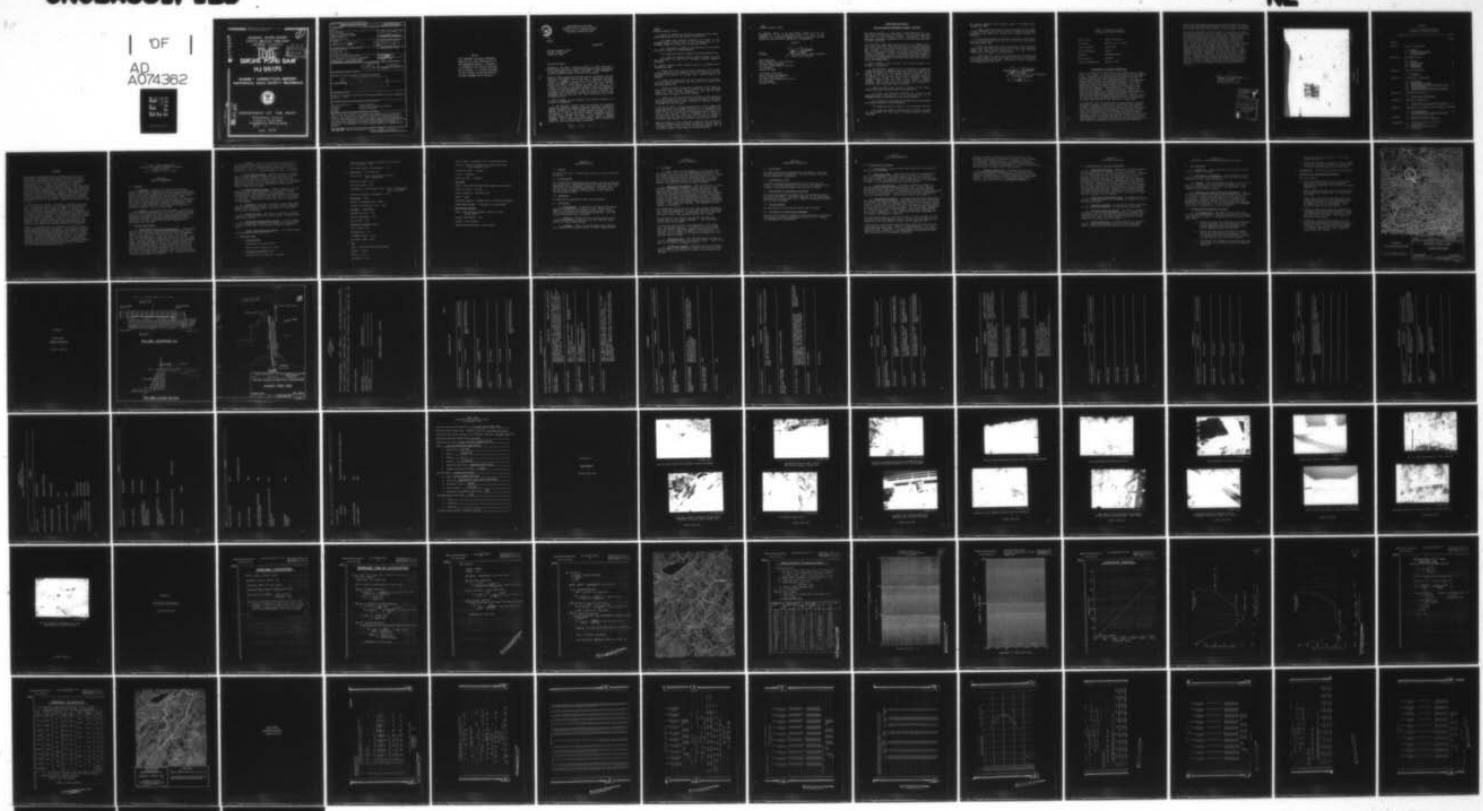
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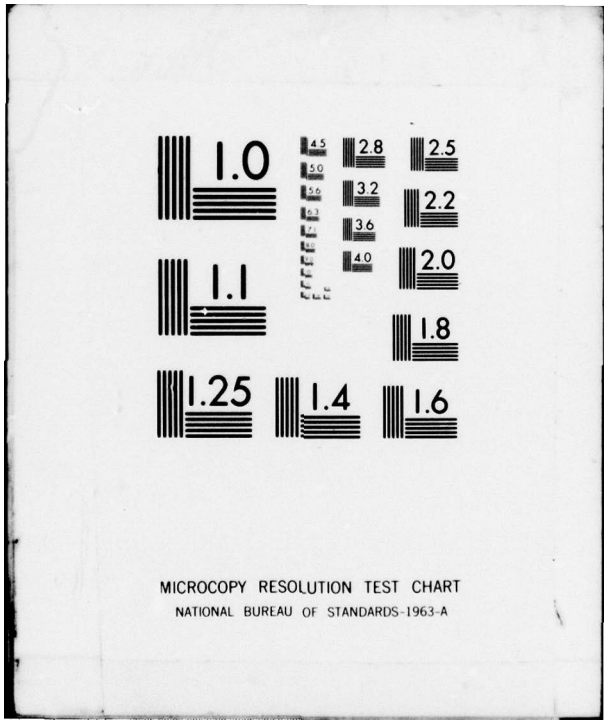
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DIXONS POND DAM

NJ 00175

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DDC FILE COPY

DEPARTMENT OF THE ARMY

Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

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June, 1979

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

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3. RECIPIENT'S CATALOG NUMBER:

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National Dam Safety Program
Dixons Pond Dam
Morris County, N.J.

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9. PERFORMING ORGANIZATION NAME AND ADDRESS:
Anderson-Nichols
6 Louden Rd.
Concord, NH 03301

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18. SUPPLEMENTARY NOTES

Copies are obtainable from National Technical Information Service, Springfield, Virginia, 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dixons Pond Dam, N.J.
Spillways
Seepage
Safety
Visual inspection
National Dam Inspection Act Report
Structural Analysis

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-D

12 SEP 1979

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, NJ 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Dixons Pond Dam in Morris County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Dixons Pond Dam, a high hazard potential structure, is judged to be in poor overall condition. The dam's spillway is considered inadequate since 11 percent of the Spillway Design Flood--SDF - would overtop the dam. (The SDF, in this instance, is one half of the Probable Maximum Flood.) The decision to consider the spillway "inadequate" instead of "seriously inadequate" is based on the determination that dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980. In the interim, a detailed emergency operation plan and warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

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b. Within six months from the date of approval of this report, engineering studies and analyses should be performed to:

(1) Design and supervise procedures for repair of the dry-stone-masonry retaining wall on the downstream side of the embankment between the spillway and the northeast abutment.

(2) Investigate the seepage at the downstream toe, and design and implement appropriate remedial measures.

(3) Design and construct repairs to the deteriorated concrete.

(4) Design and implement remedial measures needed to restore the deteriorated low level outlet including necessary operating mechanisms.

Any remedial measures found necessary should be initiated within calendar year 1980.

c. Within thirty days from the date of approval of this report the owner should set up a procedure to check the condition of the dam periodically and monitor the seepage until remedial measures are effected.

d. Within three months from the date of approval of this report the owner should remove debris from the crest of the dam and the downstream channel area.

e. Within six months from the date of approval of this report the owner should clear trees and brush on either side of the downstream channel for some distance downstream of the dam to allow identification of seepage or stability problems.

f. Within one year from the date of approval of this report the owner should engage a professional engineer qualified in the design and construction of dams to make a comprehensive technical inspection of the dam once every two years.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman James A. Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

NAN-D
Honorable Brendan T. Byrne

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

1 Incl
As stated

JOEL T. CALLAHAN
Lieutenant Colonel, Corps of Engineers
Acting District Engineer

Copies furnished:
Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

John O'Dowd, Acting Chief
Bureau of Flood Plain Management
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

DIXONS POND DAM (NJ00175)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 15 May 1979, by Anderson-Nichols & Co., Inc. under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Dixons Pond Dam, a high hazard potential structure, is judged to be in poor overall condition. The dam's spillway is considered inadequate since 11 percent of the Spillway Design Flood--SDF - would overtop the dam. (The SDF, in this instance, is one half of the Probable Maximum Flood.) The decision to consider the spillway "inadequate" instead of "seriously inadequate" is based on the determination that dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980. In the interim, a detailed emergency operation plan and warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within six months from the date of approval of this report, engineering studies and analyses should be performed to:

(1) Design and supervise procedures for repair of the dry-stone-masonry retaining wall on the downstream side of the embankment between the spillway and the northeast abutment.

(2) Investigate the seepage at the downstream toe, and design and implement appropriate remedial measures.

(3) Design and construct repairs to the deteriorated concrete.

(4) Design and implement remedial measures needed to restore the deteriorated low level outlet including necessary operating mechanisms.

Any remedial measures found necessary should be initiated within calendar year 1980.

c. Within thirty days from the date of approval of this report the owner should set up a procedure to check the condition of the dam periodically and monitor the seepage until remedial measures are effected.

d. Within three months from the date of approval of this report the owner should remove debris from the crest of the dam and the downstream channel area.

e. Within six months from the date of approval of this report the owner should clear trees and brush on either side of the downstream channel for some distance downstream of the dam to allow identification of seepage or stability problems.

f. Within one year from the date of approval of this report the owner should engage a professional engineer qualified in the design and construction of dams to make a comprehensive technical inspection of the dam once every two years.

APPROVED: Joel T. Callahan

JOEL T. CALLAHAN
Lieutenant Colonel, Corps of Engineers
Acting District Engineer

DATE: 11 Sep 79

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Dixons Pond Dam
ID Number:	FED ID No. NJ 00175
State Located:	New Jersey
County Located:	Morris
Stream:	Rockaway River
River Basin:	Passaic
Date of Inspection:	May 15, 1979

ASSESSMENT OF GENERAL CONDITIONS

Dixons Pond Dam is 150 years old and in poor overall condition. It is small in size and is classified as high hazard. A clear seepage of 10 gpm was noted at the toe of the dam between the spillway and northeast abutment. The dry-stone masonry wall on the downstream side of the embankment between the spillway and northeast abutment is in poor condition with a pronounced bulge of about 1 foot. The downstream channel contains debris, and trees and brush overhang the channel. A derelict boat is lodged on the crest of the spillway. The concrete walls, piers, and caps of the access foot bridge and spillway are eroded and spalled where exposed to weather and water. The low level outlet pipe is badly deteriorated and neither a valve nor gate operating mechanism could be found. The spillway can pass less than 5% of the PMF and is inadequate.

We recommend that the owner retain the services of a professional engineer, qualified in the design and inspection of dams, to accomplish the following in the near future: further evaluate the hydrology and hydraulics of the watershed, dam, and reservoir, and design and implement appropriate mitigating measures to insure adequate discharge capacity; repair the dry-stone masonry retaining wall on the downstream side of the dam between the spillway and northeast abutment; investigate the seepage at the downstream toe and design and implement appropriate remedial measures;

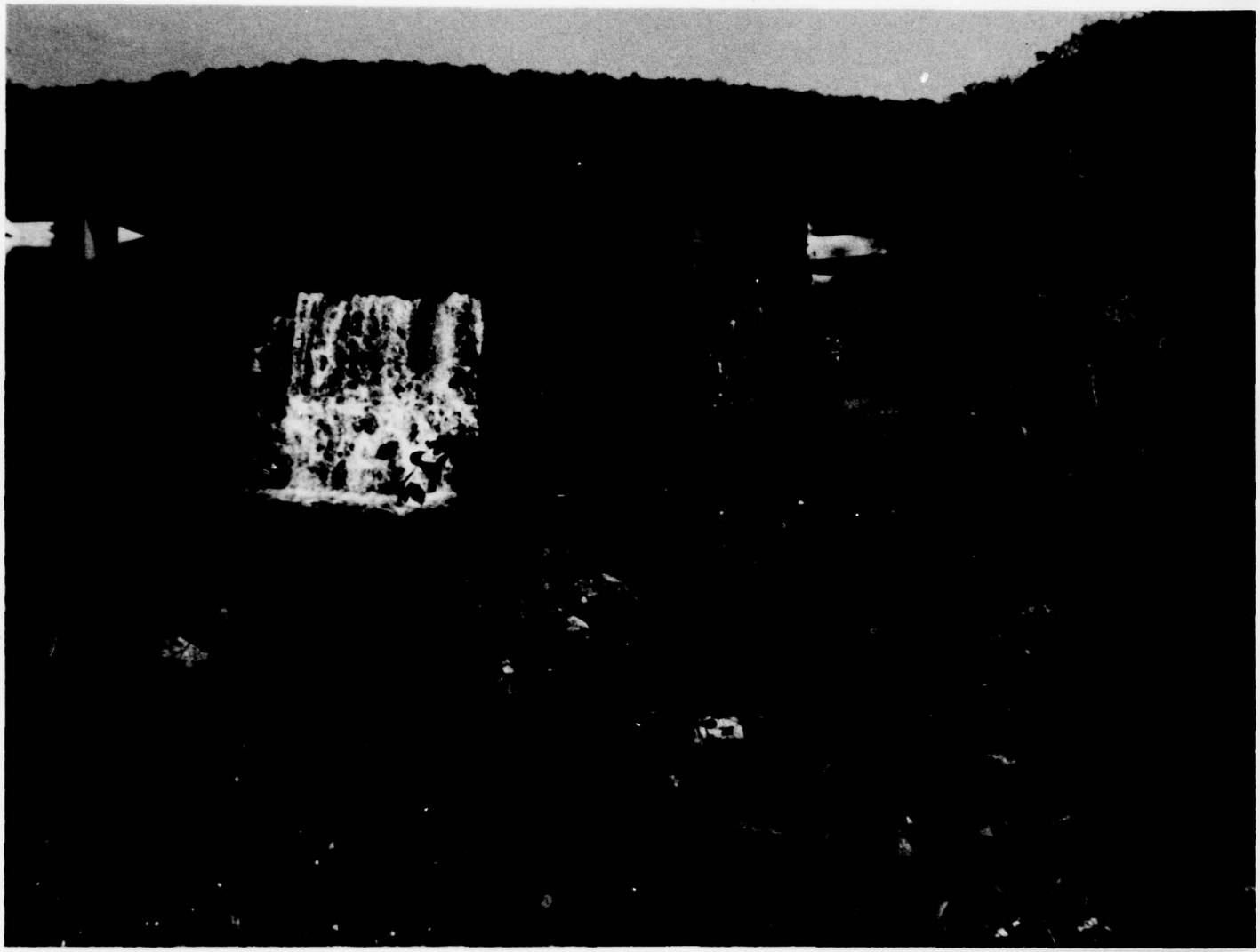
design and implement repairs to the deteriorated concrete; and design and implement remedial measures needed to restore the deteriorated low level outlet to an operable condition.

We further recommend that as a part of operating and maintenance procedures, the owner check the condition of the dam periodically and monitor the seepage at the downstream toe until remedial measures are effected. This should be started immediately. Debris should be removed soon from the crest of the dam and the downstream channel area. Trees and brush should be cleared in the near future from either side of the downstream channel for some distance downstream of the dam to allow identification of seepage or stability problems should they occur. A professional engineer qualified in the design and inspection of dams should be engaged in the future to make a comprehensive technical inspection of the dam once every two years. A surveillance program should be established in the near future for use during and immediately following periods of heavy rainfall and also a warning program to follow in case of floodflow conditions or imminent dam failure.

Warren A. Guinan

Warren A. Guinan, P.E.
Project Manager
New Jersey No. 16848

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OVERVIEW

DIXONS POND DAM

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY REPORT

DIXONS POND DAM N.J. NO. 25- 82 FED ID NO. NJ00175

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PREFACE

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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. 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. 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.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION PROGRAM
DIXONS POND DAM
U.S. #NJ00175 N.J. #25-82

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Authority to perform the Phase I Safety Inspection of Dixons Pond Dam was received from the State of New Jersey, Department of Environmental Protection, Division of Water Resources by letter dated 4 April 1979 under Contract No. FPM-39 dated 28 June 1978. This Authority was given pursuant to the National Dam Inspection Act, Public Law 92-367 and by agreement between the State and the U.S. Army Engineers District, Philadelphia. The inspection discussed herein was performed by Anderson-Nichols & Company, Inc. on 15 May 1979.

b. Purpose. The purpose of the Phase I Investigation is to develop an assessment of the general conditions with respect to the safety of Dixons Pond Dam and appurtenances based upon available data and visual inspection, and determine any need for emergency measures and conclude if additional studies, investigations, and analyses are necessary and warranted.

1.2 Project Description

a. Description of Dam and Appurtenances. Dixons Pond Dam is a 9-foot high, 150-foot long earthfill dam, built around 1830. The downstream face is of dry-stone-masonry with a 1 horizontal to 4 vertical slope. The 72-foot free overflow spillway is near the center of the dam. The crest of the spillway is capped by an 8-inch thick concrete slab. A service bridge constructed of steel channels with wooden deck and railing is set on two concrete piers and spans the spillway, about 6 inches upstream of the crest. A dirt path extends along the crest from each end of the service bridge. A 20-inch diameter steel, low level outlet pipe is located about 12 feet to the left of the spillway and 3 feet above the embankment toe. Essential features of the dam are given in Figure 2.

b. Location. The dam is located in Morris County, New Jersey on a tributary to Stony Brook, a tributary to the Rockaway River, approximately 1 mile northwest of Powerville. It is at north latitude 40° 56.0' and west longitude 74° 26.5'. A location map is given in Figure 1.

c. Size Classification. Dixons Pond Dam is classified as being "small" on the basis of storage at the dam crest of 287 acre-feet, which is less than 1000 acre-feet but more than 50 acre-feet, and on the basis of its height of 9 feet, which is less than 40 feet, in accordance with criteria given in the Recommended Guidelines for Safety Inspections of Dams.

d. Hazard Classification. Visual inspection of the downstream area shows that failure of Dixons Pond Dam could possibly cause damages to 3 residences. It is estimated that the affected structures could be inundated by less than 7 feet of water and that loss of a few lives is possible. Accordingly, Dixons Pond Dam is classified as High Hazard.

e. Ownership. The dam is owned by Dixon Associates, Boonton Township, New Jersey. Mr. Bruce Dixon, Rockaway Valley Road, Rockaway Valley, Boonton, N. J., was contacted for information.

f. Purpose of Dam. The lake is used for recreation. Originally the dam was built and operated to supply water power for a forge.

g. Design and Construction History. Little information was disclosed regarding the design and construction of the original dam. The service bridge was added in 1939.

h. Normal Operational Procedures. No current operating procedures were disclosed.

1.3 Pertinent Data

a. Drainage Area

Watershed 2.9 square miles

Normal water surface 29 acres

b. Discharge at Damsite (cfs)

Maximum flood at damsite - unknown

Ungated (total) spillway capacity at maximum pool elevation - 459

Low level outlet (if operable) - 24

c. Elevation. (ft. above MSL)

Top of dam - 551.6 (low point in crest)
551.9 (abutments)

Recreation pool - 550

Spillway crest - 550

Streambed at centerline of dam - 541.9 (downstream)
549.5 (upstream)

Maximum tailwater (estimated) - 549

d. Reservoir. (feet)

Length of maximum pool - 3600

Length of recreation pool - 3100

e. Storage. (acre-feet)

Recreation pool - 235

Design surcharge - 523

Top of dam - 287

f. Reservoir Surface (acres)

Top of dam - 30

Maximum pool - 30

Recreation pool - 29.4

Spillway crest - 29.4

g. Dam

Type - earthfill and stone masonry

Length - 150 ft.

Height - 9 ft.

Top Width - 10 ft.

Side Slopes - upstream 1H:1V; downstream 1H:4V

Zoning - Masonry upstream and downstream faces with earthfill core

Impervious core - unknown

Cutoff - unknown

Grout curtain - unknown

h. Spillway.

Type - free overflow concrete capped stone masonry

Length of weir - 70 feet

Crest elevation - 550 feet msl

Gates - none

Upstream channel - Dixons Pond (no approach channel)

Downstream channel - tributary to Stony Brook

i. Regulating Outlets.

Type - one 20-inch diameter steel low level outlet pipe.

Length (estimated) - 30'

Access - not visible

Regulating facilities - not visible

SECTION 2
ENGINEERING DATA

2.1 Design

No plans, hydraulic or hydrologic data for Dixons Pond were disclosed.

2.2 Construction

No recorded data concerning construction of Dixons Pond Dam were disclosed. Reference data on file with the New Jersey Department of Environmental Protection indicates that the dam was built in 1830 by James Dixon. The date on the service bridge abutment indicates that it was added to the structure in 1939.

2.3 Operation

No engineering operational data were disclosed.

2.4 Evaluation

a. Availability. A search of the New Jersey Department of Environmental Protection files, contact with community officials and contact with the owner revealed only a limited amount of recorded information. All disclosed information was retrieved.

b. Adequacy. Because of the limited amount of recorded data available,evaluation of this dam was based solely on visual observations.

c. Validity. Parts of the recorded data retrieved were found to be incorrect based on visual observations.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. Dam. Water is discharging at an estimated rate of 10 gpm from the toe of the embankment section of the dam between the spillway and the northeast abutment. There is a major bulge and several displaced blocks of rock in the dry-stone-masonry wall which constitutes the lower part of the downstream slope of the embankment section between the spillway and the northeast abutment.

b. Appurtenant Structures. The concrete wall in the southwest embankment is badly cracked and deteriorated with at least 5 major vertical cracks and joints. Considerable spalling has occurred at the cracks and joints. The bridge abutments and center pier of the service bridge across the spillway show considerable erosion and undermining of the concrete below the water surface. The steel channel bridge beams were observed to be in good condition. Numerous pieces of plank decking were observed to be deteriorated. Two planks are missing. The remainder of the planks are weathered.

The downstream end of the 20" low level outlet located on the northeast embankment is badly deteriorated and rusted. Water was discharging at an estimated rate of 10 gpm from the end of pipe. The upstream end was not visible.

The surface of the concrete cap on the spillway has eroded exposing the coarse aggregate. The transverse joints have also eroded.

One concrete cap section is approximately 1 1/2" lower than the adjacent section. It could not be determined from the visual inspection whether this section was constructed in that manner or whether it had settled. A derelict boat is lodged on the spillway between the crest and the service bridge.

c. Reservoir Area. The watershed above the dam is gently to steeply sloping and heavily wooded. Slopes adjacent to the reservoir appeared stable.

d. Downstream Channel. Trees and brush are growing on the banks of the downstream channel and there are two barrels and several pieces of lumber in the channel near the dam.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No formal operating procedures were disclosed. With the dam and appurtenant structures in their present condition little operation is possible.

4.2 Maintenance of Dam

No formal maintenance procedures for the dam were disclosed. From the condition of the dam,it is apparent that a regular maintenance program has not been followed.

4.3 Maintenance of Operating Facilities

No formal maintenance procedures for the operating facilities were disclosed. From the condition of the appurtenant structures,it is apparent that a regular maintenance program has not been followed.

4.4 Warning System

No description of any warning system was disclosed.

4.5 Evaluation of Operational Adequacy

Because of the lack of operation and maintenance procedures, the remedial measures described in Section 7.2 c. should be implemented as prescribed.

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. Design Data. Since no data were disclosed an evaluation could not be performed.

b. Experience Data. Reference data from New Jersey Department of Environmental Protection files indicate that during a July 1931 inspection, the owner stated that the earth section of the dam had been overtopped by a few inches twice in the preceding 40 years. No other experience data were disclosed.

c. Visual Observations. No visual evidence of damage to the structure caused by overtopping was found. Debris, such as the derelict boat, may partially obstruct the spillway opening and cause serious reduction in the capacity during a flood occurrence. At the time of inspection, less than 1-inch of water was passing over the spillway crest. The low level outlet was leaking.

d. Overtopping Potential. The hydraulic/hydrologic evaluation for Dixons Pond Dam is based on a spillway design flood (SDF) equal to one-half the probable maximum flood (PMF) in accordance with the range of floods given in the evaluation guidelines for dams classified as high hazard and small in size. The PMF has been determined by application of the SCS dimensionless unit hydrograph procedure to a 24-hour PMP storm of 22.5 inches. Hydrologic computations are given in Appendix 3. The routed half-PMF peak discharge for the subject watershed is 5,484 cfs.

The minimum elevation of the dam allows 1.55 feet of depth in the spillway before overtopping occurs. Under this head the spillway capacity is 459 cfs, which is less than the required SDF.

Flood routing calculations indicate that Dixons Pond Dam will be overtopped for more than 7 hours to a maximum depth of 3.3 feet under half-PMF conditions. It is estimated that the spillway can pass less than 5 percent of the PMF without overtopping the dam, thus the spillway is considered inadequate.

Because the dam is classified as High Hazard and the spillway cannot pass 50 percent of the PMF, the increase in downstream hazard because of overtopping failure was assessed. The dam failure analysis and downstream routing indicate that the probability of loss of life is not significantly increased due to dam failure.

e. Drawdown Capability. Assuming that the low level outlet currently in place can be restored to an operable condition, it is estimated that the pond can be drained in approximately 16 days, assuming no significant inflow. This time period is considered marginal for draining the reservoir in an emergency situation.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. There was no visual evidence of past instability or potential future instability of the dry-stone masonry spillway section of the dam. Seepage at the downstream toe and the poor condition of the dry masonry retaining wall on the downstream face of the embankment section between the spillway and the northeast abutment indicate that future instability of that section may develop. Based on the visual inspection alone it is not possible to determine the character of the dam foundation or the interior of the cross section, or the shape of the upstream face below the level of the sediment in the reservoir against the dam. Therefore, it is not possible to evaluate the factor of safety of the dam against slope failure, sliding, or overturning.

b. Design and Construction Data. No design or construction data pertinent to the structural stability of the dam were disclosed.

c. Operating Records. No operating records pertinent to the structural stability of the dam were disclosed.

d. Post Construction Changes. The visual inspection disclosed a mark in the concrete bridge pier dated 1939 indicating that the spillway cap and service bridge were added at that time. No other records pertinent to post construction changes were disclosed.

e. Seismic Stability. Dixons Pond Dam is located in Seismic Zone 1 and in accordance with the recommended Phase I guidelines does not warrant seismic analysis.

SECTION 7
ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. Dixons Pond Dam is 150 years old and in poor overall condition.

b. Adequacy of Information. The information available is such that the assessment of the dam must be based primarily on the visual inspection.

c. Urgency. The recommendations made in Section 7.2 a and the operating and maintenance procedures in 7.2 c should be implemented by the owner as prescribed, after receipt of this Phase I report.

d. Necessity for Additional Data/Evaluation. The information available from the visual inspection is adequate to identify the potential problems which are listed in 7.2 a below. These problems require the attention of a professional engineer who will have to make additional engineering studies to design or specify remedial measures to rectify the problems. If left unattended, the problems could lead to instability of the structure.

7.2 Recommendations/Remedial Measures

a. Recommendations. The owner should retain the services of a professional engineer qualified in the design and inspection of dams to accomplish the following in the near future:

1. Further evaluate the hydrology and hydraulics of the watershed, dam, and reservoir, and design appropriate mitigating measures to insure adequate discharge capacity.

2. Design and supervise procedures for repair of the dry-stone-masonry retaining wall on the downstream side of the embankment between the spillway and the northeast abutment.

3. Investigate the seepage at the downstream toe, and design and implement appropriate remedial measures.

4. Design and construct repairs to the deteriorated concrete.

5. Design and implement remedial measures needed to restore the deteriorated low level outlet including necessary operating mechanisms.

b. Alternatives. Drain the pond and breach the dam.

c. Operating and Maintenance Procedures.

The owner should:

1. Check the condition of the dam periodically and monitor the seepage until remedial measures are effected. This should be started immediately.

2. Remove debris from the crest of the dam and the downstream channel area. This should be done soon.

3. Clear trees and brush on either side of the downstream channel for some distance downstream of the dam to allow identification of seepage or stability problems. This should be done in the near future.

4. Engage a professional engineer qualified in the design and construction of dams to make a comprehensive technical inspection of the dam once every two years. This should be started in the future.

5. Establish a surveillance program for use during and immediately following periods of heavy rainfall, and also a warning program to follow in case of floodflow conditions or imminent dam failure. This should be done in the near future.



Anderson-Nichols & Co, Inc.
BOSTON MASSACHUSETTS

U.S. ARMY ENGINEER DIST. PHILADELPHIA
CORPS OF ENGINEERS
PHILADELPHIA, PA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

DIXONS POND DAM

LOCATION MAP

DIXONS POND NEW JERSEY

SCALE: SEE BAR SCALE

DATE: JUNE, 1979

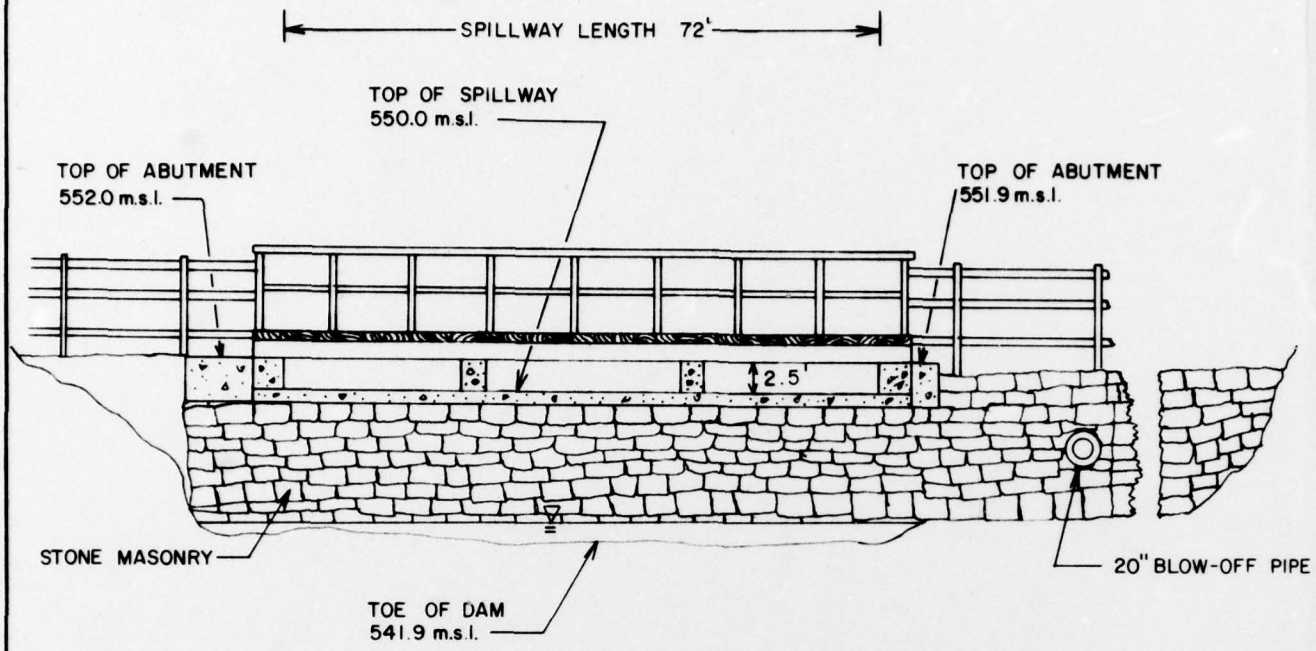
FIGURE 1

APPENDIX 1

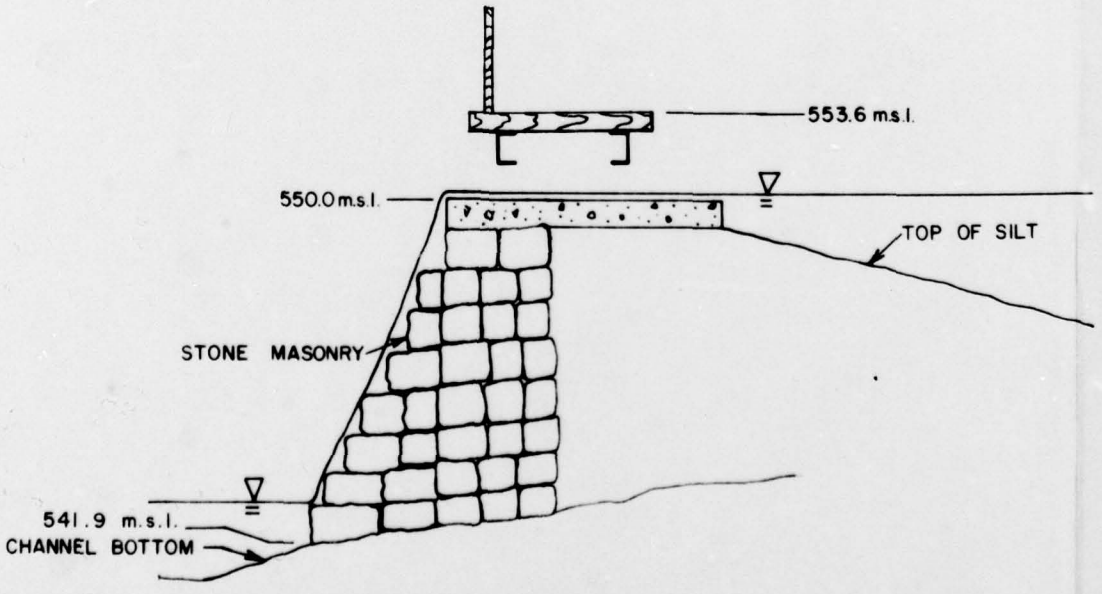
CHECK LIST

VISUAL INSPECTION

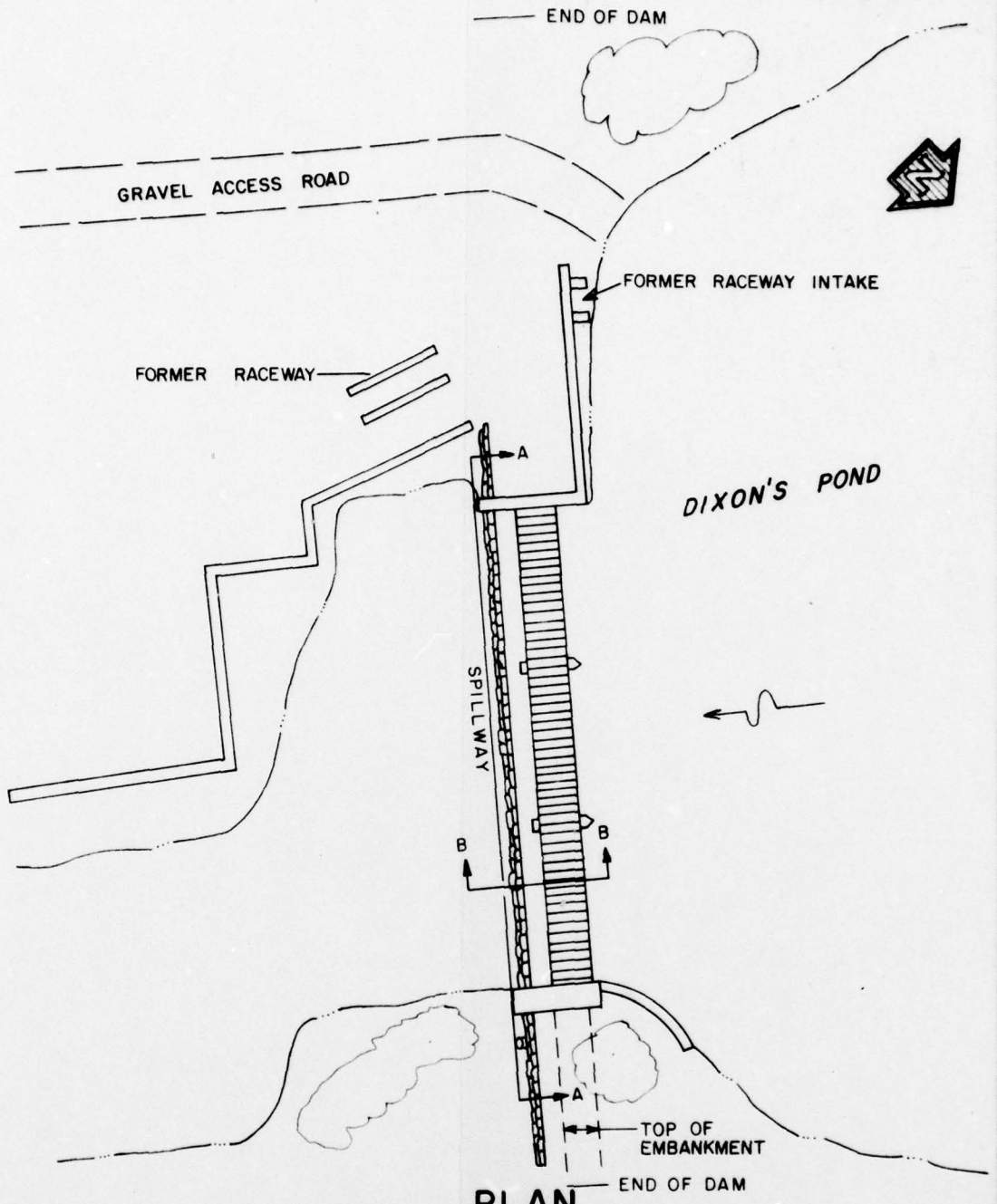
DIXONS POND DAM



SPILLWAY ELEVATION A-A



SPILLWAY ELEVATION B-B



OFF PIPE

SILT

PLAN

DATA FROM FIELD INSPECTION MAY 15, 1979

Anderson - Nichols & Co., Inc. BOSTON MASSACHUSETTS	U.S. ARMY ENGINEER DIST. PHILADELPHIA CORPS OF ENGINEERS PHILADELPHIA, PA

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

DIXON'S POND DAM

DIXON'S POND NEW JERSEY

SCALE: NOT TO SCALE

DATE: JUNE, 1979

FIGURE 2

Check List
Visual Inspection
Phase 1

Name Dam Dixons Pond Dam County Morris State New Jersey Coordinators NJDEP

Date(s) Inspection 5/15/79 Weather Sunny, cool Temperature 60° F

Pool Elevation at Time of Inspection 550.1 MSL Tailwater at Time of Inspection 541.9 MSL

Inspection Personnel:

Warren Guinan — Ronald Hirschfeld

Stephen Gilman

David Deane

Gilman & Hirschfeld Recorder

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEE PAGE ON LEAKAGE	Not observable	Water discharging over crest of masonry section obscures downstream face.
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	No indication of distress or movement.	
DRAINS	None observed	
WATER PASSAGES	Not observable	
FOUNDATION	Not observable	Water discharging over crest of masonry section obscures downstream face.

Concrete Training Walls and Abutments to Spillway.

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Right abutment and training wall - 5 major vertical cracks/joints. Concrete wall backed with earthfill. Stone masonry downstream. Numerous surface cracks and extensive spalling and erosion in vicinity of vertical cracks/joints. Length of wall, 45'. Left abutment and training wall - surface erosion and minor surface cracking. Extensive surface spalling and erosion at water surface.	
STRUCTURAL CRACKING	Right - appears to be at least 3 structural cracks in 10" thick wall. Left - 1 vertical crack at upstream face of bridge abutment.	Deteriorated concrete should be repaired.
VERTICAL AND HORIZONTAL ALIGNMENT	Right - Little evidence of horizontal or vertical movement. Left - ½" vertical movement at construction joint and 1½" horizontal separation.	
MONOLITH JOINTS	Not applicable	
CONSTRUCTION JOINTS	Right - upstream abutment face - joints in poor condition. All indicate some movement. Extensive spalling and erosion at joints. Left - One vertical construction joint near center of curved wall (See alignment above). Wall on right side, downstream of dam - Old concrete wall, purpose unknown, badly deteriorated. Tipped and cracked. Does not appear to be a structural element of dam.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Major bulge and several displaced blocks of rock in downstream dry-stone-masonry face between left abutment and left end of spillway.	Downstream dry-stone-masonry face between left abutment and left end of spillway should be repaired.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Good	
RIPRAP FAILURES	None	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RAILINGS	Right - wood post and rail fencing on downstream face, weathered condition, no paint.	Fence should be repaired and painted.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No indication of distress or movement.	
ANY NOTICEABLE SEEPAGE	Wet areas downstream of stone masonry and earth sections between spillway and left abutment and between spillway and right abutment. Both areas covered with leaves and decaying vegetation. No visible evidence of discharging water at downstream toe near right end. Small discharge water near left end.	Seepage control measures should be designed and implemented.
STAFF GAGE AND RECORDER	None observed.	
DRAINS	None observed.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Not applicable	
INTAKE STRUCTURE	Not visible due to water in reservoir. No evidence of gate operating mechanisms.	Upstream gate should be repaired and placed into operable condition.
OUTLET PIPE	20" riveted steel pipe. Bottom rusted out. Badly deteriorated. Flow of approximately 20 gpm probably due to leaking valve.	Repair corroded pipe. Holes in pipe could cause erosion of embankment.
OUTLET CHANNEL	Bottom of channel covered with boulders. Some brush growing in channel. Many trees overhanging channel.	Brush and trees should be cleared 25 feet on both sides of channel for a distance of 100 feet downstream from the dam.
EMERGENCY GATE	None observed	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR - stone masonry with concrete cap. Tip nearly flat.	Concrete cap surface eroded. Coarse aggregate exposed. Transverse construction joints eroded. One section approximately 8' long settled 1½". Crest has eroded. Concrete cap approximately 8" thick by 6'6" wide.	Date on abutment indicates work was done in 1939. Concrete should be repaired to prevent further deterioration
APPROACH CHANNEL	Wide and unobstructed. Bottom covered with sediment to level of upstream edge of spillway crest.	
DISCHARGE CHANNEL	Bottom of channel covered with boulders. Some brush growing in channel. Trees overhanging channel.	Brush and trees should be cleared 25 feet on both sides of channel for a distance of 100 feet downstream from the dam.
BRIDGE AND PIERS OVER SPILLWAY	Steel channels - long members in good condition. Little rust. Paint-fair condition, some deterioration. Piers-eroded and undermined at water surface. Wood nailer, deck and railings - badly weathered, 2 deck planks missing. Surface laitance of concrete above waterline eroded. Steel bearing pads and anchor bolts-good condition	

GATED SPILLWAY - NONE

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL		
APPROACH CHANNEL		
DISCHARGE CHANNEL		
BRIDGE AND PIERS		
GATES AND OPERATION EQUIPMENT		

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed	
OBSERVATION WELLS	None observed	
WEIRS	None observed	
PIEZOMETERS	None observed	
OTHER	None observed	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Gentle slopes, heavily forested	
SEDIMENTATION	Reservoir filled with sediment to level of upstream edge of crest of overflow spillway weir but water depth appears to be deeper farther upstream	Sedimentation of reservoir does not appear to be a problem.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Boulders cover bottom. Some brush in channel. Trees overhanging channel.	Brush and trees should be cleared 25 feet on both sides of channel for a distance of 100 feet downstream from the dam.
SLOPES	Slopes are gentle and covered with trees immediately downstream of dam	
APPROXIMATE NO. OF HOMES AND POPULATION	3 homes possibly affected. Estimated population, 10-15 people.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	None disclosed.
REGIONAL VICINITY MAP	Prepared for this report.
CONSTRUCTION HISTORY	None disclosed.
TYPICAL SECTIONS OF DAM	None
HYDROLOGIC/HYDRAULIC DATA	None
OUTLETS - PLAN	None
- DETAILS	None disclosed.
- CONSTRAINTS	None disclosed.
- DISCHARGE RATINGS	None disclosed.
RAINFALL/RESERVOIR RECORDS	None disclosed.

ITEM	REMARKS
DESIGN REPORTS	None disclosed.
GEOLOGY REPORTS	None disclosed.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None disclosed.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None disclosed.
POST-CONSTRUCTION SURVEYS OF DAM	None disclosed.
BORROW SOURCES	Unknown

ITEM	REMARKS
MONITORING SERVICES	None
MODIFICATIONS	Foot bridge added in 1939.
HIGH POOL RECORDS	None
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	None

ITE	REMARKS
SPILLWAY PLAN	
SECTIONS	Prepared for this report from field inspection data.
DETAILS	None
OPERATING EQUIPMENT	None
PLANS & DETAILS	None

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 2.9 square miles, wooded, hilly

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 555.0 MSL (235 ac-ft)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 551.6 MSL (287 ac-ft)

ELEVATION MAXIMUM DESIGN POOL: 555.0 MSL

ELEVATION TOP DAM: low pt. 551.6 MSL, abutment 551.9 MSL

CREST: free overflow concrete capped spillway

a. Elevation 550.0 MSL

b. Type concrete weir

c. Width 10' ±

d. Length 70' effective

e. Location Spillover approximate center of dam

f. Number and Type of Gates unknown

OUTLET WORKS: low-level outlet pipe

a. Type 20-inch diameter steel pipe

b. Location approximately 12 feet left of the spillway

c. Entrance Invert unknown

d. Exit Invert 544.8 MSL

e. Emergency Draindown Facilities none

HYDROMETEORLOGICAL GAGES: none

a. Type

b. Location

c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 497 CFS

APPENDIX 2

PHOTOGRAPHS

DIXONS POND DAM



15 MAY 1979

VIEW OF CREST FROM LEFT ABUTMENT LOOKING SOUTHWEST



15 MAY 1979

SPILLWAY LOOKING SOUTHWEST TOWARD RIGHT ABUTMENT, WITH LOW LEVEL OUTLET PIPE

DIXONS POND DAM



15 MAY 1979

DOWNSTREAM FACE OF LEFT SIDE OF
DAM WITH LOW-LEVEL OUTLET PIPE



15 MAY 1979

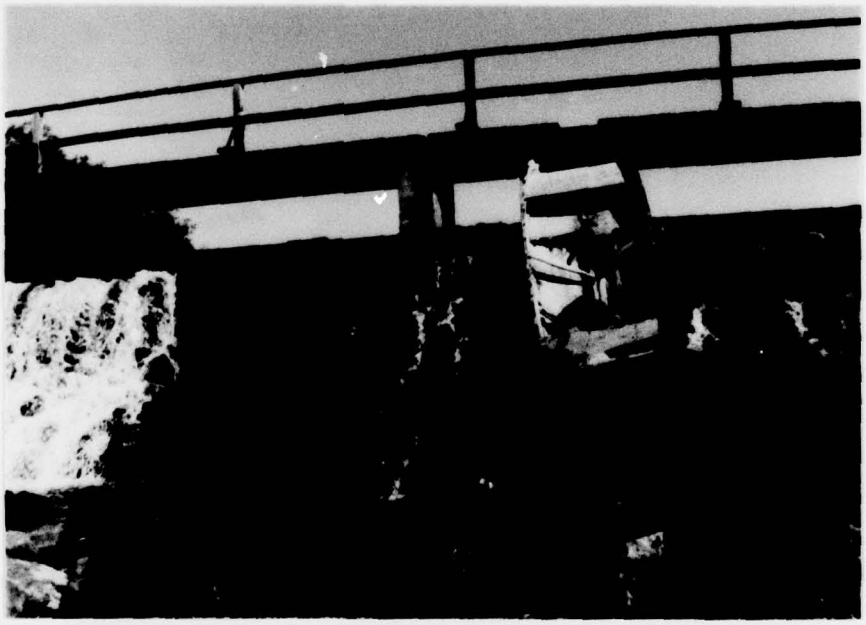
LOW-LEVEL OUTLET PIPE

DIXONS POND DAM



15 MAY 1979

BULDGE AND DISPLACED BLOCKS ON DOWNSTREAM FACE
BETWEEN LOW-LEVEL OUTLET AND LEFT DAM ABUTMENT



15 MAY 1979

SPILLWAY AND SERVICE BRIDGE WITH
DERELICT BOAT, LOOKING UPSTREAM

DIXONS POND DAM



15 MAY 1979

OVERVIEW FROM UPSTREAM NORTHEAST SHORE LOOKING DOWNSTREAM



15 MAY 1979

SEEPAGE AT TOE BETWEEN SPILLWAY AND LEFT ABUTMENT



15 MAY 1979

VIEW DOWNSTREAM FROM SERVICE BRIDGE



15 MAY 1979

VIEW DOWN ON SPILLWAY FACE FROM SERVICE BRIDGE TOWARD RIGHT ABUTMENT. NOTE DEBRIS.



15 MAY 1979

RIGHT ABUTMENT OF SERVICE BRIDGE



15 MAY 1979

RETAINING WALL ON UPSTREAM SIDE OF
EMBANKMENT LEADING TO RIGHT OF SPILLWAY

DIXONS POND DAM



15 MAY 1979

ACCESS ROAD LEADING TO RIGHT ABUTMENT



15 MAY 1979

VIEW OF POND FROM SERVICE BRIDGE LOOKING UPSTREAM



15 MAY 1979

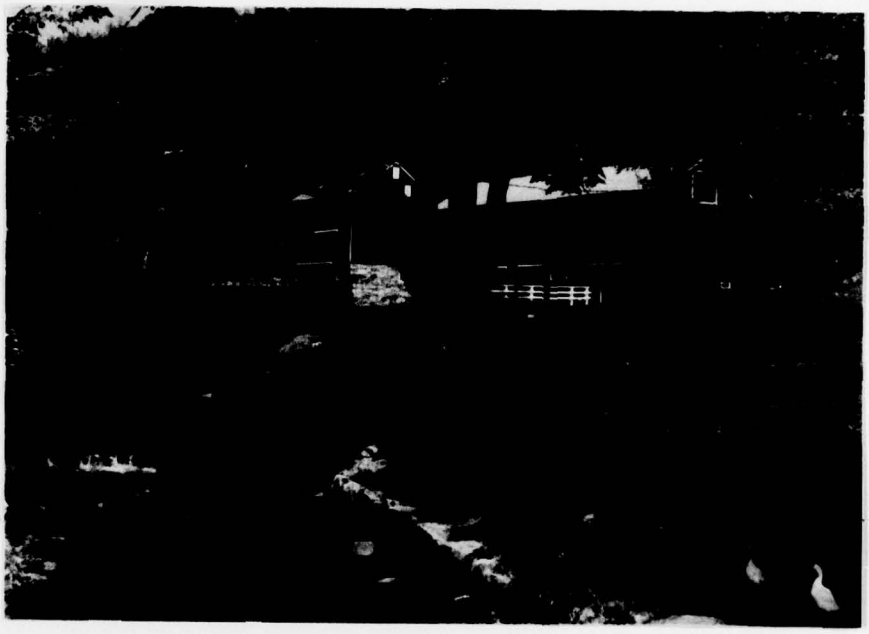
DAM 700 FEET DOWNSTREAM OF DIXONS POND DAM



15 MAY 1979

RESIDENCE ADJACENT TO OUTLET STREAM OF DIXONS POND DAM

DIXONS POND DAM



15 MAY 1979

DAM AND ADJACENT STRUCTURES 1200 FEET
DOWNSTREAM OF DIXONS POND DAM

APPENDIX 3

HYDROLOGIC COMPUTATIONS

DIXONS POND DAM

Anderson-Nichols & Company, Inc.

Subject DIXONS POND DAM

Sheet No. 1 of 14
Date 4/1179
Computed LFS
Checked EDD

JOB NO. 229-02

SQUARES 1/4 IN. SCALE

HYDROLOGIC COMPUTATIONS

NAME: DIXONS POND DAM

LOCATION: MORRIS COUNTY, NJ

DRAINAGE AREA: 2.9 SQ MILES

SURFACE AREA (NORMAL POOL): 29.4 ACRES

EVALUATION CRITERIA: SIZE: SMALL
HAZARD: HIGH

SPILLWAY DESIGN FLOOD: BASED ON SIZE AND HAZARD CLASSIFICATION, THE SPILLWAY DESIGN FLOOD WILL BE THE 1/2 PMF (ONE HALF THE PROBABLE MAXIMUM FLOOD)

Anderson-Nichols & Company, Inc.

Subject DIXONS POND
TC

Sheet No. 2 of 14
Date 5-3-91
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JOB NO. 2290-08

SQUARES 1/4 IN. SCALE

DETERMINE TIME OF CONCENTRATION

① TAKE OVERLAND FLOW FROM FARTHEST POINT TO UNNAMED STREAM
1300' long with head of 90'

Ⓐ BY KIRPICH NOMOGRAPH Tc = 5.5 mins

Ⓑ BY IZZARDS FORMULA

$$Tc = \frac{L^{1.115}}{(7700)(H^{.38})} = \frac{1300^{1.115}}{(7700)(90^{.38})} = .070 \text{ hrs} = 4.2 \text{ mins}$$

where L = length (ft)
H = head (ft)

Ⓒ BY CALIFORNIA CULVERT EQUATION
p.71 DESIGN OF SMALL DAMS

$$Tc = \left(\frac{11.9 L^3}{H}\right)^{.385} = \left[\frac{(11.9)(.246)^3}{90}\right]^{.385} = .090 \text{ hrs} = 5.4 \text{ m}$$

where L = length (mi.)
H = head (ft)

Ⓓ BY WESTON FORMULA
(velocity derived from TEXAS HIGHWAY TABLE p.70 DES. SN OF ST

$$Tc = \frac{L}{3600 V} = \frac{1300}{(3600)(2.5)} = 8.6 \text{ mins}$$

where L = length (ft)
V = velocity (ft/sec)

AVERAGE Tc = 6 mins

Anderson-Nichols & Company, Inc.

JOB NO. 3290-08

Subject DIXONS POND
TC

Sheet No. 3 of 1A
Date 5/7/79
Computed K.T.E.
Checked

SQUARES 1/4 IN. SCALE

(2) 2EACH 1

Length 8700
head 240

(A) KIRPICH NOMOGRAPH T_c = 34.5 mins

(B) IZZARDS FORMULA

$$T_c = \frac{L^{1.115}}{(7700)(H^{.38})} = \frac{8700^{1.115}}{(7700)(240^{.38})} = .40 \text{ hrs} = 24 \text{ min.}$$

(C) BY CALIFORNIA CULVERT EQUATON

$$T_c = \left(\frac{11.9L^3}{H}\right)^{.385} = \left[\frac{(11.9)(1.65)^3}{240}\right]^{.385} = .56 \text{ hrs} = 33.7 \text{ mins}$$

(D) BY WESTON FORMULA
velocity derived from U.S. NAVY TABLE P.70 DESIGN OF SM. DAMS

$$T_c = \frac{L}{3600V} = \frac{8700}{(3600)(3)} = .80 \text{ hrs} = 48.3 \text{ mins}$$

AVERAGE T_c = 35 mins

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Subject DIXON'S POND
TC

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JOB NO. 3290-08

③ REACH 2
INCLUDES LENGTH OF POND
L = 5850'
H = 20'

Ⓐ BY KIRPICH NOMOGRAPH T_C = 56 mins

B. BY IZZARDS FORMULA
WHERE L = LENGTH (FT), H = HEAD (FT)

$$T_C = \frac{L^{1.115}}{(7700)(H^{.38})} = \frac{5850^{1.115}}{(7700)(20^{.38})} = .66 \text{ HRS} = 39.6 \text{ MINS}$$

Ⓒ CALIFORNIA CULVERT EQUATION

$$T_C = \left[\frac{11.9 L^3}{H}\right]^{.385} = \left[\frac{(11.9)(1.108)^3}{20}\right]^{.385} = .92 \text{ hrs} = 55.2 \text{ mins}$$

WHERE L = LENGTH (MI), H = HEAD (FT)

Ⓓ BY WESTON FORMULA
(velocity derived from TEXAS HIGHWAY TABLE p.70 DESIGN SM. DRN.
L = LENGTH (FT)

$$T_C = \frac{L}{3600V} = \frac{5850}{(3600)(3)} = .54 \text{ hrs} = 32.4 \text{ mins}$$

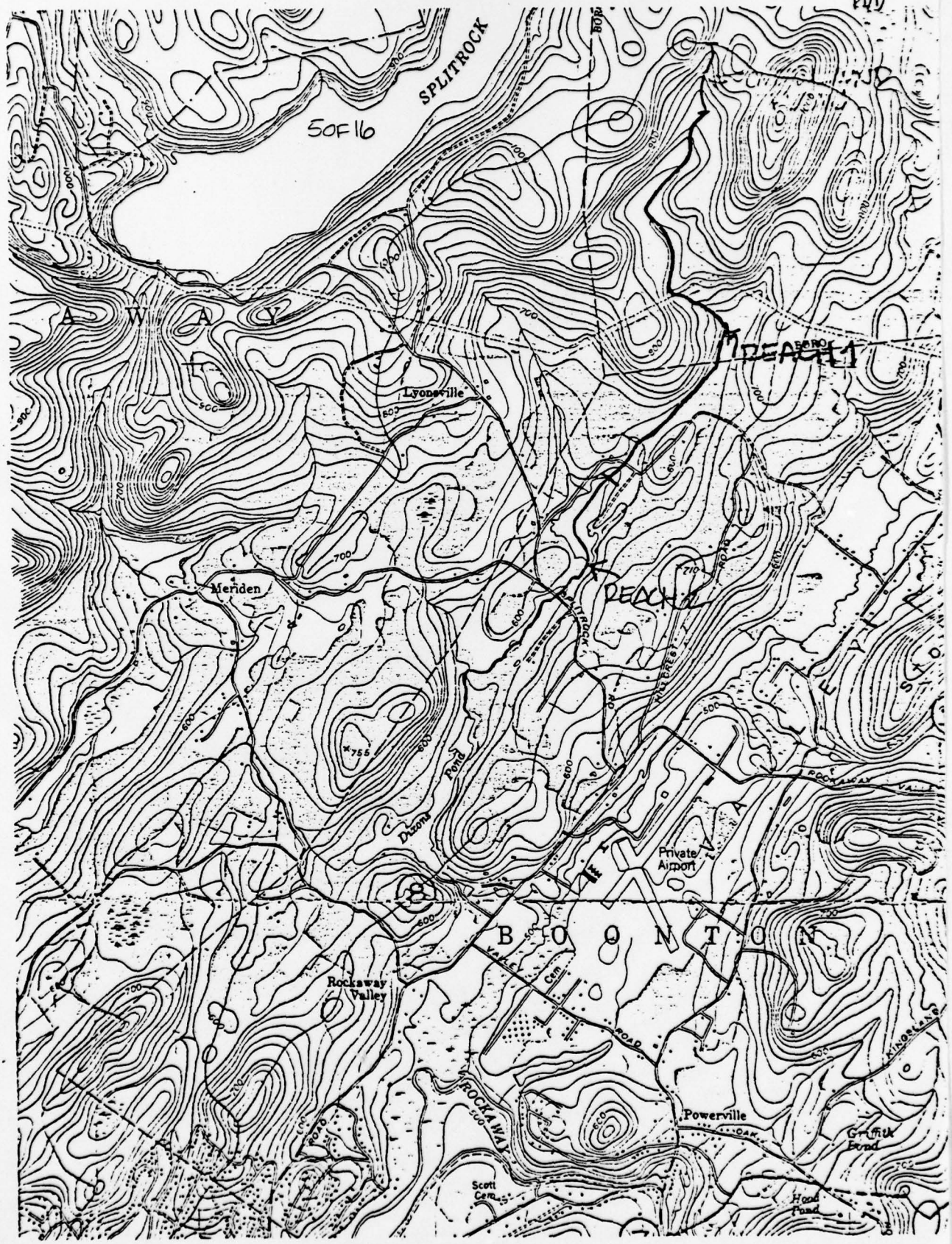
AVERAGE $T_C = (56 + 39.6 + 55.2 + 32.4) \div 4 = 45.8$ mins

TOTAL $T_C = 45.8 + 35 = 80.8$

LAG = $(T_C)(.6) = (80.8)(.6) = 48.5$ mins = .81 hrs

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6/11/79
DP
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Subject DIXONS POND DAM

Sheet No. 6 of 14
Date 6/1/79
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JOB NO. 3290-03

SQUARES 1/4 IN. SCALE 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

DEVELOPMENT OF RATING CURVE

① SPILLWAY CURVE
- A. COMPUTE Q USING WEIR FLOW EQUATION ($Q=CLH^{3/2}$) TO BEAM, THEN PRESSURE FLOW ($Q=CA\sqrt{2gh}$) TO DECK, THEN WEIR FLOW EQUATION
- B. TOOK C FROM "HANDBOOK OF HYDRAULICS" KING & BRATER
- C. EFFECTIVE LENGTH SPILLWAY = 70 ft
- D. COEFFICIENTS; WEIR: 3.4
  ORIFICE: .66
- E. AREA UNDER BRIDGE = 143.5
- F. H = HEAD (FT)

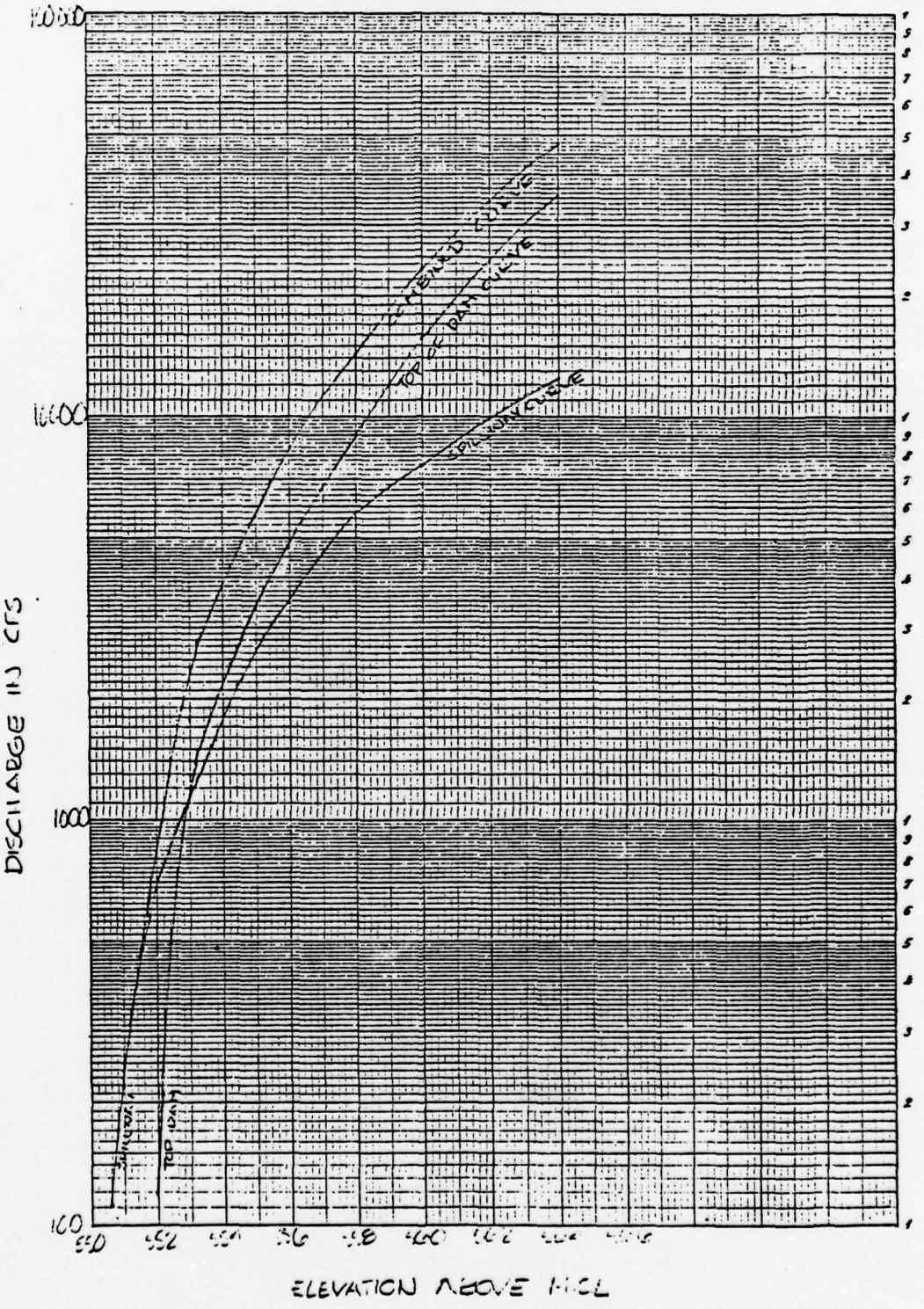
② TOP DAM CURVE
- A. COMPUTE Q USING WEIR FLOW EQUATION ($Q=CLH^{3/2}$)
- B. COEFFICIENT = 2.8

ELEVATION FT.	SPILLWAY		TOP DAM			COMBINED
	HEAD FT.	Q CFS	HEAD FT.	LENGTH FT.	Q CFS	Q CFS
550	0	0				0
551.55	1.55	459	0	142	0	459
551.75	1.75	551	.2	142	36	587
552	2.0	673	.45	142	120	793
552.2	2.2	777	.65	142	208	985
552.6	2.6	899	1.05	152	458	1357
553	3.0	1020	1.45	154	753	1773
553.2	3.2	1362	2.15	156	1377	2739
555	5.0	2661	3.45	170	3050	5711
555.35	5.35	2945	3.8	174	3609	6554
555.5	5.5	3070	3.95	176	3869	6939
556	6.0	3498	4.45	182	4784	8282
558	8.0	5385	6.45	193	8852	14237
560	10.0	7276	8.45	228	15931	23207
562	12.0	9194	10.45	258	24704	33898
564	14.0	11167	12.45	288	35725	47892
566	16.0	13232	14.45	318	48909	64141

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7 OF 14
KATE
6/11/77
FDD

DIXONS POND DAM
COMBINED RATING CURVE
2290-03



NO. 3118-H. 20 DIVISIONS PER INCH (120 DIVISIONS) BY 3 5-INCH CYCLES RATIO RULING. KEUFFEL & ESSER CO. GRAPH PAPER. IN STOCK DIRECT FROM CODES BOOK CO., NORWOOD, MASS. 02062. PRINTED IN U.S.A.

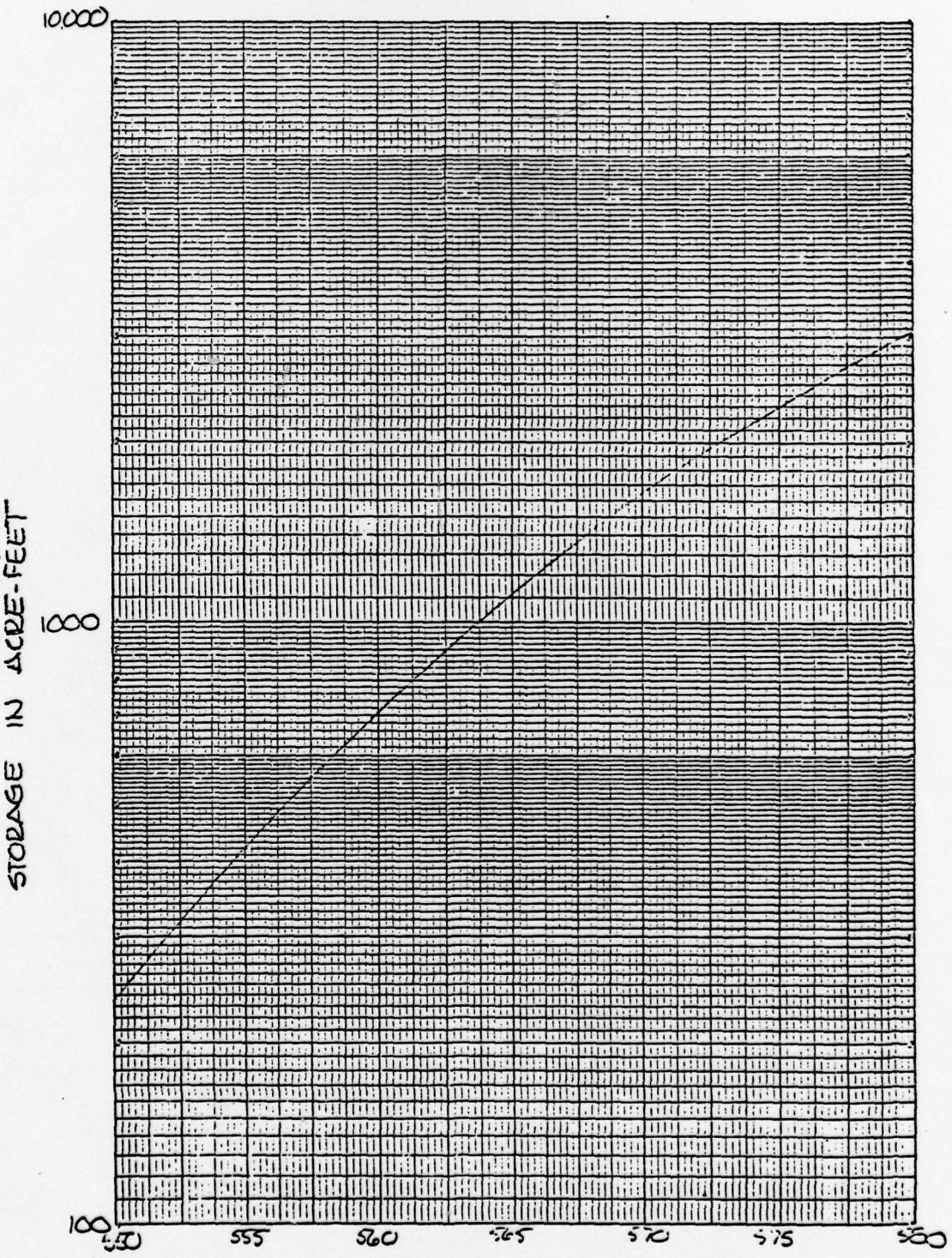
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JOB NO. 3290-08

DIXONS POND DAM
STORAGE ELEVATION CURVE
3290-05

Sheet No. 9 of 14
Date 1/28/09
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Subject DIXONS POND DAM

Sheet No. 10 of 14

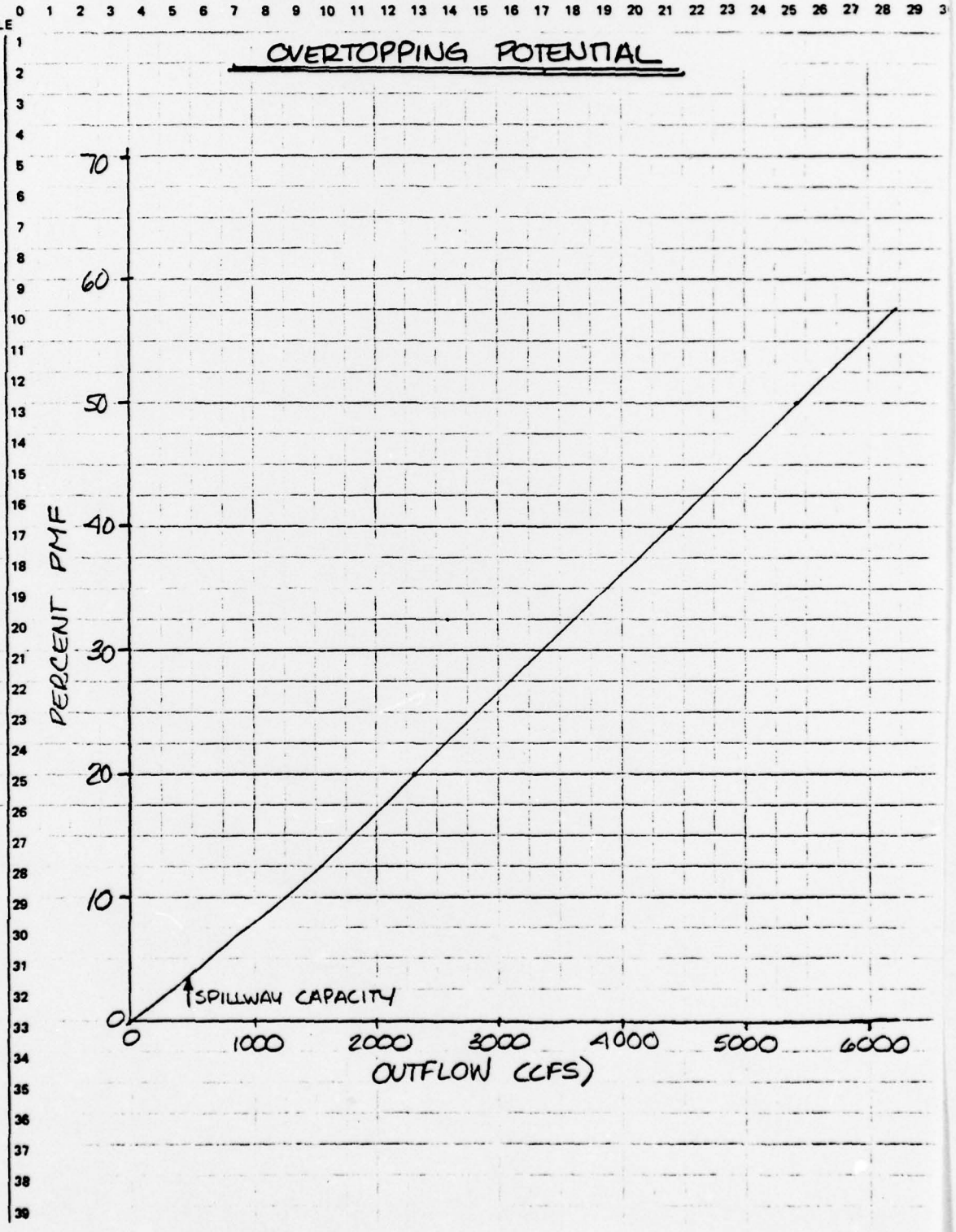
Date

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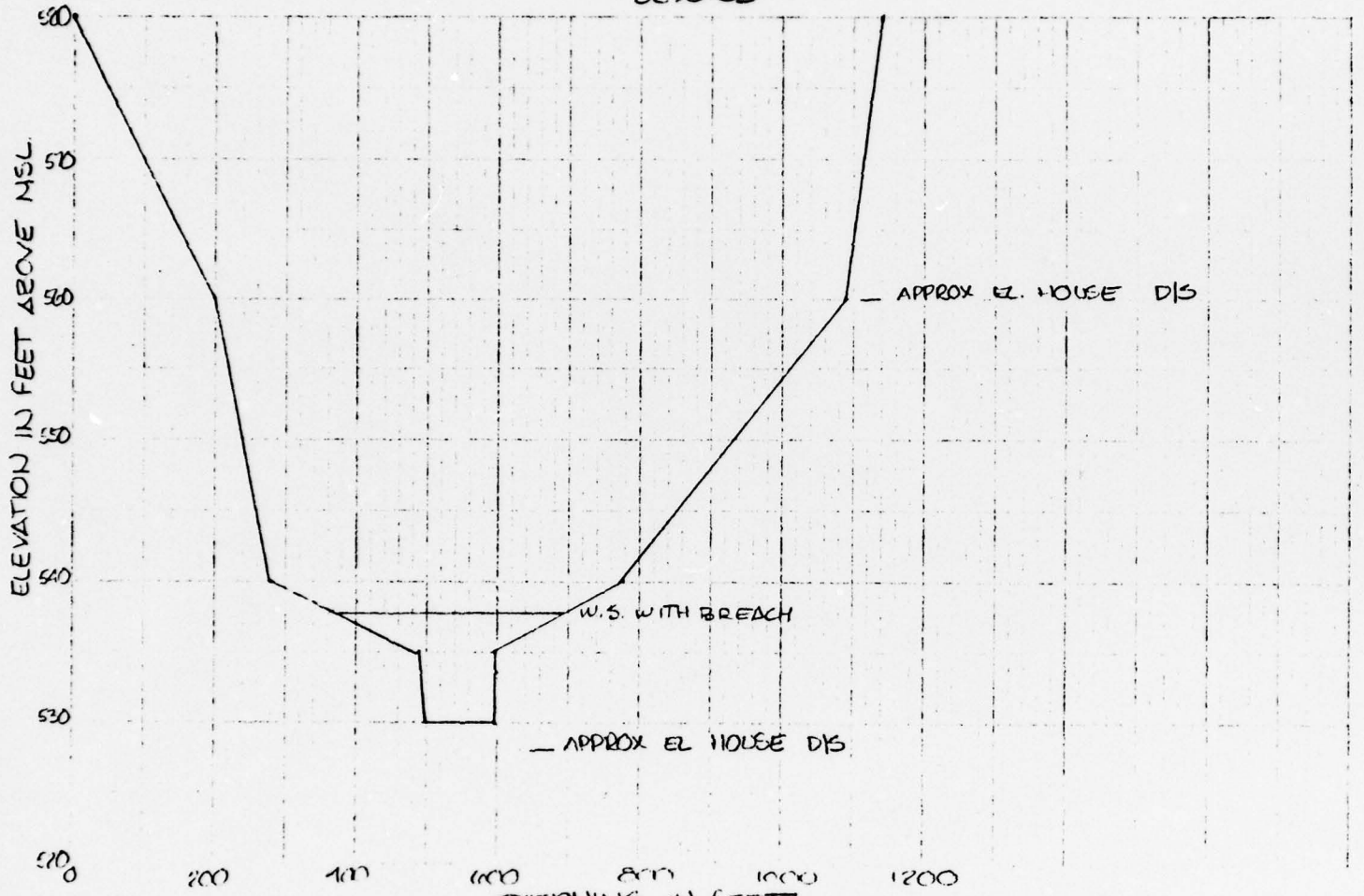
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JOB NO. 3290-03

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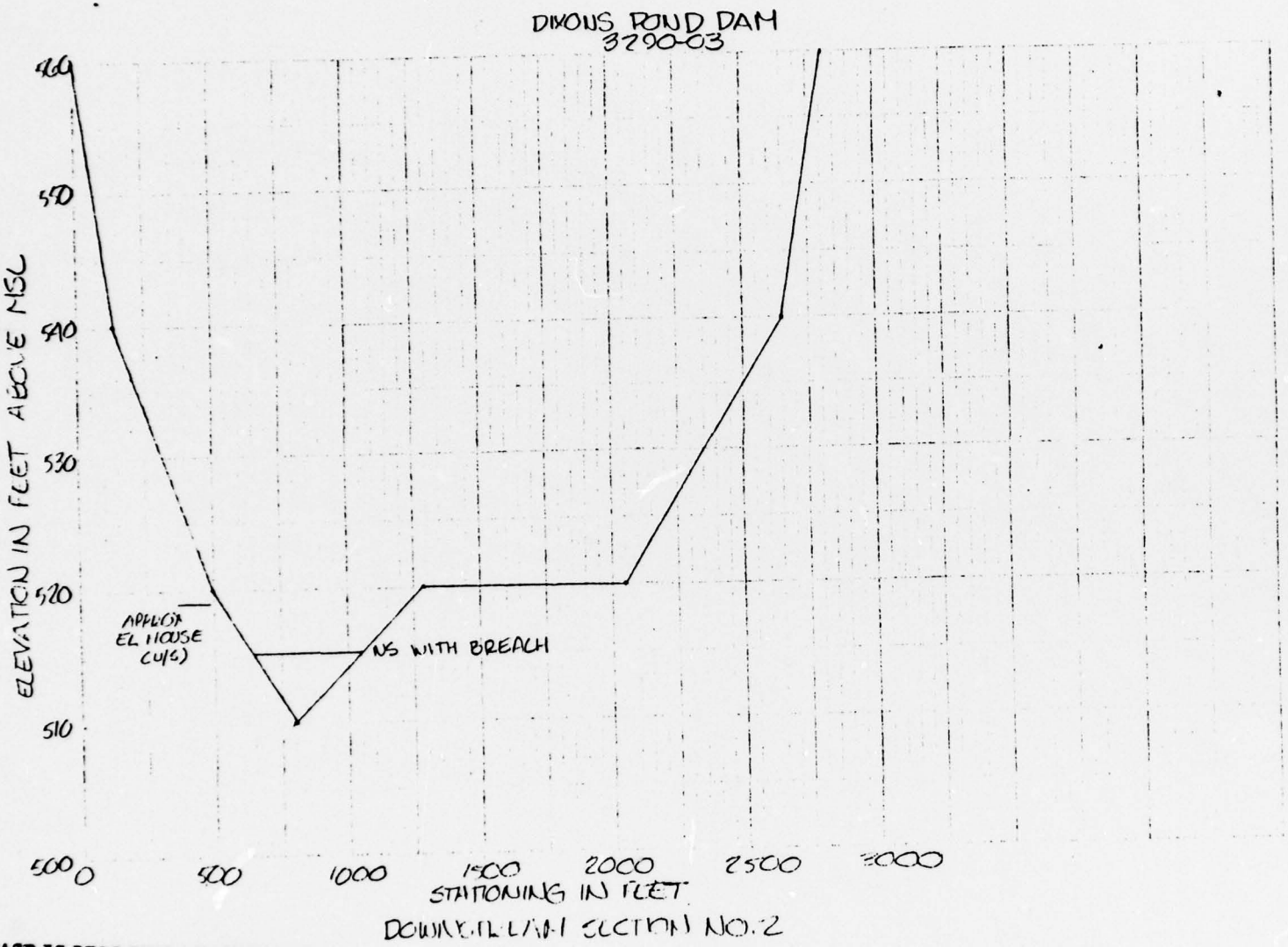


DIXONS POND DAM
3290-03



DOWNSTREAM CROSS SECTION-1

11 OF 14
7.3.15
KATE



12 OF 14
6/11/75
KATE
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Subject DIXONS POND DAM

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Date
Computed
Checked FCD

JOB NO. 3290-03

DETERMINATION OF "C" FOR BLOW-OFF PIPE

$$C_p = A_p \sqrt{\frac{29}{1 + K_t + K_e L_p}}$$

FROM S&W CONSTRUCTION ENGINEERING p. 641

TAKE N = .017 (p. 632 TABLE 61)

$$K_e = \frac{5087\, n^2}{D^{4/3}} = \frac{(5087)(.017)^2}{20^{4/3}} = .030$$

$$C_p = A_p \sqrt{\frac{64.4}{1 + K_t + K_e L_p}}$$

WHERE K_t = ENTRANCE LOSS = .8 (p. 639)
L = LENGTH = 29.7'

$$= 2.18 \sqrt{\frac{64.4}{1 + .8 + (.03)(29.7)}}$$

$$= 2.18 \sqrt{23.9}$$

$$= 10.66$$

$\therefore C = .61$

Anderson-Nichols & Company, Inc.

Subject DYONS POND DAM

Sheet No. 14 of 14
Date 6/7/79
Computed LHE
Checked EDD

JOB NO. 3290-03

DRAWDOWN CALCULATIONS

CALCULATIONS ASSUME ① NO SIGNIFICANT INFLOW
② LOW LEVEL OUTLET TO BE OPERABLE

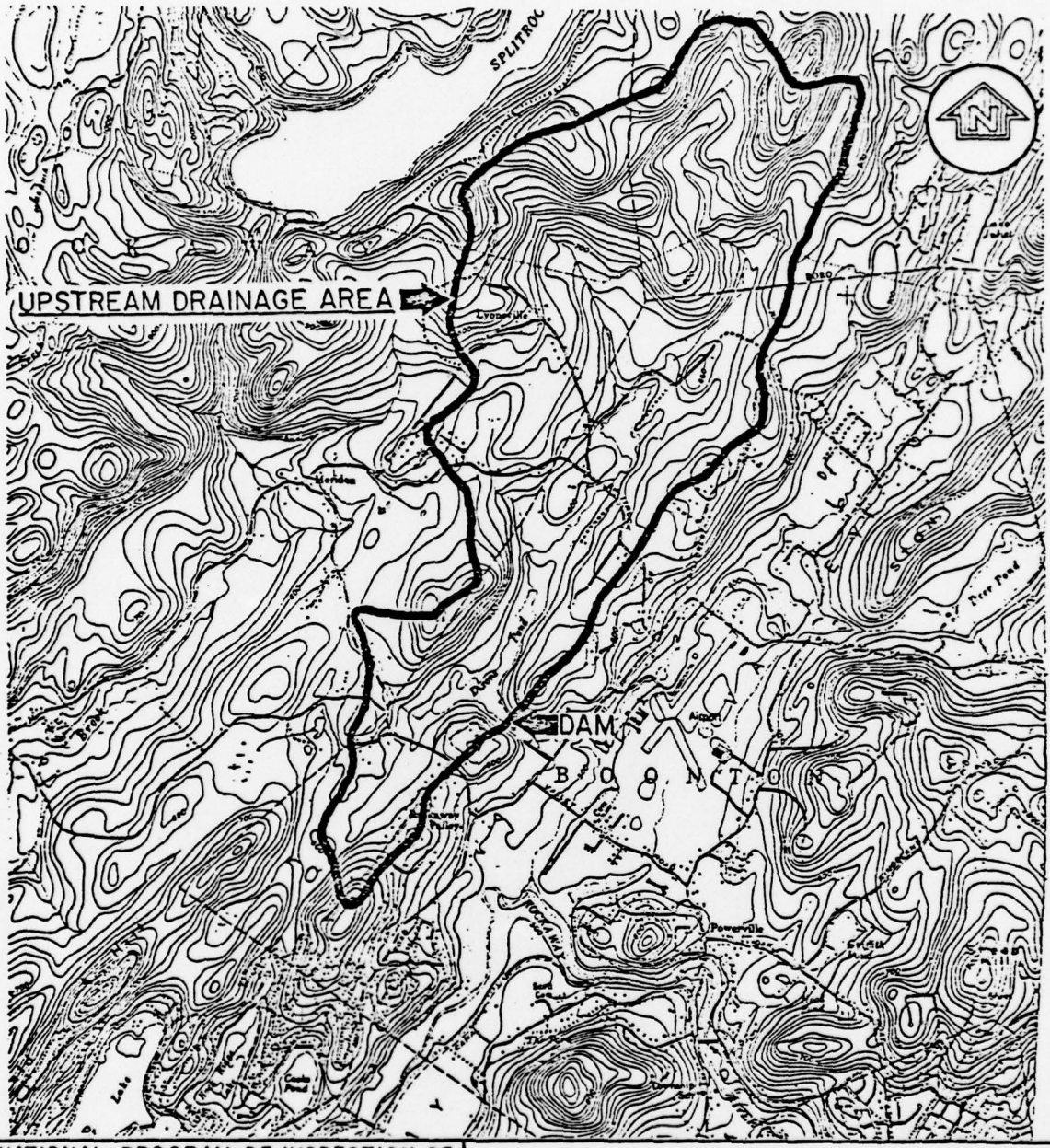
ELEV. FT	STORAGE AC-FT	Δ STORAGE AC-FT	H FT	Q CFS	AVG Q CFS	AC-FT/DAY *	DAYS *
550	235		5.2	24			
		15			23.5	46.6	.32
549.5	220		4.7	23			
		15			22.5	44.6	.34
549	205		4.2	22			
		15			21.5	42.6	.35
548.5	190		3.7	21			
		18			20	40	.45
548	172		3.2	19			
		19			18.5	37	.51
547.5	153		2.7	18			
		20			17	34	.59
547	133		2.2	16			
		21			15	30	.70
546.5	112		1.7	14			
		28			13	26	1.1
546	84		1.2	12			
		28			10.5	21	1.3
545.5	56		.7	9			
		22			7	14	3.1
545	34		.2	5			
		34			2.5	5	6.8
544.8	0		0	0			15.56

$Q_p = C_p H^{1/2} = 10.66 (H^{1/2})$ SEE PREVIOUS PAGE

*NOTE: AC-FT/DAY = 1.9835 × AVG. Q
DAYS = ΔS / AC-FT/DAY

TOTAL = 15.56 DAYS

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NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

DIXONS POND DAM
BOONTON TOWNSHIP, NEW JERSEY

REGIONAL VICINITY MAP

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

ANDERSON-NICHOLS & CO., INC. BOSTON, MA

SCALE IN MILES

0 1/2 1 2

MAP BASED ON U.S.G.S. 7.5 MINUTE QUADRANGLE SHEET. BOONTON, N.J., 1954, UPDATED 1970.

HEC-1 OUTPUT

OVERTOPPING ANALYSIS

DIXONS POND DAM

DIXONS

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION  JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
     1              A1 DIXONS LAKE DAM  OVERTOPPING ANALYSIS ****SK.DOHERTY ANDERSON NICHOLS ****
     2              A2 NEW JERSEY DAM NUMBER 25-82
     3              A3   1.0 MULTIPLE OF PMF FROM 24-HOUR   PMF -PREACH ANALYSIS-
     4              D   120       0      10       0       0       0       0       0       0       0
     5              B1     5
     6              J     1       3       1
     7              J1   0.2     0.5     1.0
     8              K     0      A1                                      0       1
     9              K1  DEVELOP INFLOW HYDROGRAPH
    10              M     1       2     2.9                                                       1
    11              P            22.5     113.    122.    132.
    12              T                                                    1      .1
    13              W2           .81
    14              X    -3.
    15              K     1      A2                                      0       1
    16              K1 ROUTE INFLOW HYDROGRAPH THROUGH IMPOUNDMENT
    17              Y                                    1       1
    18              Y1    1                                                235      -1
    19              Y4  550.   550.2   550.6   551.2  551.75    552.    552.2   552.6    553.   552.2
    20              Y4  555.  555.35   555.5    556.    558.    560.    562.    564.
    21              Y5    0      22.     110.    313.    566.    793.    985.   1357.   1773.   2739.
    22              Y9 3711.   5554.   6939.   8282.  14237.  23207.  34290.  47892.
    23              $S    0     235.    250.    267.    284.    300.    318.    337.    356.    377.
    24              $S  421.    470.    570.    705.    855.   1000.
    25              $E  542.    550.   550.5    551.   551.5    552.   552.5    553.   553.5    554.
    26              $E  555.    556.    558.    560.    562.    564.
    27              $$  550.
    28              $D 551.6
    29              $B   32       1     542       1     550   554.6
    30              K     1      A3                                      1       1
    31              K1 CHANNEL ROUTING -MOD PULS- CHANNEL REACH 1
    32              Y                                    1       1
    33              Y1    1
    34              Y6  .08     .04     .06     530.    520.    590.    .034
    35              Y7    0     550.     60.     540.    270.    535.    280.    530.    380.    530.
    36              Y7  390.    535.    560.    540.    715.    550.
    37              K     1      A4                                      1       1
    38              K1 CHANNEL ROUTING -MOD PULS- CHANNEL REACH 2
    39              Y                                    1       1
    40              Y1    1
    41              Y6  .06     .04     .06     510.    520.    740.    .027
    42              Y7    0     520.     80.     517.    150.    515.    300.    510.    540.    515.
    43              Y7  540.    517.    790.    520.   790.1    520.
    44              K    99
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	A1
ROUTE HYDROGRAPH TO	A2
ROUTE HYDROGRAPH TO	A3
ROUTE HYDROGRAPH TO	A4
END OF NETWORK	

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DIXONS LAKE DAM  OVERTOPPING ANALYSIS ******.DOHERTY ANDERSON NICHOLS ****
NEW JERSEY DAM NUMBER 25-82
  1.0 MULTIPLE OF PMF FROM 24-HOUR   PMP -BREACH ANALYSIS-

                              JOB SPECIFICATION
      NQ     NHR     NMIN     IDAY     IHR     IMIN    METRC    IPLT    IPRT   NSTAN
     120       0       10        0       0        0        0       0       0       0
                                JOPER      NWT    LROPT    TRACE
                                    5        0        0        0

                          MULTI-PLAN ANALYSES TO BE PERFORMED
                              NPLAN= 1 NRTIO= 3 LRTIO= 1
          RTIOS=     .20     .50    1.00

**********          **********          **********          **********          **********

                          SUB-AREA RUNOFF COMPUTATION

     DEVELOP INFLOW-HYDROGRAPH

                         ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                           A1       0       0       0       0       0       1       0       0

                                HYDROGRAPH DATA
          IHYDG     IUHG    TAREA    SNAP   TRSDA   TRSPC   RATIO  ISNOW   ISAME   LOCAL
              1        2     2.90    0.00    2.90     .80   0.000      0       1       0

                                  PRECIP DATA
                    SPFE     PMS      R6      R12     P24     R48     R72     R96
                    0.00   22.50  113.00  122.00  132.00    0.00    0.00    0.00

                                  LOSS DATA
     LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                0.00    0.00    1.00    0.00    0.00    1.00    1.00     .10    0.00    0.00

                              UNIT HYDROGRAPH DATA
                         TC=   0.00    LAG=   .81

                                RECESSION DATA
                         STRTQ=   -3.00    QRCSN=    0.00    RTIOR= 1.00

     UNIT HYDROGRAPH 24 END OF PERIOD ORDINATES, TC=    0.00 HOURS, LAG=   .81  VOL= 1.00
    142.    435.    915.   1369.   1567.   1534.   1341.   1078.    754.    550.
    409.    306.    222.    165.    121.     89.     66.     49.     36.     27.
     20.     15.     12.      8.      5.      2.
```

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END-OF-PERIOD FLOW

YR,DA	HR,MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	PO,DA	HR,MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.10	1	.02	0.00	.02	0.	1.01	12:10	73	.34	.32	.02	368.
1.01	.20	2	.02	0.00	.02	0.	1.01	12:20	74	.34	.32	.02	496.
1.01	.30	3	.02	0.00	.02	0.	1.01	12:30	75	.34	.32	.02	765.
1.01	.40	4	.02	0.00	.02	0.	1.01	12:40	76	.34	.32	.02	1167.
1.01	.50	5	.02	0.00	.02	0.	1.01	12:50	77	.34	.32	.02	1624.
1.01	1.00	6	.02	0.00	.02	0.	1.01	13:00	78	.34	.32	.02	2075.
1.01	1.10	7	.02	0.00	.02	0.	1.01	13:10	79	.41	.39	.02	2478.
1.01	1.20	8	.02	0.00	.02	0.	1.01	13:20	80	.41	.39	.02	2825.
1.01	1.30	9	.02	0.00	.02	0.	1.01	13:30	81	.41	.39	.02	3109.
1.01	1.40	10	.02	0.00	.02	0.	1.01	13:40	82	.41	.39	.02	3363.
1.01	1.50	11	.02	0.00	.02	0.	1.01	13:50	83	.41	.39	.02	3585.
1.01	2.00	12	.02	0.00	.02	0.	1.01	14:00	84	.41	.39	.02	3783.
1.01	2.10	13	.02	0.00	.02	0.	1.01	14:10	85	.51	.49	.02	3954.
1.01	2.20	14	.02	0.00	.02	0.	1.01	14:20	86	.51	.49	.02	4120.
1.01	2.30	15	.02	0.00	.02	0.	1.01	14:30	87	.51	.49	.02	4299.
1.01	2.40	16	.02	0.00	.02	0.	1.01	14:40	88	.51	.49	.02	4502.
1.01	2.50	17	.02	0.00	.02	0.	1.01	14:50	89	.51	.49	.02	4707.
1.01	3.00	18	.02	0.00	.02	0.	1.01	15:00	90	.51	.49	.02	4892.
1.01	3.10	19	.02	0.00	.02	0.	1.01	15:10	91	.46	.45	.02	5054.
1.01	3.20	20	.02	0.00	.02	0.	1.01	15:20	92	.77	.76	.02	5207.
1.01	3.30	21	.02	0.00	.02	0.	1.01	15:30	93	1.39	1.37	.02	5479.
1.01	3.40	22	.02	0.00	.02	0.	1.01	15:40	94	3.48	3.46	.02	6333.
1.01	3.50	23	.02	0.00	.02	0.	1.01	15:50	95	1.00	.98	.02	7158.
1.01	4.00	24	.02	0.00	.02	0.	1.01	16:00	96	.62	.60	.02	9526.
1.01	4.10	25	.02	0.00	.02	0.	1.01	16:10	97	.47	.46	.02	11730.
1.01	4.20	26	.02	0.00	.02	0.	1.01	16:20	98	.47	.46	.02	12521.
1.01	4.30	27	.02	0.00	.02	0.	1.01	16:30	99	.47	.46	.02	12553.
1.01	4.40	28	.02	0.00	.02	0.	1.01	16:40	100	.47	.46	.02	11445.
1.01	4.50	29	.02	0.00	.02	0.	1.01	16:50	101	.47	.46	.02	10167.
1.01	5.00	30	.02	0.00	.02	0.	1.01	17:00	102	.47	.46	.02	8814.
1.01	5.10	31	.02	0.00	.02	0.	1.01	17:10	103	.37	.36	.02	7614.
1.01	5.20	32	.02	0.00	.02	0.	1.01	17:20	104	.37	.36	.02	7072.
1.01	5.30	33	.02	0.00	.02	0.	1.01	17:30	105	.37	.36	.02	6471.
1.01	5.40	34	.02	0.00	.02	0.	1.01	17:40	106	.37	.36	.02	5939.
1.01	5.50	35	.02	0.00	.02	0.	1.01	17:50	107	.37	.36	.02	5498.
1.01	6.00	36	.02	0.00	.02	0.	1.01	18:00	108	.37	.36	.02	5136.
1.01	6.10	37	.05	0.00	.05	0.	1.01	18:10	109	.03	.01	.02	4790.
1.01	6.20	38	.05	0.00	.05	0.	1.01	18:20	110	.03	.01	.02	4420.
1.01	6.30	39	.05	0.00	.05	0.	1.01	18:30	111	.03	.01	.02	3947.
1.01	6.40	40	.05	0.00	.05	0.	1.01	18:40	112	.03	.01	.02	3361.
1.01	6.50	41	.05	0.00	.05	0.	1.01	18:50	113	.03	.01	.02	2739.
1.01	7.00	42	.05	0.00	.05	0.	1.01	19:00	114	.02	.01	.02	2149.
1.01	7.10	43	.05	.02	.02	12.	1.01	19:10	115	.03	.01	.02	1644.
1.01	7.20	44	.05	.03	.02	22.	1.01	19:20	116	.03	.01	.02	1239.
1.01	7.30	45	.05	.03	.02	41.	1.01	19:30	117	.03	.01	.02	952.
1.01	7.40	46	.05	.03	.02	81.	1.01	19:40	118	.03	.01	.02	748.
1.01	7.50	47	.05	.03	.02	124.	1.01	19:50	119	.03	.01	.02	588.
1.01	8.00	48	.05	.03	.02	168.	1.01	20:00	120	.03	.01	.02	463.
1.01	8.10	49	.05	.03	.02	207.	0.00	0:00	121	.03	.01	.02	374.
1.01	8.20	50	.05	.03	.02	239.	0.00	0:00	122	.03	.01	.02	316.
1.01	8.30	51	.05	.03	.02	262.	0.00	0:00	123	.03	.01	.02	276.
1.01	8.40	52	.05	.03	.02	279.	0.00	0:00	124	.03	.01	.02	244.
1.01	8.50	53	.05	.03	.02	292.	0.00	0:00	125	.03	.01	.02	220.
1.01	9.00	54	.05	.03	.02	301.	0.00	0:00	126	.03	.01	.02	202.
1.01	9.10	55	.05	.03	.02	308.	0.00	0:00	127	.03	.01	.02	189.
1.01	9.20	56	.05	.03	.02	313.	0.00	0:00	128	.03	.01	.02	180.
1.01	9.30	57	.05	.03	.02	317.	0.00	0:00	129	.03	.01	.02	173.
1.01	9.40	58	.05	.03	.02	319.	0.00	0:00	130	.03	.01	.02	169.
1.01	9.50	59	.05	.03	.02	321.	0.00	0:00	131	.03	.01	.02	164.
1.01	10.00	60	.05	.03	.02	323.	0.00	0:00	132	.03	.01	.02	161.
1.01	10.10	61	.05	.03	.02	324.	0.00	0:00	133	.03	.01	.02	159.
1.01	10.20	62	.05	.03	.02	325.	0.00	0:00	134	.03	.01	.02	158.
1.01	10.30	63	.05	.03	.02	326.	0.00	0:00	135	.03	.01	.02	158.
1.01	10.40	64	.05	.03	.02	326.	0.00	0:00	136	.03	.01	.02	158.
1.01	10.50	65	.05	.03	.02	326.	0.00	0:00	137	.03	.01	.02	158.
1.01	11.00	66	.05	.03	.02	327.	0.00	0:00	138	.03	.01	.02	158.
1.01	11.10	67	.05	.03	.02	327.	0.00	0:00	139	.03	.01	.02	158.
1.01	11.20	68	.05	.03	.02	327.	0.00	0:00	140	.03	.01	.02	158.
1.01	11.30	69	.05	.03	.02	327.	0.00	0:00	141	.03	.01	.02	158.
1.01	11.40	70	.05	.03	.02	327.	0.00	0:00	142	.03	.01	.02	158.
1.01	11.50	71	.05	.03	.02	327.	0.00	0:00	143	.03	.01	.02	158.
1.01	12.00	72	.05	.03	.02	327.	0.00	0:00	144	.03	.01	.02	158.

SUM 23.76 21.84 2.76 236775.

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HYDROGRAPH AT STA A1 FOR PLAN 1, PTIC 2

4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	11.	23.	41.	62.	84.	103.	119.	
131.	140.	146.	151.	154.	156.	158.	160.	161.	161.	
162.	162.	163.	163.	163.	163.	163.	163.	163.	163.	
163.	163.	184.	248.	383.	583.	812.	1038.	1240.	1413.	
1555.	1682.	1785.	1892.	1977.	2060.	2150.	2251.	2354.	2449.	
2527.	2604.	2740.	3166.	3929.	4964.	5965.	6260.	6177.	5722.	
5093.	4407.	3907.	3536.	3235.	2969.	2749.	2565.	2395.	2210.	
1973.	1680.	1378.	1075.	822.	620.	476.	370.	290.	230.	
189.	160.	138.	122.	110.	101.	95.	90.	87.	84.	
82.	80.	80.	79.	79.	79.	79.	79.	75.	79.	
79.	79.	79.	79.							

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6260.	2942.	822.	822.	11F340.
CMS	177.	83.	23.	23.	3351.
INCHES		9.44	10.54	10.54	10.54
MM		239.71	267.83	267.83	267.83
AC-FT		1459.	1630.	1630.	1630.
THOUS CU M		1800.	2011.	2011.	2011.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE INFLOW HYDROGRAPH THROUGH IMPOUNDMENT

ISTAO	JCOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A2	1	0	0	0	0	1	0	0.

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	235.	-1

STAGE	550.00	550.20	550.60	551.20	551.75	552.00	552.20	552.60	553.00	553.20
	555.00	555.35	555.50	556.00	558.00	560.00	562.00	564.00		
FLOW	0.00	22.00	110.00	313.00	566.00	793.00	985.00	1357.00	1773.00	2739.00
	5711.00	6554.00	6939.00	8202.00	14237.00	23207.00	34290.00	47892.00		
CAPACITY=	0.	235.	250.	267.	284.	300.	318.	337.	356.	377.
	421.	470.	570.	705.	855.	1000.				
ELEVATION=	542.	550.	551.	551.	552.	552.	553.	553.	554.	554.
	555.	556.	558.	560.	562.	564.				

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
550.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
551.6	0.0	0.0	0.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
32.	1.00	542.00	1.00	550.00	554.60

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STATION A24 PLAN 1A RATIO 2

BEGIN DAM FAILURE AT 16.33 HOURS

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	1.	1.	1.	1.	1.	1.	2.	2.
2.	2.	2.	2.	2.	2.	2.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	5.	6.	8.	11.	15.	20.
28.	38.	48.	58.	67.	75.	83.	90.	96.	102.
107.	112.	119.	124.	129.	134.	137.	141.	144.	146.
148.	150.	153.	161.	181.	220.	281.	360.	513.	736.
971.	1167.	1336.	1495.	1634.	1756.	2040.	2190.	2295.	2394.
2482.	2560.	2604.	2835.	3163.	3716.	4426.	5099.	6334.	6640.
6597.	6263.	5871.	5327.	4405.	3866.	3534.	3253.	3019.	2799.
2619.	2440.	2240.	2025.	1807.	1597.	1404.	1232.	1082.	952.
838.	743.	661.	591.	530.	479.	423.	395.	361.	331.
306.	283.	263.	245.	230.	216.	204.	193.	183.	174.
166.	159.	153.	147.						

STORAGE

235.	235.	235.	235.	235.	235.	235.	235.	235.	235.
236.	236.	236.	236.	236.	236.	236.	236.	236.	236.
236.	236.	236.	236.	236.	236.	236.	236.	236.	236.
236.	236.	236.	236.	236.	236.	236.	236.	236.	236.
236.	236.	236.	236.	236.	237.	237.	238.	239.	240.
242.	243.	245.	246.	247.	248.	249.	250.	251.	252.
253.	254.	254.	255.	255.	256.	256.	256.	257.	257.
257.	257.	258.	259.	261.	264.	271.	279.	288.	298.
307.	314.	321.	327.	332.	336.	339.	340.	341.	342.
343.	343.	344.	347.	354.	368.	387.	405.	408.	400.
383.	360.	336.	314.	294.	280.	268.	258.	249.	241.
232.	223.	211.	199.	185.	172.	159.	146.	135.	125.
115.	107.	99.	92.	86.	81.	76.	71.	67.	64.
60.	57.	55.	52.	50.	48.	46.	45.	43.	42.
41.	40.	39.	38.						

STAGE

550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0
550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0
550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0
550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0
550.0	550.0	550.0	550.0	550.0	550.1	550.1	550.1	550.1	550.2
550.2	550.3	550.3	550.4	550.4	550.4	550.5	550.5	550.5	550.6
550.6	550.6	550.6	550.6	550.7	550.7	550.7	550.7	550.7	550.7
550.7	550.7	550.7	550.8	550.8	550.9	551.1	551.3	551.6	551.9
552.2	552.4	552.6	552.7	552.9	553.0	553.1	553.1	553.1	553.1
553.1	553.2	553.2	553.3	553.5	553.8	554.2	554.6	554.7	554.5
554.1	553.6	553.0	552.4	551.8	551.4	551.0	550.7	550.5	550.2
549.9	549.6	549.2	548.8	548.3	547.9	547.4	547.0	546.6	546.2
545.9	545.6	545.4	545.1	544.9	544.7	544.6	544.4	544.3	544.2
544.1	544.0	543.9	543.8	543.7	543.6	543.6	543.5	543.5	543.4
543.4	543.3	543.3	543.3						

PEAK OUTFLOW IS 6661. AT TIME 16.13 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6640.	3186.	918.	918.	132213.
CMS	188.	90.	26.	26.	3744.
INCHES		10.22	11.78	11.78	11.78
MM		259.62	299.22	299.22	299.22
AC-FT		1580.	1821.	1821.	1821.
THOUS CU M		1949.	2246.	2246.	2246.

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THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .021 HOURS DURING BREACH FORMATION.
DOWNSTREAM CALCULATIONS WILL USE A TIME INTERVAL OF .167 HOURS.
THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.
INTERMEDIATE FLOWS ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

TIME (HOURS)	TIME FROM BEGINNING OF BREACH (HOURS)	INTERPOLATED BREACH HYDROGRAPH (CFS)	-	COMPUTED BREACH HYDROGRAPH (CFS)	=	ERROR (CFS)	ACCUMULATED ERROR (CFS)	ACCUMULATED ERROR (AC-FT)
16.333	*.000	5099.		5099.		0.	0.	0.
16.354	.021	5253.		5778.		-525.	-525.	-1.
16.375	.042	5407.		5871.		-464.	-989.	-2.
16.396	.063	5562.		5960.		-398.	-1387.	-2.
16.417	.083	5716.		6044.		-328.	-1715.	-3.
16.438	.104	5870.		6123.		-252.	-1968.	-3.
16.458	.125	6025.		6197.		-172.	-2140.	-4.
16.479	.146	6179.		6267.		-88.	-2228.	-4.
16.500	.167	6334.		6334.		0.	-2228.	-4.
16.521	.188	6372.		6394.		-22.	-2251.	-4.
16.542	.208	6410.		6447.		-37.	-2288.	-4.
16.563	.229	6448.		6494.		-46.	-2333.	-4.
16.583	.250	6487.		6534.		-48.	-2381.	-4.
16.604	.271	6525.		6569.		-44.	-2425.	-4.
16.625	.292	6563.		6598.		-34.	-2459.	-4.
16.646	.313	6601.		6621.		-20.	-2479.	-4.
16.667	.333	6640.		6640.		0.	-2479.	-4.
16.688	.354	6634.		6653.		-19.	-2496.	-4.
16.708	.375	6629.		6660.		-31.	-2529.	-4.
16.729	.396	6624.		6661.		-38.	-2566.	-4.
16.750	.417	6618.		6658.		-39.	-2606.	-4.
16.771	.438	6613.		6649.		-36.	-2642.	-5.
16.792	.458	6607.		6636.		-28.	-2670.	-5.
16.813	.479	6602.		6618.		-16.	-2687.	-5.
16.833	.500	6597.		6597.		0.	-2687.	-5.
16.854	.521	6555.		6571.		-16.	-2703.	-5.
16.875	.542	6513.		6542.		-28.	-2731.	-5.
16.896	.563	6472.		6503.		-32.	-2763.	-5.
16.917	.583	6430.		6461.		-31.	-2794.	-5.
16.938	.604	6388.		6415.		-27.	-2821.	-5.
16.958	.625	6347.		6367.		-20.	-2841.	-5.
16.979	.646	6305.		6316.		-11.	-2853.	-5.
17.000	.667	6263.		6263.		0.	-2853.	-5.
17.021	.688	6134.		6209.		-75.	-2927.	-5.
17.042	.708	6005.		6140.		-134.	-3062.	-5.
17.063	.729	5876.		6070.		-194.	-3256.	-6.
17.083	.750	5747.		6001.		-254.	-3509.	-6.
17.104	.771	5618.		5859.		+241.	-3751.	-6.
17.125	.792	5485.		5574.		-85.	-3835.	-7.
17.146	.812	5360.		5338.		22.	-3814.	-7.
17.167	.833	5231.		5231.		0.	-3814.	-7.
17.188	.854	5243.		5255.		-12.	-3826.	-7.
17.208	.875	5255.		5274.		-19.	-3845.	-7.
17.229	.896	5267.		5290.		-23.	-3868.	-7.
17.250	.917	5279.		5302.		-23.	-3890.	-7.
17.271	.937	5291.		5310.		-19.	-3909.	-7.
17.292	.958	5303.		5319.		-16.	-3925.	-7.
17.313	.979	5315.		5328.		-12.	-3937.	-7.
17.333	1.000	5327.		5327.		0.	-3937.	-7.

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- CHANNEL REACH 1

ISTEQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
AS	1	0	0	0	1	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPRP	LSTR
0.0	0.000	0.00	10	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELMVT	ELMAX	RLNTH	SEL
.0500	.0400	.0600	530.0	550.0	590.	.03400

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 550.00 60.00 540.00 270.00 535.00 280.00 530.00 380.00 530.00
390.00 535.00 560.00 540.00 715.00 550.00

STORAGE	0.00	1.46	2.97	4.55	6.18	7.91	10.48	14.19	19.03	25.02
	32.05	39.50	47.27	55.37	63.79	72.53	81.60	90.98	100.69	110.73
OUTFLOW	0.00	751.20	2396.13	4734.53	7691.27	11295.84	15922.40	21814.42	29292.63	38630.24
	50512.52	64944.58	81392.52	99815.34	120192.25	142515.16	166784.57	193007.04	221193.53	251358.35
STAGE	530.00	531.05	532.11	533.16	534.21	535.26	536.32	537.37	538.42	539.47
	540.53	541.58	542.63	543.68	544.74	545.79	546.84	547.89	548.95	550.00
FLOW	0.00	751.20	2396.13	4734.53	7691.27	11295.84	15922.40	21814.42	29292.63	38630.24
	50512.52	64944.58	81392.52	99815.34	120192.25	142515.16	166784.57	193007.04	221193.53	251358.35

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STATION AS. PLAN 1. RTIO 2

OUTFLOW

0.	0.	1.	1.	1.	1.	1.	1.	2.	2.
2.	2.	2.	2.	2.	2.	2.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	5.	6.	8.	11.	15.	19.
27.	37.	47.	57.	66.	74.	82.	89.	95.	101.
106.	111.	116.	124.	128.	133.	137.	140.	143.	146.
148.	150.	153.	160.	178.	213.	271.	364.	493.	698.
965.	1140.	1330.	1460.	1629.	1746.	2072.	2194.	2280.	2394.
2474.	2559.	2655.	2827.	3141.	3665.	4388.	5075.	6261.	6679.
6567.	6313.	5965.	5291.	4508.	3848.	3597.	3227.	3062.	2784.
2548.	2432.	2268.	2029.	1830.	1605.	1421.	1239.	1094.	958.
848.	748.	676.	598.	540.	485.	440.	400.	365.	335.
309.	286.	266.	248.	232.	218.	205.	194.	184.	175.
167.	160.	154.	148.						

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	1.	1.	1.	1.
2.	2.	2.	2.	2.	2.	3.	3.	3.	3.
3.	3.	3.	3.	3.	4.	4.	5.	5.	6.
6.	5.	5.	5.	4.	4.	4.	4.	3.	3.
3.	3.	3.	3.	2.	2.	2.	2.	2.	2.
2.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.						

STAGE

530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0
530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0
530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0
530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0
530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0	530.0
530.0	530.1	530.1	530.1	530.1	530.1	530.1	530.1	530.1	530.1
530.1	530.2	530.2	530.2	530.2	530.2	530.2	530.2	530.2	530.2
530.2	530.2	530.2	530.2	530.2	530.3	530.4	530.5	530.7	531.0
531.2	531.3	531.4	531.5	531.6	531.7	531.9	532.0	532.0	532.1
532.1	532.2	532.2	532.3	532.4	532.7	533.0	533.3	533.7	533.8
533.8	533.7	533.5	533.4	533.1	532.8	532.6	532.5	532.4	532.3
532.2	532.1	532.0	531.9	531.7	531.6	531.5	531.4	531.3	531.2
531.1	531.0	530.9	530.8	530.8	530.7	530.6	530.6	530.5	530.5
530.4	530.4	530.4	530.3	530.3	530.3	530.3	530.3	530.3	530.2
530.2	530.2	530.2	530.2						

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6678.	3186.	918.	918.	132192.
CMS	189.	90.	26.	26.	3743.
INCHES		10.22	11.78	11.78	11.78
MM		259.61	299.18	299.18	299.18
AC-FT		1580.	1821.	1821.	1821.
THOUS CU M		1949.	2246.	2246.	2246.

MAXIMUM STAGE IS 533.8

MAXIMUM STORAGE = 6.

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- CHANNEL REACH 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
AA	1	0	0	1	1	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IFMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0600	.0400	.0600	510.0	520.0	740.	.02700

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 520.00 80.00 517.00 150.00 515.00 300.00 510.00 540.00 515.00
640.00 517.00 790.00 520.00 790.10 520.00

STORAGE	0.00	.18	.73	1.65	2.94	4.59	6.61	8.99	11.75	14.87
	18.36	22.24	26.53	31.22	36.30	41.74	47.54	53.70	60.22	67.10
OUTFLOW	0.00	27.15	172.38	508.24	1094.55	1984.55	3227.10	4867.85	6949.97	9514.57
	12736.45	16638.06	21116.97	26207.66	32649.17	40092.67	48260.51	57169.18	66834.10	77270.29
STAGE	510.00	510.53	511.05	511.58	512.11	512.63	513.16	513.68	514.21	514.74
	515.26	515.79	516.32	516.84	517.37	517.89	518.42	518.95	519.47	520.00
FLOW	0.00	27.15	172.38	508.24	1094.55	1984.55	3227.10	4867.85	6949.97	9514.57
	12736.45	16638.06	21116.97	26207.66	32649.17	40092.67	48260.51	57169.18	66834.10	77270.29

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STATION A4, PLAN 1, PTIO 2

OUTFLOW

0.	0.	0.	1.	1.	1.	1.	1.	1.	2.
2.	2.	2.	2.	2.	2.	2.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	5.	7.	9.	13.	17.
23.	33.	45.	58.	68.	72.	80.	87.	94.	99.
105.	110.	116.	122.	127.	132.	136.	139.	142.	145.
147.	149.	152.	158.	172.	206.	258.	343.	465.	660.
920.	1128.	1303.	1464.	1606.	1734.	1970.	2193.	2264.	2382.
2466.	2548.	2644.	2801.	3097.	3616.	4310.	5008.	5116.	6710.
6564.	6356.	5404.	5192.	4704.	3835.	3649.	3257.	3074.	2830.
2645.	2475.	2273.	2071.	1845.	1644.	1438.	1269.	1108.	983.
861.	766.	685.	612.	546.	495.	440.	408.	372.	341.
314.	290.	269.	251.	235.	221.	208.	196.	186.	177.
169.	162.	155.	149.						

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	2.	2.
3.	3.	3.	4.	4.	4.	5.	5.	5.	5.
5.	6.	6.	6.	6.	7.	8.	9.	11.	11.
11.	11.	10.	9.	9.	7.	7.	7.	6.	6.
6.	5.	5.	5.	4.	4.	4.	3.	3.	3.
2.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.						

STAGE

510.0	510.0	510.0	510.0	510.0	510.0	510.0	510.0	510.0	510.0
510.0	510.0	510.0	510.0	510.0	510.0	510.0	510.0	510.1	510.1
510.1	510.1	510.1	510.1	510.1	510.1	510.1	510.1	510.1	510.1
510.1	510.1	510.1	510.1	510.1	510.1	510.1	510.1	510.1	510.1
510.1	510.1	510.1	510.1	510.1	510.1	510.1	510.2	510.2	510.3
510.4	510.5	510.6	510.6	510.7	510.7	510.7	510.7	510.8	510.8
510.8	510.8	510.8	510.9	510.9	510.9	510.9	510.9	510.9	511.0
511.0	511.0	511.0	511.0	511.1	511.1	511.2	511.3	511.5	511.7
511.9	512.1	512.2	512.3	512.4	512.5	512.6	512.7	512.7	512.8
512.8	512.9	512.9	513.0	513.1	513.3	513.5	513.7	514.0	514.1
514.1	514.1	513.9	513.8	513.6	513.4	513.3	513.2	513.1	513.0
512.9	512.8	512.8	512.7	512.5	512.4	512.3	512.2	512.1	512.0
511.9	511.8	511.7	511.7	511.6	511.6	511.5	511.4	511.4	511.3
511.3	511.2	511.2	511.2	511.2	511.1	511.1	511.1	511.1	511.1
511.0	511.0	511.0	511.0						

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6710.	3166.	918.	918.	1321945.
CMS	190.	90.	26.	26.	37420.
INCHES		10.22	11.77	11.77	11.77
MM		259.57	299.07	299.07	299.07
AC-FT		1580.	1820.	1820.	1820.
THOUS CU M		1949.	2245.	2245.	2245.

MAXIMUM STORAGE = 11.

MAXIMUM STAGE IS 514.1

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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 .20	RATIO 2 .50	RATIO 3 1.00
HYDROGRAPH AT	A1	2.90 (7.51)	1	2504. (70.91)	6260. (177.27)	12521. (354.55)
ROUTED TO	A2	2.90 (7.51)	1	2457. (69.58)	6640. (188.02)	13228. (374.59)
ROUTED TO	A3	2.90 (7.51)	1	2435. (68.96)	6678. (189.11)	13231. (374.65)
ROUTED TO	A4	2.90 (7.51)	1	2442. (69.14)	6710. (190.00)	13183. (373.30)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	550.00	550.00	551.60
STORAGE	235.	235.	287.
OUTFLOW	0.	0.	497.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	553.14	1.54	382.	2457.	5.33	16.50	0.00
.50	554.70	3.10	408.	6661.	8.50	16.75	16.33
1.00	555.55	3.95	448.	13228.	6.00	16.50	15.50

PLAN 1 STATION A3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.20	2435.	532.1	16.50
.50	6678.	533.8	16.67
1.00	13231.	535.7	16.50

PLAN 1 STATION A4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.20	2442.	512.8	16.67
.50	6710.	514.1	16.67
1.00	13183.	515.3	16.50

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APPENDIX 4

REFERENCES

DIXONS POND DAM

APPENDIX 4

REFERENCES

DIXONS POND DAM

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