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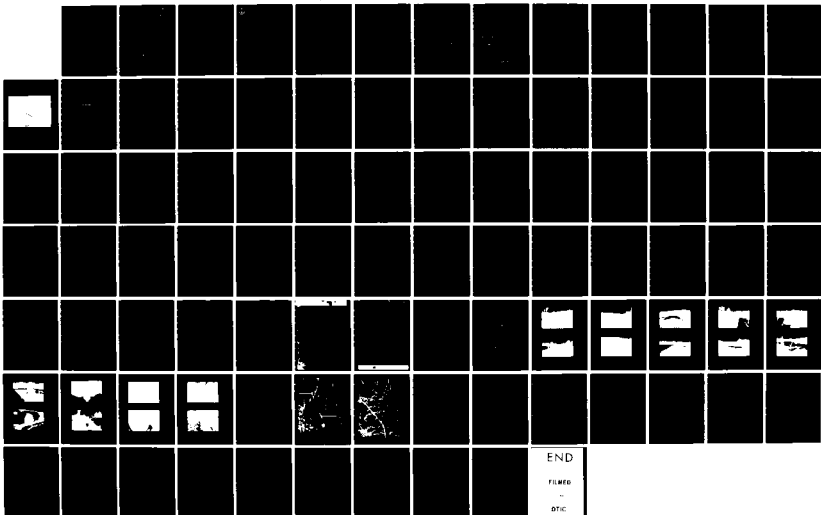
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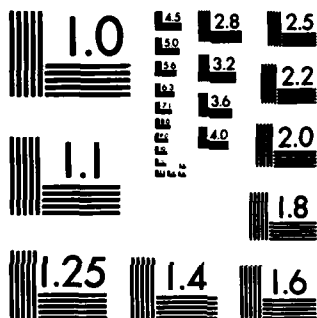
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AD-A144 603

THAMES RIVER BASIN
GRISWOLD, CONNECTICUT



HOPEVILLE POND DAM
CT. 00438

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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DEPARTMENT OF THE ARMY
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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) The dam at Hopeville Pond is approximately 493 feet long (including the overflow spillway) and is an earth embankment structure. The embankment is about 18 feet high with an average crest width of 10 feet. The assessment of the dam is based on the visual inspection only since engineering, operational, and maintenance records have not been maintained. The dam is judged to be in FAIR condition with several deficiencies that require attention. The dam is classified as INTERMEDIATE in size and a SIGNIFICANT hazard structure in accordance with the recommended guidelines established by the Corps of Engineers. The test flood is equal to 1/2 the PMF.		



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

REPLY TO
ATTENTION OF:
NEDED

OCT 17 1980

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

Dear Governor Grasso:

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

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, State of Connecticut, Dept. of Environmental Protection, Div. of Conservation & Preservation, Region 4, Griswold, CT.

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

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

Sincerely,

A handwritten signature in dark ink, appearing to read "Max B. Scheider".

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

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HOPEVILLE POND DAM

CT 00438

THAMES RIVER BASIN

GRISWOLD, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM

PHASE 1 - INSPECTION REPORT

IDENTIFICATION NO.: CT 00438
NAME OF DAM: Hopeville Pond Dam
TOWN: Griswold
COUNTY AND STATE: New London County, Connecticut
STREAM: Pachaug River
DATE OF INSPECTION: 4 April 1980

BRIEF ASSESSMENT

The dam at Hopeville Pond is approximately 493 feet long (including the overflow spillway) and is an earth embankment structure. The embankment is about 18 feet high with an average crest width of 10 feet. The embankment is divided by the overflow spillway with 198 feet of embankment to the left of the spillway and 187 feet to the right. Typical downstream embankment slopes are grassed and graded at IV:2.3H and 1V:2H on the upstream slope.

The overflow, concrete-stone masonry vertical fall spillway, is approximately 108 feet in length and located 187 feet from the right abutment. There are two outlet works structures for the dam at Hopeville Pond. High water conditions prevented members of the inspection team from measuring the actual intake and outlet structure sizes. Sizes given in the report were approximated due to highwater conditions and lack of any design or supplemental plans of the dam. The outlet works structure located at the right spillway abutment was estimated to be a 4 feet H X 4 feet W concrete box culvert with a manually controlled gate on the intake side of the culvert. The other outlet structure was located approximately 26 feet from the left spillway abutment and consisted of a gated 30 inch diameter sluice gate, a 96 inch diameter steel riveted pipe, and a concrete chamber which connects the sluice gate and steel pipe. Discharges from the spillway and right outlet works structure flow directly into the Pachaug River, while discharges from the left outlet works structure flow through a stone masonry lined tailrace and then into the Pachaug River approximately 250 feet downstream from the dam.

The assessment of the dam is based on the visual inspection only since engineering, operational, and maintenance records have not been maintained. The dam is judged to be in FAIR condition with several deficiencies that require attention. The deficiencies include: lack of slope

protection on the upstream slope, rotting tree stumps on the upstream and downstream slopes, trees growing on the downstream slope, and seepage at the downstream toe and left abutment.

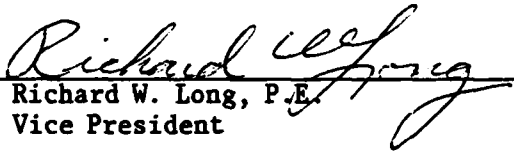
The dam is classified as INTERMEDIATE in size and a SIGNIFICANT hazard structure in accordance with the recommended guidelines established by the Corps of Engineers. The routed test flood outflow for this dam is equal to one half the Probable Maximum Flood (PMF) or approximately 17,400 CFS and would overtop the dam by about 3.72 feet; therefore, the existing spillway capacity is considered to be inadequate. The maximum spillway discharge of 3985 CFS represents only 22.9 percent of the routed test flood outflow. Overtopping could result in failure of this earth embankment.

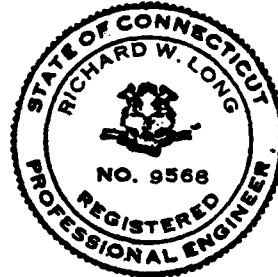
It is recommended that the Owner engage the services of a qualified registered engineer to accomplish the following: design proper rip-rap for the upstream slope of the dam embankment; monitor the extent of wet areas at the toe and left abutment of the dam; institute techniques to be included in a maintenance program to properly remove large trees, stumps, and their attendant root systems from the embankment slopes; and develop an emergency action plan.

Additional recommendations and remedial measures are included in Section 7 and should be implemented within one year after receipt of this Phase I report.

CE MAGUIRE, INC.

By


Richard W. Long, P.E.
Vice President



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

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Richard J. DiBuono

RICHARD DIBUONO, MEMBER
Water Control Branch
Engineering Division

Aramast Mahtesian

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

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, DC 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or to property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

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

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

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

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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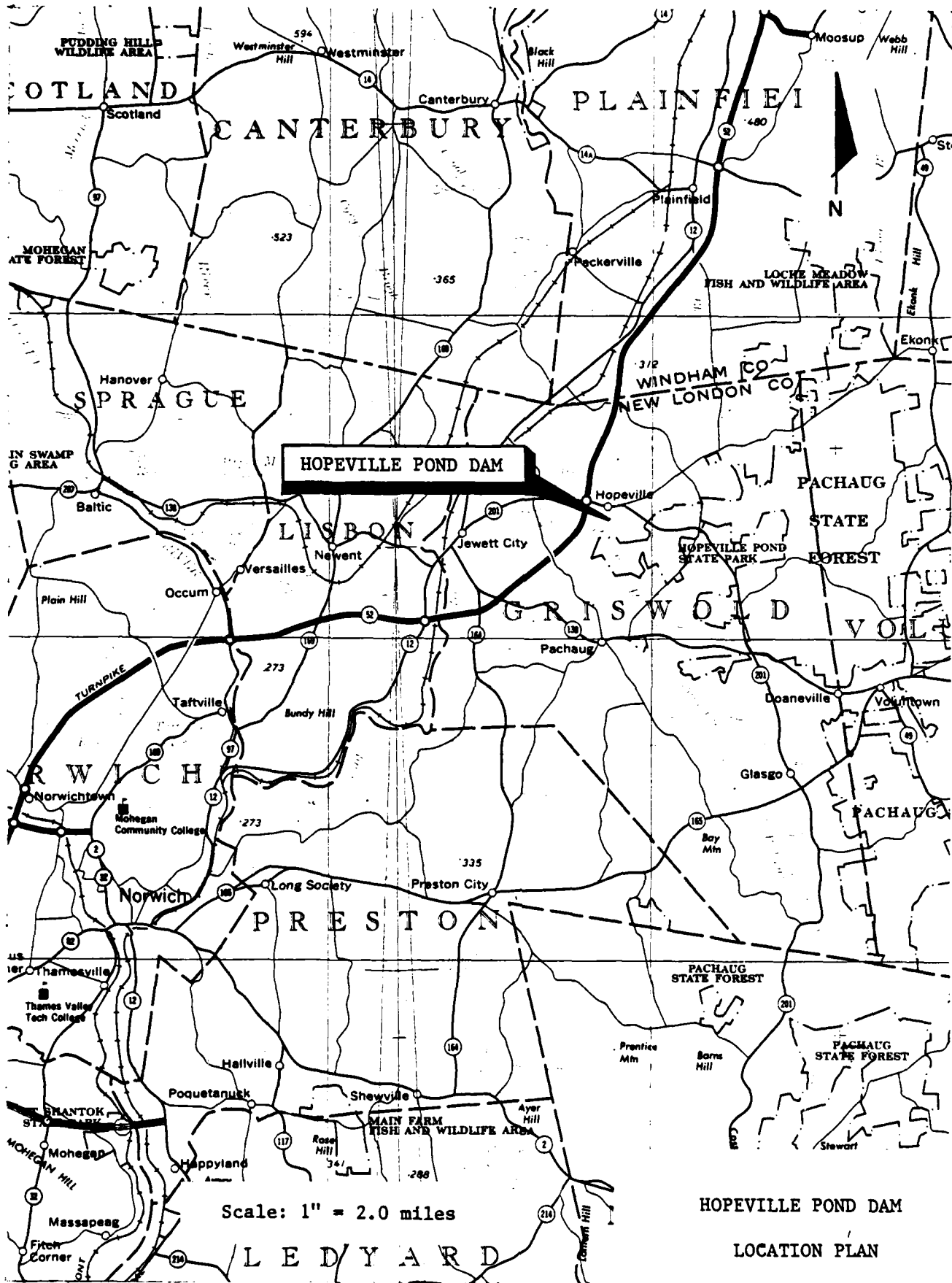
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OVERVIEW PHOTO - Hopeville Pond Dam



HOPEVILLE POND DAM

HOPEVILLE POND DAM

LOCATION PLAN

PLATE NO. 1

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

NAME OF DAM: HOPEVILLE POND DAM

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. CE 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 CE Maguire, Inc., under a letter from Max G. Scheider, Colonel, Corps of Engineers. Contract No. DACW33-80-C-0013 has been assigned by the Corps of Engineers for this work.
- b. Purpose of Inspection.
 1. Perform technical inspection and evaluation of non Federal Dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.
 2. Encourage and 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. Hopeville Pond Dam is located in the Town of Griswold, New London County, Connecticut, approximately 1300 feet southwest of the intersection of Hopeville Road (CT Rt. 201) and Edmond Road. Coordinates of the dam are approximately 41° 32.7' N Latitude and 71° 53.6' W Longitude (see Plate No. 1). The dam impounds water from the Pachaug River which drains a 60 square mile watershed of rolling terrain. The dam is located about 3.4 miles downstream from the Pachaug River gaging station. The crest of the dam is oriented in a north-south alignment with the reservoir located to the east of the dam.

- b. Description of the Dam and Appurtenances. The dam at Hopeville Pond is approximately 493 feet in length (including the overflow spillway) and is an earth embankment structure. The overflow spillway is a concrete and granite uncontrolled weir approximately 108 feet in length located approximately 187 feet from the right abutment of the dam. There are two outlet works structures at the Hopeville Pond dam. One is located at the right spillway abutment and the other is located approximately 26 feet from the left spillway abutment, along the left dam embankment. Plans delineating actual dimensions of the outlet works at the right spillway were not available and because of high water conditions could only be approximated. Downstream dimensions indicated a rectangular culvert 12.5 feet wide by 4 feet high with a manually operated sluice gate located on the upstream side of the dam. From the visual inspection of the dam it appears that the outlet works located at the left of the spillway was the source of power for a mill located at the toe of the dam. The outlet works structure consists of a manually operated 30 inch diameter sluice gate, located at the upstream toe of the embankment, a 30 inch diameter pipe leading to a 96 inch diameter riveted steel plate pipe that guides flows through the site of the old mill complex. Discharges through the remains of the mill foundation flow into the tailrace and finally to the Pachaug River approximately 250 feet downstream from the dam.
- c. Size Classification. Hopeville Pond Dam has an impoundment capacity at the top of the dam (elev. 151.68 NGVD) equal to 1,200 Ac-Ft. and a maximum height of 18.0 feet. The storage criteria warrant that this dam be classified as INTERMEDIATE in size.
- d. Hazard Classification. The dam is classified as having a SIGNIFICANT hazard potential because its failure may result in possible erosion damage to the Connecticut Turnpike (Rt. 52) highway embankment as well as the highway bridge at Edmond Road and cause temporary disruption to public utilities located within the rights of way of those roadways. Water depths due to the possible dam failure discharge of 8994 CFS may range from 8.4 feet immediately downstream of the dam to 9.0 feet at a distance 2000 feet from the dam. The failure will cause flooding conditions downstream and high velocities of flow will carry debris and may further increase the damage potential due to scouring, undermining effects, and heavy siltation.
- e. Ownership. Hopeville Pond Dam is owned by the State of Connecticut and is managed by the Department of Environmental Protection - Division of Conservation and Preservation (Region No. 4).

f. Operator.

Mr. John Olsen, Director
Division of Conservation and Preservation
Region 4

and

Mr. Stephan Merchant
Unit Manager
Corner Rt. 201 and Roode Road
Griswold, CT 06351
(203) 376-2920

- g. Purpose of the Dam. It is assumed that the dam was originally constructed as a source of power for the adjacent mill complex but was purchased by the State of Connecticut and is now managed as a recreational facility.
- h. Design and Construction History. No record drawings for construction or repairs were available for the dam at Hopeville Pond. It was reportedly constructed around 1910 and recently rehabilitated in 1962.
- i. Normal Operational Procedures. Water levels at the Hopeville Pond Dam are normally uncontrolled. The gates are not normally operated to regulate water levels in the pond.

1.3 Pertinent Data

- a. Drainage Area. The Hopeville Pond Dam drainage basin located in New London County, is generally rectangular in shape with an average length of 10 miles, an approximate width of 8 miles, and a total drainage area of 60 sq. miles (See Appendix D for Basin Map). Ten percent of the watershed (6.0 sq. miles) is swampy or occupied by natural or manmade water storage impoundments. The topography is generally flat to rolling terrain with the elevations ranging from a high of 500 feet NGVD to 147.0 feet at the spillway crest. Basin slopes range from 0.015 to 0.045 feet per foot and are considered flat to moderate. The time of concentration of the entire watershed is estimated to be nine to ten hours and is relatively large resulting in the unlikelihood that all surface runoff will peak simultaneously at the reservoir site during a high intensity rainfall event. The large storage areas in the watershed will tend to dampen and delay any peaking of the surface runoff.
- b. Discharge at Damsite. There is no discharge data available for this dam. The U.S. Geological Survey lists for gauge #01126950 - Pachaug River at Pachaug, Ct. (located approximately 3.4 miles upstream from the Hopeville Dam) a maximum

discharge for the period of record (1961-1973) as 1180 CFS occurring on March 19, 1968. Listed below are other discharge data for spillway and outlet works:

1. Outlet Works

Conduit Size	(Right)	4'x4' Box Culvert with invert elevation 132.86 feet
	(Left)	30 inch diameter pipe invert elevation 133.30 feet
i. Total Discharge Capacity		309 CFS at spillway crest, elevation 146.68 feet
ii. Total Discharge Capacity		370 CFS at top of dam elevation 151.68 feet
iii. Total Discharge Capacity		400 CFS at test flood elevation 155.4 feet

NOTE: 76.5% of total outlet discharge passes through 4'x4' box culvert.

2. Maximum known flood at damsite	Unknown
3. Ungated spillway capacity at top of dam elevation	3985 CFS
4. Ungated spillway capacity at test flood elevation	N/A (test flood overtops dam)
5. Gated spillway capacity at normal pool elevation	N/A
6. Gated spillway capacity at test flood elevation	N/A
7. Total spillway capacity at test flood elevation	N/A
8. Total project discharge at top of dam	4,355 CFS
9. Total project discharge at test flood elevation (includes outlet works' flow)	17,800 CFS

c. Elevations (Feet above NGVD)

1. Streambed at toe of dam	133.48
2. Bottom of cutoff	Unknown
3. Maximum tailwater	Unknown
4. Recreation pool	146.68
5. Full flood control pool	N/A
6. Spillway crest (ungated)	146.68
7. Design discharge (original design)	Unknown
8. Top of dam	151.68
9. Test flood level	155.4

d. Reservoir Lengths (feet)

1. Normal pool	12000
2. Flood control pool	N/A
3. Spillway crest pool	12000
4. Test flood pool	12000

e. Storage (acre-feet)

1. Normal pool	590
2. Flood control pool	N/A
3. Spillway crest	590
4. Top of dam	1200
5. Test flood pool	1664

f. Reservoir Surface Area (Acres)

1. Normal pool	122
2. Flood control pool	N/A
3. Spillway crest	122
4. Top of dam	122

	5. Test flood	122
g.	<u>Dam</u>	
	1. Type (based on visual inspection)	Earth Embankment
	2. Length	385 feet excluding 108 feet of spillway
	3. Height	18.0 feet
	4. Top Width	10.0 feet
	5. Side slopes	Upstream 1V on 2H Downstream 1V on 2.3H
	6. Zoning	Unknown
	7. Impervious core	Unknown
	8. Cutoff	Unknown
	9. Grout curtain	Unknown
	10. Other	Unknown
h.	<u>Diversion and Regulating Tunnels</u>	N/A
i.	<u>Spillway</u>	
	1. Type	Free, overflow, vertical fall, concrete-stone
	2. Size	108 ft. wide
	3. Crest elevation	146.68 feet
	4. Gates	None
	5. U/S Channel	Natural bed of reservoir
	6. D/S Channel	Natural bed of channel with masonry stone walls
	7. General	A foot bridge is located about 100 feet downstream from the toe of the dam and tends to restrict flow

j. Regulating Outlets

Refer to Paragraph 1.2b
"Description of Dam and
Appurtenances" Page 1-2 for
description of outlet works.

- | | | |
|----|-------------------|--|
| 1. | Downstream invert | 132.86 (Right)
133.30 (Left) |
| 2. | Size | 4.0 ft. x 4.0 ft. (Right)
and 30" diameter pipe
(Left) |
| 3. | Description | Concrete box culvert
(Right); riveted steel
plate pipe (Left) |
| 4. | Control Mechanism | Manually operated sluice
gates with locking hood
operated from crest of
dam |
| 5. | Other | N/A |

SECTION 2

ENGINEERING DATA

- 2.1 Design Data. No records or documents regarding this dam were available at the time of the inspection of the dam.
- 2.2 Construction Data. No record of construction or repairs was available for this dam.
- 2.3 Operation Data

The reservoir is presently used for recreation and is not normally regulated. A limited record of operation for the gates at Hopeville Pond was obtained from the Department of Environmental Protection, State of Connecticut; which indicated the pond was lowered in Sept.-Oct., 1973 for repairs to the upstream beach area at the Hopeville Pond State Park. No other operating records were available for this facility.

2.4 Evaluation of Data

- a. Availability. the information noted above for this facility is available in the files of the Department of Environmental Protection, State of Connecticut.
- b. Adequacy. The lack of in-depth engineering data did not allow a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on the visual inspection, the dam's past performance and sound engineering judgement.
- c. Validity. The validity of the limited information available must be verified.

SECTION 3

VISUAL INSPECTION

3.1 Findings

- a. General. The Phase 1 inspection of the dam at Hopeville Pond was performed on 9 April 1980 by representatives of CE Maguire, Inc. and Geotechnical Engineers, Inc. The inspection team was accompanied in the field by Mr. Steve Merchant, Unit Manager, Department of the Environmental Protection, Region 4, State of Connecticut.

Based on the visual inspection, history, and general appearance, the dam at Hopeville Pond and its appurtenances are judged to be in FAIR condition.

- b. Dam. The dam is an earth embankment reportedly built around 1910 and rehabilitated in 1962. The upstream slope is grassed with a typical slope of 1V:2H (See Photos C-1 and C-2). Numerous rotted stumps above and below the water surface were observed in both the left and right embankments (See Photo C-15).

There is no riprap protection and wave action has eroded a nearly vertical scarp approximately 2 feet high at the high water level on the upstream slope to the right of the spillway. Wave erosion is less pronounced on the upstream slope of the embankment at the left of the spillway. The upstream slope is somewhat irregular with some local sloughing. Footpaths and erosion were observed on the upstream slope at station 1+60 and adjacent to the right upstream training wall of the spillway.

The downstream slope is also grassed with a typical slope of 1V:2.3H. Both the upstream and downstream slopes were measured at Station 1+50 (See Photos C-3 and C-4). Numerous large rotting tree stumps were observed at several locations along the downstream embankment along with several animal burrows (See Photo C-18). Some erosion due to trespassing was observed behind the spillway right training wall and left training wall. A wet area was observed along the toe of the embankment to the right of the spillway (See Photo C-17). The area is flat and poorly drained, no seepage or flowing water was observed. At station 4+10 a low area with standing water was observed 20 feet downstream from the toe. No water was observed to seep into the low area from the direction of the dam. A thin wet area was observed at the left abutment 22 feet downstream from the downstream edge of the crest. Removal of vegetative cover showed that the water was seeping slowly from the direction of

the left abutment. During the inspection it could not be determined if seepage originated in the reservoir or is due to drainage from the abutment.

The embankment crest is grass covered with evidence of minor trespassing and has a typical width of 10 feet (See Photos C-5 and C-6). Several rotting tree stumps cut even with the ground surface were observed on the crest to the left of the spillway. The crest length to the right of the spillway is approximately 187 feet while the crest length to the left of the spillway is 198 feet.

c. Appurtenant Structures

1. Spillway - The vertical drop concrete spillway is 108 feet in length, approximately 16 feet high with an energy dissipating plunge pool approximately two feet deep (See Photo C-7, C-8) at its base. The spillway is located approximately 187 feet from the right dam abutment and is angled approximately 140 degrees from the alignment of the right dam embankment (See Plate B-1).

Approximately 0.9 feet of water was passing over the spillway crest during the field inspection of the dam. These conditions obscured complete inspection of the spillway and the upstream, and downstream channels. The spillway should therefore be examined again in detail during a no overflow period.

The crest of the spillway appeared to be concrete, an approximate width of 6 feet, with an inclined upstream face and a nearly vertical downstream face. It appeared to be in good condition. The spillway training walls are concrete and appear to be in fair condition with some spalling and cracking.

2. Outlet Works - There are two low level outlet works at the Hopeville Pond Dam. One is located at the right spillway abutment and the second is located approximately 26 feet from the left spillway abutment. Both outlet works control valves can be secured, were operated during the field inspection of the dam and appear to be well maintained and in good working order. There were no plans of the dam or its appurtenances available at the time of inspection and upstream dimensions and gate sizes were approximated from limited field measurements obtained during the time of inspection. The outlet works gate control structure at the right spillway abutment is located at the upstream side of the dam as shown in Photo C-10. The size of the gate and the downstream outlet were unobtainable because of high flow conditions. The downstream outlet opening was estimated to be 4 feet wide by 4 feet high by approximate measurements taken during the visual inspection and outflows discharge directly into the spillway downstream channel.

The concrete on the intake structure at the right spillway showed minor spalling and surface cracking and is in fair condition.

The second low level outlet structure is located at the left dam embankment approximately 26 feet from the left spillway abutment and is gated on the upstream side of the dam with a lockable, manually operated 30 inch diameter sluice gate. The outlet conduit consists of a 30 inch diameter sluice gate and pipe which is connected via a concrete chamber to a 96 inch diameter riveted steel plate pipe. Discharges from the low level gate flow through the embankment via the system described above and through the remaining mill foundation and into a tailrace which discharges into the Pachaug River approximately 250 feet downstream from the dam.

The right and left forebay walls of the concrete intake structure show severe cracking and spalling. The sluice gate and concrete chamber appear to be in good condition with no signs of spalling, cracking, or leaking. The riveted steel pipe is rusted and several small holes can be seen at the invert on the downstream side. As shown in Photo C-12, riprap has been placed at the end of the steel pipe to prevent discharges from eroding the area between the invert and the tailrace. The stone masonry lined tailrace shows some displaced stones but is generally in fair condition.

- d. Reservoir Area. No specific detrimental features in the pond area were noted during the visual inspection. The slopes of the shoreline are flat and well covered with grass and vegetation to preclude sloughing of shoreline materials. The southern shoreline area is presently used for pasture land.
- e. Downstream Channel. The discharge channel of the spillway is the natural streambed and is boulder-covered. The channel is partly obstructed by a bridge, a few small trees, and a small island downstream from the spillway. Stone walls support the banks of the channel upstream from the bridge. Some soil erosion was observed behind the right bank wall and portions of the wall were deteriorated near the bridge. On the left bank the stone wall is collapsed near the toe of the spillway left training wall.

3.2 Evaluation

Based on a visual inspection the dam appears to be in FAIR condition. There are several features which require attention.

- 1. Lack of slope protection on the upstream slope of the embankment could allow continued erosion of the upstream slope.

2. Rotting tree stumps on the crest and upstream and downstream slopes could further deteriorate and provide paths of seepage into the embankment. Trees on the downstream slope between Stations 4+60 and 4+95 could be uprooted during storms leaving depressions that may encourage erosion and seepage.
3. Seepage at the downstream toe of the embankment and at left abutment could increase and influence stability of the downstream slope and therefore should be monitored.
4. Inspections of the overflow spillway should be undertaken during a no overflow period.
5. Exact size of the left outlet works should also be determined.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Operational Procedures

- a. General. The water level for Hopeville Pond Dam is generally uncontrolled. Normal operating procedure allows all discharges to pass over the uncontrolled spillway with both outlet works closed. As a rule, the outlet gates have been opened only for maintenance and repair work.
- b. Description of Any Warning System in Effect. None recorded. However, the dam is visited daily during the summer recreational season and several times each week in the winter periods by State personnel.

4.2 Maintenance Procedures

- a. General. 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.
- b. Operating Facilities. No specific maintenance has occurred. The outlet works gates appear to be well maintained and were operated during inspection of the facility. The spillway could not be observed and therefore could not be evaluated.

4.3 Maintenance of the Operating Equipment. A program for testing the operation of the sluice gates annually is in effect by the regional staff of the Department of Environmental Management.

4.4 Evaluation. Although the dam at Hopeville Pond appears to be reasonably well maintained, an annually scheduled maintenance program should be implemented and followed to insure its present status.

An emergency action plan should be implemented and coordinated with other impoundments on the Pachaug River to insure its effectiveness and minimize the impact of failure. This plan should also list the expedient action to be taken and authorities to be contacted.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General. Hopeville Pond Dam, constructed in the earlier part of the twentieth century, is located on the Pachaug River in the Thames River Watershed in Connecticut. This reservoir, with a gross drainage area of 60.0 square miles, is located 2000 feet upstream of Route 52. This watershed has flat to moderate slopes with approximately 10 percent of its area covered by natural storages and swamps. This reservoir has a small storage capacity (1200 Ac-Ft.) and a small surface area (122 acres) at the top of dam elevation but has a comparatively large spillway capacity (3985 CFS).

5.2 Design Data

No specific design data is available for this watershed or structure. In lieu of existing design information, U.S.G.S. Topographic Maps (Scale 1" = 2000') were utilized to develop hydrologic parameters such as: drainage areas, reservoir surface areas, basin slopes, time of concentration, and other runoff characteristics. Elevation/storage relationships for the reservoir were approximated. Surcharge storage was computed assuming the surface area remained constant above the spillway crest. Some of the pertinent hydraulic design data was obtained and/or confirmed by actual field measurements at the time of visual field inspection.

Test flood inflow/outflow values and dam failure profiles were determined in accordance with the Corps of Engineers guidelines. Final values in this report are approximate and are no substitutes for actual detailed analysis.

The dam has a spillway length of 108 feet and a surcharge height of 5.0 feet between top of dam and spillway crest. The total length of the dam is 493 feet. The reservoir has a total storage capacity of 590 Ac-Ft. at the spillway crest elevation of 146.68 feet and can accommodate an estimated 0.19 inches of runoff from the drainage area of 60.0 square miles. One foot of depth in the reservoir above the spillway crest can accommodate 122 Ac-Ft. of volume of water equivalent to 0.04 inches of runoff from the watershed.

5.3 Experience Data. No historical data for recorded discharges or water surface elevations is available for this dam.

5.4 Test Flood Analysis. Recommended guidelines for the Safety Inspection of Dams by the U.S. Army Corps of Engineers were used for selection of the test flood. This dam is classified under those guidelines as a SIGNIFICANT hazard and INTERMEDIATE in size. Guidelines indicate that the one half PMF to the full PMF be used as a range of test floods for such classification. The watershed has a

total drainage area of 60.0 sq. miles, of which 6.0 sq. miles (10 percent) is swampy or covered by natural storage. This drainage area is sparsely populated, mostly wooded, and is hilly with rolling terrain. The average basin slope is 0.03 feet per foot which is considered flat to moderate. The watershed was assumed for this analysis to be relatively flat. A test flood equal to one half the PMF was calculated to be 300 CSM, equal to 18000 CFS and was adopted for this analysis since downstream areas are sparsely populated. Outflow discharges were also developed using the Corps of Engineers criteria for approximate routing. The routed outflow discharge for the test flood inflow was estimated to be 17400 CFS.

Calculations indicate the spillway capacity is hydraulically inadequate to pass the test flood (one-half PMF) and this flow would overtop the dam by approximately 3.72 ft. The maximum outflow capacity of the spillway without overtopping the dam, is 3985 CFS which is 22.9 percent of the test flood outflow discharge.

At the spillway crest elevation of 146.68 feet the capacity of the outlet works is 309 CFS. It will require 4.7 hours to lower the reservoir level the first foot assuming a pool surface area of 122 acres. For the total 590 Ac-Ft. of available storage below the spillway crest, it will require about 2 days to drain this reservoir through the existing outlet, assuming no additional inflow in the interim.

Since every foot of depth in the reservoir represents 0.19 inches of effective rainfall the overtopping of the dam by the test flood can not be eliminated even if the water level of the pond is kept significantly below the crest elevation.

- 5.5 Dam Failure Analysis. For this analysis a full-depth partial-width (34.0 feet) breach was assumed to have occurred in this dam. This will result in an unsteady flow phenomenon with one flood wave travelling up into the reservoir to rebound and reinforce another wave travelling downstream into the valley.

The calculated dam failure discharge of 8994 CFS, assuming the impounded water level is at the top of dam (elevation 151.68 feet), will produce an approximate water surface stage of 141.0 feet immediately downstream from the dam. This will raise the water surface approximately 3.5 feet above the depth just prior to failure when the discharge is 3985 CFS. The failure analysis covered the reach extending from the dam to a point a distance of 2000 feet downstream. It is assumed that normal uniform flow, following Manning's formula, will occur approximately at that point; and the depth of flow will equal 9.0 feet, based on the assumption that the Connecticut Turnpike which is located 2000 feet downstream from this site will withstand the impact of the wave. The depth of flow will range from 8.5 feet to 9.0 feet. The failure discharge will dim-

inish as the reservoir is emptied and the depth decreased. River valley storage and frictional losses will tend to reduce the discharge and flow velocities. Water surface elevations due to failure of the dam are computed and can be found in Appendix D.

The failure could result in possible erosion damage to the Connecticut Turnpike (Rt. 52) highway embankment, as well as the highway bridge at Edmond Road, and cause temporary disruption of utility service for those utilities located within the rights of way of those roadways. The prime impact area has been estimated, if the dam were to fail, and has been delineated on the drainage basin map in Appendix D. As a result of the failure analysis, the dam has been classified as a SIGNIFICANT hazard structure.

Hopeville Pond Dam

Inflow, Outflow and Surge Data

FREQUENCY IN YEARS	24-HOUR TOTAL RAINFALL IN INCHES	24-HOUR* EFFECTIVE RAINFALL IN INCHES	MAXIMUM INFLOW IN C.F.S.	MAXIMUM** OUTFLOW IN C.F.S.	SURCHARGE HEIGHT IN FEET	SURCHARGE STORAGE ELEVATION
100	7.0	4.5	7800	7400	6.40	153.08
½ PMF = Test Flood	11.9	9.5	18000	17400	8.72	155.40

*Infiltration assumed as 0.1"/hour

**Lake assumed initially full at spillway crest elevation 146.68
(top of dam = 151.68)

NOTES:

1. Q_{100} ; inflow discharges were computed by the approximate methodology of the Soil Conservation Service.
2. ½ PMF and "test flood" computation based on COE instructions and guidelines.
3. Maximum capacity of spillway without overtopping the top of the dam elevation (151.68) is equal to 3,985 C.F.S.
4. All discharges indicated are dependent upon the continued integrity of upstream storage reservoirs.
5. Surge storage is allowed to overtop the dam when exceeding the spillway capacity.
6. Test flood = Half PMF = 300 CSM = 18,000 CFS
(D.A. = 60 square miles).

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observation

The visual observations did not disclose evidence of present structural instability of the dam or spillway. Conditions observed that may lead to future instability of the dam include:

1. Continued erosion on the upstream slope of the embankment due to the lack of slope protection.
2. Presence of trees and rotting tree stumps on the embankment crest, upstream and downstream slopes that may be uprooted during storms or may further deteriorate and provide paths for seepage through the embankment.
3. Seepage at the downstream toe and the left abutment of the embankment, which could reduce the stability of the downstream slope during increased flow.

Some instability was observed along the walls on the banks of the downstream discharge channel for the spillway and the low-level outlet.

6.2 Design and Construction Data

No design, construction drawings or records for the embankment or spillway are available.

6.3 Post-Construction Changes. An inspection report dated July 15, 1974 indicated that funding had been allocated for repair before the inspection; however, records of these repairs are not available. This report also noted seepage at the downstream toe of the dam and indicated that drainage of the toe area may be needed.

6.4 Seismic Stability. The dam is located in Seismic Zone 1 and in accordance with recommended Phase 1 guidelines, does not warrant seismic stability analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

- a. Condition. Based on the visual inspection, the dam appears to be in FAIR condition. Several features could adversely affect the condition of the dam in the future:
 1. Rotting tree stumps on the crest, and slopes of the embankment.
 2. Trees on the downstream slope of the embankment between stations 4+60 and 4+95.
 3. Possible seepage at the downstream toe of the embankment right of the spillway and through the left abutment downstream from the embankment toe.
 4. Lack of riprap protection on the upstream slope of the embankment.
- b. Adequacy of Information. The available information was judged sufficient for a Phase I inspection.
- c. Urgency. The recommendations presented in Sections 7.2 and 7.3 should be carried out within one year of receipt of this report by the Owner.

7.2 Recommendations. The following items should be done under the direction of a qualified registered engineer:

1. Design and place riprap on the upstream slope of the embankment.
2. Remove trees growing on the downstream embankment slope between Station 4+60 and the left abutment and backfill root cavities with appropriate compacted soil.
3. Remove all stumps on the upstream face and at the downstream toe of the embankment and backfill root cavities with appropriate compacted soil.
4. Inspect the downstream face of the spillway when there is no flow over the spillway.
5. Periodically monitor the extent of wet areas and seepage at the downstream toe and left abutment of the embankment.

6. Backfill all animal burrows with proper materials.
7. Perform detailed hydrologic and hydraulic studies to further assess the need for and means to increase the project discharge capacity.
8. Perform an evaluation of the upstream impoundments to provide data for impacts on the Hopeville Pond Dam.
9. Determine the exact sizes of the outlet works controls.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

1. Maintain clearance of brush, vines, and trees on the embankment crest and slopes.
2. Institute a program of annual technical inspection by a qualified registered engineer.
3. Repair the downstream channel training walls.
4. Develop a record of operations and discharges that can be reviewed periodically to assess the reactions of the dam to unusual climatic events and physical changes of the dam.
5. Develop an "Emergency Action Plan" that will include an effective preplanned downstream warning system, reduction of inflows, locations of emergency equipment, materials and manpower, dewatering procedures, authorities to contact and potential areas that require evacuation. The Owner should also provide surveillance of the dam during intense rainfall activity.
6. Inspect the spillway during a no flow condition.
7. Develop and implement a regular maintenance program based on periodic inspections and equipment tests.

- 7.4 Alternatives. There are no alternatives to the recommendations discussed above.

APPENDIX A
INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Hopeville Pond Dam DATE April 9, 1980
TIME 9:00 A.M.
WEATHER Cloudy
W.S.ELEV. 147.6 U.S. 135.0 D.S.

PARTY:

- | | |
|---------------------------|---------------------------|
| 1. <u>A. Reed, CEM</u> | 6. <u>G. Castro, GEI</u> |
| 2. <u>L. Topp, CEM</u> | 7. <u>R. Stetkar, GEI</u> |
| 3. <u>E. Dessert, CEM</u> | 8. _____ |
| 4. <u>R. Brown, CEM</u> | 9. _____ |
| 5. <u>S. Khanna, CEM</u> | 10. _____ |

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

PERIODIC INSPECTION CHECKLIST

PROJECT Hopeville Pond Dam DATE April 9, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Crest Elevation	146.7
Current Pool Elevation	147.6
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed.
Movement or Settlement of Crest	None observed.
Lateral Movement	Too irregular to judge.
Vertical Alignment	Too irregular to judge.
Horizontal Alignment	Too irregular to judge.
Condition at Abutment and at Concrete Structures	Erosion behind spillway left training wall and adjacent to right training wall; depression at left abutment due to trespassing.
Trespassing on Slopes	At several locations on crest, upstream and downstream slopes.
Sloughing or Erosion of Slopes or Abutments	Erosion at water level of upstream slope.
Rock Slope Protection - Riprap Failures	No slope protection.
Unusual Movement or Cracking at or Near Toe	None observed.
Unusual Embankment or Downstream Seepage	Wet area along downstream toe of embankment section right of spillway; slow seepage from left abutment 20 ft. downstream of dam; standing water 20 ft. from downstream toe at sta. 4+10.
Piping or Boils	None observed.

PERIODIC INSPECTION CHECKLIST

PROJECT Hopeville Pond Dam DATE April 9, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<p><u>DAM EMBANKMENT</u> (Cont.)</p> <p>Foundation Drainage Features</p> <p>Toe Drains</p> <p>Instrumentation System</p> <p>Vegetation</p>	<p>None known.</p> <p>None known.</p> <p>None known.</p> <p>Grass covered; numerous tree stumps on upstream and downstream slopes and crest up to 24 in. diameter. trees at downstream toe, sta. 4+60 to 4+95.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT Hopeville Pond Dam DATE April 9, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u></p> <p>a. Approach Channel</p> <p>Bottom Conditions</p> <p>Rock Slides or Falls</p> <p>Log Boom</p> <p>Debris</p> <p>Drains or Weep Holes</p> <p>b. Intake Structure</p> <p>Stop Logs and Slots</p> <p>a. Approach Channel</p> <p>Bottom Conditions</p> <p>Rock Slides or Falls</p> <p>Log Boom</p> <p>Debris</p> <p>Drains or Weep Holes</p> <p>b. Intake Structure</p> <p>Stop Logs and Slots</p>	<p>Outlet works at <u>right</u> spillway abutment.</p> <p>No approach channel.</p> <p>Unobservable</p> <p>None observed.</p> <p>None</p> <p>None observed.</p> <p>None observed.</p> <p>Concrete with manually operated sluice gate.</p> <p>None observed</p> <p>Outlet works through <u>left</u> dam embankment.</p> <p>No approach channel.</p> <p>Unobservable</p> <p>None observed.</p> <p>None</p> <p>None observed.</p> <p>None observed.</p> <p>Concrete with manually operated sluice gate.</p> <p>None observed.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT Hopeville Pond Dam DATE April 9, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - TRANSITION AND CONDUIT</u></p> <p>General Condition of Concrete</p> <p>General Condition of Concrete</p> <p>Rust or Staining</p> <p>Erosion or Cavitation</p> <p>Cracking</p>	<p>Outlet works at <u>right</u> spillway abutment.</p> <p>This and all other conditions are not observable under water.</p> <p>Outlet works through <u>left</u> dam embankment.</p> <p>N.A. Conduit is riveted steel pipe.</p> <p>Steel pipe severely rusted; several holes in downstream invert.</p> <p>None observed.</p> <p>None observed.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT Hopeville Pond Dam DATE April 9, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Visible reinforcing</p> <p>Any Seepage or Efflorescence</p> <p>Condition at Joints</p> <p>Drain Holes</p> <p>Channel</p> <p>Loose Rock or Trees Overhanging Channel</p> <p>Condition of Discharge Channel</p>	<p>Outlet works at <u>right</u> spillway abutment.</p> <p>Fair with minor spalling and cracking.</p> <p>Some</p> <p>Minor surface spalling and cracking.</p> <p>None observed.</p> <p>None observed.</p> <p>Some efflorescence observed.</p> <p>Fair</p> <p>None observed.</p> <p>Outlet channel common with spillway channel,</p> <p>None observed.</p> <p>Some dislodged stones in stone masonry wall with some settlement of area behind walls.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT Hopeville Pond Dam DATE April 9, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u>	Outlet works through <u>left</u> dam embankment.
General Condition of Concrete	Fair with spalling and cracking.
Rust or Staining	Some
Spalling	Some surface spalling and cracking.
Erosion or Cavitation	None observed.
Visible Reinforcing	None observed.
Any Seepage or Efflorescence	Some efflorescence observed.
Condition at Joints	Fair
Drain Holes	None observed.
Channel	Stone masonry lined tailrace.
Loose Rock or Trees Overhanging Channel	Some trees overhang channel.
Condition of Discharge Channel	Some dislodged stone in masonry walls.

PERIODIC INSPECTION CHECKLIST

PROJECT Hopeville Pond Dam DATE April 9, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u></p>	
<p>a. Approach Channel</p>	<p>No approach channel, natural streambed.</p>
<p>b. Weir and Training Walls</p>	<p>Weir unobservable because of high water conditions - training walls in generally good condition.</p>
<p>Spalling</p>	<p>Some spalling in downstream training walls on both sides.</p>
<p>Any Visible Reinforcing</p>	<p>None observed.</p>
<p>Any Seepage or Efflorescence</p>	<p>Minor efflorescence in downstream training walls.</p>
<p>Drain Holes</p>	<p>None observed.</p>
<p>c. Discharge Channel</p>	
<p>General Condition</p>	<p>Good</p>
<p>Loose Rock Overhanging Channel</p>	<p>None</p>
<p>Trees Overhanging Channel</p>	<p>Some overhanging trees.</p>
<p>Floor of Channel</p>	<p>Boulders.</p>
<p>Other Obstructions</p>	<p>Bridge pier downstream. Small tree growing in middle of channel.</p>
<p>Other Comments</p>	<p>Some stones missing from dry stone masonry wall on right side of channel; masonry wall collapsed locally adjacent to spillway on left side of channel. Some local settlement behind wall.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT Hopeville Pond Dam DATE April 9, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - SERVICE BRIDGE</u></p>	<p>Outlet works at <u>right</u> spillway abutment: No service bridge. Gate valves bolted to intake structure headwall.</p> <p>Outlet works through <u>left</u> dam embankment: No service bridge. Gate valve bolted to intake structure headwall.</p>

APPENDIX B
ENGINEERING DATA

APPENDIX B-1

Correspondence pertaining to the history, maintenance, and modifications to the Hopeville Pond Dam as well as copies of past inspection reports are located at:

State of Connecticut
Department of Environmental Protection
State Office Building
165 Capitol Avenue
Hartford, Connecticut
Attention: Mr. Victor J. Galgowski,
Dam Safety Engineer

Mr. John Olsen, Director
Division of Conservation and Preservation
Region 4
Hartford, Connecticut

APPENDIX B-2

SELECTED COPIES OF PAST INSPECTION REPORTS

No. _____

WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA

IV-10

7

CT-438

Inventoried
By _____

Date _____

Name of Dam or Pond Hopeville Pond

Code No. T 147 S 33 Q 66 PG 29

Nearest Street Location _____

Town _____

U.S.G.S. Quad. T 147 S 33 Q 66 PG 29

Name of Stream _____

Owner STATE OF CONN.

Address _____

ok
2/73

Pond Used For REC D.A. 59.10 SM

Dimensions of Pond: Width _____ Length _____ Area 149.4

Total Length of Dam 450' Length of Spillway _____

Location of Spillway over bed

Height of Pond Above Stream Bed 10'

Height of Embankment Above Spillway 4.5'

Type of Spillway Construction _____

Type of Dike Construction _____

Downstream Conditions _____

Summary of File Data Repair done 1/1/52

Remarks _____

Remarks _____

Remarks _____

Remarks _____

Remarks _____

Would Failure Cause Damage? no Class B

1850
built
1910

IN THIS ROADWAY TO BE CONVEYED
TO HARRY BANKER.

TO LAND NOW OR FORMERLY
ES. IN ALIEN POSSESSION

STONE HILL ROAD (SO-CALLED)

LAND TO BE CONVEYED TO THE BANKING COMPANY

POND

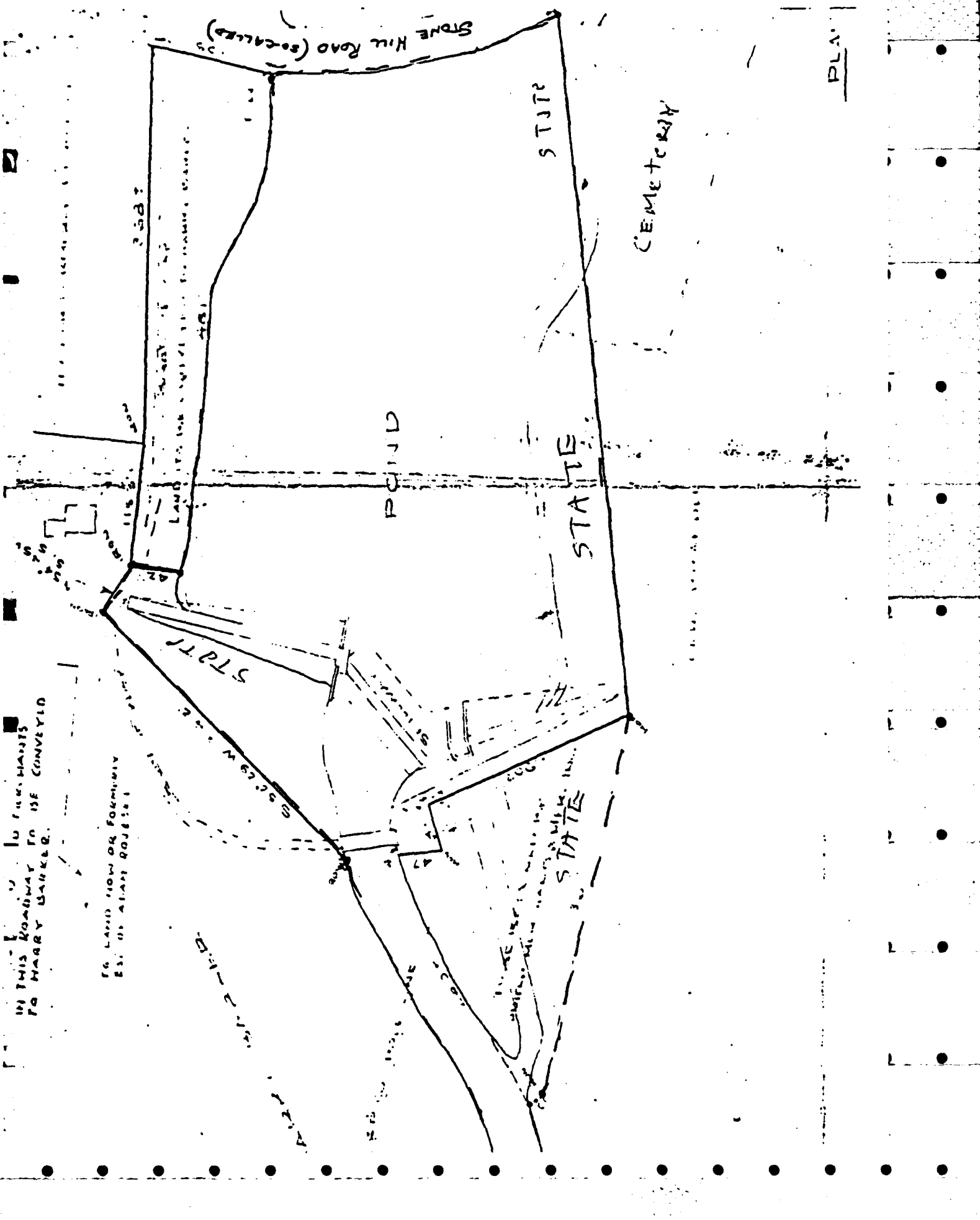
STATE

STATE

STATE

CEMETERY

PLAN



Parcel - #133

Forest - Pachaug

Grantor - United Merchants and Manufacturer's Inc.

Date -

92.0 Acre (Forest)

Area - 54.5 Acre (F & G)

146.5 Acres

Purchase Price - Hopewille Dam

1000.
**HOLD UNTIL
WE FIND OUT MORE
ON RIGHT OF WAY**
Ch

Situated in the towns of Voluntown, Griswold and North Stonington, County of New London, State of Connecticut, bounded and described as follows:

FIRST PIECE: Situated in the town of Voluntown, containing one acre, more or less, and is bounded and described:

Beginning at a mere stone located 502.2 feet, more or less, southerly from a rock marked "B" located at a point near the southerly line of a highway; thence
Southerly - 42° 10' E - 122 feet, more or less, to a rock marked "B"; thence
Northerly - 72° 00' E - 163 feet, more or less, to a mere stone; thence
Southerly - 81° 15' E - 98 feet, more or less, to a drill cut in a rock; thence
Southerly - 21° 00' E - 115.5 feet, more or less, to a point 3 feet west of a cross on a rock; the last four courses bounding on land now or formerly of John and Ilmi Talvitie; thence
Northerly - 1° 50' E - 155 feet, more or less, bounding easterly on land now or formerly of Frederick and Lillian Kauppinen, to a highwater mark of Beach Pond; thence
Westerly - in the highwater mark of said Pond 325 feet, more or less, to a point; thence
Southerly - 72° 00' W - bounding northerly on the second piece, herein described, 90 feet, more or less, to the point of beginning.

SECOND PIECE: (F & G) Situated in the town of Voluntown, containing 3 acres, more or less, with the dam and related structures thereon standing, together with easements, appurtenant to said land and dam, to impound water and to flow an estimated 350 acres, more or less, bounded and described:

Beginning at a mere stone which marks the northwest corner of the above described first piece; thence
Northerly - 20° 00' E - 502.2 feet, more or less, bounded westerly on land now or formerly of Carl J. Anderson to a rock marked "B"; thence
Northerly - 63° 29' E - 254.0 feet, more or less, bounding northerly on the highway to a mere stone at a corner of a wall; thence
Southerly - 01° 50' W - 593.0 feet, more or less, crossing Beach Ford, to a point at the highwater mark of said pond, being the northeast corner of the above described first piece; thence
Westerly - in the said highwater mark, 325 feet, more or less, to a corner; thence
Southerly - 72° 00' - 90 feet, more or less, to the point of beginning; the last two courses bounding on the above described first piece.

Parcel 11

Yoselevsky begins at a point 224.4 feet southerly from the northwest corner of land of the said Gauthier, and runs on a bearing of N 82° 31' W 175 feet to the shore of Pachaug Pond.

FOURTEENTH PIECE: Situated in the town of Griswold, at Pachaug Pond, containing 17.5 acres, being flooded with water when the pond is at its legal height, described as follows:

Beginning at the southeast corner of said lot at a stone near a ditch; thence
Northerly 31° 00' E - 38½ rods by land of Ezra Whipple to a bound; thence
Northerly - 24° 00' W - 83 rods by land of Orrin Bromley, Nathan Prentice, and Ezra Whipple, in part by each, to a bound; thence
Southerly - 82° 00' W - 38½ rods by land of Nathan Prentice to a bound; thence
Southerly - 25° 30' E - 53 rods by land of Hezekiah Boardman to a bound; thence
10° 45' W - 8 rods by land of Hezekiah Boardman to a bound; thence
40° 00' E - 39½ rods by land of Hezekiah Boardman to the first mentioned bound.

For further description refer to deed of Hezekiah Meech to William Buckingham, dated September 2, 1865, and recorded in the land records of Griswold, Vol. 7, Page 580.

FIFTEENTH PIECE: Situated in the town of Griswold, at Hopeville Pond, containing 13 acres, more or less, with the dam and related structures thereon standing, together with all easements, appurtenances to said land and dams, to impound water and flow an estimated 160 acres of land and described as follows:

Beginning at an elm tree at a point in the westerly line of the Stone Hill Road, so-called, near the northerly shore of said pond; thence
Westerly - 481 feet, more or less, along the shore of said pond to a corner; thence
Northerly - 42 feet, more or less, to an iron pin, the last two courses running in line of land of Henry Barker; thence
Northerly - 54° 45' W - 51.5 feet, more or less, to an iron; thence
Northerly - 52° 29' W - 314.2 feet, more or less, to an iron set at the northerly shore of Pachaug River, so-called; thence
Southwesterly - 720 feet, more or less, along the northerly bank of said river to the southeast corner of land now or formerly of Stanislaw Radiszensky, the last three courses running in the line of land of Henry and Sarah Barker; thence
Southerly - crossing said Pachaug River to its southerly bank; thence
Easterly - 480 feet, more or less, along the southerly bank of said river to a point where the raceway from the power station joins said river; thence
Southerly - 10 feet, more or less, to an iron set near the base of a large elm tree; thence

Parcel - (Continued)

Southeasterly - 361 feet, more or less, to an iron set at a point 206 feet, more or less, southerly of another iron set at a point 11 feet, more or less, northerly of the northeast corner of said power station; thence
Easterly - 650 feet, more or less, in a straight line to a point in the westerly line of said Stone Hill Road which is in range with the northerly face of the southerly abutment of the bridge across Hopeville Pond, so-called; the last four courses running in line of land now or formerly of Carl Brandle; thence
Northerly - 275 feet, more or less, bounding easterly on Said Stone Hill Road to point of beginning.

Dam → Together with a right of way for all purposes over the existing roadway extending westerly from Stone Hill Road to said dam and power station.

SIXTEENTH PIECE: Situated in the town of North Stonington, located at Billings Pond, containing 8 acres, more or less, and is bounded and described in deed of William W. Rodman to the Hopeville Manufacturing, dated June 10, 1852 as follows:

"My cedar swamp at the south end of Billings Pond, and so much land around the shore of said Cedar Swamp south of my north line as the pond will flow when full with a dam or bulkhead at the outlet of said pond to raise the water in said pond to a hole in a rock with an iron bolt in it at the east end of the dam or bulkhead at the outlet of said pond, and also to a hole and iron bolt in a rock at the west end of said dam or bulkhead which holes with said iron bolts in the same are of equal heights from the surface of the water, and said holes were drilled into said rocks by Wm. C. Stanton in the presence of Henry A. Lathrop and Thomas Phillips, June 2, 1852; and the quantity of swamps and land around the same which will be flowed by the water in said pond when at the height of the afore described marks, will be about 8 acres, more or less."

Recorded in Volume 7, Pages 228 and 229, North Stonington land records. Together with the right to construct and maintain a dam on land owned releases and to flow 110 acres, more or less, of land, deepen the channel of the brook flowing out of said pond, and other privileges, as appears in the deed of Gilbert Billings to Luther Capron dated March 30, 1846 as recorded in Volume 6, Page 282 of the North Stonington Land Records.

Meaning and intending to convey all of the remaining portion of the real estate described in the deed of the Glasgo Finishing Co. to the releasor dated January 11, 1954.

Griswold Land Records Volume 39, Pages 357-365
Voluntown Land Records Volume 27, Pages 564-571

Dam Inspection Report

Town: Mineola

Date of Inspection: July 15, 1974

Name of Impoundment: Hopewille Pond

Remarks: This dam seemed to be in quite good condition considering the large amount of money allocated before for its repair. The toe along the northern dike is wet much the same case as with Beant Pond may need drainage. The concrete walls on the southern side and in general need some renovation but in general in this case I think maintenance is more called for than major repair - the only major thing is sewage which

Recommendations: should be checked before trouble arises - generally the spillway section seemed O.K., of course if this dam ever failed there would be big trouble down stream in Jewett City.

Owner notified: Phone _____ (date) Letter: _____ (date)

Robert Somichsen
(Inspector's Signature)

Fish Review, Planning

INTERDEPARTMENT MAIL

DATE

Feb. 27, 1962

TO Mr. L. M. Thorpe, Director	DEPARTMENT State Fish & Game Dept.
C. I. Sweeney, Deputy Commissioner	DEPARTMENT Public Works

SUBJECT
Repairs & Alterations to Hopaville Dam, Griswold, Conn. Project RI-RR-118 P.O. 51481

You are advised that the above project is now complete and ready for use. It is hereby placed in your custody, effective February 23, 1962, and subject to the following conditions:

1. The State Fish & Game Department shall assume full responsibility for proper maintenance and for damages incurred to the premises.
2. The premises in question shall be free to access by the contractor or his agents for the purpose of performing any corrective work which may become necessary.
3. The period of guarantee for all materials and work installed under the contract becomes effective as of February 23, 1962. It is understood that the above permission to operate and use these premises and appurtenances in no way constitutes final acceptance of the project.

The total cost of this project to date is \$9,773.00. The State Comptroller is requested to place insurance as necessary to fully cover the facility and equipment, effective as of February 23, 1962.

C. I. Sweeney
Deputy Commissioner

WS/jb

RECEIVED
FEB 28 1962
CONN. BOARD OF
FISHERIES & GAME

LAKE AND POND DRAINAGE SCHEDULES

19

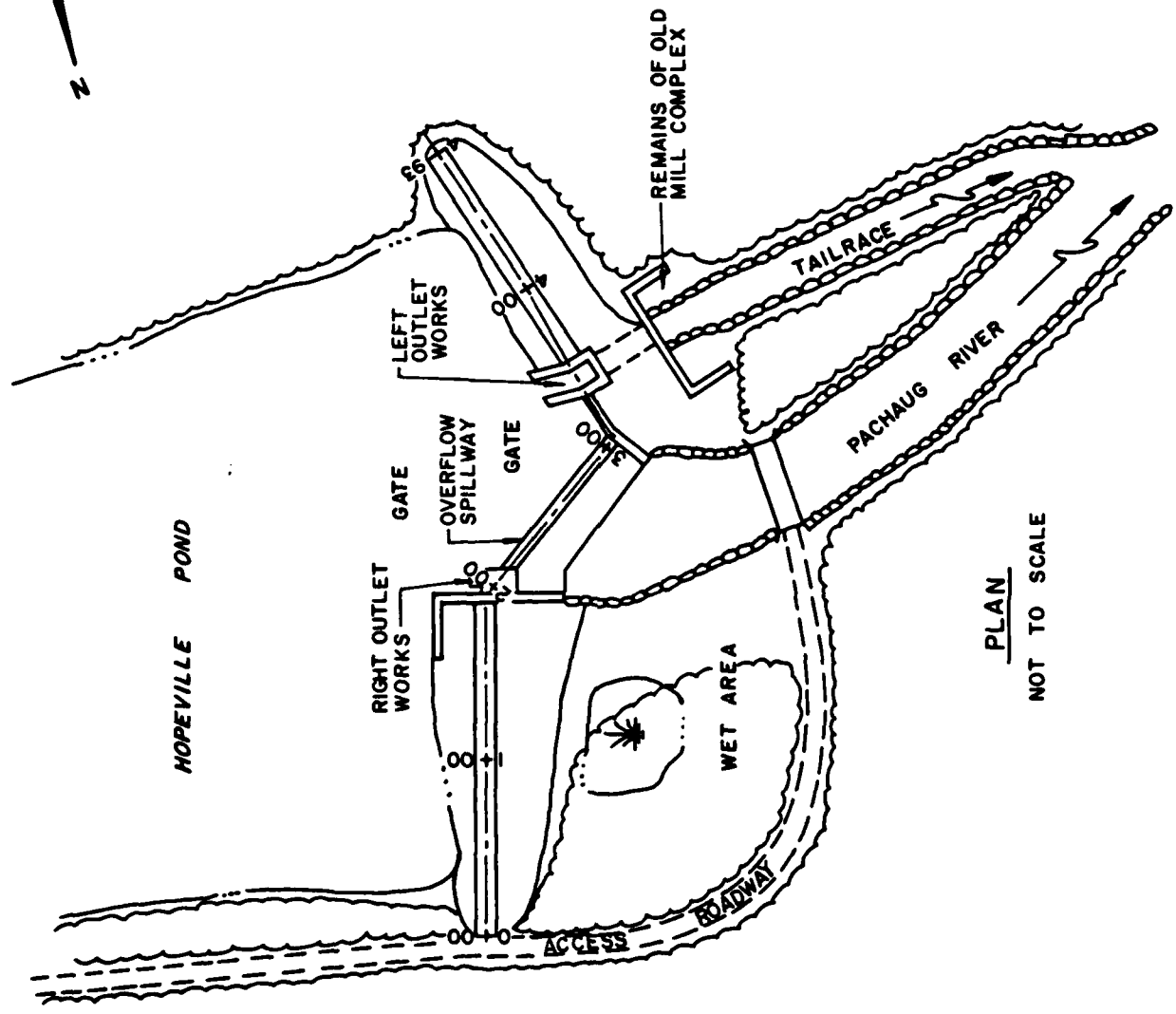
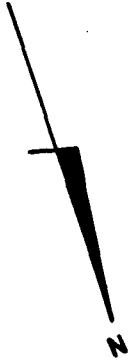
<u>OWNER</u>	<u>REQUESTED BY</u>	<u>PURPOSE</u>	<u>SCHEDULED</u>	<u>ACTUAL</u>	<u>REMARKS</u>
Peveville and Wiswold	Steven Merchant	Beach work cutting stumps	Date Start: 9/31/75 Date End: 10/8/75 Amount: 5 feet	9/31/75 10/8/75	Very easy to lower, could be tough to fill back up -Check back -- (over)
Pachaug Pond Wiswold	John Olsen	Survey work	Date Start: 10/10/75 Date End: 11/21/75 Amount: 14" max.	10/10/75 11/21/75	Pachaug was very tough to lower. We had a lot of rain and could only get it down 14" (over)
Green Falls and	John Olsen	Beach work move boat launch area	Date Start: Date End: Amount: 2 feet	10/10/75 4/23/76	Because of heavy rain during Fall - Had difficulty lowering
			Date Start: Date End: Amount:		
			Date Start: Date End: Amount:		
			Date Start: Date End: Amount:		

Hopeville Pond is relatively easy to lower, but could be tough to refill without help from Pachaug Pond or rainfall.

Pachaug was to be lowered 6 feet, but due to heavy rainfall we could only reach 14 inches. Easy to refill but very difficult to lower. Be sure top grates at spillway are kept clean to insure maximum water flow when trying to lower.

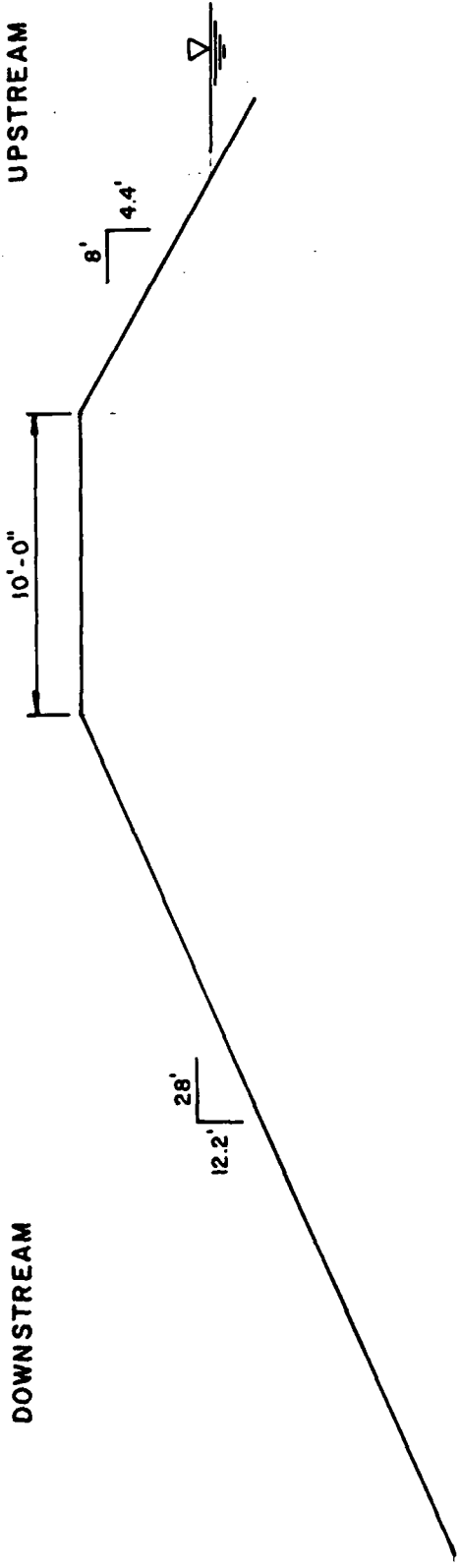
APPENDIX B-3

PLANS, SECTIONS AND DETAILS



PLAN
NOT TO SCALE

HOPEVILLE POND DAM
GENERAL PLAN



TYPICAL SECTION RIGHT SIDE
STATION 1+50

SCALE : 1" = 6'-0"

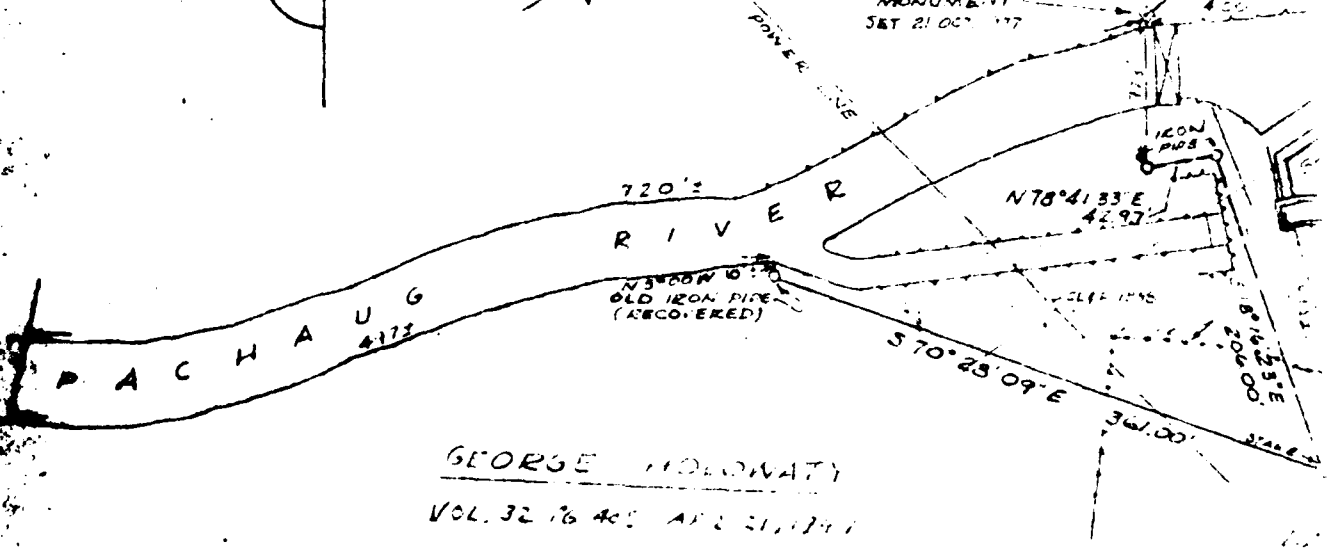
HOPEVILLE POND DAM

MAGNETIC NORTH M.A.Y 1955

JOHN AND DORIS BLUMIE
VOL. 47 PG. 23 JAN. 25, 1970

587°08'27"W
568°48'55"W
547°24'W
57°08'54"W

MONUMENT
SET 21 OCT 1977



GEORGE HOLDWATY
VOL. 32 PG. 405 APR 21, 1971

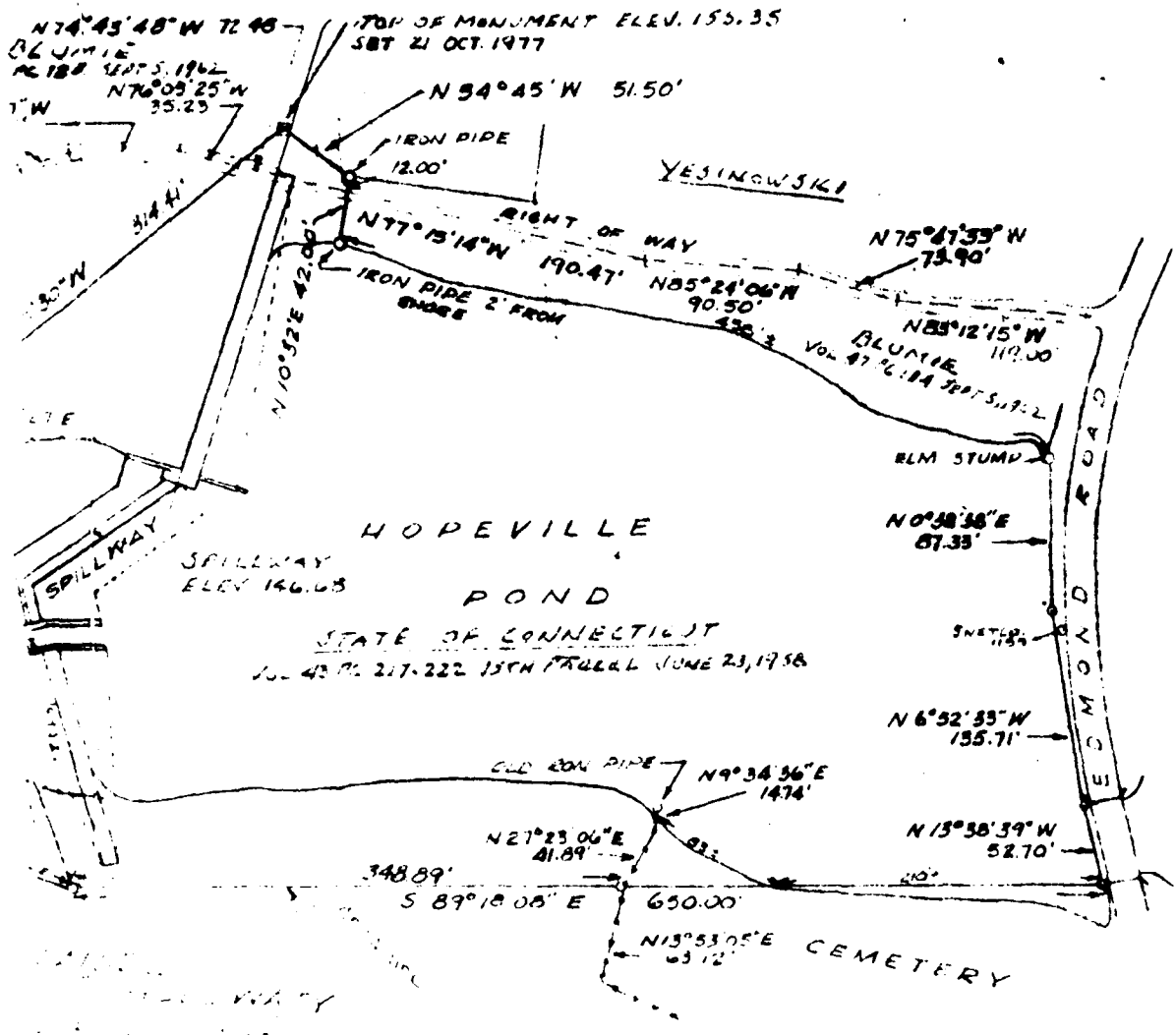
ASHLAND COUNTY
JUL 17 PG 12 MAY 11, 1972

I HEREBY CERTIFY THAT THIS MAP AND SURVEY WERE PREPARED IN ACCORDANCE WITH THE STANDARDS OF A CLASS A-2 SURVEY AS DEFINED IN THE CODE OF ORDINANCES FOR STANDARDS OF ACCURACY OF SURVEYS AND MAPS, ADOPTED AND AS AMENDED BY THE CONN. ASSOCIATION OF LAND SURVEYORS, INC.

Shepherd G. ...



DEED REFERENCE FOR SPILLWAY WETBONE VOL 26 PG 202 NOV. 2, 1915
 "THE RIGHT OF ARLAND EATON CO. TO MAINTAIN THE ROLLWAY OR
 THEIR DAM OR ANY OTHER DAM HEREON AFTER ERECTED ON THEIR
 LAND AT THE PRESENT FRONT OF THE ROLLWAY OF THEIR CONCRETE
 DAM AND TO MAINTAIN A FLASH BOARD ON SUCH DAM OR DAMS
 ONE FOOT ABOVE SAID ROLLWAY.
 ROLLWAY ELEV 146.68

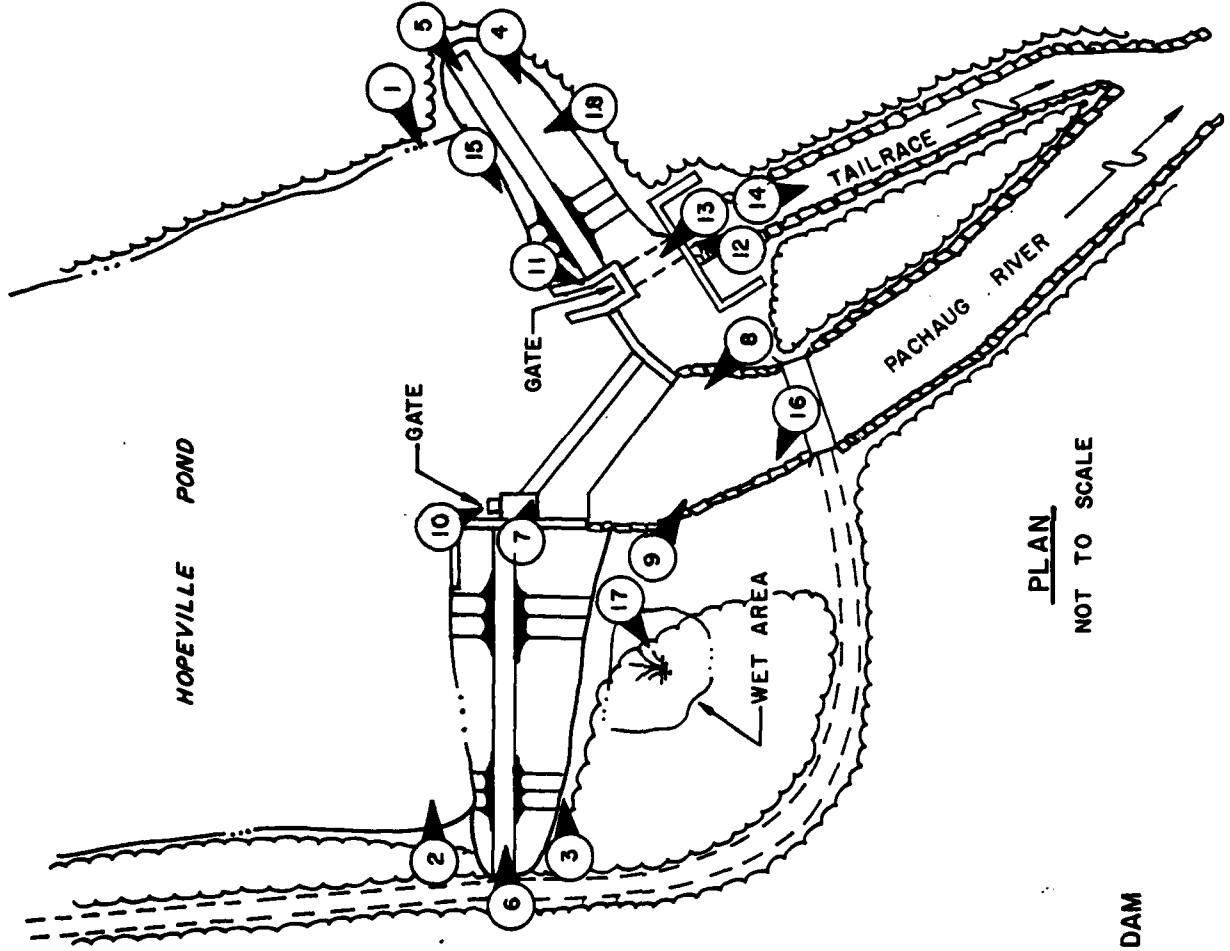
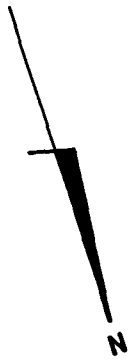


PLAN MADE FOR THE STATE OF CONNECTICUT
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 AT HOPEVILLE DAM HOPEVILLE, CONN.
 SCALE 1"=100' CHANDLER, PALMER & KING
 NORWICH, CONN.
 DEC. 1977

2

APPENDIX C

PHOTOGRAPHS



HOPEVILLE POND

GATE

GATE

TAIL RACE

PACHAUG RIVER

WET AREA

PLAN

NOT TO SCALE

HOPEVILLE POND DAM
PHOTO INDEX



PHOTO C-1 Upstream face of dam looking from left abutment.



PHOTO C-2 Upstream face of dam looking from right abutment.



PHOTO C-3 Downstream face of dam looking from right abutment.



PHOTO C-4 Downstream face of dam looking from left abutment.



PHOTO C-5 Crest of dam looking from left abutment.



PHOTO C-6 Crest of dam looking from right dam abutment.



PHOTO C-7 Spillway crest looking from right spillway abutment.



PHOTO C-8 Spillway crest looking from left side spillway discharge channel.



PHOTO C-9 Spillway discharge channel looking from right spillway abutment. Note access bridge in background.



PHOTO C-10 Right outlet works manually controlled sluice gate with lockable hood.



PHOTO C-11 Left outlet works manually controlled sluice gate with lockable hood.



PHOTO C-12 Left outlet works conduit and stone masonry foundation ruins at downstream toe of dam.



PHOTO C-13 Sluice gate invert for left outlet works taken inside 96-inch diameter culvert (see C-14).



PHOTO C-14 Tailrace looking from invert of 96-inch diameter outlet conduit left dam embankment.

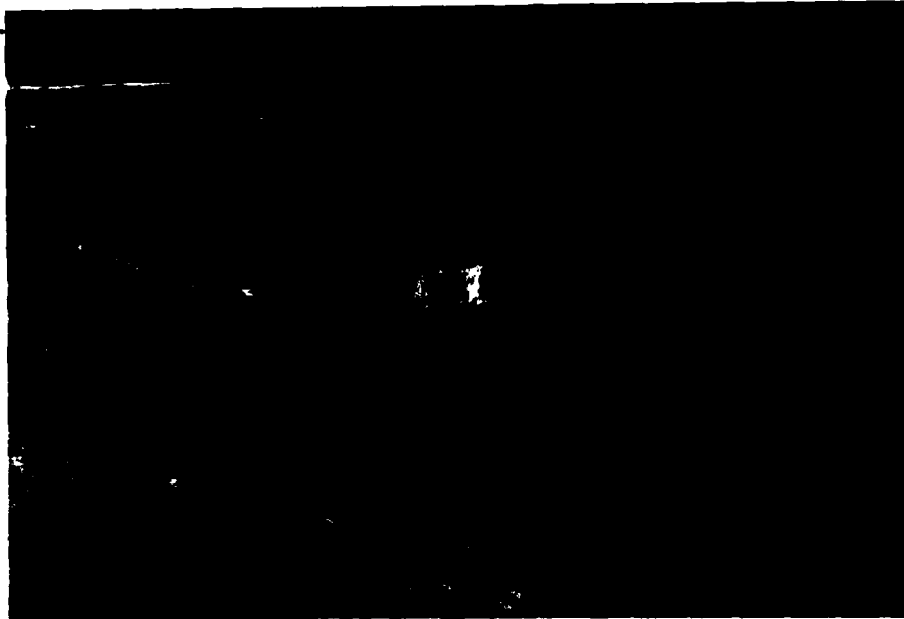


PHOTO C-15 Rotting tree stumps on upstream face of left dam embankment.



PHOTO C-16 Dislodged stones in stone masonry wall right side of spillway discharge channel.

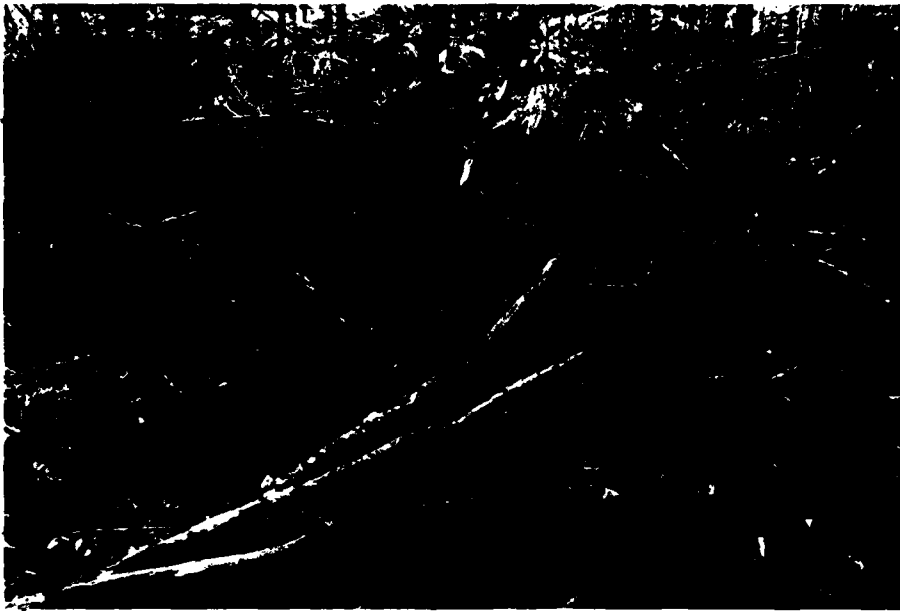


PHOTO C-17 Wet area at toe of right dam embankment.

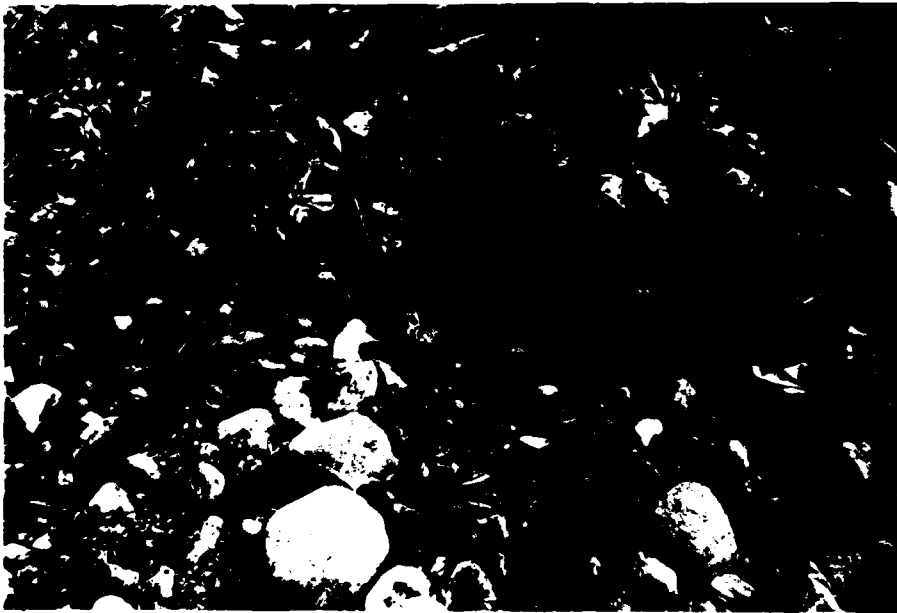
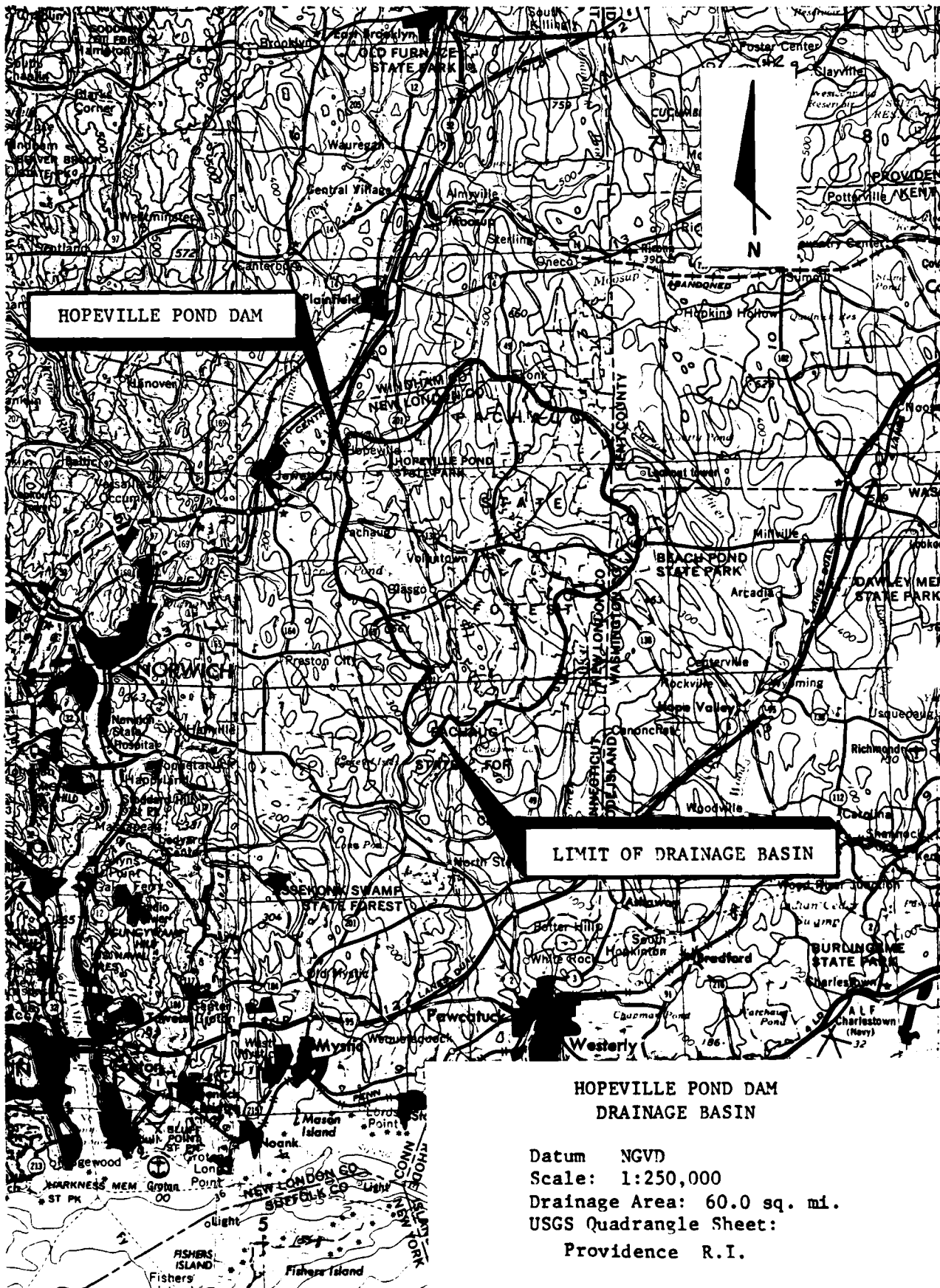


PHOTO C-18 Animal hole on downstream slope dam embankment.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

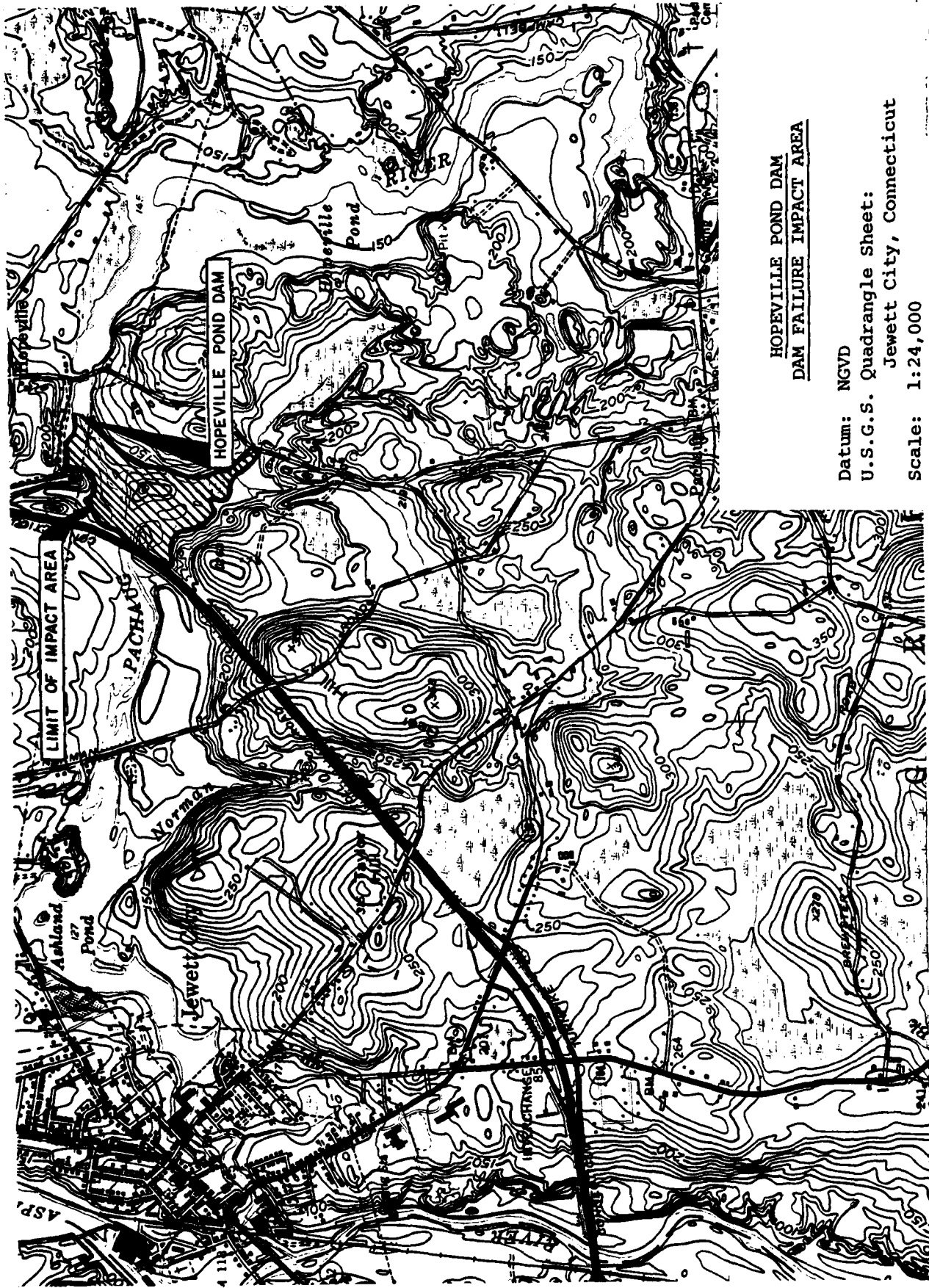


HOPEVILLE POND DAM

LIMIT OF DRAINAGE BASIN

HOPEVILLE POND DAM
DRAINAGE BASIN

Datum NGVD
 Scale: 1:250,000
 Drainage Area: 60.0 sq. mi.
 USGS Quadrangle Sheet:
 Providence R.I.



**HOPEVILLE POND DAM
DAM FAILURE IMPACT AREA**

Datum: NGVD
U.S.G.S. Quadrangle Sheet:
Jewett City, Connecticut
Scale: 1:24,000

Plate D-1A

HOPEVILLE POND DAM

A. Size Classification

Height of dam = 18.0 ft.; hence SMALL

Storage capacity at top of dam (elev. 151.5) = 1200 AC-FT.; hence Intermediate

Adopted size classification INTERMEDIATE

B. Hazard Potential

Failure of the dam could result in possible erosion damage to the Connecticut Turnpike (Route 52) highway embankment, as well as the highway bridge at Edmond Road, and cause temporary disruption of service for those utilities located within the rights of way of these roadways.

C. Adopted Classifications

<u>HAZARD</u>	<u>SIZE</u>	<u>TEST FLOOD RANGE</u>
<u>SIGNIFICANT</u>	<u>INTERMEDIATE</u>	<u>FULL PMF to Half PMF</u>
Adopted Test Flood =	Half PMF =	<u>300</u> CSM
		= <u>18000</u> CFS

D. Overtopping Potential

Drainage Area =	<u>60.0</u> sq. miles
Spillway crest elevation =	<u>146.68</u> NGVD
Top of Dam Elevation =	<u>151.68</u> NGVD
Maximum spillway discharge	
Capacity without overtopping of dam =	<u>3985</u> CFS
"test flood" inflow discharge =	<u>18000</u> CFS
"test flood" outflow discharge =	<u>17400</u> CFS
% of "test flood" overflow carried by spillway without overtopping =	<u>22.9 %</u>
"test flood" outflow discharge portion which overflows over the dam =	<u>13415</u> CFS
% of test flood which overflows over the dam =	<u>77.1 %</u>

Estimating Maximum Probable Discharges - Inflow and Outflow Values

Date of Inspection: April 9, 1980

Name of Dam Hopeville Pond Dam; Location of Dam Pachaug River, Town Jewett City

Watershed Characterization Flat to moderate; large storage and swamps upstream; 6.0 sq. miles of drainage area is swampy or occupied by storage reservoirs

Adopted "test" flood = Half PMF = 350 CSM = 18000 CFS; Re = Effective Rainfall = 9.5 inches

D.A. = Drainage Area (Gross) = 60.00 Square Miles; Basin Slope = 0.03 hence; Flat to moderate

S.A. = Surface Area of Reservoir = 0.19 Square Miles; Time of Concentration = more than 6 hours

Shape and Type of Spillway = Free overflow; vertical fall; sharp crest; cascade arrangement

B = Width of Spillway = 100 feet; C = Coefficient of Discharge = (-Friction) = 3.30

Maximum Capacity of Spillway Without Overtopping = 3985 CFS = 23.4 % of test flood

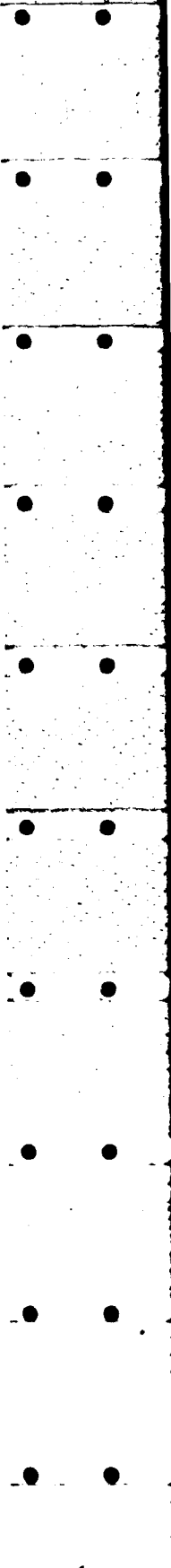
Top of Dam Elevation = 151.68; Spillway Crest Elevation = 146.68

Overflow portion of Length of Dam = 385 ft.; C = Coefficient of discharge for Dam = 3.0

Name of Dam	Test Flood		Inflow Characteristics		Outflow Characteristics First Approximation			Outflow Characteristics Second Approximation			Outflow Characteristics Third Approximation (Adopted)		
	Qp CSM	CFS	h0 in feet	S0 in in.	Qp1 CFS	h1 in ft.	S1 in in.	S2 in in.	h2 in ft.	Qp2 CFS	S3 in in.	h3 in ft.	Qp3 CFS
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Σ 100 yr. = 130	7800		1.50	0.06	-	-	-	-	-	-	0.05	6.40	7400
Σ 1/2 PMF = 300	18000		8.75	0.34	-	SEE	PLATE D-11	-	-	-	0.35	8.72	17400

Qp = Discharge; h = Surcharge height; S = Storage in inches

NOTE: Outflow discharge values are computed as per COF guidelines.



NAME OF DAM: Hopeville Pond Dam

ESTIMATING EFFECT OF SURCHARGE STORAGE ON "TEST FLOOD"

A. This routing of floods through the reservoir was carried out according to the guidelines established by the Corps of Engineers in Phase I Inspection for Dam Safety Investigations issued in March, 1978.

B. Formulas used are as follows:

- i. For no overtopping: $Q = C_1 B_1 h_1^{3/2}$
 For overtopping: $Q = C_1 B_1 [h_2 + F.B.]^{3/2} + C_2 B_2 h_2^{3/2}$
 For open channel flow: N/A
 For orifice flow: N/A

Where C_1 = coefficient of discharge for spillway ; B_1 = length of spillway
 C_2 = coefficient of discharge for dam ; B_2 = length of dam
 h_1 = head over spillway crest (feet) ; h_2 = head over dam (feet)
 F.B. = distance between spillway crest and top of dam

ii. Surcharge storage in inches = $S = 12 (h_1 + h_2) \frac{S.A.}{D.A.} = 0.038h$
 where S.A. = surface area
 D.A. = drainage area in sq. miles

iii. $Q_{outflow} = Q_{inflow} (1 - \frac{S}{Re})$; where Re = effective rainfall = 9.5"

iv. Length of dam = 385 ft. ; Top of Dam elev. = 151.68 ; c for dam = 3.0
 Length of spillway = 108 ft. ; Spillway crest el. 146.68 ; c for spillway = 3.3

$Q = 3.3 \times 108 (5 + h_2)^{1.5} + 3 \times 385 h_2^{1.5}$ where h_2 is head over top of dam

$S = \text{Storage in inches} = 12 h \frac{S.A.}{D.A.} = 0.038h$ where h is head over spillway crest

v. $Q_{inflow} = 18000 \text{ C.F.S.}$

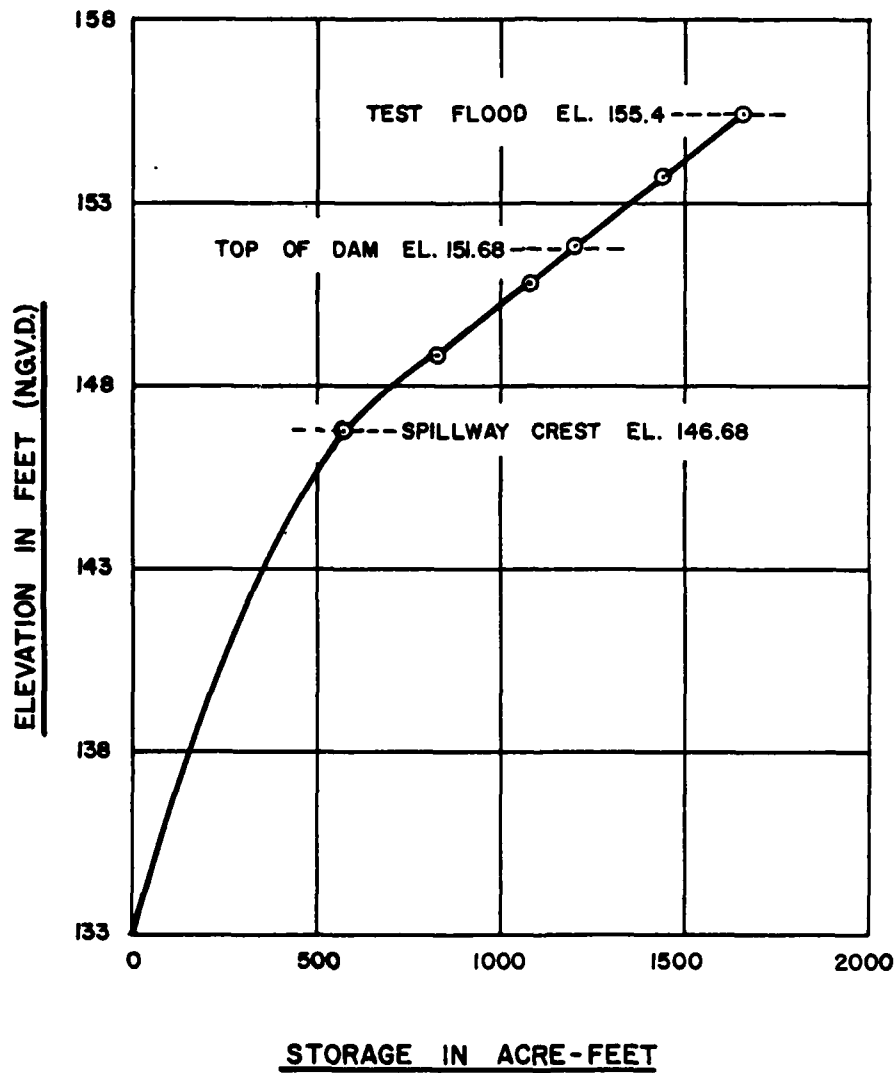
Q in CPS	Elevation	Total Head over crest $h_1 + h_2 = h$	Storage in inches = S	Remarks
17856	148.68	2.0	0.076	
17712	150.68	4.0	0.152	
17568	152.68	6.0	0.228	
17424	154.68	8.0	0.304	
17280	156.68	10.0	0.308	
17400	155.4	8.72	0.3572	

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

BASIC DATA

Name of dam Hopeville Pond Dam Name of town Jewett City, Ct.
 Drainage area = 60.0 sq. mi., Top of dam 151.68 NGVD
 Spillway type = Free overflow; vertical fall;
Sharp crest; cascade type Crest of spillway 146.68 NGVD
 Surface area at crest elevation = 122 Acres = 0.19 sq. mi.
 Reservoir bottom near dam = 132.0 NGVD
 Assumed side slopes of embankments 2:1
 Depth of reservoir at dam site 18.68 = y_0 = 18.0 ft.
 Mid-height elevation of dam = 142.0 NGVD
 Length of dam at crest = 385 ft.: excluding 108 ft. of spillway
 Length of dam at mid-height = 360 ft.
 10% of dam length at mid-height = w_B = 36 ft.
 Width of channel immediately downstream = B = 36 ft.
 Shape of breach = Rectangular

Elevation (NGVD)	Estimated Storage in AC-FT
146.68	590 Spillway Crest Elevation
148.68	834
150.68	1078
151.68	1200 Top of Dam Elevation
153.68	1444
155.48	1664 Test Flood Elevation



STORAGE-ELEVATION CURVE

HOPEVILLE POND DAM

Hopeville Pond Dam

i. DAM FAILURE ANALYSIS

A. Failure Analysis C.F.S.
Discharge = $\frac{8}{27} W_B \sqrt{g} y_0^{1.5}$
= 1.68 $W_B y_0^{1.5}$
= 5009 C.F.S.

B. Maximum Spillway

Discharge with W.S.E.

At top of Dam @ 151.68 = 3985 C.F.S.

C. Total Dam Failure Discharge 8994 C.F.S.

D. Reservoir - Storage Data:

Volume of storage at spillway crest = 590 AC-ft. @ Elev. 146.68

Surcharge storage at top of dam = 610 AC-ft. @ Elev. 151.68

Storage Total = 1200 AC-ft. @ Elev. 151.68

E. Flood Discharge Channel

1. Maximum depth of flow just D/S of Dam = $\frac{4}{9} y_0 = \underline{8.5}$ feet

Notes:

1. Failure of dam is assumed to be instantaneous. When pool reaches top of dam, and is a full-depth partial width rectangular shape failure with a width of failure = $W = \underline{34}$ feet and depth of failure $y_0 = \underline{21.0}$ feet.
2. Steady, uniform flow phenomenon is assumed for determination of failure profile and is based on Manning's formulae.
3. Failure profile for impacted area determination is determined at one typical cross section in the downstream channel. Reduction in discharge due to available storage has been taken into account.

11. Reach 1

Length = 2000 feet; Station 0 to Station 20+0; n = 0.05

Bed slope = $S_0 = S_f = 0.009$; Bed width = b = 250 ft.

Bed width is scaled from U.S.G.S. map; scale 1" = 2,000 feet

As bed width is large and 1" = 2,000 feet and 10-foot contour interval scale maps are being used for various channel parameters, it is appropriate to assume that d = R = Hyd Radius = depth, hence Manning's formulae is transformed:

$$Q = A \frac{1.49}{n} R^{2/3} \sqrt{S} = bd \frac{1.49}{n} d^{2/3} \sqrt{S}$$

$$Q = b \frac{1.49}{n} \sqrt{S} d^{5/3} = Kd^{5/3} = 230 d^{5/3}$$

State Discharge Relationship for Reach 1

Depth = d in Feet	Stage of Elevation	Discharge in CFS = Q	Velocity in ft./sec.	Storage Volume in AC-ft. = V
0	131.0	0	0	0
2	133.0	730	1.58	23
4	135.0	2316	2.52	46
6	137.0	4551	3.30	69
8	139.0	7350	4.00	92
10	141.0	10660	4.64	115
12	143.0	14442	5.23	138

F. Water surface profiles resulting from maximum spillway discharge and also from dam failure discharge are shown on Plate D-11 for comparison purposes. This figure also shows the rise in water depth due to failure of dam.

Also, Discharge -- Depth and Storage-depth curves are shown on Plate D-12 for downstream channel.

Notes: 1. Storage volume in AC-ft = $\frac{(\text{Length of Reach}) (\text{Bed Width}) (\text{Depth})}{43,560}$

2. Failure discharge being large will mostly be overbank flow on existing channel.

G. For $Q_1 = 8994$ CFS; depth = 9.0 ft. $V_1 = 104$ AC-ft.

$$\text{Trial } Q_2 = Q_1 \left(1 - \frac{V_1}{\text{Storage}}\right) = 8994 \left(1 - \frac{104}{1200}\right) = 8214 \text{ CFS}$$

$$\therefore V_2 = 98 \text{ AC-ft.}$$

$$\text{Avg } V = \frac{V_1 + V_2}{2} = 101 \text{ AC-ft.}$$

$$\therefore Q_2 = Q_1 \left(1 - \frac{V \text{ Avg.}}{\text{Storage}}\right) = 8237 \text{ CFS; } y_2 = 9.1 \text{ ft.}$$

Depth at center of flood as adopted = 9.0 ft.

Additional dam failure analysis beyond Reach 1 has not been undertaken because the depth of flow of 9.0 feet at the end of Reach 1 will not cause any hazardous conditions further downstream. The failure discharge and depth will continually decrease beyond Reach 1,

SUMMARIZED AND ADOPTED VALUES

FOR

DAM FAILURE ANALYSIS

- i. Name of Dam Hopeville Pond Dam
- ii. Dam Failure Discharge _____ = 5009 cfs.
- iii. Maximum Spillway Discharge _____ = 3985 cfs.
- iv. Total Dam Failure Discharge _____ = 8994 cfs.
- v. Normal (Manning Depth) for 8994 = 9.0 feet
- vi. Normal (Manning Depth) for 3985 = 5.5 feet
- vii. Increase in depth due to failure of dam = 3.5 feet
- viii. W.S.E. prior to failure = Ground Elevation + 5.5
- ix. W.S.E. after failure = Ground Elevation + 9.0

Note: The adopted depth of flow values are assumed to be accurate representations of damages in the impacted areas. Professional judgement is used in these final adopted values.

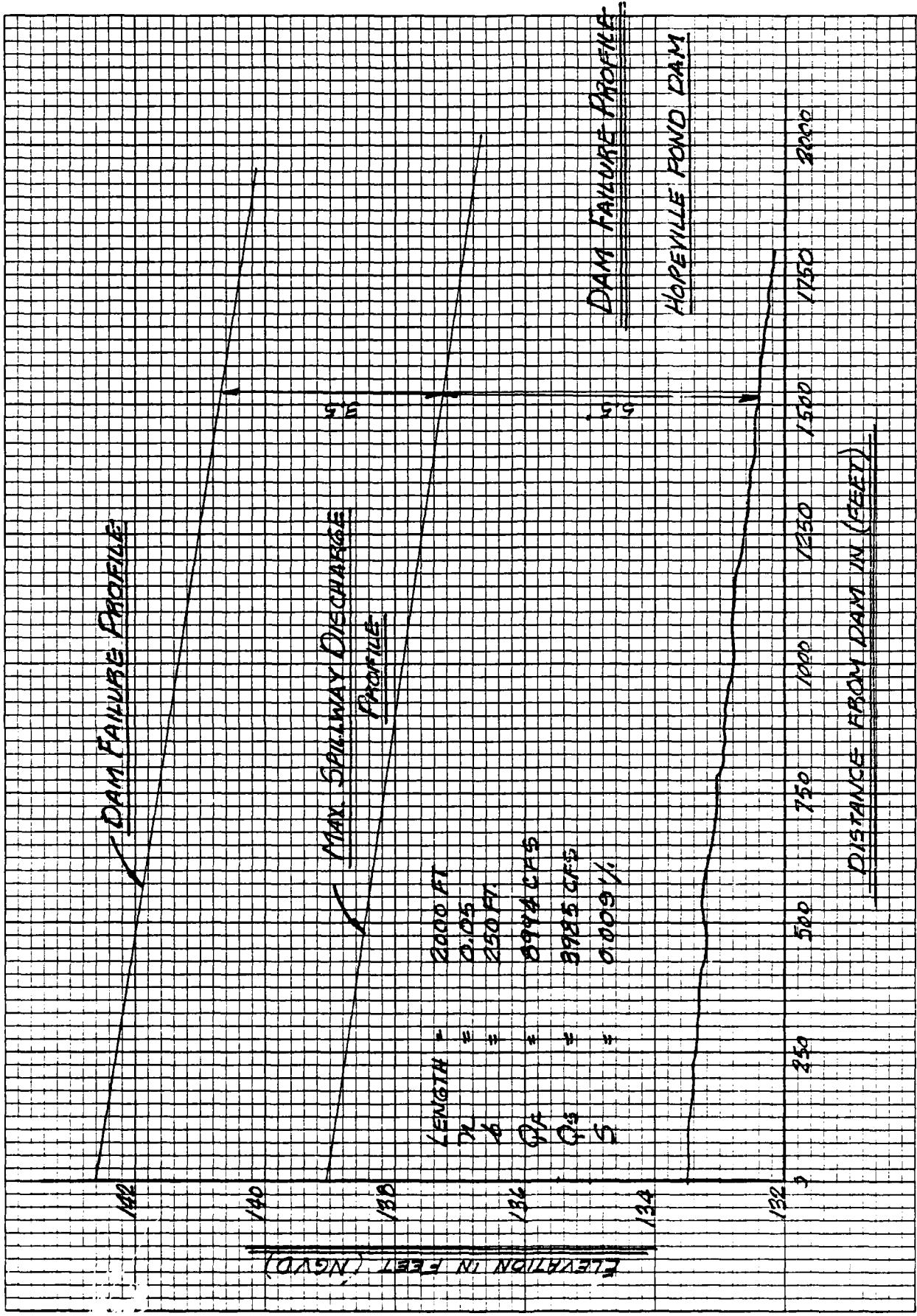


PLATE D-11

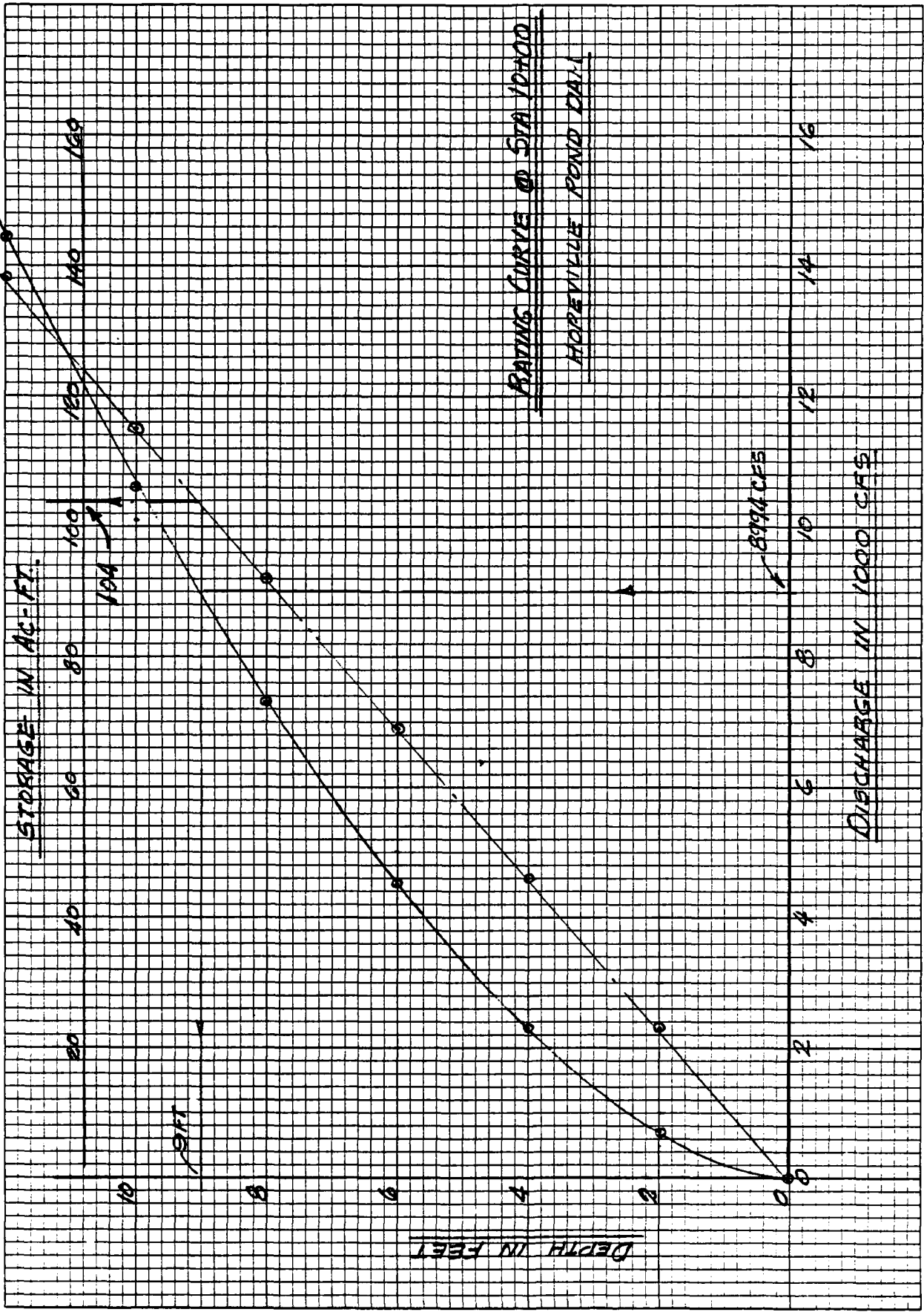


PLATE D-12

COMPUTATIONS FOR
SPILLWAY RATING CURVE AND
OUTLET RATING CURVE COMPUTATIONS

Spillway width = 108 feet; Spillway crest elevation = 146.68 NGVD
 Length of dam = 493 ft. (including spillway) feet; Top of dam elevation = 151.68 NGVD
385 ft. (excluding spillway)
 C = 3.00

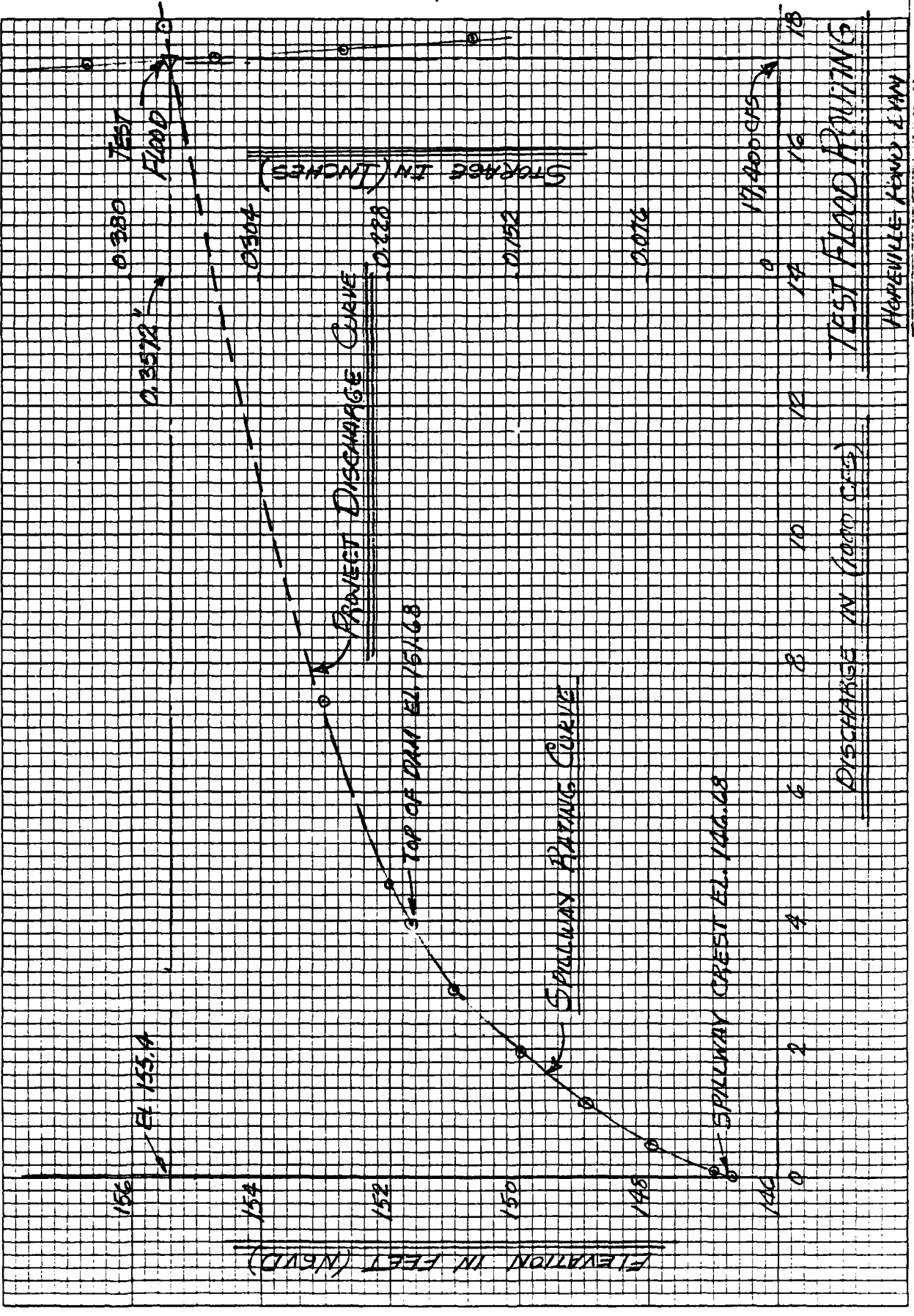
i) SPILLWAY RATING CURVE COMPUTATIONS

Elevation (ft.) NGVD	Spillway Discharge (CFS)	Remarks
146.68	0	Spillway Crest Elevation
147.0	58.6	
148.0	491.4	
149.0	1144.9	
150.0	1959.9	
151.0	2909.2	
151.68	3985	Top of Dam Elevation
152.0	4582	
153.0	7413	
155.48	17860	

ii) OUTLET RATING CURVE COMPUTATIONS

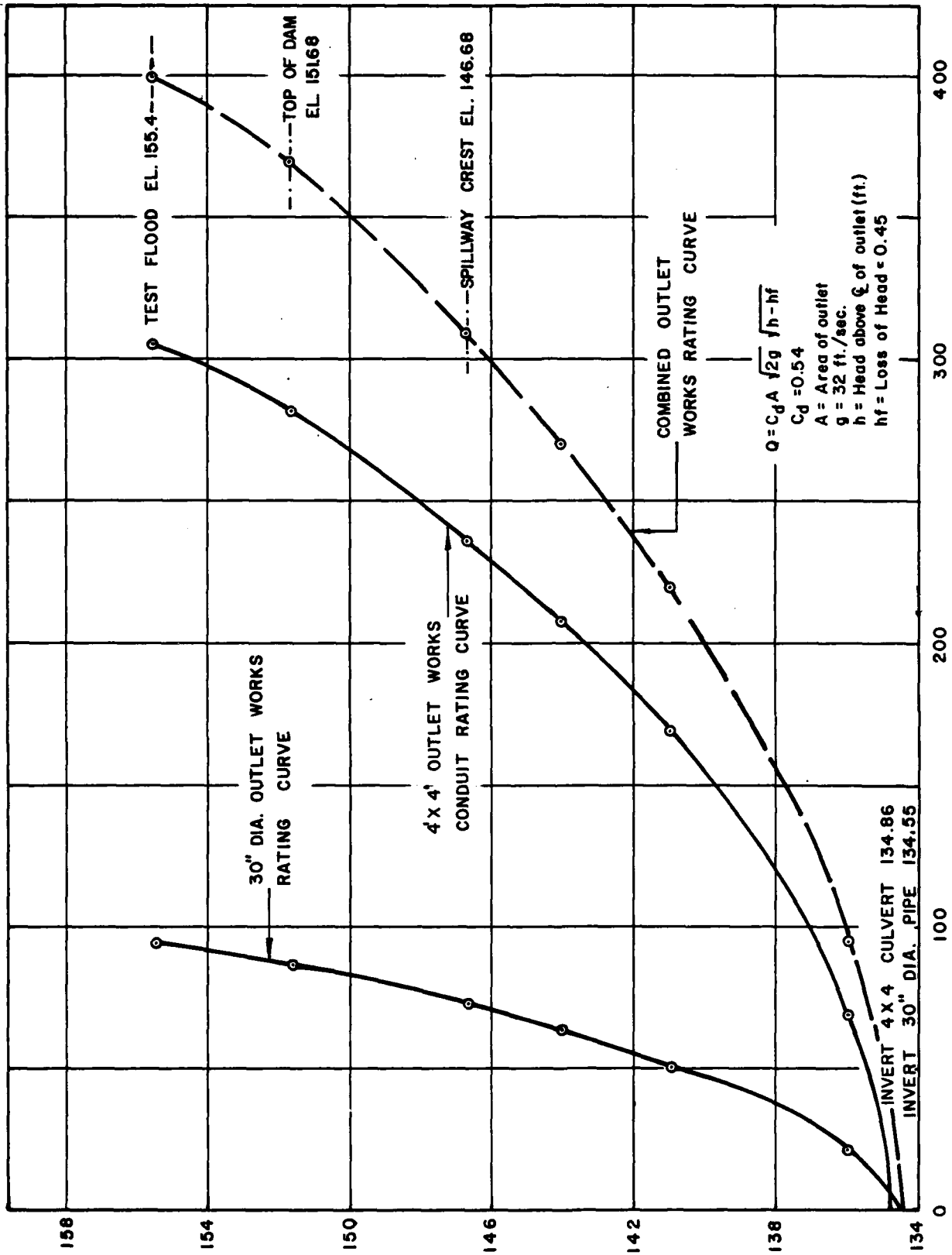
Elevation (ft.) NGVD	Discharge (CFS)	Remarks
134.55	0	Invert of 30" dia. pipe
134.86		Invert of 4' x 4' outlet
136.0	90.5	
138.0	156.0	
141.0	221.7	
144.0	271.5	
146.68	309.3	Spillway Crest Elevation
150.0	350.5	
151.68	369.6	Top of Dam Elevation
155.48	399.8	

Size of outlet = 1-30" dia. pipe Area of outlet = 4.906 sq. ft. (30" pipe)
1-4' x 4' rect. conc. culvert 16 sq. ft. (4' x 4' culvert)
 Invert of outlet = 133.30 (30" pipe) ; Center line of outlet = 134.55 (30" pipe)
132.86 (4' x 4' culvert) 134.86 (4' x 4' culvert)



MOOREVILLE, KENTUCKY, 1948

1-14



ELEVATION IN FEET (N.G.V.D.)

OUTLET WORKS RATING CURVE

HOPEVILLE POND DAM

PLATE D-15

DISCHARGE (C.F.S.)

$$Q = C_d A \sqrt{2g} \sqrt{h - hf}$$

$C_d = 0.54$
 $A = \text{Area of outlet}$
 $g = 32 \text{ ft./sec.}$
 $h = \text{Head above } \mathcal{Q} \text{ of outlet (ft.)}$
 $hf = \text{Loss of Head} = 0.45$

TEST FLOOD EL. 155.4

---TOP OF DAM EL. 151.68

---SPILLWAY CREST EL. 146.68

30" DIA. OUTLET WORKS RATING CURVE

4' x 4' CONDUIT RATING CURVE

COMBINED RATING CURVE

INVERT 4' x 4' CULVERT 134.86
 INVERT 30" DIA. PIPE 134.55

APPENDIX E

INFORMATION AS CONTAINED IN THE
NATIONAL INVENTORY OF DAMS

END

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10-84

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