Cavitation Visible Reinforcing Any Seepage or Efflorescence Condition at Joints Drain holes Channel Loose Rock or Trees Overhanging Channel Condition of Discharge Channel	Sluice gate discharges below water level into stilling basin. Gate is 36 inches wide by 48 inches high. None Concrete appears to be in good condition where observable above water level.

PERIODIC INSPECTION CHECK LIST

PROJECT Pachaug Pond Dam DATE 22 May 78
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	Straight, rectangular, unobstructed
General Condition	Fair to good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Unobstructed, appears to be covered with gravel and cobbles.
b. Weir	
General Condition	Good - grouted stone masonry
Rust or Staining	None observed
Spalling	None observed
Any Visible Reinforcing	None observed
Any Seepage or Efflorescence	None observed
Drain Holes	None observed
b'. Training Walls	
General Condition	Grouted stone masonry surface good, some settlement of stones on right training wall observed, none dislodged.
Rust or Staining	None observed
Spalling	None observed
Any Visible Reinforcing	None observed
Any Seepage or Efflorescence	None observed
Drain Holes	None observed but grout is missing in a few locations from which drainage may occur

PERIODIC INSPECTION CHECK LIST

PROJECT Pachaug Pond Dam DATE 22 May 78
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
c. Discharge Channel	
General Condition	Fair
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	Yes
Floor of Channel	Natural streambed
Other Obstructions	Brush and trees

PERIODIC INSPECTION CHECK LIST

PROJECT Pachaug Pond Dam DATE 22 May 1973

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SERVICE BRIDGE</u> a. Super Structure Bearings Anchor Bolts Bridge Seat Longitudinal Members Under Side of Deck Secondary Bracing Deck Drainage System Railings Expansion Joints Paint b. Abutment & Piers General Concition of Concrete Alignment of Abutment Approach to Bridge Concition of Seat & Backwall	N/A

APPENDIX B

1. Listing of Locations for Available Correspondence Data
2. Copies of Past Inspection Reports
3. Plans, Sections, Details

APPENDIX B-1

1. Victor J. Galgowski, Dam Safety Engineer
Department of Environmental Protection
State Office Building
165 Capital Avenue
Hartford, Connecticut 06115
2. Cole Wilde, Chief
Fish and Water Life Unit
Department of Environmental Protection
State Office Building
165 Capital Avenue
Hartford, Connecticut 06115

APPENDIX B-2

1. 9/18/75 - Memo to John Olsen, D.E.P. from
Joseph Piza, D.E.P. - Re:
leak in Pachaug Dam
2. 2/4/75 - Photos
3. 7/12/72 - Inventory data; data sheet
4. 9/30/66 - Inspection by Chandler & Palmer
5. 8/23/65 - Memo to Cole Wilde from Joseph Piza
Re: leaks in dike
6. 8/25/54 - Lake and Pond Survey by Conn. State
Board of Fisheries and Game
7. 10/7/52 - Letter to William Wise from Benjamin
Palmer - Re: Inspection of dams
on Pachaug River
8. (no date)- State Board of Supervision of Dams -
Report and Recommendations on
Pachaug Pond
9. 11/14/45 - Letter to Sanford Wadhams from Lin-
wood Mort - Re: Report on Pachaug
River with enclosures

interdepartment message

STO-200 REV. 11/73 (Stock No. 6938-050-01)

SAVE TIME: Handwritten messages are acceptable.

Use carbon if you really need a copy. If typewritten, ignore faint line:

To	NAME	John Olsen	TITLE	Regional Director	DATE	9/18/75
	AGENCY	D.E.P.	ADDRESS	Region IV		
From	NAME	Joseph Piza	TITLE	Fisheries Biologist	TELEPHONE	376-2513
	AGENCY	D.E.P.	ADDRESS	Region IV		
SUBJECT						
Leak - Pachaug Dam						

On Sept. 18, 1975 while checking the drawdown of Pachaug Pond, Steve Merchant and I observed a small leak in the dam. The leak is just above and to the right of the outlet. While of minor nature at present, it should be checked and possibly repaired if and when the pond is drained down six feet.

Joseph Piza

SAVE TIME: If convenient, handwritten reply to sender on this same sheet.



2/9/75



2/9/75



No dot p (2/9/75)



2/9/75

REGION 4

TOWNSHIP Griswold NAME OF IMPOUNDMENT Pachaug Pond

NEAREST STREET LOCATION Bethel Road

U.S.G.S. QUAD. SHOWING LOCATION OF DAM Jewett City

NAME OF STREAM Pachaug River

POND USED FOR Recreation

TYPE OF SPILLWAY CONSTRUCTION Stone

TYPE OF DIKE CONSTRUCTION Earth

TYPE OF DRAWDOWN CONSTRUCTION Gate valve

OPERABLE: YES x NO EQUIPMENT NEEDED TO OPERATE Gate valve wheel

Obtain key to open gate house at Pachaug Ranger Headquarters, Voluntown

EQUIPMENT LOCATED WHERE Pachaug Ranger Headquarters, Voluntown

KEYS REQUIRED: YES x NO LOCATION OF KEYS: ENTRANCE Pachaug Ranger Headqu

Voluntown CONTROLS

PERSON TO CONTACT John Olsen

TELEPHONE # OFFICE 376-2513 HOME 376-2370

DOWNSTREAM CONDITIONS THAT COULD RESTRAIN OPERATION OF GATES None

POTENTIAL BENEFIT OF LOWERING DURING FLOOD WATCH None

DESCRIBE DAMAGE THAT WOULD RESULT FROM DAM FAILURE Washout dams; Hopeville and Ashland Ponds. Damage Jewett City homes and factories.

7/12/72
jb

No. 14

WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA

IV-9

27 66

Inventoried
By _____

Date _____

Name of Dam or Pond DACHAUG Pond

Code No. 7 147 533 Q 66 PG-66

Nearest Street Location _____

Town GRISWOLD Long 71-55.6

U.S.G.S. Quad. Jewett City Lat 41-34.8

Name of Stream Fachaug River

Owner STATE OF Conn. DEP 02/7/73

Address _____

Pond Used For _____

Dimensions of Pond: Width _____ Length _____ Area 830.97

Total Length of Dam 600 Length of Spillway 140'

Location of Spillway Center

Height of Pond Above Stream Bed 12

Height of Embankment Above Spillway 6'

Type of Spillway Construction Vert Grouted Stone into stilling basin

Type of DiKE Construction Fill

Downstream Conditions _____

Summary of File Data "Good Condition" Palmer Oct 7/52

Remarks Struct at 18 hydro at 116

normal cap 5982 overcap 7977

Would Failure Cause Damage? Probable Class B

5-17-77 son great condition UTL

→ 3/8/73

J.O. Elmen? Dam appears in good cond. Some
growth at joints could be removed

Sluice opening 3.5' x 5' condition of gate
could not be seen as Conc Block House locked
Dike section in good condition

(Back of page 1 (IV-9))

BENJAMIN H. PALMER
SHEPARD B. PALMER

CHANDLER & PALMER
CIVIL ENGINEERS
114-116 THAYER BUILDING
TELEPHONE 887-8640

DAMS
WATER SUPPLIES
SEWERAGE
APPRAISALS
REPORTS
SURVEYS

MEMBERS AMERICAN AND CONNECTICUT SOCIETIES
OF CIVIL ENGINEERS

NORWICH, CONN.

September 30, 1966

Re: Pachaug Pond Dam

State of Connecticut
Board of Fisheries & Game
State Office Building
Hartford, Connecticut

Attention: Mr. Theodore B. Bampton, Director

Dear Sir:-

In connection with the work at Pachaug Pond Dam I report as follows.

Pachaug Pond Dam is located North $41^{\circ} 35'$ and West $71^{\circ} 56'$ as shown on the Jewett City sheet of U. S. Geological survey.

The drainage area is 51 square miles. Using the formula $Q_m = 55A^{0.8}$ then $Q_m = 1276$ c.f.s. This is the average annual flood to be expected. For a flood to be expected once in 100 years this is multiplied by 3.7 for a total flood flow of 4721 c.f.s.

The existing spillway for the dam is 121 feet long and abutment walls are 6' high. A depth of 5' 2" of water over the dam would give ~~4721 c.f.s.~~

The dam is a stone masonry dam in good condition. There are numerous ponds upstream that would tend to slow down a flood flow. This dam has gone through the 1938 and 1955 floods without damage and in my opinion is adequate for any reasonable flow.

The work which we propose to do is the installation of a new gate and will not in any way affect or lessen the spillway capacity.

Very truly yours,

BHP/ew

B H Palmer

RECEIVED

OCT - 3 1966
CONN. BOARD OF
FISHERIES & GAME

DATE

INTERDEPARTMENT MAIL

Apr. 23, 1968

TO	DEPARTMENT
Colo. W. Wilde, Chief, Fish Div.	Fish & Game
FROM	DEPARTMENT
Joseph Piza, Dist. Fishery Biologist	" "
SUBJECT	
Pachaug Pond Dam Leaks In Dike	

While surveying the proposed Pachaug Pond Launching Area I have found at least three large leaks under the dirt dike which have created a swamp under the dike. The leaks are caused by the large number of trees growing on the dike.

The leaks under the dam create a problem as far as the parking area for the launching area is concerned. In order to solve the trouble the trees should be cut and the leaks stopped on the pond side of the dike before we do any filling for the parking area.

CC: Harding Joray

LAKE AND POND SURVEY

Chemistry Mapping
Seining Netting
Growth Curves
Summarization
Recommendations

Inlet streams (take information at point where conditions are average) :

Name	Av. Depth	Av. Width	Temp.	Speed of flow	Diversion possibility	Other ponds present
Pacheco R	16'	30'	72	very slow		yes
Killdeer Cr						yes
Barton Cr						

spawning or forage areas:

Bottom springs: numerous ^{few} absent Other sources

Area under 3 ft. 23.....% over 10 ft. 15.....%

Shoal areas (under 3'): extensive intermediate rare

Bottom type: sand% gravel and rubble% mud%
sand and gravel 52% coarse rubble and boulders% clay%
broken ledge and ledge% swampy ooze 11%

Area in submerged weeds 50 % Species *P. longum*, *Utricularia*, *Ranunculus*

Area in emergent weeds 3.2% Species *Najas* *waterfieldii* *Laure* *et* *al.*

Siltation: negligible moderate large 2000 nearly complete

STATE OF CONNECTICUT



STATE BOARD OF SUPERVISION OF DAMS

ROOM 317, STATE OFFICE BUILDING, HARTFORD

Created by Chapter 290 of the Public Acts of 1939 to supervise dams, dikes, reservoirs and other similar structures. "All such structures, with their appurtenances, without exception and without further definition or enumeration herein, which, by breaking away or otherwise, might endanger life or property, shall be subject to the jurisdiction conferred by this act."

PLEASE REPLY TO

October 7, 1952

RECEIVED

Mr. William S. Wise
Chairman, State Water Commission
State Office Building
Hartford, Connecticut

Dear Sir:-

At your request I have within the past week examined several dams on the Pachaug River and report as follows:

(5) Beach Pond

This dam is also in the Town of Voluntown on the Pachaug River about 1/2 mile North of Route #165. This is a long earth dam about 400 feet long and 15 feet high. The spillway is 20 feet wide with 4 1/2 foot abutments. This pond is used for storage only and there is no power installation. The pond was down about 4 feet from full pond when I was there. Water is drawn off through a gate as required. Here again the dam and spillway appeared in good condition.

The footbridge over the spillway is made of wood, is in poor condition and needs to be replaced. The flashboards are in poor shape. I could not see much of the gate but I believe it to be in fair condition.

As a concluding statement I would say that in general the masonry and embankments of all dams are in good condition and will require little maintenance. The small amount of timber, such as gates, bridges, flashboards etc. should in general be renewed fairly soon.

I hope that this report will be of help to you.

Very truly yours,

Benjamin H. Palmer

Member, State Board of Supervision of Dams

STATE BOARD OF SUPERVISION OF LANDS
CONNECTICUT

714.753.3 & 616/46.6

1. Name: Pachaug Dam--Built about 1808
2. Owner: United Merchants & Manufacturers
Ashland Plant--Jewett City, Conn.
3. Town: Griswold
4. Stream: Pachaug River
5. Pond: Pachaug Pond
6. Location: 1 Mile South of Route 138--Jewett City
to Voluntown.
7. Watershed and Drainage Area: 49.5
8. Size of Pond: 750
9. Type of Construction: Wet rubble masonry
Ashlar stone and Earth Dam--Stone Spillway
Concrete race, gates, wash basin
10. Freeboard: 8'
11. Overall Length: (Height above Stream) 600'
12. Length of Spillway: 100'
13. Height of Spillway: 15'
14. Height of Non-Overflow Section: 22'
15. Depth of Spillway: 8'
16. Type of Gate:
17. Size of Gate:
18. Draw off Pipe: None
19. Flashboards: None
20. Max. Discharge sec. ft.: 2376 ~~from general~~
21. Spillway Capacity C.F.S.: 3800
22. Gate Capacity sec. ft.:
23. Draw off Pipe Capacity sec. ft.:
24. Max. Discharge C.F.S./s . ft.: 48

PACHAUG DAM

This dam was built about 1868 by the Ashland Cotton Company to create Pachaug Pond as a storage reservoir to insure a reserve supply for Hopeville Pond further downstream at the Dam of which a power plant is located. The Ashland Cotton company was purchased about 1925 by United Merchants & Manufacturers of New York, becoming a subsidiary of said company and known as the Ashland Corporation. The ownership of the dam and flowage and riparian rights are now vested in the present owners. The stone spillway and earth fill sections of the dam are of gravity type and stable in section and at the time of inspection in August revealed no leaks. However, the pond was low with no water flowing over the spillway and the static head was comparatively small.

This is a long dam; the earth section on the east measuring 300' and that on the west measuring 300'. To some extent they have been protected with stone paving to prevent erosion. A considerable growth of trees has been allowed to grow on the earth sections, some of particularly large size on the east end. I look upon this as undesirable as they are a source of potential trouble and can weaken the earthwork.

The storage capacity of this pond is great and acts in a manner to spread out and minimize severe floods, and helps to protect downstream works.

The spillway capacity is adequate for peak flows and allows a good safety margin.

Inspection revealed that sometime within the last couple of years, a new concrete gate canal, gates, gate house, spiral concrete gate tail sluice, abutment repairs, and repointing have taken place. This work was done without the knowledge of the Board.

This dam is the most important cog in the control of floods in the Pachaug River basin and therefore its safety is most important to all downstream structures. U.S. Route 178 crosses the Pachaug River about $\frac{1}{4}$ of a mile downstream and the area below becomes more and more heavily settled until the confluence with the main-hung in the heavily settled Borough of Jenett City. If this dam should go out, the large body of water impounded by it which is one of the largest in the state, could cause a major catastrophe. It seems important that all data relating to this structure be on file in the office of the Board.

PACIFIC DAM
(2)

RECOMMENDATION

That the Chairman of the Board write to the United Merchants & Manufacturers Corporation, Ashland Plant, Jewett City, Conn. to the following effect. That an inspection of this dam reveals that construction and repair work has been done on the gates, spillway, and appurtenances without the approval of the Board of Supervision of Dams or in accordance with State law governing work on such structures. (Enclose Copy of Booklet containing Act and explanatory data).

That it is assumed that though this work may have been prosecuted in ignorance of the law, the Board desires full information as to the nature and type of work accomplished, together with engineering data and sketches for review so that the Board may pass upon the safety of said construction.

Further, it is the opinion of the Board that the growth of trees on the earth sections of the dam embankment constitute a possible hazard to the safety of said embankment and earth fill and the owner is hereby ordered to remove same.

It is suggested that, if the owner so desires, a member of the Board be made available to go over the site with the owners representative and indicate the growth considered objectionable.

LOCATION REFERENCE & KEY TABLE

1. BEACH POND DAM
2. LYBONS DAM
3. FORGE POND DAM
- 3A. COLLINS POND DAM
4. BEACONDALE DAM
5. YELLOW HILL DAM
6. SAKHILL POND DAM
7. SHELDON'S POND DAM
8. STONE HILL DAM
9. GLASCO DAM
10. PICHASCO DAM
11. HOPLVILLE DAM
12. ASHLAND DAM
13. SLATER DAM



STATE BOARD OF SUPERVISION OF DAMS

ROOM 317, STATE OFFICE BUILDING, HARTFORD

Created by Chapter 290 of the Public Acts of 1939 to supervise dams, dikes, reservoirs and other similar structures. "All such structures, with their appurtenances, without exception and without further definition or enumeration herein, which, by breaking away or otherwise, might endanger life or property, shall be subject to the jurisdiction conferred by this act."

PLEASE REPLY TO

November 14, 1945

General Sanford H. Wadhams, Chairman
State Board of Supervision of Dams
Room 317, State Office Building
Hartford, Connecticut

Dear General Wadhams:

Under date of January 13, 1944, you wrote me concerning two dams owned by the Glasgo Finishing Company, which were repaired by them without any reference to the board and asked that I investigate the matter. Subsequently, I proceeded to do this, inspected the sites, and held a conference with Mr. Revell, superintendent of the Glasgo Finishing Company.

My investigation revealed that there were not only two dams they had repaired, but also others that they had reconstructed, one of which, located at Collings Pond, had been entirely rebuilt. In tracing down the dams controlled by the Glasgo Finishing Company, I discovered other dams on the Pachaug River which had been repaired by owners other than the Glasgo Company, the character of which would bring them under our jurisdiction. In order to properly study the Glasgo dams, it would be necessary to take these other dams into consideration. After consultation with another member of the Board, Clarence Blair, who was familiar with the territory, and has since passed away, we decided that the best method of approach would be to make a complete analysis of the Pachaug River watershed, examining all dams on the Pachaug River together with the one at Collings Pond on Denison Brook. I consequently made such recommendation to you and with your approval, have proceeded with same.

The Pachaug River rises at Beach Pond, located in the towns of Voluntown, Conn. and Exeter, R.I., and flows thence in a Westerly direction through Voluntown and Griswold, Conn. until its confluence with the Quinebaug River just below Jewett

RECEIVED
NOV 20 1945
STATE WATER COMMISSION

Mr. Wadhams
Mr. Blair
Mr. Revell
Mr. [illegible]
Mr. [illegible]

S.H.W./2/Nov. 14, 1945

City and a slight distance downstream from the large Concrete highway bridge on Route 12 across the Quinebaug River.

The situation along the valley of the Pachaug, with its numerous crossing highways, farms, and villages, and the danger to life and limb, and public and private property, should one of the larger of these dams go out, or the danger of progressive failure should one of the larger upstream impounding dams go out, is such as to bring all dams on this stream under the jurisdiction of the board.

You will find enclosed a report divided into several parts as follows:

1. Geological survey maps on which is shown the Pachaug River and tributary streams and on which I have indicated the location of dams by Key number and an outline of the Watershed of each specific contributing area.
2. Hydrologic discussion of the Pachaug River Watershed in general.
3. Key to dams.
4. Descriptive data, discussion, and conclusions concerning individual dams by key.
5. Recommendations.
6. Summation.

Notes, detailed analyses, and calculations are on file in my office and are available for reference when desired by your office or by members of the Board of Supervision of Dams.

As of this writing--detailed data and plans covering the construction of new gates at Glasgo Dam have not been received from F.V. Steutemann, Chief Engineer of the Glasgo Co. Same has been promised and I am again writing to Mr. Steutemann to remind him that we are still waiting for this information.

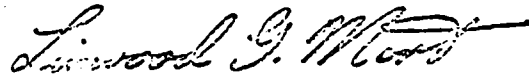
I am sending this report on to you, however, without a full report on this one dam, but as soon as final plans are received, I will correlate and forward them to you so that your file will be complete.

Two dams on the Pachaug River, located lowest downstream and nearest the mouth of the river, have not been inspected or treated in this report.

S.H.W./3/Nov. 14, 1945

The first of these, Ashland Dam, lies next in line downstream from Hopeville Dam and is in the center of the borough of Jewett City. I understand that some work was done around this structure a while back. The second of these, Slater Dam, lies just above the highway bridge on Route 138 over the Pachaug at the lower end of the borough. I understand that its condition is good. The Highway Department has just let a contract for the construction of a new 100' span bridge to replace the old at this site. Both Ashland and Slater are large dams and though inspection of them is not urgent nor not perhaps as necessary as in the case of the other Pachaug Dams, it is suggested that they be looked over a little later when construction of the new bridge at Slater Dam is started to ascertain whether in any way the dam will be disturbed or affected.

Very truly yours,



Linwood G. Mort
Member, State Board of Supervision
of Dams.

LGM:JS
Enc.

STATE BOARD OF CONSERVATION OF DAMS
CONNECTICUT

SUMMATION

From the data and information in this report and reference to the keyed Geological Survey map, one obtains a picture of typical New England use of water for power and processing. For almost a century prior to 1900, this river was dotted with small dams to give water power for small home owned industries. As the general industrial trend toward centralization of manufacturing facilities developed in the first three decades of this century, many of these small plants were abandoned and their dams and appurtenances allowed to fall into disrepair. Some were swept away never to be rebuilt again. Others were weakened by the ravages of time and maintenance allowed to lapse.

With the advent of modern truck transportation in the 1920's, manufacturers reversed their previous trend and began to decentralize some of their plants as the trucks made economical hauling of finished goods possible.

Such was the case of the Glasco Finishing Company who came into the Pachaug River area and bought up a number of old dams and mills because of the clean available water. They have expanded constantly, have spread employment, and are endeavoring to place their dams in first class condition.

It is unfortunate that the Glasco Company did not employ an engineer well versed in dam construction instead of endeavoring to design themselves. If they had done so, much needless expense to them would have been saved and their work would have been better suited to conditions.

The same thing appears to be true of other owners such as Sundholm, Gordon Brothers, Ace Woolen Company, and the Ashland Corporation.

We assume that these owners to a large extent proceeded in ignorance of the State Law governing construction of dams.

The Board, in the case of much of the work done on the Pachaug River, is faced with a fait accompli; and therefore I have, under the circumstances, not felt that we should issue certificates for these dams when we are not familiar with all details of construction. The single exception to this is the Glasco Dam, with which we are quite familiar. I shall issue the necessary certificate for this when the plans of the completed work are received.

STATE BOARD OF SUPERVISION OF DAMS
CONNECTICUT

SUMMATION

(2)

I believe that when all steps as recommended in each individual dam case have been taken, we may adjudge the situation on the Pachaug River as under control and in safe condition.

HYDROLOGIC DISCUSSION

The Pachaug River rises on the Eastern Connecticut, Rhode Island border at Beach Pond in heavily wooded, hilly country. Characteristic of the rugged topography is an average slope pitch around the headwaters of 50' in a thousand. Even with this heavy wooded growth, run-off is comparatively rapid and a coefficient of .20 has been assumed. The elevation of Beach Pond is 296, Geologic survey datum and is source of the Pachaug.

The elevation at the mouth, confluence with the Quinebaug at Jewett City, is 100, Geologic Survey datum. Thus through its meandering course of 14 miles, it shows a drop of almost 200'.

Geologic strata is mostly granite and gneiss overlaid with glacial moraines of gravel and boulders with some interweaving clay deposits.

From Colonial and Revolutionary days, dams have been built at various points along the river to provide power for grist and sawmills, for a foundry, and for various textile manufacturing processes. The present Glasco dam is built on the foundations of an original dam constructed by a negro by the name of Glasco (for whom the village is named) and iron was smelted from Bog Ore for the manufacture of Harpoons which were famous throughout the old Whaling industry.

In the past century, several severe floods have caused considerable damage mainly through the breaking of one or more of the upper dams. Since 1860 there have been two disastrous floods caused by the breaking of dams. One, in 1868, when several of the upper dams went out causing what was then called the Jewett City dam to go out and cause considerable property damage. The other took place in the spring freshet of 1888 when Slater Dam went out with attendant damage. For the past fifty years and since the construction of Pachaug Dam, a series of storage ponds and reservoirs assist in breaking peak flows and averaging them out. If it were not for this storage factor, the spillway capacity of several of the dams would be much too small to take flash floods.

On only two occasions since reliable rain-gauge recordings were made in this watershed has the rainfall exceeded 4". Computations after thorough check of records and stream flow have been based on a 4" rainfall.

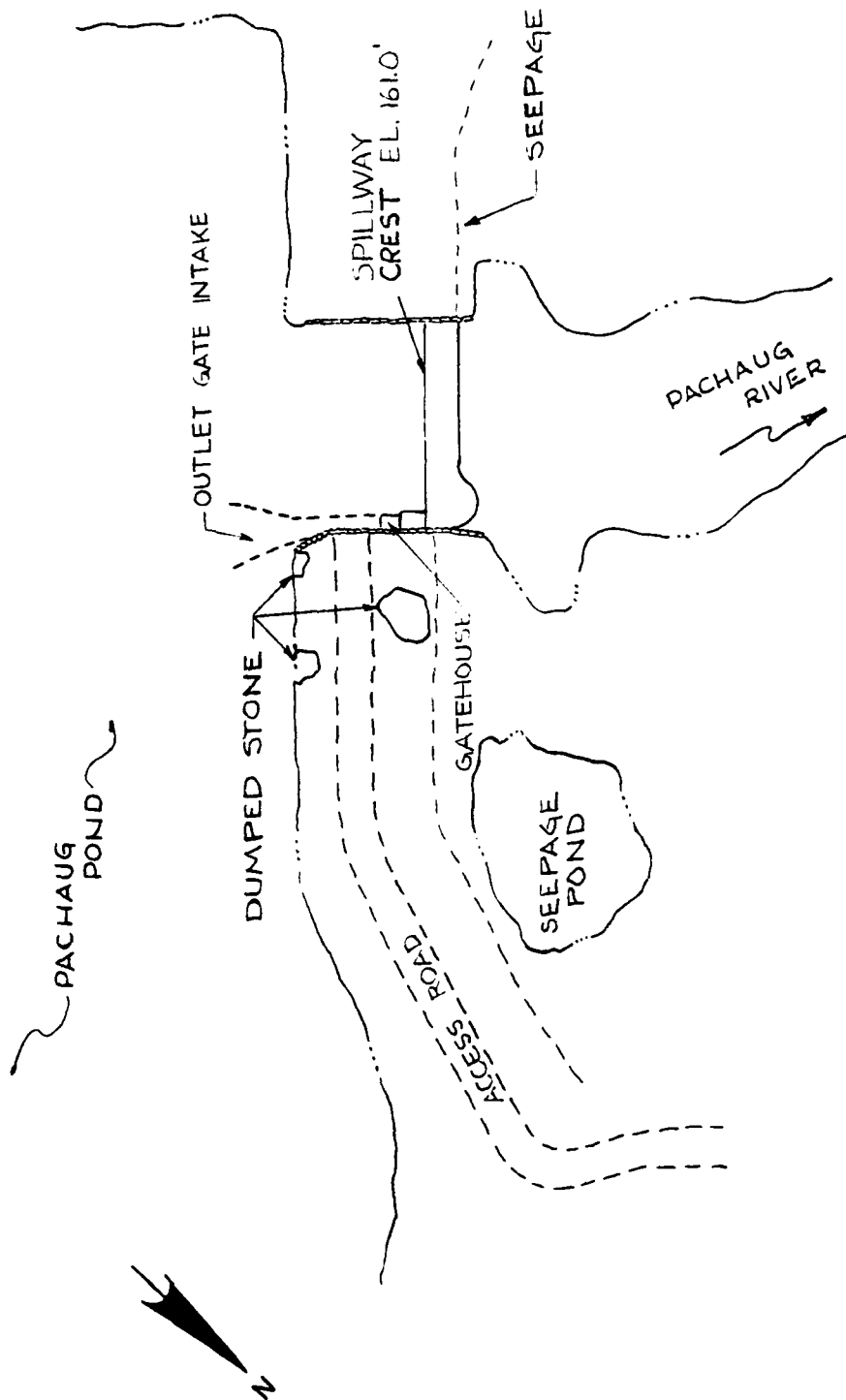
The greatest flow on record occurred on September 21, 1938, at the time of the Hurricane.

HYDROLOGIC DISCUSSION

(3)

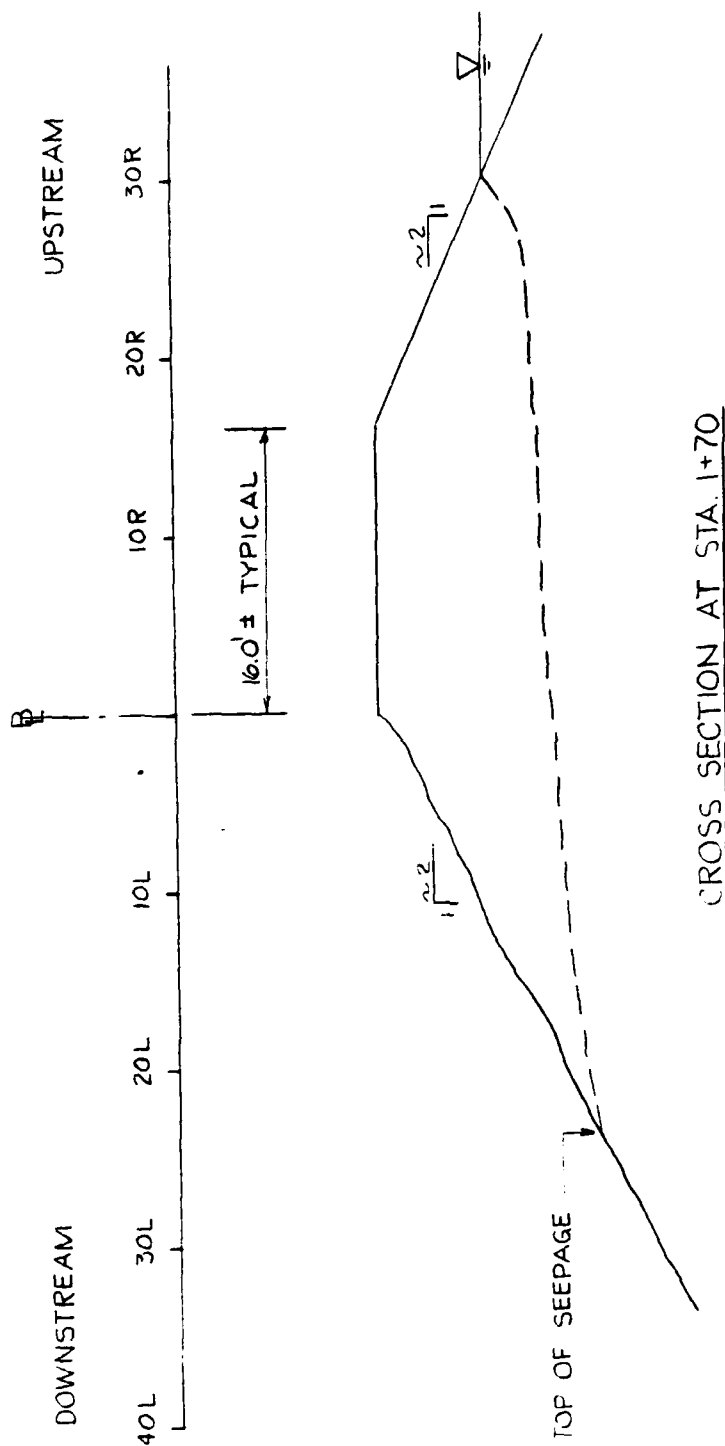
The U.S. Geological Survey gauged the flow over Slater dam, (last dam before confluence with Quinebaug) at 2240 sec. ft.. The watershed area above this dam is 59 square miles which corresponds to a flow of 28 sec.ft./sq.mi. at that time. This record flow took place at a time when all ponds were full and spillways taking near maximum capacity because of the several days heavy rain which preceded the flood and hurricane.

The safety of this chain of 13 dams is particularly interdependent. The failure of almost any one could possibly lead to the overtopping and failure of all lying below it on the stream. It is, therefore, imperative that they all be kept in excellent repair.



PLAN
SCALE: 1" = 100' ±

PACHAUG POND DAM



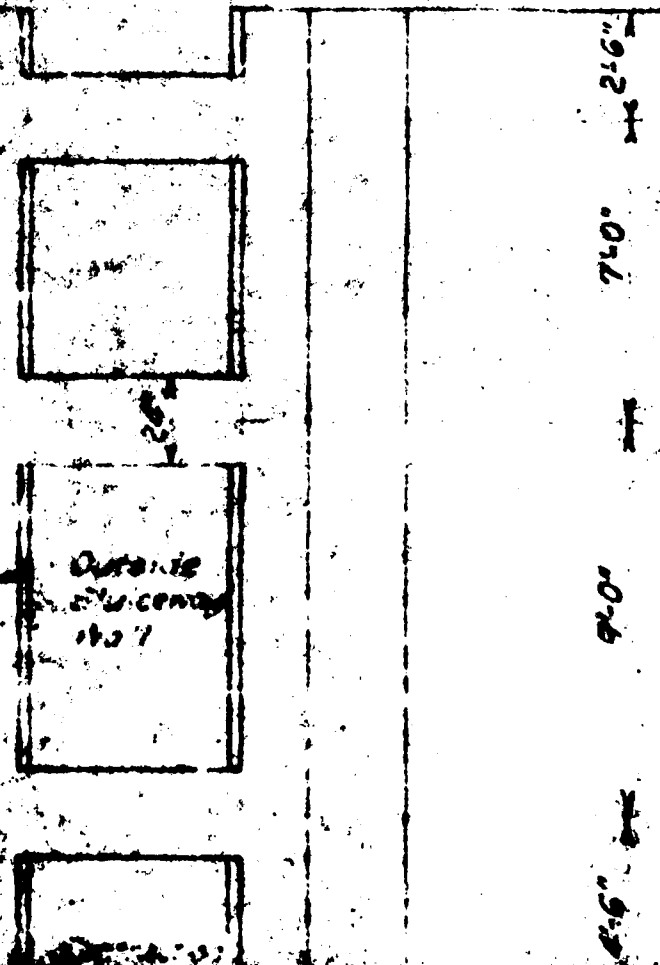
NOTE: STA. 0+00 LOCATED AT FACE OF
RIGHT SPILLWAY TRAINING WALL

Note
All dimensions subject to slight
variations according to field
conditions.

A → B

2'-6"

10'-0"



Outside
entrance
100'

2'-6"

7'-0"

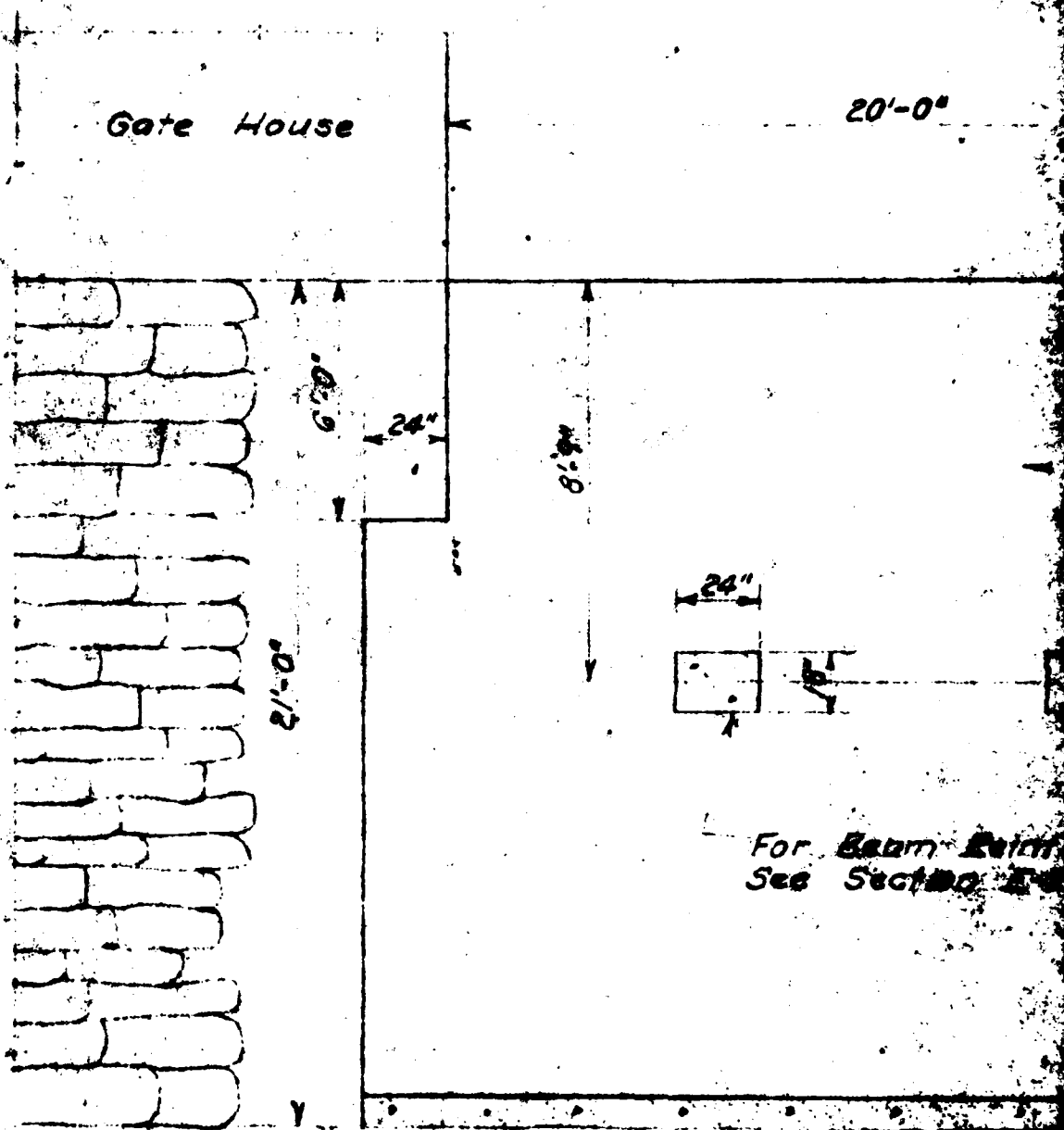
9'-0"

2'-6"

23'-0"



2



Sand & Gravel

23'-0"

3

20'-0"

23'-0"

$\frac{5}{8}" \phi @ 12" c.c.$ Both Faces Typical
for Inside and Outside Sluice-
Way Walls

Beam Reinforcement
Section E-E

$\frac{5}{8}" \phi @ 6" c.c.$ Typical
at all Beams

Contraction Joint

$\frac{5}{8}" \phi @ 12" c.c.$

Groove

$\frac{5}{8}" \phi @ 10" c.c.$

SECTION A-A

Scale: $\frac{1}{4}" = 1'-0"$

Gate House

20'-0"



2'-0"



Inside Wall

$\frac{3}{8}" \phi @ 12" c.c.$

18"

E

1" Pocket

2" Pocket

$\frac{3}{8}" \phi @ 5" c.c.$

$\frac{3}{8}" \phi @ 12" c.c.$

$\frac{3}{8}" \phi @ 6" c.c.$

E

$\frac{3}{8}" \phi @ 20" c.c.$

Hand

5



SECTION E-E

Scale: $\frac{1}{2}'' = 1'-0''$

Wall

18" c.c.

18"

18" Pocket

5" c.c.

18" c.c.

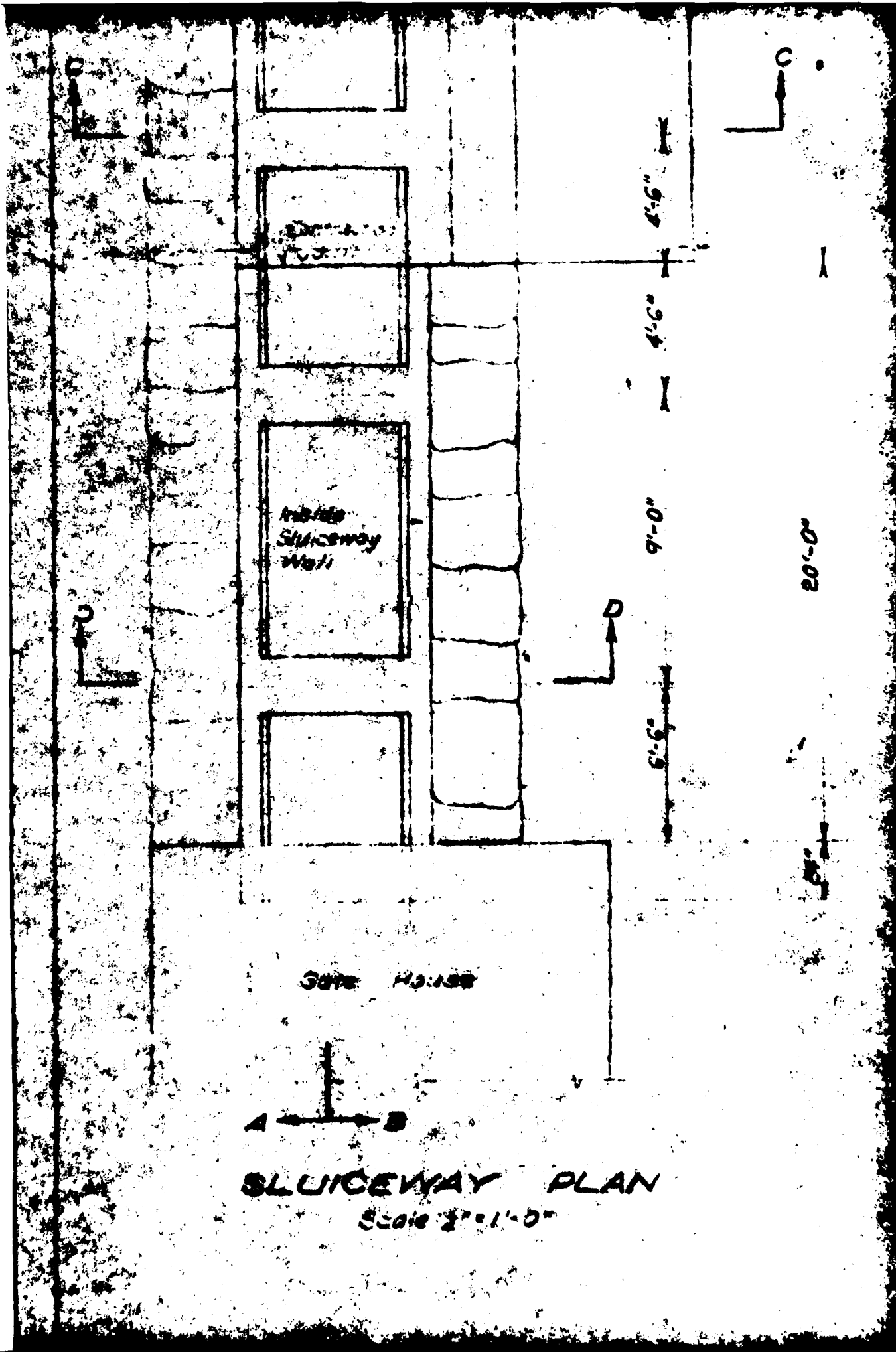
6" c.c.

5" ϕ @ 18" c.c.

5" Clear

20" c.c.

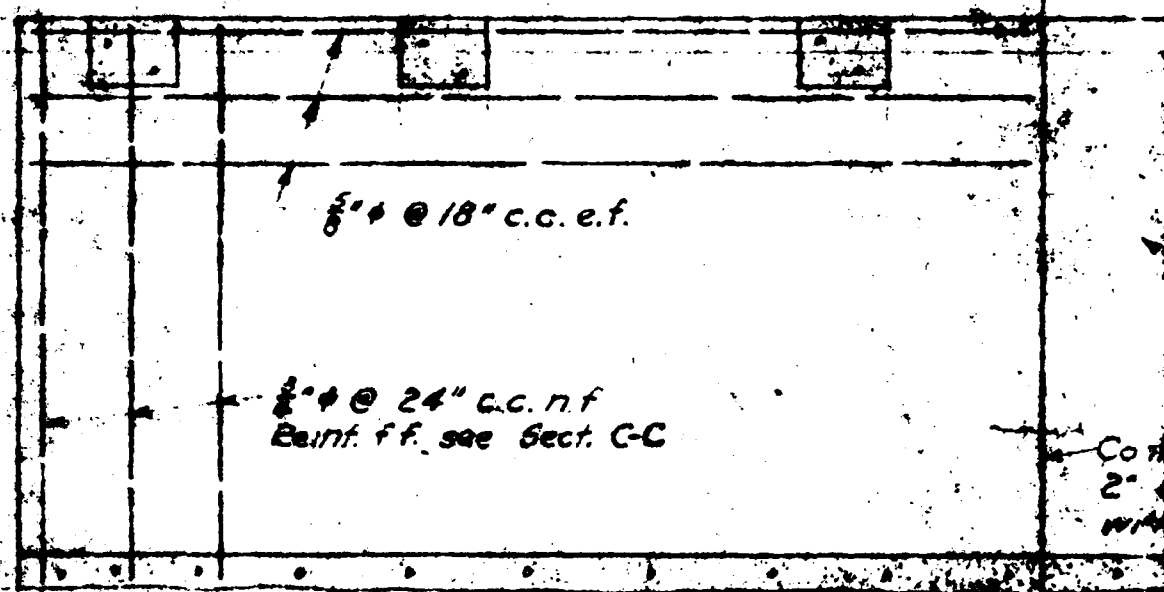
11'-6"



7

23'-0"

2'



Sand & Gravel

SECT
See



For Outside Wall Reinf. Details
See Sections A-A & C-C

For Strut
Reinf. See
Sects. C-C
and E-E

For Inside Wall Reinf.
See Sects. A-A & B-B



8

Gore House

20'-0"

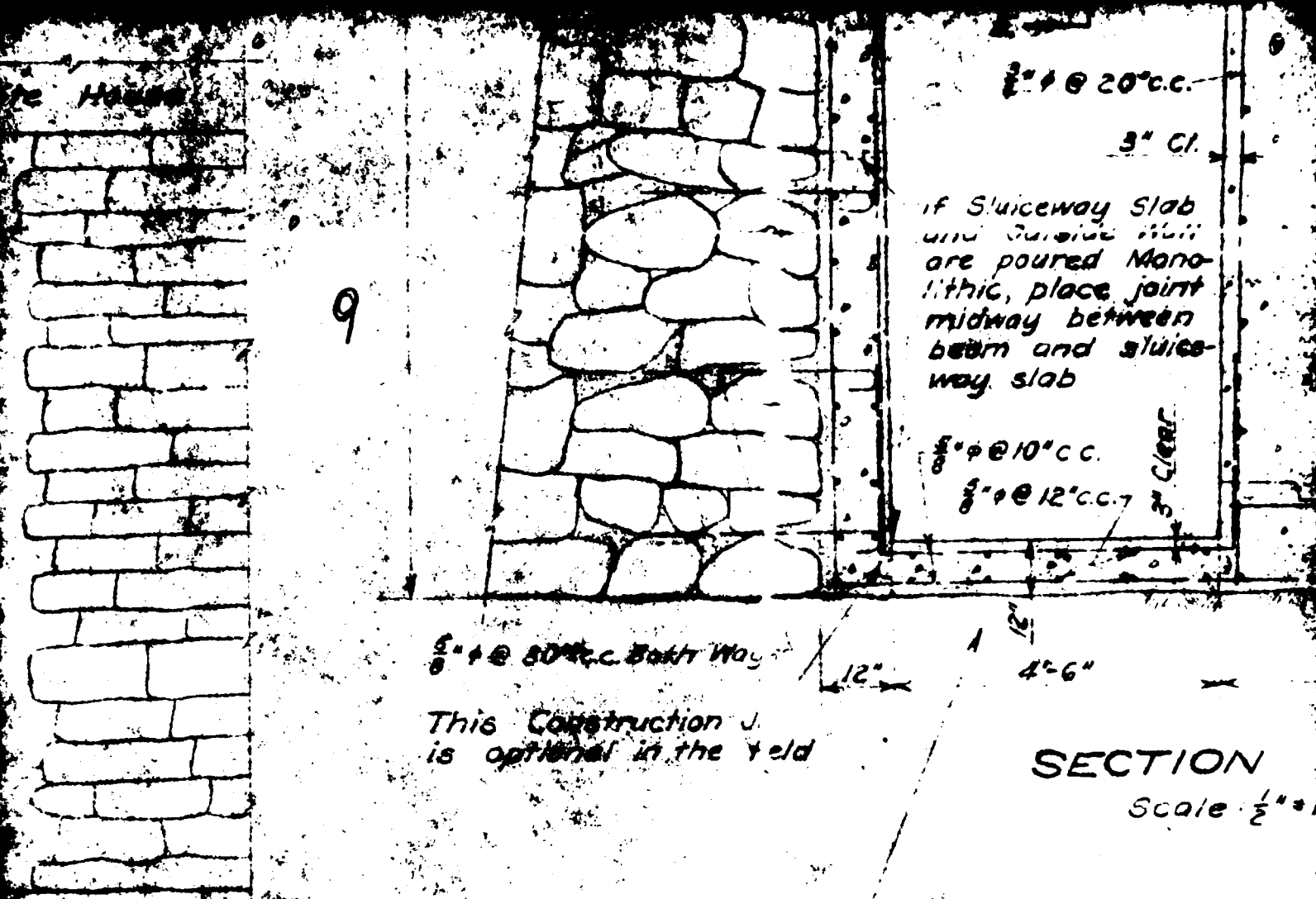
For Reinf. See Section A-A
and Section C-C

Contraction Joint
2" x 8" Key coated
with Asphalt Mastic

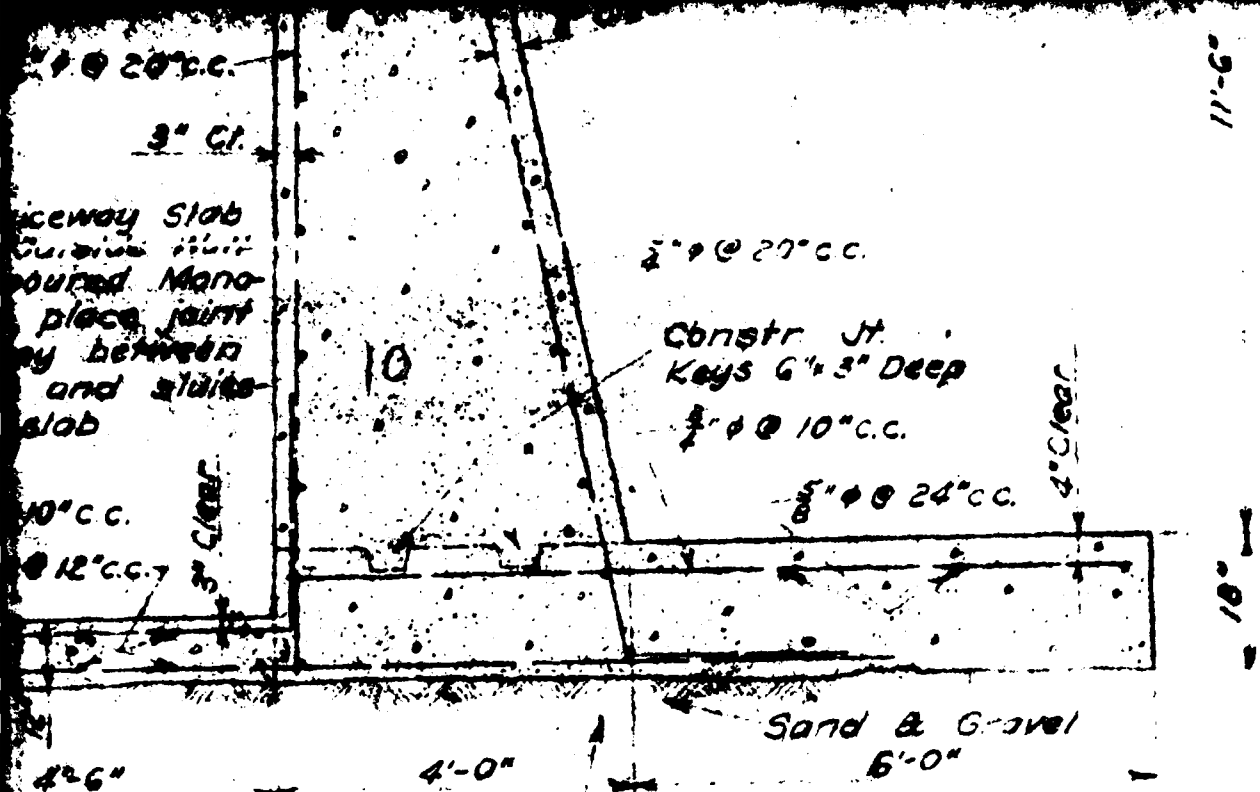
SECTION B-B

See 1/2" x 1'-0"

Before pouring floor
wall bentonite clay
be thoroughly worked
depth of about 8" to
bank-run sand and gr
prepared foundation b



pouring floor slab and base of retaining
 concrete clay (K W K Volclay No. 344) is to
 be roughly worked into the foundation to
 a depth of about 8" to 10" and tamped. About 2" depth
 of sand and gravel will be placed over the
 foundation before placing concrete.

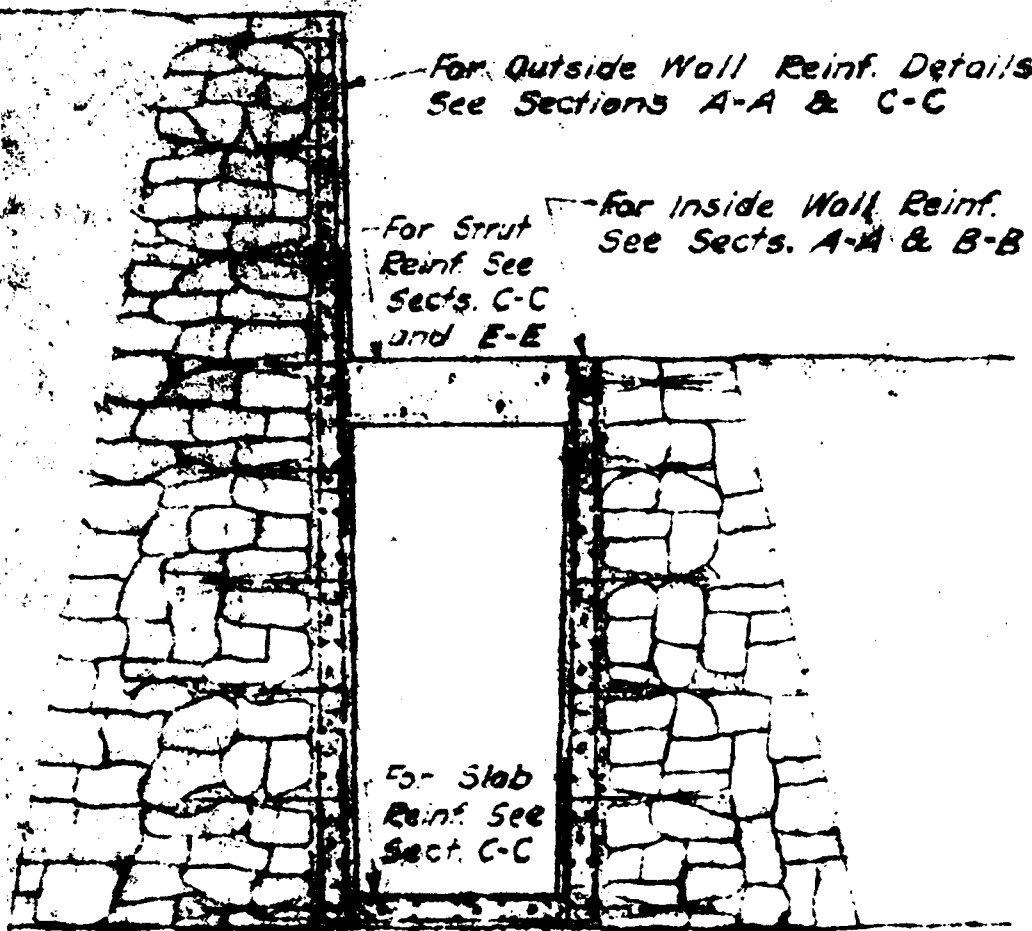


SECTION C-C
Scale: $\frac{1}{2}'' = 1'-0''$

OUTLET WORKS DETAILS
RECONDITIONING
PACHAUG STORAGE DAM
JEWETT CITY, CONN.

Sand & Gravel

SEC
50



SECTION D-D

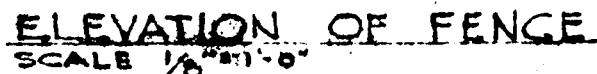
Scale $\frac{1}{2}" = 1'-0"$

12

Before pouring floor slab and base of retaining wall bentonite clay (K W K Volclay No. 344) is to be thoroughly worked into the foundation to a depth of about 6" to 10" and tamped. About 2" depth bank-run sand and gravel will be placed over the prepared foundation before placing concrete.

OUTLET WORKS DETAILS
 RECONDITIONING
 PACHAUG STORAGE DAM
 JEWETT CITY, CONN.
 UNITED MERCHANTS & MFRS.
 MANAGEMENT CORP. - ENGINEERS

AMBURSEN DAM COMPANY		
NEW YORK	ENGINEER-CONSTRUCTORS	SAN FRANCISCO
DATE E.A. 5-15-44	REVISED E.A. 5-25-44	SHEET NUMBER 4403
CHECKED E.H.B. 5-17-44	SCALE AS SHOWN	SHEET COUNT 1



SCALE 32-1-0

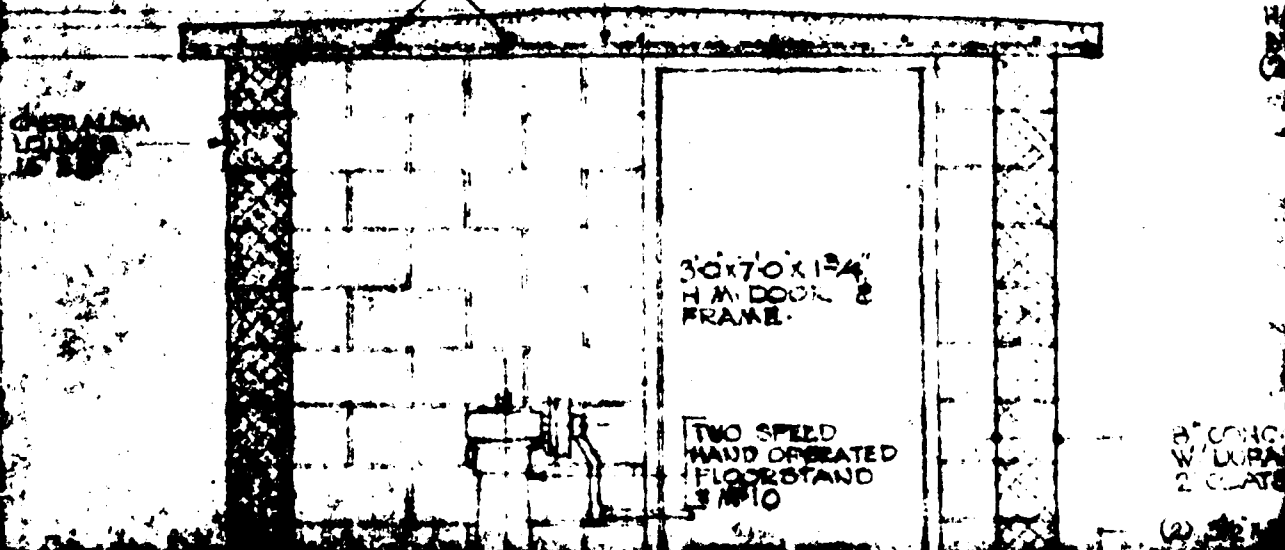
#4 REINFORCING RODS @ O.C.

4*3. TEMP. RODS 1-6 OC.

2"x2"x 1/4" L FRAME
TOP OF EXIST. WALL
ELEV. 42.30' -

1 1/2" ST. FLAT
ALL WELDED TO

WELDED TO



2

3'-0" WIDE
GATE

2" LD
BLD POST

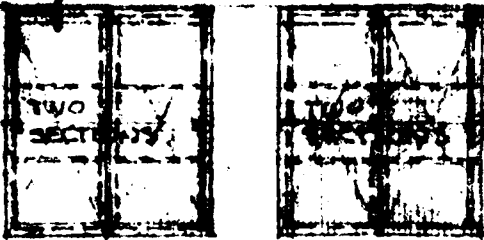
20'-0" ±

11'-0" ±

TOP OF STONE WALL

ENCE

C



2'-4" 2'-4" 2'-4" 2'-4"

C

5'-0"

1 1/2" ST FLAT BARS SPACED 1" O.C.
ALL WELDED TO Z FRAME

1/4" X 1 1/2" ST FLAT BARS
WELDED TO SLATS

DRILL 1" Z WITH SLOTTED
HOLE & WELD 3/8" Ø
BENT ST. PIN TO FRAME
(2 PER GATE SECTION)

SECTION "C-C"

SCALE 3/4" = 1'-0"

1" X 4" X 3/4" Z SUPPORT
DRILL 2 DOWEL INTO
EXIST SLICeway WALL
6" DEEP & 2'-4" O.C.

REINFORCED
#4 REINFORC
#3 TEMPERA

(2) 3/4" X 3/2" X 9/16" Z

LIE CAST ALUM. COVER
16" W X 6" H
W/INSECT SCREEN

8" CONC BLOCK WALLS
W/DUPRA WALL JOINT REINFORCING
2 COATS OF MASONRY PAINT

FLOOR STAND

3

CLEAR BRUSH & TREES TO
WATER'S EDGE.
SAV TREES CLOSE TO GROUND

10'0" WIDTH AT TOP OF DAM

CLEAR BRUSH & TREES
TO BOTTOM OF SLOPE.
SAV TREES CLOSE TO
GROUND

APPROX. CENTER LINE
OF EARTH DAM

GRAIN LINE
6'-0" HIGH

183'-0"

EXIST. AUXILIARY

REMOVE EXIST. STONE
SLAB 10'-6" X 2'-0" X 1'-0"

REINFORCED CONC. ROOF
#4 REINFORCING RODS 8" O.C.
#3 TEMPERATURE RODS 16" O.C.

LOUVER
SCREEN

ANCHOR
30" O.C.

3" X 3 1/2" X 3/8" L
(WELDED)

1/2" X 3/4" PLAT ONE ST. SLATS 1" O.C.
DRILL THRU FOR
3/8" ROD & WELD EACH SLAT

2 1/2" X 3" X 5/8" L (WELDED)

DETAIL AT GRATING
SCALE 1/4" = 1'-0"

4

TO SEWER

CHAIN LINK FENCE
6'-0" HIGH

2'-4"

SEE PLAN FOR GRATINGS
OVER EXISTING SLUICWAY
OPENINGS

30° 12'

EXIST. AUXILIARY GATE

EXIST. SLUICWAY WALL

SLUICWAY INVERT
ELEV. 23.7' ±

EXIST. CONC. BEAMS AT
SLUICWAY

OVE. EXIST. STONE
10'-6" x 2'-0" x 1'-0"

TOP OF WALL
ELEV. 42.30'

YACHANG POND

NEW
GATE HOUSE
FIN. FL. ELEV. 50.5'

2'-4"

FILL OPENING FOR EXIST.
SLUICE GATE w/ CONC.

OLD GATE HOUSE
SLUICE GATE &
OTHER SUPERSTRUCTURE
INCLUDING GAS ENGINE
TO BE REMOVED

CHAIN LINK
GATE
5'-0" WIDE

CHAIN LINK FENCE
6'-0" HIGH

SPILLWAY ELEVATION

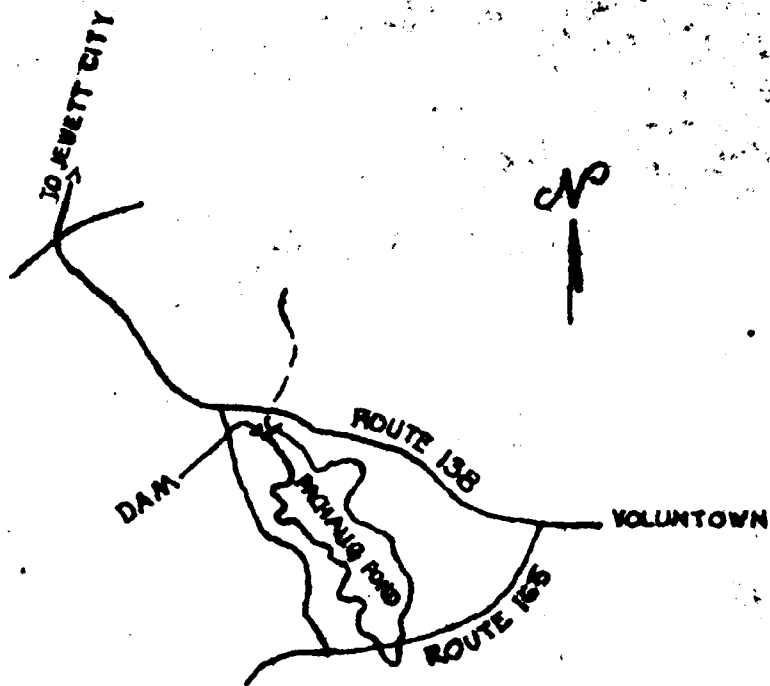
50.05' x 44.05'

B.M.
500

OUTFALL INVERT
ELEV. 29.0' ±

WALL
12'

PAGE
SPILL



KEY PLAN

FIG. 1000

WALL TO WALL
121'-0"

FACE OF EXIST.
OF BLVD

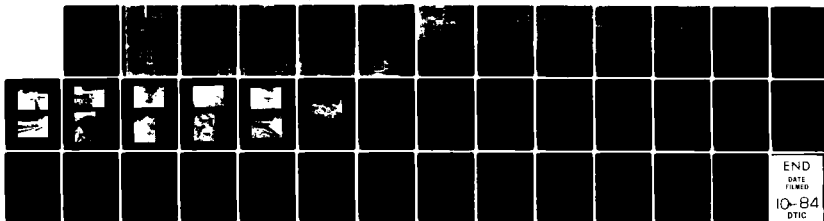
AD-A144 976

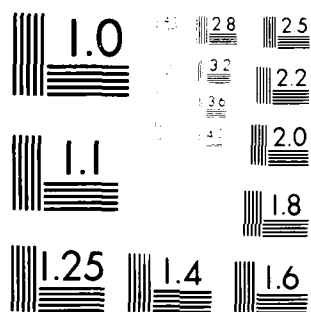
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
PACHAUG POND DAM (CT.) (U) CORPS OF ENGINEERS WALTHAM MA
NEW ENGLAND DIV SEP 78

212

UNCLASSIFIED

F/G 13/13 NL





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

TWO SPEED
HAND OPERATED
FLOOR STAND
#10

ANCHOR BOLTS
TO SUIT

DECK SILL
#3 SILL 10 8 24

REINFORCED SLAB
#4 REINFORCED 6" OC
#3 TIE RODS 17" OC

FACE OF EXIST.
STONE FOUNDATION
FOR OLD STRUCTURE
PIL TO BE REMOVED

5'-10"

STEM GUIDE
PROVIDE ANCHOR BOLTS
AS REQUIRED

24" THICK

#4 RODS 6" OC
BOTH SIDES

#5 RODS 6" OC
BOTH SIDES

#4 RODS
FLAT TOP

#5 RODS
OVER OPENING

24" STEM

RECTANG
W/ FLAT
RISING

8" CONC BLOCK WALLS
W/ DURA WALL JOINT REINFORCING
2 COATS OF MASONRY PAINT

(2) 3/2" x 2 1/2" x 5/8" L

DIE CAST ALUM LOUVER

16" V. X 8" H

W/ INSECT SCREEN

FINISHED FLOOR

ELEV. 50'-0"

TOP OF FOUNDATION EL. 50'-0"

GRATING 2'-8" x 5'-0"

2 SECTIONS

(SEE DETAIL)

3/4" BENT REINF. ROD

LADDER RUNGS

7'-4" O.C. VERTICALLY

#8 HORIZONTAL REINFORCING RODS
SPACED 2'-0" O.C.

#4 VERTICAL REINFORCING RODS
FULL HEIGHT OF WALL 8'-0"

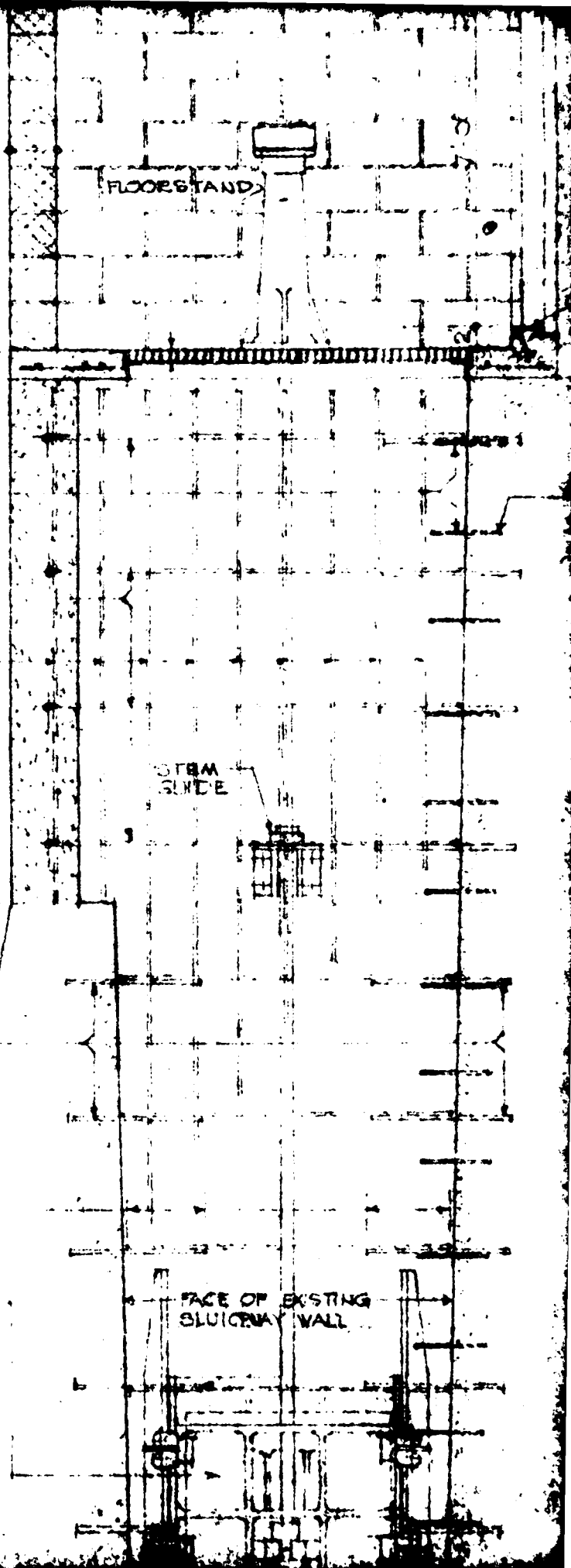
TOP OF BEAM
ELEV. 42'-0"

EXIST. REINF. CONC.
BEAM 2'-0" x 1'-6"

DRILL EXIST. WALLS OF SLUICeway FOR
#6 DOWEL RODS 2'-0" O.C.,
3" INTO EXIST. SLUICeway WALL

LAP REINFORCING RODS &
DOWELS 24 DIAMETERS

TRIANGULAR SLUICE GATE 36" V. x 48" H
PLAT FRAME & ADJUSTABLE SIDE WEDGES.
HINGED STEM TYPE. BEATING PRESSURE



2 1/2" x 5/8" L (WEIDED)

B.A.
500

DETAIL AT GRATING

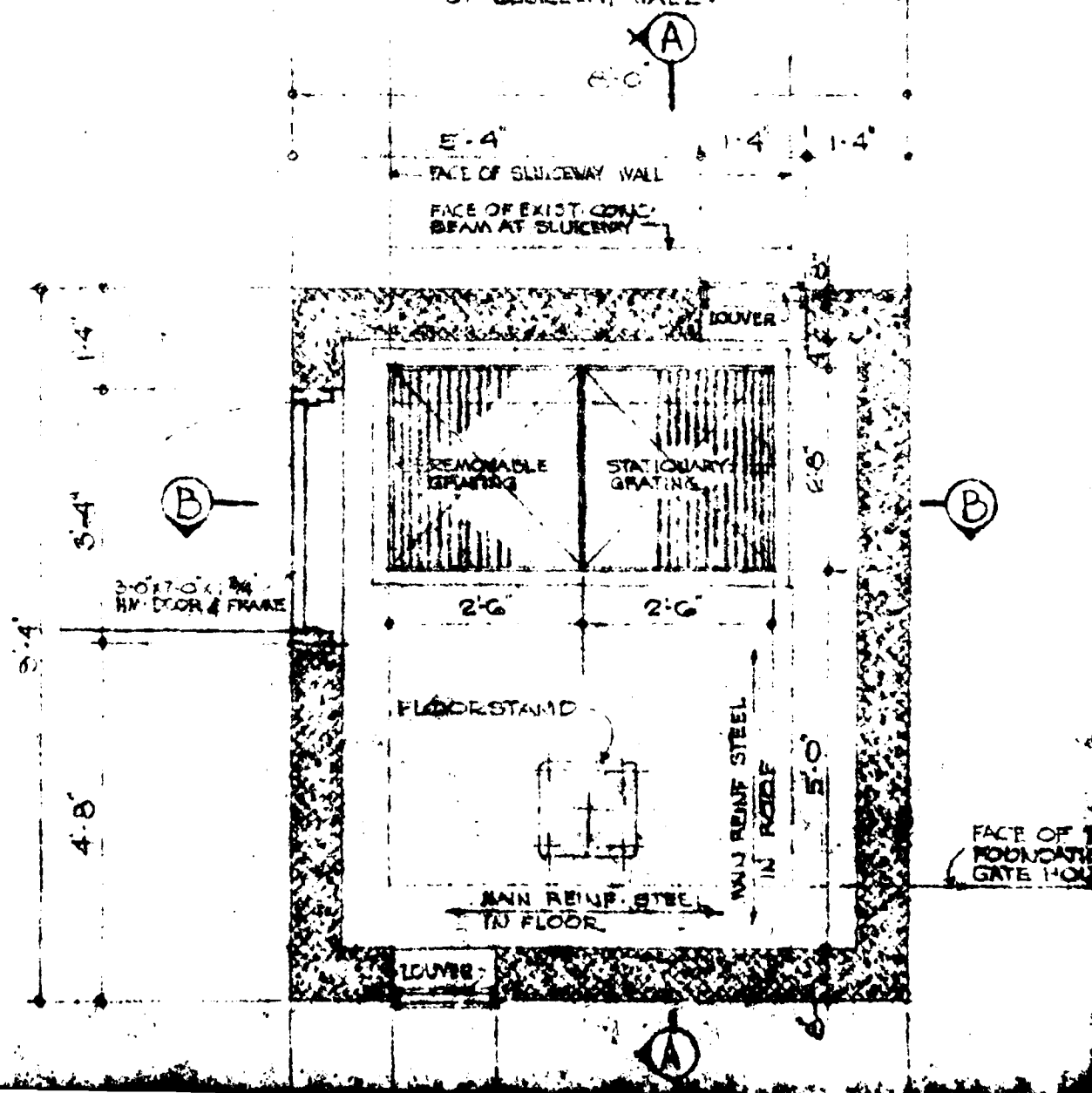
SCALE 1/2" = 1'-0"

DOOR SILL
6" ST. I.C. @ 8.2"
ANCHORED TO CONC

9
DRILL 2" INTO EXIST. WALL
FOR LADDER RINGS &
GROUT TIGHT

NOTE

GATE HOUSE TO BE LOCATED
WITH FACE OF BLOCKWORK
FLUSH WITH OUTSIDE FACE
OF SLUICeway WALL.



FACE OF EXIST.
SPILLWAY

B.M.
50.0

OUTFALL INVERT
ELEV. 29.07 ±

DATE: FLA
SCALE: 1/8" = 1'-0"

9

VARIES WITH BATTER
OF EXISTING SLUICeway SIDES

EXIST. CONC. BEAM
OVER SLUICeway

DOWNEL RODS
SEE SECT. BB

REINFORCING RODS
SEE SECT. AA & BB

(B)

FLOW

5'-10"

GATE
STEM

DOWNEL RODS
SEE SECT. BB

FACE OF EXIST. STONE
FOUNDATION AT OLD
GATE HOUSE

OUTLINE OF BUILDING
ABOVE

SLUICeway BELOW

PLAN AT FOUNDATION

STATE OF
DEPT. OF

PAGE OF EXIST.
SPILLWAY

10

SITE PLAN
SCALE 1/8" = 1'-0"

BATTER OF
EXIST. WALL

WIDTH AT BOTTOM OF
EXIST. SLUICeway 4'-6"

DOVEL ROD INTO
SLUICeway SIDES

SLUICE GATE

3'-0"

(2) 1/2" E. RODS
EACH SIDE OF GATE

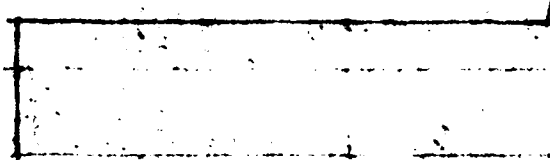
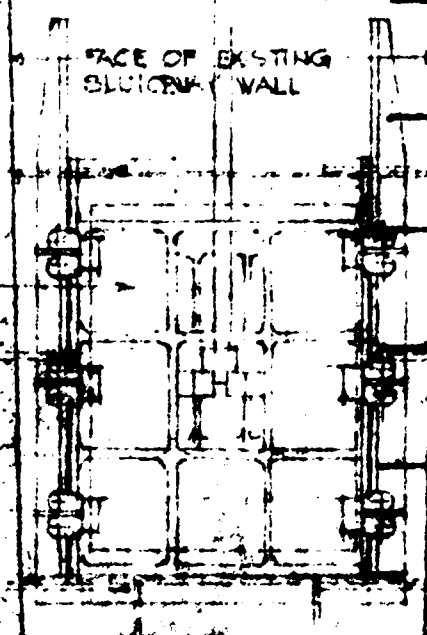
PLAN AT GATE

STATE OF CONNECTICUT
DEPT. OF FIRE PROTECTION

DRILL EXHIBIT FOR INSTALL
OF LEVELS

SECTION A-A
SCALE 1/2" = 1'-0"

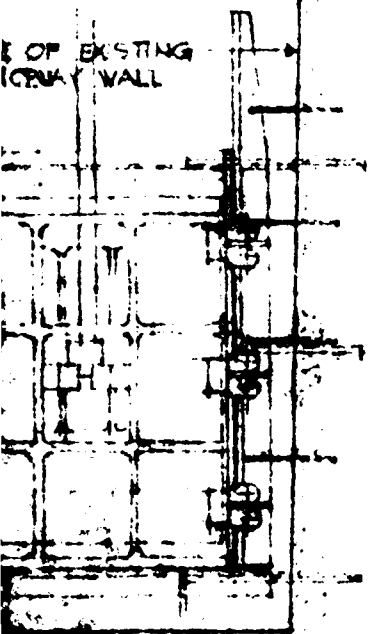
RECTANGULAR SLUICE GATE 36" W. X 48" H
W/ PLAT FRAME & ADJUSTABLE SIDE WEDGES.
RISING STEM TYPE. SEATING PRESSURE



SECTION B-B
SCALE 1/2" = 1'-0"

12

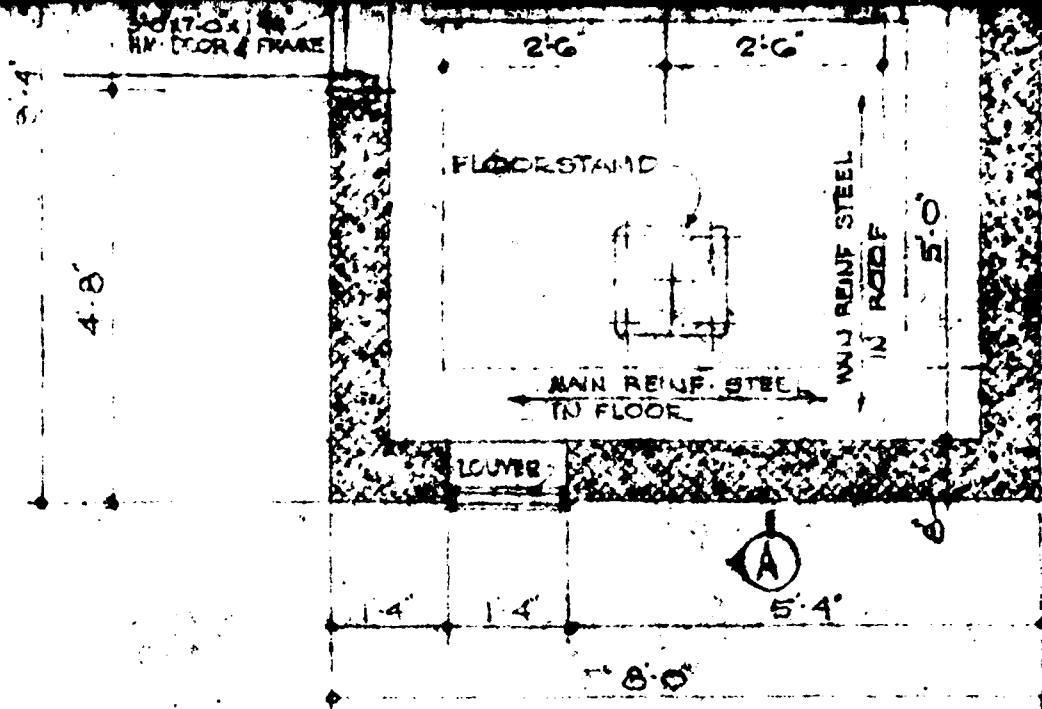
E OF EXISTING
CONCRETE WALL



DOUBLES

B-B
1'-0"

13



PLAN AT GATE HOUSE
SCALE 1/2" = 1'-0"

WALL REINFORCED
IN PLACE

5'-0"

DOWEL RODS
SEE SECT. B-B

FACE OF EXIST. STONE
FOUNDATION AT OLD
GATE HOUSE

GATE
STEM

FLOW

5'-10"

1'-0"

OUTLINE OF BUILDING
ABOVE

1'-6"

SLUICeway BELOW

PLAN AT FOUNDATION

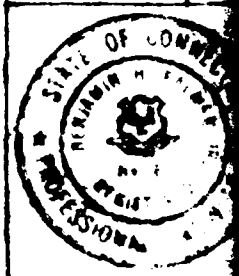
SCALE: 1/2" = 1'-0"

HOUSE

14.

REVISIONS		
NO	DESCRIPTION	DATE

DRWN: L.H.
CHKD: B.H.P.
APPROVED



S
DEP

WIDTH AT BOTTOM OF
EXIST SLUICEWAY 4'-6"

DOWEL ROD INTO
SLUICEWAY SIDES

SLUICE GATE

3'-0"

(4) # 5 BARS
EACH SIDE OF GATE

PLAN AT GATE
SCALE: AS NOTED

STATE OF CONNECTICUT
DEPT. OF FISHERIES & GAME

DRWN: L.H.

CHKD: B.H.P.

APPROVED

CONTROL GATE &
REPAIRS TO DAM
PACHAUG POND DAM
TOWN OF GRISWOLD, CONN.

PROJ. NO.

DRAWING

1.



CHANDLER & PALMER
ENGINEERS
NORWICH, CONN.

SCALE:

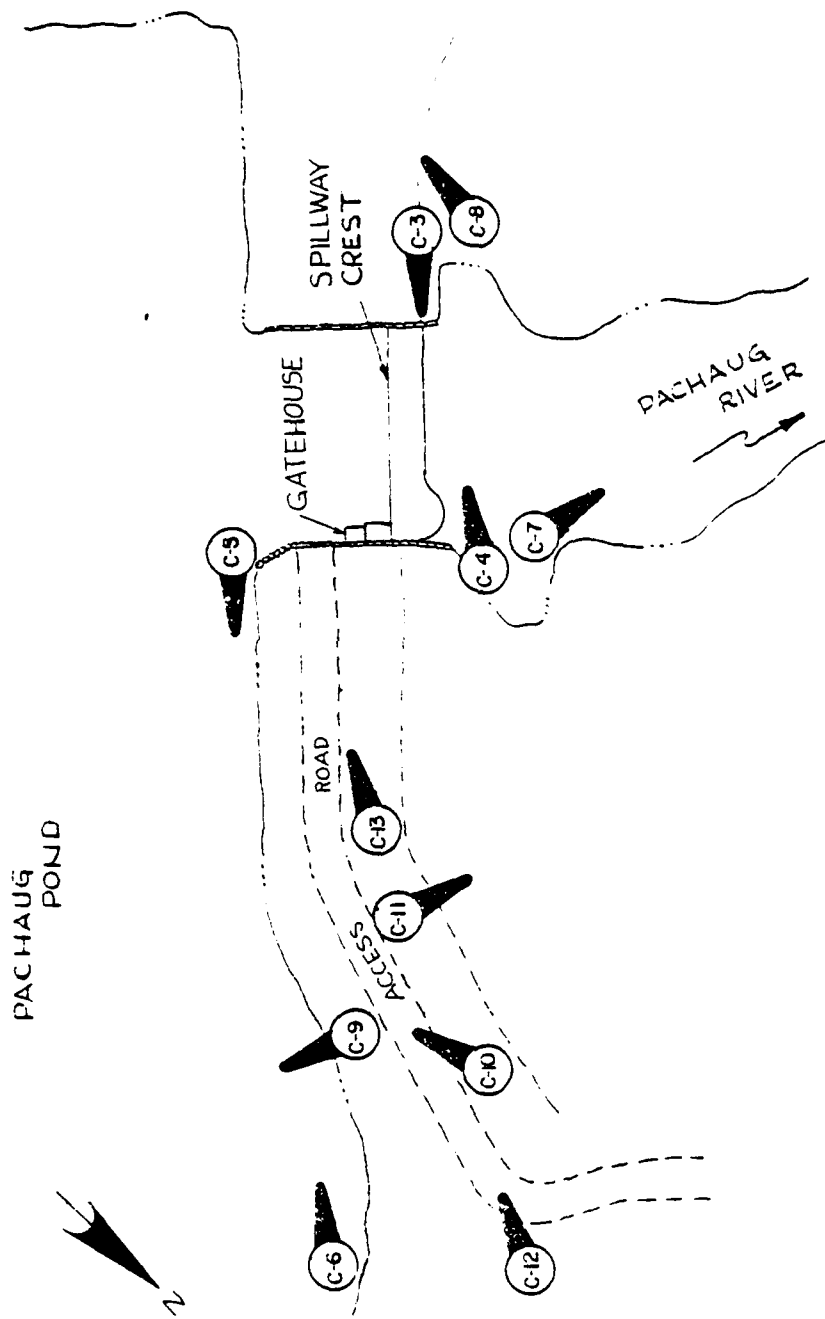
AS NOTED

DATE

SEPT. 23, '66

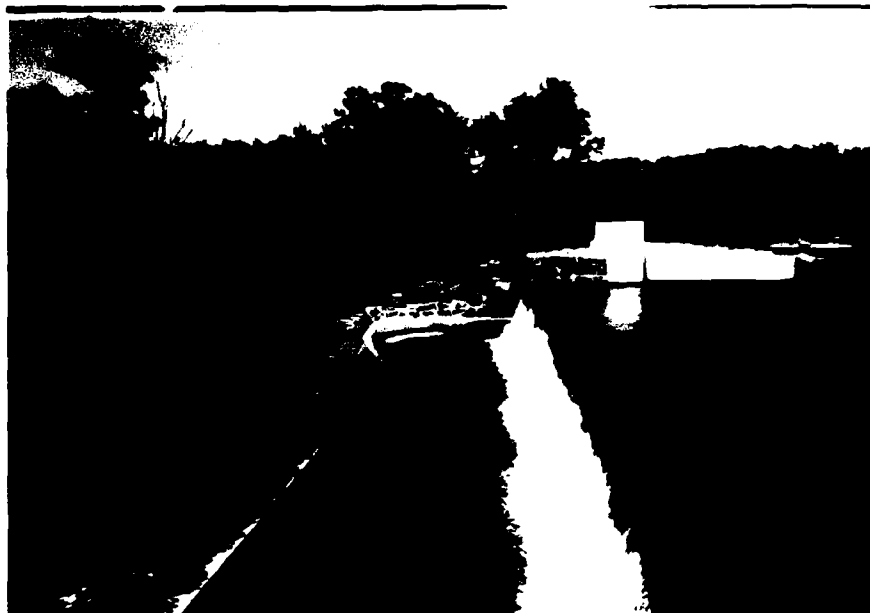
Plate No. 3 15

APPENDIX C
SELECTED PHOTOS



PLAN

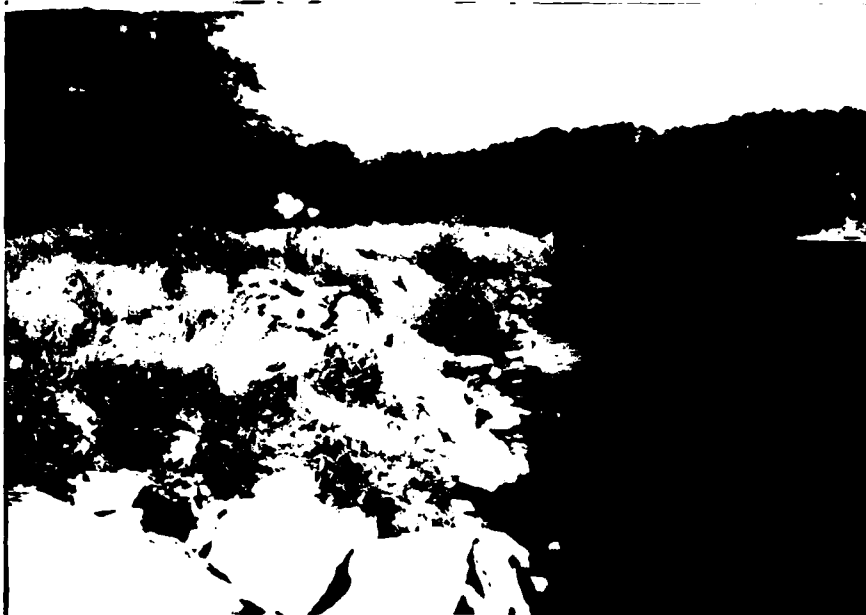
PACHAUG POND DAM
PHOTO INDEX



C-3 SPILLWAY CREST, RIGHT TRAINING WALL, GATEHOUSE
AND DOWNSTREAM STILLING BASIN



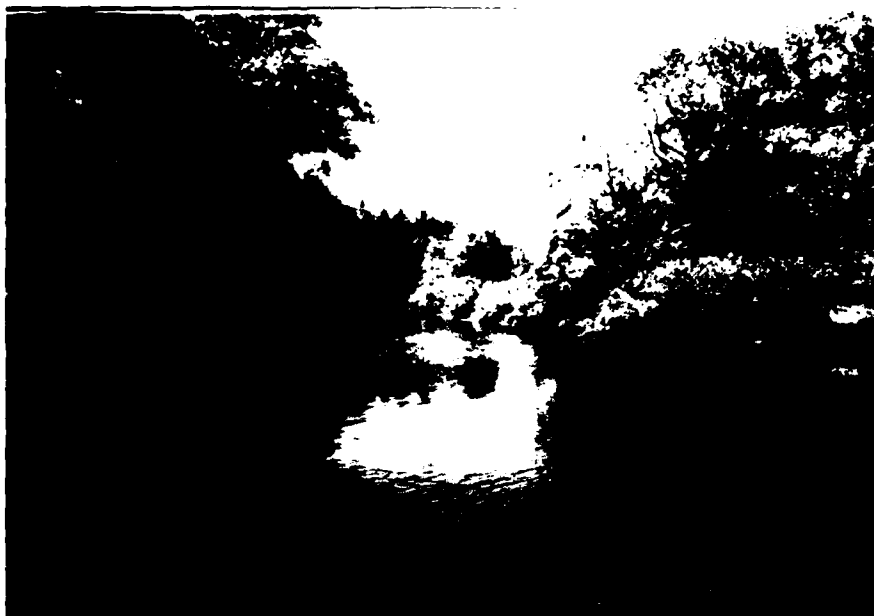
C-4 SPILLWAY CREST, DOWNSTREAM CHANNEL BED AND
LEFT TRAINING WALL



C-5 UPSTREAM FACE OF EARTH EMBANKMENT - (note localized areas filled with dumped stone)



C-6 UPSTREAM FACE OF
EARTH EMBANKMENT
AT RIGHT ABUTMENT



C-7 DOWSTREAM CHANNEL



C-8 SEEPAGE AT DOWN-
STREAM TOE - LEFT
ABUTMENT



C-9 ROTTING TREE STUMP AT WATERLINE ON UPSTREAM TOE
OF EMBANKMENT



C-10 TYPICAL ROTTING
TREE STUMP ON
DOWNSTREAM
EMBANKMENT SLOPE



C-11 SEEPAGE POND AT DOWNSTREAM TOE OF EARTH EMBANKMENT



C-12 DOWNSTREAM FACE OF EARTH EMBANKMENT. (note: seepage area to right below level of inspector standing on slope.)



C-13 DUMPED STONE ON DOWNSTREAM SLOPE

APPENDIX D
HYDROLOGIC COMPUTATIONS

A. Size Classification

Height of Dam = 18.0 feet; Hence SMALL

at crest elevation reservoir storage = 5980 AC-ft., hence INTERMEDIATE

adopted size category INTERMEDIATE

B. Hazard Potential

IT IS LOCATED IN PREDOMINANTLY RURAL OR AGRICULTURAL AREA,
BUT FAILURE OF DAM CAN CAUSE A SUBSTANTIAL DAMAGE TO
LIFE AND PROPERTY BESIDES LOSS DUE TO RECREATIONAL FACILITIES
AND ITS FLOOD CONTROL POTENTIAL. FOR DOWNSTREAM DAMAGES,
THE FAILURE OF THE DAM HAS A DISTINCT POTENTIAL OF WASHING
OUT RT. 138 AND ADVERSELY AFFECTING JEWETT CITY.

It is estimated from the rule of "thumb" failure hydrograph as follows:

<u>Category</u>	<u>Loss of Life</u>	<u>Economic Loss</u>
		Homes = YES
SIGNIFICANT	YES	Buildings = YES
		Farms = YES
		Miscellaneous = YES
		Highways or roads = YES

C. Hazard

High

"Test Flood" or Railway Design Flood

HIGH

INTERMEDIATE

PMF

Adopted

S.D.F. test flood = PMF

Interval value of test flood = 500 CSN

Estimating Maximum Probable Discharges - Inflow and Outflow Values Date of Inspection: 5/22/78

Name of Dam PACHAUG POND DAM; Location of Dam PACHAUG RIVER Town GRISWOLD, CT.

Watershed Characterization ROLLING WITH FLAT SWAMPS AND RESERVOIRS (ASSUMED FLAT AND COASTAL)

Adopted "test" flood = ONE PMF = 500 CSM = 25500 C.F.S.

D.A. = Drainage Area = 51.0 Square Miles = Acres

S.A. = Surface Area of Reservoir = 1.297 Square Miles = 830 Acres AT CREST OF SPILLWAY

Shape and Type of Spillway = BROAD CRESTED, OGEE TYPE; OVERFLOW - UNCONTROLLED

B = Width of Spillway = 121.0 feet; C = Coefficient of Discharge = (3.83 - Friction) = 3.60

Maximum Capacity of Spillway Without Overstopping = 6400 C.F.S. = 25.1 % of Test Flood

Top of Dam Elevation = 167.00; Spillway Crest Elevation = 161.00

Length of Dam = 770 feet

Name of Dam	Test Flood		Inflow Characteristics		Outflow Characteristics First Approximation			Outflow Characteristics Second Approximation			Outflow Characteristics Third Approximation		
	Qp1 CSM	CFS	h1 in feet	S1 in inc.	Qp2 CFS	h2 in feet	S2 in inc	S3 in inc	h3 in ft.	Qp3 CFS	S4 in inc.	h4 in ft.	Qp4 CFS
1	2	3	4	5	6	7	8	9	10	11	12	13	14
PACHAUG POND	500	25500	10.08	3.08	25500	10.08	3.08	3.02	9.89	24163	3.05	9.99 = 10.0	24800
	250	12750	7.96	2.43	12750	7.96	2.43	2.40	7.86	12242	2.42	7.90	12300

Qp = Discharge; h = dam crest height; S = Storage in inches

Overtopping Potential

Spillway crest elevation = 161.0 M.S.L.

Top of dam elevation = 167.0 M.S.L.

Maximum discharge capacity of

Spillway without overtopping = 6400 C.F.S.

"Test flood" outflow discharge = 24800 C.F.S.

% of "Test flood" carried by)
Spillway without overtopping) = 25.7 1

"Test flood" outflow discharge = 18400 C.F.S.
which flows over the dam

= 74.3 % of "Test flood" 2

$$1 + 2 = 100\%$$

"Rule of Thumb Guidance for Estimating
Downstream Dam Failure Hydrograph"

BASIC DATA

Name of dam Pachang Pond Dam Name of town Griswold - Conn
 Drainage area = 51.0 sq.m. Top of dam 167.0 NGVD
 Spillway type = Broad crest - open - over crest Crest of spillway 161.0 NGVD
 Surface area at crest elevation = 5982 Acres
 Reservoir bottom near dam = 151.0 NGVD
 Assumed side slopes of embankments = 2:1
 Depth of reservoir at dam site 16.0 ft = y_0 = 16.0 ft.
 Mid-height elevation of dam = 159.0 NGVD
 Length of dam at crest = 521 feet
 Length of dam at mid-height = 489 feet
 40% of dam length at mid-height = w_b = 195 feet
 Stream height of dam = 18 feet
 Hydraulic height of dam = 16 feet

Step 1:

Elevation M.S.L.	Reservoir Estimated Storage In AC-ft.	Remarks
<u>161.0</u>	<u>5982</u>	2×830
<u>163.0</u>	<u>7642</u>	
<u>165.0</u>	<u>9302</u>	
<u>167.0</u>	<u>10962</u>	
<u>169.0</u>	<u>12622</u>	
<u>171.0</u>	<u>14282</u>	

Step 2:

$$Q_{p1} = \frac{3}{27} w_b \sqrt{g} y_0^{3/2}$$

$$= \underline{1.68} w_b y_0^{3/2} = 20966 \text{ C.F.S.}$$

Step 3:

Appendix - D

Reach	Length in Feet	Stage	Discharge	Remarks
L ₁₋₂	1600 --	164	23710	See Appendix D-5
"	"	159	7440	
L ₂₋₃	7400	144.2	18590	
"	"	140.2	5858	
L ₃₋₄	8000	123	17280	
"	"	120	5440	
L ₄₋₅	7000	114.5	13500	
"	"	112.5	5070	

Notes:

1. Point 1 is at the dam and L₁₋₂ is the length from the centerline of dam to the first cross section
2. Lengths are approximate because 1:25,000 scale USGS topo maps are used
3. For values of discharges other than in the table above, linear interpolation and/or extrapolation is assumed

Step 4:

Reach Length 1-2

A) $Q_{p1} = 20965^a$ CFS

Stage = 163.15

A₁ = Area = 2745 sq. ft. =

Length = $L_{1-2} = 1600$ ft.

$V_1 =$ cu. ft. = 100.8 AC-ft.

S = 7700 AC-ft.

$\frac{V_1}{S} = 0.013$ less than 0.5; O.K.

B) Q_{p2} (Trial) = $Q_{p1} (1 - \frac{V_1}{S}) = 20690$ CFS

C) Stage for $Q_{p-2} = 163.07$

Area = 2721 sq. ft.

L_{1-2} = length = 1600 ft.

$V_2 = 100.5$ AC-ft.

S = 7700 AC-ft.

$\frac{V_2}{S} = 0.013$ less than 0.5; O.K.

D) $\frac{V_1 + V_2}{2} = V_{avg} = 100.65$ AC-ft.

$Q_{p-2} = Q_{p-1} (1 - \frac{V_{avg}}{S})$
= 20690 CFS

Stage for $Q_{p-2} = 163.00$

Stream Bed Elevation =

Depth of flow = 2.0 feet

Step 5:

Reach Length 2-3

$Q_{p2} = 20690$ CFS

Stage = 144.53

A₂ = Area = 3232 sq. ft. = AC-ft.

Length = $L_{2-3} = 7420$ ft.

$V_2 =$ cu. ft. = 540 AC-ft.

S = 7700 AC-ft.

$\frac{V_2}{S} = 0.071$ less than 0.5; O.K.

Q_{p-3} (Trial) = $Q_{p-2} (1 - \frac{V_2}{S}) = 19220$ CFS

Stage for $Q_{p-3} = 144.30$

Area = 3240 sq. ft.

L_{2-3} = length = 7400 ft.

$V_3 = 550$ AC-ft.

S = 7700 AC-ft.

$\frac{V_3}{S} = 0.071$ less than 0.5; O.K.

$\frac{V_2 + V_3}{2} = V_{avg} = 545$ AC-ft.

$Q_{p-3} = Q_{p-2} (1 - \frac{V_{avg}}{S})$
= 19200 CFS

Stage for $Q_{p-3} = 144.3$

Stream Bed Elevation = 136.0

Depth of flow = 2.0 feet

a: Linearly interpolated and or extrapolated from page D-2

Step 4 (con't): Reach Length 3-4

1) $Q_{p-3} = 19222$ CFS
 Stage = $123.48 \approx 123.5$

Area = 3900 sq. ft. =

Length = $L_{3-4} = 8000$ ft.

$V_3 = 716$ cu. ft. = 716 AC-ft.

$S = 7700$ AC-ft.

$\frac{V_3}{S} = 0.093$ less than 0.5; O.K.
 $= 0.10$

2) Q_{p-4} (Trial) = $Q_{p-3} (1 - \frac{V_3}{S}) = 17322$ CFS

3) Stage for $Q_{p-4} = 123$

Area = 3622

$L_{3-4} = 8000$ ft.

$V_4 = 661$ AC-ft.

$S = 7700$ AC-ft.

$\frac{V_4}{S} = 0.085$ less than 0.5; O.K.

$\frac{V_3 + V_4}{2} = V_{avg} = 688.5$ AC-ft.

$Q_{p-4} = Q_{p-3} (1 - \frac{V_{avg}}{S})$
 $= 17470$ CFS

Stage for $Q_{p-4} = 123.10$

Stream Bed Elevation = 117.2

Depth of flow = 5.10 ft.

Step 5 (con't): Reach Length 4-5

$Q_{p-4} = 17470$ CFS

Stage = 115.4

Area = 2450 sq. ft. =

Length = $L_{4-5} = 7000$ ft.

$V_4 = 1241$ cu. ft. = 1241 AC-ft.

$S = 7700$ AC-ft.

$\frac{V_4}{S} = 0.135$ less than 0.5; O.K.

Q_{p-5} (Trial) = $Q_{p-4} (1 - \frac{V_4}{S}) = 15110$ CFS

Stage for $Q_{p-5} = 114.20$

Area = 5520

$L_{4-5} = 7000$ ft.

$V_5 = 2225$ AC-ft.

$S = 7700$ AC-ft.

$\frac{V_5}{S} = 0.122$ less than 0.5; O.K.

$\frac{V_4 + V_5}{2} = V_{avg} = 1733$ AC-ft.

$Q_{p-5} = Q_{p-4} (1 - \frac{V_{avg}}{S})$
 $= 15200$ CFS

Stage for $Q_{p-5} = 114.5$

Stream Bed Elevation = 119.2

Depth of flow = 4.50 ft.

Step 3:

Reach No.	Distance in Feet	Mean Slope	Adopted "n"	Stage = 164				Stage = 174				Stage = 184						
				A	P	R	V	Q	A	P	R	V	Q	A	P	R	V	Q
1-2	$L_{1-2} = 1600'$	0.0033	0.05	3000	300	10	7.54	23710	1500	300	5	4.46	7440					
							Stage = 144.2					140.2						
2-3	$L_{2-3} = 7400'$	0.0024	"	3200	400	8	5.81	18590	1600	400	4	3.66	5800					
							Stage = 123					120.0						
3-4	$L_{3-4} = 8000'$	0.0024	"	3600	600	6.0	4.80	17280	1800	600	3.0	3.02	5440					
							Stage = 114.5					112.5						
4-5	$L_{4-5} = 7000'$	0.0095 0.001	"	5400	1200	4.5	2.50	13500	3000	1200	2.5	1.69	5000					
5-6	$L_{5-6} =$																	

Notes: 1 Reach No 1 is at the Dam.

2 "n" value is weighted Mannings roughness coefficient

3 Because of stage, bed width in channel, depth = R and B. P

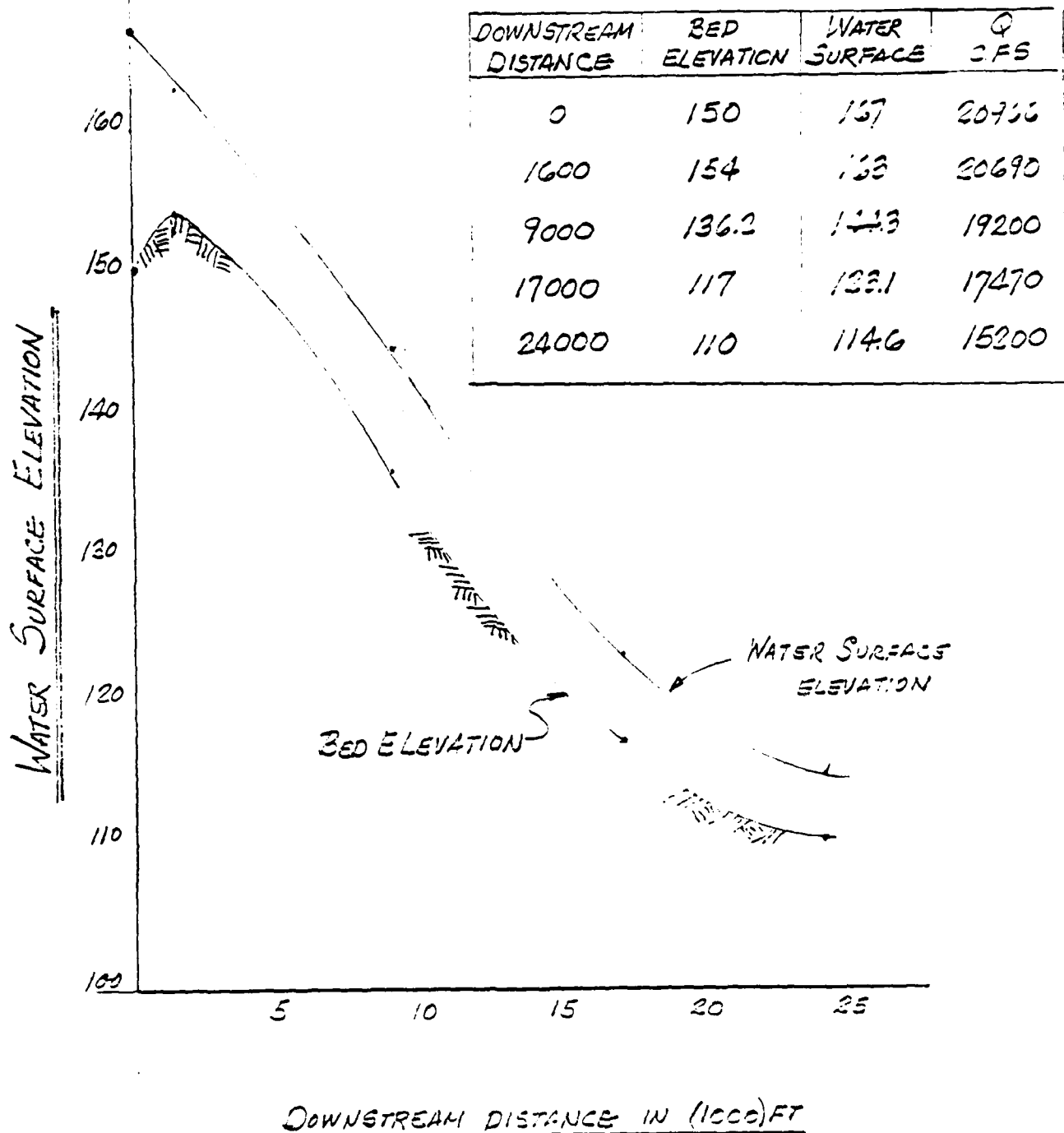
Storage Elevation Estimation Procedure

Elevation	Depth in Feet	Area Acres	Storage Capacity AC-ft.	
			Increment	Cumulation
161.0	- varies -	830	-	5982~
163.0	- - -	"	1660 ³	7642
165.0	- - -	"	" -	9302
167.0	- - -	" - -	- - "	10962
169.0	- -	" -	"	12622
171.0	- -	" -	"	14282
173.0	- -	" -	"	15942
175.0	- -	" -	"	17602

- Notes:
- a: Actual field Survey of Elevation-Area-Storage curve is not available and the value is based on sketchy available information without verification
 - b: 830 Acres-ft of storage capacity is assumed constant for every additional foot of increase in elevation above crest elevation

PROJECT PACHAUG POND DAM ACC. NO. 5155.200
 SUBJECT DAM FAILURE DIS PROFILE SHEET NO. OF
 DATE 19
 COMP. AR CHECK CONT. NO.

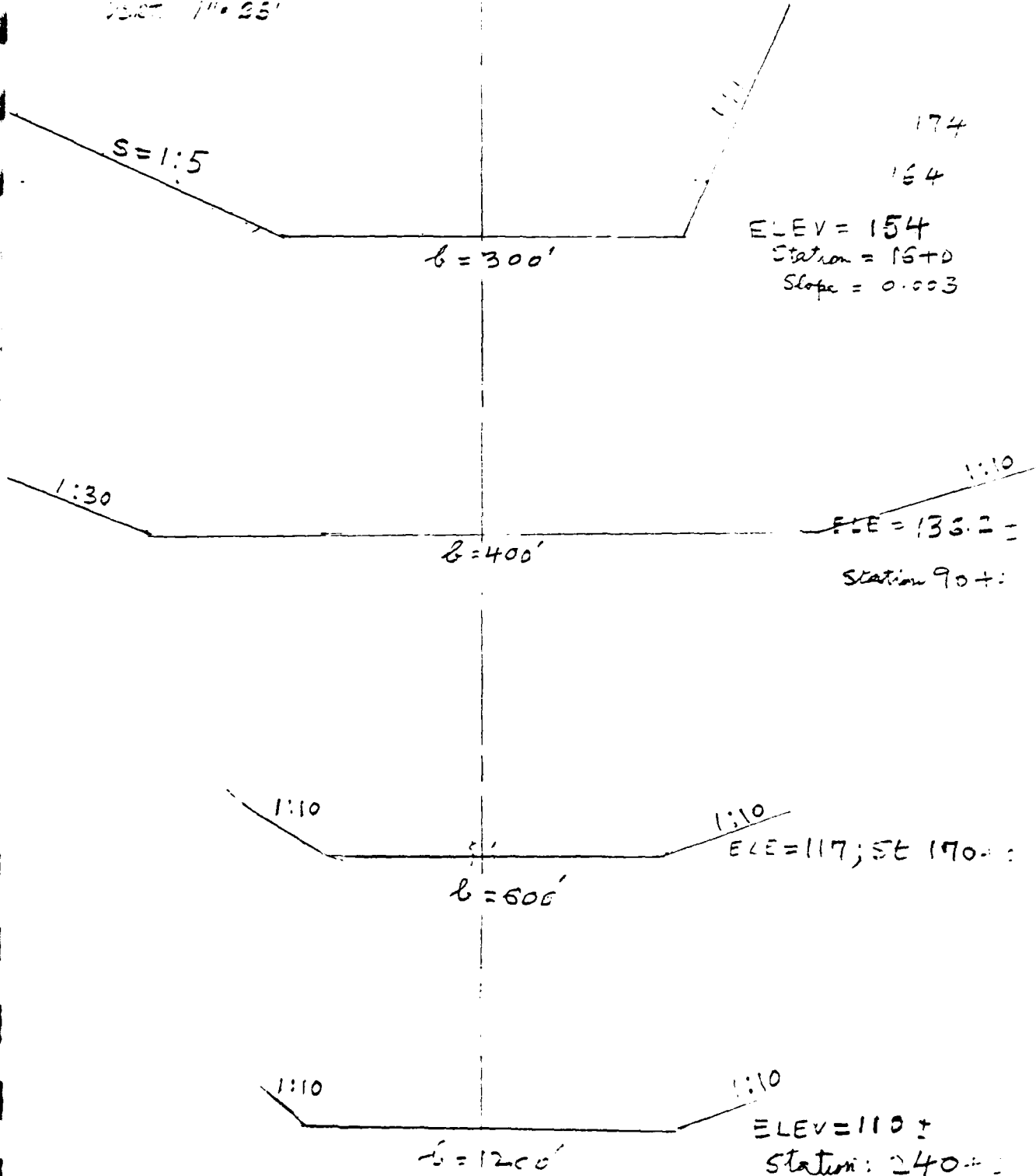
DAM FAILURE PROFILE

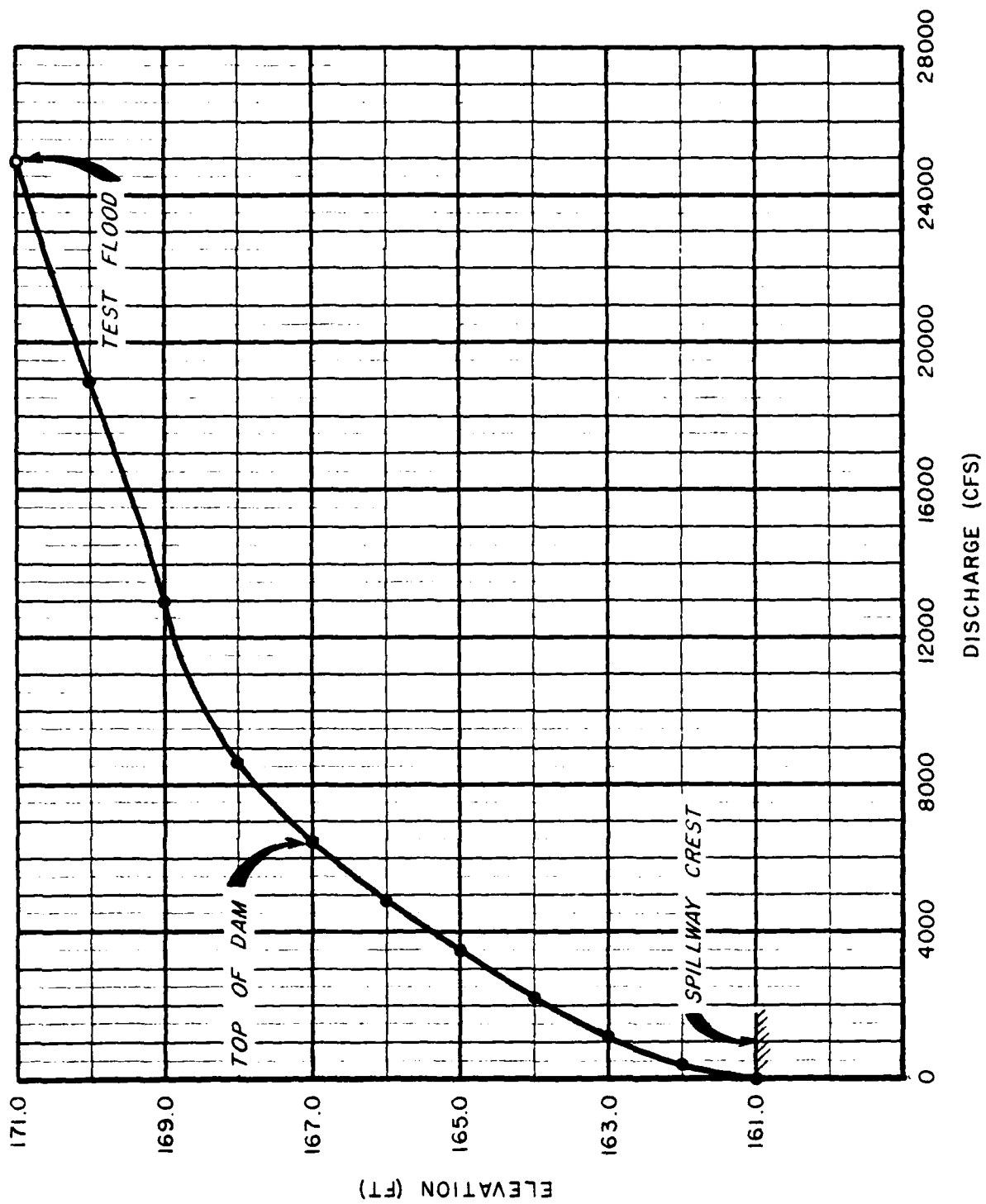


PROJECT FACHAUG POND DAM ACC. NO. 345.000
 SUBJECT WATER FILLING PROFILE X-SECTIONS SHEET NO. OF
 DATE 19
 COMP. CHECK CONT. NO.

SCALE

HORIZ 1"=100'
 VERT 1"=25'





SPILLWAY RATING CURVE
PACHAUG POND DAM

APPENDIX E
INVENTORY FORMS

1998

See reverse side for instructions

[9]

[illegible]

13

IDENTIFICATION <i>(Continued)</i>	POPULAR NAME																																														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50				
																																								PACHAUG							

[17]

LOCATION	REGION		BASIN	RIVER OR STREAM																																					NAME OF CITY									
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50							
	0	1	0	7	P	A	C	H	A	U	G	R	I	V	E	R																		J	E	W	E	T	T	C	I	T								

[26]

STATISTICS	TYPE OF DAM																		YEAR COMPLETED	PURPOSES															STRUCTURAL HEIGHT (ft)	HYDRAULIC HEIGHT (ft)	IMPOUNDING CAPACITY (acre - ft.)									
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50			
	R E P O R T																		1888	R															17	17	10962									

{ 28 }

REMARKS	REMARKS																																															
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50					
	20-1977ESTIMATE																21-MASONRY																22-ESTIMATE															

UNITED STATES
1-367)

STATE	CT
663	

[9]										[10]										[11]										[12]																																							
NAME																																								LATITUDE (North)										LONGITUDE (West)										REPORT DATE									
																																																												DAY MO YR									
DAM																																								4134.9										7155.8										22 MAY 78									

[14]																																																																															
NAME OF IMPOUNDMENT																																																																															
PACHAUG POND																																																																															

[18]																																								[19]																				[20]																			
NEAREST DOWNSTREAM CITY - TOWN - VILLAGE																																								DIST. FROM DAM (mi)																				POPULATION																			
JEWETT CITY																																								5																				34142																			

[25]										[26]										[27]										[27A]										[27B]										[27C]										[27D]										[27E]										[27F]																													
HYDRAULIC HEIGHT (ft)										IMPOUNDING CAPACITIES																				CORPS ENGR. DIST.										OWN. FED. R. PRV/FED SCS A.										VERIFICATION DATE										BLANK																																																	
										MAXIMUM (acre - ft.)																				NORMAL (acre - ft.)																																																																															
7										10962																				5982																				NEDN										NNNN										19 JUL 78																				3																			

[28]																																																																															
REMARKS																																																																															
ESTIMATE																																																																															

PART II - INVENTORY OF DAMS IN THE UNITED STATES
(PURSUANT TO PUBLIC LAW 96-379)

See reverse side for instructions

[29] [30] [31] [32] [33] [34] [35] [36] [37] [38]

STATISTICS	D	S	HAZ	CREST LENGTH (ft)	SPILLWAY										VOLUME OF DAM (CY)	POWER CAPACITY										LENGTH (ft)																				
					TYPE	WIDTH (ft)	MAXIMUM DISCHARGE (cfs)	INSTALLED (MW)					PROPOSED (MW)					Z																												
								14	15	16	17	18	35	36		37	38		39	40	41	42	43	44	45		46																			
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51		
	1				6	0	0	0	U		1	2	1				6	4	0	0																										

[46] [47]

MISC DATA	OWNER																				ENGINEERING BY																									
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51		
	S	T	A	T	E																																									

[49] [50]

MISC. DATA (Continued)	REGULATORY AGENCY																																														
	DESIGN															CONSTRUCTION															OF																
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	U	N	K	N																																											

[53] [54]

MISC. DATA (Continued)	INSPECTION BY																				INSPECTION DATE																										
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	C	E																																													

[56]

REMARKS	REMARKS																																																	
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PART III - INVENTORY OF DAMS IN THE UNITED STATES
SUPPLEMENTARY DATA

(4-4)

[illegible]

B-

[illegible]

C

[illegible][illegible][illegible]

5 IN THE UNITED STATES
RY DATA

2

CT 663

(A-3)

(A-4)

(A-5)

DATE NUMBER	F.E.R.C. NO.	U.S.G.S. SHEET
39 40 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		JEWETT CITY CONN

(B-7)

(B-8)

(B-9)

(B-10)

(B-11)

(B-12)

USABLE STORAGE ACRE FEET	RESERVOIR AREA ACRES	FLASH BOARD HT FEET	OUTLET CONDUITS NO.	OUTLET CONDUITS SIZE	INVERT ELEV. M.S.L.
39 40 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					
5982	830	0	1	3 FT X 4 FT	147

(C-5)

(C-6)

(C-7)

RETIRED YEAR	FORMER USE	CAPACITY FACTOR
39 40 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		

39 40 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

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