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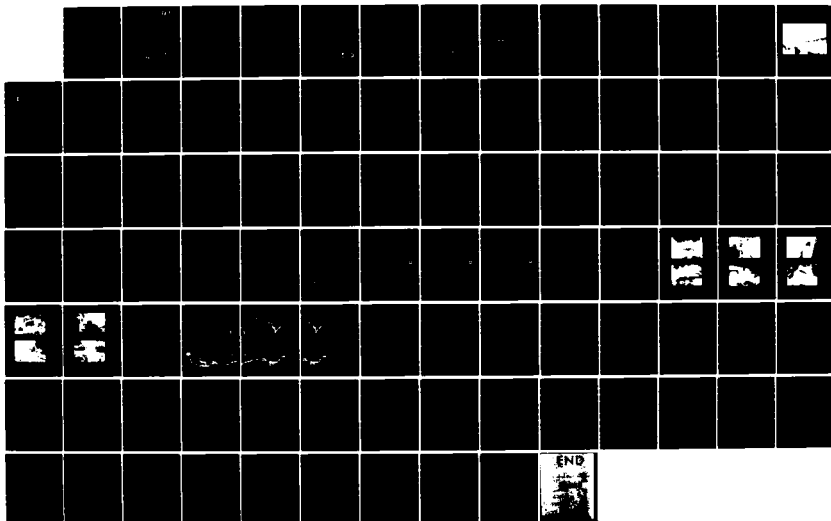
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
STUB POND DAM (CT 882. (U) CORPS OF ENGINEERS WALTHAM
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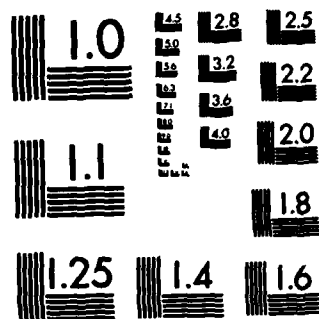
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AD-A143 980

**CONNECTICUT RIVER BASIN
AVON, CONNECTICUT**

STUB POND DAM

CT 00265

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

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AUG 9 1984
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**DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.**

APRIL, 1981

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00265	2. GOVT ACCESSION NO. AD-A193 980	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Stub Pond Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE April 1981
		13. NUMBER OF PAGES 65
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		16a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Connecticut River Basin Abon, Conn.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This dam consists of an earth embankment, and a concrete wall which extends from the embankments to the spillway on each end of the spillway. Based on the visual inspection and past operational performance, the dam is judged to be in POOR condition. There are large trees growing on the embankment. The concrete wall is severely cracked and seepage is occurring through the wall and all along the downstream of the embankment. This dam is classified as SMALL in size and a SIGNIFICANT hazard potential structure in accordance with the Corps of Engineers.		



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

REPLY TO
ATTENTION OF:
NEDED

MAY 19 1991

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Stub Pond Dam (CT-00265) 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, Avon Parks Property, P.O. Box 354, Farmington, Connecticut 06032.

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 "C.E. Edgar, III", is written over the typed name.

C.E. EDGAR, III
Colonel, Corps of Engineers
Division Engineer

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As stated

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CONNECTICUT RIVER BASIN

AVON, CONNECTICUT

STUB POND DAM

CT 00265

PHASE 1 INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

Identification No.: CT 00265
Name of Dam: Stub Pond Dam
Town: Avon
County: Hartford County, Connecticut
Stream: Nod Brook
Date of Inspection: November 14, 1980

BRIEF ASSESSMENT

This dam consists of an earth embankment, and a concrete wall which extends from the embankments to the spillway on each end of the spillway.

The earth embankment is 500 feet long, 8 feet wide at the top and 6.7 feet high, with a downstream slope of 2H:1V. The concrete spillway is located at the western end of the dam and is 40 feet long with 15 inch high permanently attached timber flashboards. The concrete wall extends 10 feet west and 54 feet east of the spillway. The drainage area is 5.8 square miles.

The dam has existed at least since 1918 at which time it was modified by the addition of various water supply appurtenances. Originally used for water supply, the dam is presently used for passive recreation. The dam is presently owned by Avon Park Properties of Farmington, Connecticut.

Based on the visual inspection, and past operational performance, the dam is judged to be in POOR condition. There are large trees growing on the embankment. The concrete wall is severely cracked and spalled and has been exposed on the downstream side by erosion. Seepage is occurring through the wall and all along the downstream toe of the embankment.

This dam is classified as SMALL in size and a SIGNIFICANT hazard potential structure in accordance with the Recommended Guidelines for Safety Inspection of Dams, by the Corps of Engineers. The impoundment storage at the top of the dam is 30 ac.-ft. and the maximum height of the dam is 6.7 feet. Failure of the dam could result in the possible loss of a few lives and appreciable economic damage to seven buildings along the downstream channel. The depth of inundation of the buildings would be 9 feet before and 0.5 to 2 feet after dam failure.

The test flood for this dam is the 100 year flood. The test flood has an inflow equal to 1810 cfs and an outflow discharge equal to 1800 cfs at a stillwater elevation of 233.1 which will overtop the dam by 1.0 foot. The maximum outflow capacity of the spillway with the water level at the top of the dam is 53 cfs, which is 3 percent of the test flood outflow.

It is recommended that the following items be studied further by a qualified registered engineer. The removal of all trees and root systems from the dam and within 15 feet of the downstream toe and backfilling with suitable compacted material. Conduct an analysis of the structural integrity of the broken and cracked concrete walls and concrete wingwalls and design repairs as required. Investigate the upstream face of the embankment and concrete walls with the pond lowered and make appropriate recommendations. Fill the eroded areas downstream of the concrete wall and provide erosion control. Conduct a detailed hydrologic/hydraulic investigation to determine the need for and means of increasing the discharge capacity of the spillway and/or providing additional freeboard. Determine the operability of the outlet works and provide a low level outlet if the existing 36 inch pipe or blowoff can not be utilized. Investigate the seepage along the toe and, if required, provide corrective measures.

The following remedial measures should be taken by the owner: Brush should be removed from the dam, debris should be cleared from the spillway and downstream channel, a downstream warning plan and an annual inspection program should be developed. The flashboards should be immediately removed from the spillway.

Recommendations and remedial measures that should be implemented within one year, except as noted, of receipt of this Phase I Inspection Report are further described in Section 7.

JAMES P. PURCELL ASSOCIATES, INC.

Sudhir A. Shah

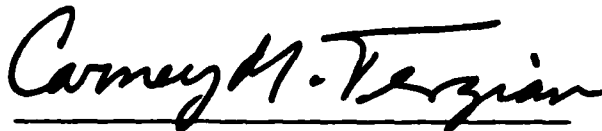
Sudhir A. Shah, P.E.
Director of Engineering
Connecticut P.E. No. 8012



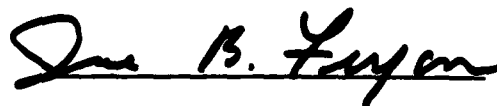
This Phase I Inspection Report on Stub Pond Dam (CT-00265) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.


JOSEPH W. FINEGAN, JR. MEMBER
Water Control Branch
Engineering Division


ARAMAST MARTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division


CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:


JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based on 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 reasonably 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 need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and 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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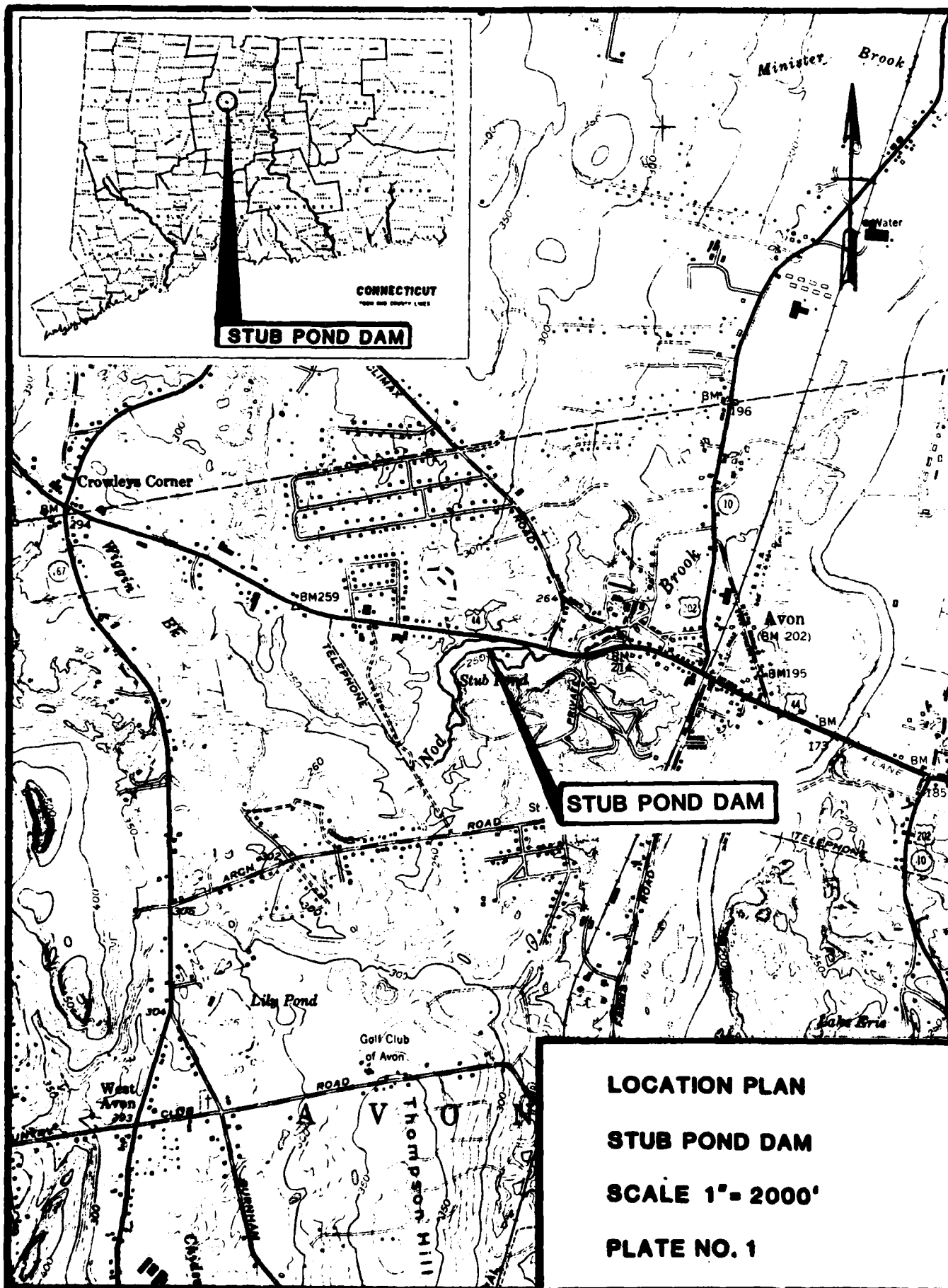
GATEHOUSE

SPILLWAY



OVERVIEW PHOTO - STUB POND DAM

PHOTO TAKEN DECEMBER 15, 1980



NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

NAME OF DAM: STUB 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. James P. Purcell Associates, 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 James P. Purcell Associates, Inc., under a letter from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0009 has been assigned by the Corps of Engineers for this work.

b. Purpose:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.
2. Encourage and prepare the States to initiate quickly, effective dam safety programs for non-federal dams.
3. To update, verify and complete the National Inventory of Dams.

1.2 Description of Project:

a. Location:

Stub Pond Dam is located in the Town of Avon, in Hartford County, Connecticut.

It is on the south side of U.S. Route 44 approximately 0.75 miles west of the village of Avon (See Plate No. 1). The dam impounds water from Nod Brook and is located approximately 8000 feet upstream of the confluence with the Farmington River. The impoundment is "L" shaped with ends pointing east and south. The dam forms the south side of the eastern end of the "L".

The latitude is $41^{\circ}-48'-38.5''$ and the longitude is $72^{\circ}-50'-32.5''$.

All elevations used in this report are based on the National Geodetic Vertical Datum (NGVD).

b. Description of Dam and Appurtenances:

Stub Pond consists of a 500 foot long earth embankment, a 64 foot long concrete wall and a 40 foot long concrete spillway. The maximum height of the dam is 6.7 feet. The top width of the embankment is 8 feet, the downstream side slope is 2H:1V, and the top is 0.5 to 1.0 feet above the top of the concrete walls. The top width of the concrete wall varies from 18 inches to 42 inches. The spillway contains 15 inch high permanently attached timber flashboards. The spillway is at the western end of the dam and the concrete wall extends 10 feet west and 54 feet east of the spillway.

There is a gate house at the eastern end of the dam which contains the control mechanism(s) to a 36 inch pipe. A metal bar rack protects the entrance to the pipe. This pipe was used in the past to supply water to the former Ensign-Bickford facilities downstream of the dam. It is suspected that this pipe is abandoned and terminates at the filled ditch 1000 feet east of the gate house (See Plan Page B-8). The outlet to the 36 inch pipe could not be located.

The visual inspection noted the outlet of what appears to be a blowoff at the concrete wall. No information concerning its size, control mechanism or operability could be found.

There is also a 6 inch pipe through the concrete wall which is controlled by gate valves on the upstream and downstream side of the wall. This pipe connects to an abandoned 6 inch water supply pipe of the Avon Water Company. Possibly, this pipe outlets at a ditch to the east of the gate house where a 6 inch C.I. pipe with flap gate was observed (See Plan Page B-8).

c. Size Classification:

The size classification of this dam is SMALL. The impoundment storage at the top of the dam is 30 ac.-ft. and the maximum height of the dam is 6.7 feet.

d. Hazard Classification:

The hazard classification of this dam is SIGNIFICANT as per the criteria set forth in the Recommended Guidelines for Safety Inspection of Dams, by the Corps of

Engineers. Seven office and storage buildings may suffer appreciable damage and the potential exists for the possible loss of a few lives in the event of dam failure. The depth of inundation at the buildings would be 0 feet before and 0.5 to 2 feet after dam failure.

e. Ownership:

Stub Pond Dam is presently owned by Avon Parks Property, P.O. Box 354, Farmington, Connecticut 06032. Telephone: (203) 677-1361. The previous owner was the Ensign-Bickford Company and the Avon Water Company previously had water rights to the pond.

f. Operator:

This person in charge of maintenance of the dam is:

Mr. Ray Greenwood
Maintenance Supervisor
F.I.P. Corporation
P.O. Box 354
Farmington, CT 06032
Telephone: (203) 677-1361

g. Purpose:

Originally used for industrial and municipal water supply, Stub Pond is presently utilized for passive recreation and aesthetics.

h. Design and Construction History:

The dam has existed at least since 1918 when it was modified to accommodate the addition of various water supply appurtenances.

i. Normal Operational Procedures:

There are presently no operational procedures and all flow is discharged over the spillway.

1.3 Pertinent Data:

a. Drainage Area:

The Stub Pond Dam drainage basin is generally rectangular in shape with a length of 3.9 miles and an average width of 1.5 miles, resulting in a total drainage area of 5.8 square miles (see drainage basin map in Appendix D). The topography is generally a moderate to steep terrain, with elevations ranging from a high of 900

feet to a low of 231.5 feet at the spillway crest (top of flashboards). Stream and basin slopes are flat to steep, 0.2 percent to 10 percent, respectively. The normal surface area of the pond is 11.5 acres which is approximately 0.3 percent of the watershed.

b. Discharge at Dam Site:

There are no specific discharge records available for this dam. Listed below are calculated discharge values for the spillway, with the flashboards in place.

1. Outlet works: There is insufficient data available to determine discharge capacities for the outlet works.
2. Maximum known discharge at dam site: Unknown. Reportedly there was up to one foot of flow over the earth embankment portion of the dam in January 1979.
3. Ungated spillway capacity at top of dam: 53 cfs at elevation 232.1.
4. Ungated spillway capacity at test flood elevation: 240 cfs at elevation 223.1.
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: 240 cfs at elevation 233.1.
8. Total project discharge at top of dam: 53 cfs at elevation 232.1.
9. Total project discharge at test flood elevation: 1800 cfs at elevation 233.1.

c. Elevation (Feet Above NGVD):

1. Stream Bed at toe of dam	225+
2. Bottom of cutoff	Unknown
3. Maximum tailwater	Unknown
4. Normal Pool	231.5
5. Full flood control pool	N/A
6. Spillway crest	231.5 (Top of Flashboards) 230.3 (Concrete Spillway)

7.	Design surcharge	Unknown
8.	Top of dam	232.1
9.	Test flood level	233.1
d.	Reservoir (Length in Feet):	
1.	Normal pool	2300
2.	Flood control pool	N/A
3.	Spillway crest pool	2300 (Top of Flashboards)
4.	Top of dam	2800
5.	Test flood pool	3400
e.	Storage (acre-feet):	
1.	Normal pool	23
2.	Flood control pool	N/A
3.	Spillway crest pool	23 (Top of Flashboards)
4.	Top of dam	35
5.	Test flood pool	47
f.	Reservoir Surface (acres):	
1.	Normal pool	11.5
2.	Flood control pool	N/A
3.	Spillway crest	11.5 (Top of Flashboards)
4.	Test flood pool	19.9
5.	Top of dam	12.0

g. Dam:

- | | |
|--------------------|--|
| 1. Type | Earth embankment and concrete wall |
| 2. Length | 500 feet - earth embankment
64 feet - concrete wall |
| 3. Height | 6.7 feet |
| 4. Top width | 8 feet |
| 5. Side slopes | 2H:1V (Downstream)
Unknown (Upstream) |
| 6. Zoning | Unknown |
| 7. Impervious Core | Unknown |
| 8. Cutoff | Unknown |
| 9. Grout curtain | Unknown |
| 10. Other | N/A |

h. Diversion and Regulating Tunnel: N/A

i. Spillway:

- | | |
|--------------------|---|
| 1. Type: | Overflow, uncontrolled weir |
| 2. Length of weir | 40 feet |
| 3. Crest elevation | 231.5 (Top of Flashboards)
230.3 (Concrete Spillway) |
| 4. Gates | None |
| 5. U/S Channel | Pond |
| 6. D/S Channel | Existing Stream |
| 7. General | 15 inches flashboard |

j. Regulating Outlets:

Refer to Paragraph 1.2b - "Description of Dam and Appurtenances" for description of Outlet Works.

	6 INCH PIPE	36 INCH PIPE	BLOWOFF
1. Invert	Unknown	Unknown	Unknown
2. Size	6 Inch	36 Inch	Unknown
3. Description	Unknown	Unknown	Unknown
4. Control mechanism	Gate Valve	Unknown	Unknown
5. Other	Operability is Unknown	Operability is Unknown	Operability is Unknown

SECTION 2

ENGINEERING DATA

2.1 Design

There are no available records presenting design information for the construction of Stub Pond Dam.

2.2 Construction

There are no available records of the construction or subsequent repairs to this dam.

2.3 Operation

No formal records of operation are maintained for this facility.

2.4 Evaluation

a. Availability:

The information concerning this dam was gathered only by field investigation and meetings with representatives of the owners.

b. Adequacy:

The lack of indepth engineering data did not allow a definite 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 judgment.

c. Validity:

The validity of the limited information available could not be verified.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General:

The visual inspection of Stub Pond Dam was conducted on November 14, 1980 and a copy of the visual inspection check list is contained in Appendix A of this report.

The following procedure was used:

1. Inspection of the upstream area of the reservoir which was impounded by the dam.
2. Visual inspection of the face and top of the dam and spillway for cracks, settlement, seepage, etc.
3. Inspection of the outlet works and other appurtenances as to their existence, location, and operability.
4. Review of procedures that could be utilized in the event of an emergency situation.
5. A check of the downstream area for seepage, piping, boils or other indications of abnormal conditions. The downstream hazard potential in the event of dam failure was investigated.
6. Photographs of the general area of the dam and of specific items of note were taken and are included in Appendix C of this report.

Before the inspection, the available existing data was studied and reviewed.

b. Dam:

1. Crest: The dam consists of an earth embankment with a top width of approximately 8 feet and a maximum height of 6.7 feet (Photos C-8, C-9). There is a footpath along the top of the dam and there are many exposed tree roots however, there does not appear to be any serious erosion.

2. **Upstream Face:** The upstream face of the dam is an earth slope which was mostly underwater and out of view. There is presently 0.6 feet between the top of the flashboards and the top of the concrete wall. The earth embankment is 0.5 to 1.0 feet higher than the top of this concrete wall. There are trees, shrubs, and grass growing on the portion of the slope above the pond (Photos C-8, C-9).
3. **Downstream Face:** The downstream face is an earth embankment with a slope of approximately 2H:1V. There are numerous large (24 to 36 inch diameter) pine trees growing on the downstream face (Photos C-8, C-9). There is clear standing water all along the toe of the dam to the east of the spillway and the toe is damp to the west of the spillway. It could not be determined if the water and dampness was due to seepage or ground/surface water. The standing water along the toe to the east of the spillway drains to a small culvert under a gravel road where it was measured at from 1/4 to 1/2 gallons per minute (See Plan Page B-8).
4. **Concrete Wall:** The area immediately downstream of the eastern wall is severely eroded (See Plan Page B-9) exposing much of the downstream face of the wall (Photo C-3). This wall is severely cracked and spalled with grass growing in the cracks (Photo C-4). The cracks extend from the spillway approximately 45 feet east. Approximately 1 to 2 gallons per minute of clear water is seeping through the wall (Photo C-4). The area below the western wall is also eroded (Photo C-6), and the wall is broken at the top of the eastern end with a large reinforcing bar exposed.

c. Appurtenant Structures:

1. **Spillway:** The concrete spillway is 40 foot long and has 15 inch high permanently attached timber flashboards which appear in sound condition (Photos C-1, C-3, C-5). Considerable debris was caught on the spillway at the western end. Water was flowing over the entire spillway on the day of the inspection. The concrete spillway wingwalls are also cracked at the base where they joint the spillway.
2. **Gate House:** The timber gate house is located at the eastern end of the dam (Photo C-9, C-10). The exterior of the house is in fair condition. There is a vent for the 36 inch pipe just east of the house, and no flow was observed in the pipe. The house was locked and the interior and control mechanism could not be inspected. The representative of the owner indicated that the key to the lock on the gate house could not be located.

3. **Blowoff:** There is a blowoff through the eastern concrete wall approximately 11.6 feet east of the spillway. The control mechanism could not be seen because it is underwater and its operability is unknown. The blowoff outlets through a concrete arched opening below the wall (Photo C-7).

4. **6 Inch Pipe:** The downstream gate valve for this pipe was visible. No other portions of the system could be observed. A 6 inch C.I. pipe with flap gate was noticed in a ditch to the east of the gate house. It is possible that this is the same pipe.

d. Reservoir Area:

The area around the eastern end of the dam is relatively flat and is utilized by a fish and game club for passive recreation. The area around the western end of the dam is bordered by relatively steep forested slopes. No geologic features were noted that could be expected to adversely affect the dam or appurtenances.

e. Downstream Channel:

Debris has formed a small dam (1 foot high) immediately downstream of the spillway (Photo C-1). The channel beyond is an existing stream through the woods, relatively free of debris, with trees growing along the edges.

3.2 Evaluation:

Based on the visual inspection, Stub Pond Dam appears to be in poor condition overall. Specific areas of concern that were noted are:

- a. The trees and brush growing on the embankment.
- b. The erosion downstream of the concrete walls.
- c. The cracks, spalling, and seepage through the concrete wall.
- d. The possible seepage through the earth embankment.
- e. The lack of an operable low level outlet.
- f. The inadequate spillway capacity.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General:

There are presently no operational procedures for Stub Pond Dam. It has only a recreational purpose at this time.

b. Description of Any Warning System in Effect:

No formal emergency or contingency plan is in effect to reduce or minimize downstream damage.

4.2 Maintenance Procedures

a. General:

There is no regular maintenance schedule for the dam. Maintenance is reportedly on an "as need" basis. Visual inspections by the owner are performed periodically.

b. Operating Facilities:

There is no regular maintenance of the spillway or outlet works.

4.3 Evaluation

To insure the safety of the resident downstream, a regular inspection and maintenance program and a formal downstream warning plan should be developed and implemented.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Stub Pond Dam creates an impoundment with a total storage capacity of 23 ac.-ft. at elevation 231.5, the top of flashboard elevation. Each foot of depth in the reservoir above the top of flashboards can accommodate approximately 11.5 ac.-ft. The drainage area is 5.8 square miles and the normal pond area is 11.5 acres or 0.3 percent of the watershed. The spillway is 40 feet long with 15 inches of flashboards and is 0.6 feet below the top of the concrete wall.

5.2 Design Data

- a. No specific design data is available for this watershed or the structures of Stub Pond Dam. In lieu of existing design information, USGS topographic maps (scale 1"=2000') were utilized to develop hydrologic parameters such as drainage area, basin length, time of concentration, and other runoff characteristics. Elevation-storage relations for Stub Pond Dam were approximated. The pond surface area and surcharge storage was computed using the USGS maps. Some of the pertinent hydraulic design data was obtained and/or confirmed by actual field measurements at the time of the visual inspection.
- b. Outflow values (routing procedures) and dam overtopping analyses were computed in accordance with the guidelines developed by the Corps of Engineers. Judgment was used in calculating final values outlined in this report, which are quite approximate and should not be considered a substitute for actual detailed analysis.

5.3 Experience Data

Historical data for recorded discharges is not available for this dam. Reportedly the earth embankment was overtopped in January, 1979 by approximately 1 foot.

5.4 Test Flood Analysis

Recommended Guidelines for the Safety Inspection of Dams by the Corps of Engineers were used for the selection of the "Test Flood". This dam is classified as a SIGNIFICANT hazard and SMALL size structure. Guidelines indicated that a range of the 100 year to 1/2 the Probable Maximum Flood (PMF) be used as the "Test Flood" for these classifications. A test flood of 100 years was chosen because of the size of the dam. The watershed has a total area of 5.8 square miles. Snyder's lag was calculated to be 5.5 hours and a Snyder peaking coefficient of 0.625 was used. The 200 square mile - 24 hour probable maximum precipitation (PMP) is 21.5 inches. The flood

hydrograph package, HEC-1 computer program, developed by the Corps of Engineers was utilized to develop the inflow hydrograph, route the flood through the reservoir, and for the dam overtopping analysis. The 1/4 PMF, which is comparable to the 100 year flood, has been used for the test flood. The test flood inflow was calculated to be 1810 cfs (310 csm), the 1/2 PMF inflow is 3600 cfs (620 csm) and the PMF inflow is 7200 cfs (1250 csm). The outlet works were assumed to be closed and the flashboards were in place for this analysis.

The spillway capacity is hydraulically inadequate to pass the "Test Flood" and overtopping of the dam will occur. The maximum outflow capacity of the spillway without overtopping the dam is 53 cfs. This corresponds to 3 percent of the test flood outflow. The maximum outflow discharge value for the test flood is 1800 cfs corresponding to a depth of flow over the top of the dam of 1.0 foot. A spillway rating curve, and a reservoir stage capacity curve are included in Appendix D of this report.

5.5 Dam Failure Analysis

This dam is classified as SIGNIFICANT hazard structure. Failure discharge could cause the loss of a few lives and damage seven buildings along the downstream channel.

The calculated dam failure discharge is 4400 cfs due to an assumed breach width of 150 feet and a pre-failure pool level equal to the top of the dam. At this elevation, the downstream discharge before failure will be the full spillway capacity of 53 cfs corresponding to a depth of flow of 1-2 feet in the downstream channel. No buildings would be inundated by this pre-failure flow. Failure will produce a water surface level of approximately 6.7 feet immediately downstream from the dam. Five buildings may be inundated by from 0.5 to 1.0 feet and two buildings may be inundated by 2.0 feet above ground level. The failure discharge will effect downstream areas for a distahce of 8000 feet from the dam. At this distance, the water surface level will be approximately 0 - 1 foot above normal observations as it enters the Farmington River. Beyond 8000 feet, the effects of the failure discharge will be reduced as it enters the Farmington River. Water surface elevations due to the failure of the dam are listed on page D-21. Probable consequences including the prime impact areas are listed on page D-27.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observation

The most significant area of distress noted for this dam was the severe erosion downstream of the eastern concrete wall. This erosion is apparently caused by water flowing over the top of the wall and then parallel to the wall to the downstream channel.

This wall is severely cracked and seepage is occurring through most of the cracks. The condition of the upstream face of the dam could not be determined due to the pond level. It is possible that the seepage and cracks are occurring and/or enhanced by unknown defects in the upstream face of the dam.

Other areas of concern were the very large trees and root systems along the top of the earth embankment and the possible seepage all along the toe of the embankment.

6.2 Design and Construction Data

There is insufficient design and construction data to permit a formal evaluation of stability.

6.3 Post-Construction Changes

The dam is believed to have remained essentially unchanged since at least 1918.

6.4 Seismic Stability

The dam is in Seismic Zone 1 and hence does not require evaluation for seismic stability according to the Corps of Engineers Recommended Guidelines.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition:

Based on the visual inspection, past performance, and hydraulic/ hydrologic evaluation, Stub Pond Dam and appurtenances are judged to be generally in POOR condition. Items of concern that should be addressed as a result of this inspection are listed in Sections 7.2 and 7.3.

b. Adequacy:

The information available is such that the assessment of the safety of the dam should be based on the visual inspection results and the past operational performance of this structure.

c. Urgency:

The recommendations and remedial measures described below should be implemented by the owner within one year after receipt of this Phase I Inspection Report except as noted.

7.2 Recommendations

It is recommended that the owner engage a qualified registered engineer to carry out the following actions and that his recommendations be implemented.

- a. All trees and their respective root systems be removed from the dam and within 15 feet of the downstream toe, and backfill with suitable compacted material.
- b. An analysis of the structural integrity of the broken and cracked concrete walls and concrete wingwalls be conducted and repairs designed as required.
- c. Investigate the upstream face of the embankment and concrete walls with the pond lowered and make appropriate recommendations.
- d. The eroded areas downstream of the concrete walls be filled and erosion control be provided.
- e. A detailed hydrologic/hydraulic investigation to determine the need for and the means of increasing the discharge capacity of the spillway and/or providing additional freeboard.

- f. Determine the operability of the outlet works and provide a low level outlet if the existing 36 inch pipe or blowoff cannot be utilized.
- g. Investigate the seepage along the toe and, if required, provide corrective measures.

7.3 Remedial Measures

1. Operation and Maintenance Procedures:

1. Remove brush from the dam.
2. Clear the debris from the downstream channel immediately below the dam and from the spillway.
3. Develop a surveillance and downstream warning plan, including round-the-clock monitoring during heavy precipitation.
4. Institute a program of annual periodic technical inspection.
5. Immediately remove the flashboards and keep them removed until all of the recommendations and remedial measures have been completed.

7.4 Alternatives

There are no practical alternatives to the above stated recommendations.

APPENDIX A

INSPECTION CHECK LIST

INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Stub Pond Dam

DATE November 14, 1980

TIME 1:00 - 4:00 p.m.

WEATHER Overcast

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

PARTY:

- | | |
|--|-------------------------------------|
| 1. <u>R. Johnston, JPPA</u> | 6. <u>R. Stevens, F.I.P., Corp.</u> |
| 2. <u>J. Hewes, JPPA</u> | 7. _____ |
| 3. <u>J. Walsh, Baystate</u> | 8. _____ |
| <u>Environmental Consultants, Inc.</u> | 9. _____ |
| 4. _____ | 10. _____ |
| 5. _____ | |

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Hydraulics</u>	<u>R. Johnston</u>	
2. <u>Structural</u>	<u>J. Hewes</u>	
3. <u>Geotechnical</u>	<u>J. Walsh</u>	
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		
9. _____		
10. _____		

INSPECTION CHECK LIST

PROJECT Stub Pond Dam DATE November 14, 1980
 PROJECT FEATURE _____ NAME _____
 DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Crest Elevation 232.1	Good footpath along crest
Current Pool Elevation 231.5	Top of flashboards
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed
Pavement Condition	N/A
Movement or Settlement of Crest	Minor due to footpath
Lateral Movement	None observed
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Severe cracking and spalling of concrete wall east of spillway
Indications of Movement of Structural Items on Slopes	None observed
Trespassing on Slopes	Yes. Footpath along crest.
Vegetation on Slopes	Yes. Large trees and brush.
Sloughing or Erosion of Slopes or Abutments	Severe erosion downstream of east concrete wall.
Rock Slope Protection - Riprap Failures	N/A
Unusual Movement or Cracking at or near Toes	None observed
Unusual Embankment or Downstream Seepage	Wet area all along downstream toe. Seepage through concrete wall.
Piping or Boils	None observed
Foundation Drainage Features	Unknown
Toe Drains	Unknown
Instrumentation System	None observed

INSPECTION CHECK LIST

PROJECT Stub Pond Dam

DATE November 14, 1980

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
Outlet works - intake channel and intake structure. a. Approach Channel b. Intake structures Blowoff 6 inch pipe 36 inch pipe	Entire pond bed - underwater Unknown Gate valve Metal bar rack at gate house.

INSPECTION CHECK LIST

PROJECT Stub Pond Dam DATE November 14, 1980

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED

CONDITION

Outlet Works - Transition and conduit

Blowoff

6 inch pipe

36 inch pipe

Unknown

Controlled by gate valves on upstream and downstream side of dam. Condition and operability unknown. Pipe is part of abandoned municipal water supply system.

Control is assumed to be in locked timber gate house. Pipe is part of abandoned industrial water supply system.

INSPECTION CHECK LIST

PROJECT Stub Pond Dam DATE November 14, 1980

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
Outlet Works - Outlet structure and outlet channel Blowoff 6 inch pipe 36 inch pipe	Arched opening below east concrete wall. Unknown. Part of abandoned water supply system. Possibly, outlet is at ditch to the east of the gate house where a 6 inch C.I. pipe with flap gate was noticed. Unknown. Suspected to be buried at upper end of ditch to east of gate house.

INSPECTION CHECK LIST

PROJECT Stud Pond Dam DATE November 14, 1980
 PROJECT FEATURE _____ NAME _____
 DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - CONTROL TOWER</u>	Interior was locked and not inspected.
a. Concrete and Timber	
General Condition	Concrete, good. Timber, fair.
Condition of Joints	N/A
Spalling	None observed
Visible Reinforcing	None observed
Rusting or Staining of Concrete	None observed
Any Seepage or Efflorescence	None observed
Joint Alignment	N/A
Unusual Seepage or Leaks in Gate Chamber	Unknown
Cracks	None observed
Rusting or Corrosion of Steel	Bar rack rusted
b. Mechanical and Electrical	
Air Vents	Unknown
Float Wells	Unknown
Crane Hoist	Unknown
Elevator	Unknown
Hydraulic System	Unknown
Service Gates	Unknown
Emergency Gates	Unknown
Lightning Protection System	None observed
Emergency Power System	None observed
Wiring and Lighting System in Gate Chamber	Unknown

INSPECTION CHECK LIST

PROJECT Stub Pond Dam DATE November 14, 1980
 PROJECT FEATURE _____ NAME _____
 DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	Pond Bed - Under water
General Condition	Under water
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	Yes
Floor of Approach Channel	Under water
b. Weir and Training Walls	
General Condition of Concrete	Poor - cracked and broken
Rust or Staining	None observed
Spalling	Yes
Any Visible Reinforcing	Yes. At top of east end of west concrete wall.
Any Seepage or Efflorescence	Yes. Through cracked wall.
Drain Holes	None observed
c. Discharge Channel	
General Condition	Fair
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	Yes
Floor of Channel	Natural - Gravel
Other Obstructions	Debris Dam - 1 foot high

APPENDIX B

ENGINEERING DATA

APPENDIX B-1

DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS

<u>Location</u>	<u>Items</u>
Mr. Victor J. Galgowski Dam Safety Engineer Water Resources Unit Department of Environmental Protection State of Connecticut State Office Building Hartford, Connecticut 06115	* 1. State Inspection Reports 2. State Order to Repair Dam
Avon Water Company 176 West Main Street Avon, Connecticut 06001	1. Map Showing Water Lines in Dam Area 2. 1918 Photograph of Dam

* Indicates material contained in this Phase I Inspection Report.

APPENDIX B-2

COPIES OF PAST INSPECTION REPORTS

LUCHS & BECKERMAN

CIVIL ENGINEERS • PLANNERS • LAND SURVEYORS

PARTNERSJOHN LUCHS JR.
STUART J. BECKERMAN

GLASTONBURY, CONN. 06033

12 NATIONAL DRIVE
PHONE 433 9401

PROVIDENCE, R. I. 02903

169 WEYBOSSET STREET
PHONE 471-0420

EAST LONGMEADOW, MASS. 01028

45 BAYMOR DRIVE
PHONE 525-6537

REPLY TO Glastonbury

May 23, 1978

Victor F. Galgowski
Superintendent of Dam Maintenance
Water Resources Unit
State of Connecticut
Department of Environmental Protection
State Office Building
Hartford, CT 06115WATER RESOURCES
UNIT
RECEIVED

MAY 26 1978

ANSWERED _____
REFERRED _____
FILED _____Re: Stub Pond Dam - Avon
Our File # 57-73-121

Dear Mr. Galgowski:

Per your letter request of 28 November 1977 Mr. Robert McCabe and the writer visited the site on April 12, 1978. I had one of my employees, a resident of Avon, check the site occasionally and it was not practical to visit it earlier due to the persistent snow cover.

The following is what we found in the field and from our office calculations:

1. Type of structure - Earthen embankment, concrete spillway and concrete cap on old concrete and stone.
2. Concrete spillway - 40' + x 1.8' with 1.1' weir boards the length of spillway.
3. Freeboard - With weir boards in place, 0.7' for concrete cap and 1' + for earth embankment.
4. Flows - With weir boards in place, a flow of 200+ cfs will overtop the concrete cap. (This happens frequently as evidenced by the downstream scour easterly of the spillway.) With the boards removed, overtopping will occur at 450+ cfs. The 100 year flow is 1400+ cfs.
5. Draw-down - There is a sluice through the wall east of the spillway.

May 23, 1978

page 2

Victor F. Galgowski
Superintendent of Dam Maintenance

Re: Stub Pond Dam
Our File #57-73-121

6. Recommendations:

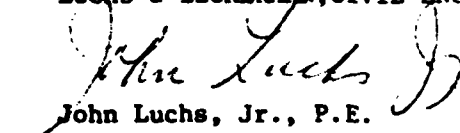
1. Remove large trees from earth embankment.
2. Remove weir boards to provide greater spillway capacity.
3. Repair deteriorating concrete wall easterly of spillway.
4. Provide scour control immediately downstream of concrete capped section.
5. Raise earth embankment to provide 2' of freeboard above high water surface.

The drainage area (5.3+ square miles) has been intensively developed since the construction of the dam and corrective work is mandated. Enclosed are five (5) sheets of photographs for your file.

If you have any questions, please call.

Very truly yours,

LUCHS & BECKERMAN, CIVIL ENGINEERS


John Luchs, Jr., P.E.

JLjr/ed

encl.

cc: file

No. _____

WATER RESOURCES UNIT
SUPERVISION OF DAMS
INVENTORY DATA

Inventoried
By _____

Date _____

CT 2, 3
Long: 72° 50.5'
Lat: 41° 48.6'

Name of Dam or Pond STUB POND DAM

Code No. _____

Nearest Street Location Route 44, Avon

Town Avon

U.S.G.S. Quad. Avon

Name of Stream Nod Brook

Owner Avon Parks Property

Address P.O. Box 354
Farmington, CT
Attn: Stanley Fisher

Pond Used For Recreation Drainage Area 5.3 sq. mi.

Dimensions of Pond: Width _____ Length _____ Area 10.2 ac.

Total Length of Dam 100' Length of Spillway 30'

Location of Spillway Center

Height of Pond Above Stream Bed 8'

Height of Embankment Above Spillway 1'

Type of Spillway Construction Concrete

Type of Dike Construction Concrete

Downstream Conditions Dirt road 1500'; paved road 3000'

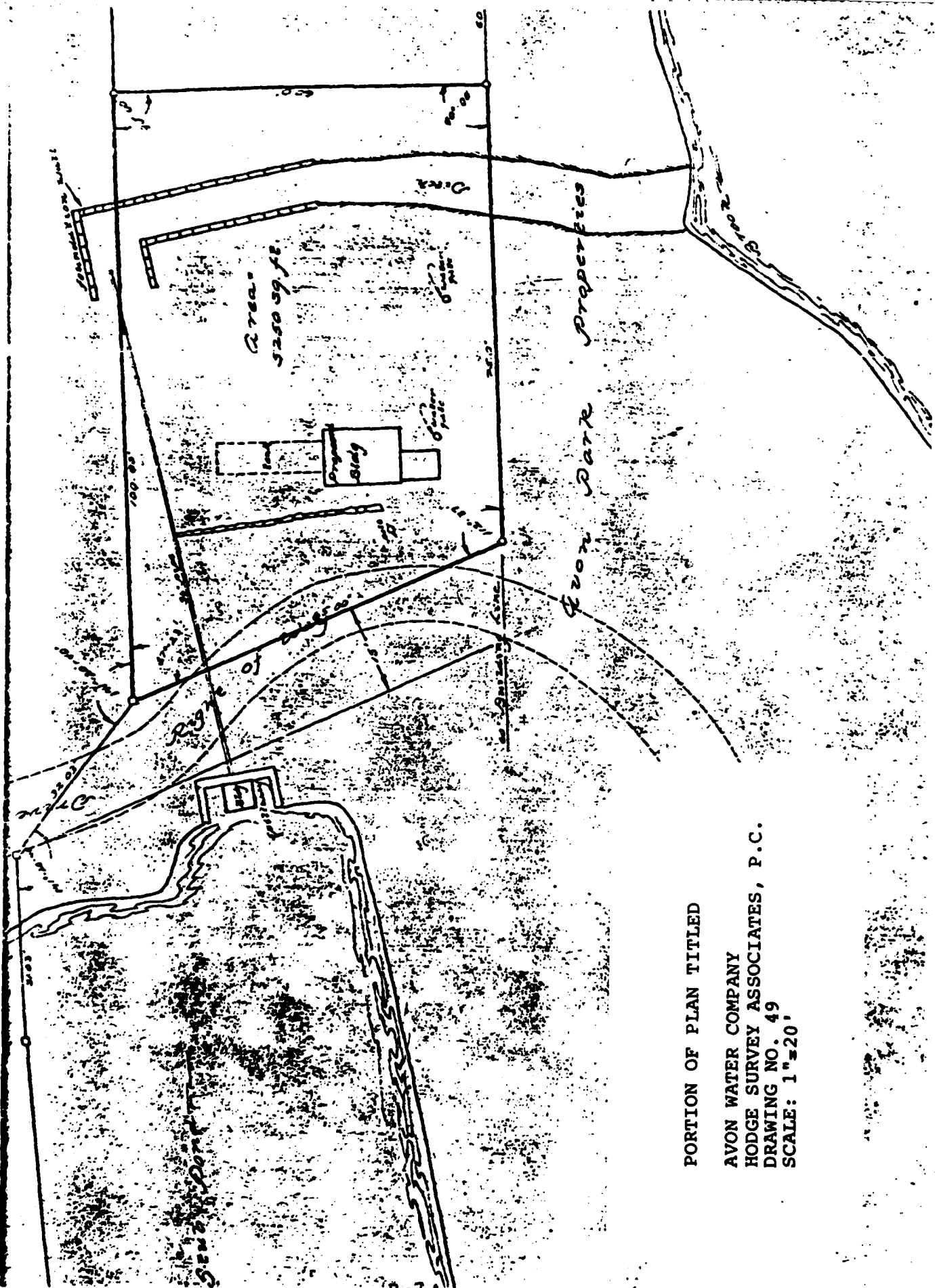
Summary of File Data _____

Remarks _____

Would Failure Cause Damage? Yes Class B

APPENDIX B-3

RECORD DRAWINGS AND SKETCHES



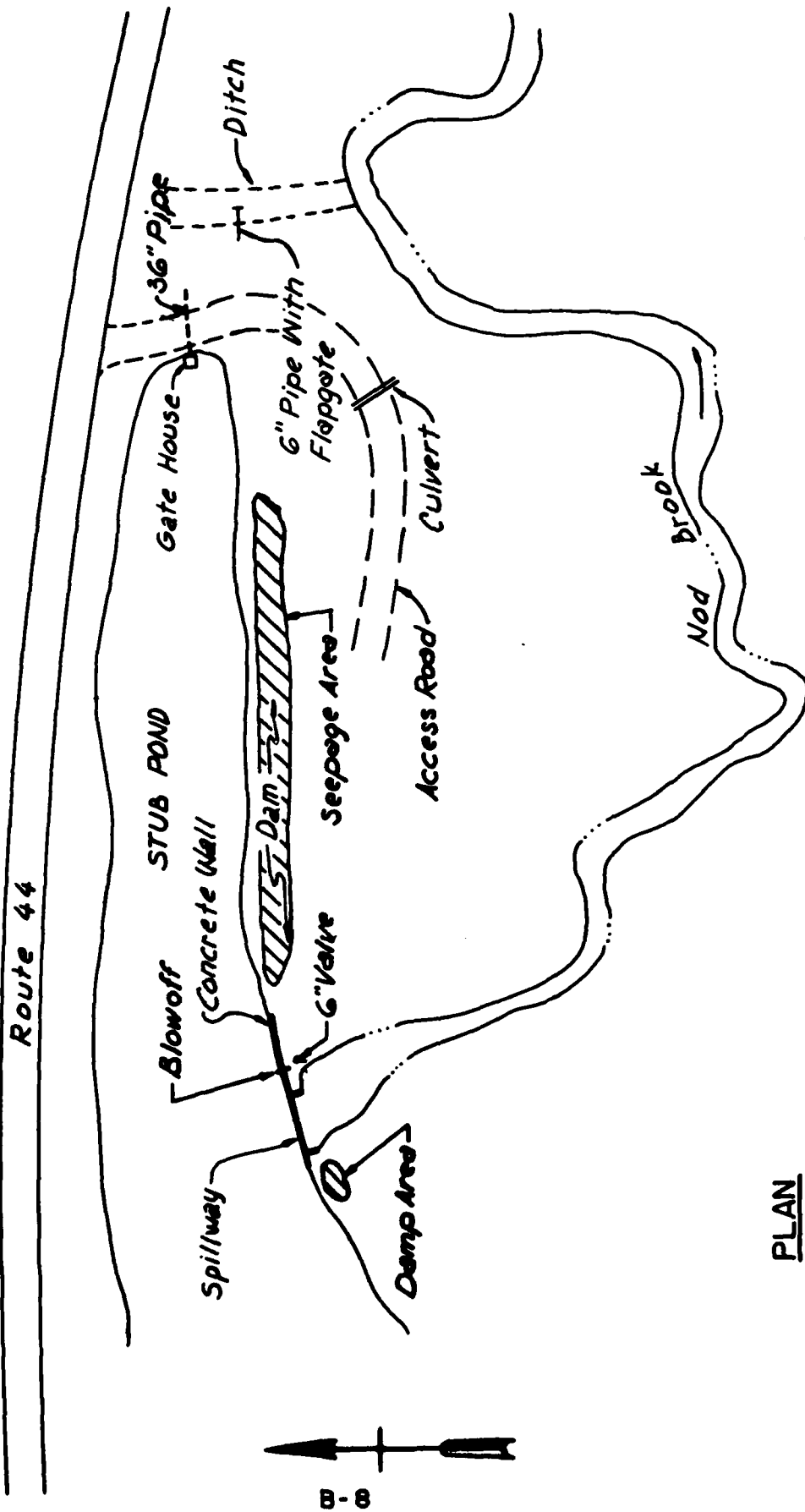
PORTION OF PLAN TITLED

AVON WATER COMPANY

HODGE SURVEY ASSOCIATES, P.C.

DRAWING NO. 49

SCALE: 1"=20'



PLAN
SCALE 1" = 100'

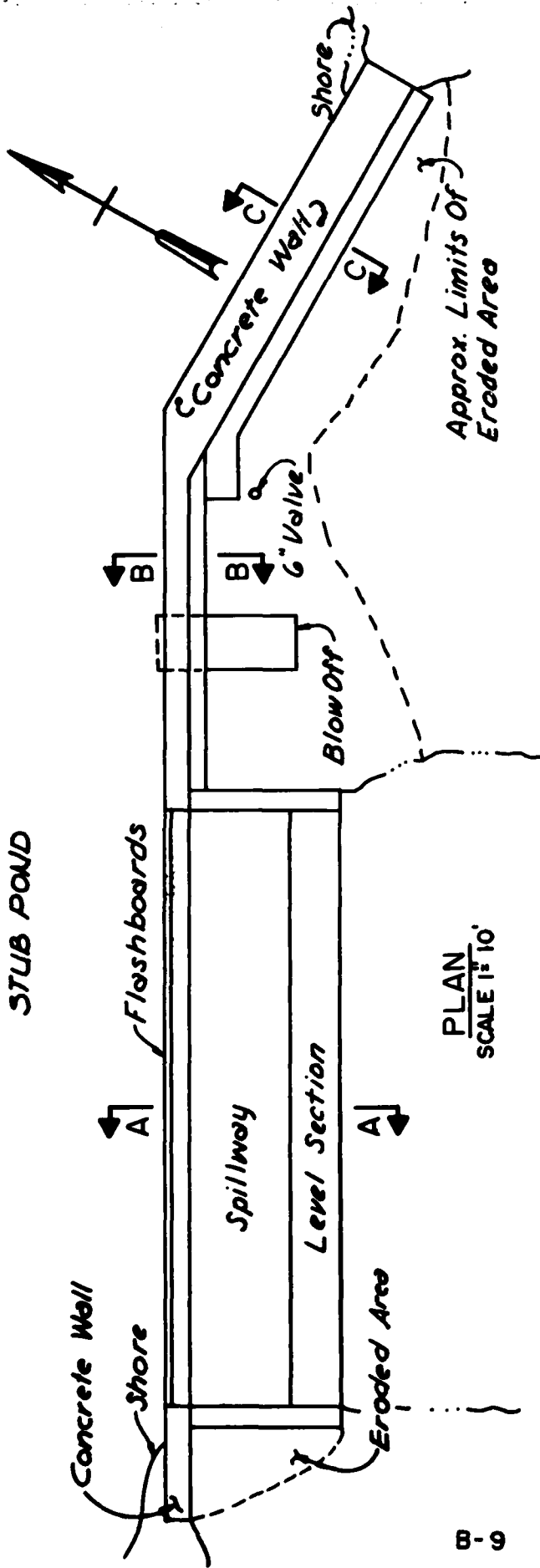
STUB POND DAM



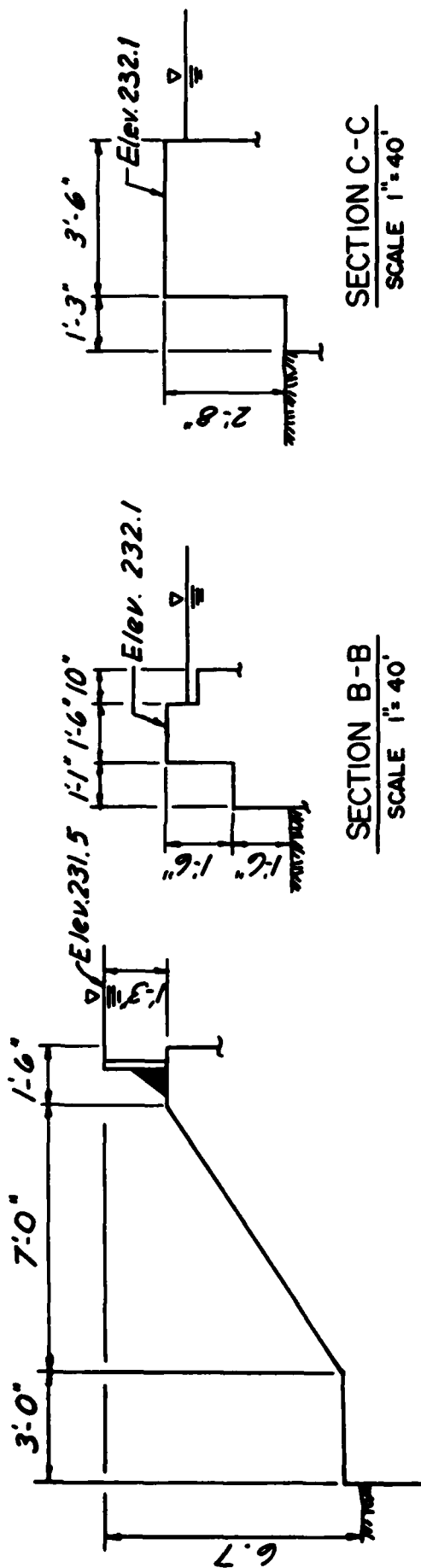
JAMES P. PURCELL ASSOCIATES, INC.
ENGINEERS • ARCHITECTS • PLANNERS

B-8

STUB POND



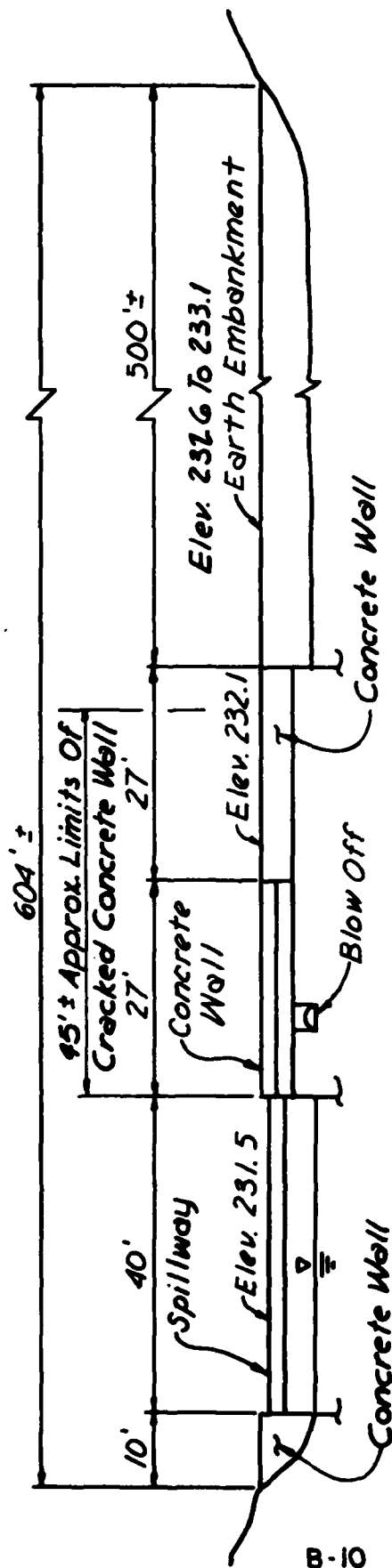
B-9



STUB POND DAM



JAMES F. PURCELL ASSOCIATES, INC.
ENGINEERS • ARCHITECTS • PLANNERS



ELEVATION OF DAM - LOOKING UPSTREAM
SCALE 1" = 20'

STUB POND DAM



JAMES P. PURCELL ASSOCIATES, INC.

ENGINEERS • ARCHITECTS • PLANNERS

APPENDIX C

PHOTOGRAPHS

Route 44

2

STUB POND

Concrete Wall

Spillway

3

4

5

6

1

5

7

6" Valve

Seepage Area

8

9

10

Gate House

Culvert

Access Road

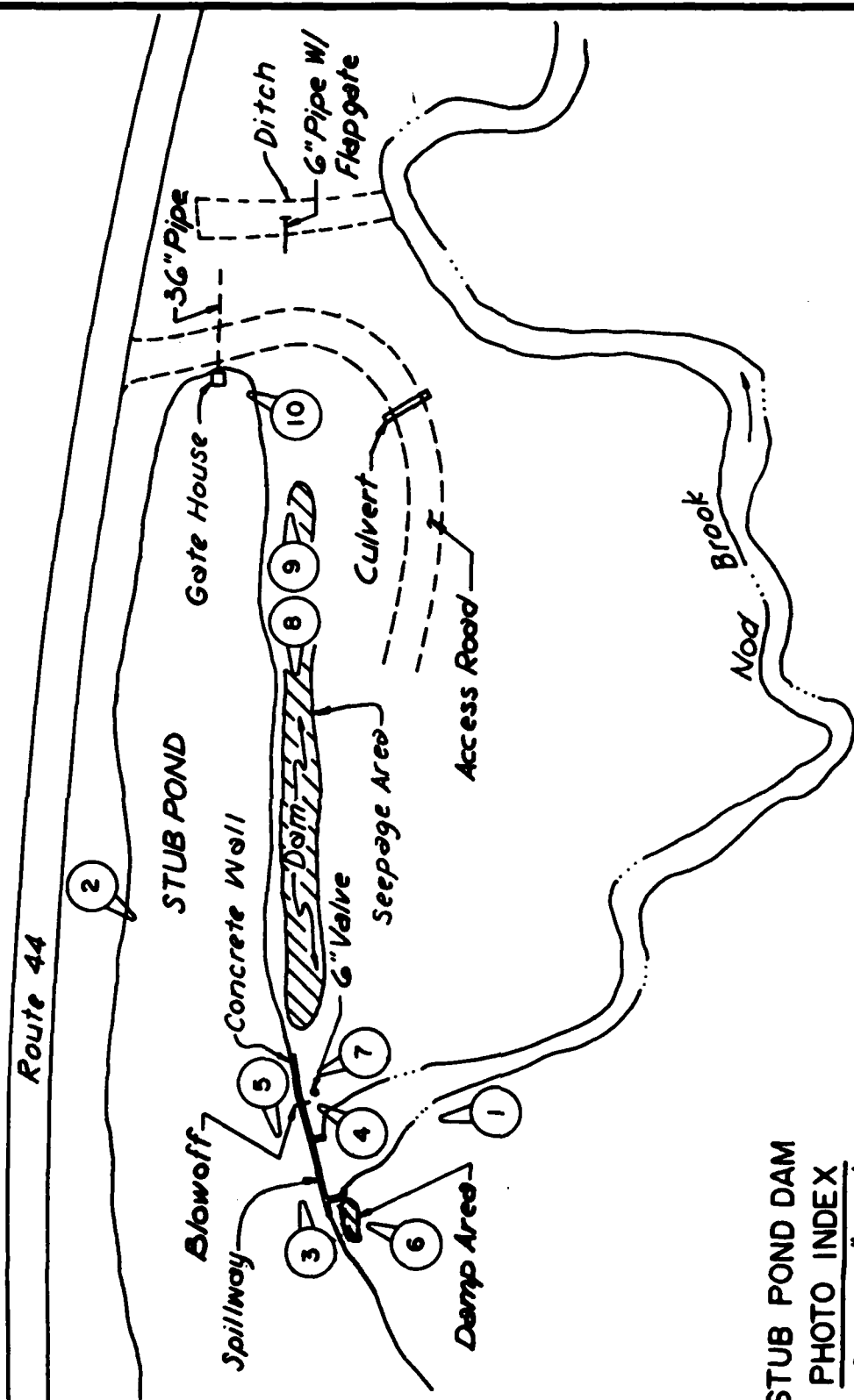
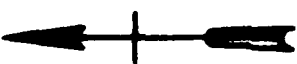
36" Pipe

Ditch

6" Pipe W/
Flapgate

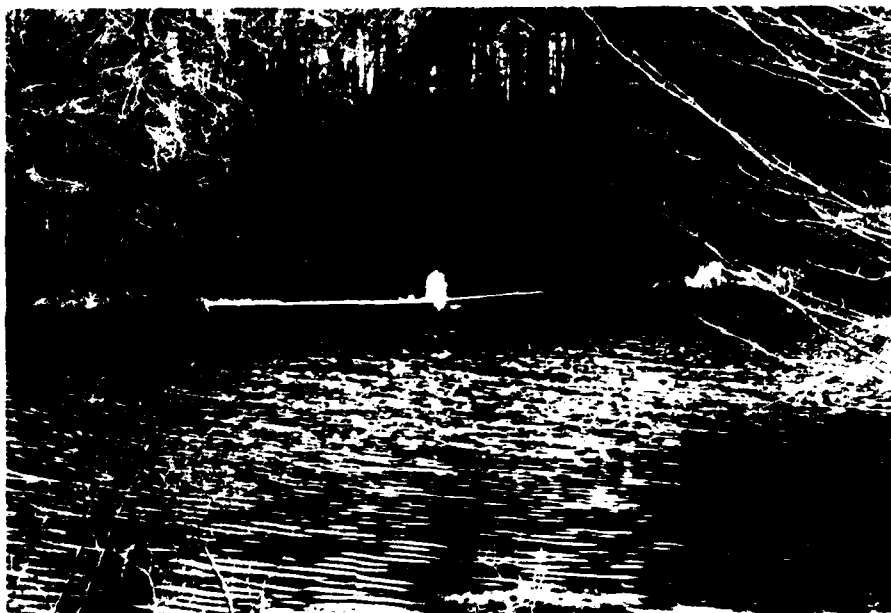
Brook

STUB POND DAM
PHOTO INDEX
SCALE 1" = 100'

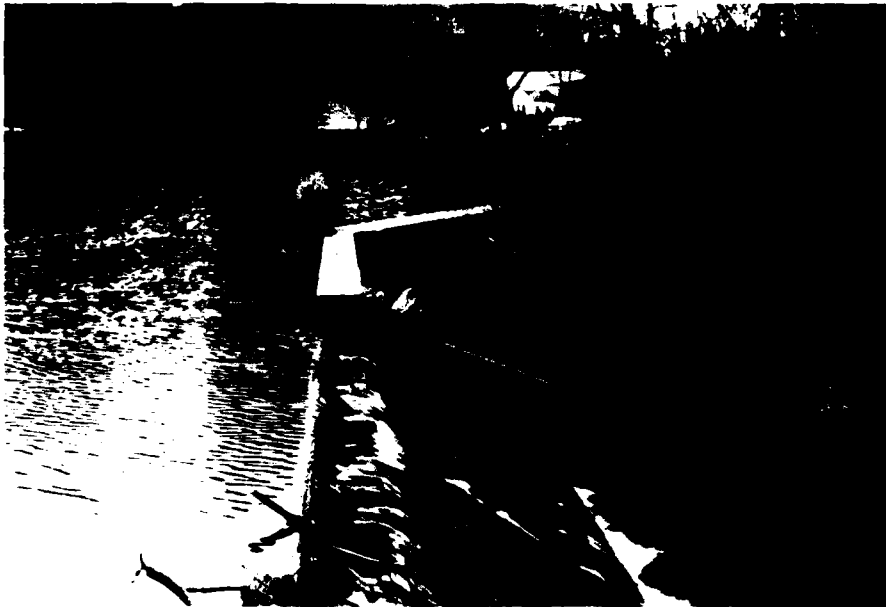




C-1 SPILLWAY - LOOKING NORTH



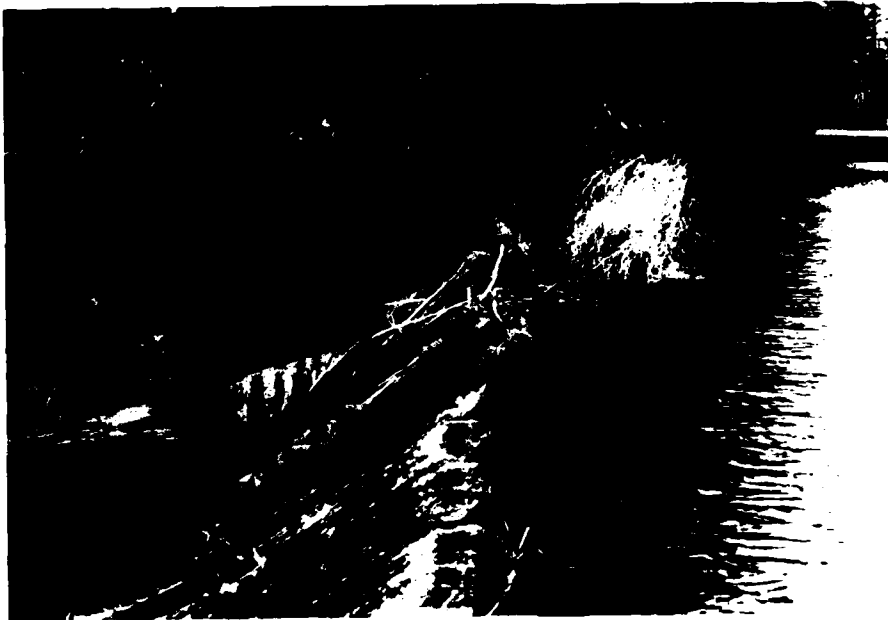
C-2 SPILLWAY - LOOKING SOUTH



C-3 EAST CONCRETE WALL - SHOWING ERODED
AREA BELOW WALL



C-4 DOWNSTREAM FACE OF EAST CONCRETE WALL
SHOWING CRACKS, EROSION AND SEEPAGE



C-5 WEST EMBANKMENT



C-6 ERODED AREA DOWNSTREAM OF WEST
CONCRETE WALL



C-7 OUTLET OF BLOWOFF DOWNSTREAM OF EAST
CONCRETE WALL



C-8 TOP OF EARTH DAM LOOKING WEST



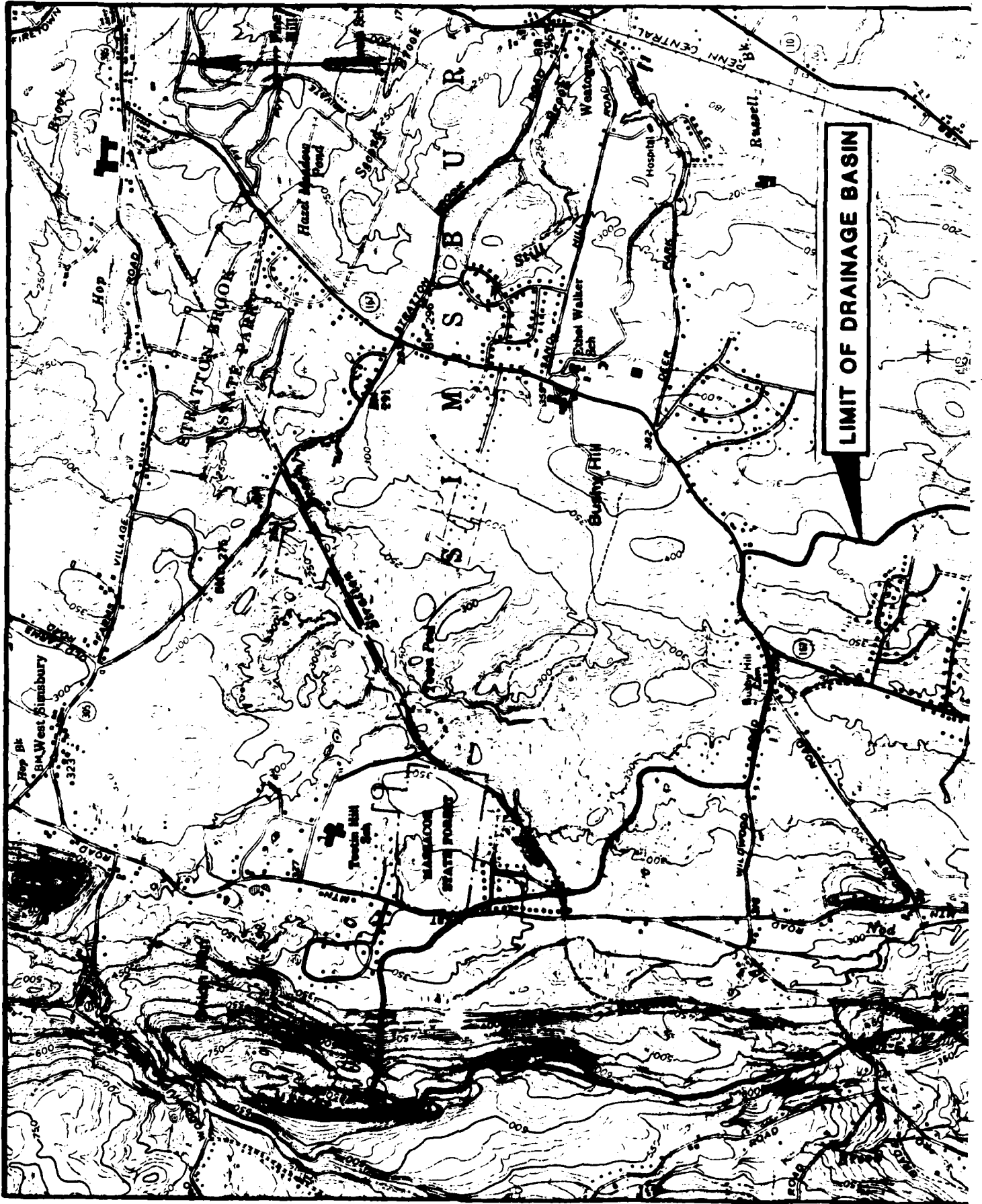
C-9 TOP OF EARTH DAM - LOOKING EAST



C-10 GATE HOUSE AT EAST END OF DAM - NOTE
VENT TO RIGHT OF HOUSE.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



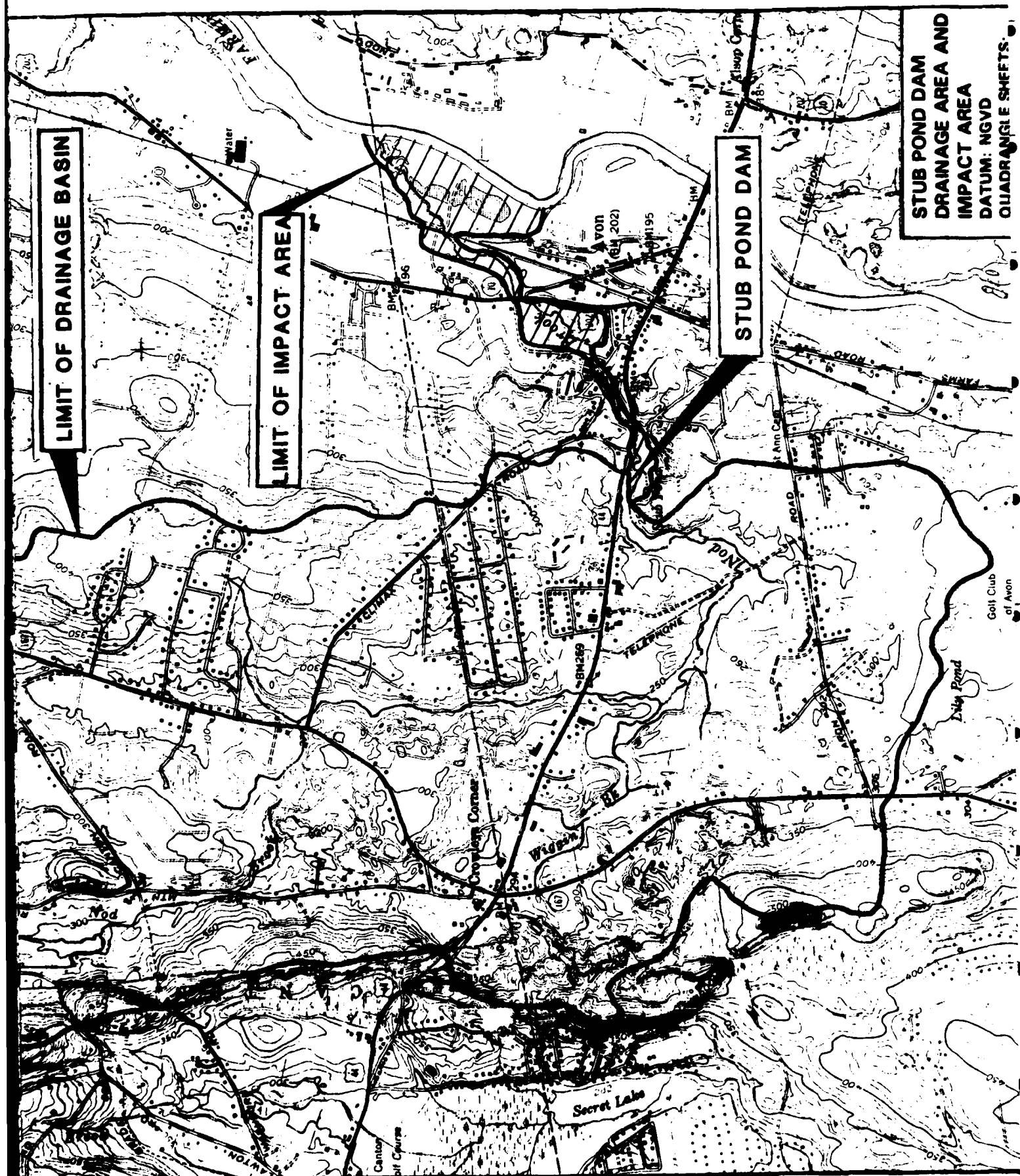
LIMIT OF DRAINAGE BASIN

LIMIT OF DRAINAGE BASIN

LIMIT OF IMPACT AREA

STUB POND DAM

STUB POND DAM
DRAINAGE AREA AND
IMPACT AREA
DATUM: NGVD
QUADRANGLE SHEETS:



HYDROLOGIC AND HYDRAULIC ANALYSIS
SUMMARY SHEET

Dam Stub Pond Dam
Test Flood 100 Year

INFLOW HYDROGRAPH DEVELOPMENT

Drainage Area 5.8 sq. mi.

Probable Maximum Precipitation
24 hour - 200 square mile PMP 21.5 inches

Initial Railfall Loss 0 Inch
Uniform Railfall loss .1 Inch

Snyder's Lag 5.5 hours
Snyder's Peaking Coefficient .625

Test Flood Inflow 1806 CFS; 1/2 PMF inflow 3612 CFS

PMF Inflow 7224 CFS

RESERVOIR ROUTING AND DAM OVERTOPPING

Test Flood Outflow 1804 CFS

Spillway Capacity at Top of Dam 53 CFS
3 % of Test Flood

Flow Over Spillway at Test Flood 243 CFS

Spillway Crest Elevation	<u>231.5</u>	Feet
Top of Dam Elevation	<u>232.1</u>	Feet
Test Flood Elevation	<u>233.1</u>	Feet

.....
 FLOW HYDROGRAPH PARAMEL (NFC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 26 FEB 79

1	A1	DAM SAFETY ANALYSIS - JOH NU. 80-100 / 02 ERJ					
2	A2	STUR POND DAM - AVON CT.					
3	A3	1-28-M					
4	R	75	1	0	0	0	0
5	R1	4					
6	J	1	3	1			
7	J1	75	50	1.0			
8	K	0	1				
9	K1						
10	M	1	1	5.8			
11	P	0	21.5	110	124	131	142
12	T						0.1
13	W	5.5	0.625				
14	X	10	-0.05	2.0			
15	K	1	1				
16	K1						
17	V	0					
18	V1	1					
19	SA	11.5	12.0	175.0			
20	SE	231.5	232.1	240.0			
21	SS	231.5	40	3.0	1.5		
22	SD	232.1	2.7	1.5	560		
23	K	99					

DAM SAFETY ANALYSIS - JON NO. 80-100 / 02 ENJ
STUB PUND DAM - AVON CT.
1-20-81

NO	MMH	NMIN	IDAY	IMH	IMIN	METRC	IPLT	IPRT	MSIAN
75	1	0	0	0	0	0	2	0	0
			JOPR	NdT	LAOPT	TRACE			
			5	0	0	0			

```

RTIOS= .25 .50 1.00
NPLAN= 1 NRTIO= 3 LRIO= 1
MULTI-PLAN ANALYSES TO BE PERFORMED

```

D-4

SUB-AREA RUNOFF COMPUTATION

COMPUTATION OF PMF - DEVELOPMENT OF INFLOW HYDROGRAPH

ISTAO	ICOMP	IECON	IYAPE	JPLI	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

INVDG	IUNG	TAREA	SNAP	HYDROGRAPH DATA				RATIO	ISNOW	ISAME	LOCAL
				TMSPC	TMSEA						
1	1	5.00	0.00	5.00	5.00			0.000	0	1	0

SPFE	PMS	R6	PRECIP DATA			M48	R72	R96
			H12	H24				
0.00	21.50	110.00	124.00	133.00	142.00	0.00	0.00	0.00

INSPC COMPUTED BY THE PROGRAM IS .000

LUSS DATA										
LRNPT	STAKR	DLTMR	RTIOL	ERRIN	STAKS	RTIOK	STRTL	CNSTL	ALSMR	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	0.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 5.50 CP= .63 NTA= 0

```

RECESSION DATA
STATQ= 10.00          RTOR= 2.00
GIVEN SNYDER CP      -0.05      AND R= 5.12
CLARK COEFFICIENTS  TP ARE TC= 6.34  INTERVALS
APPROXIMATE

```

UNIT HYDROGRAPH 31 END-OF-PERIOD ORDINATES, LAG= 5.49 HOURS, CP= .42 VOL= 1.00					
30.	104.	212.	319.	396.	425.
184.	151.	124.	102.	84.	69.
26.	21.	17.	14.	12.	10.
				6.	7.
				331.	272.
				57.	304
				47.	31.
				4.	4.
				5.	223.
					31.

MO-DA	HR-MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO-DA	HR-MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.01	0.00	.01	9.	1.02	14.00	38	2.27	2.17	.10	899.
1.01	2.00	2	.01	0.00	.01	9.	1.02	15.00	39	2.04	2.74	.10	1352.
1.01	3.00	3	.01	0.00	.01	8.	1.02	16.00	40	7.19	7.09	.10	2162.
1.01	4.00	4	.01	0.00	.01	6.	1.02	17.00	41	2.65	2.55	.10	3181.
1.01	5.00	5	.01	0.00	.01	7.	1.02	18.00	42	2.88	1.98	.10	4807.
1.01	6.00	6	.01	0.00	.01	7.	1.02	19.00	43	.15	.05	.10	6122.
1.01	7.00	7	.01	0.00	.01	6.	1.02	20.00	44	.15	.05	.10	6983.
1.01	8.00	8	.03	0.00	.03	6.	1.02	21.00	45	.15	.05	.10	7224.
1.01	9.00	9	.03	0.00	.03	5.	1.02	22.00	46	.15	.05	.10	6819.
1.01	10.00	10	.03	0.00	.03	5.	1.02	23.00	47	.15	.05	.10	5987.
1.01	11.00	11	.03	0.00	.03	5.	1.03	0.00	48	.15	.05	.10	5060.
1.01	12.00	12	.03	0.00	.03	4.	1.03	1.00	49	0.00	0.00	0.00	4206.
1.01	13.00	13	.13	.03	.10	5.	1.03	2.00	50	0.00	0.00	0.00	3487.
1.01	14.00	14	.15	.05	.10	8.	1.03	3.00	51	0.00	0.00	0.00	2800.
1.01	15.00	15	.19	.09	.18	18.	1.03	4.00	52	0.00	0.00	0.00	2391.
1.01	16.00	16	.49	.39	.10	45.	1.03	5.00	53	0.00	0.00	0.00	1974.
1.01	17.00	17	.14	.04	.10	45.	1.03	6.00	54	0.00	0.00	0.00	1625.
1.01	18.00	18	.14	.04	.10	157.	1.03	7.00	55	0.00	0.00	0.00	1336.
1.01	19.00	19	.01	0.00	.01	217.	1.03	8.00	56	0.00	0.00	0.00	1098.
1.01	20.00	20	.01	0.00	.01	259.	1.03	9.00	57	0.00	0.00	0.00	903.
1.01	21.00	21	.01	0.00	.01	273.	1.03	10.00	58	0.00	0.00	0.00	742.
1.01	22.00	22	.01	0.00	.01	256.	1.03	11.00	59	0.00	0.00	0.00	610.
1.01	23.00	23	.01	0.00	.01	221.	1.03	12.00	60	0.00	0.00	0.00	501.
1.02	0.00	24	.01	0.00	.01	184.	1.03	13.00	61	0.00	0.00	0.00	412.
1.02	1.00	25	.10	.00	.10	152.	1.03	14.00	62	0.00	0.00	0.00	354.
1.02	2.00	26	.10	.00	.10	125.	1.03	15.00	63	0.00	0.00	0.00	330.
1.02	3.00	27	.10	.00	.10	104.	1.03	16.00	64	0.00	0.00	0.00	308.
1.02	4.00	28	.10	.00	.10	87.	1.03	17.00	65	0.00	0.00	0.00	287.
1.02	5.00	29	.10	.00	.10	73.	1.03	18.00	66	0.00	0.00	0.00	268.
1.02	6.00	30	.10	.00	.10	62.	1.03	19.00	67	0.00	0.00	0.00	250.
1.02	7.00	31	.48	.38	.10	62.	1.03	20.00	68	0.00	0.00	0.00	233.
1.02	8.00	32	.48	.38	.10	87.	1.03	21.00	69	0.00	0.00	0.00	210.
1.02	9.00	33	.40	.30	.10	144.	1.03	22.00	70	0.00	0.00	0.00	203.
1.02	10.00	34	.40	.30	.10	234.	1.03	23.00	71	0.00	0.00	0.00	189.
1.02	11.00	35	.40	.30	.10	348.	1.04	0.00	72	0.00	0.00	0.00	177.
1.02	12.00	36	.40	.30	.10	472.	1.04	1.00	73	0.00	0.00	0.00	165.
1.02	13.00	37	.40	.30	.10	631.	1.04	2.00	74	0.00	0.00	0.00	154.
							1.04	3.00	75	0.00	0.00	0.00	144.

SUM 24.42 21.16 3.27 80649.
(629.) (537.) (83.) (2283.73)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7224.	6345.	3049.	1119.	88572.
CMS	205.	180.	86.	32.	2282.
INCHES		10.18	19.56	21.53	21.54
MM		258.47	496.83	546.94	547.06
AC-FT		3146.	6048.	6657.	6659.
THOUS CU M		3881.	7460.	8212.	8214.

STATION 1

[illegible]

9.00 57.
 10.00 58.
 11.00 59.
 12.00 60.
 13.00 61.
 14.00 62.
 15.00 63.
 16.00 64.
 17.00 65.
 18.00 66.
 19.00 67.
 20.00 68.
 21.00 69.
 22.00 70.
 23.00 71.
 0.00 72.
 1.00 73.
 2.00 74.
 3.00 75.1

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HYDROGRAPH AT STA		1 FOR PLAN 1, RTIO 1			
2.	1.	2.	3.	4.	5.
1.	1.	1.	1.	1.	1.
40.	40.	40.	40.	40.	40.
16.	16.	16.	16.	16.	16.
945.	945.	945.	945.	945.	945.
722.	722.	722.	722.	722.	722.
103.	103.	103.	103.	103.	103.
47.	47.	47.	47.	47.	47.
2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.
64.	64.	64.	64.	64.	64.
22.	22.	22.	22.	22.	22.
1202.	1202.	1202.	1202.	1202.	1202.
598.	598.	598.	598.	598.	598.
493.	493.	493.	493.	493.	493.
406.	406.	406.	406.	406.	406.
77.	77.	77.	77.	77.	77.
41.	41.	41.	41.	41.	41.
36.	36.	36.	36.	36.	36.

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
1886.	1586.	762.	280.	20143.
51.	45.	22.	8.	570.
INCHES	2.54	4.89	5.38	136.76
MM	64.62	124.21	136.73	1665.
AC-FT	787.	1512.	2053.	2853.
THOUS CU M	970.	1865.	2053.	2853.

HYDROGRAPH AT STA		1 FOR PLAN 1, RTIO 2			
5.	4.	3.	2.	1.	0.
136.	136.	136.	136.	136.	136.
31.	31.	31.	31.	31.	31.
1690.	1690.	1690.	1690.	1690.	1690.
1445.	1445.	1445.	1445.	1445.	1445.
286.	286.	286.	286.	286.	286.
177.	177.	177.	177.	177.	177.
95.	95.	95.	95.	95.	95.
2.	2.	2.	2.	2.	2.
118.	118.	118.	118.	118.	118.
72.	72.	72.	72.	72.	72.
3061.	3061.	3061.	3061.	3061.	3061.
813.	813.	813.	813.	813.	813.
165.	165.	165.	165.	165.	165.
82.	82.	82.	82.	82.	82.
77.	77.	77.	77.	77.	77.
144.	144.	144.	144.	144.	144.
136.	136.	136.	136.	136.	136.
549.	549.	549.	549.	549.	549.
451.	451.	451.	451.	451.	451.
2530.	2530.	2530.	2530.	2530.	2530.
449.	449.	449.	449.	449.	449.
37.	37.	37.	37.	37.	37.
109.	109.	109.	109.	109.	109.
129.	129.	129.	129.	129.	129.
31.	31.	31.	31.	31.	31.
1801.	1801.	1801.	1801.	1801.	1801.
1744.	1744.	1744.	1744.	1744.	1744.
251.	251.	251.	251.	251.	251.
102.	102.	102.	102.	102.	102.

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
3612.	3172.	1524.	559.	40286.
102.	90.	43.	16.	1141.
INCHES	5.09	9.78	10.77	18.77
MM	129.24	248.42	273.47	273.53
AC-FT	1573.	3024.	3329.	3329.
THOUS CU M	1940.	3730.	4106.	4107.

HYDROGRAPH AT STA		1 FOR PLAN 1, RTIO 3			
9.	8.	7.	6.	5.	4.
273.	273.	273.	273.	273.	273.
3381.	3381.	3381.	3381.	3381.	3381.
2898.	2898.	2898.	2898.	2898.	2898.
412.	412.	412.	412.	412.	412.
189.	189.	189.	189.	189.	189.
2.	2.	2.	2.	2.	2.
5.	5.	5.	5.	5.	5.
256.	256.	256.	256.	256.	256.
87.	87.	87.	87.	87.	87.
4807.	4807.	4807.	4807.	4807.	4807.
2391.	2391.	2391.	2391.	2391.	2391.
354.	354.	354.	354.	354.	354.
177.	177.	177.	177.	177.	177.
165.	165.	165.	165.	165.	165.
154.	154.	154.	154.	154.	154.
144.	144.	144.	144.	144.	144.
287.	287.	287.	287.	287.	287.
268.	268.	268.	268.	268.	268.
903.	903.	903.	903.	903.	903.
5060.	5060.	5060.	5060.	5060.	5060.
4206.	4206.	4206.	4206.	4206.	4206.
1352.	1352.	1352.	1352.	1352.	1352.
2162.	2162.	2162.	2162.	2162.	2162.
3487.	3487.	3487.	3487.	3487.	3487.
501.	501.	501.	501.	501.	501.
203.	203.	203.	203.	203.	203.

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
7224.	6345.	3049.	1119.	80572.
285.	180.	86.	32.	2282.
INCHES	258.47	496.83	546.94	547.06
MM	3140.	6048.	6957.	6659.
AC-FT	3881.	7460.	8212.	8212.
THOUS CU M				8214.

HYDROGRAPH ROUTING

ROUTING INFLOW HYDROGRAPH INWU POND - OVERTOPPING ANALYSIS

ISTAQ	ICOMP	IECON	ITAPC	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0
ROUTING DATA								
QLOSS	CLOSS	AVG	IMES	ISAME	IOPT	IPMP	LSTR	
0.0	0.000	0.00	1	1	0	0	0	
MSTPS	NSTDN	LAG	AMSKK	X	TSK	STORA	ISPRAT	
1	0	0	0.000	0.000	0.000	-1.	0	

SURFACE AREA= 12. 12. 175.
CAPACITY= 0. 7. 620.
ELEVATION= 232. 232. 240.

CREL	SPNID	COOM	EXPW	ELEVL	COOL	CAREA	EXPL
231.5	40.0	3.0	1.5	0.0	0.0	0.0	0.0

DAM DATA
TOPEL COOD EXPW DAMWID
232.1 2.7 1.5 560.

STATION 1. PLAN 1. RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW									
0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	2.	3.	3.	9.	19.	35.	50.
66.	61.	52.	46.	39.	33.	28.	23.	20.	20.
19.	24.	37.	62.	110.	140.	215.	320.	512.	890.
407.	1143.	1498.	1729.	1804.	1727.	1519.	1292.	1072.	130.
737.	811.	505.	416.	342.	282.	232.	191.	157.	56.
187.	91.	86.	80.	75.	70.	66.	62.	58.	
51.	50.	45.	44.	40.					
STORAGE									
0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
1.	1.	1.	1.	1.	1.	2.	3.	5.	7.
7.	7.	7.	6.	6.	6.	5.	4.	4.	4.
3.	3.	4.	5.	7.	8.	9.	10.	11.	13.
15.	19.	22.	24.	24.	24.	22.	20.	18.	16.
15.	14.	13.	12.	11.	10.	10.	9.	9.	8.
8.	8.	8.	8.	7.	7.	7.	7.	7.	7.
7.	7.	6.	6.	6.					
STAGE									
231.5	231.5	231.5	231.5	231.5	231.5	231.5	231.5	231.5	231.5
231.5	231.5	231.5	231.5	231.5	231.5	231.5	231.5	231.5	231.5
232.1	232.1	232.1	232.1	232.1	232.1	232.1	232.1	232.1	232.1
231.0	231.0	232.0	232.0	232.0	232.0	232.0	232.0	232.0	232.0
232.7	232.8	233.0	233.1	233.1	233.1	233.0	232.9	232.8	232.7
232.6	232.6	232.5	232.4	232.4	232.3	232.3	232.3	232.2	232.2
232.2	232.2	232.2	232.2	232.1	232.1	232.1	232.1	232.1	232.1
232.1	232.1	232.0	232.0	232.0					

PEAK OUTFLOW IS 1804. AT TIME 45.00 HOURS

C/S	1804.	1544.	762.	279.	20100.
CMS	51.	45.	22.	0.	569.
INCHES		2.54	4.89	5.37	5.37
MM		64.53	124.20	136.47	136.47
AC-FT		785.	1512.	1661.	1661.
THOUS CU M		969.	1865.	2049.	2049.

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(O)

[illegible]

11.00 59.
 12.00 60.
 13.00 61.
 14.00 62.
 15.00 63.
 16.00 64.
 17.00 65.
 18.00 66.
 19.00 67.
 20.00 68.
 21.00 69.
 22.00 70.
 23.00 71.
 0.00 72.
 1.00 73.
 2.00 74.
 3.00 75.

11.00 59.
 12.00 60.
 13.00 61.
 14.00 62.
 15.00 63.
 16.00 64.
 17.00 65.
 18.00 66.
 19.00 67.
 20.00 68.
 21.00 69.
 22.00 70.
 23.00 71.
 0.00 72.
 1.00 73.
 2.00 74.
 3.00 75.

[illegible]

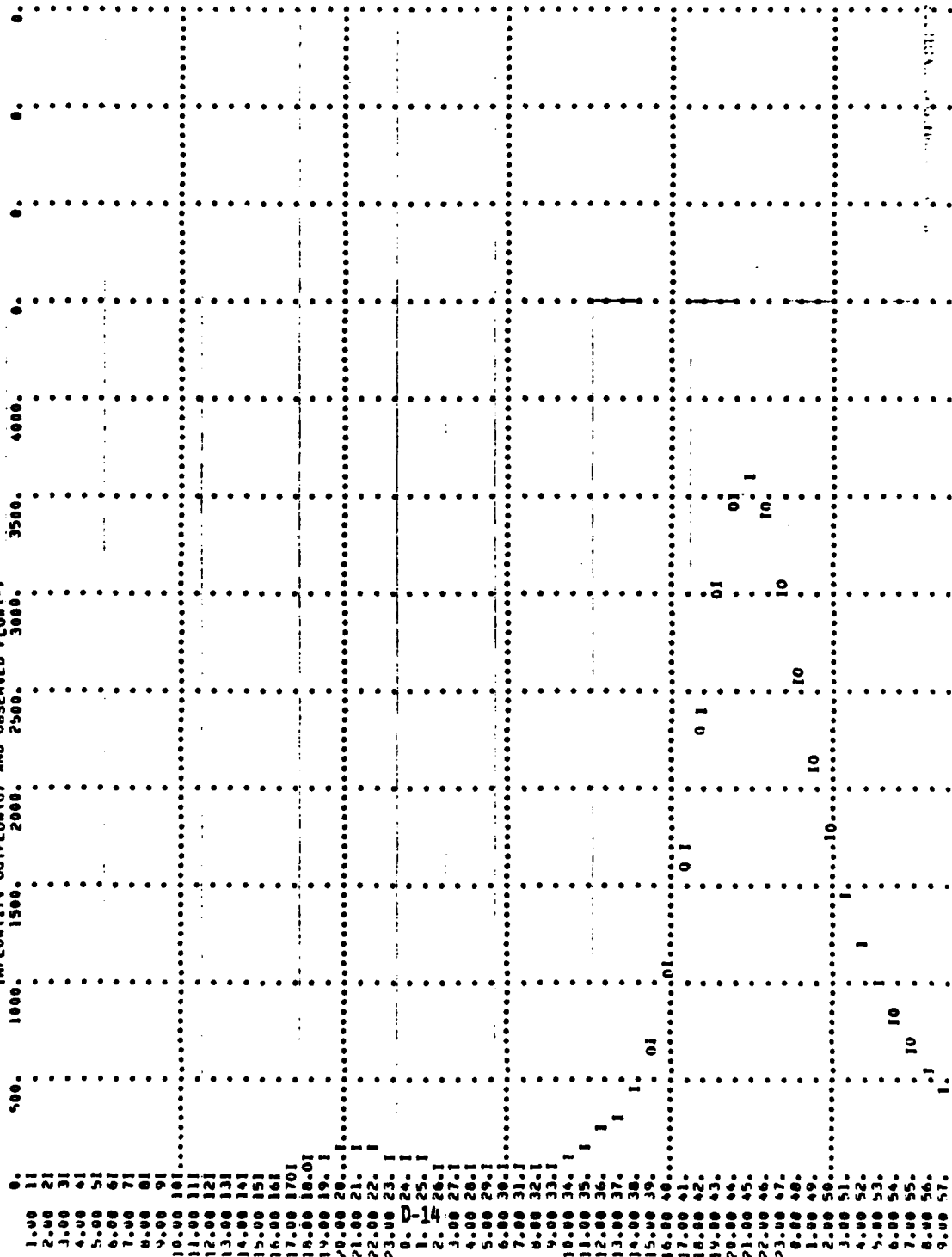
PEAK OUTFLOW IS 3612. AT TIME 45.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CFS	3612.	3180.	1523.	559.	4917.	
CMS	102.	90.	43.	16.	1139.	
INCHES		5.08	9.78	10.75	10.75	
MM		129.05	240.39	273.04	273.06	
AC-FY		1571.	3023.	3323.	3324.	
THOUS CU M		1936.	3729.	4099.	4100.	

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STATION 1

INFLOW (I), OUTFLOW (O) AND OBSERVED FLOW (F)



INC

11.00 50.
 12.00 60.
 13.00 41.
 14.00 42.
 15.00 43.
 16.00 64.
 17.00 65.
 18.00 66.
 19.00 67.
 20.00 68.
 21.00 69.
 22.00 70.
 23.00 71.
 0.00 72.
 1.00 73.
 2.00 74.
 3.00 75.1

STATION 1. PLAN 1. RATIO 3
END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW		STORAGE		STAGE		STAGE	
2.	4.	6.	6.	2.	2.	2.	2.
6.	5.	6.	6.	2.	2.	2.	2.
270.	242.	190.	190.	2.	2.	2.	2.
63.	78.	220.	130.	2.	2.	2.	2.
3228.	4032.	5964.	457.	2.	2.	2.	2.
2952.	2401.	1600.	6906.	2.	2.	2.	2.
422.	359.	313.	1122.	2.	2.	2.	2.
193.	160.	157.	272.	2.	2.	2.	2.
1.	1.	2.	147.	2.	2.	2.	2.
2.	1.	1.	2.	2.	2.	2.	2.
10.	10.	9.	2.	2.	2.	2.	2.
7.	6.	10.	8.	2.	2.	2.	2.
37.	51.	65.	12.	2.	2.	2.	2.
30.	26.	23.	75.	2.	2.	2.	2.
12.	11.	11.	18.	2.	2.	2.	2.
9.	9.	9.	10.	2.	2.	2.	2.
231.6	231.6	231.6	231.6	231.6	231.6	231.6	231.6
231.6	231.6	231.6	231.6	231.6	231.6	231.6	231.6
232.3	232.3	232.3	232.3	232.3	232.3	232.3	232.3
232.1	232.1	232.1	232.1	232.1	232.1	232.1	232.1
233.6	233.6	233.6	233.6	233.6	233.6	233.6	233.6
233.5	233.5	233.5	233.5	233.5	233.5	233.5	233.5
232.4	232.4	232.4	232.4	232.4	232.4	232.4	232.4
232.3	232.3	232.3	232.3	232.3	232.3	232.3	232.3

D-16

PEAK OUTFLOW IS 7223. AT TIME 45.00 HOURS

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
7223.	6334.	3049.	1110.	80504.
205.	179.	84.	32.	2200.
CFS	10.16	19.56	21.52	21.52
INCHES	250.02	496.79	546.54	546.59
MM	3141.	6047.	6653.	6653.
AC-FT	3874.	7459.	8206.	8207.
THOUS CU M				

END OF PERIOD HYDROGRAPH ORDINATES

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STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(O)

	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	
1.00	11									
2.00	21									
3.00	31									
4.00	41									
5.00	51									
6.00	61									
7.00	71									
8.00	81									
9.00	91									
10.00	101									
11.00	111									
12.00	121									
13.00	131									
14.00	141									
15.00	151									
16.00	161									
17.00	1701									
18.00	18.01									
19.00	19.1									
20.00	20.1									
21.00	21.1									
22.00	22.1									
23.00	23.1									
24.00	24.1									
25.00	25.1									
26.00	26.1									
27.00	27.1									
28.00	28.1									
29.00	29.1									
30.00	30.1									
31.00	31.1									
32.00	32.1									
33.00	33.1									
34.00	34.1									
35.00	35.1									
36.00	36.1									
37.00	37.1									
38.00	38.1									
39.00	39.1									
40.00	40.1									
41.00	41.1									
42.00	42.1									
43.00	43.1									
44.00	44.1									
45.00	45.1									
46.00	46.1									
47.00	47.1									
48.00	48.1									
49.00	49.1									
50.00	50.1									
51.00	51.1									
52.00	52.1									
53.00	53.1									
54.00	54.1									
55.00	55.1									
56.00	56.1									
57.00	57.1									

0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

11.00 50.
 12.00 60.
 13.00 61.
 14.00 62.
 15.00 63.
 16.00 64.
 17.00 65.
 18.00 66.
 19.00 67.
 20.00 68.
 21.00 69.
 22.00 70.
 23.00 71.
 24.00 72.
 25.00 73.
 26.00 74.
 27.00 75.

11.00 50.
 12.00 60.
 13.00 61.
 14.00 62.
 15.00 63.
 16.00 64.
 17.00 65.
 18.00 66.
 19.00 67.
 20.00 68.
 21.00 69.
 22.00 70.
 23.00 71.
 24.00 72.
 25.00 73.
 26.00 74.
 27.00 75.

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS		
				RATIO 1	RATIO 2	RATIO 3
				.25	.50	1.00
HYDROGRAPH AT	1	5.00	1	1806.	3612.	7224.
	(	25.02)	(	51.14)	102.28)	204.57)
ROUTED TO	1	5.00	1	1806.	3612.	7224.
	(	25.02)	(	51.00)	102.29)	204.54)

WILLIAMSON

PLAN I

.....	ELEVATION	INITIAL VALUE	SPELLWAY CHEST	TOP OF DAM		
	STORAGE	231.50	231.50	232.10		
	OUTFLOW	0.	0.	7.		
		0.	0.	56.		
RATIO	MAXIMUM	MAXIMUM	MAXIMUM	DURATION	TIME OF	TIME OF
OF	RESERVOIR	DEPTH	STORAGE	OVER TOP	MAX	FAILURE
PMF	W.S.ELEV	OVER DAM	AC-FT	HOURS	OUTFLOW	HOURS
			CFS		HOURS	
.25	233.12	1.02	24.	30.00	45.00	0.00
.50	233.75	1.65	41.	51.00	45.00	0.00
1.00	234.75	2.65	78.	58.00	45.00	0.00

STUB POND DAM

Dam Failure Analysis

1. Failure discharge with pool at top of dam (elev. 234.2) = 4400 CFS
2. Depth of water in reservoir at time of failure = 6.7 ft.
3. Maximum depth of flow downstream of dam = 6.7 ft.
4. Water surface elevation just downstream)
of dam at time of failure) = 233.6

The failure discharge of 4400 CFS will enter and flow downstream 8000 feet until the brook enters the Farmington River . Valley storage in this 8000 feet length of brook is SIGNIFICANT in reducing the discharge. Also due to roughness characteristics, obstructions and frictional losses, it is very likely that the unsteady dam failure flow will dissipate its wave and kinetic energy and thus convert to steady and uniform flow obeying Manning's formulae 8000 feet downstream. The failure profile will have the following hydraulic characteristics:

DISTANCE FROM THE DAM	WATER SURFACE ELEVATION	DEPTH (ft.)	REMARKS
0	233.6	6.7	At Dam
300	225.7	3.7	
1400	215.4	7.4	
2300	195.2	5.2	
3700	176.5	3.5	
8000	160±	0	Route 10 Farmington River

NOTES:

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

DATA

Name of Dam STUB POND DAM
Location AVON, CONNECTICUT
Drainage Area 5.8 sq. mi., Top of Dam 234.2
Spillway Type Flashboards, Crest of Spillway 233.6 (flashboards)
Surface Area @ Crest Elev. 11.5 Acres = 0.02 sq. mi.
Pool Bottom Near Dam = 226.9
Assumed Side Slopes of Embankments = 2:1
Depth of Pool at Dam (Y_o) = 6.7 Feet
Mid-Height Elev. 230.25
Length of Dam at Crest = 600 Feet
Length of Dam at Mid-Height = 600 Feet
25% of Dam Length at Mid-Height = W_b = 150 Feet

Step 1

Storage (S) at time of failure 30 Ac-FT
(Equal to top of dam)

Step 2

$$\begin{aligned} &\text{Peak Failure Discharge} \\ &Q_{p1} = 8/27 W_b \sqrt{g} Y_o^{3/2} \\ &= (1.68) (W_b) (Y_o)^{3/2} = \underline{4400} \text{ cfs} \end{aligned}$$

Failure is assumed to coincide with pool elevation at Top of Dam

NOTES: Datum is Metropolitan District Commission (MDC).
NGVD = MDC - 2.08 feet.

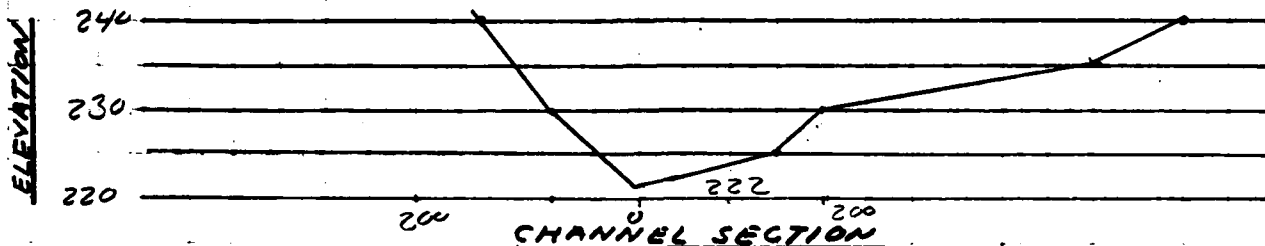
BY ERJ DATE 11/19/80 SUBJECT DAM INSPECTION STUDY
 CHKD. BY JR DATE 12/5/80
DAM FAILURE ANALYSIS

SHEET NO. 1 OF 4
 JOB NO. 80-100/02
 PURCELL ASSOCIATES
 ENGINEERS • ARCHITECTS • PLANNERS

DAM STUB POND

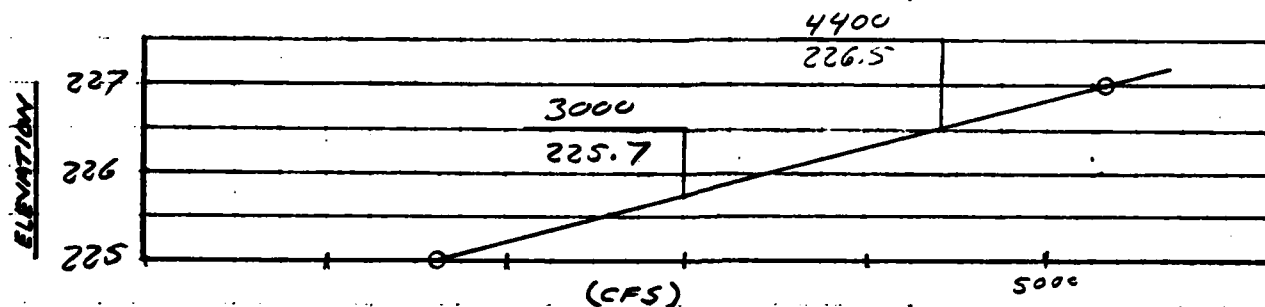
SECTION 300' FROM DAM

USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ $n = .05$ SLOPE (S_L) = .015 $\frac{1}{1}$



$Q_P = 4400$ CFS FULL SPILLWAY $Q_S = 55$ CFS
 TOTAL STORAGE (S) = 30 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
230	1480	300	4.9	15600	8
225	330	200	1.7	1680	3
227	700	230	3.0	5370	5



$$V_1 = \left(\frac{6.7 + 4.5}{2} \right) \left(\frac{150 + 230}{2} \right) \left(\frac{300}{43560} \right) \left(\frac{1}{2} \right) = 9.5 \text{ AC-FT}$$

$$Q_{P_2} = Q_P (1 - V_1/S) = 3000 \text{ CFS} \quad V_{\text{AVG}} = 9.1$$

$$V_2 = \left(\frac{6.7 + 3.7}{2} \right) (.65) = 8.7 \text{ AC-FT}$$

$$Q_{P_2} = Q_{P_1} (1 - V_{\text{AVG}}/S) = 3050 \text{ CFS} \quad \text{ELEV} = 225.7$$

DEPTH = 3.7

FULL SPILLWAY DEPTH = 0

INCREASE DUE TO DAM FAILURE = 3.7

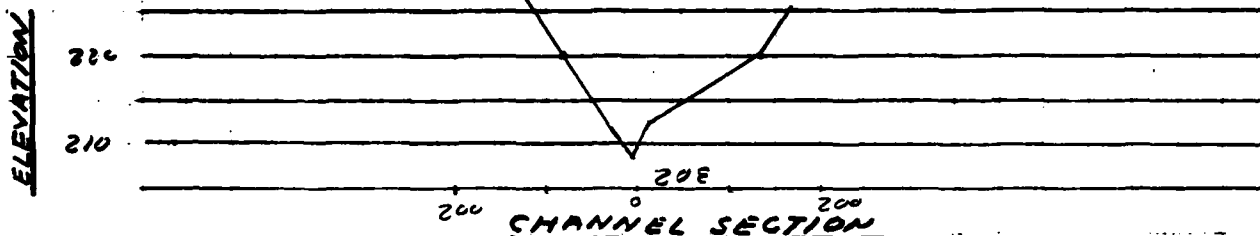
BY HR DATE 11/19/80 SUBJECT DAM INSPECTION STUDY
 CHKD. BY JR DATE 12/5/80
DAM FAILURE ANALYSIS

SHEET NO. 2 OF 4
 JOB NO. 80-100/02
 PURCELL ASSOCIATES
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DAM STUB POND

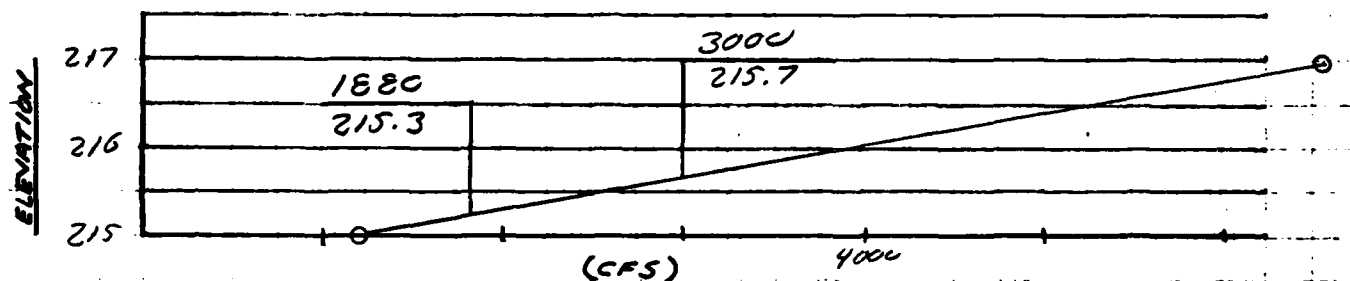
SECTION 1400' FROM DAM

USING $Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$ $n = .05$ SLOPE (S_L) = .01



$Q_p = 3050$ CFS FULL SPILLWAY $Q_s = 55$ CFS
 TOTAL STORAGE (S) = 30 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
220	1180	210	5.6	11100	12
215	330	100	3.3	2180	7
217	755	150	5.0	6600	9
213	175	50	3.5	1200	5



$$V_1 = \left(\frac{3.7 + 7.7}{2} \right) \left(\frac{200 + 1200}{2} \right) \left(\frac{1100}{43560} \right) \left(\frac{1}{2} \right) = 11.5 \text{ AC-FT}$$

$$Q_{p2} = Q_p (1 - V_1/S) = 1880 \text{ CFS} \quad V_{\text{AVG}} = 11.25$$

$$V_2 = \left(\frac{3.7 + 7.3}{2} \right) (2.0) = 11 \text{ AC-FT}$$

$$Q_{p2} = Q_p (1 - V_{\text{AVG}}/S) = 1900 \text{ CFS} \quad \text{ELEV} = 215.4$$

DEPTH = 7.4

FULL SPILLWAY & DEPTH = —

INCREASE DUE TO DAM FAILURE = 7.4

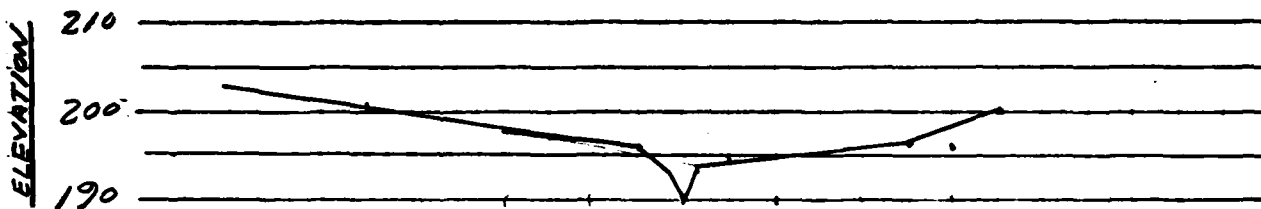
BY ERJ DATE 11/19/80 SUBJECT DAM INSPECTION STUDY
 CHKD. BY JR DATE 12/5/80
DAM FAILURE ANALYSIS

SHEET NO. 3 OF 4
 JOB NO. 80-100/02
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DAM STUB POND

SECTION 2300' FROM DAM

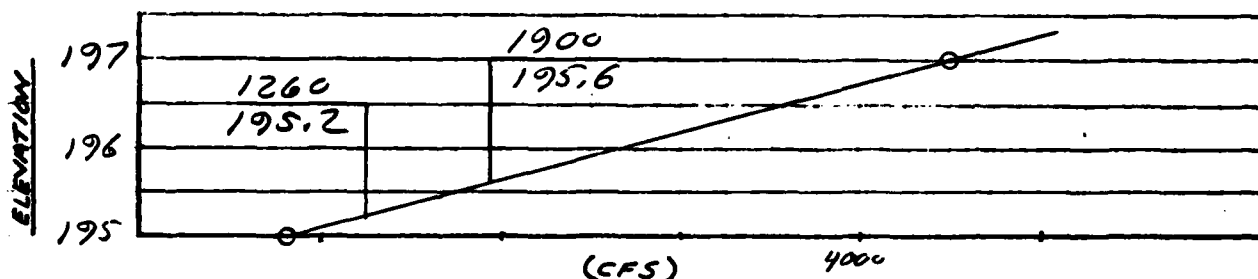
USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ $n = \underline{.05}$ SLOPE (S_L) = .02 $'/1'$



CHANNEL SECTION

$Q_P = \underline{1900}$ CFS FULL SPILLWAY $Q_S = \underline{55}$ CFS
 TOTAL STORAGE (S) = 30 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
200	1950	650	3	17000	10
195	175	150	1.2	820	5
197	755	450	1.7	4500	7



$$V_1 = \left(\frac{7.4 + 5.6}{2} \right) \left(\frac{120 + 180}{2} \right) \left(\frac{900}{43560} \right) \left(\frac{1}{2} \right) = \underline{10.0} \text{ AC-FT}$$

$$Q_{P2} = Q_P (1 - V_1/S) = \underline{1260} \text{ CFS} \quad V_{AVG} = \underline{9.88}$$

$$V_2 = \left(\frac{7.4 + 5.2}{2} \right) (1.55) = \underline{9.76} \text{ AC-FT}$$

$$Q_{P2} = Q_P (1 - V_{AVG}/S) = \underline{1275} \text{ CFS} \quad \text{ELEV} = \underline{195.2}$$

DEPTH = 5.2

FULL SPILLWAY DEPTH = —

INCREASE DUE TO DAM FAILURE = 5.2

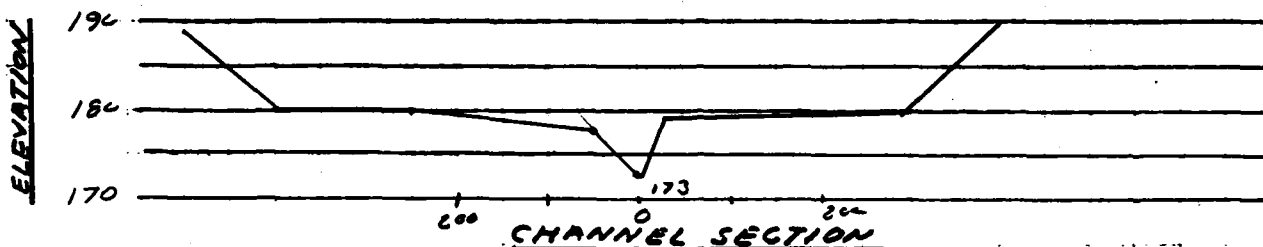
BY HRJ DATE 11/19/80 SUBJECT DAM INSPECTION STUDY
 CHKD. BY JR DATE 12/5/80
DAM FAILURE ANALYSIS

SHEET NO. 4 OF 4
 JOB NO. 80-100/02
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DAM STUB POND

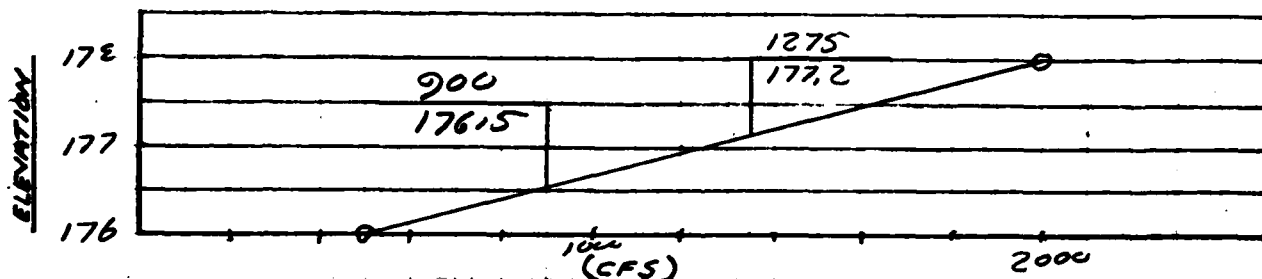
SECTION 3700' FROM DAM

USING $Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$ $n = .05$ SLOPE (S) = .012 $1/1$



$Q_p = 1275$ CFS FULL SPILLWAY $Q_s = 55$ CFS
 TOTAL STORAGE (S) = 30 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
178	375	180	2.1	2000	5
176	105	70	1.5	450	3



$$V_1 = \left(\frac{5.2 + 4.2}{2} \right) \left(\frac{180 + 60}{2} \right) \left(\frac{1400}{43560} \right) \left(\frac{1}{2} \right) = 9.1 \text{ AC-FT}$$

$$Q_{p2} = Q_p (1 - V_1/S) = 900 \text{ CFS} \quad V_{avg} = 8.7$$

$$V_2 = \left(\frac{5.2 + 3.5}{2} \right) (1.9) = 8.3 \text{ AC-FT}$$

$$Q_{p2} = Q_p (1 - V_{avg}/S) = 900 \text{ CFS} \quad \text{ELEV} = 176.5$$

DEPTH = 3.5

FULL SPILLWAY & DEPTH = —

INCREASE DUE TO DAM FAILURE = 3.5'

Stub Pond Dam

A. Size Classification

Height of dam = 6.7 ft.; hence SMALL

Storage capacity at top of dam (elev. 234.2) = 30 AC-FT.; hence SMALL

Adopted size classification: SMALL

B.i) Hazard Potential

Failure can cause damage to seven (7) buildings along the downstream channel. The potential exists for the loss of a few lives.

Adopted hazard classification: SIGNIFICANT

ii) Impact of Failure of Dam with pool at top of dam

It is estimated from the "rule of thumb" failure hydrograph, that the following adverse impacts are a possibility by the failure of this dam.

- a) Loss of homes 0;
- b) Loss of buildings 7;
- c) Loss of highways or roads 6 footpaths;
- d) Loss of bridges 6;

The failure profile can affect a distance of 8000 feet from the dam.

C. Hazard Potential Classifications

<u>HAZARD</u>	<u>SIZE</u>	<u>TEST FLOOD RANGE</u>
<u>SIGNIFICANT</u>	<u>SMALL</u>	<u>100 Yr. to 1/2 PMF</u>
Adopted Test Flood =	<u>100 Yr.</u>	= <u>310</u> CSM
		= <u>1800</u> CFS

D. Overtopping Potential

Drainage Area ----- = 5.8 sq. miles

Spillway crest elevation = 231.5

Top of Dam Elevation = 232.1

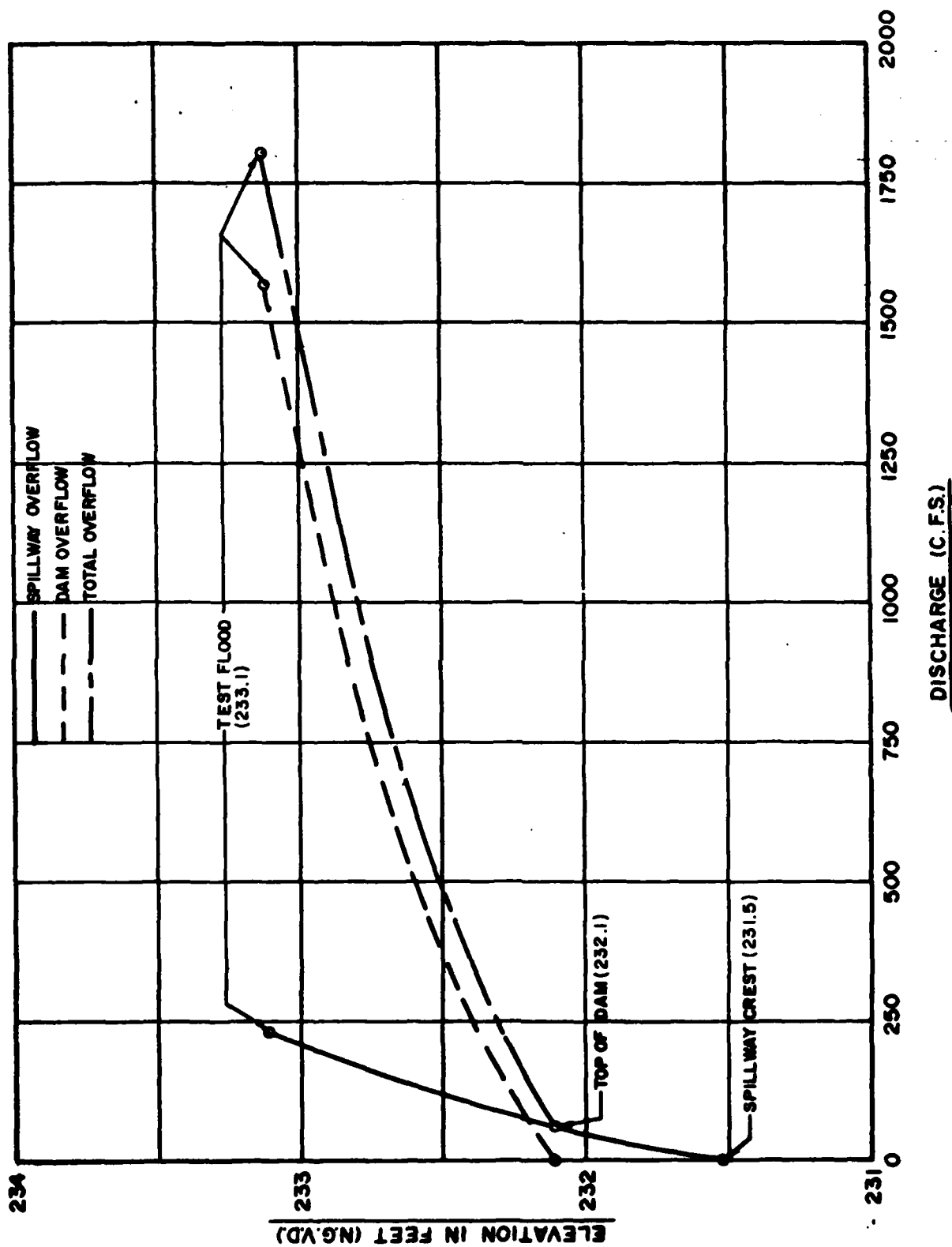
Maximum spillway discharge

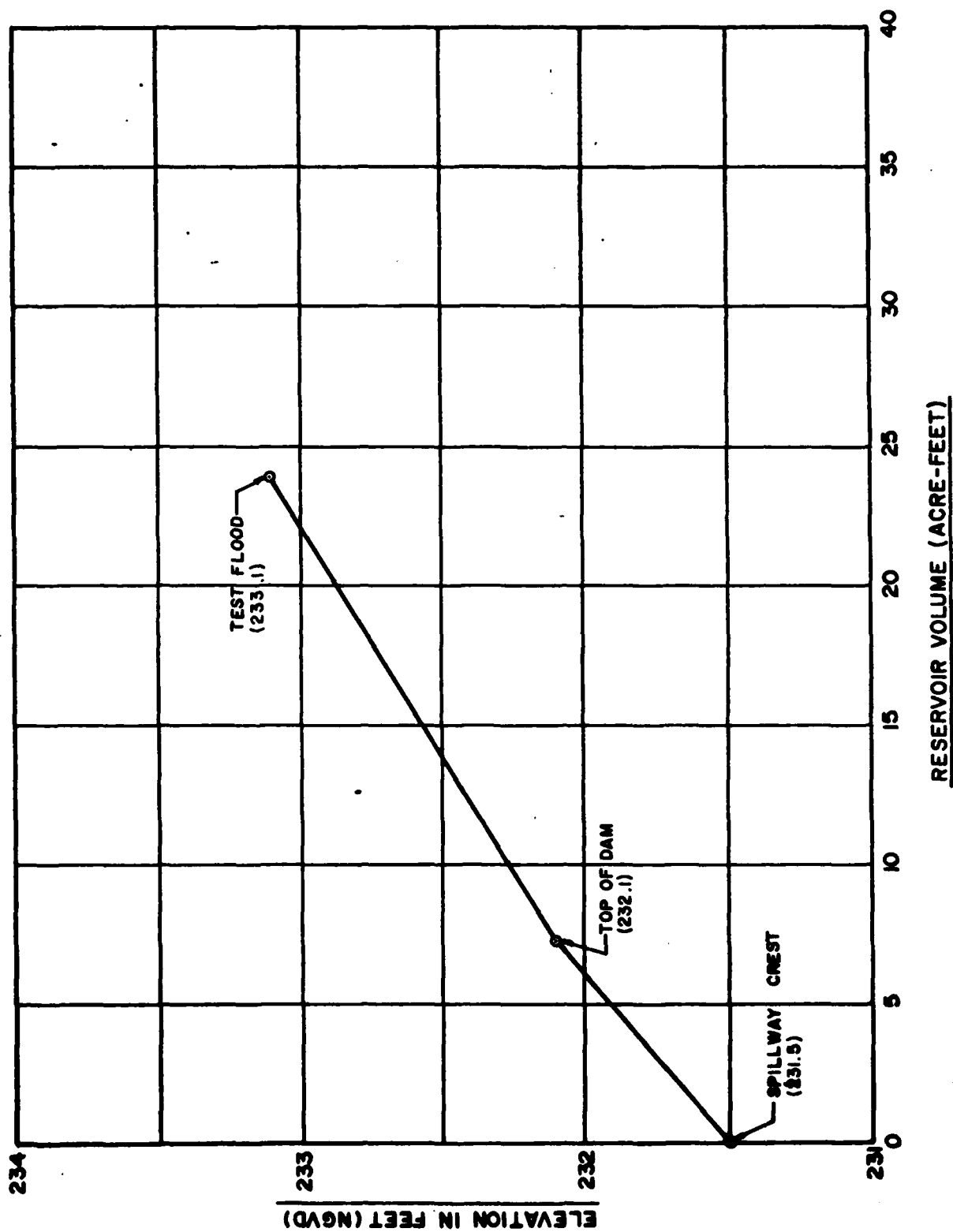
Capacity without overtopping of dam = 53 CFS
 "test flood" inflow discharge = 1800 CFS
 "test flood" outflow discharge = 1800 CFS

Rating Curve Development

Stub Pond Dam

Spillway $Q = CLH^{3/2}$
 $C = 3.00$
 $L = 40 \text{ Feet}$





APPENDIX E

**INFORMATION AS CONTAINED IN THE
NATIONAL INVENTORY OF DAMS**

(a)	(b)	(c)	(d)	(e)	(f)
REGION (AS4)	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI.)	POPULATION	
01	NOO RIVER	AVON	1	10100	

(h)	(i)	(j)	(k)	(l)	(m)	(n)
TYPE OF DAM	YEAR COMPLETED	PURPOSES	STAGNANT WATER (ACRE-FT.)	HYDRAULIC HEIGHT (FEET)	IMPOUNDING CAPACITIES (ACRE-FT.)	LIST
					MAXIMUM	
					NORMAL	
HE	1915	R	6	7	30	23

REMARKS	22 DATE OF LATEST MODIFICATIONS	24 ESTIMATE

[illegible]

(a)	(b)	(c)	(d)
OWNER	ENGINEERING BY	CONSTRUCTION BY	
AVON PARKS PROPERTY	UNKNOWN		UNKNOWN

NAME	DESIGN	CONSTRUCTION	REGULATORY AGENCY	OPERATION	MAINTENANCE
		none		CT DEP	CT DEP

(A)	INSPECTION BY	JAMES P. PURCELL ASSOCIATES INC
(B)	INSPECTION DATE	12/29/66
(C)	DAY MO YR	12 29 66
(D)	AUTHORITY FOR INSPECTION	PL 82-367

REMARKS
30 APPROXIMATE

