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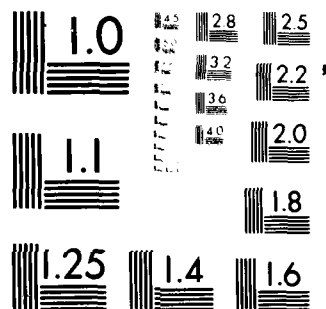
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WARREN COUNTY,  
NEW JERSEY.

**LEVEL**

⑥ National Dam Safety Program.

**N.J. NO NAME**

**DAM NO. 50**

Number

**(NJ 00814)**

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

⑨ Final rept.

⑩ Abraham Perera

⑫ 50

⑪ Mar 81

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Philadelphia District  
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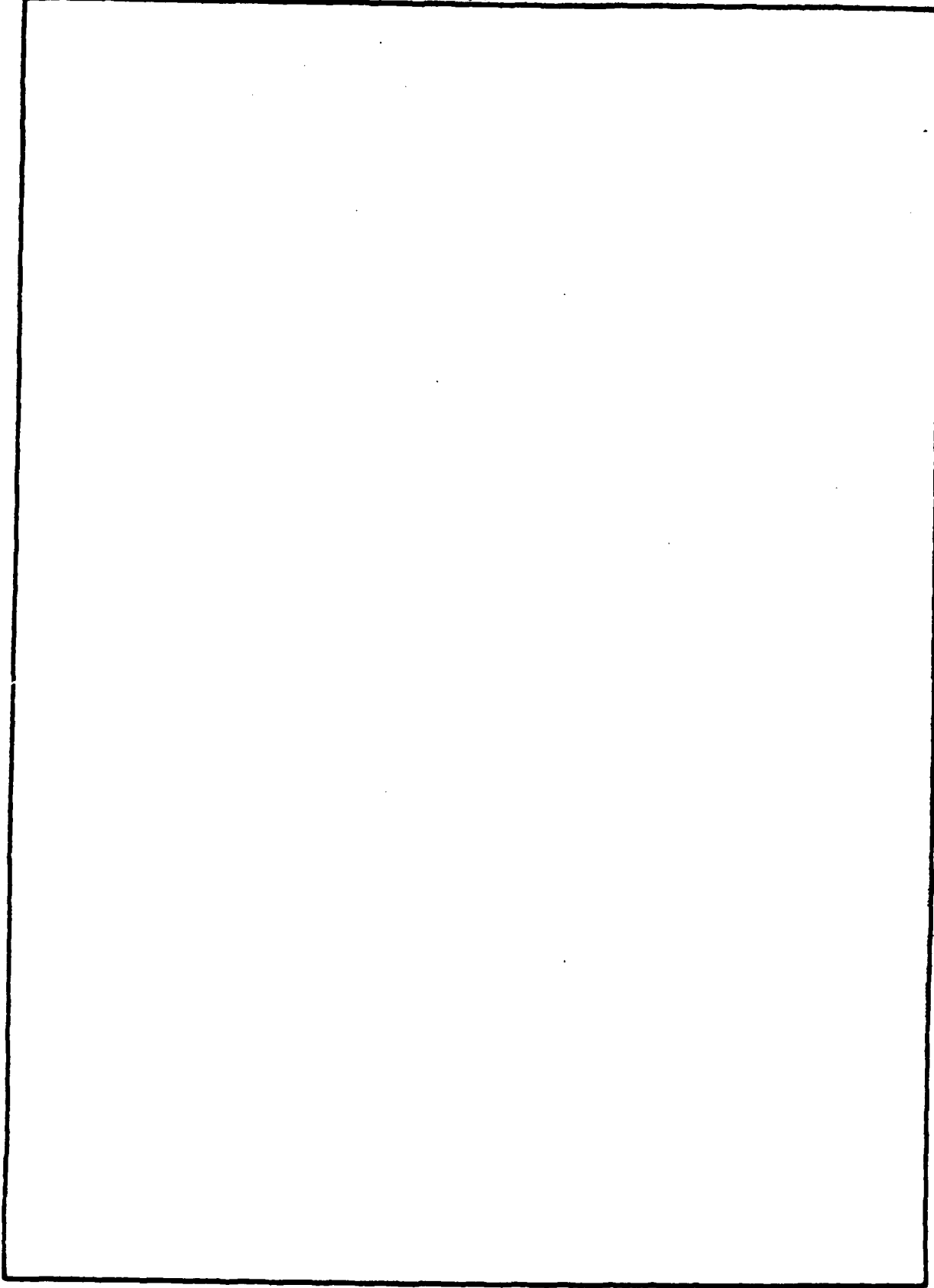
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| REPORT DOCUMENTATION PAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  | READ INSTRUCTIONS<br>BEFORE COMPLETING FORM                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------------------|
| 1. REPORT NUMBER<br>DAEN/NAP-53842/NJ00814-81/03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2. GOVT ACCESSION NO.<br>AD-A098 | 3. RECIPIENT'S CATALOG NUMBER<br>523                           |
| 4. TITLE (and Subtitle)<br>Phase I Inspection Report<br>National Dam Safety Program<br>N.J. No Name Dam, No. 50 NJ00814<br>Warren County, N.J.                                                                                                                                                                                                                                                                                                                                                                                                                   |                                  | 5. TYPE OF REPORT & PERIOD COVERED<br>FINAL                    |
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| 17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                  |                                                                |
| 18. SUPPLEMENTARY NOTES<br>Copies are obtainable from National Technical Information Service,<br>Springfield, Virginia 22151.                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                  |                                                                |
| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number)<br>Dams National Dam Safety Program<br>Embankments N.J. No Name Dam No. 50, N.J.<br>Visual Inspection Erosion<br>Structural Analysis Riprap                                                                                                                                                                                                                                                                                                                                   |                                  |                                                                |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br>This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report. |                                  |                                                                |

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

IN REPLY REFER TO  
NAPEN-N

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

87 APR 1981

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for New Jersey No Name No. 50 Dam in Warren 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, New Jersey No Name No. 50 Dam, initially listed as a high hazard potential structure but reduced to a low hazard potential structure as a result of this inspection, is judged to be in satisfactory overall condition. However, the spillway is considered inadequate, as 77 percent of the 100 year design flood would cause the dam to be overtopped. The low hazard potential classification means that in the event of failure of the dam, no loss of life and only minimal economic loss is expected. For the same reasons no further studies or increase of spillway capacity are recommended. However, to assure the continued functioning of the dam and its impoundment, the following remedial actions could be undertaken by the owner:

- a. Selectively remove trees on the downstream slope of the dam embankment.
- b. Clean the overflow inlet and the outlet pipe.
- c. Riprap the outlet end of the pipe to avoid erosion of the downstream channel at that point.
- d. Develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

NAPEN-N

Honorable Brenden T. Byrne

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.

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

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CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 28 August 1980 by Louis Berger and Associates, 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.

New Jersey No Name No. 50 Dam, initially listed as a high hazard potential structure but reduced to a low hazard potential structure as a result of this inspection, is judged to be in satisfactory overall condition. However, the spillway is considered inadequate, as 77 percent of the 100 year design flood would cause the dam to be overtopped. The low hazard potential classification means that in the event of failure of the dam, no loss of life and only minimal economic loss is expected. For the same reasons no further studies or increase of spillway capacity are recommended. However, to assure the continued functioning of the dam and its impoundment, the following remedial actions could be undertaken by the owner:

- a. Selectively remove trees on the downstream slope of the dam embankment.
- b. Clean the overflow inlet and the outlet pipe.
- c. Riprap the outlet end of the pipe to avoid erosion of the downstream channel at that point.
- d. 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: 21 April 1981

PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

Name of Dam No Name Dam No. 50 Fed I.D. # NJ 00814

State Located New Jersey  
County Located Warren  
Coordinates Lat. 4101.3 - Long. 7441.6  
Stream Unnamed Tributary of Pophandusing Brook  
Date of Inspection August 28, 1980

ASSESSMENT OF  
GENERAL CONDITIONS

No Name Dam No. 50 is assessed to be in a satisfactory overall condition and it is recommended that it be downgraded to a low hazard classification. Although the combined spillway discharge capacity of the dam is equivalent to 76% of the design flood, it poses no danger of loss of life or property damage. The recommendations include the implementation in the near future of 1) selective removal of the trees on the downstream slope of the dam embankment and thorough cleaning of its overflow inlet and outlet pipe, 2) additional hydrologic and hydraulic studies, 3) the development by the owner of written operating procedures and a periodic maintenance plan and 4) establishment of an emergency action plan and downstream warning system.

  
\_\_\_\_\_  
Abraham Perera P.E.  
Project Manager



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OVERVIEW OF N.J. NO NAME no. 50  
AUGUST, 1980

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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 can be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of Phase I investigations is to identify expeditiously those dams that may pose hazards to human life or property. The assessment of the general condition of the dam is based on available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In the review of 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 will be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway test flood is based on the estimated "probable maximum flood" for the region (greatest reasonable possible storm runoff) or fractions thereof. 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 INSPECTION PROGRAM  
NAME OF DAM: No Name Dam No. 50 FED ID # NJ 00814

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with Contract FPM-36 between Louis Berger & Associates, Inc. and the State of New Jersey and its Department of Environmental Protection, Division of Water Resources. The state, in turn, is under agreement with the U.S. Army Corps of Engineers, Philadelphia, to have this inspection performed.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the structural and hydraulic condition of No Name Dam No. 50 and appurtenant structures and to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF SUBJECT

a. Description of Dam and Appurtenances

No Name Dam No. 50 is an earth embankment 420 feet long, 12 feet wide at the top, and approximately 30 feet high. The slopes of the embankment are 2.0H to 1.0V on the downstream side and 3.0H to 1.0V on the upstream side. An overflow type inlet with a 21-inch-diameter corrugated metal outlet pipe is located on the upstream slope of the embankment 124 feet from the right abutment. This inlet constitutes the principal spillway of the dam. A depression in the top of the dam adjacent to the left abutment, approximately 30 feet long and 2.5 feet deep, serves as an auxiliary spillway. The dam impounds a small reservoir that provides irrigation water for the adjacent croplands.

b. Location

The dam is located on an unnamed tributary of Pophandusing Brook in White Township, Warren County, New Jersey. The dam can be accessed using a dirt road approximately half a mile long located on the south side of Oxford Road, approximately 0.6 miles east of the Village of Hazen.

c. Size Classification

No Name Dam No. 50 has a maximum height of 30 feet and a maximum storage capacity of 66 acre-feet. Accordingly, this dam is in the small size category as defined by the criteria in the Recommended Guidelines for Safety Inspection of Dams (storage less than 1,000 acre-feet and height less than 40 feet).

d. Hazard Classification

No Name Dam No. 50 is located in a sparsely developed area of Warren County. Approximately one-half mile downstream, the culvert under the Brass Castle Road (a light duty, secondary thoroughfare) would constitute a barrier to the flow of the water should No Name Dam No. 50 collapse. In this length of the downstream reach there are only croplands. It is not expected, therefore, that the failure of this dam would result in appreciable property damage or loss of life. Accordingly, it is recommended that No Name Dam No. 50 be downgraded to a low hazard classification.

e. Ownership

This dam is owned by Samuel Race, Hazen Road, Oxford, New Jersey (tel. 201-453-2374).

f. Purpose of Dam

The purpose of the dam is to impound water for irrigation of adjacent croplands.

g. Design and Construction History

The dam was designed in 1957 by the Soil Conservation Service (SCS) and constructed in 1960 by

the Hillyerd Construction Company of Centerville, New Jersey.

h. Normal Operating Procedures

The dam is self-regulating, first by overflow of the inlet through the outlet pipe and then through its auxiliary spillway when reservoir water reaches that level. The dam does not appear to be maintained on a periodic basis.

1.3 PERTINENT DATA

a. Drainage Area

No Name Dam No. 50 has a drainage area of 0.3 square miles that consists primarily of undeveloped woodland and some croplands.

b. Total spillway capacity at maximum pool elevation - 477 cfs

c. Elevations (ft. above NGVD)

Top of dam - 697.0  
Recreation pool - 693.0  
Auxiliary spillway crest - 694.5

d. Reservoir

Length of maximum pool (top of dam) - 900 feet  
Length of recreation pool (spillway crest) - 700 feet

e. Storage (acre-feet)

Top of dam - 67  
Recreation pool - 47

f. Reservoir Surface (acres)

Top of dam - 6.3  
Recreation pool - 3.7

g. Dam

Type - earth embankment  
Length - 420 feet  
Height - 30 feet  
Top Width - 12 feet

Side Slopes - U/S 3.0H:1.0V  
                  - D/S 2.0H:1.0V

Cutoff - Impervious core and cutoff trench  
Grout Curtain - none

h. Diversion and Regulating Tunnel

None

i. Spillway

Principal spillway - see regulating outlet  
Auxiliary spillway - next to left abutment  
                                  30 x 2.5 feet

j. Regulating Outlets

2 feet x 2 feet, 2 feet deep, with a 21-inch-  
diameter corrugated metal pipe.

## SECTION 2 - ENGINEERING DATA

### 2.1 DESIGN

The dam was designed by SCS in 1957. No design or as-built drawings of the dam were available. However, the design calculation data were located and obtained from the SCS office in Hackettstown, New Jersey. The dam was designed to accommodate a 50-year storm having a maximum discharge routing of 318 cfs at 0.1 foot below the top of the dam. This flow would distribute 24 cfs through the inlet and outflow pipe and 294 cfs through the auxiliary spillway. The drainage area included by the design calculations is 189 acres. The maximum design height of the dam was 26 feet. The dam is located in the northern portion of Warren County, where gneissic soils predominate. Bedrock is overlain by a thick layer soil, which is characterized by generally good surface drainage. The ground water table is usually fairly deep. In steeper terrain, such as at the site of the dam, the bedrock is usually found closer to the surface. The dam was designed to have an impervious core and a cutoff trench. No toe drains were to be provided.

### 2.2 CONSTRUCTION

The dam was constructed in 1960. It appears that the actual location was moved 150 feet downstream. Thus, the actual maximum height of the dam was increased to 30 feet. The originally designed top of the dam and top of auxiliary spillway elevations (respectively +697.0 and +694.5 NGVD) were maintained, and the top of the overflow inlet at the design elevation of +693.0 NGVD was also maintained.

### 2.3 OPERATION

Presently, the principal purpose of the dam is to provide impoundment for irrigation water for the adjacent croplands. The dam is uncontrolled, as there are no operational facilities except for the overflow inlet and the 21-inch-diameter outlet pipe.

## 2.4 EVALUATION

### a. Availability

Only design calculation data are available at the Hackettstown, New Jersey office of the SCS. The foundation stability is considered adequate, although no borings or founding levels of the embankment were located.

### b. Adequacy

The field inspection and measurements, as well as the design calculations located, indicate that the dam is structurally acceptable in its present condition. It is felt that these data were adequate to render the assessment contained in Sections 6 and 7 without recourse to gathering additional information.

### c. Validity

The validity of the obtained data is not challenged and is accepted without recourse to further investigations.

## SECTION 3 - VISUAL INSPECTION

### 3.1 FINDINGS

#### a. General

The on-site inspections were conducted on August 28, 1980 and revealed the dam to be in an overall stable condition. The slopes of the dam embankment are overgrown with brush and trees. At the time of inspection, the water level of the reservoir was approximately one inch below the top of the outflow inlet and, therefore, no water was flowing through the outlet pipe.

#### b. Dam

The embankment of the dam was found to be in satisfactory condition. Although its slopes were overgrown with brush and trees, making a visual inspection difficult, no signs of movement or settlement were detected. The top of the dam, 12 feet wide, serves as an access road from one side of the reservoir to the other. Although unpaved, the top of the dam appeared to be in good condition except for a very slight depression and puddle of water near the downstream half of the center top of the dam. The dam is 12 feet wide at the top and has an upstream slope of 3.0H:1.0V and downstream slope of 2.0H:1.0V. The overall length of the dam is 420 feet.

#### c. Appurtenant Structures

The only appurtenant structure is the overflow inlet on the upstream slope of the dam located 124 feet from the right abutment and 8.5 feet from the upstream edge of the top of the dam. The inlet has 2 feet x 2 feet inside dimensions. It is constructed of concrete with 6-inch-thick walls. The inlet is approximately 2 feet deep. It is drained by a 21-inch-diameter corrugated metal pipe. The inlet and the outlet pipe appear to be in good condition.

d. Reservoir Area

The reservoir of the No Name Dam No. 50 is relatively small in area (3.7 acres), and its contributing drainage area is only 0.30 square miles. The maximum depth at normal flows is 26 feet. The reservoir banks are fairly steep, stable, and overgrown with brush and weeds.

e. Downstream Channel

A few yards below the toe of the dam, water was flowing in the downstream channel. The flow was estimated at 2 to 3 gallons per minute. It was not possible to determine whether it was due to seepage from the dam or to seepage of ground water from steep side slopes. The downstream channel is densely wooded and relatively steep in gradient (approximately 4%) for the first 1,000 feet. The channel gradient subsequently becomes less steep. Approximately 2,000 feet downstream from the dam, the downstream channel feeds into a small pond, and 600 feet further it passes through a culvert under the Brass Castle Road. The entire area between the dam and Brass Castle Road is undeveloped and there are no structures or houses near the stream.

## SECTION 4 - OPERATIONAL PROCEDURES

### 4.1 PROCEDURES

No operational procedures exist at this dam.

### 4.2 MAINTENANCE OF DAM

No periodic maintenance appears to be performed by the owners. The overflow inlet is cleaned only on an "as-needed" basis by the tenant of the adjacent croplands.

### 4.3 MAINTENANCE OF OPERATING FACILITIES

As there are no operating facilities within the dam insofar as discharge capacity is concerned, there are no maintenance aspects to report on.

### 4.4 DESCRIPTION OF WARNING SYSTEM

No warning system exists at this site.

### 4.5 EVALUATION

Although there are no operational procedures or periodic maintenance at No Name Dam No. 50, this does not constitute a serious deficiency or a danger to downstream property or life for the following reasons:

- The extremely small drainage area of the dam.
- The relatively long time of concentration because of the drainage area being wooded and cultivated with crops.
- The absence of overtopping in the past and the apparently stable condition of the dam.
- The undeveloped and wooded nature of the channel between the dam and Brass Castle Road one-half mile downstream.

## SECTION 5 - HYDRAULIC/HYDROLOGIC

### 5.1 EVALUATION OF FEATURES

#### a. Design Data

In accordance with the criteria in the Recommended Guidelines for Safety Inspection of Dams, it has been determined that No Name Dam No. 50 is small in size and of low hazard. Accordingly, a 100-year frequency event was selected as the design storm and an inflow hydrograph was calculated using precipitation data from Technical Paper 40 and NOAA Technical Memorandum NWS Hydro-35. Inflow to the reservoir was calculated utilizing the HEC-1 computer program, discharging a peak into the reservoir of 690 cfs. Routing this through the reservoir reduced the peak to 625 cfs. The combined spillway capacity before overtopping of the dam occurs is approximately 477 cfs and is therefore able to accommodate only 76% of the design flood, which is inadequate.

#### b. Experience Data

Discussion with the tenant indicated that no overtopping had occurred to his recollection. Streamflow records were not available.

#### c. Visual Observations

There is no evidence of recent problems. The lake level was slightly below normal pool at the time of inspection.

#### d. Overtopping Potential

Since the spillway cannot accommodate the design flood, there is a potential for future overtopping.

#### e. Drawdown Potential

No method of drawdown is currently available.

## SECTION 6 - STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

#### a. Visual Observation

Based on the field inspection, the structural stability of the dam is of little concern. The top of the dam appears to be in good vertical and horizontal alignment. The dam abutments blend well into the adjacent natural ground. Although detailed inspection of the downstream slope was difficult because of heavy brush and trees, no evidence was found of any embankment movement, erosion, or settlement. The overall cross section of the embankment, as per field measurements made, has dimensions and slopes that provide good embankment stability under anticipated conditions.

#### b. Design and Construction Data

Although no engineering drawings were available, the design data obtained from SCS, which designed the dam, are considered sufficient to evaluate the dam. The dam appears to have performed its intended function well since its installation. Under the context of this report, additional design data would not basically alter any condition regarding the downstream flooding conditions are concerned.

#### c. Operating Records

Written operating records are non-existent.

#### d. Post Construction Changes

There have been no apparent modifications or repairs of the dam since its original construction.

#### e. Seismic Stability

This dam is considered stable under static loading conditions. It is located in Seismic Zone 1, and experience indicates that such low dams, when stable under static loading conditions, are also adequately stable under dynamic loading conditions.

## SECTION 7 - ASSESSMENTS/RECOMMENDATIONS/ REMEDIAL ACTIONS

### 7.1 DAM ASSESSMENT

#### a. Safety

Subject to the inherent limitations of the Phase I visual inspection, No Name Dam No. 50 appears to be in good overall structural condition, although the hydraulic capacity of its spillway is 76% of the design flood. However, the drainage area is small (0.30 square miles) and is covered with heavy vegetation, and the reservoir has a relatively large capacity before overtopping would occur (approximately 68 acre-feet). Thus, overtopping would probably be modest and would cause no major downstream damage.

#### b. Adequacy of Information

For reasons stated in paragraph "a" above, the data obtained as a result of this inspection of the dam are deemed adequate regarding the enclosed analysis of the dam's safe operation and stability.

#### c. Urgency

It is recommended that additional studies and remedial actions delineated below be implemented in the near future.

#### d. Necessity for Further Study

Since the dam's spillway capacity can accommodate only 76% of the SDF, it is recommended that the owner undertake additional hydrologic and hydraulic studies.

### 7.2 RECOMMENDATIONS/REMEDIAL MEASUREMENTS

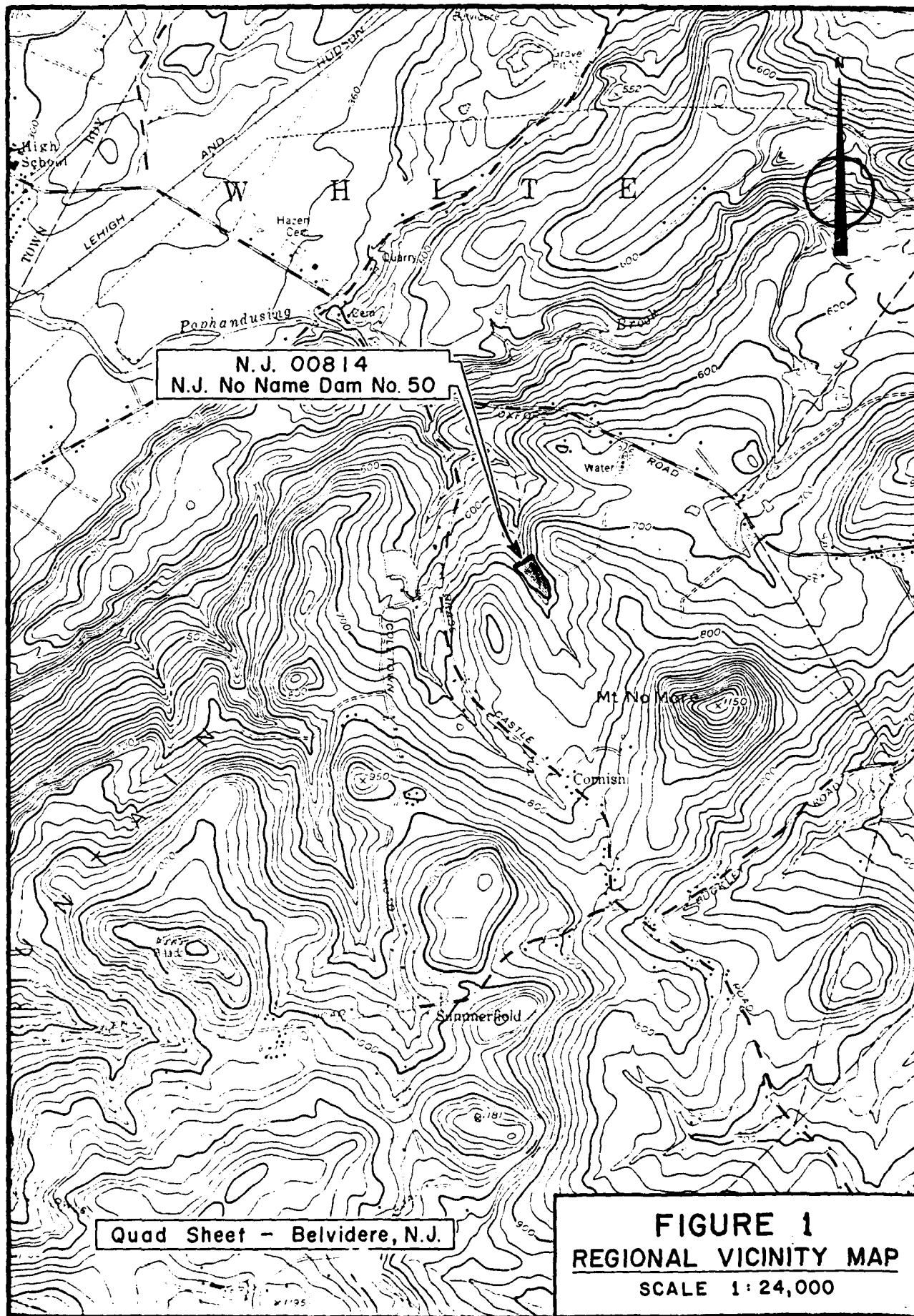
#### a. Recommendations

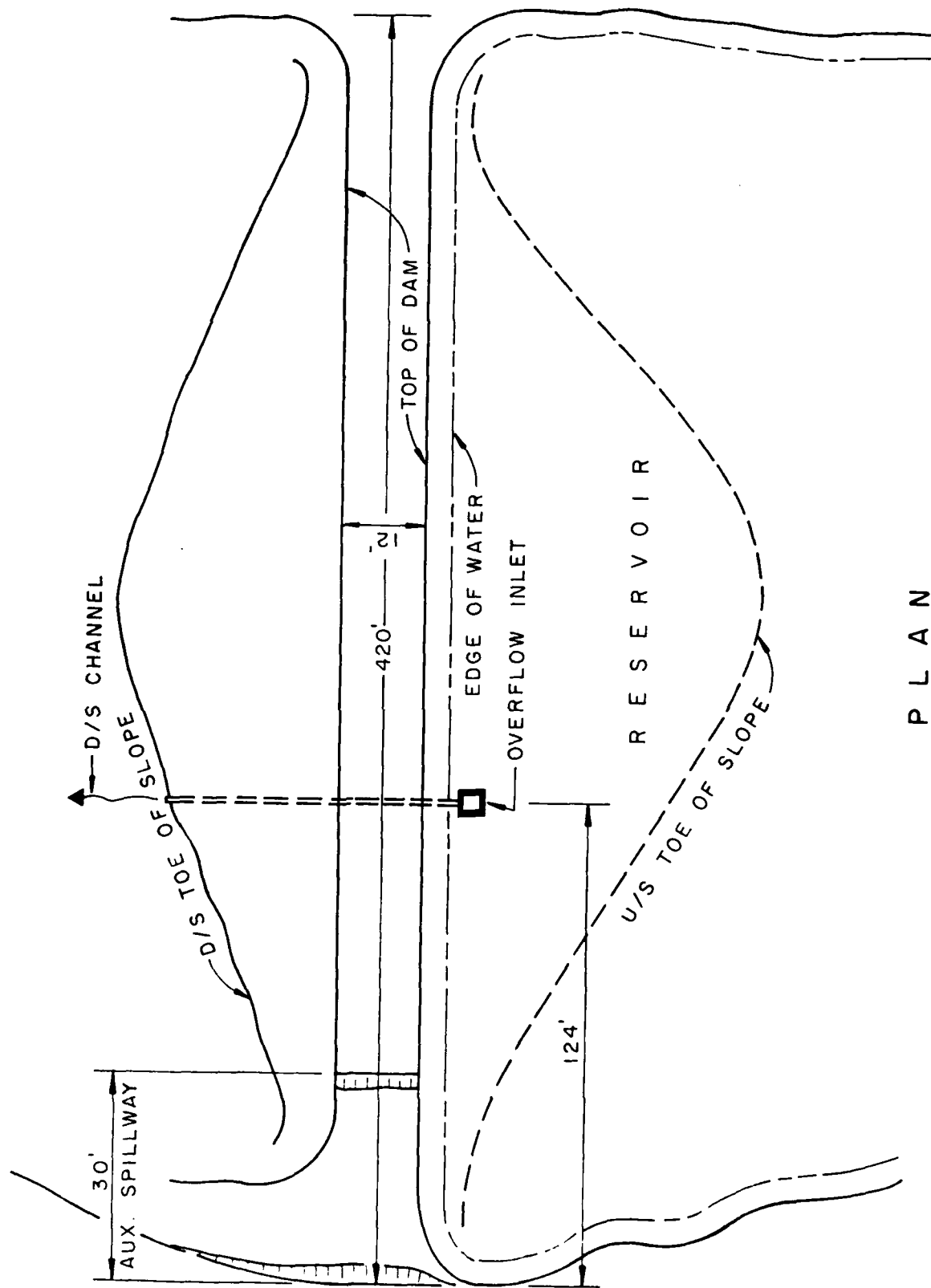
It is recommended that the trees that have grown on the downstream slope of the dam embankment be selectively cleared in order to reduce potential root damage, which could cause piping in the dam, and that the overflow inlet and outlet pipe be

cleaned. It is also recommended that the outlet end of the pipe be protected with riprap to avoid erosion of the downstream channel at that point.

b. O&M Maintenance and Procedures

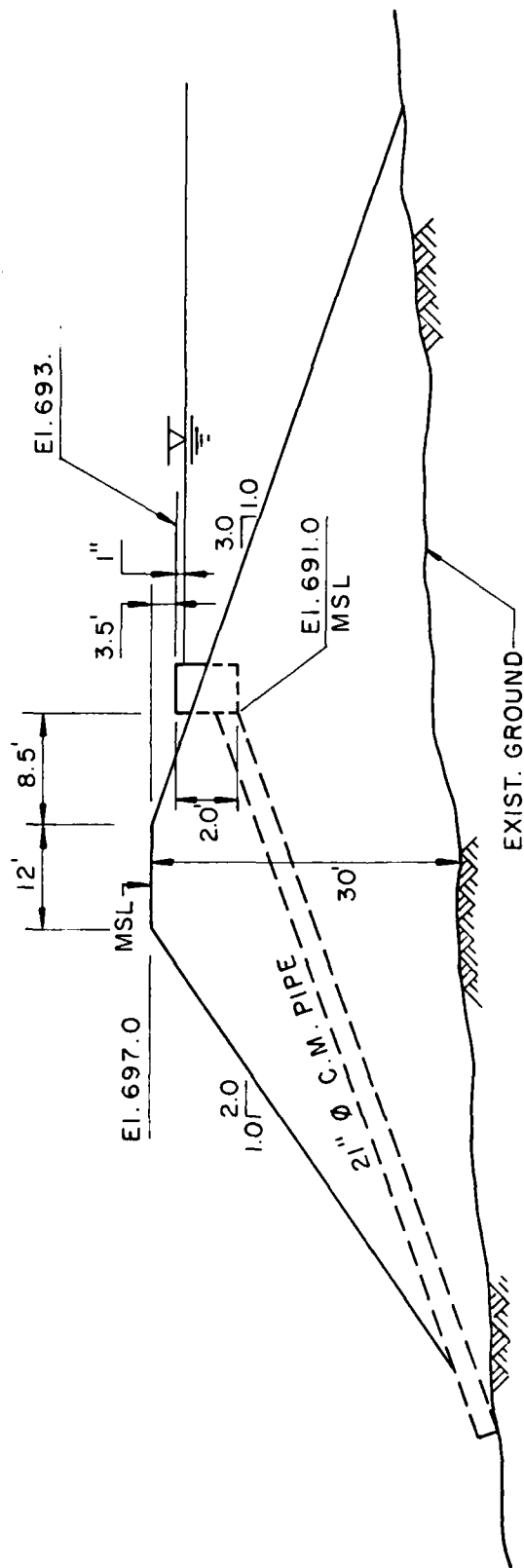
In the near future the owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam. It is further recommended that the owner establish an emergency action plan and a downstream warning system.



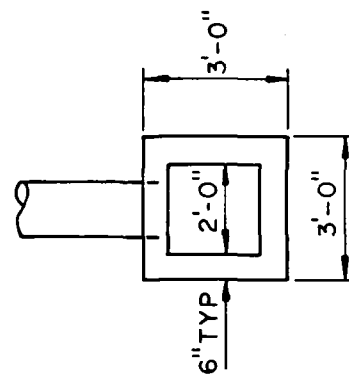


P L A N

FIGURE 2



TYPICAL CROSS-SECTION OF DAM



PLAN OF  
OVERFLOW INLET

Check List  
Visual Inspection  
Phase I

Name Dam No Name No, 50 County Warren State New Jersey Coordinates N.J.D.E.P

Date(s) Inspection 8/28/80 Weather Sunny Temperature 90°

Pool Elevation At Time of Inspection 692.9 M.S.L. Tailater at Time of Inspection N/A M.S.L.

Inspection Personnel:

A. Perera D. Lang

T. Chapter

J. Greenstein

A. Perera Recorder

# EMBANKMENT

| VISUAL EXAMINATION OF                                  | OBSERVATIONS | REMARKS OR RECOMMENDATIONS                                                                                                                                                        |
|--------------------------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SURFACE CRACKS                                         | None Noted   |                                                                                                                                                                                   |
| UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE      | None Noted   |                                                                                                                                                                                   |
| SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES | None Noted   | Downstream embankment slope heavily overgrown with brush and trees. Should be cleared in order to facilitate access and visual check as well as prevent damage due to tree roots. |
| VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST         | Good         | The crest serves as a road for access from one side of the reservoir to the other.                                                                                                |
| RIPRAP FAILURES                                        | None         | There is no riprap on the upstream slope of the dam. None is recommended, due to small size of reservoir.                                                                         |

# EMBANKMENT

| VISUAL EXAMINATION OF<br>TOP OF DAM                      | OBSERVATIONS                                                                          | REMARKS OR RECOMMENDATIONS                                                                                                                                                   |
|----------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                          | 12 feet wide, 420 long, in good condition, except for a small puddle near the center. | No history of overtopping, probably due to small watershed area and significant storage available due to the fact that top of dam is 4.0 feet above normal reservoir level.  |
| SECTION OF EMBANKMENT<br>TO ABUTMENT, SPILLWAY<br>TO DAM | Embankment grades smoothly into adjacent natural terrain.                             |                                                                                                                                                                              |
| ANY NOTICEABLE SEEPAGE                                   | Flow observed in the channel near the toe of slope of the embankment                  | Reservoir was slightly below overflow inlet rim. Therefore, no flow noted in outlet pipe. Seepage may be due to groundwater from steep sideslopes of the downstream terrain. |
| TAFF GAGE AND RECORDER                                   | None                                                                                  |                                                                                                                                                                              |
| RAINS                                                    | None                                                                                  |                                                                                                                                                                              |

# OUTLET WORKS

| VISUAL EXAMINATION OF                                        | OBSERVATIONS                           | REMARKS OR RECOMMENDATIONS                      |
|--------------------------------------------------------------|----------------------------------------|-------------------------------------------------|
| CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT | N/A                                    |                                                 |
| INTAKE STRUCTURE                                             | 2 feet x 2 feet drop (overflow) inlet. | Some debris. Should be cleaned.                 |
| OUTLET STRUCTURE                                             | 21-inch-diameter C.M. pipe in inlet.   | In good condition as observed within the inlet. |
| OUTLET CHANNEL                                               | Natural channel                        |                                                 |
| EMERGENCY GATE                                               | None                                   |                                                 |

# RESERVOIR

| VISUAL EXAMINATION OF | OBSERVATIONS                           | REMARKS OR RECOMMENDATIONS   |
|-----------------------|----------------------------------------|------------------------------|
| SLOPES                | Fairly steep, approximately 1.5H:1.OV. | Slopes overgrown with brush. |
| SEDIMENTATION         | None observed.                         |                              |
|                       |                                        |                              |
|                       |                                        |                              |
|                       |                                        |                              |

DOWNSTREAM CHANNEL

| VISUAL EXAMINATION OF                         | OBSERVATIONS                                                                                                                     | REMARKS OR RECOMMENDATIONS                                              |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| CONDITION<br>(OBSTRUCTIONS,<br>DEBRIS, ETC.)  | 1/2 mile downstream from the dam there is a culvert under Brass Castle Road. The road is approximately 8 feet above the channel. | Would constitute an obstruction to flow in case of collapse of the dam. |
| SLOPES                                        | Approximately 2.0H to 1.0V.                                                                                                      | Overgrown with brush and trees.                                         |
| APPROXIMATE NO.<br>OF HOMES AND<br>POPULATION | None observed.                                                                                                                   |                                                                         |
|                                               |                                                                                                                                  |                                                                         |
|                                               | vi                                                                                                                               |                                                                         |

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION

| ITEM                                                        | REMARKS                                                                                              |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| PLAN OF DAM                                                 | None Available                                                                                       |
| REGIONAL VICINITY MAP                                       | Available from U.S.G.S. Quad. Belvidere, New Jersey                                                  |
| CONSTRUCTION HISTORY                                        | None available in documented form. Based on information obtained on site.                            |
| TYPICAL SECTIONS OF DAM                                     | None available. Based on field measurements and information obtained from Soil Conservation Service. |
| HYDROLOGIC/HYDRAULIC DATA                                   | Some available from Soil Conservation Service.                                                       |
| OUTLETS - PLAN<br>- DETAILS<br>- CONSTRAINTS<br>- DISCHARGE | None available. Based on field measurements.                                                         |
| RAINFALL/RESERVOIR RECORDS                                  | None available.                                                                                      |

| ITEM                                   | REMARKS                                                                                      |
|----------------------------------------|----------------------------------------------------------------------------------------------|
| SPILLWAY PLAN                          | There is only an auxiliary spillway 30 feet x 2.5 feet. Main spillway is the overflow inlet. |
| SECTIONS                               |                                                                                              |
| DETAILS                                |                                                                                              |
| OPERATING EQUIPMENT<br>PLANS & DETAILS | N/A                                                                                          |

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

| ITEM | REMARKS |
|------|---------|
|------|---------|

## MONITORING SYSTEMS

None Available.

## MODIFICATIONS

None Available.

## HIGH POOL RECORDS

None Available.

POST CONSTRUCTION ENGINEERING  
STUDIES AND REPORTS

None Available.

PRIOR ACCIDENTS OR FAILURE OF DAM  
DESCRIPTION  
REPORTSNone Available.  
None Available.  
None Available.MAINTENANCE  
OPERATION  
RECORDSNone Available.  
None Available.  
None Available.



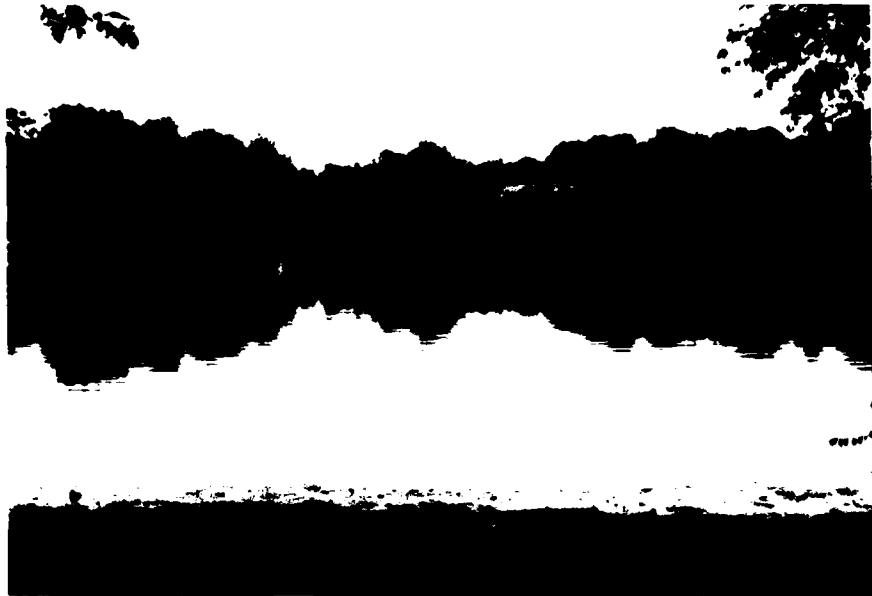
View of Auxiliary Spillway

August, 1980



Principal Spillway Inlet

August, 1980



View of Lake from Dam Crest

August, 1980



Dam Crest looking North

August, 1980

CHECK LIST  
HYDROLOGIC AND HYDRAULIC DATA  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 0.3 square miles

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 693.0 NGVD (47 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 694.5 NGVD (53 acre-feet)

ELEVATION MAXIMUM DESIGN POOL: 696.9 NGVD

ELEVATION TOP DAM: 697.0 NGVD (67 acre-feet)

CREST: \_\_\_\_\_

- a. Elevation 694.5 NGVD (Auxiliary spillway crest)
- b. Type Earth auxiliary spillway channel
- c. Width 15 feet
- d. Length 30 feet
- e. Location Spillover Left abutment
- f. Number and Type of Gates None

OUTLET WORKS: Located on upstream slope of dam embankment

- a. Type Overflow inlet
- b. Location 124 feet from left abutment, 14.5 feet from dam center
- c. Entrance inverts 693
- d. Exit inverts 667
- e. Emergency draindown facilities None

HYDROMETEOROLOGICAL GAGES: \_\_\_\_\_

- a. Type \_\_\_\_\_
- b. Location \_\_\_\_\_
- c. Records \_\_\_\_\_

MAXIMUM NON-DAMAGING DISCHARGE: 477 cfs

BY S. BERGER DATE 9/27/70 LOUIS BERGER & ASSOCIATES INC. SHEET NO. A1 OF A12  
 CHKD. BY DATE 10/1/70 PROJECT ST. LOUIS  
 SUBJECT TIME OF CONCENTRATION

LENGTH OF LONGEST WATER COURSE = 5200' = 0.975 MI.  
 $\Delta H = 875 - 670 = 180'$   
 $\therefore \text{SLOPE} = \frac{180 \text{ ft}}{5200'} = 3.5\%$

ACCELERATION,  $a = 2 \text{ ft/sec}^2$

$\therefore T_c = \frac{5200}{2 \times 3600} = 0.72 \text{ HOURS}$

CALIFORNIA TULVERTS METHOD:

$T_c = \left( \frac{11.9 \times 0.98^3}{180} \right)^{0.335} = 0.94 \text{ HOURS}$

SCS METHOD:

(FROM 'URBAN HYDROLOGY FOR SMALL WATERSHEDS' TECHNICAL RELEASE 55)

ACCELERATION  $C_N$  FOR WATERSHED =  $7\%$   
 SLOPE =  $3.5\%$   
 $L = 5200'$

$L = \frac{L^{0.3} (C_N - 1)^{0.5}}{2.5 \times 10^3} = \text{LAG IN HOURS}$

FS. 2-6

$= \frac{(5200)^{0.3} (7 - 1)^{0.5}}{2.5 \times 10^3} = 0.72$

$S = \frac{100}{C_N} - 10 = 10$

$T_c = \frac{L}{S} = \frac{0.72}{10} = 0.072 \text{ HOURS}$

$T_c = 0.072 \text{ HOURS}$

$T_c = 0.072 \text{ HOURS}$



BY J.C. DATE 2/1/51  
 CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_  
 SUBJECT \_\_\_\_\_

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. A3 OF A1  
 PROJECT C262

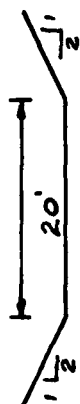
N.J. 140 Year Freq. Data No. 50  
Test Storm: 140 Year Freq.

Precipitation data from TP-40 & NOAA Technical  
 Memorandum NWS Hydro - 35

| Time | Precip. | $\Delta$ | RA  | Time | Precip. | $\Delta$ | RA  |
|------|---------|----------|-----|------|---------|----------|-----|
| 0.1  | .91     | .91      | .03 | 3.1  | 4.30    | .05      | .91 |
| 0.2  | 1.46    | .55      | .03 | 3.2  | 4.34    | .04      | .35 |
| 0.3  | 1.81    | .35      | .03 | 3.3  | 4.38    | .04      | .23 |
| 0.4  | 2.07    | .26      | .03 | 3.4  | 4.41    | .03      | .17 |
| 0.5  | 2.30    | .23      | .02 | 3.5  | 4.45    | .04      | .12 |
| 0.6  | 2.46    | .16      | .03 | 3.6  | 4.48    | .03      | .10 |
| 0.7  | 2.63    | .17      | .02 | 3.7  | 4.52    | .04      | .09 |
| 0.8  | 2.77    | .14      | .04 | 3.8  | 4.56    | .04      | .08 |
| 0.9  | 2.89    | .12      | .03 | 3.9  | 4.60    | .04      | .07 |
| 1.0  | 3.00    | .11      | .03 | 4.0  | 4.63    | .03      | .06 |
| 1.1  | 3.10    | .10      | .03 | 4.1  | 4.66    | .03      | .06 |
| 1.2  | 3.20    | .10      | .04 | 4.2  | 4.69    | .03      | .05 |
| 1.3  | 3.29    | .09      | .03 | 4.3  | 4.72    | .03      | .05 |
| 1.4  | 3.36    | .07      | .03 | 4.4  | 4.75    | .03      | .05 |
| 1.5  | 3.44    | .08      | .04 | 4.5  | 4.78    | .03      | .04 |
| 1.6  | 3.51    | .07      | .04 | 4.6  | 4.82    | .04      | .05 |
| 1.7  | 3.53    | .02      | .05 | 4.7  | 4.85    | .03      | .04 |
| 1.8  | 3.65    | .07      | .05 | 4.8  | 4.87    | .02      | .04 |
| 1.9  | 3.71    | .06      | .05 | 4.9  | 4.90    | .03      | .04 |
| 2.0  | 3.76    | .05      | .05 | 5.0  | 4.93    | .03      | .04 |
| 2.1  | 3.82    | .06      | .05 | 5.1  | 4.96    | .03      | .03 |
| 2.2  | 3.87    | .05      | .07 | 5.2  | 4.98    | .02      | .03 |
| 2.3  | 3.92    | .05      | .07 | 5.3  | 5.01    | .03      | .03 |
| 2.4  | 3.97    | .05      | .07 | 5.4  | 5.04    | .03      | .03 |
| 2.5  | 4.02    | .05      | .10 | 5.5  | 5.06    | .02      | .03 |
| 2.6  | 4.07    | .05      | .11 | 5.6  | 5.09    | .03      | .03 |
| 2.7  | 4.12    | .05      | .14 | 5.7  | 5.12    | .03      | .03 |
| 2.8  | 4.17    | .05      | .16 | 5.8  | 5.15    | .03      | .02 |
| 2.9  | 4.21    | .04      | .26 | 5.9  | 5.17    | .02      | .03 |
| 3.0  | 4.25    | .04      | .55 | 6.0  | 5.20    | .03      | .02 |

BY D. H. H. DATE April 10 1952 **LOUIS BERGER & ASSOCIATES INC.**  
CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_ N. S. McNamee Jr. 52  
SUBJECT \_\_\_\_\_ General Electric

SHEET NO. 14 OF 112  
PROJECT 5-2-2



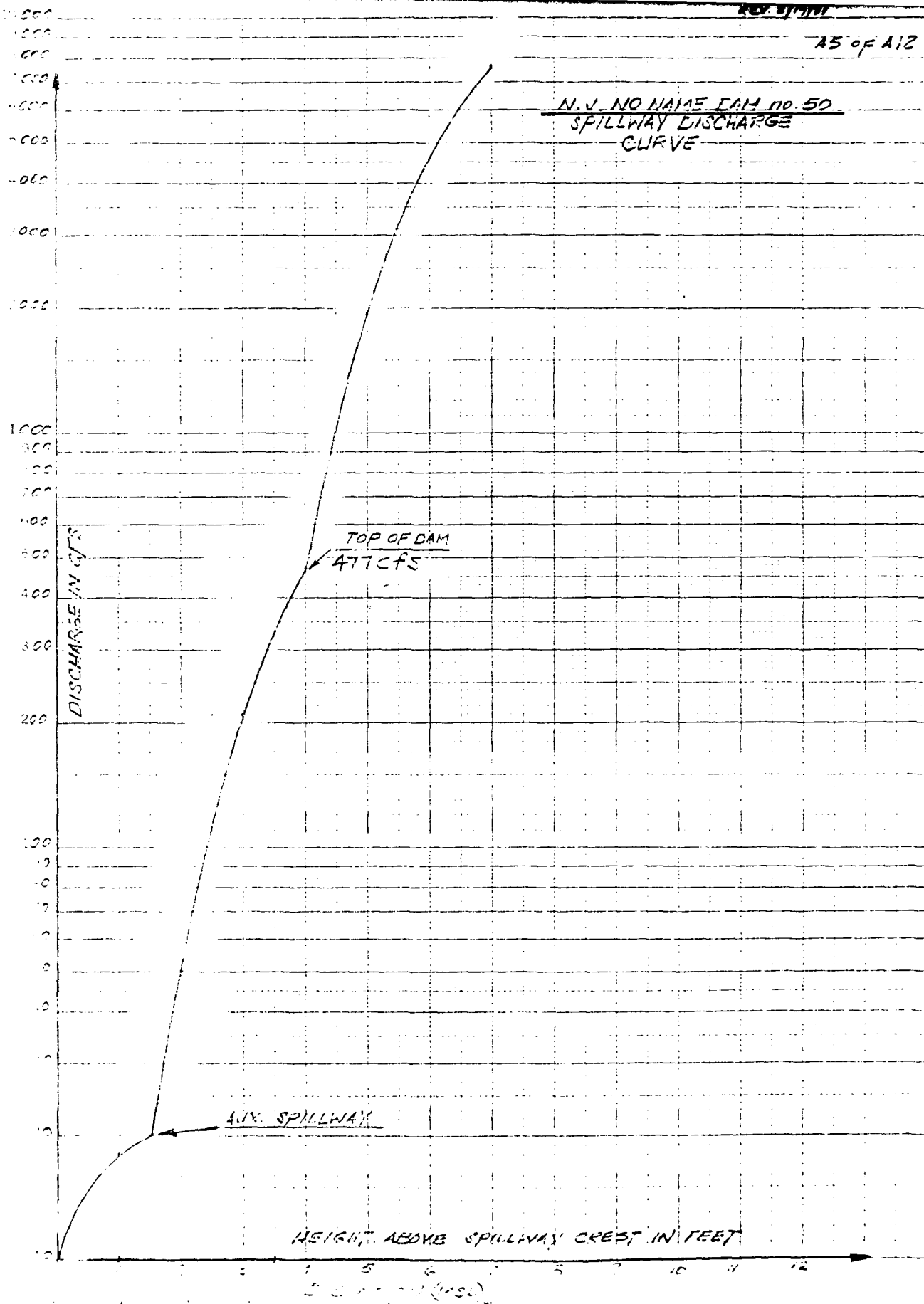
$$Q_p = CA\sqrt{2gH}$$
$$A = 2.41 \text{ ft}^2$$

21" PIPE

| INLET |     | SPILLWAY |   |                | 21" PIPE |      |                | AUXILIARY SPILLWAY |       |                  | OVER DAM |      |      |                  |                |   |   |     |                |      |
|-------|-----|----------|---|----------------|----------|------|----------------|--------------------|-------|------------------|----------|------|------|------------------|----------------|---|---|-----|----------------|------|
| ELEV. | H   | C        | L | Q <sub>0</sub> | H        | C    | Q <sub>0</sub> | H                  | S     | S <sup>1/2</sup> | A        | P    | R    | R <sup>2/3</sup> | Q <sub>A</sub> | H | C | L   | Q <sub>0</sub> | Σ Q  |
| 679.0 | 0   | 1        | 3 | 25             | 2.5      | 0.60 | 18             | 0                  | 0.015 | 0.122            | 10.25    | 22.2 | .46  | .60              | 0              | 0 | 0 | 390 | 0              | 477  |
| 694.0 | 1   |          |   | 46             | 3.0      |      | 20             | 0.5                |       |                  | 34.5     | 26.7 | 1.29 | 1.18             | 0              |   |   |     |                | 1984 |
| 694.5 | 1.5 |          |   | 10             | 3.5      |      | 22             | 1.5                |       |                  | 62.5     | 31.2 | 2.0  | 1.54             | 28             |   |   |     |                | 7658 |
| 695.0 | 2   |          |   | 129            | 4.5      |      | 25             | 1.5                |       |                  | 92.5     | 21.2 | 2.96 | 2.04             | 184            |   |   |     |                | 209  |
| 696.0 | 3   |          |   | 199            | 5.5      |      | 27             | 3.5                |       |                  | 152.5    | 31.2 | 4.89 | 2.89             | 450            |   |   |     |                | 477  |
| 697.5 | 4   |          |   |                | 6.5      |      | 29             | 5.5                |       |                  |          |      |      |                  | 863            |   |   |     |                | 1984 |
| 698.0 | 5   |          |   |                | 8.5      |      | 34             | 7.5                |       |                  |          |      |      |                  | 1984           |   |   |     |                | 7658 |
| 700.0 | 7   |          |   |                | 10.5     |      | 38             | 9.5                |       |                  |          |      |      |                  |                |   |   |     |                |      |
| 704.0 |     |          |   |                | 12.5     |      | 42             | 11.5               |       |                  |          |      |      |                  |                |   |   |     |                |      |

46 5810

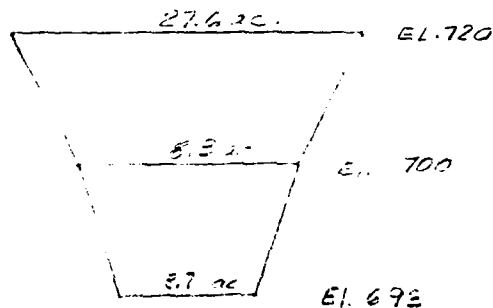
U.S. DEPARTMENT OF AGRICULTURE DIVISION OF SOIL CONSERVATION



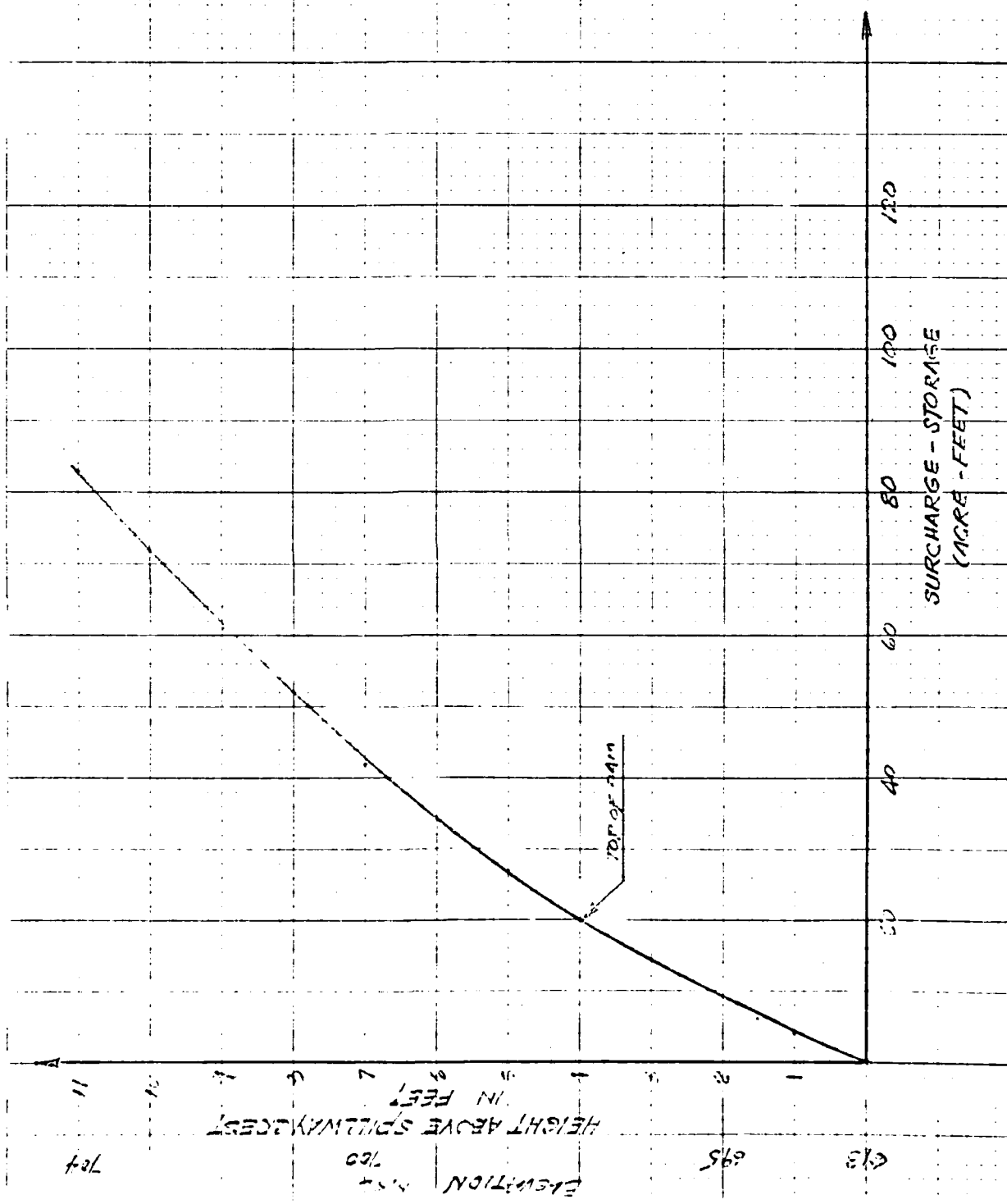
BY DAVID DATE 10/1/77  
 CHKD. BY DAVID DATE 10/1/77  
 SUBJECT SURCHARGE STORAGE

# LOUIS BERGER & ASSOCIATES INC.

SHEET NO. 14 OF 112  
 PROJECT 2-100



| ELEV. | H    | AREA<br>(ACRES) | SURCHARGE-STORAGE<br>(ACRES-FOOT) |
|-------|------|-----------------|-----------------------------------|
| 693.0 | 0    | 3.70            | 0                                 |
| 694.0 | 1    | 4.35            | 4                                 |
| 694.5 | 1.5  | 4.65            | 6                                 |
| 695.0 | 2.0  | 5.01            | 9                                 |
| 696.0 | 3.0  | 5.41            | 14                                |
| 697.0 | 4.0  | 6.32            | 20                                |
| 698.0 | 5.0  | 6.73            | 24                                |
| 700.0 | 7.0  | 8.30            | 40                                |
| 702.0 | 9.0  | 9.62            | 51                                |
| 704.0 | 11.0 | 12.16           | 82                                |



0370 94.

BY D. L. B. DATE SEPT. 21

## LOUIS BERGER &amp; ASSOCIATES INC.

SHEET NO. AB OF A12

CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

N.J. No Name Dam 72.50PROJECT C.251

SUBJECT \_\_\_\_\_

SUMMARY OF RES-1 INPUTREV. 2/12/81

| ELV.  | HEIGHT ABOVE<br>SPILLWAY CREST (FT.) | DISCHARGE - STORAGE<br>(MGD - FEET) | DISCHARGE<br>(CFS) |
|-------|--------------------------------------|-------------------------------------|--------------------|
| 693   | 0                                    | 0                                   | 0                  |
| 694   | 1                                    | 4                                   | 18                 |
| 694.5 | 1.5                                  | 6                                   | 20                 |
| 695   | 2                                    | 9                                   | 50                 |
| 696   | 3                                    | 14                                  | 209                |
| 697   | 4                                    | 20                                  | 477                |
| 698   | 5                                    | 27                                  | 1984               |
| 700   | 7                                    | 42                                  | 7658               |

BY D. LANG DATE 10-1-80

## LOUIS BERGER &amp; ASSOCIATES INC.

SHEET NO. 19 OF 21CHKD. BY            DATE           PROJECT C-262SUBJECT HES 1 OUTPUTREV 4/1/81 J.T.

N. J. NO NAME DAM no. 50

D. LANG

SEPTEMBER 29, 1980

## JOB SPECIFICATION

| NG    | NHR | NMIN | IDAY | IHR | IMIN | METRC | IPLT | IPRT | NSTAN |
|-------|-----|------|------|-----|------|-------|------|------|-------|
| 100   | 0   | 6    | 0    | 0   | 0    | 0     | 0    | 0    | 0     |
| JOPER |     |      |      |     | NWT  |       |      |      |       |
| 3     |     |      |      |     | 0    |       |      |      |       |

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## SUB-AREA RUNOFF COMPUTATION

## INFLOW TO RESERVOIR

| ISTAQ | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME |
|-------|-------|-------|-------|------|------|-------|
| 1     | 0     | 0     | 0     | 0    | 0    | 1     |

## HYDROGRAPH DATA

| IHYDG | IUNG | TAREA | SNAP | TRSDA | TRSPC | RATIO | ISNOW | ISAME | LOCAL |
|-------|------|-------|------|-------|-------|-------|-------|-------|-------|
| 0     | -1   | 0.31  | 0.00 | 0.31  | 0.00  | 0.000 | 0     | 0     | 0     |

## PRECIP DATA

| NP | STORM | DAJ  | DAK  |
|----|-------|------|------|
| 60 | 0.00  | 0.00 | 0.00 |

## PRECIP PATTERN

|      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|
| 0.03 | 0.03 | 0.03 | 0.03 | 0.02 | 0.03 | 0.02 | 0.04 | 0.03 | 0.03 |
| 0.03 | 0.04 | 0.03 | 0.03 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 |
| 0.05 | 0.07 | 0.07 | 0.07 | 0.10 | 0.11 | 0.14 | 0.16 | 0.26 | 0.55 |
| 0.91 | 0.35 | 0.23 | 0.17 | 0.12 | 0.10 | 0.09 | 0.08 | 0.07 | 0.06 |
| 0.06 | 0.05 | 0.05 | 0.05 | 0.04 | 0.05 | 0.04 | 0.04 | 0.04 | 0.04 |
| 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.02 | 0.03 | 0.02 |

## LOSS DATA

| STRKR | DLTKR | RTIOL | ERAIN | STRKS | RTIOK | STRTL | CNSTL | ALSMX | RTIMP |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.00  | 0.00  | 1.00  | 0.00  | 0.00  | 1.00  | 0.50  | 0.10  | 0.00  | 0.00  |

## GIVEN UNIT GRAPH, NUHQG= 21

|     |     |      |      |      |      |      |      |      |     |
|-----|-----|------|------|------|------|------|------|------|-----|
| 32. | 84. | 180. | 267. | 300. | 276. | 225. | 168. | 126. | 96. |
| 72. | 54. | 39.  | 29.  | 23.  | 18.  | 13.  | 10.  | 7.   | 5.  |
| 4.  |     |      |      |      |      |      |      |      |     |

UNIT GRAPH TOTALS 2028. CFS OR 1.01 INCHES OVER THE AREA

## RECESSION DATA

STRTG= 0.00 GRCSN= 0.00 RTIOR= 1.00

## END-OF-PERIOD FLOW

| TIME | RAIN | EXCS | COMP Q |
|------|------|------|--------|
| 1    | 0.03 | 0.00 | 0.     |
| 2    | 0.03 | 0.00 | 0.     |
| 3    | 0.03 | 0.00 | 0.     |
| 4    | 0.03 | 0.00 | 0.     |
| 5    | 0.02 | 0.00 | 0.     |
| 6    | 0.03 | 0.00 | 0.     |
| 7    | 0.02 | 0.00 | 0.     |
| 8    | 0.04 | 0.00 | 0.     |
| 9    | 0.03 | 0.00 | 0.     |
| 10   | 0.03 | 0.00 | 0.     |
| 11   | 0.03 | 0.00 | 0.     |
| 12   | 0.04 | 0.00 | 0.     |
| 13   | 0.03 | 0.00 | 0.     |
| 14   | 0.03 | 0.00 | 0.     |
| 15   | 0.04 | 0.00 | 0.     |
| 16   | 0.04 | 0.00 | 0.     |
| 17   | 0.05 | 0.04 | 1.     |
| 18   | 0.05 | 0.04 | 5.     |
| 19   | 0.05 | 0.04 | 12.    |
| 20   | 0.05 | 0.04 | 23.    |
| 21   | 0.05 | 0.04 | 35.    |
| 22   | 0.07 | 0.06 | 46.    |
| 23   | 0.07 | 0.06 | 57.    |
| 24   | 0.07 | 0.06 | 67.    |
| 25   | 0.10 | 0.09 | 79.    |
| 26   | 0.11 | 0.10 | 91.    |
| 27   | 0.14 | 0.13 | 107.   |
| 28   | 0.16 | 0.15 | 126.   |
| 29   | 0.26 | 0.25 | 153.   |
| 30   | 0.55 | 0.54 | 198.   |

BY            DATE             
 CHKD. BY            DATE             
 SUBJECT           

# LOUIS BERGER & ASSOCIATES INC.

SHEET NO.        OF         
 PROJECT                                 

|     |      |      |      |
|-----|------|------|------|
| 31  | 0.91 | 0.90 | 278. |
| 32  | 0.35 | 0.34 | 393. |
| 33  | 0.23 | 0.22 | 534. |
| 34  | 0.17 | 0.16 | 647. |
| 35  | 0.12 | 0.11 | 690. |
| 36  | 0.10 | 0.09 | 665. |
| 37  | 0.09 | 0.08 | 576. |
| 38  | 0.08 | 0.07 | 512. |
| 39  | 0.07 | 0.06 | 434. |
| 40  | 0.06 | 0.05 | 368. |
| 41  | 0.06 | 0.05 | 312. |
| 42  | 0.05 | 0.04 | 264. |
| 43  | 0.05 | 0.04 | 224. |
| 44  | 0.05 | 0.04 | 192. |
| 45  | 0.04 | 0.03 | 167. |
| 46  | 0.05 | 0.04 | 146. |
| 47  | 0.04 | 0.03 | 128. |
| 48  | 0.04 | 0.03 | 114. |
| 49  | 0.04 | 0.03 | 102. |
| 50  | 0.04 | 0.03 | 92.  |
| 51  | 0.03 | 0.02 | 83.  |
| 52  | 0.03 | 0.02 | 74.  |
| 53  | 0.03 | 0.02 | 68.  |
| 54  | 0.03 | 0.02 | 62.  |
| 55  | 0.03 | 0.02 | 57.  |
| 56  | 0.03 | 0.02 | 53.  |
| 57  | 0.03 | 0.02 | 50.  |
| 58  | 0.02 | 0.01 | 47.  |
| 59  | 0.03 | 0.02 | 44.  |
| 60  | 0.02 | 0.01 | 42.  |
| 61  | 0.00 | 0.00 | 39.  |
| 62  | 0.00 | 0.00 | 35.  |
| 63  | 0.00 | 0.00 | 30.  |
| 64  | 0.00 | 0.00 | 25.  |
| 65  | 0.00 | 0.00 | 19.  |
| 66  | 0.00 | 0.00 | 15.  |
| 67  | 0.00 | 0.00 | 11.  |
| 68  | 0.00 | 0.00 | 8.   |
| 69  | 0.00 | 0.00 | 6.   |
| 70  | 0.00 | 0.00 | 4.   |
| 71  | 0.00 | 0.00 | 3.   |
| 72  | 0.00 | 0.00 | 2.   |
| 73  | 0.00 | 0.00 | 2.   |
| 74  | 0.00 | 0.00 | 1.   |
| 75  | 0.00 | 0.00 | 1.   |
| 76  | 0.00 | 0.00 | 1.   |
| 77  | 0.00 | 0.00 | 0.   |
| 78  | 0.00 | 0.00 | 0.   |
| 79  | 0.00 | 0.00 | 0.   |
| 80  | 0.00 | 0.00 | 0.   |
| 81  | 0.00 | 0.00 | 0.   |
| 82  | 0.00 | 0.00 | 0.   |
| 83  | 0.00 | 0.00 | 0.   |
| 84  | 0.00 | 0.00 | 0.   |
| 85  | 0.00 | 0.00 | 0.   |
| 86  | 0.00 | 0.00 | 0.   |
| 87  | 0.00 | 0.00 | 0.   |
| 88  | 0.00 | 0.00 | 0.   |
| 89  | 0.00 | 0.00 | 0.   |
| 90  | 0.00 | 0.00 | 0.   |
| 91  | 0.00 | 0.00 | 0.   |
| 92  | 0.00 | 0.00 | 0.   |
| 93  | 0.00 | 0.00 | 0.   |
| 94  | 0.00 | 0.00 | 0.   |
| 95  | 0.00 | 0.00 | 0.   |
| 96  | 0.00 | 0.00 | 0.   |
| 97  | 0.00 | 0.00 | 0.   |
| 98  | 0.00 | 0.00 | 0.   |
| 99  | 0.00 | 0.00 | 0.   |
| 100 | 0.00 | 0.00 | 0.   |

SUM 5.20 4.26 8640

|        | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|--------|------|--------|---------|---------|--------------|
| CFS    | 690. | 144    | 86.     | 86.     | 8639.        |
| INCHES |      | 4.32   | 4.32    | 4.32    | 4.32         |
| AC-FT  |      | 71     | 71      | 71      | 71           |

BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_  
 SUBJECT \_\_\_\_\_

# LOUIS BERGER & ASSOCIATES INC.

SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_  
 PROJECT \_\_\_\_\_  
 DATE \_\_\_\_\_

## HYDROGRAPH ROUTING

### ROUTING THROUGH RESERVOIR

| ISTAG | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME |
|-------|-------|-------|-------|------|------|-------|
| 1     | 1     | 0     | 0     | 0    | 0    | 1     |

| ROUTING DATA |       |      |      |       |  |
|--------------|-------|------|------|-------|--|
| GLDSS        | CLDSS | AVG  | IFES | ISAME |  |
| 0 0          | 0 000 | 0 00 | 1    | 0     |  |

| NSTPS | NSTDL | LAG | AMEKK | X     | TSK   | STORA |
|-------|-------|-----|-------|-------|-------|-------|
| 1     | 0     | 0   | 0 000 | 0 000 | 0 000 | 0     |

| STORAGE= | 4 | 6  | 9  | 14 | 20  | 27  | 42   | 0    | 0 |
|----------|---|----|----|----|-----|-----|------|------|---|
| OUTFLOW= | 0 | 18 | 20 | 50 | 209 | 477 | 1964 | 7608 | 0 |

| TIME | EDP | STOR | AVG | IN  | EDP | OUT |
|------|-----|------|-----|-----|-----|-----|
| 1    | 0   | 0    | 0   | 0   | 0   | 0   |
| 2    | 0   | 0    | 0   | 0   | 0   | 0   |
| 3    | 0   | 0    | 0   | 0   | 0   | 0   |
| 4    | 0   | 0    | 0   | 0   | 0   | 0   |
| 5    | 0   | 0    | 0   | 0   | 0   | 0   |
| 6    | 0   | 0    | 0   | 0   | 0   | 0   |
| 7    | 0   | 0    | 0   | 0   | 0   | 0   |
| 8    | 0   | 0    | 0   | 0   | 0   | 0   |
| 9    | 0   | 0    | 0   | 0   | 0   | 0   |
| 10   | 0   | 0    | 0   | 0   | 0   | 0   |
| 11   | 0   | 0    | 0   | 0   | 0   | 0   |
| 12   | 0   | 0    | 0   | 0   | 0   | 0   |
| 13   | 0   | 0    | 0   | 0   | 0   | 0   |
| 14   | 0   | 0    | 0   | 0   | 0   | 0   |
| 15   | 0   | 0    | 0   | 0   | 0   | 0   |
| 16   | 0   | 0    | 0   | 0   | 0   | 0   |
| 17   | 0   | 0    | 1   | 0   | 0   | 0   |
| 18   | 0   | 0    | 3   | 0   | 0   | 0   |
| 19   | 0   | 0    | 8   | 0   | 0   | 0   |
| 20   | 0   | 0    | 17  | 1   | 0   | 0   |
| 21   | 0   | 0    | 29  | 2   | 0   | 0   |
| 22   | 1   | 0    | 40  | 3   | 0   | 0   |
| 23   | 1   | 0    | 52  | 5   | 0   | 0   |
| 24   | 2   | 0    | 62  | 7   | 0   | 0   |
| 25   | 2   | 0    | 73  | 10  | 0   | 0   |
| 26   | 3   | 0    | 85  | 12  | 0   | 0   |
| 27   | 3   | 0    | 99  | 16  | 0   | 0   |
| 28   | 4   | 0    | 117 | 19  | 0   | 0   |
| 29   | 5   | 0    | 140 | 19  | 0   | 0   |
| 30   | 7   | 0    | 175 | 26  | 0   | 0   |
| 31   | 8   | 0    | 238 | 42  | 0   | 0   |
| 32   | 10  | 0    | 336 | 96  | 0   | 0   |
| 33   | 13  | 0    | 463 | 181 | 0   | 0   |
| 34   | 16  | 0    | 590 | 299 | 0   | 0   |
| 35   | 19  | 0    | 668 | 414 | 0   | 0   |
| 36   | 20  | 0    | 678 | 535 | 0   | 0   |
| 37   | 21  | 0    | 630 | 625 | 0   | 0   |
| 38   | 20  | 0    | 554 | 558 | 0   | 0   |
| 39   | 20  | 0    | 473 | 478 | 0   | 0   |
| 40   | 19  | 0    | 401 | 453 | 0   | 0   |
| 41   | 19  | 0    | 340 | 418 | 0   | 0   |
| 42   | 18  | 0    | 288 | 377 | 0   | 0   |
| 43   | 17  | 0    | 244 | 336 | 0   | 0   |
| 44   | 16  | 0    | 208 | 296 | 0   | 0   |
| 45   | 15  | 0    | 180 | 260 | 0   | 0   |
| 46   | 14  | 0    | 156 | 228 | 0   | 0   |
| 47   | 14  | 0    | 137 | 202 | 0   | 0   |
| 48   | 13  | 0    | 121 | 183 | 0   | 0   |
| 49   | 13  | 0    | 108 | 166 | 0   | 0   |
| 50   | 12  | 0    | 97  | 150 | 0   | 0   |
| 51   | 12  | 0    | 87  | 135 | 0   | 0   |
| 52   | 11  | 0    | 79  | 122 | 0   | 0   |
| 53   | 11  | 0    | 71  | 110 | 0   | 0   |
| 54   | 11  | 0    | 65  | 100 | 0   | 0   |
| 55   | 10  | 0    | 60  | 90  | 0   | 0   |
| 56   | 10  | 0    | 55  | 82  | 0   | 0   |
| 57   | 10  | 0    | 51  | 75  | 0   | 0   |
| 58   | 10  | 0    | 48  | 69  | 0   | 0   |
| 59   | 9   | 0    | 46  | 63  | 0   | 0   |
| 60   | 9   | 0    | 43  | 59  | 0   | 0   |

BY  
CHKD BY  
SUBJECT

DATE  
DATE

# LOUIS BERGER & ASSOCIATES INC.

PROJECT

|     |   |    |    |
|-----|---|----|----|
| 51  | 2 | 40 | 54 |
| 52  | 4 | 27 | 50 |
| 53  | 7 | 23 | 49 |
| 54  | 9 | 19 | 47 |
| 55  | 9 | 17 | 45 |
| 56  | 8 | 17 | 44 |
| 57  | 6 | 16 | 42 |
| 58  | 4 | 14 | 40 |
| 59  | 3 | 7  | 37 |
| 60  | 2 | 5  | 34 |
| 61  | 2 | 4  | 31 |
| 62  | 2 | 3  | 28 |
| 63  | 2 | 2  | 25 |
| 64  | 2 | 1  | 22 |
| 65  | 2 | 1  | 20 |
| 66  | 2 | 1  | 18 |
| 67  | 2 | 0  | 16 |
| 68  | 2 | 0  | 14 |
| 69  | 2 | 0  | 12 |
| 70  | 5 | 0  | 10 |
| 71  | 5 | 0  | 9  |
| 72  | 5 | 0  | 8  |
| 73  | 5 | 0  | 7  |
| 74  | 5 | 0  | 6  |
| 75  | 4 | 0  | 5  |
| 76  | 4 | 0  | 4  |
| 77  | 4 | 0  | 3  |
| 78  | 4 | 0  | 2  |
| 79  | 4 | 0  | 1  |
| 80  | 4 | 0  | 0  |
| 81  | 4 | 0  | 0  |
| 82  | 4 | 0  | 0  |
| 83  | 4 | 0  | 0  |
| 84  | 4 | 0  | 0  |
| 85  | 3 | 0  | 0  |
| 86  | 3 | 0  | 0  |
| 87  | 3 | 0  | 0  |
| 88  | 3 | 0  | 0  |
| 89  | 3 | 0  | 0  |
| 90  | 3 | 0  | 0  |
| 91  | 3 | 0  | 0  |
| 92  | 3 | 0  | 0  |
| 93  | 3 | 0  | 0  |
| 94  | 3 | 0  | 0  |
| 95  | 3 | 0  | 0  |
| 96  | 3 | 0  | 0  |
| 97  | 3 | 0  | 0  |
| 98  | 3 | 0  | 0  |
| 99  | 3 | 0  | 0  |
| 100 | 3 | 0  | 0  |

SUM 87.0

| CFS    | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | AVG TIME |
|--------|------|--------|---------|---------|-------|----------|
| INCHES | 625  | 134    | 83      | 83      |       | 4.16     |
| AC-FT  |      | 4.03   | 4.16    | 4.16    |       | 69       |
|        |      | 67     | 69      | 69      |       |          |

## RUNOFF SUMMARY: AVERAGE FLOW

| HYDROGRAPH AT | 1 | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | AREA |
|---------------|---|------|--------|---------|---------|------|
| ROUNDED TO    | 1 | 625  | 134    | 83      | 83      | 4.16 |

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- 8