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THAMES RIVER BASIN
POMFRET, CONNECTICUT



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ABBOTT DAM
CT. 00582

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

AUGUST, 1980

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Abbott Dam consists of an earth embankment 440 feet long, 33.5 feet high, with a crest width of 14 feet. The dam is classified as SMALL in size and a SIGNIFICANT hazard structure. The test flood for this dam is one half the PMF. The dam is judged to be in fair condition.		



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

REPLY TO
ATTENTION OF:
NEDED

OCT 15 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 Abbott 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, Spring Farm Realty Trust, Guilford, 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,


MAX B. SCHEIDER

Colonel, Corps of Engineers
Division Engineer

Incl
As stated

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ABBOTT DAM

CT 00582

THAMES RIVER BASIN
POMFRET, CONNECTICUT

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM

PHASE 1 INSPECTION PROGRAM

IDENTIFICATION NO: CT 00582
NAME OF DAM: Abbott Dam
COUNTY AND STATE: Windham County,
Connecticut
STREAM: Unnamed Tributary to
Mashamoquet Brook
DATE OF INSPECTION: April 10, 1980

BRIEF ASSESSMENT

Abbott Dam consists of an earth embankment 440 feet long, 33.5 feet high, with a crest width of 14 feet. Both the upstream and downstream slopes are grass-covered but otherwise unprotected. The upstream slope is at 1V on 3H and the downstream slope is at 1V on 2H. The facility has two spillways. The normal spillway consists of a vertical drop inlet structure which connects with the outlet conduit through the dam embankment. The emergency spillway is a trapezoidal channel, 40 feet wide at the base, which is excavated in natural ground. The facility has one gate valve for the purpose of lowering the pond level, however, this valve was inoperable at the time of the inspection. The reservoir is used for recreation.

The assessment of the facility is based on the visual inspection, since only limited engineering, operational, and maintenance data are available. The dam is judged to be in FAIR condition with several maintenance items that require attention to insure the long term performance of the structure. These items include: erosion of embankment due to wash and turbulence at the outlet, seepage from the abutment areas, vibration of the outlet conduit caused by the turbulent outflow from the conduit and the inoperable gate valve. The dam has sufficient outflow capacity to prevent overtopping of the embankment by the test flood.

The dam is classified as SMALL in size and a SIGNIFICANT hazard structure in accordance with the recommended guidelines established by the Corps of Engineers. The test flood for this dam is one half the Probable Maximum Flood (PMF) or approximately 725 CFS. The routed test flood outflow is equal to 430 CFS and will not overtop the dam and therefore the spillway is considered adequate in size. The combined discharge capacity of both the drop inlet spillway and the emergency spillway is 1192 CFS which represents 277 percent of the test flood outflow.

The capacity of the emergency spillway represents approximately 95 percent of the total discharge capacity of the dam.

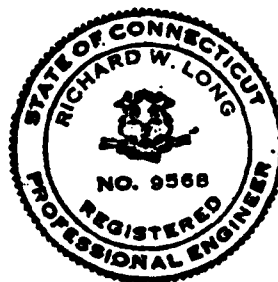
It is recommended that the Owner engage the services of an engineer experienced in the design of dams to accomplish the following: repair the outlet gate control, monitor the wet zones in the abutment area, investigate the turbulent flow in the outlet conduit and develop an "emergency action plan."

Additional recommendations and remedial measures are detailed in Section 7 and should be implemented by the Owner within one year after receipt of this Phase 1 Inspection Report.

CE Maguire, Inc.

By:

Richard W. Long
Richard W. Long, P.E.
Vice President



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 aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

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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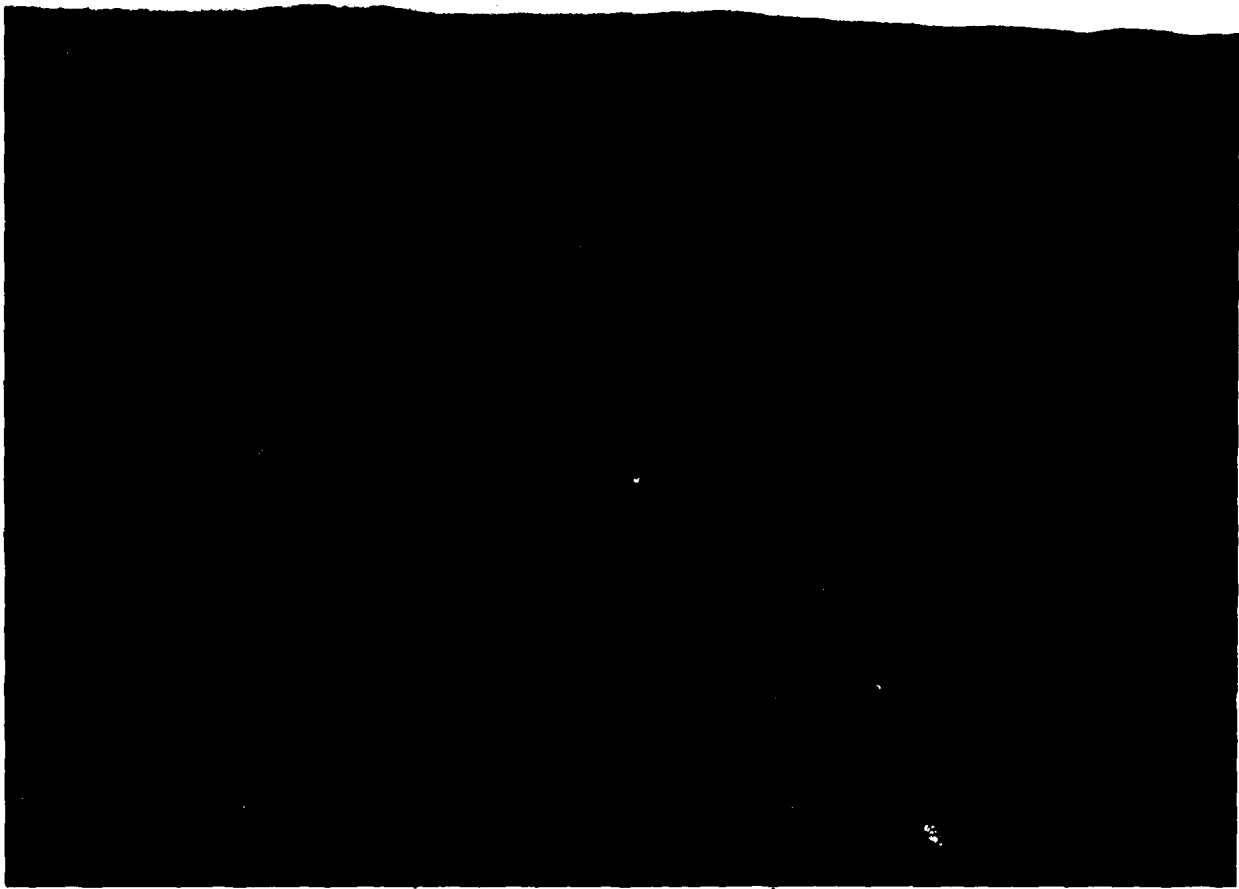
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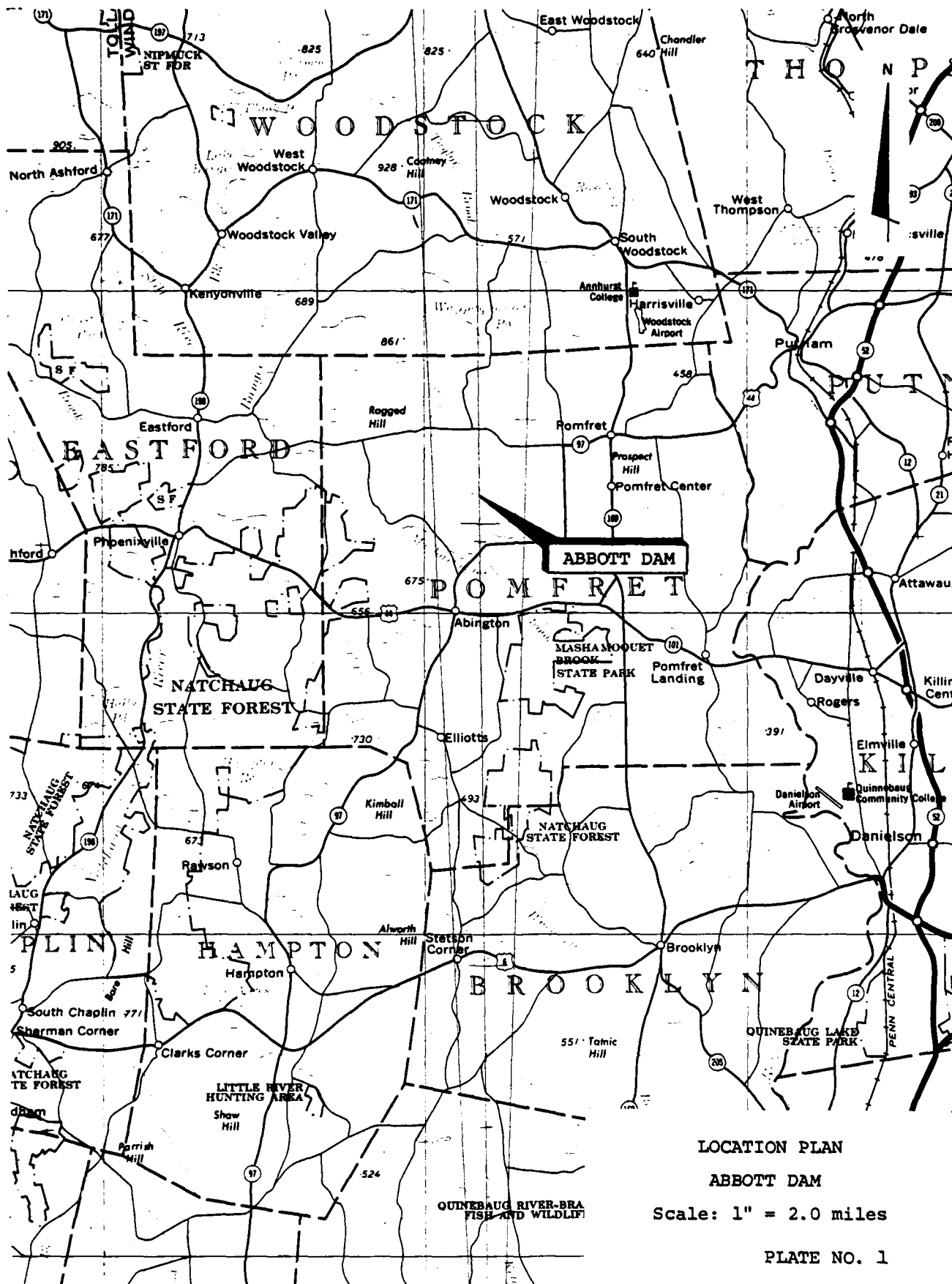
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OVERVIEW PHOTO - Abbot Dam



NATIONAL DAM INSPECTION PROGRAM

PHASE 1 INSPECTION REPORT

ABBOTT 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 B. 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 State 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. Abbott Dam is located in the Town of Pomfret, Windham County, Connecticut. The dam is sited about 2 miles southwest of Pomfret Village on an unnamed brook which joins Mashamoquet Brook about one-half mile downstream from the dam. The dam impounds water from a 0.45 square mile watershed of rolling terrain. Approximate coordinates of the dam are 41°-53.1'N Latitude and 72°-00.0'W Longitude. The reservoir is aligned along a northwest-southeast axis with the dam at the southerly extremity of the impoundment.

- b. Description of Dam and Appurtenances. The Abbott Dam is an earth embankment approximately 440 feet long, 33.5 feet high and with an average crest width of about 14 feet. Both the upstream and downstream slopes are grassed, the upstream slope graded at 1V on 3H and the downstream slope at 1V on 2H. The emergency spillway is located at the right abutment of the dam embankment and is an earth structure. The earth spillway is of trapezoidal cross section, 40 feet wide at the base with side slopes of 1V on 3H. The emergency spillway is uncontrolled. The normal spillway is a drop inlet which consists of a vertical prestressed concrete pipe of 20-inch inside diameter. The outlet conduit through the dam is a 16-inch inside diameter concrete pipe which discharges at a concrete headwall at the downstream toe of the dam. The vertical concrete drop inlet spillway joins the outlet conduit at a concrete "T" section. Existing plans indicate an 8-inch diameter gate control valve at the upstream end of the "T" section, however, this feature was not visible in the field at the time of inspection. The operating stem is reported by the Owner to be inoperable. Spillway and outlet conduit discharges flow into an unnamed brook which joins the Mashamoquet Brook about one half mile downstream from Abbott Dam.
- c. Size Classification. Abbott Dam has an impoundment capacity at the top of the dam (elev. 539.10 NGVD) equal to 382 Ac-Ft. and a height of 33.5 feet. In accordance with guidelines established by the Corps of Engineers, this Dam is classified as a SMALL size structure based on its height and capacity.
- d. Hazard Classification. The dam is classified as having a SIGNIFICANT hazard potential because it is located in an area where failure could result in the potential loss of a few lives and the inundation of 1-2 isolated dwellings. Water depths at these dwellings should range from 1-2 feet from the dam failure flow. Flooding and potential damage may also occur to Route 97 and Holbrook Road. This would cause temporary disruption of utility service for those utilities located within the right of way of these respective roadways. Water depths due to the dam failure discharge of 13,872 CFS are estimated to be approximately 15 feet. The failure will cause flooding conditions downstream and velocities of flow which will carry trees, vegetation and other debris that will increase the damage potential.
- e. Ownership. The dam is presently owned by the Spring Farm Realty Trust, Mr. Preston H. Abbott, Trustee, 161 Dunk Rock Road, Guilford, CT 06437.
- f. Operator. Operation and maintenance of the Abbott Dam are under the direction of the Owner.

- g. Purpose of Dam. To store water for recreational use.
- h. Design and Construction History. Abbott Dam, a private facility, was constructed in 1960 to impound water for recreational use. The dam was designed by the U.S. Department of Agriculture, Soil Conservation Service in 1960 through a technical assistance program. Plans and Specifications are available for the structure and appurtenances. These documents are on file at the Department of Environmental Protection, State of Connecticut.
- i. Normal Operating Procedure. The reservoir is unregulated, due to the inoperable gate control. Discharge from the pond occurs as a result of flow through the overflow drop inlet spillway. No discharge has ever been observed through the emergency spillway, according to the Owner.

1.3 Pertinent Data

- a. Drainage Area. The Abbott Dam drainage basin is located entirely within the Town of Pomfret, Connecticut. The basin is elongated with a north-south axis of 5500 feet and a maximum east-west axis of 3900 feet. The total drainage area is approximately 0.45 square miles. (See Appendix D for Basin Map). The topography is generally moderately sloped with elevations ranging from a maximum of 720 feet at Shaw Hill to 533 feet at the dam. Negligible natural storage is provided by swamps in the basin. Basin slopes average 0.08 to 0.10 feet per foot. The time of concentration for the basin is estimated to be 15 minutes which is considered relatively small. It is probable that all surface runoff will peak at the damsite simultaneously during a high intensity rainfall event.
- b. Discharge at Damsite. There are no discharge records available for this dam. Listed below are discharge data for the spillway and outlet works:

1. Outlet Works:

Conduit size	8-inch dia. control pipe Invert Elevation 505.60
a) Discharge capacity	7.8 CFS at spillway crest Elevation 533.10
b) Discharge capacity	8.6 CFS at top of dam Elevation 539.10

c) Discharge capacity	8.30 CFS at test flood Elevation 537.3
2. Maximum known flood at damsite	Unknown
3. Ungated spillway capacity at top of dam.	34.5 CFS for drop inlet Elev. 533.10 feet; 1158 CFS for emergency spillway Elev. 535.27 feet
4. Ungated spillway capacity at test flood elevation	433.6 CFS at 537.3 feet (drop inlet plus emergency spillway)
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	433 CFS
8. Total project discharge at top of dam	1201 CFS
9. Total project discharge at test flood elevation	441.9 CFS

c. Elevations (Feet above NGVD)

1. Streambed at toe of dam	505.60
2. Bottom of cutoff	Unknown
3. Maximum tailwater	Unknown
4. Recreation pool	533.10
5. Full flood control pool	N/A
6. Spillway crest	533.10 drop inlet 535.27 emergency
7. Design discharge (original design)	725 CFS (From SCS Hydrograph)
8. Top of dam	539.10

9.	Test Flood level	537.3
d.	<u>Reservoir Lengths (in feet)</u>	
1.	Normal pool	1,600
2.	Flood control pool	N/A
3.	Spillway crest pool	1,600
4.	Top of dam pool	1,600
5.	Test Flood pool	1,600
e.	<u>Storage (Acre-Feet)</u>	
1.	Normal pool	250
2.	Flood control pool	N/A
3.	Spillway crest	250 drop inlet 298 emergency
4.	Top of dam	382
5.	Test flood pool	352
f.	<u>Reservoir Surface Area (Acres)</u>	
1.	Normal pool	22
2.	Flood control pool	N/A
3.	Spillway crest	22
4.	Test flood pool	22
5.	Top of Dam	22
g.	<u>Dam</u>	
1.	Type (based on visual inspection)	Earth embankment
2.	Length	440 feet
3.	Height	33.5 feet
4.	Top width	14 feet
5.	Side slopes	Upstream IV on 3H Downstream IV on 2H

6.	Zoning	Selected soil materials
7.	Impervious core	None
8.	Cutoff	Yes
9.	Grout curtain	None
10.	Other	----
h.	<u>Diversion and Regulating Tunnels</u>	N/A
i.	<u>Spillway</u>	
1.	Normal spillway	
a)	Type	Vertical drop inlet
b)	Size	20-inch diameter
c)	Crest elevation	533.10
d)	Gates	None
e)	U/S Channel	Natural bed of reservoir
f)	D/S Channel	Natural bed of brook
g)	General	Vertical concrete pipe to 16-inch discharge conduit through dam
2.	Emergency Spillway	
a)	Type	Trapezoidal earth channel
b)	Size	40 ft. wide at invert, side slopes are 1V on 3H
c)	Crest Elevation	535.27
d)	Gates	None
e)	U/S Channel	Natural bed of reservoir

- | | |
|------------------------------|--|
| f) D/S Channel | Natural terrain |
| g) General | Earth channel is cut in natural ground |
| j. <u>Regulating Outlets</u> | Refer to paragraph 1.2b "Description of dam and appurtenances" page 1-2 for description of outlet works. |
| 1. Downstream invert | 505.60 |
| 2. Size | 8-inch diameter gate valve |
| 3. Description | Cast iron gate valve |
| 4. Control Mechanism | Manually operated. Gate stem rises to surface of reservoir. |
| 5. Other | Gate stem is not visible. The stem is reportedly damaged and inoperable. |

SECTION 2
ENGINEERING DATA

2.1 Design Data

The following documents which contain the principal information regarding this dam were reviewed in the preparation of this report.

- a. "Abbott Pond, Phoenixville, Connecticut, U.S. Department of Agriculture Soil Conservation Service." Plans approved by State Water Resources Commission April 4, 1960. Design drawings numbered 1 through 5.
- b. "Charles C. Abbott Farm Pond, Pomfret, Connecticut." Specifications approved by the State Water Resources Commission April 4, 1960.

2.2 Construction Data

Several inspection reports concerning completion of construction are available at the office of the Connecticut Department of Environmental Protection, State Office Building, Hartford, Connecticut.

2.3 Operation Data

No record of operation for this facility has been maintained.

2.4 Evaluation of Data

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

SECTION 3

VISUAL INSPECTION

3.1 Findings

- a. General. The Phase 1 Inspection of Abbott Dam was performed on 10 April 1980 by representatives of CE Maguire, Inc. and Geotechnical Engineers, Inc. A field inspection checklist and photographic record of that inspection are included in Appendix A and C, respectively, of this report. Based on the visual inspection and general appearance, the Abbott Dam is judged to be in FAIR condition.
- b. Dam. The dam is an earth embankment with an emergency spillway at the right abutment and a drop inlet pipe spillway combined with a low-level outlet at the maximum cross section of the dam. At the time of inspection, the water level in the reservoir was at Elevation 534 feet which is about 1 foot below the crest of the emergency spillway.

The exposed part of the upstream slope of the dam is grass covered (Photos C-1 and C-2). Some erosion has occurred at the water level resulting in an almost vertical scar about one foot high along most of the dam.

The crest of the dam is grass covered with no indications of cracks or significant erosion.

The downstream slope is grass covered (Photos C-3 and C-4). Some minor sloughing is evident, particularly in the area of the maximum cross section (Photo C-13). Footpaths have resulted in some erosion in the area of the outlet pipe. No indications of seepage were observed on the slope. It should be noted that the slope was wet as the result of rainfall just prior to the visual inspection. Occasional holes by burrowing animals could be seen in the upper part of the slope. At the left abutment, about 90 feet right of the end of the dam and about 20 feet downstream of the toe of dam, there is a seep with some rust-colored water in a wet and soft area (Photo C-11). Total discharge from this area into the outlet channel was roughly estimated at a few gallons per minute. About 10 feet downstream of the main seep there is another seep with insignificant flow.

Approximately 30 feet downstream from the toe and about 220 feet right of the left end of the dam seepage could be observed. Sand and silt have been carried by seepage and could be seen at the ground surface. Seepage is apparently extensive underneath the root mass of trees and brush and surfaces also at other locations.

Water could be seen flowing along the toe of the right side of the dam visible in the lower right of Photo C-12, but it could not be ascertained whether it was the result of seepage or surface water runoff from the downstream slope of the dam and the right abutment.

c. Appurtenant Structures

1. Emergency Spillway. The emergency spillway on the right abutment is cut into natural soil with grass cover for erosion protection. Some brush and small trees were growing on the channel bottom and slopes (Photos C-5, C-6 and C-7). No evidences of significant sloughing or erosion of the slopes were observed. According to the Owner, the emergency spillway has never carried any flow.
 2. Drop Inlet Spillway. This structure is shown on Photo C-8 and on the plans in Appendix B-3 (See sheets 3 and 4). Only the anti-vortex portion of the spillway could be observed. This visible portion appeared to be in fair condition. Considerable rusting has occurred on portions of this device. No part of the vertical concrete pipe was visible.
 3. Gate Valve and Control Stem. This feature is illustrated on the design drawings in Appendix B-3. The control stem was not visible above the water surface at the time of inspection. The stem was reported to be damaged and inoperable by the Owner.
 4. Outlet Structure. This structure is a headwall at the discharge end of the 16-inch diameter conduit. At the time of the inspection very little of the structure was visible due to the depth of tailwater (See Photos C-9 and C-10). Some of the erosion around the headwall was probably the result of surging of the discharge flow. Water plunging into the vertical intake apparently entraps air pockets in the conduit. As these air pockets move with the flow and escape at the outlet, loud thumping can be heard and considerable surging and splashing occurs. These eruptions of water cause erosion around the headwall. Some ground vibration due to the discharge could be felt adjacent to the outlet. The surging and entrapment of air in the outlet conduit could be caused by debris that has dropped into the vertical shaft of the drop inlet and impedes the uniform discharge of the outflow.
- d. Reservoir Area. The reservoir formed by the dam is approximately 22 acres and provides storage of approximately 250 Ac-Ft of water. The reservoir extends a distance of about 1600 feet

upstream from the dam in a northwesterly direction. The maximum width of the impoundment is about 1000 feet. The shoreline is undeveloped and consists primarily of grass and woods. No signs of sloughing or slope instability were evident along the reservoir edge in the vicinity of the dam.

- e. Downstream Channel. The downstream channel is the natural streambed of an unnamed tributary to Mashamoquet Brook. No obstructions are evident near the toe of the dam although beavers have constructed a dam several hundred feet downstream of the outlet headwall. This construction is visible as a line of white foam near the top of Photo C-12.

3.2 Evaluation

Based on visual observations, the dam appears to be in FAIR condition. The following factors could adversely affect the future performance of the dam:

- a. Seepage is exiting out of the left abutment and out of the foundation soils downstream of the right part of the dam. The test pit logs of the foundation investigation for initial design indicate the soils to consist mainly of sandy and silty soils given the U.S. Soil Classification symbols of SM, ML, SP, and CL-ML. These soils can be sensitive to erosion and piping, as shown by some soil carried out by the seeps to the ground surface. This seepage flow should be monitored.
- b. The extensive turbulence of the flow as it exits the outlet pipe has produced some erosion of the embankment slope adjacent to the outlet. Vibrations generated by the turbulence could damage the pipe and pipe connections, and lead to erosion of the soil adjacent to the pipe. The surging of the discharge outflow should be investigated and corrective measures undertaken to eliminate this hazard.
- c. The lack of an operable outlet gate control renders control of the pond level impossible.
- d. The discharge from the emergency spillway merely enters the woods. This wooded area could block the spillway if debris collected among the trees and brush.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

- a. General. The reservoir is unregulated due to the inoperable gate valve. Water surface is determined by the flow into the drop inlet spillway.
- b. Description of Any Warning System in Effect. There is no warning system in effect at Abbott Dam.

4.2 Maintenance Procedures

- a. General. Maintenance consists of cutting trees and brush from the dam embankment and emergency spillway. No documented maintenance has occurred.
- b. Operating Facilities. No specific maintenance has occurred. The gate operation stem requires repair to be operable.

- 4.3 Evaluation. The Abbott Dam requires minimal operation procedures. The gate mechanism should be operational. The pool should be drained and the gate made operational. With the pool emptied the cause of the entrapment of air in the outlet conduit should be investigated. Once the gate has been repaired operational checks of the gate should be performed from time to time to insure satisfactory operation. Based on the visual inspection, the maintenance procedures for cutting vegetation on the embankment and earth spillway are satisfactory inasmuch as no substantial tree growth was observed. Maintenance also should involve periodic surveillance of seepage zones, slope damage, animal burrows and debris removal. An emergency action plan should be developed that will outline procedures to follow for dewatering, authorities to contact, locations of emergency equipment, material and personnel and downstream areas that are affected.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

- 5.1 General. Abbott Dam, constructed as a recreation facility, is located on an unnamed tributary to the Mashamoquet Brook in Connecticut and about 4,000 feet upstream from Connecticut Route 97. The watershed for the reservoir is equal to 0.45 square miles with a negligible amount of natural storage.

The dam has a drop inlet spillway that is a 20-inch diameter concrete pipe and an emergency trapezoidal spillway with a base width of 40.0 feet. There is a surcharge height of 3.9 feet between the top of dam and the invert of the emergency spillway. The total length of the dam is 440 feet including the emergency spillway. Each foot of depth in the reservoir above the spillway level (drop-inlet) can accommodate 22 Ac-Ft. of volume of water equivalent to 0.91 inches of runoff. Surcharge storage of 132 Ac-Ft. equivalent to 5.5 inches of runoff from the drainage area is available to the top of dam.

- 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 that 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 inflows and outflows and dam failure flows were determined in accordance with the Corps of Engineers guidelines. Final values used in this report are quite approximate and are no substitute for actual detail analysis.
- 5.3 Experience Data. No historical data for recorded discharges or water surface elevations are available for the dam or watershed. The Owner of the dam does not recall any overtopping of the dam or any emergency spillway flow. The as-built drawings for this dam are attached in Appendix D.
- 5.4 Test Flood Analysis. Recommended guidelines for the Safety Inspection of Dams by the Corps of Engineers were used for selection of the Test Flood. This dam is classified under those guidelines as a SIGNIFICANT hazard and SMALL in size. Guidelines indicate that the range of test floods to be considered is the 100 year frequency event the one-half PMF. The watershed has a total drainage area of 0.45 square miles, of which a negligible area (0%) is swampy or

covered by storage reservoirs. This drainage area is largely wooded, and is hilly with rolling terrain. The basin slope is 0.08 to 0.10 feet per feet which is classified as steep. A test flood equal to one half the PMF was calculated to be 1600 CSM, equal to 725 CFS, for the drainage area and was adopted for this analysis because there are isolated dwellings downstream that could be inundated. The routed test flood outflow discharge was also developed using the Corps of Engineers criteria for approximate routing. The routed outflow discharge for the test flood inflow was estimated to be 430 CFS. Additional design data developed for this investigation is listed in tabular form at the end of this section. The spillway and outlet rating curves are illustrated in Appendix D. Flood routings were performed with assumed initial conditions of a full reservoir pool (at spillway crest elevation).

The drop inlet plus the emergency spillway capacity is hydraulically adequate to pass the test flood (one half PMF) and this flood event would not overtop the dam. The inflow and outflow discharge values for this test flood are 725 CFS and 430 CFS, respectively. The maximum outflow capacity of both spillways, without overtopping of the dam is 1192 CFS which is 277 percent of the routed test flood overflow discharge.

At the normal spillway crest elevation of 533.1 feet, the capacity of the outlet gate control structure is 7.8 CFS. It would require 34 hours to lower the reservoir level the first foot assuming a surface area of 22 acres. For the total 250 Ac-Ft. of available storage below the spillway crest, it would require 32 days to drain this reservoir through the existing outlet assuming no inflow in the interim. One foot of depth in the reservoir at the spillway crest can approximately accommodate 0.91 inches of effective runoff.

5.5 Dam Failure Analysis

An instantaneous, full-depth 40 feet breach was assumed to have occurred in this dam. This would result in an unsteady flow condition, causing a failure wave to travel downstream and its reflection wave traveling into the reservoir and rebounding to reinforce the downstream wave passing through the valley. The calculated dam failure discharge of 13,872 CFS presumes the reservoir level was at the top of dam before failure and will result in water surface elevations of 520 feet immediately below the dam (about 11.0 feet above the depth just prior to failure). The estimated damage reach extends downstream 6,000 feet where normal uniform flow will occur. The failure could result in the potential loss of a few lives and inundation of 1-3 dwellings. Flooding and potential damage may also occur to Connecticut Route 97 and Holbrook Road and cause temporary disruption to utility services located within the rights of way of those roadways. It is estimated that water depths would average 15 feet and that velocities of flow could cause

erosion, stripping of vegetation and additional damage from debris impact. 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.

ABBOTT DAM

Inflow, Outflow and Surge Data

<u>FREQUENCY</u> <u>IN</u> <u>YEARS</u>	<u>24-HOUR TOTAL</u> <u>RAINFALL IN</u> <u>INCHES</u>	<u>24-HOUR* EFFECTIVE</u> <u>RAINFALL IN</u> <u>INCHES</u>	<u>MAXIMUM</u> <u>INFLOW</u> <u>IN CFS</u>	<u>MAXIMUM**</u> <u>OUTFLOW</u> <u>IN CFS</u>	<u>SURCHARGE</u> <u>HEIGHT</u> <u>IN FEET</u>	<u>SURCHARGE</u> <u>STORAGE</u> <u>ELEVATION</u>
1/2 PMF= Test Flood	11.9	9.5	725	430	4.2 Above spillway	537.3

*Infiltration assumed as 0.1"/hour

**Lake assumed initially full at spillway crest elevation 533.10 for pipe or shaft spillway
(top of dam = 539.1)

NOTES:

1. 1/2 PMF test flood computation based on Corps of Engineers instructions and guidelines.
2. Maximum capacity of spillway without overtopping the top of the dam elevation (539.10 feet) is equal to 1192 CFS.
3. Surge storage is allowed to overtop the dam when exceeding the spillway capacity.
4. Test flood = Half PMF = 1600 CSM = 725 CFS (D.A. = 0.45 sq. miles).

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

- 6.1 Visual Observations. There were no visual indications of structural instability of the dam observed except for local minor sloughing of the downstream slope.

Conditions observed that may lead to future instability of the dam include:

1. Seepage exiting at the left abutment area and through the foundation soils downstream from the right end of the dam. This seepage could increase, transport soil materials and result in piping of the internal dam materials.
 2. Turbulence caused by the present condition of the outlet to the drop spillway can produce erosion at the dam toe, vibration of the outlet pipe and damage to the pipe could result in erosion of the embankment.
- 6.2 Design and Construction Data. The design and construction data does not contain information on the zoning or types of soil in the dam, and thus it is not sufficient for performing a formal stability analysis.
- 6.3 Post-Construction Changes. There are no known post-construction changes.
- 6.4 Seismic Stability. The dam is located in Seismic Zone 1 and in accordance with the Phase 1 inspection guidelines does not warrant seismic stability analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 Dam Assessment

- a. Condition. Based on the visual inspection and review of available information, the dam appears to be in FAIR condition. There are several features, however, which adversely affect the future condition of the dam:
 1. The gate valve is inoperable.
 2. Seepage is occurring at the left abutment and out of the foundation soils downstream from the right abutment.
 3. Surging discharge from the outlet conduit is causing vibration and splashing that could damage the conduit and embankment.
 4. The emergency spillway discharges into the woods with no clearly defined channel.
- b. Adequacy of Information. The information available is such that the assessment of the safety of the dam must be based on the visual inspection.
- c. Urgency. The recommendations and remedial measures described below should be implemented within one year after receipt of this Phase 1 inspection report by the Owner.

7.2 Recommendations

The following should be accomplished under the supervision of a qualified registered engineer, experienced in the design of dams and recommendations resulting from the investigations should be implemented by the Owner.

- a. Clear or modify, as needed, the drop inlet spillway to prevent vibrations of the outlet pipe in the future. Inspect in detail the present condition of the outlet pipe.
- b. Investigate the significance of the seepage exiting downstream of the dam and consider the installation of weighted inverted filters in the seepage areas after clearing them of trees and brush.

- c. Repair the operating stem of the outlet gate valve.
- d. Repair the eroded area around the discharge headwall. This area should be repaired with riprap and bedding.
- e. Clear trees and brush from the end of the emergency spillway discharge channel to a point such that collection of debris will not affect spillway flow.

7.3 Remedial Measures

- a. Operation and Maintenance Procedures. An annual program of technical inspection by a qualified registered engineer should be implemented.
- b. Develop an "Emergency Action Plan" that will include an effective preplanned warning system, 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 rainfalls.
- c. Implement a program of regular maintenance.

7.4 Alternatives. There are no recommended alternatives to the above measures.

APPENDIX A
INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Abbott Dam DATE April 10, 1980
TIME A.M.
WEATHER Rain
W.S.ELEV. 534.0 , U.S. 508.0 D.S.

PARTY :

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

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

PERIODIC INSPECTION CHECKLIST

PROJECT Abbott Dam DATE April 10, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Crest Elevation	539.0
Current Pool Elevation	534.0
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	Good
Trespassing on Slopes	Minor trespassing on downstream slope. Footpath with minor erosion.
Sloughing or Erosion of Slopes or Abutments	Minor sloughing and erosion of downstream slope, erosion at water level of upstream slope.
Rock Slope Protection - Riprap Failures	No riprap.
Unusual Movement or Cracking at or Near Toe	None observed.
Unusual Embankment or Downstream Seepage	Seepage downstream of dam at right abutment and right of outlet.
Piping or Boils	None observed.
Foundation Drainage Features	None known.
Toe Drains	A blanket drain shown in plans for left part of dam could not be observed.

PERIODIC INSPECTION CHECKLIST

PROJECT Abbott Dam DATE April 10, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<p><u>DAM EMBANKMENT</u> (Cont.)</p> <p>Instrumentation System</p> <p>Vegetation</p>	<p>None known.</p> <p>Grass covered slopes; well maintained.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT Abbott Dam DATE April 10, 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 style="padding-left: 40px;">Slope Conditions</p> <p style="padding-left: 40px;">Bottom Conditions</p> <p style="padding-left: 40px;">Rock Slides or Falls</p> <p style="padding-left: 40px;">Log Boom</p> <p style="padding-left: 40px;">Debris</p> <p>b. Intake Structure</p> <p style="padding-left: 40px;">Condition of Concrete</p> <p style="padding-left: 40px;">Stop Logs and Slots</p>	<p>Approach from body of lake.</p> <p>Not observable.</p> <p>Not observable.</p> <p>None</p> <p>None</p> <p>None</p> <p>Drop inlet, vertical circular concrete pipe.</p> <p>Not observable.</p> <p>None</p>

PERIODIC INSPECTION CHECKLIST

PROJECT Abbott Dam DATE April 10, 1980
INSPECTOR _____ DISCIPLINE _____
INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - CONTROL TOWER</u>	Not observable. Gate stem is reportedly damaged and unusable. The gate control was submerged at the time of inspection.

PERIODIC INSPECTION CHECKLIST

PROJECT Abbott Dam DATE April 10, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - TRANSITION AND CONDUIT</u>	Not observable.

PERIODIC INSPECTION CHECKLIST

PROJECT Abbott Dam DATE April 10, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u>	Concrete headwall. Mostly submerged.
General Condition of Concrete	Not observable.
Rust or Staining	Not observable.
Spalling	Not observable.
Erosion or Cavitation	Erosion of embankment has occurred around the headwall.
Visible Reinforcing	Not observable.
Any Seepage or Efflorescence	Not observable.
Condition at Joints	Not observable.
Drain Holes	Not observable.
Channel	
Loose Rock or Trees Overhanging Channel	Trees overhang channel.
Condition of Discharge Channel	Fair. Water is backing up due to beaver dam construction downstream.

PERIODIC INSPECTION CHECKLIST

PROJECT Abbott Dam DATE April 10, 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> General Condition</p> <p> Loose Rock Overhanging Channel</p> <p> Trees Overhanging Channel</p> <p> Floor of Approach Channel</p> <p>b. Weir and Training Walls</p> <p> Any Seepage or Efflorescence</p> <p>c. Discharge Channel</p> <p> General Condition</p> <p> Loose Rock Overhanging Channel</p> <p> Trees Overhanging Channel</p> <p> Floor of Channel</p> <p> Other Obstructions</p>	<p>Open body of lake.</p> <p>Good</p> <p>None</p> <p>None</p> <p>Earth - grass and light brush.</p> <p>Earth - grass and light brush.</p> <p>None observed.</p> <p>Earth - grass and brush.</p> <p>Channel below dam enters woods with abundant tree growth.</p> <p>None</p> <p>None</p> <p>Earth - grass and brush.</p> <p>Woods downstream of spillway.</p>

APPENDIX B
ENGINEERING DATA

APPENDIX B-1

Correspondence pertaining to the history, maintenance, and modifications to the Abbott 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
Attn: Mr. Victor J. Galgowski,
Dam Safety Engineer

APPENDIX B-2

SELECTED COPIES OF PAST INSPECTION REPORTS

Palmer

588

STATE BOARD FOR THE SUPERVISION OF DAMS
INVENTORY DATA

V 41 - 53 - 10
72 - 0 - 10

Name of Dam or Pond ARRATTIS DAM

Code No. Q 321 1A 70 U O. 9

Location of Structure

Town Windsor

Name of Stream _____

U.S.G.S. Quad. Eastford

Owner Clark Abbott

Address Prophet Center

Prophet

OK
1/73

910

Pond Used For RFC DA 0.455 mi

Dimensions of Pond: Width _____ Length _____ Area 22.4

Total Length of Dam 450' ✓ Length of Spillway _____

Depth of Water Below Spillway Level (Downstream) 27.5

Height of Abutments Above Spillway 76'

Type of Spillway Construction _____

Type of Dike Construction _____

Downstream Conditions _____

Summary of File Data erosion records noted on 10/1/72

DA 0.45 50 mi

Remarks _____

BENJAMIN H. PALMER
HEPARD S. PALMER

CHANDLER & PALMER
CIVIL ENGINEERS
114-116 THAYER BUILDING
TELEPHONE TURNER 7-3640

DAMS
WATER SUPPLIES
SEWERAGE
APPRAISALS
REPORTS
SURVEYS

MEMBERS AMERICAN AND CONNECTICUT SOCIETIES
OF CIVIL ENGINEERS

NORWICH, CONN.

August 12, 1963

STATE WATER RESOURCES
COMMISSION
RECEIVED
AUG 13 1963

ANSWERED.....

REFERRED.....

FILED.....

~~State Water~~ Resources Commission
State Office Building
Hartford 15, Connecticut

Re: Abbott's Dam
Pomfert, Connecticut

Gentlemen:

On Saturday, August 10, 1963, I visited the dam at Pomfert Center, owned by Mr. Charles C. Abbott. This is located at Latitude North 41 degrees 53 minutes 10 seconds, Longitude West 72 degrees 0 minutes 10 seconds. I made a careful inspection of the dam and in my opinion, it is in good condition.

I can see no reason to ask the Owner to do any work on it at the present time. The grass on the slopes is in good condition and everything appeared to me, to be in good shape.

Very truly yours,

CHANDLER & PALMER

B. H. Palmer

BHP/nir

June 17, 1963

Mr. Benjamin Palmer
Chandler & Palmer
Consulting Engineers
16 Franklin Street
Norwich, Connecticut

Re: Abbott's Dam
~~Eastford~~, Connecticut

Pomper

Dear Sir:

It has been brought to the attention of this office that the Abbott's Dam in the Town of Eastford, which was built in accordance with plans and specifications prepared by the Soil Conservation Service and approved by this office, shows considerable signs of erosion on the downstream slope and around the outlet structure.

Kindly inspect this dam and report to this office as to the extent of damage created by the erosion and what steps, if any, should be taken to place this dam in a safe condition.

Very truly yours,

Emitt A. Dell
Field Inspector

EAD:js

STATE OF CONNECTICUT
WATER RESOURCES COMMISSION
Room 317, State Office Building
Hartford, Connecticut

CERTIFICATE OF APPROVAL

Date November 9, 1961

To: Mr. Charles C. Abbott, Trustee

Spring Farm

Pomfret Center, Connecticut

NAME OF STRUCTURE: Spring Farm Dam

This is to certify that the following construction work:

construction of an earth dam in accordance with plans consisting of
five sheets and specifications prepared by the U. S. Department of
Agriculture, Soil Conservation Service

on your property on an unnamed tributary of Mashamoquet Brook
in the Town (s) of Pomfret

for which construction permit was issued April 4, 1960, has been
completed to the satisfaction of this Commission and that such structure
is approved as of date of this Certificate.

WATER RESOURCES COMMISSION

cc: Soil Conservation
Service

BY: William S. Wise
William S. Wise, Director

Note: The owner is required by law to record this Certificate in the
land records of the town or towns in which the dam, dike or similar
structure is located.

October 26, 1961

Memo to Mr. Wise

Spring Farm Dam
Pomfret, Connecticut

Ben Palmer was original consultant on this dam. Since Mr. Palmer is no longer one of our consultants and since the only thing holding up Certificate of Approval on this dam was to make final inspection to see if dam was leaking and if banks were seeded, it was felt that I could make final inspection.

As a result, on October 13, 1961 I visited site and found the dam was completed. The pond was full and the banks were seeded and a good cover of grass had taken hold. There were no signs of leakage. As a result I feel Certificate of Approval should be granted.

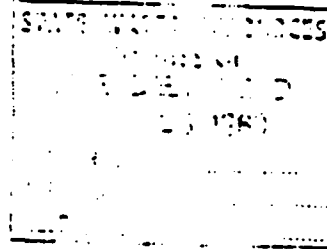
Emitt A. Dell
Field Inspector

EAD:js

UNIVERSITY OF VIRGINIA GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
MONROE HALL CHARLOTTESVILLE VIRGINIA

December 21, 1960

OFFICE OF THE DEAN



Mr William S Wise, Director
State of Connecticut
Water Resources Commission
State Office Building
Hartford 15, Connecticut

Dear Mr Wise:

I have your letter of November 29, notifying me that the Commission had voted to withhold a certificate of approval of the dam built on Spring Farm until the eroded sections had been re-seeded in the Spring.

It is our intention to look after this matter then and I hope the Commission will then grant a certificate of approval.

Yours very truly,

Charles C Abbott
Dean

CCA:LL

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Agricultural Center
Brooklyn, Conn.

Oct. 4, 1961

William S. Wise, Director
Water Resources Commission
State Office Building
Hartford 15, Conn.

Dear Mr. Wise:

Mr. Charles C. Abbott, Spring Farm, Pomfret Center, Conn. asked me to contact the Water Resources Commission to find out if an inspection of his dam had been made this year.

He has completed some work on his structure this year including fertilization. Mr. Abbott is interested in receiving your certificate of approval. Thank you.

Very truly yours,

Albion L. Weeks

Albion L. Weeks
Work Unit Conservationist

STATE WATER RESOURCES COMMISSION RECEIVED OCT 6 1961 ANSWERED
REFERRED
FILED

STATE OF CONNECTICUT
WATER RESOURCES COMMISSION
Room 317, State Office Building
Hartford, Connecticut

STATE WATER RESOURCES
COMMISSION
RECEIVED
MAR 17 1960
ANSWERED.....
REFERRED.....
FILED.....

APPLICATION FOR CONSTRUCTION PERMIT FOR DAM

Owner Charles C. Abbott

Date February 23, 1960

P. O. Address Spring Farm

Pondret Center, Conn.

Tel. No. _____

Location of Structure:

Town Pondret

Shown on USGS Quadrangle Eastford, Conn.

Name of Stream None

at 1 1/2 inches south of Lat. 41-52-30
north
and 1/8 inches west of Long. 72-00
west

Directions for reaching site from nearest village or route intersection:
(see sketch on reverse side)

Turn North at intersection Route U.S. 44 and Conn. 97, turn North on dirt road just
after crossing Mashamoquet Brook, drive in approximately 1/2 mile.

This is an application for: (New Construction) ~~(Alteration-Addition)~~ ~~(Removal)~~
(check one or more of above)

This pond is to be used for: Recreation

Dimensions of Pond: width 800' length 1500' area 22 acres

Maximum depth of water immediately above dam: 27'

Total length of dam: 450'

Length of spillway: Principal = 180' Emergency = 455'

Height of abutments above spillway: Above Emergency 20'+

Type of spillway construction: Principal - Reinforced Concrete Pipe-Emerg. - Earth

Type of dike construction: Compacted Earth

Spillway section will be set on: ~~(Bedrock)~~ ~~(Gravel)~~ ~~(Clay)~~ (Till)
(check one of above)

Remarks: _____

Signed: [Signature]
(owner)

Name of Engineer, if any Soil Conservation Service

Note-- Show details of construction on reverse side.

STATE OF CONNECTICUT
DEPARTMENT OF CONSERVATION
BUREAU OF DAMS
HARTFORD, CONNECTICUT

October 31, 1960

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

STATE WATER RESOURCES
RECEIVED
1 1960
INDEXED
REFERRING
FILED

Dear Sir:-

About two weeks ago I made an inspection of the Abbott Dam at Pomfret Center. At that time the work was substantially completed, although the grass seeding had not been done. I recommended that the seeding be placed on the downstream slope as well as the spillway area. I gave the man permission to allow the water to accumulate in the pond.

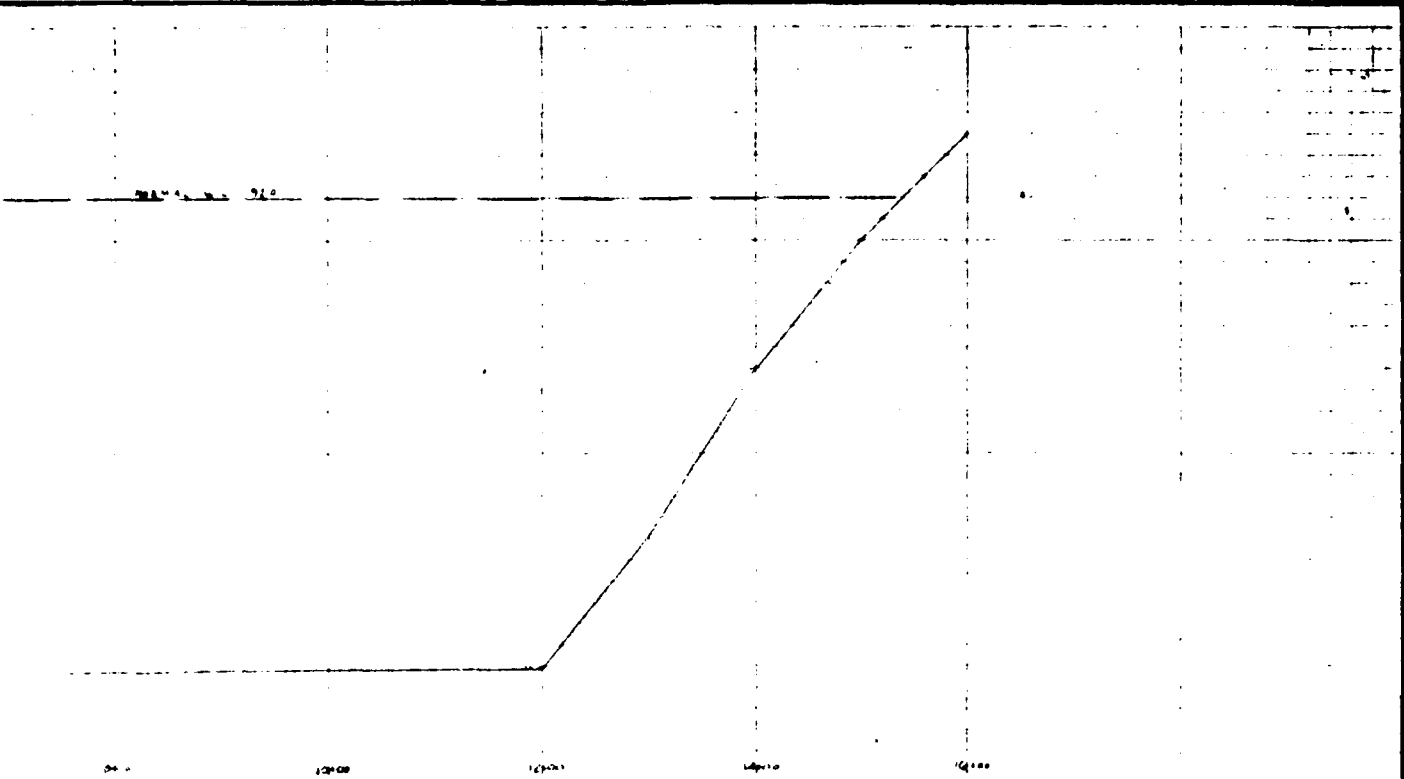
On Saturday, October 29th, I made a final inspection of the dam and I recommend that a final construction permit be issued. Due to the fact that the seeding was done so late in the season there has been some washing of material on the slopes of the dam, particularly the downstream slope. The grass has taken hold in some areas but is not very substantial at present. I believe it will be necessary to touch up these slopes in the Spring and put some seed on certain areas, as I anticipate there will be some slight erosion on the slopes during the Winter. The general construction of the dam is good and I find all work is finished with the exception that it will probably be necessary to touch up this work in the Spring.

Very truly yours,
H. P. [Signature]

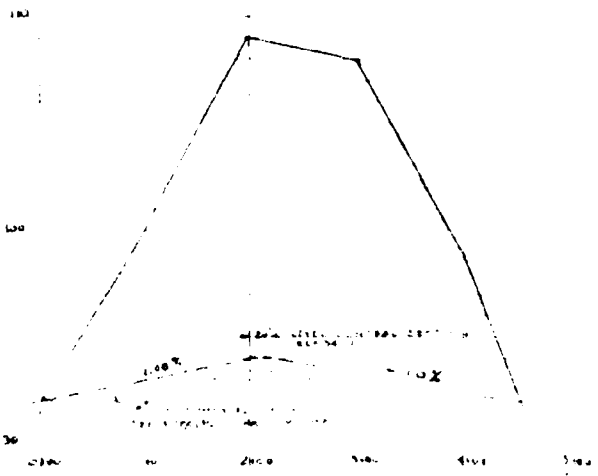
BHP/ew

APPENDIX B-3

PLANS, SECTIONS AND DETAILS



ABBOTT POND
 STATE OF MISSISSIPPI

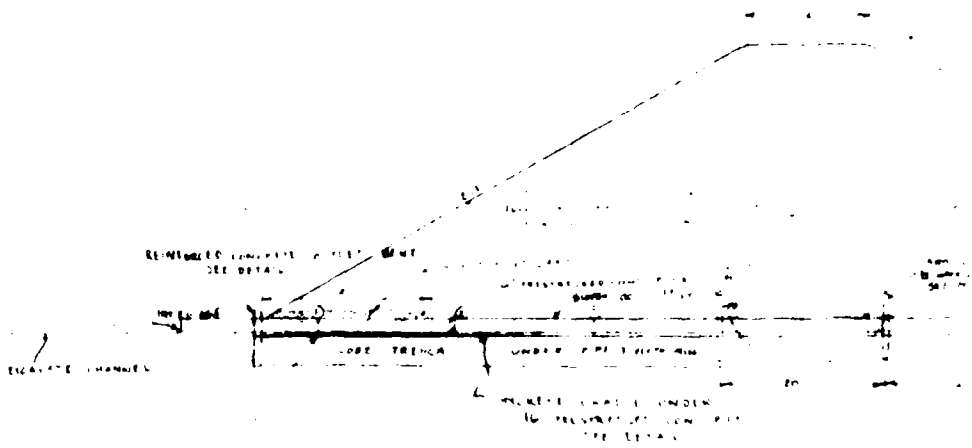


PROFILES OF LAND USE SERVICE
 SCALES

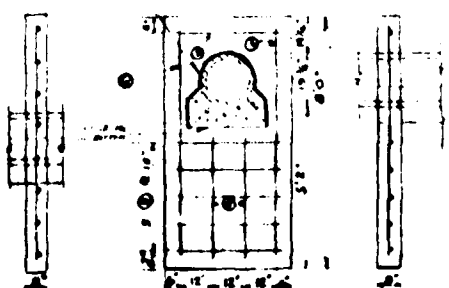
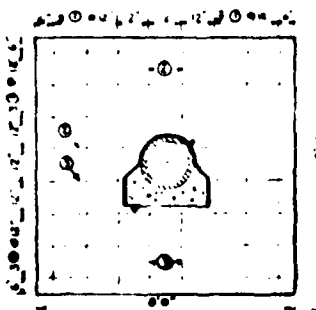
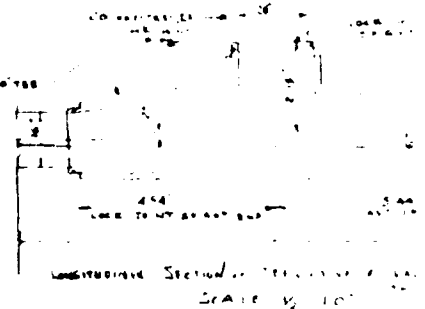
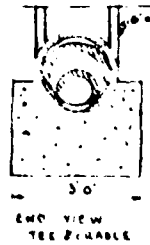
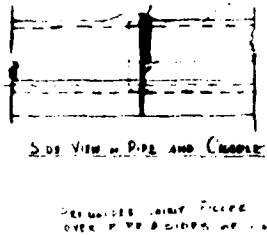
ABBOTT POND PHOENIXVILLE, LOUISIANA
 PROFILES
 LAND USE SERVICE
 U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

NOT TO SCALE

Form 2-5-10 (November 1960)



CROSS SECTION SCALE 1/4" = 1'-0"



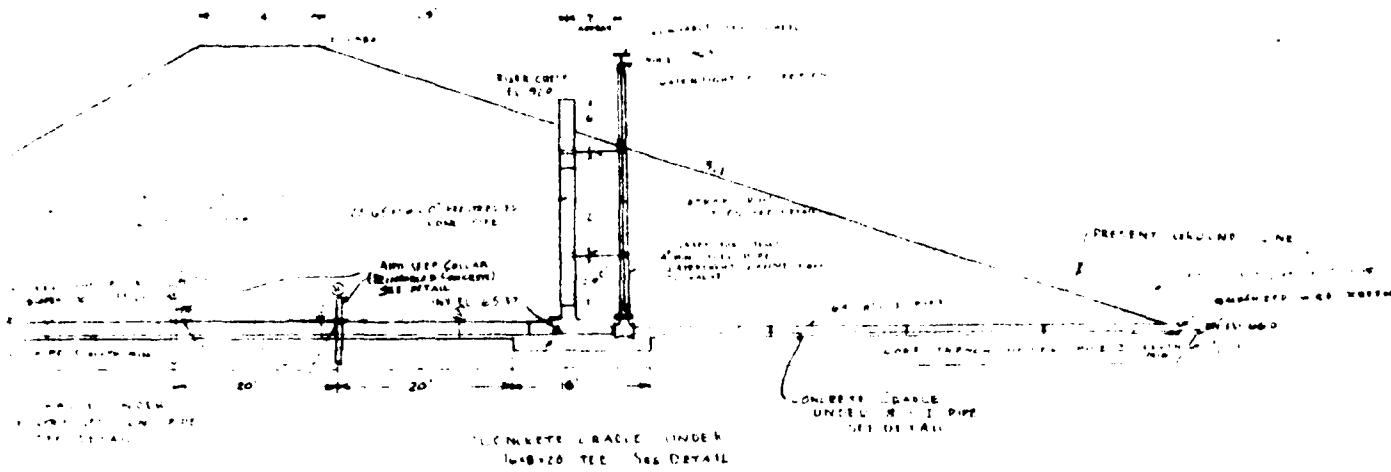
NO.	LOCATION	LENGTH	WEIGHT
1	ANTI-SEP COLLAR	4.74	16
2		8.4	20
3		4.25	8
4	OUTLET BENT	2.4	7
5		3.6	21
6		2.4	15

TOTAL NO. 4 BARS...
 TOTAL CLASS 'B' CONCRETE...
 CRADLE, ANTI-SEP COLLAR,
 ANTI-SEP COLLAR

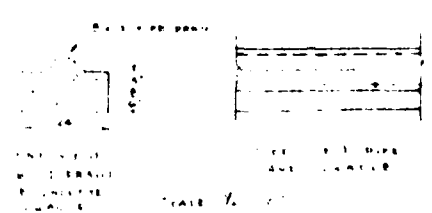
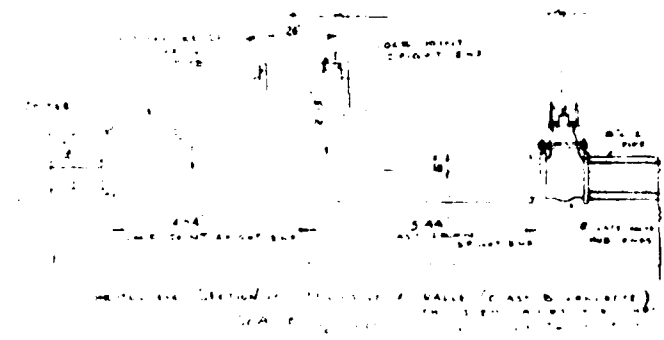
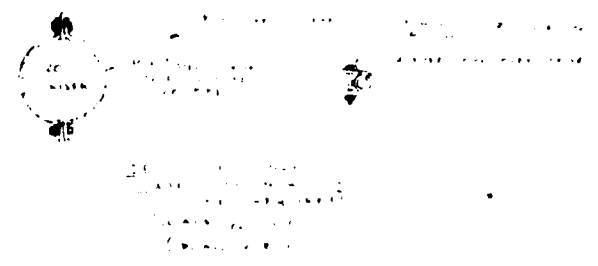
55 LB. NET
 ON BOTTOM

DIMENSIONS AND STEEL DETAILS OF ANTI-SEP COLLAR SCALE 1/4" = 1'-0"

DIMENSIONS AND STEEL DETAILS OF OUTLET BENT SCALE 1/4" = 1'-0"



CROSS SECTION OF DAM ALONG 4 OF PIPE
SCALE 1"=20'



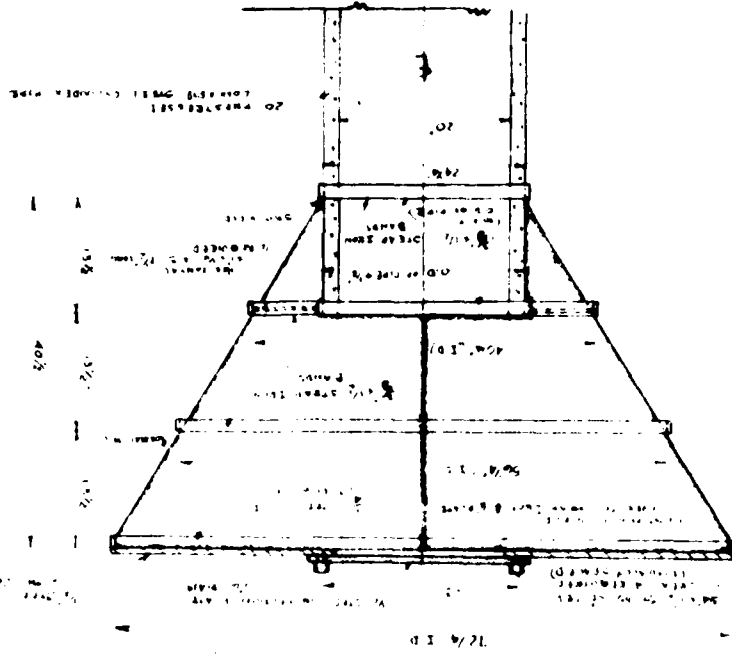
NO.	DESCRIPTION	DEPTH	FEET
1	16.00
2	70.00
3	8.00
4	2.00
5	15.00

2

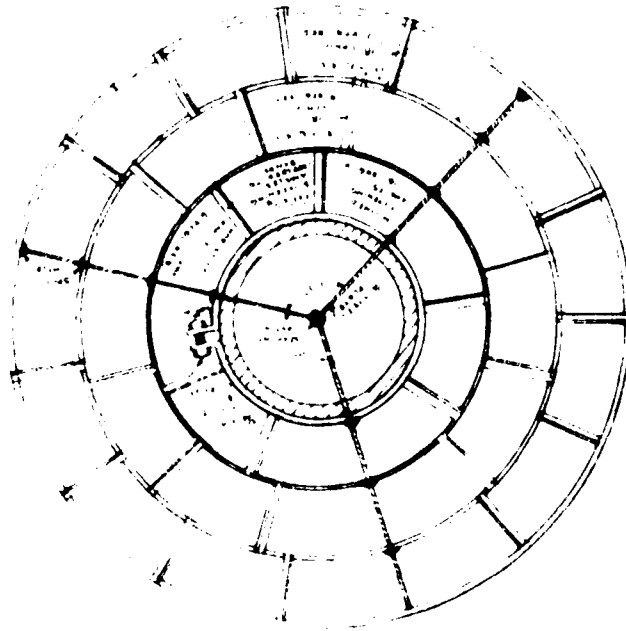
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SECTION A A (CONTINUED FROM PREVIOUS PAGE)

SCALE 1" = 10'



TOP VIEW OF TOWER



2

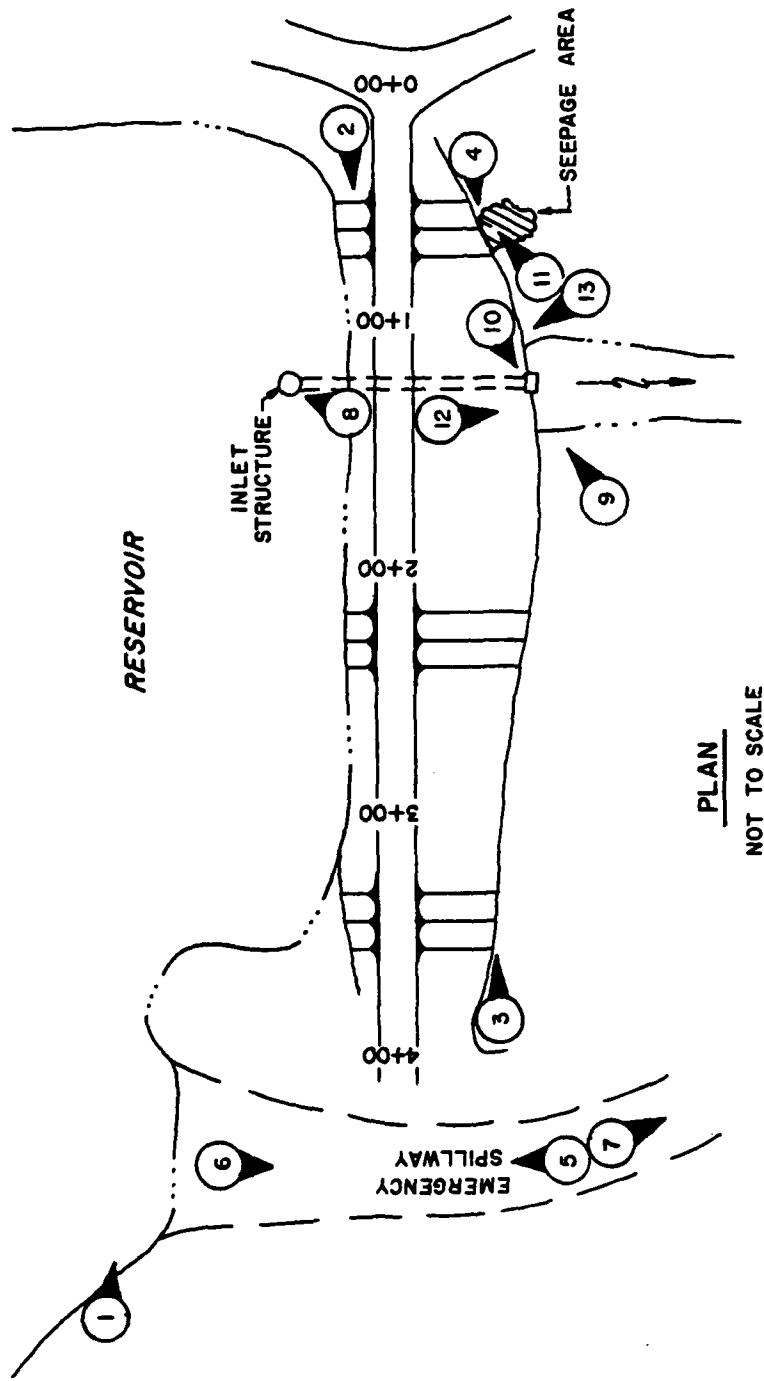
APPOINTMENT: HERRINGVILLE CONNL			
WASH FACE & ANTI VORTEX DEVICE			
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed by	Date	Approved by	
Checked by	1955	Title	
Drawn by	M. HERRINGVILLE	1955	Title
Checked by		Drawn by	
		Checked by	

PHOTO REPRODUCED
NOT TO SCALE

DATE 11-16

APPENDIX C

PHOTOGRAPHS



ABBOTT DAM
PHOTO INDEX



PHOTO C-1 Upstream slope of dam looking toward left abutment. Emergency spillway approach channel in foreground.



PHOTO C-2 Upstream slope of dam looking toward right abutment.



PHOTO C-3 Downstream slope of dam looking toward left abutment.



PHOTO C-4 Downstream slope of dam looking toward right abutment.



PHOTO C-5 Emergency spillway looking upstream.



PHOTO C-6 Emergency spillway looking downstream.



PHOTO C-7 Downstream end of emergency spillway.

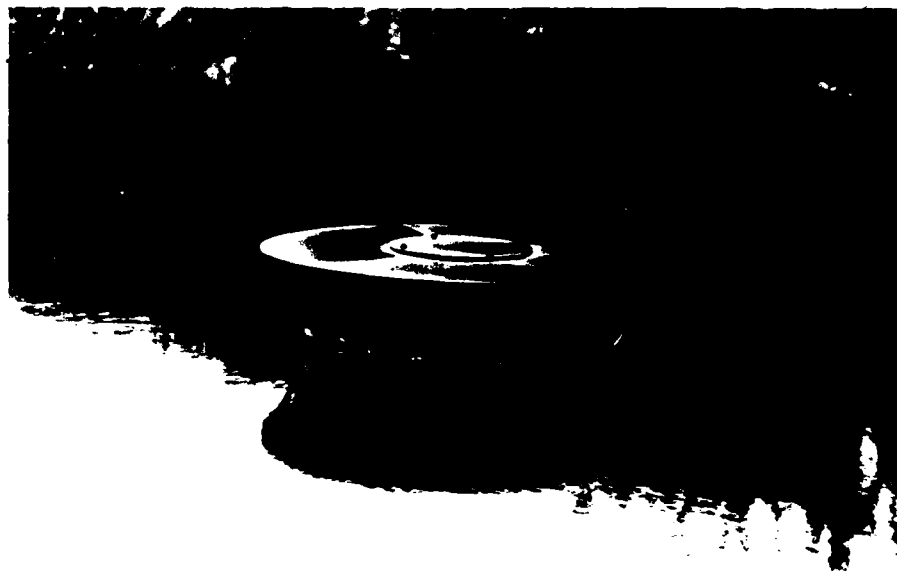


PHOTO C-8 Drop inlet spillway.



PHOTO C-9 Outlet works - headwall at discharge end of conduit.



PHOTO C-10 Erosion around headwall.



PHOTO C-11 Seepage from left abutment.



PHOTO C-12 View of downstream channel.

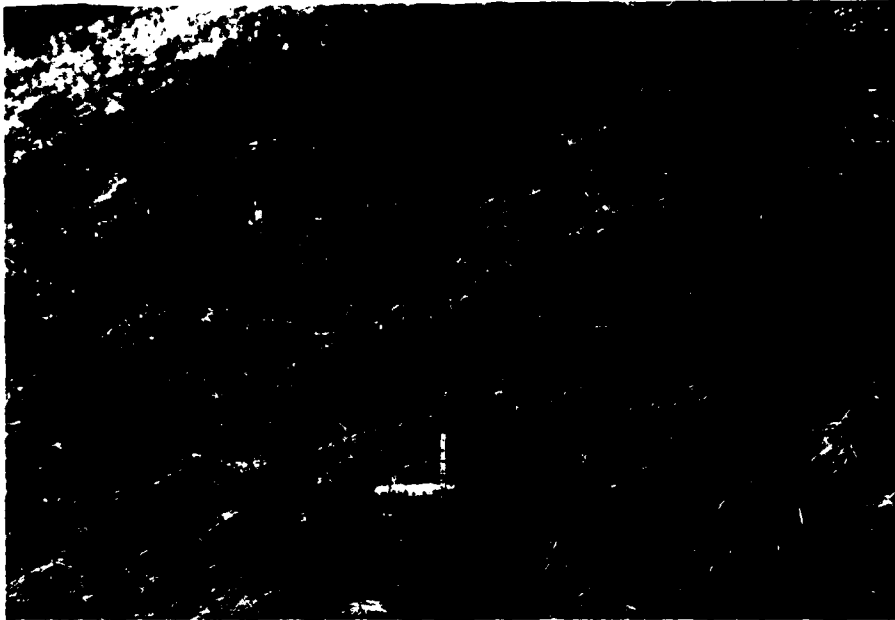
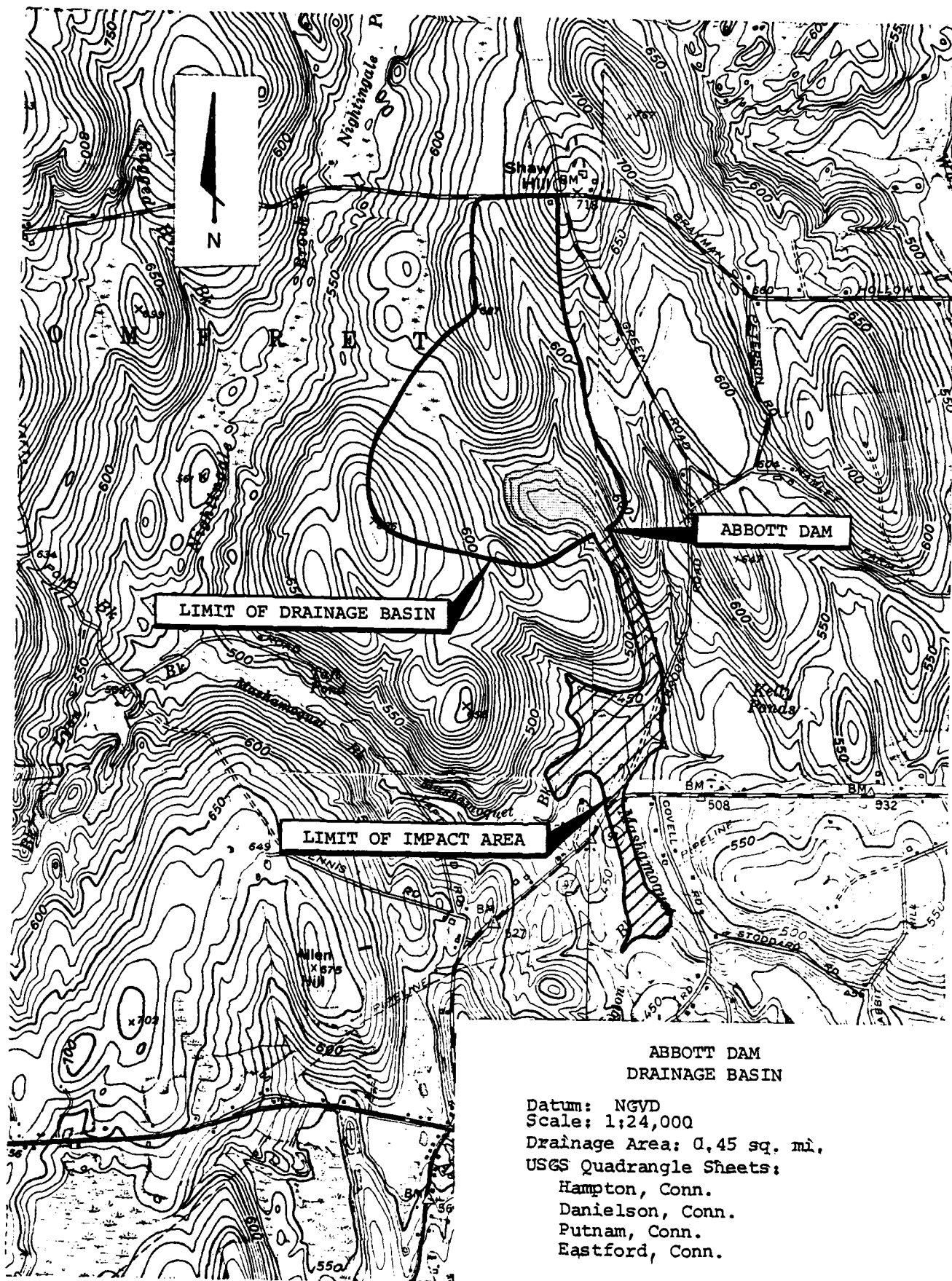


PHOTO C-13 Downstream slope of embankment indicating minor sloughing.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



**ABBOTT DAM
DRAINAGE BASIN**

Datum: NGVD
 Scale: 1:24,000
 Drainage Area: 0.45 sq. mi.
 USGS Quadrangle Sheets:
 Hampton, Conn.
 Danielson, Conn.
 Putnam, Conn.
 Eastford, Conn.

ABBOTT DAM

A. Size Classification

Height of dam = 33.5 ft.; hence SMALL

Storage capacity at top of dam (elev. 539.10) = 382 AC-FT.; hence SMALL

Adopted size classification SMALL

B. Hazard Potential

This dam is located in a wooded hilly area and is used for recreational purposes. Failure of this dam will cause damage to Holbrook Road and Connecticut Route 97 as well as disruption of service to utilities located in the failure flow path. Failure will cause flooding conditions downstream and the high velocity discharge will be the cause of accumulation of debris, scouring and erosion. The failure wave could also inundate 1-2 dwellings.

C. Adopted Classifications

<u>HAZARD</u>	<u>SIZE</u>	<u>TEST FLOOD RANGE</u>
<u>SIGNIFICANT</u>	<u>SMALL</u>	<u>100yr to 1/2 PMF</u>
Adopted Test Flood =	<u>Half</u> PMF =	<u>1600</u> CSM
		<u>725</u> CFS

D. Overtopping Potential

Drainage Area = 0.45 sq. miles
 Spillway crest elevation = 533.1; Emergency Spillway = 535.27 NGVD
 Top of Dam Elevation = 539.10 NGVD

Maximum spillway discharge
 Capacity without overtopping of dam = 1192 CFS
 "test flood" inflow discharge = 725 CFS
 "test flood" outflow discharge = 430 CFS

% of "test flood" overflow carried by spillway without overtopping = 277%

"test flood" outflow discharge portion which overflows over the dam = 0

% of test flood which overflows over the dam = 0%

Estimating Maximum Probable Discharges - Inflow and Outflow Values Date of Inspection: April 10, 1980

Name of Dam Abbott Dam, Location of Dam Masha Magnet Brook, Town Pomfret, Ct.

Watershed Characterization Hilly, wooded, steep slopes, is swampy or occupied by storage reservoirs sq. miles of drainage area

Adopted "test" flood = Half PMF = 1600 CSM = 725 CFS, Re = Effective Rainfall = 9.5 inches

D.A. = Drainage Area (Gross) = 0.45 Square Miles; Basin Slope = 0.08 ft./ft. hence; Steep

S.A. = Surface Area of Reservoir = 0.034 Square Miles; Time of Concentration 15 minutes:

Shape and Type of Spillway = a.) Pipe Shaft spillway b.) Earthen trapezoidal emergency spillway

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

Maximum Capacity of Spillway Without Overtopping = 1192 CFS = 277 % of test flood

Top of Dam Elevation = 539.10 Pipe spillway Crest Elevation = 533.10
Emergency spillway crest elevation = 535.27

Overflow portion of Length of Dam = 440 ft.; C = Coefficient of discharge for Dam = 3.0

Name of Dam	Test Flood Qp CSM	Inflow Characteristics		Outflow Characteristics First Approximation		Outflow Characteristics Second Approximation		Outflow Characteristics Third Approximation (Adopted)					
		h0 in feet	S0 in in.	h1 in ft.	S1 in in.	h2 in in.	S2 in in.	h3 in ft.	S3 in in.				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
2	1/2 PMF = 1600	725	5.0	4.53	-	SEE PLATE	D-11	-	-	-	3.913	4.2	430

Qp = Discharge; h = Surge height; S = Storage in inches NOTE: Outflow discharge values are computed as per COF guidelines.

NAME OF DAM: ABBOTT 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 1 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: N/A
 For open channel flow: N/A
 For orifice flow: N/A

where C_1 = coefficient of discharge for spillway; B_1 = length of spillway
 H_1 = head over spillway crest in feet

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

iii. $Q_{outflow} = Q_{inflow} (1 - \frac{S}{Re})$; where $Q_{inflow} =$; $Re = N/A$

iv. Length of dam = 440 ft. ; Top of Dam elev. = 539.10 ; c for dam = 3.0
 Length of spillway = ; Spillway crest = 533.10 ; c for spillway = 3.0
 535.27 0.54

$S = \text{storage in inches} = 12h \frac{S.A.}{D.A.} = 0.9066h$ where h is head over Spillway crest

v. $Q_{inflow} = 725$

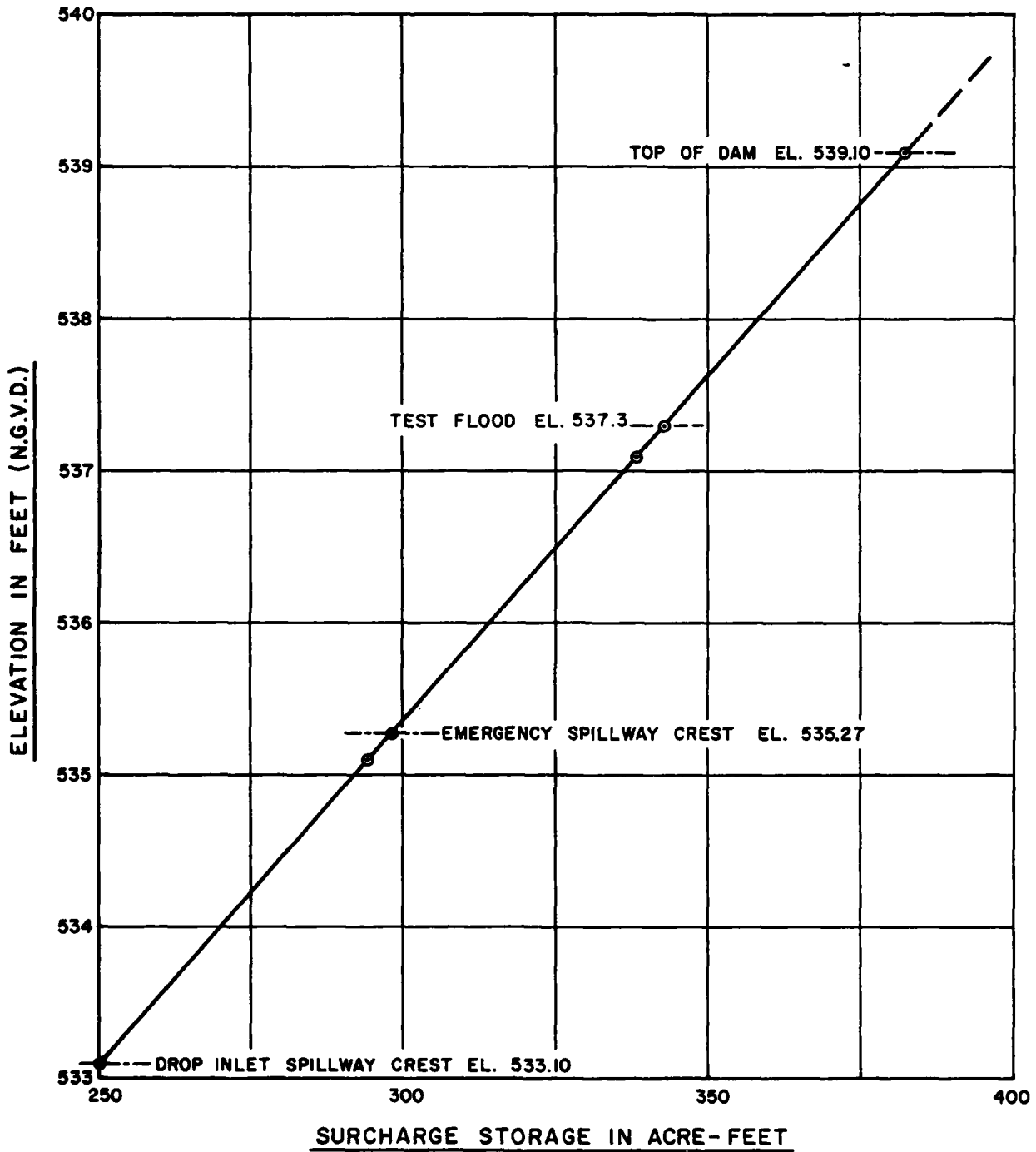
Q in CFS	Elevation	Total Head over crest $h_1 + h_2 = h$	Storage in inches = S	Remarks
697	533.50	0.40	0.3626	
663	534.00	0.90	0.816	
628	534.5	1.40	1.27	
594	535.0	1.90	1.72	
559	535.5	2.40	2.17	
524	536.0	2.90	2.63	
490	536.5	3.40	3.08	
430	537.3	4.2	3.913	

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

BASIC DATA

Name of dam Abbott Dam Name of town Pomfret, Ct.
 Drainage area = 0.45 sq. mi., Top of dam 539.10 NGVD
 Spillway type = Pipe-shaft spillway plus an emergency spillway Crest of spillway 533.10 NGVD
 Surface area at crest elevation = 0.034 sq. mi. = 22 Acres
 Reservoir bottom near dam = 505.60 NGVD
 Assumed side slopes of embankments 2:1
 Depth of reservoir at dam site _____ = y_0 = 34.0 ft.
 Mid-height elevation of dam = 522.60 NGVD
 Length of dam at crest = 440
 Length of dam at mid-height = 400
 10% of dam length at mid-height = W_b = 40

Elevation (NGVD)	Estimated Storage in AC-FT
533.10	250 Pipe Spillway Crest
535.10	294
535.27	298 Emergency Spillway Crest
537.10	338
537.3	342 Test Flood Elevation
539.10	382 Top of Dam Elevation



SURCHARGE STORAGE-ELEVATION CURVE
ABBOT DAM

ABBOTT DAM

1. DAM FAILURE ANALYSIS

A. Failure Analysis C.F.S.

$$\begin{aligned} \text{Discharge} &= \frac{8}{27} W_B \sqrt{g} y_0^{1.5} \\ &= 1.68 W_B y_0^{1.5} \\ &= 13322 \text{ C.F.S.} \end{aligned}$$

B. Maximum Spillway

Discharge with W.S.E.

At top of Dam @ 539.10 550 C.F.S.

C. Total Dam Failure Discharge 13872 C.F.S.

D. Reservoir - Storage Data:

Volume of storage at spillway crest = 250 AC-ft. @ Elev. 533.10

Surcharge storage at top of dam = 132 AC-ft. @ Elev. 539.10

Storage Total = 382 AC-ft. @ Elev. 539.10

E. Flood Discharge Channel

i. Maximum depth of flow just D/S of Dam = $\frac{4}{9} y_0 = \underline{15.1}$ 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 = $W = \underline{40}$ feet and depth of failure $y_0 = \underline{34.0}$ 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.

ii. Reach 1

Length = 3000 feet; Station 0 to Station 60+0; n = 0.05

Bed slope = $S_0 \approx S_f = 0.023$; Bed width = b = 122 feet

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 in this case with channel parameters as below:

$$Q = A \frac{1.49}{n} R^{2/3} \sqrt{S} = bd \frac{1.49}{n} d^{2/3} \sqrt{S} \quad b = 122' \text{ for } d = 11'$$

$$Q = b \frac{1.49}{n} \sqrt{S} d^{5/3} = Kd^{5/3} = 152 d^{5/3} \text{ for } b = 122'$$

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	466	0	0	0
2	468	175	1.41	8.5
4	470	550	2.30	19.2
6	472	1286	3.00	34.0
8	474	2400	3.70	50.0
10	476	3940	4.40	70.0
12	478	6600	4.80	92.0
14	480	11400	5.10	140.0
16	482	15700	5.80	180

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 $Q_1 = 13872$ CFS; depth = 15.0 ft. $V_1 = 160$ AC-ft.

$$\text{Trial } Q_2 = Q_1 \left(1 - \frac{V_1}{\text{Storage}}\right) = \left(1 - \frac{160}{382}\right) = 8062 \text{ CFS}$$

$$\therefore V_2 = 96 \text{ AC-ft.}$$

$$\text{Avg } V = \frac{V_1 + V_2}{2} = 128 \text{ AC-ft.}$$

$$\therefore Q_2 = Q_1 \left(1 - \frac{V \text{ Avg.}}{\text{Storage}}\right) = 9223 \text{ CFS; } y_2 = 12.8 \text{ ft.}$$

Depth at center of flood as adopted = ft.

Additional dam failure analysis beyond Reach 1 has not been undertaken because the depth of flow of 12.8 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 Abbott Dam
- ii. Dam Failure Discharge _____ = 13322 cfs.
- iii. Maximum Spillway Discharge _____ = 550 cfs.
- iv. Total Dam Failure Discharge _____ = 13872 cfs.
- v. Normal (Manning Depth) for 13872 = 15.0 feet
- vi. Normal (Manning Depth) for 550 = 4.0 feet
- vii. Increase in depth due to failure of dam = 11.0 feet for 3000 ft.
- viii. W.S.E. prior to failure = Ground Elevation + 4.0
- ix. W.S.E. after failure = Ground Elevation + 15.0

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.

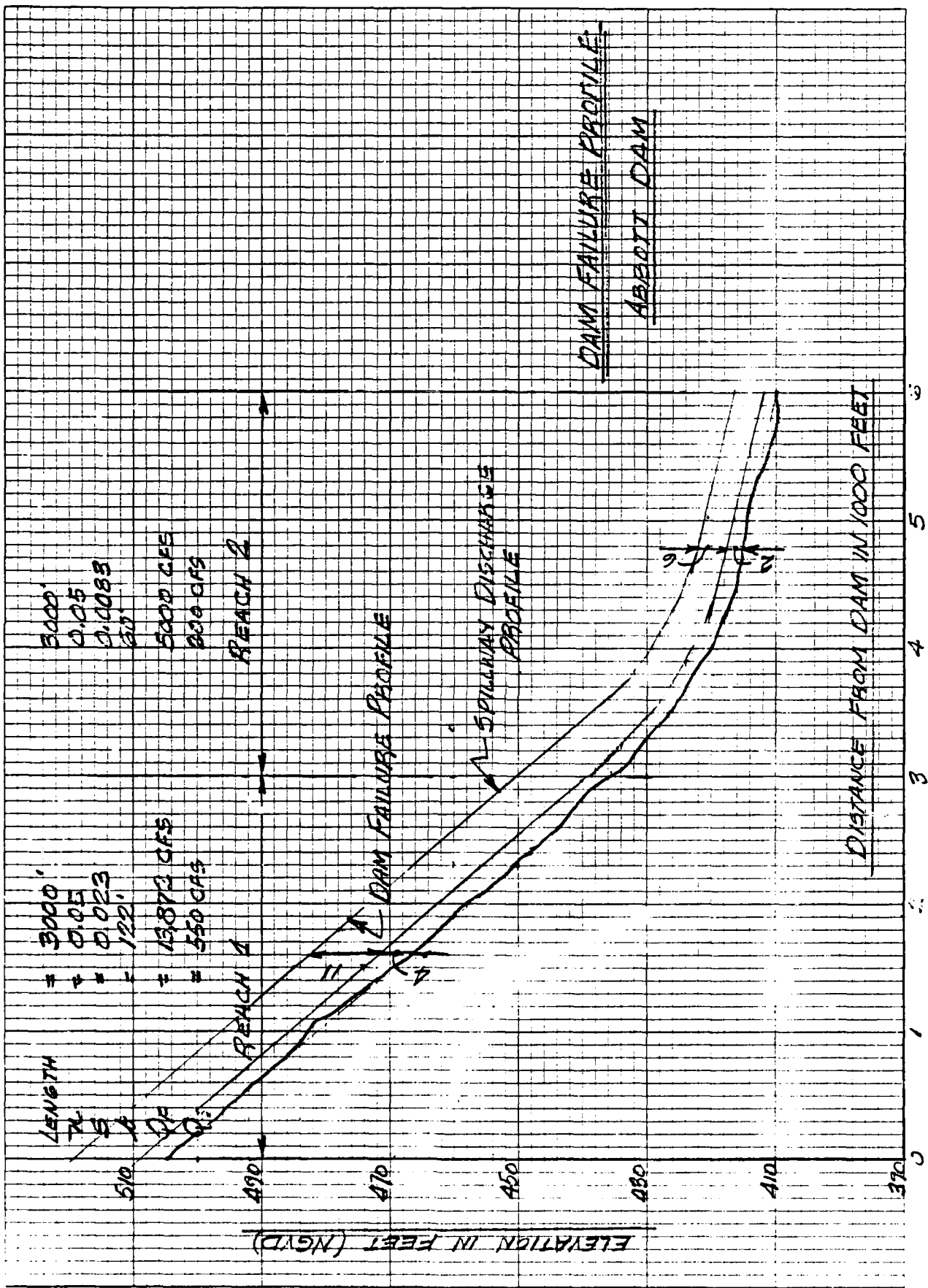
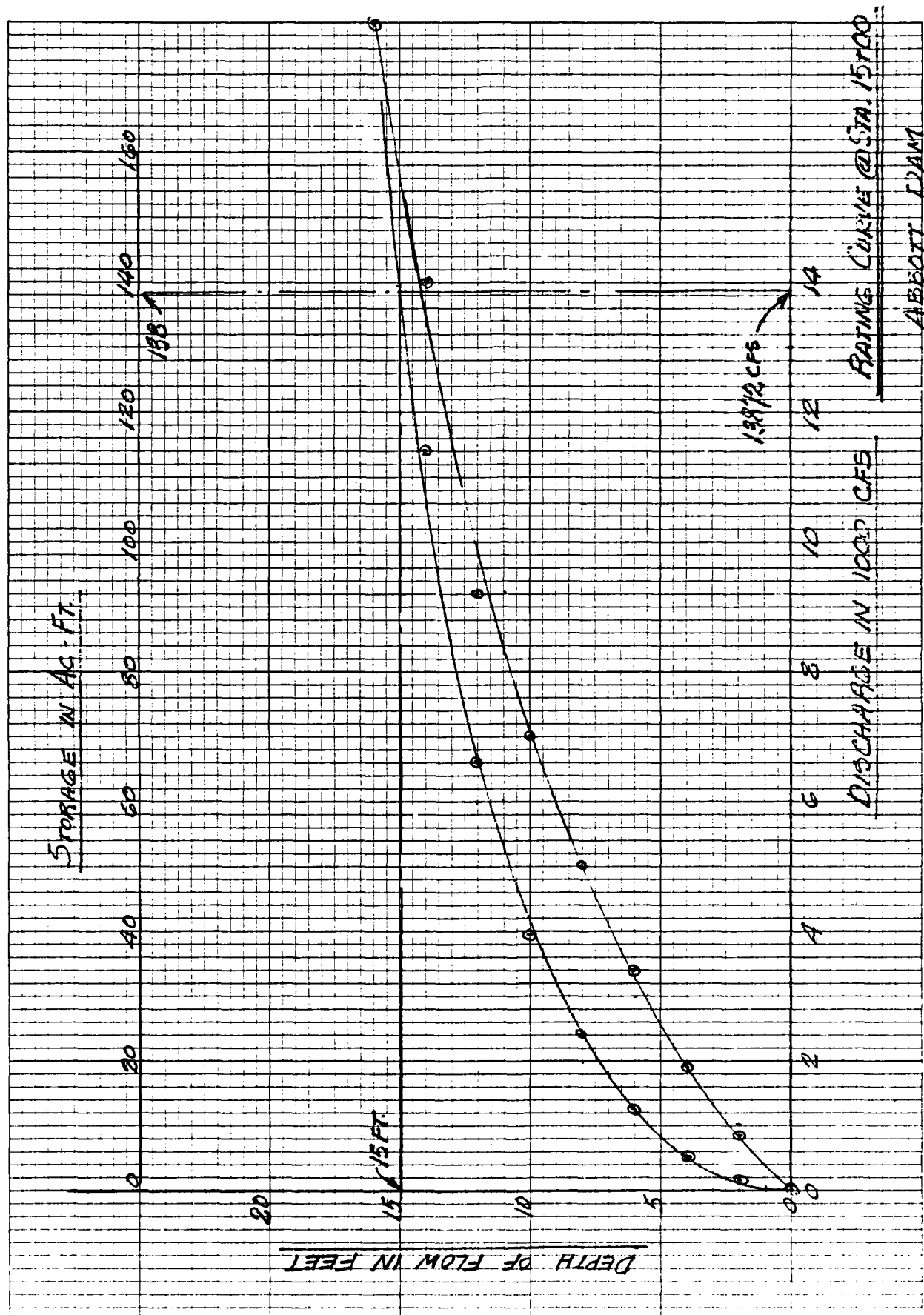


PLATE D-11



ABBOTT DAM
 RATING CURVE @ STA. 15700

DISCHARGE IN 1000 CFS

PLATE D-12

ABBOTT DAM

COMPUTATIONS FOR SPILLWAY RATING CURVE AND OUTLET RATING CURVE COMPUTATIONS

Spillway width = See attached sketch feet; Emergency spillway crest = 535.27
 Spillway crest elevation = 533.10 NGVD

Length of dam = 600 feet; Top of dam elevation = 539.10 NGVD

c = 3.0 for overflow weir and 0.54 for orifice conditions

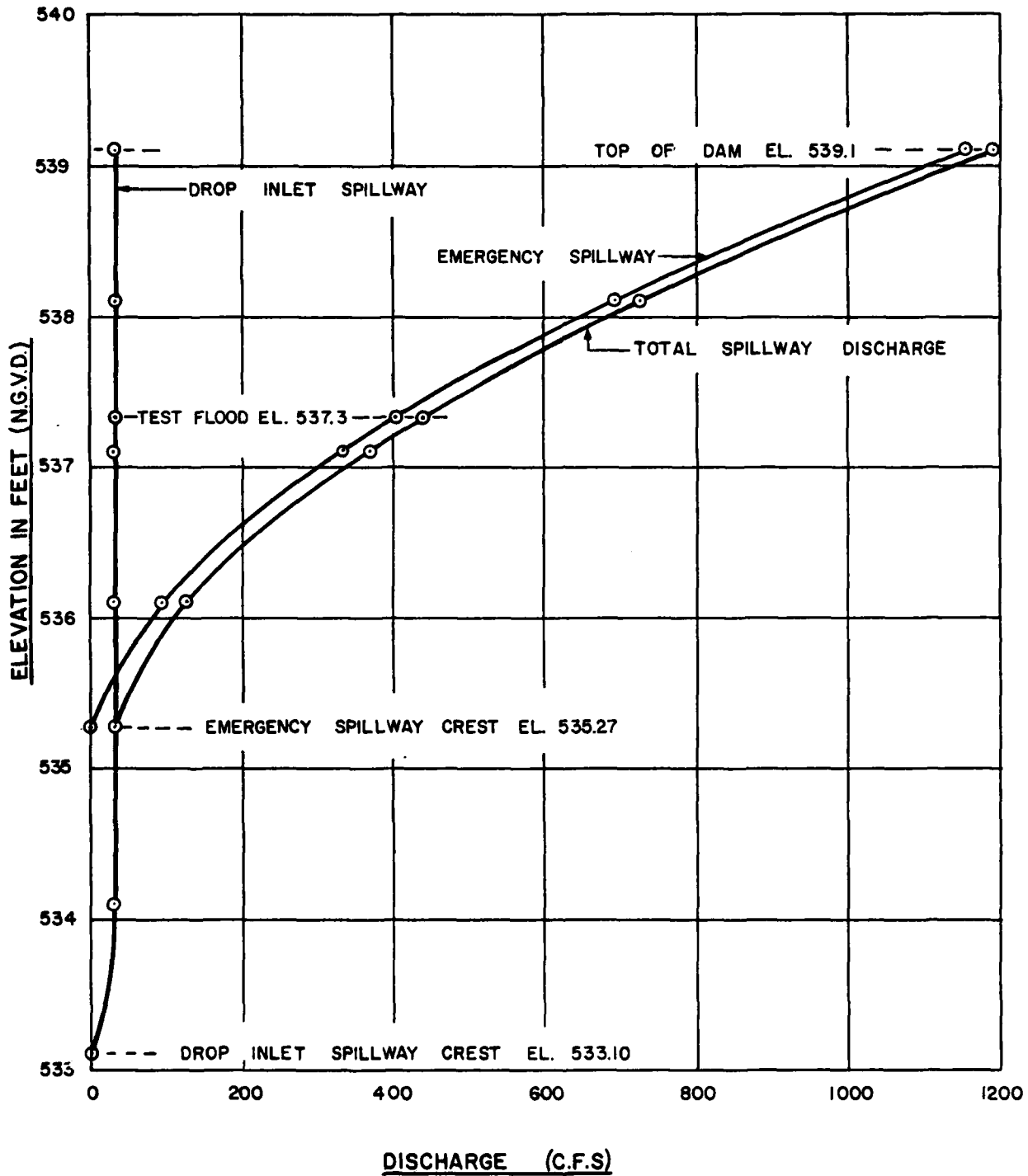
i) SPILLWAY RATING CURVE COMPUTATIONS

Elevation (ft.) NGVD	Spillway Discharge (CFS)			Remarks
533.10	0	0	0	Pipe Spillway Crest Elev.
534.10	31.75	0	31.75	
535.10	32.31	0	32.31	
535.27	32.40	0	32.40	Emergency Spillway Crest Elev.
536.10	32.86	96.40	129.26	
537.10	33.41	337.90	371.31	
537.3	33.60	400.00	433.60	Test Flood Elevation
538.10	33.94	692.70	726.64	
539.10	34.52	1158.0	1192.52	Top of Dam Elevation

ii) OUTLET RATING CURVE COMPUTATIONS

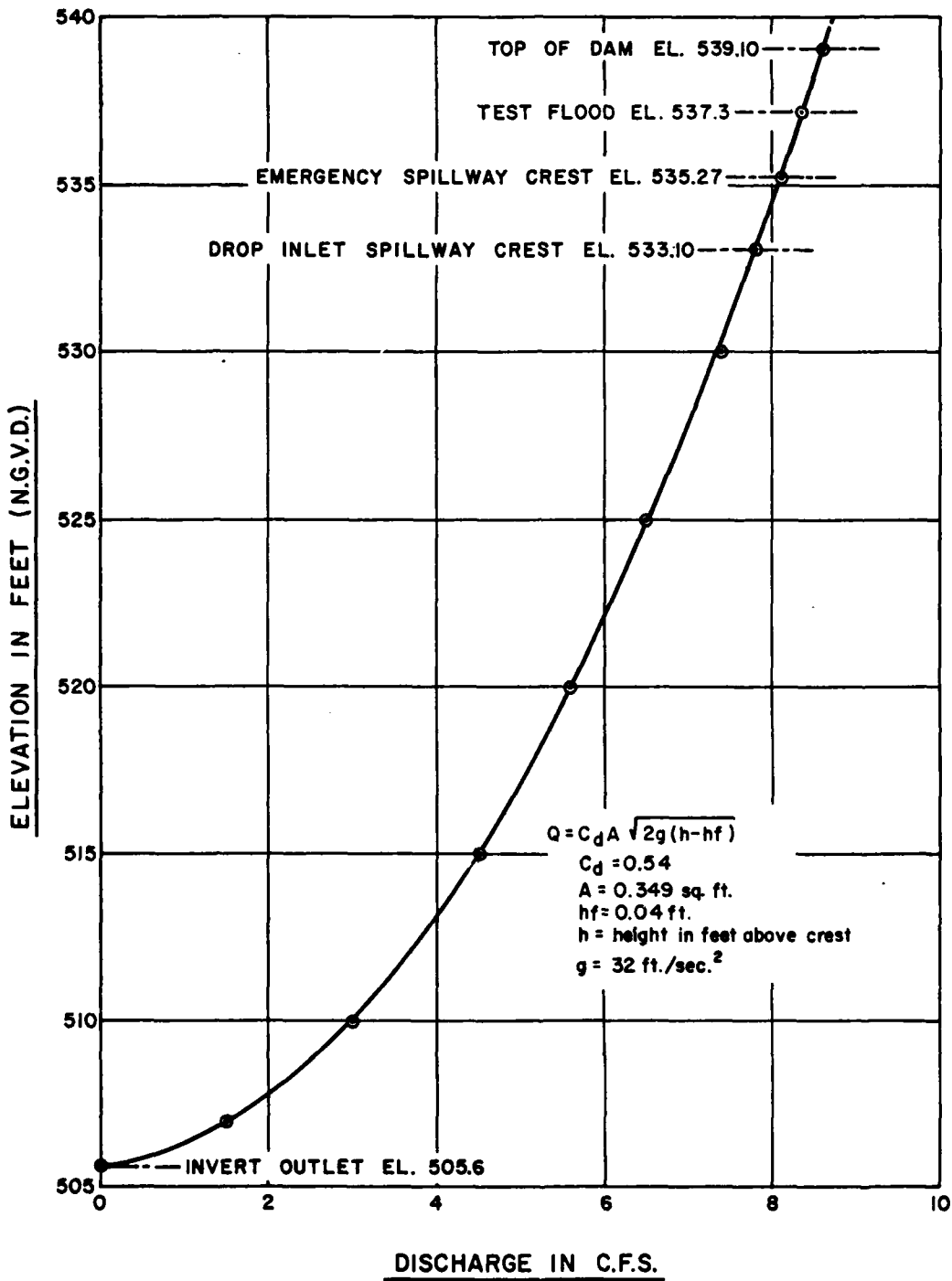
Elevation (ft.) NGVD	Discharge (CFS)	Remarks
505.6	0	Invert of Outlet Pipe
507.0	1.5	
510.0	3.0	
515.0	4.5	
520.0	5.6	
525.0	6.5	
530.0	7.4	
533.1	7.8	Pipe Spillway Crest Elev.
535.27	8.1	Emergency Spillway Crest Elev.
537.3	8.3	Test Flood Elevation
539.1	8.6	Top of Dam Elevation

Size of outlet = 8" diameter control; Area of outlet = 0.349 sq. ft.
 Invert of outlet = 505.60; Center line of outlet = 505.93

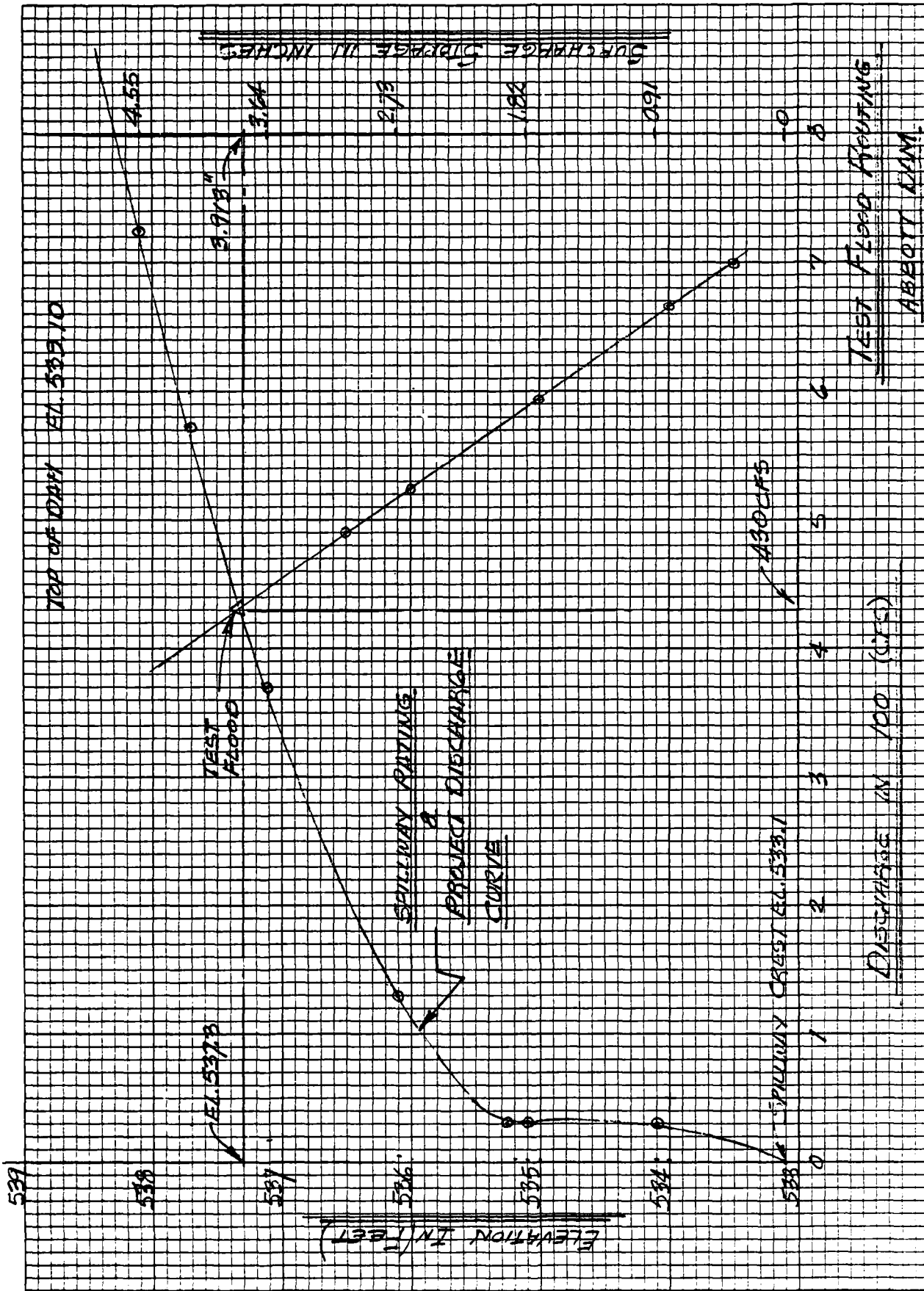


SPILLWAY RATING CURVE

ABBOTT DAM



OUTLET RATING CURVE
ABBOTT DAM



APPENDIX E

INFORMATION AS CONTAINED IN THE
NATIONAL INVENTORY OF DAMS

D-5

END

FILMED

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