AD-A106 467 BLACK AND VEATCH KANSAS CITY MO F/G 13/13
NATIONAL DAM SAFETY PROGRAM. ODESSA DAM (MO 20042), MISSOURI - -ETC(U)
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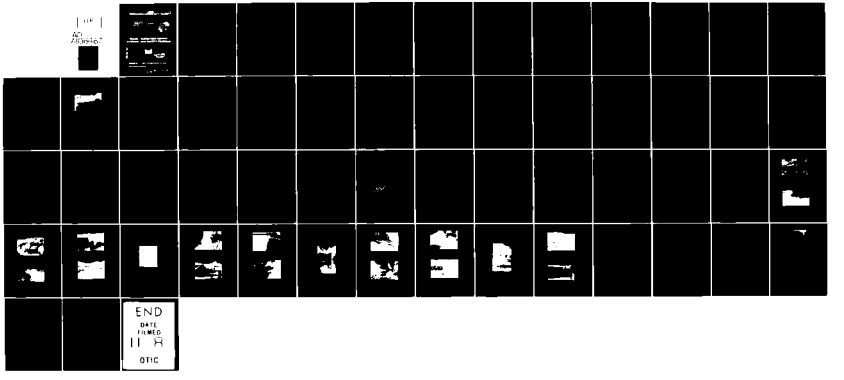

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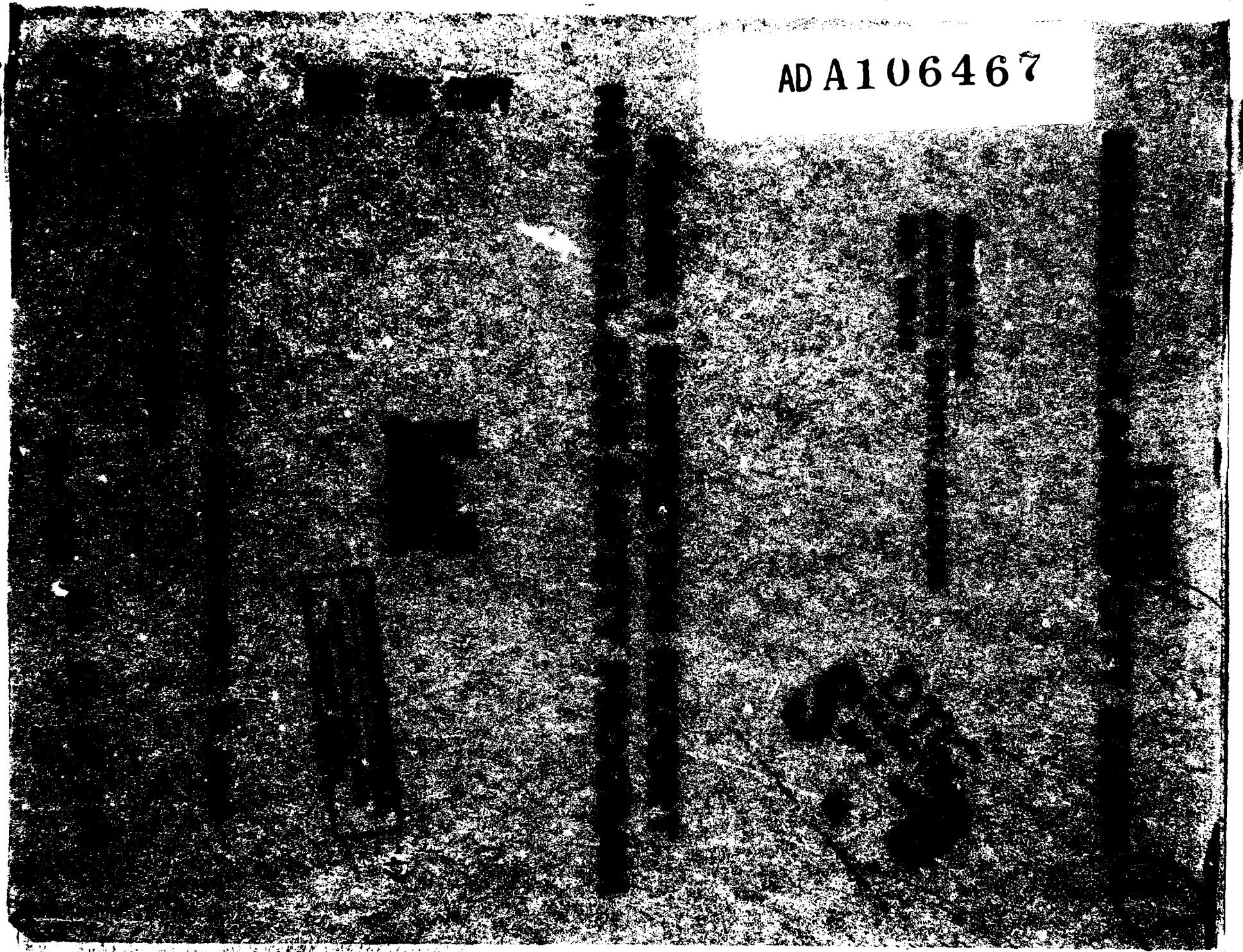

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REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A106467 / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Dam Inspection Report National Dam Safety Program Odessa Dam (MO 20042) Lafayette 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
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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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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

LMSED-FI

6 October 1978

SUBJECT: National Program of Inspection of Dams

THRU: Division Engineer, Lower Mississippi Valley, ATTN: LMVED-G

TO: HQDA (DAEN-CWE-DS), WASH DC 20314

1. Reference letter, DAEN-CWE-DS, your office, 16 February 1978, subject as above.

2. As requested in referenced letter, inclosed are the correspondence file and final inspection report for Odessa Dam (Mo. 20042), which has been classified as unsafe.

FOR THE DISTRICT ENGINEER:

JACK R. NIEMI
Chief, Engineering Division

2 Incl
as

LMSED-FI 6 October 1978

SUBJECT: Phase I Inspection Report

District Engineer
Department of the Army
Kansas City District, Corps of Engineers
700 Federal Building
Kansas City, Missouri 64106

Odessa Dam (Mo.20042), which is within the boundaries of your district, was recently inspected under the provisions of the National Program of Inspection of Non-Federal Dams. Inclosed for your information and retention is a copy of the final inspection report.

FOR THE DISTRICT ENGINEER:

SIGNED
Jack R. Niemi

1 Incl
as

JACK R. NIEMI
Chief, Engineering Division

Copy furnished:
LMVD, ATTN: LMVED-G

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ST.LOUIS
CORPS OF ENGINEERS
210 NORTH 12th ST.
ST. LOUIS, MISSOURI 63101

LMSED-PI

26 September 1978

LMVD Attn: LMVED-G

Honorable Joseph P. Teasdale
Governor of Missouri
State Capitol
Jefferson City, Missouri 65101

Dear Governor Teasdale:

The purpose of this letter is to furnish the Phase I Inspection Report for Odessa Dam (20042), located in Lafayette County, Missouri, and to inform you that the dam has been classified in the unsafe, non-emergency category. This classification is based on criteria set forth for the National Program of Inspection of Non-Federal Dams.

As stated in the report, this dam is classified as an intermediate size dam with a high downstream hazard potential. Our evaluation indicates that the spillway will pass only 30 percent of the Probable Maximum Flood without overtopping the dam. Since the spillway is not capable of passing 50 percent of the Probable Maximum Flood without overtopping the dam and causing failure, the spillway is considered seriously inadequate and the dam is considered unsafe.

The Corps of Engineers is constrained from performing additional investigations beyond the scope of the Phase I inspection. Detailed investigations may be needed to determine the requirements for obtaining additional spillway capacity. Such additional investigations are the responsibility of the state or owner.

Under provisions of the Freedom of Information Act, this information will be subject to release, upon request, to interested parties upon receipt of this information by the Governor of Missouri or his representative.

26 September 1978

LMSED-PT
Honorable Joseph P. Teasdale

Please keep me informed of any actions taken to remedy this unsafe condition.

A similar letter has been furnished to the owner, the city of Odessa.

Sincerely yours,

1 Incl
As stated

LEON E. McKINNEY
Colonel, CE
District Engineer

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ST.LOUIS
CORPS OF ENGINEERS
210 NORTH 12th ST.
ST. LOUIS, MISSOURI 63101

LMSED-PI

26 September 1978

City of Odessa
City Hall
125 South 2nd Street
Odessa, Missouri 64076

Dear Sirs:

The purpose of this letter is to furnish the Phase I Inspection Report for Odessa Dam (20042), located in Lafayette County, Missouri, and to inform you that the dam has been classified in the unsafe, non-emergency category. This classification is based on criteria set forth for the National Program of Inspection of Non-Federal Dams.

As stated in the report, this dam is classified as an intermediate size dam with a high downstream hazard potential. Our evaluation indicates that the spillway will pass only 30 percent of the Probable Maximum Flood without overtopping the dam. Since the spillway is not capable of passing 50 percent of the Probable Maximum Flood without overtopping the dam and causing failure, the spillway is considered seriously inadequate and the dam is considered unsafe.

The Corps of Engineers is constrained from performing additional investigations beyond the scope of the Phase I inspection. Detailed investigations may be needed to determine the requirements for obtaining additional spillway capacity. Such additional investigations are the responsibility of the state or owner.

Under provisions of the Freedom of Information Act, this information will be subject to release, upon request, to interested parties upon receipt of this information by the Governor of Missouri or his representative.

LMSED-FI 26 September 1978
City of Odessa

A similar letter was furnished to the Governor of Missouri on 26 September 1978.

I have also inclosed an explanation of the National Program for Inspection of Non-Federal Dams for your information.

Sincerely yours,

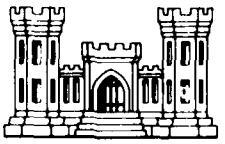
2 Incl
As stated

LEON E. McKINNEY
Colonel, CE
District Engineer

MISSOURI-KANSAS CITY BASIN

ODESSA DAM
LAFAYETTE COUNTY, MISSOURI
MO. 20042

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



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

FOR: STATE OF MISSOURI

JULY 1978

ODESSA LAKE DAM

LAFAYETTE COUNTY, MISSOURI

MISSOURI INVENTORY NO. 20042

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

JULY 1978

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

IN REPLY REFER TO

SUBJECT: Odessa Dam Phase I Inspection Report

This report presents the results of field inspection and evaluation of the Odessa 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 — 27 SEP 1978
Chief, Engineering Division — Date

APPROVED BY: [illegible] — 27 SEP 1978
Colonel, CE, District Engineer — Date

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam	Odessa Lake Dam
State Located	Missouri
County Located	Lafayette County
Stream	Tributary to East Fork Sni-A-Bar Creek
Date of Inspection	27 July 1978

Odessa Lake 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 an intermediate 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 approximately four families downstream of the dam and would potentially cause appreciable damage to the bridges of three improved roads within the estimated damage zone which extends 5 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 pass 30 percent of the probable maximum flood without overtopping.

Deficiencies visually observed by the inspection team were erosion, seepage, and presence of excessive brush and small trees on the downstream and upstream embankment slopes. Also a large crack has developed in the concrete slab at the lower end of the spillway chute.

The design data available relating to the structural stability of the dam does not meet the criteria established in the guidelines for a dam having the above size and hazard potential. Therefore, seepage and stability analyses are required by the guidelines.

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 prevent additional vegetal growth on the embankment which could lead to the development of potential safety hazards. A detailed report discussing each of these deficiencies is attached for submittal to lake owners and to the Governor of Missouri.

Paul R. Zaman

Paul R. Zaman, PE
Illinois 62-29261

Edwin R Burton

Edwin R. Burton, PE
Missouri E-10137

Harry L Callahan

Harry L. Callahan, Partner
Black & Veatch

OVERVIEW OF DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
ODESSA LAKE DAM

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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 Odessa Lake 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 the valley of a tributary to the East Fork Sni-A-Bar Creek in western Lafayette County, Missouri, (Plate 1). Topography of the contributing watershed is characterized by rolling hills and farm land. Topography in the vicinity of the dam is shown on Plate 2. A smaller lake is located immediately upstream of the Odessa dam. Spillway releases from this structure would be influenced by the elevation of Odessa Lake.

(2) Overflow from the reservoir flows through the spillway approach channel at the left end of the embankment then over the spillway crest to the spillway chute. The crest serves as a control weir to the chute. The approach channel has a grass and earth bottom with earth embankment on the right and natural rock cut on the left. The spillway crest and chute has a concrete slab and training walls. The spillway chute discharges to a limestone cut exit channel.

(3) A drain structure is located at the toe of the upstream slope near the center of the embankment. Flow through this structure is controlled by inlet and outlet sluice gates.

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

b. Location. The dam is located in the western portion of Lafayette 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 Odessa South, Missouri in Sections 10, 11, 14, and 15 of T48N and R28W.

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 intermediate size category.

d. Hazard Classification. The hazard classification for this dam is as follows: The Odessa Lake Dam has a high hazard potential, meaning that the dam is located where failure may cause loss of life, serious damage to homes, extensive agricultural, industrial and commercial facilities, important public utilities, main highways or railroads. The Corps of Engineers has estimated that for the Odessa Lake Dam the flood damage zone extends downstream for five miles. Within the damage zone are four homes and three major road crossings. The flood plain is farmed.

e. Ownership. The dam is owned by the City of Odessa, City Hall, 125 South 2nd Street, Odessa, Missouri 64076.

f. Purpose of Dam. The dam forms a 90-acre water supply and recreational lake (from design drawings).

g. Design and Construction History. The dam was designed by the late Mark B. Layne, Consulting Engineer of Higginsville, Missouri in 1963. The dam was constructed by R. W. Lingenfelter of Kansas City, Missouri.

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

1.3 PERTINENT DATA

a. Drainage Area - 2,370 acres of which approximately two-thirds is in the upstream lake drainage area.

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 - 5,180 cfs (top of dam).

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

(1) Top of dam - 817.3 ± (see Plate 3)

(2) Spillway crest - 810

(3) Streambed at centerline of dam - 770 ±

(4) Maximum tailwater - unknown.

d. Reservoir. Length of maximum pool - 5,600 feet ±

e. Storage (Acre-feet).

(1) Top of dam - 1,500 (from 1973 inventory)

(2) Spillway Crest - 1,300 (from design data)

f. Reservoir Surface (Acres). Spillway crest - 90 (from design drawings)

g. Dam.

(1) Type - earth embankment

(2) Length - 1,150 feet

(3) Height - 50 feet maximum

(4) Top width - 24 feet

(5) Side Slopes - 3H:1V (see Plate 5)

(6) Zoning - Impervious core supported by random fill on each slope (see Plate 5)

(7) Impervious Core - Clay core (See Plate 5)

(8) Cutoff - 8 inch concrete wall (see Plate 5)

(9) Grout curtain - unknown

h. Diversion and Regulating Tunnel. None.

i. Spillway.

(1) Type - chute

(2) Length of weir - 125 feet (spillway)
- 205 feet (emergency spillway)

(3) Crest elevation - 810 feet m.s.l.

(4) U/S channel - Approach channel 125 feet in width was constructed in a unit of interbedded limestone and shale near the left abutment. The invert elevation is about 810 m.s.l.

(5) D/S channel - discharge channel was formed by a cut in the limestone. The invert elevation is about 790 m.s.l.

j. Regulating Outlets. The reservoir level can be lowered through the drain structure. Outlet from the drain structure is connected to a 12 inch diameter, mechanical joint, ductile iron pipe with 5 feet square concrete collars. Located at the drain structure are two manually operated 12 inch sluice gates, inlet and outlet. This outlet serves as an emergency drawdown facility.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Design data was made available by Layne-Riddle Engineers, Inc. The data included a report with background design information and as-built drawings.

2.2 CONSTRUCTION

Construction was reportedly begun in 1964 by R. W. Lingenfelter and impoundment reportedly begun in 1965. No other construction data is available.

2.3 OPERATION

The maximum recorded loading on the dam is unknown.

2.4 EVALUATION

a. Availability. Engineering data in the form of background reports and as-built drawings were available from Layne-Riddle Engineers, Inc. No other engineering data were found.

b. Adequacy. The engineering data available were inadequate to make a detailed assessment of design, construction, and operation.

c. Validity. The engineering data available were insufficient to determine the validity of the design, construction, and operation.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. A visual inspection of Odessa Lake dam was made on 27 July 1978. The inspection team included professional engineers with experience in dam design and construction, hydrologic - hydraulic engineering, and structural 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. Small trees and dense weeds were observed on both the upstream and downstream faces. Several larger trees had been cut from the upstream slope but the stumps and roots were not removed. Visible seepage was observed near the downstream toe of slope near the left abutment. Evidence of seepage was observed along the downstream face about 5 feet above the toe of slope; however, the seepage was not visible on the day of the inspection. No cracks or slides were noticed along the embankment. Some minor erosion on the downstream slope was observed.

c. Appurtenant Structures. The inspection team observed the following items pertaining to appurtenant structures. The right slope of the spillway approach channel is unprotected from erosion and contains a heavy stand of grass and brush and a few trees. The channel bottom is grass lined. There is a wire fence across the channel about 100 feet upstream from the concrete spillway. The cutoff wall is located beneath the fence and is keyed to the limestone on the left slope of the channel. There is evidence of erosion immediately downstream of the fence on the right slope of the spillway approach channel probably caused by eddies formed from water flowing through the fence. Several erosion ditches, probably the result of surface runoff, were observed along the right slope of the channel. Trees have grown on the back side of both the left and right training walls.

The crest of the concrete spillway is in good shape. However the lower portion of the spillway chute near the flip bucket was cracked, lifted, and buckled and is in need of repair. The base material for this portion of the slab has evidently either eroded, settled, slid, or suffered shear failure leaving the slab unsupported to a depth of about 1-1/2 feet and a large crack has developed which runs the width of the slab. Based on observation of the near vertical cut made to form the discharge channel, the base material that moved is probably shale. No major obstructions to flow were observed in the discharge channel and excessive erosion of the channel was not observed.

The operators for the sluice gates located at the drain structure have been removed. The inspection team was unable to locate the outlet end of the connecting pipe.

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

e. Downstream Channel. Spillway discharges flow down the approach channel, through the concrete chute to the discharge channel, and then to a natural stream channel. Heavy vegetation and mild slopes typical of streams in the area characterize the downstream channel.

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

The existing outlet works would serve as a means to evacuate the pool, but due to the size of the pipe the evacuation time would be lengthy. Apparently the outlet is not being used and in an emergency requiring rapid drawdown of the pool, the outlet would be of little value. The pool is primarily controlled by rainfall, runoff, evaporation, capacity of the uncontrolled spillway, and withdrawals for water supply.

4.2 MAINTENANCE OF DAM

Apparently the only maintenance regularly performed is mowing the grass cover on the crest of the embankment.

4.3 MAINTENANCE OF OPERATING FACILITIES

Apparently, no maintenance has been performed on the sluice gates or drain structure.

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 seepage observed on the downstream side of the dam, although minor, increases the potential for failure and warrants regular monitoring and control.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data. Report and as-built drawings were available, but detailed design calculations were not available. The spillway was designed for a discharge of 7,600 cfs, a fifty year flood as determined by the rational method. The storage area of the lake was to be designed so that this peak runoff would be accommodated for a period of over one hour without benefit of a spillway.

b. Experience Data. The drainage and lake surface areas were developed from USGS Odessa South Quadrangle Map. The spillway and dam layout are from surveys made during the inspection and as-built drawings.

c. Visual Observations.

(1) Concrete weir spillway and the spillway discharge channel are in good condition. The trees and other large vegetation and the fence in the approach channel would partially obstruct the spillway discharges.

(2) Drawdown facilities are available to evacuate the pool, see paragraph 3.1c.

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

d. Overtopping Potential. The spillway will not pass 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 existing spillway will pass 30 percent of the probable maximum flood without overtopping. This flood is greater 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 intermediate size should pass 100 percent of the probable maximum flood without overtopping. The portion of the estimated peak discharge of the probable maximum flood overtopping the dam would be 10,000 cfs of the total discharge from the reservoir of 21,710 cfs. The overtopping duration is estimated to be 290 minutes. The portion of the estimated peak discharge of 50 percent of the probable maximum flood overtopping the dam would be 590 cfs of the total discharge from the reservoir of 7,420 cfs. The overtopping duration is estimated to be 130 minutes.

Failure of upstream water impoundments shown on the USGS map would have a significant impact on the hydrologic or hydraulic analysis as the

storage effects of other reservoirs were considered. However, the wave produced by instantaneous failure would most probably not stress the main Odessa Dam.

The effect from rupture of the dam could extend approximately 5 miles downstream of the dam, according to the St. Louis District, Corps of Engineers. There are four inhabited 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. No post construction changes exist which will affect the structural stability of the dam.

e. Seismic Stability. The dam is located in the Seismic Zone 1. However, since stability analyses do not exist, no inferences are made to the seismic stability of the dam.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety. Several items observed during the visual inspection by the inspection team which should be monitored, repaired, or controlled are seepage near the left abutment, the uncontrolled growth on the upstream and downstream slopes, growth on the back side of the left and right training walls of the approach channel, the uncontrolled growth in the approach channel and the crack at the lower portion of the spillway chute.

b. Adequacy of Information. Due to the inadequacy of engineering design data, the conclusions in this report were based on performance history, review of drawings, 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 Section 3.6.1 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. 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. The spillway size and/or the height of dam need to be increased to pass the probable maximum flood for the dam to comply with the guidelines.

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

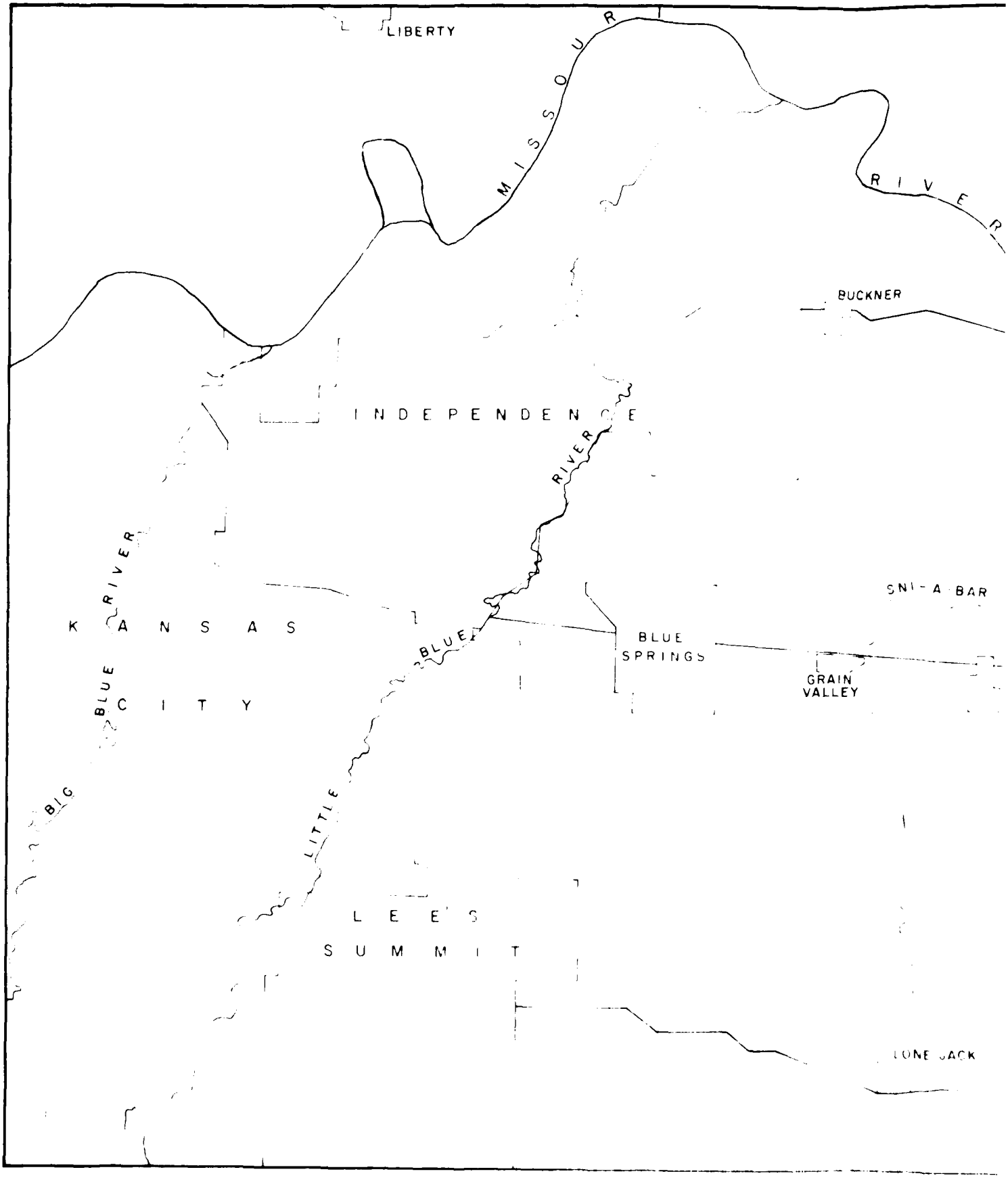
(1) Check the downstream face of the dam periodically for seepage and stability problems. If increased seepage flows are observed or deterioration of the foundations of the embankment noted, the dam should be inspected and the pending condition evaluated by an engineer experienced in design and construction of earthen dams.

(2) The crack across the lower portion of the spillway chute should be repaired.

(3) A regular maintenance program should be initiated to control the growth on downstream and upstream slopes of the dam and in the approach channel.

(4) The trees growing on the back side of the concrete training walls (approach channel) should be removed.

(5) 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 other than those already mentioned.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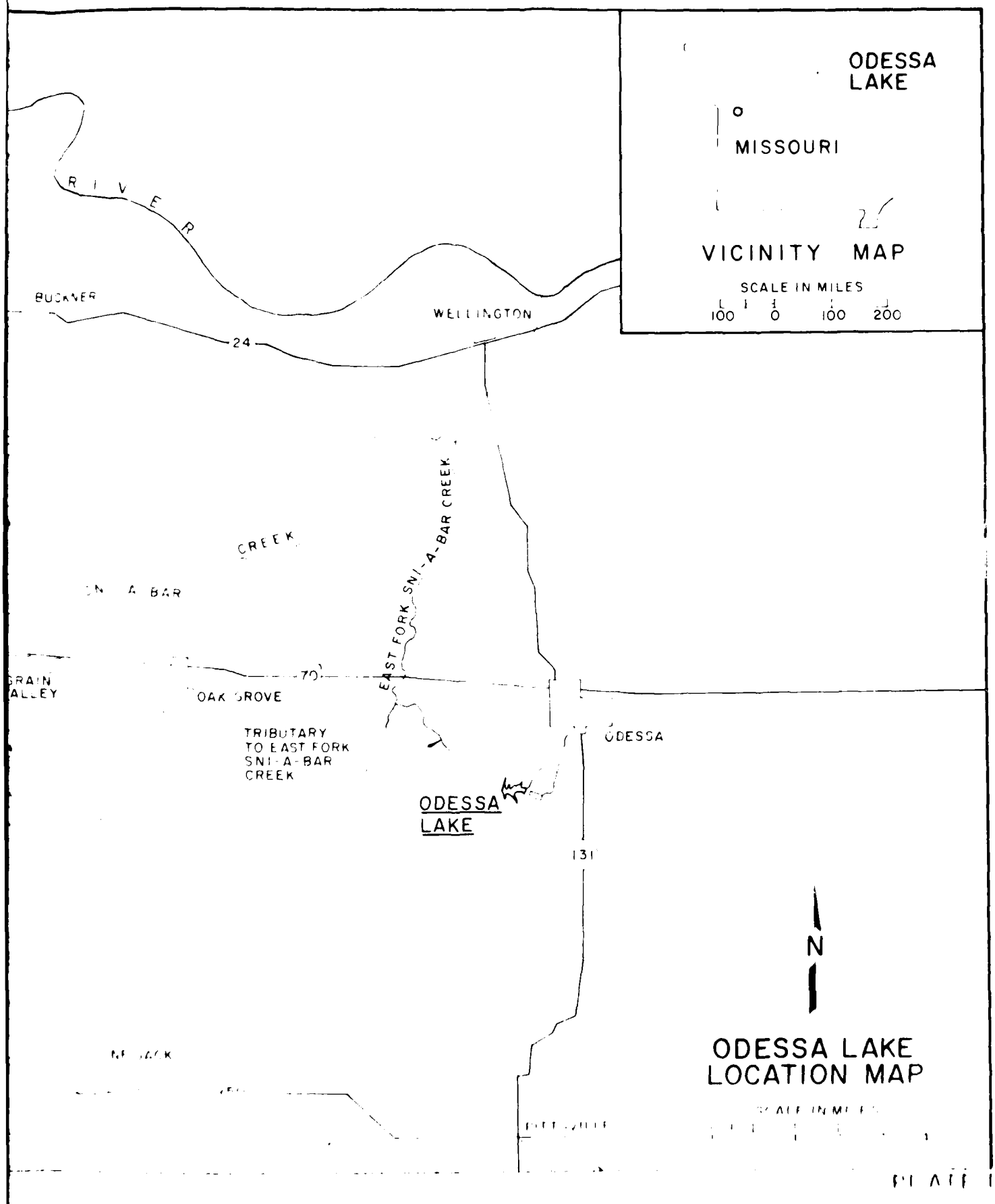
BUCKNER
INDEPENDENCE
BLUE RIVER
BIG BLUE RIVER
KANSAS CITY
BLUE SPRINGS
GRAIN VALLEY
SNI-A-BAR
LITTLE BLUE
LEES SUMMIT
LONE JACK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TRIBUTARY
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SNI-A-BAR
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ODESSA
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LAKE
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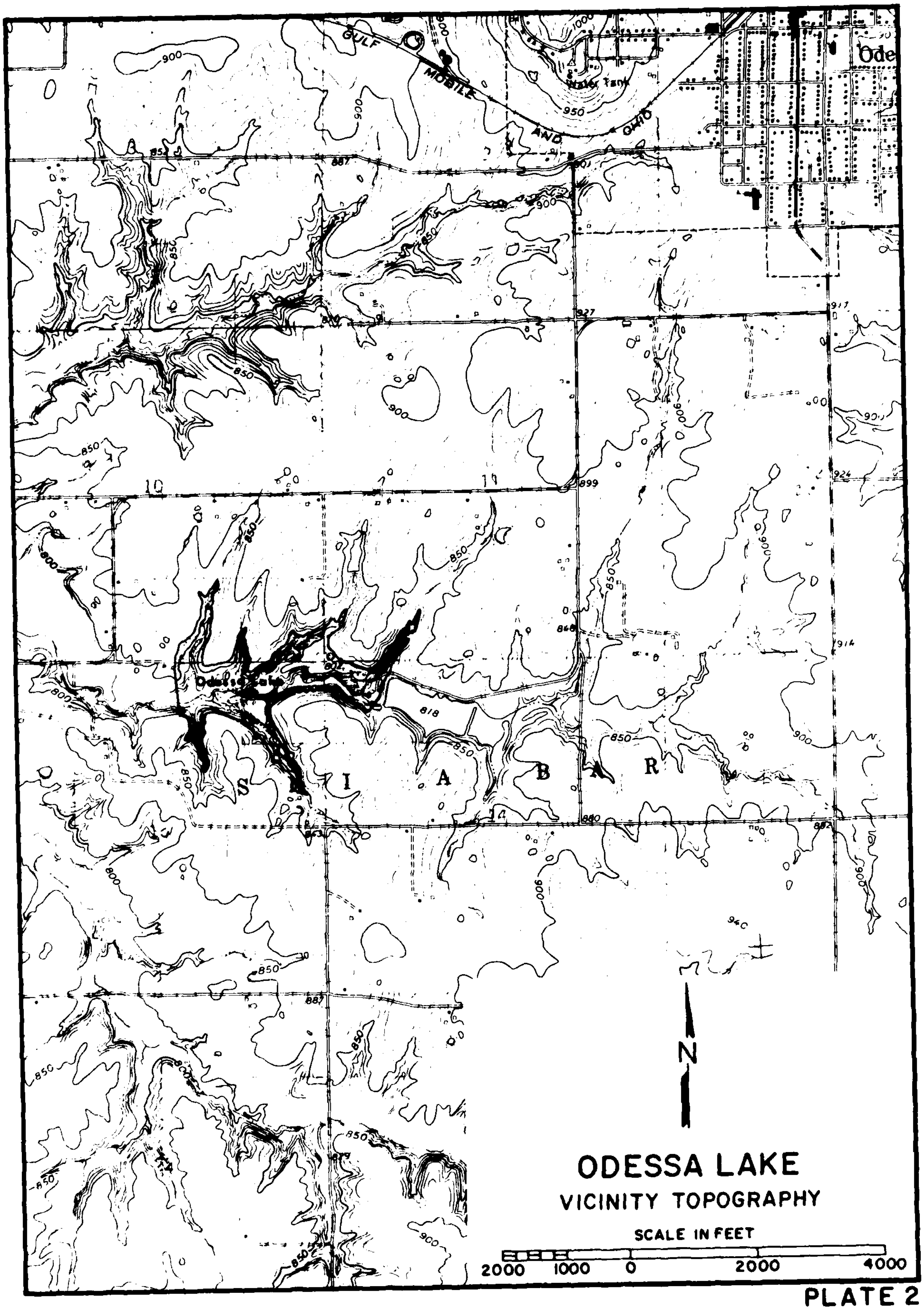
ODESSA LAKE
LOCATION MAP



ODESSA LAKE
VICINITY TOPOGRAPHY

PLATE 2

O D E S S A L A K

DRAIN
STRUCTURE

(3) (19)

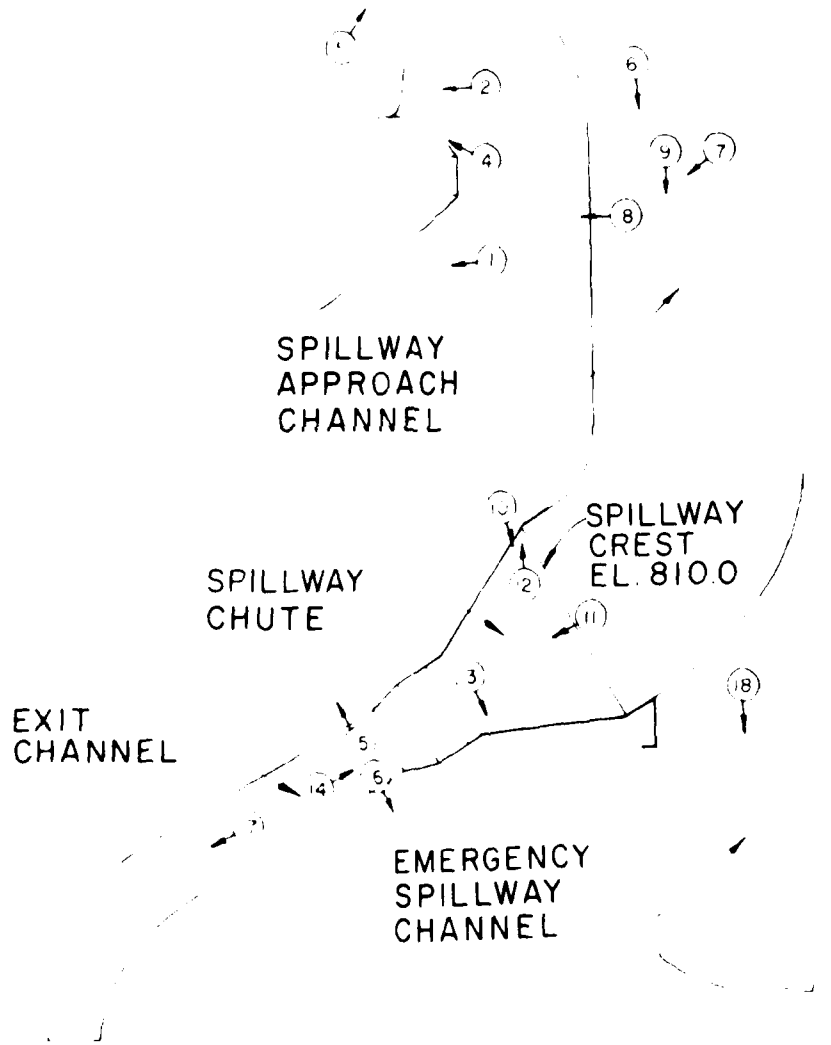
TOP OF DAM EL. 817.3

20:1 BLANKET SLOPE

L A K E

AIN
RUCTURE

817.3 –

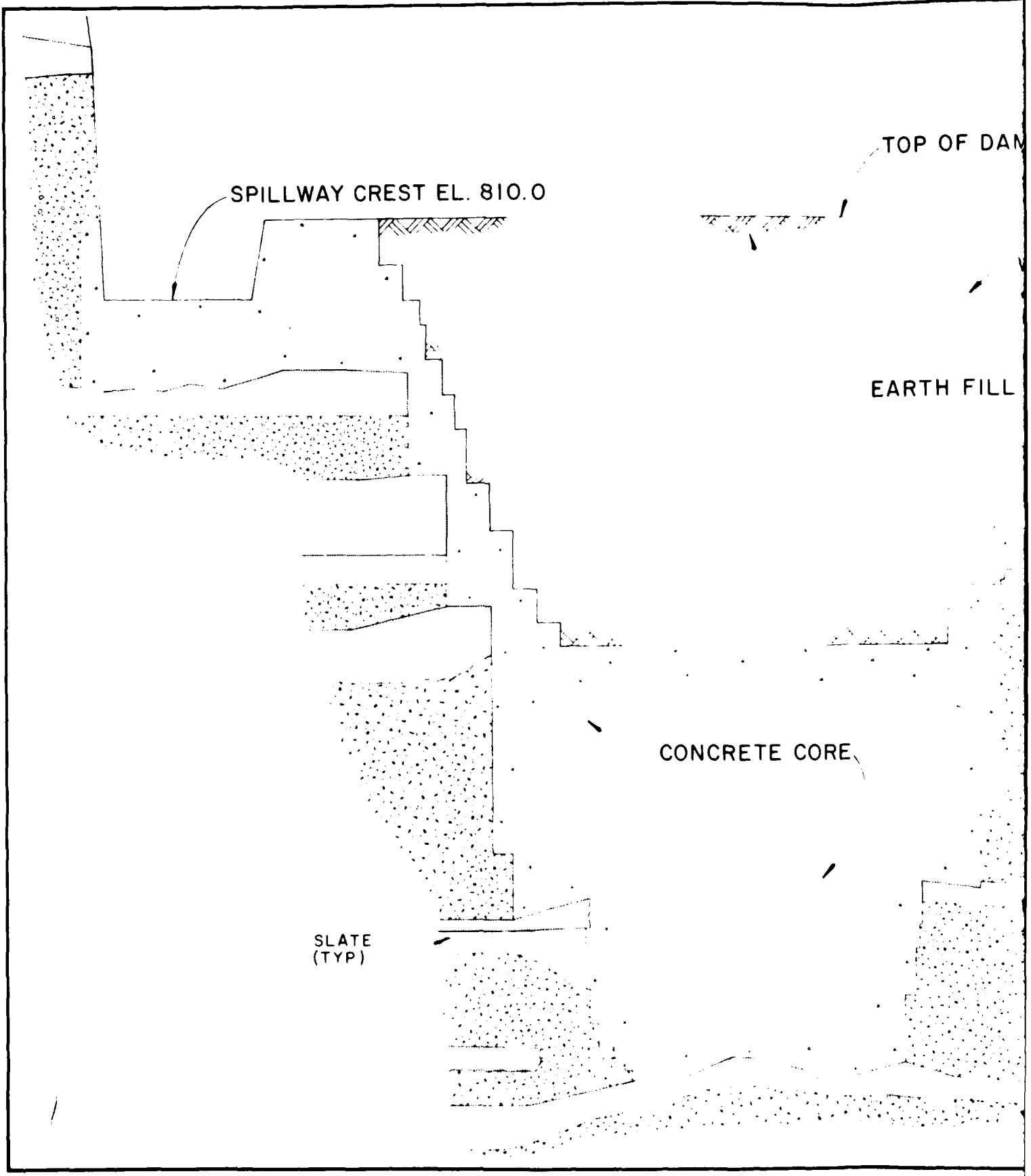


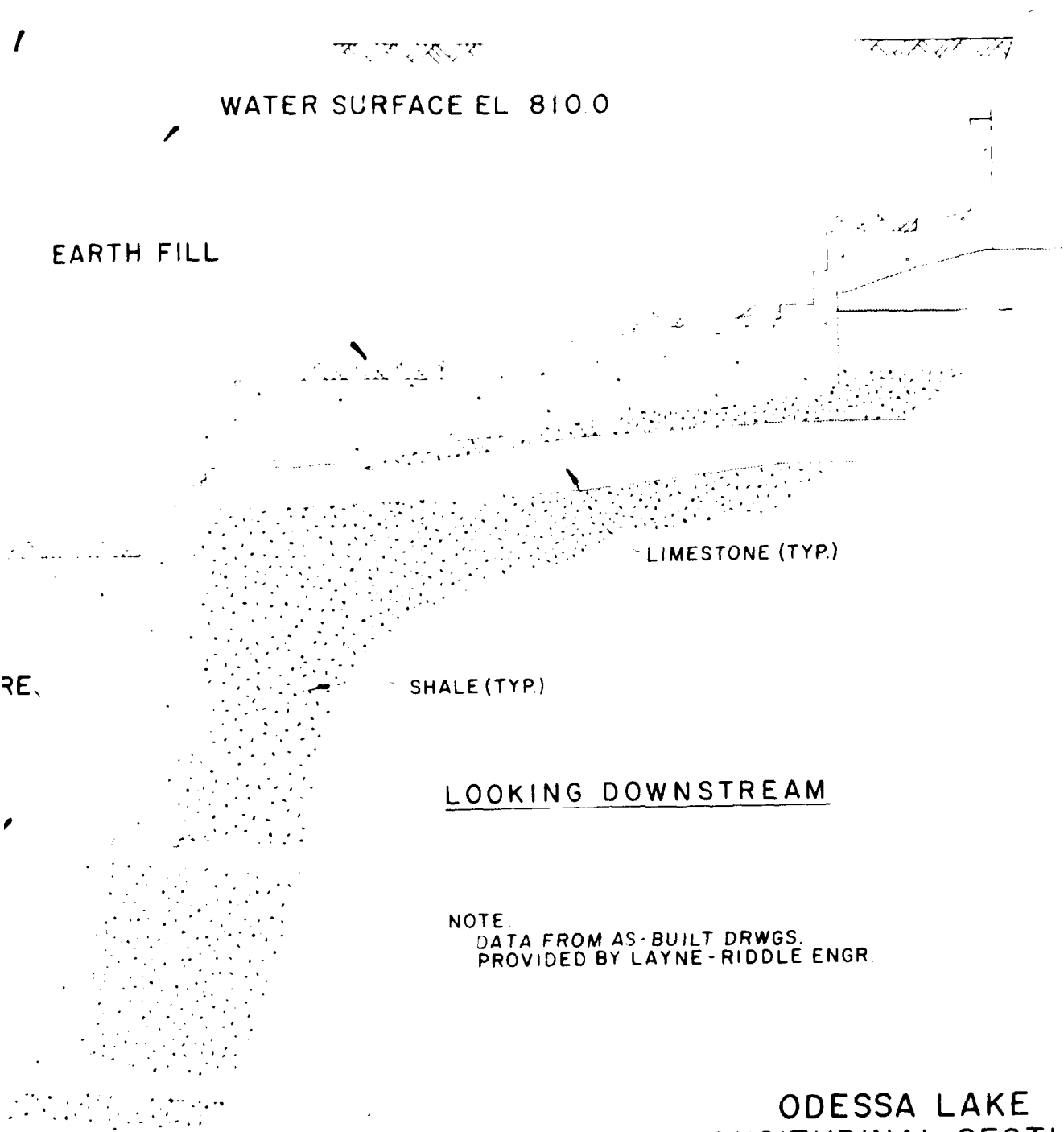
NUMBER AND DIRECTION OF PHOTOGRAPH

2

ODESSA LAKE
PLAN

PLATE 3

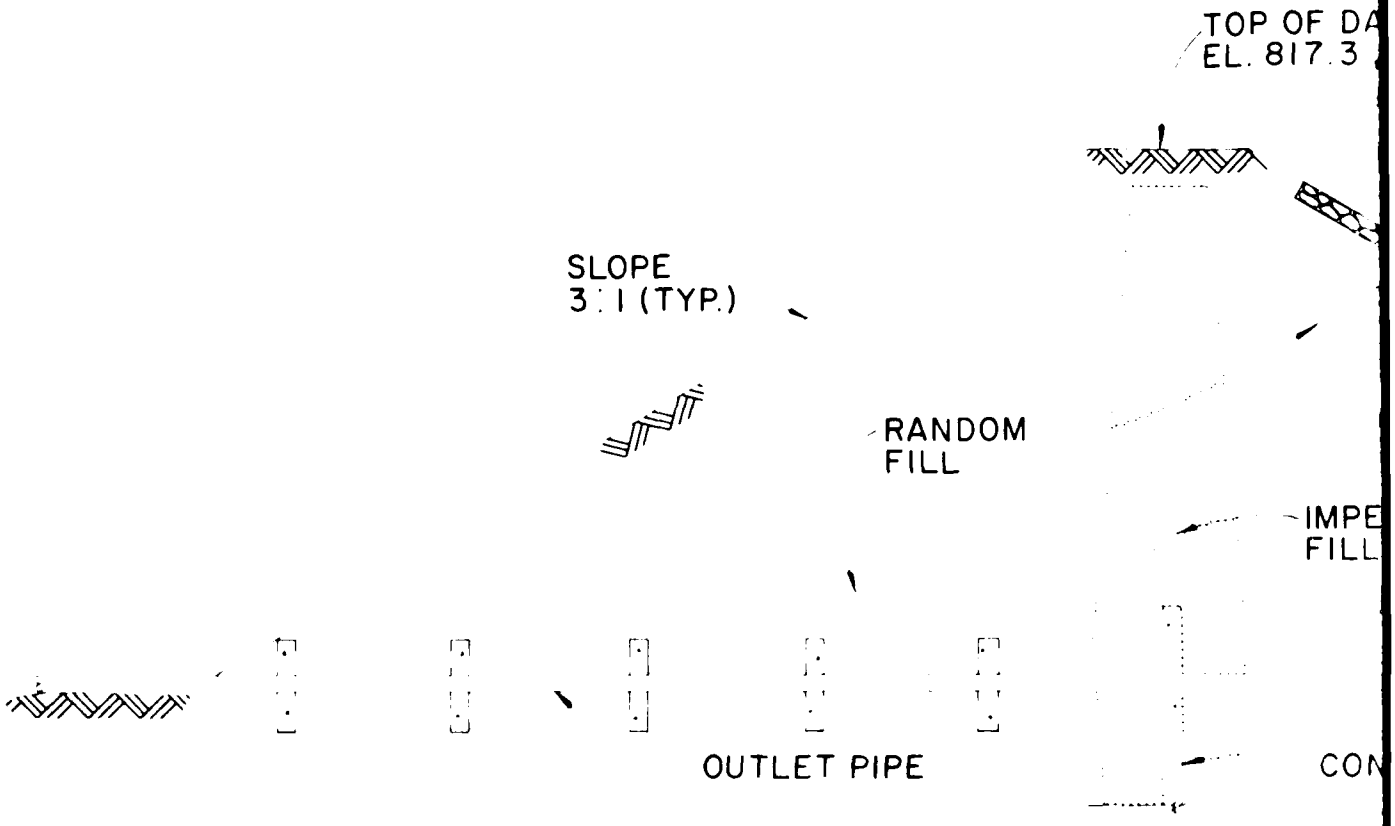

TOP OF DAM
SPILLWAY CREST EL. 810.0
EARTH FILL
CONCRETE CORE
SLATE
(TYP)

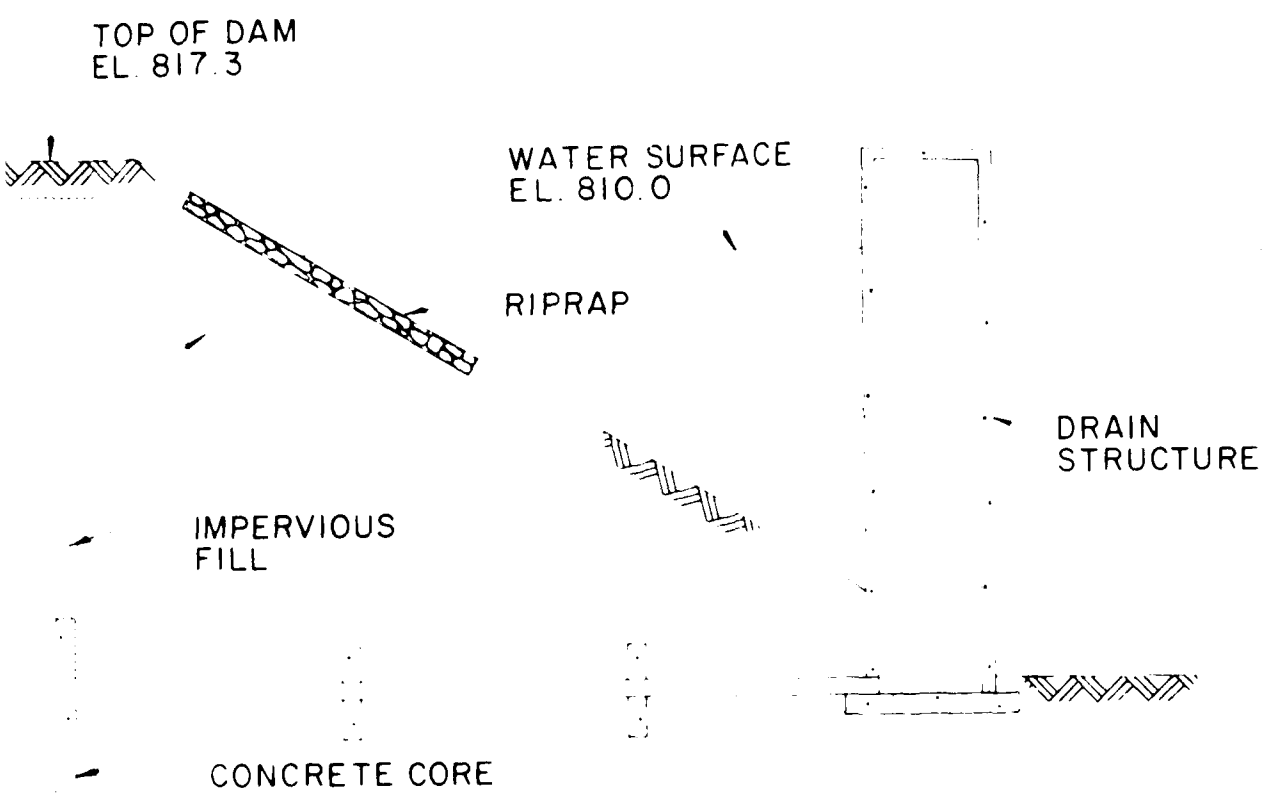


NOTE
DATA FROM AS-BUILT DRWGS.
PROVIDED BY LAYNE-RIDDLE ENGR.

ODESSA LAKE
LONGITUDINAL SECTION

PLATE 4


TOP OF DA
EL. 817.3
SLOPE
3:1 (TYP.)
RANDOM
FILL
IMPE
FILL
OUTLET PIPE
CON



NOTE
DATA FROM AS-BUILT DRWGS.
PROVIDED BY LAYNE-RIDDLE ENGR.

ODESSA LAKE
CROSS SECTION

PLATE 5

Photo No. 1: DOWNSTREAM FACE OF DAM

Photo No. 2: UPSTREAM FACE OF DAM

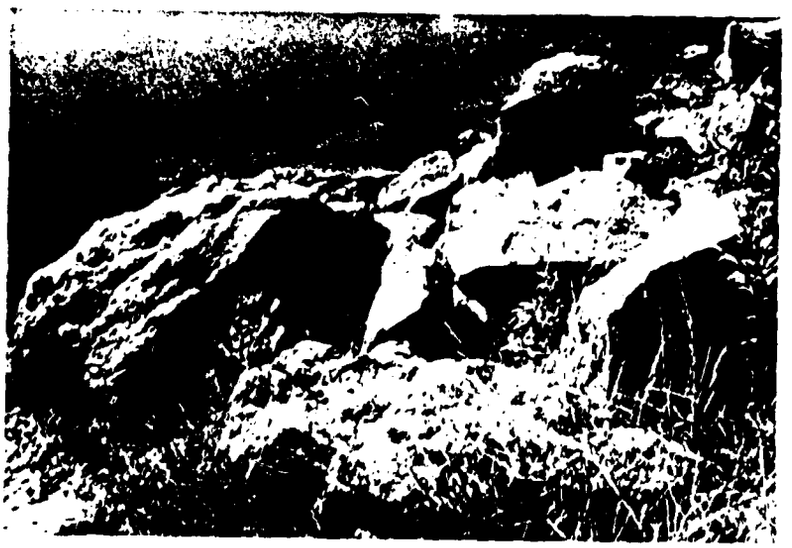


Photo No. 3: RIPRAP ON UPSTREAM FACE

Photo No. 4: UPSTREAM FACE AT JUNCTION OF LEFT ABUTMENT AND SPILLWAY APPROACH CHANNEL

Photo No. 5: ENTRANCE SPILLWAY TO APPROACH CHANNEL

Photo No. 6: SPILLWAY APPROACH CHANNEL LOOKING UPSTREAM FROM AXIS OF DAM

Photo No. 7: EROSION OF RIGHT BANK OF SPILLWAY APPROACH CHANNEL

Photo No. 8: CONCRETE CORE AT SPILLWAY APPROACH CHANNEL

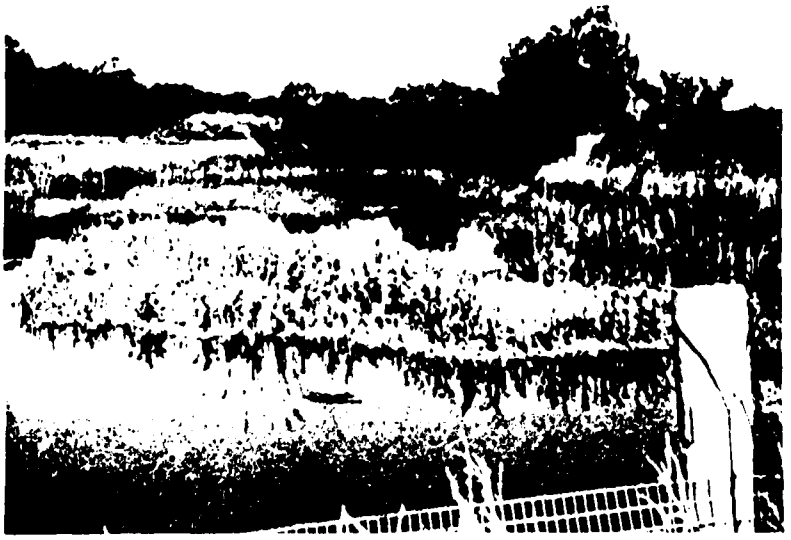


Photo No. 9: SPILLWAY APPROACH CHANNEL LOOKING DOWNSTREAM FROM AXIS OF DAM (NOTE EMERGENCY SPILLWAY OUTFLOW WALL AT LEFT)

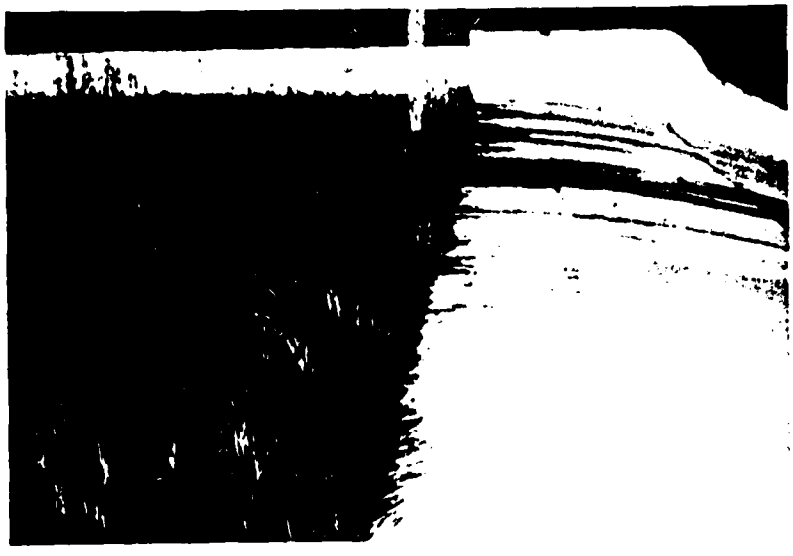


Photo No. 10: SPILLWAY CREST

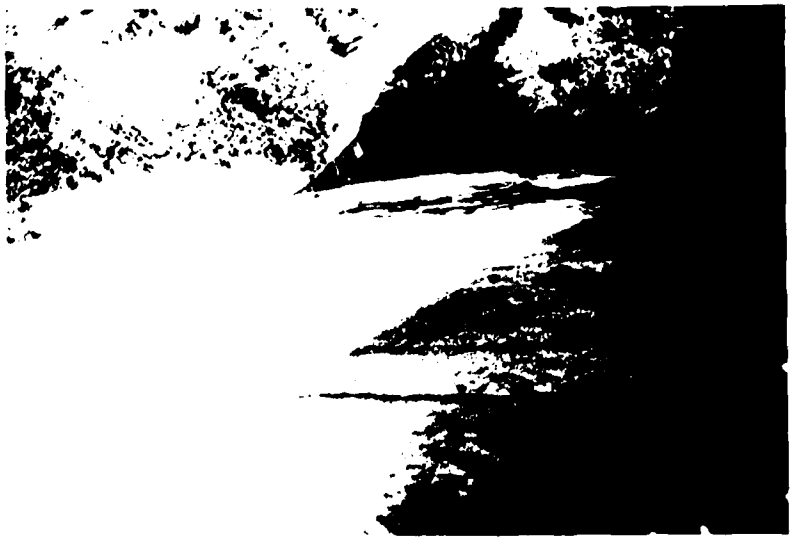


Photo No. 11: SPILLWAY CHUTE LOOKING DOWNSTREAM

Photo No. 12: RIGHT TRAINING WALL AT SPILLWAY CREST

Photo No. 13: CRACK NEAR BASE OF SPILLWAY CHUTE

Photo No. 14: BASE OF SPILLWAY CHUTE

Photo No. 15: RIGHT BANK OF SPLASH POOL

Photo No. 16: DISCHARGE CHANNEL DOWNSTREAM FROM SPILLWAY

Photo No. 17: LEFT BANK OF SPLASH POOL

Photo No. 18: EMERGENCY SPILLWAY CHANNEL

Photo No. 19: DRAIN STRUCTURE

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

b. Drainage area = 2,370 acres.

c. Time of concentration: $Tc = (11.9 \times L^3/H)^{0.385} = 53$ 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 91 and antecedent moisture condition III.

2. Spillway release rates are based on backwater analysis through the spillway and approach channels using HEC-2(3). The capacity of the emergency spillway was estimated using the broad-crested weir equation:

$Q = CLH^{1.5}$ (C = 2.5, L = 205 feet, H is the head on weir)

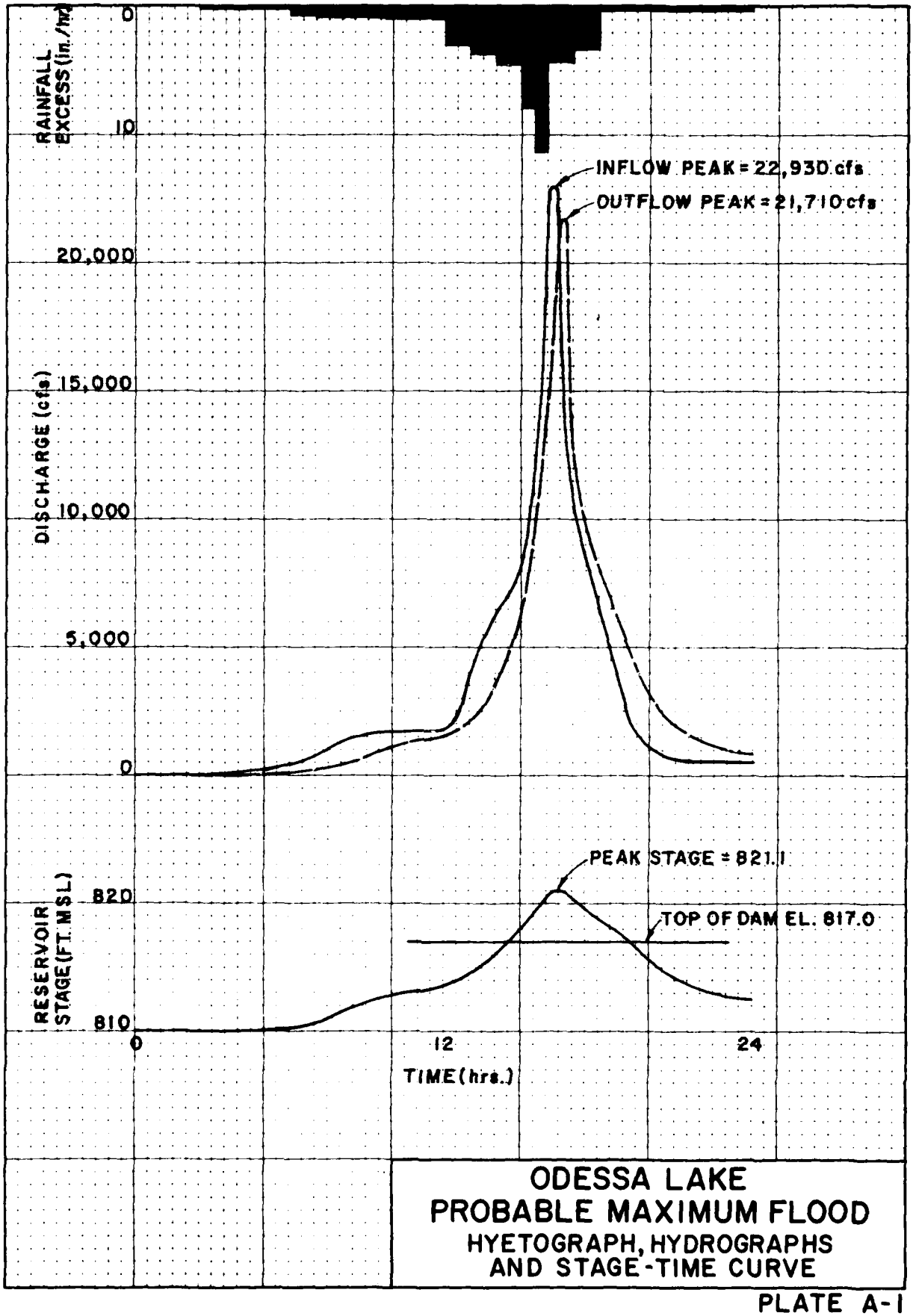
3. The elevation-storage relationship above normal pool elevation was constructed by planimetering the area enclosed within each contour above normal pool. The storage between two elevations was computed by multiplying the average of the areas at the two elevations by the elevation difference. The summation 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.

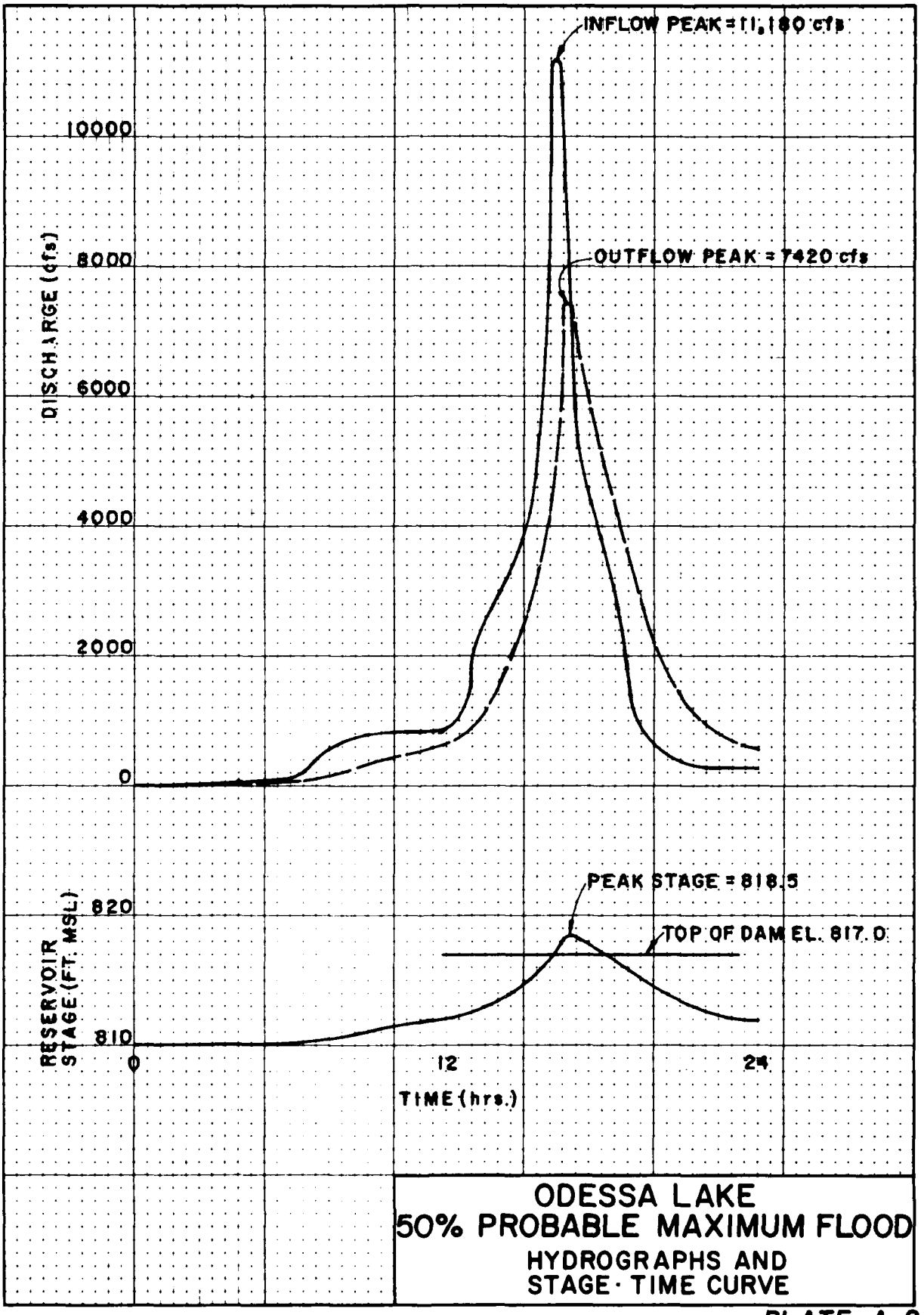
(2) U.S. Department of the Interior, Bureau of Reclamation, Design of Small Dams, 1974, Washington, D.C.

(3) U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2, Water Surface Profiles, November, 1976, Davis, California.



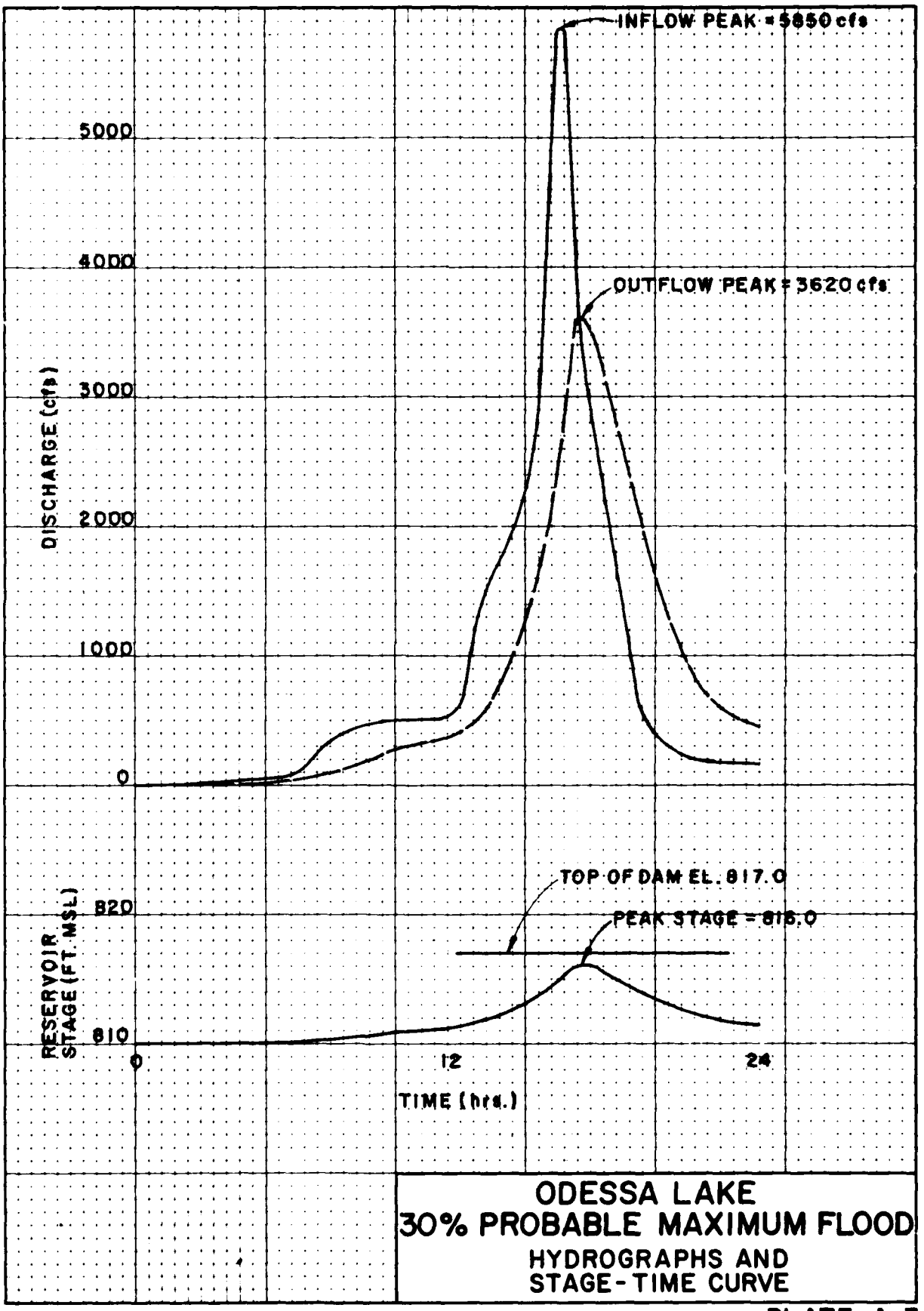
ODESSA LAKE
PROBABLE MAXIMUM FLOOD
HYETOGRAPH, HYDROGRAPHS AND STAGE-TIME CURVE

PLATE A-1



ODESSA LAKE
50% PROBABLE MAXIMUM FLOOD
HYDROGRAPHS AND STAGE-TIME CURVE

PLATE A-2



ODESSA LAKE
30% PROBABLE MAXIMUM FLOOD
HYDROGRAPHS AND STAGE-TIME CURVE

PLATE A-3

END

DATE
FILMED
11-81

DTIC