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BERGER ASSOCIATES INC HARRISBURG PA
NATIONAL DAM INSPECTION PROGRAM. LAKE LATTIMORE DAM (NDI-ID NUM--ETC(U)
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LAKE LATTIMORE DAM**

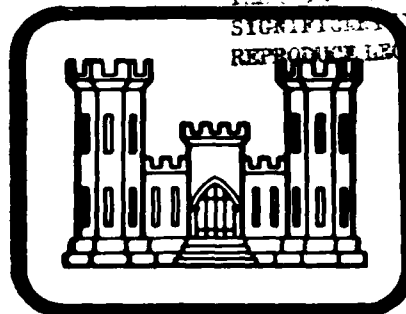
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LEVEL

PIKE COUNTY, PENNSYLVANIA

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

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PREPARED FOR
DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

BY

Berger Associates, Inc.
Harrisburg, Pennsylvania

JUNE 1980

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PREFACE

This report has been prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITIONS
AND RECOMMENDATIONS

Name of Dam: LAKE LATTIMORE DAM
State & State No.: PENNSYLVANIA, 52-78
County: PIKE
Stream: DINGMANS CREEK
Date of Inspection: April 1, 1980

↓ Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in fair condition.

In accordance with the Corps of Engineers' evaluation guidelines, the size classification of this dam is small and the hazard classification is high. The Spillway Design Flood (SDF) for a dam having these classifications is in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. The recommended SDF for this dam is one-half of the PMF. The spillway capacity is inadequate to pass the SDF peak inflow without overtopping the dam. The project is capable of passing only 17 percent of the PMF. Failure of this dam will significantly increase the hazard to loss of life downstream from the dam. The spillway capacity is seriously inadequate. The project, therefore, is considered to be unsafe, non-emergency.

✓ The following recommendations are presented for immediate action by the owner:

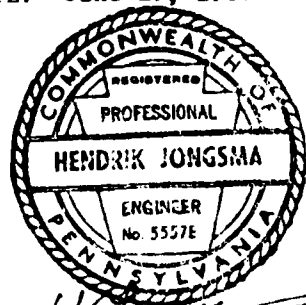
1. That a detailed hydrologic and hydraulic engineering analysis be made by a professional engineer with experience in the design and construction of dams to determine means for improving the capacity of the spillway and reservoir system so that it will meet the requirements of the Commonwealth of Pennsylvania,
2. That all brush and trees be removed from the embankment slopes and that a professional engineer, experienced in the design and construction of dams, be consulted for the removal of tree stumps and roots.

3. That the drawdown facilities be made operable and be operated and maintained on a regular basis,
4. That the deteriorated areas of the spillway weir and walls be repaired,
5. That a formal surveillance and downstream warning system be developed for use during periods of high or prolonged precipitation, *and*
6. That an operation and maintenance manual be prepared for guidance in the operation of the dam during normal and emergency conditions, and that a schedule be developed for the annual inspection of the dam and its appurtenant structures.

SUBMITTED BY:

BERGER ASSOCIATES, INC.
HARRISBURG, PENNSYLVANIA

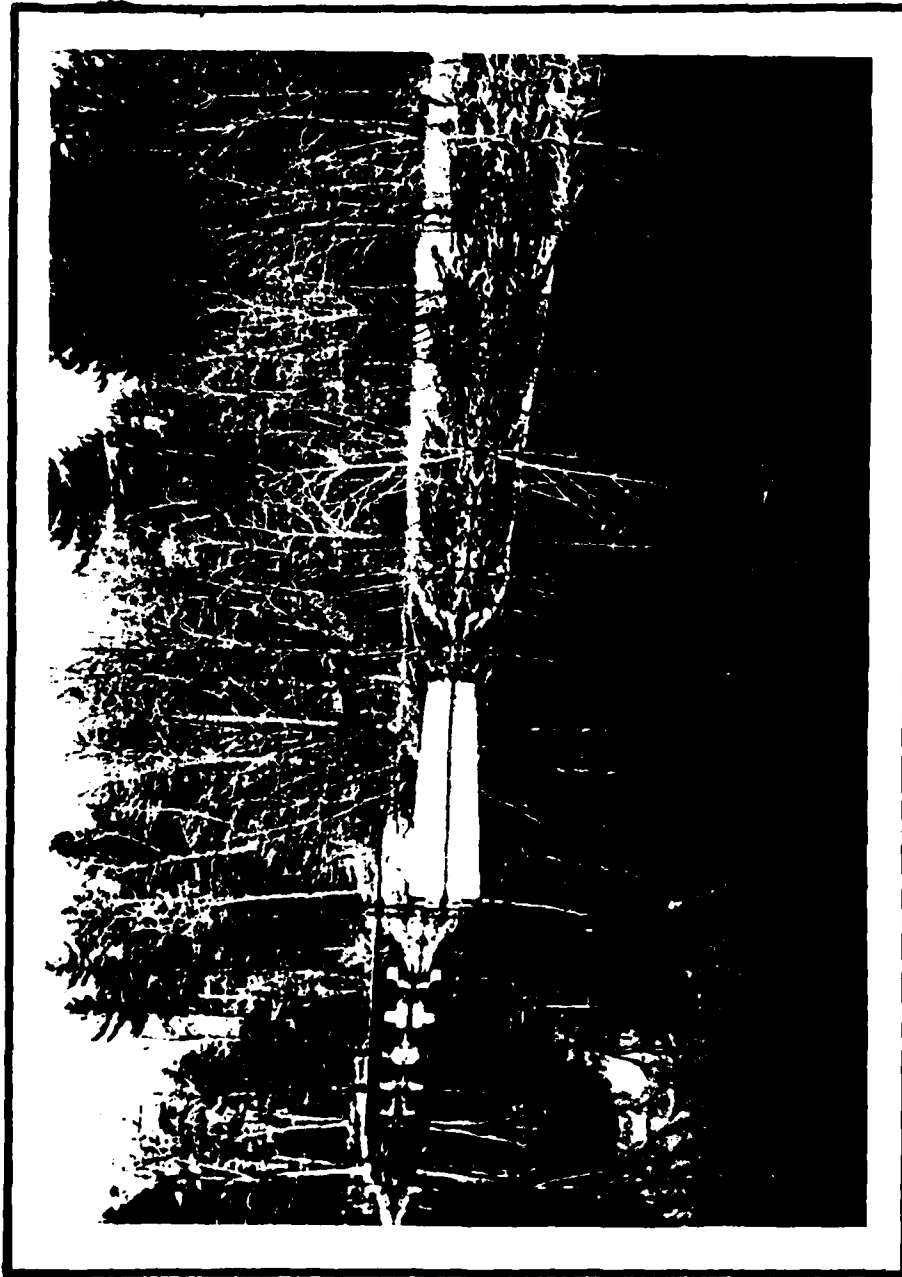
DATE: June 19, 1980



APPROVED BY:

James W. Peck
JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

DATE *21 July 1980*



OVERVIEW
LAKE LATTIMORE DAM
Photograph No. 1

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Number

LAKE LATTIMORE DAM

NDI-ID PA-00406,

DER-ID 52-78

Delaware River Basin
Pike County, Pennsylvania. Phase I Inspection

SECTION 1 - PROJECT INFORMATION

Report #

1.1 GENERAL

A. Authority

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspections of dams throughout the United States.

B. Purpose

The purpose of this inspection is to determine if the dam constitutes a hazard to human life and property.

1.2 DESCRIPTION OF PROJECT

A. Description of Dam and Appurtenances

Lake Lattimore Dam, formerly known as Nyce Lake Dam, is an earthfill structure with a concrete core wall. The top of the dam is 15 feet above the original streambed elevation. The embankment is approximately 250 feet long and abuts a state highway at the right end. This highway borders the south side of the reservoir (Plate II, Appendix E). The spillway is located in the left abutment. It consists of a 110 foot long ogee section which discharges the water into a short grouted riprap channel. The forebay of the spillway is bridged by a steel beam bridge supported on 5 piers. This pedestrian bridge has a wooden deck. The emergency drawdown consists of two 42-inch pipes with slide gates at the upstream end. Access to the control structure is from the breast of the embankment.

B. Location:

Delaware Township, Pike County
U.S.G.S. Quadrangle - Lake Maskenozha,
Pennsylvania - New Jersey
Latitude 41°-14.8', Longitude 74°-55.5'
Appendix E, Plates I & II

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Outlet works low-pool outlet at pool Elev. 1035.0	164
Outlet works at pool level Elev. 1041.0 (spillway crest)	280
Spillway capacity at pool Elev. 1044.9 (low point of dam)	3322
D. <u>Elevation</u> (feet above mean sea level)	
Top of dam (low point as surveyed)	1044.9
Top of dam (design)	1045.0
Spillway crest (normal pool)	1041.0
Upstream portal invert (slide gate openings)	1030.0
Downstream portal invert	1029.5
Streambed at centerline of dam - estimate	1030.0
D. <u>Reservoir</u> (miles)	
Length of normal pool	0.5
Length of maximum pool	0.5
E. <u>Storage</u> (acre-feet)	
Spillway crest (Elev. 1041.0)	199
Top of dam (Elev. 1044.9)	433
F. <u>Reservoir Surface</u> (acres)	
Top of dam (Elev. 1044.9)	69
Spillway crest (Elev. 1041.0)	53.8
G. <u>Dam</u>	
Refer to Plate V in Appendix E for plan and section.	
Type: Homogeneous earthfill with concrete core wall.	
Length: 250 feet.	

Height: 15 feet.

Top Width: 10 feet.

Side Slopes:		<u>Design</u>	<u>Surveyed</u>
	Upstream	2H to 1V	2.1H to 1V
	Downstream	2H to 1V	3.8H to 1V

Zoning: Concrete core wall to elevation 1042.0.

Grouting: None reported.

H. Outlet Facilities

Type: Two 42" diameter concrete pipes through embankment.

Location: Near center of dam.

Closure: Two 42" slide gates on upstream end.

I. Spillway

Type: Concrete ogee section.

Width: 110 feet.

Location: Left abutment.

Crest Elevation: 1041.0

Low Flow Notch: 30' wide at elevation 1040.9

Approach Channel: 120' wide with bridge located about 40' upstream of right end of ogee.

Downstream Channel: Grouted riprap apron.

J. Emergency Outlet

See Section 1.3.H.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The engineering design data for Lake Lattimore Dam (Nyce Lake) are not very extensive and are limited to the construction drawings prepared by the design engineers. The original design drawings, prepared in 1929, consisted of four drawings of which two have been reproduced as Plates III and IV in Appendix E. One drawing, not reproducible, indicated that test pits were excavated. Overburden was about four feet thick consisting of clay underlain by hardpan. A report prepared by PennDER on the application for a permit to construct the dam indicates that the spillway capacity was 3375 cfs which was considered to be adequate.

Repairs to the facilities were made in 1970. The available design data consists of two drawings, reproduced as Plates V and VI in Appendix E. Plate V is a tracing of one of the original drawings.

2.2 CONSTRUCTION

The available construction data are limited to the design drawings and some inspection reports by a representative of the State. These reports indicate that the overburden consisted of a mixture of clay and stone over yellow hardpan. The trenches for the core wall and ogee section were excavated into this hardpan. A spring was encountered during the excavation to the right of the blowoff pipes. The final report indicates that the construction was apparently accomplished with good workmanship.

2.3 OPERATION

Formal records of operation have not been maintained by the owner(s). Inspection reports in the 30's and 40's indicate that maintenance was not good. Indications are that brush and trees were present on the embankment slopes.

Seepage adjacent to the blowoff pipes was recorded in 1935 and presumed to originate from the spring encountered during construction. The original bridge over the spillway forebay collapsed in 1948 and was replaced at a later date.

2.4 EVALUATION

A. Availability

The available data, consisting of construction drawings and inspection reports, are located in the files of PennDER.

B. Adequacy

The available engineering data, combined with the visual site inspection, are considered to be adequate for making a reasonable assessment of the dam and its appurtenant structures.

C. Operating Records

Operating records, including maximum pool levels, are not maintained by the owners.

D. Post Construction Changes

Besides some repair work of the spillway crest and spillway abutment walls, a change was made to the top of the control tower. The upper part of this structure was replaced in 1970 (Plate VI, Appendix E) and the access footbridge to this structure was replaced with earthfill between two retaining walls.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

A. General

The general appearance of Lake Lattimore is fair. Brush and trees are growing on the upstream and downstream slopes of the embankment. The spillway ogee section has some spalling of concrete and the gates on the outlet facilities are rusted and could not be operated during the inspection.

The visual inspection check list and sketches of the general plan and profile of the dam, as surveyed during the inspection, are presented in Appendix A of this report. Mr. Art Hoehne represented the owners and accompanied the inspectors.

Photographs taken on the day of inspection are reproduced in Appendix C.

B. Embankment

A heavy growth of small trees and brush is present on the upstream and downstream slopes of the embankment. Signs of stability problems or seepage were not detected on the slopes. The toe of the dam was dry. The design drawings indicate a long low embankment paralleling the state highway. At the present, the edge of the reservoir is adjacent to the shoulder of the highway. It appears that the highway has been raised and that a portion of the dam embankment was incorporated into the highway fill. The profile, as surveyed (Plate A-II), indicates that the embankment has a low point at elevation 1044.9. The embankment ends at the road. The road forms a barrier on the south side of the reservoir. A small area south of the roadway is at a lower elevation and has no apparent outlet. The highway rises to the east and prevents any flow in that direction.

C. Appurtenant Structures

The spillway forebay was excavated into the left hillside (Plate V, Appendix E) and is bridged by a steel beam structure supported by five concrete piers. The concrete of the piers shows deterioration (Photograph 4, Appendix C). This does not affect the safety of the dam.

The spillway section is a 110 foot long ogee nearly perpendicular to the centerline of the dam. The ogee section shows some deterioration consisting of exposed aggregate and spalling of a few corners at construction joints. Although the spalling is not serious,

preventive maintenance is recommended. The weir has a small notch located near the center of its length for low flow. The slab below the ogee section consists of grouted riprap and is in fair condition.

A low concrete wall on the left side has deteriorated and should be repaired to prevent future damage to the riprap and the hillside. A concrete wall on the right side is constructed against the embankment fill. This wall makes a 90° turn at the toe of the fill and forms the right spillway wall and continues as the headwall for the outlet pipe. This wall is in good condition. Two 42-inch concrete pipes were installed. These pipes are closed off with sliding gates at the upstream end and are operated by controls located on the top of a concrete endwall. Concrete walls extend from the tower to the embankment. Backfill was placed between these walls, thus providing access to the tower from the embankment. The gates were last operated in 1970. On the day of inspection, the gates could not be budged. The operating mechanism is heavily rusted.

D. Reservoir Area

The reservoir is surrounded by wooded slopes except where the highway borders the reservoir. The banks appeared to be stable.

E. Downstream Channel

The downstream channel below the spillway is a natural stream with exposed rocks on the bottom and sides. The channel passes under the highway about 500 feet downstream from the dam and flows through a State park half a mile further downstream. Extensive picnic facilities exist in this park within the floodplain. There are several cottages near the stream about 7700 feet downstream. A potential hazard to loss of life exists downstream if the dam fails. The hazard category for this dam is considered to be "High."

3.2 EVALUATION

The overall visual evaluation of these facilities indicates that the dam and its appurtenant structures are in fair condition, mainly due to poor or non-existing maintenance procedures. Recommendations include removal of all brush and trees from the embankment and some repair of the spillway weir and walls. The sliding gates on the outlet should be greased and operated at regular intervals.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The operational procedures at Lake Lattimore Dam are limited. The reservoir is used for recreation and the pool level is maintained at the elevation of the spillway crest. Any additional inflow is discharged over the spillway.

4.2 MAINTENANCE OF DAM

The top of the dam provides access to the Girl Scout Camp and is kept free of trees and brush. The embankment slopes, however, are covered with trees and brush and no maintenance has been provided.

4.3 MAINTENANCE OF OPERATING FACILITIES

The gates on the outlet pipes have not been maintained or operated during the past 10 years. The handle to operate the gate stems is stored in the basement of the caretakers house.

4.4 WARNING SYSTEM

A formal surveillance and downstream warning system does not exist at the present time.

4.5 EVALUATION

The operational procedures for these facilities should include the removal of trees, brush and high weeds on an annual basis. The operating mechanism of the sliding gates should be greased regularly and the gates should be opened at least on an annual basis.

A formal surveillance and downstream warning system should be developed for use during periods of high or prolonged precipitation.

SECTION 5 - HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

A. Design Data

The hydrologic and hydraulic analyses available from PennDER for Lake Lattimore Dam were not very extensive. No stage-discharge curve, stage-storage curve, unit hydrograph, nor flood routings were contained in the PennDER files.

B. Experience Data

There are no records of flood levels at Lake Lattimore Dam. Based on records of the U.S.G.S. stream gage on Mill Creek at nearby Mountainhome, Pa., the maximum inflow to Lake Lattimore is estimated to be 2758 cfs. This flood was apparently passed without difficulty.

C. Visual Observations

On the date of the inspection, no conditions were observed that would indicate that the appurtenant structures of the dam could not operate satisfactorily during a flood event until the dam is overtopped. It was noted that the gates on the outlet works are rusted and could not be operated. Upstream of Lake Lattimore are three manmade dams and two natural lakes. These impoundments were included in the hydrologic evaluation in Appendix D.

D. Overtopping Potential

Lake Lattimore has a total storage capacity of 433 acre-feet and an overall height of 15 feet, both referenced to the top of the dam. These dimensions indicate a size classification of "Small," the hazard classification is "High" (See Section 3.1.E.).

The recommended Spillway Design Flood (SDF) for a dam having the above classification is in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. Because of the size, the recommended SDF is one-half the PMF. For this dam, the SDF peak inflow is 11,085 cfs (See Appendix D for HEC-1 inflow computations).

Comparison of the estimated SDF peak inflow of 11,085 cfs with the estimated spillway discharge capacity of 3,322 cfs indicates that a potential for overtopping of Lake Lattimore exists.

An estimate of the storage effect of the reservoir and routing of the computed inflow hydrograph through the reservoir shows that this dam does not have the necessary storage available to pass the SDF without

overtopping. The spillway-reservoir system can pass only a flood event equal to 17% of a PMF.

E. Dam Break Evaluation

The calculations to determine the behavior of the dam in the event of an overtopping and a resulting breaching of the embankment indicates that there will be a substantial increase in water levels downstream from the dam.

Several cottages are located about 7,700 feet downstream from the dam. On the basis of the results of a dam break analysis, using the U.S. Army Corps of Engineers HEC-1 program, the water surface elevations in the vicinity of the houses have been compared for several conditions prior to and after a dam break. (Refer to Table 1, Appendix D). For an earth embankment, it is estimated that one-half foot of overtopping would result in a breach. For this report, it was assumed that the concrete core wall would fail when the embankment erodes. Calculations indicate that 22 percent of the PMF inflow would cause an overtopping of 0.5 foot. The increase in water levels downstream due to overtopping of 1/2 foot with no failure as compared to no overtopping would be 0.9 to 1.0 foot. While more property would be exposed to flooding, the increase to the hazard to loss of life is not considered significant. With failure, however, the breaching analysis indicates a rise of 1.6 feet above the flow level just prior to breach when considering a 15 minute time to complete the breach and a 1.0 foot rise above flow level just prior to breach when considering a one hour time to complete the breach. The increase in hazard to loss of life and property damage is reflected not only in the increase in depth of water of 1.6 feet in the 15 minute breach and 1.0 foot in the one hour breach, but more significantly in the shorter time to reach the peak. Less time would be available to respond to the flooding under the breach conditions.

Being an earth embankment, it is judged that the breach would be completed between the 15 minute and the one hour period. The numerical difference of water levels is 0.6 foot. The property damage would be similar with either time of failure. Again, however, the time factor is most significant regarding loss of life. Calculations indicate that the water depth will increase at a rate of 1.6 feet in 30 minutes under the 15 minute breach condition.

Three dams and two natural lakes are located upstream of Lake Lattimore Dam. For this evaluation, none of these dams were considered to have failed (See Appendix D).

On the basis of these calculations, it is concluded that the hazard to loss of life and property damage is significantly increased

when the dam is overtopped and failed as compared to the condition just prior to failure.

Refer to Table 1, Appendix D, for comparison of flood water levels.

F. Spillway Adequacy

The small size category and high hazard category, in accordance with the Corps of Engineers criteria and guidelines, indicates that the spillway design flood for this dam should be in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. The recommended SDF is one-half PMF.

Calculations show that the spillway discharge capacity and reservoir storage capacity combine to handle only 17% of the PMF (Refer to Appendix D).

Since the spillway discharge and reservoir storage capacity cannot pass one-half of the PMF and because the downstream hazard to loss of life is high and this hazard is significantly increased when the dam fails as compared to just prior to failure, the spillway is judged to be seriously inadequate.

The hydrologic analysis for this investigation was based upon existing conditions of the watershed. The effects of future development were not considered.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

A. Visual Observations

1. Embankment

The visual inspection of Lake Lattimore Dam did not detect any signs of embankment instability. There were no signs of sloughs or seepage. The downstream slope is apparently flatter than the design drawings indicate. Additional fill was placed to the top of the right spillway wall.

2. Appurtenant Structures

The spillway weir and walls show some deterioration, but are apparently stable. No excessive settlement or deflection was noted during the inspection. The outlet and control structure appears to be in good stable condition. There were no signs of cracking or movement in the joints.

B. Design and Construction Data

1. Embankment

The typical section and plans in Appendix E indicate that a concrete core wall was placed in a trench. This wall has an indicated base width of about 2.5 feet and extends up to one foot above normal pool level. Inspection reports indicate that the foundation for this core wall was inspected and approved by a State engineer. A 12-inch thick layer of riprap was placed on the upstream slope. There are no indications of a toe drain.

2. Appurtenant Structures

The concrete ogee section is keyed into the hardpan and has a base width of six feet and appears to be adequate for the height of construction. Details of the abutment walls are limited. The walls are not reinforced. Photographs taken during construction indicate wall thickness of two to four feet, varying with height.

The spillway slab downstream of the weir consists of grouted handlaid riprap with a two foot deep cutoff wall at the downstream end (Plate IV, Appendix E).

The concrete at the upstream end of the outlet pipe apparently deteriorated considerably and was replaced in 1970 with new

concrete starting at about 2.5 feet above the top of the pipes (Plate VI, Appendix E). The walls extending from this tower to the embankment are reinforced. The embankment foundation apparently has consolidated sufficiently so that these walls have not settled or cracked.

The outlet pipe has one seepage collar besides the cutoff wall formed by the core wall.

C. Operating Records

Operating records for this dam have not been maintained.

D. Post Construction Changes

Changes were limited to repair work on the spillway wall (in 1965) and the reconstruction of the intake control structure. The reconstruction of the highway in the early 60's included raising the roadway and incorporating the embankment, paralleling the road, into the roadway fill.

E. Seismic Stability

This dam is located in Seismic Zone 1 and it is considered that the static stability is sufficient to withstand minor earthquake-induced dynamic forces. No studies or calculations have been made to confirm this assumption.

SECTION 7 - ASSESSMENT AND RECOMMENDATIONS

7.1 DAM ASSESSMENT

A. Safety

The visual inspection and the review of the available design and construction data indicate that Lake Lattimore Dam is in fair condition. The design of the dam appears to be adequate and the inspection did not detect any signs of instability or seepage that could indicate an unsafe condition. Improved maintenance practices are required to ensure continued safe operation of the facilities.

The hydrologic and hydraulic computations indicate that the combination of reservoir storage capacity and the spillway discharge are adequate to pass only 17 percent of the PMF. Failure of the dam due to overtopping will significantly increase the hazard to loss of life downstream of the dam. The spillway capacity is seriously inadequate. The dam, therefore, is considered to be unsafe, non-emergency.

B. Adequacy of Information

The design and construction information contained in the files of PennDER, combined with the visual inspection, are considered to be adequate for making a reasonable assessment of this dam.

C. Urgency

The recommendations presented below should be implemented immediately.

D. Additional Studies

A detailed hydrologic and hydraulic analysis should be performed by a professional engineer, experienced in the design and construction of dams, to determine means for improving the capacity of the spillway.

7.2 RECOMMENDATIONS

In order to assure the continued satisfactory operation of this dam, the following recommendations are presented to the owner for immediate implementation:

1. That a detailed hydrologic and hydraulic engineering analysis be made by a professional engineer with experience in the design and construction of dams to determine means for improving the capacity of the spillway and reservoir system so that it will meet the requirements of the Commonwealth of Pennsylvania.

2. That all brush and trees be removed from the embankment slopes and that a professional engineer, experienced in the design and construction of dams, be consulted for the removal of tree stumps and roots.
3. That the drawdown facilities be made operable and be operated and maintained on a regular basis.
4. That the deteriorated areas of the spillway weir and walls be repaired.
5. That a formal surveillance and downstream warning system be developed for use during periods of high or prolonged precipitation.
6. That an operation and maintenance manual be prepared for guidance in the operation of the dam during normal and emergency conditions, and that a schedule be developed for the annual inspection of the dam and its appurtenant structures.

APPENDIX A
CHECKLIST OF VISUAL INSPECTION REPORT

APPENDIX A

CHECK LIST

PHASE I - VISUAL INSPECTION REPORT

PA DER # <u>52-78</u>		NDI NO. <u>PA-00406</u>	
NAME OF DAM <u>Lake Lattimore Dam</u>		HAZARD CATEGORY <u>High</u>	
TYPE OF DAM <u>Earth embankment</u>			
LOCATION <u>Delaware</u>		TOWNSHIP <u>Pike</u>	COUNTY, <u>PENNSYLVANIA</u>
INSPECTION DATE <u>4/1/80</u>		WEATHER <u>Clear, sunny</u>	TEMPERATURE <u>40-50</u>
INSPECTORS: <u>R. Houseal (Recorder)</u>		OWNER'S REPRESENTATIVE(s):	
<u>H. Jongsma</u>		<u>Art Hoehne</u>	
<u>R. Shireman</u>		<u></u>	
<u>A. Bartlett</u>		<u></u>	
<u></u>		<u></u>	
NORMAL POOL ELEVATION: <u>1041.0</u>		AT TIME OF INSPECTION:	
BREAST ELEVATION: <u>1045.0 (Design)</u>		POOL ELEVATION: <u>1041.15</u>	
SPILLWAY ELEVATION: <u>1041.0</u>		TAILWATER ELEVATION: <u></u>	
MAXIMUM RECORDED POOL ELEVATION: <u>No records</u>			
GENERAL COMMENTS:			
<u>Attempted to open gates; not successful.</u>			

VISUAL INSPECTION
EMBANKMENT

	OBSERVATIONS AND REMARKS
A. SURFACE CRACKS	None evident.
B. UNUSUAL MOVEMENT BEYOND TOE	None evident.
C. SLOUGHING OR EROSION OF EMBANKMENT OR ABUTMENT SLOPES	None evident.
D. ALIGNMENT OF CREST: HORIZONTAL: VERTICAL:	Horizontal - good. Vertical - Refer to Profile, Plate A-II.
E. RIPRAP FAILURES	No riprap failures evident.
F. JUNCTION EMBANKMENT & ABUTMENT OR SPILLWAY	Abutment good at bridge and near roadway.
G. SEEPAGE	None observed.
H. DRAINS	None observed.
J. GAGES & RECORDER	None.
K. COVER (GROWTH)	Trees and brush on both slopes upstream and downstream. Crest - grass covered.

VISUAL INSPECTION
OUTLET WORKS

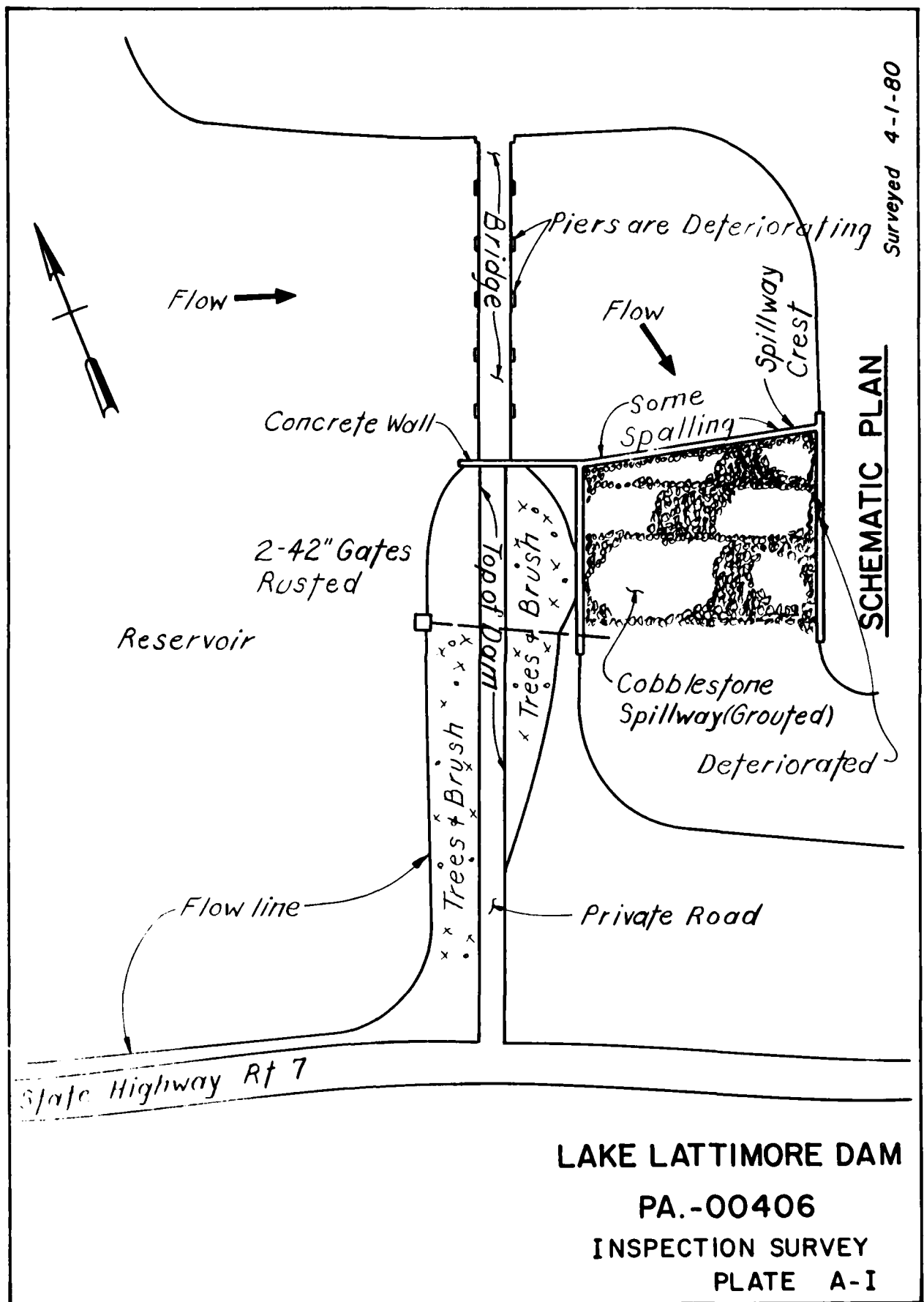
OBSERVATIONS AND REMARKS	
A. INTAKE STRUCTURE	Headwall with gates and controls for two 42" pipes.
B. OUTLET STRUCTURE	Endwall through which the two 42" steel pipes discharge.
C. OUTLET CHANNEL	Excavated open channel with brush and small trees on the near 1:1 side slopes. Channel is clear of obstructions.
D. GATES	Two 42" gates controlling the discharge through the 42" $\emptyset$ steel pipes. Rising stem type controls are rusty and need some maintenance attention.
E. EMERGENCY GATE	Refer to D. above.
F. OPERATION & CONTROL	Unknown. Gates probably last opened in 1970.
G. BRIDGE (ACCESS)	Approach directly from embankment. No bridge.

VISUAL INSPECTION
SPILLWAY

	OBSERVATIONS AND REMARKS
A. APPROACH CHANNEL	Approach channel is from side of main reservoir. It turns 90° to the right to meet the main spillway.
B. WEIR: Crest Condition Cracks Deterioration Foundation Abutments	The spillway is an ogee type section. Its condition is fair as indicated by exposed aggregate and the loss of some spots along the crest. The walls are in good condition showing only slight cracks. They are vertical and do not appear to have settled or otherwise been displaced.
C. DISCHARGE CHANNEL: Lining Cracks Stilling Basin	Discharge channel below ogee is stone lined and has a slope break in the flow path. Several large (4" to 6") clump trees are growing in the channel just at the toe of the chute. There is no stilling basin.
D. BRIDGE & PIERS	One bridge spans the approach channel. Refer to sketch for location. It has 5 concrete piers which support two steel girders and a wooden deck.
E. GATES & OPERATION EQUIPMENT	None.
F. CONTROL & HISTORY	No records.

VISUAL INSPECTION

	OBSERVATIONS AND REMARKS
<u>INSTRUMENTATION</u>	
Monumentation	None.
Observation Wells	None.
Weirs	None.
Piezometers	None.
Staff Gauge	None.
Other	None.
<u>RESERVOIR</u>	
Slopes	Woodlands.
Sedimentation	None reported 4:1±.
Watershed Description	Lightly wooded, some residential developments.
<u>DOWNSTREAM CHANNEL</u>	
Condition	Natural stream, Dingman Creek. Stone bottom.
Slopes	Wooded, moderate slopes.
Approximate Population	Varies. Child State Park about 1/2 mile downstream. Dingmans Ferry is 4 miles downstream.
No. Homes	Several cottages near the stream about 7700 feet downstream.

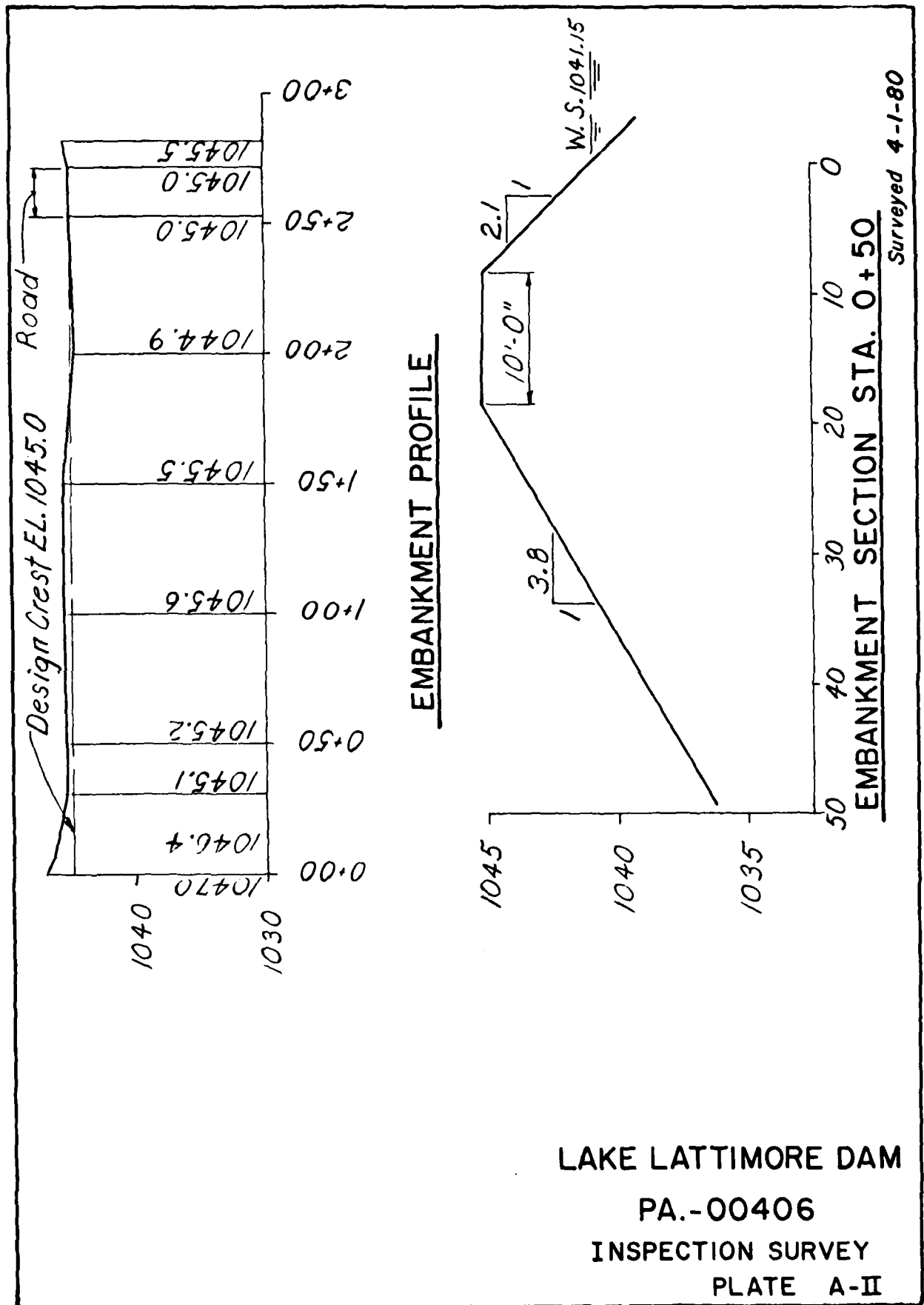


LAKE LATTIMORE DAM

PA.-00406

INSPECTION SURVEY

PLATE A-I



APPENDIX B
CHECKLIST OF ENGINEERING DATA

APPENDIX B

CHECK LIST
ENGINEERING DATA

PA DER # 52-78

NDI NO. PA-00406

NAME OF DAM Lake Lattimore Dam

ITEM	REMARKS
AS-BUILT DRAWINGS	Not existing. Design drawings in PennDER files.
REGIONAL VICINITY MAP	U.S.G.S. Quadrangle - Lake Maskenozha, PA-NJ See Plate II, Appendix E
CONSTRUCTION HISTORY	Foundation inspection reports by state representative.
GENERAL PLAN OF DAM	Plate V, Appendix E.
TYPICAL SECTIONS OF DAM	Plate III, Appendix E.
OUTLETS: PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	Plates III through VI, Appendix E. None. None.

ENGINEERING DATA

ITEM	REMARKS
RAINFALL & RESERVOIR RECORDS	No records.
DESIGN REPORTS	Not available.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS: HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS: BORING RECORDS LABORATORY FIELD	None. None. 3 test pits.
POST CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	Unknown.

ENGINEERING DATA

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	None.
HIGH POOL RECORDS	No records.
POST CONSTRUCTION ENGINEERING STUDIES & REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM Description: Reports:	None.
MAINTENANCE & OPERATION RECORDS	None, except inspection reports by state.
SPILLWAY PLAN, SECTIONS AND DETAILS	Plate IV and V, Appendix E.

ENGINEERING DATA

ITEM	REMARKS
OPERATING EQUIPMENT, PLANS & DETAILS	Two upstream slide gates on construction outlet.
CONSTRUCTION RECORDS	Inspection report by state during the excavation period.
PREVIOUS INSPECTION REPORTS & DEFICIENCIES	None.
MISCELLANEOUS	

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: woodland and swamps

ELEVATION:

TOP NORMAL POOL & STORAGE CAPACITY: Elev. 1041 Acre-Feet 199TOP FLOOD CONTROL POOL & STORAGE CAPACITY: Elev. 1044.9 Acre-Feet 433MAXIMUM DESIGN POOL: Elev. 1045TOP DAM: Elev. 1044.9

SPILLWAY:

a. Elevation 1041 with low flow notch at 1040.9b. Type concrete ogee sectionc. Width 110'd. Length --e. Location Spillover left abutmentf. Number and Type of Gates none

OUTLET WORKS:

a. Type two 42" diameter concrete pipes with slide gatesb. Location center of damc. Entrance inverts 1030d. Exit inverts 1030e. Emergency drawdown facilities 2 slide gates

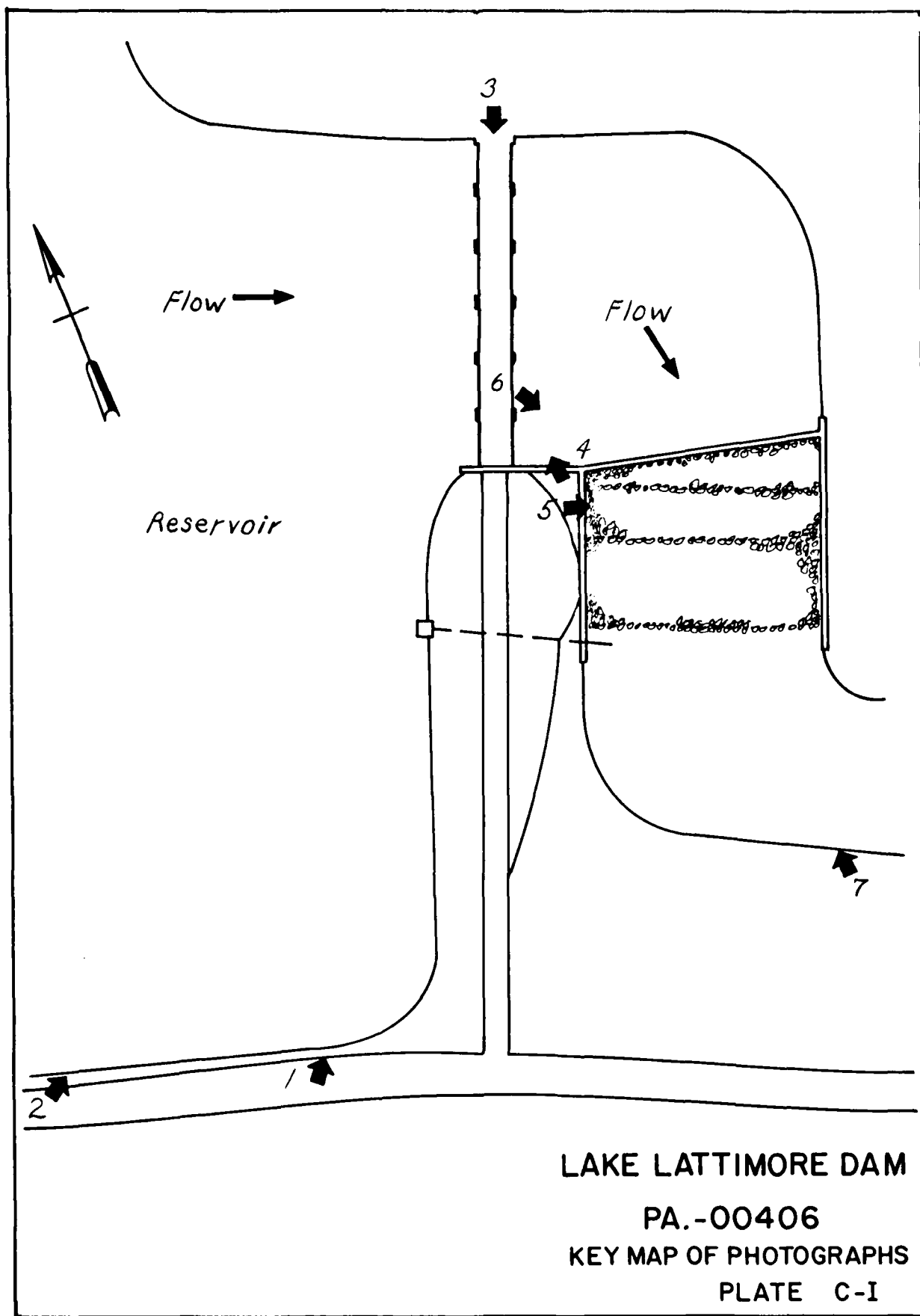
HYDROMETEOROLOGICAL GAGES:

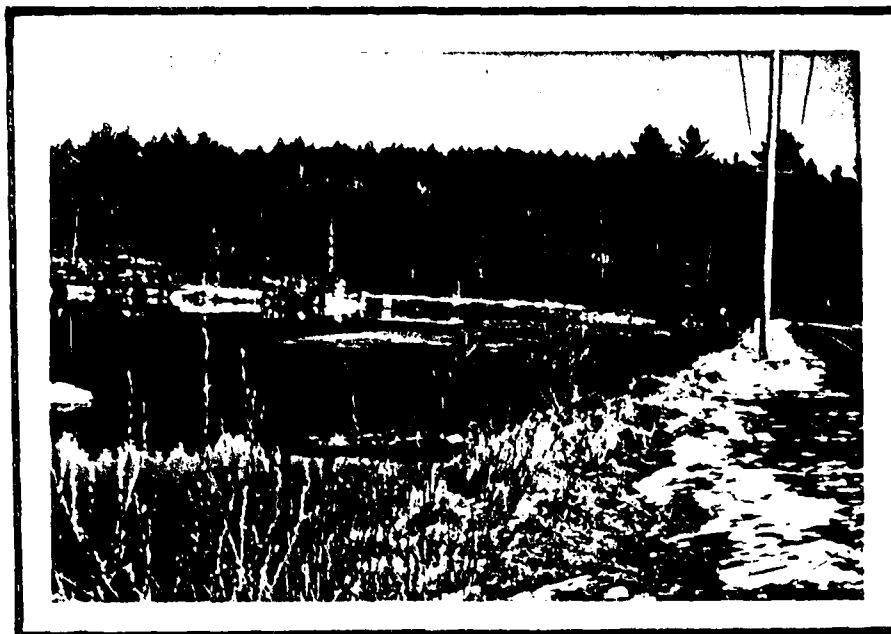
a. Type noneb. Location c. Records MAXIMUM NON-DAMAGING DISCHARGE: 1322 cfs

APPENDIX C

PHOTOGRAPHS

APPENDIX C



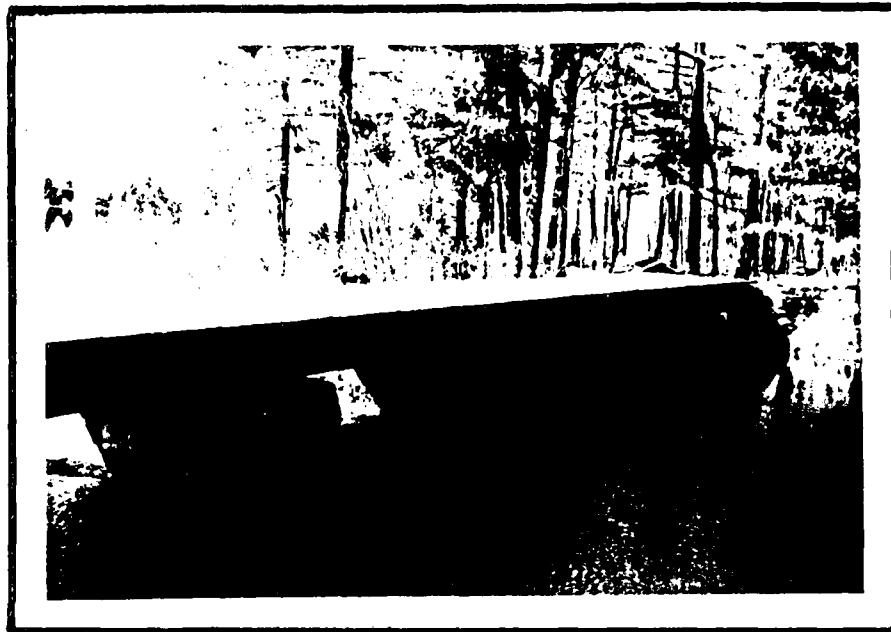


VIEW FROM HIGHWAY TO UPSTREAM SLOPE - NO. 2



FOOTBRIDGE, EMBANKMENT IN BACKGROUND - NO. 3

PA-00-06
Plate 6-11



FOOTBRIDGE. NOTE DETERIORATION OF PIERS - NO. 4



SPILLWAY - NO. 5

PA-00496
Plate C-III



DOWNSTREAM CHANNEL. NOTE DETERIORATION ON LEFT SPILLWAY WALL - NO. 6



LOOKING UPSTREAM TO SPILLWAY - NO. 7

PA-00436
Plate C-IV

APPENDIX D
HYDROLOGY AND HYDRAULIC CALCULATIONS

APPENDIX D

SUMMARY DESCRIPTION
OF
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION

The hydrologic and hydraulic evaluation for this inspection report has employed computer techniques using the Corps of Engineers computer program identified as the Flood Hydrograph Package (HEC-1) Dam Safety Version.

The program has been designed to enable the user to perform two basic types of hydrologic analyses: (1) the evaluation of the overtopping potential of the dam, and (2) the capability to estimate the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. A brief summary of the computation procedures typically used in the dam overtopping analysis is shown below.

- Development of an inflow hydrograph to the reservoir.
- Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.
- Routing of the outflow hydrograph(s) of the reservoir to desired downstream locations. The results provide the peak discharge and maximum stage of each routed hydrograph at the outlet of the reach.

The output data provided by this program permits the comparison of downstream conditions just prior to a breach failure with that after a breach failure and the determination as to whether or not there is a significant increase in the hazard to loss of life as a result of such a failure.

The results of the studies conducted for this report are presented in Section 5.

For detailed information regarding this program refer to the Users Manual for the Flood Hydrograph Package (HEC-1) Dam Safety Version prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California.

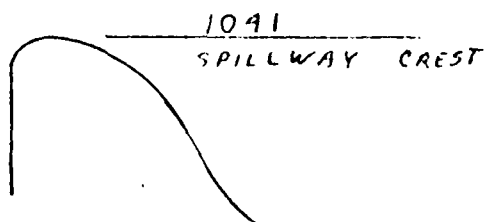
BY ALS DATE 5/5/80
CHKD. BY _____ DATE _____
SUBJECT _____

BERGER ASSOCIATES

SHEET NO. 1 OF 4
PROJECT D9650

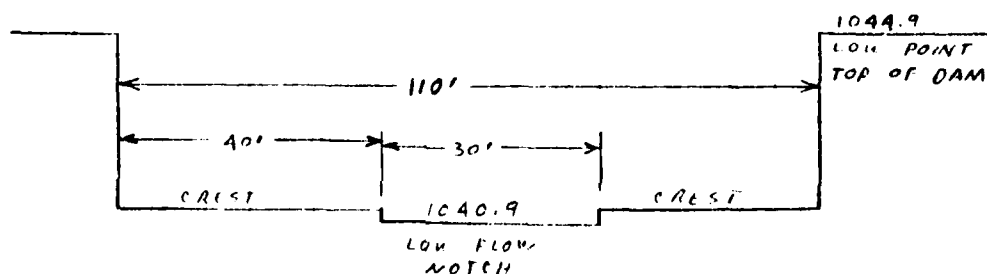
LAKE LATTIMORE

SPILLWAY RATING



OGEES SECTION

$C = 3.88$ (SMALL DAMS)



$$Q = C L_1 H_1^{3/2} + C L_2 H_2^{3/2}$$

$$H_1 = 1044.9 - 1040.9 = 4'$$

$$L_1 = 30'$$

$$H_2 = 1044.9 - 1041 = 3.9'$$

$$L_2 = 80'$$

$$Q = 3.88 \times 30 \times (4)^{1.5} + 3.88 \times 80 \times (3.9)^{1.5}$$

$$= 3322 \text{ CFS}$$

BY R.L.S. DATE 5/5/80

BERGER ASSOCIATES

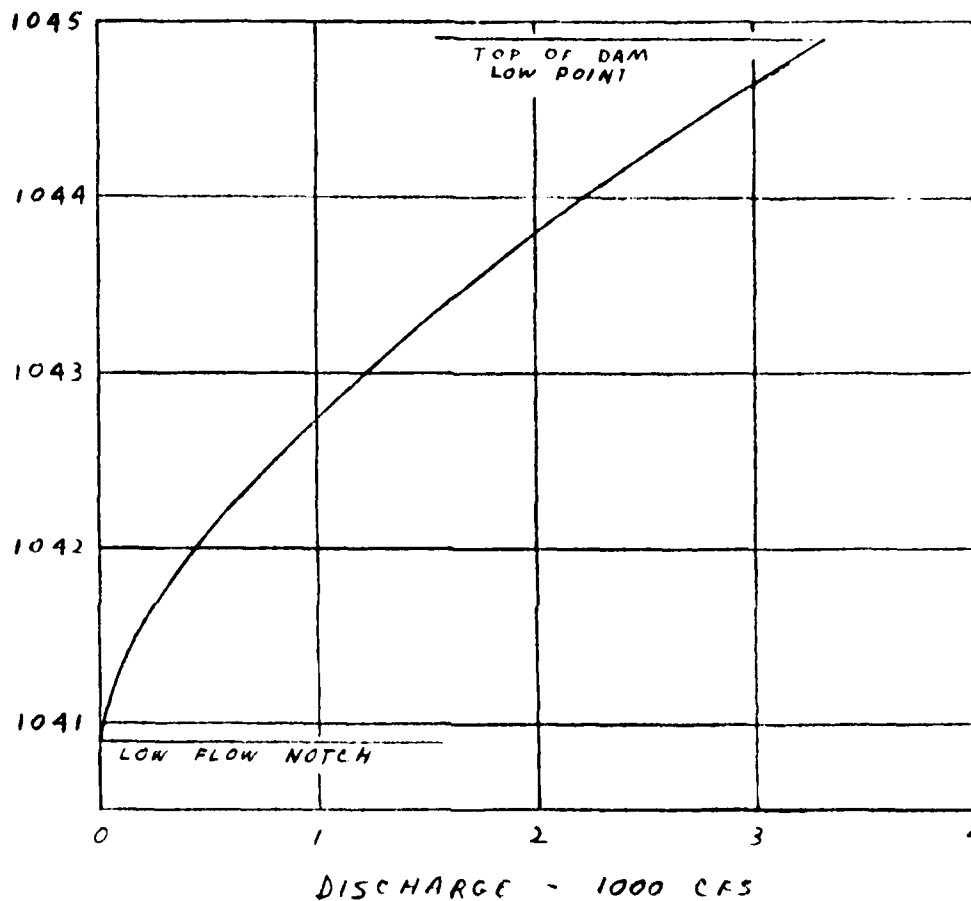
SHEET NO. 2 OF 7

CHKD. BY _____ DATE _____

PROJECT D96

SUBJECT LAKE LATTIMORE

SPILLWAY RATING CURVE



BY R.L.S. DATE 5/5/82
CHKD. BY _____ DATE _____
SUBJECT _____

BERGER ASSOCIATES

SHEET NO. 3 OF 9
PROJECT D 9650

DISCHARGE THROUGH OUTLET WORKS

TWO 42" DIA. CONCRETE PIPES WITH
SLIDE GATE

$C = 0.6$

INVERT ELEV. = 1030

$$Q = CA \sqrt{2gH}$$

AT POOL ELEV 1041

$$H = 1041 - 1031.88 = 9.12$$

$$Q = 2 \times 0.6 \times \pi \times \frac{(3.5)^2}{4} \times (2 \times 32.2 \times 9.12)^{0.5}$$
$$= 280 \text{ CFS}$$

AT LOW POOL ELEV 1035

$$H = 1035 - 1031.88 = 3.12$$

$$Q = 2 \times 0.6 \times \pi \times \frac{(3.5)^2}{4} \times (2 \times 32.2 \times 3.12)^{0.5}$$
$$= 164 \text{ CFS}$$

BY RLS DATE 5/5/80

BERGER ASSOCIATES

SHEET NO. 4 OF 9

CHKD. BY DATE

PROJECT D9620

SUBJECT LAKE LATTIMORE

MAXIMUM KNOWN FLOOD AT DAM SITE

THERE ARE NO RECORDS OF POOL LEVELS FOR THIS DAM. BASED ON THE RECORDS OF THE GAGE STATION FOR MILL CREEK AT NEARBY MOUNTAIN HOME, PA. (D.A. = 5.84 SQ. MI.) THE MAXIMUM DISCHARGE AT THE GAGE OCCURRED IN JULY 1969 WHEN A DISCHARGE OF 1650 CFS WAS OBSERVED. THE MAXIMUM INFLOW TO LAKE LATTIMORE DAM IS ESTIMATED TO BE:

$$Q = \left(\frac{11.1}{5.84} \right)^{0.8} \times 1650$$

$$= 2758 \text{ CFS}$$

DESIGN FLOOD

SIZE CLASSIFICATION

MAXIMUM STORAGE = 433 ACRES- FEET

MAXIMUM HEIGHT = 15 FEET

SIZE CLASSIFICATION IS "SMALL"

HAZARD CLASSIFICATION

STATE PARK AND VILLAGE OF DINGMANS FERRY

LOCATED ALONG THE DOWNSTREAM CHANNEL.

USE "HIGH"

RECOMMENDED SPILLWAY DESIGN FLOOD

THE ABOVE CLASSIFICATIONS INDICATE

USE OF AN SDF EQUAL TO ONE HALF

PMP TO THE PROBABLE MAXIMUM FLOOD

BY RLS DATE 5/9/80
 CHKD. BY _____ DATE _____
 SUBJECT _____

BERGER ASSOCIATES

SHEET NO. 5 OF 7
 PROJECT 29650

LAKE LATTIMORE

EMBANKMENT RATING

$$Q = CLH^{3/2}$$

$$C = 2.7 \text{ (KINGS HOOK)}$$

AT ELEV. 1045.4

$2.7 \times 17 \times (.5)^{1.5}$	=	18
$2.7 \times 43 \times (.55)^{1.5}$	=	58
$2.7 \times 50 \times (.3)^{1.5}$	=	22
$2.7 \times 11 \times (.25)^{1.5}$	=	4
$2.7 \times 37 \times (.15)^{1.5}$	=	6
$2.7 \times 20 \times (.35)^{1.5}$	=	11
$2.7 \times 5 \times (.2)^{1.5}$	=	2

$\Sigma = 121 \text{ CFS}$

AT ELEV. 1046

$2.7 \times 17 \times (.1)^{1.5}$	=	51
$2.7 \times 53 \times (1.05)^{1.5}$	=	154
$2.7 \times 50 \times (.8)^{1.5}$	=	97
$2.7 \times 50 \times (.4)^{1.5}$	=	41
$2.7 \times 50 \times (.6)^{1.5}$	=	63
$2.7 \times 20 \times (.55)^{1.5}$	=	42
$2.7 \times 17 \times (.45)^{1.5}$	=	14
$2.7 \times 11 \times (.75)^{1.5}$	=	17

$\Sigma = 481 \text{ CFS}$

AT ELEV. 1047

$2.7 \times 17 \times (2)^{1.5}$	=	145
$2.7 \times 53 \times (2.05)^{1.5}$	=	420
$2.7 \times 50 \times (1.5)^{1.5}$	=	326
$2.7 \times 50 \times (1.45)^{1.5}$	=	236
$2.7 \times 50 \times (1.6)^{1.5}$	=	273
$2.7 \times 20 \times (1.55)^{1.5}$	=	136
$2.7 \times 25 \times (1.25)^{1.5}$	=	94
$2.7 \times 1 \times (.3)^{1.5}$	=	2
$2.7 \times 11 \times (1.75)^{1.5}$	=	69

$\Sigma = 1701 \text{ CFS}$

AT ELEV. 1048

$\Sigma = 3388 \text{ CFS}$

AT ELEV. 1049

$\Sigma = 5430 \text{ CFS}$

AT ELEV. 1050

$\Sigma = 7773 \text{ CFS}$

BY: H.S. DATE 5/5/82
CHKD. BY: DATE
SUBJECT: LAKE LATTIMORE

BERGER ASSOCIATES

SHEET NO. 6 OF 7
PROJECT

UPSTREAM RESERVOIR

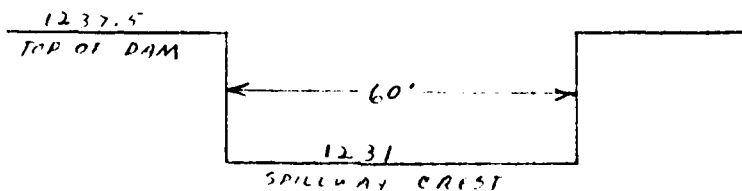
MARCEL LAKE

23' HIGH DAM
800' LONG

SPILLWAY RATING

Ogee Section $C = 3.88$ (SMALL DAMS)

EMBANKMENT $C = 2.7$ (KING'S IDEA)



$Q = CLH^{3/2}$

$3.88 \times 60 \times (6.5)^{1.5}$

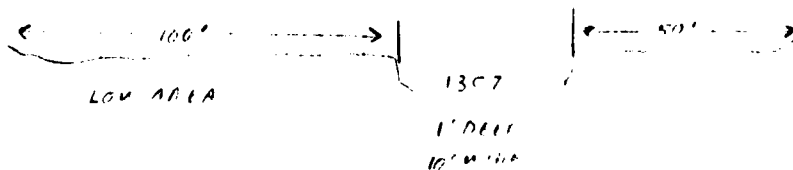
3858 CFS

SILVER LAKE

NATURAL LAKE

NATURAL OVERT

$C = 2.7$



$Q = CLH^{3/2}$

$2.7 \times 10 \times (1)^{1.5}$

27 CFS

BY RLS. DATE 1/9/80
 CHKD. BY DATE
 SUBJECT

BERGER ASSOCIATES

SHEET NO. 7 OF 11
 PROJECT 1765

LAKE LATTIMORE

UPSIOLAM RESERVOIR

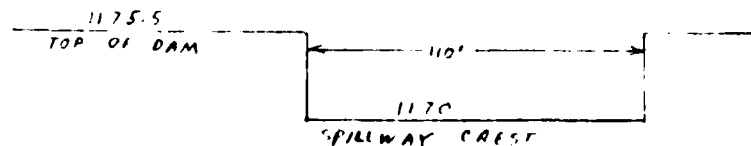
CAMP MASSAD LAKE

10' HIGH DAM
 450' LONG

SPILLWAY RATING

CELL SECTION C 3.88 (SMALL DAMS)

EMBANKMENT C 2.7 (HUGE DAM)



$$Q = CLH^{3/2}$$

$$= 3.88 \times 110 \times (5.5)^{1.5}$$

$$= 5505 \text{ CFS}$$

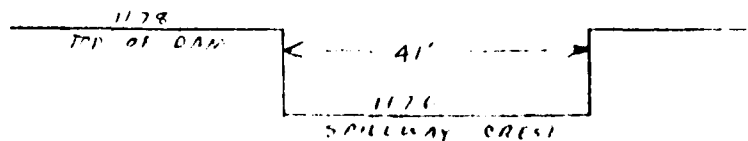
WOODPECKER LAKE

10' HIGH DAM
 300' LONG

SPILLWAY RATING

ROAD-TESTED, ROCK LINED C 2.7

EMBANKMENT C 2.7



$$Q = CLH^{3/2}$$

$$= 2.7 \times 41 \times (2)^{1.5}$$

$$= 313 \text{ CFS}$$

BY RLS
CHKD. BY
SUBJECT

DATE 11/1/80
DATE

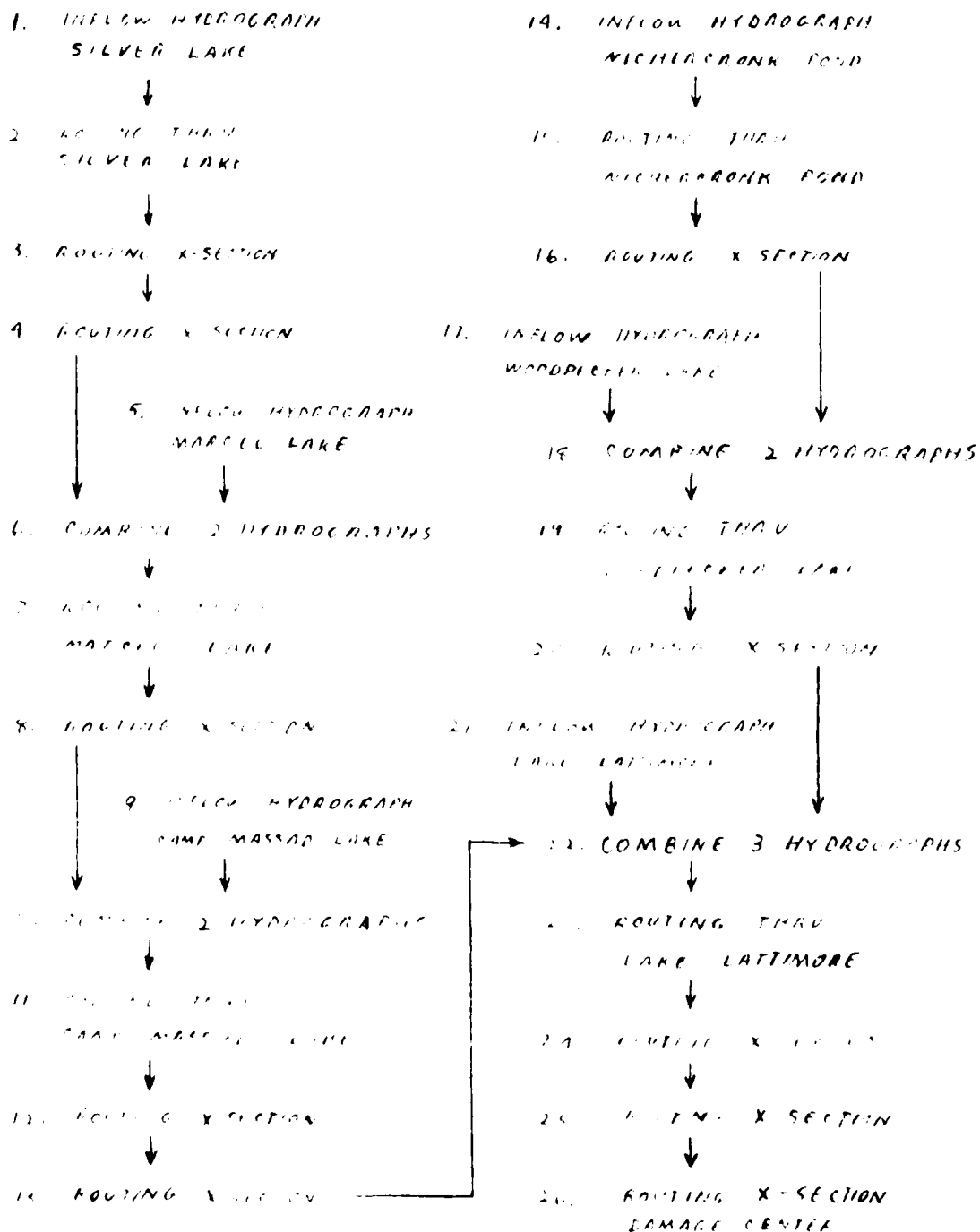
BERGER ASSOCIATES

SHEET NO. 70 OF
PROJECT 2765

LAKE 10 HIGHER

PROJECT DATA

(FLOW DIAGRAM)



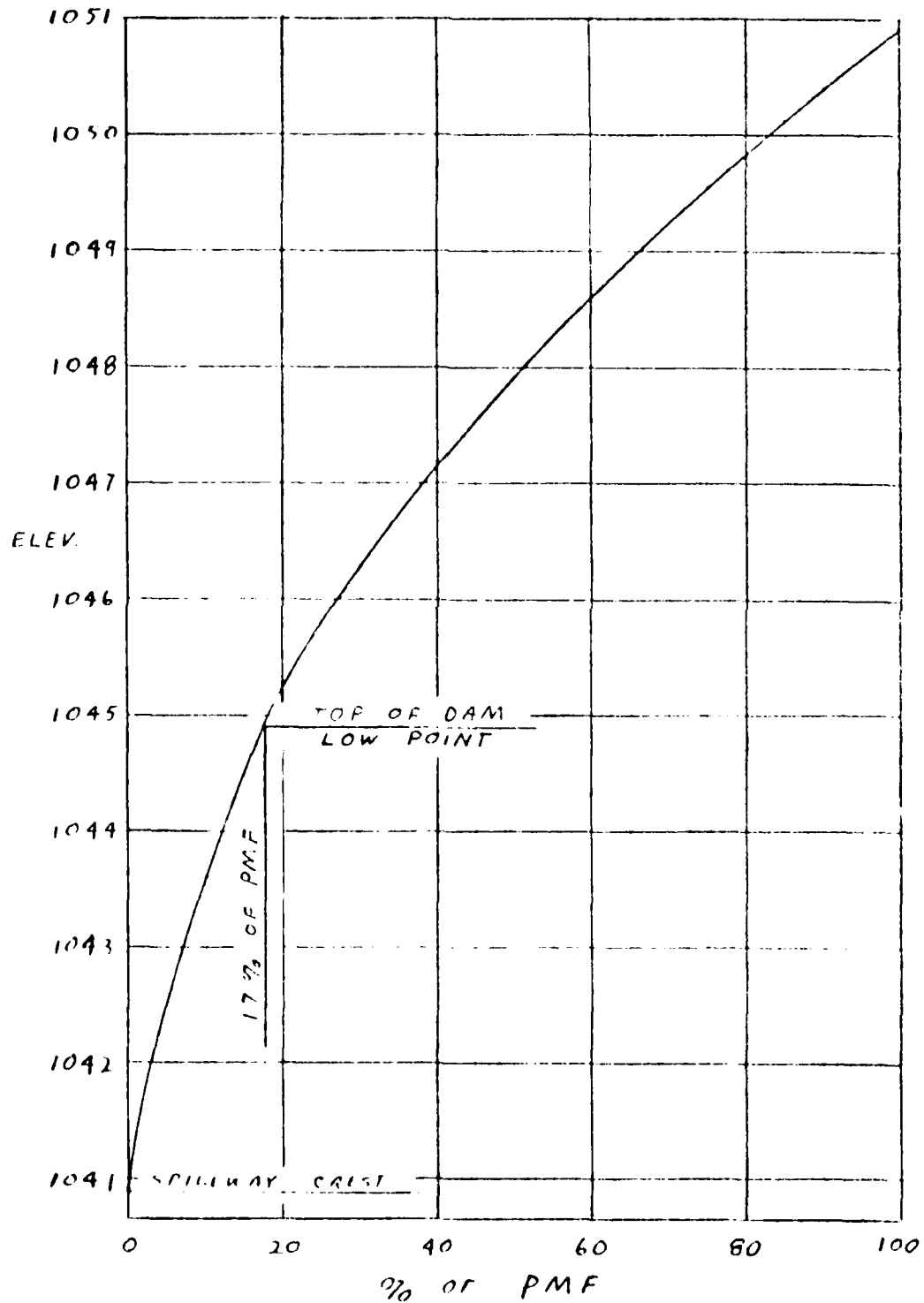
BY RLS DATE 4/1/61
CHKD. BY DATE
SUBJECT

BERGER ASSOCIATES

SHEET NO. 8 OF 9
PROJECT D4650

LAKE LATTIMORE

SPILLWAY CAPACITY CURVE



BY RLS DATE 4/4/84
CHKD. BY _____ DATE _____
SUBJECT _____

BERGER ASSOCIATES

SHEET NO. 19650 OF 1
PROJECT _____

LAKE LATTIMORE

BREACH ASSUMPTIONS

BREACH WIDTH = 50'

SIDE SLOPE (EARTH EMBANKMENT) = 1:1

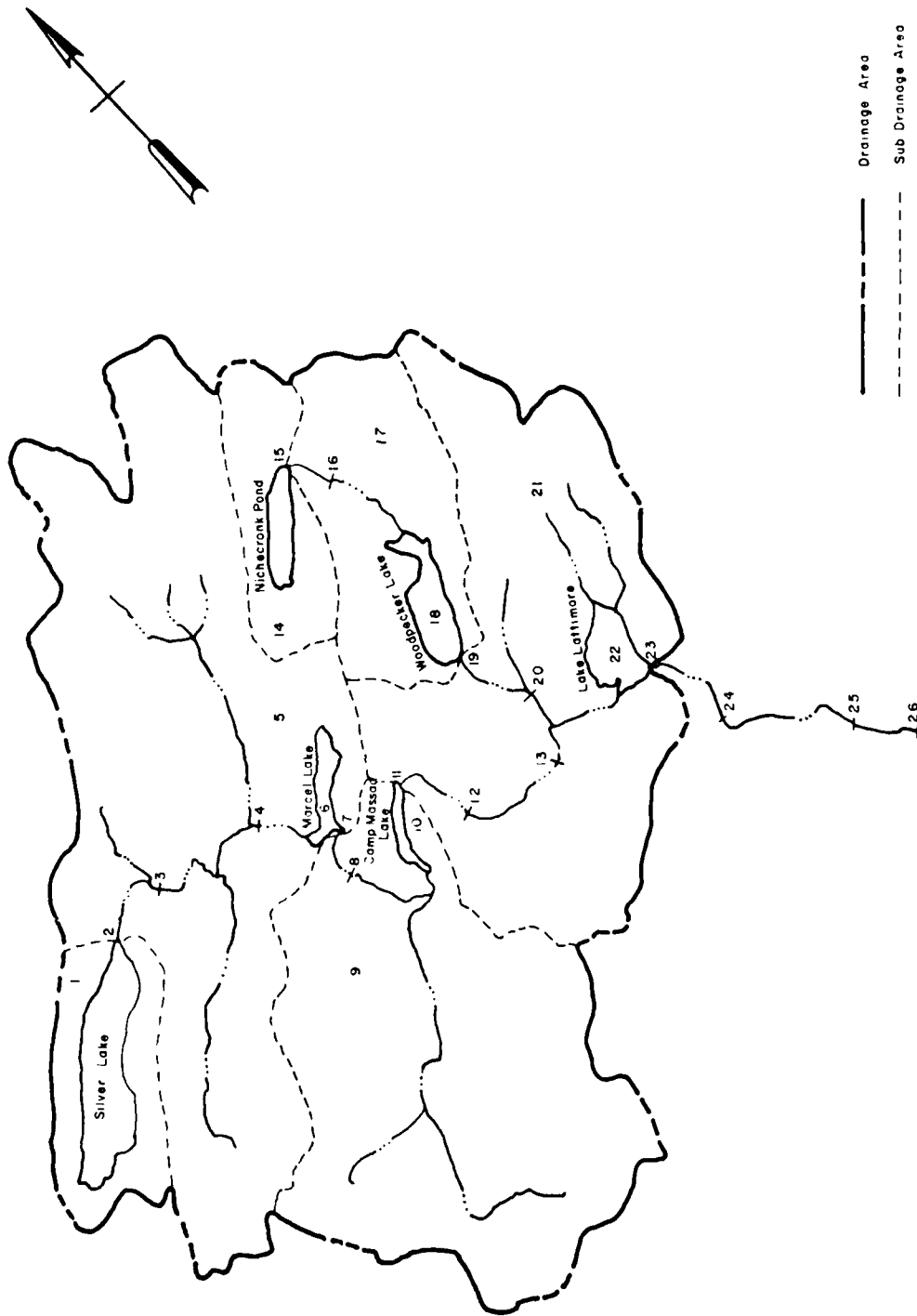
FAILURE TIME (EARTH EMBANKMENT WITH
PARTIAL DRAINAGE)
BETWEEN 15 MIN. AND 1 HR.
USE: .25 HR., .5 HR., 1.0 HR.

POOL LEVEL AT FAILURE: EARTH EMBANKMENT
SAY 0.5 FT. OVER TOP OF DAM
(COFF WALL EXPECTED TO
FAIL AFTER EMBANKMENT CREDS)

UPSTREAM DAMS:

ATWOOD LAKE - AGE OVERTOPPED BY 22% PMF
CAMP MASSAD LAKE - AGE OVERTOPPED BY 22% PMF
WINDPICKER LAKE - OVERTOPPED 0.1' BY 22% PMF.
AGE EXPECTED TO PASS FAILURE.

∴ UPSTREAM DAMS WILL AGE FAR DUE TO
OVERTOPPING PRIOR TO BREACH OF LAKE
LATTIMORE DAM.



——— Drainage Area
 - - - Sub Drainage Area
 ——— Streams
 23 Stream Station Identification

DRAINAGE AREA MAP

Scale 1" = 4000'

LAKE LATTIMORE DAM
PA.-00406

PLATE D-I

HYDROLOGY AND HYDRAULIC ANALYSIS DATA BASE

NAME OF DAM: LAKE LATTINORE RIVER BASIN: DELAWARE
PROBABLE MAXIMUM PRECIPITATION (PMP) = 21.9 INCHES/24 HOURS ⁽¹⁾

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		SILVER LAKE	MARCEL LAKE	MARCEL LAKE DAM	CAMP MASSAD LAKE
DRAINAGE AREA (SQUARE MILES)		.64	3.74		2.75
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		.64	4.38	4.38	7.13
ADJUSTMENT OF PMP FOR DRAINAGE AREA (%) ⁽²⁾	6 HOURS	111	111		111
	12 HOURS	123	123		123
	24 HOURS	133	133		133
	48 HOURS	142	142		142
	72 HOURS				
	Zone 1	-	-		-
SNYDER HYDROGRAPH PARAMETERS	ZONE ⁽³⁾	1	1		1
	C_p / C_1 ⁽⁴⁾	.45/1.23	.45/1.23		.45/1.23
	L (MILES) ⁽⁵⁾	$L_1 = .28$	2.88		3.35
	L_{co} (MILES) ⁽⁵⁾		.7		1.40
	$T_p = C_1 (L \cdot L_{co})^{0.3}$ (hours)	$C_t (L_1)^{0.6} = .57$	1.52		1.96
SPILLWAY DATA	CREST LENGTH (FT.)	10		60	
	FREEBOARD (FT.)	1		6.5	
	DISCHARGE COEFFICIENT	2.7		3.88	
	EXPONENT	1.5		1.5	
	ELEVATION	1307		1231	
AREA ⁽⁶⁾ (ACRES)	NORMAL POOL	140.2	29.5		12.3
	ELEV. _____	1320 = 175	1240 = 41.9		1180 = 25.6
	ELEV. _____				
STORAGE ACRES- FEET	NORMAL POOL ⁽⁷⁾	3704	159		61.4
	ELEV. _____ ⁽⁸⁾	1228 = 0	1214.9 = 0		1055 = 0
	ELEV. _____ ⁽⁸⁾				
	ELEV. _____ ⁽⁸⁾				

HYDROLOGY AND HYDRAULIC ANALYSIS DATA BASE

NAME OF DAM: LAKE LATTIMORE RIVER BASIN: DELAWARE
PROBABLE MAXIMUM PRECIPITATION (PMP) = 21.9 INCHES/24 HOURS⁽¹⁾

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		CAMP MASSAD LAKE DAM	NICHERCRONK POND	WOODPECKER LAKE	WOODPECKER LAKE DAM
DRAINAGE AREA (SQUARE MILES)			.40	.98	
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		7.13	.40	1.38	1.38
ADJUSTMENT OF PMP FOR DRAINAGE AREA (%) (2)	6 HOURS		111	111	
	12 HOURS		123	123	
	24 HOURS		133	133	
	48 HOURS		142	142	
	72 HOURS		-	-	
	Zone 1				
SNYDER HYDROGRAPH PARAMETERS	ZONE ⁽³⁾		1	1	
	C_p / C_1 ⁽⁴⁾		.45/1.23	.45/1.23	
	L (MILES) ⁽⁵⁾		$L^1 = .57$	1.74	
	L_{co} (MILES) ⁽⁵⁾			1.08	
	$T_p = C_1 (L \cdot L_{co})^{0.3}$ (hours)		$C_t (L^1)^{0.6} = .88$	1.49	
SPILLWAY DATA	CREST LENGTH (FT.)	110	10		41
	FREEBOARD (FT.)	5.5	1		2
	DISCHARGE COEFFICIENT	3.88	2.7		2.7
	EXPONENT	1.5	1.5		1.5
	ELEVATION	1170	1266		1176
AREA ⁽⁶⁾ (ACRES)	NORMAL POOL		38.0	57.7	
	ELEV. _____		1280 = 69.2	1180 = 117.9	
	ELEV. _____				
STORAGE ACRE- FEET)	NORMAL POOL ⁽⁷⁾		353	192.3	
	FLEV. _____ ⁽⁸⁾		1238.1 = 0	1166 = 0	
	FLEV. _____ ⁽⁸⁾				
	FLEV. _____ ⁽⁸⁾				

HYDROLOGY AND HYDRAULIC ANALYSIS DATA BASE

NAME OF DAM: LAKE LATTIMORE RIVER BASIN: DELAWARE
PROBABLE MAXIMUM PRECIPITATION (PMP) = 21.9 INCHES/24 HOURS ⁽¹⁾

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		LAKE LATTIMORE	LAKE LATTIMORE DAM		
DRAINAGE AREA (SQUARE MILES)		2.62			
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		11.13	11.13		
ADJUSTMENT OF PMP FOR DRAINAGE AREA (%) ⁽²⁾	6 HOURS	111			
	12 HOURS	123			
	24 HOURS	133			
	48 HOURS	142			
	72 HOURS Zone 1	-			
SNYDER HYDROGRAPH PARAMETERS	ZONE ⁽³⁾	1			
	C_p / C_t ⁽⁴⁾	.45/1.23			
	L (MILES) ⁽⁵⁾	2.20			
	L_{co} (MILES) ⁽⁵⁾	.80			
	$T_p = C_t (L \cdot L_{co})^{0.3}$ (hours)	1.46			
SPILLWAY DATA	CREST LENGTH (FT.)		110		
	FREEBOARD (FT.)		4		
	DISCHARGE COEFFICIENT		3.88		
	EXPONENT		1.5		
	ELEVATION		1041		
AREA ⁽⁶⁾ (ACRES)	NORMAL POOL	53.8			
	ELEV. _____	1060=126.9			
	ELEV. _____				
STORAGE AREA - FEET	NORMAL POOL ⁽⁷⁾	199			
	ELEV. _____ ⁽⁸⁾	1029.9=0			
	ELEV. _____ ⁽⁸⁾				
	ELEV. _____ ⁽⁸⁾				

- (1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.
- (2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.
- (3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).
- (4) Snyder's Coefficients.
- (5) L = Length of longest water course from outlet to basin divide.
 L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.
- (6) Planimetered area encompassed by contour upstream of dam.
- (7) PennDER files.
- (8) Computed by conic method.

TABLE NO. 1
COMPARISON OF WATER SURFACE ELEVATIONS
LAKE LATTIMORE DAM

PMF = 23,807 cfs

Crest Elevation - 1044.9

Low Point - 1044.9

Spillway Elevation - 1040.9

	<u>STAGE</u>	<u>CREST OF DAM</u>		<u>7700' D/S OF DAM*</u> <u>ELEVATION</u>
		<u>ELEVATION</u>	<u>DEPTH</u>	
A.	At Low Point in Embankment Crest	1044.9	0	751.6
B.	22% PMF Overtopping No Breach	1045.51	.61	752.5
C.	22% PMF Overtopping (15 Min. Breach)	1045.42	.52	754.1
D.	22% PMF Overtopping (1 Hour Breach)	1045.43	.53	753.5

*Several cottages located about 7700 feet downstream of Lake Lattimore Dam.
This area was considered to be the damage center.

Condition C: (Time refers to elapsed time after start of storm). Time to reach breach elevation 1045.4 at dam = 42.25 Hours. Water level 7700' downstream prior to breach = 752.5. Duration of breach = 15 Minutes. Time for breach to peak 7700' downstream = .5 Hours. Peak elevation 7700' downstream due to breach = 754.1. Rate of increase in water level = 1.6 in 30 Minutes.

AT THE HYDROLOGIC ENGINEERING CENTER
916-440-2329 (FIS 448-2329)

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FLOOD HYDROGRAPH PACKAGE (HEC-1)

DAM SAFETY VERSION JULY 1978

LAST MODIFICATION 26 FEB 79

1	A1	LAKE LATTIMORE DAM **** DINGMANS CREEK									
2	A2	DELAWARE TWP., PIKE COUNTY, PA.									
3	A3	NDI # PA-00406 PA DER # 52-78									
4	B	300	0	15	0	0	0	0	0	-4	0
5	B1	5									
6	J	1	9	1							
7	J1	1	.85	.75	.6	.5	.4	.3	.2	.1	
8	K		1					1			
9	K1	INFLOW HYDROGRAPH - SILVER LAKE SUBAREA									
10	M	1	1	.64	11.13						
11	P		21.9	111	123	133	142				
12	T							1	.05		
13	W	.57	.45								
14	X	-1.5	-.05	2							
15	K	1	2					1			
16	K1	RESERVOIR ROUTING - THRU SILVER LAKE									
17	Y			1							
18	Y1	1						3704	-1		
19	Y4	1307	1308	1309	1310	1311					
20	Y5	0	27	481	1286	2320					
21	Y4	0	140.2	175							
22	Y5	1228	1307	1320							
23	Y6	1307									
24	Y0	1308									
25	K	1	3					1			
26	K1	ROUTING THRU REACH 2 - 3									
27	Y			1							
28	Y1	1									
29	Y6	.1	.08	.1	1279	1320	2400	.0117			
30	Y7	0	1320	350	1300	890	1280	910	1279	920	1279
31	Y7	980	1280	1650	1300	1980	1320				
32	K	1	4					1			
33	K1	ROUTING THRU REACH 3 - 4									
34	Y			1							
35	Y1	1									
36	Y6	.1	.08	.1	1244	1300	4200	.0083			
37	Y7	0	1280	10	1280	370	1260	440	1244	450	1244
38	Y7	600	1260	760	1280	1050	1300				
39	K		5					1			
40	K1	INFLOW HYDROGRAPH - MARCEL LAKE SUBAREA									
41	M	1	1	3.74	11.13						
42	P		21.9	111	123	133	142				
43	T							1	.05		
44	W	1.52	.45								
45	X	-1.5	-.05	2							
46	K	2	6					1			
47	K1	COMBINE HYDROGRAPHS AT MARCEL LAKE									
48	K	1	7					1			
49	K1	RESERVOIR ROUTING - THRU MARCEL LAKE									
50	Y			1							
51	Y1	1						159			
52	Y4	0	29.5	41.9							
53	Y5	1214.9	1231	1240							
54	Y6	1231	60	3.88	1.5						

	K1	COMBINE HYDROGRAPHS AT MARCEL LAKE									
48	K	1	7							1	
49	K1	RESERVOIR ROUTING - THRU MARCEL LAKE									
50	Y			1							
1 51	Y1	1								159	
52	\$A	0	29.5	41.9							
53	\$E1214.9		1231	1240							
54	\$I 1231		60	3.88	1.5						
55	\$D1237.5		2.7	1.5	800						
56	K	1	8							1	
57	K1	ROUTING THRU REACH 7 - 8									
58	Y			1							
59	Y6	1									
60	Y6	.1	.08	.1	1207	1260	900	.0138			
61	Y7	0	1260	200	1240	400	1220	720	1207	730	1207
62	Y7	840	1220	1050	1240	1200	1260				
63	K		9							1	
64	K1	INFLOW HYDROGRAPH - CAMP MASSAD LAKE SUBAREA									
65	M	1	1	2.75	11.13						
66	P		21.9	111	123	133	142				
67	T								1	.05	
68	W	1.96	.45								
69	X	-1.5	-.05	2							
70	K	2	10							1	
71	K1	COMBINE HYDROGRAPHS AT CAMP MASSAD LAKE									
72	K	1	11							1	
73	K1	RESERVOIR ROUTING - THRU CAMP MASSAD LAKE									
74	Y			1							
75	Y1	1								61.4	
76	\$A	0	12.3	25.6							
77	\$E 1155		1170	1180							
78	\$I 1170		110	3.88	1.5						
79	\$D1175.5		2.7	1.5	450						
80	K	1	12							1	
81	K1	ROUTING THRU REACH 11 - 12									
82	Y			1							
83	Y1	1									
84	Y6	.1	.08	.1	1146	1200	2000	.01			
85	Y7	0	1200	100	1180	1030	1160	1220	1146	1230	1146
86	Y7	1670	1160	1880	1180	2000	1200				
87	K	1	13							1	
88	K1	ROUTING THRU REACH 12 - 13									
89	Y			1							
90	Y1	1									
91	Y6	.09	.06	.07	1081	1140	3100	.021			
92	Y7	0	1140	200	1120	350	1100	520	1081	530	1081
93	Y7	1110	1100	1500	1120	1700	1120				
94	K		14							1	
95	K1	INFLOW HYDROGRAPH - NICHERCROCK POND SUBAREA									
96	M	1	1	.4	11.13						
97	P		21.9	111	123	133	142				
98	T								1	.05	
99	W	.89	.45								
100	X	-1.5	-.05	2							
1 101	K	1	15							1	
102	K1	RESERVOIR ROUTING - THRU NICHERCROCK POND									
103	Y			1							
104	Y1	1								353	-1
105	Y4	1266	1267	1268	1269	1270	1271				
106	Y5	0	27	290	779	1697	3064				
107	\$A	0	38	69.2							
108	\$E 1266.1		1266	1268							

97	F		21.9	111	123	133	142						
98	T							1	.05				
99	W	.88	.45										
100	X	-1.5	-.05	2									
101	N	1	15					1					
102	N1			RESERVOIR ROUTING - THRU NICHERCROK POND									
103	Y			1									
104	Y1	1						353	-1				
105	Y4	1266	1267	1268	1269	1270	1271						
106	Y5	0	27	290	779	1697	3064						
107	YA	0	38	69.2									
108	YE	1238.1	1266	1280									
109	YB	1266											
110	YD	1267											
111	K	1	16					1					
112	K1			ROUTING THRU REACH 15 - 16									
113	Y			1									
114	Y1	1											
115	Y6	.1	.08	.1	1200	1260	1200	.055					
116	Y7	0	1260	180	1240	400	1220	470	1200	480	1200		
117	Y7	575	1220	740	1240	900	1260						
118	K		17					1					
119	K1			INFLOW HYDROGRAPH - WOODPECKER LAKE SUBAREA									
120	M	1	1	.98		11.13							
121	P		21.9	111	123	133	142						
122	T							1	.05				
123	W	1.49	.45										
124	X	-1.5	-.05	2									
125	K	2	18					1					
126	K1			COMBINE HYDROGRAPHS AT WOODPECKER LAKE									
127	K	1	19					1					
128	K1			RESERVOIR ROUTING - THRU WOODPECKER LAKE									
129	Y			1									
130	Y1	1						192.3					
131	YA	0	57.7	117.9									
132	YE	1166	1176	1180									
133	YB	1176	41	2.7	1.5								
134	YD	1178	2.7	1.5	300								
135	K	1	20					1					
136	K1			ROUTING THRU REACH 19 - 20									
137	Y			1									
138	Y1	1											
139	Y6	.1	.08	.1	1079	1120	2700	.05					
140	Y7	0	1120	110	1100	220	1080	230	1079	240	1079		
141	Y7	250	1080	550	1100	660	1120						
142	K		21					1					
143	K1			INFLOW HYDROGRAPH - LAKE LATTIMORE SUBAREA									
144	M	1	1	2.62		11.13							
145	P		21.9	111	123	133	142						
146	T							1	.05				
147	W	1.46	.45										
148	X	-1.5	-.05	2									
149	K	3	22					1					
150	K1			COMBINE HYDROGRAPHS AT LAKE LATTIMORE									
151	K	1	23					1					
152	K1			RESERVOIR ROUTING - THRU LAKE LATTIMORE									
153	Y			1									
154	Y1	1						199	-1				
155	Y4	1040.9	1041.5	1042	1042.5	1043	1044	1044.9	1045.5	1046	1047		
156	Y4	1048	1049	1050	1051								
157	Y5	0	164	445	806	1232	2248	3322	4232	5292	8017		
158	Y5	11349	15137	19449	23947								

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152 NI RESERVOIR ROUTING - THRU LAKE LATTIMORE 4/31
 153 Y 1
 154 Y1 1 199 -1
 155 Y41040.9 1041.5 1042 1042.5 1043 1044 1044.9 1045.5 1046 1047
 156 Y4 1048 1049 1050 1051
 157 Y5 0 164 445 806 1232 2248 3322 4232 5292 8017
 158 Y5 11339 15137 19349 23937
 159 \$A 0 53.8 126.9
 160 \$E1029.9 1041 1060
 161 \$\$1040.9
 162 \$D1044.9
 163 K 99

1

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT 1
 ROUTE HYDROGRAPH TO 2
 ROUTE HYDROGRAPH TO 3
 ROUTE HYDROGRAPH TO 4
 RUNOFF HYDROGRAPH AT 5
 COMBINE 2 HYDROGRAPHS AT 6
 ROUTE HYDROGRAPH TO 7
 ROUTE HYDROGRAPH TO 8
 RUNOFF HYDROGRAPH AT 9
 COMBINE 2 HYDROGRAPHS AT 10
 ROUTE HYDROGRAPH TO 11
 ROUTE HYDROGRAPH TO 12
 ROUTE HYDROGRAPH TO 13
 RUNOFF HYDROGRAPH AT 14
 ROUTE HYDROGRAPH TO 15
 ROUTE HYDROGRAPH TO 16
 RUNOFF HYDROGRAPH AT 17
 COMBINE 2 HYDROGRAPHS AT 18
 ROUTE HYDROGRAPH TO 19
 ROUTE HYDROGRAPH TO 20
 RUNOFF HYDROGRAPH AT 21
 COMBINE 3 HYDROGRAPHS AT 22
 ROUTE HYDROGRAPH TO 23
 END OF NETWORK

 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 26 FEB 79

RUN DATE: 80/05/13.
 TIME: 06.07.43.

LAKE LATTIMORE DAM *** DINGMANS CREEK
 DELAWARE TWP., PIKE COUNTY, PA.
 NDI # PA-00406 PA DER # 52-78

JOB SPECIFICATION
 NO NHR NMIN IDAY IHR IMIN METRC IPLT IPRT NSTAN
 300 0 15 0 0 0 0 0 -4 0
 JOPLR NWT LROPT TRACE
 5 0 0 0

PEAK OUTFLOW IS 13628. AT TIME 42.25 HOURS

5/31

PEAK OUTFLOW IS 11085. AT TIME 42.25 HOURS

PEAK OUTFLOW IS 8537. AT TIME 42.50 HOURS

PEAK OUTFLOW IS 6113. AT TIME 42.75 HOURS

PEAK OUTFLOW IS 3840. AT TIME 42.75 HOURS

PEAK OUTFLOW IS 1832. AT TIME 43.00 HOURS

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	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9		
				1.00	.85	.75	.60	.50	.40	.30	.20	.10		
HYDROGRAPH AT	1	.64	1	2443.	2076.	1832.	1466.	1221.	977.	733.	489.	244.		
	(	1.66)	(	69.17)	(58.80)	(51.88)	(41.50)	(34.59)	(27.67)	(20.75)	(13.83)	(6.92)		
ROUTED TO	2	.64	1	1219.	980.	831.	583.	426.	302.	173.	27.	14.		
	(	1.66)	(	34.51)	(27.98)	(23.53)	(16.50)	(12.07)	(8.54)	(4.90)	(.82)	(.40)		
ROUTED TO	3	.64	1	1215.	986.	828.	581.	423.	299.	171.	29.	14.		
	(	1.66)	(	34.42)	(27.92)	(23.46)	(16.46)	(11.98)	(8.47)	(4.85)	(.81)	(.40)		
ROUTED TO	4	.64	1	1211.	978.	821.	574.	420.	296.	166.	28.	14.		
	(	1.66)	(	34.29)	(27.70)	(23.24)	(16.25)	(11.88)	(8.40)	(4.70)	(.80)	(.40)		
HYDROGRAPH AT	5	3.74	1	8659.	7360.	6474.	5195.	4329.	3464.	2598.	1737.	868.		
	(	9.69)	(	245.20)	(208.42)	(183.90)	(147.12)	(122.60)	(98.08)	(73.56)	(49.04)	(24.52)		
2 COMBINED	6	4.38	1	9671.	8136.	7101.	5566.	4564.	3590.	2634.	1749.	875.		
	(	11.34)	(	273.85)	(230.30)	(201.08)	(157.60)	(129.24)	(101.65)	(74.57)	(49.52)	(24.78)		
ROUTED TO	7	4.38	1	9640.	8115.	7076.	5540.	4494.	3407.	2482.	1619.	812.		
	(	11.34)	(	272.98)	(229.78)	(200.65)	(156.89)	(127.25)	(96.46)	(70.28)	(45.85)	(23.42)		
ROUTED TO	8	4.38	1	9643.	8118.	7091.	5524.	4513.	3405.	2480.	1618.	812.		
	(	11.34)	(	273.07)	(229.87)	(200.80)	(156.43)	(127.79)	(96.42)	(70.21)	(45.82)	(23.42)		
HYDROGRAPH AT	9	2.75	1	5485.	4662.	4114.	3291.	2743.	2194.	1646.	1097.	548.		
	(	7.12)	(	155.32)	(132.03)	(116.49)	(93.19)	(77.66)	(62.13)	(46.60)	(31.06)	(15.53)		

		(11.34)	(273.85)(230.38)(201.08)(157.60)(129.24)(101.65)(74.57)(49.75)(24.91)
ROUTED TO	7	4.38 (11.34)	1 9643. 8118. 7086. 5540. 4484. 3407. 2482. 1619. 772. (272.98)(229.78)(200.65)(156.89)(127.25)(96.46)(70.28)(45.89)(22.42)
TO	8	4.38 (11.34)	1 9643. 8118. 7086. 5524. 4513. 3405. 2482. 1619. 772. (273.07)(229.87)(200.80)(156.43)(127.79)(96.42)(70.21)(45.89)(22.42)
HYDROGRAPH AT	9	2.75 (7.12)	1 5485. 4662. 4114. 3291. 2703. 2194. 1646. 1092. 549. (155.32)(132.03)(116.49)(93.19)(77.66)(62.13)(46.60)(31.06)(15.53)
2 COMBINED	10	7.13 (18.47)	1 15109. 12763. 11190. 8801. 7205. 5569. 4103. 2700. 1376. (427.83)(361.41)(316.87)(249.28)(205.45)(157.70)(116.18)(76.45)(37.61)
ROUTED TO	11	7.13 (18.47)	1 15090. 12735. 11163. 8801. 7204. 5560. 4091. 2691. 1323. (427.31)(360.61)(316.11)(249.22)(204.84)(157.44)(115.85)(76.20)(37.47)
ROUTED TO	12	7.13 (18.47)	1 15084. 12744. 11179. 8801. 7222. 5568. 4091. 2691. 1320. (427.13)(360.66)(316.56)(249.78)(204.52)(157.33)(115.85)(76.15)(37.37)
ROUTED TO	13	7.13 (18.47)	1 15088. 12745. 11186. 8823. 7213. 5563. 4083. 2674. 1320. (427.24)(360.89)(316.18)(249.85)(204.25)(157.24)(115.75)(76.00)(37.38)
HYDROGRAPH AT	14	.40 (1.04)	1 1225. 1041. 918. 735. 612. 490. 387. 293. 122. (34.68)(29.48)(26.01)(20.81)(17.34)(13.87)(10.40)(6.94)(3.47)
ROUTED TO	15	.40 (1.04)	1 1009. 817. 702. 548. 438. 325. 223. 121. 24. (28.58)(23.13)(19.87)(15.51)(12.44)(9.20)(6.32)(3.60)(.67)
ROUTED TO	16	.40 (1.04)	1 1008. 817. 703. 548. 440. 325. 223. 121. 24. (28.55)(23.13)(19.90)(15.52)(12.45)(9.20)(6.32)(3.60)(.67)
HYDROGRAPH AT	17	.98 (2.54)	1 2296. 1932. 1722. 1378. 1148. 918. 689. 459. 230. (65.02)(55.26)(48.76)(39.01)(32.51)(26.01)(19.51)(13.00)(6.50)
2 COMBINED	18	1.38 (3.57)	1 3304. 2744. 2408. 1905. 1556. 1196. 878. 543. 246. (93.54)(77.71)(68.23)(53.94)(44.05)(33.88)(24.79)(15.36)(6.97)
ROUTED TO	19	1.38 (3.57)	1 2992. 2497. 2174. 1668. 1351. 1002. 652. 292. 119. (84.73)(70.70)(61.57)(47.80)(38.26)(28.38)(18.47)(8.46)(3.36)
ROUTED TO	20	1.38 (3.57)	1 2994. 2494. 2173. 1686. 1351. 1002. 653. 292. 117. (84.79)(70.63)(61.52)(47.73)(38.26)(28.37)(18.49)(8.46)(3.36)
HYDROGRAPH AT	21	2.62 (6.79)	1 6152. 5129. 4614. 3691. 3076. 2461. 1846. 1230. 610. (174.21)(148.08)(130.66)(104.53)(87.11)(69.69)(52.26)(34.84)(17.42)
3 COMBINED	22	11.13 (28.83)	1 23807. 20075. 17590. 13835. 11283. 8625. 6187. 3928. 1942. (674.13)(568.45)(497.81)(391.76)(318.94)(244.23)(175.25)(112.86)(54.99)
ROUTED TO	23	11.13 (28.83)	1 23694. 19878. 17494. 13628. 11085. 8537. 6113. 3847. 1932. (668.39)(563.44)(493.10)(385.91)(313.91)(241.74)(173.10)(108.73)(51.87)

SUMMARY OF DAM SAFETY ANALYSIS

LAM 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1307.08	1307.00	1308.00
STORAGE	3703.	3692.	3833.
OUTFLOW	2.	0.	27.

Summary of Dam Safety Analysis

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PLAN 1

ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
STORAGE	1307.08	1307.00	1302.00
OUTFLOW	3703.	3692.	3833.
	2.	0.	27.

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
1.00	1309.92	1.92	4112.	1219.	20.50	42.00	0.00
.85	1309.63	1.63	4067.	988.	19.50	42.00	0.00
.75	1309.43	1.43	4041.	831.	18.75	42.25	0.00
.60	1309.13	1.13	3996.	583.	17.50	42.50	0.00
.50	1308.88	.88	3960.	426.	16.00	42.50	0.00
.40	1308.61	.61	3920.	302.	14.25	42.75	0.00
.30	1308.32	.32	3879.	173.	12.00	43.00	0.00
.20	1308.00	.00	3834.	29.	1.75	44.50	0.00
.10	1307.52	0.00	3766.	14.	0.00	44.50	0.00

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1215.	1281.9	42.00
.85	986.	1281.7	42.25
.75	828.	1281.5	42.25
.60	581.	1281.3	42.50
.50	423.	1280.9	42.75
.40	299.	1280.3	43.00
.30	171.	1279.8	43.25
.20	29.	1279.1	44.75
.10	14.	1279.1	44.75

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1211.	1240.1	42.25
.85	978.	1249.5	42.50
.75	811.	1248.9	42.50
.60	574.	1248.1	42.75
.50	420.	1247.6	43.00
.40	296.	1247.2	43.25
.30	166.	1246.2	43.75
.20	28.	1244.4	45.25
.10	14.	1244.2	45.50

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
STORAGE	1231.02	1231.00	1237.50
OUTFLOW	159.	158.	378.
	1.	0.	3858.

RATIO	FLOW,CFS	STAGE,FT	HOURS
1.00	1211.	1247.1	42.25
.85	978.	1247.5	42.50
.75	821.	1248.9	42.50
.60	574.	1248.1	42.75
.50	420.	1247.6	43.00
.40	296.	1247.2	43.25
.30	166.	1246.2	43.75
.20	88.	1244.4	45.25
.10	14.	1244.2	45.50

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1231.02	1231.00	1237.50
STORAGE	159.	158.	378.
OUTFLOW	1.	0.	3858.

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
1.00	1239.08	1.58	440.	9640.	5.50	41.50	0.00
.85	1238.77	1.27	427.	8115.	4.50	41.50	0.00
.75	1238.53	1.03	418.	7086.	4.00	41.50	0.00
.60	1238.14	.84	403.	5543.	3.00	41.50	0.00
.50	1237.80	.70	370.	4494.	2.00	41.75	0.00
.40	1236.98	0.00	358.	3407.	0.00	42.00	0.00
.30	1235.84	0.00	316.	2482.	0.00	42.00	0.00
.20	1234.64	0.00	274.	1619.	0.00	42.00	0.00
.10	1233.26	0.00	228.	792.	0.00	42.25	0.00

PLAN 1 STATION 8

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	9643.	1216.2	41.50
.85	8118.	1215.7	41.50
.75	7091.	1215.3	41.50
.60	5524.	1214.4	41.50
.50	4413.	1213.8	41.75
.40	3405.	1213.1	42.00
.30	2480.	1212.5	42.00
.20	1619.	1211.3	42.00
.10	792.	1210.2	42.25

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1169.98	1170.00	1175.50
STORAGE	61.	62.	147.
OUTFLOW	0.	0.	5505.

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
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.40 4513. 1113.8 41.75
 .40 3475. 1113.1 42.00
 .30 2480. 1112.5 42.00
 .20 1618. 1111.3 42.00
 .10 792. 1110.2 42.25

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1169.98	1170.00	1175.50
STORAGE	61.	62.	147.
OUTFLOW	0.	0.	5505.

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
1.00	1178.13	2.63	202.	15090.	6.50	41.50	0.00
.85	1177.62	2.12	190.	12735.	5.50	41.50	0.00
.75	1177.25	1.75	182.	11163.	5.00	41.75	0.00
.60	1176.65	1.15	170.	8891.	3.75	41.50	0.00
.50	1176.18	.68	160.	7234.	3.00	41.75	0.00
.40	1175.53	.03	148.	5560.	.50	42.00	0.00
.30	1174.51	0.00	129.	4091.	0.00	42.00	0.00
.20	1173.41	0.00	110.	2691.	0.00	42.00	0.00
.10	1172.13	0.00	90.	1323.	0.00	42.25	0.00

PLAN 1 STATION 12

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	15084.	1156.5	41.75
.85	12744.	1155.8	41.75
.75	11179.	1155.3	41.75
.60	8821.	1154.6	41.75
.50	7222.	1153.8	42.00
.40	5556.	1153.0	42.25
.30	4091.	1152.2	42.25
.20	2689.	1151.3	42.25
.10	1320.	1149.8	42.50

PLAN 1 STATION 13

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	15088.	1087.4	41.75
.85	12745.	1086.8	41.75
.75	11166.	1086.4	41.75
.60	8823.	1087.0	41.75
.50	7213.	1087.4	42.00
.40	5553.	1086.7	42.25
.30	4088.	1085.8	42.25
.20	2684.	1085.0	42.25
.10	1320.	1084.2	42.50

SUMMARY OF DAM SAFETY ANALYSIS

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.30	4088.	1045.8	42.25
.20	2684.	1045.0	42.25
.10	1320.	1084.2	42.50

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1265.97	1266.00	1267.00
STORAGE	352.	353.	392.
OUTFLOW	0.	0.	27.

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
1.00	1267.25	2.25	487.	1009.	16.00	41.25	0.00
.85	1269.04	2.04	478.	817.	15.00	41.50	0.00
.75	1268.84	1.84	469.	702.	14.25	41.75	0.00
.60	1268.53	1.53	456.	548.	13.25	41.75	0.00
.50	1268.31	1.31	446.	439.	12.00	41.75	0.00
.40	1268.07	1.07	436.	325.	11.00	42.25	0.00
.30	1267.75	.75	423.	223.	9.50	42.50	0.00
.20	1267.38	.38	408.	127.	7.25	42.75	0.00
.10	1266.88	0.00	388.	24.	0.00	44.25	0.00

PLAN 1 STATION 16

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
1.00	1009.	1204.0	41.50
.85	817.	1203.7	41.50
.75	703.	1203.5	41.75
.60	548.	1203.2	41.75
.50	440.	1202.8	42.00
.40	325.	1202.1	42.25
.30	223.	1201.4	42.50
.20	127.	1200.8	42.75
.10	24.	1200.2	44.25

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1176.00	1176.00	1178.00
STORAGE	192.	192.	334.
OUTFLOW	0.	0.	313.

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
1.00	1179.91	1.91	526.	2972.	11.50	42.25	0.00
.85	1179.65	1.65	497.	2497.	11.00	42.25	0.00
.75	1179.48	1.48	477.	2174.	10.50	42.25	0.00
.60	1179.19	1.19	447.	1680.	9.25	42.50	0.00
.50	1178.98	.98	425.	1351.	8.25	42.75	0.00
.40	1178.73	.73	400.	1002.	7.25	43.00	0.00
.30	1178.43	.43	373.	652.	5.50	43.50	0.00

OUTFLOW

0.

0.

313.

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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
1.00	1179.91	1.91	526.	2992.	11.50	42.25	0.00
.85	1179.65	1.65	497.	2497.	11.00	42.25	0.00
.75	1179.48	1.48	477.	2174.	10.50	42.25	0.00
.60	1179.19	1.19	447.	1680.	9.25	42.50	0.00
.50	1178.98	.98	425.	1351.	8.25	42.75	0.00
.40	1178.73	.73	400.	1002.	7.25	43.00	0.00
.30	1178.43	.43	373.	652.	5.50	43.50	0.00
.20	1177.94	0.00	329.	299.	0.00	44.50	0.00
.10	1177.05	0.00	260.	119.	0.00	44.50	0.00

PLAN 1 STATION 20

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	2994.	1084.3	42.25
.85	2494.	1083.9	42.25
.75	2173.	1083.6	42.50
.60	1686.	1083.2	42.50
.50	1351.	1082.7	42.75
.40	1002.	1082.1	43.00
.30	653.	1081.6	43.50
.20	299.	1080.7	44.50
.10	119.	1079.7	44.75

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1041.00	1040.90	1044.90
STORAGE	197.	194.	433.
OUTFLOW	26.	0.	3322.

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
1.00	1050.93	6.03	897.	23604.	11.25	42.00	0.00
.85	1050.12	5.22	827.	19898.	10.50	42.00	0.00
.75	1049.54	4.64	778.	17414.	10.00	42.00	0.00
.60	1048.60	3.70	702.	13628.	9.00	42.25	0.00
.50	1047.92	3.02	649.	11085.	7.75	42.25	0.00
.40	1047.16	2.76	591.	8537.	6.75	42.50	0.00
.30	1046.30	1.40	529.	6113.	5.25	42.75	0.00
.20	1045.24	.34	456.	3840.	2.25	42.75	0.00
.10	1043.59	0.00	349.	1832.	0.00	43.00	0.00

EOI ENCOUNTERED.

11/11

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[illegible]

57	K1				ROUTING THRU REACH 7 - 8									
58	Y				1	1								
59	Y6	1												
60	Y6	.1	.09	.1	1207	1760	900	.0138						
61	Y7	0	1260	200	1240	400	1220	720	1207	730	1207			
62	Y7	840	1220	1050	1240	1200	1260							
63	K		9								1			
64	K1				INFLOW HYDROGRAPH - CAMP MASSAD LAKE SUBAREA									
65	H	1	1	2.75		11.13					1			
66	P		21.9	111	123	133	142							
67	T										1	.05		
68	W	1.94	.45											
69	X	-1.5	-.05	2										
70	K	2	10								1			
71	K1				COMBINE HYDROGRAPHS AT CAMP MASSAD LAKE									
72	K	1	11								1			
73	K1				RESERVOIR ROUTING - THRU CAMP MASSAD LAKE									
74	Y				1	1								
75	Y1	1									61.4			
76	\$A	0	12.3	25.6										
77	\$E	1155	1170	1180										
78	\$F	1170	110	3.88	1.5									
79	\$D	1175.5	2.7	1.5	450									
80	K	1	12								1			
81	K1				ROUTING THRU REACH 11 - 12									
82	Y				1	1								
83	Y1	1												
84	Y6	.1	.08	.1	1146	1200	2000	.01						
85	Y7	0	1200	100	1180	1030	1160	1220	1146	1230	1146			
86	Y7	1670	1160	1880	1180	2000	1200							
87	K	1	13								1			
88	K1				ROUTING THRU REACH 12 - 13									
89	Y				1	1								
90	Y1	1												
91	Y6	.09	.06	.09	1081	1140	3100	.021						
92	Y7	0	1140	200	1120	350	1100	520	1081	530	1081			
93	Y7	1110	1100	1500	1120	1700	1120							
94	K		14								1			
95	K1				INFLOW HYDROGRAPH - NICHERCROMA POND SUBAREA									
96	H	1	1	.4		11.13					1			
97	P		21.9	111	123	133	142							
98	T										1	.05		
99	W	.88	.45											
100	X	-1.5	-.05	2										
101	K	1	15								1			
102	K1				RESERVOIR ROUTING - THRU NICHERCROMA POND									
103	Y				1	1								
104	Y1	1									353	-1		
105	Y4	1266	1267	1268	1269	1270	1271							
106	Y5	0	27	290	779	1697	3064							
107	\$4	0	38	69.2										
108	\$F	1239.1	1266	1280										
109	\$F	1266												
110	\$D	1267												
111	K	1	16								1			
112	K1				ROUTING THRU REACH 15 - 16									
113	Y				1	1								
114	Y1	1												
115	Y6	.1	.08	.1	1200	1260	1260	.055						
116	Y7	0	1260	120	1260	400	1220	470	1200	480	1200			

117	Y	5/5	1220	740	1230	900	1260				
118	K		17					1			
119	M			INFLOW HYDROGRAPH - WOODPECKER LAKE SUBAREA							
120	M	1	1	.90		11.13				1	
121	P		21.9	111	123	133	142				
122	T							1	.05		
123	W	1.49	.45								
124	X	-1.5	-.05	2							
125	K	2	18					1			
126	M			COMBINE HYDROGRAPHS AT WOODPECKER LAKE							
127	K	1	19					1			
128	M			RESERVOIR ROUTING - THRU WOODPECKER LAKE							
129	Y			1	1						
130	Y1	1						192.3			
131	\$A	0	57.7	117.9							
132	\$E	1166	1176	1180							
133	\$F	1176	41	2.7	1.5						
134	\$D	1178	2.7	1.5	300						
135	K	1	20					1			
136	M			ROUTING THRU REACH 19 - 20							
137	Y			1	1						
138	Y1	1									
139	Y6	.1	.08	.1	1079	1120	2700	.05			
140	Y7	0	1120	110	1100	220	1080	230	1079	240	1079
141	Y7	250	1080	550	1100	660	1120				
142	K		21					1			
143	M			INFLOW HYDROGRAPH - LAKE LATTIMORE SUBAREA							
144	M	1	1	2.62		11.13				1	
145	P		21.9	111	123	133	142				
146	T							1	.05		
147	W	1.46	.45								
148	X	-1.5	-.05	2							
149	K	3	22					1			
150	M			COMBINE HYDROGRAPHS AT LAKE LATTIMORE							
151	K	1	23					1			
152	M			RESERVOIR ROUTING - THRU LAKE LATTIMORE							
153	Y			1	1						
154	Y1	1						199	-1		
155	Y4	1040.7	1041.5	1042	1042.5	1043	1044	1044.9	1045.5	1046	1047
156	Y4	1048	1049	1050	1051						
157	Y5	0	164	445	806	1232	2248	3322	4232	5292	8017
158	Y5	11339	15137	19349	23937						
159	\$A	0	53.8	126.9							
160	\$E	1029.9	1041	1060							
161	\$F	1040.9									
162	\$D	1044.9									
163	\$B	50	1	1037	.25	1040.9	1045.4				
164	\$B	50	1	1037	.5	1040.9	1045.4				
165	\$B	50	1	1037	1	1040.9	1045.4				
166	\$B	50	1	1037	2	1040.9	1095.4				
167	K	1	24					1			
168	M			ROUTING THRU REACH 23 - 24							
169	Y			1	1						
170	Y1	1									
171	Y6	.1	.09	.1	976	1020	2400	.0225			
172	Y7	0	1000	10	1000	100	980	180	976	190	976
173	Y7	280	980	350	1000	510	1020				
174	K	1	25					1			
175	M			ROUTING THRU REACH 24 - 25							
176	Y			1	1						
177	Y1	1									

	K1									
177	Y1	1								
178	Y6	.1	.09	.1	774	820	3700	.055		
179	Y7	0	820	90	800	160	780	240	774	250 774
180	Y7	300	780	380	890	420	820			
181	K	1	26					1		
182	K1			ROUTING THRU REACH 25 - 26						
183	Y			1	1					
184	Y1	1								
185	Y6	.1	.09	.1	744	800	1600	.0187		
186	Y7	0	800	100	780	180	760	275	744	285 744
187	Y7	450	760	530	780	620	800			
188	K	99								

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
ROUTE HYDROGRAPH TO	3
ROUTE HYDROGRAPH TO	4
RUNOFF HYDROGRAPH AT	5
COMBINE 2 HYDROGRAPHS AT	6
ROUTE HYDROGRAPH TO	7
ROUTE HYDROGRAPH TO	8
RUNOFF HYDROGRAPH AT	9
COMBINE 2 HYDROGRAPHS AT	10
ROUTE HYDROGRAPH TO	11
ROUTE HYDROGRAPH TO	12
ROUTE HYDROGRAPH TO	13
RUNOFF HYDROGRAPH AT	14
ROUTE HYDROGRAPH TO	15
ROUTE HYDROGRAPH TO	16
RUNOFF HYDROGRAPH AT	17
COMBINE 2 HYDROGRAPHS AT	18
ROUTE HYDROGRAPH TO	19
ROUTE HYDROGRAPH TO	20
RUNOFF HYDROGRAPH AT	21
COMBINE 3 HYDROGRAPHS AT	22
ROUTE HYDROGRAPH TO	23
ROUTE HYDROGRAPH TO	24
ROUTE HYDROGRAPH TO	25
ROUTE HYDROGRAPH TO	26
END OF NETWORK	

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79

RUN DATE# 80.06.11.
TIME# 06.03.37.

Lake Lattimore Dam *** Dingmans Creek
Delaware Twp., Pike County, PA.
NDI # PA-00406 PA DER # 52-78

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	INH	IMIN	METRC	IPLT	IPRT	NSTAN
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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	RATIO	1	RATIOS APPLIED TO FLOWS
					.22	
HYDROGRAPH AT	1	.64	1	537.		
	(	1.66)	(	15.22)	(	
			2	537.		
			(	15.22)	(	
			3	537.		
			(	15.22)	(	
			4	537.		
			(	15.22)	(	
ROUTED TO	2	.64	1	61.		
	(	1.66)	(	1.72)	(	
			2	61.		
			(	1.72)	(	
			3	61.		
			(	1.72)	(	
			4	61.		
			(	1.72)	(	
ROUTED TO	3	.64	1	60.		
	(	1.66)	(	1.70)	(	
			2	60.		
			(	1.70)	(	
			3	60.		
			(	1.70)	(	
			4	60.		
			(	1.70)	(	
ROUTED TO	4	.64	1	58.		
	(	1.66)	(	1.65)	(	
			2	58.		
			(	1.65)	(	
			3	58.		
			(	1.65)	(	
			4	58.		
			(	1.65)	(	
HYDROGRAPH AT	5	3.74	1	1905.		
	(	9.69)	(	53.94)	(	
			2	1905.		
			(	53.94)	(	
			3	1905.		
			(	53.94)	(	
			4	1905.		
			(	53.94)	(	

11/21

			3	1905.
)			(	53.94)(
)			4	1905.
)			(	53.94)(
)	2 COMBINED	6	4.38	1 1924.
)		(	11.34)	(54.47)(
)			2	1924.
)			(	54.47)(
)			3	1924.
)			(	54.47)(
)			4	1924.
)			(	54.47)(
)	ROUTED TO	7	4.38	1 1786.
)		(	11.34)	(50.56)(
)			2	1786.
)			(	50.56)(
)			3	1786.
)			(	50.56)(
)			4	1786.
)			(	50.56)(
)	ROUTED TO	8	4.38	1 1785.
)		(	11.34)	(50.54)(
)			2	1785.
)			(	50.54)(
)			3	1785.
)			(	50.54)(
)			4	1785.
)			(	50.54)(
)	HYDROGRAPH AT	9	2.75	1 1207.
)		(	7.12)	(34.17)(
)			2	1207.
)			(	34.17)(
)			3	1207.
)			(	34.17)(
)			4	1207.
)			(	34.17)(
)	2 COMBINED	10	7.13	1 2975.
)		(	18.47)	(84.24)(
)			2	2975.
)			(	84.24)(
)			3	2975.
)			(	84.24)(
)			4	2975.
)			(	84.24)(
)	ROUTED TO	11	7.13	1 2967.
)		(	18.47)	(84.01)(
)			2	2967.
)			(	84.01)(
)			3	2967.
)			(	84.01)(
)			4	2967.
)			(	84.01)(
)	ROUTED TO	12	7.13	1 2964.
)		(	18.47)	(83.93)(

12/2

			4	2967.
			(	84.01)(
ROUTED TO	12	7.13	1	2964.
	(	18.47)	(	83.93)(
			2	2964.
			(	83.93)(
			3	2964.
			(	83.93)(
			4	2964.
			(	83.93)(
ROUTED TO	13	7.13	1	2959.
	(	18.47)	(	83.78)(
			2	2959.
			(	83.78)(
			3	2959.
			(	83.78)(
			4	2959.
			(	83.78)(
HYDROGRAPH AT	14	.40	1	269.
	(	1.04)	(	7.63)(
			2	269.
			(	7.63)(
			3	269.
			(	7.63)(
			4	269.
			(	7.63)(
ROUTED TO	15	.40	1	147.
	(	1.04)	(	4.16)(
			2	147.
			(	4.16)(
			3	147.
			(	4.16)(
			4	147.
			(	4.16)(
ROUTED TO	16	.40	1	147.
	(	1.04)	(	4.16)(
			2	147.
			(	4.16)(
			3	147.
			(	4.16)(
			4	147.
			(	4.16)(
HYDROGRAPH AT	17	.98	1	505.
	(	2.54)	(	14.30)(
			2	505.
			(	14.30)(
			3	505.
			(	14.30)(
			4	505.
			(	14.30)(
2 COMBINED	18	1.38	1	612.
	(	3.57)	(	17.33)(
			2	612.
			(	17.33)(

(14.30)(

17/21

2 COMBINED

18 1.38
(3.57)

1 612.
(17.33)(
2 612.
(17.33)(
3 612.
(17.33)(
4 612.
(17.33)(

ROUTED TO

19 1.38
(3.57)

1 355.
(10.05)(
2 355.
(10.05)(
3 355.
(10.05)(
4 355.
(10.05)(

ROUTED TO

20 1.38
(3.57)

1 354.
(10.03)(
2 354.
(10.03)(
3 354.
(10.03)(
4 354.
(10.03)(

HYDROGRAPH AT

21 2.62
(6.79)

1 1354.
(38.33)(
2 1354.
(38.33)(
3 1354.
(38.33)(
4 1354.
(38.33)(

3 COMBINED

22 11.13
(28.83)

1 4399.
(124.57)(
2 4399.
(124.57)(
3 4399.
(124.57)(
4 4399.
(124.57)(

ROUTED TO

23 11.13
(28.83)

1 7478.
(211.75)(
2 6853.
(194.05)(
3 5954.
(168.59)(
4 4953.
(120.43)(

ROUTED TO

24 11.13
(28.83)

1 6872.
(194.60)(
2 6481.
(183.52)(
3 5864.
(166.06)(

ROUTED TO 24 11.13 1 6872.
(28.83) (194.60)
2 6481.
(183.52)
3 5864.
(166.06)
4 4244.
(120.18)

ROUTED TO 25 11.13 1 6877.
(28.83) (194.75)
2 6406.
(181.40)
3 5756.
(163.00)
4 4747.
(120.25)

ROUTED TO 26 11.13 1 6671.
(28.83) (188.90)
2 6422.
(181.85)
3 5691.
(161.15)
4 4748.
(120.24)

1

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 INITIAL VALUE SPILLWAY CREST TOP OF DAM
ELEVATION 1307.08 1307.00 1308.00
STORAGE 3703. 3692. 3833.
OUTFLOW 2. 0. 27.

RATIO OF FPE	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
.22	1308.07	.07	3844.	61.	7.00	43.75	0.00

PLAN 2 INITIAL VALUE SPILLWAY CREST TOP OF DAM
ELEVATION 1307.08 1307.00 1308.00
STORAGE 3703. 3692. 3833.
OUTFLOW 2. 0. 27.

RATIO OF FPE	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
.22	1308.07	.07	3844.	61.	7.00	43.75	0.00

PLAN 3 INITIAL VALUE SPILLWAY CREST TOP OF DAM
ELEVATION 1307.08 1307.00 1308.00

PLAN 3

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1307.08	1307.00	1308.00
STORAGE	3703.	3692.	3833.
OUTFLOW	2.	0.	27.

RATIO OF PNF	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
.22	1308.07	.07	3844.	61.	7.00	43.75	0.00

PLAN 4

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1307.08	1307.00	1308.00
STORAGE	3703.	3692.	3833.
OUTFLOW	2.	0.	27.

RATIO OF PNF	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
.22	1308.07	.07	3844.	61.	7.00	43.75	0.00

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.22	60.	1279.3	44.00

PLAN 2 STATION 3

RATIO	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.22	60.	1279.3	44.00

PLAN 3 STATION 3

RATIO	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.22	60.	1279.3	44.00

PLAN 4 STATION 3

RATIO	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.22	60.	1279.3	44.00

PLAN 1 STATION 4

PLAN 1	STATION	4	
	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.22	58.	1244.8	44.50

PLAN 2	STATION	4	
	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.22	58.	1244.8	44.50

PLAN 3	STATION	4	
	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.22	58.	1244.8	44.50

PLAN 4	STATION	4	
	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.22	58.	1244.8	44.50

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1231.00	1231.00	1237.50
STAGE	158.	158.	378.
OUTFLOW	1.	0.	3858.

RATIO OF FREE RESERVOIR W/STAGE	MAXIMUM STAGE OVER DAM	MAXIMUM STAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
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PLAN 2	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1231.00	1231.00	1237.50
STAGE	158.	158.	378.
OUTFLOW	1.	0.	3858.

RATIO OF FREE RESERVOIR W/STAGE	MAXIMUM STAGE OVER DAM	MAXIMUM STAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.22	1244.80	0.00	283.	178.	0.00	42.00

PLAN 3	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1231.00	1231.00	1237.50

PLAN 3

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1231.02	1231.00	1237.50
STORAGE	159.	158.	378.
OUTFLOW	1.	0.	3858.

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
.22	1234.89	0.00	283.	1786.	0.00	42.00	0.00

PLAN 4

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1231.02	1231.00	1237.50
STORAGE	159.	158.	378.
OUTFLOW	1.	0.	3858.

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
.22	1234.89	0.00	283.	1786.	0.00	42.00	0.00

PLAN 1 STATION 8

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	1785.	1211.6	42.00

PLAN 2 STATION 8

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	1785.	1211.6	42.00

PLAN 3 STATION 8

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	1785.	1211.6	42.00

PLAN 4 STATION 8

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	1785.	1211.6	42.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

INITIAL VALUE SPILLWAY CREST TOP OF DAM

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1169.98	1170.00	1175.50
STORAGE	61.	62.	147.
OUTFLOW	0.	0.	5505.

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
.22	1173.64	0.00	114.	2967.	0.00	42.00	0.00

PLAN 2

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1169.98	1170.00	1175.50
STORAGE	61.	62.	147.
OUTFLOW	0.	0.	5505.

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
.22	1173.64	0.00	114.	2967.	0.00	42.00	0.00

PLAN 3

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1169.98	1170.00	1175.50
STORAGE	61.	62.	147.
OUTFLOW	0.	0.	5505.

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
.22	1173.64	0.00	114.	2967.	0.00	42.00	0.00

PLAN 4

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1169.98	1170.00	1175.50
STORAGE	61.	62.	147.
OUTFLOW	0.	0.	5505.

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
.22	1173.64	0.00	114.	2967.	0.00	42.00	0.00

PLAN 1 STATION 12

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
.22	2964.	1151.6	42.25

.22 2964. 1151.6 42.25

PLAN 2 STATION 12

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
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.22 2964. 1151.6 42.25

PLAN 3 STATION 12

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
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.22 2964. 1151.6 42.25

PLAN 4 STATION 12

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
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.22 2964. 1151.6 42.25

PLAN 1 STATION 13

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
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.22 2959. 1085.2 42.25

PLAN 2 STATION 13

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
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.22 2959. 1085.2 42.25

PLAN 3 STATION 13

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
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.22 2959. 1085.2 42.25

PLAN 4 STATION 13

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
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.22 2959. 1085.2 42.25

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
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CONTINUED OF DAM SHEET ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1265.97	1266.00	1267.00
STORAGE	352.	353.	392.
OUTFLOW	0.	0.	27.

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
.22	1267.46	.46	411.	147.	8.00	42.75	0.00

PLAN 2

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1265.97	1266.00	1267.00
STORAGE	352.	353.	392.
OUTFLOW	0.	0.	27.

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
.22	1267.46	.46	411.	147.	8.00	42.75	0.00

PLAN 3

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1265.97	1266.00	1267.00
STORAGE	352.	353.	392.
OUTFLOW	0.	0.	27.

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
.22	1267.46	.46	411.	147.	8.00	42.75	0.00

PLAN 4

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1265.97	1266.00	1267.00
STORAGE	352.	353.	392.
OUTFLOW	0.	0.	27.

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
.22	1267.46	.46	411.	147.	8.00	42.75	0.00

PLAN 1 STATION 16

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
.22	147.	1200.9	42.75

PLAN 1	STATION	16
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
.22	147.	1200.9
		42.75

PLAN 2	STATION	16
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
.22	147.	1200.9
		42.75

PLAN 3	STATION	16
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
.22	147.	1200.9
		42.75

PLAN 4	STATION	16
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
.22	147.	1200.9
		42.75

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1176.00	1176.00	1178.00
	STORAGE	192.	192.	334.
	OUTFLOW	0.	0.	313.
	RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT
	.22	1178.09	.09	342.
				355.
				2.50
				44.25
				0.00

PLAN 2		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1176.00	1176.00	1178.00
	STORAGE	192.	192.	334.
	OUTFLOW	0.	0.	313.
	RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT
	.22	1178.09	.09	342.
				355.
				2.50
				44.25
				0.00

PLAN 3		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1176.00	1176.00	1178.00

.22 1178.09 .09 342. 355. 2.50 44.25 0.00

PLAN 3

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1176.00	1176.00	1178.00
STORAGE	192.	192.	334.
OUTFLOW	0.	0.	313.

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
.22	1178.09	.09	342.	355.	2.50	44.25	0.00

PLAN 4

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1176.00	1176.00	1178.00
STORAGE	192.	192.	334.
OUTFLOW	0.	0.	313.

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
.22	1178.09	.09	342.	355.	2.50	44.25	0.00

PLAN 1 STATION 20

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	354.	1081.1	44.25

PLAN 2 STATION 20

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	354.	1081.1	44.25

PLAN 3 STATION 20

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	354.	1081.1	44.25

PLAN 4 STATION 20

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	354.	1081.1	44.25

SUMMARY OF LAM SAFETY ANALYSIS

1

RATIO FLOW(CFS) STAGE(FT) HOURS

.22 354. 1081.1 44.25

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1040.90	1040.90	1044.90
STORAGE	194.	194.	433.
OUTFLOW	0.	0.	3322.

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
.22	1045.42	.52	468.	7478.	1.29	42.50	42.25

PLAN 2

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1040.90	1040.90	1044.90
STORAGE	194.	194.	433.
OUTFLOW	0.	0.	3322.

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
.22	1045.43	.53	468.	6853.	1.44	42.75	42.25

PLAN 3

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1040.90	1040.90	1044.90
STORAGE	194.	194.	433.
OUTFLOW	0.	0.	3322.

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
.22	1045.43	.53	469.	5954.	1.71	43.25	42.25

PLAN 4

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1040.90	1040.90	1044.90
STORAGE	194.	194.	433.
OUTFLOW	0.	0.	3322.

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
.22	1045.51	.61	474.	4253.	3.25	42.75	0.00

PLAN 1 STATION 24

MAXIMUM	MAXIMUM	TIME
DATE	DATE	DATE

PLAN 1	STATION	24
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
	TIME HOURS	
.22	6872.	983.0 42.75

PLAN 2	STATION	24
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
	TIME HOURS	
.22	6481.	982.8 42.75

PLAN 3	STATION	24
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
	TIME HOURS	
.22	5864.	982.5 43.25

PLAN 4	STATION	24
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
	TIME HOURS	
.22	4244.	981.6 42.75

PLAN 1	STATION	25
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
	TIME HOURS	
.22	6877.	781.4 42.75

PLAN 2	STATION	25
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
	TIME HOURS	
.22	6406.	781.2 43.00

PLAN 3	STATION	25
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
	TIME HOURS	
.22	5756.	780.8 43.25

PLAN 4	STATION	25
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT
	TIME HOURS	
.22	4247.	780.0 43.00

31-1

PLAN 3		STATION 25	
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	5756.	780.8	43.25

PLAN 4		STATION 25	
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	4247.	780.0	43.00

PLAN 1		STATION 26	
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	6671.	754.1	42.75

PLAN 2		STATION 26	
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	6422.	754.0	43.00

PLAN 3		STATION 26	
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	5691.	753.5	43.25

PLAN 4		STATION 26	
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.22	4246.	752.5	43.00

EOI ENCOUNTERED.

N

TERMINAL 255 TIME OUT.

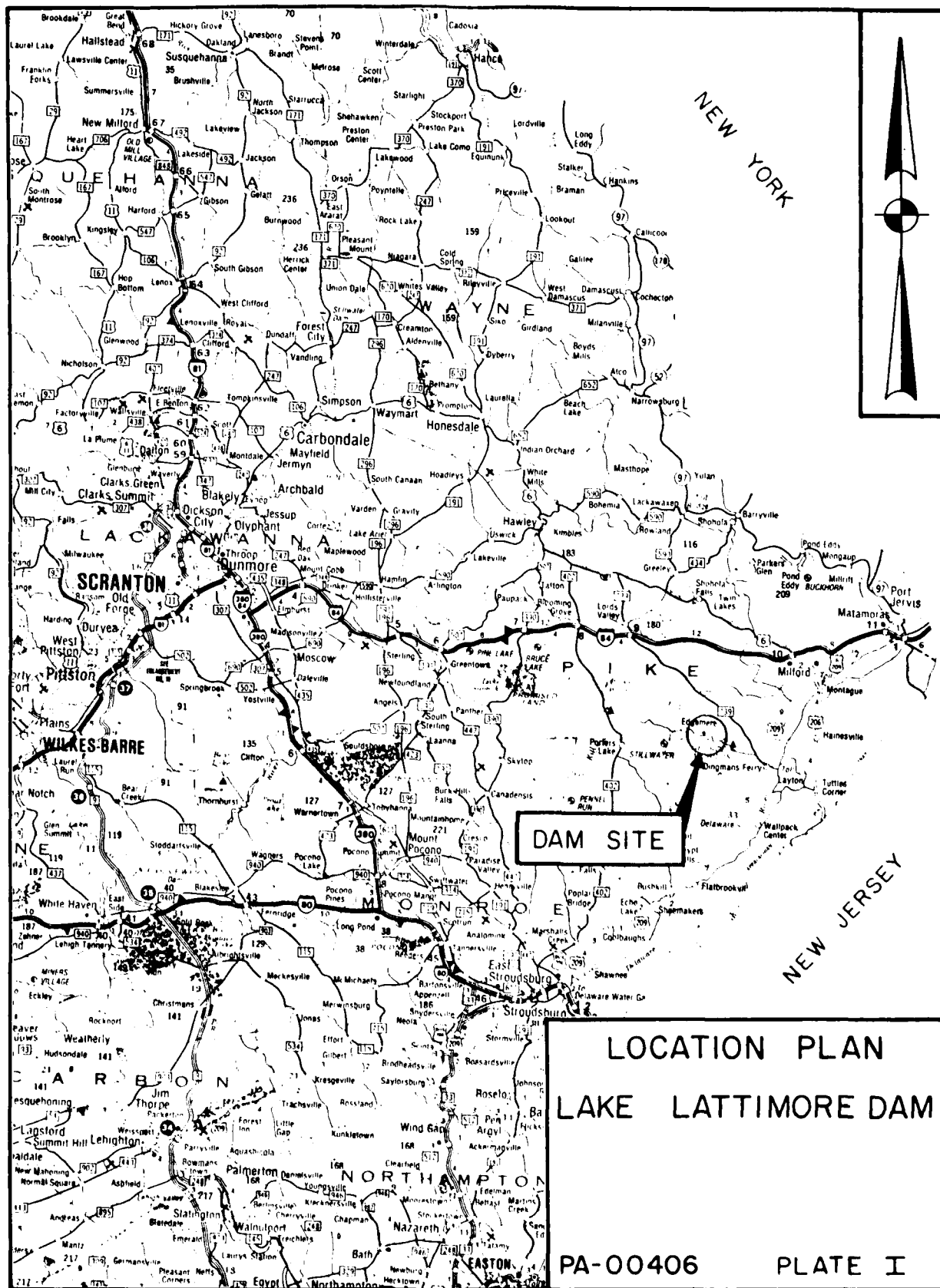
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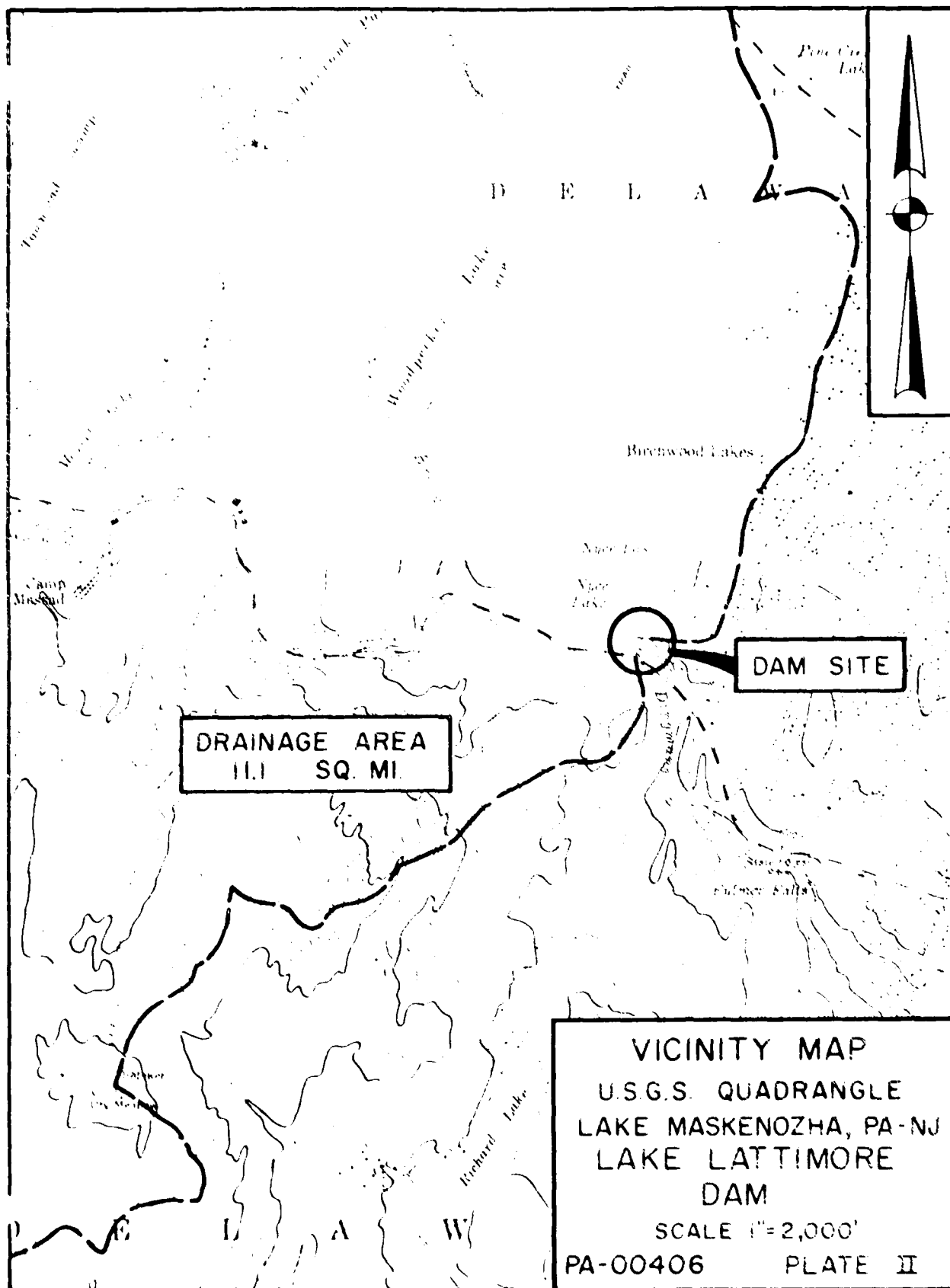
32

APPENDIX E

PLATES

APPENDIX E





ELEV 1045

ELEV 1032

SODDED

TWO 424 REINFORCED CONCRETE PILES



SECTION G-H
SCALE 1"=5'

1

14-00000
14-00000

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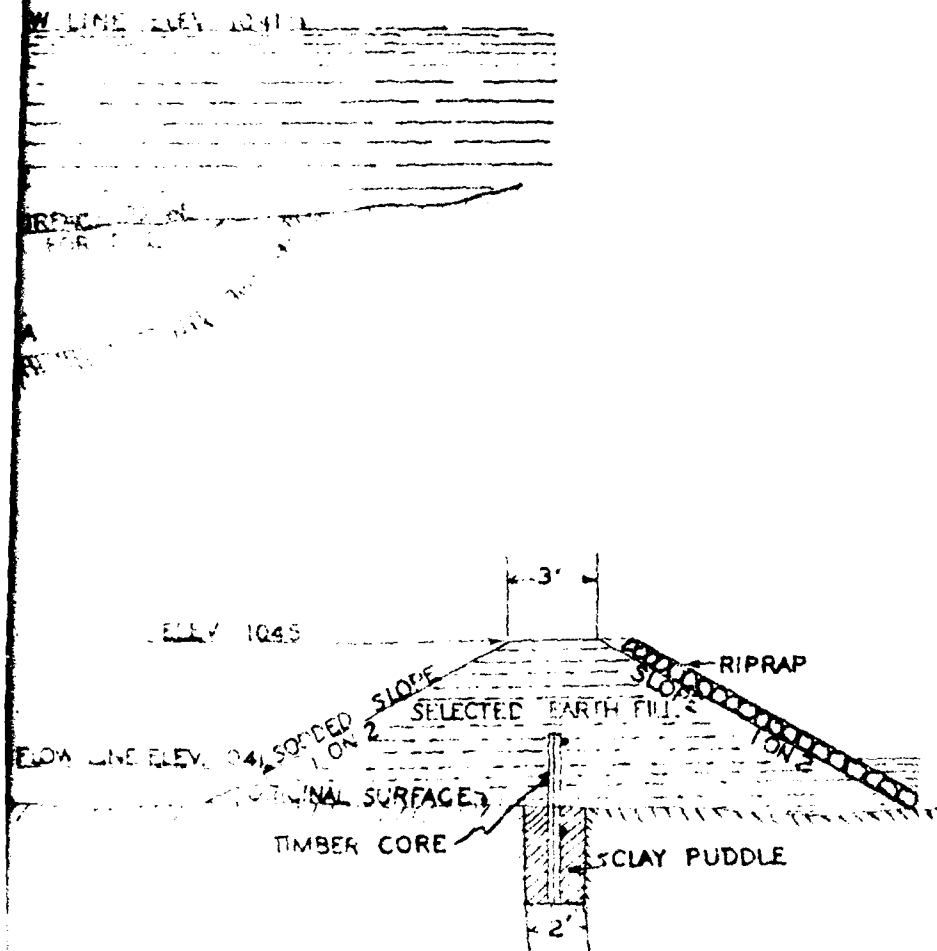
BERGER ASSOCIATES INC HARRISBURG PA
NATIONAL DAM INSPECTION PROGRAM. LAKE LATTIMORE DAM (NDI-ID NUM--ETC(U)
JUN 80 DACW31-80-C-0019
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2 of 2
PAGE TWO



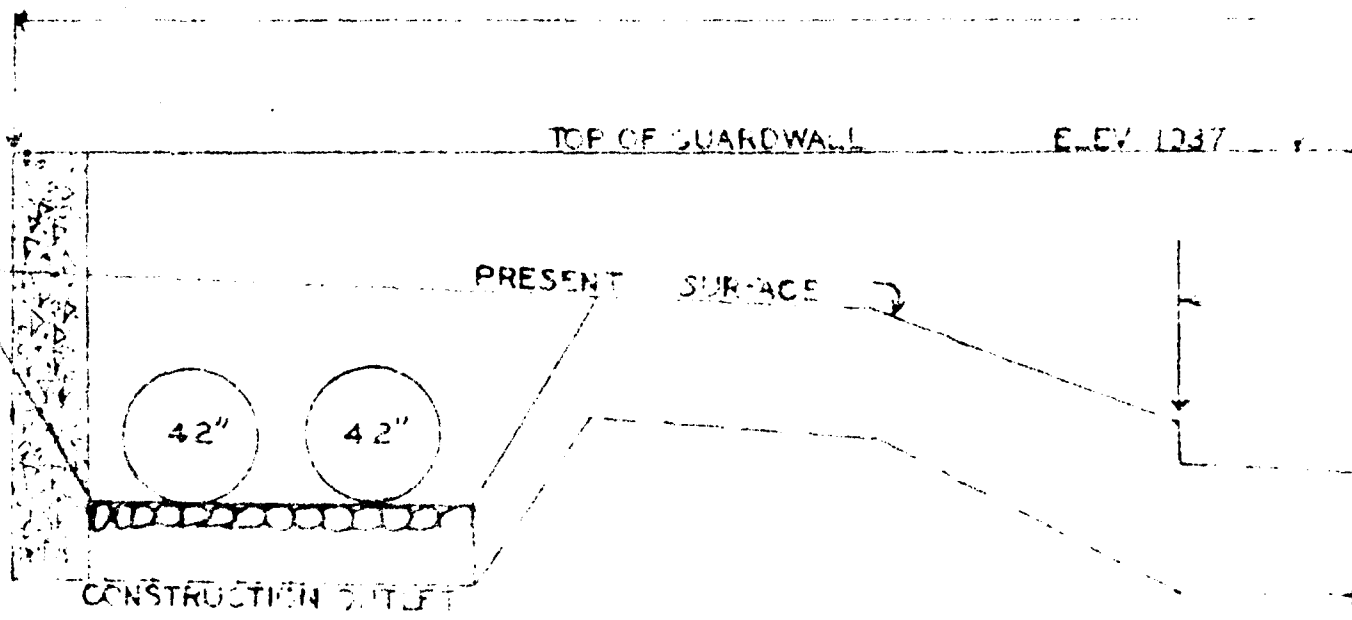
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DATE
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9-80
DTIC



SECTIONS OF SIDE BREAST FROM SIDE BREAST
 MAIN BREAST EXTENDING THROUGH TO STA.

3

PA-00406
 PLATE III



STREAM 11

10.2

12

2"

12

CONCRETE OUTLET

LINE 1A

SCALE AS SHOWN

1959

2

ELEV 1045--TOP OF DAM

LOW LINE & SPILLWAY ELEV. 1041

ELEV. 1037

ELEV. 1034.7

GRADED R/W

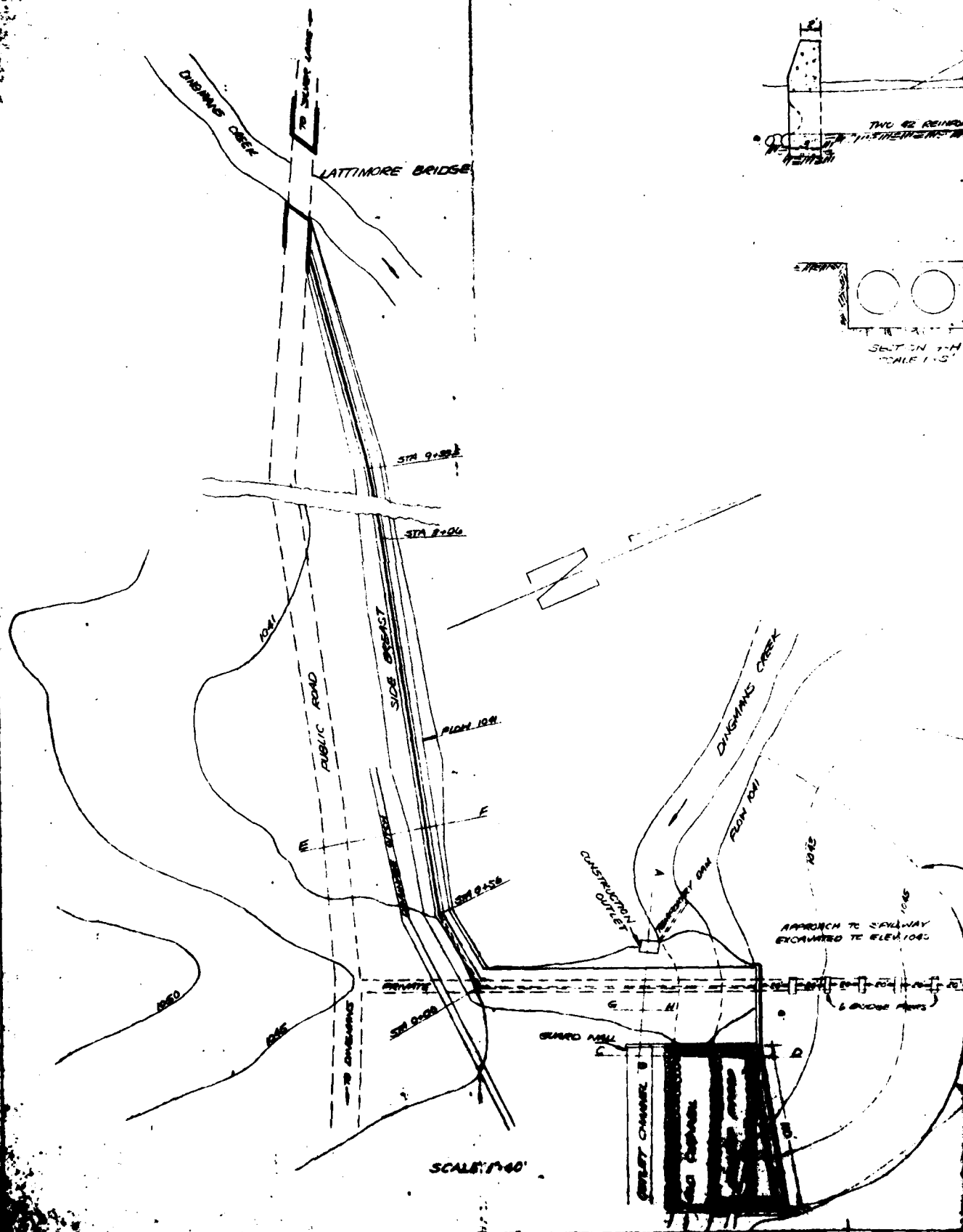
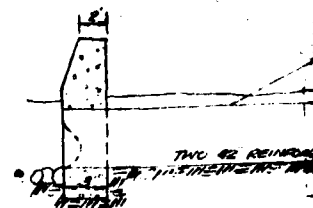
SECTION 6-D

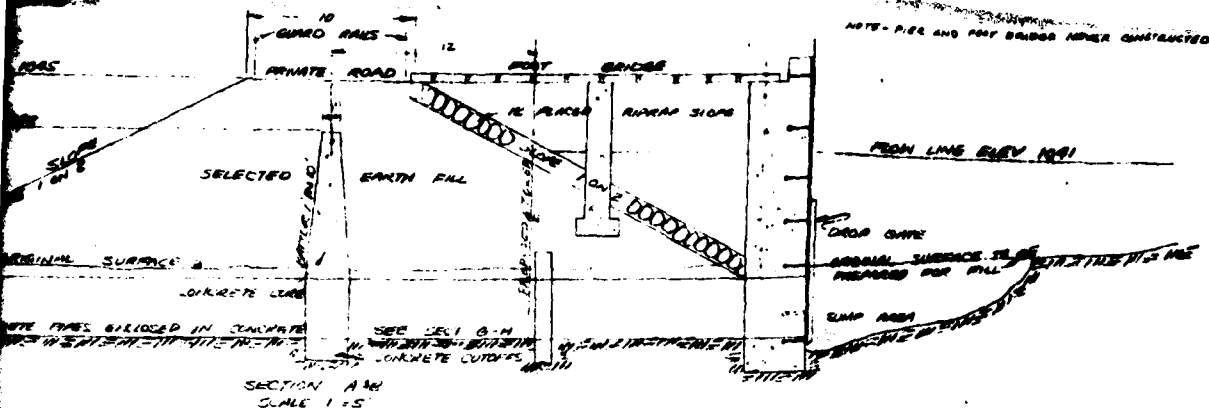
PLAN

PA-004
PLATE

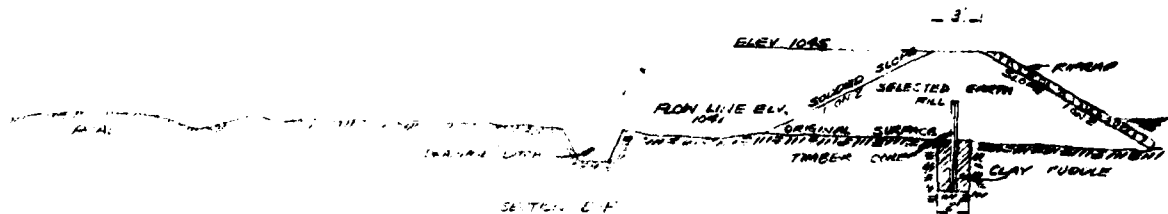
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NOTE - HEADWALL ACTUALLY
CONSTRUCTED IN APPROX.
LOCATION OF DASHED LINES





SECTION A-A
SCALE 1/2" = 1'-0"



SECTION B-B
SCALE 1/2" = 1'-0"
NEW 12" DIA. TIMBER CORE PIPE IN PLACE IN SETTING OF SIDE BRACKET FROM SIDE BRACKET
STA 0+50 TO STA 7+00 CONCRETE CURB OF MAIN BRACKET EXTENDING THROUGH TO STA 0+50
IF THE BRACKET

2

PLANNED PROJECT FOR

LAKE

CHUCK GIL, LAND ENGINEER, GREATER ERIE COUNTY, NEW JERSEY

LAKEVIEW TOWNSHIP - PIKE COUNTY, PENNA.
JUNE 23, 1970

SCALE AS SHOWN

EDWARD C. HESS ASSOCIATES
STROUDSBURG, PA.

FORCED FROM DRAWINGS TITLED "GENERAL PLAN
CROSS SECTIONS
PROPOSED LAKE" LITTLETON, CO.

BY J. E. HESS
BY J. E. HESS

Revised SEP. 19, 1971

SHEET 1 OF 2

PA-0
PLAT

SECTION A-A
1/8" = 10'

BACKFILL TO TOP OF WALLS

PLAN VIEW
3/8" = 10'

EAST ELEVATION
3/8" = 10'

NOTES:

1. ALL CONCRETE TO BE CLASS "B"
2. REINFORCING TO BE #5 BARS - 18" O.C.
3. DIMENSIONS IN EXISTING FOUNDATION TO BE #7 BARS

REQUIRED WORK:

1. REMOVE BOTH LIFTS AND BRACKETS
2. REMOVE TOP SECTION OF EXISTING TOWER (8'-11" x 9'-6")
3. CLEAN CHANNEL IN FRONT OF GATES
4. RECONSTRUCT TOWER AND TWO NEW WING WALLS
5. REPLACE LIFTS AND BRACKETS
6. BACKFILL BETWEEN WING WALLS

QUANTITIES:

1. CONCRETE - 26 CY
2. REINFORCING STEEL - 12 TO LB.
3. #5 BARS - 17' O.C.
4. #7 BARS - 2 x 4' - 26 LB.
5. BACKFILL BETWEEN WING WALLS - 17 CY

2
NORTH ELEVATION

LIST OF STRUCTURAL REPAIRS
NYCE LAKE
JULY 27, 1970, TOWNSHIP OF GEBARA, ESSEX COUNTY, NEW JERSEY

DELAWARE TOWNSHIP - PILE COUNTY - PENNA.
SEPT. 7, 1970 SCALE AS SHOWN

EDWARD C. HESS ASSOCIATES
STROUBERSBURG, PA.

PA-00
PLATE

APPENDIX F
GEOLOGIC REPORT

APPENDIX F

GEOLOGIC REPORT

Bedrock - Dam and Reservoir

Formation Name: Towamensing Member of the Catskill Formation.

Lithology: Fine to medium grained, gray calcareous sandstone, with interbeds of olive to gray shales and siltstone. The sandstones make up 90% of the formation and are thick bedded with distinct cross-lamination. Lenses of calcareous conglomerate are locally present.

Structure

The dam is located near the eastern edge of the Pocono Plateau. The regional strike of the beds is N40°E and the dip is a few degrees to the northwest. Minor folds are superimposed on the regional dip and locally dips as high as 15° occur. No faults are mapped in the vicinity of the dam. Joint sets trending N2° to 13°E and N82°E to N75°W are reported.

Air photo fracture traces trend: N5°E and N40°W.

Overburden

This site is within the limits of Pleistocene glaciation and variable thicknesses of glacial till and outwash sediments are present. The records of borings along the centerline of the dam show one to three feet of topsoil and "clay" above "hardpan." The borings were all less than ten feet deep and no rock was encountered. Inspection reports written during construction describe the "hardpan" as containing clay, boulders and some sandy layers. It is likely that this material is glacial till.

Aquifer Characteristics

The rocks of the Catskill formation are essentially impermeable and ground water movement is entirely along bedding planes and fractures. The most permeable aquifers in the area are the sands and gravel of the glacial outwash commonly found in the valleys.

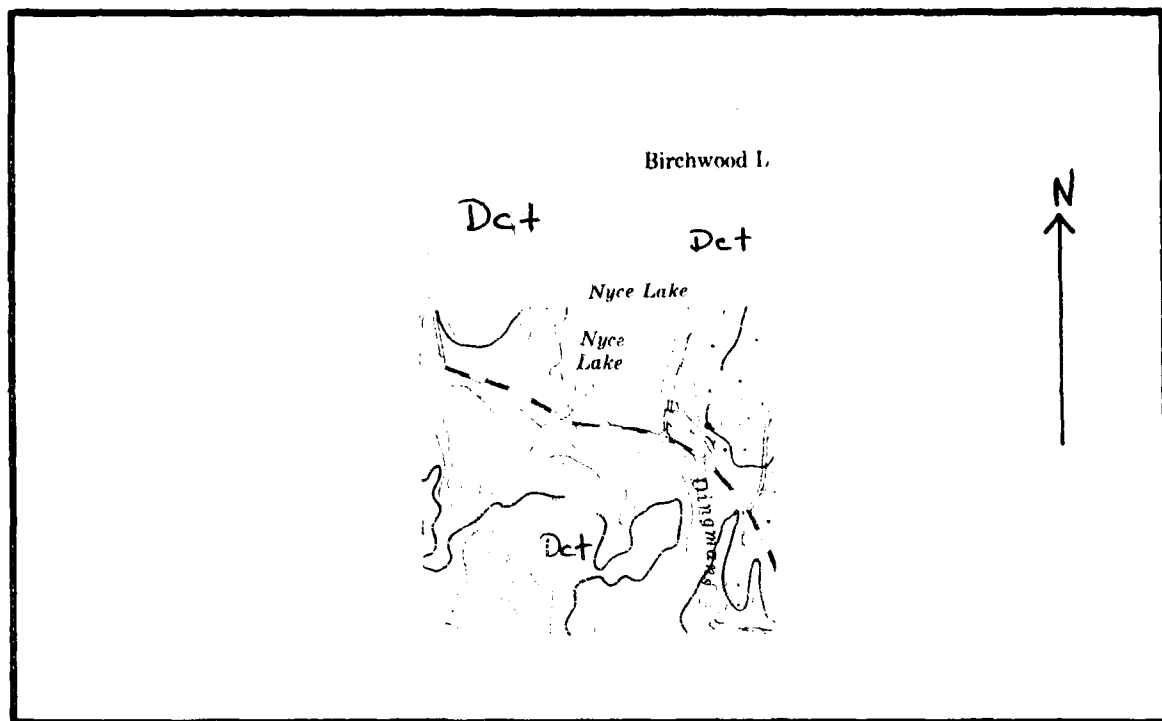
Discussion

This dam is constructed with a cutoff trench dug into the glacial till. There was some indication that some of the sandy layers were water bearing, but the till is probably a quite suitable foundation material for a dam of this type.

Sources of Information

1. Fletcher, F.W. and Woodrow, Donald L. (1970), "Geology and Economic Resources of the Pennsylvania Portion of the Milford and Port Jervis 15-Minute Quadrangles," Pa. Geologic Survey Atlas 223, Harrisburg, Pa.
2. Sevon, W.D., et al., "Geology and Mineral Resources of Pike County," open file report, Pa. Geologic Survey, Harrisburg, Pa.
3. Air photographs dated 1973, scale 1:40,000.
4. Plans and inspection reports in file.

GEOLOGIC MAP - Lake Lattimore Dam



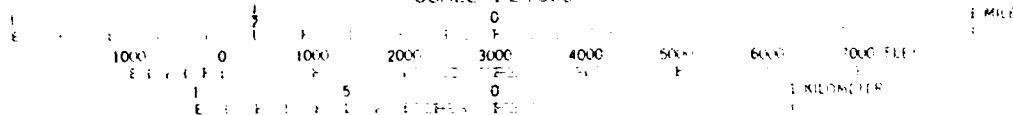
Det

Catskill Fm.- Towamensing member

— . — .

air photo fracture trace

SCALE 1:24,000



CONTOUR INTERVAL 20 FEET

