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4 POTOMAC RIVER BASIN

5 TRIBUTARY TO TOMS CREEK, ADAMS COUNTY

6 PENNSYLVANIA

2 K—SECTION DAM

3 NDI ID NO. PA-1045

DER ID NO. 1-84

7 CARROLL VALLEY BOROUGH

8 PHASE I INSPECTION REPORT

/ NATIONAL DAM INSPECTION PROGRAM

DTIC FILE COPY

Prepared By

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG, PENNSYLVANIA
15931

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FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT CORPS OF ENGINEERS
BALTIMORE, MARYLAND
21203

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AUGUST 1981

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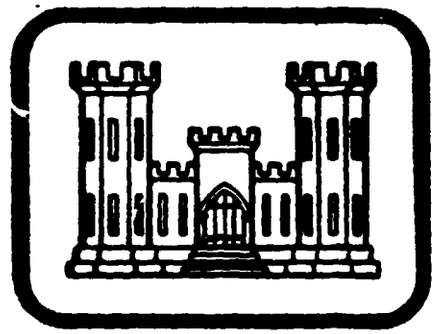

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PREFACE

This report is 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 REPORT

NAME OF DAM	K-Section Dam
STATE LOCATED	Pennsylvania
COUNTY LOCATED	Adams
STREAM	Tributary to Toms Creek
DATES OF INSPECTION	April 22, 1981 and May 12, 1981
COORDINATES	Lat: 39° 44.5' Long: 77° 22.3'

ASSESSMENT

The assessment of the K-Section Dam is based upon visual observations made at the time of inspection, review of available records and data, hydraulic and hydrologic computations and past operational performance.

The K-Section Dam appears to be in good condition and adequately maintained. No major deficiencies were observed during the inspection which were considered as significantly affecting the stability of the structure. Minor erosion areas were observed adjacent to the right spillway approach and discharge channel walls. No seepage was observed during the inspection. A wet area was observed along the downstream toe of the dam. No control exists for the 24" drainline through the embankment. A piece of plywood has been bolted to the end of the pipe at the outlet.

The K-Section Dam is a low hazard-small size dam. The recommended spillway design flood (SDF) for a dam of this size and classification is in the range of the 50-year storm to the 100-year storm. No homes or structures were observed in the potential flood wave associated with a dam failure. It should be noted that future development downstream of the dam could increase the hazard classification of the dam. A change in the hazard classification would warrant the formulation of an emergency action plan to warn downstream residents of imminent failure of the dam. The spillway design flood has been selected as the 100-year storm.

The spillway and reservoir are not capable of controlling the 100-year storm. Therefore, the spillway is rated as inadequate.

The following recommendations and remedial measures should be instituted immediately.

1. The spillway capacity should be increased to provide adequate spillway capacity to pass the spillway design flood (100-year storm).

An investigation of overtopping potential across the west bank of the impoundment should be conducted to evaluate this condition. Modifications to the structure, if required, should be initiated immediately after design.

2. Positive upstream closure should be provided for the drainline, or the line should be plugged and some other means devised to drain the reservoir which does not include a pressurized pipe through the embankment.

3. A regularly scheduled maintenance and operation plan should be prepared and implemented to insure continued safe operation of the facility.

4. The observed erosion along the right spillway approach, discharge wall and embankment slopes should be repaired.

5. A safety inspection program should be implemented with inspections at regular intervals by qualified personnel.

SUBMITTED BY:

L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS AND ARCHITECTS

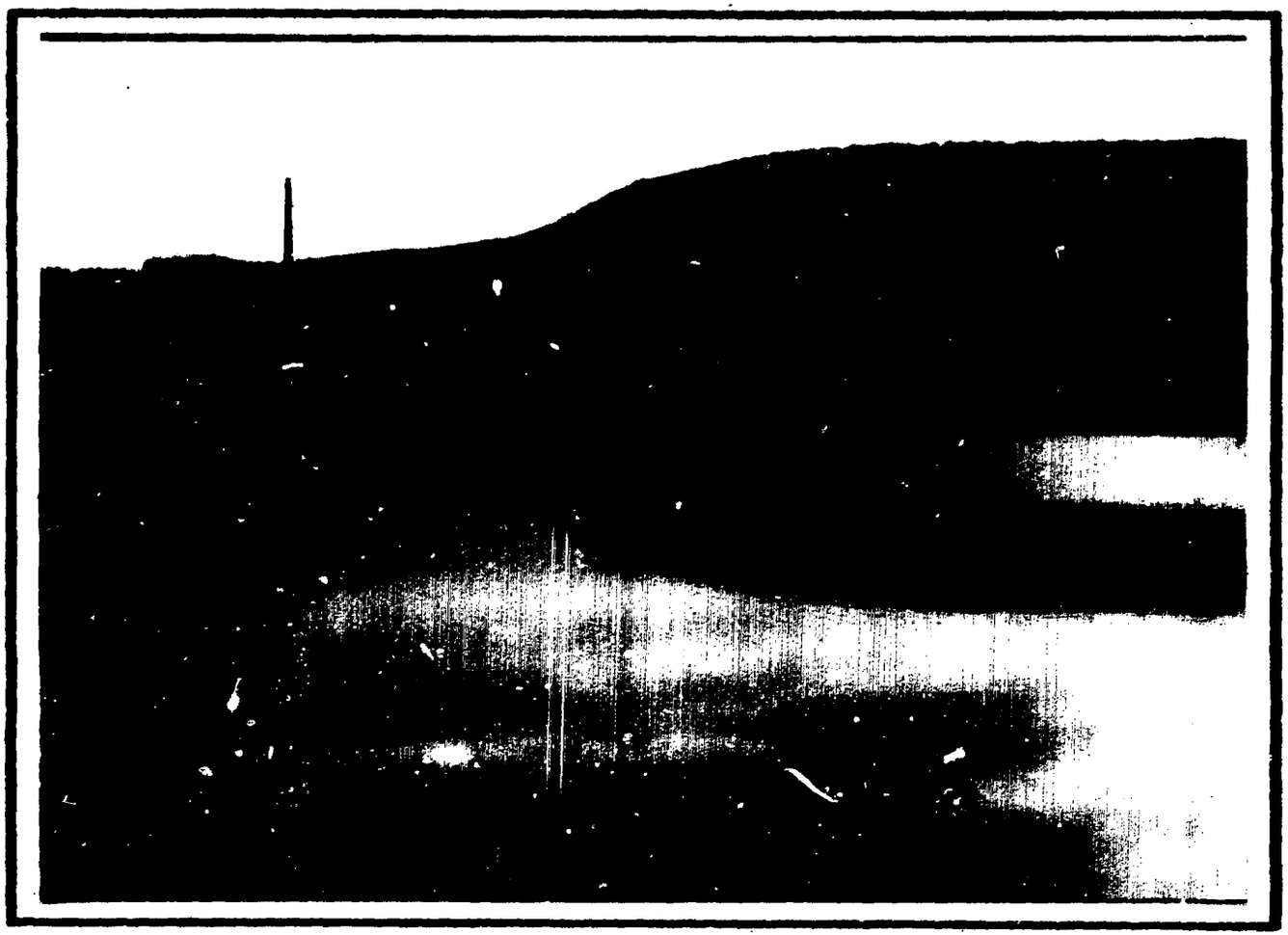
8/6/81
Date

R. Jeffrey Kimball, P.E.

APPROVED BY:

DATE: 28 Aug 81

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer



Overview of K-Section Dam.

TABLE OF CONTENTS

APPENDICES

APPENDIX A - CHECKLIST, VISUAL INSPECTION, PHASE I
APPENDIX B - CHECKLIST, ENGINEERING DATA, DESIGN, CONSTRUCTION, OPERATION, PHASE I
APPENDIX C - PHOTOGRAPHS
APPENDIX D - HYDROLOGY AND HYDRAULICS
APPENDIX E - DRAWINGS
APPENDIX F - GEOLOGY

PHASE I
NATIONAL DAM INSPECTION PROGRAM

K-SECTION DAM
NDI. I.D. NO. PA 1045
DER I.D. NO. 1-84

SECTION 1
PROJECT INFORMATION

1.1 General.

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

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. The K-Section Dam is an earthfill dam, 375 feet long (including spillway) and 12 feet high. The crest width of the dam is 28 feet. The upstream and downstream slopes are 2H:1V and grass covered.

The spillway for the dam is located near the right abutment. The spillway consists of a reinforced concrete box structure through the embankment. The structure is approximately 38 feet long and has dimensions of 9.8 feet in width with a vertical opening of 3.8 feet. A 24 inch diameter steel outlet pipe exists through the embankment and outlets adjacent to the right spillway wingwall at the downstream toe of the dam.

b. Location. The dam is located on a tributary to Toms Creek in the Borough of Carroll Valley, Adams County, Pennsylvania. The K-Section Dam can be located on the Iron Springs, PA U.S.G.S. 7.5 minute quadrangle.

c. Size Classification. The K-Section Dam is a small size dam (12 feet high, 89 acre-feet).

d. Hazard Classification. The Baltimore District Corps of Engineers has directed that the K-Section Dam be classified as a low hazard dam. A golf course, State Route 116 and local roads are located 1 mile downstream of the dam. Minimal economic loss would occur if the structure should fail.

e. Ownership. The K-Section Dam is owned by The Borough of Carroll Valley. Correspondence should be addressed to:

Carroll Valley Borough
Box 127
Fairfield, Pennsylvania 17320
717/642-8269

f. Purpose of Dam. The dam was originally constructed for the purposes of recreation and real estate development. The dam is presently used for recreation.

g. Design and Construction History. Based on information contained in the PennDER files, it appears as though the construction of the dam began prior to 1970. No information is available regarding the construction of the dam. The design of proposed modifications to the dam was completed by Evans, Hagan and Holdefer, Inc., Baltimore, Maryland. A June 11, 1970 memo contained in the DER files indicates that the dam was inspected due to a complaint from a downstream property owner. It was noted that no permit was granted for the construction, and it was recommended that the owner (Charnita, Inc.) be ordered to breach the dam and apply for a permit.

An application for a permit was made by Charnita, Inc., in January of 1971. A report upon the application, dated May 9, 1972, indicates that the existing spillway did not meet the current design capacity. A new spillway was designed for the structure and modifications to the existing embankment were discussed. The modifications to the existing embankment and construction of a new spillway were never completed.

The Borough of Carroll Valley obtained ownership of the structure in November 1979.

h. Normal Operating Procedures. A resevoir is currently maintained at the spillway crest elevation. No operations are conducted at the dam.

1.3 Pertinent Data.

a. Drainage Area. 0.9 square mile

b. Discharge at Dam Site (cfs).

Maximum flood at dam site	Unknown
Drainline capacity at normal pool	Unknown
Spillway capacity at top of dam	371
Other (flow over the west bank)	104
Combined	475

c. Elevation (U.S.G.S. Datum) (feet). - Field survey based on elevation of spillway crest, elevation 577.7 (design drawings-proposed modifications).

Top of dam - low point	582.0
Top of dam - design height	582.5
Pool at time of inspection	577.7
Spillway crest	577.7
Maximum pool - design surcharge	Unknown
Full flood control pool	N/A
Normal pool	577.7
Upstream portal - 24" drainline	Unknown
Downstream portal - 24" drainline	569.6
Streambed at centerline of dam	Unknown
Maximum tailwater	Unknown
Toe of dam	569.6

d. Reservoir (feet).

Length of maximum pool	1500
Length of normal pool	1200

e. Storage (acre-feet).

Normal pool (spillway crest)	26
Top of dam	89

f. Reservoir Surface (acres).

Top of dam (low spot)	20
Normal pool	10
Spillway crest	10

g. Dam.

Type	Earthfill
Length (including spillway)	375 feet
Height	12 feet
Top width	28 feet
Side slopes - upstream	2H:1V
- downstream	2H:1V
Zoning	Unknown
Impervious core	Unknown
Cutoff	Unknown
Grout curtain	Unknown

h. Reservoir Drain.

Type	24" diameter steel pipe
Length	60 feet
Closure	Plywood bolted on downstream end of pipe

Access	Downstream toe
Regulating facilities	None

i. Spillway.

Type	Reinforced concrete box structure
Length (crest)	9.8 feet
Crest elevation	577.7
Upstream channel	Lake (unrestricted)
Downstream channel	Tributary to Toms Creek

SECTION 2
ENGINEERING DATA

2.1 Design. Review of available information in the files of the Commonwealth of Pennsylvania, Department of Environmental Resources, revealed that some correspondence, permit information and limited design drawings were available for review. Selected drawings relative to the existing structure and proposed dam are located in Appendix E of this report.

2.2 Construction. No information was available regarding the construction of the dam.

2.3 Operation. No operations are conducted at the dam.

2.4 Evaluation.

a. Availability. Engineering data were provided by the PennDER, Bureau of Dams and Waterway Management. The borough manager of the Borough of Carroll Valley, Mr. Aylwyn Williams, was interviewed to obtain data relative to the dam. Mr. Williams did not supply any additional information.

b. Adequacy. This Phase I Report is based on the visual inspection and hydrologic and hydraulic analysis. Sufficient information exists to complete a Phase I Report.

SECTION 3
VISUAL INSPECTION

3.1 Findings.

a. General. The onsite inspection of K-Section Dam was conducted by personnel of L. Robert Kimball and Associates on April 22, 1981 and May 12, 1981. The inspection consisted of:

1. Visual inspection of the retaining structure, abutments and toe.
2. Examination of the spillway facilities, exposed portion of any outlet works and other appurtenant works.
3. Observations affecting the runoff potential of the drainage basin.
4. Evaluation of the downstream area hazard potential.

b. Dam. The dam appears to be in good condition. From a brief survey conducted during the inspection, it was noted that the low spot on the crest of the dam was located adjacent to the spillway. A paved roadway exists along the entire length of the crest. The upstream and downstream slopes of the dam were measured to be 2H:1V. It was noted that the slopes were grass covered, and no riprap existed along the upstream slope of the dam. Design drawings located in Appendix E indicate that riprap was to be added to the upstream slope but apparently was never completed. A wet area was observed beyond the downstream toe of the dam. It was noted during the inspection that the wet area was probably due to runoff from the left abutment and poor drainage from the area.

The top of dam survey from that area was continued around the west bank of the lake. This area would possibly be overtopped prior to overtopping of the main earthen embankment section. Overtopping in this area would not be detrimental to the stability of the main earthen embankment section. The area is an open field, grass covered and gently sloped. No seepage was observed on the main earthen embankment section.

c. Appurtenant Structures. The spillway for the dam is located near the right abutment of the dam. The spillway consists of a reinforced concrete box culvert structure through the embankment. Concrete wingwalls exist at the entrance to the culvert. The culvert opening is 9.8 feet wide and 3.8 feet high. The length of the culvert is approximately 27.5 feet. The outlet channel for the spillway consists of a concrete lined channel lying on a 2H:1V slope. A near horizontal concrete pad exists at the bottom of the slope for a

distance of approximately 7 feet beyond the toe of the channel slope. The reinforced concrete culvert serves as a bridge for the roadway located along the crest of the dam. The outlet for the 24" steel drainline pipe is located approximately 10 feet to the right of the spillway discharge channel. The shut-off for the drainline consisted of a piece of plywood bolted to the end of the pipe. Minor erosion areas were observed adjacent to the spillway approach and discharge channel walls on the embankment.

d. Reservoir Area. The reservoir area was observed as consisting of open fields and residential areas. The reservoir slopes are moderate and are not susceptible to landslides which would affect the storage volume of the reservoir or overtopping of the dam by displacing water.

e. Downstream Channel. The downstream channel for the K-Section Dam consists of a tributary to Toms Creek. A golf course, State Route 116 and local roads are located approximately 1 mile downstream of the dam. No homes were observed along the stream immediately downstream of the dam. Minimal damage would occur to downstream properties should the structure fail.

3.2 Evaluation. In general, the dam and appurtenant structures appear to be in good condition. No seepage was observed on the downstream slope or along the toe of the embankment section. Minor erosion was observed along the upstream slope of the dam. Erosion on the embankment slopes were observed adjacent to the right spillway approach and discharge channel walls. The erosion should be repaired. The closure facilities for the 24" steel pipe consist of a piece of plywood bolted to the end of the pipe. The closure was apparently meant to be a temporary measure. A permanent upstream shut-off should be provided for the line.

The wet condition of the area along the downstream toe of the dam was considered as being caused by surface runoff from the left abutment. No major problems were anticipated due to the runoff.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures. The reservoir is maintained at the spillway crest elevation. No other procedures are conducted at the dam.

4.2 Maintenance of the Dam. Maintenance of the dam is considered fair. No planned maintenance schedule exists for the dam.

4.3 Maintenance of Operating Facilities. There is no planned maintenance of the operating facilities.

4.4 Warning System in Effect. There is no warning system in effect to warn downstream residents of large spillway discharges or imminent failure of the dam.

4.5 Evaluation. No maintenance of the dam or operating facilities is conducted. A planned maintenance and operational procedures program should be prepared and implemented at the dam.

An emergency action plan should be available for every dam in the high and significant hazard categories. Such plans should outline actions to be taken by the operator to minimize downstream effect of an emergency, and should include an effective warning system. No emergency action plan is required, but the owner should be aware that development downstream of the dam could increase the hazard classification of the dam and an emergenccy action plan will be required at that time.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features.

a. Design Data. No information was availble relative to the hydraulic design of the spillway. The available data agree with measurements taken during the inspection relative to the spillway dimensions. A detailed design for a proposed spillway exists in the DER files. The proposed design is located in Appendix E (page E-3). The proposed spillway was never constructed.

b. Experience Data. No rainfall, runoff or reservoir level data were available. The spillway reportedly has functioned adequately in the past.

c. Visual Observations. The spillway appeared to be in good condition and adequately maintained. The spillway consists of a reinforced concrete box culvert structure. The inlet for the culvert was measured to be 9.8 feet wide and 3.8 feet high. The culvert is approximately 27.5 feet long.

The low spot on the embankment crest was observed to be located adjacent to the spillway. It was observed during the inspection that during periods of excessive inflow to the reservoir, water would flow from the reservoir across the west bank of the impoundment prior to overtopping of the main earthen embankment section. Flow across the west bank of the impoundment would be across an open field gently sloped and grass covered. Flow across the area would discharge away from the main earthen embankment section and may not affect the stability of the dam.

d. Overtopping Potential. Overtopping potential was investigated through the development of the 100 year flood (peak inflow) for the region.

The Corps of Engineers, Baltimore District, has directed that the 100 year flood be computed by two methods and the average value used to analyze the spillway adequacy. the two sources of data used to determine the 100 year peak inflow are; (1) Resource Bulletin No. 13 and (2) Hydrologic Study (Typical Storm Agnes) prepared by the N.A.D., Corps of Engineers, 1975.

5.2 Evaluation Assumptions. To enable completion of the hydraulic and hydrologic analysis for this structure, it was necessary to make the following assumptions.

1. The pool elevation in the reservoir prior to the storm was assumed to be at the spillway crest elevation, 577.7.

2. The top of dam was considered to be the low spot on the embankment crest at elevation, 582.0.

3. The west bank of the reservoir was considered as being capable of sustaining flow from the reservoir for an undetermined depth and duration.

5.3 Summary of Overtopping Analysis. Complete summary sheets for the hydraulic and hydrologic analysis and computer output are presented in Appendix D.

Peak inflow (100-year storm)	590 cfs
Spillway capacity (culvert)	371 cfs
Discharge over west bank	104 cfs
Combined capacity	475 cfs

a. Spillway Adequacy Rating. The Spillway Design Flood (SDF) is based on the hazard and size classification of the dam. The recommended spillway design flood for a dam of this size and classification is in the range of 50-year storm to the 100-year storm. At the time of the inspection, there were no homes observed within the anticipated flood plain of the dam. The spillway is not capable of safely passing the Spillway Design Flood (100-year storm). The spillway design flood is based on the currently limited downstream development and has been selected as the 100-year storm. Based on the following definition provided by the Corps of Engineers, the spillway is rated as inadequate as a result of our hydrologic analysis.

> Inadequate - All low hazard dams which do not pass the spillway design flood (100-year).

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. Several erosion areas were observed on the embankment crest or slopes. Minor erosion areas were observed adjacent to the right spillway approach and discharge channel wingwalls on the embankment slopes. No seepage was observed at the time of the inspection. A wet area was observed along the downstream toe of the dam, but it was noted that the wet area was due to runoff from the left abutment.

b. Design and Construction Data. Only limited design data were available for review. Design drawings relative to proposed modifications to the dam are included in Appendix E, but the proposed modifications were never completed.

The dam was constructed sometime prior to 1970. The design of proposed modifications to the dam was completed by Evans, Hagan and Holdlefer, Inc., of Baltimore, Maryland. No information was available relative to the construction of the dam.

c. Operating Records. No operating records exist for the dam.

d. Post Construction Changes. No post construction changes are known to have occurred.

e. Evaluation. No major deficiencies were observed during the inspection which were considered as having an immediate effect on the static stability of the structure. Since no sign of instability were noted during the inspection, the K-Section Dam is assumed to be statically stable. No calculations were made to document this assumption.

f. Seismic Stability. The dam is located in seismic zone 1. No seismic stability analyses have been performed. Normally, it can be considered that if a dam in this zone is stable under static loading conditions, it can be assumed safe for any expected earthquake loading. Since the dam is assumed to be statically stable at the present time, the dam is assumed to be capable of sustaining potential seismic loadings. No calculations were performed to document this assumption.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. In general, the dam appears to be in good condition and adequately maintained. No major erosion areas were observed on the slope or crest of the dam. Minor erosion areas were observed adjacent to the right spillway approach and discharge walls. The erosion should be repaired. No control valve exists on the drainline.

A wet area was observed along the downstream toe of the dam. The wet area is apparently due to surface runoff from the left abutment.

The K-Section Dam is a low hazard-small size dam. The recommended spillway design flood (SDF) for a dam of this size and classification is in the range of 50-year storm to the 100-year storm. No homes or structures were observed in the potential flood wave associated with a dam failure. It should be noted that future development downstream of the dam could increase the hazard classification of the dam. A change in the hazard classification would warrant the formulation of an emergency action plan to warn downstream residents of imminent failure of the dam. The spillway design flood has been selected as the 100-year storm.

The visual observations, review of available data, hydrologic and hydraulic calculations and past operational performance indicate that the K-Section Dam is not capable of controlling the 100-year storm. The spillway is termed inadequate.

b. Adequacy of Information. Sufficient information is available to complete a Phase I report.

c. Urgency. The recommendations suggested below should be implemented as soon as possible.

d. Necessity for Further Investigation. In order to accomplish some of the recommendations/remedial measures outlined below, further investigations will be required.

7.2 Recommendations/Remedial Measures.

1. The spillway capacity should be increased to provide adequate spillway capacity to pass the spillway design flood (100-year storm).

An investigation of overtopping potential across the west bank of the impoundment should be conducted to evaluate this condition. Modifications to the structure, if required, should be initiated immediately after design.

2. Positive upstream closure should be provided for the drainline, or the line should be plugged and some other means devised to drain the reservoir which does not include a pressurized pipe through the embankment.

3. A regularly scheduled maintenance and operation plan should be prepared and implemented to insure continued safe operation of the facility.

4. The observed erosion along the right spillway approach, discharge wall and embankment slopes should be repaired.

5. A safety inspection program should be implemented with inspections at regular intervals by qualified personnel.

APPENDIX A
CHECKLIST, VISUAL INSPECTION, PHASE I

CHECK LIST
VISUAL INSPECTION
PHASE I

NAME OF DAM K-Section Dam COUNTY Adams STATE Pennsylvania ID# 1045

TYPE OF DAM Earthfill HAZARD CATEGORY Low

DATE(s) INSPECTION April 22, 1981 May 12, 1981 WEATHER Clear and warm TEMPERATURE 60°

POOL ELEVATION AT TIME OF INSPECTION 577.7 M.S.L. TAILWATER AT TIME OF INSPECTION 570.6 M.S.L.

A-1

INSPECTION PERSONNEL:

R. Jeffrey Kimball, P.E. - L. Robert Kimball and Associates

James T. Hockensmith - L. Robert Kimball and Associates

O.T. McConnell - L. Robert Kimball and Associates

Richard Peace - Pennsylvania Department of Environmental Resources

O.T. McConnell RECORDER

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None noted.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None noted.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None noted.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Appears to be all right.	
RIPRAP FAILURES	Not applicable.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATION	Embankment slopes grass covered. No significant accumulations of brush on slopes.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Minor erosion was observed adjacent to the right spillway approach and discharge channel wall.	The erosion areas should be repaired.
ANY NOTICEABLE SEEPAGE	None.	
STAFF GAUGE AND RECORDER	None.	
DRAINS	None.	

CONCRETE/MASONRY DAMS - NOT APPLICABLE

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	Not applicable.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Not applicable.	
DRAINS	Not applicable.	
WATER PASSAGES	Not applicable.	
FOUNDATION	Not applicable.	

CONCRETE/MASONRY DAMS - NOT APPLICABLE

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Not applicable.	
STRUCTURAL CRACKING	Not applicable.	
VERTICAL AND HORIZONTAL ALIGNMENT	Not applicable.	
MONOLITH JOINTS	Not applicable.	
CONSTRUCTION JOINTS	Not applicable.	
STAFF GAUGE OR RECORDER	Not applicable.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Not applicable.	
INTAKE STRUCTURE	Not observed.	
OUTLET STRUCTURE	24" steel pipe.	
OUTLET CHANNEL	Outlets through a concrete endwall at the downstream toe of the slope.	
EMERGENCY GATE	None. A piece of plywood is bolted to the end of the 24" drainline.	A permanent control should be provided at the upstream end of the drainline or the drainline should be plugged and some other means devised to drain the reservoir.

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The spillway controls exhibit the properties of a concrete box culvert.	
APPROACH CHANNEL	Lake [unrestricted].	
DISCHARGE CHANNEL	Concrete lined discharge channel with concrete channel walls.	
BRIDGE AND PIERS	Reinforced concrete culvert serves as a bridge for the roadway which crosses the culvert.	

GATED SPILLWAY - NOT APPLICABLE

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not applicable.	
APPROACH CHANNEL	Not applicable.	
DISCHARGE CHANNEL	Not applicable.	
BRIDGE AND PIERS	Not applicable.	
GATES AND OPERATION EQUIPMENT	Not applicable.	

DOWNSTREAM CHANNEL

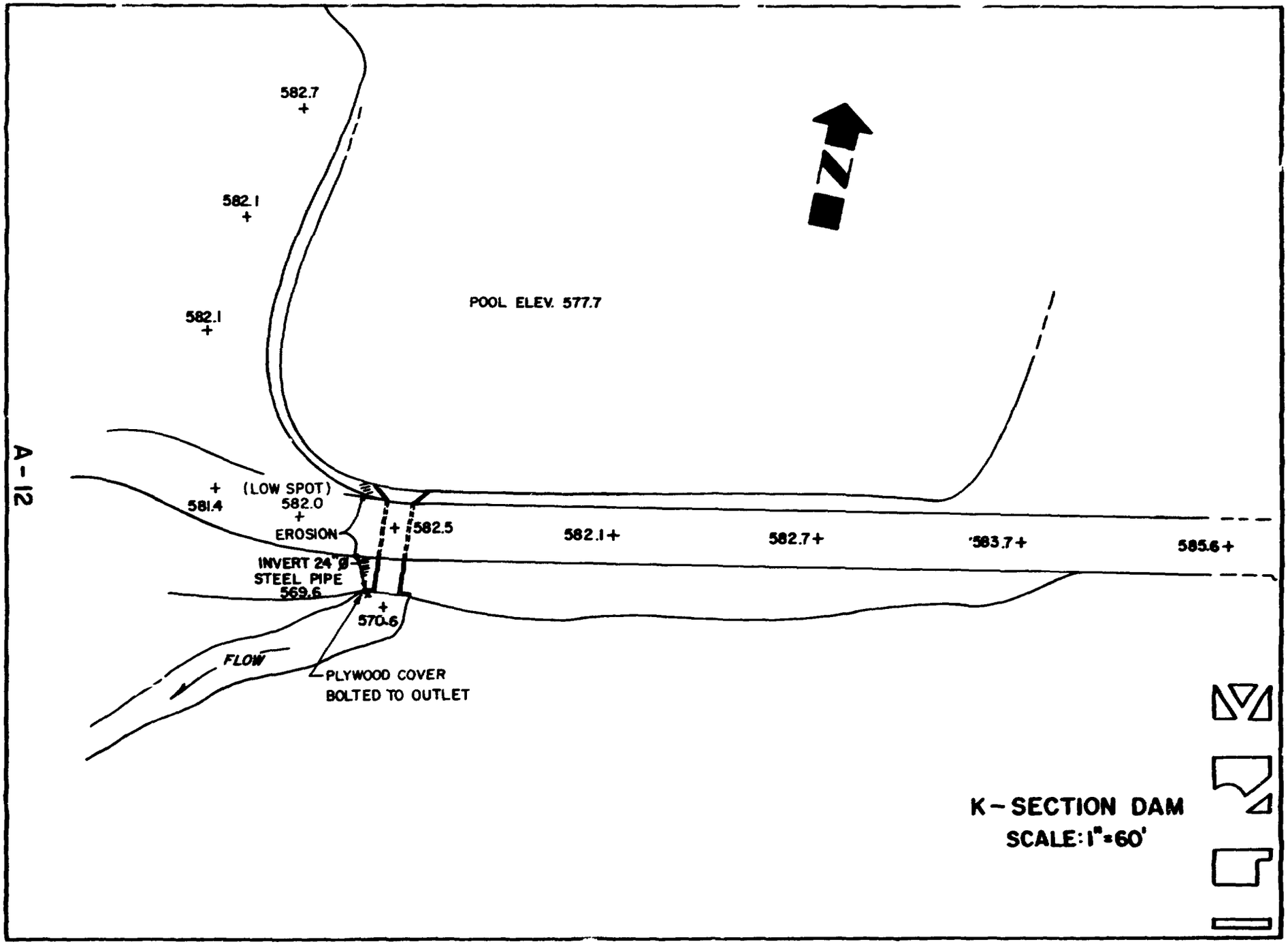
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel for the K-Section Dam consists of a tributary to Toms Creek. No homes or other significant structures were observed to be within the potential downstream floodplain of the dam.	
SLOPES	Appear to be stable.	
APPROXIMATE NO. OF HOMES AND POPULATION	It was observed during the inspection that no homes exist in the potential floodplain of the dam.	

RESERVOIR

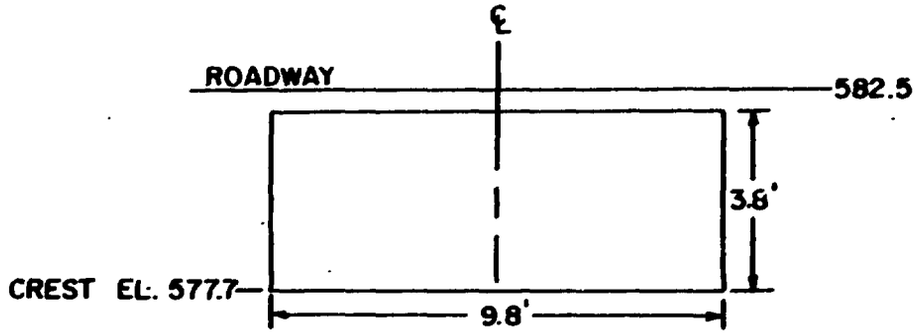
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderate.	
SEDIMENTATION	Unknown.	

INSTRUMENTATION

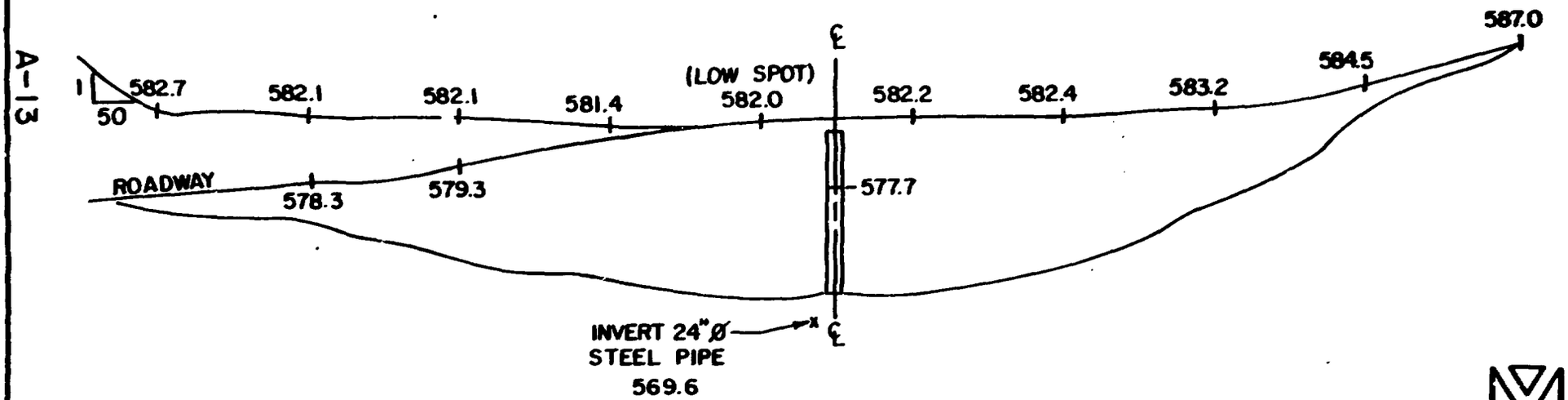
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	



K-SECTION DAM
SCALE: 1"=60'



SPILLWAY INLET DETAIL
NOT TO SCALE



PROFILE
LOOKING UPSTREAM

SCALE HORIZ. 1"=100'
VERT. 1"= 10'

K- SECTION DAM

APPENDIX B
CHECKLIST, ENGINEERING DATA, DESIGN, CONSTRUCTION, OPERATION, PHASE I

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM K-Section Dam

ID# 1045

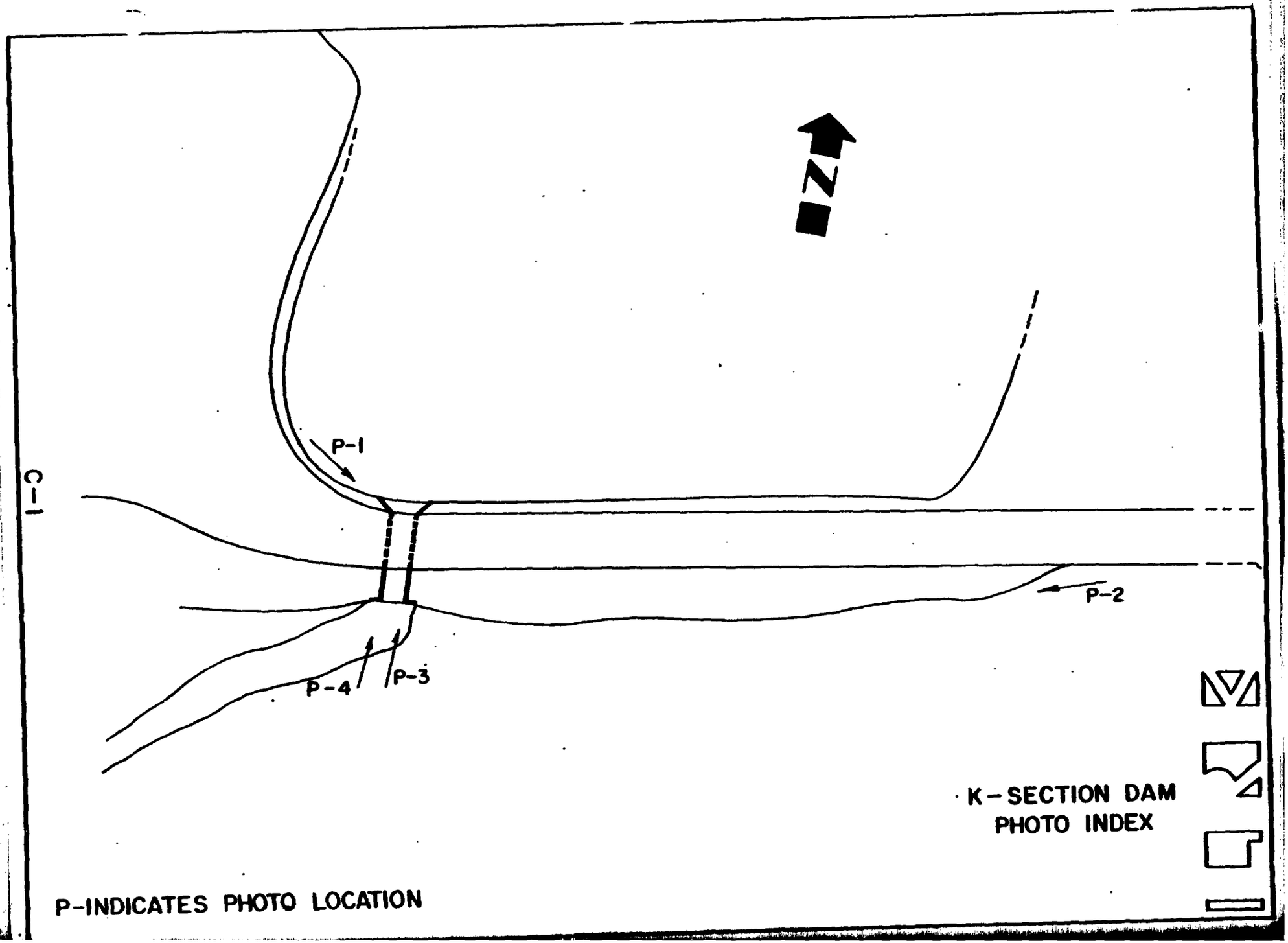
ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	U.S.G.S. 7.5 minute quadrangle.
CONSTRUCTION HISTORY	None available.
TYPICAL SECTIONS OF DAM	None available.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS RAINFALL/RESERVOIR RECORDS	See Appendix E. See Appendix E. See Appendix E. None. None.

ITEM	REMARKS
DESIGN REPORTS	None available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None.
POST-CONSTRUCTION SURVEYS OF DAM	Proposed spillway modifications were designed but not implemented.
BORROW SOURCES	Reservoir area.

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	None known to exist since construction of the dam.
HIGH POOL RECORDS	None.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None available.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None known to have occurred.
MAINTENANCE OPERATION RECORDS	None.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	See Appendix E.
OPERATING EQUIPMENT PLANS & DETAILS	None.

APPENDIX C
PHOTOGRAPHS


N
P-1
C-1
P-2
P-4
P-3
K-SECTION DAM
PHOTO INDEX
P-INDICATES PHOTO LOCATION

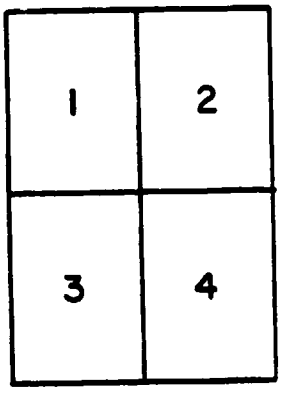
K-SECTION DAM
PA 1045

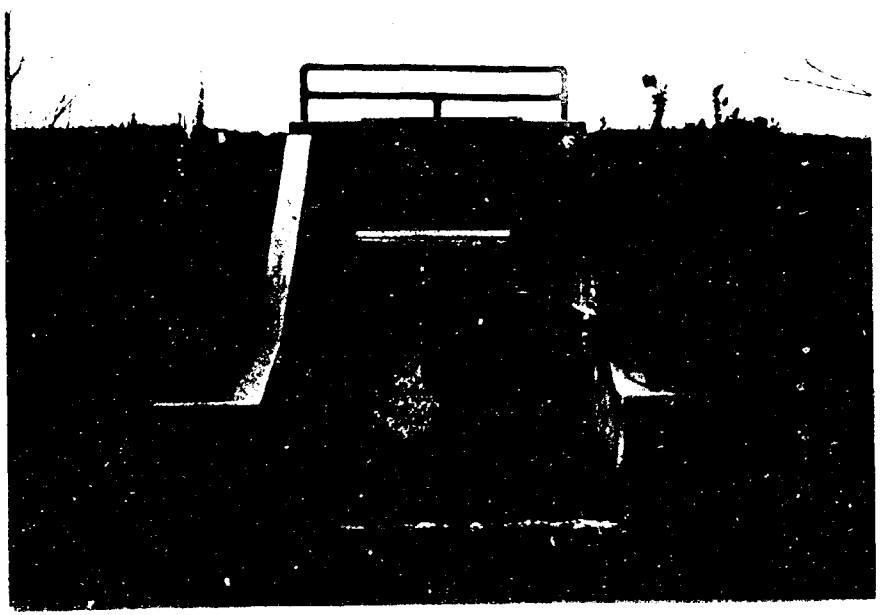
Sheet 1

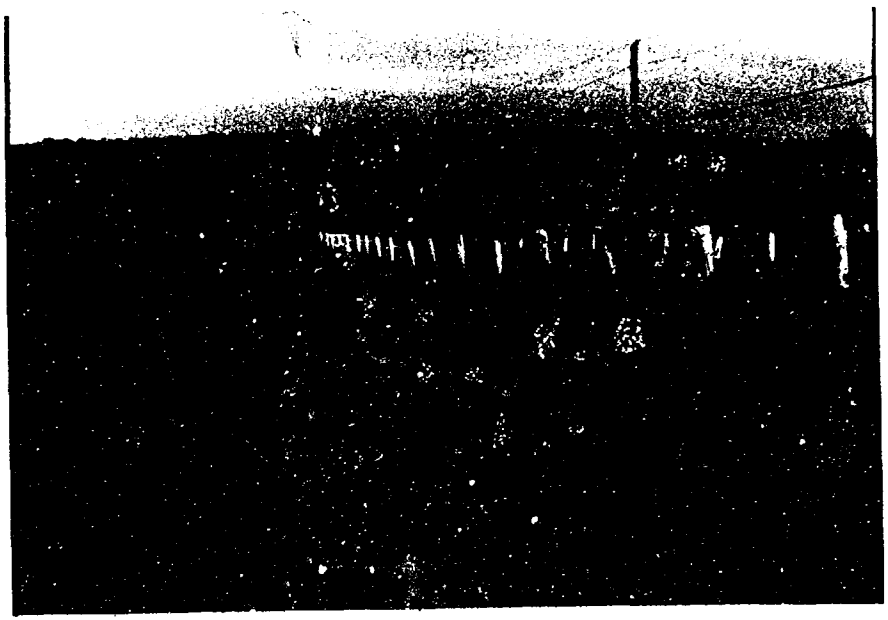
Front

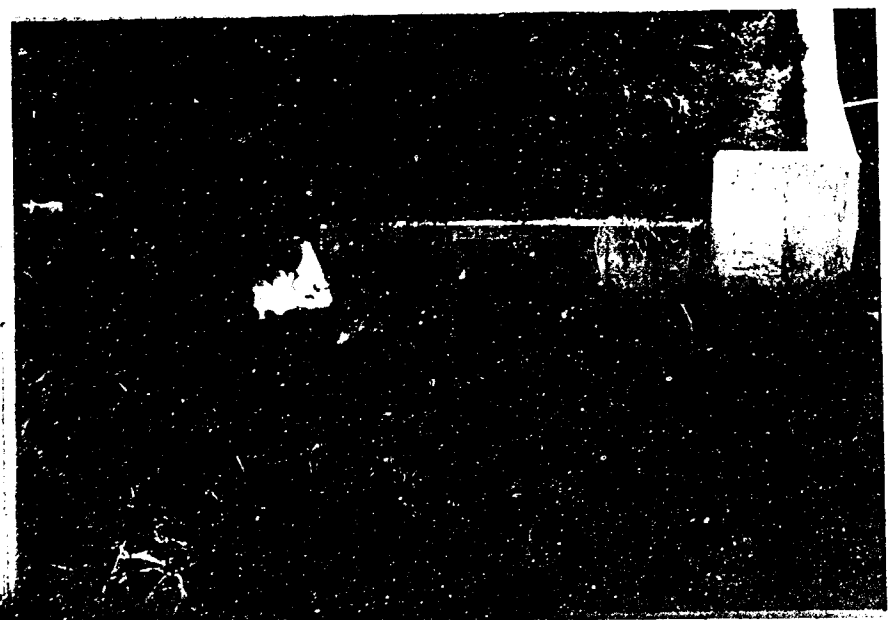
(1) Upper left - View of spillway approach and upstream slope of dam. View towards left abutment.
(2) Upper right - View of downstream slope and toe area. View towards the right abutment.
(3) Lower left - View of spillway discharge structure.
(4) Lower right - View of downstream end of 24" drainline.

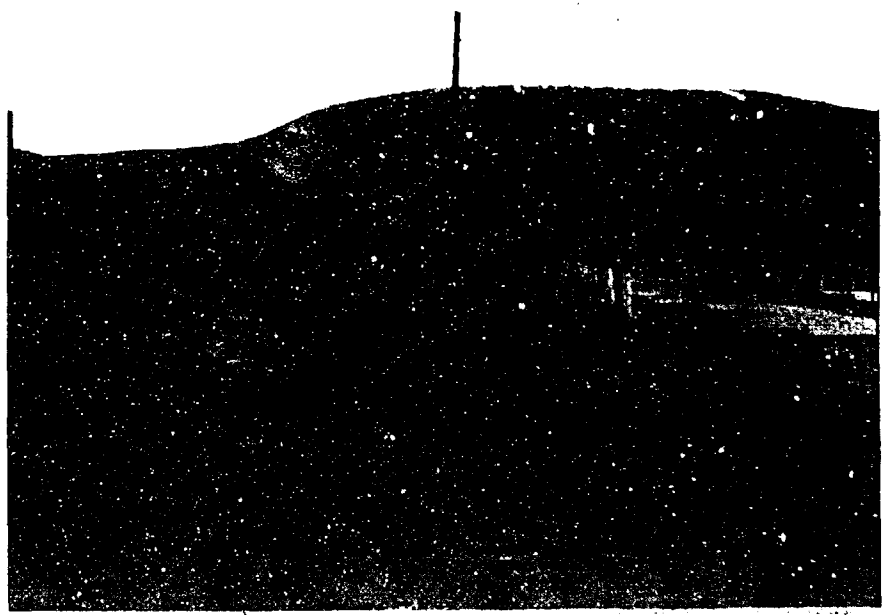
TOP OF PAGE











APPENDIX D
HYDROLOGY AND HYDRAULICS

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 0.90 sq.mi. [moderate slopes]

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 577.7 [26 ac-ft]

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 582.0 [89 ac-ft]

ELEVATION MAXIMUM DESIGN POOL: 582.5

ELEVATION TOP DAM: 582.0 [low spot]

SPILLWAY CREST:

a. Elevation 577.7
b. Type Reinforced concrete box culvert
c. Width 9.8 feet
d. Length Culvert length = 27.5 feet
e. Location Spillover Right abutment
f. Number and Type of Gates None

OUTLET WORKS:

a. Type 24" diameter steel pipe
b. Location Through embankment adjacent to spillway
c. Entrance inverts Unknown
d. Exit inverts 569.6
e. Emergency drawdown facilities 24" diameter steel pipe [no controls]

HYDROMETEOROLOGICAL GAUGES:

a. Type None
b. Location None
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: Unknown

NOTE: Elevations refer to MSL.

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CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

NAME K- SECTION DAM
NUMBER PA-1045
SHEET NO. 1 OF 4
BY DTM DATE 7/81

HYDROLOGIC - HYDRAULIC ANALYSIS

DETERMINATION OF 100-YR FLOOD INFLOW

POTOMAC RIVER BASIN, POTOMAC SUB-BASIN.

METHOD No. 1 :

FROM HYDROLOGIC STUDY (TROPICAL STORM AGNES). NAD, CORPS OF ENGINEERS, 1975.

$$\log Q(P) = \log Q(M) + K(P,g)\,S$$

1) DRAINAGE AREA = 0.9 SQ. MI.^{2}

2) $\log Q(M) = 1.9 + 0.75 \log(0.9)$
$= 1.9 + 0.75(-0.05)$
$= 1.866$

3) $S = 0.41 - 0.05 \log(0.9)$
$= 0.41 - 0.05(-0.05)$
$= 0.412$

4) SKEW COEFFICIENT = +0.5

5) $K(P,g) = 2.695$

6) $\log(Q_1) = 1.866 + (2.695)(0.412)$
$= 2.972$
$Q_1 =$ 940 c.f.s.

METHOD No. 2:

FROM RESOURCES BULLETIN No. 13, OCT., 1977

CONSIDER MODEL No. 6-B:

$Q_T = c A^x$

$C = 259$, $A = 0.9$, $X = 1.050$

$$Q_{100} = 259 (0.9)^{1.050}$$
$$= 230 \text{ cfs}$$

$$Q_{100 \text{ AVERAGE}} = \frac{Q(\text{METHOD 1}) + Q(\text{METHOD 2})}{2}$$

$$= \frac{940 + 230}{2}$$

$$= 585 \text{ cfs}$$ ROUND OFF TO 590 cfs.

SPILLWAY RATING

CONSIDER A RECTANGULAR CONCRETE BOX CULVERT.

$$Q_{MAX} = C_D A \sqrt{2g h_{MAX}}$$

WHERE; C_D = ENTRANCE LOSS COEFFICIENT (0.6)
A = AREA OF CULVERT ($9.8' \times 3.9' = 37.2 FT^2$)
g = $32.2 FT/SEC^2$
$h_{(MAX)} = (582.0 - 577.7) = 4.3 FT.$

$$\therefore Q_{(MAX)} = 0.6 (37.2) \sqrt{(2)(32.2)(4.3)}$$
$$= 0.6 (37.2)(16.6)$$
$$= 371 \text{ cfs}$$

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EBENSBURG PENNSYLVANIA

NAME
NUMBER PA-1045
SHEET NO. 3 OF 4
BY DTM DATE 7/3

DETERMINE FLOW ACROSS WEST BANK OF IMPOUNDMENT

FROM: $Q = c l L^{3/2}$

COEFFICIENT OF DISCHARGE (c) = 2.9 (BROAD CREST)

$h_{MAX} = 582.0 - 581.4 = 0.6$ FT

l = VARIES WITH L

AT ELEVATION 581.4, $l = 20'$
AT ELEVATION 582.0, $l = 155'$

ASSUME $l_{AVERAGE} = 20' + 155' + \sqrt{20 \times 155}/3$
$= 76.9'$ USE $77'$

THEN $Q_{AVG} = (c)\, l_{AVG}\, (h_{(MAX)})$
$= (2.9)(77.0)(0.6)^{1.5}$
$= 103.8$ cfs, USE 104 cfs.

SPILLWAY ADEQUACY RATING

ASSUME OUTFLOW = INFLOW

100-YR STORM INFLOW = COMBINED DISCHARGE

590 = 371 + 104

DAM WOULD BE OVERTOPPED. THEREFORE, THE SPILLWAY IS INADEQUATE. SPILLWAY CAPACITY SHOULD BE INCREASED TO PASS AT LEAST THE 100-YR FLOOD.

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CONSULTING ENGINEERS & ARCHITECTS
EBENSBURG PENNSYLVANIA

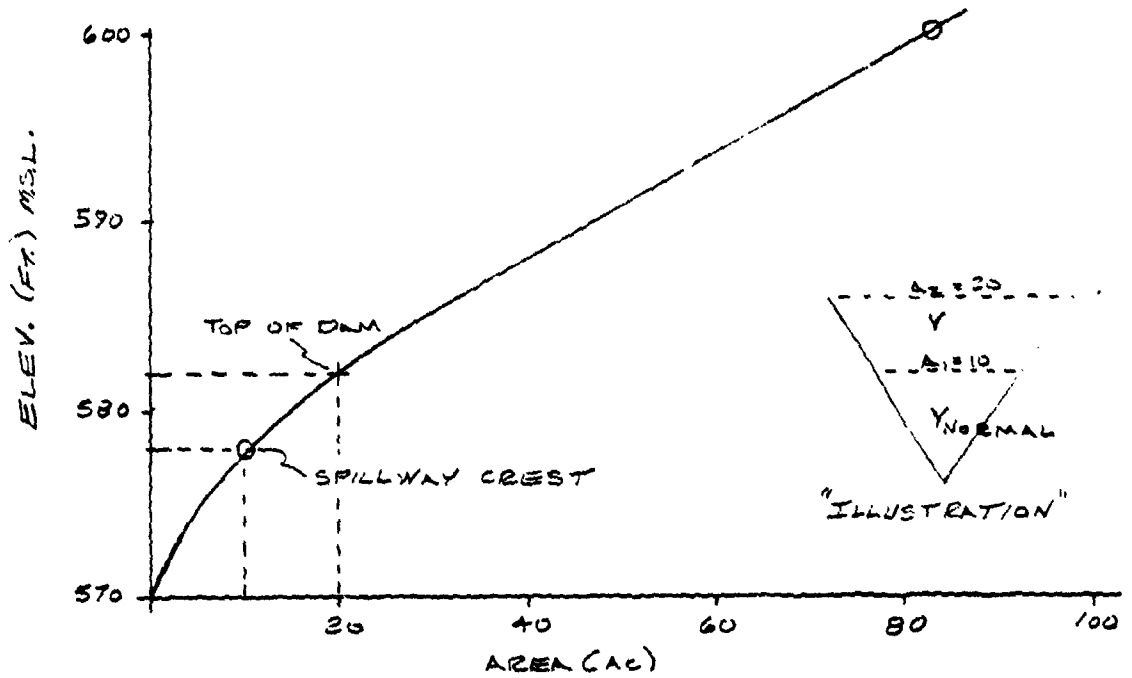
NAME
NUMBER PA-125
SHEET NO. 4 OF 4
BY DTM DATE 7/81

ELEVATION AREA CAPACITY RELATIONSHIPS

FROM U.S.G.S. 7.5-MIN. QUAD., D.E.R. FILES AND FIELD INSPECTION DATA.

SPILLWAY CREST ELEVATION AT 577.7
TOP OF DAM (LOW SPOT) = 582.0

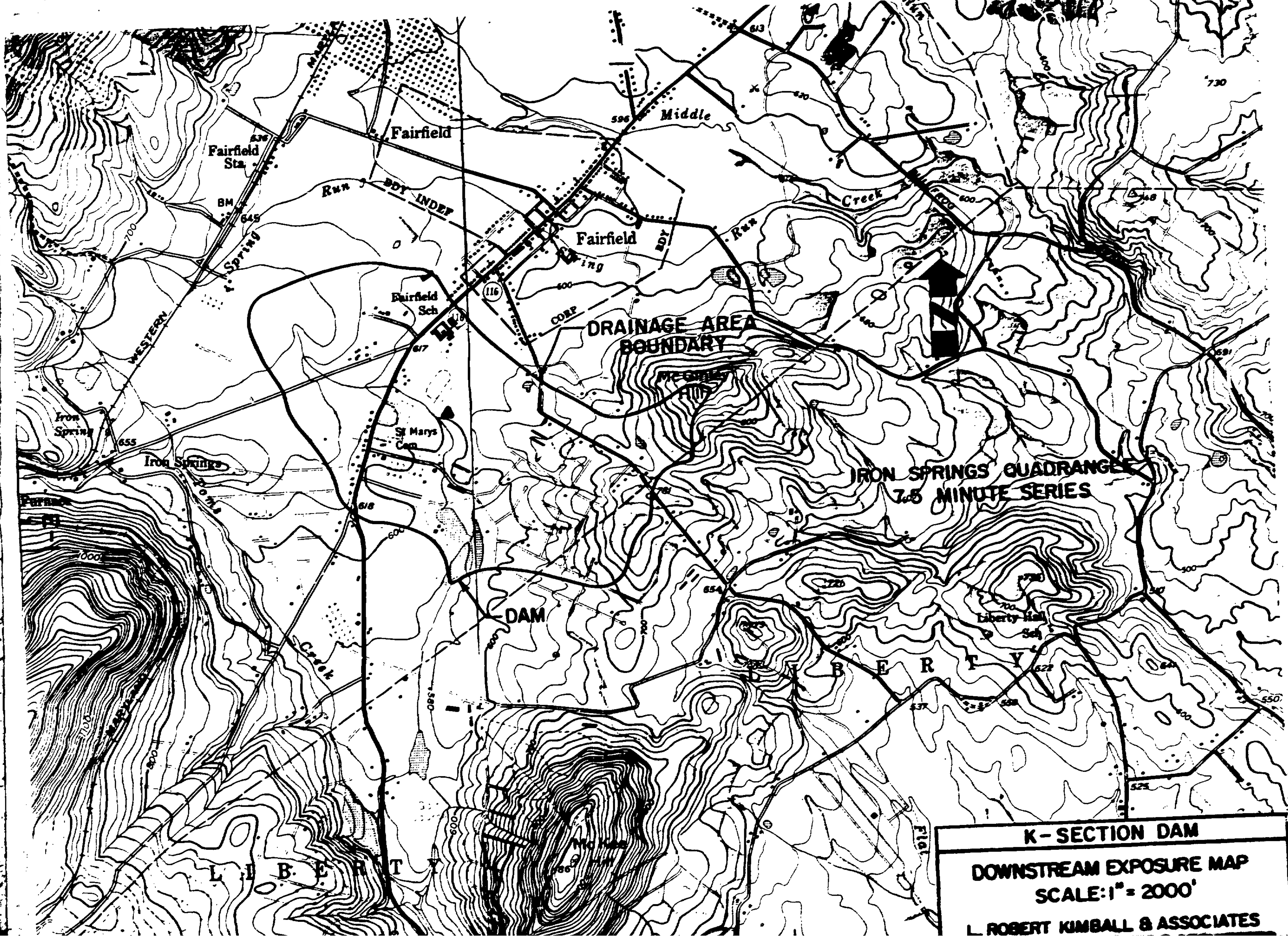
ELEVATION (FT.)	AREA (AC)
570.0	0 (EST.)
577.7	10
600.0	83

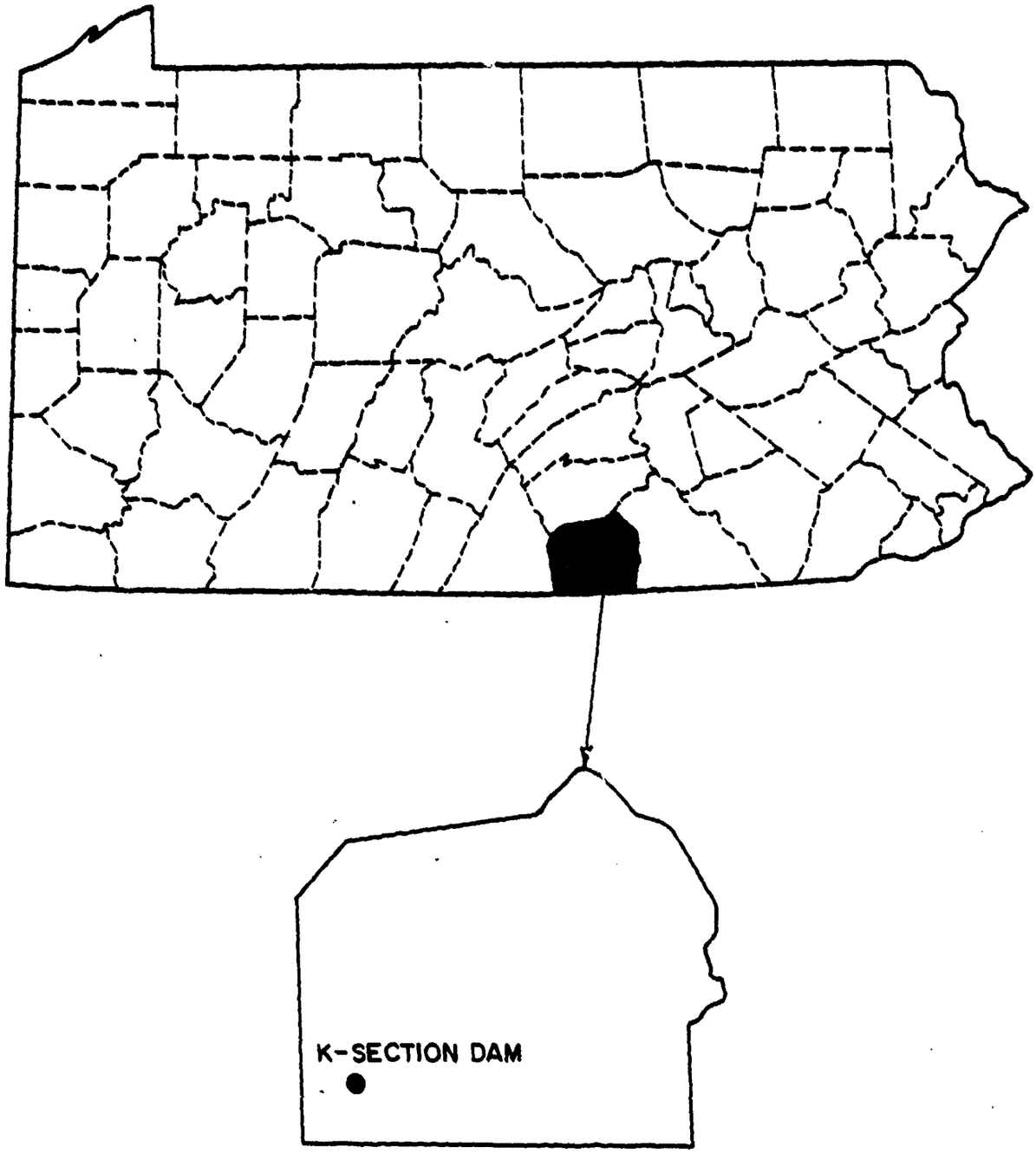


$V_{NORMAL} = h(A)/3$
$= (577.7-570)(10)/3$
$= 25.7$ AC-FT

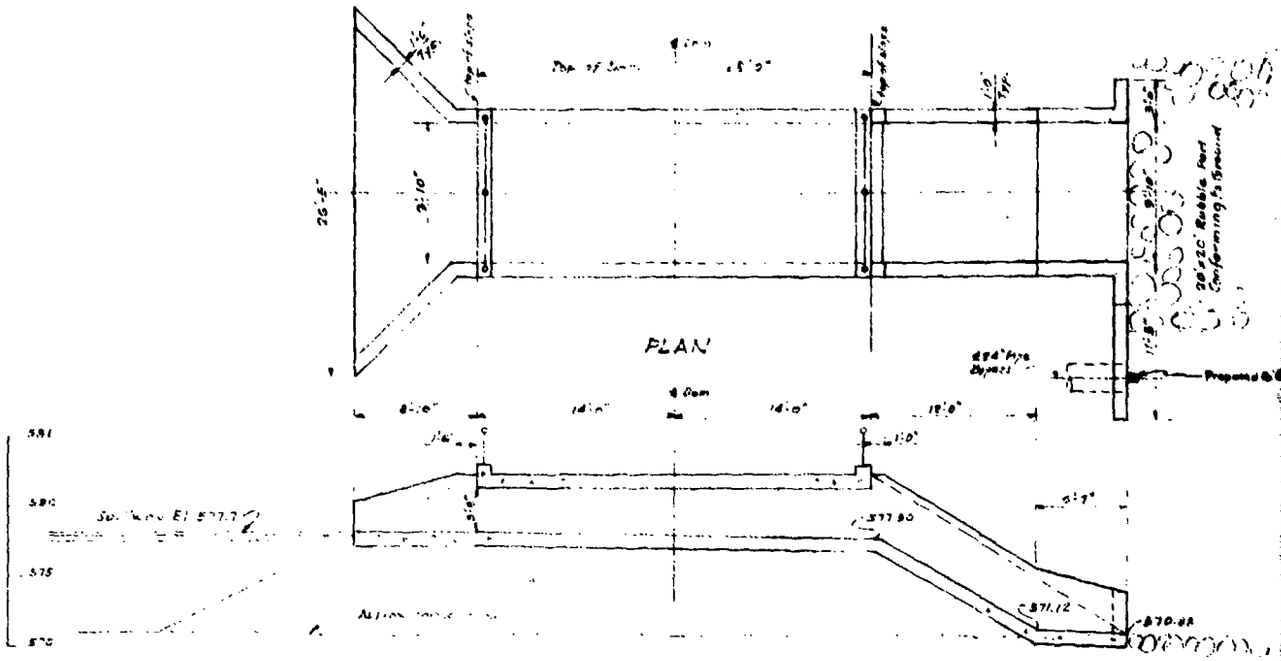
$V_{MAX} = (582-577.7)(10+20+\sqrt{10 \cdot 20}/3) + V_{NORMAL}$
$= (4.3)(44.1)/3 + 25.7$
$= 63.3 + 25.7$
$= 89$ AC-FT

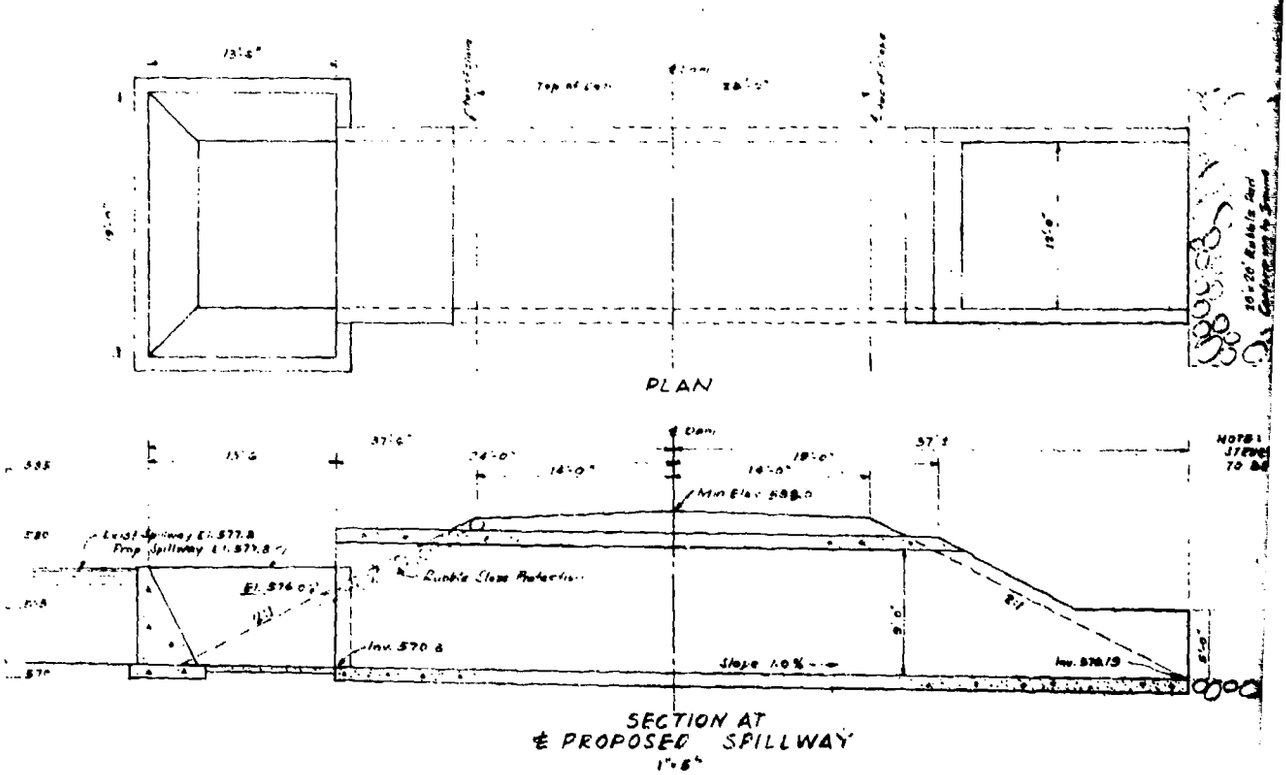
APPENDIX E
DRAWINGS

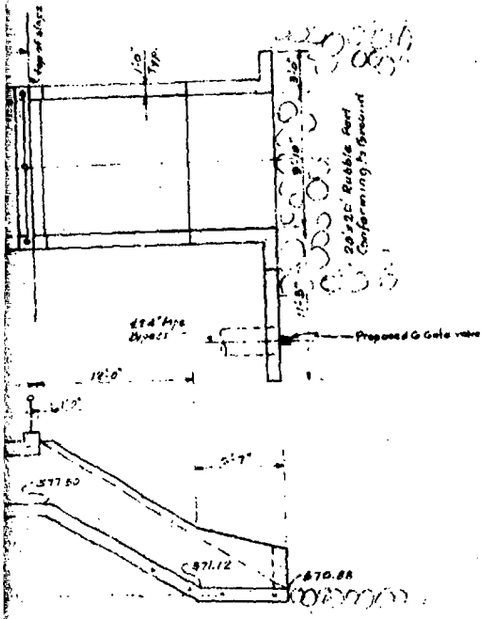

K-SECTION DAM
DOWNSTREAM EXPOSURE MAP
SCALE: 1" = 2000'
L. ROBERT KIMBALL & ASSOCIATES
DRAINAGE AREA BOUNDARY
DAM
IRON SPRINGS QUADRANGLE
7.5 MINUTE SERIES
Fairfield
Fairfield Sta.
Fairfield Sch
St Marys Cem
Iron Springs
Iron Spring
Middle
Creek
Run
Spring
Toms
WESTERN
BDY INDEF
CORP
BDY
Liberty Hall Sch
LIBERTY
Flat
116

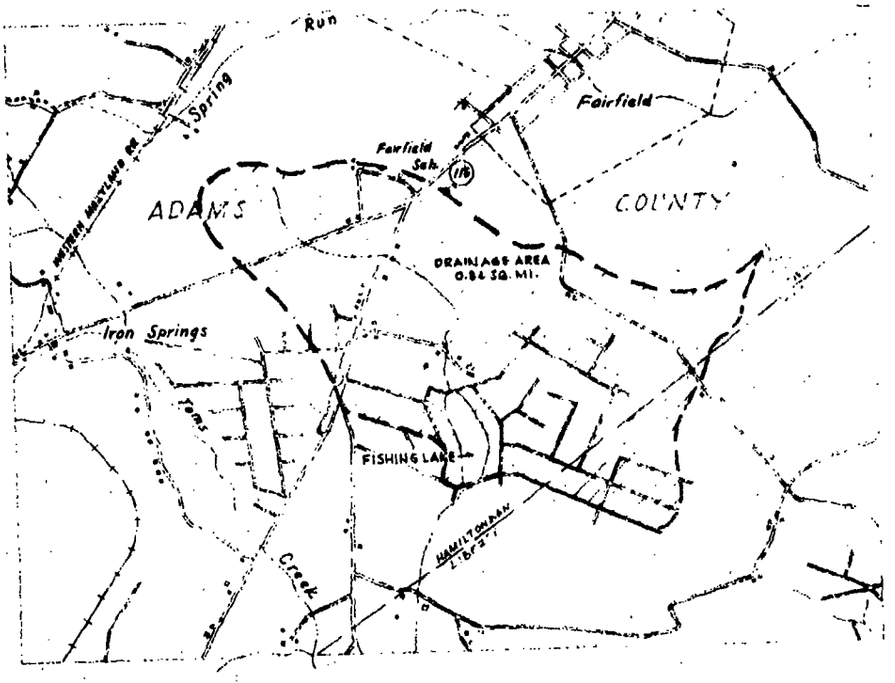


SITE LOCATION MAP
ADAMS COUNTY, PENNSYLVANIA

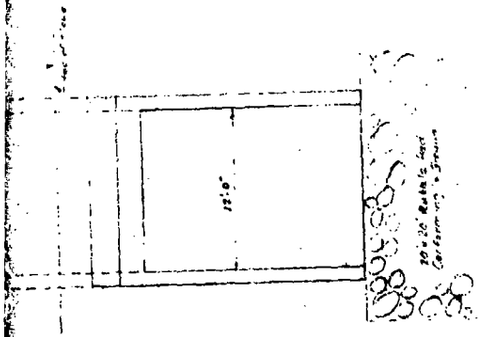

PLAN
SECTION AT
℄ EXISTING SPILLWAY

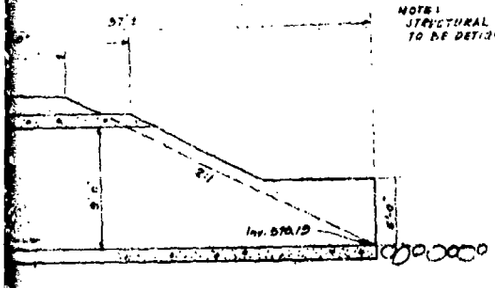

PLAN
SECTION AT
℄ PROPOSED SPILLWAY





LOCATION PLAN
1"=1000'





SECTION 'K'

CHARNITA FISHING LAKE

FOR

CHARNITA, INC. FAIRFIELD, PA.

SCALE AS SHOWN 11-30-70

FILED
RECEIVED IN THE OFFICE OF THE DEPARTMENT OF ENVIRONMENTAL RESOURCES.
ON 1-19-72

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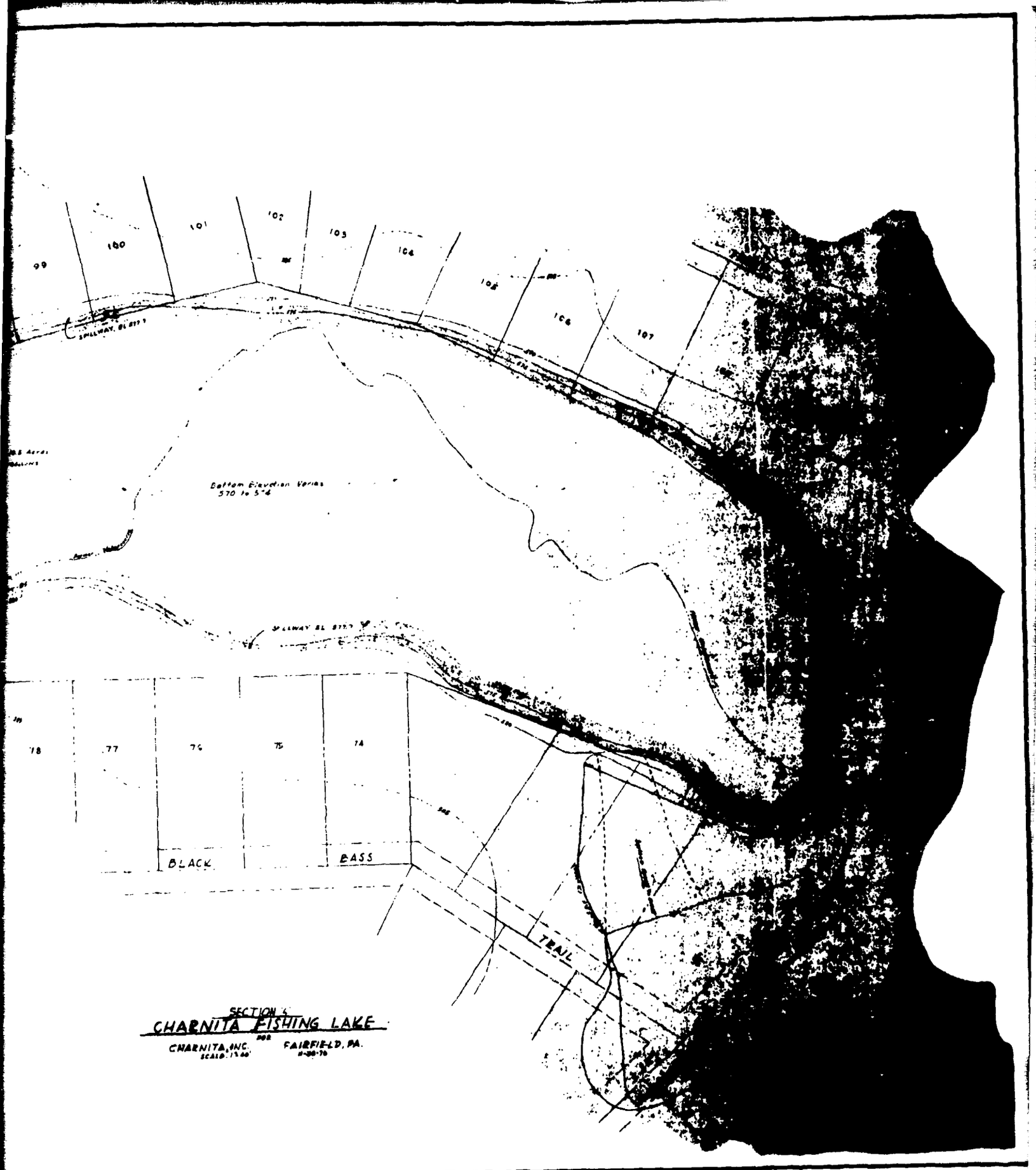
100
99
98
97
TRAIL
81
80
79
78
77



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CONSULTING ENGINEERS & ARCHITECTS

APPENDIX F
GEOLOGY

General Geology

The K-Section Dam is located in the Triassic Lowland Section, also known as the Gettysburg Plain, of the Piedmont province. This province is separated from the Blue Ridge province, which lies to the west, by a normal fault zone running north-south. The strata on the west side of this fault were uplifted during the closing stages of the Triassic period, forming the South Mountains of the Blue Ridge Province. Into the plain to the east of the fault, streams have cut open valleys 100 to 150 feet deep, and above it rise scattered hills 900 to 1,100 feet in elevation.

The K-Section Dam lies 1.5 to 2.0 miles from this normal fault zone. The effect this fault may have on the dam is unknown. The dam is underlain by Upper Triassic Age strata which belong to the Brunswick or Gettysburg Formation of the Newark Group. The rock is composed of brown, fine to coarse grained quartzose sandstone with interbedded shale and limestone conglomerate. Limestone of Ordivician Age underly the Gettysburg Formation.

GEOLOGIC MAP OF THE AREA AROUND THE CALEDONIA WATER COMPANY DAM AND THE K-SECTION DAM
SCALE 1:250,000

TRIASSIC

Diabase (Y)
Dark gray, medium to coarse grained; composed chiefly of gray plagioclase feldspar and black or green augite.

Brunswick Formation or Gettysburg Formation
Brunswick and Gettysburg-Red to brown, fine to coarse grained quartzose sandstone with red shale interbeds; interbedded shale and limestone conglomerate ℔c and quartz pebble conglomerate ℔qc. Heidlersburg Member ℔h consists of gray arkosic sandstone with interbedded red shale, quartz pebble conglomerate and limestone conglomerate

Lockatong Formation
Dark gray to black, thick bedded argillite with occasional zones of thin bedded black shale, locally has thin layers of impure limestone or calcareous shale.

Stockton Formation or New Oxford Formation
Stockton and New Oxford- Light gray to buff, coarse grained arkosic sandstone and conglomerate, red and brown fine grained, siliceous sandstone, and red shale.

CAMBRIAN

GREAT VALLEY AND PIEDMONT

Cah

Antietam Formation
Gray, buff weathering quartzite and quartz schist.

Harpers Formation
Dark greenish gray phyllite and schist with thin quartzite layers; includes Montalto Member Cma, gray quartzite.

Chickies Formation or Weverton Formation
Chickies- Light gray, hard, massive, scolithus-bearing quartzite and quartz schist; thin interbedded dark slate at top; conglomerate (Hellam Member) at base. Weverton- Equivalent to Chickies; gray to purplish gray, feldspathic quartzite and quartzose conglomerate in hard resistant beds containing rounded pebbles; sericitic slate and purplish gray, crumbly, poorly sorted, arkosic sandstones and conglomerates (Loudoun Formation) at base.

Chy

Hardyston Formation
Quartzite with conglomerate at the base.