

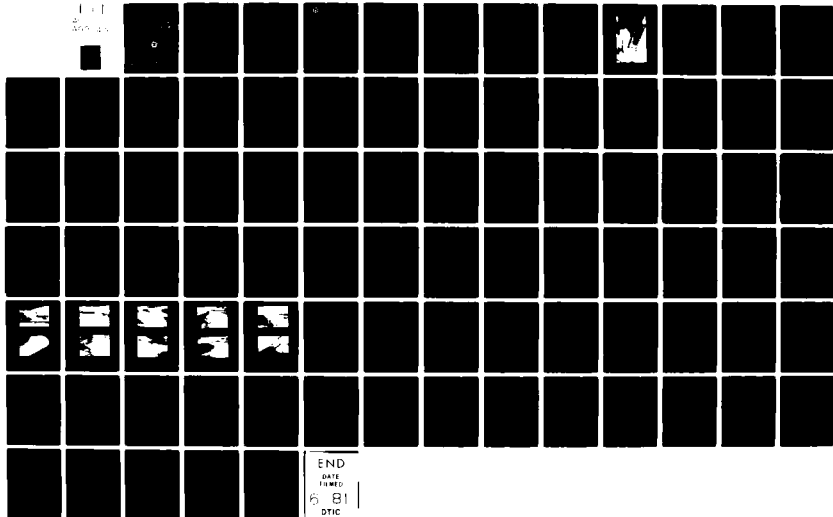
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NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/G 13/13
NATIONAL DAM SAFETY PROGRAM, SUNRISE LAKE DAM (NJ00808), PASSAIC--ETC(U)
MAY 81 J GRIBBIN, R J MCDERMOTT DACW61-79-C-0011

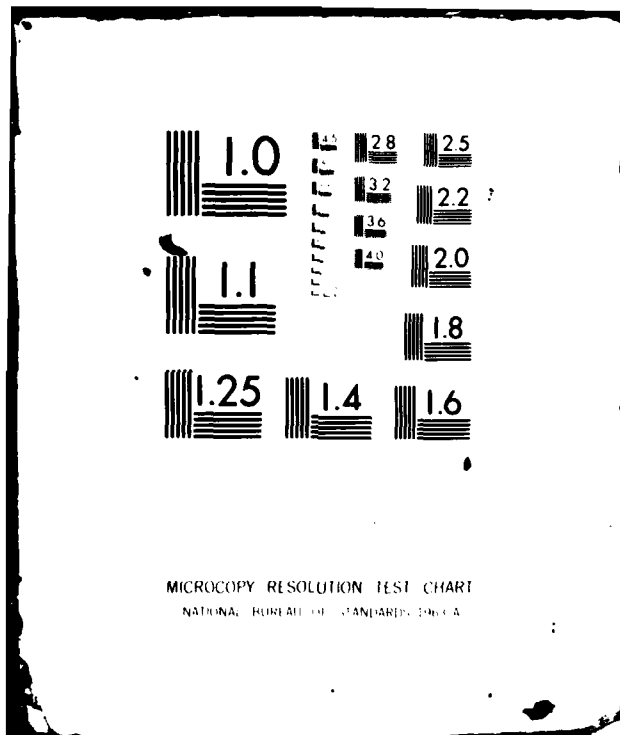
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TRIBUTARY TO WHIPPANY RIVER,
MORRIS COUNTY,
NEW JERSEY.

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National Dam Safety Program.

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SUNRISE LAKE DAM

(NJ 00808)

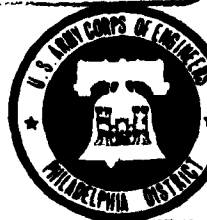
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PHASE 1 INSPECTION REPORT.
NATIONAL DAM SAFETY PROGRAM

⑩ John Gribbin
Richard S. McDermott

⑨ Final Rept.

⑫ 89



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DEPARTMENT OF THE ARMY

Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

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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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DEPARTMENT OF THE ARMY
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PHILADELPHIA, PENNSYLVANIA 19106

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

20 MAY 1981

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Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Sunrise Lake 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, Sunrise Lake 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 good overall condition. The dam's spillway is considered inadequate because a flow equivalent to 14 percent of the One Hundred Year Flood would cause the dam to be overtopped. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated.

b. Within six months from the date of approval of this report the following remedial actions should be initiated:

(1) The outlet works should be investigated with respect to operational adequacy and then restored to proper operational condition.

(2) Spalled and cracked concrete on the upstream training walls should be repaired.

(3) The undermining of the footing of the left wingwall should be corrected.

NAPEN-N

Honorable Brendan T. Byrne

(4) The two clusters of small trees on the right side of the spillway should be removed and animal holes in the embankment should be filled.

(5) The observed seepage and the outflow from the toe drain should be monitored on a periodic basis by a professional engineer experienced in the design and construction of dams in order to detect any changes in volume or condition.

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

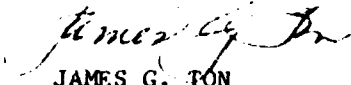
d. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

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 Congresswoman Fenwick of the Fifth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

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

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

SUNRISE LAKE DAM (NJ00808)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 17 December 1980 by Storch Engineers, 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.

Sunrise Lake 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 good overall condition. The dam's spillway is considered inadequate because a flow equivalent to 14 percent of the One Hundred Year Flood would cause the dam to be overtopped. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated.

b. Within six months from the date of approval of this report the following remedial actions should be initiated:

(1) The outlet works should be investigated with respect to operational adequacy and then restored to proper operational condition.

(2) Spalled and cracked concrete on the upstream training walls should be repaired.

(3) The undermining of the footing of the left wingwall should be corrected.

(4) The two clusters of small trees on the right side of the spillway should be removed and animal holes in the embankment should be filled.

(5) The observed seepage and the outflow from the toe drain should be monitored on a periodic basis by a professional engineer experienced in the design and construction of dams in order to detect any changes in volume or condition.

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

d. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

APPROVED:

James G. Ton
JAMES G. TON

Colonel, Corps of Engineers
District Engineer

DATE:

26 May 1981

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Sunrise Lake Dam, I.D. NJ00808
State Located: New Jersey
County Located: Morris
Drainage Basin: Passaic River
Stream: Tributary to Whippany River
- Date of Inspection: December 17, 1980

Assessment of General Condition of Dam

Based on visual inspection, past operational performance and Phase I engineering analyses, Sunrise Lake Dam is assessed as being in good overall condition.

Based on investigations of the downstream flood plain made in connection with this report, it is recommended that the hazard potential classification be downgraded from high to significant hazard.

Hydraulic and hydrologic analyses indicate that the spillway is inadequate. Discharge from the spillway is not sufficient to pass the designated spillway design flood (100-year storm) without an overtopping of the dam. The spillway is capable of passing approximately 13 percent of the SDF. Therefore, the owner should engage a professional engineer experienced in the design and construction of dams in the near future to perform more accurate hydraulic and hydrologic analyses relating to spillway capacity. Based on findings of the analyses, the need for and type of remedial measures should be determined and then implemented.

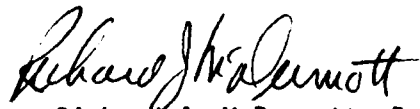
The owner should, in the near future, develop an emergency action plan together with an effective warning system outlining actions to be taken by the operator to minimize downstream effects of an emergency at the dam.

The observed seepage and the outflow from the toe drain should be monitored on a periodic basis by a professional engineer experienced in the design and construction of dams in order to detect any changes in volume or condition.

In addition, it is recommended that the following remedial measures be undertaken in the near future:

- 1) The outlet works should be investigated with respect to operational adequacy and then restored to proper operational condition.
- 2) Spalled and cracked concrete on the upstream training walls should be repaired.
- 3) The undermining of the footing of the left wingwall should be corrected.
- 4) The two clusters of small trees on the right side of the spillway should be removed and animal holes in the embankment should be filled.

In the future, the owner of the dam should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.


Richard J. McDermott, P.E.


John E. Gribbin, P.E.



OVERVIEW - SUNRISE LAKE DAM

20 JANUARY 1981

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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 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 the unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydraulic and hydrologic 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 hydraulic and hydrologic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

SUNRISE LAKE DAM, I.D. NJ00808

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The Division of Water Resources of the New Jersey Department of Environmental Protection (NJDEP) in cooperation with the Philadelphia District of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the State of New Jersey. Storch Engineers has been retained by the NJDEP to inspect and report on a selected group of these dams. The NJDEP is under agreement with the Philadelphia District of the Corps of Engineers.

b. Purpose of Inspection

The visual inspection of Sunrise Lake Dam was made on December 17, 1980. The purpose of the inspection was to make a general assessment of the structural integrity and operational adequacy of the dam structure and its appurtenances.

1.2 Description of Project

a. Description

The dam is an earth embankment with a concrete spillway structure serving as both spillway and outlet works. The spillway is an uncontrolled overflow concrete weir with an ogee shaped downstream face.

The outlet works consists of a gated 24" pipe or sluice which transversely penetrates the center of the concrete spillway structure. The outlet discharges from the downstream face of the spillway structure at a point approximately one foot above a concrete apron.

The crest and downstream face of the dam is stabilized by grass and ground cover plants while the upstream face is protected by riprap. A concrete pipe is located along the toe of dam on the left side of the spillway.

The elevation of the spillway crest is 358.5 (N.G.V.D.) while that of the crest of dam is 360.0. The elevation of the invert of the outlet works is 345.2 while that of the channel bed is 342.3. The overall length of the dam is 495 feet and its height is 17.7 feet.

b. Location

Sunrise Lake Dam is located in the Township of Mendham, Morris County, New Jersey. It impounds a recreational lake located in Lewis Morris County Park adjacent to Route 24. Principal access to the dam is through the park which is entered from Route 24. Discharge from the spillway of the dam flows into a tributary of the Whippany River.

c. Size and Hazard Classification

The dam is classified in accordance with criteria presented in "Recommended Guidelines for Safety Inspection of Dams" published by the U.S. Army Corps of Engineers. Size categories consist of Small, Intermediate and Large while hazard categories are designated as Low, Significant and High.

Size Classification: Sunrise Lake Dam is classified as "Small" size since its maximum storage volume is 51 acre-feet (which is less than 1000 acre-feet) and its height is 17.7 feet (which is less than 40 feet).

Hazard Classification: Visual inspection of the downstream flood plain of the dam together with breach analysis indicate that failure of the dam could inundate the roadway of NJ Route 24 located 200 feet from the dam. It is not anticipated that dam failure during a storm equivalent to the SDF would cause inundation of the Morris County Park stables located approximately 3500 feet from the dam. Accordingly, Sunrise Lake Dam is classified as "Significant" hazard.

d. Ownership

Sunrise Lake Dam is owned and operated by the Morris County Parks Commission, Mendham Road, Morris Township, N.J. 07960.

e. Purpose of Dam

The purpose of the dam is the impoundment of a recreational lake facility for the Morris County Parks Commission.

f. Design and Construction History

Reportedly, Sunrise Lake Dam was constructed in the 1930's by a private owner. In 1968 the Morris County Parks Commission acquired ownership of the dam and lake incorporating it as part of the Lewis Morris Park.

Reportedly, no records or plans for the dam are on file.

Reportedly, the Soil Conservation Service was requested to inspect the dam by the Parks Commission in 1968. They found the dam to be in good condition and recommended that the County remove willow trees that were growing on the embankment. This was reportedly complied with by the County.

g. Normal Operational Procedures

The dam and appurtenances are maintained by the Morris County Parks Commission. There is no fixed schedule of maintenance; repairs are made as the need arises.

The outlet works is used to drain the lake for lake maintenance purposes, but its gate valve is not presently operable.

The lake was last lowered by siphoning in 1974 in order to facilitate beach improvements by the Park Commission.

1.3 Pertinent Data

a. Drainage Area	0.71 square miles
b. Discharge at Damsite	
Maximum flood at damsite	Unknown
Outlet Works at pool elevation	55 cfs.
Spillway capacity at top of dam	102 cfs

c. Elevation (N.G.V.D.)

Top of Dam	360.0
Maximum pool-design surcharge	360.6
Recreation pool	358.6
Spillway crest	358.5
Stream bed at centerline of dam	342.3
Maximum tailwater	348 (Estimated)

d. Reservoir

Length of maximum pool	300 feet (Scaled)
Length of recreation pool	300 feet (Scaled)

e. Storage (Acre-feet)

Recreation pool	37 acre-feet
Design surcharge	61 acre-feet
Top of dam	51 acre-feet

f. Reservoir Surface (acres)

Top of dam	16.5 acres (Estimated)
Maximum pool - design surcharge	16.8 acres (Estimated)
Recreation pool	3.6 acres

g. Dam

Type	Earthfill
Length	495 feet
Height	17.7 feet
Sideslopes - Upstream	3 horiz. to 1 vert.
- Downstream	2.5 horiz. to 1 vert.
Zoning	Unknown

Impervious core	Unknown
Cutoff	Unknown
Grout curtain	Unknown

h. Diversion and Regulating Tunnel	N.A.
------------------------------------	------

i. Spillway

Type	Concrete Weir
Length of weir	17.2 feet
Crest elevation	358.5
Gates	N.A.
Upstream channel	N.A.
Downstream channel	Natural stream

j. Regulating Outlet

24" diameter low-level outlet works controlled by gate valve

SECTION 2: ENGINEERING DATA

2.1 Design

No plans or calculations pertaining to the original construction of the dam could be obtained. Drawings prepared in or about 1966 relating to a proposed subdivision which show a plan of the lake are on file with the Township of Mendham.

2.2 Construction

No data or reports pertaining to the construction of the dam are available.

2.3 Operation

Reportedly, informal maintenance reports are on file with the Morris County Parks Commission. No data pertaining to operations are available.

2.4 Evaluation

a. Availability

Available engineering data is limited to that which is on file with the Township of Mendham. The file contains drawings relating to a proposed subdivision.

b. Adequacy

Available engineering data pertaining to Sunrise Lake Dam is not adequate to be of significant assistance to the performance of a Phase I evaluation. A list of absent information is included in paragraph 7.1.b.

c. **Validity**

The validity of engineering data cannot be assessed due to the absence of data.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

The inspection of Sunrise Lake Dam was performed on December 17, 1980 by staff members of Storch Engineers. A copy of the visual inspection check list is contained in Appendix 1. The following procedures were employed for the inspection:

- 1) The embankment of the dam, appurtenant structures and adjacent areas were examined.
- 2) The embankment and accessible appurtenant structures were measured and key elevations determined by surveyor's level.
- 3) The embankment, appurtenant structures and adjacent areas were photographed.

b. Dam

The upstream face and the crest of the dam are grass covered, and the downstream face is graded regularly and grass and brush covered. The crest appears to be graded uniformly, however, there is evidence of vehicle tracks on it. A slight depression was observed in the ground surface running adjacent to the toe of the embankment left of the spillway. The depression could possibly be due to formation of a trench to place a toe drain. A hole was observed at the upstream side of the crest of dam approximately midway between the spillway and the left end; the hole could possibly be an animal hole.

Along the upstream face, riprap ranging from 6 inches to 8 inches was observed. The riprap continues along the entire length of the dam to the right end of the dam and then around

the lake bank as far as the recreation building located on the right bank. The riprap appeared to be satisfactory although it could not be observed below the water line. Along the right section of the dam two trees were observed at the downstream side of the crest. The trees, approximately 18 inches in diameter did not appear to be creating an adverse condition. There were two clusters of small trees on the downstream side of the dam immediately to the right of the spillway structure. Also, evidence of small trees on the embankment that had been cut off was observed.

c. Appurtenant Structures

The condition of the concrete forming the spillway appeared to be satisfactory. The wingwalls were slightly deteriorated on the surface, although the concrete appeared to be sound. In addition, each wingwall showed repair sections at its downstream end. The repairs were approximately 10 feet long and 2 feet in height. Two vertical cracks were observed in the upstream training wall on the right side of the spillway. The cracks were approximately 1/8 inch wide. The concrete crest of the spillway appeared to be in satisfactory condition. The discharge end of the low level outlet pipe was observed at the base of the spillway. It appeared to be in satisfactory condition, however, the operating mechanism for the gate could not be observed. The base of the left wingwall of the spillway was undermined, although no seepage was observed at the location of the undermining. The concrete apron immediately downstream from the spillway appeared to be in satisfactory condition and although the downstream channel was scoured approximately 1 foot deep downstream from the apron, the apron itself does not appear to be undermined. The channel banks immediately downstream from the spillway were eroded, apparently as a result of high tailwater.

A concrete headwall was observed at the extreme left end of the dam at the toe. Another concrete headwall with a 12-inch pipe was observed at the toe of dam on the left side of the downstream channel. Water was discharging from the 12-inch pipe at a rate of approximately 2 or 3 gallons per minute. This pipe appeared to be connected to the pipe at the headwall at the other end of the dam, although no water was flowing into the pipe at that end. The pipe therefore appeared to be serving as a toe drain from the dam.

Evidence of seepage was observed at several locations along the channel banks downstream from the dam. Orange deposits were noted at the headwall immediately below the 12-inch pipe. Also, orange deposits were observed emerging from the right bank of the downstream channel at several points along the bank.

d. Reservoir Area

The reservoir is used as a swimming area for the County Park. The right side of the reservoir is a beach area while the upstream end and left side are wooded. Shoreline slopes are approximately 40 percent except for the beach area which is approximately 5 percent.

e. Downstream Channel

The downstream channel between the dam and Route 24 consists of a straight stream with a cobbly bed and grass covered banks approximately 3 to 4 feet high. The opening under Route 24 consists of concrete abutments in good condition, but the opening is relatively small. Downstream from Route 24, the channel becomes a meandering stream thickly wooded on both banks with a fairly smooth bed. The banks are approximately 2 to 3 feet high.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

The level of water in the Sunrise Lake Dam impoundment is regulated by discharge over the concrete spillway. At present the outlet works of the dam can not be used to drain the lake or to augment the discharge capacity of the spillway.

The most recent drawdown of the lake occurred in 1974 when the Morris County Parks Department siphoned the lake down a total of eight feet in order to perform repairs on the beach.

4.2 Maintenance of the Dam

Reportedly, maintenance is performed on an "as needed" basis. The County Parks' maintenance department inspects the dam on a yearly basis and performs repairs, if necessary.

4.3 Maintenance of Operating Facilities

The outlet works for the dam does not function as apparently designed. It was not repaired 6 years ago when the lake was drawn down.

4.4. Description of Warning System

Reportedly, no warning system is currently in use for the dam.

4.5 Evaluation of Operational Adequacy

The operation of the dam has been successful to the extent that the dam reportedly has not been overtopped.

Although maintenance has been good in some areas, a few aspects of dam maintenance have not been adequately performed, including the following:

- 1) Outlet work facilities not functioning properly.
- 2) Spalled concrete and cracks on spillway training walls.
- 3) Footing of left wingwall undermined and channel banks immediately downstream from spillway eroded.
- 4) Two clusters of small trees on the embankment not removed.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

The quantity of storm water runoff that the spillway should be able to handle is based on the size and hazard classification of the dam. This runoff quantity, called the spillway design flood (SDF) is described in terms of return frequency or probable maximum flood (PMF) depending on the extent of the dam's size and potential hazard. According to the "Recommended Guidelines for Safety Inspection of Dams" published by the U.S. Army Corps of Engineers, The SDF for Sunrise Lake Dam falls in a range of 100-year frequency to 1/2 PMF. In this case, the low end of the range, 100-year frequency, is chosen since the factors used to select size and hazard classification are on the low side of their respective ranges.

The SDF peak computed for Sunrise Lake Dam is 772 c.f.s. This value is derived from the 100-year flood hydrograph computed by the use of the HEC-1-Dam Flood Hydrograph Computer Program using the Soil Conservation Service Triangular hydrograph method with the curvilinear transformation. Hydrologic computations and computer output are contained in Appendix 4.

The spillway discharge rates were computed by the use of a weir formula appropriate for the configuration of the spillway structure. The total spillway discharge with lake level equal to the top of the dam was computed to be 102 c.f.s. The SDF was routed through the dam by use of the HEC-1-D computer program using the modified Puls Method. In routing the SDF, it was found that the dam crest would be overtopped by a depth of 0.6 feet. Accordingly, the subject spillway is assessed as being inadequate in accordance with criteria developed by the U.S. Army Corps of Engineers.

A dam breach analysis was then performed using a trapezoidal breach section with bottom length of 297 feet and sideslopes of 1 horizontal to 1 vertical. The breach peak outflow was computed to be 2245 c.f.s. Dam breach computations are contained in Appendix 4.

The breach analysis indicates that dam failure from overtopping would not cause inundation of the Morris County Park stables located approximately 3500 feet downstream from the dam. The breach analysis also indicates that failure of the dam could inundate the roadway of N.J. Route 24.

b. Experience Data

Reportedly, the dam has not been overtopped since its construction.

c. Visual Observation

No evidence was found at the time of inspection that would indicate that the dam had been overtopped.

d. Overtopping Potential

As indicated in paragraph 5.1.a. a storm of magnitude equal to the SDF would cause overtopping of the dam to a height of 0.6 foot over the crest of the dam. The spillway is capable of passing approximately 13 percent of the SDF with the lake level equal to the top of dam.

e. Drawdown Data

Drawdown of the lake is accomplished by opening the gate in the 24-inch outlet pipe. Total time for drawdown is estimated to be 12 hours. (See Appendix 4.)

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

The dam appeared, at the time of inspection to be outwardly structurally sound with no evidence of embankment cracks or distress. Evidence of seepage was observed at several locations on the banks of the downstream channel near the dam. The vertical cracks that were observed in the upstream training wall on the right side of the spillway does not appear to be an indication of distress in the spillway structure or the embankment.

b. Generalized Soils Description

The generalized soils description of the dam site consists of recent alluvial soil composed of stratified materials deposited by streams overlying glacial terminal moraine. The terminal moraine consists of silt, sandy silt and silty sand with varying amounts of gravel and small amounts of clay deposited at the outer edge of the ice sheet during glaciation.

c. Design and Construction Data

Analysis of structural stability and construction data for the embankment are not available.

d. Operating Records

No operating records are available for the dam. The water level of Sunrise Lake is not monitored.

e. Post-Construction Changes

Reportedly, it is not known whether or not there have been any post-construction changes. No evidence of significant post-construction changes was noted at the time of inspection.

f. Seismic Stability

Sunrise Lake Dam is located in Seismic Zone 1 as defined in "Recommended Guidelines for Safety Inspection of Dams" which is a zone of very low seismic activity. Experience indicates that dams in Seismic Zone 1 will have adequate stability under seismic loading conditions if they have adequate stability under static loading conditions. Sunrise Lake Dam appeared to be stable under static loading conditions at the time of inspection.

SECTION 7: ASSESSMENT AND RECOMMENDATIONS

7.1 Dam Assessment

a. Safety

Based on hydraulic and hydrologic analyses outlined in Section 5 and Appendix 4, the spillway of Sunrise Lake Dam is assessed as being inadequate. The spillway is not able to pass the SDF without an overtopping of the dam.

The embankment appeared, at the time of inspection, to be generally outwardly stable. Observed seepage and cracks in the spillway structure are not considered to be evidence of immediate dam instability.

b. Adequacy of Information

Information sources for this report include 1) field inspections, 2) USGS quadrangle, and consultation with personnel of the the Morris County Parks Commission. The information obtained is sufficient to allow a Phase I assessment as outlined in "Recommended Guidelines for Safety Inspection of Dams."

Some of the absent data are as follows:

1. Construction and as-built drawings.
2. Description of fill material for embankment.
3. Design computations and reports.
4. Soils report for the site.

c. Necessity for Additional Data/Evaluation

Although some data pertaining to Sunrise Lake are not available, additional data are not considered imperative for this Phase I evaluation.

7.2 Recommendations

a. Remedial Measures

Based on hydraulic and hydrologic analyses outlined in paragraph 5.1.a, the spillway is considered to be inadequate. It is therefore recommended that a professional engineer experienced in the design and construction of dams be engaged in the near future to perform more accurate hydraulic and hydrologic analyses relating to spillway capacity. Based on the findings of these analyses, the need for and type of remedial measures should be determined and then implemented.

In addition, it is recommended that the following remedial measures be undertaken by the owner in the near future.

- 1) The outlet works should be investigated with respect to operational adequacy and then restored to proper operational condition.
- 2) Spalled and cracked concrete on the upstream training walls should be repaired.
- 3) The undermining of the footing of the left wingwall should be corrected.
- 4) The two clusters of small trees on the right side of spillway should be removed and animal holes in the embankment should be filled.

b. Maintenance

The owner of the dam should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

c. Additional Studies

The observed seepage and the outflow from the toe drain should be monitored on a periodic basis by a professional engineer experienced in the design and construction of dams in order to detect any changes in volume or condition.

PLATES

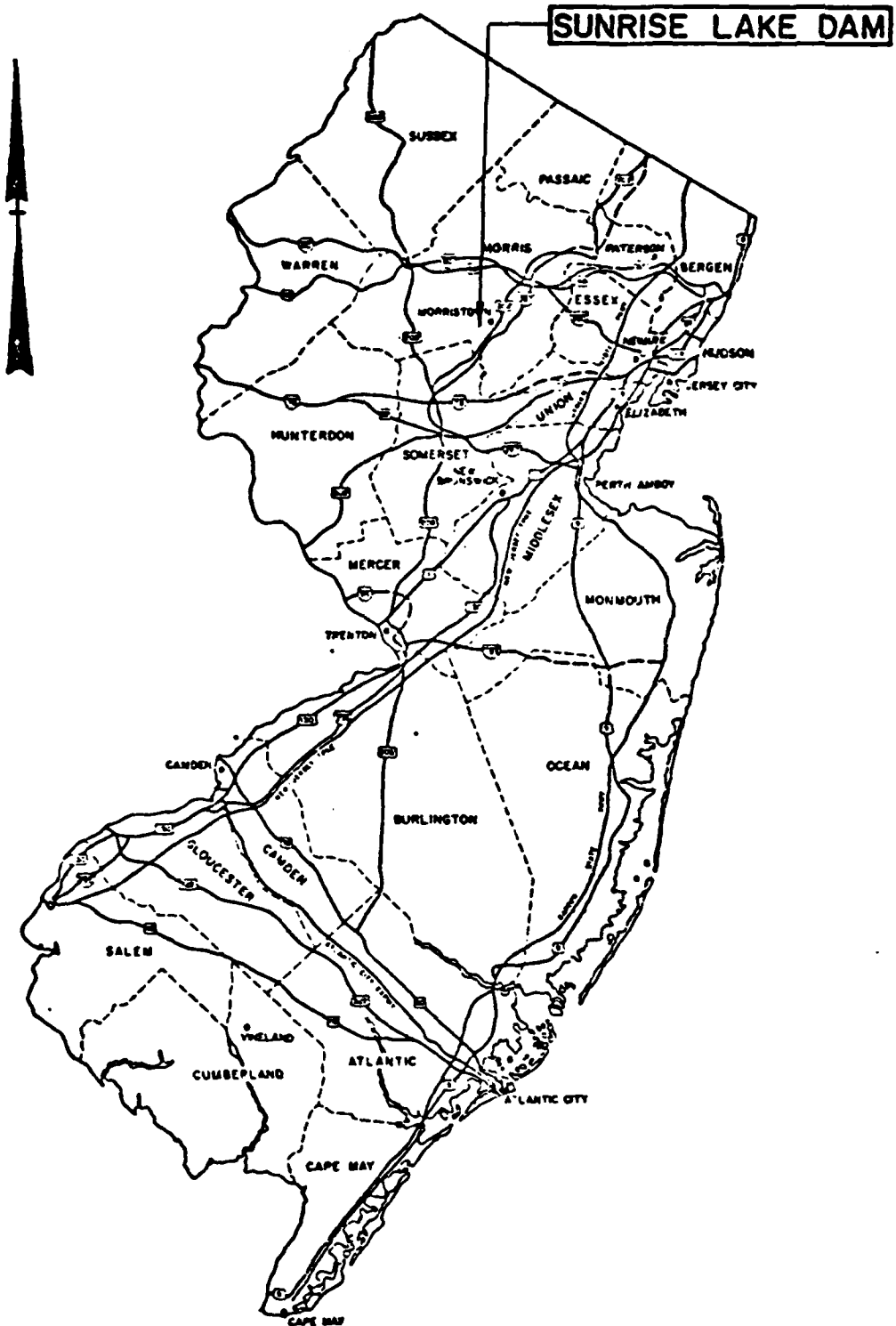


PLATE I

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

KEY MAP

SUNRISE LAKE DAM

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

SCALE: NONE

DATE: FEB. 1981



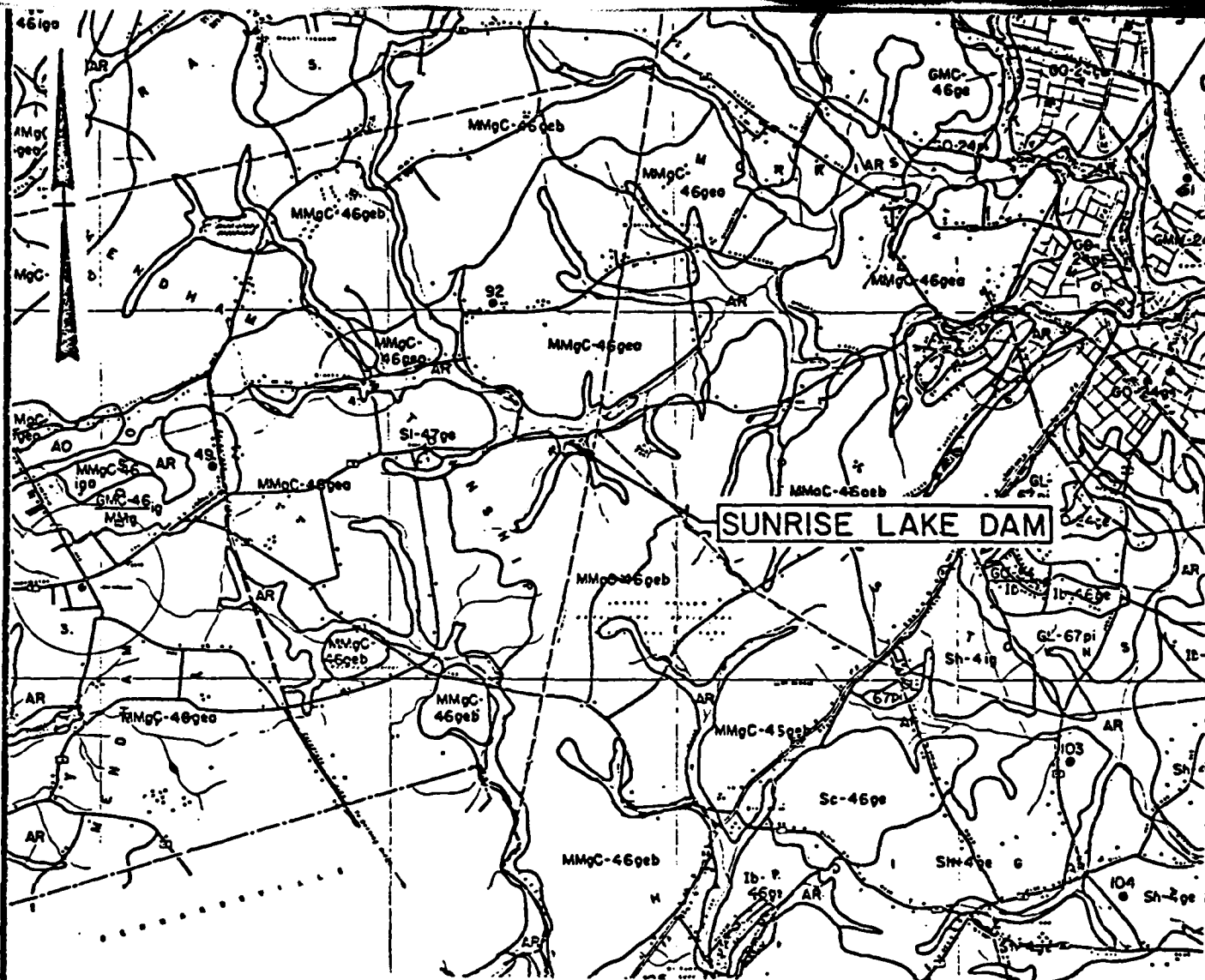
PLATE 2

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS
VICINITY MAP
SUNRISE LAKE DAM

SCALE: AS SHOWN
DATE: FEB. 1981



Legend

- AR Recent alluvium composed of stratified materials deposited by streams; depth to bedrock varies.
- MMgC-46 Residual soil weathered to comparatively great depth, overlying granitoid gneissic bedrock (Losee Gneiss, Pre-Cambrian formation).

Note: Information taken from: Rutgers University, Engineering Soil Survey of New Jersey, Report No. 9, Morris County, November 1953 and Geologic Map of New Jersey prepared by J.V. Lewis, revised by H.B. Kummel 1931 and M. Johnson 1950.

PLATE 3

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY.

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY.

INSPECTION AND EVALUATION OF DAMS

SOIL MAP
SUNRISE LAKE DAM

SCALE: NONE

DATE: FEB. 1981

SUNRISE

Water Elev.

Length of Dam

Steel Pipe
(Boat Barrier)

Crest of Spillway
Elev. = 358.5

Concrete Training Walls

17'

Concrete Wingwall

Concrete Headwall

Concrete Appro

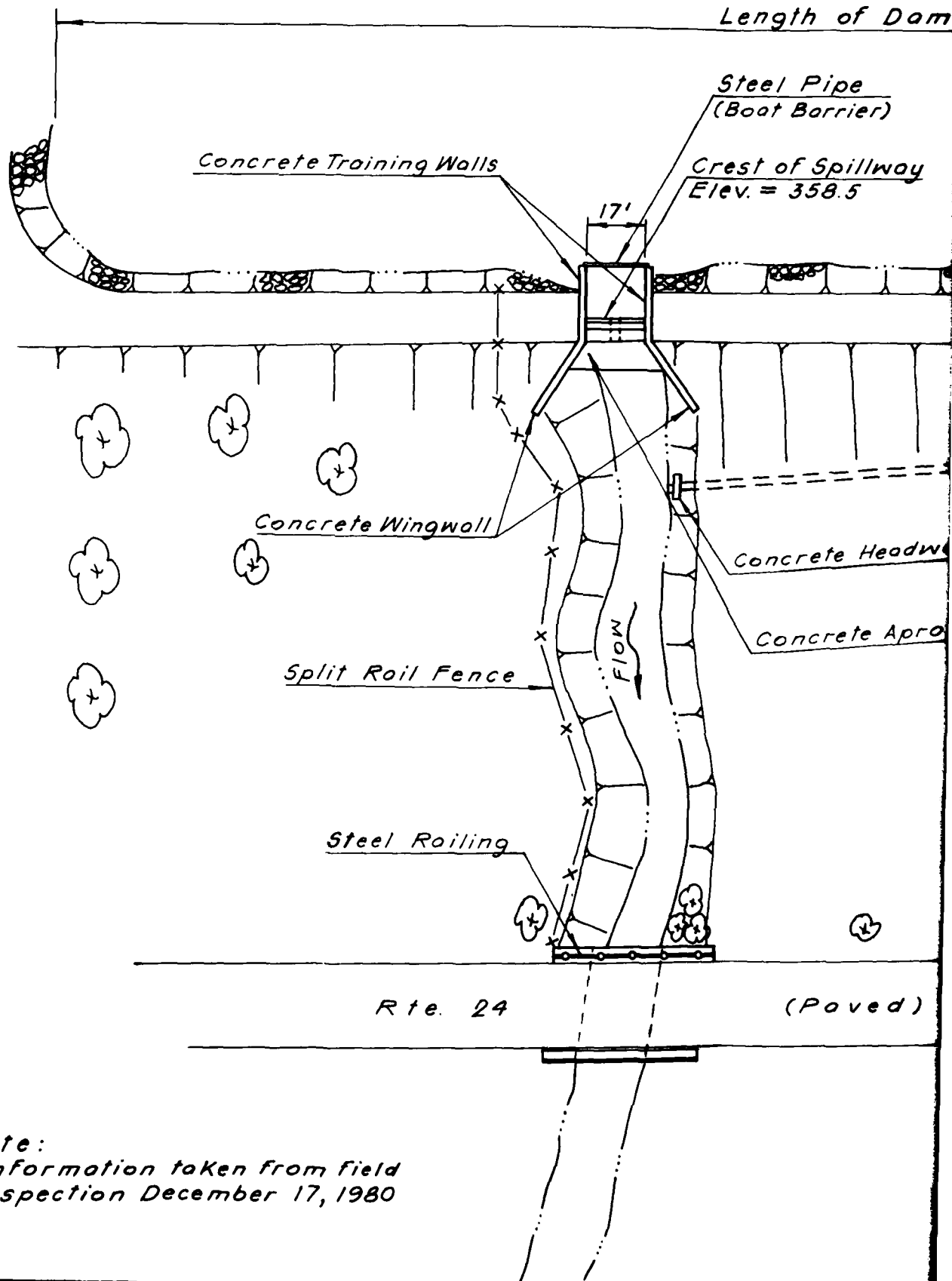
Split Rail Fence

Steel Railing

Rte. 24

(Paved)

Note:
Information taken from field
inspection December 17, 1980



SUNRISE LAKE

Water Elev. = 358.6

Length of Dam = 495'

Steel Pipe
(Boat Barrier)

West of Spillway
Elev. = 358.5

Upstream Face of Embankment

Rip-Rap

12" Concrete Pipe

Concrete Headwall

Concrete Headwall

Concrete Apron

Crest of Dam
Elev. = 360.0

Downstream Face of Embankment

Unpaved Roadway



(Paved)

PLATE 4

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIRONMENTAL PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

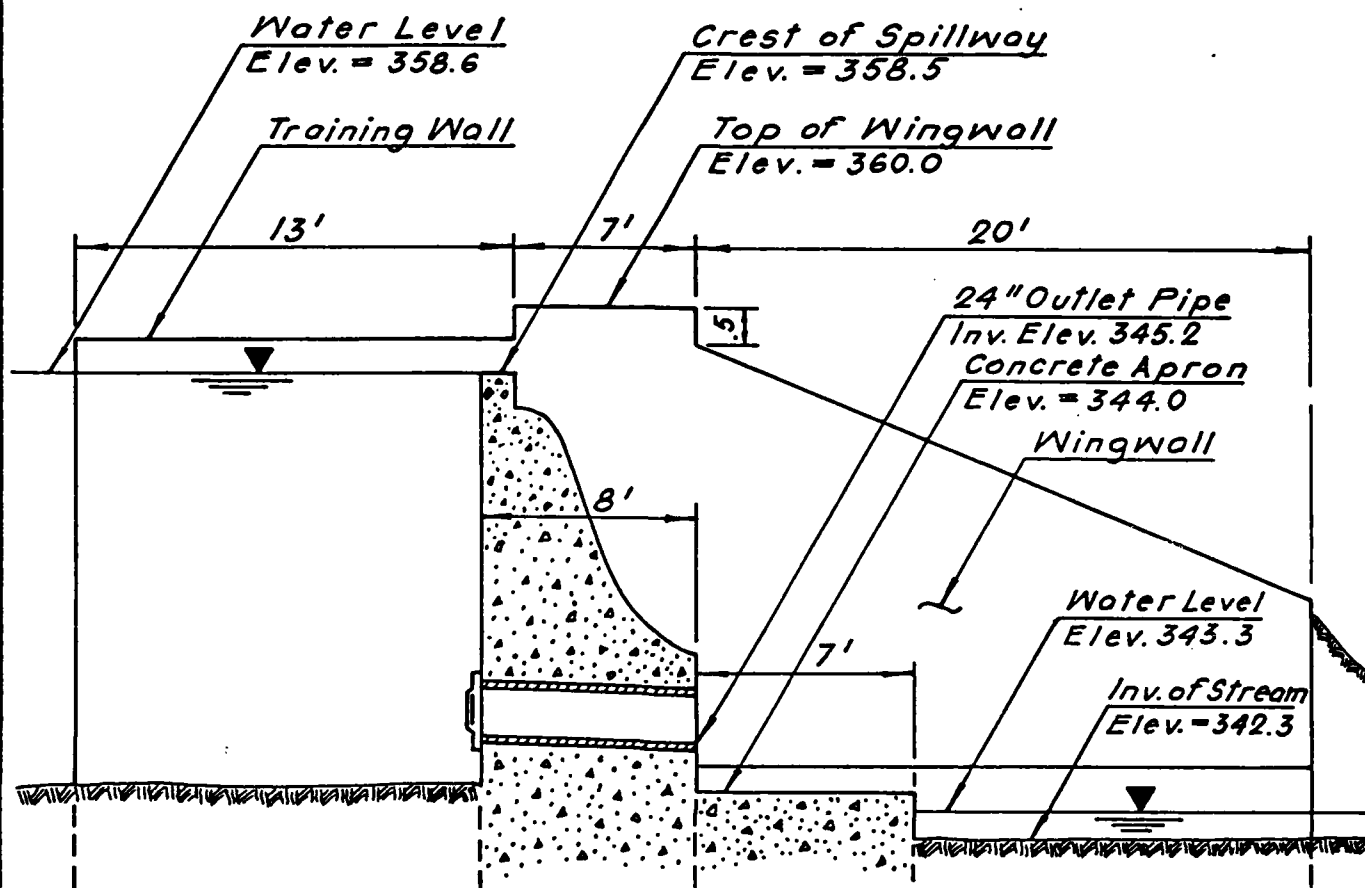
GENERAL PLAN

SUNRISE LAKE DAM

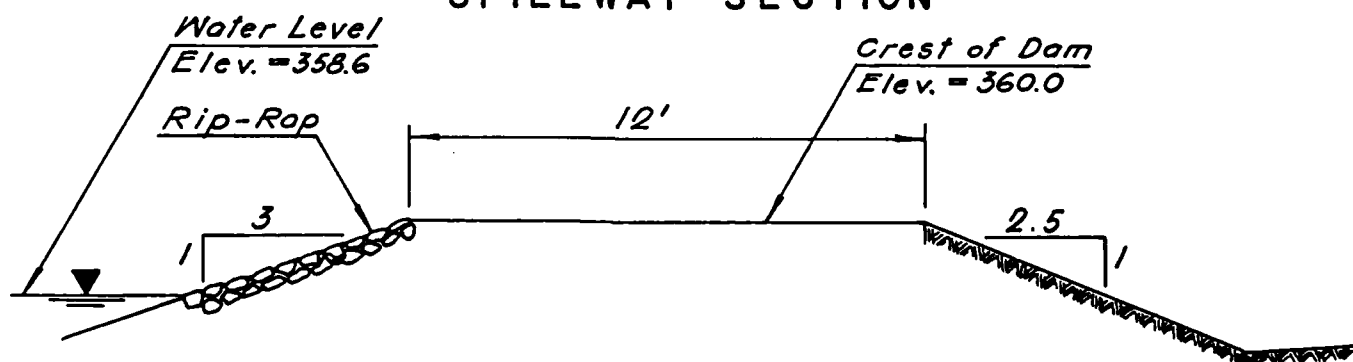
I.D. N.J. 00808

SCALE: NOT TO SCALE

DATE: FEB. 1981



SPILLWAY SECTION



DAM SECTION

Note:
Information taken from field
inspection December 17, 1980

PLATE 5

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS
SECTIONS
SUNRISE LAKE DAM

I.D. N.J. 00808

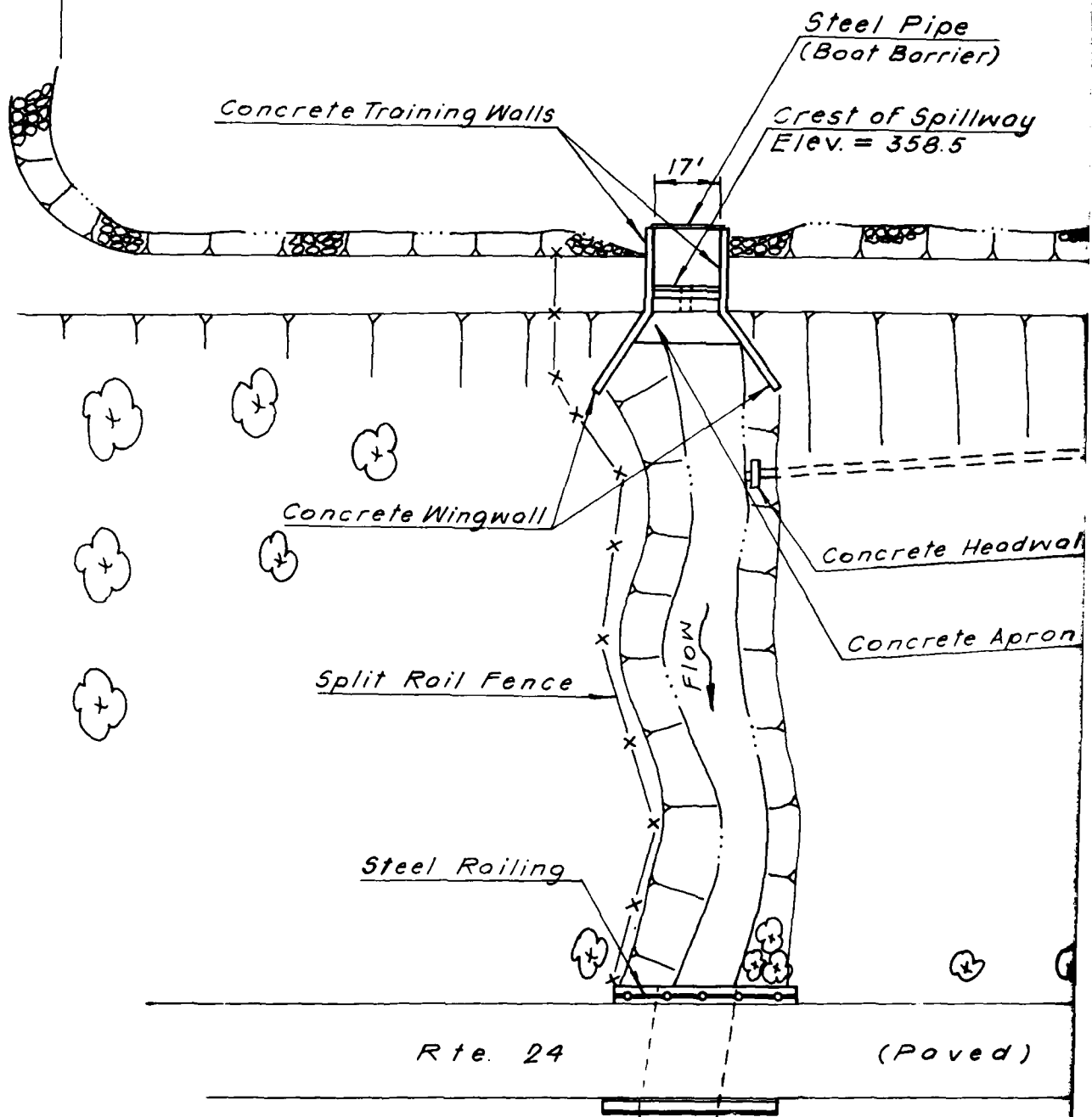
SCALE: NONE

DATE: FEB. 1981

SUNRISE

Water Elev. =

Length of Dam =



Note:
Information taken from field
inspection December 17, 1980

SUNRISE LAKE

Water Elev. = 358.6

Length of Dam = 495'

Steel Pipe
(Boot Barrier)

Crest of Spillway
Elev. = 358.5

Upstream Face of Embankment

Rip-Rap

12" Concrete Pipe

Concrete Headwall

Concrete Headwall

Concrete Apron

Crest of Dam
Elev. = 360.0

Downstream Face of Embankment

Unpaved Roadway

(Paved)

PLATE

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIRONMENTAL PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS GENERAL PLAN SUNRISE LAKE DAM

I.D. N.J. 00808

SCALE: NOT TO SCALE

DATE: FEB. 1981

APPENDIX 1

Check List - Visual Inspection

Check List - Engineering Data

Check List

Visual Inspection

Phase I

Name of Dam Sunrise Lake Dam County Morris State N.J. Coordinators N.J.D.E.P.

Date(s) Inspection 12/17/80 Weather Sunny Temperature 25° F.

Pool Elevation at time of Inspection 358.6 M.S.L. Tailwater at Time of Inspection 343.3 M.S.L.

Inspection Personnel:

<u>John Gribbin</u>	<u>Richard McDermott</u>
<u>Charles Osterkorn</u>	<u></u>
<u>Daniel Buckelew</u>	<u></u>

John Gribbin Recorder

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
GENERAL	Surface generally grass covered with vegetative ground cover on downstream side. Remains of small trees on crest and downstream side-trees have been cut off near ground line. One animal hole observed at upstream side of crest. Cluster of small trees adjacent to right side of spillway.	Cluster of small trees should be removed Observed animal hole should be filled.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Abutments at spillway and ends of dam generally sound. Left, downstream spillway wingwall undermined.	Undermining should be corrected.
ANY NOTICEABLE SEEPAGE	Evidence of seepage observed along both banks of downstream channel from dam to Route 24 bridge. Orange deposits observed emerging from banks; no observable flow of water.	Seepage should be regularly monitored to determine extent and detect possible progression.
STAFF GAGE AND RECORDER	None observed.	
DRAINS	Drain pipe located at downstream toe from left end to downstream channel bank. Concrete headwalls located at each end. No flow observed entering upstream end; flow of approx. 2-gal. per-minute observed discharging at channel bank.	Drain could be intended as either storm drain or toe drain. Function of pipe should be investigated discharge should be monitored along with seepage.

EMBANKMENT

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None Observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	Depression observed along downstream toe left of spillway.	Depression appears to be associated with pipe Cause of subsidence should be investigated together with pipe investigation.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Embankment slopes generally sound. Undermining of left spillway wingwall observed. Erosion of channel bank downstream of left wingwall observed.	Undermining and erosion should be properly backfilled and stabilized.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Vertical : Level Horizontal : Generally Straight	
RIPRAP	Riprap observed along upstream face approx. 6 in. to 8 in. in size. Coverage appeared satisfactory.	Riprap could not be observed below water level

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SURFACES IN OUTLET CONDUIT	Discharge end of pipe located in spillway structure could be observed, and appeared to be in satisfactory condition.	
INTAKE STRUCTURE	Not observed.	
OUTLET STRUCTURE	Outlet pipe discharges at base of downstream face of spillway.	
OUTLET CHANNEL	Outlet pipe discharges directly onto spillway apron.	
GATE AND GATE HOUSING	Gate not observed. Operating mechanism could not be observed.	

SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
WEIR	Concrete surfaces generally in satisfactory condition.	
APPROACH CHANNEL	Top of training walls in generally satisfactory condition. Walls could not be observed below the water level. Two vertical cracks approx. 1/8" wide were observed in the right training wall. Steel pipe spanning upstream end is secured by one bolt at each end and is generally secure.	Approach channel formed by upstream parallel concrete training walls.
DISCHARGE CHANNEL	Spillway discharges directly onto downstream apron and then into downstream channel.	
WINGWALLS	Concrete surfaces are moderately deteriorated; walls appeared to be generally sound. Wingwalls have been repaired at their downstream ends. The repairs are approximately 10' by 2' in size.	
APRON	Concrete surfaces are generally satisfactory with some erosion due to water flow observed. Channel invert immediately downstream of apron scoured approx. 1 foot. Apron did not appear to be undermined.	Channel bottom in vicinity of spillway should be stabilized.

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	NONE	
OBSERVATION WELLS	NONE	
WEIRS	NONE	
PIEZOMETERS	NONE	
OTHER		

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Reservoir used as public swimming area. Portion of shore used as beach with 5% slope. Remaining shore slopes grassed with approx 40% grade.	
SEDIMENTATION	Unknown.	
STRUCTURES ALONG BANKS	Park facility building with dock located on right bank.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTION, DEBRIS, ETC.)	Channel bed cobbly and generally smooth. Route 24 bridge located approx. 200' downstream.	
SLOPES	Banks generally 2' to 3' high and wooded to the water line. Generally flat to moderately sloping flood plain approx. 700' wide beyond the banks.	
STRUCTURES ALONG BANKS	Morris County Parks horse stables located adjacent to channel bank approx. 3500' downstream. N.J. Route 24 road bridge located over channel approx. 200' downstream.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
DAM - PLAN	Not Available
SECTIONS	
SPILLWAY - PLAN	Not Available.
SECTIONS	
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	Not Available
OUTLETS - PLAN	Not Available
DETAILS	
CONSTRAINTS	
DISCHARGE RATINGS	
HYDRAULIC/HYDROLOGIC DATA	Not Available
RAINFALL/RESERVOIR RECORDS	Not Available
CONSTRUCTION HISTORY	Not Available
LOCATION MAP	Available at Mendham Twp. Engineer's office.

ITEM	REMARKS
DESIGN REPORTS	Not Available
GEOLOGY REPORTS	Not Available
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM INSTABILITY SEEPAGE STUDIES	Not Available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Not Available
POST-CONSTRUCTION SURVEYS OF DAM	Not Available
BORROW SOURCES	Not Available

ITEM	REMARKS
------	---------

MONITORING SYSTEMS

None

MODIFICATIONS

Not Available

HIGH POOL RECORDS

Not Available

POST CONSTRUCTION ENGINEERING
STUDIES AND REPORTS

Not Available

PRIOR ACCIDENTS OR FAILURE OF DAM
DESCRIPTION
REPORTS

Not Available

MAINTENANCE
OPERATION
RECORDS

Informal reports on file at Morris County Parks Commission, Mendham Rd., Morris
Twp., N.J. 07960.

APPENDIX 2

Photographs



PHOTO 1
SPILLWAY OVERVIEW



PHOTO 2
DOWNSTREAM FACE OF SPILLWAY SHOWING OUTLET WORKS PIPE

SUNRISE LAKE DAM
17 DECEMBER 1980



PHOTO 3

SPILLWAY APPROACH CHANNEL WITH SAFETY BARRIER



PHOTO 4

RIGHT DOWNSTREAM WINGWALL

SUNRISE LAKE DAM

17 DECEMBER 1980



PHOTO 5

LEFT DOWNSTREAM WINGWALL



PHOTO 6

UNDERMINED FOOTING OF LEFT DOWNSTREAM WINGWALL

SUNRISE LAKE DAM

17 DECEMBER 1980



PHOTO 7

CREST AND UPSTREAM FACE OF DAM SHOWING RIPRAP



PHOTO 8

DOWNSTREAM FACE OF DAM SHOWING
INTAKE FOR PIPE LOCATED ALONG TOE

SUNRISE LAKE DAM
17 DECEMBER 1980



17 DECEMBER 1980

PHOTO 9

DOWNSTREAM CHANNEL BETWEEN DAM AND ROUTE 24 BRIDGE



20 JANUARY 1981

PHOTO 10

AERIAL VIEW OF DAM SHOWING DOWNSTREAM CHANNEL

SUNRISE LAKE DAM

APPENDIX 3

Engineering Data

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Hilly parkland

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 358.6 (37 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N.A.

ELEVATION MAXIMUM DESIGN POOL: 360.6

ELEVATION TOP DAM: 360.0

SPILLWAY CREST: _____

a. Elevation 358.5

b. Type Broad Crested Weir

c. Width 1.0 ft.

d. Length 17.2 ft.

e. Location Spillover Downstream side of dam near midpoint

f. Number and Type of Gates None

OUTLET WORKS: _____

a. Type Gated 24-inch Sluice Pipe

b. Location Center of spillway structure

c. Entrance Invert 345.2

d. Exit Invert 345.2

e. Emergency Draindown Facilities: Gate presently not operational

HYDOMETEOROLOGICAL GAGES: None

a. Type N.A.

b. Location N.A.

c. Records N.A.

MAXIMUM NON-DAMAGING DISCHARGE:

(Lake Stage Equal to Top of Dam) 102 c.f.s.

APPENDIX 4

Hydraulic/Hydrologic Computations

HydrologyHydrologic Analysis

Runoff hydrograph will be developed by
HEC-1-DAM using SCS triangular hydrograph
with the curvilinear transformation.

Drainage Area = 0.71 sq. miles

Infiltration Data

Initial infiltration	1.5 inches
Constant infiltration	0.15 inches/hour

Time of Concentration (t_c) (Method #1)

By SCS TR-55

Overland flow:	4500'
Aver. Slope	6.67%
Aver. Velocity	0.66 f.p.s.
Time	1.89 Hr.

Channel Flow	1200'
Aver. Slope	4.17%
Aver. Velocity	4.20 f.p.s.
Time	0.08 Hr.
t_c	1.97 Hr.

Project

SUNRISE LAKE DAM

Made By JLP Date 1-19-81

Chkd By JG Date 2/12/81

Time of Concentration (Method #2)

by Kerby

Pg. 14-36

"Handbook of Applied Hydrology" Chow

$$T_c^{2.14} = \frac{1}{3} \frac{Ln}{\sqrt{S}}$$

 T_c = Time of Concentration L = Length of Flow S = Slope n = Roughness Coeff.Overland Flow:

$$L = 4500'$$

$$S = 6.67\%$$

$$n = 0.40$$

$$\text{Time} =$$

$$0.86 \text{ Hr.}$$

Channel Flow:

$$L = 1200'$$

$$S = 4.17\%$$

$$n = 0.1$$

$$\text{Time} =$$

$$0.27 \text{ Hr.}$$

$$t_c =$$

$$1.13 \text{ Hr.}$$

Time of Concentration (Method #3)

N.J. Highway Authority & D.E.P. Nomographs

Overland Flow

$$L = 4500'$$

Average GRASS

$$S = 6.67\%$$

$$\text{Time} =$$

$$0.75 \text{ Hr.}$$

Project

SUNRISE LAKE DAM

Made By

JLP

Date

1-19-81

Chkd By

JG

Date

2/12/81N.J. Highway & D.E.P. Nomographs (cont.)Channel Flow: $L = 0.23$ mi. Δ Elev. = 50'

Time =

0.11 Hr. $t_c =$ 0.86 Hr.Time of Concentration (Method #4)By p. 70 U.S. Dept. of Interior "Design of
Small Dams" Texas Highway Dept. &
NAVDocks TP-PW-5

OVERLAND Flow:

 $L = 4500'$ $S = 6.67\%$ $V = 2.0$ f.p.s.

Time =

0.63 Hr.

Channel Flow:

 $L = 1200'$ $S = 4.17\%$ $V = 4.00$ f.p.s. $t_c =$ 0.08 Hr.0.71 Hr.Time of Concentration and Lag Time T_c use 1.97 Hr.Lag = $0.6 T_c = 1.2$ Hr.

Project

SUNRISE LAKE DAM

Made By

JLP

Date

1-14-81

Chkd By

JG

Date

2/12/81PRECIPITATION24 HOUR, 100-YEAR RAINSTORM DISTRIBUTIONFOR SUNRISE LAKE DAM

TIME (HR.)	RAIN (INCHES)
1	0.075
2	0.075
3	0.075
4	0.075
5	0.075
6	0.075
7	0.075
8	0.075
9	0.075
10	0.075
11	0.075
12	0.075
13	0.15
14	0.15
15	0.15
16	0.33
17	0.65
18	3.00
19	0.65
20	0.33
21	0.33
22	0.15
23	0.15
24	0.15

7.09 Total

HYDRAULICSStage Discharge CalculationSpillway Capacity:

The spillway at SUNRISE LAKE DAM is a broad crested concrete weir with an effective length of 17.15'.

Discharge Q , can be calculated by:

$$Q = CLh^{3/2}$$

where:

- Q = discharge over spillway
- C = discharge coefficient
- L = effective length of spillway
- h = total head on spillway

Values for the discharge coefficient, "C" were taken from the "Handbook of Hydraulics" by King & Brater.

SPILLWAYSTAGE DISCHARGE TABULATION

WATER SURFACE ELEVATION	HEAD (ft.)	"Z"	DISCHARGE (CFS)
358.5	0	3.24	0
359.0	0.5	3.24	19.6
360.0	1.5	3.24	102.0
361.0	2.5	3.24	219.6
362.0	3.5	3.24	363.8
363.0	4.5	3.24	530.4
364.0	5.5	3.24	716.7
365.0	6.5	3.24	920.8
366.0	7.5	3.24	1141.3
367.0	8.5	3.24	1377.0

Project

SUNRISE LAKE DAM

Made By JLP

Date 1-19-81

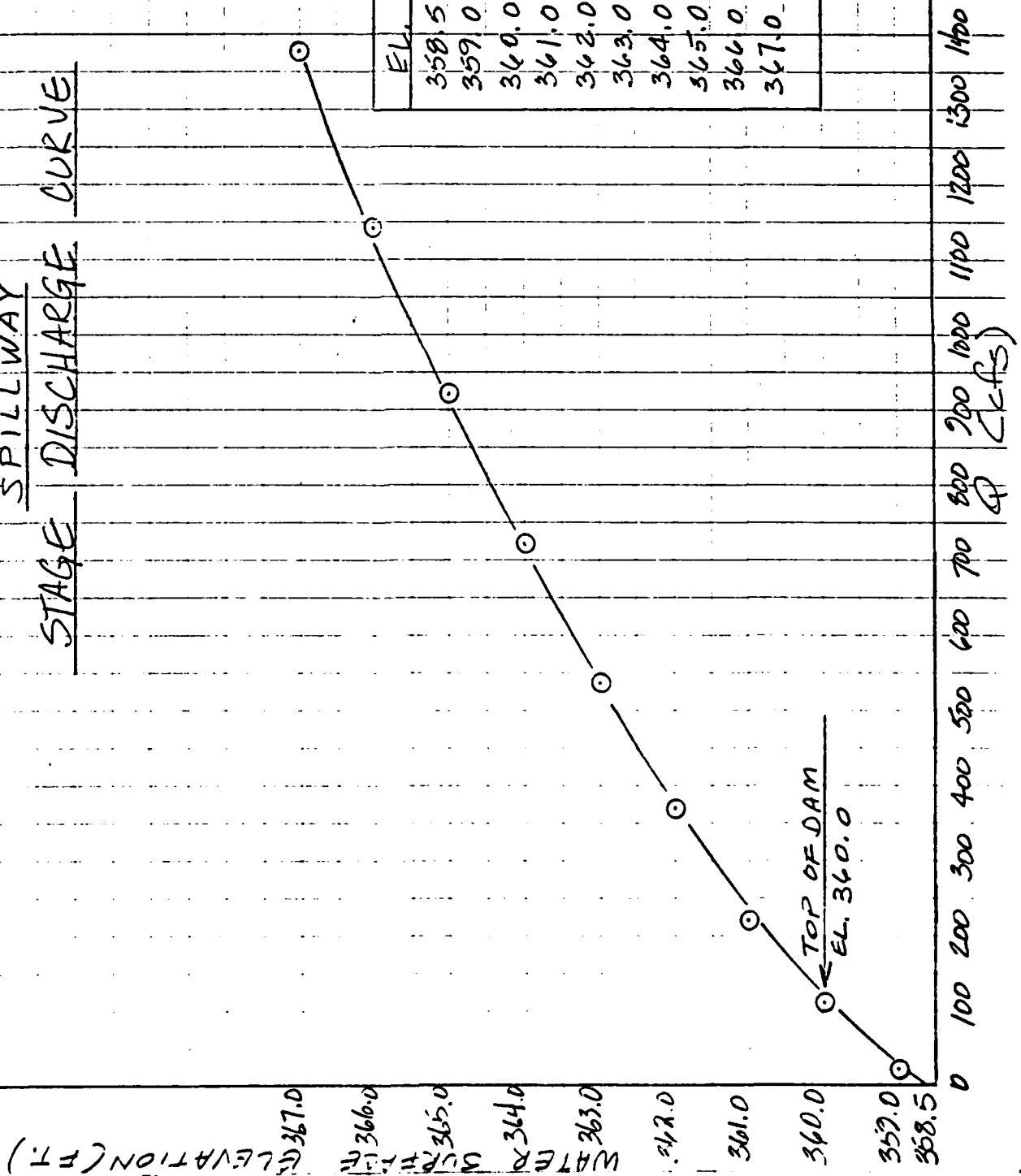
Chkd By JG

Date 2/12/81

SQUARE 4 x 4 TO THE INCH

SPILLWAY
STAGE DISCHARGE CURVE

EL.	Q
358.5	0
359.0	19.6
360.0	102.0
361.0	219.6
362.0	363.8
363.0	530.4
364.0	716.7
365.0	920.8
366.0	1141.3
367.0	1377.0



ELEVATION - AREA Table

Elev. (MSL)	AREA (Ac)
344.0	0.0
344.1	1.70
358.5	3.60
360.0	16.50
380.0	25.70

HEC-1-DAM Computer program will develop storage capacity from surface areas & elevations.

Information taken from USGS Quadrangle, Mendham, N.J.

Project

SUNRISE LAKE DAMMade By JLP Date 1-26-81Chkd By JG Date 2/12/81OUTLET WORKS CAPACITY

OUTLET WORKS FOR THE SUNRISE LAKE DAM

CONSIST OF A 24" DIAMETER R.C.P. 8 FEET

LONG. OUTLET INVERT 345.2

FROM "HYDRAULIC CHARTS FOR THE SELECTION

OF HIGHWAY CULVERTS" BUREAU OF PUBLIC ROADS,

1963; INLET CONTROL (FROM CHART #2)

MAXIMUM DISCHARGE; HW = 12.0'
 $Q = 55.0 \text{ CFS}$ AVERAGE DISCHARGE; HW = 6.0' (DURING
 $Q = 37.0 \text{ CFS}$ DRAWDOWN)DRAWDOWN

$$\text{DRAWDOWN} = \frac{\text{STORAGE AT SPILLWAY}}{\text{AVERAGE DISCHARGE} - \text{AVG. INFLOW}}$$

AVERAGE DISCHARGE = 37.0 cfs

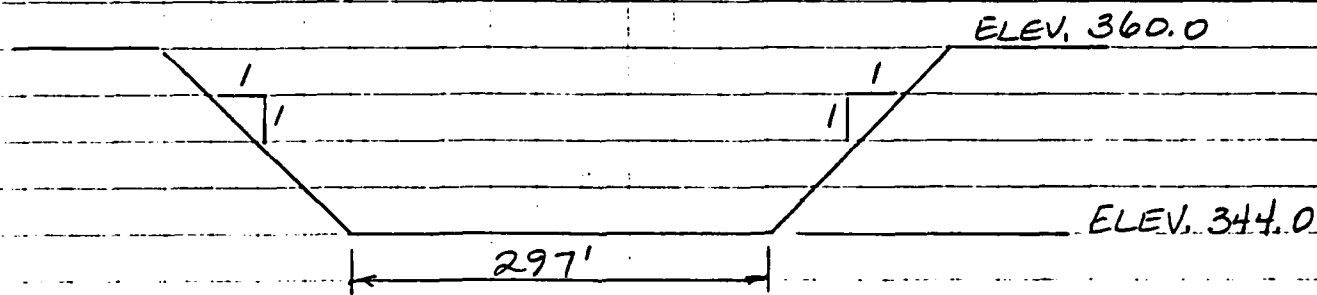
AVERAGE INFLOW = 1.0 cfs based upon 1 cfs/sq. mi.

$$= \frac{37 \text{ acre-ft. (43560) SQ. FT./ACRE}}{(37-1) \text{ cfs (3600) SEC./HR.}} = 12 \text{ HOURS}$$

BREACH ANALYSIS

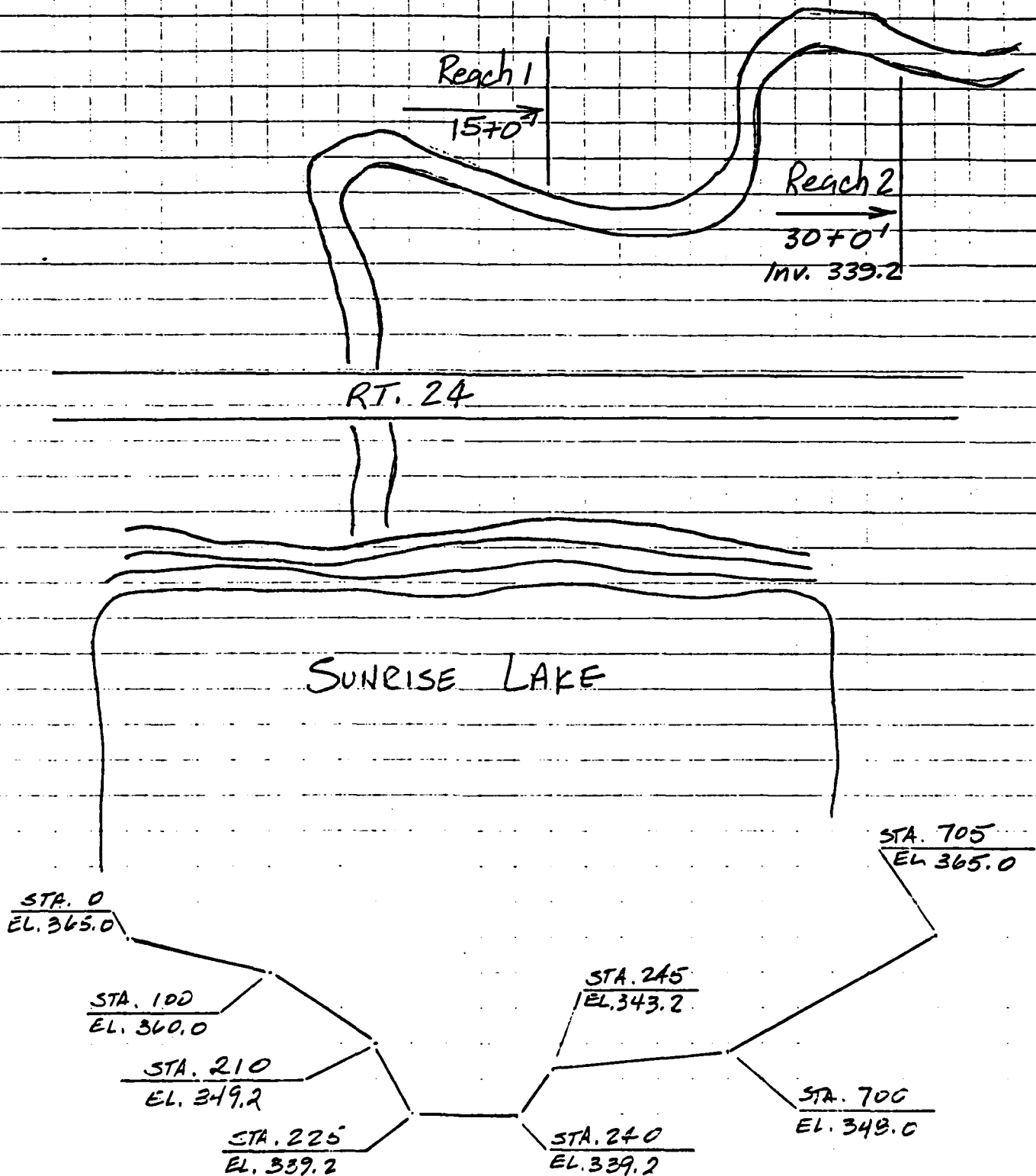
A BREACH HYDROGRAPH WILL BE COMPUTED BY THE
HEC-1 - DAM PROGRAM AND ROUTED THROUGH TWO
DOWNSTREAM REACHES BY THE MODIFIED PULS METHOD.
THE ASSUMED BREACH CONDITIONS ARE AS FOLLOWS:

1. THE BREACH BEGINS WHEN THE WATER
SURFACE ELEVATION REACHES 360.0
2. TIME TO DEVELOP BREACH = 1.0 HR.
3. SECTION



FULLY DEVELOPED BREACH

Project

SUNRISE LAKE DAMMade By JLPDate 1-26-81Chkd By JGDate 2/12/81Morris County
Parks StobleElev.
355SOURCE
TO THE RIGHTCROSS SECTION END OF REACH 2

$$S = 0.001$$

Project Sunrise Lake DamMade By JG Date 2/12/81

Chkd By _____ Date _____

Breach Results:

1. Peak outflow = 2245 c.f.s.

2. Max. channel stage, Reach 2 = 346.6

3. Stable not inundated.

HEC - 1 - DAM PRINTOUT

Overtopping Analysis

NATIONAL DAM SAFETY PROGRAM SUNRISE LAKE DAM, NEW JERSEY 100 YEAR STORM ROUTING

STATION	INFLOW	LAKE HYDROGRAPH TO SUNRISE LAKE DAM	DAM	0	1	2	3
41	3.0	0.0	0.0	0.0	0.0	0.0	0.0
42	3.0	0.0	0.0	0.0	0.0	0.0	0.0
43	3.0	0.0	0.0	0.0	0.0	0.0	0.0
44	3.0	0.0	0.0	0.0	0.0	0.0	0.0
45	3.0	0.0	0.0	0.0	0.0	0.0	0.0
46	3.0	0.0	0.0	0.0	0.0	0.0	0.0
47	3.0	0.0	0.0	0.0	0.0	0.0	0.0
48	3.0	0.0	0.0	0.0	0.0	0.0	0.0
49	3.0	0.0	0.0	0.0	0.0	0.0	0.0
50	3.0	0.0	0.0	0.0	0.0	0.0	0.0
51	3.0	0.0	0.0	0.0	0.0	0.0	0.0
52	3.0	0.0	0.0	0.0	0.0	0.0	0.0
53	3.0	0.0	0.0	0.0	0.0	0.0	0.0
54	3.0	0.0	0.0	0.0	0.0	0.0	0.0
55	3.0	0.0	0.0	0.0	0.0	0.0	0.0
56	3.0	0.0	0.0	0.0	0.0	0.0	0.0
57	3.0	0.0	0.0	0.0	0.0	0.0	0.0
58	3.0	0.0	0.0	0.0	0.0	0.0	0.0
59	3.0	0.0	0.0	0.0	0.0	0.0	0.0
60	3.0	0.0	0.0	0.0	0.0	0.0	0.0
61	3.0	0.0	0.0	0.0	0.0	0.0	0.0
62	3.0	0.0	0.0	0.0	0.0	0.0	0.0
63	3.0	0.0	0.0	0.0	0.0	0.0	0.0
64	3.0	0.0	0.0	0.0	0.0	0.0	0.0
65	3.0	0.0	0.0	0.0	0.0	0.0	0.0
66	3.0	0.0	0.0	0.0	0.0	0.0	0.0
67	3.0	0.0	0.0	0.0	0.0	0.0	0.0
68	3.0	0.0	0.0	0.0	0.0	0.0	0.0
69	3.0	0.0	0.0	0.0	0.0	0.0	0.0
70	3.0	0.0	0.0	0.0	0.0	0.0	0.0
71	3.0	0.0	0.0	0.0	0.0	0.0	0.0
72	3.0	0.0	0.0	0.0	0.0	0.0	0.0
73	3.0	0.0	0.0	0.0	0.0	0.0	0.0
74	3.0	0.0	0.0	0.0	0.0	0.0	0.0
75	3.0	0.0	0.0	0.0	0.0	0.0	0.0
76	3.0	0.0	0.0	0.0	0.0	0.0	0.0
77	3.0	0.0	0.0	0.0	0.0	0.0	0.0
78	3.0	0.0	0.0	0.0	0.0	0.0	0.0
79	3.0	0.0	0.0	0.0	0.0	0.0	0.0
80	3.0	0.0	0.0	0.0	0.0	0.0	0.0
81	3.0	0.0	0.0	0.0	0.0	0.0	0.0
82	3.0	0.0	0.0	0.0	0.0	0.0	0.0
83	3.0	0.0	0.0	0.0	0.0	0.0	0.0
84	3.0	0.0	0.0	0.0	0.0	0.0	0.0
85	3.0	0.0	0.0	0.0	0.0	0.0	0.0
86	3.0	0.0	0.0	0.0	0.0	0.0	0.0
87	3.0	0.0	0.0	0.0	0.0	0.0	0.0
88	3.0	0.0	0.0	0.0	0.0	0.0	0.0
89	3.0	0.0	0.0	0.0	0.0	0.0	0.0
90	3.0	0.0	0.0	0.0	0.0	0.0	0.0
91	3.0	0.0	0.0	0.0	0.0	0.0	0.0
92	3.0	0.0	0.0	0.0	0.0	0.0	0.0
93	3.0	0.0	0.0	0.0	0.0	0.0	0.0
94	3.0	0.0	0.0	0.0	0.0	0.0	0.0
95	3.0	0.0	0.0	0.0	0.0	0.0	0.0
96	3.0	0.0	0.0	0.0	0.0	0.0	0.0
97	3.0	0.0	0.0	0.0	0.0	0.0	0.0
98	3.0	0.0	0.0	0.0	0.0	0.0	0.0
99	3.0	0.0	0.0	0.0	0.0	0.0	0.0
100	3.0	0.0	0.0	0.0	0.0	0.0	0.0

RUN DATE# 81/01/28.
TIME# 14.09.59.

NATIONAL DAM SAFETY PROGRAM
SUNHISE LAKE DAM, NEW JERSEY
100 YEAR STORM ROUTING

NO		NMH		IDAY		JDR SPECIFICATION		IPRT		NSTAN	
300	0	15	0	0	0	IHR	IMIN	METRC	IPLT	0	0
						NUT	LROPT	TRACE			
				JOPER	5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 1 LRTIO= 1

RTIOS= 1.00

SUB=AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH TO SUNRISE LAKE DAM

INSTAD	ICOMP	TECON	ITAPE	JPLT	JPRI	INAME	ISTAGE	IAUTO
LAVER	0	0	0	0	0	1	0	0

HYDROGRAPH DATA				LOCAL	
INVDG	TIME	SNAP	TRSDG	TRSPC	ISAME
1	0.00	0.00	0.00	0.00	0
2	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.00	0.00	0
5	0.00	0.00	0.00	0.00	0
6	0.00	0.00	0.00	0.00	0
7	0.00	0.00	0.00	0.00	0
8	0.00	0.00	0.00	0.00	0
9	0.00	0.00	0.00	0.00	0
10	0.00	0.00	0.00	0.00	0
11	0.00	0.00	0.00	0.00	0
12	0.00	0.00	0.00	0.00	0
13	0.00	0.00	0.00	0.00	0
14	0.00	0.00	0.00	0.00	0
15	0.00	0.00	0.00	0.00	0
16	0.00	0.00	0.00	0.00	0
17	0.00	0.00	0.00	0.00	0
18	0.00	0.00	0.00	0.00	0
19	0.00	0.00	0.00	0.00	0
20	0.00	0.00	0.00	0.00	0
21	0.00	0.00	0.00	0.00	0
22	0.00	0.00	0.00	0.00	0
23	0.00	0.00	0.00	0.00	0
24	0.00	0.00	0.00	0.00	0
25	0.00	0.00	0.00	0.00	0
26	0.00	0.00	0.00	0.00	0
27	0.00	0.00	0.00	0.00	0
28	0.00	0.00	0.00	0.00	0
29	0.00	0.00	0.00	0.00	0
30	0.00	0.00	0.00	0.00	0
31	0.00	0.00	0.00	0.00	0
32	0.00	0.00	0.00	0.00	0
33	0.00	0.00	0.00	0.00	0
34	0.00	0.00	0.00	0.00	0
35	0.00	0.00	0.00	0.00	0
36	0.00	0.00	0.00	0.00	0
37	0.00	0.00	0.00	0.00	0
38	0.00	0.00	0.00	0.00	0
39	0.00	0.00	0.00	0.00	0
40	0.00	0.00	0.00	0.00	0
41	0.00	0.00	0.00	0.00	0
42	0.00	0.00	0.00	0.00	0
43	0.00	0.00	0.00	0.00	0
44	0.00	0.00	0.00	0.00	0
45	0.00	0.00	0.00	0.00	0
46	0.00	0.00	0.00	0.00	0
47	0.00	0.00	0.00	0.00	0
48	0.00	0.00	0.00	0.00	0
49	0.00	0.00	0.00	0.00	0
50	0.00	0.00	0.00	0.00	0
51	0.00	0.00	0.00	0.00	0
52	0.00	0.00	0.00	0.00	0
53	0.00	0.00	0.00	0.00	0
54	0.00	0.00	0.00	0.00	0
55	0.00	0.00	0.00	0.00	0
56	0.00	0.00	0.00	0.00	0
57	0.00	0.00	0.00	0.00	0
58	0.00	0.00	0.00	0.00	0
59	0.00	0.00	0.00	0.00	0
60	0.00	0.00	0.00	0.00	0
61	0.00	0.00	0.00	0.00	0
62	0.00	0.00	0.00	0.00	0
63	0.00	0.00	0.00	0.00	0
64	0.00	0.00	0.00	0.00	0
65	0.00	0.00			

NP	STORM	PRECIP DATA	DAJ	DAK
96	0.00	0.00	0.00	0.00

[illegible][illegible]

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= 1.20

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RECESSION DATA
STRTQ= -1.00 QRC SN= -.05 RTIOR= 2.00

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UNIT HYDROGRAPH 26- END OF PERIOD ORIGINATES, TC=		0.00 HOURS, LAB=	1.20	YOL= 1.00
24.	226.	251.	173.	87.
25.	154.	257.	218.	9.
26.	35.	19.	10.	6.
27.	2.	1.	8.	
28.	1.	0.		

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	772.	322.	87.	29.	8382.
CMS	22.	9.	2.	1.	237.
INCHES		4.21	4.57	4.58	4.58
MM		107.04	116.02	116.23	116.23
AC-FT		159.	173.	173.	173.
THOUS CU-M		197.	213.	214.	214.

HYDROGRAPH AT STA LAKE FOR PLAN 1, RTIO 1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	772.	322.	87.	29.	8382.
CMS	22.	9.	2.	1.	237.
INCHES		4.21	4.57	4.58	4.58
MM		107.04	116.02	116.23	116.23
AC-FT		159.	173.	173.	173.
THOUS CU-M		197.	213.	214.	214.

HYDROGRAPH ROUTING

ROUTE DISCHARGE THROUGH DAM

STAGE	ICOMP	IECON	ITAPE	JPLI	JPRI	INAME	ISTAGE	IAUTO
0.0	1	0	0	0	0	0	0	0
2.0	1	0	0	0	0	0	0	0
4.0	1	0	0	0	0	0	0	0
6.0	1	0	0	0	0	0	0	0
8.0	1	0	0	0	0	0	0	0
10.0	1	0	0	0	0	0	0	0
12.0	1	0	0	0	0	0	0	0
14.0	1	0	0	0	0	0	0	0
16.0	1	0	0	0	0	0	0	0
18.0	1	0	0	0	0	0	0	0
20.0	1	0	0	0	0	0	0	0
22.0	1	0	0	0	0	0	0	0
24.0	1	0	0	0	0	0	0	0
26.0	1	0	0	0	0	0	0	0
28.0	1	0	0	0	0	0	0	0
30.0	1	0	0	0	0	0	0	0
32.0	1	0	0	0	0	0	0	0
34.0	1	0	0	0	0	0	0	0
36.0	1	0	0	0	0	0	0	0
38.0	1	0	0	0	0	0	0	0
40.0	1	0	0	0	0	0	0	0
42.0	1	0	0	0	0	0	0	0
44.0	1	0	0	0	0	0	0	0
46.0	1	0	0	0	0	0	0	0
48.0	1	0	0	0	0	0	0	0
50.0	1	0	0	0	0	0	0	0
52.0	1	0	0	0	0	0	0	0
54.0	1	0	0	0	0	0	0	0
56.0	1	0	0	0	0	0	0	0
58.0	1	0	0	0	0	0	0	0
60.0	1	0	0	0	0	0	0	0
62.0	1	0	0	0	0	0	0	0
64.0	1	0	0	0	0	0	0	0
66.0	1	0	0	0	0	0	0	0
68.0	1	0	0	0	0	0	0	0
70.0	1	0	0	0	0	0	0	0
72.0	1	0	0	0	0	0	0	0
74.0	1	0	0	0	0	0	0	0
76.0	1	0	0	0	0	0	0	0
78.0	1	0	0	0	0	0	0	0
80.0	1	0	0	0	0	0	0	0
82.0	1	0	0	0	0	0	0	0
84.0	1	0	0	0	0	0	0	0
86.0	1	0	0	0	0	0	0	0
88.0	1	0	0	0	0	0	0	0
90.0	1	0	0	0	0	0	0	0
92.0	1	0	0	0	0	0	0	0
94.0	1	0	0	0	0	0	0	0
96.0	1	0	0	0	0	0	0	0
98.0	1	0	0	0	0	0	0	0
100.0	1	0	0	0	0	0	0	0

TOPEL 368.0 COOD 256 EXPD 153 DAMWID 478.

HYDROGRAPH ROUTING

CHANNEL ROUTING REACH 1

ISTAQ	1	ICOMP	1	IECON	0	ITAPE	0	JPLT	0	JPRT	0	INAME	1	ISTAGE	0	IAUTO	0
CLOSS	0.00	AVG	0.00	IRF	1	ROUTING DATA	0	IOPT	0	IPMP	0	LSTR	0				
NSIPS	1	NSIDL	0	LAG	0	AMSKK	0.000	X	0.000	ISK	0.000	STORA	0	ISPRAT	0		

NORMAL DEPTH CHANNEL ROUTING

CH(1) CH(2) CH(3) ELNVT ELMAX RLNTH SEL
 .1000 .0350 .1000 340.7 375.0 1500. .00100

CRU55 SECTION COORDINATES--STA.ELEV.STAGELEV--ETC

STORAGE	0.00	27.10	84.57	104.31	2.15	3.91	126.32	150.59	7.35	12.50	28.19	30.98	51.91
OUTFLOW	0.00	50.87	6544.47	8309.67	156.74	320.38	10369.42	558.53	891.55	15452.17	1990.31	24693.47	3813.13
STAGE	340.70	342.51	342.51	344.31	346.12	346.12	346.12	347.92	349.73	353.34	353.34	355.14	356.95
FLOW	5052.92	5052.92	6544.47	8309.67	156.74	320.38	10369.42	12713.79	15452.17	1990.41	21225.76	24693.47	3813.13

● ● ● ● ● ● ● ● ● ●

1
2
3
4
5
6

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SUMMARY OF DAM SAFETY ANALYSIS

.....	FLEWATION STORAGE OUTFLOW	INITIAL VALUE 359.50 37. 0.	SPILLWAY CREST 358.50 37. 0.	TOP OF DAM 360.00 51. 102.
-------	---------------------------------	--------------------------------------	---------------------------------------	-------------------------------------

RATIO OF D.F	MAXIMUM RESERVOIR M.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	360.50	50	61.	758.	4.25	19.00	0.00

PLAN 1 STATION 1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	736.	348.9	19.00

PLAN 1 STATION 2

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	693.	345.5	19.50

HEC - 1 - DAM PRINTOUT

Breach Analysis

NATIONAL DAM SAFETY PROGRAM
GEORGE L. LAKE DAM, NEW JERSEY
12 YEAR STUDY ROUTING

[illegible]

SUMMARY OF DAM SAFETY ANALYSIS

.....

FLEWATION
STORAGE
OUTFLOW

INITIAL VALUE
358.50
37.
C.

SPILLWAY CREST
358.50
37.
C.

TOP OF DAM
360.00
51.
102.

RATIO
OF
PWF

MAXIMUM
RESERVOIR
W.S. ELEV
358.13

MAXIMUM
DEPTH
OVER DAM
.13

MAXIMUM
STORAGE
AC-FT
53.

MAXIMUM
OUTFLOW
CFS
2245.

DURATION
OVER TOP
HOURS
.31

TIME OF
MAX OUTFLOW
HOURS
18.17

TIME OF
FAILURE
HOURS
18.00

PLAN 1 STATION 1

RATIO
1.00
MAXIMUM
FLOW, CFS
1237.
MAXIMUM
STAGE, FT
351.1
TIME
HOURS
18.75

PLAN 1 STATION 2

RATIO
1.00
MAXIMUM
FLOW, CFS
1111.
MAXIMUM
STAGE, FT
346.6
TIME
HOURS
19.00

APPENDIX 5

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