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NATIONAL DAM SAFETY PROGRAM. LAKE MAHOPAC DAM (INVENTORY NUMBER--ETC(U)
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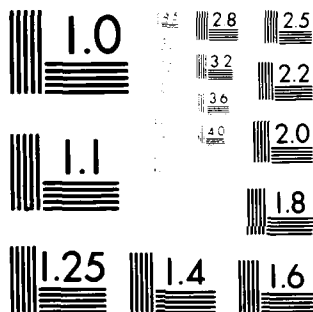
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Phase I Inspection Report

Lake Mahopac Dam

Lower Hudson River Basin, Putnam County, NY

Inventory No. 1329

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Lake Mahopac Dam

Putnam County

Lower Hudson River Basin

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

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

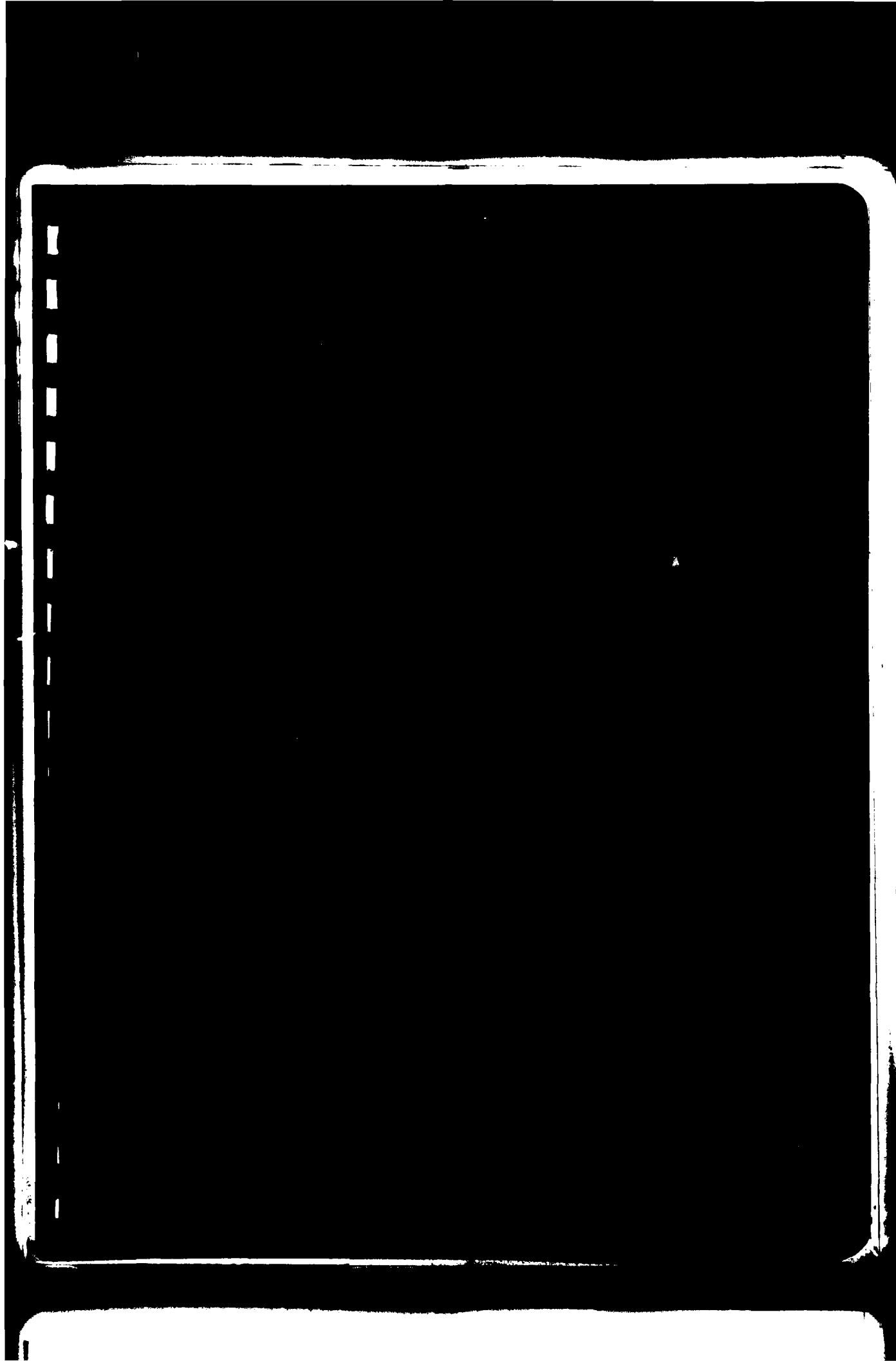
The examination of documents and the visual inspection of Lake Mahopac Dam and its appurtenant structures did not reveal conditions which constitute an immediate hazard to human life and property.

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Using Corps of Engineers screening criteria, it has been determined that the dam would be overtopped for all storms exceeding approximately 56 percent of Probable Maximum Flood (PMF). The maximum spillway discharge capacity is 7.9 percent of the PMF peak outflow. The spillway is, therefore adjudged as "inadequate".

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LOWER HUDSON RIVER BASIN

LAKE MAHOPAC DAM

**PUTNAM COUNTY, NEW YORK
INVENTORY NO. N.Y. 1329**

**PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM**

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NEW YORK DISTRICT CORPS OF ENGINEERS

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LAKE MAHOPAC DAM
I.D. NO. N.Y. 1329
D.E.C. NO. 213D-4462
LOWER HUDSON RIVER BASIN
PUTNAM COUNTY, N.Y.

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- C. VISUAL INSPECTION CHECKLIST
- D. HYDROLOGIC DATA AND COMPUTATIONS
- E. REFERENCES

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NAME OF DAM: Lake Mahopac Dam, N.Y. 1329
STATE LOCATED: New York
COUNTY LOCATED: Putnam
STREAM: Tributary of Muscoot River
BASIN: Lower Hudson River
DATE OF INSPECTION 6 May 1981

ASSESSMENT

→ The examination of documents and the visual inspection of Lake Mahopac Dam and its appurtenant structures did not reveal conditions which constitute an immediate hazard to human life and property.

Using Corps of Engineers screening criteria, it has been determined that the dam would be overtopped for all storms exceeding approximately 56 percent of Probable Maximum Flood (PMF). The maximum spillway discharge capacity is 7.9 percent of the PMF peak outflow. The spillway is, therefore adjudged as "inadequate".

The following remedial measures should be performed within 12 months from notification:

(1) Missing portions of the upstream stone masonry wall should be repaired.

(2) Brush and shrubbery should be removed from the embankment, spillway-reservoir drain structure and downstream channel. Provide a program of periodic cutting and or mowing of the dam surfaces, spillway-reservoir drain structure and the downstream channel.

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cont
(3) The collected debris at the spillway-reservoir drain structure and in the downstream channel should be removed and hauled away from the dam.

(4) A program of periodic inspections and maintenance of the dam and appurtenances should be provided, including yearly operation and lubrication of the reservoir drain and its control facilities. This information should be documented for future reference.

(5) An emergency action plan for the project should be developed.

Eugene O'Brien

Eugene O'Brien, P.E.
New York No. 29823

Approved by:

W. M. Smith, Jr.

Col. W. M. Smith, Jr.
New York District Engineer

Date:

14 Aug 61

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1. OVERVIEW OF DAM.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LAKE MAHOPAC DAM
I.D. NO. N.Y. 1329
D.E.C. NO. 213D-4462
LOWER HUDSON RIVER BASIN
PUTNAM COUNTY, N.Y.

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers by Contract No. DACW 51-81-C-0008 dated 14 December 1980 in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367, 8 August 1972.

b. Purpose of Inspection

The inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF THE PROJECT

a. Description of Dam and Appurtenant Structures

Lake Mahopac Dam consists of an earth embankment about 190 feet long and has a maximum height of about 9 feet. The width of the crest varies from 25 feet to 50 feet. The visible portion of the upstream face of the embankment is vertical and is retained by a 2 foot wide stone masonry wall. The downstream slope of the embankment, to the right of a spillway-reservoir drain structure, is vertical and protected by a 2 foot wide stone masonry wall; to the left of the spillway-reservoir drain structure it is 1 vertical to 4 horizontal near the crest and vertically retained by one of the stone masonry walls of the spillway-reservoir drain downstream channel.

A stone masonry/concrete structure, which serves as a spillway and a reservoir drain is located about 25 feet from the right abutment. The crest of the spillway is about 3 feet from the top of the dam and is 8 feet wide. Two foot wide stone masonry approach and downstream training walls flank the structure.

The reservoir drain is located at the bottom of the structure. The discharge through the reservoir drain is controlled by a sluice gate which can be operated from the top of the structure. The gate is about 12 feet downstream from the spillway crest. The discharges over the crest and through the reservoir drain flow over a sloping concrete apron, then into the downstream channel. The downstream channel is stone masonry lined, about 5 feet wide and 6 feet high. The channel invert forms the toe of the embankment. Its alignment makes a 120° bend about 100 feet from the spillway-reservoir drain structure; continues along Peeksville Road for 1500 feet where it joins the downstream channel of Kirk Lake.

b. Location

The dam is located on a tributary of Muscoot River and Hudson River; approximately 800 feet from the intersection of Peeksville Road and West Lake Blvd. in the Village of Mahopac Falls.

c. Size Classification

The dam is about 9 feet high and impounds approximately 1300 acre-feet. Therefore, the dam is in the "intermediate" size category (between 1000 acre-feet and 50,000 acre-feet).

d. Hazard Classification

The dam is classified as high hazard due to several homes, a highway and commercial properties located 0.25 miles downstream from the dam.

e. Ownership

Lake Mahopac is owned by the Town of Carmel. The person to contact is Town Supervisor, Town Hall, Town of Carmel, McAlpin Avenue, Mahopac, New York, 10541, Telephone No. (914) 628-1470. At present the town supervisor is Mr. Dean Barrett. The maintenance of the dam is the responsibility of the Highway Department of the Town.

f. Purpose of Dam

The impoundment provided by the dam is mainly for recreation. The lake also supplies water to developments around the lake.

g. Design and Construction History

Original design and construction records are not available. It is reported that the dam was designed and constructed in 1940. The names of the designer and the contractor are unknown.

h. Normal Operating Procedures

There are no normal operating procedures. Lake level is maintained at the spillway crest in spring and summer. In fall the lake level is lowered by 1 to 1.5 feet to allow maintenance of docks and prevent damage to docks due to ice in winter.

1.3 PERTINENT DATA

a.	<u>Drainage Area</u> , Square Miles	2.7
b.	<u>Discharge at Damsite</u> , cfs	
	Ungated spillway capacity at El 660	108.8
c.	<u>Elevation</u> (Feet above MSL)	
	Top of Dam	660.00
	Spillway Crest	657.00
	Reservoir Drain (at Sluice Gate)	653.7
d.	<u>Reservoir</u>	
	Length of Normal Pool (Miles)	0.8
	Surface Area at El 657 (Acres)	608
	Surface Area at El 660 (Acres)	625
e.	<u>Storage</u> (Acre-Feet)	
	Top of Spillway Crest (El 657)	1300
	Top of Dam (El 660.0)	3080
f.	<u>Dam</u>	
	Type	Earth Embankment
	Length (Feet)	190
	Height (Feet)	9
	Crest Width (Feet)	Varies from 25 to 50 feet
	Side Slopes:	
	Upstream	Vertical, Stone masonry wall
	Downstream, Right of Spillway-Reservoir Drain Structure	Vertical, Stone masonry wall
	Downstream, Left of Spillway-Reservoir Drain Structure	1 (V):4 (H) and vertical stone masonry wall
g.	<u>Spillway</u>	
	Type	Sharp-crested, Stone Masonry-concrete
	Length	8 ft
	Crest Elevation	657.0
h.	<u>Reservoir Drain</u>	
	Type	15-inch diameter sluice way
	Elevation (Invert)	Intake 653.7

SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

The records of the owner contain no data on site geology. However, there is data available in the literature on the general geology of the area. Mahopac Lake Dam is located in the Hudson Highlands section of the New England Uplands physiographic province. The province is characterized by a low, but rugged mountain range consisting primarily of igneous and metamorphic rock. The rock underlying the area of the dam is Precambrian biotite-quartz-plagioclase paragneiss with subordinate biotite granitic gneiss, amphibolite and calcilicate rock.

2.2 SUBSURFACE INVESTIGATIONS

There are no records of subsurface investigations available. It is known that the surficial soils in the vicinity of the dam and reservoir are coarse grained glacial till material.

2.3 DAM AND APPURTENANT STRUCTURES

There are no design data, construction drawings or design memoranda available for the project features.

2.4 CONSTRUCTION RECORDS

There are no records of the original construction of the dam available. The name(s) of the contractor is (are) unknown.

2.5 OPERATION RECORDS

There are no records of operation of the dam. The reservoir drain sluice gate is reportedly operated during fall to lower the lake level by 1 foot to 1.5 feet so that maintenance of the docks may be carried out and to prevent damage to the docks by ice. There is no formal operation and maintenance manual for the project. No records of reservoir levels and rainfall are kept.

2.6 EVALUATION DATA

Information was made available by the New York State Department of Environmental Conservation and the Town of Carmel, New York.

The information obtained from the available data, personal interviews and the visual inspection are considered adequate for this Phase I inspection and evaluation.

SECTION 3 - VISUAL OBSERVATION

3.1 FINDINGS

a. General

The visual observation of the Mahopac Dam was made on 6 May 1981. The weather was sunny with the temperature ranging between 60 and 70° F. At the time of inspection, the reservoir level was about El 657.2, 2 inches above the crest of the spillway-reservoir drain structure. The reservoir drain was closed.

b. Dam

The dam, which consists of earth embankment appears to be in generally good condition. There are no visible signs of distress or movement. The horizontal and vertical alignment of the crest are also good.

The visible portion of the upstream slope which is protected by a vertical stone masonry wall, appears to be in good condition except in the vicinity of the left abutment, where about 50 feet of the wall is missing. There is minor vegetation growing through the wall joints particularly near the spillway.

The downstream slopes as well as the stone masonry wall of the channel appear to be in good condition except for minor vegetation such as bushes and overgrown grass. The slope does not exhibit any erosion, sloughing or signs of trespassing. There are no signs of seepage at the downstream toe.

c. Spillway-Reservoir Drain

The spillway and reservoir drain which are located about 25 feet from the left abutment are part of a stone masonry-concrete structure. The exposed spillway portion of the structure and the downstream concrete apron appear to be in good condition except for debris collected at and inside the structure.

The reservoir drain and the control are in operating condition.

A detailed sketch showing the configuration of the spillway-reservoir drain structure as was determined from field measurements is given in Plates 4 and 5.

d. Abutments

There are no signs of seepage or other unusual conditions at both abutments.

e. Downstream Channel

The channel downstream of the spillway-reservoir drain structure is stone masonry lined rectangular in section and appears to be in generally good condition except for minor vegetation growing through the joints and collected debris.

f. Reservoir Area

In the vicinity of the dam there is no evidence of sloughing, potentially unstable slopes or other unusual conditions which would adversely affect the dam. No evidence of excessive sedimentation was observed. The lake water was relatively clean.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the inspection did not reveal serious problems which would adversely affect the adequacy of the dam and the appurtenant facilities. The following summarizes the encountered problem areas, in order of importance with the recommended remedial action:

1. The missing portion of the upstream stone masonry wall should be repaired.

2. The brush and shrubs should be removed from the embankment, spillway-reservoir drain structure and downstream channel. A program of periodic cutting and or mowing of the dam surfaces, spillway-reservoir drain structure and the downstream channel should be provided.

3. The collected debris at the spillway-reservoir drain structure and in the downstream channel should be removed and hauled away from the dam.

4. An emergency action plan for the project should be developed.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

There are no operating procedures for regulating the discharges. The reservoir drain sluice gate is kept closed during the spring and summer so that the lake level is maintained at the spillway crest. In fall the lake level is maintained 1 to 1.5 feet below the spillway crest by discharging through the reservoir drain (gates kept open). It is reported that lowering the lake is done to allow for dock maintenance and to prevent ice damage to docks in the winter.

4.2 MAINTENANCE OF THE DAM

There is no operating and maintenance manual for the dam. There is no regular maintenance done at the dam, but is done as needed. The presence of the debris in the spillway and discharge channel, overgrown bushes and shrubs and trees is considered unacceptable.

4.3 MAINTENANCE OF OPERATING EQUIPMENT

There is no regular maintenance of the sluice gate of the reservoir drain. During the inspection the sluice gate was operated and appears to be in good condition except for minor rusting of the stem. The operating mechanism for the gate is kept at the Highway Department, Town of Carmel.

4.4 WARNING SYSTEM IN EFFECT

There is no warning system in effect or in preparation.

4.5 EVALUATION

The operation and maintenance of Lake Mahopac Dam is considered inadequate in the following areas:

1. Maintenance of the upstream stone masonry wall.
2. Control of vegetation on the embankment and in the spillway-reservoir drain structure and its channel.
3. Debris in and at the spillway-reservoir drain structure.

SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

Lake Mahopac is located in Carmel Township, Putnam County, New York (Hydrologic Unit Code No. 02030101), and is the headwater of the Muscoot River, with a drainage area of 2.7 square miles. The lake surface area at elevation 657 is 0.95 square miles or 35 percent of the drainage area. The basin consists of a northern sub-area of 0.94 square miles, relatively undeveloped with some surface storage in Wixon Pond and a small wet-land area. The urbanized southern sub-area has little storage in its 0.83 square miles and no defined river channels. The basin is extremely narrow on the eastern and western sides of the lake.

5.2 ANALYSIS CRITERIA

The analysis of the adequacy of the spillway was performed by developing a design flood using the unit hydrograph method and the Probable Maximum Precipitation (PMP). The all season 200 square mile 24 hour PMP for the Lake Mahopac basin of 22 inches was obtained from Hydro-meteorological Report No. 33, and distributed according to Standard Project Flood Determination, EM 1110-2-1411, Army Corps of Engineers.

The unit hydrograph for each sub-area was computed using Snyder's method with coefficients of 2 and 0.625 for C_T and C_p , respectively. Rainfall loss parameters of 1.0 inch initial loss and 0.1 inch per hour constant loss were selected as representative for the PMP event. In accordance with the recommended guidelines for Safety Inspection of Dams, the adequacy of the spillway was analyzed using the Probable Maximum Flood (PMF). A multi-plan analysis was performed for 50%, 75% and 100% PMF.

5.3 SPILLWAY CAPACITY

The maximum discharge of the unconventional structured spillway, was computed to be 108.8 cfs with the lake surface at El 660, and the sluice gate closed. A low coefficient of discharge was selected in order to represent the obstruction to flow caused by the structure built in the spillway channel.

5.4 RESERVOIR CAPACITY

The normal capacity of the reservoir is listed as 1300 acre-feet. The computed surcharge storage between spillway crest (El 657) and the top of the dam (El 660) is 1780 acre-feet, which is equivalent to approximately 12.4 inches of runoff over the entire drainage area.

5.5 FLOODS OF RECORD

There are no records of floods or maximum reservoir elevations at the dam.

5.6 OVERTOPPING POTENTIAL

The potential of the dam being overtopped was investigated on the basis of the spillway discharge capacity and the available surcharge storage to meet the selected design flood inflows.

The HEC-1DB analysis was performed assuming that the water surface of the lake was at spillway crest elevation at the start of the flood event. The basin was divided into two sub-areas and the combined hydrographs routed through the lake.

The results of the multi-ratio analysis are as follows:

<u>RATIO OF PMF</u>	<u>PEAK INFLOW</u>	<u>PEAK OUTFLOW</u>	<u>OVERTOPPING</u>
1.00	7797 cfs	1372 cfs	1.57 ft.
0.75	5848 cfs	540 cfs	0.74 ft.
0.50	3899 cfs	99 cfs	0.00 ft.

The dam would be overtopped by all floods exceeding 56 percent of the PMF. The maximum spillway discharge capacity is 7.9 percent of the peak PMF outflow.

5.7 EVALUATION

The dam does not have sufficient capacity to pass PMF, however, it has capacity to pass one-half PMF. Using the Corps of Engineers screening criteria, the spillway is therefore assessed as being "inadequate".

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observation

Visual observations did not indicate either existing or potential problems with the dam and spillway-reservoir drain structure. The observed missing wall at the upstream face is not detrimental to the dam's stability or safety at the present time, however, condition should be repaired before it worsens.

b. Design and Construction Data

There exists no design computations or other data regarding the structural stability of the dam or spillway-reservoir drain structure.

c. Operating Records

There are no available records of the reservoir elevations and gate operations. No major operational problems which would affect the stability of the dam were reported.

d. Post Construction Changes

There are no records of post construction changes available.

e. Seismic Stability

According to the recommended Corps of Engineers guidelines, the dam is located in Seismic Zone No. 1. However, based on past earthquake history the New York State Geological Survey considers the site to be in Zone 2. Based on this assessment the dam is considered in the Seismic Zone 2.

6.2 STRUCTURAL STABILITY ANALYSIS

Analyses to determine the stability of the spillway-reservoir drain structure to withstand sliding or overturning were not performed. Considering the relatively small external loadings acting upon the relatively large, heavy concrete structure, it has been concluded on engineering judgment that the stability criteria (overturning and sliding) as set forth by U.S. Army Engineering Regulations ER 1110-2-106 Appendix B, will be met for all required loading cases.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

Examination of the available documents and the visual inspection of Lake Mahopac Dam did not reveal any conditions which constitute an immediate hazard to life or property.

Using the Corps of Engineers screening criteria for examination of spillway adequacy, it has been determined that the dam would be overtopped for all storms exceeding approximately 56 percent of Probable Maximum Flood (PMF). The maximum spillway discharge capacity is 7.9 percent of the PMF peak outflow. The spillway is, therefore adjudged as "inadequate".

b. Adequacy of Information

This report and its conclusions are based on the visual inspection, interviews and hydrologic/hydraulic studies. This information and data are adequate for a Phase I inspection.

c. Need for Additional Information

No additional investigations are required for the project.

d. Urgency

All remedial actions described below should be completed within one year of notification to the owner.

7.2 RECOMMENDED MEASURES

The recommended measures are as follows:

1. The missing portion of the upstream stone masonry wall should be repaired.

2. Brush and shrubs should be removed from the embankment, spillway-reservoir drain structure and downstream channel. A program of periodic cutting and or mowing of the dam surfaces, spillway-reservoir drain structure and the downstream channel should be provided.

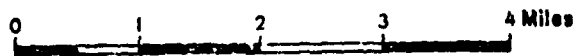
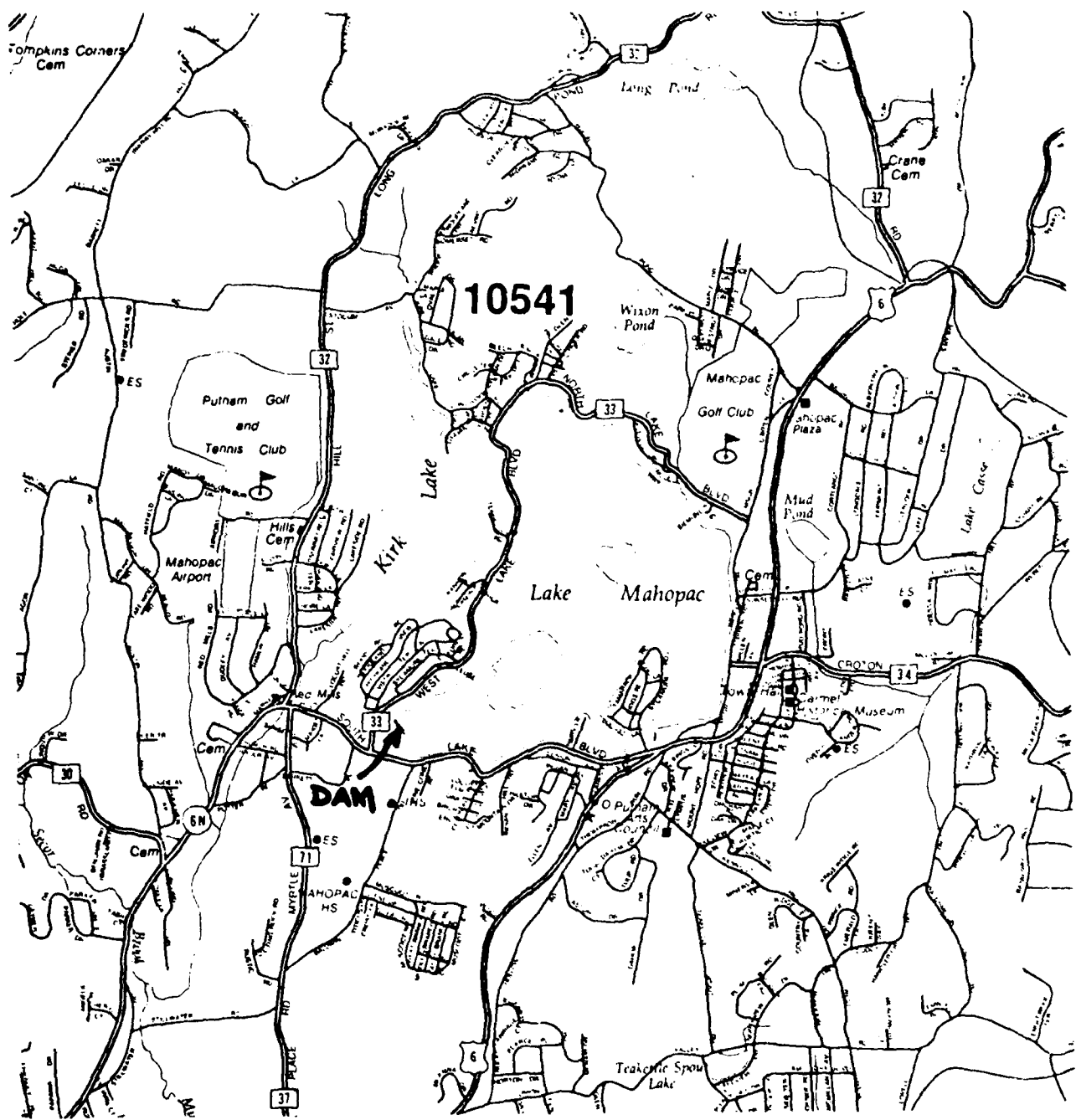
3. The collected debris at the spillway-reservoir drain structure and in the downstream channel should be removed and hauled away from the dam.

4. A program of periodic inspections and maintenance of the dam and appurtenances including yearly operation and lubrication of the reservoir drain and its control facilities should be provided. This information should be documented for future reference.

5. An emergency action plan for the project should be developed.

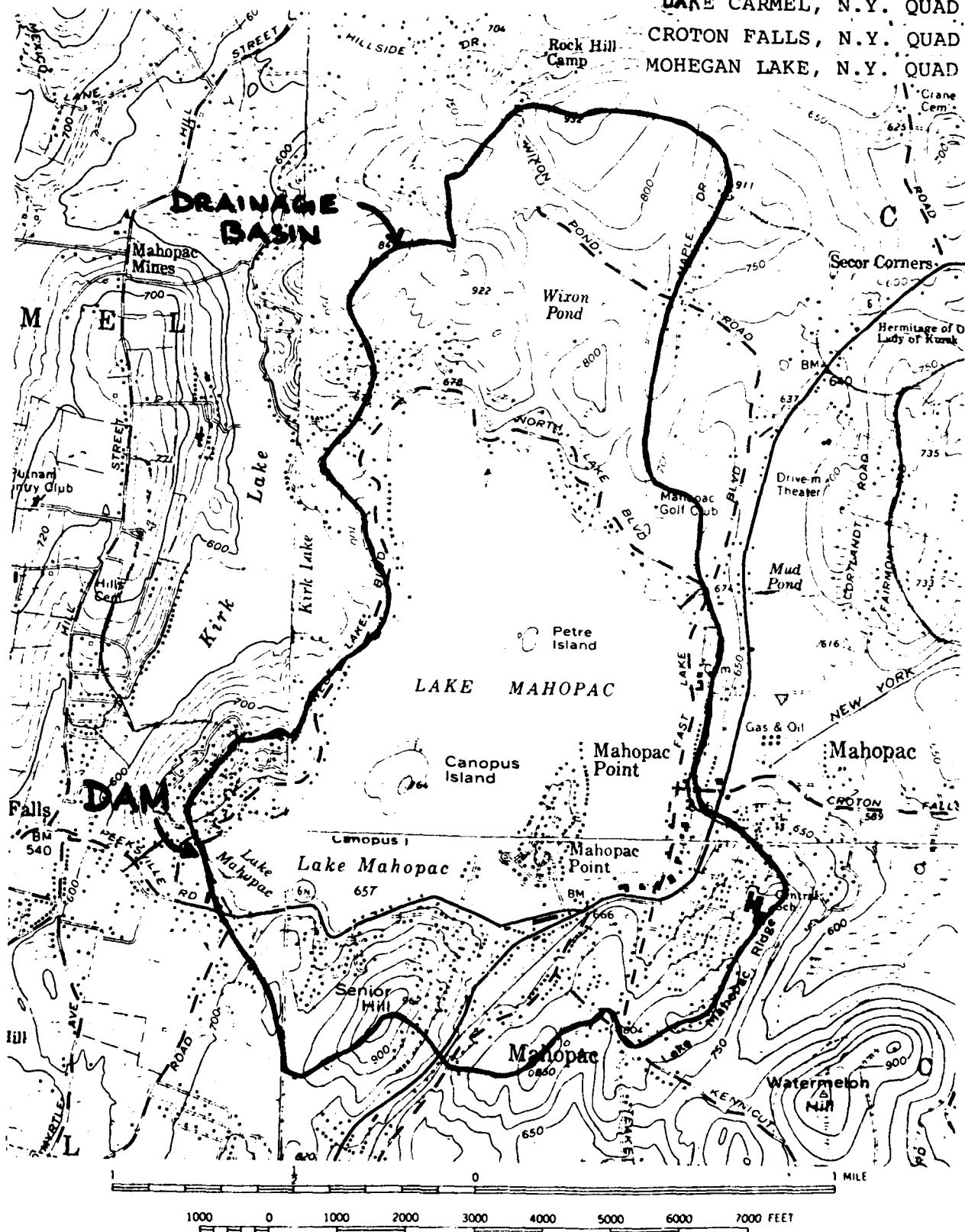
DRAWINGS

APPENDIX A



VICINITY MAP
LAKE MAHOPAC DAM

OSCAWANA LAKE, N.Y. QUAD
 LAKE CARMEL, N.Y. QUAD
 CROTON FALLS, N.Y. QUAD
 MOHEGAN LAKE, N.Y. QUAD



SCALE 1:24:000

TOPOGRAPHIC MAP
 LAKE MAHOPAC DAM

NOTE
 1. Drawing based on rough field measurement
 2. Length of dam about 190 ft.

Lake Mahopac

Site of Spillway-Reservoir
 Drain structure

UPSTREAM
 Stone Masonry
 Wall

Embankment

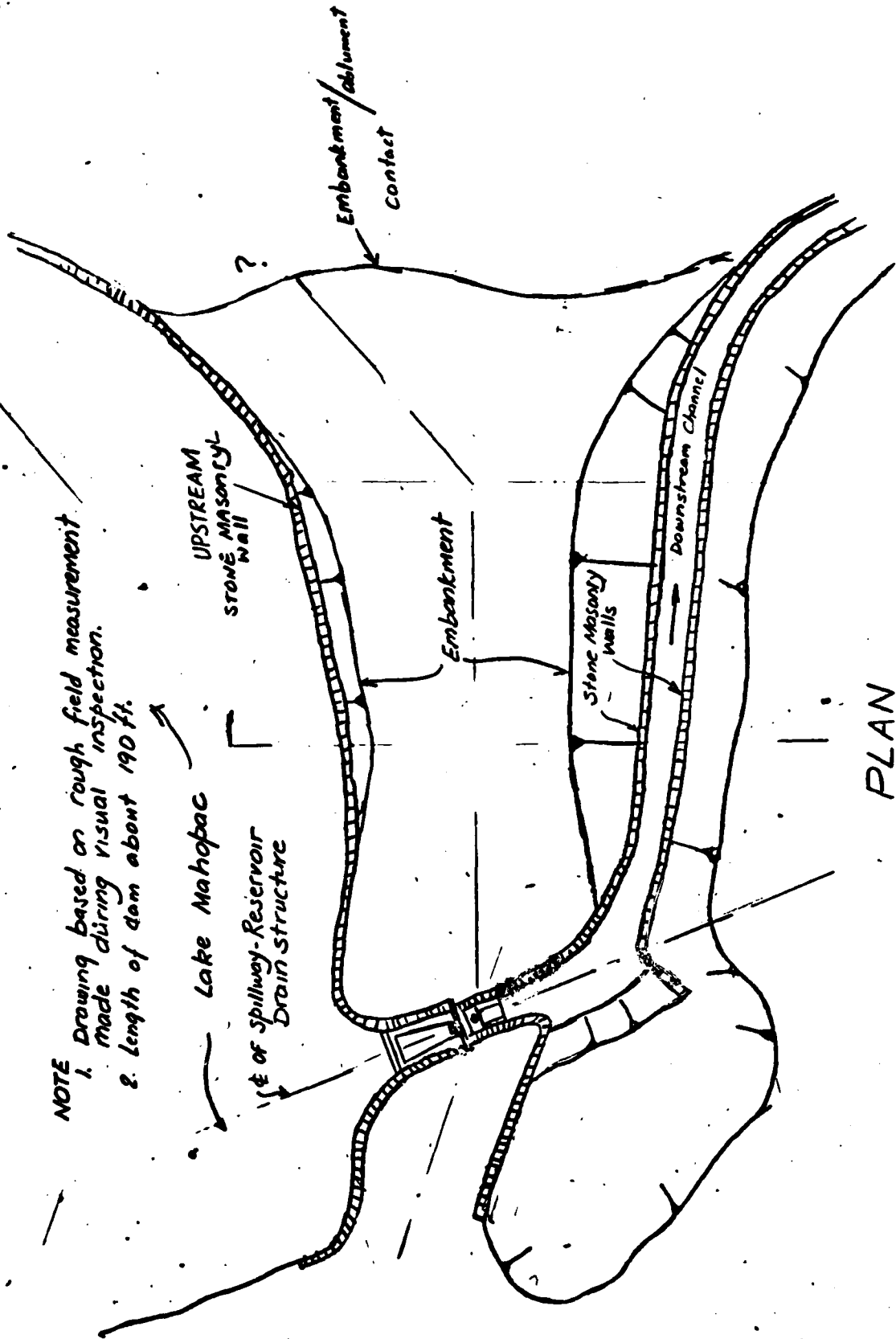
Embankment/abutment
 contact

Stone Masonry
 walls

Downstream Channel

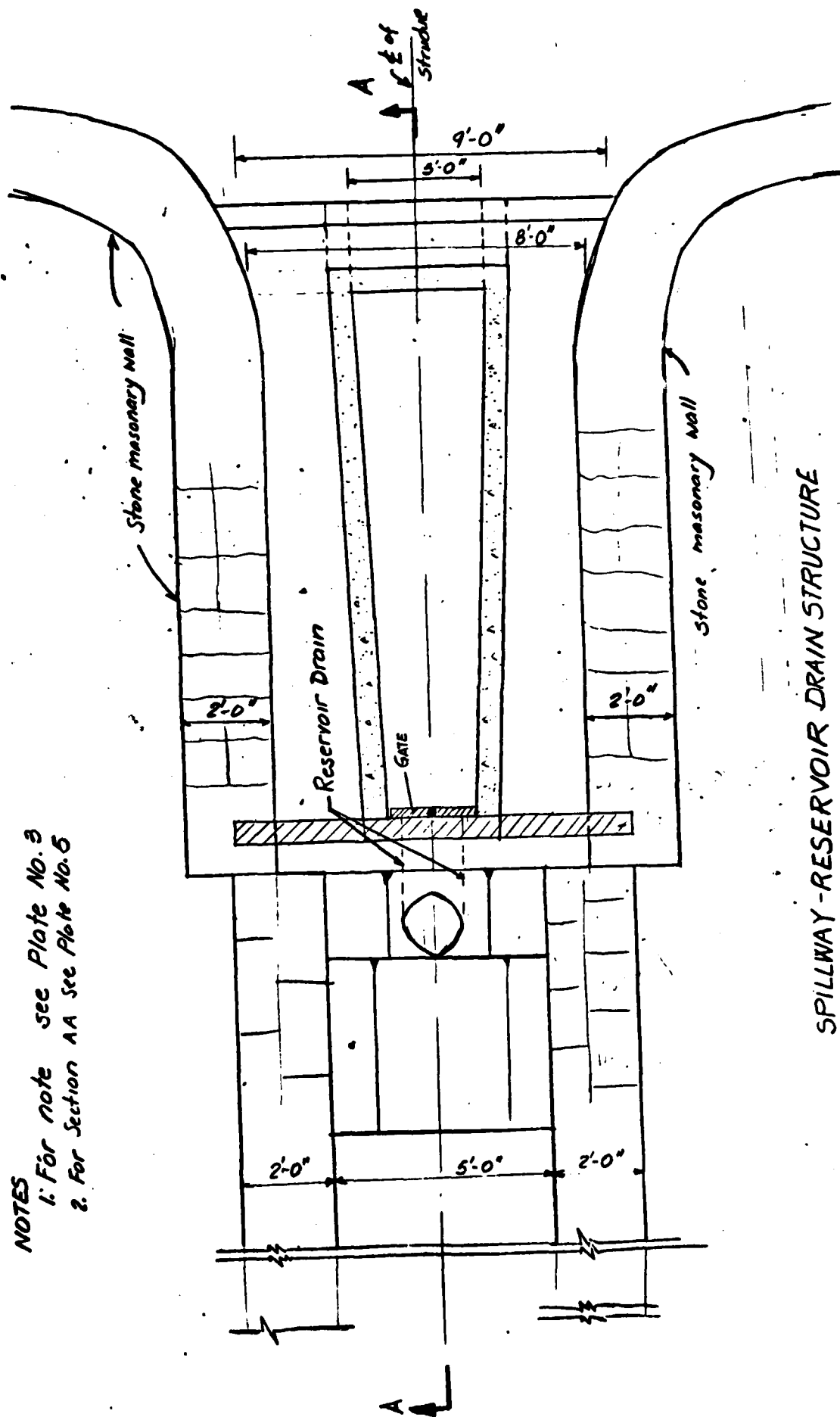
PLAN
 Scale: NTS

PLATE NO. 3.



NOTES

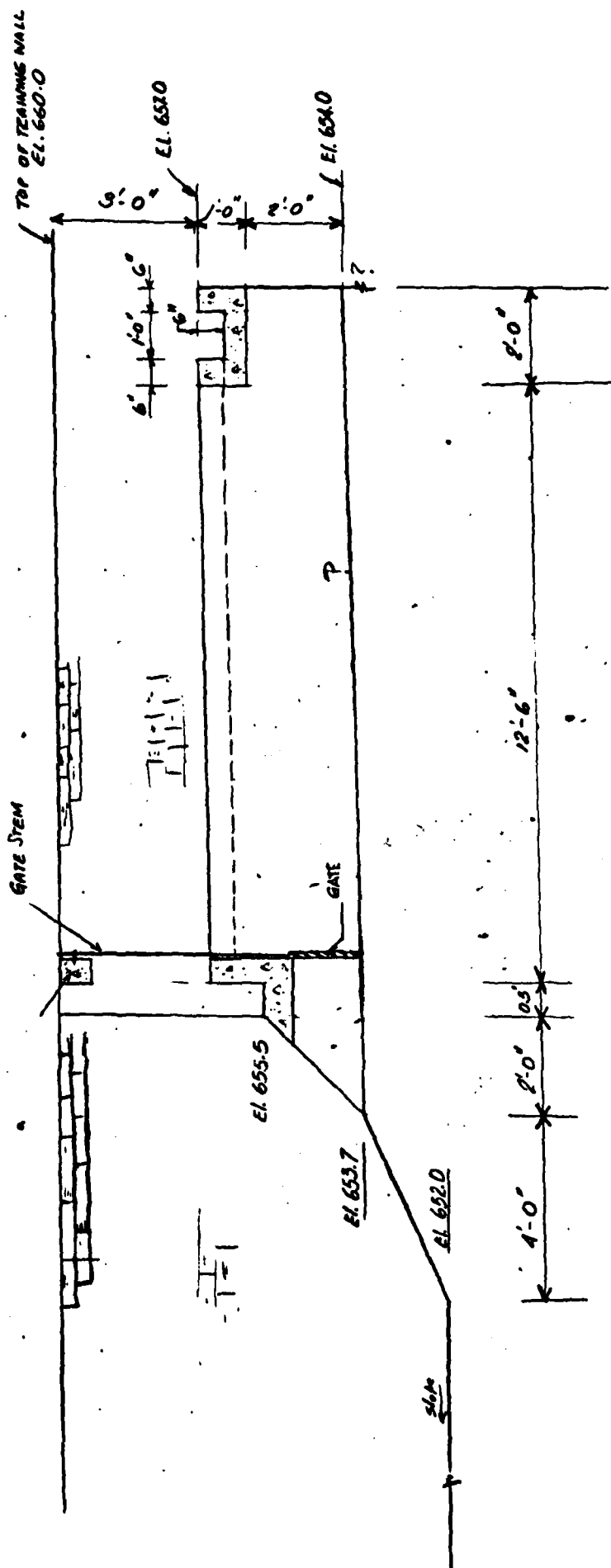
1. For note see Plate No. 3
2. For Section AA see Plate No. 5



SPILLWAY-RESERVOIR DRAIN STRUCTURE

PLAN
SCALE: NTS

Plate No 4



SECTION AA
SCALE: NTS

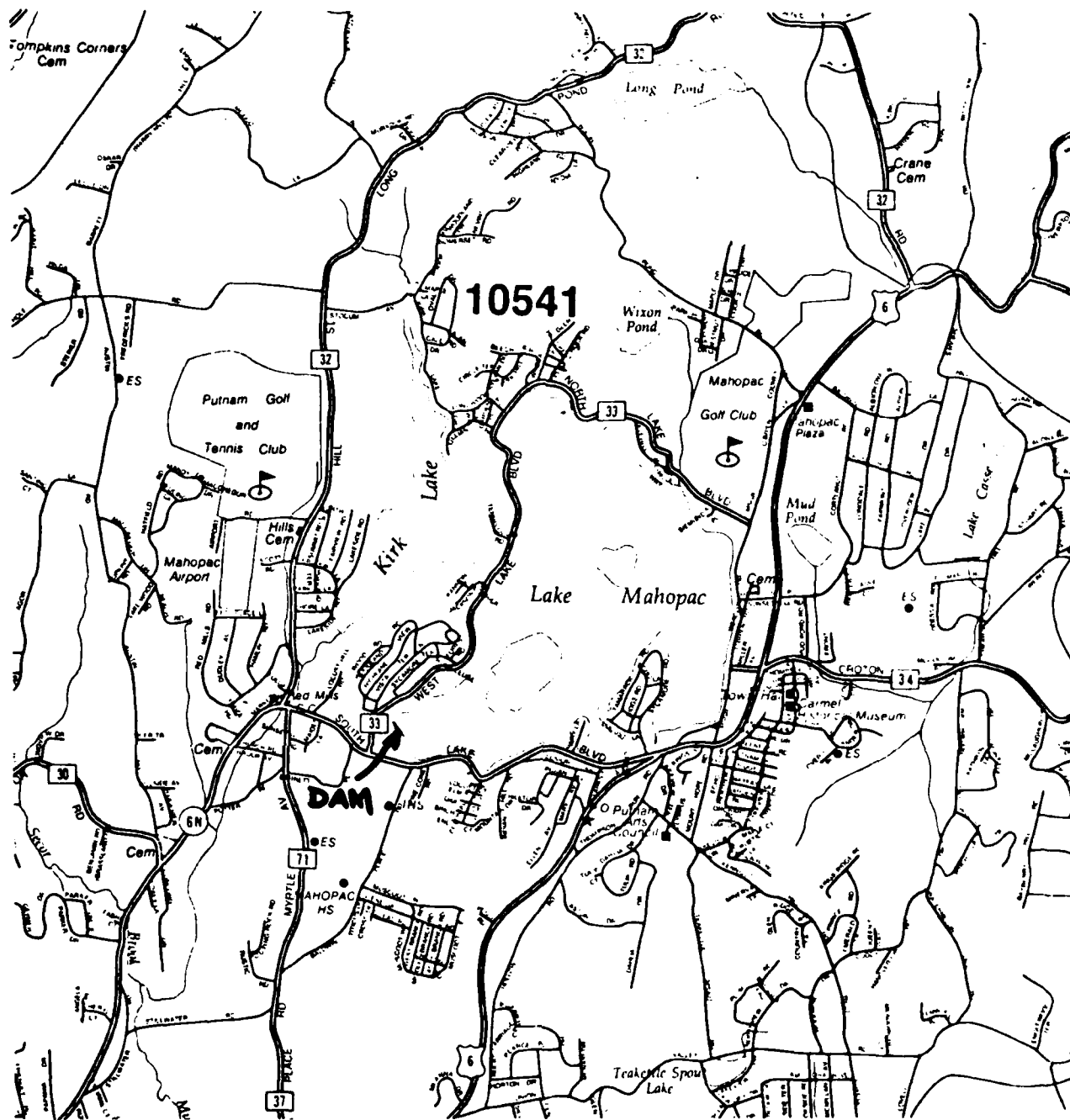
Plate No. 5

PHOTOGRAPHS

APPENDIX B

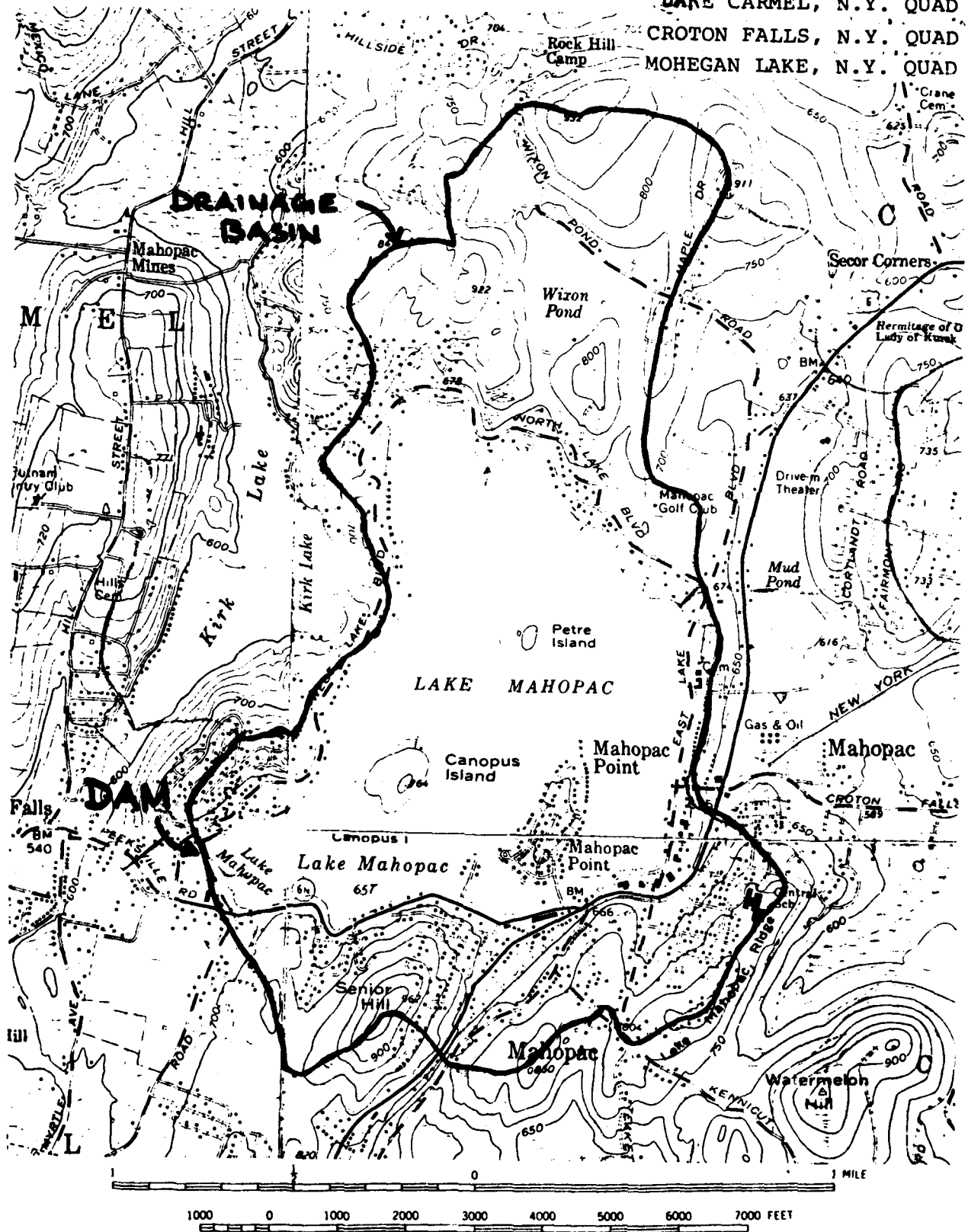
DRAWINGS

APPENDIX A



VICINITY MAP
LAKE MAHOPAC DAM

OSCAWANA LAKE. N.Y. QUAD
 LAKE CARMEL, N.Y. QUAD
 CROTON FALLS, N.Y. QUAD
 MOHEGAN LAKE, N.Y. QUAD



SCALE 1:24:000

TOPOGRAPHIC MAP
 LAKE MAHOPAC DAM

NOTE
 1. Drawing based on rough field measurement
 made during visual inspection.
 2. Length of dam about 190 ft.

Lake Mahopac

Spillway-Reservoir
 Drain structure

UPSTREAM
 STONE MASONRY
 Wall

Embankment

Embankment/abutment
 Contact

Stone Masonry
 walls

Downstream Channel

PLAN
 Scale: NTS

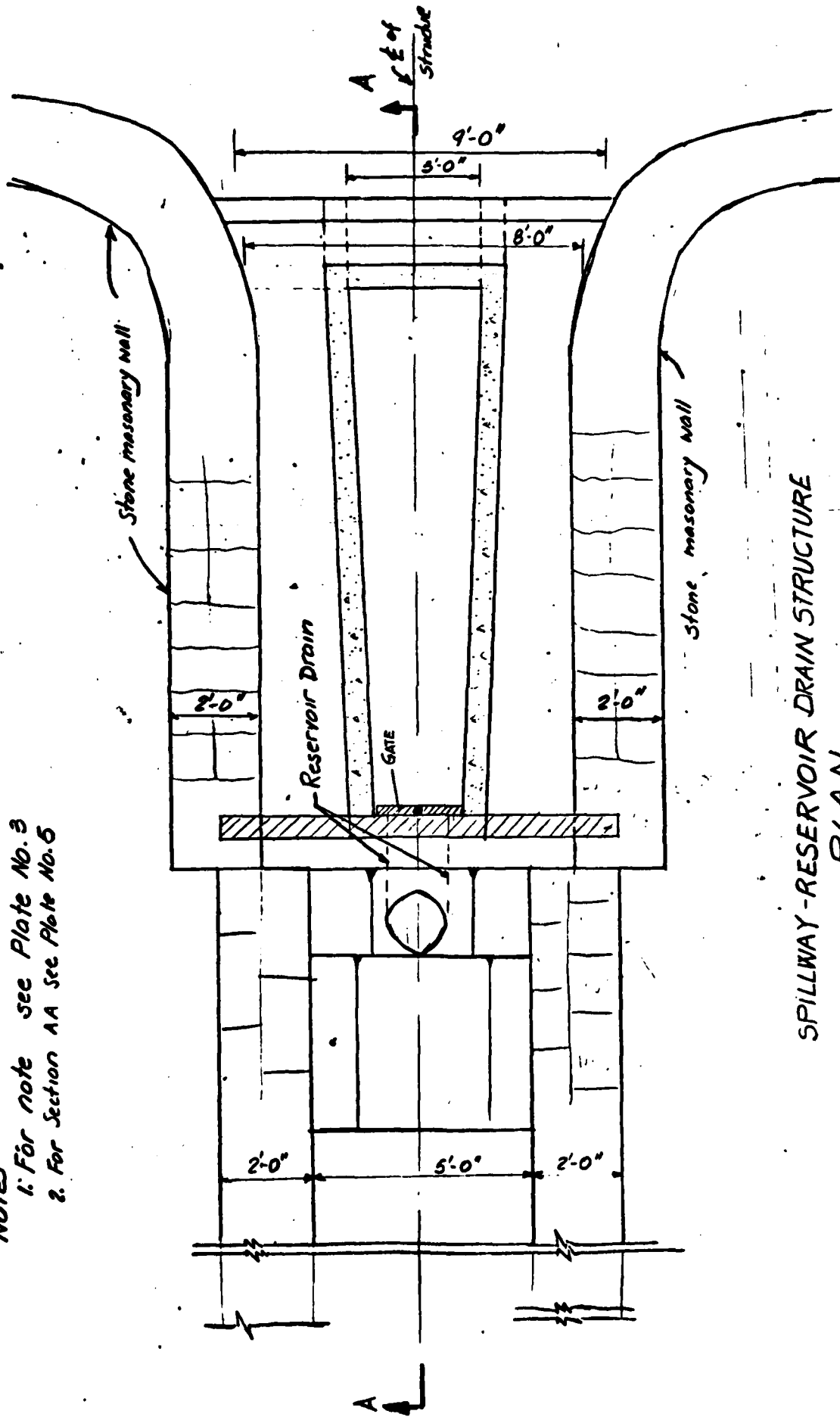
PLATE NO. 3.



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NOTES

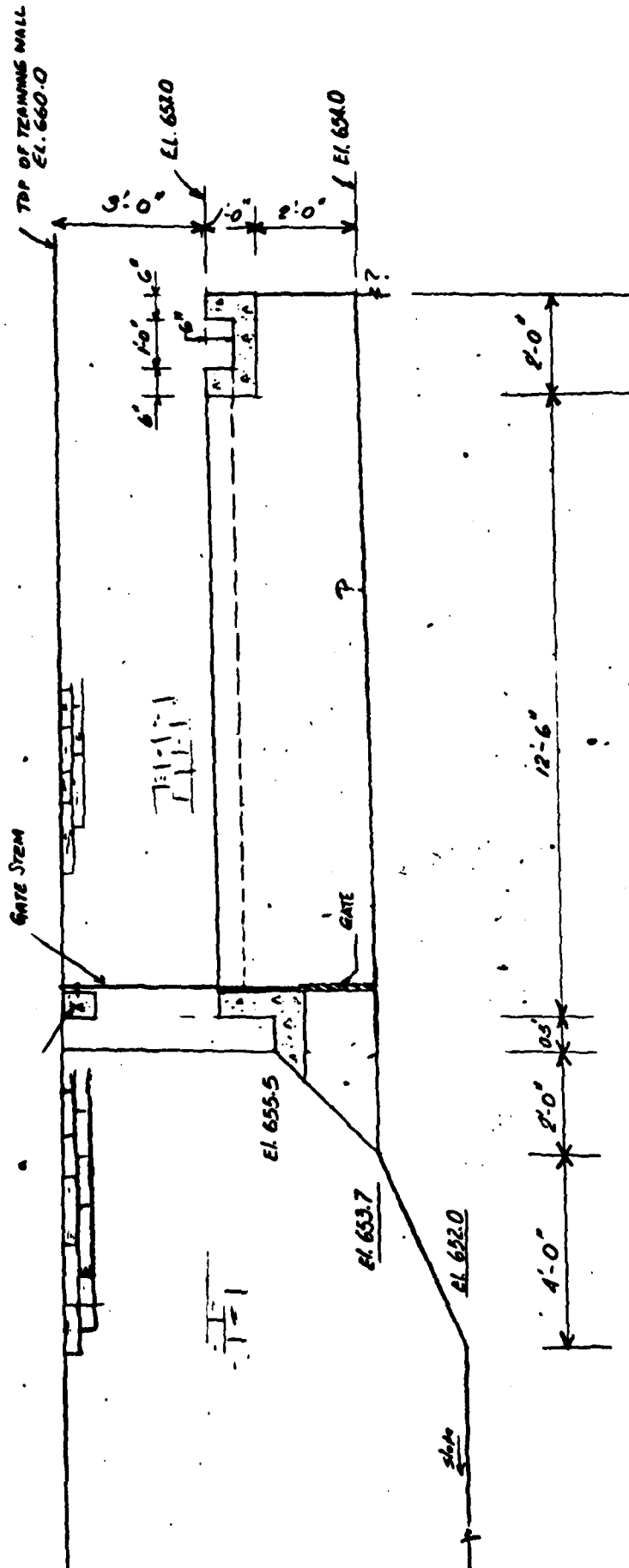
1. For note see Plate No. 3
2. For Section AA see Plate No. 5



SPILLWAY-RESERVOIR DRAIN STRUCTURE

PLAN
SCALE: NTS

Plate No 4



SECTION AA
SCALE: NTS

Plate No. 5

PHOTOGRAPHS

APPENDIX B



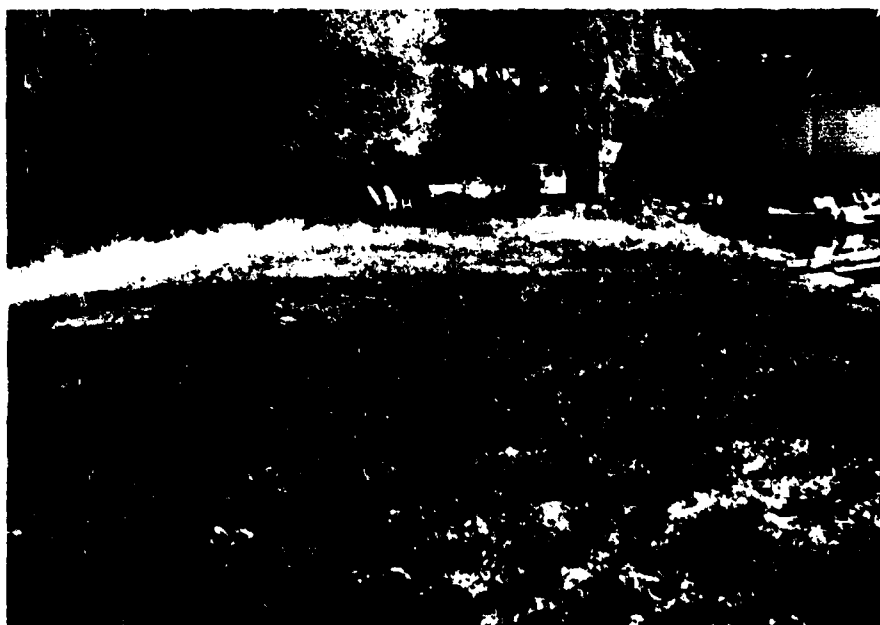
2. UPSTREAM VIEW OF DAM. (NOTE: Floating Debris in Reservoir)



3. UPSTREAM VIEW AT SPILLWAY-RESERVOIR DRAIN STRUCTURE.



4. VIEW OF CREST FROM SPILLWAY-RESERVOIR
DRAIN STRUCTURE LOOKING LEFT. (NOTE: Trees)



5. VIEW OF CREST LOOKING RIGHT. PHOTOGRAPH
TAKEN ABOUT 70 FT FROM LEFT ABUTMENT/DAM
CONTACT.



6. VIEW OF SPILLWAY-RESERVOIR DRAIN STRUCTURE
SILL. (NOTE: Collected Debris)



7. VIEW OF SPILLWAY-RESERVOIR DRAIN STRUCTURE
AT DRAIN OUTLET. (NOTE: Collected Debris)



8. VIEW OF DOWNSTREAM FACE OF SPILLWAY-
RESERVOIR DRAIN STRUCTURE. (NOTE: Vege-
tation and Collected Debris)



9. VIEW OF UPSTREAM FACE. (NOTE: Upstream
Stone Wall Condition)



10. VIEW OF DOWNSTREAM CHANNEL - LOOKING RIGHT.



11. VIEW OF DOWNSTREAM CHANNEL - LOOKING LEFT.

VISUAL INSPECTION CHECKLIST

APPENDIX C

VISUAL INSPECTION CHECKLIST

1 Basic Data

a. General

Name of Dam LAKE MAHOPAC
Fed. I.D. # N.Y. 1329 DEC Dam No. 213 D-4462
River Basin HUDSON RIVER BASIN
Location: Town MAHOPAC VILLAGE County PUTNAM
Stream Name MUSCOOT RIVER
Tributary of HUDSON RIVER
Latitude (N) 41° 22.5° Longitude (W) 73° 45.3°
Type of Dam EARTH
Hazard Category HIGH (1)
Date(s) of Inspection MAY 6, 81
Weather Conditions Partly Cloudy; 60-70° F.
Reservoir Level at Time of Inspection El. 657.2

b. Inspection Personnel HARVEY FELDMAN & JYOTINDRA PATEL

c. Persons Contacted (Including Address & Phone No.)
MR. DEAN BARRETT, TOWN SUPERVISOR
TOWN HALL, TOWN OF CARMEL
Mc ALPIN AV.
MAHOPAC NY 10541

d. History:
Date Constructed 1940 * Date(s) Reconstructed —
* reported
Designer Unknown
Constructed By Unknown
Owner TOWN OF CARMEL (Address as above)

Embankment

a. Characteristics

- (1) Embankment Material Earth fill; classification of earth fill unknown.
- (2) Cutoff Type Unknown
- (3) Impervious Core Unknown
- (4) Internal Drainage System Unknown
- (5) Miscellaneous None

b. Crest

- (1) Vertical Alignment Good
- (2) Horizontal Alignment Good.
- (3) Surface Cracks none observed
- (4) Miscellaneous brushes and several large size trees; Several animal burrows

c. Upstream Slope

- (1) Slope (Estimate) (V:H) VERTICAL - STONE WALL.
- (2) Undesirable Growth or Debris, Animal Burrows _____
- (3) Sloughing, Subsidence or Depressions Near left abutment about 30' ft of wall displaced and stones missing.

(4) Slope Protection — stone wall

(5) Surface Cracks or Movement at Toe Unobservable - below water level

d. Downstream Slope

(1) Slope (Estimate - V:H) Varies from Vertical to 1(V):4(H)

(2) Undesirable Growth or Debris, Animal Burrows Overgrown grass, brushes and animal burrows

(3) Sloughing, Subsidence or Depressions None observed.

(4) Surface Cracks or Movement at Toe None observed

(5) Seepage None observed

(6) External Drainage System (Ditches, Trenches; Blanket) None.
however downstream spillway - low level outlet channel runs along the toe.

(7) Condition Around Outlet Structure

(8) Seepage Beyond Toe none observed.

e. Abutments - Embankment Contact

Both abutments - natural ground

(1) Erosion at Contact none observed

(2) Seepage Along Contact none observed.

3) Drainage System

a. Description of System Appears to be none

b. Condition of System

c. Discharge from Drainage System

d) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs,
Piezometers, Etc.)

None

1) Reservoir

- a. Slopes Visible slopes in vicinity of Dam are in generally stable condition.
- b. Sedimentation _____
- c. Unusual Conditions Which Affect Dam none observed

2) Area Downstream of Dam

- a. Downstream Hazard (No. of Homes, Highways, etc.) Several homes, and Rt 6 downstream of Dam.
- b. Seepage, Unusual Growth (a) None observed. (b) none except brushes and trees.
- c. Evidence of Movement Beyond Toe of Dam none observed.
- d. Condition of Downstream Channel see spillway channel (7d.)

3) Spillway(s) (Including Discharge Conveyance Channel)

Spillway structure also has low level outlet.

- a. General The spillway structure also shall low level outlet (reservoir drain). Because of discharge flowing in the spillway the layout and details of the low level outlet could not be determine.
- b. Condition of Service Spillway Generally good except collected debris at and in spillway.

c. Condition of Auxiliary Spillway No Auxiliary spillway

d. Condition of Discharge Conveyance Channel Discharge channel (stone lined)
is also for reservoir drain is in good condition except
some brush growing through stone masonry
joints and debris.

e. Reservoir Drain/Outlet *

Type: Pipe _____ Conduit _____ Other Circular hole in Concrete
Structure

Material: Concrete ☒ Metal _____ Other _____

Size: 15" ** Length _____

Invert Elevations: Entrance _____ Exit _____

Physical Condition (Describe): _____ Unobservable ☒

Material: _____ Under water

Joints: _____ Alignment _____

Structural Integrity: _____

Hydraulic Capability: _____

Means of Control: Gate ☒ Valve _____ Uncontrolled _____

Operation: Operable ☒ Inoperable _____ Other _____

Present Condition (Describe): Gate was operated - appears
to be in good condition.

* Outlet of the reservoir drain is visible at the face of the spillway channel.

** Approximate dimensions, since could not be
determined because of discharge flowing.
(measured at outlet end).

9) Structural

- a. Concrete Surfaces The spillway reservoir drain-structure concrete surface appears to be in relatively good condition
- b. Structural Cracking No structural cracking is visible at spillway reservoir drain-structure.
- c. Movement - Horizontal & Vertical Alignment (Settlement) None observed
- d. Junctions with Abutments or Embankments Junctions with embankment are in good condition
- e. Drains - Foundation, Joint, Face None visible
- f. Water Passages, Conduits, Sluices Not Accessible
- g. Seepage or Leakage None observed.

h. Joints - Construction, etc. None Visible

i. Foundation None Visible - Spillway structure
founded on Glacial till.

j. Abutments None

k. Control Gates No structural control gates
on spillway - Reservoir Drain Structure

l. Approach & Outlet Channels The outlet channel is
stone masonry lined and in good condition. Minor
vegetation growing through the joints and collected
debris.

m. Energy Dissipators (Plunge Pool, etc.) None Applicable

n. Intake Structures None

o. Stability No calculations are available; Visual
observation indicates there appears to be no problem.

p. Miscellaneous _____

10) Appurtenant Structures (Powerhouse, Lock, Gatehouse, Other)

a. Description and Condition

only spillway
Reservoir drain structure - see
previous comments.

I

HYDROLOGIC DATA AND COMPUTATIONS

APPENDIX D

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

1

AREA-CAPACITY DATA:

	<u>Elevation</u> (ft.)	<u>Surface Area</u> (acres)	<u>Storage Capacity</u> (acre-ft.)
1) Top of Dam	<u>660±</u>	<u>625</u>	<u>3080</u>
2) Design High Water (Max. Design Pool)	<u>—</u>	<u>—</u>	<u>—</u>
3) Auxiliary Spillway Crest	<u>NONE</u>	<u>—</u>	<u>—</u>
4) Pool Level with Flashboards	<u>—</u>	<u>—</u>	<u>—</u>
5) Service Spillway Crest	<u>657</u>	<u>608</u>	<u>1300</u>

DISCHARGES

	<u>Volume</u> (cfs)
1) Average Daily	<u>UNKNOWN</u>
2) Spillway @ Maximum High Water	<u>42</u>
3) Spillway @ Design High Water	<u>UNKNOWN</u>
4) Spillway @ Auxiliary Spillway Crest Elevation	<u>—</u>
5) Low Level Outlet (Reservoir drain)	<u>—</u>
6) Total (of all facilities) @ Maximum High Water	<u>—</u>
7) Maximum Known Flood	<u>UNKNOWN</u>
8) At Time of Inspection	<u>UNKNOWN</u>

CREST:

ELEVATION: 660 ±Type: EarthWidth: Varies 25' to 50' Length: 190 FT.Spillover Uncontrolled concrete weirLocation about 25' from Right abutment

SPILLWAY:

SERVICE

AUXILIARY - None657

Elevation

Sharp crested - concrete

Type

6"

Width

✓ Type of Control

Uncontrolled

Controlled:

Type

(Flashboards; gate)

Number

Size/Length

Invert Material

Anticipated Length
of operating service6' - Sloping

Chute Length

8' ±Height Between Spillway Crest
& Approach Channel Invert
(Weir Flow)

HYDROMETEROLOGICAL GAGES:

None used

Type : _____

Location: _____

Records:

Date - _____

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: _____ None

Method of Controlled Releases (mechanisms):

DRAINAGE AREA: 2.7 sq. miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: approx 60% urban-suburban & 40% woods & pastures

Terrain - Relief: hilly with relatively steep slopes

Surface - Soil: glacial till

Runoff Potential (existing or planned extensive alterations to existing
(surface or subsurface conditions)

none observed

Potential Sedimentation problem areas (natural or man-made; present or future)

None in vicinity of lake observed

Potential Backwater problem areas for levels at maximum storage capacity
including surcharge storage:

None

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the
Reservoir perimeter:

Location: _____

Elevation: _____

Reservoir:

Length @ Maximum Pool 0.8 (Miles)

Length of Shoreline (@ Spillway Crest) 5.68 (Miles)

TAMS

Job No. 1579-17

Project LAKE MAHOPAC DAM INSPECTION

Subject HYDROLOGIC / HYDRAULIC COMPUTATIONS

Sheet 1 of

Date MAY 27, 81

By DLC

Ch'k. by

SUB AREA A

$$L = 3.5'' = 7000' = 1.3 \text{ mi.}$$

$$L_{CA} = 1.1'' = 2200' = 0.42 \text{ mi}$$

$$t_p = C_r (LL_{CA})^{0.3} \quad \text{use } C_r = 2$$

$$t_p = 2.0 (1.3 \times 0.42)^{0.3} = 1.67 \text{ hours}$$

$$t_R = t_p / 5.5 = 0.30 \text{ hrs.}$$

$$\text{for } t_R = 0.5 \text{ hours}$$

$$t_{PR} = t_p + 0.25(t_R - t_R) = 1.67 + 0.25(0.5 - 0.3) \\ = 1.67 + 0.05 = 1.72 \text{ hours}$$

$$\text{USE } 640 C_p = 400 \quad C_p = 0.625$$

SUB AREA B

$$L = 1.5 = 3000' = 0.57 \text{ mi}$$

$$L_{CA} = 0.5 = 1000' = 0.19 \text{ mi}$$

$$t_p = C_r (LL_{CA})^{0.3} \quad \text{use } C_r = 2$$

$$t_p = 2 (0.57 \times 0.19)^{0.3} = 1.03 \text{ hours}$$

$$t_R = t_p / 5.5 = 1.03 / 5.5 = 0.19$$

$$\text{for } t_R = 0.5$$

$$t_{PR} = t_p + 0.25(0.5 - 0.19) = 1.03 + 0.08 \\ = 1.11 \text{ hrs.}$$

$$\text{USE } 640 C_p = 400 \quad C_p = 0.625$$

TAMS

Job No. 1579-17

Project LAKE MAHOPAC DAM

Subject HYDROLOGIC / HYDRAULIC COMPUTATIONS

Sheet 2 of

Date

By

Ch'k. by

ALL SEASON 24 HR 200 SQ MILE PMP = 22 inches

DURATION (HR) 6 12 24 48

% RAINFALL 112 123 133 141

INITIAL RAINFALL LOSS

1.0 inch

CONSTANT RAINFALL LOSS

0.1 inch/hour

CROSS SECTION 1000 FT DOWN STREAM OF DAM

SLOPE 0.038 Ft/Ft.

DISTANCE

ELEVATION

1) 0 660

2) 250 640

3) 317 620

4) 318 614

5) 323 614

6) 324 620

7) 580 640

8) 700 660

$n = 0.035$

$n = 0.015$ (lined channel)

$n = 0.035$

TAMS

Job No. 1579-17 Sheet 3 of
 Project LAKE MAHOPAC DAM SAFETY INVESTIGATION Date MAY 27, 1981
 Subject HYDROLOGIC / HYDRAULIC COMPUTATIONS. By D.L.C.
 Ch'k. by

SPILLWAY RATING

Effective width 8.0'

Assume $C = 2.6$

$CXL = 20.8$

EL	h_e	$Q, CLH^{1.5}$
657	0	0
658	1	20.8
660	3	108.1
665	8	470.6
670	13	974.9

DAM LENGTH

190'

TOP OF DAM EL

660' MSL

Sub-area A

$$6.55 \text{ in}^2 = 601.5 \text{ acres} = 0.94 \text{ sq mi}$$

Sub-area B

$$5.75 \text{ in}^2 = 528.0 \text{ acres} = 0.83 \text{ sq mi}$$

$$\text{LAKE AREA PLUS ISLANDS} = 6.62 \text{ sq mi} = 607.9 \text{ acres}$$

$$\text{LAKE SURFACE AREA AT EL. 657} = (607.9 - 48.7) = 559.2 \text{ acres}$$

$$\text{LAKE SURFACE AREA AT EL. 660} = (665.3 - 39.95) = 625.3 \text{ acres}$$

$$\text{LAKE SURFACE AREA AT EL. 670} = (771.8 - 33.1) = 738.7 \text{ acres}$$

TAMS

Job No. 1579-17

Project LAKE MAHOPAC

Subject HYDROLOGIC / HYDRAULIC COMPUTATIONS

Sheet 4 of

Date MAY 28, 81

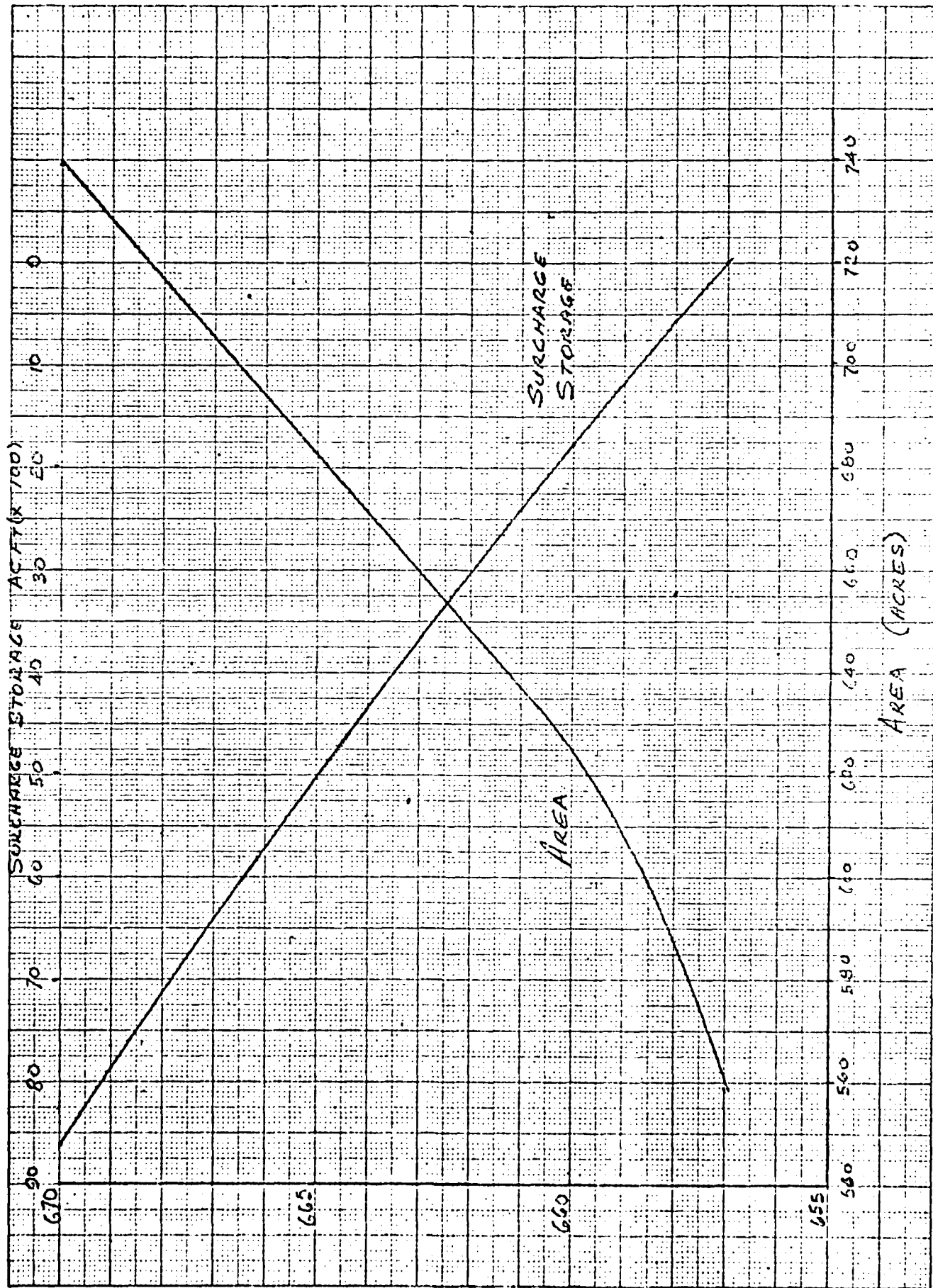
By D.L.C

Ch'k. by

EL	ΔH	AREA	MEAN AREA	ΔVOL	SURCHARGE STORAGE Ac. Ft.	STORAGE CAPACITY
657		559.2			0	1300
658	1	580.8	370.	570	570	1870
660	2	625.3	603.	1206	1780	3080
665	5	682.	653.7	3268.	5040	6340
670	5	738.7	710.4	3552	8600	9900

- Area of Islands removed from surface area of lake for surcharge storage computations -
- no rainfall losses will be computed for the 48+ acres of Islands.

$$\% \text{ impervious} = 35\% \quad \text{i.e.} \quad \frac{\text{Lake Area}}{\text{Drainage area}} = \frac{608}{1728} \times 100$$



 CLOS HYDROGRAPH PACKAGE (HEC-1)
 DAY SAFETY VERSION JULY 1978
 LAST MODIFICATION CT APR 70

RUN DATE= 5/10/78
 TIME= 13.243

LAKE MAHOPAC DAM 1579-17
 PHASE 1 SAFETY INSPECTION
 HEC 1 DB PMF ANALYSIS MAY 1981

JOB SPECIFICATION
 NO NMR NMIN IDAY INR ININ METRC IPLY IPRT NSTAN
 100 0 30 0 0 0 0 0 0 0
 JUPER 5 LROPT TRACE
 0 0 0 0

MULTI-PLAN ANALYSES TO BE PERFORMED
 NPLAN= 1 NRTIO= 4 LRTIO= 1
 RTIOS= 1.00 .75 .50 .25

SUB-AREA RUNOFF COMPUTATION

1 SUB-AREA A RUNOFF

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRY	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

INVDG	IUNG	TAREA	SHAP	TRSDA	TRSPC	RATIO	ISNCW	ISAME	LOCAL
1	1	1.40	0.00	2.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PRS	R6	R12	R24	R48	R72	R96
0.00	22.00	112.00	123.00	133.00	141.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .600

LOSS DATA

LROPT	STARR	DLTKR	RTIOL	ERAIN	STKRS	RTIOX	STRTL	INSTL	ALSMX	RTIPP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.10	0.00	.51

UNIT HYDROGRAPH DATA
 TP= 1.72 CP= .63 NTA= 0

RECESSION DATA

STRTO= -1.00 ORCSU= -.10 RTIOR= 1.50
 APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SYNTER CP AND TP ARE TC= 3.98 AND P= 3.19 INTERVALS

UNIT HYDROGRAPH 19 END-OF-PERIOD ORDINATES, LAG= 1.72 HOURS, CP= .63 VOL= 1.00
 44. 155. 272. 320. 276. 201. 146. 107. 78. 57.
 41. 30. 22. 16. 12. 8. 6. 5. 3.

UNIT HYDROGRAPH DATA

TP= 1.72 CP= .63 NTA= 0

RECESSION DATA

START= -1.00 GRCSN= -10 RTIOR= 1.50

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 3.98 ND R= 3.19 INTERVALS

UNIT HYDROGRAPH TO END-OF-PERIOD ORIGINATES, LAG= 1.72 HOURS, CP= .63 VOL= 1.00
44. 155. 272. 320. 276. 201. 146. 107. 78. 57.
41. 30. 22. 16. 12. 8. 6. 3. 5. 3.

NO. DA		HR. MIN		PERIOD		RAIN		EXCS		LOSS		COMP Q		END-OF-PERIOD FLOW		NO. DA		HR. MIN		PERIOD		RAIN		EXCS		LOSS		COMP Q	
1.01	1.30	1	00	1	00	00	00	00	00	00	00	1.02	1.02	1.30	51	06	03	02	21.										
1.01	1.00	2	00	2	00	00	00	00	00	00	00	1.02	2.00	2.30	52	06	03	02	30.										
1.01	1.30	3	00	3	00	00	00	00	00	00	00	1.02	2.30	3.00	53	06	03	02	39.										
1.01	2.00	4	00	4	00	00	00	00	00	00	00	1.02	3.00	3.30	54	06	03	02	45.										
1.01	2.30	5	00	5	00	00	00	00	00	00	00	1.02	3.30	4.00	55	06	03	02	49.										
1.01	3.00	6	00	6	00	00	00	00	00	00	00	1.02	4.00	4.30	56	06	03	02	53.										
1.01	3.30	7	00	7	00	00	00	00	00	00	00	1.02	4.30	5.00	57	06	03	02	55.										
1.01	4.00	8	00	8	00	00	00	00	00	00	00	1.02	5.00	5.30	58	06	03	02	57.										
1.01	4.30	9	00	9	00	00	00	00	00	00	00	1.02	5.30	6.00	59	06	03	02	58.										
1.01	5.00	10	00	10	00	00	00	00	00	00	00	1.02	6.00	6.30	60	06	03	02	59.										
1.01	5.30	11	00	11	00	00	00	00	00	00	00	1.02	6.30	7.00	61	06	03	02	64.										
1.01	6.00	12	00	12	00	00	00	00	00	00	00	1.02	7.00	7.30	62	06	03	02	81.										
1.01	6.30	13	00	13	00	00	00	00	00	00	00	1.02	7.30	8.00	63	06	03	02	109.										
1.01	7.00	14	00	14	00	00	00	00	00	00	00	1.02	8.00	8.30	64	06	03	02	142.										
1.01	7.30	15	00	15	00	00	00	00	00	00	00	1.02	8.30	9.00	65	06	03	02	171.										
1.01	8.00	16	00	16	00	00	00	00	00	00	00	1.02	9.00	9.30	66	06	03	02	191.										
1.01	8.30	17	00	17	00	00	00	00	00	00	00	1.02	9.30	10.00	67	06	03	02	207.										
1.01	9.00	18	00	18	00	00	00	00	00	00	00	1.02	10.00	10.30	68	06	03	02	217.										
1.01	9.30	19	00	19	00	00	00	00	00	00	00	1.02	10.30	11.00	69	06	03	02	225.										
1.01	10.00	20	00	20	00	00	00	00	00	00	00	1.02	11.00	11.30	70	06	03	02	231.										
1.01	10.30	21	00	21	00	00	00	00	00	00	00	1.02	11.30	12.00	71	06	03	02	236.										
1.01	11.00	22	00	22	00	00	00	00	00	00	00	1.02	12.00	12.30	72	06	03	02	239.										
1.01	11.30	23	00	23	00	00	00	00	00	00	00	1.02	12.30	13.00	73	06	03	02	277.										
1.01	12.00	24	00	24	00	00	00	00	00	00	00	1.02	13.00	13.30	74	06	03	02	277.										
1.01	12.30	25	00	25	00	00	00	00	00	00	00	1.02	13.30	14.00	75	06	03	02	406.										
1.01	13.00	26	00	26	00	00	00	00	00	00	00	1.02	14.00	14.30	76	06	03	02	640.										
1.01	13.30	27	00	27	00	00	00	00	00	00	00	1.02	14.30	15.00	77	06	03	02	935.										
1.01	14.00	28	00	28	00	00	00	00	00	00	00	1.02	15.00	15.30	78	06	03	02	1229.										
1.01	14.30	29	00	29	00	00	00	00	00	00	00	1.02	15.30	16.00	79	06	03	02	1504.										
1.01	15.00	30	00	30	00	00	00	00	00	00	00	1.02	16.00	16.30	80	06	03	02	1773.										
1.01	15.30	31	00	31	00	00	00	00	00	00	00	1.02	16.30	17.00	81	06	03	02	2215.										
1.01	16.00	32	00	32	00	00	00	00	00	00	00	1.02	17.00	17.30	82	06	03	02	2891.										
1.01	16.30	33	00	33	00	00	00	00	00	00	00	1.02	17.30	18.00	83	06	03	02	3511.										
1.01	17.00	34	00	34	00	00	00	00	00	00	00	1.02	18.00	18.30	84	06	03	02	3752.										
1.01	17.30	35	00	35	00	00	00	00	00	00	00	1.02	18.30	19.00	85	06	03	02	3832.										
1.01	18.00	36	00	36	00	00	00	00	00	00	00	1.02	19.00	19.30	86	06	03	02	3078.										
1.01	18.30	37	00	37	00	00	00	00	00	00	00	1.02	19.30	20.00	87	06	03	02	2623.										
1.01	19.00	38	00	38	00	00	00	00	00	00	00	1.02	20.00	20.30	88	06	03	02	2106.										
1.01	19.30	39	00	39	00	00	00	00	00	00	00	1.02	20.30	21.00	89	06	03	02	1608.										
1.01	20.00	40	00	40	00	00	00	00	00	00	00	1.02	21.00	21.30	90	06	03	02	1203.										
1.01	20.30	41	00	41	00	00	00	00	00	00	00	1.02	21.30	22.00	91	06	03	02	907.										
1.01	21.00	42	00	42	00	00	00	00	00	00	00	1.02	22.00	22.30	92	06	03	02	692.										
1.01	21.30	43	00	43	00	00	00	00	00	00	00	1.02	22.30	23.00	93	06	03	02	533.										
1.01	22.00	44	00	44	00	00	00	00	00	00	00	1.02	23.00	23.30	94	06	03	02	417.										
1.01	22.30	45	00	45	00	00	00	00	00	00	00	1.02	23.30	24.00	95	06	03	02	368.										
1.01	23.00	46	00	46	00	00	00	00	00	00	00	1.03	0.00	0.00	96	06	03	02	353.										
1.01	23.30	47	00	47	00	00	00	00	00	00	00	1.03	0.30	1.00	97	06	03	02	339.										
1.02	0.00	48	00	48	00	00	00	00	00	00	00	1.03	1.00	1.30	98	06	03	02	313.										
1.02	0.30	49	00	49	00	00	00	00	00	00	00	1.03	1.30	2.00	99	06	03	02	300.										
1.02	1.00	50	00	50	00	00	00	00	00	00	00	1.03	2.00	2.00	100	06	03	02	288.										

SUM 24.82 23.02 1.80 42156.
(630.) (585.) (46.) (1193.72)

TOTAL VOLUME
42015.

72-HOUR
460.

24-HOUR
845.

6-HOUR
2486.

PEAK
3752.

CFS

1.01	2.30	46	.01	.00	.00	1.02	23.30	95	.09	.06	.02	342.
1.02	2.30	47	.01	.00	.00	1.03	23.30	95	.09	.06	.02	342.
1.03	2.30	48	.01	.00	.00	1.03	1.00	98	.00	0.00	0.00	326.
1.04	2.30	49	.06	.03	.02	1.03	1.30	99	0.00	0.00	0.00	300.
1.05	2.30	50	.06	.03	.02	1.03	2.00	100	0.00	0.00	0.00	292.
SUM 24.82 23.02 1.80 42156.												
(630.)(385.)(46.)(1193.72)												

TOTAL VOLUME
42015.

72-HOUR
420.

24-HOUR
845.

6-HOUR
2486.

PEAK
3752.

CFS

THOUS CU M

INCHES

AC-FT

PM

CPS

1.01	2.30	46	.01	.00	.00	1.02	23.30	95	.09	.06	.02	342.
1.02	2.30	47	.01	.00	.00	1.03	23.30	95	.09	.06	.02	342.
1.03	2.30	48	.01	.00	.00	1.03	1.00	98	.00	0.00	0.00	326.
1.04	2.30	49	.06	.03	.02	1.03	1.30	99	0.00	0.00	0.00	300.
1.05	2.30	50	.06	.03	.02	1.03	2.00	100	0.00	0.00	0.00	292.
SUM 24.82 23.02 1.80 42156.												
(630.)(385.)(46.)(1193.72)												

TOTAL VOLUME
42015.

72-HOUR
420.

24-HOUR
845.

6-HOUR
2486.

PEAK
3752.

CFS

THOUS CU M

INCHES

AC-FT

PM

CPS

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.	51.	52.	53.	54.	55.	56.	57.	58.	59.	60.	61.	62.	63.	64.	65.	66.	67.	68.	69.	70.	71.	72.	73.	74.	75.	76.	77.	78.	79.	80.	81.	82.	83.	84.	85.	86.	87.	88.	89.	90.	91.	92.	93.	94.	95.	96.	97.	98.	99.	100.	101.	102.	103.	104.	105.	106.	107.	108.	109.	110.	111.	112.	113.	114.	115.	116.	117.	118.	119.	120.	121.	122.	123.	124.	125.	126.	127.	128.	129.	130.	131.	132.	133.	134.	135.	136.	137.	138.	139.	140.	141.	142.	143.	144.	145.	146.	147.	148.	149.	150.	151.	152.	153.	154.	155.	156.	157.	158.	159.	160.	161.	162.	163.	164.	165.	166.	167.	168.	169.	170.	171.	172.	173.	174.	175.	176.	177.	178.	179.	180.	181.	182.	183.	184.	185.	186.	187.	188.	189.	190.	191.	192.	193.	194.	195.	196.	197.	198.	199.	200.	201.	202.	203.	204.	205.	206.	207.	208.	209.	210.	211.	212.	213.	214.	215.	216.	217.	218.	219.	220.	221.	222.	223.	224.	225.	226.	227.	228.	229.	230.	231.	232.	233.	234.	235.	236.	237.	238.	239.	240.	241.	242.	243.	244.	245.	246.	247.	248.	249.	250.	251.	252.	253.	254.	255.	256.	257.	258.	259.	260.	261.	262.	263.	264.	265.	266.	267.	268.	269.	270.	271.	272.	273.	274.	275.	276.	277.	278.	279.	280.	281.	282.	283.	284.	285.	286.	287.	288.	289.	290.	291.	292.	293.	294.	295.	296.	297.	298.	299.	300.	301.	302.	303.	304.	305.	306.	307.	308.	309.	310.	311.	312.	313.	314.	315.	316.	317.	318.	319.	320.	321.	322.	323.	324.	325.	326.	327.	328.	329.	330.	331.	332.	333.	334.	335.	336.	337.	338.	339.	340.	341.	342.	343.	344.	345.	346.	347.	348.	349.	350.	351.	352.	353.	354.	355.	356.	357.	358.	359.	360.	361.	362.	363.	364.	365.	366.	367.	368.	369.	370.	371.	372.	373.	374.	375.	376.	377.	378.	379.	380.	381.	382.	383.	384.	385.	386.	387.	388.	389.	390.	391.	392.	393.	394.	395.	396.	397.	398.	399.	400.	401.	402.	403.	404.	405.	406.	407.	408.	409.	410.	411.	412.	413.	414.	415.	416.	417.	418.	419.	420.	421.	422.	423.	424.	425.	426.	427.	428.	429.	430.	431.	432.	433.	434.	435.	436.	437.	438.	439.	440.	441.	442.	443.	444.	445.	446.	447.	448.	449.	450.	451.	452.	453.	454.	455.	456.	457.	458.	459.	460.	461.	462.	463.	464.	465.	466.	467.	468.	469.	470.	471.	472.	473.	474.	475.	476.	477.	478.	479.	480.	481.	482.	483.	484.	485.	486.	487.	488.	489.	490.	491.	492.	493.	494.	495.	496.	497.	498.	499.	500.	501.	502.	503.	504.	505.	506.	507.	508.	509.	510.	511.	512.	513.	514.	515.	516.	517.	518.	519.	520.	521.	522.	523.	524.	525.	526.	527.	528.	529.	530.	531.	532.	533.	534.	535.	536.	537.	538.	539.	540.	541.	542.	543.	544.	545.	546.	547.	548.	549.	550.	551.	552.	553.	554.	555.	556.	557.	558.	559.	560.	561.	562.	563.	564.	565.	566.	567.	568.	569.	570.	571.	572.	573.	574.	575.	576.	577.	578.	579.	580.	581.	582.	583.	584.	585.	586.	587.	588.	589.	590.	591.	592.	593.	594.	595.	596.	597.	598.	599.	600.	601.	602.	603.	604.	605.	606.	607.	608.	609.	610.	611.	612.	613.	614.	615.	616.	617.	618.	619.	620.	621.	622.	623.	624.	625.	626.	627.	628.	629.	630.	631.	632.	633.	634.	635.	636.	637.	638.	639.	640.	641.	642.	643.	644.	645.	646.	647.	648.	649.	650.	651.	652.	653.	654.	655.	656.	657.	658.	659.	660.	661.	662.	663.	664.	665.	666.	667.	668.	669.	670.	671.	672.	673.	674.	675.	676.	677.	678.	679.	680.	681.	682.	683.	684.	685.	686.	687.	688.	689.	690.	691.	692.	693.	694.	695.	696.	697.	698.	699.	700.	701.	702.	703.	704.	705.	706.	707.	708.	709.	710.	711.	712.	713.	714.	715.	716.	717.	718.	719.	720.	721.	722.	723.	724.	725.	726.	727.	728.	729.	730.	731.	732.	733.	734.	735.	736.	737.	738.	739.	740.	741.	742.	743.	744.	745.	746.	747.	748.	749.	750.	751.	752.	753.	754.	755.	756.	757.	758.	759.	760.	761.	762.	763.	764.	765.	766.	767.	768.	769.	770.	771.	772.	773.	774.	775.	776.	777.	778.	779.	780.	781.	782.	783.	784.	785.	786.	787.	788.	789.	790.	791.	792.	793.	794.	795.	796.	797.	798.	799.	800.	801.	802.	803.	804.	805.	806.	807.	808.	809.	810.	811.	812.	813.	814.	815.	816.	817.	818.	819.	820.	821.	822.	823.	824.	825.	826.	827.	828.	829.	830.	831.	832.	833.	834.	835.	836.	837.	838.	839.	840.	841.	842.	843.	844.	845.	846.	847.	848.	849.	850.	851.	852.	853.	854.	855.	856.	857.	858.	859.	860.	861.	862.	863.	864.	865.	866.	867.	868.	869.	870.	871.	872.	873.	874.	875.	876.	877.	878.	879.	880.	881.	882.	883.	884.	885.	886.	887.	888.	889.	890.	891.	892.	893.	894.	895.	896.	897.	898.	899.	900.	901.	902.	903.	904.	905.	906.	907.	908.	909.	910.	911.	912.	913.	914.	915.	916.	917.	918.	919.	920.	921.	922.	923.	924.	925.	926.	927.	928.	929.	930.	931.	932.	933.	934.	935.	936.	937.	938.	939.	940.	941.	942.	943.	944.	945.	946.	947.	948.	949.	950.	951.	952.	953.	954.	955.	956.	957.	958.	959.	960.	961.	962.	963.	964.	965.	966.	967.	968.	969.	970.	971.	972.	973.	974.	975.	976.	977.	978.	979.	980.	981.	982.	983.	984.	985.	986.	987.	988.	989.	990.	991.	992.	993.	994.	995.	996.	997.	998.	999.	1000.	1001.	1002.	1003.	1004.	1005.	1006.	1007.	1008.	1009.	1010.	1011.	1012.	1013.	1014.	1015.	1016.	1017.	1018.	1019.	1020.	1021.	1022.	1023.	1024.	1025.	1026.	1027.	1028.	1029.	1030.	1031.	1032.	1033.	1034.	1035.	1036.	1037.	1038.	1039.	1040.	1041.	1042.	1043.	1044.	1045.	1046.	1047.	1048.	1049.	1050.	1051.	1052.	1053.	1054.	1055.	1056.	1057.	1058.	1059.	1060.	1061.	1062.	1063.	1064.	1065.	1066.	1067.	1068.	1069.	1070.	1071.	1072.	1073.	1074.	1075.	1076.	1077.	1078.	1079.	1080.	1081.	1082.	1083.	1084.	1085.	1086.	1087.	1088.	1089.	1090.	1091.	1092.	1093.	1094.	1095.	1096.	1097.	1098.	1099.	1100.	1101.	1102.	1103.	1104.	1105.	1106.	1107.	1108.	1109.	1110.	1111.	1112.	1113.	1114.	1115.	1116.	1117.	1118.	1119.	1120.	1121.	1122.	1123.	1124.	1125.	1126.	1127.	1128.	1129.	1130.	1131.	1132.	1133.	1134.	1135.	1136.	1137.	1138.	1139.	1140.	1141.	1142.	1143.	1144.	1145.	1146.	1147.	1148.	1149.	1150.	1151.	1152.	1153.	1154.	1155.	1156.	1157.	1158.	1159.	1160.	1161.	1162.	1163.	1164.	1165.	1166.	1167.	1168.	1169.	1170.	1171.	1172.	1173.	1174.	1175.	1176.	1177.	1178.	1179.	1180.	1181.	1182.	1183.	1184.	1185.	1186.	1187.	1188.	1189.	1190.	1191.	1192.	1193.	1194.	1195.	1196.	1197.	1198.	1199.	1200.	1201.	1202.	1203.	1204.	1205.	1206.	1207.	1208.	1209.	1210.	1211.	1212.	1213.	1214.	1215.	1216.	1217.	1218.	1219.	1220.	1221.	1222.	1223.	1224.	1225.	1226.	1227.	1228.	1229.	1230.	1231.	1232.	1233.	1234.	1235.	1236.	1237.	1238.	1239.	1240.	1241.	1242.	1243.	1244.	1245.	1246.	1247.	1248.	1249.	1250.	1251.	1252.	1253.	1254.	1255.	1256.	1257.	1258.	1259.	1260.	1261.	1262.	1263.	1264.	1265.	1266.	1267.	1268.	1269.	1270.	1271.	1272.	1273.	1274.	1275.	1276.	1277.	1278.	1279.	1280.	1281.	1282.	1283.	1284.	1285.	1286.	1287.	1288.	1289.	1290.	1291.	1292.	1293.	1294.	1295.	1296.	1297.	1298.	1299.	1300.	1301.	1302.	1303.	1304.	1305.	1306.	1307.	1308.	1309.	1310.	1311.	1312.	1313.	1314.	1315.	1316.	1317.	1318.	1319.	1320.	1321.	1322.	1323.	1324.	1325.	1326.	1327.	1328.	1329.	1330.	1331.	1332.	1333.	1334.	1335.	1336.	1337.	1338.	1339.	1340.	1341.	1342.	1343.	1344.	1345.	1346.	1347.	1348.	1349.	1350.	1351.	1352.	1353.	1354.	1355.	1356.	1357.	1358.	1359.	1360.	1361.	1362.	1363.	1364.	1365.	1366.	1367.	1368.	1369.	1370.	1371.	1372.	1373.	1374.	1375.	1376.	1377.	1378.	1379.	1380.	1381.	1382.	1383.	1384.	1385.	1386.	1387.	1388.	1389.	1390.	1391.	1392.	1393.	1394.	1395.	1396.	1397.	1398.	1399.	1400.	1401.	1402.	1403.	1404.	1405.	1406.	1407.	1408.	1409.	1410.	1411.	1412.	1413.	1414.	1415.	1416.	1417.	1418.	1419.	1420.	1421.	1422.	1423.	1424.	1425.	1426.	1427.	1428.	1429.	1430.	1431.	1432.	1433.	1434.	1435.	1436.	1437.	1438.	1439.	1440.	1441.	1442.	1443.	1444.	1445.	1446.	1447.	1448.	1449.	1450.	1451.	1452.	1453.	1454.	1455.	1456.	1457.	1458.	1459.	1460.	1461.	1462.	1463.	1464.	1465.	1466.	1467.	1468.	1469.	1470.	1471.	1472.	1473.	1474.	1475.	1476.	1477.	1478.	1479.	1480.	1481.	1482.	1483.	1484.	1485.	1486.	1487.	1488.	1489.	1490.	1491.	1492.	1493.	1494.	1495.	1496.	1497.	1498.	149
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113. 276. 765. 754. 1280. 902. 490.
 244. 22. 2.
 1206. 234.
 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME
 2814. 1864. 633. 315. 31512.
 53. 18. 9. 892.
 INCHES 12.39 16.84 17.45 17.45
 314.65 427.62 443.19 443.19
 924. 1256. 1302. 1302.
 1140. 1550. 1606. 1606.
 AC-FT
 THOUS CU M

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3									
1.	1.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	3.	3.	4.	4.	4.	4.	4.	4.
3.	5.	5.	7.	7.	15.	15.	20.	20.	24.
35.	47.	59.	65.	63.	57.	49.	39.	39.	30.
17.	13.	10.	8.	7.	6.	6.	6.	7.	7.
15.	19.	22.	25.	26.	28.	29.	29.	30.	30.
32.	40.	55.	71.	85.	96.	109.	113.	113.	116.

55. 42. 110. 141. 155. 164. 169. 172. 175. 176.
 175. 187. 217. 244. 255. 264. 274. 280. 292. 311.
 266. 321. 211. 266. 254. 244. 234. 225. 216. 207.
 292. 275. 266. 254. 244. 234. 225. 216. 207.

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME
 CFS 3215 1865 616 308 30280
 CFS 91 53 17 9 272
 INCHES 13.34 17.64 19.35 19.35
 336.96 448.12 466.19 466.19
 AC-FT 925 1223 1272 1272
 THOUS CU M 1141 1508 1569 1569

HYDROGRAPH AT STA 2 FOR PLAN 1, RTIO 3

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.	51.	52.	53.	54.	55.	56.	57.	58.	59.	60.	61.	62.	63.	64.	65.	66.	67.	68.	69.	70.	71.	72.	73.	74.	75.	76.	77.	78.	79.	80.	81.	82.	83.	84.	85.	86.	87.	88.	89.	90.	91.	92.	93.	94.	95.	96.	97.	98.	99.	100.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.	51.	52.	53.	54.	55.	56.	57.	58.	59.	60.	61.	62.	63.	64.	65.	66.	67.	68.	69.	70.	71.	72.	73.	74.	75.	76.	77.	78.	79.	80.	81.	82.	83.	84.	85.	86.	87.	88.	89.	90.	91.	92.	93.	94.	95.	96.	97.	98.	99.	100.

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME
 CFS 2423 1243 411 205 20220
 CFS 61 33 12 6 581
 INCHES 8.90 11.76 12.24 12.24
 225.97 298.75 310.79 310.79
 AC-FT 617 815 848 848
 THOUS CU M 760 1005 1046 1046

HYDROGRAPH AT STA 2 FOR PLAN 1, RTIO 4

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.	51.	52.	53.	54.	55.	56.	57.	58.	59.	60.	61.	62.	63.	64.	65.	66.	67.	68.	69.	70.	71.	72.	73.	74.	75.	76.	77.	78.	79.	80.	81.	82.	83.	84.	85.	86.	87.	88.	89.	90.	91.	92.	93.	94.	95.	96.	97.	98.	99.	100.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.	51.	52.	53.	54.	55.	56.	57.	58.	59.	60.	61.	62.	63.	64.	65.	66.	67.	68.	69.	70.	71.	72.	73.	74.	75.	76.	77.	78.	79.	80.	81.	82.	83.	84.	85.	86.	87.	88.	89.	90.	91.	92.	93.	94.	95.	96.	97.	98.	99.	100.

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME
 CFS 1072 622 205 103 13260
 CFS 30 18 6 3 291
 INCHES 4.45 5.88 6.12 6.12
 112.99 149.37 155.40 155.40
 AC-FT 308 408 424 424
 THOUS CU M 380 503 523 523

COMBINE HYDROGRAPHS

3 COMBINE TWO HYDROGRAPHS

ISTAG ICOMP IECON ITAPE JPLT JPRT INAME ISTATE IAUO
 3 2 0 0 0 0 1 0 0

SUM OF 2 HYDROGRAPHS AT 7. 3 PLAN 1 RTIO 1 P. A. 8.

ISTAG	ICOMP	I ECON	ITYPE	JPLY	JPRY	INAME	ISTAGE	IAUTO
3	2	0	0	0	0	1	0	0

	3 PLAN 1	RTIO 1
SUM OF 2 HYDROGRAPHS AT	7.	8.
3.	5.	8.
4.	6.	8.

Year	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352
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	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CS	7791	492	1665	83	8355	8355
INCHS	221	139	4	83	2352	2352
INCHS		16.97	22.17	23.85	23.85	23.85
AC-T		430.62	563.62	605.68	605.68	605.68
INCHS		2442	3303	3433	3432	3432
INCHS		3012	4071	4233	4233	4233

SUM OF 2 HYDROGRAPHS AT ... 3 PLAN 1 RTIO 2

Year	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																					

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CSS	5848.	3693.	12530.	6233.	62801.
CSS	160.	103.	351.	11.	1704.
INCHES		12.72	17.82	17.88	17.88
AC-F	323.19	323.19	437.49	454.26	454.26
PM	1831.	1831.	2476.	2574.	2574.
INCHES CU M	2259.	3058.	3175.	3175.	3175.

SUM OF 2 HYDROGRAPHS AT 3 PLAN 1 RTIO 3

[illegible]

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|--------|--------|---------|---------|-------|--------|
| 3899. | 2462. | 833. | 415. | | 41527. |
| 110. | 70. | 24. | 12. | | 1176. |
| | 8.48 | 11.48 | 11.92 | | 11.92 |
| INCHES | | | | | |

| | | | | |
|------------|--------|--------|--------|--------|
| IN | 215.46 | 291.66 | 302.84 | 302.84 |
| AC-FT | 1221. | 1633. | 1716. | 1716. |
| THOUS CU M | 1306. | 2039. | 2117. | 2117. |

| SUM OF 2 HYDROGRAPHS AT | | | | | | | | | |
|-------------------------|----|----|----|----|----|----|----|----|-----|
| 3 PLAN 1 RTIO 4 | | | | | | | | | |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |

| | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|------------|-------|--------|---------|---------|--------|--------|
| CTS | 1940. | 1231. | 417. | 208. | 588. | 2078. |
| EMS | 55. | 35. | 12. | 6. | 58. | 58. |
| INCHES | | 4.24 | 5.72 | 5.64 | 5.64 | |
| W | | 107.73 | 145.83 | 151.42 | 151.42 | |
| AC-FT | | 826. | 826. | 826. | 826. | |
| THOUS CU W | | 753. | 1019. | 1058. | 1058. | |

 HYDROGRAPH ROUTING

| 4 ROUTE HYDROGRAPH THROUGH LAKE MAWCPAC | | | | | | | | | |
|---|--------|--------|--------|--------|-------|-------|--------|-------|--|
| ISTAQ | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME | ISTAGE | IAUTO | |
| 4 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | |
| ROUTING DATA | | | | | | | | | |
| GLOSS | CLOSS | AVG | IRBS | ISAME | IOPT | IPMP | LSTR | | |
| 0.0 | 0.00 | 0.00 | 1 | 1 | 0 | 0 | 0 | | |
| ASTPS | NTSL | LAG | APSKK | X | TSK | STORA | ISTRAT | | |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 1300. | -1 | | |
| STAGE | 657.00 | 660.00 | 665.00 | 670.00 | | | | | |
| FLW | 0.00 | 108.80 | 470.60 | 974.00 | | | | | |
| CAPACITY | 1303. | 1870. | 3080. | 9900. | | | | | |
| ELEVATION | 657. | 665. | 670. | | | | | | |

| CEL | SPWID | CONW | EXPW | ELEV | COOL | CAREA | EXPL |
|----------|-------|------|-------|------|------|-------|------|
| 657.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| DAM DATA | | | | | | | |
| TOPEL | COOP | EXPD | DAWID | | | | |
| 640.0 | 3.1 | 1.5 | 193. | | | | |

0000NNNN0
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0000NNNN0
OUTFLOW
0000NNNN0
0000NNNN0
0000NNNN0
0000NNNN0
0000NNNN0

| | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 26. | 38. | 50. | 60. | 69. | 76. | 82. | 85. | 88. | 90. |
| 27. | 39. | 51. | 61. | 70. | 77. | 83. | 86. | 89. | 91. |
| 28. | 40. | 52. | 62. | 71. | 78. | 84. | 87. | 90. | 92. |
| 29. | 41. | 53. | 63. | 72. | 79. | 85. | 88. | 91. | 93. |
| 30. | 42. | 54. | 64. | 73. | 80. | 86. | 89. | 92. | 94. |
| 31. | 43. | 55. | 65. | 74. | 81. | 87. | 90. | 93. | 95. |
| 32. | 44. | 56. | 66. | 75. | 82. | 88. | 91. | 94. | 96. |
| 33. | 45. | 57. | 67. | 76. | 83. | 89. | 92. | 95. | 97. |
| 34. | 46. | 58. | 68. | 77. | 84. | 90. | 93. | 96. | 98. |
| 35. | 47. | 59. | 69. | 78. | 85. | 91. | 94. | 97. | 99. |
| 36. | 48. | 60. | 70. | 79. | 86. | 92. | 95. | 98. | 100. |

| STORAGE | | | |
|---------|---------|-------|-------|
| 1300. | 1300. | 1300. | 1301. |
| 1301. | 1302. | 1302. | 1301. |
| 1302. | 1302. | 1302. | 1304. |
| 1303. | 1306. | 1306. | 1305. |
| 1304. | 1306. | 1306. | 1305. |
| 1305. | 1307. | 1307. | 1305. |
| 1306. | 1307. | 1307. | 1305. |
| 1307. | 1307. | 1307. | 1305. |
| 1308. | 1307. | 1307. | 1305. |
| 1309. | 1307. | 1307. | 1305. |
| 1310. | 1307. | 1307. | 1305. |
| 1311. | 1307. | 1307. | 1305. |
| 1312. | 1307. | 1307. | 1305. |
| 1313. | 1307. | 1307. | 1305. |
| 1314. | 1307. | 1307. | 1305. |
| 1315. | 1307. | 1307. | 1305. |
| 1316. | 1307. | 1307. | 1305. |
| 1317. | 1307. | 1307. | 1305. |
| 1318. | 1307. | 1307. | 1305. |
| 1319. | 1307. | 1307. | 1305. |
| 1320. | 1307. | 1307. | 1305. |
| 1321. | 1307. | 1307. | 1305. |
| 1322. | 1307. | 1307. | 1305. |
| 1323. | 1307. | 1307. | 1305. |
| 1324. | 1307. | 1307. | 1305. |
| 1325. | 1307. | 1307. | 1305. |
| 1326. | 1307. | 1307. | 1305. |
| 1327. | 1307. | 1307. | 1305. |
| 1328. | 1307. | 1307. | 1305. |
| 1329. | 1307. | 1307. | 1305. |
| 1330. | 1307. | 1307. | 1305. |
| 1331. | 1307. | 1307. | 1305. |
| 1332. | 1307. | 1307. | 1305. |
| 1333. | 1307. | 1307. | 1305. |
| 1334. | 1307. | 1307. | 1305. |
| 1335. | 1307. | 1307. | 1305. |
| 1336. | 1307. | 1307. | 1305. |
| 1337. | 1307. | 1307. | 1305. |
| 1338. | 1307. | 1307. | 1305. |
| 1339. | 1307. | 1307. | 1305. |
| 1340. | 1307. | 1307. | 1305. |
| 1341. | 1307. | 1307. | 1305. |
| 1342. | 1307. | 1307. | 1305. |
| 1343. | 1307. | 1307. | 1305. |
| 1344. | 1307. | 1307. | 1305. |
| 1345. | 1307. | 1307. | 1305. |
| 1346. | 1307. | 1307. | 1305. |
| 1347. | 1307. | 1307. | 1305. |
| 1348. | 1307. | 1307. | 1305. |
| 1349. | 1307. | 1307. | 1305. |
| 1350. | 1307. | 1307. | 1305. |
| 1351. | 1307. | 1307. | 1305. |
| 1352. | 1307. | 1307. | 1305. |
| 1353. | 1307. | 1307. | 1305. |
| 1354. | 1307. | 1307. | 1305. |
| 1355. | 1307. | 1307. | 1305. |
| 1356. | 1307. | 1307. | 1305. |
| 1357. | 1307. | 1307. | 1305. |
| 1358. | 1307. | 1307. | 1305. |
| 1359. | 1307. | 1307. | 1305. |
| 1360. | 1307. | 1307. | 1305. |
| 1361. | 1307. | 1307. | 1305. |
| 1362. | 1307. | 1307. | 1305. |
| 1363. | 1307. | 1307. | 1305. |
| 1364. | 1307. | 1307. | 1305. |
| 1365. | 1307. | 1307. | 1305. |
| 1366. | 1307. | 1307. | 1305. |
| 1367. | 1307. | 1307. | 1305. |
| 1368. | 1307. | 1307. | 1305. |
| 1369. | 1307. | 1307. | 1305. |
| 1370. | 1307. | 1307. | 1305. |
| 1371. | 1307. | 1307. | 1305. |
| 1372. | 1307. | 1307. | 1305. |
| 1373. | 1307. | 1307. | 1305. |
| 1374. | 1307. | 1307. | 1305. |
| 1375. | 1307. | 1307. | 1305. |
| 1376. | 1307. | 1307. | 1305. |
| 1377. | 1307. | 1307. | 1305. |
| 1378. | 1307. | 1307. | 1305. |
| 1379. | 1307. | 1307. | 1305. |
| 1380. | 1307. | 1307. | 1305. |
| 1381. | 1307. | 1307. | 1305. |
| 1382. | 1307. | 1307. | 1305. |
| 1383. | 1307. | 1307. | 1305. |
| 1384. | 1307. | 1307. | 1305. |
| 1385. | 1307. | 1307. | 1305. |
| 1386. | 1307.</ | | |

[illegible]

WEEK SUPPLY IS - 99. AT TIME 10.00 HOURS

| | PEAK
°C | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------------|------------|--------|---------|---------|--------------|
| CBS | | | | | |
| CM5 | 3. | 94 | 36. | 18. | 1780. |
| INCHES | | | | | |
| PM | | 52 | 50 | 51 | 50. |
| AC FT | | 8.23 | 12.68 | 12.98 | 12.98 |
| TROUS CU N | | 47. | 72. | 74. | 74. |
| | | 56. | 89. | 91. | 91. |

STATION 4. PLAN 1. RAYIO 4

[illegible]

94:15:3 94:15:3 94:15:3

| | | | | | |
|-------|-------|-------|-------|-------|--------|
| 'V(2) | QV(3) | ELAVT | ELMAX | RLWTH | SFL |
| .C15J | .0350 | 614.0 | 660.0 | 1000. | .03F00 |

250255Z SECTION COMBINES--STA, ELEV, STA, ELEV--ETC

| | C.00 | 66C.00 | 250.00 | 640.00 | 317.00 | 620.00 | 318.00 | 614.00 | 323.00 | 614.00 | |
|-------|----------|--------|--------|----------|---------|----------|----------|-----------|-----------|-----------|-----------|
| STAGE | 16.26 | 20.39 | 29.00 | 61 | 1.01 | 43.55 | 1.82 | 4.79 | 3.08 | 6.97 | 12.67 |
| | | | | | | | 64.04 | 120.63 | 90.44 | 153.32 | 226.15 |
| STAGE | 27160.14 | 289.85 | 757.77 | 43006.00 | 1390.03 | 61903.31 | 2401.68 | 6395.30 | 4003.80 | 9752.42 | 20001.96 |
| | | | | | | | 91031.12 | 190915.93 | 134250.26 | 274237.33 | 473362.98 |
| STAGE | 614.00 | 616.42 | 618.84 | 643.05 | 621.26 | 645.47 | 673.68 | 628.53 | 626.11 | 630.95 | 635.79 |
| | 635.21 | 640.63 | 643.05 | | | | 647.89 | 652.74 | 650.32 | 655.16 | 660.00 |
| FLC | 27160.14 | 289.85 | 757.77 | 43006.00 | 1390.03 | 61903.31 | 2401.68 | 6395.30 | 4003.80 | 9752.42 | 20001.96 |
| | | | | | | | 91031.12 | 190915.93 | 134250.26 | 274237.33 | 473362.98 |

3. PLAN 1, RT20 1

STATION

OUTFLOW

[illegible]

STOR

[illegible][illegible]

| PERM | 3-4-HOUR | 7-8-HOUR | TOTAL VOLUME |
|------|----------|----------|--------------|
| 1371 | 126 | 492 | 19837 |

| | | | |
|-----|-----|-----|----|
| 39. | 36. | 12. | 6. |
| 39. | 36. | 12. | 6. |

| | | | |
|------|------|------|------|
| 4.35 | 5.67 | 5.70 | 5.70 |
|------|------|------|------|

| DATE | DESCRIPTION | AMOUNT | BALANCE |
|----------|-------------|--------|---------|
| 11-10-38 | 146.00 | 146.00 | 146.00 |
| 11-10-38 | 146.00 | 146.00 | 146.00 |

5

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

[illegible]

SUMMARY OF DAM SAFETY ANALYSIS

| | | | |
|-----------|---------------|----------------|------------|
| PLAN 1 | INITIAL VALUE | SPILLWAY CREST | TOP OF DAM |
| ELEVATION | 657.00 | 657.00 | 660.00 |
| STORAGE | 1300. | 1300. | 3080. |
| OUTFLOW | 0. | 0. | 100. |

| RATIO OF PPF | MAXIMUM RESERVOIR W.S. ELEV | MAXIMUM DEPTH OVER DAM | MAXIMUM STORAGE AC-FT | MAXIMUM OUTFLOW CFS | DURATION OVER TOP HOURS | TIME OF MAX OUTFLOW HOURS | TIME OF FAILURE HOURS |
|--------------|-----------------------------|------------------------|-----------------------|---------------------|-------------------------|---------------------------|-----------------------|
| 1.00 | 661.57 | 1.57 | 4101. | 1372. | 9.00 | 45.00 | 0.00 |
| .75 | 660.74 | 1.74 | 3865. | 560. | 8.00 | 47.00 | 0.00 |
| .50 | 659.77 | 0.00 | 2942. | 99. | 0.00 | 50.00 | 0.00 |
| .25 | 658.43 | 0.00 | 2129. | 40. | 0.00 | 50.00 | 0.00 |

| PLAN 1 | | STATION 5 | |
|--------|------------------|------------------|------------|
| RATIO | MAXIMUM FLOW-CFS | MAXIMUM STAGE-FT | TIME HOURS |
| 1.00 | 1371. | 621.2 | 45.00 |
| .75 | 540. | 617.7 | 47.50 |
| .50 | 99. | 616.8 | 50.00 |
| .25 | 40. | 616.3 | 50.00 |

REFERENCES

APPENDIX E

REFERENCES

1. "Flood Hydrograph Package (HEC-1) Users Manual for Dam Safety Investigations", U. S. Army Corps of Engineers, Hydrologic Engineering Center, September 1979.
2. "Seasonal Variation of the Probable Maximum Precipitation, East of the 105th Meridian for Areas from 10 to 1,000 Square Miles, and Durations of 6, 12, 24 and 48 Hours", Hydrometeorological Report No. 33. Weather Bureau, U.S. Department of Commerce, April 1956.
3. "Recommended Guidelines for Safety Inspection of Dams", Department of the Army, Office of the Chief of Engineers, Appendix B.
4. The University of the State of New York, The State Education Department State Museum and Science Service Geological Survey - MAP and Chart Series No. 5, Geologic MAP of New York 1961, Lower Hudson Sheet.

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DATE
ILME