

AD-A081 634

BERGER ASSOCIATES INC HARRISBURG PA
NATIONAL DAM INSPECTION PROGRAM. HANKINS POND DAM (NDI ID NUMBE--ETC(U)
JAN 80

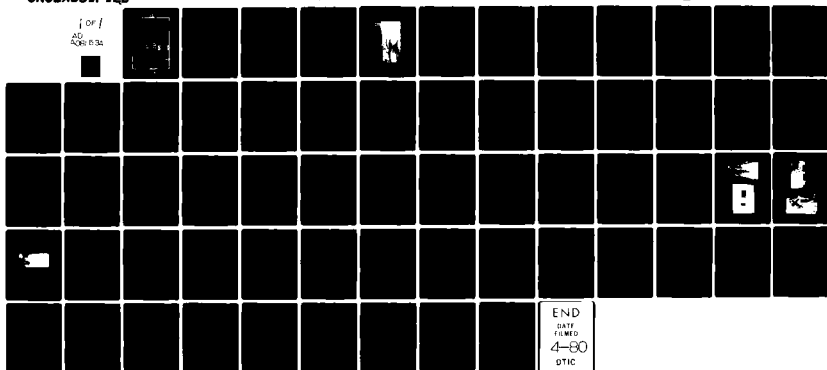
DACW31-80-C-0019

F/G 13/13

ML

UNCLASSIFIED

1 of 1
AD
A081 634



LEVEL

Handwritten initials/signature

AD A 081 634

DELAWARE RIVER BASIN

HANKINS POND DAM

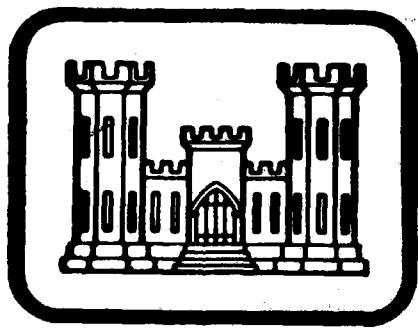
NDI NO. PA-00169

DER NO. 64-40

WAYNE COUNTY, PENNSYLVANIA

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

ORIGINAL CONTAINS COLOR PLATES: ALL DOC
REPRODUCTIONS WILL BE IN BLACK AND WHITE



DTIC ELECTE
S D
MAR 11 1980
A

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

DISTRIBUTION STATEMENT
Approved for public release
Distribution Unlimited

BY

Berger Associates, Inc.
Harrisburg, Pennsylvania

JANUARY 1980

DOC FILE COPY

411003

80 3 11 034

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.

**ORIGINAL CONTAINS COLOR PLATES: ALL DDC²
REPRODUCTIONS WILL BE IN BLACK AND WHITE**

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITIONS
AND RECOMMENDATIONS

Name of Dam: HANKINS POND, NDI NO. PA-00169
State & State No.: PENNSYLVANIA, 64-40
County: WAYNE
Stream: TRIBUTARY TO WEST BRANCH LACKAWAXEN RIVER
Date of Inspection: October 24, 1979

DACW31-80-C-0019

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 intermediate and the hazard classification is significant. The spillway capacity combined with the available storage is sufficient to pass the PMF (Probable Maximum Flood) peak inflow without overtopping the dam. The spillway is therefore considered to be adequate. These calculations are based on a maximum stoplog elevation of 9 feet above the wetwell floor.

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

1. That the seepage discharge from the toe of the wall be observed on a regular bases. If the clarity or the discharge rate changes, immediate steps should be taken for remedial action.
2. That the screens in the spillway opening be removed.
3. That all brush and trees be removed from the embankment on a regular maintenance schedule.
4. That the crushing of the wall at the strut be evaluated and repaired as required.
5. That the woodchuck hole on the upstream slope be filled.

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DOC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	<input type="checkbox"/>
By _____	
Distribution/	
Availability Codes	
1. 01	Avail and/or special
<i>A</i>	

6. That a formal surveillance downstream warning system be developed and implemented to be used during periods of high or prolonged rainfall.
7. That a program be developed for regular inspection and maintenance for the dam and its appurtenant structures.

SUBMITTED BY:

BERGER ASSOCIATES, INC.
HARRISBURG, PENNSYLVANIA

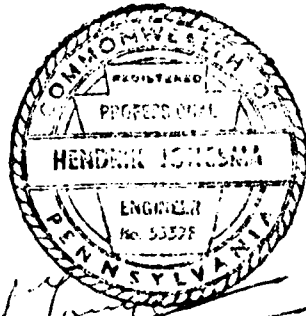
DATE: January 25, 1980

APPROVED BY:

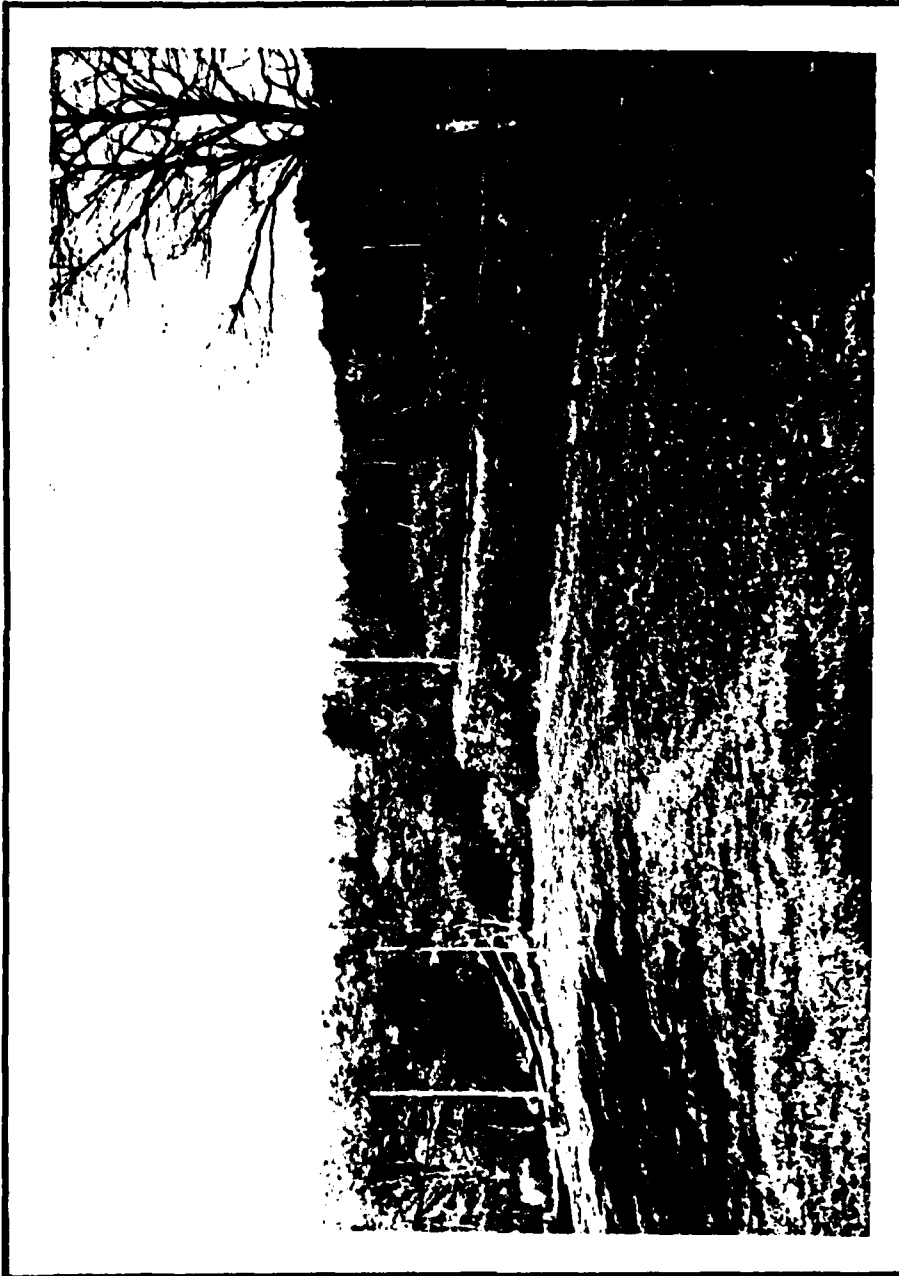
James W. Peck
JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

DATE

25 Feb 1980



H. Iorgosna



OVERVIEW

HANKINS POND DAM

Photograph No. 1

TABLE OF CONTENTS

	<u>Page</u>
<u>SECTION 1 - PROJECT INFORMATION</u>	
1.1 GENERAL	1
1.2 DESCRIPTION OF PROJECT	1
1.3 PERTINENT DATA	2
<u>SECTION 2 - ENGINEERING DATA</u>	
2.1 DESIGN	5
2.2 CONSTRUCTION	5
2.3 OPERATION	5
2.4 EVALUATION	5
<u>SECTION 3 - VISUAL INSPECTION</u>	
3.1 FINDINGS	6
3.2 EVALUATION	7
<u>SECTION 4 - OPERATIONAL PROCEDURES</u>	
4.1 PROCEDURES	9
4.2 MAINTENANCE OF DAM	9
4.3 MAINTENANCE OF OPERATING FACILITIES	9
4.4 WARNING SYSTEM	9
4.5 EVALUATION	9
<u>SECTION 5 - HYDROLOGY/HYDRAULICS</u>	
5.1 EVALUATION OF FEATURES	10
<u>SECTION 6 - STRUCTURAL STABILITY</u>	
6.1 EVALUATION OF STRUCTURAL STABILITY	12
<u>SECTION 7 - ASSESSMENT AND RECOMMENDATIONS</u>	
7.1 DAM ASSESSMENT	14
7.2 RECOMMENDATIONS	14
APPENDIX A - CHECK LIST OF VISUAL INSPECTION REPORT	
APPENDIX B - CHECK LIST OF ENGINEERING DATA	
APPENDIX C - PHOTOGRAPHS	
APPENDIX D - HYDROLOGY AND HYDRAULIC CALCULATIONS	
APPENDIX E - PLATES	
APPENDIX F - GEOLOGIC REPORT	

11 Jan 80

12/54

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

HANKINS POND DAM

NDI ID Number PA-00169
DER ID Number 64-40

Delaware River Basin,
Wayne County, Pennsylvania

SECTION 1 - PROJECT INFORMATION

Phase I Inspection Report

1.1 GENERAL

A. Authority

15 DHC 31-80-C-00191

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 reservoir elevation on U.S.G.S. Quadrangle sheet of 1458 was assumed as the normal water surface elevation for this report.

Hankins Pond Dam has an embankment length of about 1000 feet and reaches a maximum height of 26 feet above streambed. The typical section consists of an upstream embankment and a vertical downstream handlaid dry stone wall. Near the center of the embankment length is a 5 foot wide spillway controlled with stoplogs. The stoplogs permit lowering the reservoir to the bottom of the spillway, 25 feet below top of dam.

B. Location:

Mount Pleasant Township, Wayne County
U.S.G.S. Quadrangle - Forest City, Pa.
Latitude 41°-42.9', Longitude 75°-23.7'
Appendix E, Plates I & II

411003

JP

- C. Size Classification: Intermediate. (Height: 26 feet
Storage: 1705 acre-feet)
- D. Hazard Classification: Significant. (Refer to Section 3.1.E)
- E. Ownership: Pennsylvania Fish Commission
P.O. Box 1673
Harrisburg, PA 17105
- F. Purpose: Fish Propagation.
- G. Design and Construction History

According to a report by the Pennsylvania Water Supply Commission dated May 17, 1917, the dam was constructed in about 1830 by the Delaware & Hudson Canal Company as a feeder for their canal. No records of the design or construction exist. The sluiceway was originally controlled with a wooden flood gate. This gate was replaced by wooden stoplogs in 1923 (See Appendix E, Plate III).

H. Normal Operating Procedures

The Pennsylvania Fish Commission uses the reservoir for fish propagation. The reservoir is normally drained in the fall and refilled in the early spring.

1.3 PERTINENT DATA

- A. Drainage Area (square miles)

From files:	1.9
Computed for this report:	1.5
Use:	1.5
- B. Discharge at Dam Site (cubic feet per second)
See Appendix D for hydraulic calculations

Maximum known flood May 22, 1942	186
Outlet works	None
Spillway capacity at pool Elev. 1472.5 (low point of dam) with stoplogs to Elev. 1458, 9 feet above bottom of sluiceway	905
- C. Elevation (feet above mean sea level)

Top of dam (low point)	1472.5
------------------------	--------

	Spillway crest (stoplogs)	1458.0
	Upstream portal invert (bottom of stoplogs)	1449.3
	Downstream portal invert	1449.3
	Streambed at cent rline of dam - estimate	1448.0
D.	<u>Reservoir</u> (miles)	
	Length of normal pool	0.6
	Length of maximum pool	0.8
E.	<u>Storage</u> (acre-feet)	
	Spillway crest (Elev. 1458.0)	452
	Top of dam (Elev. 1472.5)	1705
F.	<u>Reservoir Surface</u> (acres)	
	Top of dam (Elev. 1472.5)	94.6
	Spillway crest (Elev. 1458)	68.9
G.	<u>Dam</u>	
	Refer to Plates A-I & A-III in Appendix A for plan and section.	
	Type: Earthfill with downstream vertical handlaid dry stone wall.	
	Length: 1000 feet.	
	Height: 26 feet.	
	Top Width: 16 feet.	
	Side Slopes: Upstream - 1.77H to 1V Downstream - Vertical	
	Zoning: Earthfill and a downstream loosely laid dry stone wall.	
	Cutoff: Unknown.	
	Grouting: Unknown.	

H. Outlet Facilities

None.

Note: Drawing Plate III, Appendix E, indicates a 12-inch pipe below bottom slab of spillway with an upstream slide gate.

I. Spillway

Type: Uncontrolled broadcrested weir (stoplogs).

Length of Weir: 5 feet.

Crest elevation: 1458.

Bridge: Concrete slab over spillway channel.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Data for the design of Hankins Pond Dam does not exist in the files of the Pennsylvania Department of Environmental Resources (PennDER) nor in the files of the owner. The only available information was several inspection reports by the Water Supply Commission, predecessor of PennDER, including a descriptive report dated May 1917 and one drawing in the files of the owner detailing improvements to the spillway in 1923 (Plate III, Appendix E).

2.2 CONSTRUCTION

Records of construction are not available.

2.3 OPERATION

Records of operation are not maintained. A letter from the Pennsylvania Fish Commission states that the maximum depth recorded on May 22, 1942, was reported to be 15 feet above bottom of dam with 10 feet of stoplogs in place.

2.4 EVALUATION

A. Availability

Engineering data for the design and construction of this dam do not exist except for the details of changes to the spillway (Appendix E, Plate III).

B. Adequacy

Since there is no design data, the evaluation of the safety of this dam must be based on visual inspection.

C. Operating Records

Operating records do not exist.

D. Post Construction Changes

In 1923, a modification was made to the spillway consisting of concrete walls at the upstream end and concrete facing of the downstream end (Plate III, Appendix E).

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

A. General

The general appearance of Hankins Pond Dam is fair. However, at the time of inspection, the reservoir had been drawn down to about the level of the sluiceway bottom. All stoplogs are removed in the fall for fish management. Seepage and leakage, reported by the owners' representatives as occurring when the reservoir is at normal pool, could not be observed. The visual inspection check list is in Appendix A of this report. This appendix also contains sketches of survey information obtained during the inspection. Mr. Jon Grindall, P.E., Senior Project Engineer, and Mr. Charles J. Rupert, Area III Maintenance Manager, both of the Pennsylvania Fish Commission, accompanied the inspectors. Photographs taken during the inspection are reproduced in Appendix C.

B. Embankment

As previously described, this earthfill embankment has a handlaid vertical dry stone wall on the downstream side. The embankment was constructed on a long horizontal curve across the valley. The upstream slope was exposed due to the drawdown of the reservoir. The slope appeared to be stable. Brush is present above the normal pool level and four trees are located on the slope near the right end of the embankment. The only evidence of slope protection is around the entrance to the sluiceway. The riprap did not show any failures and there were no signs that wave action had damaged other areas of the upstream slope. One woodchuck hole exists near the spillway. Heavy brush prevented close observation.

The crest of the dam is covered with grass and is, in general, slightly higher than the stone wall on the downstream side. The longitudinal profile was taken along the crest of the earth embankment, rather than along the top of the wall. The sluiceway (spillway) is located in the right half of the embankment length and is covered with wooden boards and a concrete slab. The downstream section of the dam is formed by loose handlaid stone. The outside face is nearly vertical and there were no signs of stress or failures along this wall. One large stone on the top has a date of 1869, although records indicate that the dam was constructed around 1830. A catch-basin has been constructed at the outlet of the sluiceway. Representatives of the owner stated that when the pool is at normal level, water seeps through the wall near the bottom at three places in this basin. No other seepage points were reported and no signs of seepage were found along the wall, except near the right end of the wall. This point appears to be higher than the pool level at the time of inspection, and the wet condition could therefore

have been caused by heavy rain of the previous night. Brush and trees grow close to the wall and should be removed to enable better surveillance.

C. Appurtenant Structures

The sluiceway or spillway is located to the right of center of the dam embankment. The original walls of the sluiceway were constructed of stone. These have been replaced by concrete walls in the upstream section and have been cemented over in the downstream section. The concrete walls are braced with concrete struts. The concrete has severely cracked and bulged at one of the strut supports.

Stoplogs are used to control the pool level of the reservoir. Bar screens are still in place, but have no function in the fish management. The sluiceway is narrow and appears to be easily clogged, especially with the screens extending over most of its height. The area manager, however, indicated that blockage has not been a problem.

D. Reservoir Area

The banks of the reservoir are mostly wooded, flat and appear to be stable. The amount of siltation does not appear to be excessive near the dam, but it was reported that the silt is 3 to 9 feet deep in the upstream end of the reservoir. A small (one acre) independent pond was constructed in the reservoir near the left end of the dam. This pond is filled and drained through an 8-inch pipe in the pond embankment. The embankment of this pond was *not* investigated and is totally contained inside the main reservoir. This pond is used for fish management.

E. Downstream Channel

Immediately downstream of the catch-basin is State Highway Route 670. One house is located on the downstream side of the highway. It appears that this house is situated in such a manner, by location and elevation, that it will only be endangered if the left end of the embankment would fail due to overtopping. A failure on the right end of the embankment would probably not endanger the house. No other homes or farms were noticed in the floodplain downstream. The stream joins the West Branch Lackawaxen River 2.5 miles downstream of the dam. The state highway and the single home near the left end of the dam indicate that the hazard to loss of life due to failure of the dam would be less than a few. The hazard classification for this structure is considered to be "Significant."

3.2 EVALUATION

The dam and its appurtenant structure appear to be in fair condition. It is recommended that brush and trees on the embankment and near the toe of the downstream wall be removed and annually controlled. If the screens in the sluiceway are not used for specific reasons, it appears

↓
that removal of the screens would improve the hydraulic conditions and reduce the hazards of blocking the outlet. The concrete wall, where it is crushed at the strut support, should be evaluated. This will determine if repair or additional support is required. Careful study should be made to definitely establish the source, clarity and volume of flow through the wall into the catch-basin when the reservoir is at normal pool elevation and if found to be excessive or otherwise hazardous, immediate steps shall be taken to correct the condition. The woodchuck hole to the right of the spillway should be filled.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

Hankins Pond is owned by the Pennsylvania Fish Commission and is used for fish propagation. The reservoir is lowered each fall for cleaning purposes and to remove unsuitable fish. The pool level is controlled by removing or adding stoplogs in the sluiceway.

4.2 MAINTENANCE OF DAM

The brush growing on the embankment is cut once a year, although it appears that not all brush had been removed. About four trees are growing at the right end of the embankment on the upstream slope. Growing of trees on any type of embankment should be discouraged, although the presence of a downstream masonry wall makes it less objectionable. The downstream area beyond the toe of the dam is grassy and mowed, except close to the toe of the wall where mowing is difficult. Trees are also growing near the right end of the wall.

4.3 MAINTENANCE OF OPERATING FACILITIES

There are no mechanical operating facilities. Stoplogs provide control of pool level and the support system of the stoplogs is adequate. The high concrete wall at the entrance of the sluiceway has deteriorated due to excessive pressure. This condition should be evaluated and corrective action should be taken to prevent collapsing of the walls.

4.4 WARNING SYSTEM

Mr. Jon Grindall, of the Pennsylvania Fish Commission, stated that work is progressing on an Operation and Maintenance Manual for this dam. This manual will include instructions for surveillance and a downstream warning system.

4.5 EVALUATION

The overall operational procedures appear to be adequate, although improvements can be made in the removal of brush and trees. The concrete wall in the sluiceway requires evaluation and possible repair. Filling of the woodchuck hole is required. The completion of the Operation Manual should be pursued and should include a detailed method of surveillance and downstream warning to be activated during periods of heavy or prolonged precipitation.

SECTION 5 - HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

A. Design Data

The hydrologic and hydraulic analyses available from PennDER for Hankins Pond Dam were not very extensive. The only information contained in the owner's files was stage-storage data (Plate IV, Appendix E).

B. Experience Data

The maximum known flood experienced at Hankins Pond Dam occurred in May 1942. During this flood, the pool level rose to 5 feet above the top of 10 feet of stoplogs. This storm was 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. The only exception to this would be the bar screens located upstream of the stoplogs. A possibility exists that these could become blocked to the extent that the discharge over the stoplogs could be reduced.

D. Overtopping Potential

Hankins Pond Dam has a total storage capacity of 1705 acre-feet and the overall height is 26 feet above the streambed. These dimensions indicate a size classification of "Intermediate". The hazard classification for this dam is "Significant" (See Section 3.1.E).

The recommended Spillway Design Flood (SDF) for a dam having the above classifications is one-half PMF to the full PMF (Probable Maximum Flood). For this dam the PMF peak inflow is 3118 cfs (See Appendix D for hydraulic calculations).

Comparison of the estimated PMF peak inflow of 3118 cfs with the estimated total discharge capacity of 905 cfs indicates that a potential for overtopping of the Hankins Pond 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 has the necessary storage available to pass the full PMF without overtopping.

E. Spillway Adequacy

The intermediate size and significant hazard categories, in accordance with the Corps of Engineers criteria and guidelines, indicates that the Spillway Design Flood (SDF) for this dam should be one-half the Probable Maximum Flood to the full Probable Maximum Flood.

Calculations show that the spillway discharge capacity and reservoir storage capacity combine to handle 100% of the PMF with about 0.8 feet of freeboard (Refer to Appendix D).

Since the spillway discharge and reservoir storage capacity can pass the full PMF without overtopping, the spillway is considered to be adequate.

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 typical dam section of Hankins Pond Dam consists of an upstream embankment and a downstream handlaid dry stone wall. The upstream slope is relatively steep (1.77H to 1V), but apparently stable. Although very little riprap was present, no wave damage was detected during the inspection.

The downstream masonry wall of this 150 year old dam is in excellent condition. No distortions are noticeable and no movements have taken place. It was reported that some seepage or leakage is occurring at the toe of the wall in the catch-basin when the reservoir is full. There are no reasons for concern if the discharge is small and has no turbidity.

2. Appurtenant Structures

The deep spillway with stoplogs is the only visible appurtenant structure. The concrete sidewalls are supported with struts. The support for one of the struts has severely cracked, spalled and bulged, indicating need for an evaluation and probably repair to prevent collapsing of both walls, and closure of the only discharge opening of the reservoir. The owner is not aware of the 12-inch pipe under the slab and assumes that this pipe has been removed or closed off.

B. Design and Construction Data

Actual design and construction data is not available for evaluation. A few photographs indicate that the old spillway opening was braced with wood timbers up to 1923. At that time the concrete walls were placed against the handlaid stone walls in the downstream sections. The walls were replaced by concrete walls in the upstream section of the spillway.

C. Operating Records

Formal operating records have not been maintained. The original wooden supports in the spillway were replaced.

D. Post Construction Changes

The only post construction change of record is the placing of concrete walls in the spillway and the installation of stoplogs at that time.

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, the review of available design data and the operational history of Hankins Pond Dam indicate that this dam is in fair condition.

The hydrologic and hydraulic computations indicate that this facility has the capacity for passing 100 percent of the PMF without overtopping the dam. The spillway is considered to be adequate, with the stoplogs placed to an elevation of nine feet above the floor of the sluiceway.

B. Adequacy of Information

The information available in the PennDER files and from the owner, together with the observed conditions at the site are considered sufficiently adequate for making a reasonable assessment of this facility.

C. Urgency

The recommendations presented as a result of this inspection should be implemented without delay.

D. Necessity for Additional Studies

Additional studies are not indicated 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. Observe the seepage discharge from the toe of the wall on a regular basis. Note clarity of water and flow rate. If color appears or if flow increases, take immediate steps to determine cause and implement remedial action.
2. Remove screens in the spillway opening.
3. Remove all trees and brush on the embankment and implement an annual maintenance program for the removal of weed and brush growth on embankment and along downstream toe.

4. That the crushing of the wall at the strut be evaluated and repaired as required.
5. Fill the woodchuck hole on the upstream slope.
6. Develop and implement a formal surveillance and downstream system to be used during periods of high or prolonged rainfall.
7. That a program be developed for regular inspection and maintenance for the dam and its appurtenant structures.

APPENDIX A
CHECKLIST OF VISUAL INSPECTION REPORT

APPENDIX A

CHECK LIST

PHASE I - VISUAL INSPECTION REPORT

PA DER # 64-40

NDI NO. PA-00 169

NAME OF DAM HANKINS POND HAZARD CATEGORY Significant

TYPE OF DAM Earthfill with handlaid masonry wall at downstream

LOCATION Mt. Pleasant TOWNSHIP Wayne COUNTY, PENNSYLVANIA

INSPECTION DATE 10/24/79 WEATHER Clear, Sunny TEMPERATURE 40's

INSPECTORS: R.V. Houseal (Recorder)

OWNER'S REPRESENTATIVE(S):

H. Jongsma

Jon Grindall

R. Shireman

Zenas Bean - Hatchery Sup't

A.W. Bartlett

Chuck Rupert

NORMAL POOL ELEVATION: 1458 AT TIME OF INSPECTION: (Drawn down)

BREAST ELEVATION: 1472.5 POOL ELEVATION: 1450.7

SPILLWAY ELEVATION: 1458 (top of stoplogs) TAILWATER ELEVATION: ---

MAXIMUM RECORDED POOL ELEVATION: 1463±

GENERAL COMMENTS:

The reservoir was essentially empty. When in use, the pond is used for breeding small fish as food for game fish. There is a small independent pond adjacent to the main pond on the left side at the main embankment. This pond was also drained. Outlet is a 8" pipe at the bottom leading to the main pond.

VISUAL INSPECTION
EMBANKMENT

	OBSERVATIONS AND REMARKS
A. SURFACE CRACKS	None .
B. UNUSUAL MOVEMENT BEYOND TOE	None .
C. SLOUGHING OR EROSION OF EMBANKMENT OR ABUTMENT SLOPES	None . One woodchuck hole to the right of the spillway.
D. ALIGNMENT OF CREST: HORIZONTAL: VERTICAL:	Horizontal appears to be okay. Originally curved. For vertical, see profile Plate A-II.
E. RIPRAP FAILURES	Rip rap is limited to the earth embankment adjacent to the outlet structure. There are no failures evident in these areas.
F. JUNCTION EMBANKMENT & ABUTMENT OR SPILLWAY	Abutments with natural ground and with the outlet structure appear to be sound. There is no serious erosion at the concrete and earth joints.
G. SEEPAGE	The pond was empty; therefore no signs or evidence of seepage.
H. DRAINS	Outlet structure only
J. GAGES & RECORDER	None
K. COVER (GROWTH)	Grass, weeds, brush & trees

VISUAL INSPECTION
OUTLET WORKS

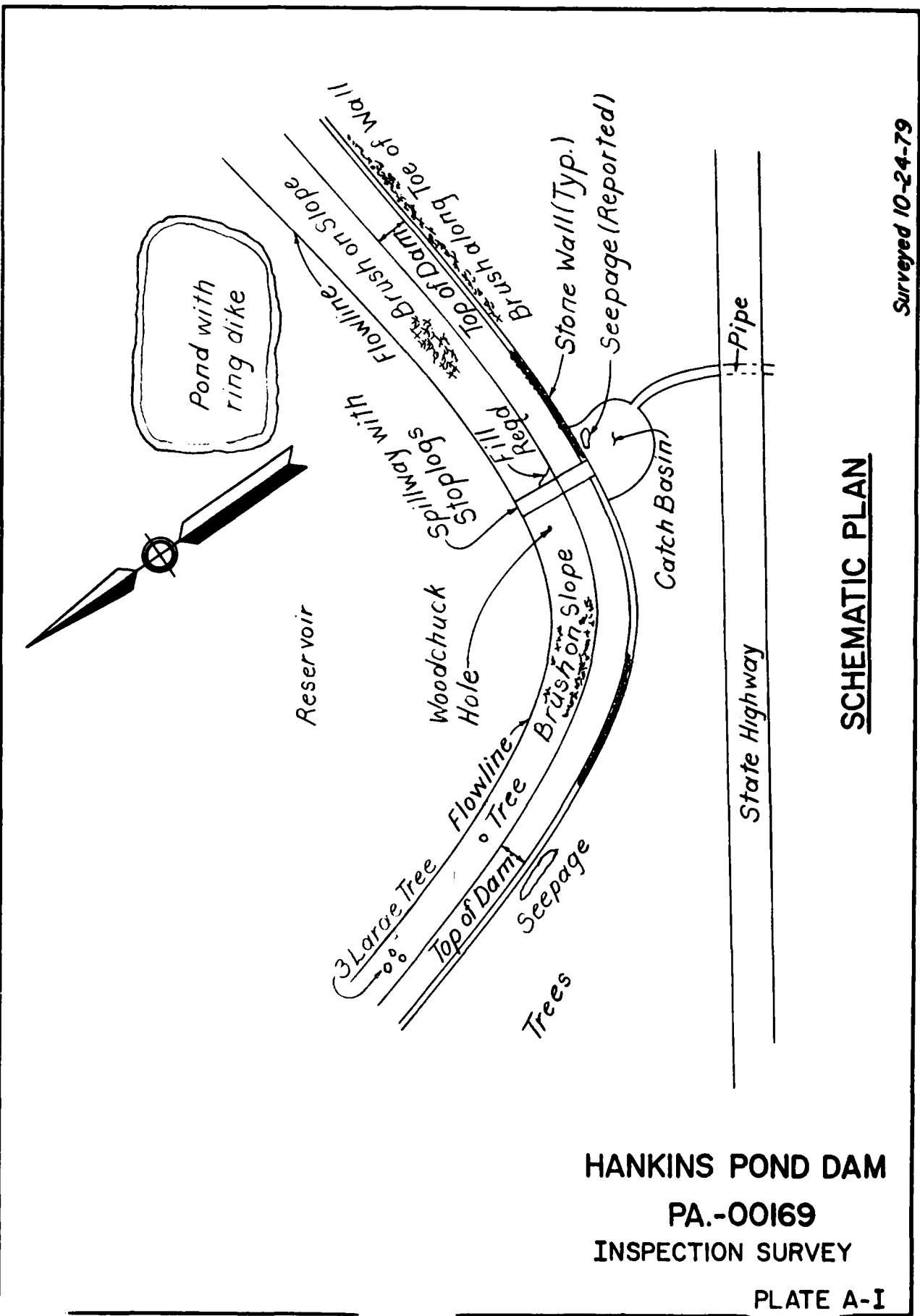
	OBSERVATIONS AND REMARKS
A. INTAKE STRUCTURE	Sluiceway
B. OUTLET STRUCTURE	Stoplogs in sluiceway (spillway)
C. OUTLET CHANNEL	See spillway
D. GATES	Stoplogs
E. EMERGENCY GATE	Stoplogs
F. OPERATION & CONTROL	Reservoir drawn down every fall for fish management.
G. BRIDGE (ACCESS)	None. Sluiceway in middle of embankment. Concrete slab and wooden boards across opening.

VISUAL INSPECTION
SPILLWAY

	OBSERVATIONS AND REMARKS
A. APPROACH CHANNEL	Directly from reservoir
B. WEIR: Crest Condition Cracks Deterioration Foundation Abutments	None. Walls are partial concrete, partial cemented handlaid stone. Crushed at strut support. Unknown.
C. DISCHARGE CHANNEL: Lining Cracks Stilling Basin	N/A
D. BRIDGE & PIERS	Concrete slab and wood planks.
E. GATES & OPERATION EQUIPMENT	N/A
F. CONTROL & HISTORY	Controlled by stoplogs, which are removed annually for fish management.

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	Stable, flat mostly wooded
Sedimentation	8-9 feet in upstream part. Not near dam.
Watershed Description	Wooded around the reservoir. Cultivated land in the upper regions of the watershed.
<u>DOWNSTREAM CHANNEL</u>	
Condition	Natural. Pipe underneath highway.
Slopes	Stable
Approximate Population	1 farmhouse to the left. In danger if dam would fail in that area. Highway immediately downstream.
No. Homes	1

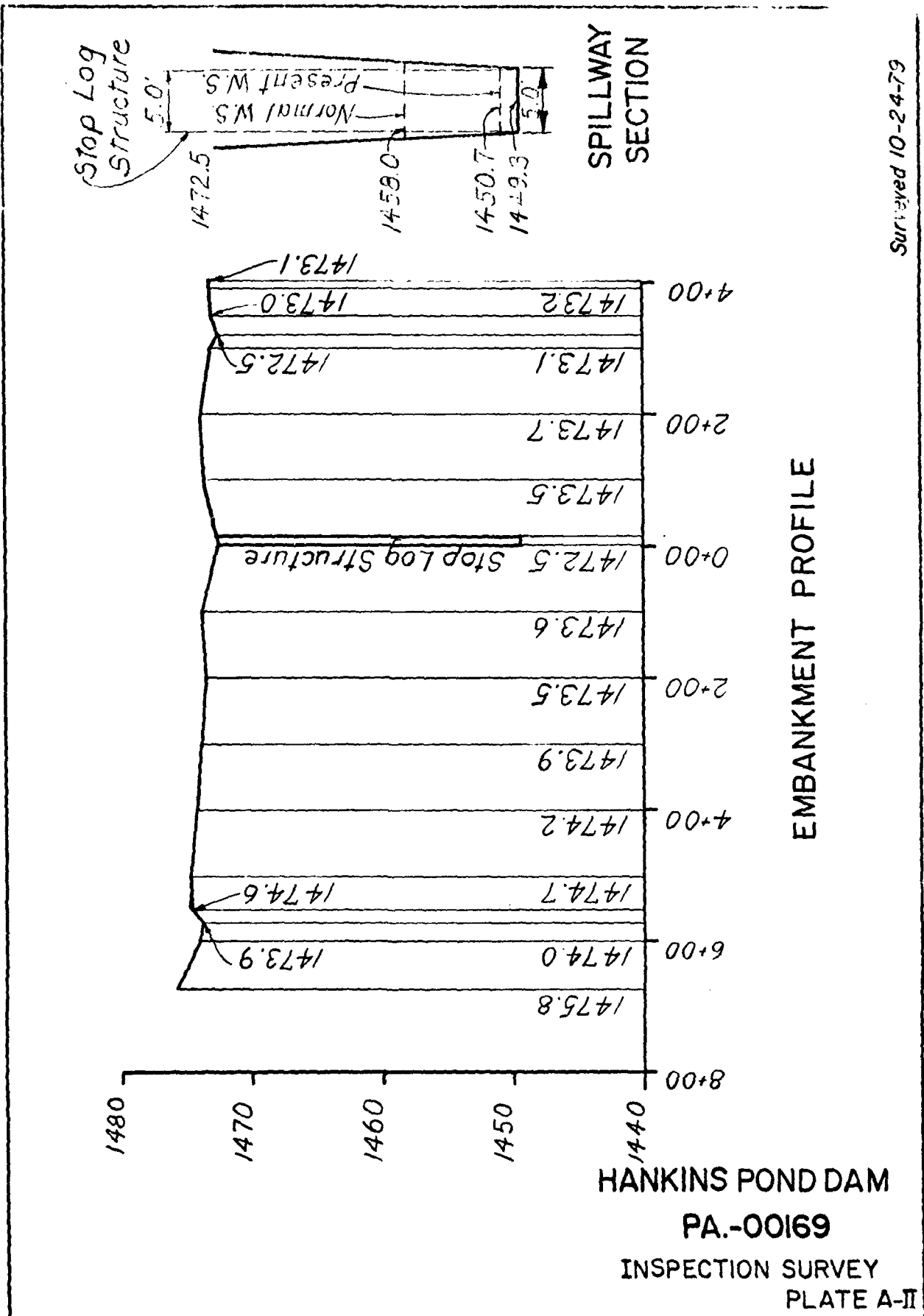


Surveyed 10-24-79

SCHEMATIC PLAN

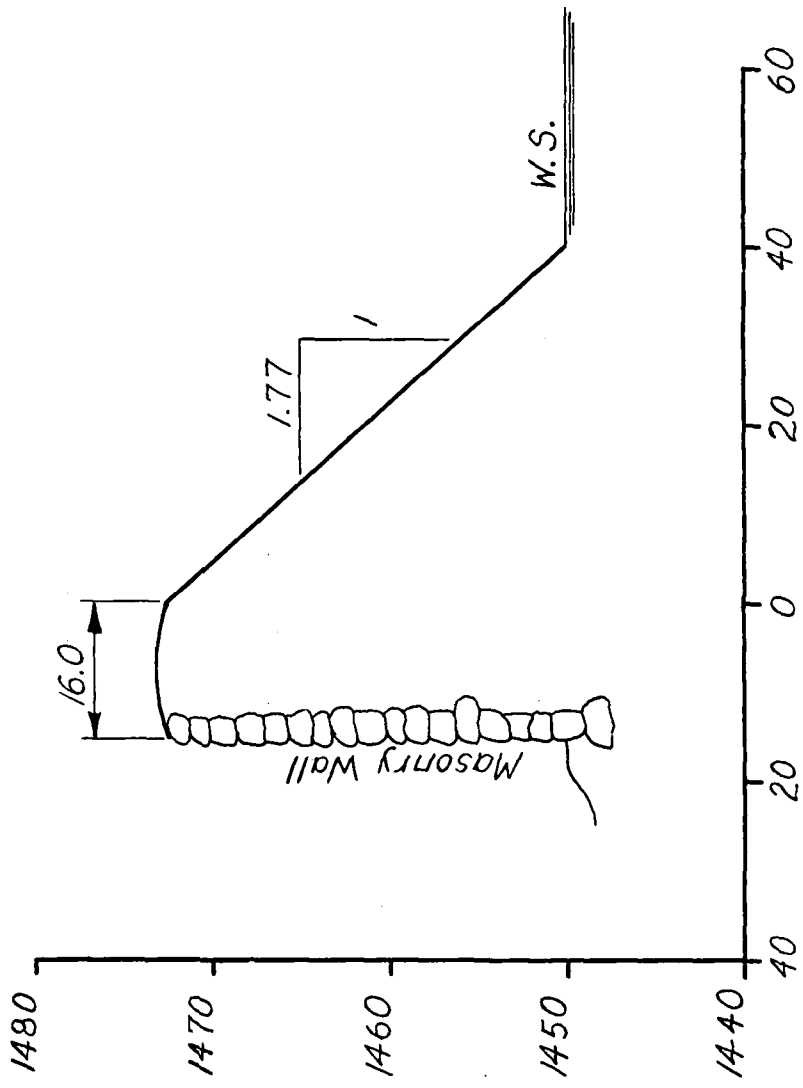
**HANKINS POND DAM
PA.-00169
INSPECTION SURVEY**

PLATE A-I



Surveyed 10-24-79

HANKINS POND DAM
 PA.-00169
 INSPECTION SURVEY
 PLATE A-II



Surveyed 10-24-79

EMBANKMENT SECTION

HANKINS POND DAM
 PA.-00169
 INSPECTION SURVEY
 PLATE A-III

APPENDIX B
CHECKLIST OF ENGINEERING DATA

APPENDIX B

CHECK LIST
ENGINEERING DATA

PA DER # 64-40

NDI NO. PA-00 169

NAME OF DAM HANKINS POND

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	U.S.G.S. Quadrangle Forest City, Pa. See Plate II, Appendix E
CONSTRUCTION HISTORY	None.
GENERAL PLAN OF DAM	None available.
TYPICAL SECTIONS OF DAM	None available.
OUTLETS: PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	None available.

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	None.
POST CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	Unknown.

ENGINEERING DATA

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	Placed concrete walls in spillway around 1923. Installed stoplogs.
HIGH POOL RECORDS	May 22, 1942, 5 feet above normal pool, a total of 15 feet above bottom of sluiceway.
POST CONSTRUCTION ENGINEERING STUDIES & REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM Description: Reports:	None reported.
MAINTENANCE & OPERATION RECORDS	Not maintained.
SPILLWAY PLAN, SECTIONS AND DETAILS	Plan of proposed improvement See Appendix E, Plate III.

ENGINEERING DATA

ITEM	REMARKS
OPERATING EQUIPMENT, PLANS & DETAILS	None.
CONSTRUCTION RECORDS	None.
PREVIOUS INSPECTION REPORTS & DEFICIENCIES	Inspection Reports by PennDER 1917 - Pool drained. Wooden gate and timber supports rotted. 1930 - Pool drained. Good condition. 1938 - Some trees on embankment. Good condition. 1965 - Good condition.
MISCELLANEOUS	

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 50% wooded, 50% farmland

ELEVATION:

TOP NORMAL POOL & STORAGE CAPACITY: Elev. 1458 452 Acre-FeetTOP FLOOD CONTROL POOL & STORAGE CAPACITY: Elev. 1472.5 1705 Acre-FeetMAXIMUM DESIGN POOL: Elev. 1472.5TOP DAM: Elev. 1472.5

SPILLWAY:

a. Elevation 1458b. Type Stoplog structurec. Width 5'

d. Length _____

e. Location Spillover Near center of damf. Number and Type of Gates None

OUTLET WORKS:

a. Type None

b. Location _____

c. Entrance inverts _____

d. Exit inverts _____

e. Emergency drawdown facilities Stoplogs

HYDROMETEOROLOGICAL GAGES:

a. Type None

b. Location _____

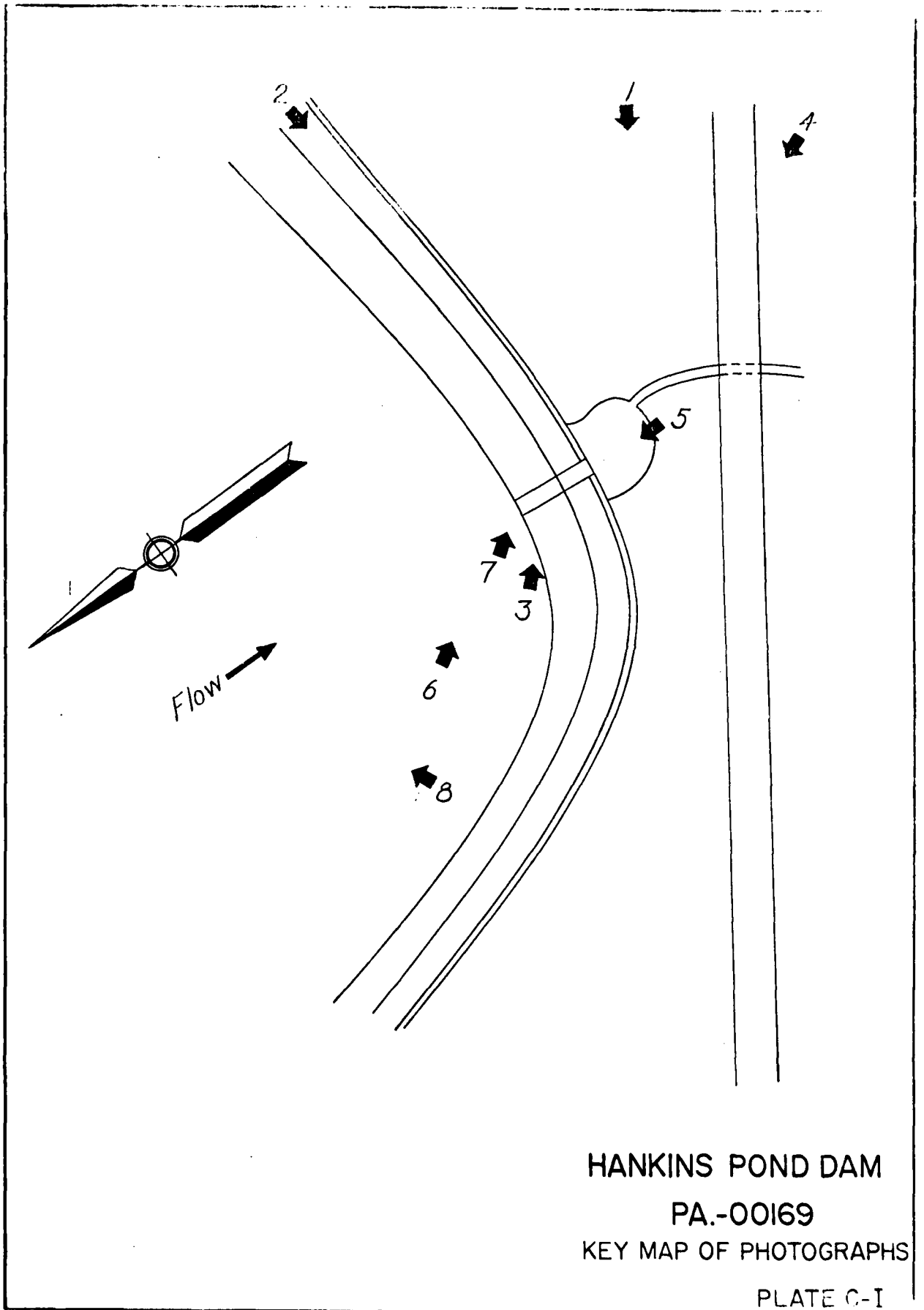
c. Records _____

MAXIMUM NON-DAMAGING DISCHARGE: 905 cfs

APPENDIX C

PHOTOGRAPHS

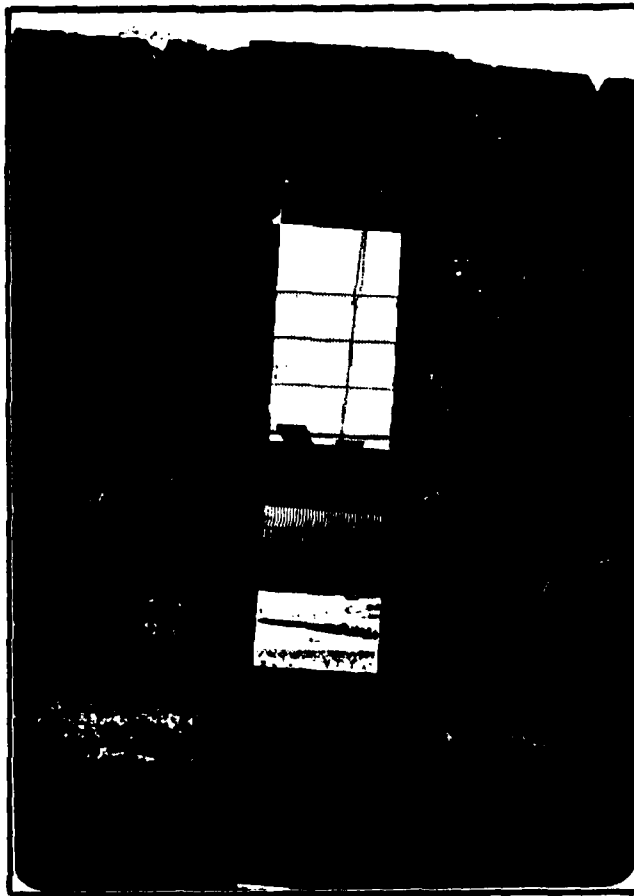
APPENDIX C



HANKINS POND DAM
PA.-00169
KEY MAP OF PHOTOGRAPHS
PLATE C-I



DOWNSTREAM DRY STONE WALL - NO. 4



SPILLWAY LOOKING UPSTREAM - NO. 5
NOTE SCREENS IN OPENING

PA-00169
Plate C-III



SPILLWAY LOOKING DOWNSTREAM - NO. 6
NOTE: STOPLOGS REMOVED AND CONCRETE STRUT



DETAIL OF WALL AT CONCRETE STRUT - NO. 7

PA-00169
Plate C-IV



RESERVOIR IN DRAWDOWN CONDITION - NO. 3

PA-00169
Plate C-V

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.

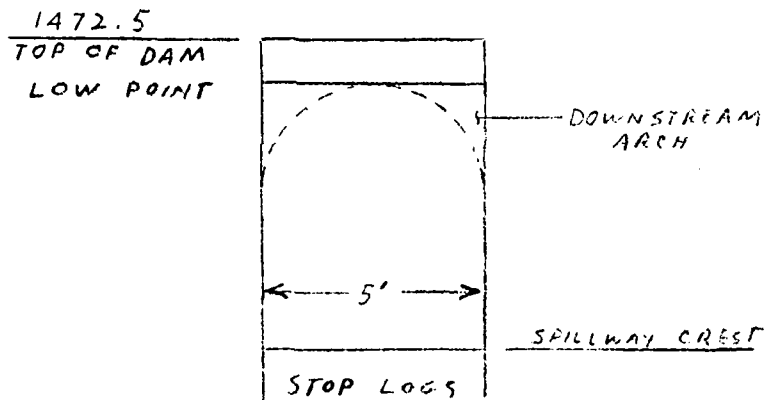
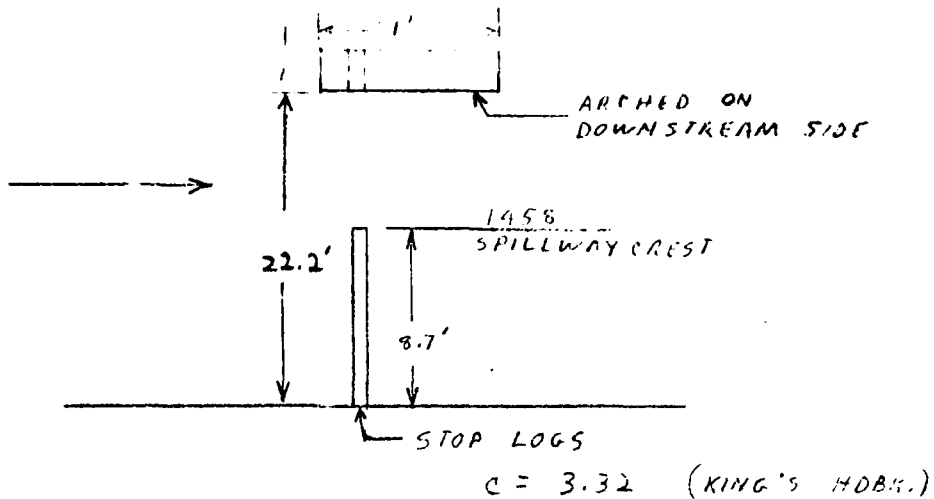
For detailed information regarding this program refer to the Users Manual for the Flood Hydrograph Package (HEC-1) Dam Safety Version prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California.

BY _____ DATE _____
 CHKD. BY _____ DATE _____
 SUBJECT _____

BERGLER ASSOCIATES

SHEET NO. _____
 PROJECT _____

SPILLWAY LAYOUT



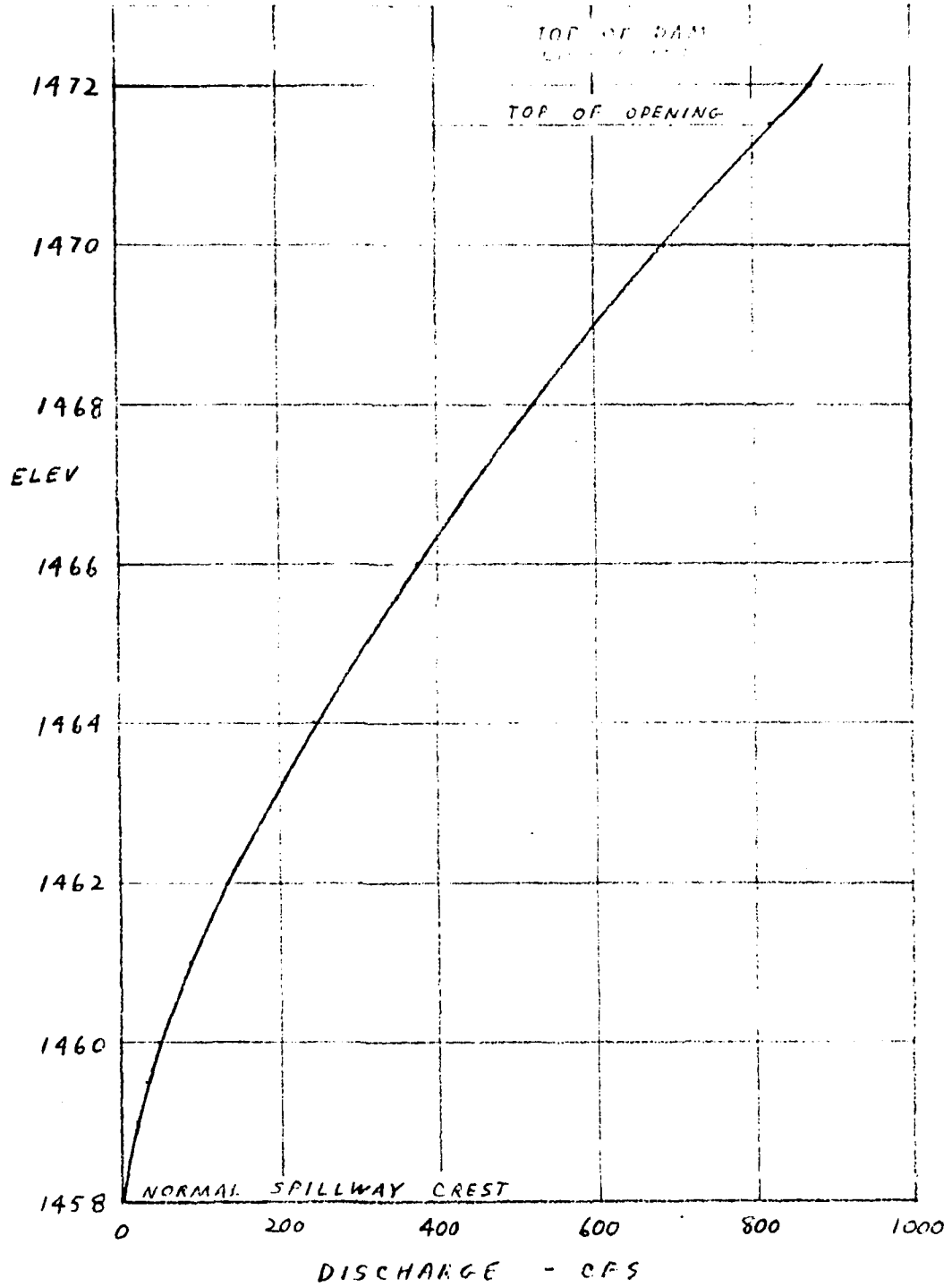
$$\begin{aligned}
 Q &= C A \sqrt{2gH} & C &= 0.6 \\
 &= 0.6 \times 5 \times 13.5 \times (2 \times 32.2 \times 7.75)^{.5} \\
 &= 905 \text{ CFS}
 \end{aligned}$$

DATE _____
CHKD. BY _____
SUBJECT _____

BERGER ASSOCIATES

SHEET NO. _____
PROJECT _____

SPILLWAY RATING CURVE



DATE 1967
CHKD. BY DATE
SUBJECT

BERGER ASSOCIATES

SHEET NO
PROJECT

HANBINS LOND

MAXIMUM KNOWN FLOOD AT DAMSITE

THE MAXIMUM KNOWN FLOOD AT HANBINS DAM
OCCURRED IN MAY 1911 WHEN THE WATER
LEVEL IN THE LAKE ROSE TO AN ELEVATION 5 FEET
ABOVE THE TOP OF THE STOP LOGS.

$$C = 3.32$$

$$L = 5'$$

$$H = 5'$$

$$\begin{aligned} Q &= C L H^{3/2} \\ &= 3.32 \times 5 \times (5)^{1.5} \\ &= 186 \text{ CFS} \end{aligned}$$

SIZE CLASSIFICATION

MAXIMUM STORAGE = 1705 ACRE-FEET

MAXIMUM HEIGHT = 26 FEET

SIZE CLASSIFICATION IS "INTERMEDIATE"

HAZARD CLASSIFICATION

ONE FARM LOCATED NEAR DOWN STREAM
CHANNEL AND STATE HIGHWAY CROSSES
CHANNEL.

USE "SIGNIFICANT"

RECOMMENDED SPILLWAY DESIGN FLOOD

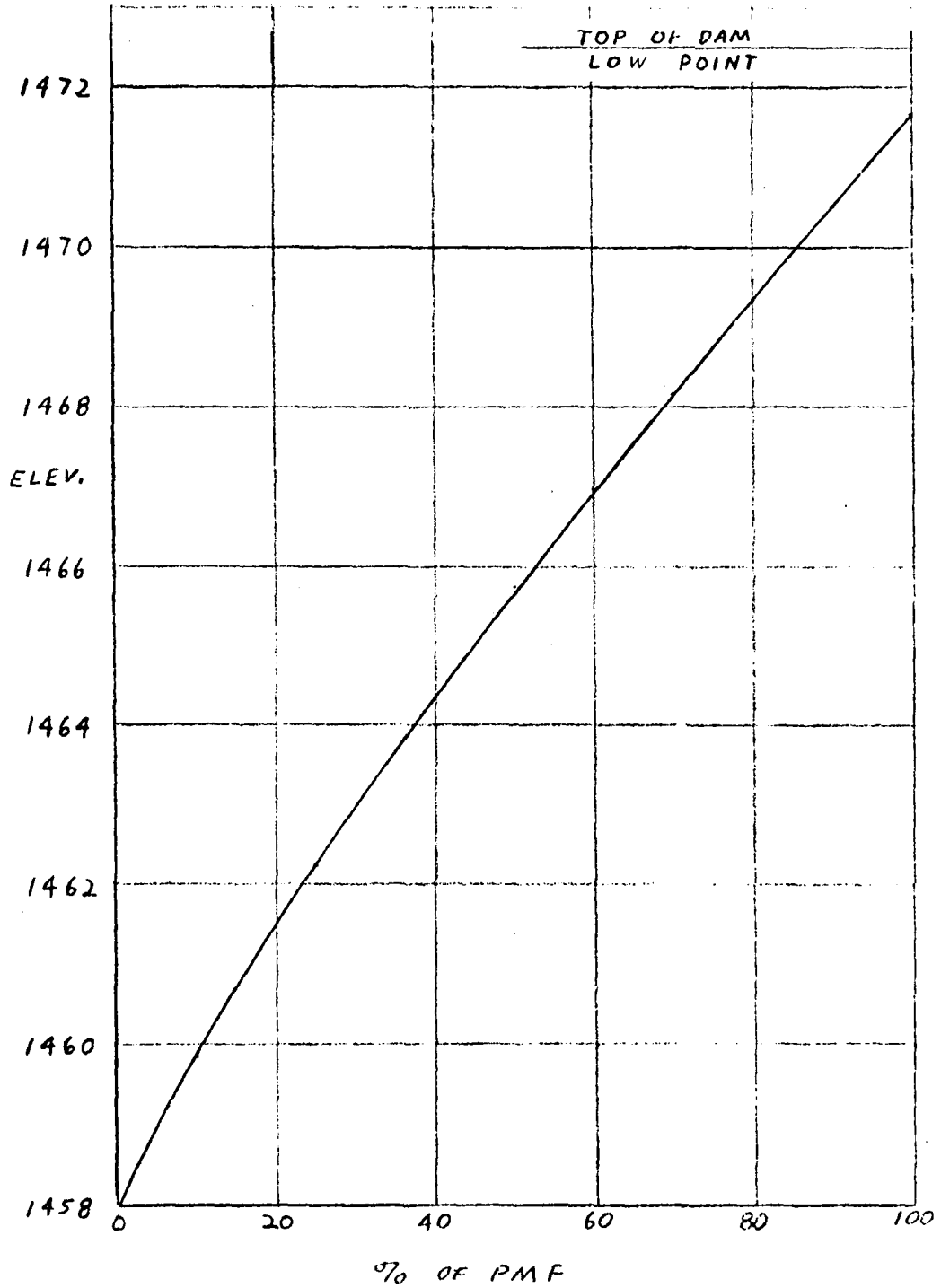
THE ABOVE CLASSIFICATIONS INDICATE USE
OF AN SDF EQUAL TO $\frac{1}{2}$ THE PROBABLE
MAXIMUM FLOOD TO THE PROBABLE MAXIMUM
FLOOD.

U DATE 11/2/77
CHKD. BY DATE
SUBJECT

BERGHE ASSOCIATES

SHEET NO.
PROJECT

SPILLWAY CALIBRATION CURVE



HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: HANKINS POND RIVER BASIN DELAWARE
 PROBABLE MAXIMUM PRECIPITATION (PMP) = 21.1 INCHES/24 HOURS ⁽¹⁾

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		Hankins Pond	Hankins Pond Dam		
DRAINAGE AREA (SQUARE MILES)		1.51	-		
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		1.51	1.51		
ADJUSTMENT OF PMP FOR DRAINAGE AREA (%) ⁽²⁾	6 HOURS	111	-		
	12 HOURS	123	-		
	24 HOURS	133	-		
	48 HOURS	142	-		
	72 HOURS	-	-		
SNYDER HYDROGRAPH PARAMETERS	ZONE ⁽³⁾	1	-		
	C_p / C_t ⁽⁴⁾	0.45/1.23	-		
	L (MILES) ⁽⁵⁾	2.67	-		
	L_{co} (MILES) ⁽⁵⁾	1.10	-		
	$T_p = C_t (L \cdot L_{co})^{0.3}$ (hours)	1.70	-		
SPILLWAY DATA	CREST LENGTH (FT.)	-	5		
	FREEBOARD (FT.)	-	14.5		
	DISCHARGE COEFFICIENT	-	3.32		
	EXPONENT	-	1.5		
	ELEVATION	-	1458		
AREA ⁽⁶⁾ (ACRES)	NORMAL POOL		68.9		
	ELEV. _____		-		
	ELEV. _____		-		
STORAGE (ACRE- FEET)	NORMAL POOL ⁽⁷⁾	-	452		
	ELEV. <u>1449.3</u> ⁽⁷⁾	-	0		
	ELEV. <u>1459.3</u> ⁽⁷⁾	-	547		
	ELEV. <u>1466.3</u> ⁽⁷⁾	-	1121		

- (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_L).
- (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.

```

1      AI  HANKINS FOND DAM *** TRIBUTARY TO WEST BRANCH LACKAWAXEN RIVER
2      A2  MOUNT PLEASANT TWP., WAYNE COUNTY, PA.
3      A3  NDI # PA-00169   PA DER # 64-40
4      R  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      A  1
9      K1  INFLOW HYDROGRAPH
10     M  1   1   1.51
11     P  21.1  111  123  133  142
12     T  1   .05
13     W  1.7  .45
14     X  -1.5 .05  2
15     K  1   2
16     K1  RESERVOIR ROUTING
17     Y  1
18     Y1  1   452  -1
19     Y4  1458 1458.5 1459 1459.5 1460 1461 1462 1464 1466 1468
20     Y4  1470 1471.5 1472 1472.5
21     Y5  0   6   17  30  47  86  133  244  376  525
22     Y5  690  823  875  905
23     $S  0   27.5 100.2 205.0 334.1 452 547 781 1121 1593
24     $S  2404
25     $E1449.3 1450.3 1452.3 1454.3 1456.3 1458 1459.3 1462.3 1466.3 1471.3
26     $E 1480
27     $$ 1458
28     $D1472.5
29     K  99

```

1

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

```

RUNOFF HYDROGRAPH AT      1
ROUTE HYDROGRAPH TO     2
END OF NETWORK

```

```

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

```

```

RUN DATE# 79/12/04.
TIME# 07.42.53.

```

```

HANKINS FOND DAM *** TRIBUTARY TO WEST BRANCH LACKAWAXEN RIVER
MOUNT PLEASANT TWP., WAYNE COUNTY, PA.
NDI # PA-00169   PA DER # 64-40

```

JOB SPECIFICATION

```

NQ   NHR  NMIN  IDAY  IHR  IMIN  METRC  IPLT  IPRT  NSTAM
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

```

JOB SPECIFICATION

NO	HR	MIN	ICAY	INR	INFD	NETFC	IFLT	IFRT	NETAN
300	0	15	0	0	0	0	0	-4	0
			JOPER	MRT	LPRT	TRCE			
			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

ISTAQ	ICOMP	IECON	ITAFE	JFLT	JFRT	INANE	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISROW	ISANE	LOCAL
1	1	1.51	0.00	1.51	0.00	0.000	0	0	0

PRECIP DATA

SFFE	FMS	R6	R12	R24	R48	R72	R96
0.00	21.10	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROFT	STRAR	BLTKR	RTIDL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSHK	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= 1.70 CP= .45 NIA= 0

RECESSION DATA

STRTO= -1.50 DRCSN= .05 RTIOR= 2.00

UNIT HYDROGRAPH 62 END-OF-PERIOD ORDINATES, LAG= 1.71 HOURS, CP= .45 VOL= 1.00

13.	47.	97.	153.	205.	242.	259.	251.	230.	210.
191.	175.	159.	146.	133.	121.	111.	101.	92.	84.
77.	70.	64.	58.	53.	49.	44.	40.	37.	34.
31.	28.	26.	23.	21.	19.	18.	16.	15.	13.
12.	11.	10.	9.	9.	8.	7.	6.	6.	5.
5.	4.	4.	4.	3.	3.	3.	3.	2.	2.
2.	2.								

0

END-OF-PERIOD FLOW

NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
-------	-------	--------	------	------	------	--------	-------	-------	--------	------	------	------	--------

SUM 23.97 21.59 2.38 83714.
 (609.)(548.)(61.)(2370.52)

RESERVOIR ROUTING

	ISTAD	JCOMS	IECON	ITAGE	JPLI	JPKI	JWWE	ISIAE	ISUO	
	2	1	0	0	0	0	1	0	0	
	ROUTING DATA									
	OCSS	OCSS	GLI	IES	ISAE	IPPI	IPPI	ISIP		
	0.0	0.000	0.00	1	0	0	0	0		
	NSIS	NSID	LAG	AMOR	X	ISL	ISLA	ISMA		
	1	0	0	0.000	0.000	0.000	452.	-1		
STAGE	1458.00 1470.00	1458.50 1471.50	1459.00 1472.00	1459.50 1472.50	1460.00	1461.00	1462.00	1464.00	1466.00	1468.00
FLOW	0.00 670.00	6.00 823.00	17.00 875.00	30.00 905.00	47.00	86.00	133.00	244.00	376.00	525.00
CAPACITY=	0. 2404.	28.	100.	205.	334.	452.	547.	781.	1121.	1593.
ELEVATION=	1449. 1480.	1450.	1452.	1454.	1456.	1459.	1459.	1462.	1466.	1471.

CREL	SPUID	COGW	EXPW	ELEVL	COQL	CAREA	EXPL
1458.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
1472.5	0.0	0.0	0.

PEAK OUTFLOW IS 838. AT TIME 46.50 HOURS

PEAK OUTFLOW IS 734. AT TIME 46.50 HOURS

PEAK OUTFLOW IS 635. AT TIME 46.50 HOURS

PEAK OUTFLOW IS 539. AT TIME 46.75 HOURS

PEAK OUTFLOW IS 448. AT TIME 46.75 HOURS

PEAK OUTFLOW IS 357. AT TIME 47.00 HOURS

PEAK OUTFLOW IS 268. AT TIME 47.25 HOURS

PEAK OUTFLOW IS 148. AT TIME 47.50 HOURS

PEAK OUTFLOW IS 43. AT TIME 48.75 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 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 .10
HYDROGRAPH AT	1	1.51	1	3118.	2806.	2494.	2183.	1871.	1559.	1247.	779.	312.
	(	3.91)	(	88.29)	(79.46)	(70.63)	(61.80)	(52.97)	(44.14)	(35.32)	(22.07)	(8.83)
ROUTED TO	2	1.51	1	838.	734.	635.	539.	448.	357.	268.	148.	43.
	(	3.91)	(	23.73)	(20.78)	(17.99)	(15.25)	(12.70)	(10.12)	(7.60)	(4.19)	(1.21)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1458.00	1458.00	1472.50
	STORAGE	452.	452.	1705.
	OUTFLOW	0.	0.	905.

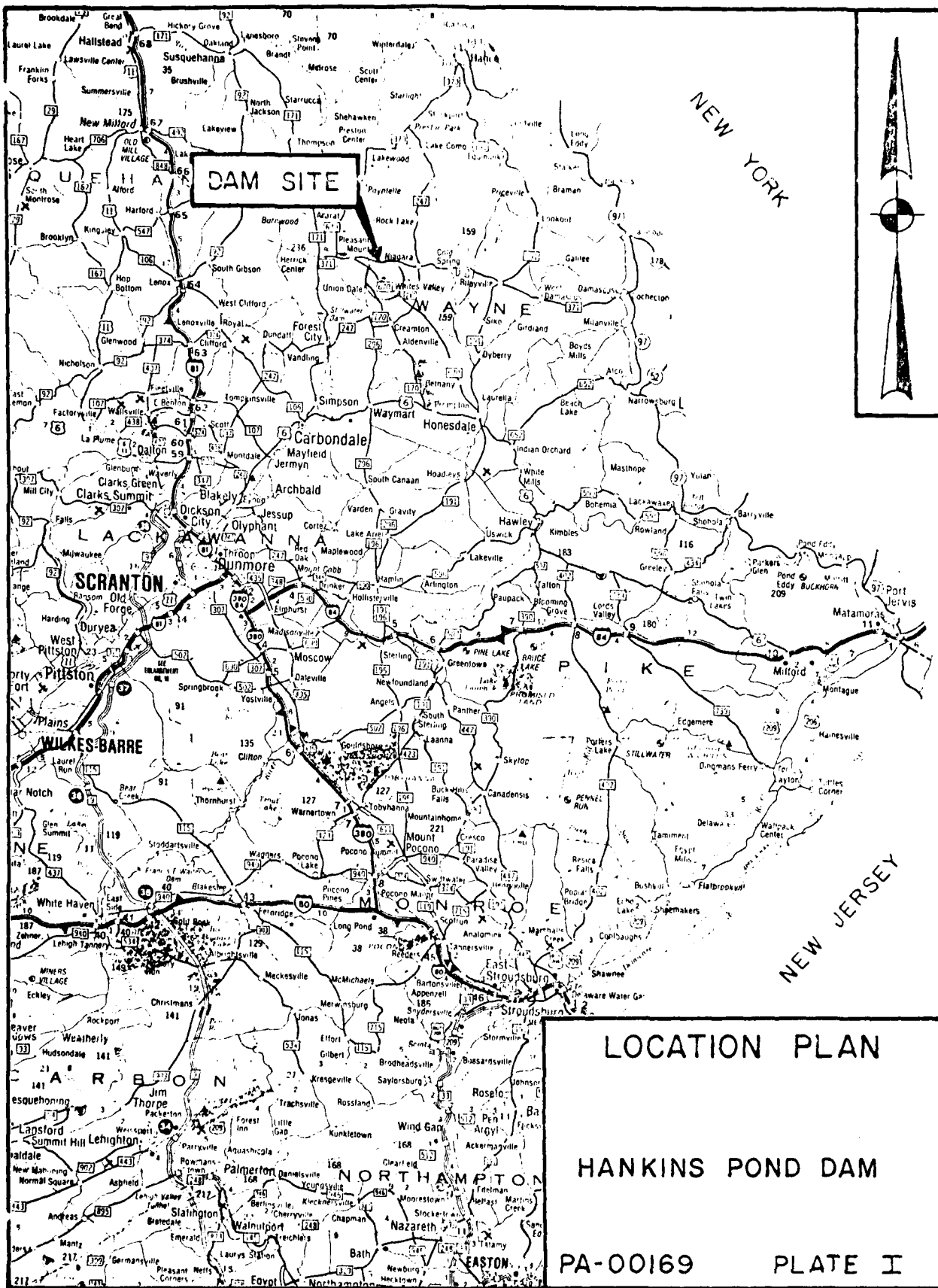
RATIO OF PHF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1471.64	0.00	1625.	838.	0.00	46.50	0.00
.90	1470.50	0.00	1517.	734.	0.00	46.50	0.00
.80	1469.34	0.00	1408.	635.	0.00	46.50	0.00
.70	1468.16	0.00	1297.	539.	0.00	46.75	0.00
.60	1466.97	0.00	1184.	448.	0.00	46.75	0.00
.50	1465.72	0.00	1071.	357.	0.00	47.00	0.00
.40	1464.37	0.00	957.	268.	0.00	47.25	0.00
.25	1462.27	0.00	779.	148.	0.00	47.50	0.00
.10	1459.87	0.00	592.	43.	0.00	48.75	0.00

EOI ENCOUNTERED.

APPENDIX E

PLATES

APPENDIX E

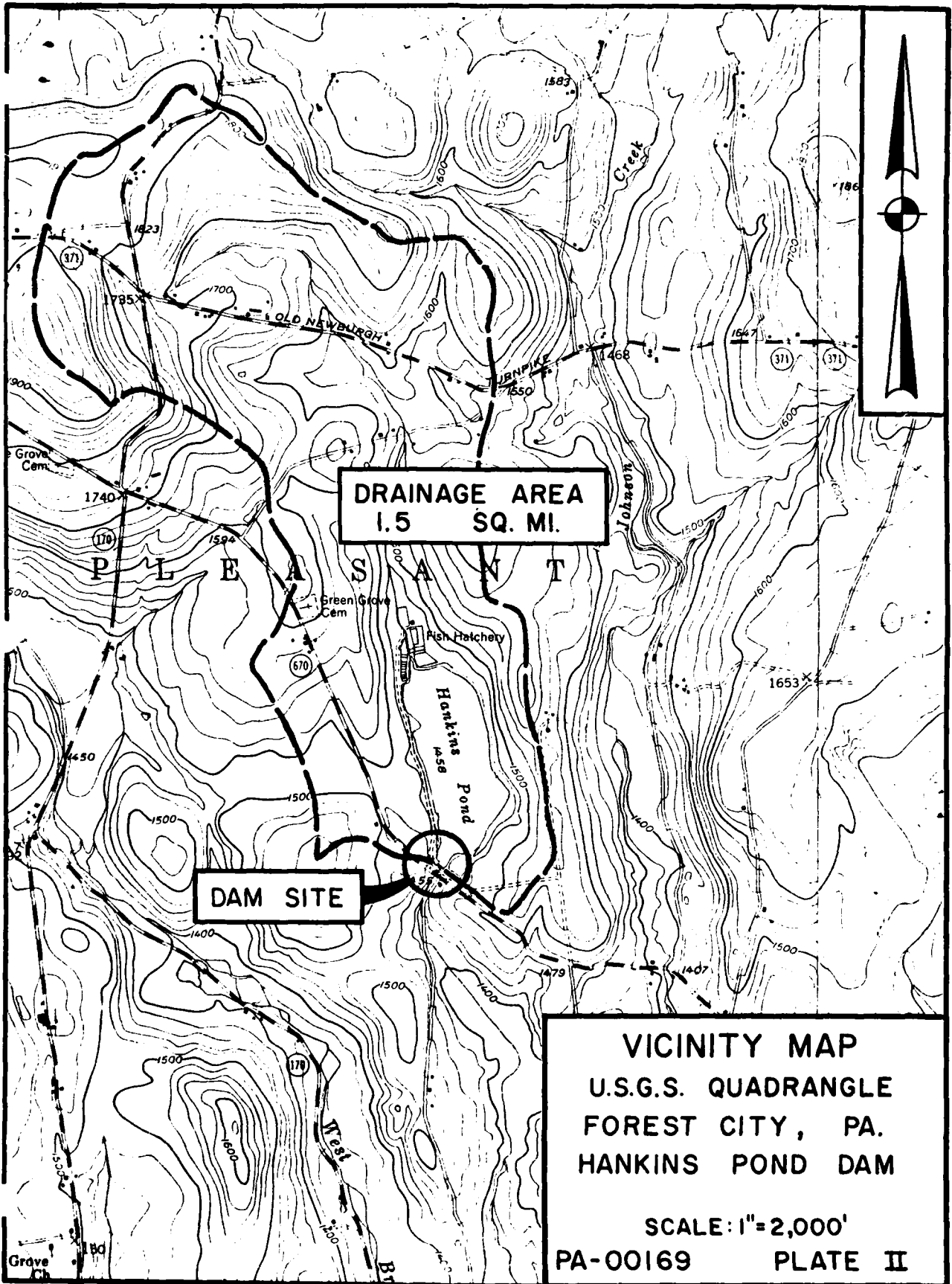


LOCATION PLAN

HANKINS POND DAM

PA-00169

PLATE I



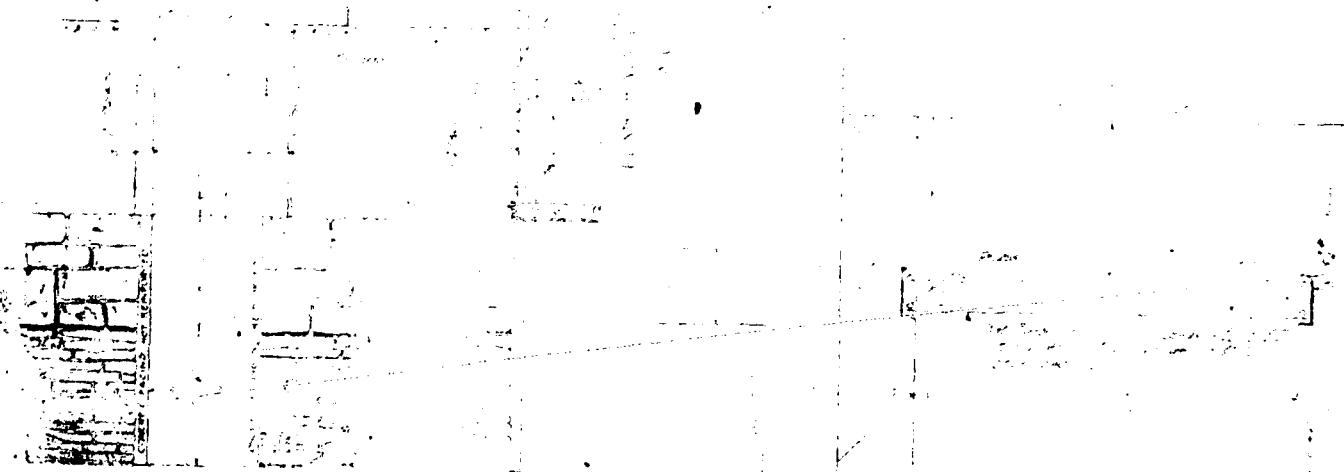
DRAINAGE AREA
1.5 SQ. MI.

DAM SITE

VICINITY MAP
U.S.G.S. QUADRANGLE
FOREST CITY, PA.
HANKINS POND DAM

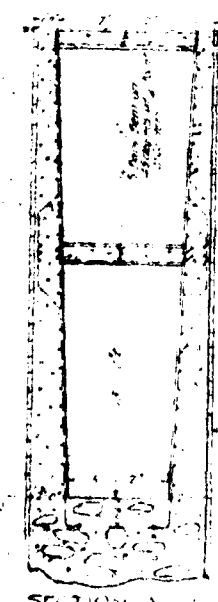
SCALE: 1"=2,000'
PA-00169 PLATE II

A

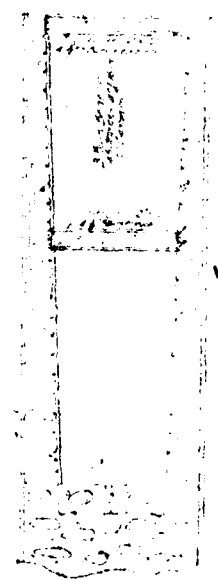


PLAN
GENERAL LAYOUT

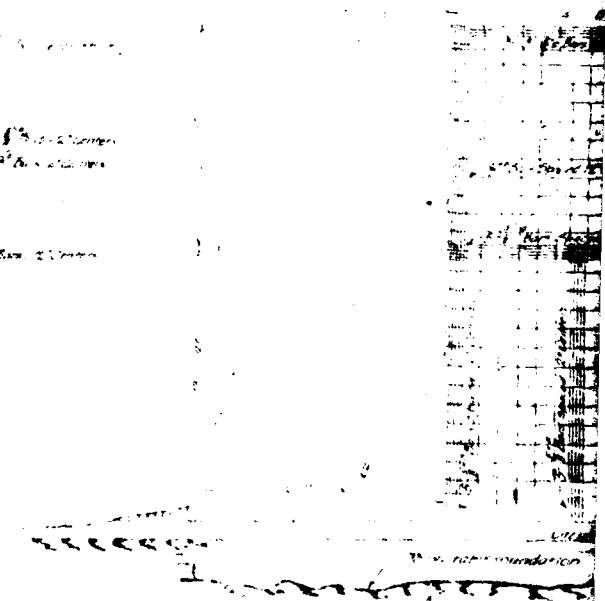
STORY AND A WALL AND CEILING



SECTION A-A



SECTION B-B



SIDE ELEVATION

ELEVATION
 COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF FISHERIES
 PLAN OF
 IMPROVEMENTS
 TO
 WASTEWAY OF HANKINS POND DAM
 ANNE CO PA

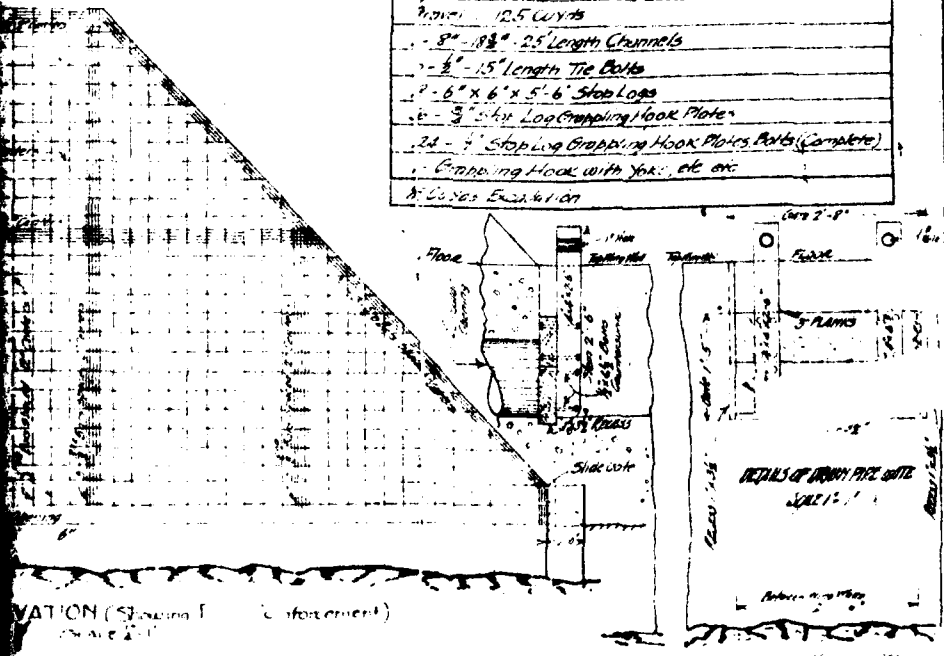
THIS PAGE IS BEST QUALITY PRACTICABLE FROM COPY FURNISHED TO DDG

DESIGNED BY AS STATION
 APPROVED *J. D. Keller*
 Commissioner of Fisheries

MATERIALS

Reference Nos	Number	20	4	4	4	7	20	8	8	8	16	40	4	4	4	7	Weight			
	Length in feet	8 1/2	7	9	11	12	13	15	17	19	21	23	25	26	28	30	32	34	36	26

- 12-4 Concrete 125 cu yds
- 1 cement 210 bbls
- 1 sand 12.5 cu yds
- 1 gravel 12.5 cu yds
- 8" - 18" - 25' Length Channels
- 2-3" - 15' length Tie Bolts
- 2-6" x 6" x 5'-6" Stop Logs
- 2-9" Sky Log Grappling Hook Plates
- 24-4" Stop Log Grappling Hook Plates (Complete)
- Grappling Hook with Yoke, etc etc
- 8' Cases Excavation



PA-00169
 PLATE III 2

JOHN MUSSEY

TRACT

LANDS OF DANIEL KENNEDY

DANIEL BRODHEAD TRACT

PENNA No 430 This Tract of 151 A 141 1/2 Acre Allowance
Conveyed by the Commonwealth of Pennsylvania to the Del & Hud
Canal Co and Addison Beadle April 2 1873

LANDS OF NATHAN L KENNEDY

Oliver Stevenson & Wife to the Delaware and Hudson Canal Co June 14 1859

Oliver Stevenson & Wife to the Delaware and Hudson Canal Co June 14 1859

Conveyed by Addison Beadle to Oliver Stevenson May 16 1859

LANDS OF ADDISON BEADLE

RICHARD VAN DYKE TRACT

SILAS KELLOGG TRACT

190 151 1/2 Acre Allowance
Conveyed by the Commonwealth of Pennsylvania to the Delaware and Hudson Canal Co

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

THIS PAGE IS BEST QUALITY PRACTICABLE

20	1,000.00	100.00
19	900.00	90.00
18	800.00	80.00
17	700.00	70.00
16	600.00	60.00
15	500.00	50.00
14	400.00	40.00
13	300.00	30.00
12	200.00	20.00
11	100.00	10.00
10	0.00	0.00
9	0.00	0.00
8	0.00	0.00
7	0.00	0.00
6	0.00	0.00
5	0.00	0.00
4	0.00	0.00
3	0.00	0.00
2	0.00	0.00
1	0.00	0.00
0	0.00	0.00

Stevenson's Pond Reservoir.

Mt. Pleasant Twp. Wayne Co. Pa.

Scale - 200 Ft to an inch

Situate on a tributary to the Mt. Branch of the Lackawanna River
12 miles from the Canal Basin at Homestead
The Dam is 40 feet long and 22 feet high
Flows at low water mark 1,000,000 square feet or 23 Acres and of
high water 4,300,000 square feet or 98 Acres of land
held when full 63,000,000 cubic feet of water

APPENDIX F
GEOLOGIC REPORT

APPENDIX F

GEOLOGIC REPORT

Bedrock - Dam and Reservoir

Formation Name: Catskill Formation.

Lithology: Dark grayish-red to reddish brown shale and siltstone interbedded with greenish-gray coarse grained sandstone. Grains of sandstones are cemented primarily with clay, iron oxides and micas. Very little carbonate present except in rare conglomeratic beds.

Structure

The dam is located on the eastern limb of the Lackawanna syncline. The strike of the beds is about N-S and they dip gently to the west. Air photo fracture traces trend: E-W, N30°W and N30°E.

Overburden

No drilling or other data concerning the overburden at the dam site are available. The area is within the limits of Pleistocene glaciation and variable thicknesses of ground moraine and outwash deposits can be expected. The clear expression of air photograph fracture traces suggests that the ground moraine is thin on the hilltops here. The stream valleys all contain at least some outwash sand and gravel.

Aquifer Characteristics

The Catskill Formation consists of essentially impermeable rocks. Ground water movement is entirely on bedding planes and fractures. The most permeable aquifers in the area are the sands and gravels in the stream valleys. In the smaller valleys, such as this one, the sediments tend to be very lenticular and continuous zones of high permeability are not common.

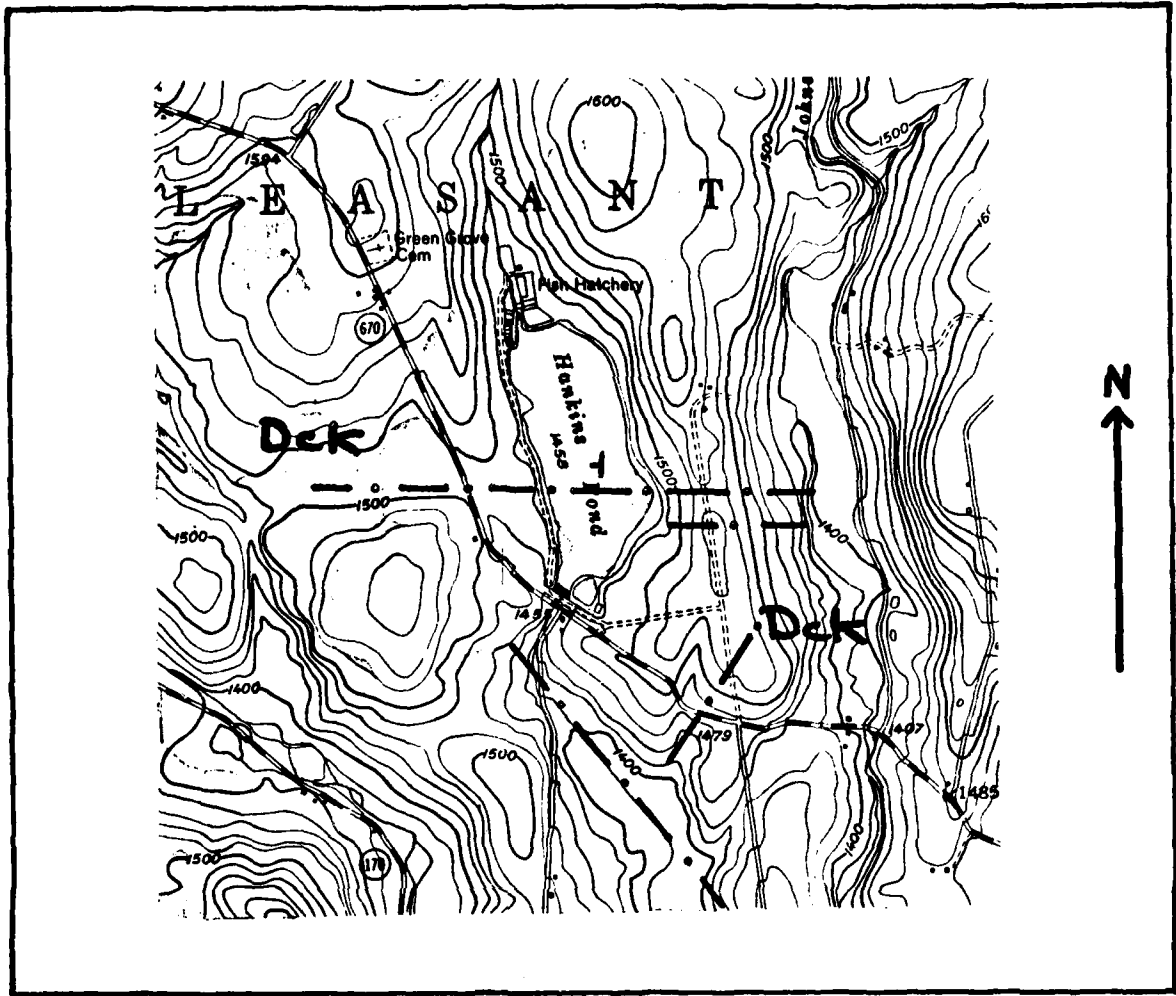
Discussion

This dam was built in the 1830's and no foundation information is available. It is unlikely that the foundation was excavated to fresh bedrock. More likely, it rests on till and outwash. Since only small leakage is reported there probably are no very permeable zones under the foundation.

Sources of Information

1. Manuscript "Geologic Map of the Forest City Quadrangle", open file, Pa. Geological Survey, Harrisburg, Pa.
2. Air Photographs. Scale 1:24,000, dated 1969.

GEOLOGIC MAP - Jenkins Pond Dam



key



Catskill Fm. - undifferentiated

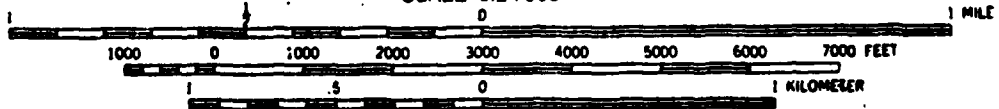


strike and dip



air photo fracture trace

SCALE 1:24 000



CONTOUR INTERVAL 20 FEET