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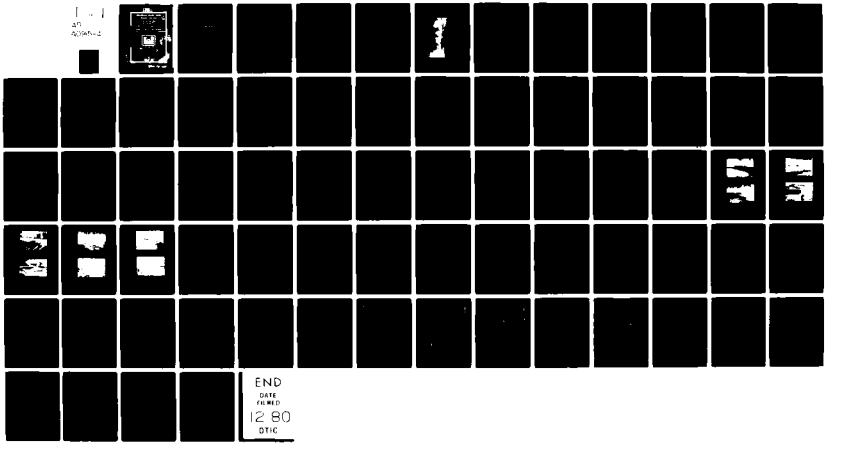

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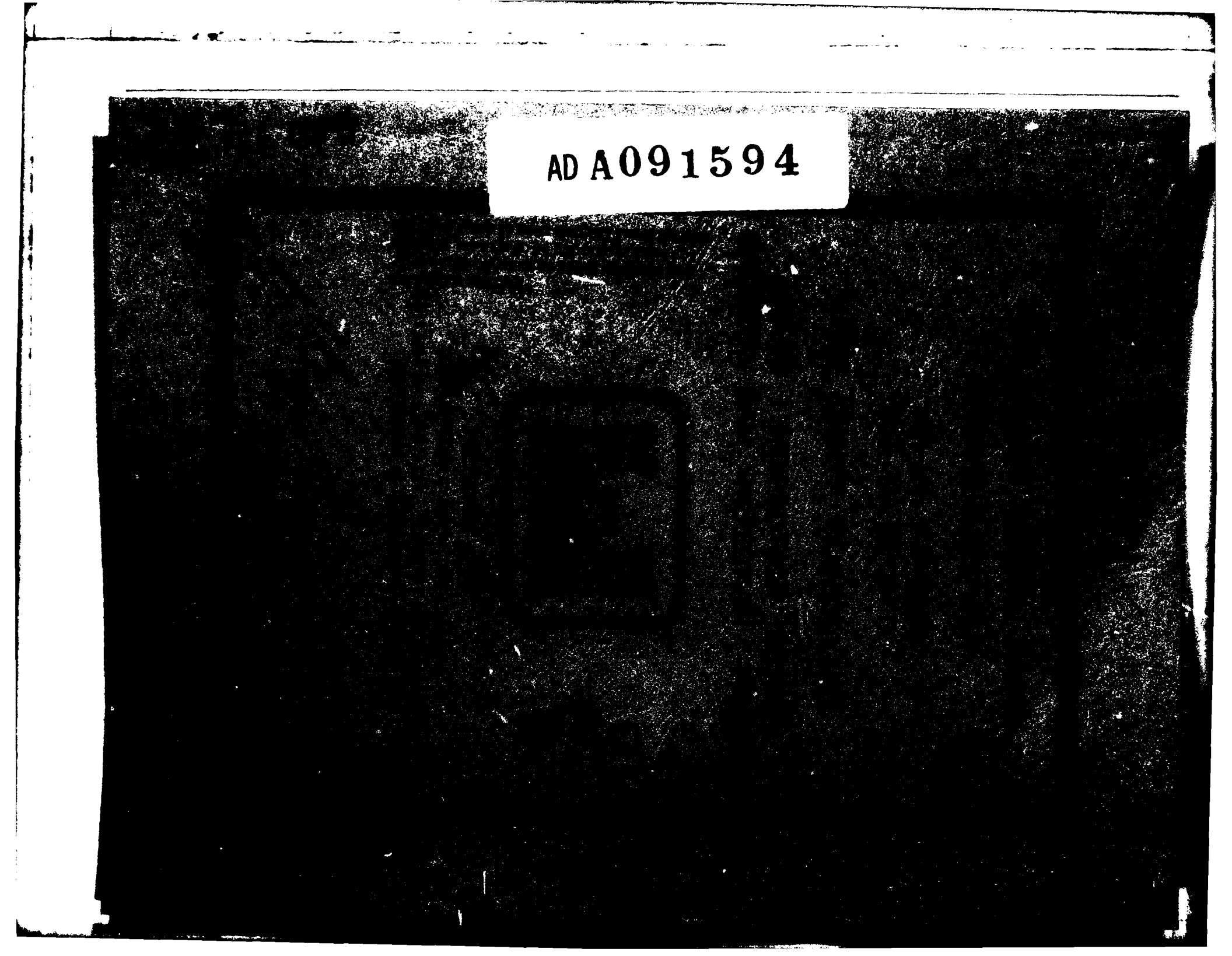
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PREFACE

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.

PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITIONS AND RECOMMENDATIONS

Name of Dam:	WALKER LAKE DAM
State & State No.:	PENNSYLVANIA, 52-127
County:	PIKE
Stream:	WALKER CREEK
Date of Inspection:	April 3, 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. These classifications indicate that the Spillway Design Flood (SDF) should be in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. The recommended SDF for this flood control structure is the PMF. The spillway capacity is adequate for passing 71 percent of the PMF peak inflow without overtopping the dam. The spillway, therefore, is considered to be inadequate, but not seriously inadequate.

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

1. That the headwall on the outlet pipe be replaced and that holes and cracks in the spillway weir and apron be repaired.

2. That the gate on the outlet pipe be maintained and operated at least once a year.

3. That all brush and high weeds be removed from the embankment on an annual basis.

4. That the spillway walls be maintained and repaired to prevent further deterioration.

5. That a formal surveillance plan and downstream warning system be developed for use during periods of high or prolonged rainfall.

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: August 1, 1980

APPROVED BY:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer
DATE 30 August 1980

OVERVIEW

WALKER LAKE DAM

Photograph No. 1

TABLE OF CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

WALKER LAKE DAM

NDI-ID No. PA-00317
DER-ID No. 52-127

SECTION 1 - PROJECT INFORMATION

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

Note: The design drawings indicate a spillway crest elevation of 102.9. The U.S.G.S. quadrangle map shows a reservoir elevation of 1214.0. This U.S.G.S. elevation is used in this report as the spillway crest elevation, requiring the addition of 1111.1 to all design elevations.

Walker Lake Dam consists of a 560 foot long earthfill embankment with a maximum construction height of 15 feet above the streambed. A four foot deep trench was excavated along the centerline. A concrete core wall was placed in this trench and extends two feet into the embankment (Section C-C, Plate III, Appendix E). A modified ogee spillway was constructed near the right abutment. The spillway crest is four feet below the design crest elevation of the dam and has an effective length of 70 feet. A pier is located in the center of the spillway but was never used as a bridge support. A four foot long, one foot deep, low flow notch is closed off with stoplogs. A wet well intake structure is located at the upstream toe of the original embankment. To prevent ice damage to this structure, additional fill was placed on the upstream

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side, and the top of the dam now extends around the wet well. A 36-inch slide gate is located in this well. Water is discharged through a 36-inch diameter pipe under the embankment to the downstream channel.

B. Location: Shohola Township, Pike County
U.S.G.S. Quadrangle - Shohola, Pa.
Latitude 41°-25.5', Longitude 74°-54.8'
Appendix E, Plates I & II

C. Size Classification: Small: Height - 15 feet
Storage - 835 acre-feet

D. Hazard Classification: High (Refer to Section 3.1.E.)

E. Ownership: Mr. Karl A. Wagner
Walker Lake Inc.
402 Broad Street
Milford, PA 18337

F. Purpose: Recreation

G. Design and Construction History

The facilities were designed by Edward C. Hess, Civil Engineer, Stroudsburg, Pennsylvania. A permit for construction was issued by the Pennsylvania Department of Environmental Resources (PennDER) on April 9, 1952. Revisions were made to the plans and these were approved by PennDER on July 8, 1953. Mr. Joseph Biehm, the contractor, started construction in June 1953 and completed construction, except seeding, on November 5, 1953. Several inspection reports by PennDER indicate that the core wall foundation was founded on suitable material and that the project was carried out in a workmanlike manner.

H. Normal Operating Procedures

The normal operating procedure is to discharge all inflow over the spillway crest. The reservoir is used for recreation. The reservoir is lowered, when needed, for maintenance of docks, banks and beaches.

1.3 PERTINENT DATA

A. Drainage Area (square miles)

From files:	3.2
Computed for this report:	3.4
Use:	3.4

B. Discharge at Dam Site (cubic feet per second)
See Appendix D for hydraulic calculations

Maximum known flood	1200
Outlet works at low-pool Elev. 1209	42
Outlet works at pool level Elev. 1214.0 (spillway crest)	67
Spillway capacity at pool Elev. 1218.1 (low point of dam)	2274
Emergency spillway in Eastern Shore at pool Elev. 1218.1	1907
Total discharge capacity	4181

C. Elevation (feet above mean sea level)

Top of dam (low point)	1218.1
Top of dam (design crest)	1218.0
Spillway crest	1214.0
Upstream portal invert	1204.6
Downstream portal invert	1202.6
Streambed at downstream toe of dam (estimate)	1203.±

D. Reservoir (miles)

Length of normal pool (Elev. 1214.0)	1.1
Length of maximum pool (Elev. 1218.1)	1.2

E. Storage (acre-feet)

Spillway crest (Elev. 1214.0)	307
Top of dam (Elev. 1218.1)	835

F. Reservoir Surface (acres)

Top of dam (Elev. 1218.1)	145
Spillway crest (Elev. 1214.0)	113

G. Dam

Refer to Plate III in Appendix E for plan and section.

Type: Homogeneous earthfill with concrete cutoff wall.

Length: 560 feet, including 73 foot spillway.

Height: 15 feet.

Top Width: Design - 16 feet; Survey - 24 feet.

Side Slopes:	Design	Surveyed
Upstream	2H to 1V	2H to 1V
Downstream	2H to 1V	3.3H to 1V

Zoning: None.

Cutoff: Trench excavated to about four foot depth with two feet into suitable foundation material. Concrete core wall placed in trench extending two feet into embankment.

Grouting: None.

H. Outlet Facilities

Type: 36" sluice gate in wet well.

Inlet: 30" concrete pipe into wet well. The original wet well opening was 36 inches. The extension is a 30-inch concrete pipe (Plate IV, Appendix E).

Outlet: 36" CMP downstream of wet well.

Location: Upstream side of embankment.

I. Spillway

Type: Uncontrolled ogee weir with 1' deep by 4' wide stoplog notch.

Length of Weir: 70.5 feet.

Crest Elevation: 1214.

J. Regulating Outlets

See Section 1.3.H. above.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The engineering data for Walker Lake Dam are not very extensive. The available material consists of the "Report Upon the Application" for a permit to construct the dam by PennDER, and one construction drawing (Plate III, Appendix E). The original permit issued in 1952 indicates that the spillway crest was six feet below the top of dam. Several revisions were made and the final approved drawing indicates that the spillway crest elevation is four feet below the top of dam. The crest of the dam was lowered one foot and the crest of the spillway was raised one foot. The spillway capacity was reduced from 4,000 cfs to 2,070 cfs. Test pit data or boring information are not available.

2.2 CONSTRUCTION

The construction data are limited to three inspection reports by PennDER. One report indicates that the trench for the blow-off pipe and the core wall on the right side of the pipe had been excavated to a depth of four feet with two feet reaching into a satisfactory blue clay. The reports indicated satisfactory workmanship by the contractor.

2.3 OPERATION

Records of operation have not been maintained by the owner. Local property owners estimate that the maximum flow over the spillway reached a depth of about two feet. The reservoir was lowered in 1968 to repair a leak in the joint between the intake structure and the outlet pipe. The reservoir has been lowered a few feet several times to clean the banks of the reservoir.

2.4 EVALUATION

A. Availability

The available engineering data are located in the files of PennDER, Harrisburg, Pennsylvania.

B. Adequacy

The available engineering and construction data, combined with the field inspection, are considered to be sufficiently adequate for making a reasonable assessment of the dam.

C. Operating Records

Operating records, including maximum pool levels, have not been maintained.

D. Post Construction Changes

In the winter of 1967-1968, ice pressure caused a small tilt of the intake structure, opening the joint between this structure and the outlet pipe. The joint was repaired in the fall of 1968 (Plate IV, Appendix E), and embankment fill was placed around the structure to prevent a reoccurrence of this damage.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

A. General

The general appearance of Walker Lake Dam is fair. There are no signs of seepage or embankment stability problems. The embankment is covered with a light growth of weeds and small brush in several areas. The concrete of the spillway shows signs of deterioration and the headwall of the outlet pipe has collapsed. The drawdown slide gate is in working condition.

The Walker Lake Shores Landowners Association is presently considering buying the facility from the present owner. The property owners requested Mr. Vaden R. Butler, P.E., Harrisburg, Pa., to evaluate the condition of the dam. A copy of Mr. Butler's report, dated August 1979, is in the files of PennDER. Mr. Karl Read and Mr. Frank Fontaine of the Landowners Association accompanied the inspectors.

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. Photographs of the facilities taken during the inspection are reproduced in Appendix C.

B. Embankment

The horizontal alignment of the dam is good. The crest of the dam has a considerable width at the intake structure since 1968, when additional embankment fill was placed on the upstream side to protect the structure from ice damage. The surveyed profile of the dam (Plate A-II, Appendix A) indicates that the crest is above design crest elevation. The embankment slopes are flat on the downstream side and appear to be adequate for the height of dam under consideration. There were no signs of seepage or sloughage on the slopes. The upstream slope is protected with riprap. Although heavy brush and trees had been recently cut on the downstream slope, some additional weed growth and brush should be removed from both slopes (Photographs No. 1, No. 2 and No. 3). A small area of standing water near the downstream slope is attributed to poor surface drainage.

C. Appurtenant Structures

The spillway is located near the right abutment. It consists of a 73 foot long modified concrete ogee section with an unused three foot wide pier in its center (Photograph No. 7). A one foot deep by four feet wide low flow notch is located in the left bay. This opening is blocked off with stoplogs (Photograph No. 6).

The apron immediately downstream of the spillway has been constructed with grouted handlaid stone. Several cracks and holes have formed in this apron. The immediate streambed below the apron is protected with loose riprap. The concrete of the ogee section and spillway walls show signs of deterioration (Photographs No. 5 and No. 7).

The intake structure is a concrete wet well covered with timber planks (Photograph No. 8). The slide gate on the downstream side of the wet well was partially opened during the inspection. The intake structure is directly accessible from the crest of the dam over a fill which was placed in 1968.

The outlet from the wet well is a 36-inch pipe which daylights at the downstream toe. A protective concrete headwall has collapsed. The fill is supported by a handlaid stone wall. This would be inadequate if the outlet would discharge at full capacity (Photograph No. 9).

D. Reservoir Area

The reservoir has flat to moderate wooded slopes with many homes located close to the water's edge. All banks are stable; and although siltation has occurred, the amount and consequences are minimal for this shallow reservoir.

E. Downstream Channel

The channel downstream of the spillway was excavated into the hillside over a length of about 200 feet. The channel is stone lined and has many trees growing on the banks. The channel joins the natural stream 200 feet below the dam. Two homes, about 800 feet downstream from the dam, are located in the floodplain. About 1.7 miles downstream from the dam Walker Creek passes beneath a railroad then joins the Delaware River. A potential hazard to life exists downstream if the dam fails. The hazard classification is therefore considered to be "High."

3.2 EVALUATION

The overall visual evaluation of the facilities indicates that Walker Lake Dam is in fair condition. The embankment appears to be stable and no signs of seepage were detected. The drawdown facilities are operable; however, to prevent damage to the downstream toe, the headwall should be repaired.

The spillway and spillway walls should be repaired to prevent further erosion. All brush and high weeds on the embankment slopes should be removed.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The dam and reservoir were constructed as a recreational facility for the owners of the surrounding homes. The reservoir is maintained at spillway crest elevation except when pool level is lowered for maintenance requirements. All inflow is discharged over the spillway.

4.2 MAINTENANCE OF DAM

Trees and brush on the downstream slope had been recently cut. Light brush and weeds are still located in several areas.

4.3 MAINTENANCE OF OPERATING FACILITIES

The only operating facilities for this dam are the stoplogs in the spillway and the 36-inch slide gate in the wall. This gate is in operable condition, but a regular maintenance schedule is not followed at the present time.

4.4 WARNING SYSTEM

There is no formally organized surveillance and downstream warning system in existence.

4.5 EVALUATION

The operational procedures for Walker Lake Dam should include at least an annual removal of trees, brush and weeds from the embankment and in an area ten feet beyond the downstream toe. The slide gate should be greased and operated on an annual basis to ensure its working condition during an emergency. A formal surveillance plan and downstream warning system should be developed for implementation during periods of heavy or prolonged rainfall.

SECTION 5 - HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

A. Design Data

The hydrologic and hydraulic analyses available from PennDER for Walker Lake Dam were not very extensive. No stage-discharge curve, stage-storage curve, design flood hydrograph, nor flood routings were submitted by the designer to PennDER.

B. Experience Data

It was reported that the maximum known flood at Walker Lake Dam caused the water level in the lake to reach an elevation that resulted in water flowing several inches deep through a swale in the eastern shoreline. The project passed that flood without damage.

C. Visual Observations

It was noted that a natural swale in the eastern shoreline of the lake acts as an emergency spillway (Plate II, Appendix E). The high point of this swale is at elevation 1216.1, 2.1 feet above spillway crest elevation. Several houses are located in this low area. The swale is relatively wide and flat, having a maximum depth of water to the top of the dam of 2 feet. Structural damage to the houses is not expected. The flow through this area joins Walker Creek about 3,000 feet downstream of the dam. Flow through this area was included in the discharge capacity calculations (Appendix D). The endwall at the outlet of the blowoff pipe has partially collapsed. Large discharges through the blowoff pipe could cause considerable erosion at the outlet. No other 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.

D. Overtopping Potential

Walker Lake Dam has a total storage capacity of 835 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 classifications is in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. Due to the presence of two homes in the flood plain, about 800 feet downstream of the dam the recommended SDF is the full PMF. For this dam, the PMF peak inflow is 6320 cfs (see Appendix D for HEC-1 inflow computations).

Comparison of the estimated PMF peak inflow of 6320 cfs with the estimated total spillway discharge capacity of 4181 cfs indicates that a potential for overtopping of the Walker Lake Dam 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 PMF without overtopping. The spillway-reservoir system can pass a flood event equal to 71% of a PMF.

E. Spillway Adequacy

The small size and high hazard categories, in accordance with the Corps of Engineers criteria and guidelines, indicates that the SDF for this dam should be in the range of one-half the PMF to the full PMF. The recommended SDF should be the full PMF.

Calculations show that the discharge capacity of the spillway and low swale area and the reservoir storage capacity combine to handle 71% of the PMF (refer to Appendix D).

Since the spillway discharge and reservoir storage capacity cannot pass the full PMF without overtopping, but can pass more than one-half the PMF without overtopping, the spillway is considered to be inadequate but not 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 Walker Lake Dam did not detect any signs of seepage or embankment distress. The embankment slopes appear to be adequate for the height of dam under consideration. Adequate riprap protection is on the upstream slope. The crest of the dam is above the design crest elevation. Ten feet long cutoff walls project from the spillway walls into the embankment.

2. Appurtenant Structures

The spillway weir, downstream apron and spillway walls show signs of some deterioration. Holes and cracks in the apron should be repaired to prevent serious damage. Maintenance on the walls and weir is recommended at this time to prevent further deterioration and more costly repairs at a later date. The walls appeared to be stable at the time of inspection. There were no signs of tilting or unusual movement.

The intake structure is a wet well and was not inspected. The concrete exposed above the embankment is deteriorating on the outside face (Photograph No. 8). The headwall of the outlet pipe has collapsed and should be replaced. This will require removal of a part of the existing stone wall (Photograph No. 9).

B. Design and Construction Data

1. Embankment

A trench was excavated on the centerline of the dam and an unreinforced concrete core wall was placed in this trench. This core wall extends two feet into the embankment. The embankment material was to be placed in six inch layers and compacted with a sheepsfoot roller. Except for an inspection report indicating that good impervious material was encountered, subsurface information is not available. The upstream slope is protected with an 18-inch layer of dumped riprap.

2. Appurtenant Structures

The spillway weir was constructed in a trench at least five feet below existing ground and four feet below the excavated forebay area. The weir is a two foot wide unreinforced wall. A 20 foot long

apron of grouted stone pavement is located downstream from the weir. The apron end is protected with a cutoff wall.

The spillway walls are unreinforced gravity sections. The indicated maximum height is eleven feet with a bottom width of about five feet.

The 36-inch blowoff pipe has three anti-seepage collars and is encased in concrete.

C. Operating Records

Formal operating records for this dam have not been maintained by the owners.

D. Post Construction Changes

Letters in the files of PennDER indicate that the wet well intake structure was pushed over slightly by ice in the winter of 1967-1968. This movement caused a crack to develop in the joint between the wet well and the outlet pipe. The joint was repaired in 1968 (Plate IV, Appendix E) and embankment fill was placed around the wet well structure to prevent future damage.

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 construction drawings indicate that Walker Lake Dam is in fair condition. The embankment appears to be stable and there were no signs of seepage. To prevent damage during high discharges, repairs should be made to the spillway apron and the outlet pipe headwall.

The hydrologic and hydraulic computations indicate that the combination of storage capacity and the discharge of the spillway is sufficient to pass 71 percent of the PMF. The spillway is considered to be inadequate but not seriously inadequate.

B. Adequacy of Information

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

C. Urgency

The recommendations presented below should be implemented immediately.

D. Additional Studies

Additional studies are not required at this time.

7.2 RECOMMENDATIONS

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

1. That the headwall on the outlet pipe be replaced and that holes and cracks in the spillway weir and apron be repaired.

2. That the gate on the outlet pipe be maintained and operated at least once a year.

3. That all brush and high weeds be removed from the embankment on an annual basis.

4. That the spillway walls be maintained and repaired to prevent further deterioration.

5. That a formal surveillance plan and downstream warning system be developed for use during periods of high or prolonged rainfall.

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

CHECK LIST

PHASE I - VISUAL INSPECTION REPORT

PA DER # 52-127 NDI NO. PA-00 317

NAME OF DAM WALKER LAKE DAM HAZARD CATEGORY High

TYPE OF DAM Earthfill

LOCATION Shohola TOWNSHIP Pike COUNTY, PENNSYLVANIA

INSPECTION DATE 4/3/80 WEATHER overcast TEMPERATURE 40's

INSPECTORS: R. Houseal (Recorder) OWNER'S REPRESENTATIVE(s):

H. Jongsma Karl Read

R. Shireman Frank Fontaine

A. Bartlett

NORMAL POOL ELEVATION: 1214 (U.S.G.S.) AT TIME OF INSPECTION:

BREAST ELEVATION: 1218 (design) POOL ELEVATION: 1214.2

SPILLWAY ELEVATION: 1214.0 TAILWATER ELEVATION:

MAXIMUM RECORDED POOL ELEVATION: 1216±

GENERAL COMMENTS:

A considerable overflow section is available in another area over a roadway. This area is about 2 feet above normal pool level.

NDI NO. PA-00 317

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 - Okay. Vertical - See Profile, Plate A-II.
E. RIPRAP FAILURES	No failures in riprap on upstream slope.
F. JUNCTION EMBANKMENT & ABUTMENT OR SPILLWAY	Abutments sound.
G. SEEPAGE	None evident.
H. DRAINS	None observed.
J. GAGES & RECORDER	None.
K. COVER (GROWTH)	Top grass. Downstream: Grass and weeds. Heavy brush & trees recently cut. Upstream: Riprap and some brush.

NDI NO. PA-00317

VISUAL INSPECTION
OUTLET WORKS

	OBSERVATIONS AND REMARKS
A. INTAKE STRUCTURE	Concrete wet well with ladder located at the upstream toe. Area around wet well backfilled in 1968.
B. OUTLET STRUCTURE	Broken concrete headwall with stone walls.
C. OUTLET CHANNEL	Stone lined bottom with short walls.
D. GATES	36" slide gate. Was operated on date of inspection. Operated easily.
E. EMERGENCY GATE	Same as D above.
F. OPERATION & CONTROL	Drawdown operated about every 4 years.
G. BRIDGE (ACCESS)	Access directly from embankment since repairs of ice damage in 1968.

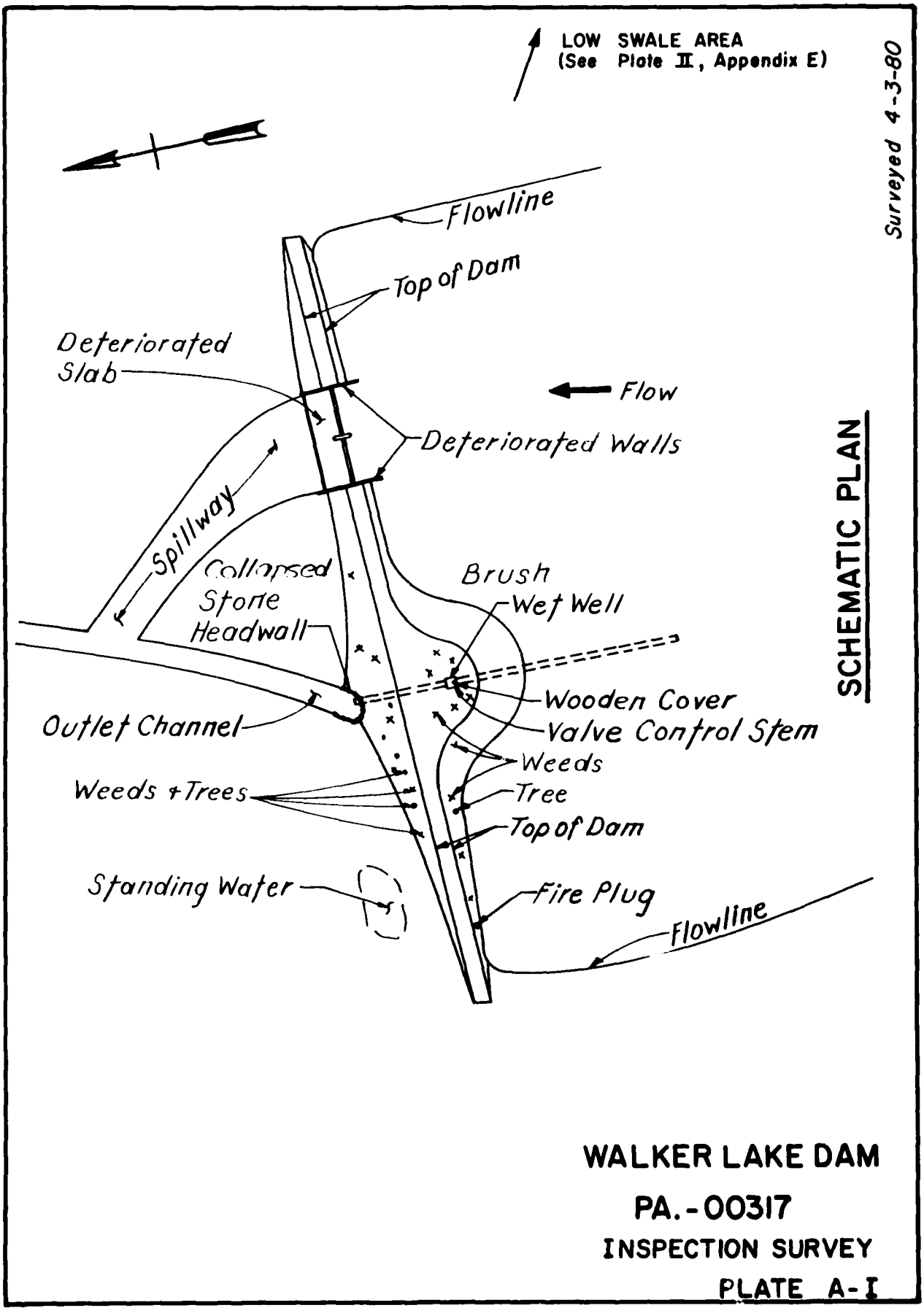
NDI NO. PA-00317

VISUAL INSPECTION
SPILLWAY

	OBSERVATIONS AND REMARKS
A. APPROACH CHANNEL	Directly from reservoir.
B. WEIR: Crest Condition Cracks Deterioration Foundation Abutments	Weir in good condition. Walls and center pier show signs of surface deterioration but appear to be structurally sound. Downstream slab cracked and some deterioration.
C. DISCHARGE CHANNEL: Lining Cracks Stilling Basin	Channel excavated in hillside, stone lined over about 200 feet, where it joins the original natural streambed.
D. BRIDGE & PIERS	One pier near center of spillway. No bridge.
E. GATES & OPERATION EQUIPMENT	None.
F. CONTROL & HISTORY	No records. Estimated maximum flow about 2 feet over spillway crest.

VISUAL INSPECTION

	OBSERVATIONS AND REMARKS
INSTRUMENTATION Monumentation	None.
Observation Wells	None.
Weirs	None.
Piezometers	None.
Staff Gauge	None.
Other	None.
RESERVOIR Slopes	3:1 to 4:1 wooded with homes and cottages at lake side. Some grass.
Sedimentation	None reported.
Watershed Description	Woodlands. Moderate slopes. Some marshland.
DOWNSTREAM CHANNEL Condition	Natural stream.
Slopes	Varies above floodplain - wooded.
Approximate Population	6
No. Homes	2 homes immediately downstream.

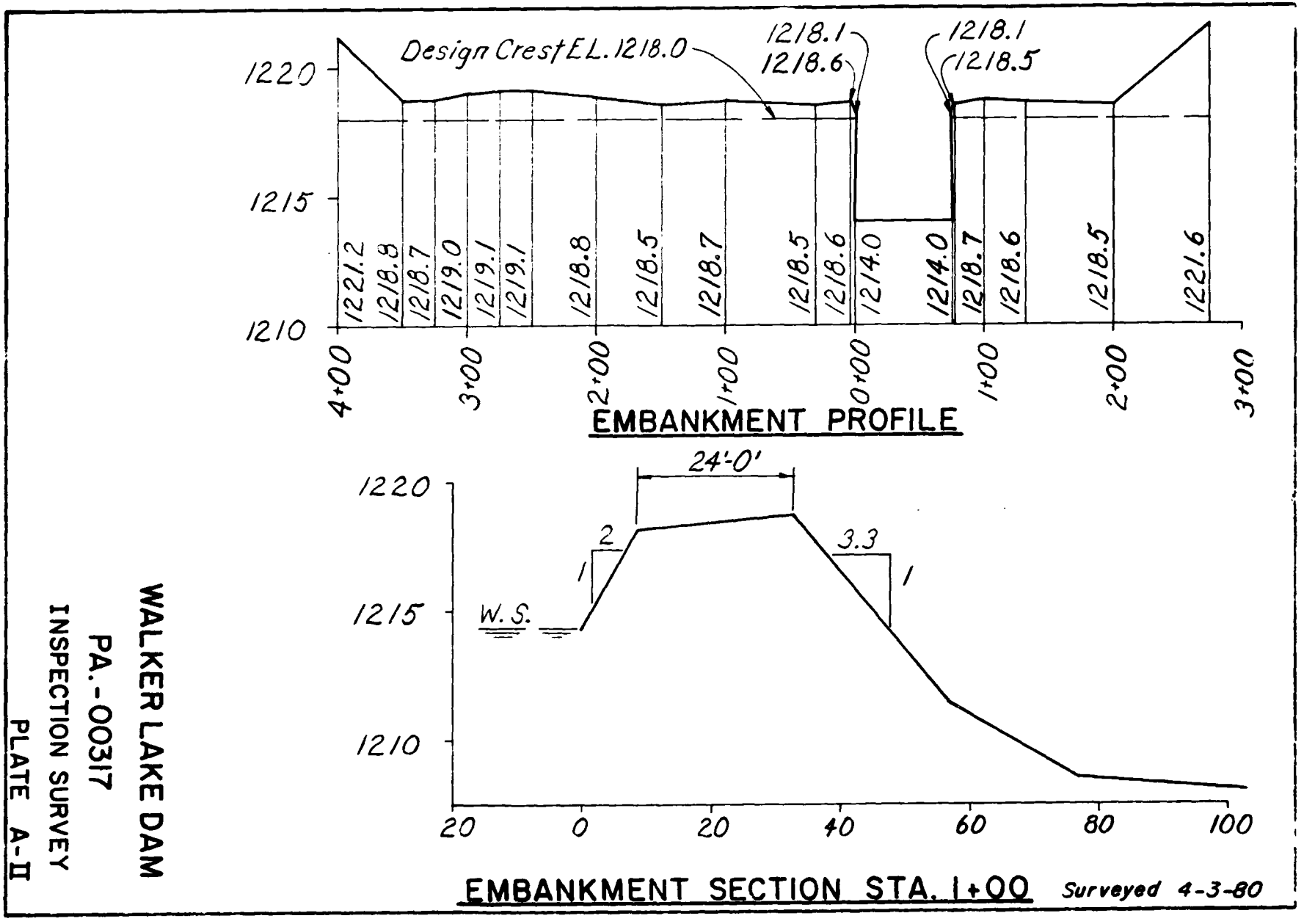


WALKER LAKE DAM

PA.-00317

INSPECTION SURVEY

PLATE A-I



WALKER LAKE DAM

PA.-00317

INSPECTION SURVEY

PLATE A-II

APPENDIX B

CHECKLIST OF ENGINEERING DATA

CHECK LIST
ENGINEERING DATA

PA DER # 52-127 NDI NO. PA-00317

NAME OF DAM WALKER LAKE DAM

ITEM	REMARKS
AS-BUILT DRAWINGS	None. Design drawing dated January 1952 with revisions to May 1953. Drawing of repair dated February 1969.
REGIONAL VICINITY MAP	U.S.G.S. Quadrangle - Shohola, Pa. See Plate II, Appendix E
CONSTRUCTION HISTORY	Permit issued April 9, 1952. Contractor: Mr. Joseph Biehm. Construction started June 1953, completed spring 1954.
GENERAL PLAN OF DAM	Plate III, Appendix E.
TYPICAL SECTIONS OF DAM	Plate III, Appendix E.
OUTLETS: PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	Plate III, Appendix E. None.

NDI NO. PA-00 317

ENGINEERING DATA

ITEM	REMARKS
RAINFALL & RESERVOIR RECORDS	None.
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS: HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS: BORING RECORDS LABORATORY FIELD	No records.
POST CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	Unknown.

ENGINEERING DATA

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	Ice pressure tilted the wet well in winter 1967/1968. Leak in joint between well and pipe sealed and earthfill placed around wet well.
HIGH POOL RECORDS	No records. Estimated at 2 feet.
POST CONSTRUCTION ENGINEERING STUDIES & REPORTS	Report by Mr. Vaden R. Butler, P.E., dated August 1979. This inspection was made at the request of future owners.
PRIOR ACCIDENTS OR FAILURE OF DAM Description: Reports:	None.
MAINTENANCE & OPERATION RECORDS	None.
SPILLWAY PLAN, SECTIONS AND DETAILS	Plate III, Appendix E.

ENGINEERING DATA

ITEM	REMARKS
OPERATING EQUIPMENT, PLANS & DETAILS	Plates III & IV, Appendix E.
CONSTRUCTION RECORDS	Three inspection progress reports by PennDER.
PREVIOUS INSPECTION REPORTS & DEFICIENCIES	PennDER inspection 1965. Brush on downstream slope. Report by Vaden R. Butler.
MISCELLANEOUS	

NDI NO. PA-00 317

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Woodlands, moderate slopes, some marshland.

ELEVATION:

TOP NORMAL POOL & STORAGE CAPACITY: Elev.1214 Acre-Feet 307

TOP FLOOD CONTROL POOL & STORAGE CAPACITY: Elev.1218.1 Acre-Feet 835

MAXIMUM DESIGN POOL: Elev.1218

TOP DAM: Elev.1218.1

SPILLWAY:

a. Elevation 1214

b. Type Uncontrolled ogee weir with 1' deep x 4' stoplog notch

c. Width 70.5 feet

d. Length ---

e. Location Spillover Near right abutment

f. Number and Type of Gates None

OUTLET WORKS:

a. Type Wet well with sluice gate

b. Location Near center of dam

c. Entrance inverts 1204.6

d. Exit inverts 1202.6

e. Emergency drawdown facilities 36" sluice gate

HYDROMETEOROLOGICAL GAGES:

a. Type None

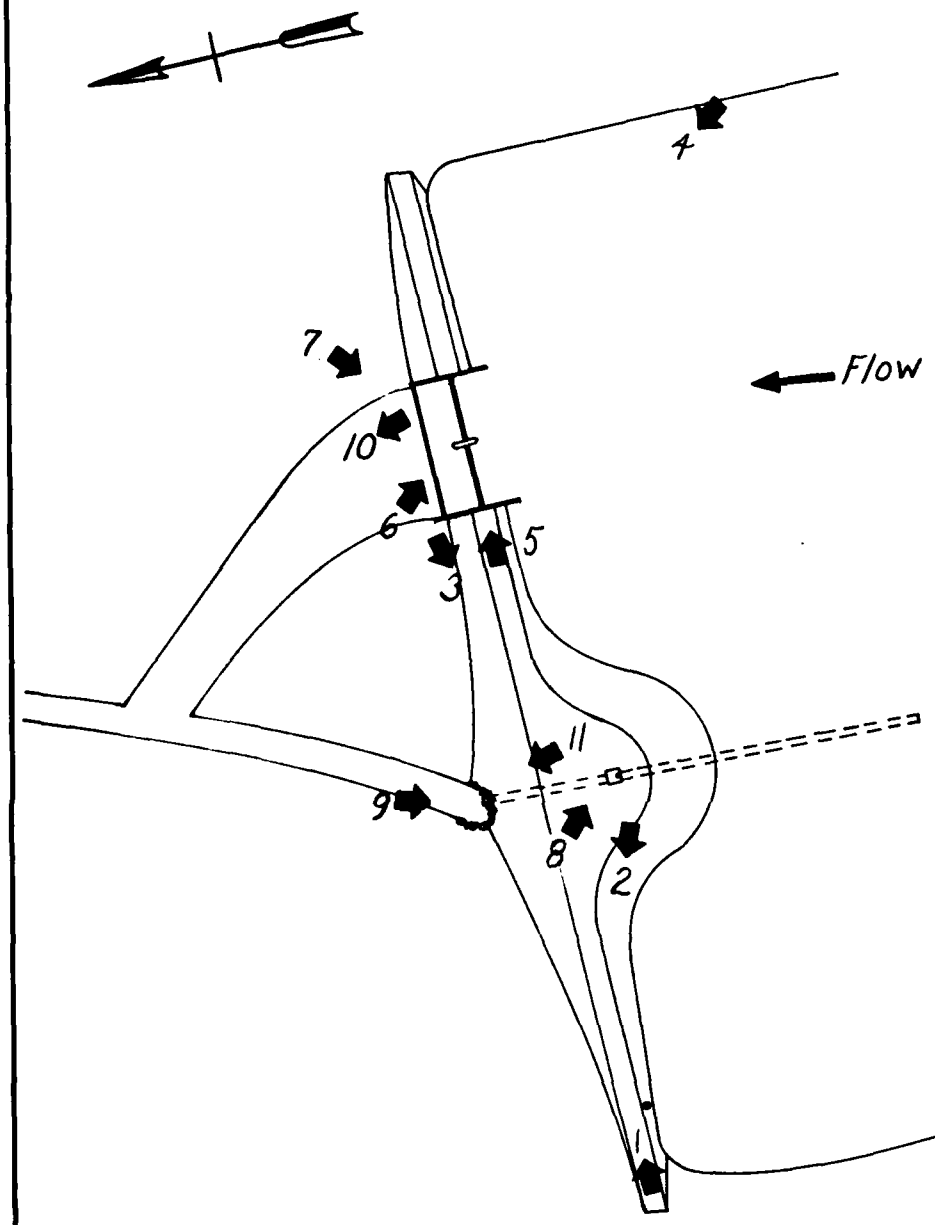
b. Location

c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 4181 cfs

APPENDIX C

PHOTOGRAPHS



WALKER LAKE DAM

PA.-00317

KEY MAP OF PHOTOGRAPHS

PLATE C-I

LEFT END UPSTREAM SLOPE - NO. 2

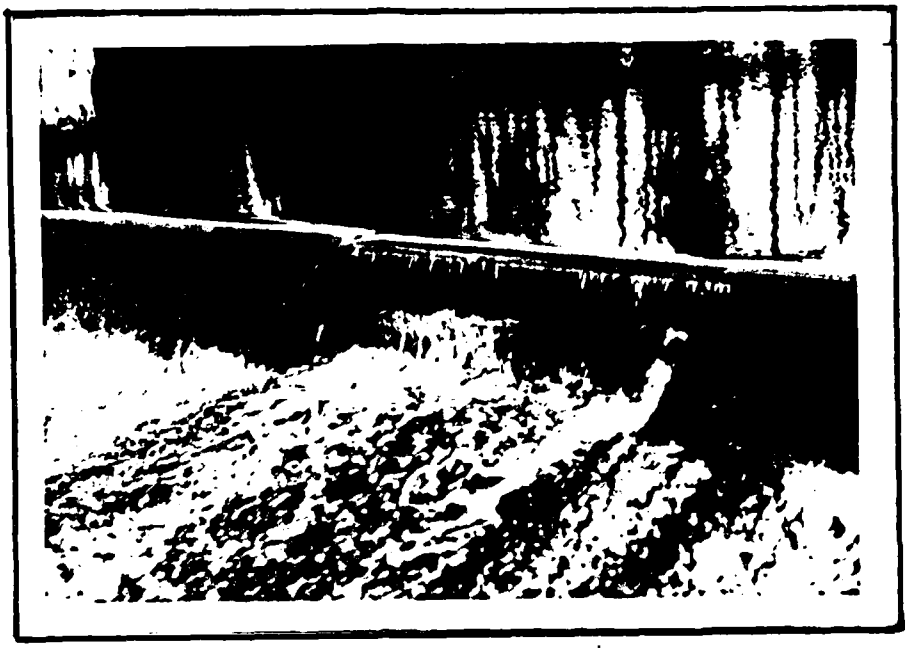
LEFT END DOWNSTREAM SLOPE - NO. 3

PA-00317
Plate G-II

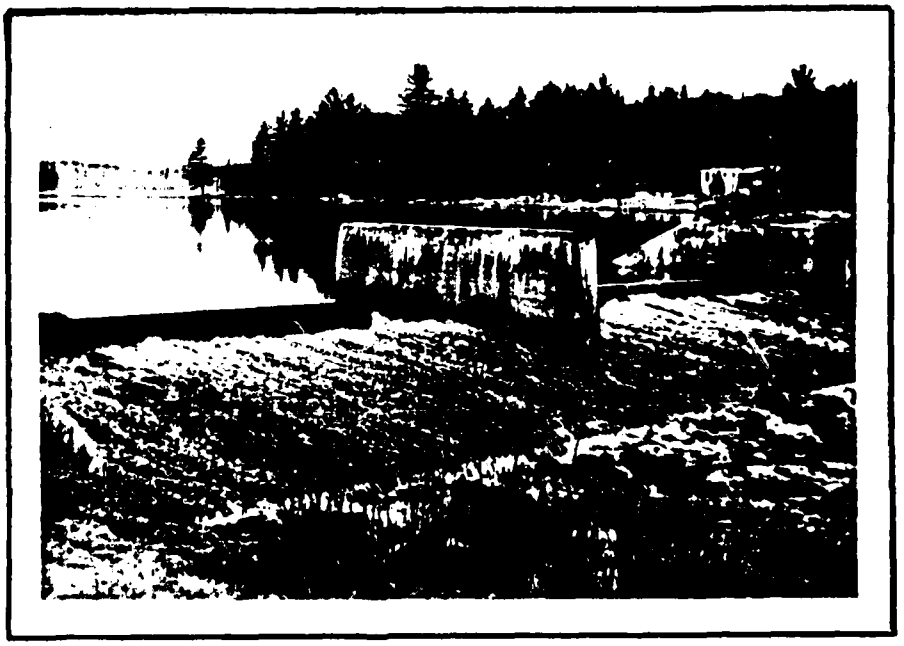
SPILLWAY FOREBAY - NO. 4

DETERIORATION SPILLWAY WALL - NO. 5

PA-00317
Plate C-III



LOW FLOW NOTCH - NO. 6



SPILLWAY APRON - NO. 7

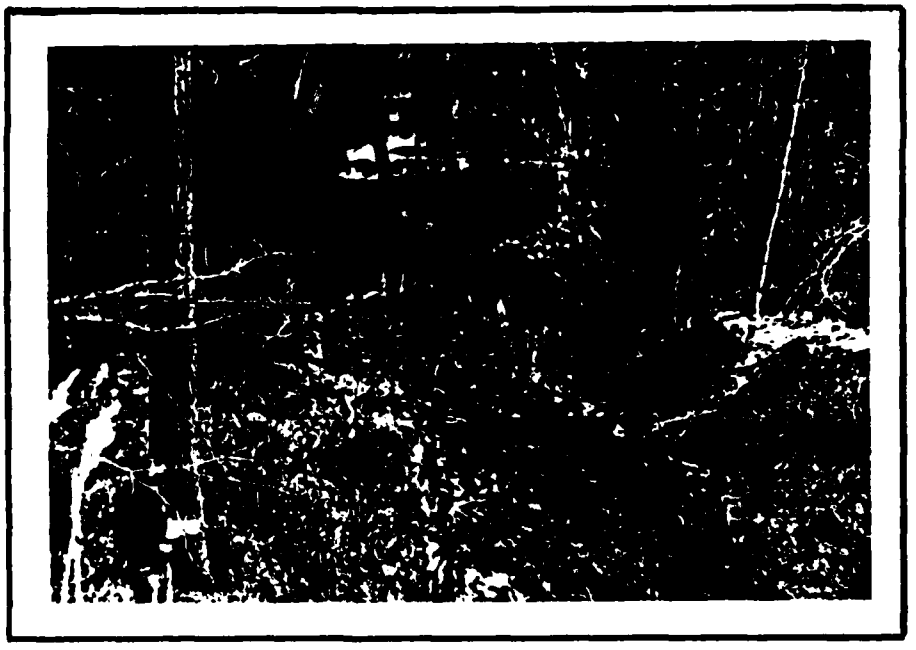
PA-00317
Plate C-IV

BLOWOFF - WETWELL & VALVE STEM - NO. 8

COLLAPSED HEADWALL OUTLET PIPE - NO. 9

PA-00317
Plate C-V

DISCHARGE CHANNEL SPILLWAY - NO. 10



DISCHARGE CHANNEL OUTLET PIPE - NO. 11

APPENDIX D

HYDROLOGY AND HYDRAULIC CALCULATIONS

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.

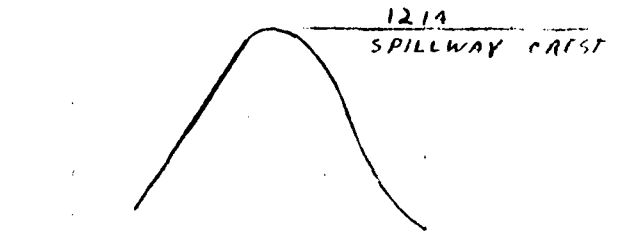
The output data provided by this program permits the comparison of downstream conditions just prior to a breach failure with that after a breach failure and the determination as to whether or not there is a significant increase in the hazard to loss of life as a result of such a failure.

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 RLS DATE 6/2/82 **BERGER ASSOCIATES** SHEET NO. 1 OF 9
CHKD. BY DATE PROJECT D9650
SUBJECT WALKER LAKE

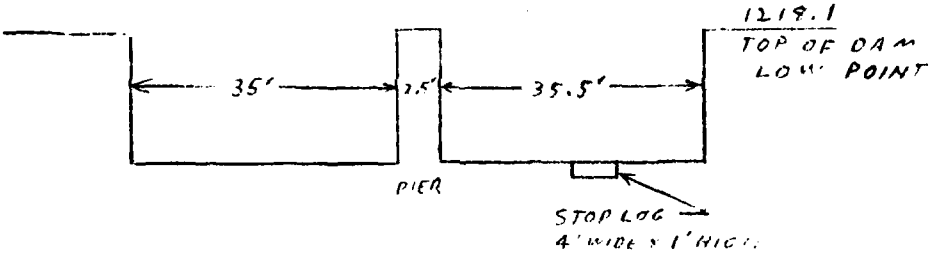
SPILLWAY RATING



OGEE SECTION
WITH SLOPING UPSTREAM FACE

$C = 3.38 \times 1.01$ (FROM SMALL DAMS FIG. 249 + 251)

$= 3.92$



$C = 3.3$ (KING - HOBA)

$Q = C_1 L_1 H^{3/2} + C_2 L_2 H^{3/2}$

$H = 1218.1 - 1214 = 4.1$

$L_1 = 66.5$

$C_1 = 3.92$

$L_2 = 9$

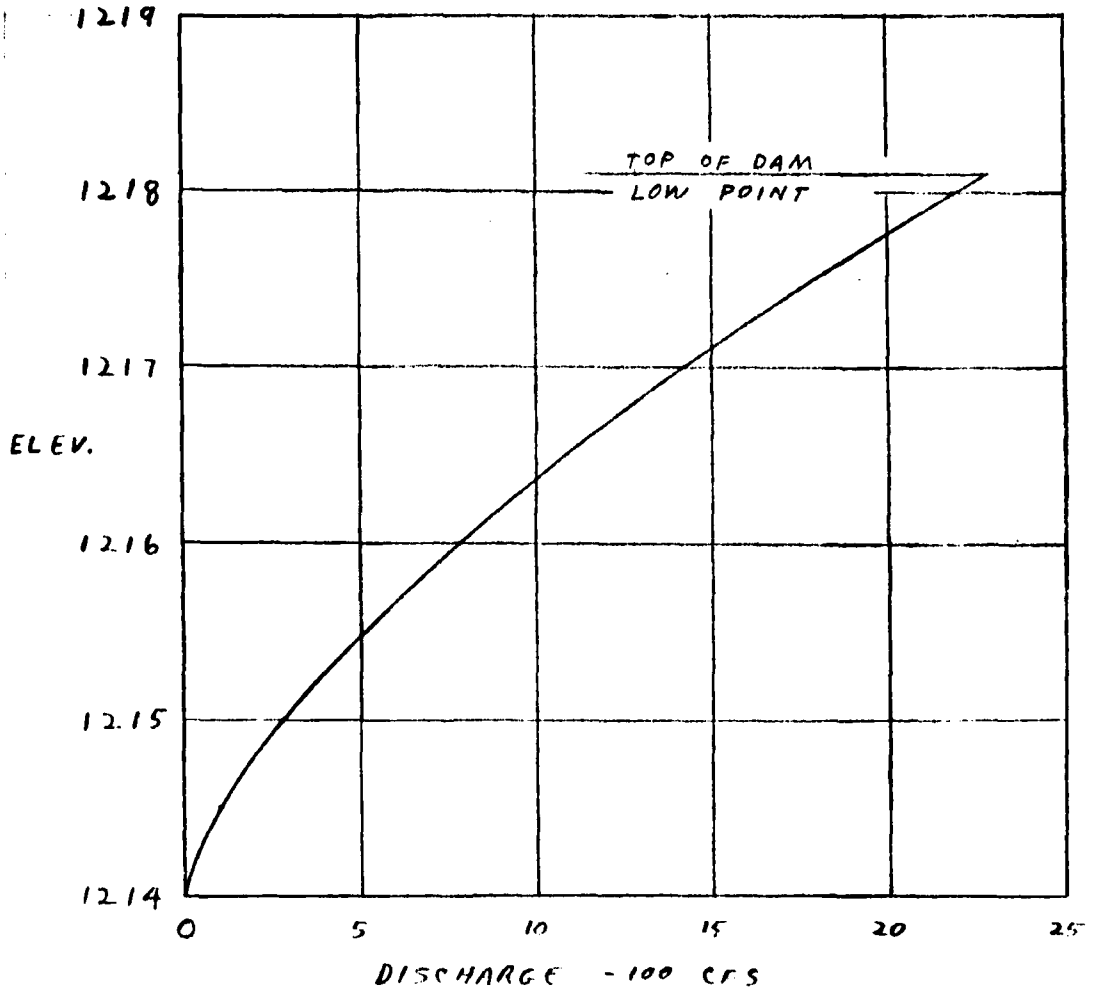
$C_2 = 3.3$

$Q = 3.92 \times 66.5 \times (4.1)^{1.5} + 3.3 \times 4 \times (4.1)^{1.5}$

$= 2164 + 110 = 2274$ CFS

BY RLS DATE 6/2/80 BERGER ASSOCIATES SHEET NO. 2 OF 9
CHKD. BY DATE PROJECT D9650
SUBJECT WALKER LAKE

SPILLWAY RATING CURVE



BY RLS DATE 6/21/80 **BERGER ASSOCIATES** SHEET NO. 3 OF 7
CHKD. BY DATE PROJECT D7650
SUBJECT WALKER LAKE

DISCHARGE THROUGH OUTLET WORKS

30" DIA. CONC PIPE CULVERT C 0.6

INVERT ELEV. = 1204.6

$Q = CA\sqrt{2gH}$

AT POOL ELEV 1214

$H = 1214 - 1205.85 = 8.15'$

$Q = 0.6 \times \pi \times \frac{(2.5)^2}{4} \times (2 \times 32.2 \times 8.15)^{0.5}$

$= 67$ CFS

AT LOW POOL ELEV 1209

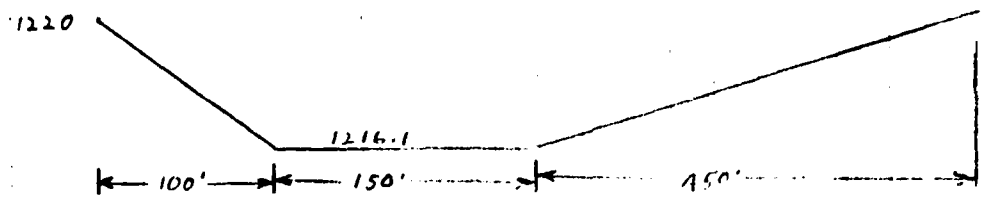
$H = 1209 - 1205.85 = 3.15'$

$Q = 0.6 \times \pi \times \frac{(2.5)^2}{4} \times (2 \times 32.2 \times 3.15)^{0.5}$

$= 42$ CFS

BY RLS DATE 6/2/80 **BERGER ASSOCIATES** SHEET NO. 1 OF 7
CHKD. BY ____ DATE ____ PROJECT D9650
SUBJECT WALKER LAKE

DISCHARGE THROUGH SWALE



BROADCRESTED WEIR C = 2.7 (KINGS HDBK.)

$$Q = C L_1 H_1^{3/2} + C L_2 H_2^{3/2} + C L_3 H_3^{3/2}$$

AT TOP OF DAM ELEV 1218.1

$H_1 = 1218.1 - 1216.1 = 2'$

$H_2 = H_3 = H_1/2 = 1'$

$L_1 = 150'$
$L_2 = (2/3.9) \times 100 = 51'$
$L_3 = (2/3.9) \times 450 = 231'$

$Q = 2.7 \times 150 \times (2)^{1.5} + 2.7 \times 51 \times (1)^{1.5} + 2.7 \times 231 \times (1)^{1.5}$

$= 1907$ CFS

BY RLS DATE 11/2/82 **BERGER ASSOCIATES** SHEET NO. 5 OF 9
CHKD. BY DATE PROJECT D9650
SUBJECT WALKER LAKE

MAXIMUM KNOWN FLOOD AT DAMSITE

IT WAS REPORTED THAT THE MAXIMUM KNOWN FLOOD AT THE WALKER LAKE DAM CAUSED THE WATER LEVEL IN THE LAKE TO REACH AN ELEVATION WHICH RESULTED IN WATER FLOWING SEVERAL INCHES DEEP THROUGH THE SWALE.

APPROXIMATE ELEVATION = 1216.5

SPILLWAY $H = 1216.5 - 1214 = 2.5'$

$$Q = C_1 L_1 H^{3/2} + C_2 L_2 H^{3/2}$$

$$= 3.92 \times 66.5 \times (2.5)^{1.5} + 3.3 \times 4 \times (2.5)^{1.5}$$

$$= 1083 \text{ CFS}$$

SWALE $H_1 = 1216.5 - 1216.1 = .4$

$H_2 = H_1/2 = .2$

$L_2 = (.4/3.9) \times 100 = 10'$

$L_3 = (.4/3.7) \times 46 = 46'$

$$Q = C L_1 H_1^{3/2} + C L_2 H_2^{3/2} + C L_3 H_3^{3/2}$$

$$= 2.7 \times 150 \times (.4)^{1.5} + 2.7 \times 10 \times (.2)^{1.5} + 2.7 \times 46 \times (.2)^{1.5}$$

$$= 116 \text{ CFS}$$

TOTAL FLOW

$116 + 1083 = 1199$ SAY 1200 CFS

BY RS DATE 6/3/80 **BERGER ASSOCIATES** SHEET NO. 6 OF 9
CHKD. BY DATE PROJECT 09650
SUBJECT WALKER LAKE

EMBANKMENT RATING

$Q = C L H^{3/2}$ $C = 2.7$ (KINGS HDBK.)

AT ELEV 1218.5

$2.7 \times 4 \times (.2)^{1.5} = 1$
$2.7 \times 2 \times (.2)^{1.5} = -$ $\Sigma = 1$ CFS

AT ELEV 1219

$2.7 \times 5 \times (.65)^{1.5} = 7$
$2.7 \times 2 \times (.7)^{1.5} = 3$
$2.7 \times 25 \times (.45)^{1.5} = 20$
$2.7 \times 120 \times (.4)^{1.5} = 82$
$2.7 \times 50 \times (.35)^{1.5} = 28$
$2.7 \times 33 \times (.1)^{1.5} = 3$
$2.7 \times 25 \times (.15)^{1.5} = 4$
$2.7 \times 25 \times (.25)^{1.5} = 8$
$2.7 \times 4 \times (.1)^{1.5} = -$
$2.7 \times 25 \times (.4)^{1.5} = 17$
$2.7 \times 30 \times (.4)^{1.5} = 17$
$2.7 \times 70 \times (.45)^{1.5} = 57$
$2.7 \times 12 \times (.25)^{1.5} = 4$ $\Sigma = 250$ CFS

AT ELEV 1219.5

$2.7 \times 5 \times (1.15)^{1.5} = 17$
$2.7 \times 2 \times (1.2)^{1.5} = 7$
$2.7 \times 25 \times (.95)^{1.5} = 63$
$2.7 \times 120 \times (.9)^{1.5} = 277$
$2.7 \times 50 \times (.85)^{1.5} = 106$
$2.7 \times 50 \times (.55)^{1.5} = 55$
$2.7 \times 25 \times (.4)^{1.5} = 17$
$2.7 \times 25 \times (.45)^{1.5} = 20$
$2.7 \times 25 \times (.65)^{1.5} = 35$
$2.7 \times 25 \times (.75)^{1.5} = 44$
$2.7 \times 15 \times (.35)^{1.5} = 8$
$2.7 \times 25 \times (.9)^{1.5} = 58$
$2.7 \times 30 \times (.85)^{1.5} = 63$
$2.7 \times 70 \times (.95)^{1.5} = 175$
$2.7 \times 24 \times (.5)^{1.5} = 23$ $\Sigma = 968$ CFS

BY RLS DATE 12/28/82 BERGER ASSOCIATES SHEET NO. 2 OF 2
CHKD. BY DATE PROJECT D-9610
SUBJECT WALKER LAKE

DISCHARGE SUMMARY

ELEV.	Q (cfs) SPILLWAY	Q (cfs) SWALE	Q (cfs) EMBANKMENT	Q TOTAL
1214	0	0	0	0
1214.5	97	0	0	97
1215	274	0	0	274
1215.5	503	0	0	503
1216.1	833	0	0	833
1216.5	1083	117	0	1200
1217	1423	449	0	1872
1217.5	1793	984	0	2777
1218.1	2274	1907	0	4181
1218.5	2614	2709	1	5324
1219	3062	3928	250	7240
1219.4	3533	5406	968	9907

BY RLA DATE 6/2/80 **BERGER ASSOCIATES** SHEET NO. 8 OF 9
CHKD. BY ____ DATE ____ PROJECT D-9650
SUBJECT WALKER LAKE

SIZE CLASSIFICATION

MAXIMUM STORAGE = 835 ACRE-FEET
MAXIMUM HEIGHT = 15 FEET
SIZE CLASSIFICATION IS "SMALL"

HAZARD CLASSIFICATION

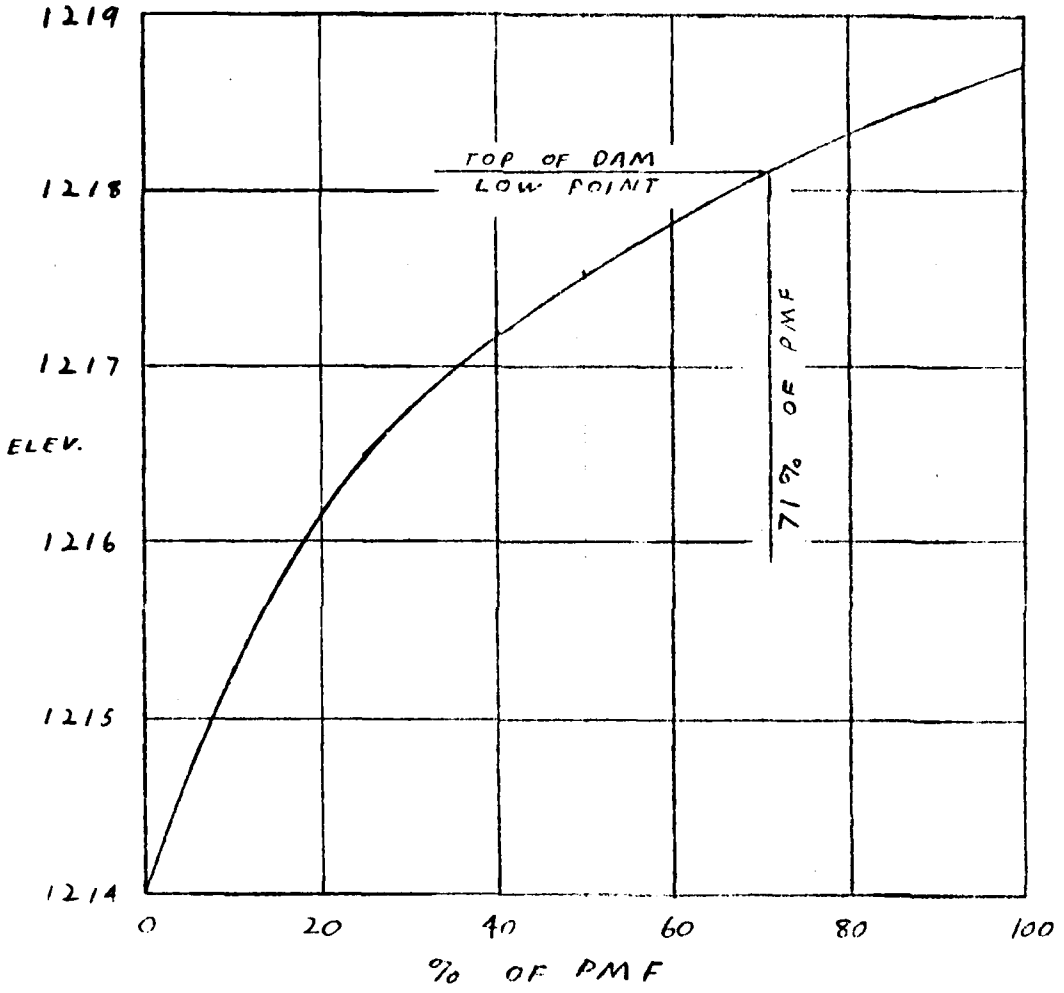
SEVERAL HOUSES ARE LOCATED ALONG THE DOWNSTREAM CHANNEL.
USE "HIGH"

RECOMMENDED SPILLWAY DESIGN FLOOD

THE ABOVE CLASSIFICATIONS INDICATE USE OF AN SDF EQUAL TO ONE-HALF PMF TO THE PROBABLE MAXIMUM FLOOD

BY RLS DATE 6/15/89 **BERGER ASSOCIATES** SHEET NO. 9 OF 9
CHKD. BY DATE PROJECT D7650
SUBJECT WALKER LAKE

SPILLWAY CAPACITY CURVE



HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: WALKER LAKE DAM RIVER BASIN: Delaware

PROBABLE MAXIMUM PRECIPITATION (PMP) = 21.5 INCHES/24 HOURS[1]

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		WALKER LAKE	WALKER LAKE DAM		
DRAINAGE AREA (SQUARE MILES)		3.4	--		
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		3.4	3.4		
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]	3.62			
	L_{ca} (MILES)[5]	1.75			
	$T_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	2.14			
SPILLWAY DATA	CREST LENGTH (FT.)		70.5		
	FREEBOARD (FT.)		4.1		
	DISCHARGE COEFFICIENT		3.92		
	EXPONENT		1.5		
	ELEVATION		1214		
AREA[6] (ACRES)	NORMAL POOL	113			
	ELEV. 1220	160			
	ELEV.				
STORAGE (ACRE-FEET)	NORMAL POOL[7]	307			
	ELEV. 1206[8]	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 encompased by contour upstream of dam.

(7) PennDER files.

(8) Computed by conic method.

```
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************
    1             A1       WALKER LAKE DAM ****  WALKER LAKE CREEK
    2             A2      SHOHOLA TWP., PIKE COUNTY, PA.
    3             A3      NDI # PA-00317     PA DER # 52-127
    4             B   300      0      15       0       0       0       0       0      -4       0
    5             B1    5
    6             J     1      9       1
    7             J1    1     .9      .8      .7      .6      .5      .4     .25      .1
    8             K           1                                      1
    9             K1              INFLOW  HYDROGRAPH
   10             M     1       1     3.4
   11             P           21.5     111     123     133     142
   12             T                                              1     .05
   13             W  2.14     .45
   14             X  -1.5     .05       2
   15             K     1       2                                1
   16             K1              RESERVOIR  ROUTING
   17             Y                              1
   18             Y1    1                                                307      -1
   19             Y4 1214  1214.5    1215  1215.5  1216.1  1216.5    1217  1217.5  1218.1  1218.5
   20             Y4 1219  1219.5    1220
   21             Y5    0      97     274     503     833    1200    1872    2777    4181    5324
   22             Y5 7240    9907
   23             $A    0     113     160
   24             $E1205.8   1214    1220
   25             $$ 1214
   26             $D1218.1
   27             K    99
1                          PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                RUNOFF HYDROGRAPH AT          1
                                ROUTE HYDROGRAPH TO           2
                                END OF NETWORK


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

 RUN  DATE# 80/06/03.
      TIME# 14.32.36.


                          WALKER LAKE DAM ****  WALKER LAKE CREEK
                          SHOHOLA TWP., PIKE COUNTY, PA.
                          NDI # PA-00317     PA DER # 52-127

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


                                  MULTI-PLAN ANALYSES TO BE PERFORMED
                                      1     NPLAN= 1 NRTIO= 5 LRTIO= 1
```

SHOHOLA TWP., PIKE COUNTY, PA.
NDI # PA-00317 PA DER # 52-127

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	15	0	0	0	0	0	-4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1
RTIOS= 1.00 .90 .80 .70 .60 .50 .40 .25 .10

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

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	3.40	0.00	3.40	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.50	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 2.14 CP= .45 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= .05 RTIOR= 2.00

UNIT HYDROGRAPH 77 END-OF-PERIOD ORDINATES, LAG= 2.14 HOURS, CP= .45 VOL= 1.00

16.	61.	125.	200.	282.	358.	416.	455.	469.	453.
421.	391.	363.	337.	314.	291.	271.	251.	234.	217.
202.	187.	174.	162.	150.	140.	130.	121.	112.	104.
97.	90.	84.	78.	72.	67.	62.	58.	54.	50.
46.	43.	40.	37.	35.	32.	30.	28.	26.	24.
22.	21.	19.	18.	17.	15.	14.	13.	12.	11.
11.	10.	9.	9.	8.	7.	7.	6.	6.	6.
5.	5.	4.	4.	4.	4.	3.			

0 END-OF-PERIOD FLOW

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

SUM	24.42	22.04	2.39	192427.
	(620.)	(560.)	(61.)	(5448.93)

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

HYDROGRAPH ROUTING

RESERVOIR ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	307.	-1

STAGE	1214.00	1214.50	1215.00	1215.50	1216.10	1216.50	1217.00	1217.50	1218.10	1218.50
	1219.00	1219.50	1220.00							
FLOW	0.00	97.00	274.00	503.00	833.00	1200.00	1872.00	2777.00	4181.00	5324.00
	7240.00	9907.00	0.00							
SURFACE AREA=	0.	113.	160.							
CAPACITY=	0.	309.	1124.							
ELEVATION=	1206.	1214.	1220.							

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXFL
1214.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1218.1	0.0	0.0	0.

PEAK OUTFLOW IS 6078. AT TIME 42.50 HOURS

PEAK OUTFLOW IS 5408. AT TIME 42.75 HOURS

PEAK OUTFLOW IS 4772. AT TIME 42.75 HOURS

PEAK OUTFLOW IS 4117. AT TIME 42.75 HOURS

PEAK OUTFLOW IS 3496. AT TIME 43.00 HOURS

PEAK OUTFLOW IS 2838. AT TIME 43.00 HOURS

PEAK OUTFLOW IS 2199. AT TIME 43.25 HOURS

PEAK OUTFLOW IS 1198. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 399. AT TIME 44.50 HOURS

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

1

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 1.00	RATIO 2 .90	RATIO 3 .80	RATIO 4 .70	RATIO 5 .60	RATIO 6 .50	RATIO 7 .40	RATIO 8 .25	RATIO 9 .1
HYDROGRAPH AT	1	3.40	1	6320.	5688.	5056.	4424.	3792.	3160.	2528.	1580.	632.
	(	8.81)	(	178.96)(	161.06)(	143.17)(	125.27)(	107.37)(	89.48)(	71.58)(	44.74)(	17.90)
ROUTED TO	2	3.40	1	6078.	5408.	4772.	4117.	3496.	2838.	2199.	1198.	399.
	(	8.81)	(	172.10)(	153.15)(	135.12)(	116.57)(	98.99)(	80.35)(	62.26)(	33.93)(	11.29)

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1213.95	1214.00	1218.10
STORAGE	303.	309.	835.
OUTFLOW	0.	0.	4181.

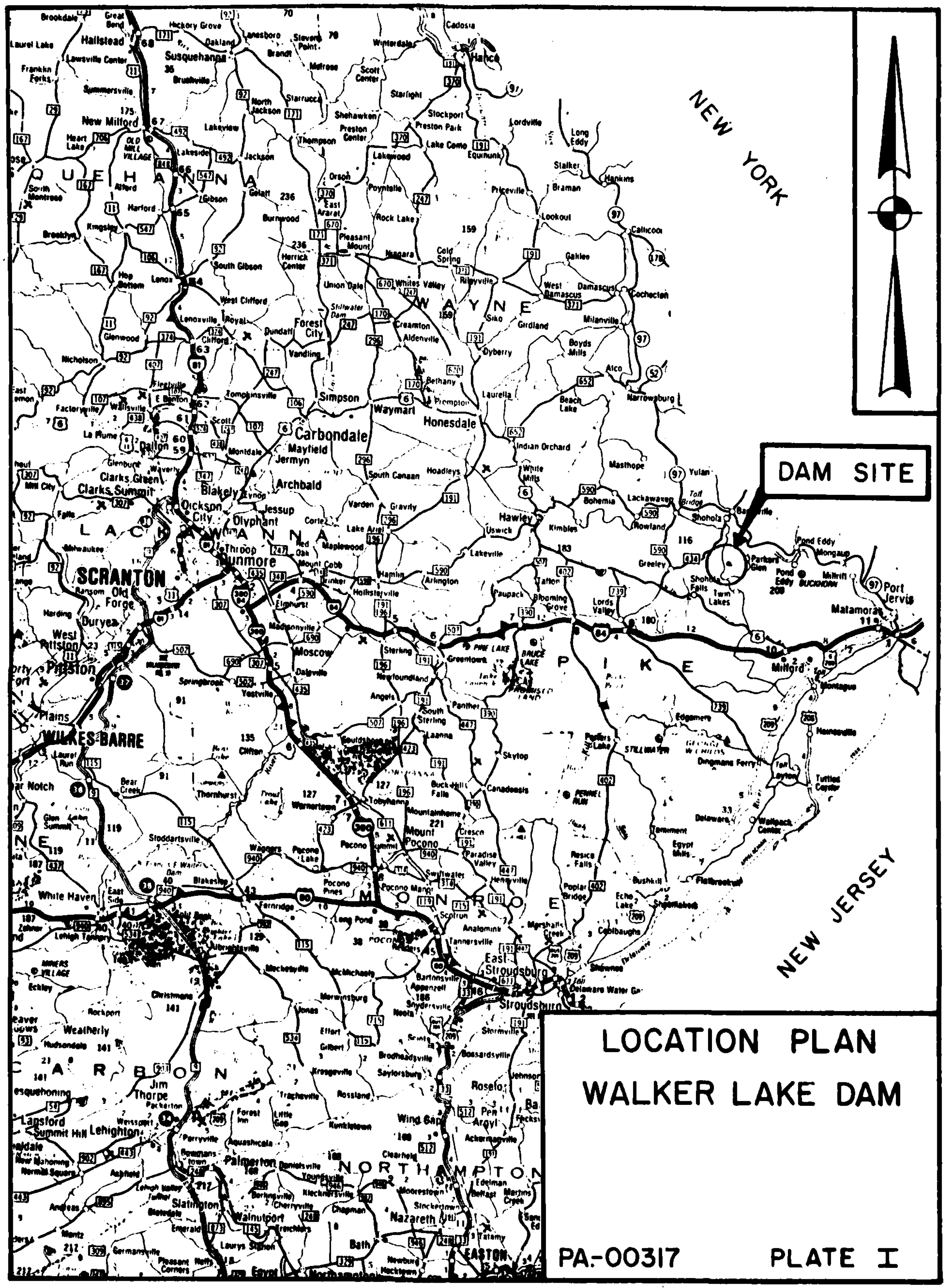
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1218.70	.60	922.	6078.	4.00	42.50	0.00
.90	1218.52	.42	896.	5408.	3.25	42.75	0.00
.80	1218.31	.21	865.	4772.	2.25	42.75	0.00
.70	1218.07	0.00	831.	4117.	0.00	42.75	0.00
.60	1217.81	0.00	793.	3496.	0.00	43.00	0.00
.50	1217.53	0.00	753.	2838.	0.00	43.00	0.00
.40	1217.18	0.00	706.	2199.	0.00	43.25	0.00
.25	1216.50	0.00	614.	1198.	0.00	44.00	0.00
.10	1215.27	0.00	459.	399.	0.00	44.50	0.00

EOI ENCOUNTERED.

TERMINAL 251 TIME OUT.

APPENDIX E

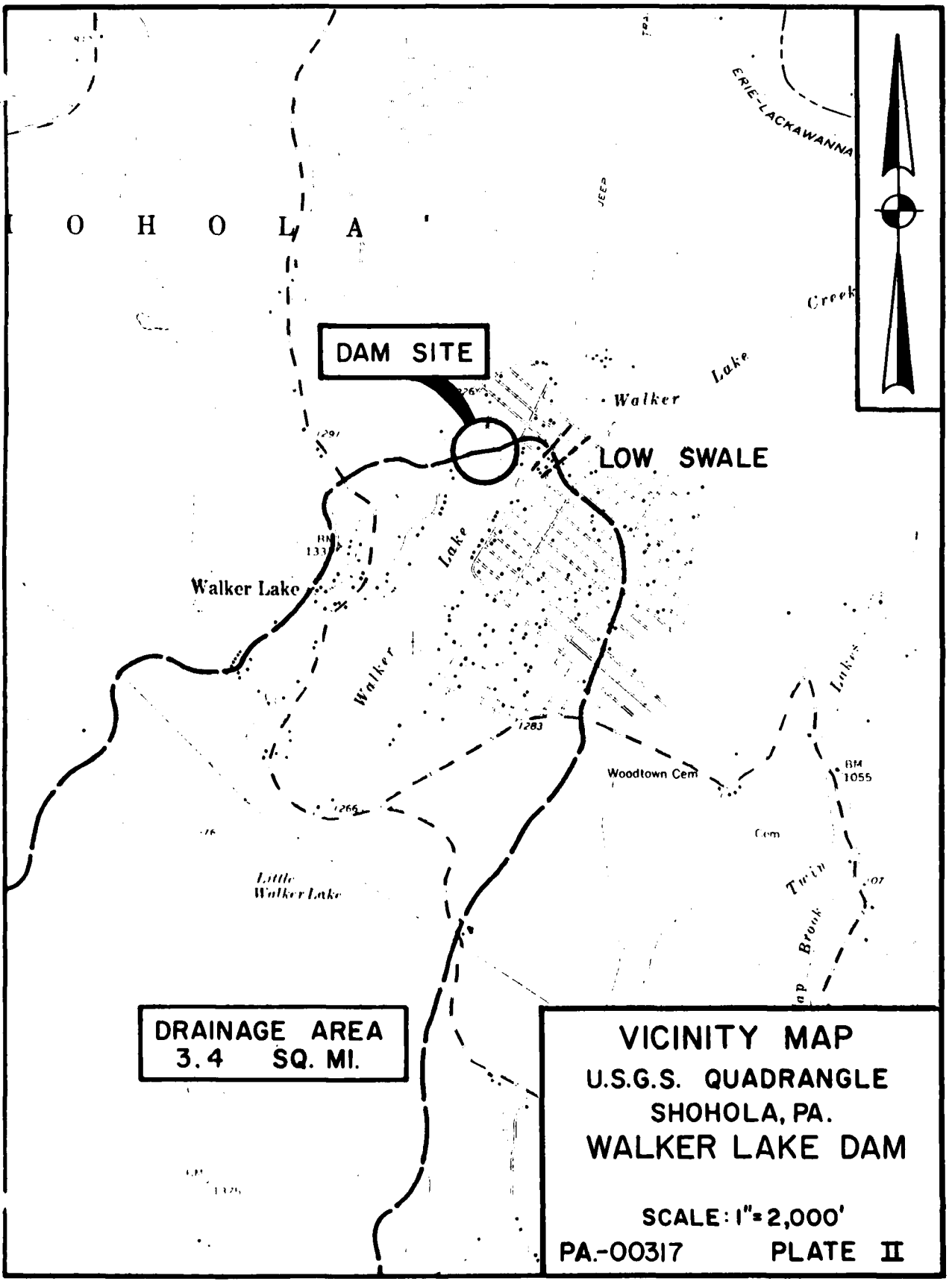
PLATES

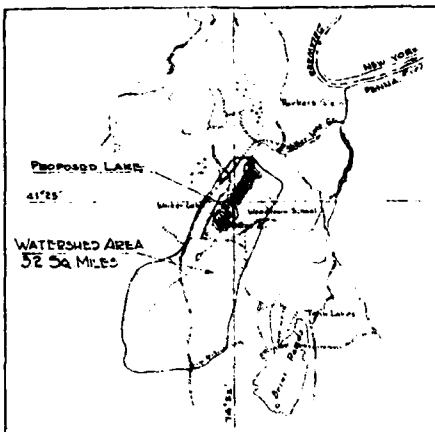


LOCATION PLAN

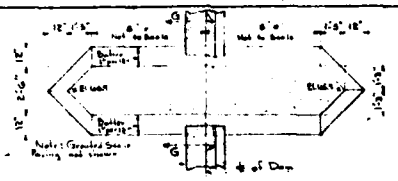
WALKER LAKE DAM

PA-00317 PLATE I

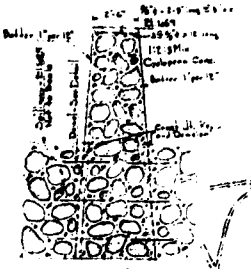

I O H O L A
ERIE-LACKAWANNA
Creek
DAM SITE
Walker Lake
LOW SWALE
Walker Lake
Walker Lake
Lakes
Woodtown Cem
BM 1055
Cem
Little Walker Lake
Twin
Brook
DRAINAGE AREA
3.4 SQ. MI.
VICINITY MAP
U.S.G.S. QUADRANGLE
SHOHOLA, PA.
WALKER LAKE DAM
SCALE: 1"= 2,000'
PA.-00317 PLATE II



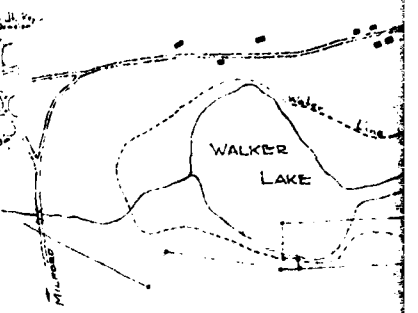
PORTION OF MILFORD QUADRANGLE U.S GEOLOGICAL SURVEY
SHOWING PROPOSED LAKE AND WATERSHED AREA
Scale = 1/62,500



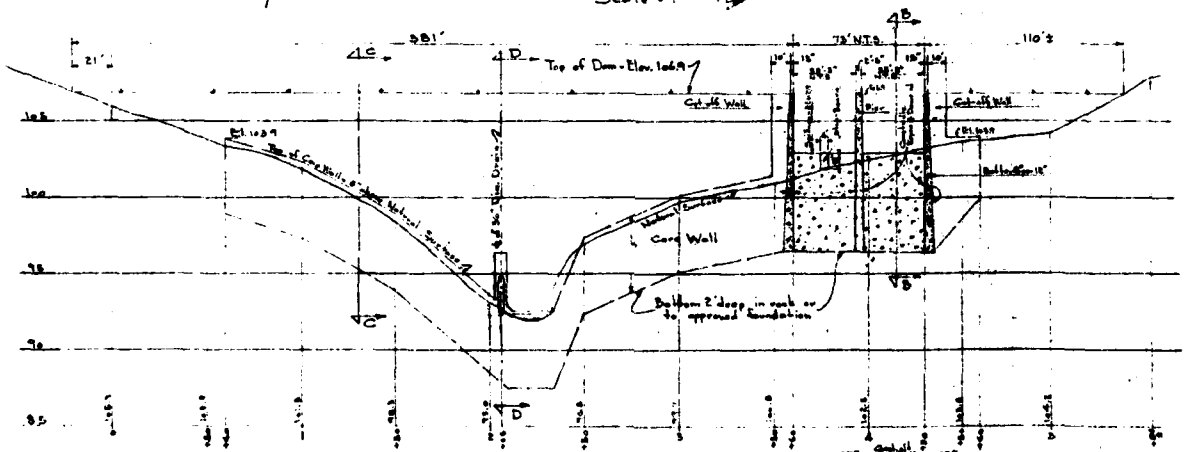
PLAN OF PIER
Scale = 1" = 4'



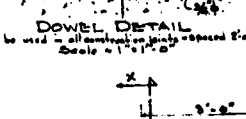
SECTION G-G
Scale = 1" = 4'



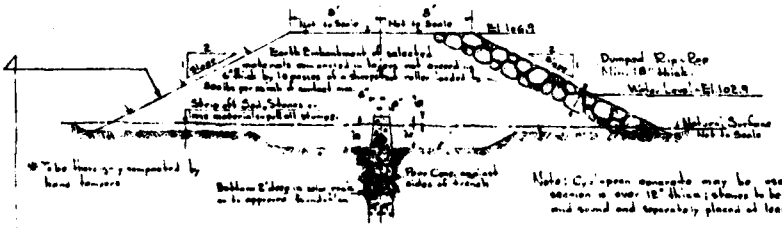
PLAN
Scale = 1" = 40'



PROFILE C-C
Scales Hor. = 1" = 40'
Vert. = 1" = 5'

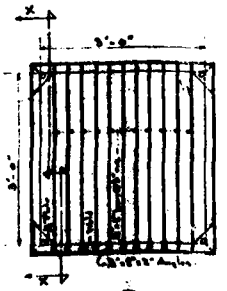


DOWEL DETAIL
To be used - all construction joints spaced 8'-0" o.c.
Scale = 1" = 1'-0"

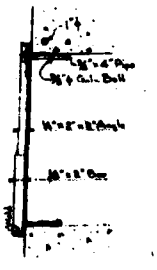


TYPICAL SECTION OF EMBANKMENT C-C
Scale = 1" = 5'

Note: Seed and Fertilize downstream side of Embankment with
Mulch seed mix 4 lbs. of Tung Fertilizer per 100 Square Feet.
Seed to be blended as follows - 75% Perennial Rye Grass
25% Korean Lespedeza

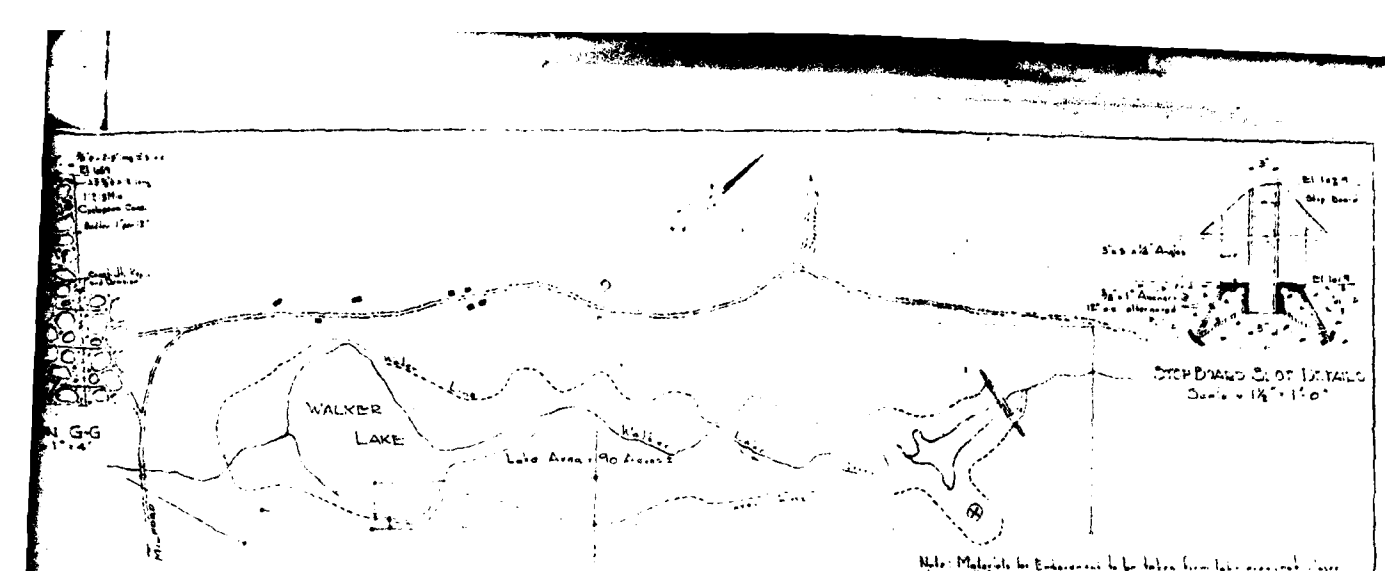


SCREEN DETAILS
Scale = 1/2" = 1'-0"

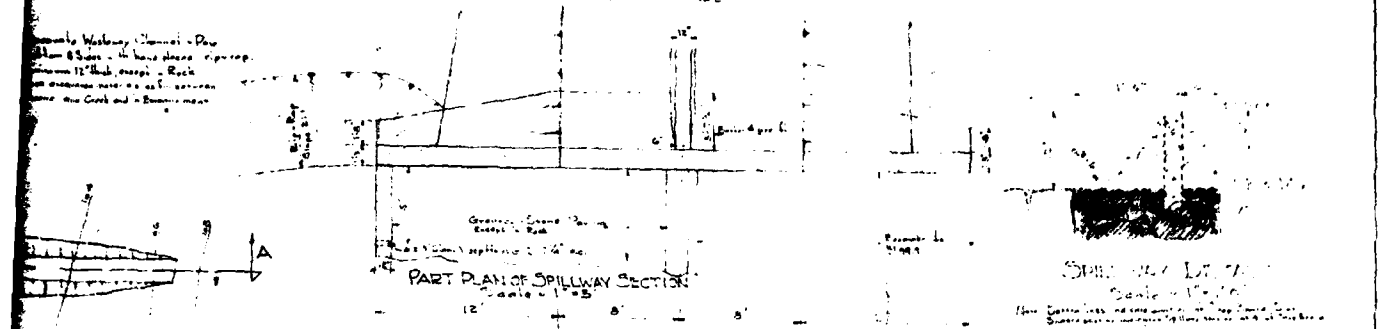


SECTION X-X
Scale = 1/2" = 1'-0"

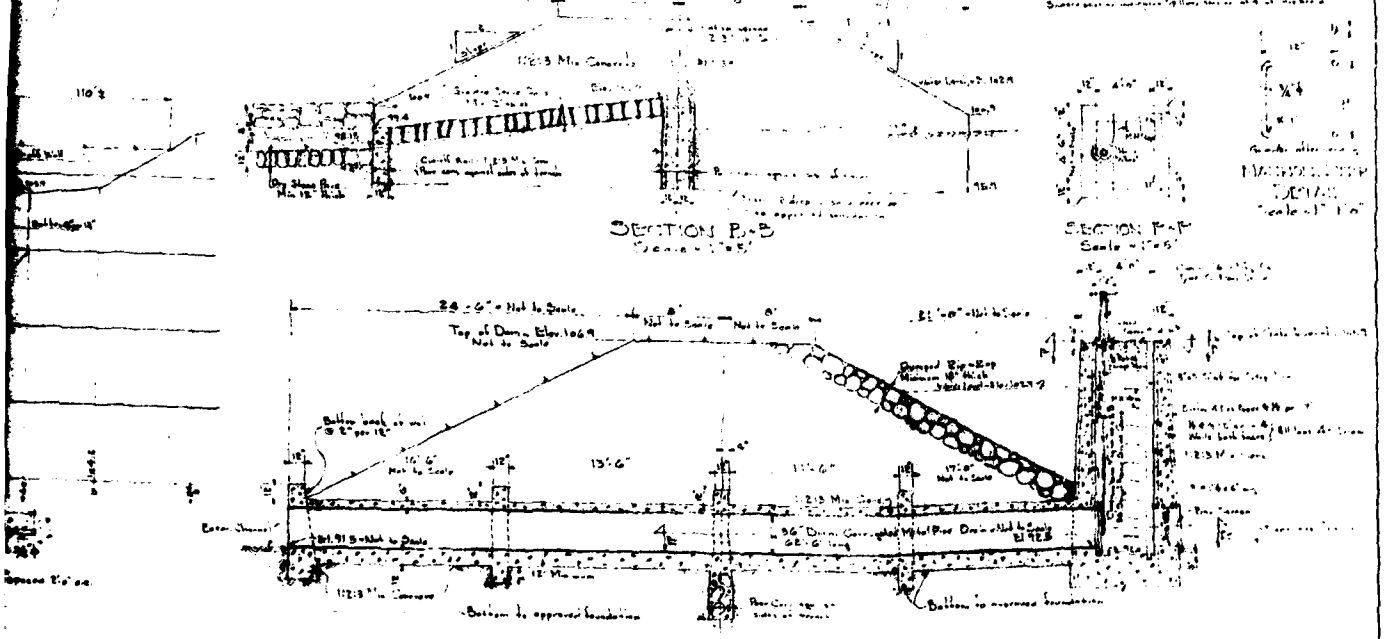
Note: Screens to be heavily galvanized after fabrication



GENERAL PLAN



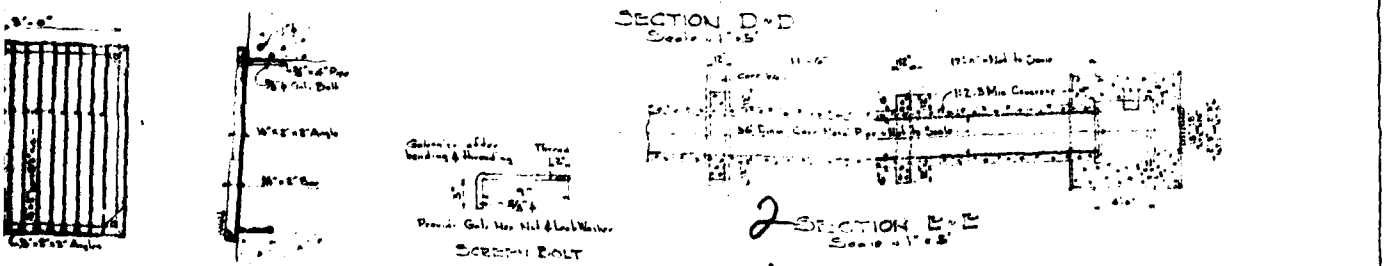
PART PLAN OF SPILLWAY SECTION



SECTION B-B

SECTION C-C

SECTION D-D



SECTION E-E

SCREEN BOLT

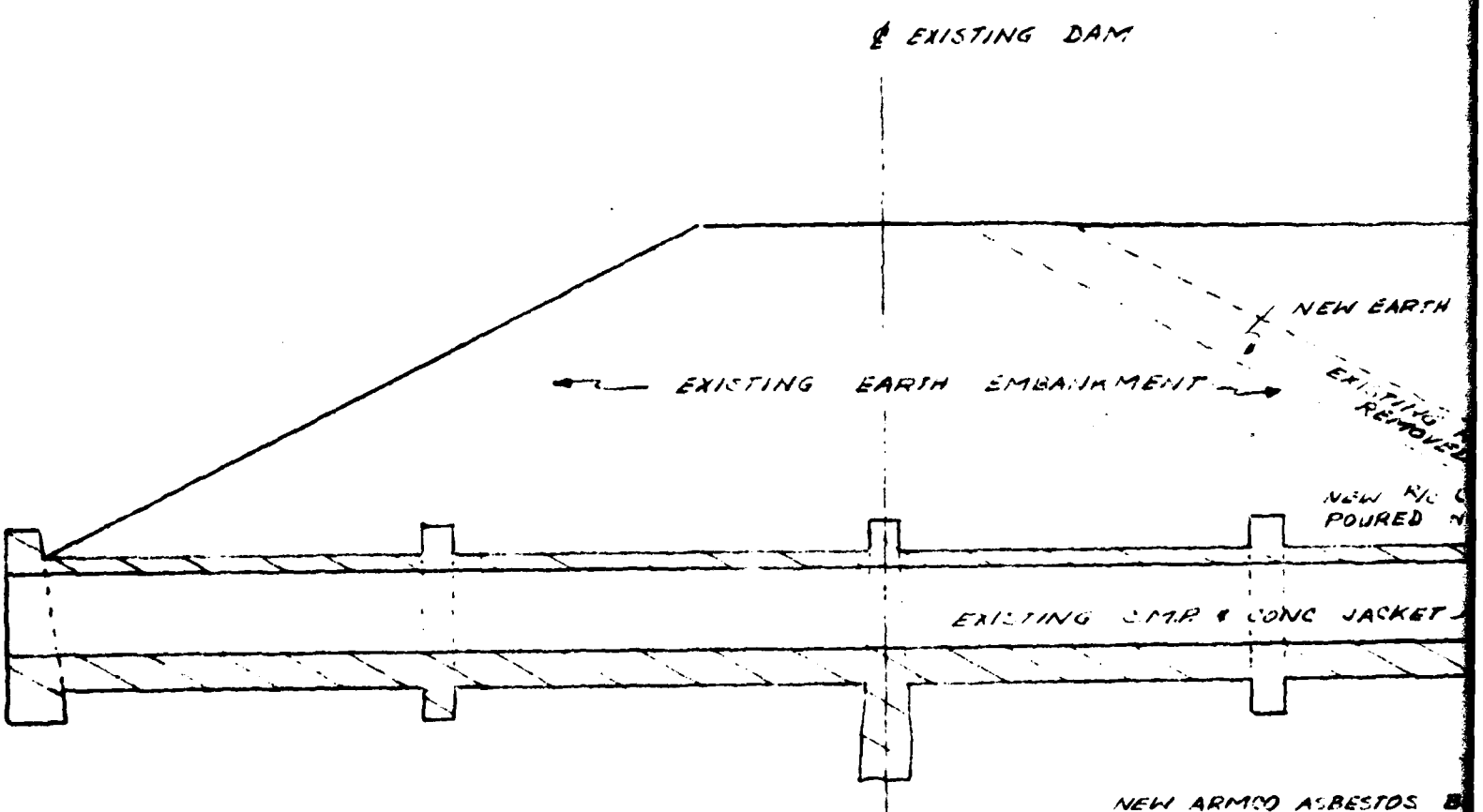
SECTION X-X

PLANS AND SECTIONS OF PROPOSED DAM ON
WALKER LAKE CREEK
FOR
+ WALKER LAKE INC. +
SHOHOLA TWP., PIKE COUNTY, PA.
JANUARY 22, 1952 SCALES AS SHOWN.

Revised May 12, 1953
Revised March 13, 1953
Revised February 16, 1952

Edward C. Haas
Civil Engineer

PA-003
PLATE



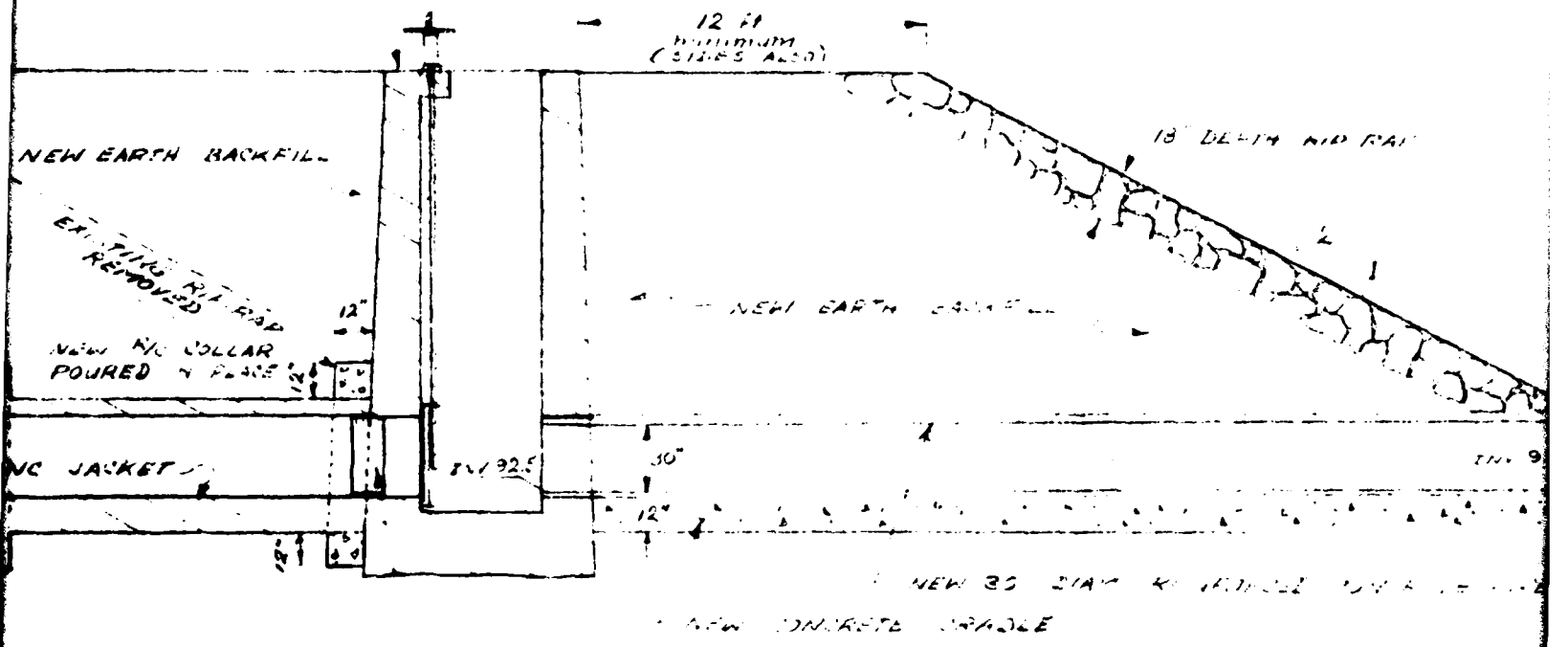
NEW ARMCO ASBESTOS
INTERNAL EXPANDING
½" NEOPRENE GASKET
OPENING BETWEEN TO
OUTLET PIPE.

NEW R/C COLL

FAILURE OCCURRED AT JUN
OF GATE TOWER AND OUTLET

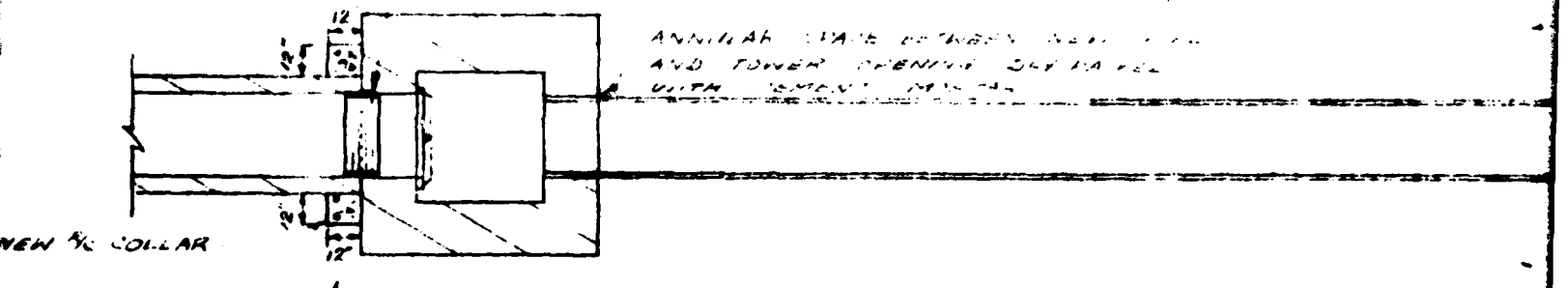
FAILURE WAS APPARENTLY CAUSED BY TILTING OF THE GATE TOWER DUE TO ICE PRESSURE DURING WINTER OF 1967-68.

EXISTING GATE TOWER



SECTION THROUGH TOWER & OUTLET PIPE

ASBESTOS BONDED CMP EXPANDING BAND WITH NE GASKET TO SEAL ETWEEN TOWER AND IPE.



D AT JUNCTION
AND OUTLET PIPE

PLAN VIEW

2

NOTE: THIS DRAWING SHOWS AS-BUILT CONDITIONS AFTER EMERGENCY REPAIR.

52-127

NUMBER

RECEIVED IN THE OFFICE OF THE WATER & POWER RESOURCES BOARD DEPARTMENT OF FORESTS & WATERS ON THE DAY OF Feb A.D. 1969

File Clerk

EMERGENCY REPAIR

WALKER LAKE

CHOCOLA TOWNSHIP PIKE COUNTY, PA.

SHOWING METHOD OF REPAIR OF FAILURE AT GATE TOWER AND OUTLET PIPE

FEB 17 1969 Fred C. Schoenagel, Jr.

SCALE 1" = 5' REGISTERED PROFESSIONAL ENGINEER

PA-00317

PLATE IV

APPENDIX F

GEOLOGIC REPORT

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 thickbedded with distinct cross lamination. Lenses of calcareous conglomerate are present.

Structure

The dam is located in the Pocono Plateau area and the beds are nearly flat lying. There is a regional dip to the northwest.

Air photo fracture traces trend: N70°W, N5°W, N5°E and N75°E.

Overburden

This site is within the limits of Pleistocene glaciation and variable thicknesses of glacial till and outwash sediments are present. Plans for the dam specify that the cutoff trench was to be dug "two feet deep in solid rock or approved foundation." No boring or test pit information is available. Some glacial outwash was probably present in the valley where the dam was built, and till may also have been present. It seems likely that the cutoff trench was in either bedrock or glacial till (clay).

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

If the specifications were followed, the foundation of this dam is probably sound. The leakage reported was due to ice damage to the outlet structure in 1968.

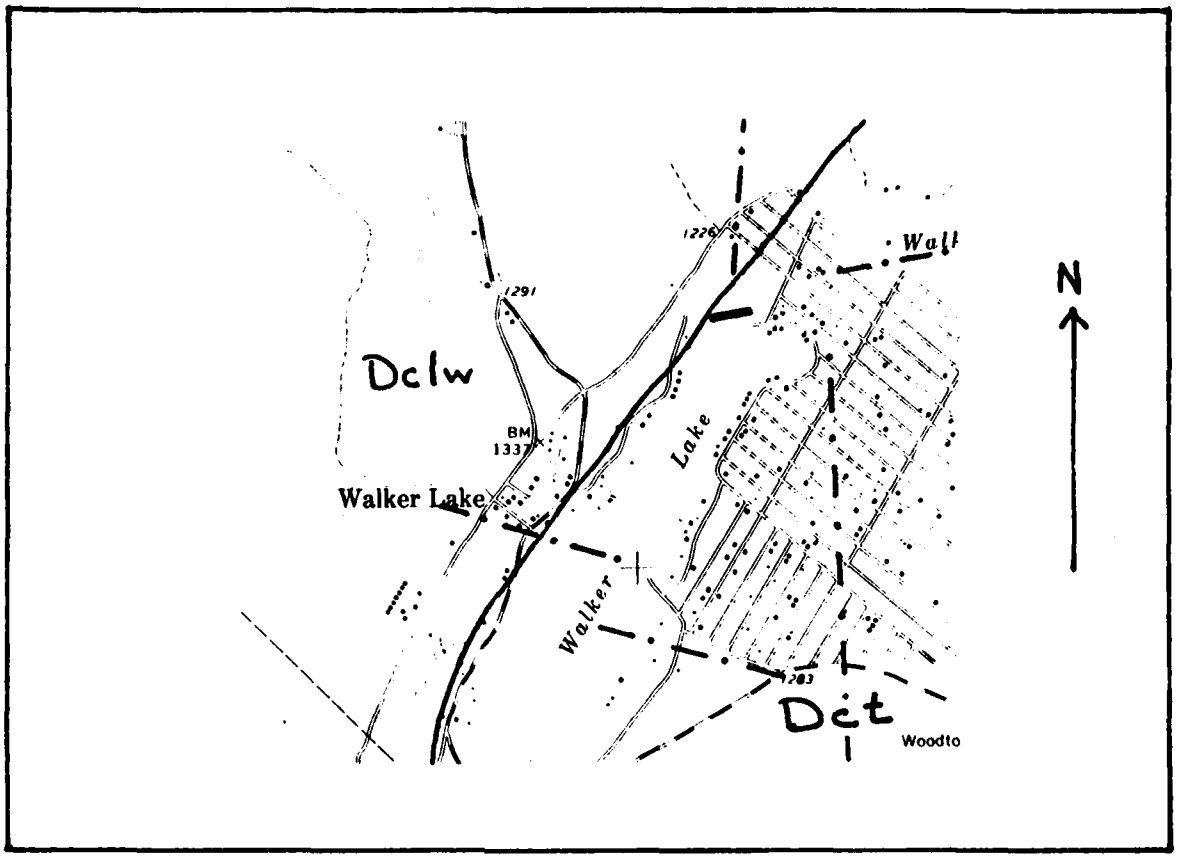
Sources of Information

1. Manuscript Geologic Map; Shohola Quadrangle in open file, Pa. Geologic Survey, Harrisburg, Pa.

2. Air Photographs, dated 1973. Scale 1:40,000.

3. Plans and inspection reports in file.

GEOLOGIC MAP - Walker Lake Dam



Dclw — Catskill Fm.- Long Run/Walksville member

Dct — Catskill Fm.- Towamensing member

—.—. air photo fracture trace

SCALE 1:24000

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

CONTOUR INTERVAL 20 FEET


FIL
2