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NATIONAL DAM SAFETY PROGRAM. TEMPLES LAKE DAM (MO 40065), LOWER--ETC(U)
MAR 80 J L ANDERSON, W J SELVO, R M DAVIS

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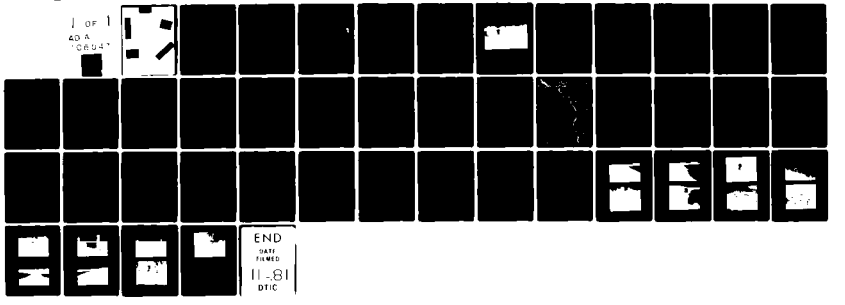

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.	

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TEMPLES LAKE DAM
STODDARD COUNTY, MISSOURI

MISSOURI INVENTORY NO. 40065

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY: ST. LOUIS DISTRICT CORPS OF ENGINEERS
FOR: GOVERNOR OF MISSOURI

MARCH 1980

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

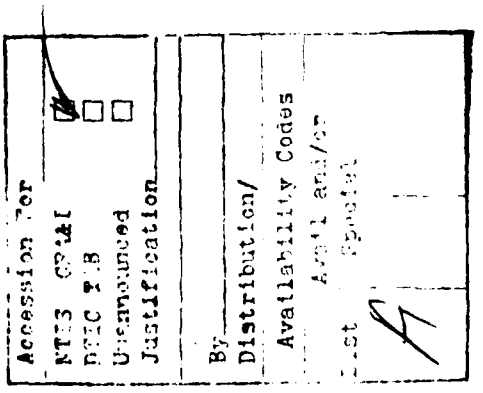
Name of Dam	Temples Lake Dam
State Located	Missouri
County Located	Stoddard County
Stream St. Francis River	
Date of Inspection	21 May 1979

The Temples Lake Dam was inspected by an interdisciplinary team of engineers from the Memphis District, U. S. Army 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. Failure would threaten the life and property of two families downstream of the dam.

The inspection and evaluation indicate that the spillway is adequate and does meet the criteria set forth in the guidelines for a dam having the above mentioned size classification and hazard potential. For its size and hazard category, this dam is required by the guidelines to pass from one-half PMF to PMF. However, several considerations were given to selecting the appropriate spillway design flood. There were only two family dwellings downstream of the dam and one dwelling was uninhabited at the time of the inspection. Also, the owner has breached the guide levee (which increases the outflow quantity considerably) during times of high reservoir levels in the past and it is his intention to do so again if the need ever arises. Hence, considering the small number of dwellings and property downstream of the dam and the past operational procedures of the owner, the one-half PMF is considered the appropriate spillway design flood. The spillway (with the guide levees in place) will pass both the 100-year flood and one-half PMF without the dam overtopping. The 100-year flood is a flood which has a 1 percent chance of being exceeded in any given year. There are no other hydrologic or hydraulic deficiencies.

Deficiencies visually observed by the inspection team were minor erosion gullies on the downstream embankment slope and minor wavewash on the upstream embankment slope. Another deficiency found was the lack of seepage and stability analysis records.



It is recommended that the owner take action to correct or control the deficiencies described. Corrective works should be in accordance with analyses and design performed by an engineer experienced in the design and construction of dams.

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SIGNED
SUBMITTED BY: _____ 14 APR 1980
Chief, Engineering Division Date

SIGNED
APPROVED BY: _____ 14 APR 1980
Colonel, CE, District Engineer Date

Overview of Lake

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
TEMPLES LAKE DAM - ID NO. 40065

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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 for the St. Louis District, Corps of Engineers, directed that a safety inspection of Temples 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 earthen structure built on a plateau in the uplands which border the Mississippi Embayment. Topography adjacent to the valley is gently rolling. Soils in the area are formed of silty clays. Topography in the vicinity of the dam is shown on Plate 2.

(2) A 8-inch diameter smooth iron pipe with a canopy inlet and trash rack sloping through the embankment for a horizontal distance of 98 feet on a slope of approximately 1V on 9.25H is the primary means of discharge. An earthen emergency spillway is cut in the right abutment. The emergency spillway is a triangular section with a left side slope of 1V on 6.25H and right side slope of 1V on 8.2H. The average depth is 5 feet. The discharge of the emergency spillway empties into a side channel that extends for a distance of approximately 700 feet where it connects to a farm pond. (See Plate 3).

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

b. Location. The dam is located in the south central portion of Stoddard County, Missouri, as shown on Plate 1. The lake formed by the dam as shown on Plate 2 is located on the Valley Ridge, Missouri Quadrangle sheet in Section 25; Township 24 North; Range 9 East.

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, this dam and impoundment is in the small size category.

d. Hazard Classification. Guidelines for determining hazard classification are presented in the same guidelines as referenced in paragraph c above. Based on referenced guidelines, this dam is in the High Hazard Classification.

e. Ownership. The dam is owned by Mr. Kenneth Temples, Route 3, Dexter, Missouri 63841.

f. Purpose of Dam. The dam forms a 9-acre farm pond.

g. Design and Construction History. The dam was constructed in 1974 by the present owner, Mr. Kenneth Temples. There were no design plans. Borrow material for the construction of the dam consisted of the native clay which was taken from the lake area and from the surrounding hills. The effort utilized in compacting the embankment is unknown. The dam reportedly has a core trench, however, the dimensions of the trench are not known. A guide levee on the downstream side of the emergency spillway channel connects to a farm pond about 700 feet from the centerline of the main dam (See Plate 3). The owner reported that on some occasions he has breached the guide levee that forms the side channel to relieve the dam of rising water levels.

h. Normal Operating Procedure. Normal rainfall, runoff, transpiration, and evaporation all combine to maintain a relatively stable water surface elevation. However, at the time of the inspection, the owner was draining the lake with a PVC siphon pipe inserted within the primary discharge pipe.

1.3 PERTINENT DATA

a. Drainage Area - 185 acres (Topographic Quadrangle)

b. Discharge at Damsite.

(1) Discharge can take place through a canopy pipe inlet and an emergency spillway. The flow is contained within a guide levee until elevation 347.6 N.G.V.D. Then flow will overtop portions of the guide levee.

(2) Estimated experienced maximum flood at damsite - unknown.

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

(1) Observed Pool - 344.0
(2) Normal Pool - 343.9
(3) Spillway Crest
(i) Main Spillway - 344.0
(ii) Guide levee - 347.6

(4) Maximum Experienced Pool - Unknown
(5) Top of Dam - 350.7
(6) Maximum Pool
(i) PMF - 351.2
(ii) ½ PMF - 350.2
(7) Invert of Discharge Pipe at Stilling Basin - 330.3
(8) Streambed at centerline of dam - 324.5
(9) Maximum Tailwater - Unknown

d. Reservoir. Length of maximum pool - 1400± feet.

e. Storage. (Acre - feet)

(1) Observed Pool - 41
(2) Normal Pool - 40
(3) Spillway Crest
(i) Main spillway - 41
(ii) Guide levee - 74
(4) Maximum Experienced Pool - Unknown
(5) Top of Dam - 108
(6) Maximum Pool
(i) PMF - 113
(ii) ½ PMF - 102

f. Reservoir Surface Area (Acres)

(1) Observed Pool - 8.63
(2) Normal Pool - 8.57
(3) Spillway Crest
(i) Main spillway - 8.63
(ii) Guide levee - 10.85
(4) Maximum Experienced Pool - Unknown
(5) Top of Dam - 12.76
(6) Maximum Pool
(i) PMF - 13.07
(ii) ½ PMF - 12.46

g. Dam.

(1) Type - earth embankment
(2) Length - 370± feet
(3) Height - 26.2 feet Maximum
(4) Top Width - 13± feet
(5) Side Slopes
(a) Downstream - 1V on 3.12H
(b) Upstream - 1V on 3.54H

(6) Impervious core - Reported by owner - no verification.
(7) Cutoff - Unknown
(8) Grout curtain - Unknown

h. Diversion and Regulating Tunnel. None.

i. Primary Discharge System.

(1) Type - An uncontrolled 8-inch diameter smooth iron pipe with a canopy inlet and trash rack sloping through the embankment on slope of 1V on 9.25H. (See paragraph 1.2a).
(2) Horizontal length of 8-inch diameter pipe - 98 feet
(3) Invert elevation of inlet - 343.9 N.G.V.D.
(4) Invert elevation of outlet - 330.3 N.G.V.D.

j. Emergency Spillway.

(1) Type - Uncontrolled earthen triangular section.
(2) Width of weir - N/A
(3) Average depth - 5 feet
(4) Length of discharge channel - approximately 700 feet.
(5) Side Slopes
(i) Left - IV on 6.25H
(ii) Right - IV on 8.2H
(6) Crest Elevation
(i) Main Spillway - 344.0 N.G.V.D.
(ii) Guide levee - 347.6 N.G.V.D

k. Regulating Outlet. None.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No design data exists.

2.2 CONSTRUCTION

The dam was constructed in 1974 by the present owner, Mr. Kenneth Temples. Borrow material for the construction of the dam consisted of the native clay which was taken from the lake area and from the surrounding hills. The effort utilized in compacting the embankment is unknown. The dam reportedly has a core trench, however, the dimensions of the trench are not known.

2.3 OPERATION

The primary means of discharge is the 8-inch smooth iron pipe. Emergency discharge can take place through the emergency spillway located in the right abutment. Both structures are uncontrolled and normal rainfall, runoff, and evaporation coupled with the uncontrolled discharges combine to maintain a rather stable water surface. Discharges from the lake flow along the spillway channel and for elevations less than 347.6 N.G.V.D. will flow into another farm pond. For elevation greater than 347.6 N.G.V.D. flow will pass over the guide levee into the floodplain below dam.

2.4 EVALUATION

a. Availability. The only engineering data readily available are the personal recollections of the present and previous owners.

b. Adequacy. The field and visual inspections presented herein are considered adequate to support the conclusions of this report. Seepage and stability analyses comparable to the requirments 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. Not applicable.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. Visual inspection of Temples Lake Dam was performed on 21 May 1979. Personnel making the inspection were employees of the Memphis District, Corps of Engineers, and included a geologist, hydraulic engineer, and soils engineer. Specific observations are discussed below.

b. Project Geology. The dam is located on the Monadnockic Remnant of the Pleistocene Uplands of the Mississippi River Embayment. In the local area, this section is called Crowleys Ridge. Crowleys Ridge is the remnant of the Pleistocene which formerly covered the Mississippi Embayment area prior to its dissection by the Mississippi-Ohio River complex. Geological sections indicate that Crowleys Ridge consists of a loess mantle covering the Pleistocene which is underlain by the Wilcox Group of the Lower Eocene. The loess consists of predominantly silt sized particles while the Pleistocene is a coarse sand at the top, grading to a gravel on top of the Tertiary. In this area, the Wilcox Group is the Ackerman formation which is the light gray to brown silty non-marine clay. The dam is located in a Seismic Zone 3.

c. Dam. Based on the cross-section presented on Plate 5, the dam has an average upstream embankment slope of 1V on 3.54H and an average downstream slope of 1V on 3.12H. The crown width of the dam is 13 feet. The visual inspection indicates no evidence of any undue settlement, cracking or sliding of the dam. No animal burrows were observed in the dam. The crest and slopes are very well grassed and maintained. (See Photos 1, 2, and 3).

The upstream embankment has no erosion protection and some minor wavewash has occurred intermittently along the upstream face (See Photo 4). Minor erosion appears on the downstream face of dam; however, this appears to have been caused by the use of this portion of the dam by cattle. (See Photo 5). Also a marshy area was observed on the downstream toe of the embankment near the emergency spillway (See Photo 6). No evidence of piping material or seepage flow was observed. The area appeared to be a low marshy area.

d. Appurtenant Structures. An 8-inch diameter smooth iron pipe with a canopy inlet and trash rack is the primary means of discharge. At the time of the inspection the trash rack had been removed. The lake was also being drained by a siphon constructed of PVC pipe inserted within the main discharge pipe. (See Photo 7). Minor seepage flow with a reddish iron oxide tint was observed in the area of the outlet. No piping of dam material was observed. Willow trees and cattails grew abundantly in the area. (See Photo 8). An earthen V-shaped emergency spillway was cut in the right abutment. The discharge of the emergency spillway empties into a side channel that extends for a distance of approximately 700 feet. The channel then connects to a small farm pond. The emergency spillway and side channel are very well maintained. (See Photos 9 and 10). Plate 6 shows the centerline profile of the top of the guide levee and the centerline of the bottom of the emergency spillway channel from the main dam to the farm pond.

Plates 7 and 8 show cross-section along the emergency spillway channel as depicted on Plate 3. Photos 11 and 12 show the farm pond and lagoon respectively.

e. Reservoir Area. No wavewash, excessive erosion, or slides were observed along the shoreline of the reservoir.

f. Downstream Channel. The downstream channel is overgrown with trees and brush. However, the flood plain immediately downstream is pastureland. (See Photo 13).

3.2 EVALUATION

None of the conditions observed are significant enough to indicate a need for immediate remedial action. However, the minor wavewash and minor erosion gullies on the downstream embankment slope of the dam should be corrected or controlled.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The primary discharge system and emergency spillway are uncontrolled; therefore, no regulating procedure exists for these structures. The pool is controlled by rainfall, runoff, evaporation, and capacity of the uncontrolled discharge system. Discharges from the lake flow along the spillway channel and for elevation less than 347.6 N.G.V.D. flow will pass over the guide levee into the floodplain below the dam.

4.2 MAINTENANCE OF DAM

In the past, the guide levee has been breached by the owner during times of high water level in the reservoir to enhance the discharge potential of the main spillway exit section. The dam and discharge structures are all very well maintained.

4.3 MAINTENANCE OF OPERATING FACILITIES

No operating facilities exist at this dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEM

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

4.5 EVALUATION

The maintenance of the dam is adequate.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data. There was no hydraulic nor hydrologic design data to evaluate.

b. Experience Data. The drainage area was developed using USGS Valley Ridge, Missouri Quadrangle. The spillway and dam layout are made from surveys conducted by the inspecting team.

c. Visual Observation.

(1) The primary means of discharge is through an 8-inch diameter smooth iron pipe as discussed in para 1.3i.

(2) The emergency discharge is through a triangular shape ditch as discussed in para 1.3j.

(3) Both discharge structures are very well maintained.

(4) The emergency spillway channel is connected to a farm pond approximately 700 ft. downstream from the centerline of the dam. On occasion, the flow from the emergency spillway could act as a source of water for the downstream pond (See Plate 3 and Photos 9, 10, 11, and 12).

d. Overtopping Potential. The spillway will safely pass one-half of the Probable Maximum Flood (PMF) at a discharge of 860 cfs without overtopping. The Probable Maximum Flood is defined as the flood discharge that may be discharged from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The 100-year frequency flood will not overtop the embankment. For its size and hazard category, this dam is required by the guidelines to pass from one-half PMF to PMF. However, several considerations were given to selecting the appropriate spillway design flood. There were only two family dwellings downstream of the dam and one dwelling was uninhabited at the time of the inspection. Also, in the past, the owner has breached the guide levee during times of high reservoir levels to increase the flows through the principal emergency spillway section. Hence considering the small nmber of dwellings and property downstream of the dam and the past maintenance procedures of the owner, the one-half PMF is considered the appropriate spillway design. The data utilized in the preparation of the estimates was various Federal reports, data from field inspection and survey, and output from COE program HEC-1, Dam Safety Version. More specific details will be found in Appendix A.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observation. Visual observations of the dam and appurtenant structures are discussed and evaluated in SECTIONS 3 and 5.

b. Design and Construction Data. The design and construction data were limited to that information discussed in SECTION 2.

c. Opertion Records. There have been no known operations which have affected the structural stability of the dam.

d. Post Construction Changes. No post construction changes exist which will affect the structural stability of the dam.

e. Seismic Stability. This dam is located in Seismic Zone 3. Since this dam is located in Seismic Zone 3, it is possible that an earthquake could occur of sufficient intensity to cause severe damage or failure of the dam.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety. Several items were noted during the visual inspection which should be corrected or controlled. The marshy area on the downstream toe near the emergency spillway area, the seepage observed at the outlet, the minor wave wash on the upstream slope, and the small erosion gullies are the items of concern. 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. One-half of the probable Maximum Flood (the spillway design flood) will not overtop the dam.

b. Adequacy of Information. Due to the lack of engineering design and construction data, the conclusions in this report were based on performance history and external visual conditions. The inspection team considers that these data are sufficient to support the conclusions herein.

c. Urgency. The remedial measures recommended in paragraph 7.2 should be accomplished in the near future. The stability and seepage analyses should be given priority by the owner and accomplished without delay in order to determine if corrective measures are necessary.

d. Necessity for Phase II. Based on the results of the Phase I inspection, no Phase II inspection is recommended.

e. Seismic Stability. This dam is located in Seismic Zone 3. Since this dam is located in Seismic Zone 3, it is possible that an earthquake could occur of sufficient intensity to cause severe damage or failure of the dam.

7.2 REMEDIAL MEASURES

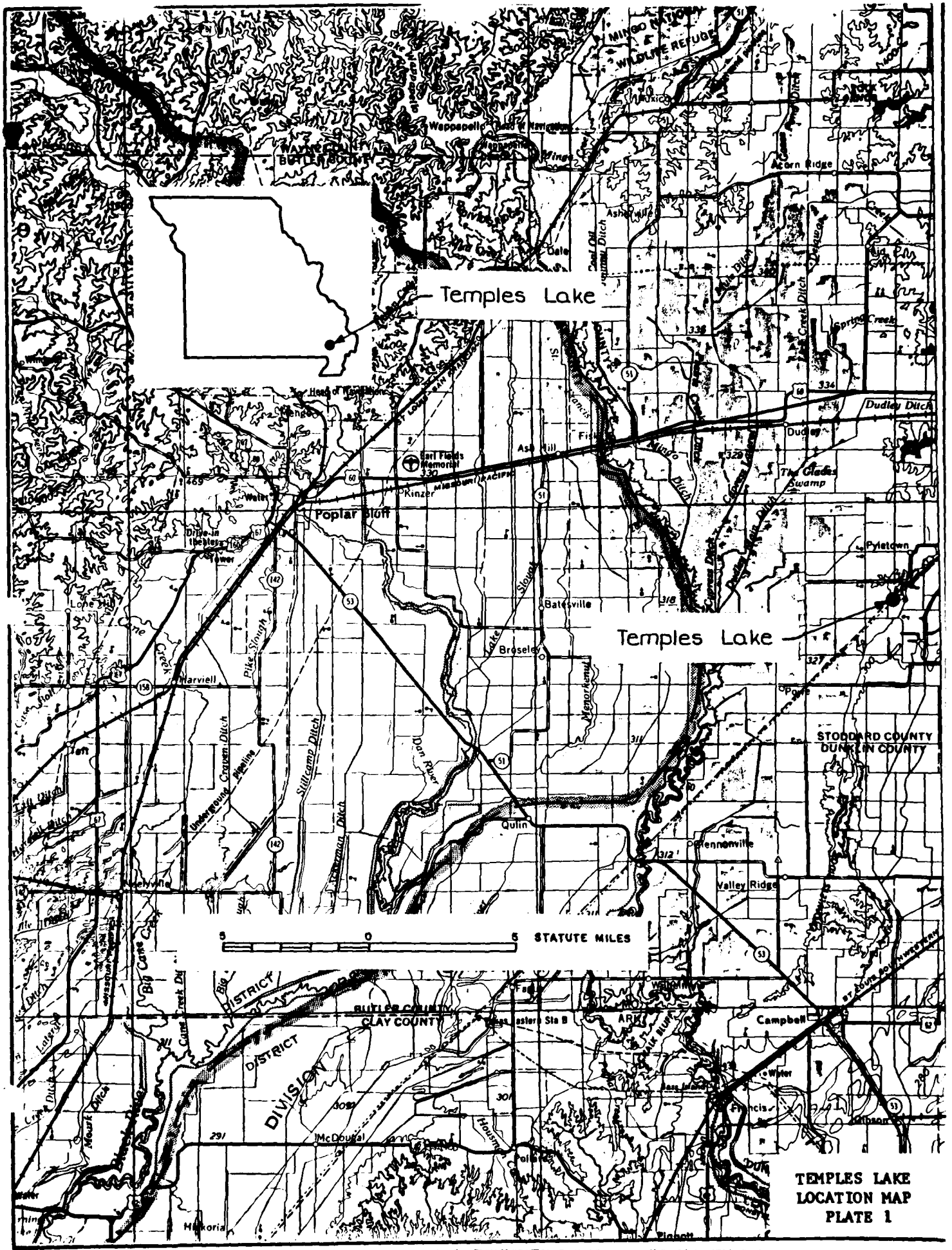
a. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available which is considered a deficiency. These seepage and stability analyses should be performed for the appropriate loading conditions (including earthquake loads) and made a matter of record.

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

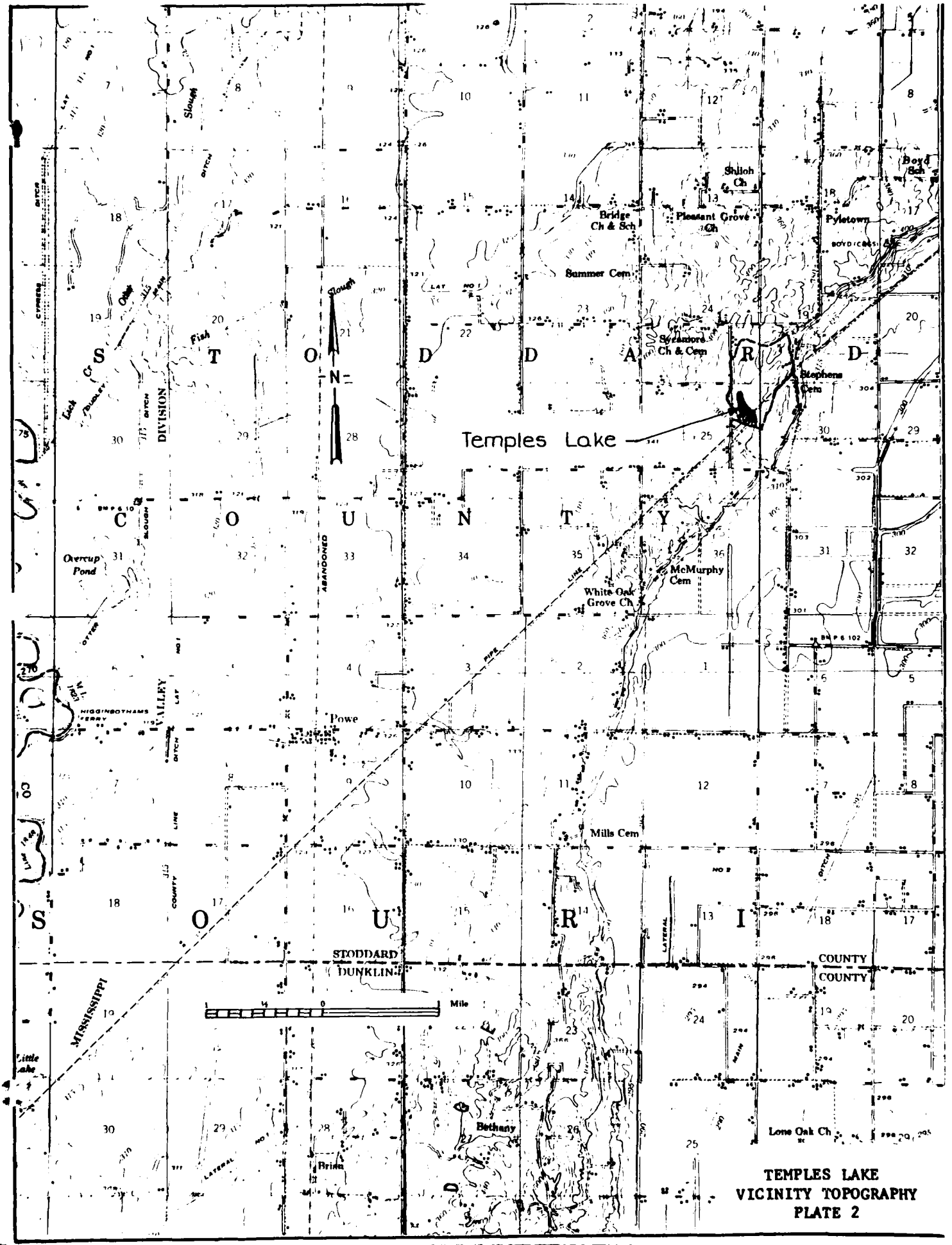
(1) The minor wave wash of the upstream embankment slope and the minor erosion gullion on the downstream embankment slope should be corrected or controlled.

(2) Periodic inspection of dam to ascertain if any additional seepage problems occur or the ones noted begin to pipe dam material.

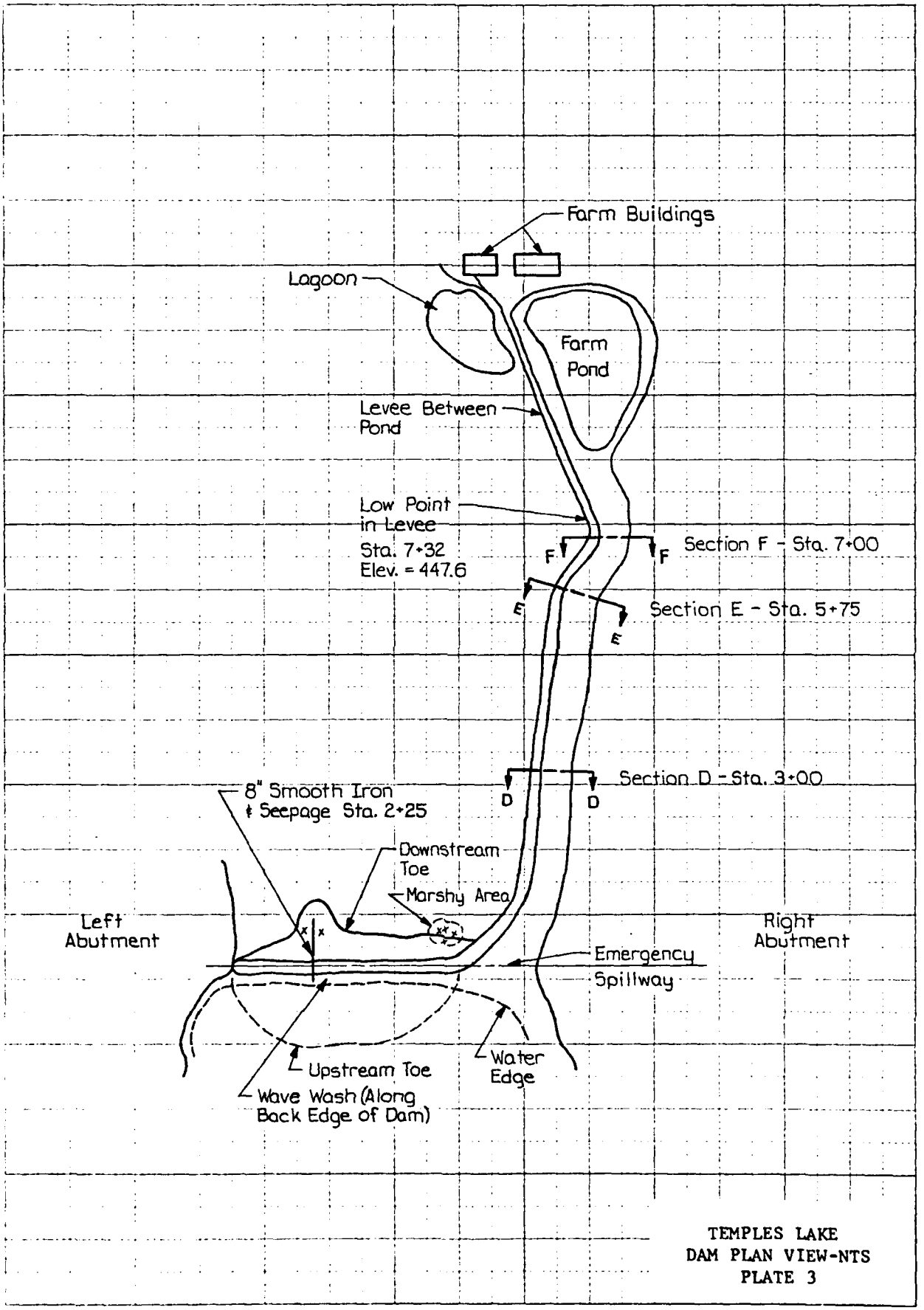
(3) A detailed inspection of the dam should be made at least every 5 years by an engineer experienced in design and construction of dams.



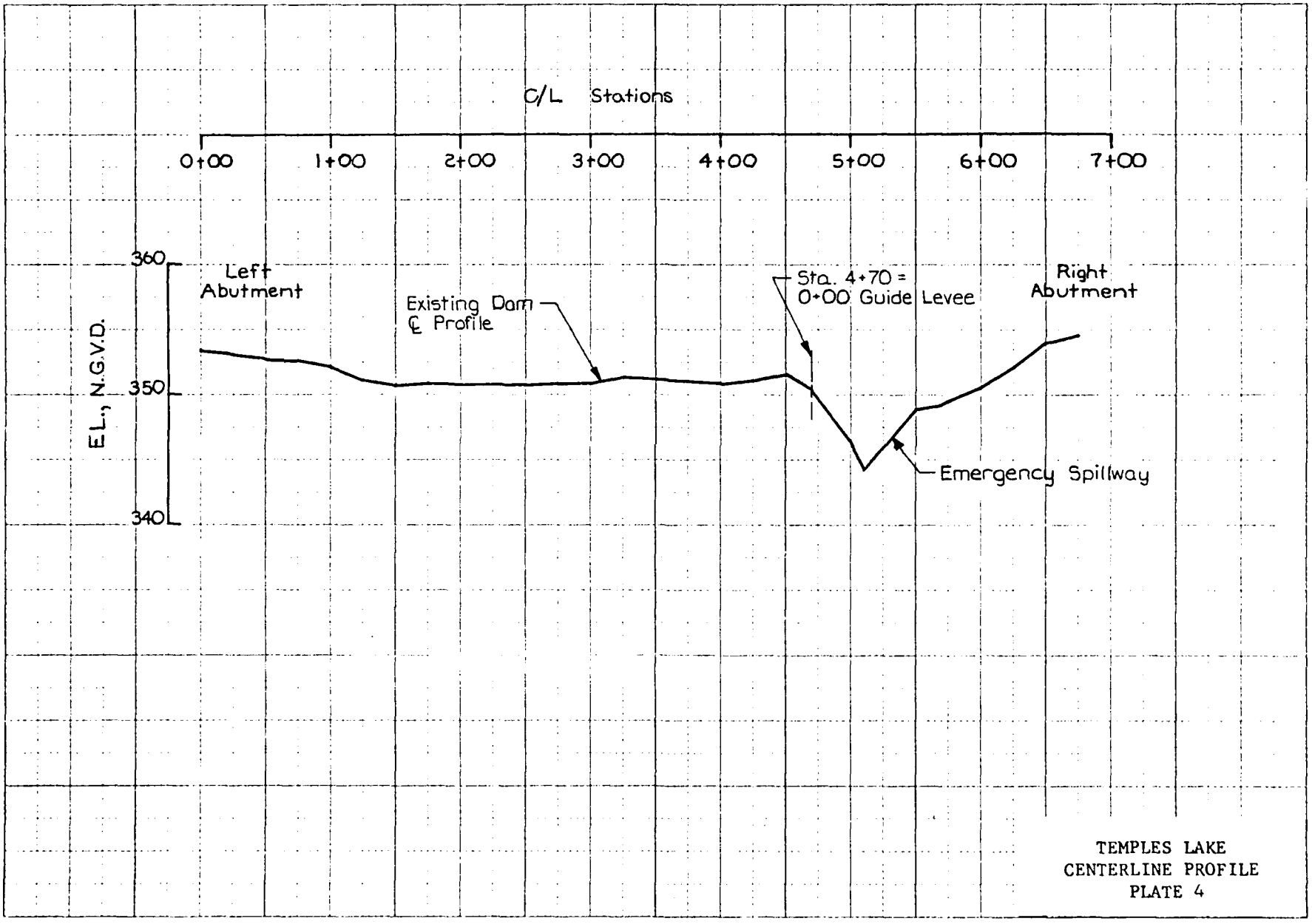
TEMPLES LAKE LOCATION MAP PLATE 1



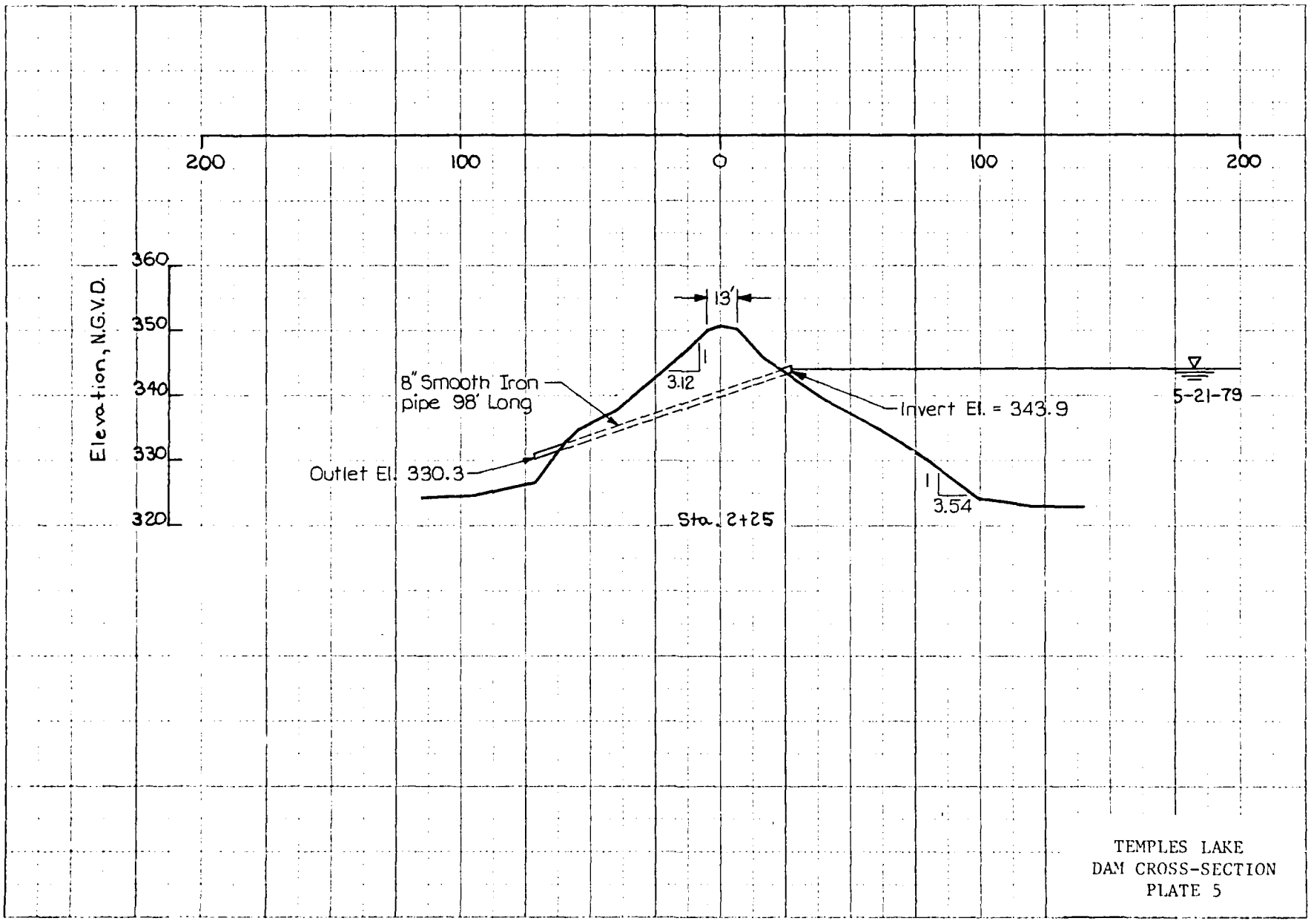
TEMPLES LAKE
VICINITY TOPOGRAPHY
PLATE 2



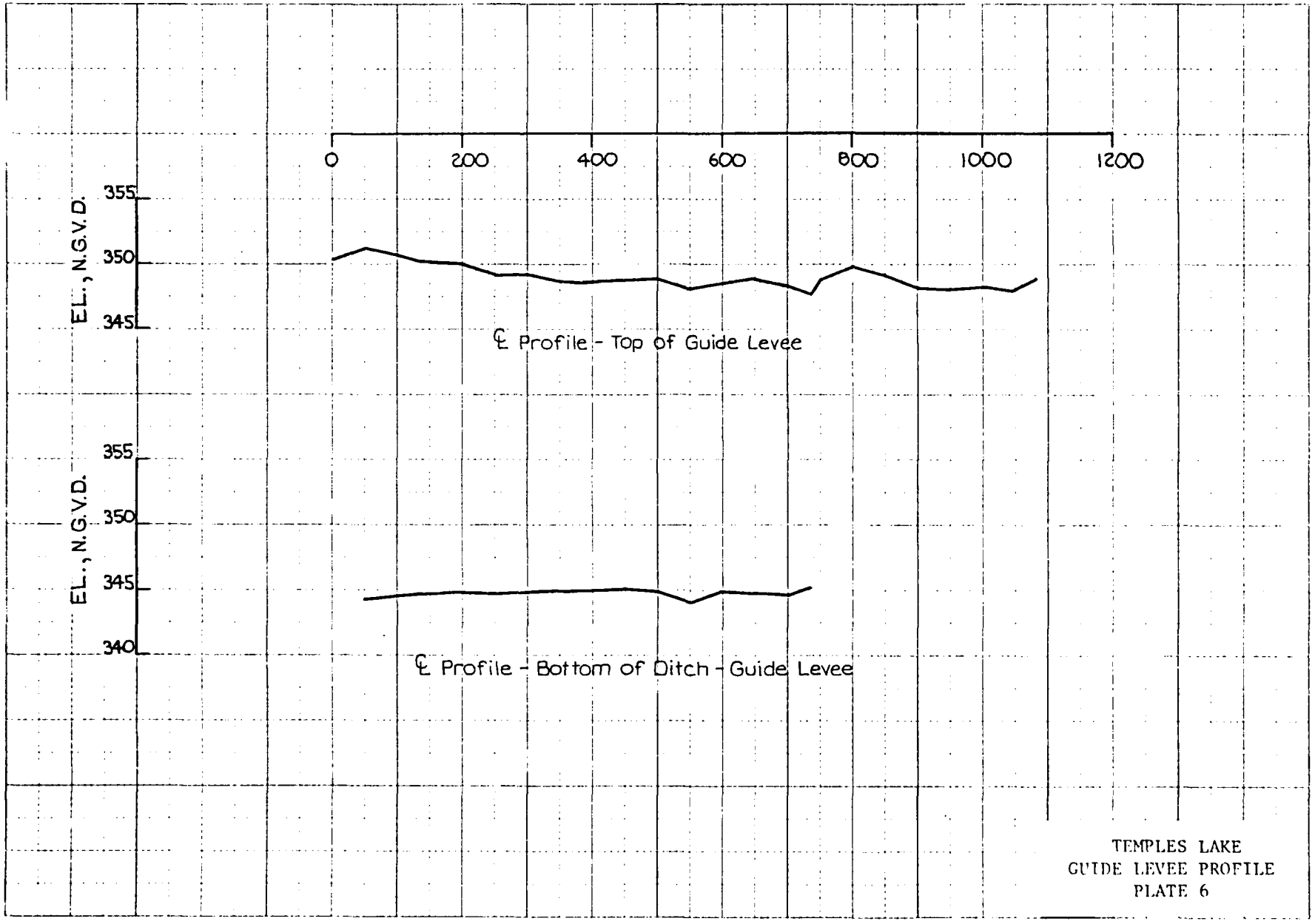
TEMPLES LAKE
DAM PLAN VIEW-NTS
PLATE 3



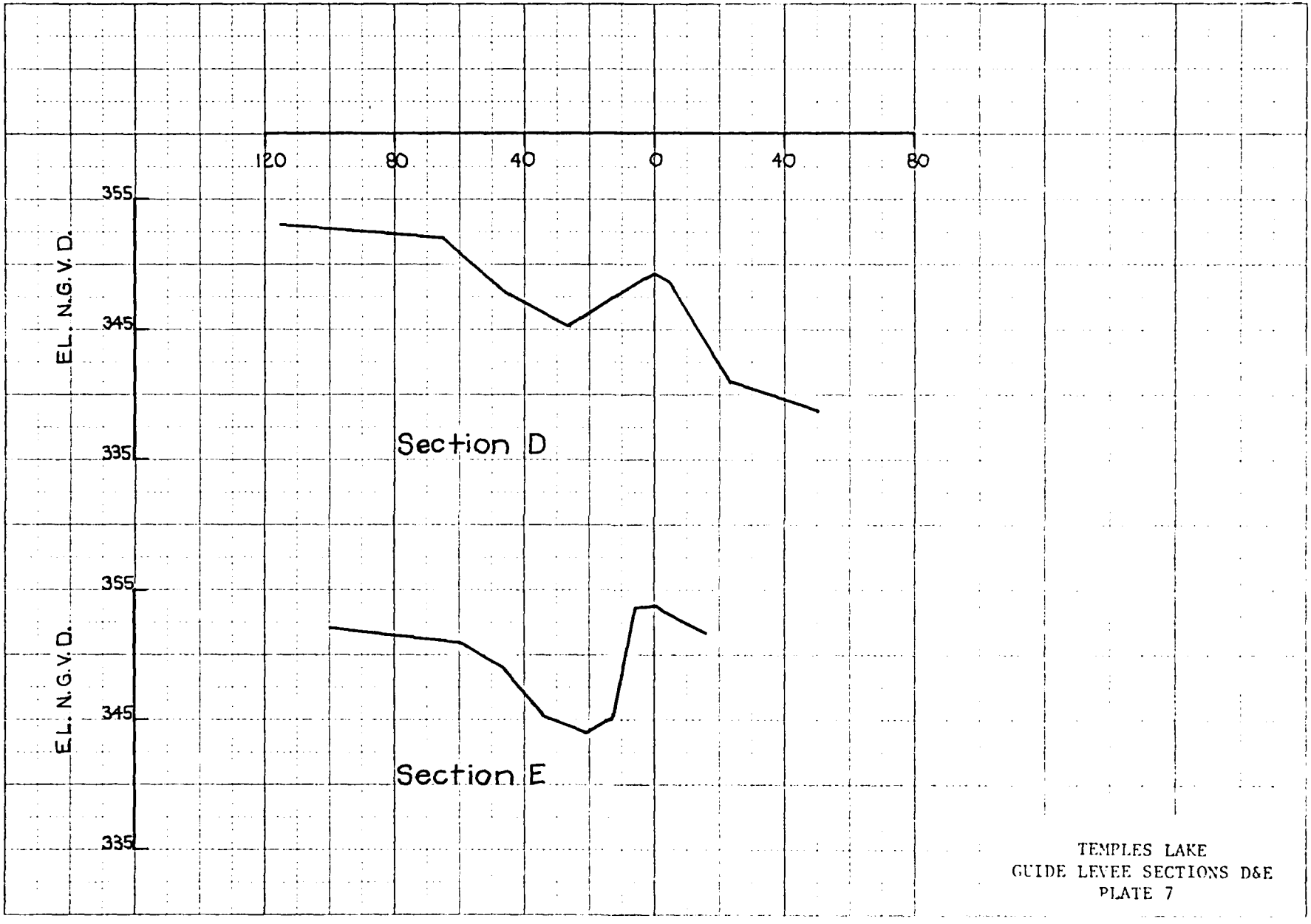
TEMPLES LAKE
CENTERLINE PROFILE
PLATE 4



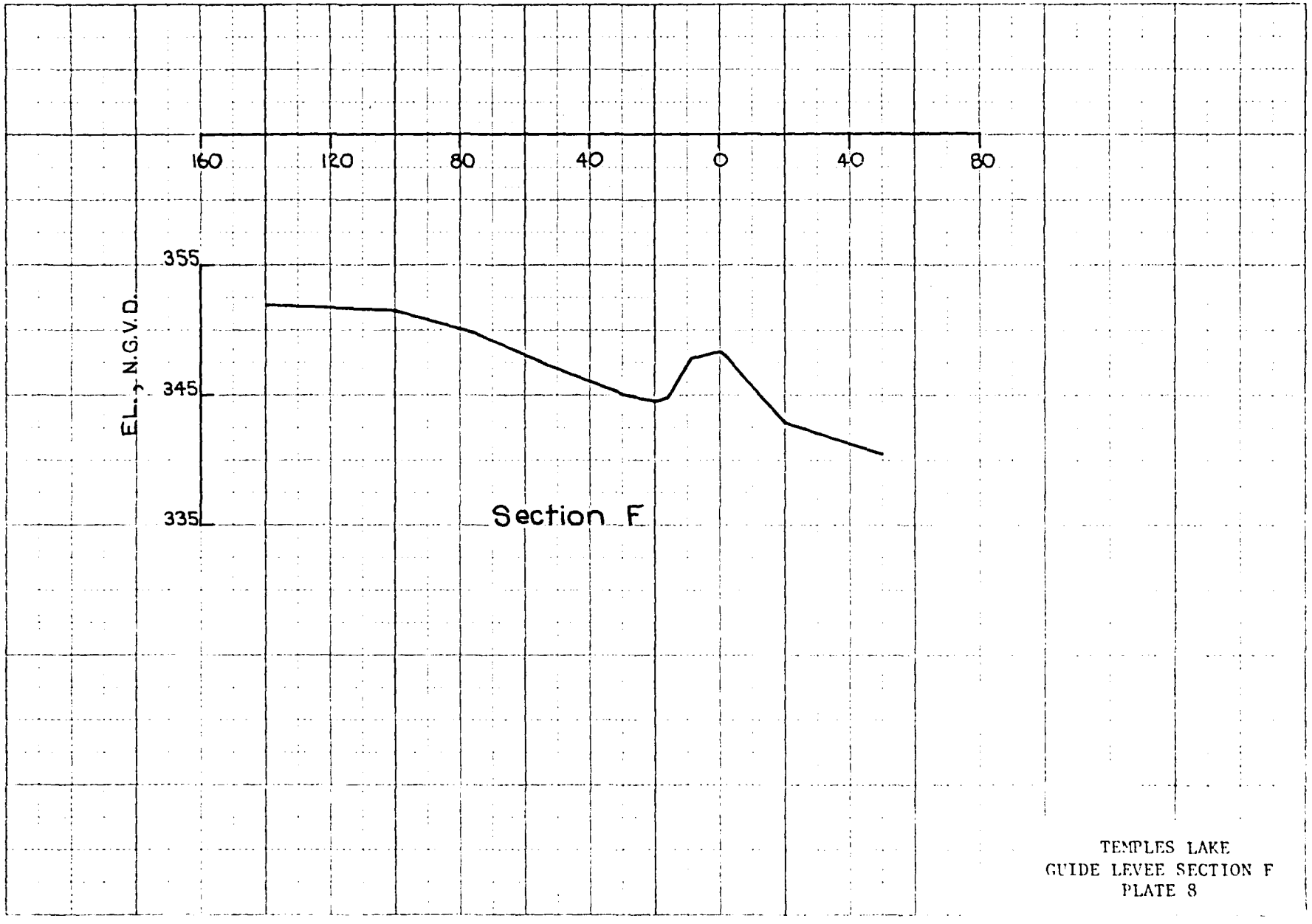
TEMPLES LAKE
DAM CROSS-SECTION
PLATE 5



TEMPLES LAKE
GUIDE LEVEE PROFILE
PLATE 6



TEMPLES LAKE
GUIDE LEVEE SECTIONS D&E
PLATE 7



TEMPLES LAKE
GUIDE LEVEE SECTION F
PLATE 8

APPENDIX A

Hydrology and Hydraulic

1. Narrative. The methods and sources of data were primarily those suggested by the Hydraulics Branch, St. Louis District, Corps of Engineers. Specific references and methods will be discussed below. A field inspection survey was made to determine the outlet structures and the topographic characteristics of the dam. HEC-1, Dam Safety Version was used in conjunction with appropriate input parameters to compute inflow hydrographs, determine storage, and route through the structure.

a. Rainfall. The PMF was developed using *Hydrometeorological Report No. 33*. The "Hop Brook" reduction factor was not used to adjust the rainfall for this study. The distribution of rainfall was developed using the criteria as described by EM 1110-2-1411 (Standard Project Storm).

PMF Rainfall	27.1 inches
PMF Percentages	6 hr - 102
	12 hr - 120
	24 hr - 130
	48 hr - 140

b. Unit Hydrograph Coefficients. The unit hydrograph for the drainage basin was developed using the Snyder Method as outlined in HEC-1, Dam Safety Version. Two methods of determining time of concentration were used, namely the Snyder's method and Kirpich method for comparative purposes.

The variables used for the appropriate method are listed below.

Snyder's: $t_p = C_t (L L_{ca})^{0.3}$; L and L_{ca} in miles

L = 5830 feet = 1.10 miles

L_{ca} = 2710 feet = 0.51 miles

Stream Slope = 59 ft/mi. = .0112 ft/ft

C_t = .72

t_p = .61 hr

t_c = .71 hr

Kirpich: $t_c = .00013 \left(\frac{L, \text{ ft}}{\sqrt{\text{Slope, ft/ft}}} \right)^{.77}$

t_c = .58 hr

Where

L = *length of the main stream channel* from the outlet to the divide.

L_{ca} = length along the main channel to a point opposite the watershed centroid.

C_t = coefficient used in Snyder's method.

t_p = time to peak (hr)

t_c = time of concentration (hr)

Consequently, since the time of concentrations agreed so closely, a value for t_p was chosen to be .61 hr or 36.6 minutes which necessitated developing a 10-minute unit hydrograph and applying a 48 hr rainfall to develop the inflow hydrographs.

The general soils map of Stoddard County indicates that Temples Lake Dam lies in an area where the soil is of the Loring-Memphis Association which is a well to moderately well drained medium textured soil on the sloping uplands of Crowley's Ridge. This places the area in a Soil Group C/B. The primary soil cover consists of woods and pasture in a fair hydrologic condition which gives a value of CN of 80 for antecendent moisture condition III. Consequently a value of C_p = .65 was chosen as the runoff parameter to be used in Snyder's method.

Listed below are the remaining parameters necessary to develop the unit hydrograph of 10-minute duration.

$C_p = .649$

Drainage Area = .289 sq. mi.

The unit hydrograph ordinates are found in the computer printout.

c. Loss Rates. A loss rate of .5 in. initially and .05 in./hr. was chosen based upon engineering experience.

d. Base Flow and Antecendent Flood Conditions. A base flow of 1 cfs was selected and the routing was started at elevation 347.6 N.G.V.D. in the emergency spillway which corresponds to the low point on the top of the guide levee.

e. Hydrograph Routing. HEC-1, Dam Safety Version uses the single routing step of the "Modified Puls" method. Routing through the emergency spillway and over the embankment was accomplished using the non-level dam top option of the HEC-1, Dam Safety Version (See Plate 3) coupled with critical energy consideration of the flow. The routing through the canopy inlet structure was obtained considering pipe full conditions with the following assumptions:

Primary Discharge Structure

D = 8 inch smooth iron pipe

L = 98 feet

n = .016

head losses: $h_{ent} = \frac{1}{2}\frac{V^2}{2g}$

$h_{exit} = \frac{V^2}{2g}$

h_f = friction loss (Manning's Equation)

$Q = .3248\ A_{8"}\sqrt{2g}\ \ H^{1/2}$

The invert elevation from which to calculate H, height of head, is 330.7 N.G.V.D. The flow was calculated by hand as input into computer program on Y4 and Y5 cards for elevation and discharge, respectively.

f. Storage. The storage was calculated with the HEC-1, Dam Safety Version with input consisting of elevations and respective surface area which were determined using the USGS Valley Ridge, MO Quadrangle.

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  10 JAN 80
**********
    1     A                                NON-FEDERAL DAM INSPECTION
    2     A                                      DAM #40065
    3     A                                   TEMPLE'S DAM
    4     B    300       0       10       -0       -0       -0       -0       -0       -0       -0
    5     1      5
    6     J      1       9        1
    7     J1    .1      .15      .2       .25      .3       .35      .4       .5       1.
    8     K      0       1                                                    1
    9     1                  PROBABLE MAXIMUM PRECIPITATION-48 HR DURATION
   10     M      1       1     .2891                .2891     1.
   11     P            27.1      102      120      130      140
   12     T                                                          .5       .05
   13     W     .61     .649
   14     X      1       1        2
   15     K      1       2                                                    1
   16     K1                              ROUTED FLOWS THROUGH TEMPLES DAM
   17     Y                                       1        1
   18     Y1     1                                                  -347.6     -1
   19     Y4  343.9    344.9    345.9    346.9    347.9    348.9    349.9    351.9    353.9
   20     Y5     0     3.45     3.57     3.68     3.80     3.90     4.01     4.21     4.40
   21     SA     0        0    6.166   18.497
   22     SE   330      334      340      360
   23     SS 347.6
   24     SD 350.7
   25     SL     0       50       66       83      125      140      190      453      501      641
   26     SV 347.6    347.6    348.9    349.2    350.5    350.7    350.7    351.0    351.5    353.2
   27     K     99
```

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  10 JAN 80
**********************************

RUN  DATE: 11 JAN 80
     TIME: 11.25.24
```

NON-FEDERAL DAM INSPECTION
DAM #40065
TEMPLE'S DAM

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	10	=0	=0	=0	=0	=0	=0	=0

JOPER	NWT	LROPT	TRACE
5	=0	=0	=0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS=	.10	.15	.20	.25	.30	.35	.40	.50	1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

PROBABLE MAXIMUM PRECIPITATION-48 HR DURATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	=0	=0	=0	=0	1	=0	=0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.29	=0.	.29	1.00	=0.	=0	=0	=0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
=0.	27.10	102.00	120.00	130.00	140.00	=0.	=0.

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
=0	=0.	=0.	1.00	=0.	=0.	1.00	.50	.05	=0.	=0.

UNIT HYDROGRAPH DATA
TP= .61 CP= .65 NTA= =0

RECESSION DATA
STRTQ= 1.00 QRCSN= 1.00 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 4.25 AND R= 3.14 INTERVALS

UNIT HYDROGRAPH 19 END-OF-PERIOD ORDINATES, LAG= .61 HOURS, CP= .65 VOL= 1.00

25.	88.	158.	195.	176.	131.	95.	69.	50.	36.
26.	19.	14.	10.	7.	5.	4.	3.	2.	

0 END-OF-PERIOD FLOW

MO,DA	HR,MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO,DA	HR,MN	PERIOD	RAIN	EXCS	LOSS	COMP Q

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS								
				RATIO 1 .10	RATIO 2 .15	RATIO 3 .20	RATIO 4 .25	RATIO 5 .30	RATIO 6 .55	RATIO 7 .40	RATIO 8 .50	RATIO 9 1.00
HYDROGRAPH AT	1	.29	1	191.	287.	383.	479.	574.	670.	766.	957.	1915.
	(	.75)	(	5.42)(	8.13)(	10.84)(	13.55)(	16.26)(	18.97)(	21.69)(	27.11)(	54.21)
ROUTED TO	2	.29	1	146.	229.	315.	403.	492.	582.	671.	857.	1860.
	(	.75)	(	4.14)(	6.50)(	8.91)(	11.41)(	13.94)(	16.47)(	18.99)(	24.26)(	52.67)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	347.60	347.60	350.70
STORAGE	73.	73.	108.
OUTFLOW	4.	4.	1252.

RATIO OF PMF	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
.10	348.50	0.	83.	146.	0.	40.50	0.
.15	348.80	0.	86.	229.	0.	40.50	0.
.20	349.06	0.	89.	315.	0.	40.50	0.
.25	349.29	0.	91.	403.	0.	40.50	0.
.30	349.49	0.	94.	492.	0.	40.50	0.
.35	349.68	0.	96.	582.	0.	40.50	0.
.40	349.84	0.	97.	671.	0.	40.50	0.
.50	350.15	0.	101.	857.	0.	40.33	0.
1.00	351.16	.46	113.	1860.	1.00	40.33	0.

PHOTO 1: Centerline of Dam from the Left Abutment

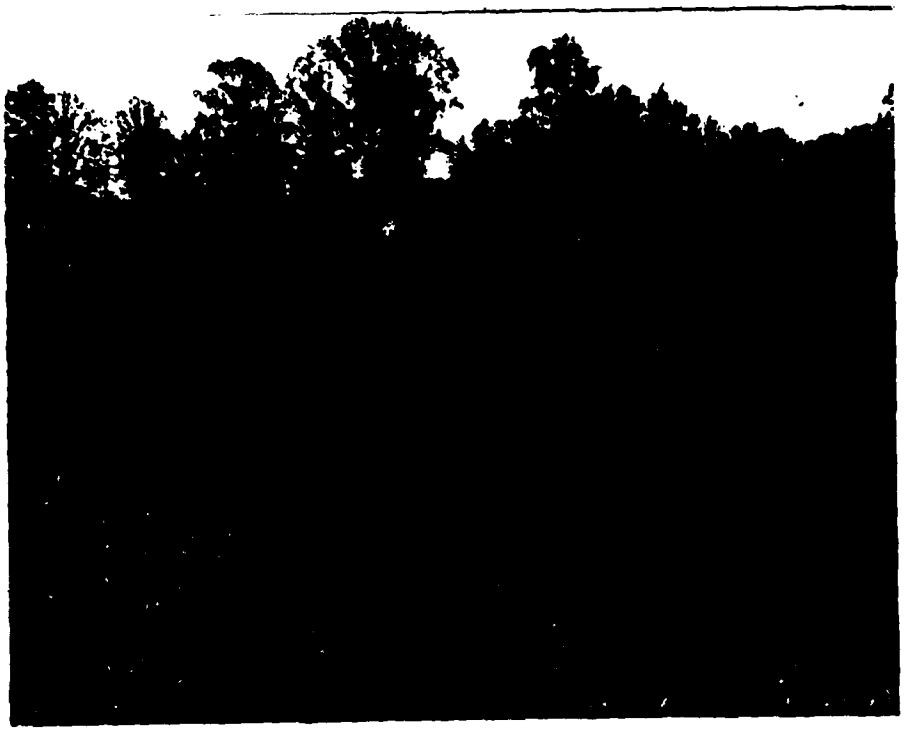


PHOTO 2: Downstream Slope from Right Abutment

PHOTO 3: Upstream Slope from Left Abutment

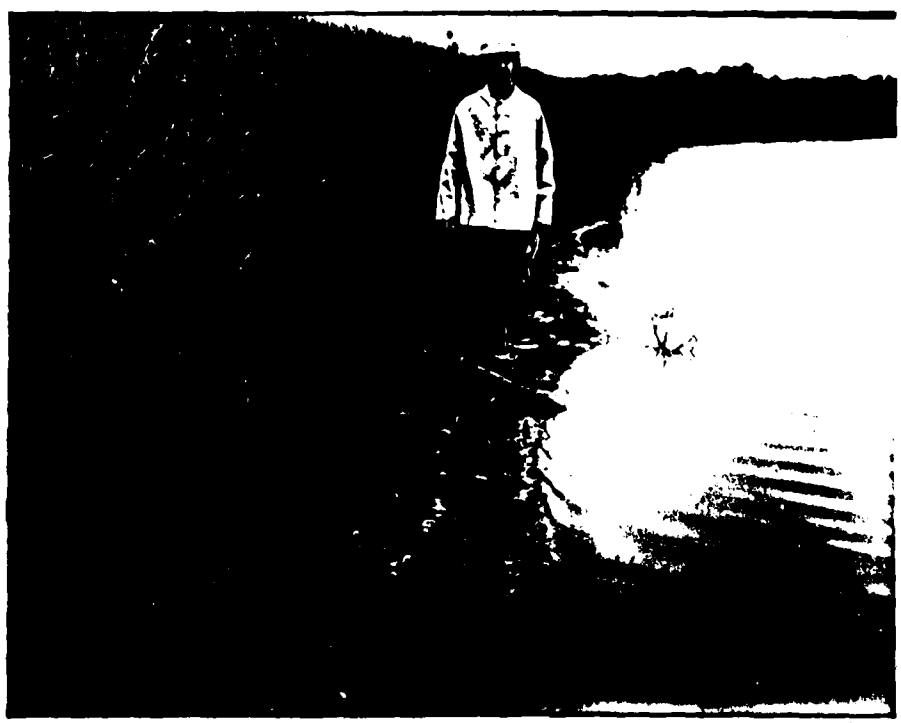


PHOTO 4: Wavewash on Upstream Slope

PHOTO 5: Erosion Area

PHOTO 6: Marshy Area near Downstream Toe and Emergency Spillway

PHOTO 7: Inlet Pipe

PHOTO 8: Outlet Pipe

PHOTO 9: Emergency Spillway

PHOTO 10: Guide Levee between Farm Pond and Lagoon

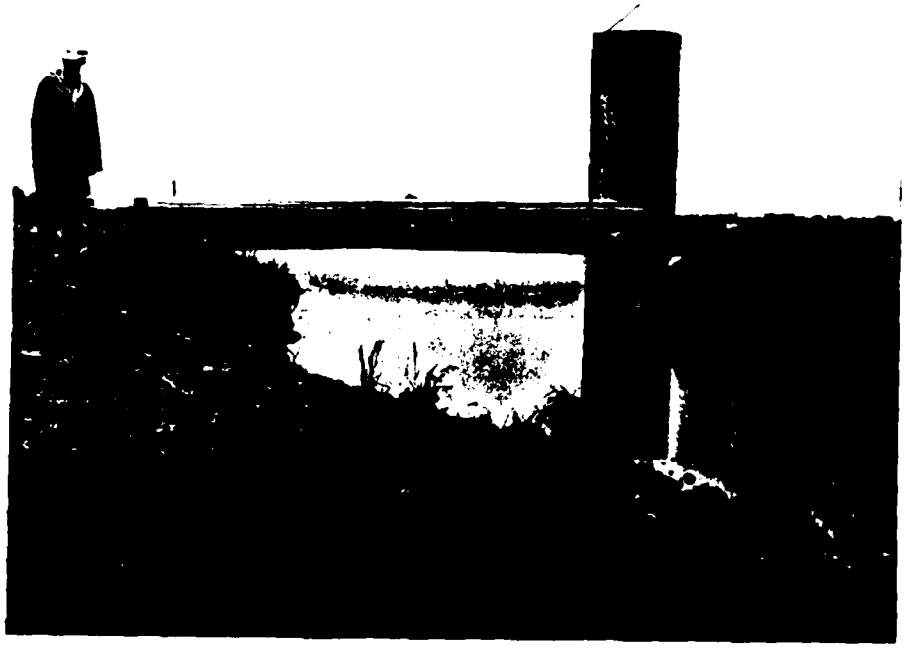


PHOTO 11: Farm Pond

PHOTO 12: Lagoon

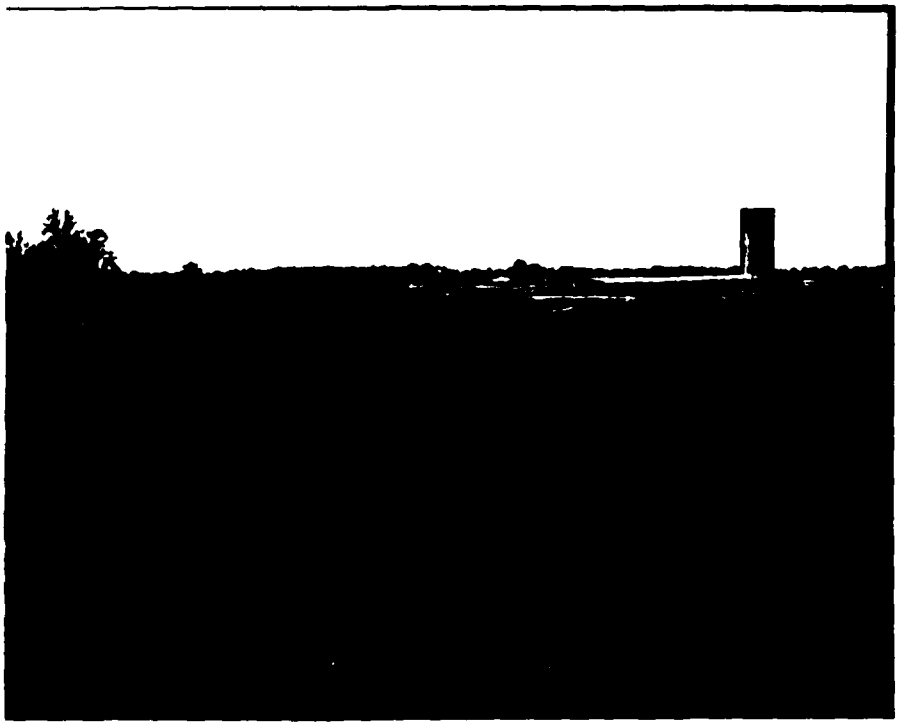


PHOTO 13: Floodplain Downstream from Dam

PHOTO 14: Dwelling Downstream of Dam

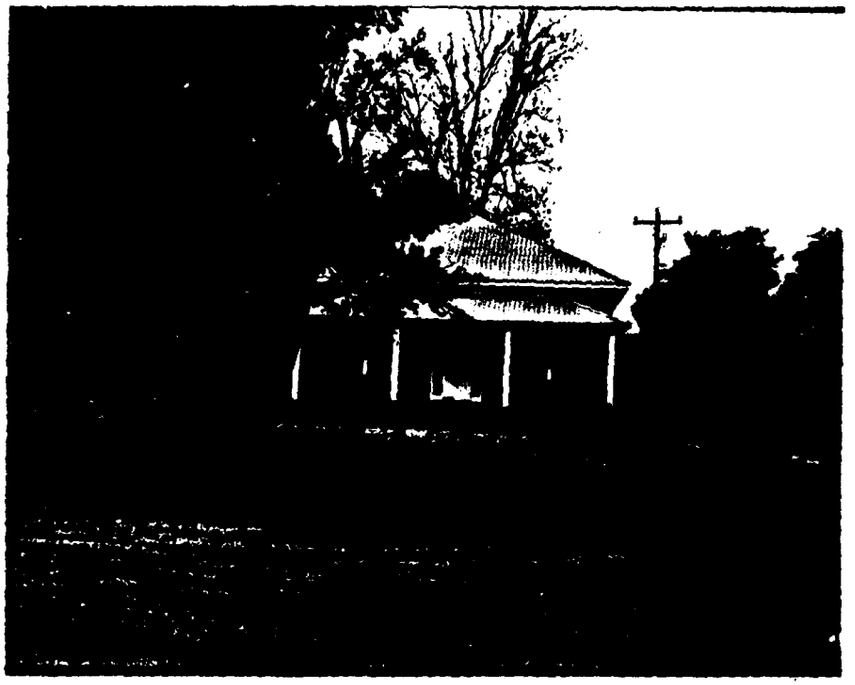


PHOTO 15: Uninhabited Dwelling Downstream of Dam


DATE:
ILME