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NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON
NATIONAL DAM SAFETY PROGRAM. LAKE AMES DAM (NJ00337), PASSAIC R--ETC(U)
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DACW61-79-C-0011

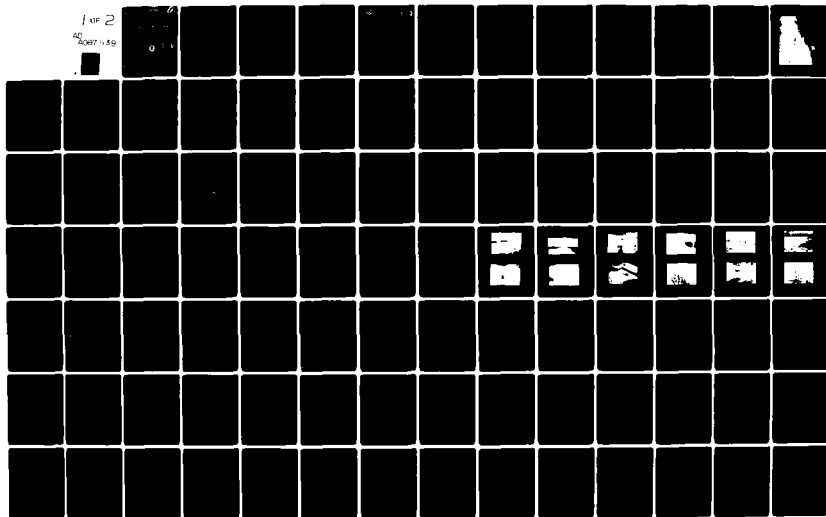
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PASSAIC RIVER BASIN
HIBERNIA BROOK, MORRIS COUNTY
NEW JERSEY

LAKE AMES DAM

NJ 00337

PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM

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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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28 JUL 1980

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

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Lake Ames 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, Lake Ames Dam, initially listed as a high hazard potential structure but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's two spillways are considered inadequate because a flow equivalent to 19 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is one half of the Probable Maximum Flood.) To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillways' 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. Within three months of the consultant's findings, remedial action to ensure spillway adequacy should be initiated.

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

(1) Investigate the seepage and standing water at the toe of the dam and design remedial or control measures, if needed.

(2) Design and oversee repairs for eroded areas on the upstream and downstream slopes of the dam, including removal or replacement of the deteriorated concrete wall on the upstream edge of the crest of the embankment.

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Honorable Brendan T. Byrne

(3) Design and oversee procedures for removing or rehabilitating the dry stone-masonry retaining wall at the downstream toe of the embankment between the stoplog spillway and the north abutment.

(4) Design and oversee procedures for the removal of trees and brush from the upstream slope, downstream slope, and a zone 25 feet wide at the downstream toe of the embankment, and for removal of the tree behind the stone-masonry training wall on the south side of the principal spillway discharge channel.

(5) Design and oversee the removal and replacement of the stoplog facility.

(6) Design and oversee the rebuilding of the spillway cap and abutments.

c. Within six months from the date of approval of this report, the owner should establish a surveillance program for use during and immediately following periods of heavy rainfall and also a warning program to follow in case of emergency conditions.

d. Within thirty days from the date of approval of this report, the following remedial actions should be initiated:

(1) Monitor the seepage at the downstream toe of the dam.

(2) Control trespassing on the dam to help decrease erosion.

(3) Clear brush, logs and debris from the channels downstream of the stoplog spillway and emergency spillway and from the entrance channel to the emergency spillway.

e. Within one year from the date of approval of this report the owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

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 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.

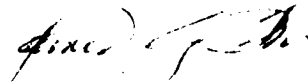
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Honorable Brendan T. Byrne

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.

An important aspect of the Dam Inspection 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,



JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

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

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

LAKE AMES DAM (NJ00337)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 6 November 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.

Lake Ames Dam, initially listed as a high hazard potential structure but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's two spillways are considered inadequate because a flow equivalent to 19 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is one half of the Probable Maximum Flood.) To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillways' 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. Within three months of the consultant's findings, remedial action to ensure spillway adequacy should be initiated.

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

(1) Investigate the seepage and standing water at the toe of the dam and design remedial or control measures, if needed.

(2) Design and oversee repairs for eroded areas on the upstream and downstream slopes of the dam, including removal or replacement of the deteriorated concrete wall on the upstream edge of the crest of the embankment.

(3) Design and oversee procedures for removing or rehabilitating the dry stone-masonry retaining wall at the downstream toe of the embankment between the stoplog spillway and the north abutment.

(4) Design and oversee procedures for the removal of trees and brush from the upstream slope, downstream slope, and a zone 25 feet wide at the downstream toe of the embankment, and for removal of the tree behind the stone-masonry training wall on the south side of the principal spillway discharge channel.

(5) Design and oversee the removal and replacement of the stoplog facility.

(6) Design and oversee the rebuilding of the spillway cap and abutments.

c. Within six months from the date of approval of this report, the owner should establish a surveillance program for use during and immediately following periods of heavy rainfall and also a warning program to follow in case of emergency conditions.

d. Within thirty days from the date of approval of this report, the following remedial actions should be initiated:

(1) Monitor the seepage at the downstream toe of the dam.

(2) Control trespassing on the dam to help decrease erosion.

(3) Clear brush, logs and debris from the channels downstream of the stoplog spillway and emergency spillway and from the entrance channel to the emergency spillway.

e. Within one year from the date of approval of this report the owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

APPROVED:

James G. Ton
JAMES G. TON

Colonel, Corps of Engineers
District Engineer

DATE:

20 Jan 80

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Lake Ames Dam
Identification No.: Fed ID No. NJ00337
State Located: New Jersey
County Located: Morris
Stream: Hibernia Brook
River Basin: Passaic
Date of Inspection: November 6, 1979

ASSESSMENT OF GENERAL CONDITIONS

Lake Ames Dam is about 45 years old and in poor condition. It is small in size and classified as significant hazard. There is a major seepage at the downstream toe of the dam near the north abutment and a pool of standing water in a depression near the toe of the dam north of the stoplog spillway discharge channel. The upstream and downstream slopes of the embankment are deeply eroded adjacent to the south side of the stoplog spillway. The upstream slope of the embankment is deeply eroded next to the north side of the principal spillway. Ruins of a concrete wall are visible at several locations on the upstream edge of the crest of the embankment; the concrete is badly deteriorated and the wall is broken and tilted at several locations. A dry stone-masonry wall which retains the downstream toe of the embankment between the stoplog spillway, and the north abutment bulges locally. The slopes and crest of the dam are covered with varying amounts of trees, brush and grass. The combined capacity of the principal, stoplog, and emergency spillways is less than 18 percent of the selected half-PMF and is inadequate.

We recommend that the owner retain the services of a professional engineer, qualified in the design and construction of dams, to accomplish the following in the near future: investigate the seepage and standing water at the toe of the dam and design remedial or control measures, if needed; design and oversee repairs for eroded areas on the upstream and downstream slopes of the dam, including rehabilitation or replacement of the deteriorated concrete wall on the upstream edge of the crest of the embankment; design and oversee procedures for removing or rehabilitating the dry stone-masonry retaining wall at the downstream toe of the embankment between the stoplog spillway and the north abutment; design and oversee procedures for the removal of trees and brush from the upstream slope, downstream slope, and the downstream toe of the embankment, and for removal of the tree behind the stone-masonry training wall on the south side of the principal spillway discharge channel; design and oversee the removal and replacement of the stoplog structure; design and oversee the rebuilding of the spillway cap and abutments; conduct further detailed hydrologic and hydraulic analysis of the watershed, reservoir, dam and spillways to determine the need for and type of mitigating measures required.

We further recommend that, as part of operating and maintenance procedures, the owner monitor seepage at the downstream toe of the dam; control trespassing on the dam to reduce erosion; and clear brush, logs and debris from the channels downstream of the stoplog spillway and emergency spillway and from the entrance channel to the emergency spillway. These tasks should commence immediately. In the future, the owner should establish a surveillance program for use during and immediately following periods of heavy rainfall, and also, a warning program to follow in case of emergency conditions. Within one year from the date of approval of this report, the owner should develop written operating procedures and a periodic maintenance plan to insure the safety of the dam.

ANDERSON-NICHOLS & COMPANY, INC.

A handwritten signature in dark ink, reading "Warren A. Guinan". The signature is written in a cursive, flowing style with a large initial 'W'.

Warren A. Guinan
Project Manager
New Jersey No. 16848



6 November 1979

Overview
Lake Ames Dam

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NATIONAL DAM SAFETY REPORT
LAKE AMES DAM N.J. NO. 22-27 FED ID NO. NJ00337

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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
LAKE AMES DAMS
U.S. #NJ00337-N.J. #22-27

SECTION I
PROJECT INFORMATION

1.1 General

a. Authority. Authority to perform the Phase I Safety Inspection of Lake Ames Dam was received from the State of New Jersey, Department of Environmental Protection (NJDEP), Division of Water Resources by letter dated 26 October 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 Engineer District, Philadelphia. The inspection discussed herein was performed by Anderson-Nichols & Company, Inc. on 6 November 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 Lake Ames 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. Lake Ames Dam is a 9-foot high, 287-foot long earthfill and concrete dam. The crest of the embankment is approximately 20 feet wide. The upstream face slopes at about 1H:1V and the slope of the downstream face varies from vertical to 4H:1V. The crest of the embankment section is grass covered. Its upstream face is covered with low shrubs and weeds while the downstream face supports shrubs, weeds, and some trees up to 18 inches in diameter. An emergency spillway is located at the extreme north end of the dam. It is 20 feet long with vertical stone abutments and a rock-lined bottom which forms an uneven crest. A 4-foot long stoplog structure is located near the center of the embankment section. Its concrete walls are bridged by 5 sections of steel rail. The tailrace for the stoplog spillway is bordered by 5-foot high stone wingwalls. The extreme south end of the dam consists of a 45-foot long, 15-foot wide principal spillway. The crest is a concrete cap that sits atop a stone masonry base which forms a vertical outfall. The tailrace for the principal spillway is also bordered by 5-foot high stone-masonry walls running about 15 feet downstream from the vertical outfall. The south abutment of the dam consists of a sandy beach while the north abutment is a steep, partially wooded slope adjacent to N.J. Route 513. Essential features of the dam are given in Figure 1.

b. Location. Lake Ames Dam is located in Morris County, New Jersey, on Hibernia Brook, which flows into Beaver Brook, a tributary of the Rockaway River. The dam is shown on U.S.G.S. Quadrangle, Dover, New Jersey, with approximate coordinates of N 40° 57.1', W 74° 30.1'. A location map has been included as Figure 2.

c. Size Classification. Lake Ames Dam is classified as small on the basis of storage at top of dam of 197 acre-feet, which is less than 1000 acre-feet, but more than 50 acre-feet, and on the basis of structural height of 9 feet, which is less than 40 feet, in accordance with criteria given in the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification. Visual inspection of the downstream area revealed one inhabited structure located about 6 feet above Hibernia Brook. The breach analysis contained herein indicates that flood stages associated with the half-PMF would reach about 4.5 feet above the sill of the structure. Also, the bridge carrying New Jersey Route 513, a frequently traveled road located about 800 feet downstream of the dam, would be inundated by about 4 feet of water. Appreciable property damage and loss of a few lives could occur. Accordingly, Lake Ames Dam is classified as Significant Hazard.

e. Ownership. The dam is owned by the Township of Rockaway, 19 Mount Hope Road, Rockaway, New Jersey, 07866. The town engineer is Art Deluca; phone: 201/625-3700.

f. Purpose of Dam. The dam provides recreation for the surrounding community.

g. Design and Construction History. No information was disclosed regarding the design and construction of the original dam.

h. Normal Operational Procedures. No operational procedures exist for Lake Ames Dam.

i. Site Geology. No site specific geologic information (such as borings) was available at the time the dam was inspected. Information derived from a report entitled "Engineering Geology of the Northeast Corridor, Washington, DC to Boston, MA" and the Geologic Map of New Jersey (Lewis and Kummel, 1912) indicate that soils within the immediate site area consist of ground moraine overlying bedrock. Although no outcrops were observed during inspection of this dam, the previously mentioned reports indicate that the underlying bedrock consists of granitoid gneiss, with associated migmatite, granulite, amphibolite and granitic rocks of Precambrian age.

1.3 Pertinent Data

a. Drainage Area

5.3 square miles

b. Discharge at Damsite (cfs)

Maximum flood at damsite - unknown

Principal spillway capacity at top of dam - 382

Stoplog spillway capacity at top of dam - 29

Emergency spillway capacity at top of dam - 72

Total spillway capacity at top of dam - 483

Low-level outlet - not applicable

c. Elevation (ft. above NGVD)

Top of dam - 637.1

Recreation pool - 635.0

Spillway crest - 634.9

Maximum pool ($\frac{1}{2}$ PMF) - 641.6

Streambed at centerline of principal spillway - 628.7
(downstream); 633.9 (upstream)

Maximum tailwater (estimated) - 632

d. Reservoir Length (feet)

Maximum pool - 1330

Recreation pool - 1300

e. Storage (acre-feet)

Recreation pool - 155

Design surcharge ($\frac{1}{2}$ PMF) - 292

Top of dam - 197

f. Reservoir Surface Area (acres)

Top of dam - 16

Recreation pool - 14

Spillway crest - 14

g. Dam

Type - earthfill and concrete

Length - 287 feet

Height - 8 feet (hydraulic)

- 9 feet (structural)

Topwidth - 20 feet

Side slopes - upstream 1H:1V

downstream varies 4H:1V to vertical

Zoning - unknown

Impervious core - unknown

Cutoff - unknown

Grout curtain - unknown

h. Principal Spillway

Type - concrete vertical

Length of weir - 45 feet

Crest elevation - 634.9 NGVD

Gates - none

Upstream channel - Lake Ames (no approach channel)

Downstream channel - Hibernia Brook

i. Emergency Spillway

Type - rock-lined bottom sloping gradually downward

Length of weir - 20 feet

Crest elevation - 635.5 (low point along crest)

Gates - none

Upstream channel - Lake Ames (no approach channel)

Downstream channel - tributary to Hibernia Brook

j. Stoplog Spillway

Type - concrete vertical

Length of weir - 4 feet

Crest elevation - 635.2 (top of debris)

Gates - none

Upstream channel - Lake Ames (no approach channel)

Downstream channel - tributary to Hibernia Brook

k. Regulating Outlets

Type - concrete stoplog structure

Length - 4 feet

Access - crest of embankment section

Regulating facilities - none; concrete stoplog structure;
stoplogs have been removed.

SECTION 2 ENGINEERING DATA

2.1 Design

No plans, hydraulic or hydrologic data pertinent to Lake Ames Dam were available.

2.2 Construction

No data concerning construction of Lake Ames Dam were disclosed.

2.3 Operation

No engineering operational data were available.

2.4 Evaluation

a. Availability. A search of the NJDEP files and contact with community officials revealed only a limited amount of recorded information.

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

c. Validity. Information disclosed by community officials appears to concur with that obtained by the inspection team.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. Dam. A major seepage was observed at the downstream toe of the dam near the north abutment. There is also a pool of standing water in a depression near the toe of the dam north of the stoplog spillway discharge channel. The upstream and downstream slopes of the embankment are deeply eroded next to the south side of the concrete stoplog spillway structure. The upstream slope of the embankment is deeply eroded next to the north side of the principal spillway. Deep erosion channels are present on the upstream side of the south abutment which is a sandy parking and access area. Minor erosion of the upstream slope has occurred at several locations due to both trespassing and wave action. An apparent remnant of a concrete wall is visible at several locations on the upstream edge of the crest of the embankment; the concrete is badly deteriorated and the wall is broken and tilted at several locations. A dry-stone-masonry wall which retains the downstream toe of the embankment between the stoplog spillway and the north abutment bulges locally and is topped over locally. The crest of the dam is covered with coarse weeds. The upstream slope of the dam is covered with brush. The downstream slope of the dam is covered with trees, brush, and cut brush.

b. Appurtenant Structures. Trees are growing at the entrance to the emergency spillway channel. A large tree is growing immediately behind the stone-masonry training wall on the north side of the discharge channel immediately downstream of the principal spillway. The west side of concrete capped spillway and its concrete abutments are badly cracked and deteriorated. The stoplog spillway near the center of the dam is severely deteriorated. The upstream concrete walls have collapsed into the intake channel and effectively block it. The steel stoplog supports are badly corroded. The south wall of the stoplog structure has a large hole in it through which water flows from the embankment south of the wall and into the spillway channel.

c. Reservoir Area. The watershed above the lake is moderately sloping and wooded. There are no buildings on the shore of the lake. The slopes on the shore of the lake appear to be stable. No evidence of significant sedimentation was observed.

d. Downstream Channel. Trees overhang the channels downstream of the principal spillway, the stoplog spillway and the emergency spillway. In addition, there are logs, brush and debris in the discharge channel below the stoplog spillway, and there is brush growing in the discharge channel below the emergency spillway.

SECTION 4 OPERATIONAL PROCEDURES

4.1 Procedures

No formal operational procedures for Lake Ames Dam exist.

4.2 Maintenance of Dam

No formal maintenance procedures for the dam were disclosed. From a phone conversation with the Town Engineer, Art Deluca, it was learned that "the area around the pond will be spruced up" as part of the facelifting program dealing with several recreational areas in the town.

4.3 Maintenance of Operating Facilities

No formal maintenance procedures for the operating facilities exist. The stoplog structure appears to have been undergoing decay for quite a few years.

4.4 Warning System

No warning system exists for Lake Ames Dam.

4.5 Evaluation of Operational Adequacy

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

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. Design Data. An evaluation could not be performed because no data were disclosed.

b. Experience Data. Investigation of the files at the NJDEP and telephone contact with the Township of Rockaway yielded no data concerning past overtopping or flood heights at Lake Ames Dam.

c. Visual Observations. Erosion of the embankment section was noted adjacent to the south wall of the stoplog spillway. Water is passing through a hole in the stoplog structure concrete wall and discharging back into the spillway. The entrance to the spillway is almost completely blocked with debris. There was no visual evidence of damage to the structure caused by overtopping.

d. Overtopping Potential. The hydraulic/hydrologic evaluation for Lake Ames Dam is based on a Spillway Design Flood (SDF) equal to one-half the Probable Maximum Flood (PMF) in accordance with the range of test floods given in the evaluation guidelines for dams classified as high hazard and small in size. The PMF was determined by application of the SCS dimensionless unit hydrograph to a 24-hour probable maximum storm of 22.7 inches. Hydrologic computations are shown in Appendix 3. The routed half-PMF peak discharge resulting from the combination of flow from sub-areas 1 & 2 (see sketch, Appendix c, p. 5/16) is 8,569 cfs.

Water will rise to a depth of 2.2 feet above the spillway crest before overtopping the low section along the dam embankment crest. Under this head, the combination of the principal, emergency, and stoplog spillways will pass a total flow of 483 cfs, which is less than the selected SDF.

Flood routing calculations indicate that Lake Ames Dam will be overtopped for about 9 hours to a maximum depth of 4.5 feet under half-PMF conditions. It is estimated that the spillways can pass less than 18 percent of the half-PMF before overtopping of the dam occurs; thus, the spillway is considered inadequate.

The dam was initially classified as significant hazard based on visual observation. A breach analysis was performed to assess the increase in downstream hazard under dam failure conditions and determine if the dam might be high hazard. The results of the breach analysis, contained in Appendix 3, show that the downstream potential for loss of life and excessive property damage is not increased under dam failure conditions. However, the analysis does indicate that heavily traveled N.J. Route 513 will

be inundated by up to 4 feet of water and that one house about 2000 feet downstream of the dam could be inundated above the first floor sill by 4.5 feet of water. Flow velocities at these locations would be very high.

SECTION 6 STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

Major seepage near the north abutment and standing water in a depression north of the stoplog spillway discharge channel are indicative of seepage through and under the dam, which, if not properly controlled, could lead to failure of the dam. Deep erosion of both the upstream and downstream slopes of the dam could result in breaching of the dam if allowed to continue. A concrete wall on the upstream edge of the crest, which may have been intended to control erosion or seepage, is in such poor condition that it cannot be relied upon for either of these purposes. Local failures of the dry stone-masonry retaining wall at the downstream toe of the embankment between the stoplog spillway and the north abutment could initiate seepage and erosion problems if allowed to continue. Trees growing on the downstream slope and in the downstream toe area, and brush which is now growing on the upstream and downstream slopes and may attain tree-size eventually, may cause seepage and erosion problems if a tree blows over and pulls out its roots or if a tree dies or is cut and its roots rot. 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. Therefore, it is not possible to evaluate the factor of safety of the dam against slope failure. The severe deterioration of the spillway abutments and stoplog facility, if allowed to progress, could result in failure of the structure.

6.2 Design and Construction Data

No design or construction data pertinent to the structural stability of the dam were available.

6.3 Operating Records

No operating records pertinent to the structural stability of the dam were found.

6.4 Post-Construction Changes

No records pertinent to post-construction changes were disclosed.

6.5 Seismic Stability

Lake Ames Dam is located in Seismic Zone 1. According to the Recommended Guidelines, dams located in Seismic Zone 1 "may be assumed to present no hazard from earthquake provided static stability conditions are satisfactory and conventional safety margins exist". However, because no data are available concerning the engineering properties of the embankment and foundation materials for this dam or of the below-ground configuration of the concrete walls in the dam, it is not possible to make an engineering evaluation of the stability of the slopes or the factor of safety under static conditions.

SECTION 7
ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. Lake Ames Dam is about 45 years old and is in poor condition.

b. Adequacy of Information. The information available is such that the assessment of the dam must be based on the results of the visual inspection. The presence of coarse weeds on the crest of the embankment, brush on the upstream slope, and brush, trees, and piles of cut brush on the downstream slope make it impossible to inspect the dam adequately.

c. Urgency. The recommendations made in 7.2 a. and 7.2 b. should be implemented by the owner as prescribed.

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. These problems require the attention of a professional engineer who will have to make additional engineering studies to design or specify remedial measures. If left unattended, the problems could lead to failure of the dam. The dam should be reinspected after the trees, brush, and weeds have been cleared from the embankment.

7.2 Recommendations/Remedial Measures

a. Recommendations. The owner should engage a professional engineer experienced in the design and construction of dams to do the following things in the near future:

1. Investigate the seepage and standing water at the toe of the dam and design remedial or control measures, if needed.

2. Design and oversee repairs for eroded areas on the upstream and downstream slopes of the dam, including removal or replacement of the deteriorated concrete wall on the upstream edge of the crest of the embankment.

3. Design and oversee procedures for removing or rehabilitating the dry stone-masonry retaining wall at the downstream toe of the embankment between the stoplog spillway and the north abutment.

4. Design and oversee procedures for the removal of trees and brush from the upstream slope, downstream slope, and a zone 25 feet wide at the downstream toe of the embankment, and for removal of the tree behind the stone-masonry training wall on the south side of the principal spillway discharge channel.

5. Design and oversee the removal and replacement of the stoplog facility.

6. Design and oversee the rebuilding of the spillway cap and abutments.

7. Conduct further detailed hydrologic and hydraulic analyses for the watershed, reservoir, dam and spillways to determine the need for and type of mitigating measures required.

b. Operating and Maintenance Procedures. The owner should undertake the following things immediately:

1. Monitor the seepage at the downstream toe of the dam.

2. Control trespassing on the dam to reduce erosion.

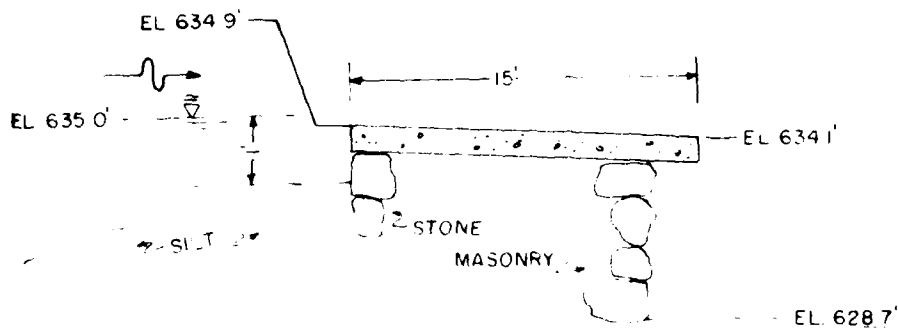
3. Clear brush, logs and debris from the channels downstream of the stoplog spillway and emergency spillway and from the entrance channel to the emergency spillway.

The Owner should undertake the following things in the near future:

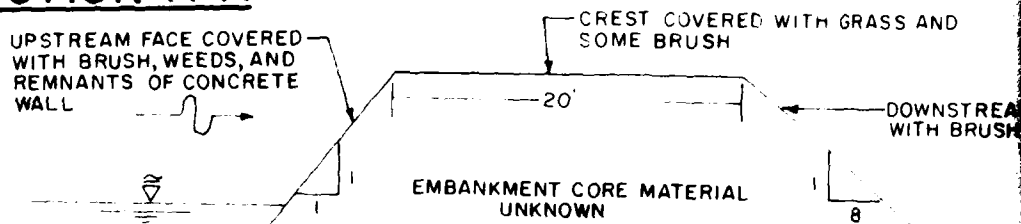
1. Establish a surveillance program for use during and immediately following periods of heavy rainfall.

2. Establish a warning program to follow in case of emergency conditions.

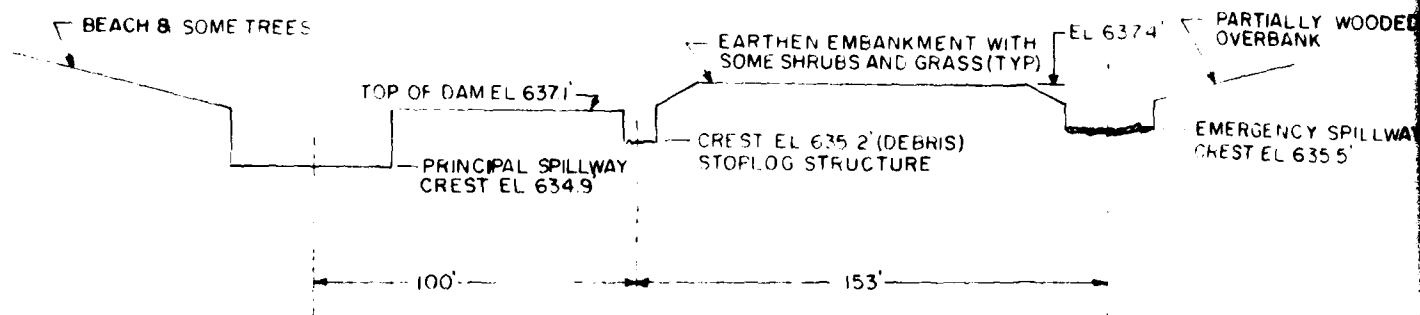
Within one year from the date of approval of this report, the owner should develop written operating procedures and a periodic maintenance plan to insure the safety of the dam.



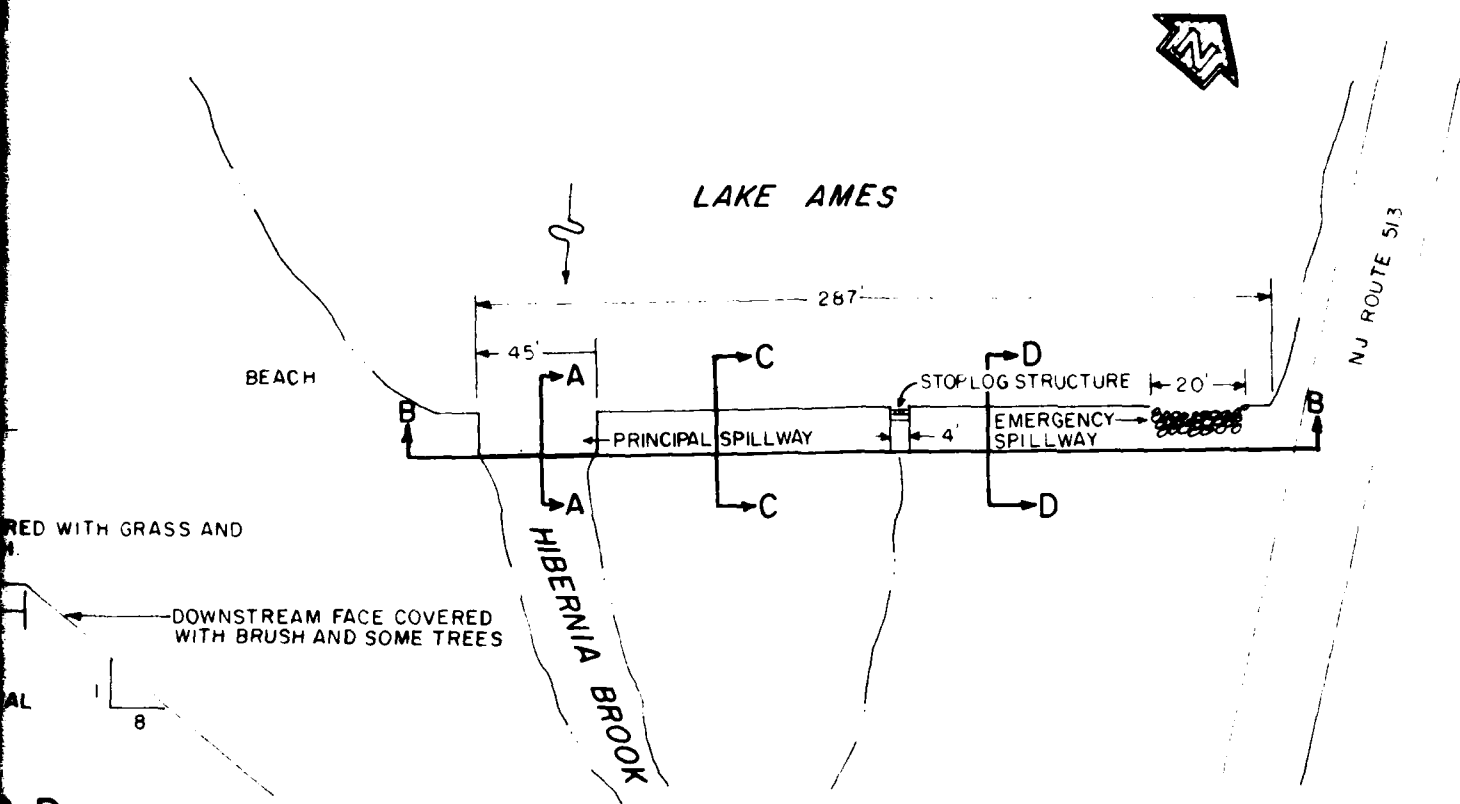
SECTION A-A



SECTIONS C-C & D-D



ELEVATION B-B



PLAN

374' PARTIALLY WOODED OVERBANK

EMERGENCY SPILLWAY CREST EL 635.5'

DETAIL FROM FIELD INSPECTION 11/6/79

Anderson-Nichols & Co, Inc		U.S. ARMY ENGINEER DIST PHILADELPHIA	
CONCORD		CORPS OF ENGINEERS	
NEW HAMPSHIRE		PHILADELPHIA, PA	
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS			
LAKE AMES DAM			
HIBERNIA BROOK		NEW JERSEY	
		SCALE NOT TO SCALE	
		DATE JANUARY 1980	

FIGURE - L



MAP BASED ON STATE OF NEW JERSEY
OFFICIAL HIGHWAY MAP AND GUIDE.

Anderson-Nichols & Co., Inc.		U.S. ARMY ENGINEER DIST. PHILADELPHIA	
CONCORD		CORPS OF ENGINEERS	
NEW HAMPSHIRE		PHILADELPHIA, PA.	
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS			
LAKE AMES DAM LOCATION MAP			
HIBERNIA BROOK		NEW JERSEY	
		SCALE: SEE BAR SCALE	
		DATE: JANUARY 1980	

APPENDIX 1

CHECK LIST
VISUAL INSPECTION

LAKE AMES DAM

Check List
Visual Inspection
Phase 1

Name Dam Lake Ames Dam County Morris State NJ Coordinators NJDEP

Date(s) Inspection Nov. 6, 1979 Weather cool, cloudy Temperature 48° F

Pool Elevation at Time of Inspection 635.0 NGVD Tailwater at Time of Inspection 629.3 NGVD

Inspection Personnel:

<u>Warren Guinan</u>	<u>Ronald Hirschfeld</u>
<u>Stephen Gilman</u>	<u></u>
<u>Kenneth Stuart</u>	<u></u>

Gilman/Hirschfeld Recorder

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Upstream concrete wall visible only partial length of dam. Top of wall is badly deteriorated and spalled; many areas of cracking.	Rebuild upstream concrete wall.
STRUCTURAL CRACKING		
VERTICAL AND HORIZONTAL ALIGNMENT		
MONOLITH JOINTS		
CONSTRUCTION JOINTS	None visible.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	Stone retaining wall at toe of dam between left abutment and stoplog spillway is bulging locally and has toppled over locally.	Rebuild downstream toe of dam.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Erosion at many localized sections of upstream slope due to wave action and trespassing.	Repair eroded areas. Clear brush now growing on upstream slope. Establish grassy vegetation and place erosion protection.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Good.	
RIPRAP FAILURES	No riprap. Apparent remnant of a concrete wall badly deteriorated and toppled over locally, along upstream edge of crest from left abutment to stoplog spillway.	See note under "Sloughing or Erosion..." above.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RAILINGS	No railings.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Major erosion at right side of stoplog spillway and left side of principal spillway.	Repair erosion next to principal and stoplog spillway structure.
ANY NOTICEABLE SEEPAGE	Major seepage near toe of dam near left abutment. Water standing in depression downstream of dam to right of stoplog spillway channel.	Engage engineer to investigate source of seepage and to design appropriate remedial measures.
STAFF GAGE AND RECORDER	None observed.	
DRAINS	None observed.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Concrete capped stone masonry; concrete apron badly cracked and spalled. Middle construction joint is eroded. Right abutment is badly cracked, spalled, and undermined. Top is tipped approximately 2". Left abutment badly undermined and tipped. Large piece of concrete wall missing at upstream end of abutment.	Rebuild concrete spillway and training wall.
APPROACH CHANNEL	Wide and unobstructed.	
DISCHARGE CHANNEL	Trees overhang channel. Channel bottom covered with boulders.	Clear trees and brush on either side of channel to prevent channel blockage. Maintain cleared area free of brush.

BRIDGE AND PIERS
OVER SPILLWAY

**GATED SPILLWAY
(STOPLOG SPILLWAY)**

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WALLS	Both walls of channel are badly eroded and spalled. Concrete core wall near channel has large hole in it where water is discharging. Steel rails across channel are rusted. Upstream end of channel has collapsed, blocking some flow area.	Remove and replace stoplog spillway.
APPROACH CHANNEL	Debris filled.	
DISCHARGE CHANNEL	Logs, brush, debris and uprooted trees clog channel at several locations.	Clear channel of debris from dam to highway bridge downstream. Clear trees and brush on either side of channel for a distance downstream from dam. Maintain cleared areas free of brush.
BRIDGE AND PIERS	None.	
GATES AND OPERATION EQUIPMENT	Stoplogs - visible portions badly deteriorated. Steel slots badly corroded and separated from concrete.	Remove and replace stoplog spillway.

EMERGENCY SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
WEIR	6-12 inch diameter rocks resting on soil. Some weeds.	No action required.
APPROACH CHANNEL	Wide and unobstructed.	
DISCHARGE CHANNEL	Rocks and some weeds and brush. 2' high stone masonry walls form sides.	
BRIDGE AND PIERS OVER SPILLWAY	None.	

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	Moderately sloping and wooded.	
SEDIMENTATION	No evidence of significant sedimentation observed.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Good. Some trees overhang channel immediately downstream of dam. Route 513 and Miggen Road bridges located about 800 and 900 feet downstream, respectively, of the dam.	
SLOPES	Mostly wooded, stable. 20H:1V	
APPROXIMATE NO. OF HOMES AND POPULATION	One home in floodpath - estimated population of 2-4 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.
- CONSTRAINTS	None.
- DISCHARGE RATINGS	None.
RAINFALL/RESERVOIR RECORDS	None.

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

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

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

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 5.3 sq. miles, partially wooded, hilly

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 635.0 NGVD (155 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): not applicable

ELEVATION MAXIMUM DESIGN POOL: 641.6 NGVD (half-PMF)

ELEVATION TOP DAM: 637.1 NGVD

CREST: Principal spillway - unrestricted flow over concrete

- a. Elevation 634.9 NGVD (upstream edge)
- b. Type concrete capped vertical
- c. Width 15'
- d. Length 45'
- e. Location right end
- f. Number and Type of Gates none

STOPLOG SPILLWAY: restricted flow (clogged with debris)

- a. Elevation 635.2 NGVD (top of debris)
- b. Type - wooden stoplogs - vertical; stoplogs no longer in place
- c. Width 20 feet
- d. Length 4 feet
- e. Location Spillover center of dam

EMERGENCY SPILLWAY unrestricted flow over rocks

- a. Elevation 635.5 NGVD (low point)
- b. Type rock-lined bottom, stone wall sides
- c. Width varies
- d. Length 20 feet
- e. Location Spillover left end of dam

OUTLET WORKS: 4-foot long stoplog structure

- a. Type concrete vertical
- b. Location center of embankment section

c. Entrance Inverts 635.2 NGVD (top of debris)

d. Exit Inverts 628.4 NGVD

e. Emergency Draindown Facilities none

HYDROMETEOROLOGICAL GAGES: none

a. Type _____

b. Location _____

c. Records _____

MAXIMUM NON-DAMAGING DISCHARGE: 483 cfs

APPENDIX 2

PHOTOGRAPHS

LAKE AMES DAM



6 November 1979

Looking northwest at downstream face of principal spillway.



6 November 1979

Looking east at downstream channel just below
principal spillway.

LAKE AMES DAM

2-1



6 November 1979

Looking west at upstream reservoir.



6 November 1979

Looking north across principal spillway crest. Note erosion on upstream face of north spillway abutment.

LAKE AMES DAM

2-2



6 November 1979
Looking west at downstream face of stoplog spillway structure.



6 November 1979
Looking northwest across stoplog spillway structure.
Note leak through main dam wall and cracking and spalling of concrete.

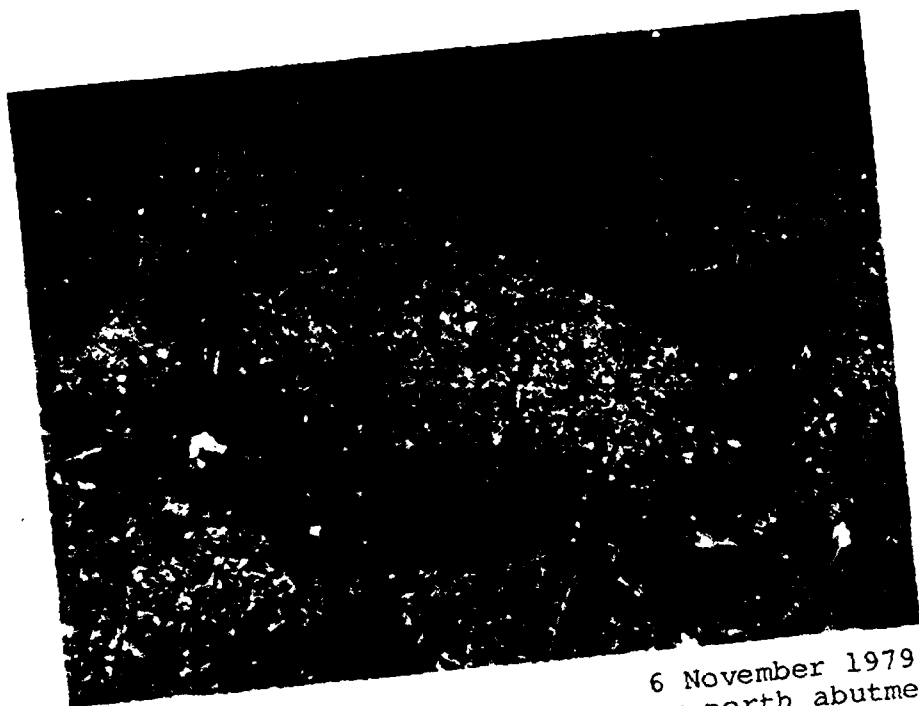


6 November 1979
Looking south across dam crest from north abutment.
Note engineer standing on emergency spillway crest
in foreground.



6 November 1979
Looking downstream through emergency spillway.

LAKE AMES DAM



6 November 1979
Seepage at downstream toe of dam near north abutment.



6 November 1979
Looking downstream through culvert below N.J. Route 513
bridge encountered about 800 feet downstream of Lake
Ames Dam.

LAKE AMES DAM



6 November 1979
Looking downstream from N.J. Route 513 bridge at second
bridge encountered downstream of dam.



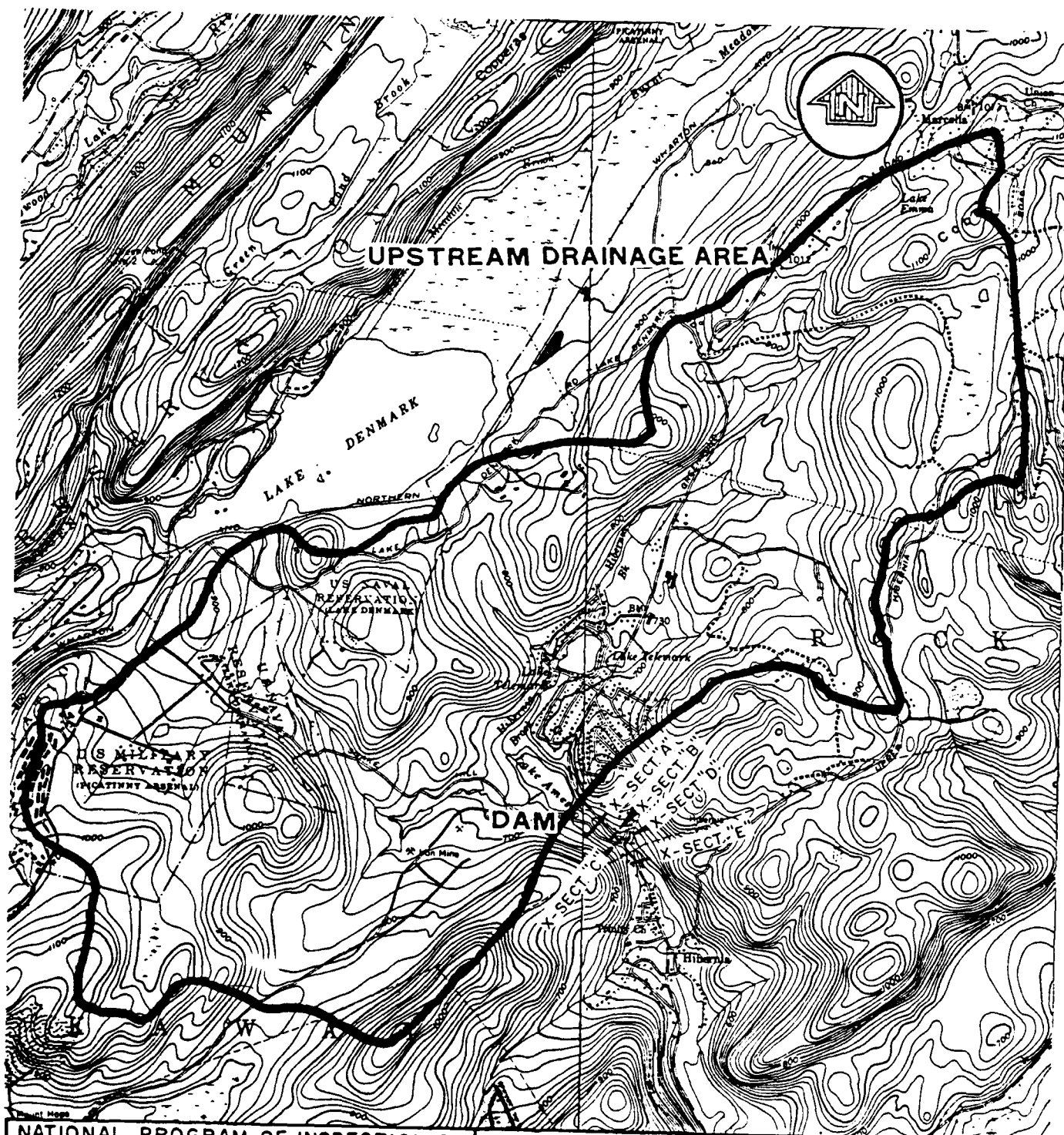
6 November 1979
Looking southeast at downstream channel just below
second bridge downstream of dam.

LAKE AMES DAM

APPENDIX 3

HYDROLOGIC COMPUTATIONS

LAKE AMES DAM



NATIONAL PROGRAM OF INSPECTION OF
NON-FED. DAMS

LAKE AMES DAM

ROCKAWAY TOWNSHIP, NEW JERSEY

REGIONAL VICINITY MAP

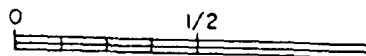
JANUARY 1980

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

ANDERSON-NICHOLS & CO., INC.

CONCORD, NH

SCALE IN MILES



MAP BASED ON U.S.G.S. 7.5 MINUTE QUADRANGLE
SHEETS. DOVER, N.J. 1954. REVISED 1970. AND
BOONTON, N.J. 1954. REVISED 1970.

JOB NO. 3409-03SQUARES 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 30
1/4 IN. SCALEHYDROLOGIC COMPUTATIONSDrainage area = 5.3 mi^2

Lake surface area (normal pool) = 14 acres

Evaluation criteria

size: small
hazard: high

Spillway design flood

Based on size and hazard classification,
the spillway design flood will be
one half the probable maximum
flood (1/2 PMF).

JOB NO. 3409-03SCALES 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 30
1/4" IN SCALEDETERMINE TIME OF CONCENTRATION, T_C Method 1 *

Estimate velocity

overland flow

reach length = 1200 ft.

$$\text{slope} = \frac{990 - 955}{1200} = 0.03$$

from table; mostly "woodlands",
average velocity = 1 fps

channel flow

reach length = 11,300 ft.

$$\text{slope} = \frac{955 - 635}{11,300} = 0.03$$

from table, average velocity = 1 fps

$$T_C = \frac{1200}{1} + \frac{11,300}{1} = 12,500 \text{ sec} = \underline{\underline{3.47 \text{ hr}}}$$

Method 2 ∇

from group C, runoff curve No. = 70

from nomograph, $T_L = 1.35 \text{ hr.}$

$$T_C = 1.67 T_L = 1.67(1.35) = \underline{\underline{2.25 \text{ hr.}}}$$

* See Appendix 4, reference 5.

 ∇ See Appendix 4, reference 3.

JOB NO. 8409-03SCALES
1/4" = 1' SCALE

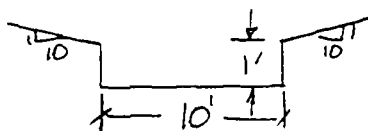
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Method 3*Overland flow
slope = 0.03 (see Method 1)

flow occurs mostly through woodlands;

from plot of % slope vs. velocity,

$$V = 0.45 \text{ fps}$$

Channel flow
estimate channel shapeassume depth of
water in channel = 1 ft.

$$A = 10(1) = 10 \text{ ft}^2$$

$$R = \frac{A}{WP} = \frac{10}{2(1) + 10} = 0.83 \text{ ft.}$$

$$V = \frac{1.49}{n} R^{2/3} S^{1/2}$$

$$S = 0.03, R = 0.83, n = 0.045$$

from Manning's nomograph, $V = 4.8 \text{ fps}$

$$T_c = \frac{1200}{2.47} + \frac{11,300}{4.8} = 5021 \text{ sec} = \underline{\underline{1.39 \text{ hr.}}}$$

* See Appendix 4, reference 7.

JOB NO. 5409-03SCALES 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 30
1/2 IN SCALEMethod 4*

$$T_c = 0.83 \left(\frac{NL}{\sqrt{S}} \right)^{0.467} \text{ for overland flow}$$

overland flow

$$N = 0.60, S = 0.03, L = 1200 \text{ ft.}$$

$$T_{cov} = 0.83 \left(\frac{0.60(1200)}{\sqrt{0.03}} \right)^{0.467} = 40.6 \text{ min.}$$

channel flow

from Manning's nomograph, $V = 4.8 \text{ fps}$
(see Method 3)

$$T_{ch} = \frac{11,300}{4.8} = 2354 \text{ sec} = 39 \text{ min.}$$

$$T_c = 40.6 + 39 = 79.6 \text{ min} = \underline{\underline{1.33 \text{ hr}}}$$

$$T_{c_{avg}} = \frac{1.33 + 1.39 + 2.25 + 3.47}{4} = \underline{\underline{2.11 \text{ hr}}}$$

$$T_{LAG} = 0.6 T_c = 0.6 (2.11) = \underline{\underline{1.27 \text{ hr}}}$$

* See Appendix 4, reference 7.

P. 5/14/16
 1151a
 3 Jan 60

KEY

--- OVERLAND FLOW FROM MOST REMOTE POINT IN DRAINAGE AREA

--- CHANNEL FLOW

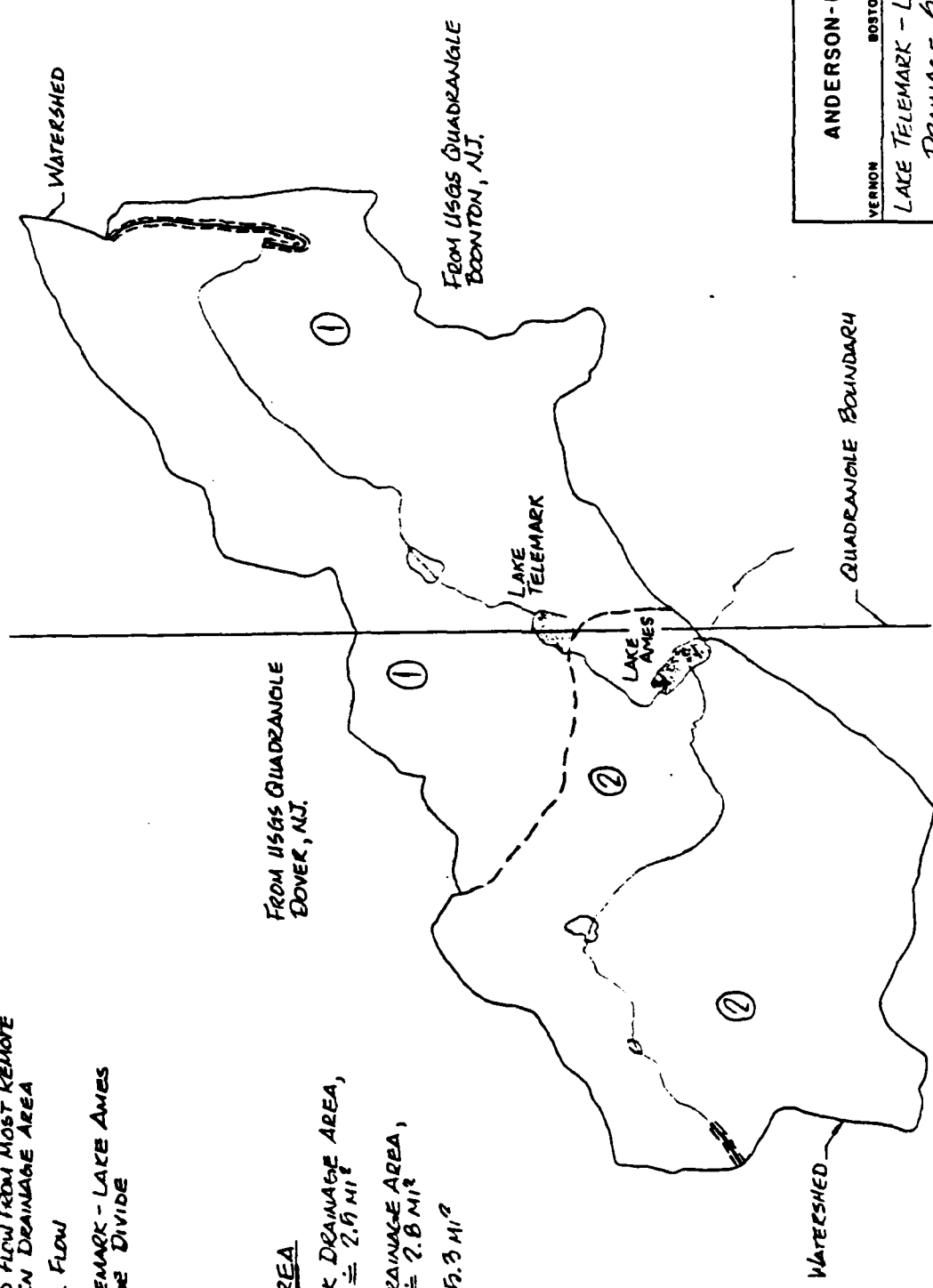
--- LAKE TELEMARK - LAKE AMES DRAINAGE DIVIDE

AREA

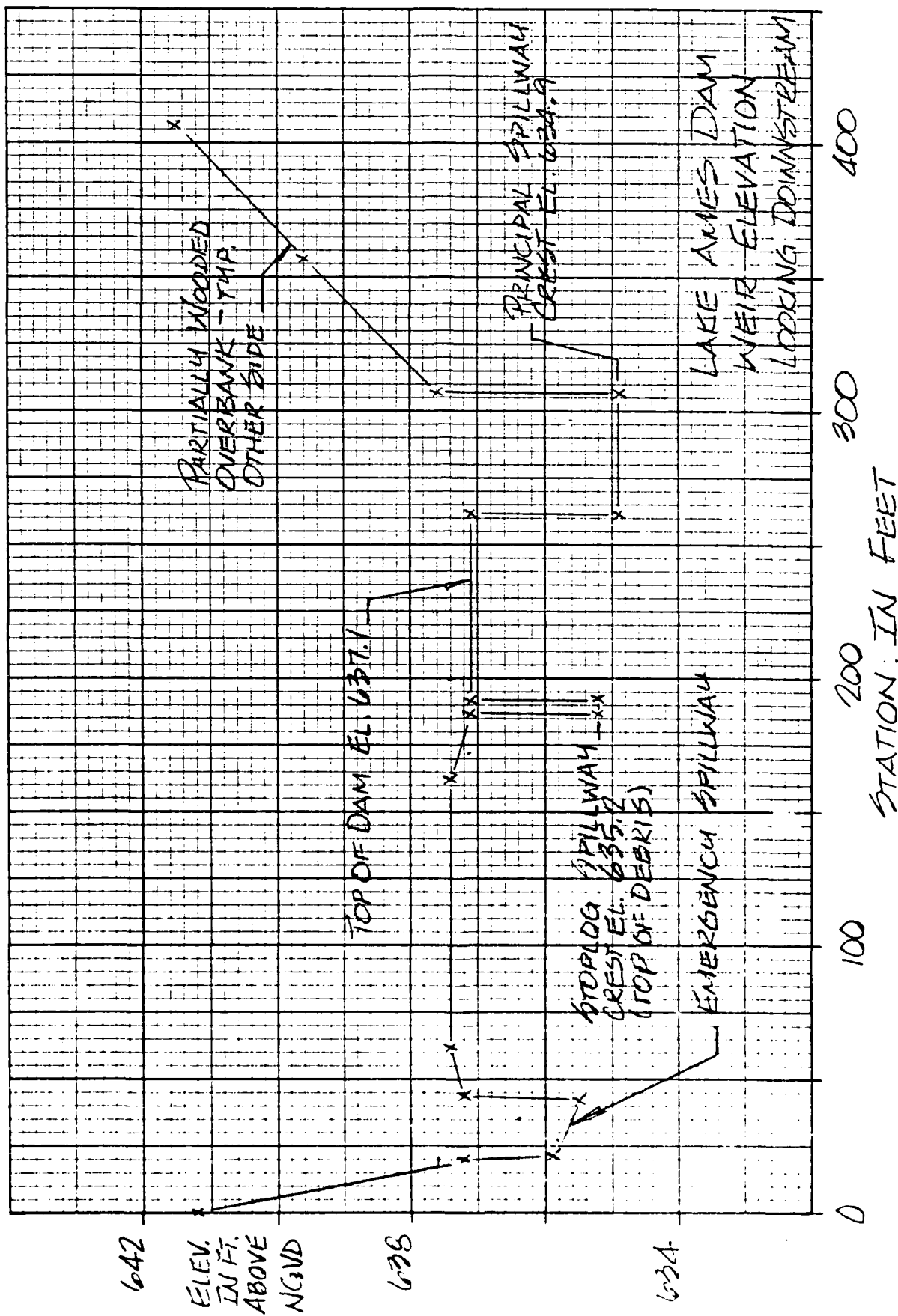
LAKE TELEMARK DRAINAGE AREA,
 SUB-AREA ① $\approx 2.9 \text{ MI}^2$

LAKE AMES DRAINAGE AREA,
 SUB-AREA ② $\approx 2.8 \text{ MI}^2$

TOTAL AREA $\approx 5.7 \text{ MI}^2$



ANDERSON-NICHOLS	
VERNON	BOSTON
CONCORD	
LAKE TELEMARK - LAKE AMES	
DRAINAGE SCHEMATIC	
DATE 28 DEC 60	SCALE 1" = 1 MI
FIG NO 5204	SHEET NO 03



JOB NO. 3409-03SCALES 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 30
1/4 IN SCALEDEVELOP RATING CURVE AT DAM

Flow over principal spillway

Use weir equation, $Q = CLH^{3/2}$ where $C = 2.6^*$
 $L = 2 \text{ ft.}$
 H varies

Flow over stoplog spillway

Use weir equation, $Q = CLH^{3/2}$ where $C = 2.8^*$
 $L = 4 \text{ ft.}$
 H varies

Flow over emergency spillway and dam crest

Use weir equation, $Q = CLH^{3/2}$ where $C = 2.5$
 $L \neq H$ vary* from Table 3-2, p. 3-10, Bureau of Eng. Handbook
of Hydraulics

JOB NO. 3409-03SCALES 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 30
1/4" = 1' SCALE

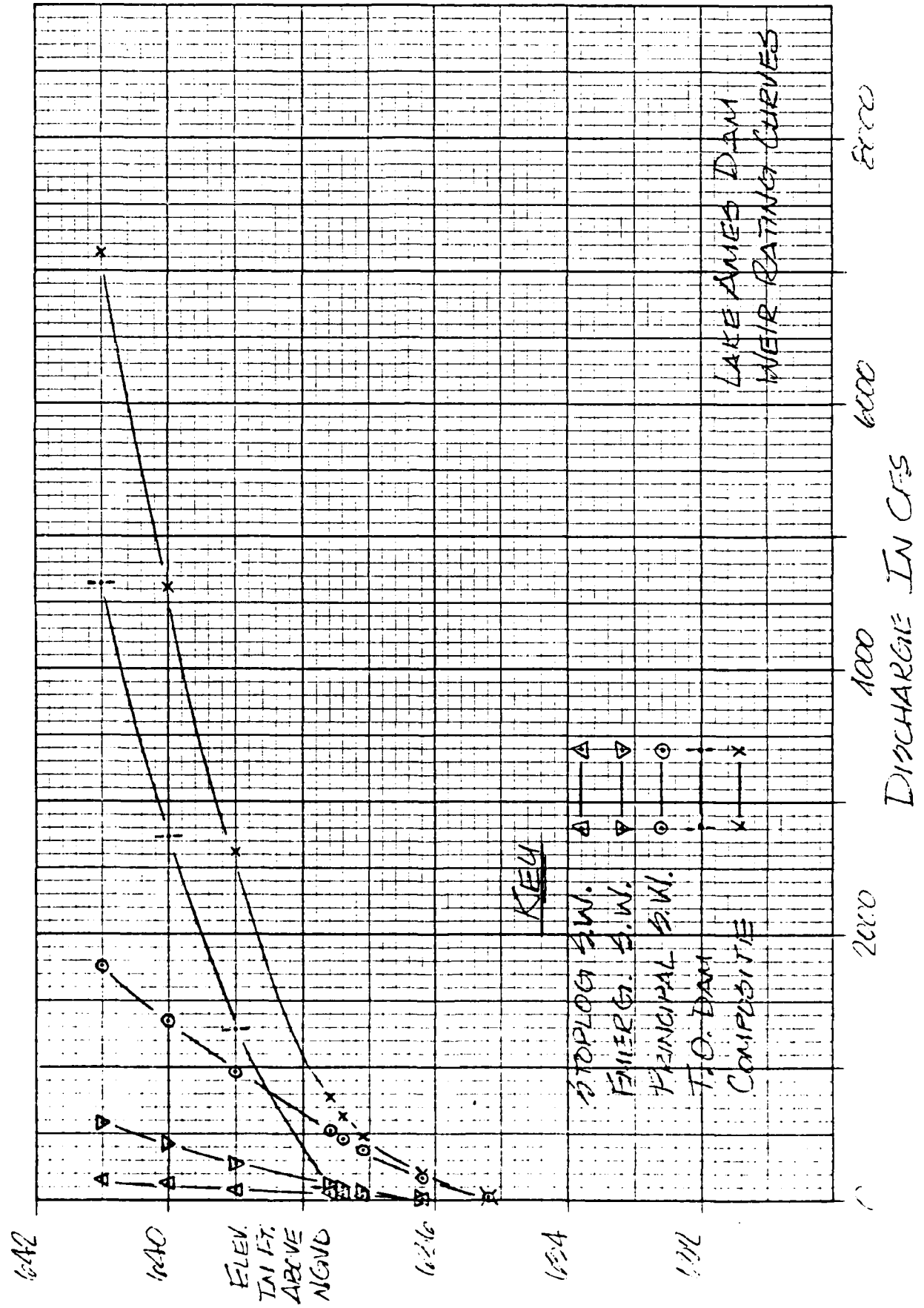
ELEVATION (FT. ABOVE NGVD)	SPILLWAYS						TOP OF DAM			Q TOTAL
	PRINCIPAL		EMERGENCY		STOPLOGS		HEAD (#)	LENGTH (#)	Q [°] (cfs)	
	HD(4)	Q(cfs)	HD(4)	Q(cfs)	HD(4)	Q(cfs)				
634.9										0
635.2	0.3	19								19
636.2	1.3	173	0.7	15	1.0	12				200
637.1	2.2	382	1.6	72	1.9	29				483
637.4	2.5	462	1.9	98	2.2	37	0.3	92	36	633
637.6	2.7	519	2.1	117	2.4	42	0.3	236	101	779
639.0	4.1	971	3.5	279	3.8	83	1.6	257	1288	2621
640.0	5.1	1348	4.5	421	4.8	118	2.5	272	2731	4618
641.0	6.1	1763	5.5	582	5.8	156	3.5	287	4639	7140

° Head above lowest point on non-level crest.

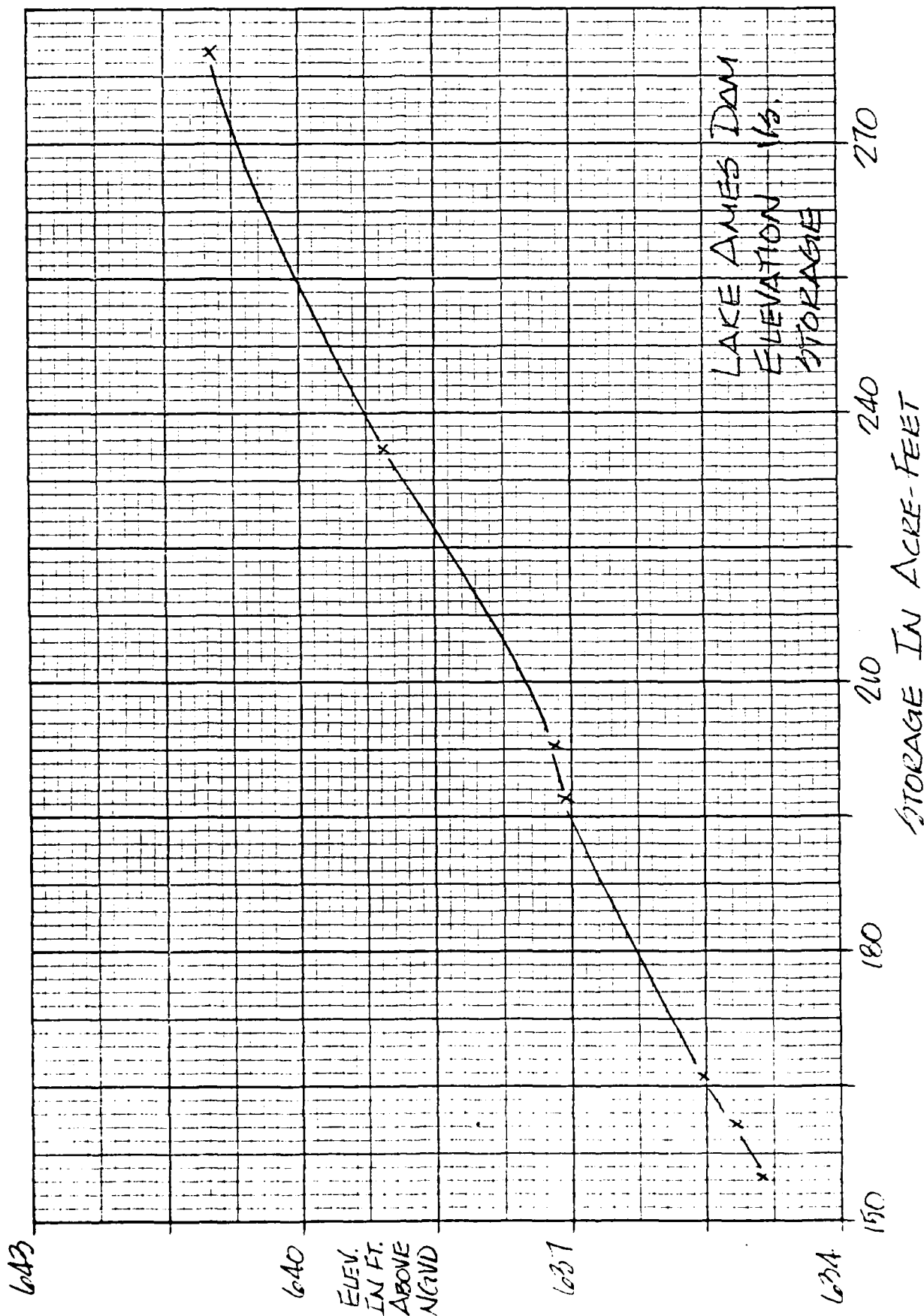
* Average value

$$^{\circ}Q = CLH^{3/2} \text{ where } C = 2.5$$

9/16
 3 Jan 80
 185 ft
 9' 00"



10/11/60
 2/1/61
 3/24/60
 TDD

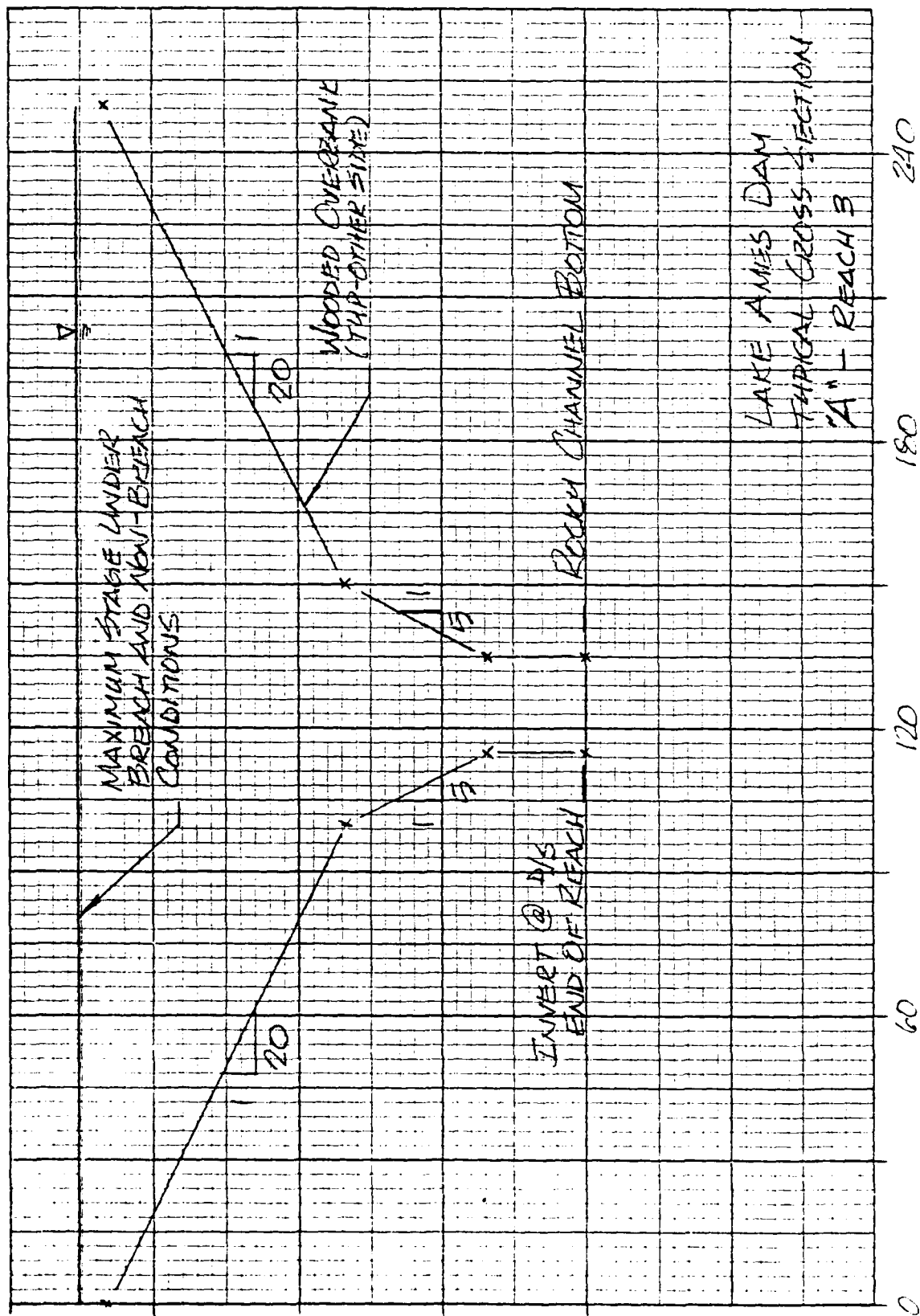


622

616

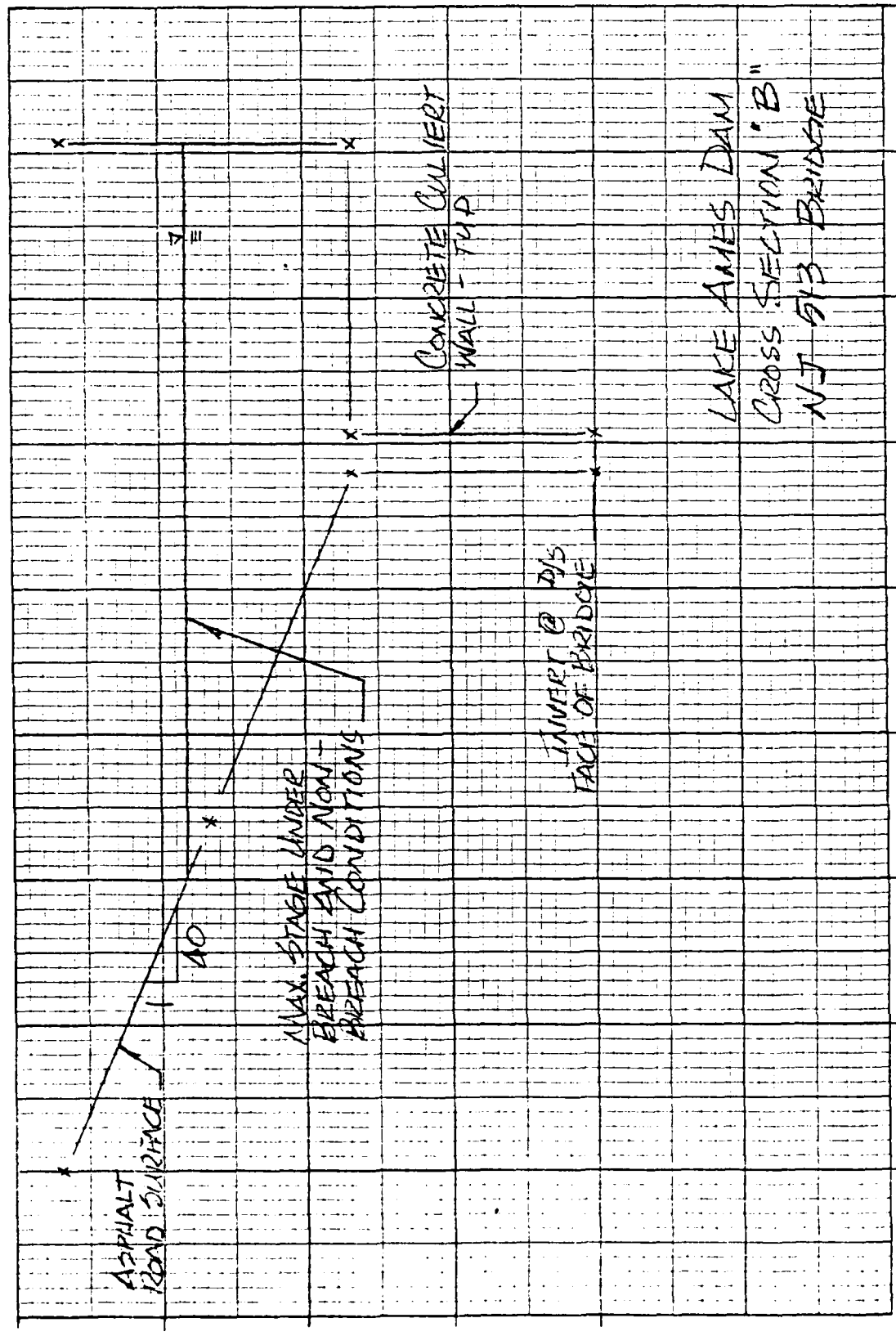
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610



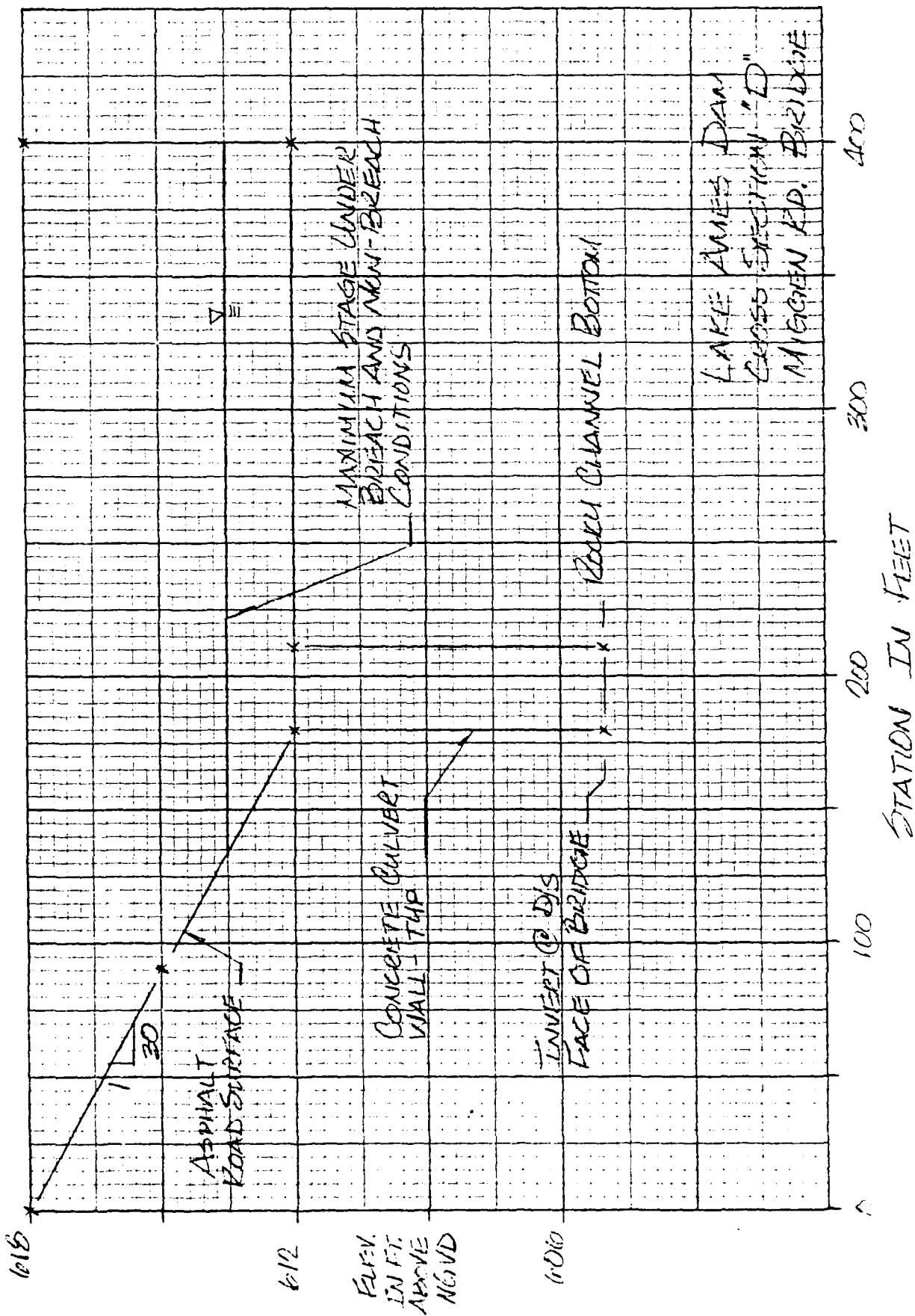
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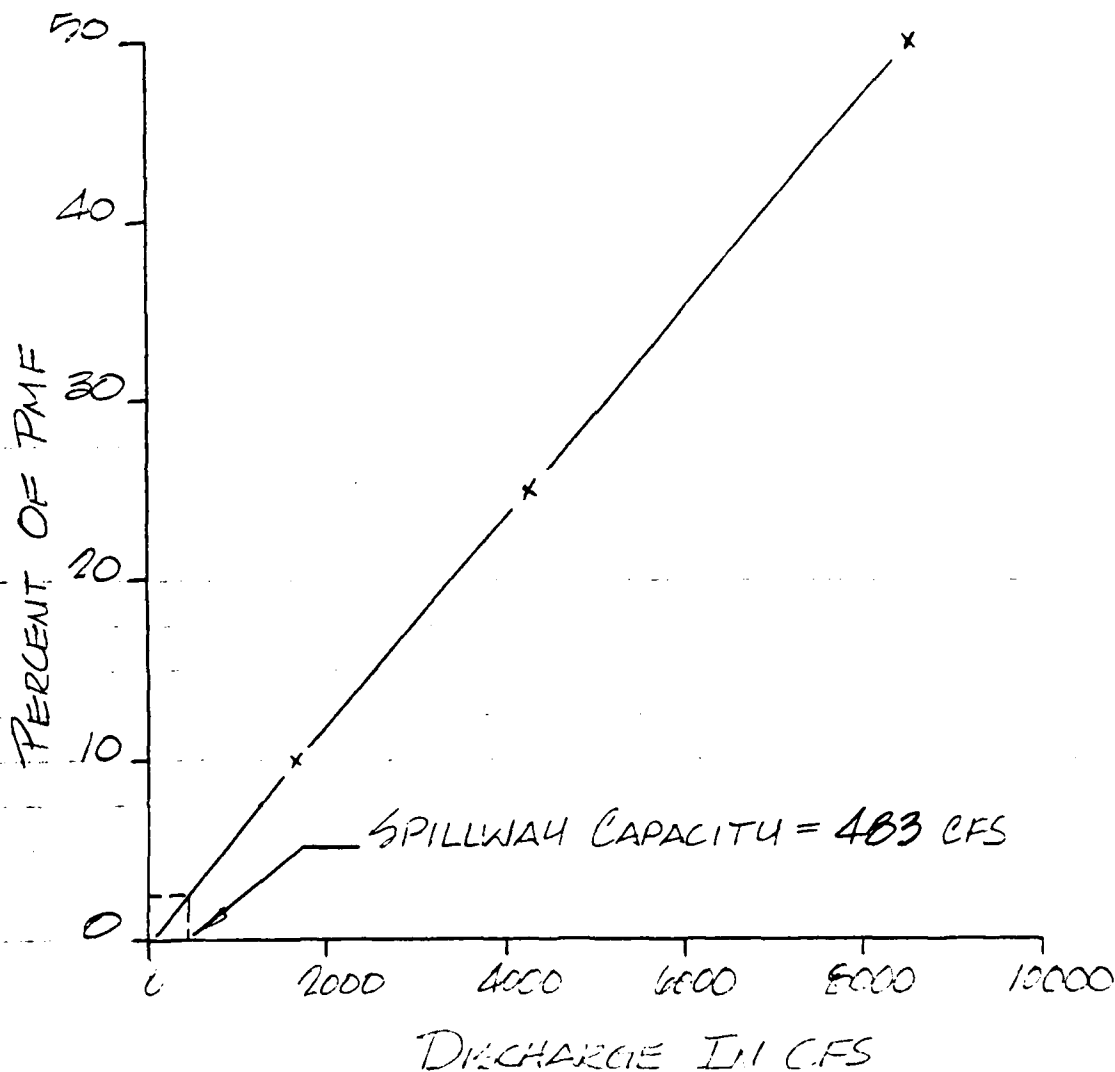
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JOB NO. 3409-03

SCALES 1/4" = 1' 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 30

OVERTOPPING POTENTIAL



HEC-1 OUTPUT

OVERTOPPING ANALYSIS

LAKE AMES DAM

P	22.7	113	123	132		0.1
T	1.27					
X	-3					
K	2	A7	1	1		
K1	COMBINE SUB-AREA 1 & SUB-AREA 2 FLOW CONTRIBUTIONS					
Y	1	A8	1	1		
K1	ROUTE INFLOW HYDROGRAPH THROUGH LAKE AMFS					
Y	1	1				
Y1	1				155	-1
Y4	634.9	636.2	637.1	637.4	637.6	639.0
Y5	0	19	200	483	633	779
Y5	0	155	141	166	197	203
Y6	628.4	634.9	635.2	637.1	637.4	639.0
Y6	634.9					
Y6	637.1					
Y6	26	1	628.4	1	634.9	637.1
Y6	26	1	628.4	1	634.9	650.0
Y6	1	A9				
K1	CHANNEL ROUTING -MOD PULS- REACH 3					
Y	1	1				
Y1	1					
Y6	0.07	0.05	0.06	610	620	1100
Y7	0	620	100	615	115	612
Y7	135	612	150	615	250	620
K	1	A10				
K1	CHANNEL ROUTING -MOD PULS- NJ 513 PRIOR					
Y	1	1				
Y1	1					
Y6	0.03	0.04	0.03	609	620	60
Y7	0	620	120	617	240	614
Y7	253	614	353	614	353	620
K	1	A11				
K1	CHANNEL ROUTING -MOD PULS- REACH 4					
Y	1	1				
Y1	1					
Y6	0.03	0.05	0.03	606	618	200
Y7	0	618	20	616	40	614
Y7	145	614	165	616	185	618
K	1	A12				
K1	CHANNEL ROUTING -MOD PULS- MUGGEN RD BRIDGE					
Y	1	1				
Y1	1					
Y6	0.016	0.04	0.016	605	618	37
Y7	0	618	90	615	180	612
Y7	211	612	400	612	400	618
K	1	A13				
K1	CHANNEL ROUTING -MOD PULS- REACH 5					
Y	1	1				
Y1	1					
Y6	0.016	0.04	0.016	605	618	37
Y7	0	618	90	615	180	612
Y7	211	612	400	612	400	618
K	1	A13				
K1	CHANNEL ROUTING -MOD PULS- REACH 5					
Y	1	1				
Y1	1					

101
102
103
104

Y6 0.06
Y7 0
Y7 118
Y 99

0.05 0.06
572 50
562 168

540 540
557 100
567 218

1200 572
562 100
572 572

560 118
560 560

560

PREVIEW OF SEQUENCE OF STEEP NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT A1
ROUTE HYDROGRAPH TO A2
ROUTE HYDROGRAPH TO A3
ROUTE HYDROGRAPH TO A4
ROUTE HYDROGRAPH TO A5
ROUTE HYDROGRAPH TO A6
ROUTE HYDROGRAPH AT A7
COMBINE 2 HYDROGRAPHS AT A8
ROUTE HYDROGRAPH TO A9
ROUTE HYDROGRAPH TO A10
ROUTE HYDROGRAPH TO A11
ROUTE HYDROGRAPH TO A12
ROUTE HYDROGRAPH TO A13
END OF NETWORK

 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 26 FEB 79

RUN DATE: 19/12/81
 TIME: 08.18.20.

LAKE TELEMARK-LAKE AMES TANDEN DAM OVERTOPPING ANALYSES ## G.SHARRY A-NICO ##
 NEW JERSEY DAM NOS-22-29227-27 RESPECTIVLY MORRIS COUNTY-TOWNSHIP OF ROCKAWAY
 0.5 MULTIPLE OF PMF FROM 24-HOUR PMF - BREACH ANALYSIS

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
200	0	10	0	0	0	0	0	0	0
			JOPER	NVT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED

RTIOSE = .10 .25 .50
 NPLAN= 2 NR110= 3 LR110= 1

SUB-AREA RUNOFF COMPUTATION

DEVELOP LAKE TELEMARK INFLOW HYDROGRAPH - SUB-AREA 1

1STAQ	ICOMP	TECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
AI	0	0	0	0	1	1	0	0

HYDROGRAPH DATA

INHYG	IUNIC	TAREA	SNAP	TRSDA	TPSPC	PATIO	ISNOW	ISAME	LOCAL
1	2	2.50	0.00	2.50	.80	0.000	0	1	0

PRECIP DATA

SPEE	PMS	RA	P12	P24	R48	R72	P96
0.00	22.70	113.00	123.00	132.00	0.00	0.00	0.00

LOSS DATA

LPOT	STRVR	DLIKR	RTIOL	ERAIN	STAKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	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= 1.41

RECESSION DATA

STRIC= -3.00 ORCSM= 0.00 RTIOF= 1.00

UNIT HYDROGRAPH 50 PMD OF PERIOD ORIGINATES. TC= 0.00 HOURS, LAG= 1.41 VOL= 1.00									
21.	70.	132.	216.	324.	458.	572.	653.	700.	712.
707.	271.	623.	565.	507.	421.	347.	292.	248.	211.
102.	157.	174.	117.	90.	62.	70.	60.	51.	43.
16.	31.	77.	23.	19.	17.	14.	12.	10.	9.

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MP.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.10	1	.02	0.00	.02	P.	1.01	16.50	101	.48	.02	7523.
1.01	1.20	2	.02	0.00	.02	A.	1.01	17.00	102	.46	.02	7762.
1.01	1.30	3	.02	0.00	.02	A.	1.01	17.10	103	.36	.02	7819.
1.01	1.40	4	.02	0.00	.02	A.	1.01	17.20	104	.36	.02	7801.
1.01	1.50	5	.02	0.00	.02	A.	1.01	17.30	105	.36	.02	7632.
1.01	1.00	6	.02	0.00	.02	A.	1.01	17.40	106	.36	.02	7338.
1.01	1.10	7	.02	0.00	.02	A.	1.01	17.50	107	.36	.02	7083.
1.01	1.20	8	.02	0.00	.02	P.	1.01	18.00	108	.36	.02	6710.
1.01	1.30	9	.02	0.00	.02	A.	1.01	18.10	109	.03	.02	6279.
1.01	1.40	10	.02	0.00	.02	P.	1.01	18.20	110	.03	.02	5058.
1.01	1.50	11	.02	0.00	.02	A.	1.01	18.30	111	.03	.02	5473.
1.01	2.00	12	.02	0.00	.02	A.	1.01	18.40	112	.03	.02	5113.
1.01	2.10	13	.02	0.00	.02	A.	1.01	18.50	113	.03	.02	4752.
1.01	2.20	14	.02	0.00	.02	A.	1.01	19.00	114	.03	.02	4304.
1.01	2.30	15	.02	0.00	.02	A.	1.01	19.10	115	.03	.02	3008.
1.01	2.40	16	.02	0.00	.02	A.	1.01	19.20	116	.03	.02	3604.
1.01	2.50	17	.02	0.00	.02	A.	1.01	19.30	117	.03	.02	3211.
1.01	3.00	18	.02	0.00	.02	P.	1.01	19.40	118	.03	.02	2840.
1.01	3.10	19	.02	0.00	.02	A.	1.01	19.50	119	.03	.02	2490.
1.01	3.20	20	.02	0.00	.02	A.	1.01	20.00	120	.03	.02	2169.
1.01	3.30	21	.02	0.00	.02	A.	1.01	20.10	121	.03	.02	1876.
1.01	3.40	22	.02	0.00	.02	P.	1.01	20.20	122	.03	.02	1613.
1.01	3.50	23	.02	0.00	.02	A.	1.01	20.30	123	.03	.02	1382.
1.01	4.00	24	.02	0.00	.02	P.	1.01	20.40	124	.03	.02	1108.
1.01	4.10	25	.02	0.00	.02	A.	1.01	20.50	125	.03	.02	1028.
1.01	4.20	26	.02	0.00	.02	A.	1.01	21.00	126	.03	.02	892.
1.01	4.30	27	.02	0.00	.02	P.	1.01	21.10	127	.03	.02	777.
1.01	4.40	28	.02	0.00	.02	A.	1.01	21.20	128	.03	.02	617.
1.01	4.50	29	.02	0.00	.02	P.	1.01	21.30	129	.03	.02	595.
1.01	5.00	30	.02	0.00	.02	A.	1.01	21.40	130	.03	.02	522.
1.01	5.10	31	.02	0.00	.02	A.	1.01	21.50	131	.03	.02	460.
1.01	5.20	32	.02	0.00	.02	A.	1.01	22.00	132	.03	.02	407.
1.01	5.30	33	.02	0.00	.02	A.	1.01	22.10	133	.03	.02	363.
1.01	5.40	34	.02	0.00	.02	A.	1.01	22.20	134	.03	.02	325.
1.01	5.50	35	.02	0.00	.02	P.	1.01	22.30	135	.03	.02	293.
1.01	6.00	36	.02	0.00	.02	A.	1.01	22.40	136	.03	.02	266.
1.01	6.10	37	.05	0.00	.05	A.	1.01	22.50	137	.03	.02	242.
1.01	6.20	38	.05	0.00	.05	A.	1.01	23.00	138	.03	.02	221.
1.01	6.30	39	.05	0.00	.05	P.	1.01	23.10	139	.03	.02	203.
1.01	6.40	40	.05	0.00	.05	P.	1.01	23.20	140	.03	.02	188.
1.01	6.50	41	.05	0.00	.05	A.	1.01	23.30	141	.03	.02	174.
1.01	7.00	42	.05	0.00	.05	A.	1.01	23.40	142	.03	.02	161.
1.01	7.10	43	.05	0.00	.05	A.	1.01	23.50	143	.03	.02	151.
1.01	7.20	44	.05	.03	.02	A.	1.02	0.00	144	.03	.02	142.
1.01	7.30	45	.05	.03	.02	11.	1.02	.10	145	0.00	0.00	136.
1.01	7.40	46	.05	.03	.02	14.	1.02	.20	146	0.00	0.00	131.
1.01	7.50	47	.05	.03	.02	24.	1.02	.30	147	0.00	0.00	125.
1.01	8.00	48	.05	.03	.02	35.	1.02	.40	148	0.00	0.00	119.
1.01	8.10	49	.05	.03	.02	51.	1.02	.50	149	0.00	0.00	113.
1.01	8.20	50	.05	.03	.02	71.	1.02	1.00	150	0.00	0.00	104.
1.01	8.30	51	.05	.03	.02	93.	1.02	1.10	151	0.00	0.00	98.
1.01	8.40	52	.05	.03	.02	117.	1.02	1.20	152	0.00	0.00	89.
1.01	8.50	53	.05	.03	.02	141.	1.02	1.30	153	0.00	0.00	80.
1.01	9.00	54	.05	.03	.02	165.	1.02	1.40	154	0.00	0.00	71.
1.01	9.10	55	.05	.03	.02	187.	1.02	1.50	155	0.00	0.00	63.

1.01	9.20	56	.05	.03	.02	208.	1.02	2.00	151	0.00	0.00	0.00	55.
1.01	9.30	57	.05	.03	.02	227.	1.02	2.10	157	0.00	0.00	0.00	48.
1.01	9.40	58	.05	.03	.02	244.	1.02	2.20	159	0.00	0.00	0.00	42.
1.01	9.50	59	.05	.03	.02	257.	1.02	2.30	159	0.00	0.00	0.00	37.
1.01	10.00	60	.05	.03	.02	269.	1.02	2.40	160	0.00	0.00	0.00	32.
1.01	10.10	61	.05	.03	.02	287.	1.02	2.50	161	0.00	0.00	0.00	28.
1.01	10.20	62	.05	.03	.02	294.	1.02	3.00	162	0.00	0.00	0.00	25.
1.01	10.30	63	.05	.03	.02	300.	1.02	3.10	163	0.00	0.00	0.00	23.
1.01	10.40	64	.05	.03	.02	305.	1.02	3.20	164	0.00	0.00	0.00	20.
1.01	10.50	65	.05	.03	.02	309.	1.02	3.30	165	0.00	0.00	0.00	19.
1.01	11.00	66	.05	.03	.02	313.	1.02	3.40	166	0.00	0.00	0.00	17.
1.01	11.10	67	.05	.03	.02	319.	1.02	3.50	167	0.00	0.00	0.00	15.
1.01	11.20	68	.05	.03	.02	321.	1.02	4.00	168	0.00	0.00	0.00	14.
1.01	11.30	69	.05	.03	.02	325.	1.02	4.10	169	0.00	0.00	0.00	13.
1.01	11.40	70	.05	.03	.02	328.	1.02	4.20	170	0.00	0.00	0.00	12.
1.01	11.50	71	.05	.03	.02	333.	1.02	4.30	171	0.00	0.00	0.00	12.
1.01	12.00	72	.05	.03	.02	335.	1.02	4.40	172	0.00	0.00	0.00	11.
1.01	12.10	73	.05	.03	.02	339.	1.02	4.50	173	0.00	0.00	0.00	10.
1.01	12.20	74	.05	.03	.02	344.	1.02	5.00	174	0.00	0.00	0.00	10.
1.01	12.30	75	.05	.03	.02	354.	1.02	5.10	175	0.00	0.00	0.00	10.
1.01	12.40	76	.05	.03	.02	394.	1.02	5.20	176	0.00	0.00	0.00	9.
1.01	12.50	77	.05	.03	.02	458.	1.02	5.30	177	0.00	0.00	0.00	9.
1.01	13.00	78	.05	.03	.02	553.	1.02	5.40	178	0.00	0.00	0.00	9.
1.01	13.10	79	.05	.03	.02	687.	1.02	5.50	179	0.00	0.00	0.00	9.
1.01	13.20	80	.05	.03	.02	856.	1.02	6.00	180	0.00	0.00	0.00	8.
1.01	13.30	81	.05	.03	.02	1052.	1.02	6.10	181	0.00	0.00	0.00	8.
1.01	13.40	82	.05	.03	.02	1265.	1.02	6.20	182	0.00	0.00	0.00	8.
1.01	13.50	83	.05	.03	.02	1400.	1.02	6.30	183	0.00	0.00	0.00	8.
1.01	14.00	84	.05	.03	.02	1717.	1.02	6.40	184	0.00	0.00	0.00	8.
1.01	14.10	85	.05	.03	.02	1944.	1.02	6.50	185	0.00	0.00	0.00	8.
1.01	14.20	86	.05	.03	.02	2167.	1.02	7.00	186	0.00	0.00	0.00	8.
1.01	14.30	87	.05	.03	.02	2385.	1.02	7.10	187	0.00	0.00	0.00	8.
1.01	14.40	88	.05	.03	.02	2593.	1.02	7.20	188	0.00	0.00	0.00	8.
1.01	14.50	89	.05	.03	.02	2787.	1.02	7.30	189	0.00	0.00	0.00	8.
1.01	15.00	90	.05	.03	.02	2970.	1.02	7.40	190	0.00	0.00	0.00	8.
1.01	15.10	91	.05	.03	.02	3148.	1.02	7.50	191	0.00	0.00	0.00	8.
1.01	15.20	92	.05	.03	.02	3321.	1.02	8.00	192	0.00	0.00	0.00	8.
1.01	15.30	93	.05	.03	.02	3492.	1.02	8.10	193	0.00	0.00	0.00	8.
1.01	15.40	94	.05	.03	.02	3680.	1.02	8.20	194	0.00	0.00	0.00	8.
1.01	15.50	95	.05	.03	.02	3947.	1.02	8.30	195	0.00	0.00	0.00	8.
1.01	16.00	96	.05	.03	.02	4311.	1.02	8.40	196	0.00	0.00	0.00	8.
1.01	16.10	97	.05	.03	.02	4745.	1.02	8.50	197	0.00	0.00	0.00	8.
1.01	16.20	98	.05	.03	.02	5268.	1.02	9.00	198	0.00	0.00	0.00	8.
1.01	16.30	99	.05	.03	.02	5886.	1.02	9.10	199	0.00	0.00	0.00	8.
1.01	16.40	100	.05	.03	.02	6546.	1.02	9.20	200	0.00	0.00	0.00	8.
1.01	16.50					7115.							

SUM 23.97 21.29 2.69 207463.
(609.3) (541.3) (68.3) (5874.70)

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
7839.	4239.	1438.	1037.	207431.
222.	137.	41.	29.	5874.
	18.00	21.40	21.44	21.44
	457.21	543.49	544.57	544.57
	2399.	2851.	2857.	2857.
	2000.	3517.	3520.	3520.

CFS
CFS
INCHES
AC-FT
THOUS CU M

[illegible]

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3920.	2419.	719.	519.	103715.
CFS	111.	66.	26.	15.	2937.
INCHES		9.00	10.70	10.72	
MM		238.60	271.74	272.29	272.29
AC-FT		1199.	1626.	1426.	1429.
THOUS CU M		1479.	1759.	1762.	1762.

PLAN 2 SAME AS PLAN 1

HYDROGRAPH ROUTING

SCOUT INFLOW HYDROGRAPH THROUGH LAKE TELEMARK

ISTAQ	ICOMP	IECON	ITAPT	JFLT	JFRT	INAME	ISTAGE	IAUTO
A2	1	0	0	0	1	1	0	0

ALL PLANS HAVE SAFE
ROUTING DATA

[illegible]

ELEVATION: 665. 669. 670. 671. 672. 673. 675. 677.

CREL 669.0
 SPVID 0.0
 COOV 0.0
 EXPV 0.0
 ELEV 0.0
 COBL 0.0
 CAREA 0.0
 EXPL 0.0

DAM DATA
 TOPEL 673.2
 COOD 0.0
 EXFD 0.0
 DAMVID 0.

DAM BREACH DATA
 BRVID 17.
 Z 2
 LLRM 664.60
 TAIL 1.00
 USEL 670.00
 FAILEL 673.20

ASSAY: A2, PLAN 1, RATIO 3

END-OF-PREFLOW HYDROGRAPH OPINATES

[illegible]

STORAGE			
70.	70.	70.	69.
69.	69.	69.	69.
68.	68.	68.	68.
68.	68.	68.	67.
67.	67.	67.	67.
69.	71.	72.	77.
82.	84.	85.	90.
93.	93.	94.	97.
111.	111.	109.	102.
107.	109.	108.	104.
127.	128.	127.	123.
119.	116.	112.	109.
93.	88.	84.	65.
56.	54.	50.	44.
39.	38.	32.	34.
32.	31.	30.	29.
27.	26.	26.	25.
24.	23.	23.	23.
22.	22.	22.	21.
21.	21.	21.	21.

[illegible]

673.1	672.1	672.2	672.3	672.4	672.6	672.8	673.1
673.4	673.5	673.4	673.3	673.2	673.0	673.0	673.1
673.4	673.5	673.7	673.8	674.0	674.2	674.4	674.6
674.8	674.8	674.8	674.7	674.7	674.6	674.5	674.4
674.2	674.1	673.9	673.6	673.4	673.3	673.1	672.8
672.1	671.7	670.9	670.6	670.2	669.9	669.5	669.2
668.6	668.4	668.2	668.0	667.8	667.4	667.3	667.2
666.9	666.8	666.7	666.6	666.5	666.4	666.4	666.3
666.2	666.1	666.0	666.0	665.9	665.9	665.8	665.8
665.7	665.6	665.6	665.5	665.5	665.5	665.4	665.4
665.4	665.3	665.3	665.3	665.3	665.3	665.2	665.2
665.2	665.2	665.2	665.2	665.2	665.1	665.1	665.1
665.1	665.1	665.1	665.1	665.1	665.1	665.1	665.1

PEAK OUTFLOW IS 3910. AT TIME 17.33 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3910.	2444.	742.	537.	107302.
CFS	111.	69.	21.	15.	3038.
INCHES		9.09	11.04	11.09	
AC-FT		230.94	280.52	281.70	
THOUS CU H		1212.	1472.	1478.	
		1495.	1815.	1823.	

THE OAP 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-F1)
13.500	0.000	420.	420.		0.	0.	0.
13.521	.021	451.	452.		-1.	-1.	-0.
13.542	.042	482.	484.		-3.	-4.	-0.
13.563	.063	512.	516.		-4.	-7.	-0.
13.583	.083	543.	547.		-4.	-12.	-0.
13.604	.104	573.	578.		-5.	-16.	-0.
13.625	.125	604.	608.		-4.	-20.	-0.
13.646	.146	635.	637.		-2.	-22.	-0.
13.667	.167	665.	665.		0.	-22.	-0.
13.688	.188	691.	693.		-2.	-25.	-0.
13.708	.208	716.	720.		-4.	-29.	-0.
13.729	.229	741.	746.		-5.	-33.	-0.
13.750	.250	767.	772.		-5.	-38.	-0.
13.771	.271	792.	797.		-5.	-43.	-0.
13.792	.292	817.	821.		-4.	-47.	-0.
13.813	.313	843.	845.		-2.	-49.	-0.
13.833	.333	868.	868.		0.	-49.	-0.
13.854	.354	889.	891.		-1.	-50.	-0.
13.875	.375	910.	913.		-3.	-52.	-0.
13.896	.396	932.	935.		-3.	-55.	-0.
13.917	.417	953.	956.		-3.	-58.	-0.
13.938	.438	974.	977.		-3.	-61.	-0.
13.958	.458	994.	998.		-4.	-63.	-0.
13.979	.479	1017.	1018.		-1.	-64.	-0.
14.000	.500	1038.	1038.		0.	-64.	-0.
14.021	.521	1057.	1058.		-1.	-65.	-0.
14.042	.542	1076.	1078.		-2.	-67.	-0.
14.063	.563	1095.	1097.		-2.	-68.	-0.
14.083	.583	1114.	1116.		-2.	-70.	-0.
14.104	.604	1133.	1135.		-2.	-72.	-0.
14.125	.625	1152.	1153.		-1.	-73.	-0.
14.146	.646	1171.	1172.		-1.	-74.	-0.
14.167	.667	1190.	1190.		0.	-74.	-0.
14.188	.688	1207.	1208.		-1.	-74.	-0.
14.208	.708	1225.	1226.		-1.	-75.	-0.
14.229	.729	1242.	1244.		-2.	-77.	-0.
14.250	.750	1260.	1261.		-1.	-78.	-0.
14.271	.771	1277.	1278.		-1.	-79.	-0.
14.292	.792	1295.	1296.		-1.	-80.	-0.
14.313	.812	1312.	1313.		-1.	-80.	-0.
14.333	.833	1330.	1330.		0.	-80.	-0.
14.354	.854	1349.	1347.		2.	-78.	-0.
14.375	.875	1367.	1363.		4.	-72.	-0.
14.396	.896	1384.	1380.		4.	-64.	-0.
14.417	.917	1407.	1396.		11.	-53.	-0.
14.438	.937	1427.	1412.		15.	-38.	-0.
14.459	.958	1446.	1428.		18.	-20.	-0.
14.479	.978	1466.	1450.		16.	-10.	-0.
14.500	1.000	1485.	1485.		0.	-10.	-0.

END-OF-TYPE HYDROGRAPHIC OPERATES

INLET	OUTLET
10.	10.
9.	9.
8.	8.
7.	7.
6.	6.
5.	5.
4.	4.
3.	3.
2.	2.
1.	1.

8.	8.	P.	R.	P.	R.	P.	P.	7.	7.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	7.	7.
0.	10.	10.	11.	13.	14.	15.	16.	16.	16.	18.
21.	35.	49.	61.	72.	82.	92.	100.	107.	107.	107.
119.	124.	130.	136.	145.	158.	175.	200.	232.	232.	232.
587.	721.	843.	964.	1114.	1227.	1329.	1424.	1515.	1515.	1515.
1691.	1789.	1902.	2060.	2258.	2496.	2764.	3105.	3413.	3413.	3413.
3830.	3904.	3910.	3855.	3749.	3614.	3450.	3249.	3035.	3035.	3035.
2649.	2471.	2290.	2102.	1907.	1710.	1536.	1360.	1101.	1101.	1101.
908.	808.	704.	610.	529.	459.	399.	349.	305.	305.	305.
239.	233.	226.	218.	209.	199.	190.	180.	171.	171.	171.
152.	144.	136.	128.	121.	114.	106.	102.	96.	96.	96.
85.	80.	75.	70.	65.	60.	56.	51.	47.	47.	47.
40.	36.	33.	30.	28.	25.	21.	21.	19.	19.	19.
20.	20.	20.	20.	20.	20.	19.	19.	17.	17.	17.
19.	18.	17.	16.	16.	16.	16.	16.	16.	16.	16.

STORAGE

[illegible]

STAGE

[illegible]

670.7 670.7 670.7 670.7 670.7 670.6 670.6 670.6 670.6 670.6

PEAK OUTFLOW IS 3910. AT TIME 17.33 HOURS

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME

CFS 3910. 714. 516. 103270.

CMS 111. 68. 20. 2024.

INCHES 8.99 10.63 10.67 10.67

MM 228.44 269.90 271.12 271.12

AC-FT 1199. 1416. 1422. 1422.

THOUS CU M 1478. 1747. 1755. 1755.

HYDROGRAPH ROUTING

CHANNEL ROUTING -HOO PULS- REACH 1

ISTAO IECON ITAPE JPLI JPRJ INAME ISTAGE IAUO

A3 0 0 0 0 1 0

ALL PLANS HAVE SAME ROUTING DATA

LOSS CLOSS AVG IRES ISAME LOPT IPMP LSTR

0.0 0.000 0.00 1 1 0 0

NSTPS NSTOL LAG AMSKK X TSK STORA ISPRAT

1 0 0 0.000 0.000 -1. 0

NORMAL DEPTH CHANNEL ROUTING

ON(1) ON(2) ON(3) ELNVT ELMAX PLNTH SEL

.0500 .0500 .0500 663.0 674.0 50. .01200

CROSS SECTION COORDINATES--STA,CLEV,STATELEV--ETC

0.00 674.00 32.00 670.00 64.00 666.00 64.00 663.00

64.00 666.00 116.00 670.00 148.00 674.00

STORAGE	0.00	.01	.03	.04	.05	.07	.10	.13	.16
OUTFLOW	0.00	25.29	77.49	147.25	230.34	324.02	438.94	583.40	765.76
STAGE	1275.51	1616.59	2023.43	2501.86	3057.39	3695.36	4420.91	5239.00	6154.49
FLOW	0.00	25.29	77.49	147.25	230.34	324.02	438.94	583.40	765.76
	1275.51	1616.59	2023.43	2501.86	3057.39	3695.36	4420.91	5239.00	6154.49

[illegible]

3665.	3826.	3900.	3911.	3857.	3753.	3614.	3445.	3242.	3048.
	2661.	2490.	2318.	2154.	1971.	1777.	1586.	1456.	1363.
1281.	1133.	1010.	894.	801.	730.	662.	597.	535.	480.
431.	353.	300.	321.	291.	266.	242.	225.	204.	187.
173.	160.	148.	138.	128.	120.	113.	106.	100.	95.
89.	80.	79.	75.	70.	65.	61.	57.	53.	50.
46.	43.	40.	37.	35.	33.	30.	28.	27.	25.
20.	22.	21.	20.	19.	18.	17.	16.	15.	14.
13.	15.	12.	11.	11.	11.	10.	10.	10.	9.
9.	9.	8.	8.	8.	8.	7.	7.	7.	7.

[illegible][illegible]

	PEAK	6-HOUR	24-FOUR	72-HOUR	TOTAL VOLUME
CFS	3911	2000	702	527	107302
CMS	111	60	21	15	3030
INCHES		9.09	11.00	11.00	11.00
"A		230.94	280.52	291.70	291.70

1212.	1472.	1478.	1478.
1495.	1415.	1423.	1423.

MAXIMUM STORAGE = 1.

MAXIMUM STAGE IS 671.9

STATION A3, PLAN 2, PTIC 3

10.

19.	17.	10.	16.	2.	8.	5.
-----	-----	-----	-----	----	----	----

[illegible]

STOR

[illegible]

STIG

[illegible]

667.26	667.79	668.32	668.84	669.37	669.89	670.42	670.95	671.47	672.00
0.00	18.68	50.68	104.80	165.79	231.64	302.95	378.72	458.20	540.78
626.02	713.52	820.40	993.25	1277.09	1712.54	2335.00	3176.62	4267.36	5635.04

FLOW

STATION A4, PLAN 1, R110 3

OUTFLOW

10.	10.	10.	10.	10.	9.	9.	9.	9.	9.
9.	9.	9.	9.	9.	9.	9.	9.	9.	9.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
7.	7.	7.	7.	7.	7.	7.	7.	7.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	7.
10.	10.	10.	11.	12.	14.	15.	14.	14.	1P.

STÖR

STAGE

TRACK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
1	100	100	100	300
2	100	100	100	300
3	100	100	100	300
4	100	100	100	300
5	100	100	100	300
6	100	100	100	300
7	100	100	100	300
8	100	100	100	300
9	100	100	100	300
10	100	100	100	300
11	100	100	100	300
12	100	100	100	300
13	100	100	100	300
14	100	100	100	300
15	100	100	100	300
16	100	100	100	300
17	100	100	100	300
18	100	100	100	300
19	100	100	100	300
20	100	100	100	300
21	100	100	100	300
22	100	100	100	300
23	100	100	100	300
24	100	100	100	300
25	100	100	100	300
26	100	100	100	300
27	100	100	100	300
28	100	100	100	300
29	100	100	100	300
30	100	100	100	300
31	100	100	100	300
32	100	100	100	300
33	100	100	100	300
34	100	100	100	300
35	100	100	100	300
36	100	100	100	300
37	100	100	100	300
38	100	100	100	300
39	100	100	100	300
40	100	100	100	300
41	100	100	100	300
42	100	100	100	300
43	100	100	100	300
44	100	100	100	300
45	100	100	100	300
46	100	100	100	300
47	100	100	100	300
48	100	100	100	300
49	100	100	100	300
50	100	100	100	300
51	100	100	100	300
52	100	100	100	300
53	100	100	100	300
54	100	100	100	300
55	100	100	100	300
56	100	100	100	300
57	100	100	100	300
58	100	100	100	300
59	100	100	100	300
60	100	100	100	300
61	100	100	100	300
62	100	100	100	300
63	100	100	100	300
64	100	100	100	300
65	100	100	100	300
66	100	100	100	300
67	100	100	100	300
68	100	100	100	300
69	100	100	100	300
70	100	100	100	300
71	100	100	100	300
72	100	100	100	300
73	100	100	100	300
74	100	100	100	300
75	100	100	100	300
76	100	100	100	300
77	100	100	100	300
78	100	100	100	300
79	100	100	100	300
80	100	100	100	300

CPS	3911.	2444.	742.	537.	107302.
CPS	111.	69.	21.	15.	3038.
INCHES		9.09	11.04	11.09	11.09
IN		230.94	280.52	281.70	281.70
AC-FT		1212.	1472.	1478.	1478.
THOUS CU W		1495.	1815.	1823.	1823.

MAXIMUM STORAGE = 0.

MAXIMUM STAGE IS 671.3

AD-A087 538

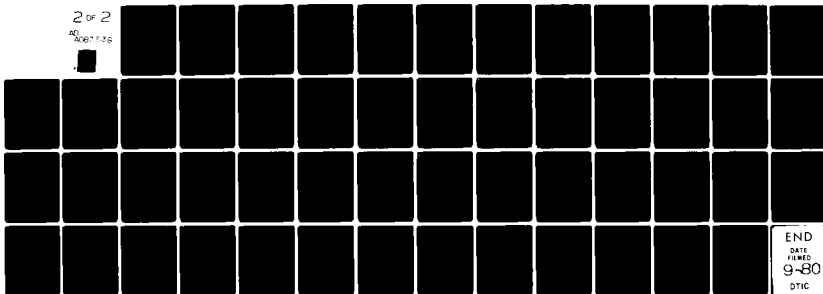
NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/13
NATIONAL DAM SAFETY PROGRAM. LAKE AMES DAM (NJ00337), PASSAIC R--ETC(U)
FEB 80 W A GUINAN DACW61-79-C-0011

UNCLASSIFIED

NL

2 OF 2

AD-A087 538



END
DATE
FILMED
9-80
DTIC

OUTFLOW									
10.	10.	10.	10.	10.	10.	10.	10.	10.	10.
9.	9.	9.	9.	9.	9.	9.	9.	9.	9.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
7.	7.	7.	7.	7.	7.	7.	7.	7.	7.
8.	9.	10.	11.	12.	13.	14.	15.	16.	18.
19.	21.	34.	61.	72.	157.	175.	199.	231.	107.
13.	119.	124.	130.	136.	145.	157.	175.	199.	231.
12.	587.	718.	843.	960.	1113.	1224.	1328.	1422.	1515.
01.	1690.	1787.	1901.	2056.	2256.	2492.	2781.	3101.	3410.
54.	3829.	3903.	3856.	3751.	3615.	3452.	3251.	3038.	2808.
35.	2651.	2472.	2304.	1999.	1712.	1539.	1363.	1194.	1024.
38.	910.	810.	706.	611.	530.	460.	400.	349.	306.
68.	239.	233.	227.	218.	199.	190.	180.	171.	161.
61.	153.	144.	136.	128.	121.	114.	108.	102.	96.
91.	86.	80.	75.	70.	65.	60.	56.	51.	47.
43.	40.	36.	33.	31.	28.	26.	23.	21.	19.
19.	20.	20.	20.	20.	20.	19.	18.	17.	16.
19.	19.	18.	18.	18.	18.	18.	18.	17.	16.
17.	17.	17.	17.	16.	16.	16.	16.	16.	16.

STÖR

[illegible]

STAGE

662.3	662.3	662.3	662.3	662.3	662.3	662.3	662.3
662.3	662.3	662.3	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.3	662.3	662.3	662.4	662.5	662.5
662.6	662.9	663.1	663.2	663.3	663.4	663.5	663.6
663.7	663.8	663.8	663.9	663.9	664.0	664.4	664.6
667.0	667.8	668.4	669.1	669.3	669.4	669.5	669.7
669.9	670.0	670.2	670.4	670.5	670.7	670.9	671.1
671.3	671.3	671.3	671.2	671.2	671.1	671.0	670.9
670.6	670.7	670.4	670.2	670.1	669.9	669.5	669.2
668.6	668.3	667.7	667.2	666.7	666.2	665.5	665.2

664.7	664.7	664.6	664.6	664.5	664.5	664.4	664.3	664.2	664.1
664.1	664.0	663.9	663.8	663.7	663.6	663.5	663.4	663.3	663.2
663.4	663.3	663.2	663.1	663.0	662.9	662.8	662.7	662.6	662.5
662.9	662.8	662.7	662.6	662.5	662.4	662.3	662.2	662.1	662.0
662.4	662.3	662.2	662.1	662.0	661.9	661.8	661.7	661.6	661.5
662.5	662.4	662.3	662.2	662.1	662.0	661.9	661.8	661.7	661.6
662.5	662.4	662.3	662.2	662.1	662.0	661.9	661.8	661.7	661.6

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3911.	2417.	714.	103270.
CMS	111.	68.	20.	2924.
INCHES	8.99	10.63	10.67	10.67
MM	228.43	269.90	271.12	271.12
AC-FT	1199.	1416.	1422.	1422.
THOUS CU H	1478.	1747.	1755.	1755.

MAXIMUM STORAGE = 0.

MAXIMUM STAGE IS 671.3

.....

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- REACH 2

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRI	INAME	ISTAGE	IAUTO
A5	1	0	0	0	1	1	1	0

ALL PLANS HAVE SAME

ROUTING DATA	TOPT	IPMP	LSTR
GROSS	0.00	0.00	0
AVG	0.00	0.00	0
IRIS	1	1	0
ISAME	1	1	0

NSIPS	MSIDL	LAG	ANSKK	X	ISK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QNC(1)	QNC(2)	QNC(3)	ELNVT	ELMAX	RLNTH	SEL
.0600	.0500	.0600	635.0	645.0	2300.	.01200

CROSS SECTION COORDINATES--STA+ELEV+STAGELEV--ETC

0.00	645.00	70.00	741.00	160.00	637.00	160.00	635.00
172.00	637.00	212.00	641.00	252.00	645.00		

STORAGE	0.00	.33	.67	1.00	1.36	1.98	3.06	4.58	6.54	P.03
	11.77	15.04	18.75	22.90	27.40	32.52	37.99	43.90	50.24	57.02

	0.00	12.71	38.31	71.77	111.89	169.74	257.74	387.23	567.82	808.13
OUTFLOW	1116.15	1499.37	1964.90	2519.54	3169.84	3922.10	4782.45	5756.83	6851.03	8070.60
	635.00	635.53	636.05	636.58	637.11	637.63	638.16	638.68	639.21	639.74
STAGE	640.26	640.79	641.32	641.84	642.37	642.89	643.42	643.95	644.47	645.00
	0.00	12.71	38.31	71.77	111.89	169.74	257.74	387.23	567.82	808.13
FLOW	1116.15	1499.37	1964.90	2519.54	3169.84	3922.10	4782.45	5756.83	6851.03	8070.60

[illegible]

[illegible][illegible]

A5, PLAN 2, RTIO 3

[illegible][illegible][illegible]

640.8	640.9	641.1	641.2	641.3	641.5	641.7	641.9	642.2	642.4
642.0	642.8	642.9	642.9	642.9	642.8	642.7	642.6	642.5	642.3
642.2	642.0	641.2	641.7	641.5	641.4	641.2	640.9	640.7	640.5
640.3	640.1	639.9	639.7	639.5	639.3	639.1	638.9	638.7	638.5
634.3	634.2	634.1	634.0	634.0	633.9	633.9	633.8	633.7	633.7
636.9	636.8	636.7	636.7	636.6	636.5	636.5	636.4	636.3	636.2
636.2	636.1	636.1	636.0	635.9	635.9	635.8	635.8	635.7	635.7
635.7	635.7	635.7	635.7	635.6	635.6	635.6	635.6	635.6	635.6
635.6	635.6	635.6	635.6	635.6	635.6	635.6	635.6	635.6	635.6

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME
CFS 3908. 2416. 714. 516. 103241.
CMS 111. 68. 20. 15. 2924.
INCHES 8.99 10.63 10.67 10.67
PP 228.30 269.88 271.09 271.09
AC-FT 1198. 1416. 1422. 1422.
THOUS CU M 1477. 1747. 1754. 1754.

MAXIMUM STORAGE = 32.

MAXIMUM STAGE IS 642.9

SUB-AREA RUNOFF COMPUTATION

DEVELOP LAKE AMES INFLOW HYDROGRAPH - SUB-AREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRI	INAME	ISTAGE	IAUTO
AR	0	0	0	0	1	1	0	0

HYDROGRAPH DATA

1HYDC	1UHG	YAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	2.80	0.00	2.80	.80	0.000	0	1	0

PRECIP DATA

SPFF	PMS	R6	R12	R24	R48	R72	R96
0.00	22.70	113.00	123.00	132.00	0.00	0.00	0.00

LOSS DATA

LROPT	STKR	DLTKR	RTIOL	FRIN	STKS	RTIOK	STRTL	CNSTL	ALSHX	RTIMP
0	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 LAGE= 1.27

RECESSION DATA
SIRTS= -3.00 GRCSH= 0.00 PILOP= 1.00

UNIT HYDROGRAPH	40 END OF PERIOD	ORDINATES	TC=	0.00	HOURS	LAGE	1.27	VOL=	1.00
46.	142.	273.	458.	685.	862.	967.	998.	908.	907.
817.	702.	550.	443.	361.	295.	246.	202.	145.	134.
110.	91.	73.	60.	40.	33.	27.	22.	18.	10.

END-OF-PERIOD FLOW

NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	7.	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.01	1	.02	0.00	.02	8.	1.01	16.50	101	.48	.02	.46	.02	9824.
1.01	1.01	2	.02	0.00	.02	8.	1.01	17.00	102	.48	.02	.46	.02	9723.
1.01	1.01	3	.02	0.00	.02	8.	1.01	17.10	103	.38	.02	.36	.02	9370.
1.01	1.01	4	.02	0.00	.02	8.	1.01	17.20	104	.38	.02	.36	.02	8893.
1.01	1.01	5	.02	0.00	.02	8.	1.01	17.30	105	.38	.02	.36	.02	8297.
1.01	1.01	6	.02	0.00	.02	8.	1.01	17.40	106	.38	.02	.36	.02	7615.
1.01	1.01	7	.02	0.00	.02	8.	1.01	17.50	107	.38	.02	.36	.02	7008.
1.01	1.01	8	.02	0.00	.02	8.	1.01	18.00	108	.38	.02	.36	.02	6517.
1.01	1.01	9	.02	0.00	.02	8.	1.01	18.10	109	.03	.01	.01	.02	6082.
1.01	1.01	10	.02	0.00	.02	8.	1.01	18.20	110	.03	.01	.01	.02	5685.
1.01	1.01	11	.02	0.00	.02	8.	1.01	18.30	111	.03	.01	.01	.02	5277.
1.01	1.01	12	.02	0.00	.02	8.	1.01	18.40	112	.03	.01	.01	.02	4847.
1.01	1.01	13	.02	0.00	.02	8.	1.01	18.50	113	.03	.01	.01	.02	4377.
1.01	1.01	14	.02	0.00	.02	8.	1.01	19.00	114	.03	.01	.01	.02	3886.
1.01	1.01	15	.02	0.00	.02	8.	1.01	19.10	115	.03	.01	.01	.02	3396.
1.01	1.01	16	.02	0.00	.02	8.	1.01	19.20	116	.03	.01	.01	.02	2921.
1.01	1.01	17	.02	0.00	.02	8.	1.01	19.30	117	.03	.01	.01	.02	2474.
1.01	1.01	18	.02	0.00	.02	8.	1.01	19.40	118	.03	.01	.01	.02	2075.
1.01	1.01	19	.02	0.00	.02	8.	1.01	19.50	119	.03	.01	.01	.02	1721.
1.01	1.01	20	.02	0.00	.02	8.	1.01	20.00	120	.03	.01	.01	.02	1422.
1.01	1.01	21	.02	0.00	.02	8.	1.01	20.10	121	.03	.01	.01	.02	1181.
1.01	1.01	22	.02	0.00	.02	8.	1.01	20.20	122	.03	.01	.01	.02	988.
1.01	1.01	23	.02	0.00	.02	8.	1.01	20.30	123	.03	.01	.01	.02	831.
1.01	1.01	24	.02	0.00	.02	8.	1.01	20.40	124	.03	.01	.01	.02	703.
1.01	1.01	25	.02	0.00	.02	8.	1.01	20.50	125	.03	.01	.01	.02	597.
1.01	1.01	26	.02	0.00	.02	8.	1.01	21.00	126	.03	.01	.01	.02	511.
1.01	1.01	27	.02	0.00	.02	8.	1.01	21.10	127	.03	.01	.01	.02	440.
1.01	1.01	28	.02	0.00	.02	8.	1.01	21.20	128	.03	.01	.01	.02	382.
1.01	1.01	29	.02	0.00	.02	8.	1.01	21.30	129	.03	.01	.01	.02	333.
1.01	1.01	30	.02	0.00	.02	8.	1.01	21.40	130	.03	.01	.01	.02	292.
1.01	1.01	31	.02	0.00	.02	8.	1.01	21.50	131	.03	.01	.01	.02	259.
1.01	1.01	32	.02	0.00	.02	8.	1.01	22.00	132	.03	.01	.01	.02	229.
1.01	1.01	33	.02	0.00	.02	8.	1.01	22.10	133	.03	.01	.01	.02	205.
1.01	1.01	34	.02	0.00	.02	8.	1.01	22.20	134	.03	.01	.01	.02	187.
1.01	1.01	35	.02	0.00	.02	8.	1.01	22.30	135	.03	.01	.01	.02	174.
1.01	1.01	36	.02	0.00	.02	8.	1.01	22.40	136	.03	.01	.01	.02	164.
1.01	1.01	37	.02	0.00	.02	8.	1.01	22.50	137	.03	.01	.01	.02	155.
1.01	1.01	38	.02	0.00	.02	8.	1.01	23.00	138	.03	.01	.01	.02	148.
1.01	1.01	39	.02	0.00	.02	8.	1.01	23.10	139	.03	.01	.01	.02	143.
1.01	1.01	40	.02	0.00	.02	8.	1.01	23.20	140	.03	.01	.01	.02	138.
1.01	1.01	41	.02	0.00	.02	8.	1.01	23.30	141	.03	.01	.01	.02	134.
1.01	1.01	42	.02	0.00	.02	8.	1.01	23.40	142	.03	.01	.01	.02	131.
1.01	1.01	43	.02	0.00	.02	8.	1.01	23.50	143	.03	.01	.01	.02	129.
1.01	1.01	44	.02	0.00	.02	8.	1.02	0.00	144	.03	.01	.01	.02	127.
1.01	1.01	45	.02	0.00	.02	8.	1.02	.10	145	0.00	0.00	0.00	0.00	125.
1.01	1.01	46	.02	0.00	.02	8.	1.02	.20	146	0.00	0.00	0.00	0.00	122.
1.01	1.01	47	.02	0.00	.02	8.	1.02	.30	147	0.00	0.00	0.00	0.00	118.
1.01	1.01	48	.02	0.00	.02	8.	1.02	.40	148	0.00	0.00	0.00	0.00	113.
1.01	1.01	49	.02	0.00	.02	8.	1.02	.50	149	0.00	0.00	0.00	0.00	106.
1.01	1.01	50	.02	0.00	.02	8.	1.02	1.00	150	0.00	0.00	0.00	0.00	97.
1.01	1.01	51	.02	0.00	.02	8.	1.02	1.10	151	0.00	0.00	0.00	0.00	87.
1.01	1.01	52	.02	0.00	.02	8.	1.02	1.20	152	0.00	0.00	0.00	0.00	76.
1.01	1.01	53	.02	0.00	.02	8.	1.02	1.30	153	0.00	0.00	0.00	0.00	66.
1.01	1.01	54	.02	0.00	.02	8.	1.02	1.40	154	0.00	0.00	0.00	0.00	56.
1.01	1.01	55	.02	0.00	.02	8.	1.02	1.50	155	0.00	0.00	0.00	0.00	48.

1.01	9.20	.05	.03	.02	294.	1.02	2.00	156	0.00	0.00	0.00	40.
1.01	9.20	.05	.03	.02	300.	1.02	2.10	157	0.00	0.00	0.00	34.
1.01	9.40	.05	.03	.02	321.	1.02	2.20	158	0.00	0.00	0.00	27.
1.01	9.50	.05	.03	.02	330.	1.02	2.30	159	0.00	0.00	0.00	26.
1.01	10.00	.05	.03	.02	338.	1.02	2.40	160	0.00	0.00	0.00	23.
1.01	10.10	.05	.03	.02	345.	1.02	2.50	161	0.00	0.00	0.00	20.
1.01	10.20	.05	.03	.02	351.	1.02	3.00	162	0.00	0.00	0.00	14.
1.01	10.30	.05	.03	.02	355.	1.02	3.10	163	0.00	0.00	0.00	14.
1.01	10.40	.05	.03	.02	357.	1.02	3.20	164	0.00	0.00	0.00	15.
1.01	10.50	.05	.03	.02	362.	1.02	3.30	165	0.00	0.00	0.00	13.
1.01	11.00	.05	.03	.02	364.	1.02	3.40	166	0.00	0.00	0.00	13.
1.01	11.10	.05	.03	.02	366.	1.02	3.50	167	0.00	0.00	0.00	12.
1.01	11.20	.05	.03	.02	368.	1.02	4.00	168	0.00	0.00	0.00	11.
1.01	11.30	.05	.03	.02	369.	1.02	4.10	169	0.00	0.00	0.00	11.
1.01	11.40	.05	.03	.02	370.	1.02	4.20	170	0.00	0.00	0.00	10.
1.01	11.50	.05	.03	.02	371.	1.02	4.30	171	0.00	0.00	0.00	10.
1.01	12.00	.05	.03	.02	372.	1.02	4.40	172	0.00	0.00	0.00	10.
1.01	12.10	.05	.03	.02	386.	1.02	4.50	173	0.00	0.00	0.00	9.
1.01	12.20	.05	.03	.02	427.	1.02	5.00	174	0.00	0.00	0.00	9.
1.01	12.30	.05	.03	.02	507.	1.02	5.10	175	0.00	0.00	0.00	9.
1.01	12.40	.05	.03	.02	641.	1.02	5.20	176	0.00	0.00	0.00	8.
1.01	12.50	.05	.03	.02	841.	1.02	5.30	177	0.00	0.00	0.00	8.
1.01	13.00	.05	.03	.02	1093.	1.02	5.40	178	0.00	0.00	0.00	9.
1.01	13.10	.05	.03	.02	1378.	1.02	5.50	179	0.00	0.00	0.00	9.
1.01	13.20	.05	.03	.02	1675.	1.02	6.00	180	0.00	0.00	0.00	8.
1.01	13.30	.05	.03	.02	1985.	1.02	6.10	181	0.00	0.00	0.00	8.
1.01	13.40	.05	.03	.02	2281.	1.02	6.20	182	0.00	0.00	0.00	8.
1.01	13.50	.05	.03	.02	2565.	1.02	6.30	183	0.00	0.00	0.00	8.
1.01	14.00	.05	.03	.02	2829.	1.02	6.40	184	0.00	0.00	0.00	8.
1.01	14.10	.05	.03	.02	3063.	1.02	6.50	185	0.00	0.00	0.00	8.
1.01	14.20	.05	.03	.02	3275.	1.02	7.00	186	0.00	0.00	0.00	8.
1.01	14.30	.05	.03	.02	3475.	1.02	7.10	187	0.00	0.00	0.00	8.
1.01	14.40	.05	.03	.02	3670.	1.02	7.20	188	0.00	0.00	0.00	8.
1.01	14.50	.05	.03	.02	3868.	1.02	7.30	189	0.00	0.00	0.00	8.
1.01	15.00	.05	.03	.02	4063.	1.02	7.40	190	0.00	0.00	0.00	8.
1.01	15.10	.05	.03	.02	4247.	1.02	7.50	191	0.00	0.00	0.00	8.
1.01	15.20	.05	.03	.02	4427.	1.02	8.00	192	0.00	0.00	0.00	8.
1.01	15.30	.05	.03	.02	4645.	1.02	8.10	193	0.00	0.00	0.00	8.
1.01	15.40	.05	.03	.02	5035.	1.02	8.20	194	0.00	0.00	0.00	8.
1.01	15.50	.05	.03	.02	5622.	1.02	8.30	195	0.00	0.00	0.00	8.
1.01	16.00	.05	.03	.02	6389.	1.02	8.40	196	0.00	0.00	0.00	8.
1.01	16.10	.05	.03	.02	7345.	1.02	8.50	197	0.00	0.00	0.00	8.
1.01	16.20	.05	.03	.02	8378.	1.02	9.00	198	0.00	0.00	0.00	8.
1.01	16.30	.05	.03	.02	9190.	1.02	9.10	199	0.00	0.00	0.00	8.
1.01	16.40	.05	.03	.02	9674.	1.02	9.20	200	0.00	0.00	0.00	8.

SUM 23.97 21.29 2.69 232315.
(609.) (541.) (68.) (6578.43)

PEAK	4-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
9824.	5559.	1410.	1162.	232322.
278.	157.	46.	33.	6579.
	18.47	21.40	21.44	21.44
	469.11	543.49	544.57	544.57
	2757.	3194.	3200.	3200.
	3400.	3410.	3447.	3447.

CFS
INCHES
AC-FT
THOUS CU "

HYDROGRAPH AT STA A6 FOR PLAN 1, RTIO 3

[illegible]

PLAN 2 SAME AS PLAN 1

COMBINE HYDROGRAPHS

COMBINE SUB-AREA 1 & SUB-AREA 2 FLOW CONTRIBUTIONS

ISTAQ	ICOMP	IFCON	ITAFI	JFLY	JFRT	INAME	ISTAGE	IAUTO
A7	2	0	0	0	1	1	0	0

THOUS CU M 3155. 3115. 3728. 3728.

HYDROGRAPH ROUTING

ROUTE INFLOW HYDROGRAPH THROUGH LAKE AMES

ISTAQ	ICOMP	IFCON	ITAPE	JPLT	JFRT	INAME	ISTAGE	IAUTO
AB	1	0	0	0	1	1	0	0

ALL PLANS HAVE SAME

ROUTING DATA

QLOSS	CLOSS	AVG	IRIS	ISAME	ICPT	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	155.	-1

STAGE	634.90	635.20	636.20	637.10	637.60	639.00	640.00	641.00
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FLOW	0.00	19.00	200.00	483.00	633.00	779.00	2621.00	4618.00
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CAPACITY=	47.	155.	161.	166.	197.	203.	236.	280.
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ELEVATION=	628.	635.	635.	636.	637.	637.	639.	641.
------------	------	------	------	------	------	------	------	------

CREL	SPUID	COOV	EXPV	ELEV	COOL	CAREA	EXPL
634.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPFL	COOD	EXPD	DAMVID
637.1	0.0	0.0	0.

DAM BREACH DATA

ORVID	2	ELOM	TFAIL	VSEL	FAILEL
26.	1.00	628.40	1.00	634.90	637.10

PEAK OUTFLOW IS 8572. AT TIME 17.17 HOURS

636.3	636.3	636.4	636.4	636.5	636.6	636.7	636.9	637.1	637.3
637.5	637.5	637.4	637.3	637.1	636.9	636.9	637.1	637.2	637.3
637.4	637.7	637.7	637.8	638.0	638.2	638.0	638.9	639.3	639.6
639.7	639.8	639.9	639.8	639.7	639.6	639.4	639.3	639.1	639.0
638.8	638.6	638.4	638.2	637.9	637.7	637.5	637.2	636.9	636.5
636.2	635.9	635.6	635.2	634.9	634.6	634.2	633.9	633.6	633.3
633.1	632.8	632.6	632.3	632.1	631.9	631.8	631.6	631.5	631.3
631.2	631.1	631.0	630.8	630.8	630.7	630.6	630.5	630.4	630.4
630.3	630.2	630.2	630.1	630.0	630.0	629.9	629.8	629.8	629.7
629.7	629.6	629.6	629.5	629.5	629.4	629.4	629.4	629.3	629.3
629.3	629.2	629.2	629.2	629.2	629.1	629.1	629.1	629.1	629.1
629.0	629.0	629.0	629.0	629.0	628.9	628.9	628.9	628.9	628.9
628.9	628.9	628.9	628.9	628.8	628.8	628.8	628.8	628.8	628.8

PEAK	8572.	6-HOUR	5217.	24-HOUR	1600.	72-HOUR	1154.	TOTAL VOLUME	230882.
CFS	243.		148.		45.		33.		6538.
CFS			2.16		11.23		11.26		11.26
INCHES			252.60		285.27		285.92		285.92
AC-FT			2587.		3173.		3180.		3180.
THOUS CU M			3191.		3914.		3923.		3923.

THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .021 HOURS DURING BREACH FORMATION.
 DOWNSREAM CALCULATIONS WILL USE A TIME INTERVAL OF .167 HOURS.
 THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSREAM 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)
13.167	0.000	491.	491.	0.	0.	0.
13.188	.021	528.	515.	13.	13.	0.
13.208	.042	565.	546.	19.	31.	0.
13.229	.063	603.	581.	21.	53.	0.
13.250	.083	640.	619.	21.	74.	0.
13.271	.104	677.	659.	18.	92.	0.
13.292	.125	715.	701.	14.	106.	0.
13.313	.146	752.	745.	7.	113.	0.
13.333	.167	790.	790.	0.	113.	0.
13.354	.188	841.	836.	5.	118.	0.
13.375	.208	891.	883.	8.	126.	0.
13.396	.229	942.	932.	10.	137.	0.
13.417	.250	993.	985.	8.	145.	0.
13.438	.271	1044.	1038.	6.	151.	0.
13.458	.292	1095.	1091.	4.	156.	0.
13.479	.313	1146.	1144.	2.	158.	0.
13.500	.333	1197.	1197.	0.	158.	0.
13.521	.354	1252.	1250.	2.	160.	0.
13.542	.375	1308.	1304.	3.	163.	0.
13.563	.396	1363.	1359.	4.	167.	0.
13.583	.417	1418.	1414.	4.	171.	0.
13.604	.438	1474.	1470.	4.	174.	0.
13.625	.458	1529.	1526.	3.	177.	0.
13.646	.479	1584.	1583.	1.	179.	0.
13.667	.500	1640.	1640.	0.	179.	0.
13.688	.521	1698.	1697.	1.	180.	0.
13.708	.542	1757.	1755.	2.	182.	0.
13.729	.563	1816.	1813.	3.	185.	0.
13.750	.583	1874.	1872.	2.	187.	0.
13.771	.604	1933.	1931.	2.	190.	0.
13.792	.625	1991.	1990.	1.	191.	0.
13.813	.646	2050.	2049.	1.	192.	0.
13.833	.667	2109.	2109.	0.	192.	0.
13.854	.688	2169.	2168.	1.	193.	0.
13.875	.708	2229.	2227.	2.	195.	0.
13.896	.729	2289.	2286.	3.	198.	0.
13.917	.750	2350.	2347.	3.	201.	0.
13.938	.771	2410.	2408.	2.	202.	0.
13.958	.792	2470.	2470.	0.	203.	0.
13.979	.812	2530.	2530.	0.	203.	0.
14.000	.833	2591.	2591.	0.	203.	0.
14.021	.854	2649.	2651.	-2.	201.	0.
14.042	.875	2707.	2710.	-3.	198.	0.
14.063	.896	2765.	2768.	-3.	195.	0.
14.083	.917	2823.	2826.	-3.	191.	0.
14.104	.937	2881.	2883.	-2.	189.	0.
14.125	.958	2939.	2939.	0.	189.	0.
14.146	.979	2996.	2994.	2.	191.	0.
14.167	1.000	3054.	3054.	0.	191.	0.

•OVN•

7A

DAM PREFACH DATA
 PRUID 26. 1.00 628.40 1.00 634.90 650.00
 Z ELPW TFAIL USEL FAILEL

STATION AR, PLAN 2, RATIO 3
 END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

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.
30.	31.	32.	33.	34.
35.	36.	37.	38.	39.
40.	41.	42.	43.	44.
45.	46.	47.	48.	49.
50.	51.	52.	53.	54.
55.	56.	57.	58.	59.
60.	61.	62.	63.	64.
65.	66.	67.	68.	69.
70.	71.	72.	73.	74.
75.	76.	77.	78.	79.
80.	81.	82.	83.	84.
85.	86.	87.	88.	89.
90.	91.	92.	93.	94.
95.	96.	97.	98.	99.
100.	101.	102.	103.	104.
105.	106.	107.	108.	109.
110.	111.	112.	113.	114.
115.	116.	117.	118.	119.
120.	121.	122.	123.	124.
125.	126.	127.	128.	129.
130.	131.	132.	133.	134.
135.	136.	137.	138.	139.
140.	141.	142.	143.	144.
145.	146.	147.	148.	149.
150.	151.	152.	153.	154.
155.	156.	157.	158.	159.
160.	161.	162.	163.	164.
165.	166.	167.	168.	169.
170.	171.	172.	173.	174.
175.	176.	177.	178.	179.
180.	181.	182.	183.	184.
185.	186.	187.	188.	189.
190.	191.	192.	193.	194.
195.	196.	197.	198.	199.
200.	201.	202.	203.	204.
205.	206.	207.	208.	209.
210.	211.	212.	213.	214.
215.	216.	217.	218.	219.
220.	221.	222.	223.	224.
225.	226.	227.	228.	229.
230.	231.	232.	233.	234.
235.	236.	237.	238.	239.
240.	241.	242.	243.	244.
245.	246.	247.	248.	249.
250.	251.	252.	253.	254.
255.	256.	257.	258.	259.
260.	261.	262.	263.	264.
265.	266.	267.	268.	269.
270.	271.	272.	273.	274.
275.	276.	277.	278.	279.
280.	281.	282.	283.	284.
285.	286.	287.	288.	289.
290.	291.	292.	293.	294.
295.	296.	297.	298.	299.
300.	301.	302.	303.	304.
305.	306.	307.	308.	309.
310.	311.	312.	313.	314.
315.	316.	317.	318.	319.
320.	321.	322.	323.	324.
325.	326.	327.	328.	329.
330.	331.	332.	333.	334.
335.	336.	337.	338.	339.
340.	341.	342.	343.	344.
345.	346.	347.	348.	349.
350.	351.	352.	353.	354.
355.	356.	357.	358.	359.
360.	361.	362.	363.	364.
365.	366.	367.	368.	369.
370.	371.	372.	373.	374.
375.	376.	377.	378.	379.
380.	381.	382.	383.	384.
385.	386.	387.	388.	389.
390.	391.	392.	393.	394.
395.	396.	397.	398.	399.
400.	401.	402.	403.	404.
405.	406.	407.	408.	409.
410.	411.	412.	413.	414.
415.	416.	417.	418.	419.
420.	421.	422.	423.	424.
425.	426.	427.	428.	429.
430.	431.	432.	433.	434.
435.	436.	437.	438.	439.
440.	441.	442.	443.	444.
445.	446.	447.	448.	449.
450.	451.	452.	453.	454.
455.	456.	457.	458.	459.
460.	461.	462.	463.	464.
465.	466.	467.	468.	469.
470.	471.	472.	473.	474.
475.	476.	477.	478.	479.
480.	481.	482.	483.	484.
485.	486.	487.	488.	489.
490.	491.	492.	493.	494.
495.	496.	497.	498.	499.
500.	501.	502.	503.	504.
505.	506.	507.	508.	509.
510.	511.	512.	513.	514.
515.	516.	517.	518.	519.
520.	521.	522.	523.	524.
525.	526.	527.	528.	529.
530.	531.	532.	533.	534.
535.	536.	537.	538.	539.
540.	541.	542.	543.	544.
545.	546.	547.	548.	549.
550.	551.	552.	553.	554.
555.	556.	557.	558.	559.
560.	561.	562.	563.	564.
565.	566.	567.	568.	569.
570.	571.	572.	573.	574.
575.	576.	577.	578.	579.
580.	581.	582.	583.	584.
585.	586.	587.	588.	589.
590.	591.	592.	593.	594.
595.	596.	597.	598.	599.
600.	601.	602.	603.	604.
605.	606.	607.	608.	609.
610.	611.	612.	613.	614.
615.	616.	617.	618.	619.
620.	621.	622.	623.	624.
625.	626.	627.	628.	629.
630.	631.	632.	633.	634.
635.	636.	637.	638.	639.
640.	641.	642.	643.	644.
645.	646.	647.	648.	649.
650.	651.	652.	653.	654.
655.	656.	657.	658.	659.
660.	661.	662.	663.	664.
665.	666.	667.	668.	669.
670.	671.	672.	673.	674.
675.	676.	677.	678.	679.
680.	681.	682.	683.	684.
685.	686.	687.	688.	689.
690.	691.	692.	693.	694.
695.	696.	697.	698.	699.
700.	701.	702.	703.	704.
705.	706.	707.	708.	709.
710.	711.	712.	713.	714.
715.	716.	717.	718.	719.
720.	721.	722.	723.	724.
725.	726.	727.	728.	729.
730.	731.	732.	733.	734.
735.	736.	737.	738.	739.
740.	741.	742.	743.	744.
745.	746.	747.	748.	749.
750.	751.	752.	753.	754.
755.	756.	757.	758.	759.
760.	761.	762.	763.	764.
765.	766.	767.	768.	769.
770.	771.	772.	773.	774.
775.	776.	777.	778.	779.
780.	781.	782.	783.	784.
785.	786.	787.	788.	789.
790.	791.	792.	793.	794.
795.	796.	797.	798.	799.
800.	801.	802.	803.	804.
805.	806.	807.	808.	809.
810.	811.	812.	813.	814.
815.	816.	817.	818.	819.
820.	821.	822.	823.	824.
825.	826.	827.	828.	829.
830.	831.	832.	833.	834.
835.	836.	837.	838.	839.
840.	841.	842.	843.	844.
845.	846.	847.	848.	849.
850.	851.	852.	853.	854.
855.	856.	857.	858.	859.
860.	861.	862.	863.	864.
865.	866.	867.	868.	869.
870.	871.	872.	873.	874.
875.	876.	877.	878.	879.
880.	881.	882.	883.	884.
885.	886.	887.	888.	889.
890.	891.	892.	893.	894.
895.	896.	897.	898.	899.
900.	901.	902.	903.	904.
905.	906.	907.	908.	909.
910.	911.	912.	913.	914.
915.	916.	917.	918.	919.
920.	921.	922.	923.	924.
925.	926.	927.	928.	929.
930.	931.	932.	933.	934.
935.	936.	937.	938.	939.
940.	941.	942.	943.	944.
945.	946.	947.	948.	949.
950.	951.	952.	953.	954.
955.	956.	957.	958.	959.
960.	961.	962.	963.	964.
965.	966.	967.	968.	969.
970.	971.	972.	973.	974.
975.	976.	977.	978.	979.
980.	981.	982.	983.	984.
985.	986.	987.	988.	989.
990.	991.	992.	993.	994.
995.	996.	997.	998.	999.
1000.	1001.	1002.	1003.	1004.
1005.	1006.	1007.	1008.	1009.
1010.	1011.	1012.	1013.	1014.
1015.	1016.	1017.	1018.	1019.
1020.	1021.	1022.	1023.	1024.
1025.	1026.	1027.	1028.	1029.
1030.	1031.	1032.	1033.	1034.
1035.	1036.	1037.	1038.	1039.
1040.	1041.	1042.	1043.	1044.
1045.	1046.	1047.	1048.	1049.
1050.	1051.	1052.	1053.	1054.
1055.	1056.	1057.	1058.	1059.
1060.	1061.	1062.	1063.	1064.
1065.	1066.	1067.	1068.	1069.
1070.	1071.	1072.	1073.	1074.
1075.	1076.	1077.	1078.	1079.
1080.	1081.	1082.	1083.	1084.
1085.	1086.	1087.	1088.	1089.
1090.	1091.	1092.	1093.	1094.
1095.	1096.	1097.	1098.	1099.
1100.	1101.	1102.	1103.	1104.
1105.	1106.	1107.	1108.	1109.
1110.	1111.	1112.	1113.	1114.
1115.	1116.	1117.	1118.	1119.
1120.	1121.	1122.	1123.	1124.
1125.	1126.	1127.	1128.	1129.
1130.	1131.	1132.	1133.	1134.
1135.	1136.	1137.	1138.	1139.
1140.	1141.	1142.	1143.	1144.
1145.	1146.	1147.	1148.	1149.
1150.	1151.	1152.	1153.	1154.
115				

[illegible][illegible]

635.2 635.2 635.2 635.2 635.2 635.2 635.2 635.2 635.2

PEAK OUTFLOW IS 8569, AT TIME 17.17 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8569	5148	1517	1095	210991
CMS	243	146	43	31	6201
INCHES		9.04	10.65	10.68	
AC-FT		229.50	270.54	271.19	
THOUS CU M		2553	3009	3016	
		3149	3712	3721	

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD FULS- REACH 3

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

ALL PLANS HAVE SAME

ROUTING DATA

LOSS	CLOSS	AVG	IRCS	ISAME	IOPT	IPHP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1	0

NORMAL DEPTH CHANNEL ROUTING

QW(1)	QW(2)	QW(3)	ELWY	ELMAX	RLNTH	SEL
0.0700	0.0500	0.0600	610.0	620.0	1100	0.01600

CROSS SECTION COORDINATES--STA=ELEV--STA=ELEV--ETC

	0.00	20.00	100.00	150.00	200.00	250.00	300.00	350.00	400.00	450.00	500.00	550.00	600.00
0.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00

STORAGE	0.00	27	53	80	106	138	176	222	274	334
4.03	4.97	6.20	7.70	9.49	11.55	13.89	16.52	19.42	22.60	26.14

OUTFLOW	0.00	25.00	76.82	146.38	230.89	337.54	467.19	623.13	808.15	1024.83
1253.63	1528.77	1881.59	2320.18	2854.87	3496.15	4254.19	5138.84	6159.55	7325.49	8648.74

STAGE	610.00	615.53	611.05	611.54	612.11	612.63	613.16	613.68	614.21	614.74
615.26	615.79	616.32	616.84	617.37	617.89	618.42	618.95	619.47	619.99	620.50

FLOW	0.00	25.00	76.82	146.38	230.89	337.54	467.19	623.13	808.15	1024.83
1253.63	1528.77	1881.59	2320.18	2854.87	3496.15	4254.19	5138.84	6159.55	7325.49	8648.74

A9. PLAN 1, RTIO 3

		OUTFLOW					
1.	2.	3.	4.	5.	6.	7.	8.
1.	1.	2.	3.	4.	5.	6.	7.
5.	6.	6.	7.	7.	8.	7.	8.
8.	8.	9.	9.	9.	9.	9.	9.
9.	10.	10.	10.	10.	10.	10.	10.
10.	10.	11.	11.	12.	13.	13.	15.
17.	36.	61.	73.	95.	104.	104.	114.
122.	139.	197.	168.	176.	176.	196.	231.
241.	254.	284.	309.	399.	399.	472.	709.
1526.	1989.	2972.	3005.	2917.	3050.	3170.	3290.
3919.	3775.	4031.	4774.	5329.	6018.	6849.	7602.

8125.	8457.	8571.	8495.	8275.	7938.	7529.	7112.	6707.	6315.
5956.	5582.	5173.	4767.	4355.	3953.	3574.	3256.	2962.	2679.
2415.	2196.	2001.	1792.	1627.	1493.	1357.	1239.	1124.	1027.
933.	853.	779.	713.	654.	601.	554.	512.	474.	440.
409.	382.	357.	334.	314.	295.	279.	263.	249.	235.
222.	210.	198.	187.	176.	165.	156.	146.	138.	130.
122.	115.	108.	102.	96.	90.	85.	81.	76.	72.
69.	65.	62.	59.	56.	53.	50.	47.	46.	44.
42.	40.	38.	37.	35.	34.	32.	31.	30.	29.
28.	27.	26.	25.	25.	24.	23.	22.	22.	21.

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.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	2.	2.	2.
4.	5.	7.	8.	10.	10.	10.	10.	11.	11.
11.	12.	12.	13.	14.	15.	17.	19.	21.	23.
25.	26.	26.	26.	25.	24.	23.	22.	21.	20.
19.	18.	17.	15.	14.	13.	12.	11.	10.	9.
8.	7.	7.	6.	5.	5.	4.	4.	4.	3.
3.	3.	3.	2.	2.	2.	2.	2.	2.	2.
2.	2.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
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.

STAGE

610.0	610.0	610.0	610.0	610.0	610.1	610.1	610.1	610.1	610.1
610.1	610.1	610.1	610.1	610.1	610.1	610.1	610.1	610.1	610.1
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2
610.4	610.5	610.6	610.8	610.9	611.0	611.1	611.2	611.3	611.3
611.4	611.5	611.5	611.6	611.6	611.7	611.8	611.8	611.9	612.0
612.1	612.2	612.2	612.3	612.4	612.5	612.7	612.9	613.2	613.9
614.9	615.0	616.4	617.0	617.4	617.5	617.4	617.5	617.6	617.7
617.8	617.9	618.1	618.3	618.5	618.7	619.0	619.4	619.8	620.1
620.4	620.5	620.6	620.5	620.4	620.3	620.1	619.9	619.7	619.5
619.4	619.2	619.0	618.7	618.5	618.2	617.9	617.7	617.5	617.2
616.9	616.7	616.5	616.2	615.9	615.7	615.5	615.2	615.0	614.7
614.5	614.3	614.1	613.9	613.8	613.6	613.5	613.3	613.2	613.0
612.9	612.8	612.7	612.6	612.5	612.4	612.3	612.3	612.2	612.1
612.1	612.0	611.9	611.8	611.8	611.7	611.6	611.5	611.5	611.5
611.4	611.3	611.3	611.2	611.2	611.2	611.1	611.1	611.0	611.0
611.0	610.9	610.9	610.8	610.8	610.8	610.8	610.8	610.7	610.7
610.7	610.7	610.7	610.6	610.6	610.6	610.6	610.6	610.6	610.6
610.4	610.5	610.5	610.5	610.5	610.5	610.5	610.5	610.5	610.4

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
8571.	5216.	1400.	1154.	230867.
283.	149.	95.	33.	6537.
	9.15	11.23	11.26	11.26
	232.53	285.27	285.50	285.90

CFS
CMS
INCHES
MP

✓
23

MAXIMUM STAGE IS 620.6

OUTFLOW	1.	1.	2.
2.	1.	1.	2.

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[illegible][illegible]

STAGE									
610.0	610.0	610.0	610.0	610.0	610.0	610.1	610.1	610.1	610.1
610.1	610.1	610.1	610.1	610.1	610.1	610.1	610.1	610.1	610.1
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2
610.4	610.5	610.6	610.6	610.6	610.6	611.0	611.1	611.2	611.3
611.4	611.5	611.5	611.6	611.6	611.7	611.8	611.8	611.9	612.0
612.1	612.2	612.2	612.3	612.3	612.5	612.7	612.9	613.2	613.6
613.2	615.0	615.7	616.1	616.5	616.8	617.1	617.3	617.6	617.7
617.9	618.0	618.1	618.3	618.5	618.8	619.0	619.5	619.8	620.1
620.4	620.5	620.6	620.6	620.9	620.9	620.1	619.9	619.7	619.5
619.3	619.1	618.7	618.7	618.5	618.2	617.9	617.6	617.2	616.9
615.6	616.3	615.8	615.5	615.2	614.8	614.4	613.9	613.9	613.8
613.6	613.4	613.2	613.1	613.0	612.9	612.8	612.7	612.7	612.6
612.5	612.4	612.3	612.3	612.2	612.2	612.1	612.0	611.9	611.9
611.5	611.4	611.3	611.7	611.7	611.6	611.6	611.5	611.5	611.4
611.3	611.3	611.2	611.2	611.1	611.1	611.1	611.0	610.9	610.9

87

	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9
610.6	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9	610.5	610.6	610.7	610.8	610.9

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME
 1517. 1095. 218975.
 146. 43. 31. 6201.
 INCHES 9.03 10.65 10.68 10.68
 229.47 270.54 271.17 271.17
 2552. 3009. 3016. 3016.
 3148. 3712. 3720. 3720.
 THOUS CU M

MAXIMUM STORAGE = 26.

MAXIMUM STAGE IS 620.6

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- NJ 513 BRIDGE

ISTAO	ICOMP	IECON	ITAPE	JFLT	JPR1	INAME	ISTAGE	IAUTO
1	1	0	0	0	1	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

CLOSS	CLOSS	AVG	IRCS	ISAME	IOPT	IPMP	ISTR
0.0	0.000	0.00	1	1	0	0	0

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

NORMAL DEPTH CHANNEL ROUTING

ON(1)	ON(2)	ON(3)	FLMVI	ELMAX	PLNTH	SEL
0.300	0.400	0.300	609.0	620.0	60.	0.01600

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

0.00	620.00	120.00	617.00	240.00	614.00	240.00	609.00	253.00	609.00
263.00	614.00	353.00	614.00	353.00	620.00	620.00	620.00	620.00	620.00

STORAGE	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12
0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12

OUTFLOW

1245.22

2148.94

23.27

70.11

3410.64

5042.65

131.27

202.64

7062.19

281.73

948.26

366.85

12340.72

15639.65

456.80

550.70

703.74

23657.32

19405.17

613.05

613.63

614.21

612.47

611.49

611.32

610.74

610.14

609.58

609.00

608.42

607.84

607.26

606.68

606.10

605.52

604.94

604.36

603.78

603.20

602.62

602.04

601.46

600.88

600.30

599.72

599.14

598.56

597.98

597.40

596.82

596.24

595.66

595.08

594.50

593.92

593.34

592.76

592.18

591.60

591.02

590.44

589.86

589.28

588.70

588.12

587.54

586.96

586.38

585.80

585.22

584.64

584.06

583.48

582.90

582.32

581.74

581.16

580.58

579.99

579.41

578.83

578.25

577.67

577.09

576.51

575.93

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574.77

574.19

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573.03

572.45

571.87

571.29

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568.97

568.39

567.81

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565.49

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505.75

505.17

504.59

504.01

503.43

502.85

502.27

501.69

501.11

500.53

499.95

22

FLOW	614.72	615.37	615.95	616.52	617.11	617.68	618.24	618.84	619.42	620.00
0.00		23.27	70.11	131.27	202.64	281.73	366.85	456.88	550.70	703.74
1245.22		2148.94	3410.64	5042.65	7062.18	9488.26	12340.72	15639.65	19405.17	23677.32

A10 PLAN 1, RTIO 3

STATION

OUTFLOW

1.	1.	2.	3.	4.	5.
5.	6.	7.	8.	9.	10.
8.	10.	11.	12.	13.	14.
10.	11.	12.	13.	14.	15.
10.	11.	12.	13.	14.	15.
17.	22.	26.	31.	36.	41.

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CFS	8570.	5216.	1600.	1159.	230866.
CMS	243.	140.	45.	33.	6537.
INCHES		9.15	11.23	11.26	11.26
IN		232.53	285.27	285.90	285.90
AC-FT		2506.	3173.	3180.	3180.
THOUS CU M		3190.	3914.	3922.	3922.

MAXIMUM STORAGE = 1.

MAXIMUM STAGE IS 617.5

OUTFLOW									
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.	1.	2.	3.	4.	5.				
5.	6.	6.	7.	7.	8.				
8.	8.	9.	9.	9.	9.				
9.	10.	10.	10.	10.	10.				
10.	10.	11.	11.	12.	15.				
17.	36.	49.	73.	94.	113.				
22.	139.	147.	176.	186.	210.				
22.	131.	156.	176.	186.	210.				
27.	241.	267.	309.	398.	592.				
06.	1456.	1757.	2302.	2825.	3283.				
78.	3651.	4074.	4846.	6172.	7600.				
19.	8565.	8929.	7948.	7125.	6324.				
21.	5104.	4695.	3917.	3089.	2405.				
30.	1604.	1392.	1046.	790.	651.				
90.	544.	459.	408.	365.	328.				
10.	296.	268.	230.	221.	200.				
72.	186.	171.	155.	139.	123.				
75.	101.	95.	95.	72.	61.				
56.	52.	46.	40.	36.	33.				
31.	29.	29.	27.	26.	25.				
24.	24.	23.	23.	22.	22.				

[illegible]

STAGE									
9.0	609.0	609.0	609.0	609.1	609.1	609.1	609.1	609.1	609.1
9.1	609.1	609.1	609.1	609.2	609.2	609.2	609.2	609.2	609.2
9.2	609.2	609.2	609.2	609.2	609.2	609.2	609.2	609.2	609.2
9.3	609.2	609.2	609.2	609.2	609.2	609.2	609.2	609.2	609.2
9.4	609.3	609.3	609.3	609.3	609.3	609.3	609.3	609.3	609.3
9.5	609.3	609.3	609.3	609.3	609.3	609.3	609.3	609.3	609.3
9.6	609.6	609.7	609.7	610.0	610.2	610.3	610.4	610.5	610.6
9.7	610.7	610.8	610.9	610.9	611.0	611.1	611.2	611.3	611.4
10.0	611.6	611.7	611.8	611.9	612.1	612.3	612.7	613.1	613.0
10.3	614.7	614.7	615.1	615.3	615.4	615.6	615.7	615.8	615.9
10.5	616.0	616.1	616.2	616.3	616.5	616.6	616.9	617.1	617.2
10.6	617.4	617.5	617.6	617.6	617.8	617.9	617.9	617.9	616.9
10.8	616.7	616.5	616.4	616.3	616.1	616.0	615.8	615.6	615.5
10.9	615.2	615.0	614.9	614.7	614.6	614.4	614.3	614.2	614.0

613.0	613.6	613.3	613.1	612.9	612.7	612.6	612.5	612.3	612.2
612.1	612.0	611.9	611.8	611.7	611.6	611.5	611.4	611.3	611.3
611.2	611.2	611.1	611.1	611.0	610.9	610.9	610.8	610.7	610.7
610.6	610.5	610.4	610.4	610.3	610.3	610.2	610.2	610.1	610.0
610.0	609.9	609.9	609.9	609.8	609.8	609.8	609.7	609.7	609.7
609.7	609.7	609.7	609.6	609.6	609.6	609.6	609.6	609.6	609.6
609.6	609.6	609.6	609.6	609.6	609.6	609.6	609.6	609.5	609.5

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5147.	1517.	1095.	218974.
CMS	243.	43.	31.	6201.
INCHES	9.03	10.65	10.68	10.68
MM	229.47	270.54	271.17	271.17
AC-FT	2552.	3009.	3016.	3016.
THOUS CU M	3148.	3712.	3720.	3720.

MAXIMUM STORAGE = 1.

MAXIMUM STAGE IS 617.5

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- REACH 4

ISTAQ	ICOMP	IECON	ITAPF	JPLT	JPRY	INAME	ISTAGE	IAUTO
411	1	0	0	0	1	1	0	0

QLOSS	QLOSS	AVG	ROUTING DATA	IPMP	LSTR
0.0	0.000	0.00	ISAME	IPMP	LSTR
			ISAME	IPMP	LSTR
			ISAME	IPMP	LSTR

NSIPS	NSIDL	LAG	AMSKY	X	TSR	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

ALL PLANS HAVE SAME

NORMAL DEPTH CHANNEL ROUTING

Q(1)	Q(2)	Q(3)	ELHVT	ELMAX	RLNTH	SEL
.0300	.0500	.0300	606.0	618.0	200.	.01600

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

0.00	618.00	20.00	616.00	40.00	614.00	80.00	606.00
100.00	614.00	165.00	616.00	165.00	618.00		

STORAGE	0.00	.08	.30	.44	.59	.76	1.17	1.39
	1.64	1.91	2.17	2.49	3.20	3.61	4.53	5.05

[illegible]

STATION	ALL, PLAN 1, RTIO 3
1.	3.
2.	2.
3.	6.
4.	7.
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100.	

[illegible][illegible]

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THOUS CU M

MAXIMUM STORAGE = 3.

MAXIMUM STAGE IS 615.4

MAIL, PLAN 2, RYIO 3

OUTFLOW									
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.	130.	146.	155.	165.	175.	185.	196.	210.	586.
2.	240.	253.	266.	283.	304.	336.	468.	586.	3277.
3.	1113.	1447.	1747.	2034.	2394.	2816.	3076.	3277.	7587.
4.	3660.	3846.	4067.	4375.	4832.	6156.	6913.	7587.	6330.
5.	8439.	8566.	8501.	8288.	7354.	7132.	6733.	6330.	2411.
6.	5524.	5113.	4705.	4316.	3527.	3092.	2716.	2411.	653.
7.	1858.	1610.	1399.	1212.	1052.	795.	714.	653.	322.
8.	545.	474.	452.	434.	408.	365.	346.	322.	200.
9.	296.	282.	268.	255.	243.	221.	210.	200.	123.
10.	186.	179.	171.	163.	155.	147.	131.	123.	33.
11.	108.	102.	95.	89.	83.	77.	67.	61.	25.
12.	52.	49.	46.	43.	40.	38.	35.	33.	22.
13.	31.	30.	29.	28.	27.	26.	25.	25.	22.
14.	24.	24.	23.	23.	23.	22.	22.	22.	22.

[illegible][illegible]

612.4	612.5	612.7	612.9	613.1	613.4	613.8	614.3	614.6	614.9
613.2	613.3	613.4	613.5	613.6	613.7	613.8	613.9	614.0	614.1
614.1	614.2	614.3	614.4	614.5	614.6	614.7	614.8	614.9	615.0
615.1	615.2	615.3	615.4	615.5	615.6	615.7	615.8	615.9	616.0
616.1	616.2	616.3	616.4	616.5	616.6	616.7	616.8	616.9	617.0
617.1	617.2	617.3	617.4	617.5	617.6	617.7	617.8	617.9	618.0
618.1	618.2	618.3	618.4	618.5	618.6	618.7	618.8	618.9	619.0
619.1	619.2	619.3	619.4	619.5	619.6	619.7	619.8	619.9	620.0
620.1	620.2	620.3	620.4	620.5	620.6	620.7	620.8	620.9	621.0
621.1	621.2	621.3	621.4	621.5	621.6	621.7	621.8	621.9	622.0
622.1	622.2	622.3	622.4	622.5	622.6	622.7	622.8	622.9	623.0
623.1	623.2	623.3	623.4	623.5	623.6	623.7	623.8	623.9	624.0
624.1	624.2	624.3	624.4	624.5	624.6	624.7	624.8	624.9	625.0
625.1	625.2	625.3	625.4	625.5	625.6	625.7	625.8	625.9	626.0
626.1	626.2	626.3	626.4	626.5	626.6	626.7	626.8	626.9	627.0
627.1	627.2	627.3	627.4	627.5	627.6	627.7	627.8	627.9	628.0
628.1	628.2	628.3	628.4	628.5	628.6	628.7	628.8	628.9	629.0
629.1	629.2	629.3	629.4	629.5	629.6	629.7	629.8	629.9	630.0
630.1	630.2	630.3	630.4	630.5	630.6	630.7	630.8	630.9	631.0
631.1	631.2	631.3	631.4	631.5	631.6	631.7	631.8	631.9	632.0
632.1	632.2	632.3	632.4	632.5	632.6	632.7	632.8	632.9	633.0
633.1	633.2	633.3	633.4	633.5	633.6	633.7	633.8	633.9	634.0
634.1	634.2	634.3	634.4	634.5	634.6	634.7	634.8	634.9	635.0
635.1	635.2	635.3	635.4	635.5	635.6	635.7	635.8	635.9	636.0
636.1	636.2	636.3	636.4	636.5	636.6	636.7	636.8	636.9	637.0
637.1	637.2	637.3	637.4	637.5	637.6	637.7	637.8	637.9	638.0
638.1	638.2	638.3	638.4	638.5	638.6	638.7	638.8	638.9	639.0
639.1	639.2	639.3	639.4	639.5	639.6	639.7	639.8	639.9	640.0
640.1	640.2	640.3	640.4	640.5	640.6	640.7	640.8	640.9	641.0
641.1	641.2	641.3	641.4	641.5	641.6	641.7	641.8	641.9	642.0
642.1	642.2	642.3	642.4	642.5	642.6	642.7	642.8	642.9	643.0
643.1	643.2	643.3	643.4	643.5	643.6	643.7	643.8	643.9	644.0
644.1	644.2	644.3	644.4	644.5	644.6	644.7	644.8	644.9	645.0
645.1	645.2	645.3	645.4	645.5	645.6	645.7	645.8	645.9	646.0
646.1	646.2	646.3	646.4	646.5	646.6	646.7	646.8	646.9	647.0
647.1	647.2	647.3	647.4	647.5	647.6	647.7	647.8	647.9	648.0
648.1	648.2	648.3	648.4	648.5	648.6	648.7	648.8	648.9	649.0
649.1	649.2	649.3	649.4	649.5	649.6	649.7	649.8	649.9	650.0
650.1	650.2	650.3	650.4	650.5	650.6				

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL
CFS	A566.	1517.	1095.		218971.
CMS	243.	146.	87.	31.	6201.
INCHFS		9.03	10.45	10.68	10.68
MM		229.46	270.54	271.17	271.17
AC-FT		3552.	3009.	3016.	3016.
THOUS CU YD		3148.	3712.	3720.	3720.

MAXIMUM STORAGE = 30

MAXIMUM STAGE IS 615.4

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOO PULS- HIGGEN RD BRIDGE

ISTAQ	ICOMP	IECON	IYAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A12	1	0	0	0	1	1	0	0

ALL PLANS HAVE SAME

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IMPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSPTS	NSTD	LAG	AMSKN	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	FLNVT	FLMAX	RLNTH	SEL
.0160	.0400	.0160	605.0	618.0	37.	.01600

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

0.00	618.00	70.00	15.00	612.00	180.00	605.00	211.00	605.00
211.00	612.00	600.00	612.00	600.00	612.00			

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STORAGE	0.00 .18	.02 .29	.04 .43	.05 .58	.07 .75	.09 .93	.11 1.12	.13 1.32	.14 1.54	.16 1.76
OUTFLOW	0.00 2822.73	75.40 4075.71	232.86 7090.44	445.72 11378.37	701.81 17014.55	993.28 23930.22	1314.49 32129.30	1661.12 41627.29	2029.79 52446.32	2417.75 64612.61
STAGE	605.00 611.84	605.68 612.53	606.37 613.21	607.05 613.89	607.74 614.58	608.42 615.26	609.11 615.95	609.79 616.63	610.47 617.32	611.16 618.00
FLOW	0.00 2822.73	75.40 4075.71	232.86 7090.44	445.72 11378.37	701.81 17014.55	993.28 23930.22	1314.49 32129.30	1661.12 41627.29	2029.79 52446.32	2417.75 64612.61

STATION A12, PLAN 1, R10 3

[illegible][illegible]

STAGE									
5.0	605.0	605.0	605.0	605.0	605.0	605.0	605.0	605.0	605.0
5.0	605.0	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1
5.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1
5.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1
5.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1
5.1	605.2	605.3	605.4	605.5	605.6	605.7	605.8	605.8	605.8
5.3	605.9	606.0	606.0	606.1	606.1	606.1	606.2	606.2	606.3
5.3	606.4	606.4	606.5	606.5	606.6	606.7	606.9	607.1	607.7
5.5	609.5	610.4	611.2	611.9	611.9	611.9	612.0	612.0	612.1
5.5	612.2	612.4	612.5	612.6	612.7	612.8	613.0	613.2	613.3
5.7	613.4	613.5	613.4	613.4	613.4	613.3	613.1	613.1	613.0
5.7	612.9	612.8	612.7	612.6	612.5	612.3	612.1	611.9	611.6
5.7	610.8	610.4	610.0	609.7	609.5	609.2	608.9	608.7	608.5
5.7	609.1	607.9	607.6	607.6	607.5	607.4	607.2	607.1	607.0

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605.1	605.2	605.3	605.4	605.5	605.6	605.7	605.8	605.9	605.0
605.7	605.9	606.0	606.0	606.0	606.1	606.1	606.2	606.2	606.3
606.3	606.4	606.4	606.5	606.5	606.5	606.6	606.7	606.9	607.0
608.0	608.7	609.4	609.9	610.5	610.9	611.4	611.8	612.0	612.1
612.2	612.3	612.4	612.5	612.6	612.7	612.8	613.0	613.2	613.3
613.4	613.4	613.5	613.4	613.4	613.4	613.3	613.2	613.1	613.0
613.0	612.9	612.8	612.7	612.6	612.4	612.2	612.0	611.7	611.1
610.7	610.2	609.7	609.3	608.9	608.5	608.2	608.0	607.8	607.6
607.4	607.3	607.2	607.1	607.0	606.9	606.9	606.8	606.7	606.7
606.6	606.6	606.5	606.5	606.4	606.4	606.4	606.3	606.3	606.2
606.2	606.2	606.1	606.1	606.1	606.0	606.0	606.0	605.9	605.9
605.9	605.8	605.8	605.8	605.7	605.7	605.7	605.7	605.6	605.6
605.5	605.5	605.4	605.4	605.4	605.4	605.3	605.3	605.3	605.3
605.3	605.3	605.3	605.3	605.2	605.2	605.2	605.2	605.2	605.2
605.2	605.2	605.2	605.2	605.2	605.2	605.2	605.2	605.2	605.2

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME
A565. 5147. 1517. 1095. 218971.
243. 146. 43. 31. 6201.
INCHES 9.03 10.65 10.68 10.68
AC-FT 229.46 270.54 271.16 271.16
THOUS CU FT 2552. 3009. 3016. 3016. 3720.
3148. 3712. 3720.

MAXIMUM STORAGE = 0.

MAXIMUM STAGE IS 613.5

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- REACH 5

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	TAUTO
A13	1	0	0	0	1	1	0	0
ALL PLANS HAVE SAME ROUTING DATA								
QLOSS	CLOSS	AVG	IRCS	ISARE	IOPT	IFMP	LSTR	
0.0	0.000	0.00	1	1	0	0	0	
NSTPS	NSIDL	LAG	AMSK	X	TSK	STORA	ISPRAT	
1	0	0	0.000	0.000	0.000	-1.	0	

NORMAL DEPTH CHANNEL ROUTING

QNI(1) QNI(2) QNI(3) LLNVT ELMAX PLNTH SEL
.0400 .0500 .0600 560.0 572.0 1200. .01600

511 ✓

[illegible]

A13, PLAN 1, RTIO 3

OUTFLOW									
1.	1.	2.	2.	3.	3.	4.	4.	5.	5.
1.	1.	2.	2.	3.	3.	4.	4.	5.	5.
5.	5.	6.	6.	7.	7.	7.	7.	9.	9.
8.	8.	8.	8.	9.	9.	9.	9.	10.	10.
9.	10.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	11.	11.	11.	12.	12.	13.	13.
15.	25.	41.	56.	67.	75.	90.	101.	110.	110.
128.	136.	144.	153.	162.	172.	183.	193.	205.	205.
236.	250.	263.	278.	300.	332.	379.	445.	612.	612.
1407.	1855.	2395.	2827.	3031.	2938.	2995.	3151.	3262.	3262.
3529.	3722.	4270.	4669.	5201.	5863.	5863.	6671.	7469.	7469.
8407.	8564.	8520.	8324.	8009.	7613.	7192.	6788.	6396.	6396.
5663.	5263.	4954.	4448.	4045.	3660.	3330.	3033.	2750.	2750.
2249.	2054.	1851.	1668.	1531.	1397.	1271.	1160.	1056.	1056.
878.	803.	734.	673.	619.	570.	526.	487.	452.	452.
20.	365.	321.	302.	284.	264.	253.	239.	239.	239.
214.	202.	190.	179.	169.	159.	150.	141.	133.	133.
117.	110.	104.	98.	92.	88.	83.	78.	74.	74.
67.	63.	60.	57.	54.	52.	49.	47.	45.	45.
41.	39.	37.	36.	34.	33.	32.	31.	30.	30.
28.	27.	26.	25.	25.	24.	23.	22.	22.	22.

STOR

[illegible]

STAGE

[illegible]

119 ✓

570.1	570.3	570.3	570.3	570.2	570.1	569.9	569.7	569.5	569.3
569.1	568.9	568.7	568.4	568.1	567.8	567.6	567.3	567.1	566.8
566.5	566.3	566.1	565.8	565.6	565.4	565.2	565.1	564.9	564.7
564.5	564.3	564.2	564.0	563.9	563.7	563.6	563.4	563.3	563.2
563.1	563.0	562.9	562.8	562.7	562.6	562.5	562.4	562.4	562.3
562.2	562.1	562.1	562.0	561.9	561.9	561.8	561.7	561.6	561.6
561.5	561.5	561.4	561.4	561.3	561.3	561.2	561.2	561.1	561.1
561.0	561.0	561.0	560.9	560.9	560.9	560.9	560.8	560.8	560.8
560.8	560.7	560.7	560.7	560.7	560.7	560.7	560.6	560.6	560.6
560.6	560.6	560.6	560.5	560.5	560.5	560.5	560.5	560.5	560.5

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
8564.	5214.	1600.	1154.	230847.
242.	148.	45.	33.	6537.
	9.15	11.23	11.25	11.25
	232.45	285.26	285.87	285.87
	2586.	3173.	3180.	3180.
	3189.	3914.	3922.	3922.

THOUS CU F

MAXIMUM STORAGE = 24.

MAXIMUM STAGE IS 570.3

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 RATIO 1 RATIO 2 RATIO 3
 .10 .25 .50

HYDROGRAPH AT A1 2.50 784. 1960. 3920.
 (6.47) (22.20) (55.50) (110.99)
 2 1960. 3920.
 (22.20) (55.50) (110.99)

ROUTED TO A2 2.50 1192. 1945. 3910.
 (6.47) (33.75) (55.09) (110.73)
 2 775. 1955. 3910.
 (21.95) (55.35) (110.73)

ROUTED TO A3 2.50 1190. 1946. 3911.
 (6.47) (33.70) (55.11) (110.75)
 2 775. 1955. 3911.
 (21.95) (55.35) (110.75)

ROUTED TO A4 2.50 1189. 1946. 3911.
 (6.47) (33.68) (55.12) (110.76)
 2 775. 1954. 3911.
 (21.96) (55.35) (110.75)

ROUTED TO A5 2.50 1121. 1939. 3906.
 (6.47) (31.76) (54.90) (110.62)
 2 772. 1949. 3908.
 (21.87) (55.20) (110.66)

HYDROGRAPH AT A6 2.80 982. 2456. 4912.
 (7.25) (27.82) (69.55) (139.09)
 2 982. 2456. 4912.
 (27.82) (69.55) (139.09)

2 COMBINED A7 5.30 2094. 4212. 8610.
 (13.73) (59.29) (119.26) (243.80)
 2 1681. 4287.
 (47.60) (121.39) (243.71)

ROUTED TO A8 5.30 2504. 4171. 8572.
 (13.73) (70.91) (118.12) (242.73)
 2 1662. 4256. 8569.
 (47.06) (120.52) (242.66)

ROUTED TO A9 5.30 2418. 4170. 8571.
 (13.73) (69.46) (118.08) (242.69)
 2 1662. 4248. 8566.
 (47.06) (120.30) (242.56)

ROUTED TO A10 5.30 2417. 4171. 8570.
 (13.73) (69.44) (118.11) (242.68)

ROUTED TO

A11 (5.30 13.73) 2 (1662. 4248. 8565. (47.07)(120.29)(242.54)(2407. 4170. 8572. (60.15)(116.09)(242.73)(1662. 4247. 8566. (47.07)(120.25)(242.57)(

ROUTED TO

A12 (5.30 13.73) 1 (2408. 4171. 8573. (68.19)(118.10)(242.75)(1662. 4246. 8565. (47.07)(120.22)(242.54)(

ROUTED TO

A13 (5.30 13.73) 1 (2440. 4167. 8564. (69.08)(118.01)(242.50)(1659. 4248. 8564. (46.99)(120.29)(242.24)(

SUMMARY OF DAM SAFETY ANALYSIS

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PLAN 1

RATIO OF PMF	ELEVATION		INITIAL VALUE		SPILLWAY CREST		TOP OF DAM		TIME OF FAILURE HOURS
	MAXIMUM RESERVOIR W.S. LEVEL	STORAGE OUTFLOW	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	MAX OUTFLOW HOURS		
.10	673.35		.15	108.	1192.	.69	16.83		15.83
.25	673.50		.40	111.	1945.	2.46	17.33		14.17
.50	674.82		1.62	128.	3910.	5.79	17.33		13.50

PLAN 2

RATIO OF PMF	ELEVATION		INITIAL VALUE		SPILLWAY CREST		TOP OF DAM		TIME OF FAILURE HOURS
	MAXIMUM RESERVOIR W.S. LEVEL	STORAGE OUTFLOW	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	MAX OUTFLOW HOURS		
.10	673.81		.61	114.	775.	4.33	17.33		0.00
.25	674.65		1.45	125.	1955.	7.00	17.33		0.00
.50	675.60		2.40	139.	3910.	8.50	17.33		0.00

PLAN 1 STATION A3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1190.	668.6	16.83
.25	1946.	669.8	17.33
.50	3911.	671.9	17.33

PLAN 2 STATION A3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	775.	667.7	17.33
.25	1945.	669.8	17.33
.50	3911.	671.9	17.33

PLAN 1 STATION A4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1180.	669.2	16.83
.25	1945.	670.1	17.33

.50 3911. 671.3 17.33

PLAN 2 STATION A4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	775.	668.1	17.33
.25	1954.	670.1	17.33
.50	3911.	671.3	17.33

PLAN 1 STATION A5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1121.	640.3	17.00
.25	1939.	641.3	17.50
.50	3906.	642.9	17.33

PLAN 2 STATION A5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	772.	639.7	17.50
.25	1949.	641.3	17.33
.50	3906.	642.9	17.33

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

RATIO OF PMF	MAXIMUM RESERVOIR W.S. ELEV	ELEVATION		MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
		STORAGE	OUTFLOW						
.10	637.31	634.90	0.	.21	201.	2504.	.77	16.67	15.67
.25	637.89	155.	155.	.70	213.	4171.	2.92	17.33	14.00
.50	639.08	0.	0.	2.78	255.	8572.	6.15	17.17	13.17

TOP OF DAM
637.10
197.
493.

PLAN 2

RATIO OF PMF	MAXIMUM RESERVOIR W.S. ELEV	ELEVATION		MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
		STORAGE	OUTFLOW						
.10	638.27	634.90	0.	.21	201.	2504.	.77	16.67	15.67
.25	639.82	155.	155.	.70	213.	4171.	2.92	17.33	14.00
.50	641.57	0.	0.	2.78	255.	8572.	6.15	17.17	13.17

TOP OF DAM
637.10
197.
493.

PLAN 1 STATION A9

RATIO	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.10	2418.	616.0	16.67
.25	4170.	618.4	17.33
.50	8571.	620.6	17.17

PLAN 2 STATION A9

RATIO	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.10	1662.	616.0	17.33
.25	4248.	618.4	17.17
.50	8566.	620.6	17.17

PLAN 1 STATION A10

RATIO	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.10	2417.	615.5	16.67
.25	4171.	616.2	17.33

.50 8570. 617.5 17.17

PLAN 2 STATION A19

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
.10	1662.	615.1	17.33
.25	4248.	616.2	17.17
.50	8565.	617.5	17.17

PLAN 1 STATION A11

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
.10	2407.	611.3	16.43
.25	4170.	613.0	17.33
.50	8572.	615.4	17.17

PLAN 2 STATION A11

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
.10	1662.	610.5	17.33
.25	4247.	613.0	17.17
.50	8566.	615.4	17.17

PLAN 1 STATION A12

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
.10	2408.	611.1	16.43
.25	4171.	612.5	17.33
.50	8573.	613.5	17.17

PLAN 2 STATION A12

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
.10	1662.	609.8	17.33
.25	4246.	612.6	17.17
.50	8565.	613.5	17.17

PLAN 1 STATION A13

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
.10	2440.	566.5	16.43
.25	4147.	567.9	17.33

.50 856.0 570.3 17.17

PLAN 2 STATION A13

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1659.	565.6	17.33
.25	4240.	568.0	17.33
.50	8554.	570.3	17.17

APPENDIX 4

REFERENCES

LAKE AMES DAM

APPENDIX 4

REFERENCES

LAKE AMES DAM

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