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NATIONAL DAM SAFETY PROGRAM. WALES LAKE DAM NO NAME 784 (MO 109--ETC(U)
AUG 79 P R ZAMAN, H L CALLAHAN, B A AINSWORTH DACW43-78-C-0148

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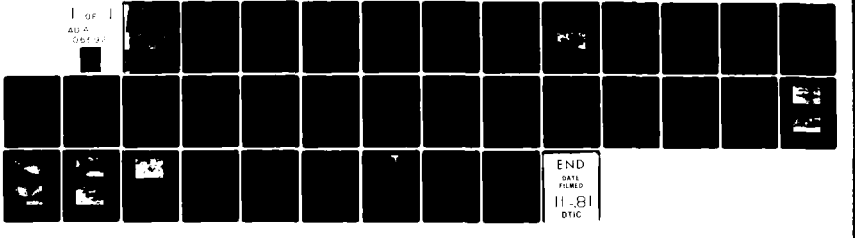

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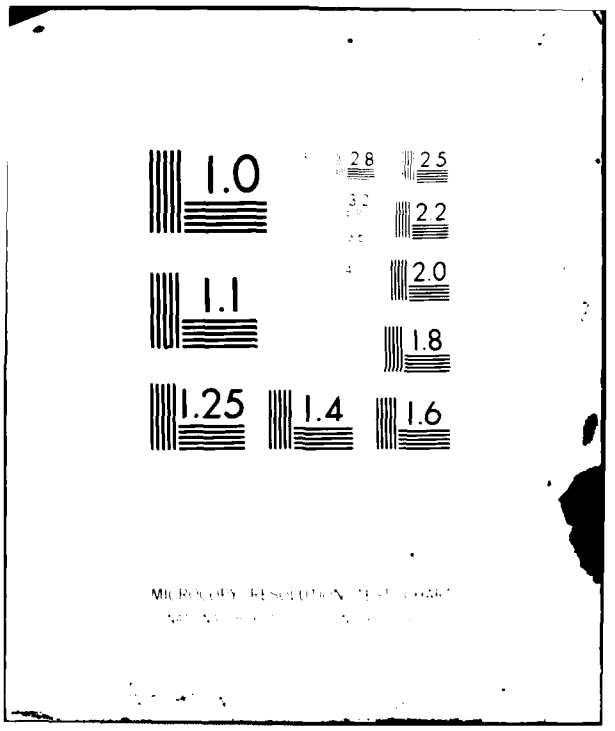
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MISSOURI-KANSAS CITY BASIN

LEVEL

NONAME 784
PLATTE COUNTY,MISSOURI
MO 10928

PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM

PREPARED BY: U.S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

AUGUST 1978

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
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4. TITLE (and Subtitle) Phase I Dam Inspection Report National Dam Safety Program Wales Lake Dam - No Name 784 (MO 10928) Platte County, Missouri	5. TYPE OF REPORT & PERIOD COVERED Final Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Black & Veatch, Consulting Engineers	8. CONTRACT OR GRANT NUMBER(s) DACW43-78-C-0148
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101	12. REPORT DATE August 1979 13. NUMBER OF PAGES Approximately 30
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P. R. /Zaman Harry L. /Callahan
Bruce A. /Ainsworth

National Dam Safety Program. Noname 784 (MO 10928), Missouri - Kansas City Basin, Platte County, Missouri. Phase I Inspection Report.

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

Dam Safety, Lake, Dam Inspection, Private Dams

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

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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MISSOURI-KANSAS CITY BASIN

NONAME 784
PLATTE COUNTY,MISSOURI
MO 10928

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY: U.S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

AUGUST 1978

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

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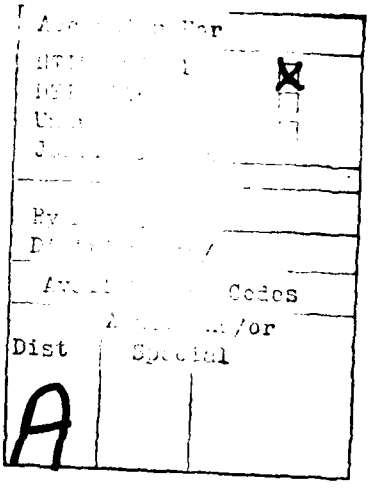


SUBJECT: No Name 784 Dam Phase I Inspection Report

This report presents the results of field inspection and evaluation of the No Name 784 dam.

It was prepared under the National Program of Inspection of Non-Federal Dams

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

1) Spillway will not pass 50 percent of the Probable Maximum Flood
2) Overtopping could result in dam failure.
3) Dam failure significantly increases the hazard to loss of life downstream

SUBMITTED BY: SIGNED — 31 JAN 1979

Chief, Engineering Division — Date

APPROVED BY : SIGNED — 1 FEB 1979

Colonel, CE, District Engineer — Date

NO NAME 784

PLATTE COUNTY, MISSOURI

MISSOURI INVENTORY NO. 10928

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

PREPARED BY:

BLACK & VEATCH
CONSULTING ENGINEERS
KANSAS CITY, MISSOURI

UNDER DIRECTION OF

ST. LOUIS DISTRICT CORPS OF ENGINEERS

FOR

GOVERNOR OF MISSOURI

AUGUST 1978

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam	No Name 784 Dam
State Located	Missouri
County Located	Platte County
Stream	Tributary to Line Creek
Date of Inspection	31 August 1978

No Name 784 Dam was inspected by a team of engineers from Black & Veatch, Consulting Engineers for the St. Louis District, Corps of Engineers. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

The guidelines used in the assessment were furnished by the Department of the Army, Office of the Chief of Engineers and developed with the help of several Federal and State agencies, professional engineering organizations, and private engineers. Based on these guidelines, this dam is classified as a small size dam with a high downstream hazard potential. According to the St. Louis District, Corps of Engineers, failure would threaten the life and property of families in two homes and two apartment buildings downstream of the dam and would potentially cause appreciable damage to an interstate highway bridge within the first mile of the estimated damage zone which extends 3 miles downstream of the dam.

Our inspection and evaluation indicates the spillway does not meet the criteria set forth in the guidelines for a dam having the above size and hazard potential. The spillway will not pass either the probable maximum flood or 50 percent of the probable maximum flood without overtopping but will pass 10 percent of the probable maximum flood, which is less than the estimated 100-year discharge. Considering the small volume of water impounded, the large flood plain downstream, and the two homes and two apartment buildings downstream, the spillway should be designed to pass 50 percent of the probable maximum flood.

Deficiencies visually observed by the inspection team were erosion, seepage, cracking and undercutting of the concrete discharge and approach channels, and the presence of excessive brush and trees on the upstream and downstream embankment slopes.

There were no observed deficiencies or conditions existing at the time of the inspection which indicated an immediate safety hazard. Future corrective action and regular maintenance will be required to correct or control the described deficiencies. In addition, an engineer experienced in the design of earthen dams should be retained by the owner to make detailed seepage and stability analyses of the existing dam. A detailed report discussing each of these deficiencies is attached.

P. R. Zaman, PE
Illinois 62-29261

Harry L. Callahan, Partner
Black & Veatch

Bruce A. Ainsworth, PE
Missouri E-18023

OVERVIEW OF LAKE AND DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NO NAME 784 DAM

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

LIST OF PLATES

LIST OF PHOTOGRAPHS

APPENDIX

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the District Engineer of the St. Louis District Corps of Engineers, directed that a safety inspection of the No Name 784 Dam be made.

b. Purpose of Inspection. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

c. Evaluation Criteria. Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams". These guidelines were developed with the help of several Federal agencies and many State agencies, professional engineering organizations, and private engineers.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances.

(1) The dam is an earth structure located in southeastern Platte County, Missouri (see Plate 1). Topography of the contributing watershed is characterized by rolling hills. The watershed is comprised of residential land. Topography in the vicinity of the dam is shown on Plate 2.

(2) A spillway channel was excavated in the limestone strata in the south abutment. A concrete broad-crested weir and spillway was constructed at the left abutment from which the water flows into a concrete-lined discharge channel.

(3) Pertinent physical data are given in paragraph 1.3.

b. Location. The dam is located in the southeastern portion of Platte County, Missouri, as indicated on Plate 1. The lake formed by the dam is shown on the United States Geological Survey 7.5 minute series quadrangle map for North Kansas City, Missouri, in the NW 1/4 of Section 28, T51N, R33W.

c. Size Classification. Criteria for determining the size classification of dams and impoundments are presented in the guidelines referenced in paragraph 1.1c above. Based on these criteria, the dam and impoundment are in the small size category.

d. Hazard Classification. The hazard classification assigned by the St. Louis District, Corps of Engineers for this dam is as follows: The No Name 784 Dam has a high hazard potential, meaning that the dam is located where failure may cause loss of life, and serious damage to homes, extensive agricultural, industrial and commercial facilities, and to important public utilities, main highways or railroads. For the No Name 784 Dam the flood damage zone extends downstream for 3 miles. Within the damage zone downstream of the dam are two houses, two apartment buildings, and an interstate highway bridge.

e. Ownership. The dam is owned by Mrs. W. B. Wales, 4800 Cliff View Drive, Kansas City, Missouri 64151.

f. Purpose of Dam. The dam forms a 5.5-acre recreational lake.

g. Design and Construction History. The inspection team was unable to locate design data for the dam.

h. Normal Operating Procedure. Normal rainfall, runoff, transpiration, and evaporation all combine to maintain a relatively stable water surface elevation.

1.3 PERTINENT DATA

a. Drainage Area. 178 acres.

b. Discharge at Damsite.

(1) Normal discharge at the damsite is through an uncontrolled spillway

(2) Estimated experienced maximum flood at damsite - unknown

(3) Estimated ungated spillway capacity at maximum pool elevation - 170 cfs (top of dam)

c. Elevation (Feet Above M.S.L.).

(1) Top of dam - 820 ± (see Plate 3)

(2) Spillway crest - 817.8

(3) Streambed at centerline of dam - 790 ±

(4) Maximum tailwater - unknown

d. Reservoir. Length of maximum pool - 700 feet ±

e. Storage (Acre-feet).

(1) Top of dam - 50 (from 1974 inventory)

(2) Design Surcharge - not available

f. Reservoir Surface (Acres).

(1) Top of dam - 8.0

(2) Spillway crest - 5.5

g. Dam.

(1) Type - earth embankment

(2) Length - 430 feet

(3) Height - 30 feet maximum

(4) Top width - 29 feet

(5) Side Slopes - (see Plate 5)

(6) Zoning - unknown

(7) Impervious core - unknown

(8) Cutoff - unknown

(9) Grout curtain - unknown

h. Diversion and Regulating Tunnel. none

i. Spillway.

(1) Type - concrete and rock (see paragraph 3.1c)

(2) Length of weir - 20 feet (see paragraph 3.1c)

(3) Crest elevation - 817.8 feet m.s.l.

(4) Gates - none

(5) Upstream Channel - none

(6) Downstream Channel - Broken limestone. Side slopes one-quarter mile downstream of dam are typical of streams in the area

j. Regulating Outlets. none

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No design data were found to be readily available.

2.2 CONSTRUCTION

Construction data were unavailable.

2.3 OPERATION

The maximum recorded loading on the dam is unknown.

2.4 EVALUATION

a. Availability. No engineering data were found.

b. Adequacy. No engineering data were available to make a detailed assessment of design, construction, and operation. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions (including earthquake loads) and made a matter of record.

c. Validity. No engineering data were available to determine the validity of the design, construction, and operation.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. A visual inspection of No Name 784 Dam was made on 31 August 1978. The inspection team included professional engineers with experience in dam design and construction, hydrology - hydraulic engineering, and geotechnical engineering. Specific observations are discussed below. No observations were made of the condition of the upstream face of the dam below the pool elevation at the time of the inspection.

b. Dam. The inspection team observed the following items at the dam. Large trees and heavy brush on the upstream and downstream slopes are excessive and should be controlled. Slight deviations in the horizontal and vertical alinements appear to have been present at the time of construction. Seepage flow into the discharge channel at the downstream embankment toe near the midpoint of the longitudinal axis of the dam of approximately one gallon per minute was observed; however, its source was not determined. The upstream slope has no slope protection other than vegetation; however, there was very little erosion evident.

c. Appurtenant Structures. The spillway is a concrete broad-crested weir consisting of three 6.75-foot bays with a total weir length of 20.25 feet which spills into a concrete lined discharge channel. There is some minor cracking and spalling of the concrete in the walls and slab of the spillway. The concrete approach channel upstream of the spillway has cracked and been undermined near the right spillway wall. The concrete discharge channel has cracks which extend the full width of the channel at 20 feet and 45 feet downstream of the spillway. Erosion of material beneath the discharge channel is evident. Large rock has been dumped at the downstream end of the concrete discharge channel.

d. Reservoir Area. No slides or excessive erosion due to wave action were observed along the shore of the reservoir.

e. Downstream Channel. Spillway discharge flows over the concrete, broad-crested weir to a concrete-lined discharge channel, then to a natural streambed channel. A limestone ledge traverses the downstream channel 100 feet downstream from the end of the concrete discharge channel. A 5.0-foot diameter culvert is located approximately 800 feet downstream of the spillway. Heavy vegetation and mild channel slopes typical of streams in the area characterize the area downstream of the spillway.

3.2 EVALUATION

None of the conditions observed are significant enough to indicate a need for immediate remedial action or a serious potential of failure.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

No controlled outlet works exist. The pool is primarily controlled by rainfall, runoff, evaporation, and capacity of the uncontrolled spillway.

4.2 MAINTENANCE OF DAM

Maintenance performed was unknown.

4.3 MAINTENANCE OF OPERATING FACILITIES

No controlled outlet works exist.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

The inspection team is not aware of any existing warning system for this dam.

4.5 EVALUATION

Existing erosion observed in the approach and discharge channels and excessive growth of trees and brush on the embankment increase the potential for failure and warrant regular monitoring and control.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data. No as-built drawings or design calculations were available.

b. Experience Data. The drainage area and lake surface area are developed from the USGS North Kansas City, Missouri - Kansas Quadrangle Map. The spillway and dam layout are from surveys made during the inspection.

c. Visual Observations.

(1) The spillway approach and discharge channels are eroding beneath the concrete surfaces with cracks present as described in paragraph 3.1c. The concrete weir spillway has some minor cracking and spalling of the walls and slab.

(2) No drawdown facilities are available to evacuate the pool.

(3) The spillway and discharge channel are located at the left abutment. Spillway releases will not endanger the integrity of the dam.

d. Overtopping Potential. The spillway will not pass 50 to 100 percent of the probable maximum flood, which is the spillway design flood recommended by the guidelines, without overtopping. The probable maximum flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The spillway will pass 10 percent of the probable maximum flood without overtopping. This flood is less than the 100-year flood estimated according to the methodology outlined by the USGS in "Technique for Estimating the Magnitude and Frequency of Missouri Floods". According to the recommended guidelines from the Department of the Army, Office of the Chief of Engineers, a high hazard dam of small size should pass 50 to 100 percent of the probable maximum flood. The portion of the estimated peak discharge of 50 percent of the probable maximum flood overtopping the dam would be 800 cfs of the total discharge from the reservoir of 1,200 cfs. The estimated depth of overtopping is 1.3 feet. The estimated duration of overtopping is 5.4 hours. The portion of the estimated peak discharge of the probable maximum flood overtopping the dam would be 2,200 cfs of the total discharge from the reservoir of 2,800 cfs. The estimated depth of overtopping is 2.1 feet. The estimated duration of overtopping is 6.8 hours.

According to the St. Louis District, Corps of Engineers, the effect from rupture of the dam could extend approximately 3 miles downstream of the dam. There are two apartment buildings and two homes downstream of the dam which could be severely damaged and lives of the inhabitants could be lost should failure of the dam occur.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. Visual observations of conditions which affect the structural stability of this dam are discussed in Section 3, paragraph 3.1b.

b. Design and Construction Data. No design data relating to the structural stability of the dam were found.

c. Operating Records. No operational records exist.

d. Post Construction Changes. Sewer lines have been installed along the right and left abutments. A manhole is located approximately 40 feet downstream of the longitudinal axis of the dam. No modifications to the spillway or dam were apparent at the time of inspection.

e. Seismic Stability. The dam is located in Seismic Zone 1 which is a zone of minor seismic risk. A properly designed and constructed earth dam using sound engineering principles and conservatism should pose no serious stability problems during earthquakes in this zone.

The seismic stability of an earth dam is dependent upon a number of factors. The important factors are embankment and foundation materials and shear strengths; abutment materials, conditions, and strength; embankment zoning; and embankment geometry. Adequate descriptions of embankment design parameters, foundation and abutment conditions, or static stability analyses to assess the seismic stability of this embankment were not available and therefore no inferences will be made regarding the seismic stability.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety. Several items noted during the visual inspection by the inspection team which should be monitored or controlled are erosion of material from beneath the concrete approach and discharge channels, seepage at the downstream toe of the dam, and the excessive growth of trees and brush on the embankment.

b. Adequacy of Information. Due to the lack of engineering design data and drawings, the conclusions in this report were based only on performance history and visual conditions. The inspection team considers that these data are sufficient to support the conclusions herein. However, seepage and stability analyses are needed to satisfy the requirements of the guidelines.

c. Urgency. A program should be developed as soon as possible to monitor at regular intervals the deficiencies described in this report. The remedial measures recommended in paragraph 7.2 could be accomplished now or delayed until observations of this monitoring program and/or the recommendation of a qualified engineer indicate the necessity of action. If the safety deficiencies listed in paragraph 7.1a are not corrected, they will continue to deteriorate and lead to a serious potential of failure. Presently, immediate action is not considered necessary.

d. Necessity for Phase II. The Phase I investigation does not raise any serious questions relating to the safety of the dam or identify any serious dangers that would require a Phase II investigation.

e. Seismic Stability. This dam is located in Seismic Zone 1. Because stability analyses are not available, the seismic stability of the dam cannot be assessed.

7.2 REMEDIAL MEASURES

a. Alternatives. In order to pass 50 percent of the probable maximum flood as required by the Recommended Guidelines, the spillway size and/or height of dam should be increased. The spillway design flood has been selected as 50 percent of the probable maximum flood due to the small volume of water impounded, the large flood plain downstream, and the two homes and two apartment buildings downstream.

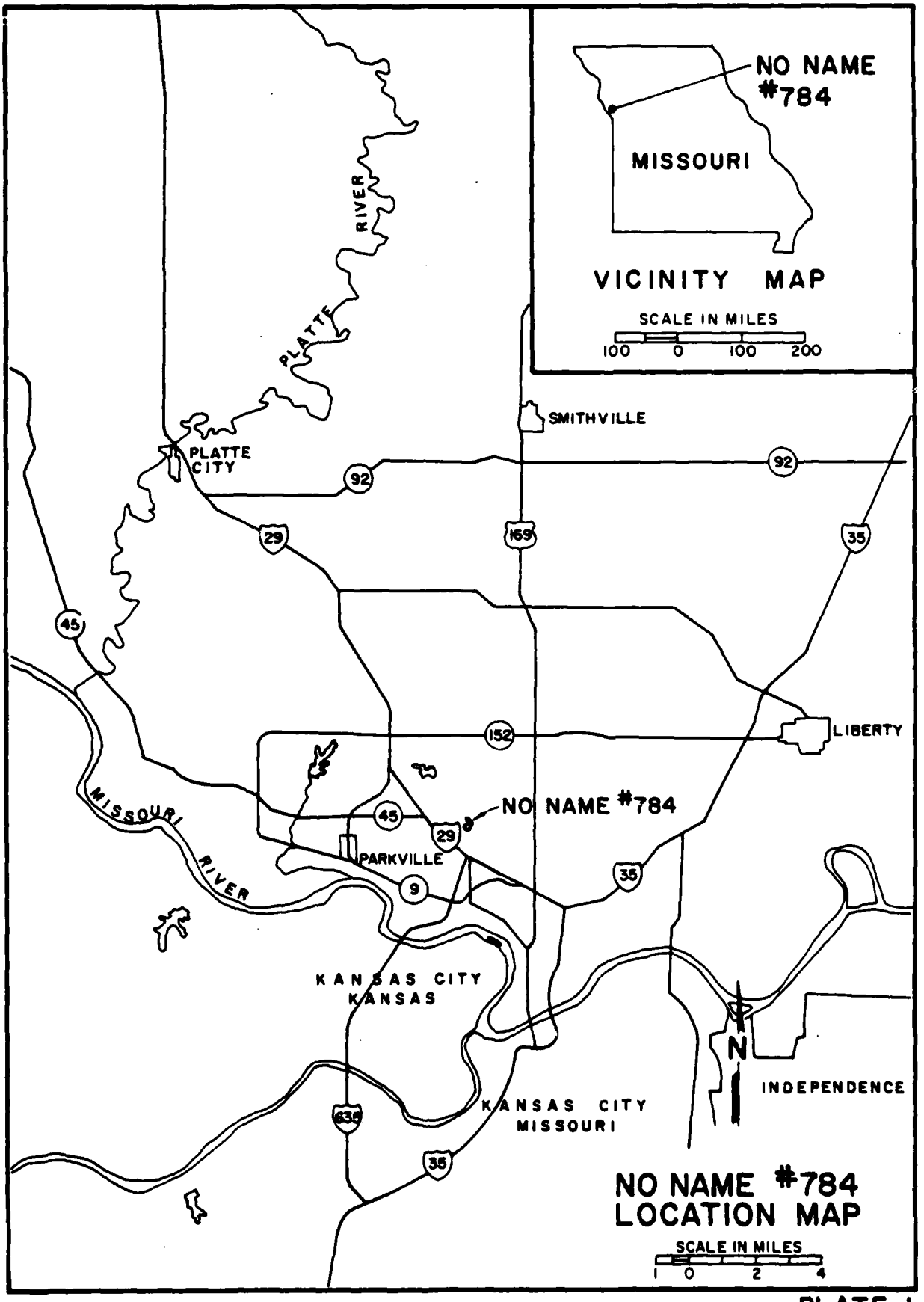
b. O&M Maintenance and Procedures. The following O&M maintenance and procedures are recommended:

(1) A regular maintenance program should be initiated to control the growth on the embankment.

(2) An engineer experienced in the design and construction of earthen dams should be retained to develop procedures to prevent further undermining of the approach and discharge channels.

(3) Seepage and stability analyses should be performed by a professional engineer experienced in the design and construction of dams.

(4) A detailed inspection of the dam should be made at least every year by an engineer experienced in design and construction of dams. More frequent inspections may be required if items of distress are observed.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MISSOURI
VICINITY MAP
SCALE IN MILES
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PLATTE RIVER
SMITHVILLE
PLATTE CITY
92
29
169
35
45
LIBERTY
152
MISSOURI RIVER
NO NAME #784
PARKVILLE
9
KANSAS CITY KANSAS
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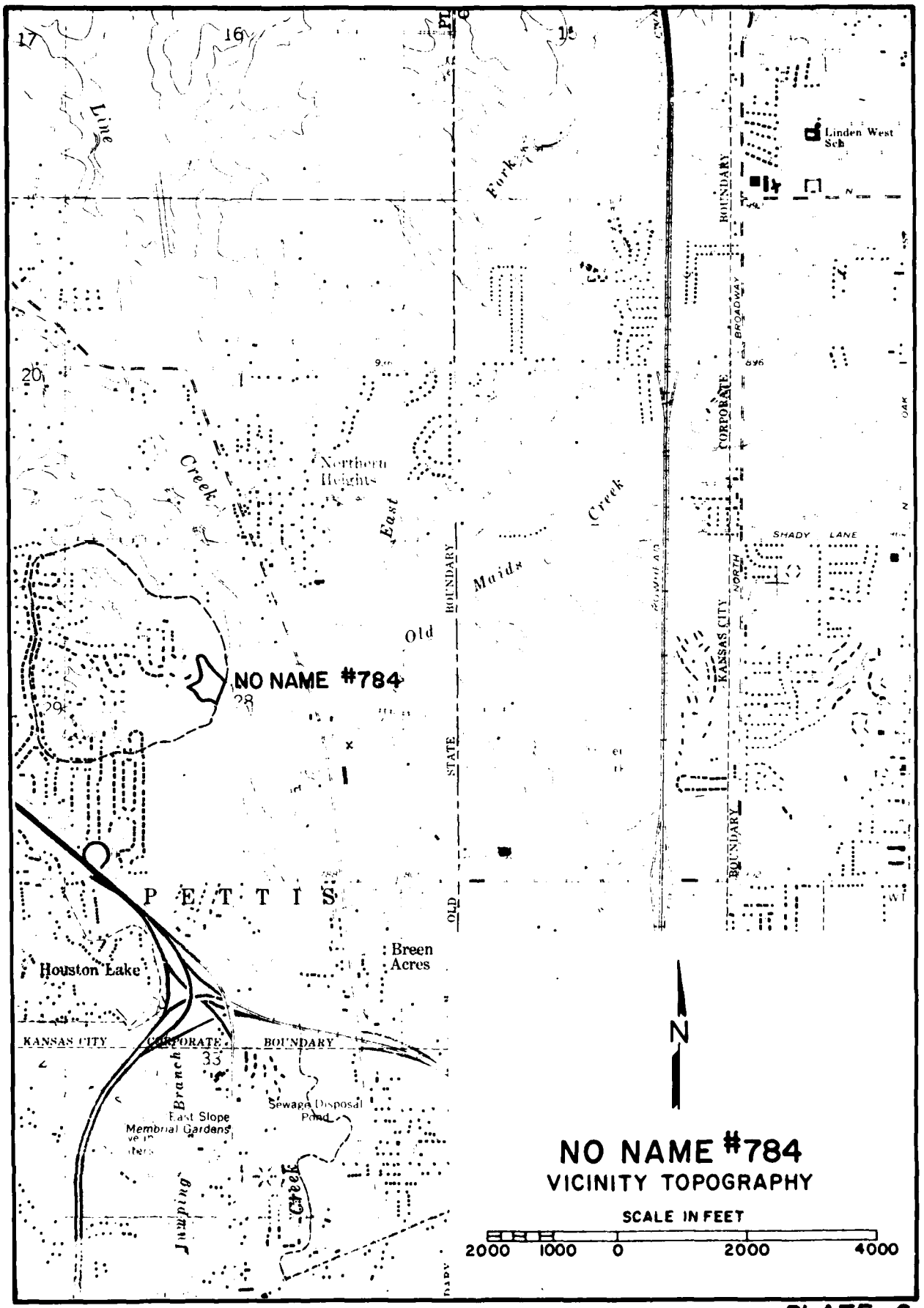
PLATE 1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Linden West Sch
Northern Heights
East Fork
Maids Creek
Old
BOUNDARY
STATE
CORPORATE
BROADWAY
SHADY LANE
NORTH
KANSAS CITY
OAK
P E T T I S
Houston Lake
Breen Acres
KANSAS CITY CORPORATE BOUNDARY
Branch
East Slope Memorial Gardens
Sewage Disposal Pond
Jumping
Creek
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VICINITY TOPOGRAPHY
SCALE IN FEET
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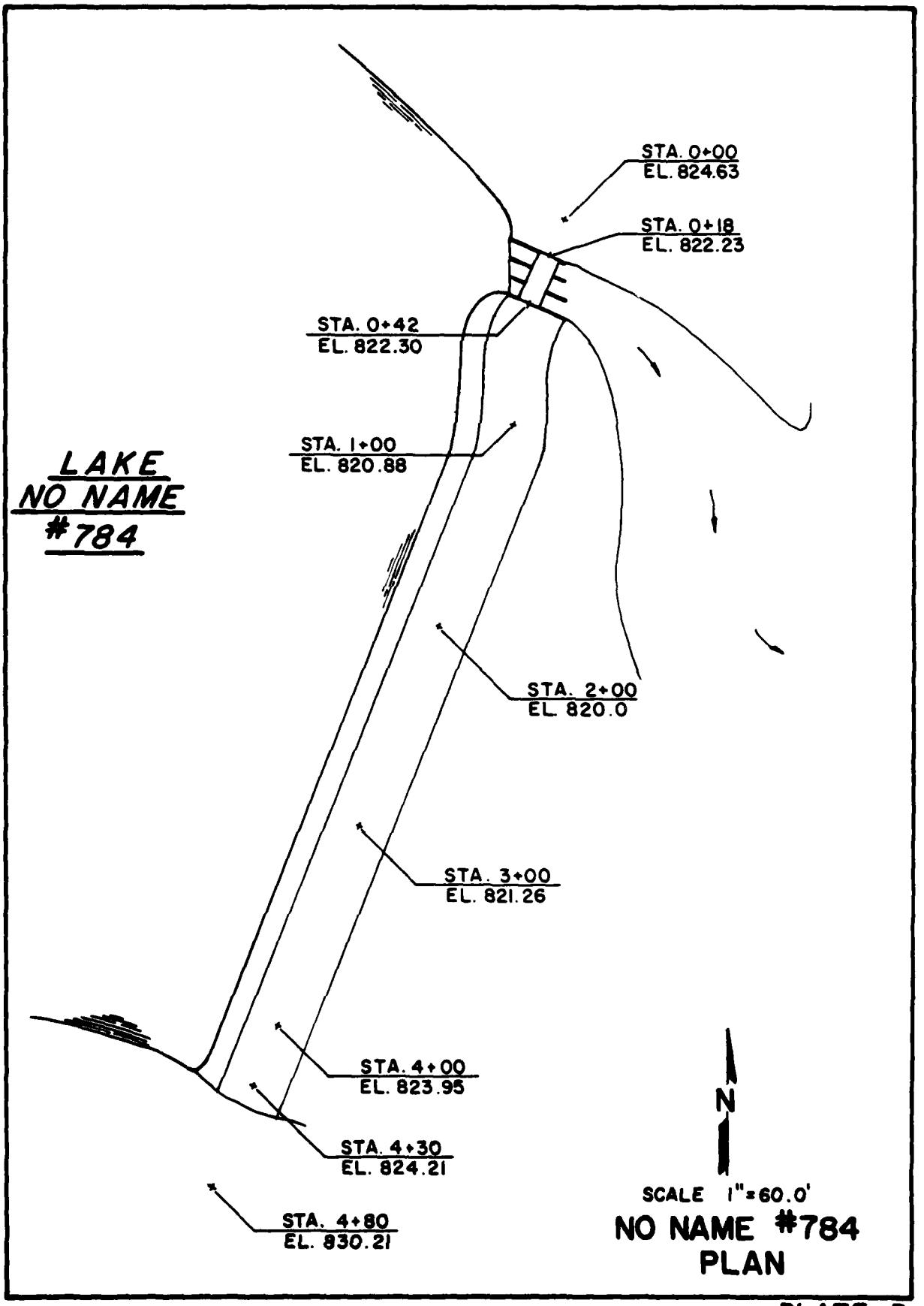
PLATE 2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EL. 820.88
STA. 2+00
EL. 820.0
STA. 3+00
EL. 821.26
STA. 4+00
EL. 823.95
STA. 4+30
EL. 824.21
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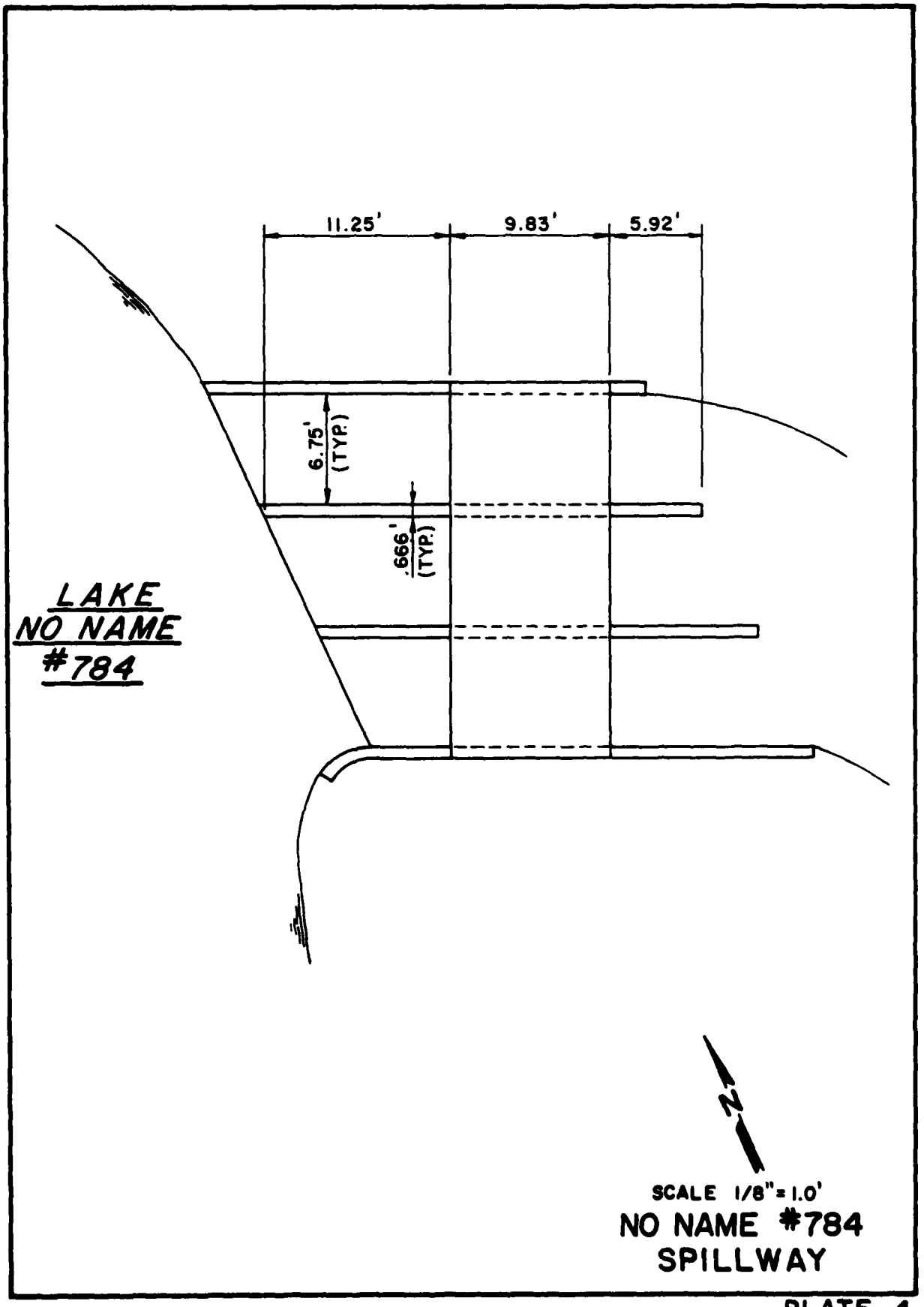
PLAN

PLATE 3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9.83'
5.92'
6.75' (TYP.)
.666' (TYP.)
LAKE
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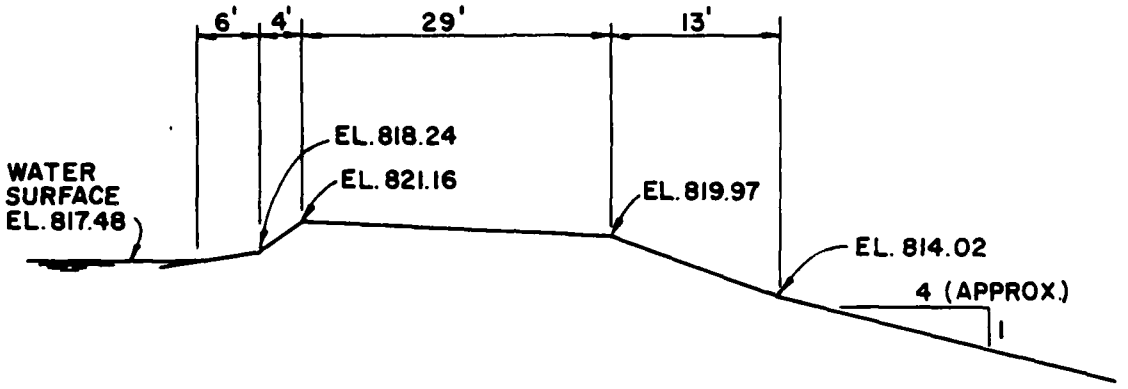
NO NAME #784
SPILLWAY

PLATE 4



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NO NAME #784
CROSS SECTION

PLATE 5

PHOTO 1: OVERVIEW OF LAKE (LOOKING UPSTREAM FROM DAM)

PHOTO 2: UPSTREAM FACE OF DAM (LOOKING SOUTH)

PHOTO 3: DOWNSTREAM FACE OF DAM (LOOKING NORTH)

PHOTO 4: SPILLWAY (LOOKING UPSTREAM)

PHOTO 5: CRACK IN SPILLWAY DISCHARGE CHANNEL (LOOKING UPSTREAM)

PHOTO 6: CULVERT IN DOWNSTREAM CHANNEL (LOOKING UPSTREAM)

PHOTO 7: DOWNSTREAM CHANNEL BELOW CULVERT (LOOKING DOWNSTREAM)

APPENDIX A

HYDROLOGIC COMPUTATIONS

HYDROLOGIC COMPUTATIONS

1. The Soil Conservation Service (SCS) dimensionless unit hydrograph and HEC-1 (1) were used to develop the inflow hydrographs (see Plates A-1, A-2, and A-3), and hydrologic inputs are as follows:

a. Twenty-four hour, probable maximum precipitation determined from U.S. Weather Bureau Hydrometeorological Report No. 33.

200 square mile, 24 hour rainfall inches	- 24.6
10 square mile, 6 hour percent of 24 hour 200 square mile rainfall	- 101 percent
10 square mile, 12 hour percent of 24 hour 200 square mile rainfall	- 120 percent
10 square mile, 24 hour percent of 24 hour 200 square mile, rainfall	- 130 percent

b. Drainage area = 178 acres.

c. Time of concentration: $Tc = (11.9 \times L^3/H)^{0.385}$ = 0.2 hours = 12 minutes (L = length of longest watercourse in miles, H = elevation difference in feet) (2)

d. Losses were determined in accordance with SCS methods for determining runoff using a curve number of 80 and antecedent moisture condition III.

2. Spillway release rates are based on the broad-crested weir equation.

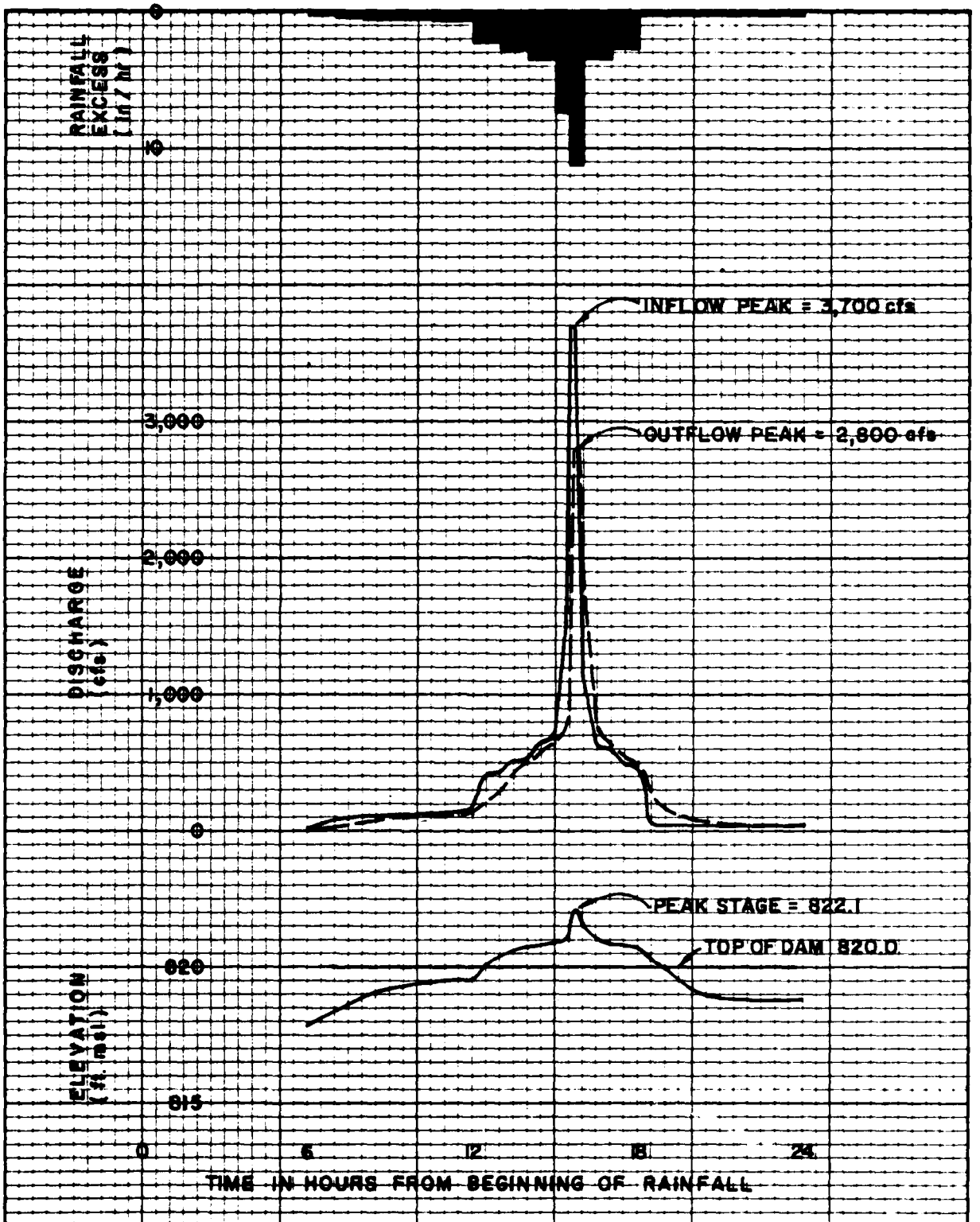
$Q = CLH^{1.5}$
C = 2.63
L = 20 feet (length of weir)
H = head on weir

3. The elevation-storage relationship above normal pool elevation was constructed by planimetering the area enclosed within each contour above normal pool. The storage between two elevations was computed by multiplying the average of the areas at the two elevations by the elevation difference. The summation of these increments below a given elevation is the storage below that level.

4. Floods are routed through the spillway using HEC-1, modified Puls to determine the capability of the spillway. Inflow and outflow hydrographs are shown on Plates A-1, A-2, and A-3.

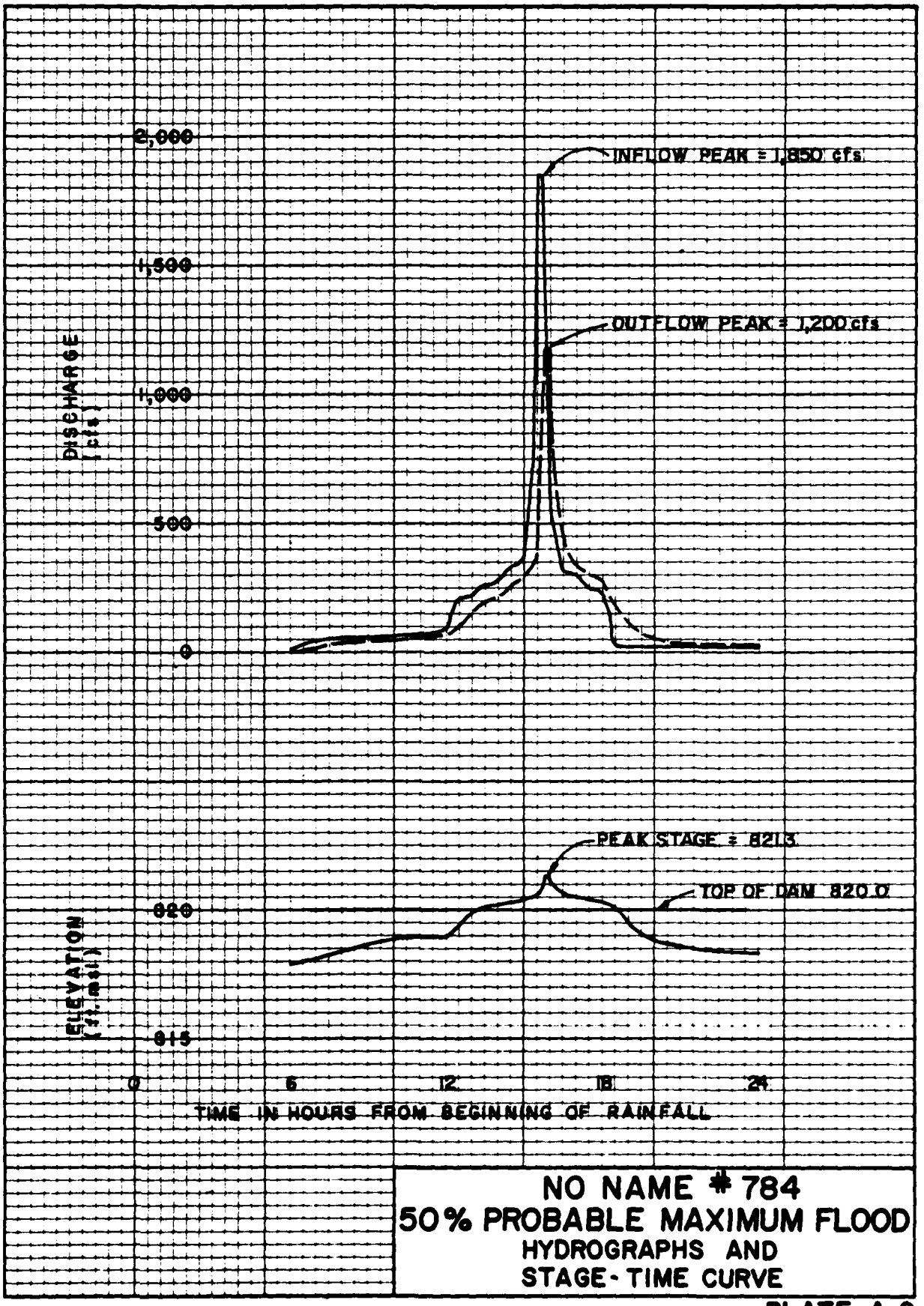
(1) U.S. Army Corps of Engineers, Hydrologic Engineering Center, Flood Hydrograph Package (HEC-1), Dam Safety Version, July 1978, Davis, California.

(2) U.S. Department of the Interior, Bureau of Reclamation, Design of Small Dams, 1974, Washington, D.C.



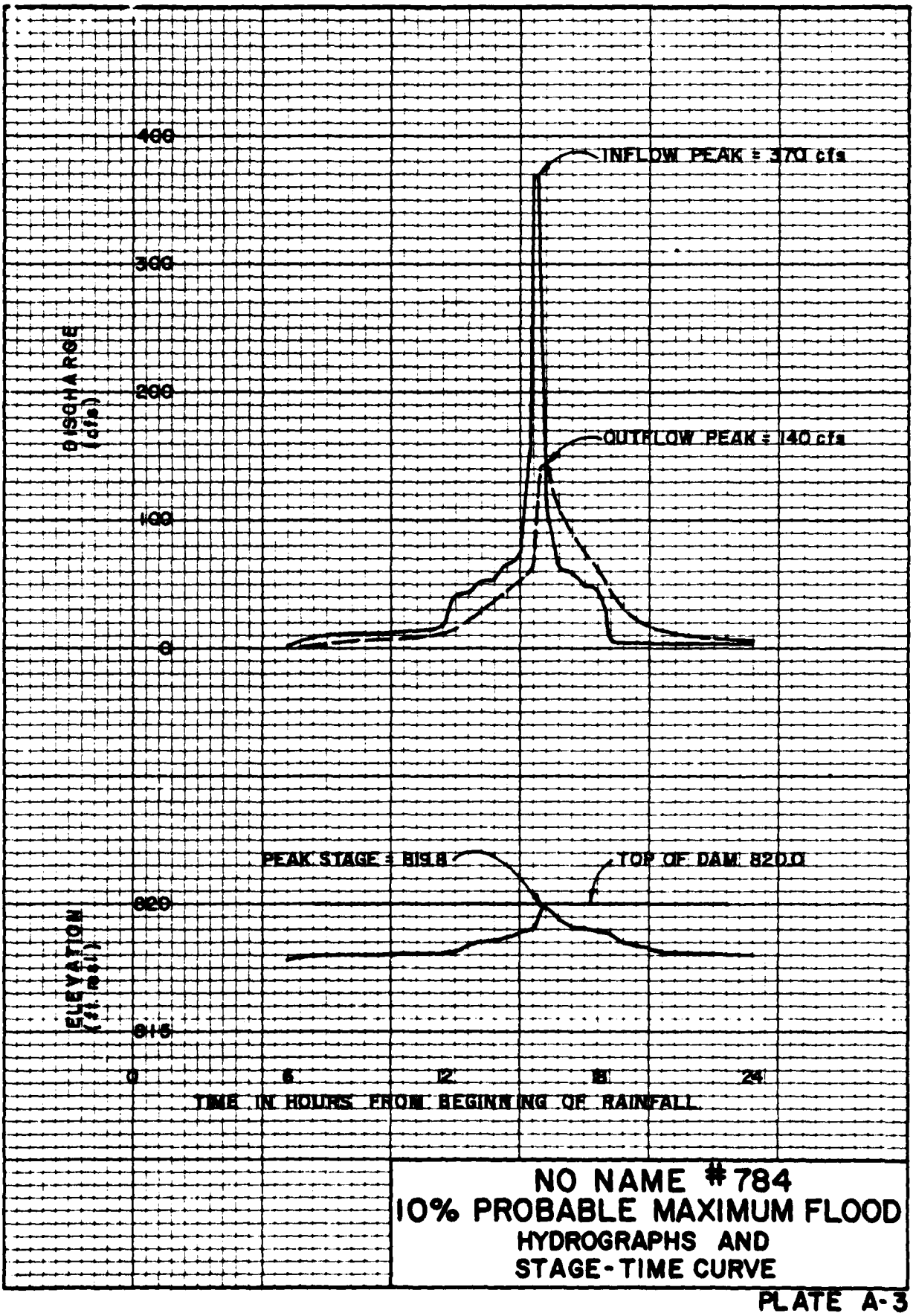
NO NAME #784
PROBABLE MAXIMUM FLOOD
HYETOGRAPH, HYDROGRAPHS AND STAGE - TIME CURVE

PLATE A-1



NO NAME # 784
50% PROBABLE MAXIMUM FLOOD
HYDROGRAPHS AND
STAGE - TIME CURVE

PLATE A-2



NO NAME #784
10% PROBABLE MAXIMUM FLOOD
HYDROGRAPHS AND STAGE-TIME CURVE

PLATE A-3


ATE
LME