LEVEL II

DELAWARE RIVER BASIN
SCS DAM PA-445

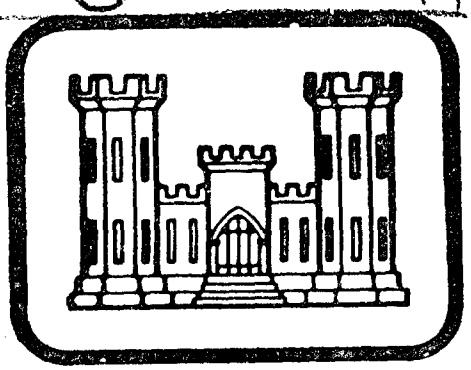
NDI NO. PA-00099
DER NO. 64-176

Delaware River Basin

WAYNE COUNTY, PENNSYLVANIA

PHASE I INSPECTION REPORT.
NATIONAL DAM INSPECTION PROGRAM.

(15) DACW 31-84-C-0019



PREPARED FOR

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

Berger Associates, Inc.
Harrisburg, Pennsylvania

(11) MARCH 1980

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PREFACE

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

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

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

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

PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITIONS
AND RECOMMENDATIONS

Name of Dam:	SCS DAM PA-445
State & State No.:	PENNSYLVANIA, 64-176
County:	WAYNE
Stream:	GREEN CREEK
Date of Inspection:	November 6, 1979

Evaluation [illegible]

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

In accordance with the Corps of Engineers' evaluation guidelines, the size classification of this dam is small and the hazard classification is high. For this dam the recommended spillway design flood is the Probable Maximum Flood (PMF). The spillway capacity is adequate for passing the full PMF peak inflow without overtopping the dam.

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

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

2. That a program be developed for regular maintenance and inspection of the dam and its appurtenant structures.

SUBMITTED BY:

BERGER ASSOCIATES, INC.
HARRISBURG, PENNSYLVANIA

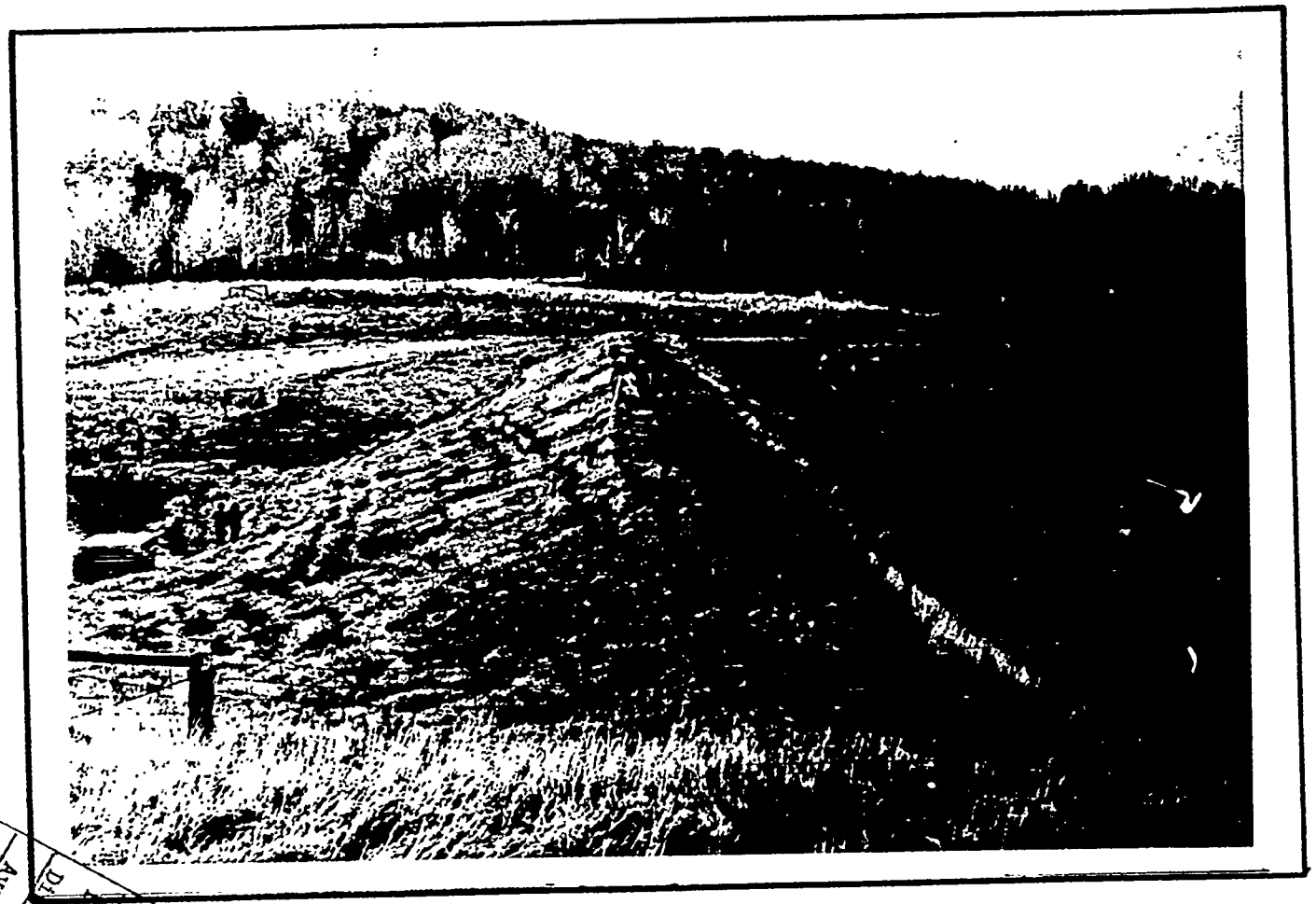
DATE: March 10, 1980

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
HENDRIK JONGSMA
ENGINEER
No. 5557E

APPROVED BY:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

DATE: 25 March 1980



OVERVIEW

SCS DAM PA-445

Photograph No. 1

TABLE OF CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

SCS DAM PA-445

NDI-ID NO. PA-00099
DER-ID NO. 64-176

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

A. Authority

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

B. Purpose

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

1.2 DESCRIPTION OF PROJECT

A. Description of Dam and Appurtenances

This flood control dam was designed by the United States Soil Conservation Service (SCS) and is known to its owners as SCS Dam PA-445. The facilities, completed in 1961, consist of a 550-foot-long homogeneous earthfill embankment with a maximum height of 31 feet above the streambed. The structure has two spillways. The principal spillway is a drop inlet structure and discharges through a 24-inch diameter pipe. An emergency spillway is constructed in the left abutment. This spillway consists of a grassed earth channel with a bottom channel width of 75 feet. The emergency spillway crest was designed to be 3.5 feet below the top of the dam.

B.	Location:	Dreher Township, Wayne County U.S.G.S. Quadrangle - Newfoundland, Pa. Latitude 41°-18.3', Longitude 75°-21.1' Appendix E, Plates I & II
C.	Size Classification:	Small (Height: 31 feet Storage: 408 acre-feet)
D.	Hazard Classification:	High (Refer to Section 3.1.E)

E. Ownership (Maintenance): Wayne County Commissioners
Wayne County Court House
Honesdale, PA 18431

F. Purpose: Flood Control

G. Design and Construction History

The flood control dam was designed by the U.S.D.A. Soil Conservation Service. An application for a permit to construct the dam was filed by the Wayne County Commissioners and approved by the Pennsylvania Department of Environmental Resources (PennDER) on May 17, 1961. The contractor started work in the summer of 1961 and completed the construction in December 1961.

H. Normal Operating Procedures

The facilities were constructed to retard storm water runoff. Both spillways are uncontrolled. All inflow is discharged through the principal spillway until the pool level reaches the level of the emergency spillway crest.

1.3 PERTINENT DATA

A. Drainage Area (square miles)

From files:	0.9
Computed for this report:	0.9
Use:	0.9

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

Maximum known inflow (estimated from U.S.G.S. gage data for Mill Creek at nearby Mountainhome, Pa.)	370
Principal spillway at pool Elev. 1679.8 (Emergency spillway elevation)	69
Principal spillway at pool level Elev. 1685 (low point of dam)	78
Emergency spillway capacity at pool Elev. 1685.0 (low point of dam)	2878
Total spillway capacity	2956

C. Elevation (feet above mean sea level)

Top of dam (low point as surveyed)	1685.0
Top of dam (design)	1684.0
Emergency spillway crest (as surveyed)	1679.8
Emergency spillway crest (design)	1680.5
Principal spillway weir elevation	1667.0
Upstream orifice opening invert (normal pool)	1664.5
Downstream outlet invert	1654.5
Streambed at centerline of dam - estimate	1654.0

D. Reservoir (miles)

Length of normal pool	.2
Length of maximum pool	.4

E. Storage (acre-feet)

Normal pool (Elev. 1664.5)	9
Emergency spillway crest (Elev. 1679.8)	256
Top of dam (Elev. 1685.0)	408

F. Reservoir Surface (acres)

Top of dam (Elev. 1685.0)	33
Normal pool (Elev. 1664.5)	7.3

G. Dam

Refer to Plates III through VI in Appendix E for plan and section.

Type: Homogeneous earthfill with a cutoff core.

Length: 550 feet.

Height: 31 feet.

Top Width: Design - 14 feet; Surveyed - 12 feet.

Side Slopes:	Design	Surveyed
Upstream	3H to 1V	3H to 1V
Downstream	2H to 1V	2H to 1V

Zoning: None, except a low cutoff core (Plate IV). A filter trench and blanket in the downstream section controls the phreatic line and prevents possible piping. A downstream berm was included as a farmer's access road.

Cutoff: Cutoff trench excavated to 4 feet in depth across the valley (Plate IV, Appendix E).

Grouting: None.

H. Outlet Facilities

Type: 14" cast iron pipe.

Location: Discharges into drop inlet structure.

Closure: Metal plate bolted onto discharge end of pipe.

I. Spillway

Sediment Pool Level

Type: 2' wide x 6" high orifice.

Location: Drop inlet structure.

Crest Elevation: 1664.5

Principal

Type: Drop inlet structure.

Inlet: 2 orifices, each 1' high x 6' long.

Outlet: 24" diameter concrete pipe through embankment.

Crest Elevation: 1667.

Location: Upstream toe near center of dam.

Emergency

Type: Uncontrolled sod-lined broad crested weir and channel. The upstream channel slope is 2 percent. The downstream channel, after a short level section, terminates at a wooded area having about a 10 percent slope.

Width: 75 feet on bottom with side slopes of 3.4H to 1V on left and 5.4H to 1V on right.

Crest Elevation: 1679.8

Location: Left abutment.

J. Emergency Outlet

None.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The engineering design data for this dam are found in two principal documents: a design report and the construction drawings. Both documents were prepared by the S.C.S., the design agency. The design report is a comprehensive documentary report with hydrologic and hydraulic data, soils investigation information, including field and laboratory results, geologic report, structural design calculations and specifications. Parts of this report and full size design drawings are available in the PennDER files. Several of the design drawings have been reduced and are included in Appendix E of this report. Reference is made to Section 5.1.A and 6.1.B. of this report for discussion of some of the available design criteria.

2.2 CONSTRUCTION

The available construction data is limited to two progress reports, indicating percentage of completion of major work items and a set of reduced "As Built Plans." This set of plans is in the files of the S.C.S. Harrisburg office. There are no records of any construction problems.

2.3 OPERATION

There are no formal records of operation with the owner, PennDER or S.C.S. The purpose of the facility is flood control and aside from annual maintenance inspection program, there are no other operational procedures.

2.4 EVALUATION

A. Availability

Copies of the design report, as built drawings and specifications are available in the files of the Harrisburg S.C.S. office. Copies of the design drawings and part of the design report are in the files of PennDER. These files do not contain calculations for the structures, hydrology or hydraulics.

B. Adequacy

The available engineering data is considered sufficiently adequate for a reasonable assessment of the design of the dam.

C. Operating Records

Operating records, including maximum pool levels, are not maintained by the County, the agency responsible for maintenance of the project.

D. Post Construction Changes

There have been no modifications made to this facility since the completion of construction in 1961.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

A. General

The general appearance of SCS Dam PA-445 is good. The dam, completed in 1961, was designed and constructed by the Soil Conservation Service as a flood control structure and is located on privately owned property. The County Commissioners of Wayne County are responsible for the maintenance of the dam and its appurtenant structures. An access easement agreement exists between the owners of the property and the Commissioners.

The visual inspection check list and sketches of the general plan and profile of the dam, as surveyed during the inspection, are presented in Appendix A of this report.

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

B. Embankment

The function of this dam is to detain storm water runoff and to release it slowly thus reducing the peak discharge in the downstream area. Storage, therefore, is its prime function. Most of its upstream slope is exposed.

The condition of the upstream and downstream embankment slopes appear to be good. There were no signs of slippage or sloughage. A heavy growth of field grass prevented close observation. Seepage was not observed; however, the normal pool level is only about 5 feet above the elevation of the downstream toe. The downstream berm has some wet areas. This berm is used by farm equipment and the wheel tracks causes poor drainage. There were no drains in the downstream toe.

The horizontal alignment of the dam is straight. The vertical profile of the dam is good and appears to be nearly 1.5 feet higher than the design elevation of 1684.0 (Refer to Plate A-II, Appendix A). The crest of the embankment is also covered with thick field grass.

C. Appurtenant Structures

There are two spillways; the principal spillway and an emergency spillway. The principal spillway consists of a drop inlet type structure with orifice openings. There are no controls on this inlet. Low flows enter the structure through a 2 x 0.5 foot orifice opening. Two open weirs on the side of the structure are located two feet above the orifice opening. Each weir is 6 feet long. The water discharges

from the structure through a 24-inch pipe through the embankment. The outlet of the pipe projects several feet beyond the downstream toe and discharges into a shallow plunge pool. Some riprap protection is present on the downstream toe of the embankment at this location (Photograph 4, Appendix C).

The emergency spillway is located in the left abutment and consists of a grassed earth channel. The channel curves to the right and discharges in a wooded area. The flow of water is directed away from the embankment by a small spur dike. A fence located at the end of the spillway is not desirable, however, woodland is immediately behind the fence and a wide area is available for the discharge. The fence prevents cattle from grazing on the embankment.

D. Reservoir Area

This dam is located in the headwaters of the stream. The banks of the reservoir are flat and stable. Most of the drainage area is wooded.

E. Downstream Channel

Over the first 1000 feet, the downstream channel is a natural stream through a wooded area. At that point, the stream discharges in a manmade lake with a small dam. Within the next 1000 feet downstream, two homes are located in the flood plain and the stream crosses a township road. About 1.5 miles downstream from the dam, is the town of Newfoundland with several homes located close to the stream. Due to the potential hazard to loss of life and economic loss caused by dam failure, the hazard category for this dam is considered to be "High."

3.2 EVALUATION

The overall visual evaluation of the facilities indicates that the dam is in good condition. The emergency spillway has a good grass mat for protection against erosion. The embankment has a thick growth of field grass preventing close observation. There was, however, no evidence of stability or seepage problems. The wet condition at the downstream toe is caused by poor drainage.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

This dam is a flood control dam, maintained by Wayne County. All inflow is discharged through the uncontrolled principal spillway until the pool level reaches the elevation of the emergency spillway. The dam and facilities are regularly inspected by the County for possible maintenance requirements.

4.2 MAINTENANCE OF DAM

The embankment has a thick growth of field grass and is apparently not mowed. Brush or heavy weed growth are not evident at the present time.

4.3 MAINTENANCE OF OPERATING FACILITIES

There are no operating facilities on this structure.

4.4 WARNING SYSTEM

There is no formally organized surveillance or downstream warning system in operation for this dam.

4.5 EVALUATION

Although the operational procedures for this dam are minimal, the facilities are in good condition. A formal surveillance plan and downstream warning system should be developed for implementation 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 and SCS for SCS Dam PA-445 were extensive. A spillway rating curve, stage-storage curve, design flood hydrograph and flood routing data were all contained in the files. The computations contained in Appendix D of this report were made as a check on the design computations. The designer's computations are in reasonably close agreement with those in the appendix.

The design flood hydrograph used by the designer was based on an SCS freeboard hydrograph, having 10.5 inches of runoff and producing a peak inflow of 2434 cfs. When routed through the reservoir, this flood caused the pond water level to rise to about 3.5 feet above the emergency spillway crest.

Since the design flood was not the Probable Maximum Flood (PMF), computations are shown in Appendix D to evaluate the routing of a PMF through this project.

B. Experience Data

There are no records of flood levels at SCS Dam PA-445. Based on records of the U.S.G.S. stream gage on Mill Creek at nearby Mountainhome, PA, the maximum inflow to PA-445 is estimated to be 370 cfs. The emergency spillway has not been used since construction of the dam was completed in 1961.

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.

D. Overtopping Potential

SCS Dam PA-445 has a total storage capacity of 408 acre-feet and the overall height is 31 feet above the streambed. These dimensions indicate a size classification of "Small." The hazard classification for this dam is "High" (See Section 3.1.E).

The recommended Spillway Design Flood (SDF) for a dam having the above classifications is in the range of one-half the PMF to the full PMF. Since this dam is a flood control structure, the recommended SDF is the PMF. For this dam the PMF peak inflow is 2627 cfs (See Appendix D for hydraulic calculations).

Comparison of the estimated PMF peak inflow of 2627 cfs with the estimated total discharge capacity of 2956 cfs indicates that a potential for overtopping of the SCS Dam PA-445 by the PMF does not exist.

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 PMF without overtopping. The spillway-reservoir system can pass a flood event equal to 100% of a PMF, with about 0.7 feet of freeboard.

E. Spillway Adequacy

The small size and high hazard categories, in accordance with the Corps of Engineers criteria and guidelines, indicates that the Spillway Design Flood (SDF) for this dam is in the range of one-half PMF to the full PMF. Since this dam is a flood control structure, the SDF should be the PMF.

Calculations show that the total spillway discharge capacity and reservoir storage capacity, based on the present low point in the dam profile, combine to handle 100% of the PMF (Refer to Appendix D).

Since the total 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 visual inspection of SCS Dam PA-445 did not detect any signs of embankment instability. The field survey indicates that the embankment slopes approximately match the design slopes and are considered to be adequate for the height of dam under consideration. The breast elevation of the dam is about 1.5 feet higher than the design elevation, except adjacent to the spillway, where the dam is one foot above the design elevation.

2. Appurtenant Structures

The emergency spillway in the left abutment appeared to be in good condition with a good grass mat for erosion protection. The side slopes are stable and the flow of water is directed away from the toe of the dam by a spur dike. (Appendix A, Plate A-I). The principal spillway appeared to be in good condition.

B. Design and Construction Data

The information contained in the design report and the design drawings indicate that this dam was designed using current and acceptable engineering procedures. Stability calculations for the embankment were made and the recommended slopes were 3H to 1V and 2.5H to 1V for the upstream and downstream slopes respectively. The final design drawings show a downstream slope of 2H to 1V. No explanation was found. However, the present slopes are considered to be adequate for a flood control embankment of this height. A filter blanket in the downstream toe with a small rock toe is indicated on the drawings (Plate IV, Appendix E). The borings indicated a high water table in the valley. A cutoff trench was excavated (Plate IV, Appendix E) to a depth of about 4 feet, acting as a cutoff wall. The length of this trench is not indicated on the plans. Three antiseep collars were placed on the outlet pipe (Plate VI, Appendix E). A filter drain with a 6-inch perforated pipe was placed in the emergency spillway bottom along the toe of the cut (See Plates III and V, Appendix E).

C. Operating Records

Operating records for this dam have not been maintained.

D. Post Construction Changes

There have been no changes or modifications made to the dam since its completion in 1961.

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 the design report, and construction drawings indicate that SCS Dam PA-445 is in good condition and has been designed in accordance with current engineering practices. The field inspection did not detect any signs of instability or seepage that could be considered to endanger the safety of the dam.

The hydrologic and hydraulic computations indicate that the combination of storage capacity and the discharge of both spillways are adequate to handle 100 percent of the PMF. The spillway is considered to be adequate.

B. Adequacy of Information

The design information contained in the files are considered adequate for making a reasonable assessment of this dam. The conclusions reached that this dam is adequately designed and constructed is supported by the visual appearance of the entire facility.

C. Urgency

The recommendations presented below should be implemented as soon as possible.

D. Additional Studies

Additional studies are not required at this time.

7.2 RECOMMENDATIONS

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

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

2. That a program be developed for regular maintenance and inspection of the dam and its appurtenant structures.

APPENDIX A

CHECKLIST OF VISUAL INSPECTION REPORT

CHECK LIST

PHASE I - VISUAL INSPECTION REPORT

PA DER # 64-176 NDI NO. PA-00 099

NAME OF DAM SCS PA-445 HAZARD CATEGORY High

TYPE OF DAM Earthfill

LOCATION Dreher TOWNSHIP Wayne COUNTY, PENNSYLVANIA

INSPECTION DATE 11/6/79 WEATHER Cloudy-windy TEMPERATURE Low 40's

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

H. Jongsma

R. Shireman

A. Bartlett

NORMAL POOL ELEVATION: 1664.5 (Orifice) AT TIME OF INSPECTION:

BREAST ELEVATION: 1684.0 (Design) POOL ELEVATION: 1664.7

SPILLWAY ELEVATION: 1679.8 (emergency) TAILWATER ELEVATION:

MAXIMUM RECORDED POOL ELEVATION: Unknown

GENERAL COMMENTS: Dam appears to be in good condition. Emergency spillway has a fence across and ends at the edge of woodland, close to dam.

NDI NO. PA-00 099

VISUAL INSPECTION
EMBANKMENT

	OBSERVATIONS AND REMARKS
A. SURFACE CRACKS	None observed. High meadow grass cover.
B. UNUSUAL MOVEMENT BEYOND TOE	None. Some slightly wet areas due to poor drainage in car tracks.
C. SLOUGHING OR EROSION OF EMBANKMENT OR ABUTMENT SLOPES	None detected.
D. ALIGNMENT OF CREST: HORIZONTAL: VERTICAL:	Good. See profile Appendix A, Plate A-II.
E. RIPRAP FAILURES	No riprap.
F. JUNCTION EMBANKMENT & ABUTMENT OR SPILLWAY	Good. Junction at emergency spillway has a low spur dike.
G. SEEPAGE	None observed. Pool level was normal, e.g. low within flood control structure.
H. DRAINS	None observed. There is a large stone fill at outlet structure.
J. GAGES & RECORDER	None.
K. COVER (GROWTH)	Meadow grass on slopes and top.

NDI NO. PA-00 099

VISUAL INSPECTION
OUTLET WORKS
PRINCIPAL SPILLWAY

	OBSERVATIONS AND REMARKS
A. INTAKE STRUCTURE	Principal spillway structure has an orifice. The concrete structure is in good condition.
B. OUTLET STRUCTURE	24-inch pipe projecting out of the toe of the embankment. Discharges into small plunge pool. Good riprap protection around pipe.
C. OUTLET CHANNEL	Natural stream.
D. GATES	None. Principal spillway structure has a bolted manhole cover.
E. EMERGENCY GATE	None.
F. OPERATION & CONTROL	No records.
G. BRIDGE (ACCESS)	None.

NDI NO. PA-00 099

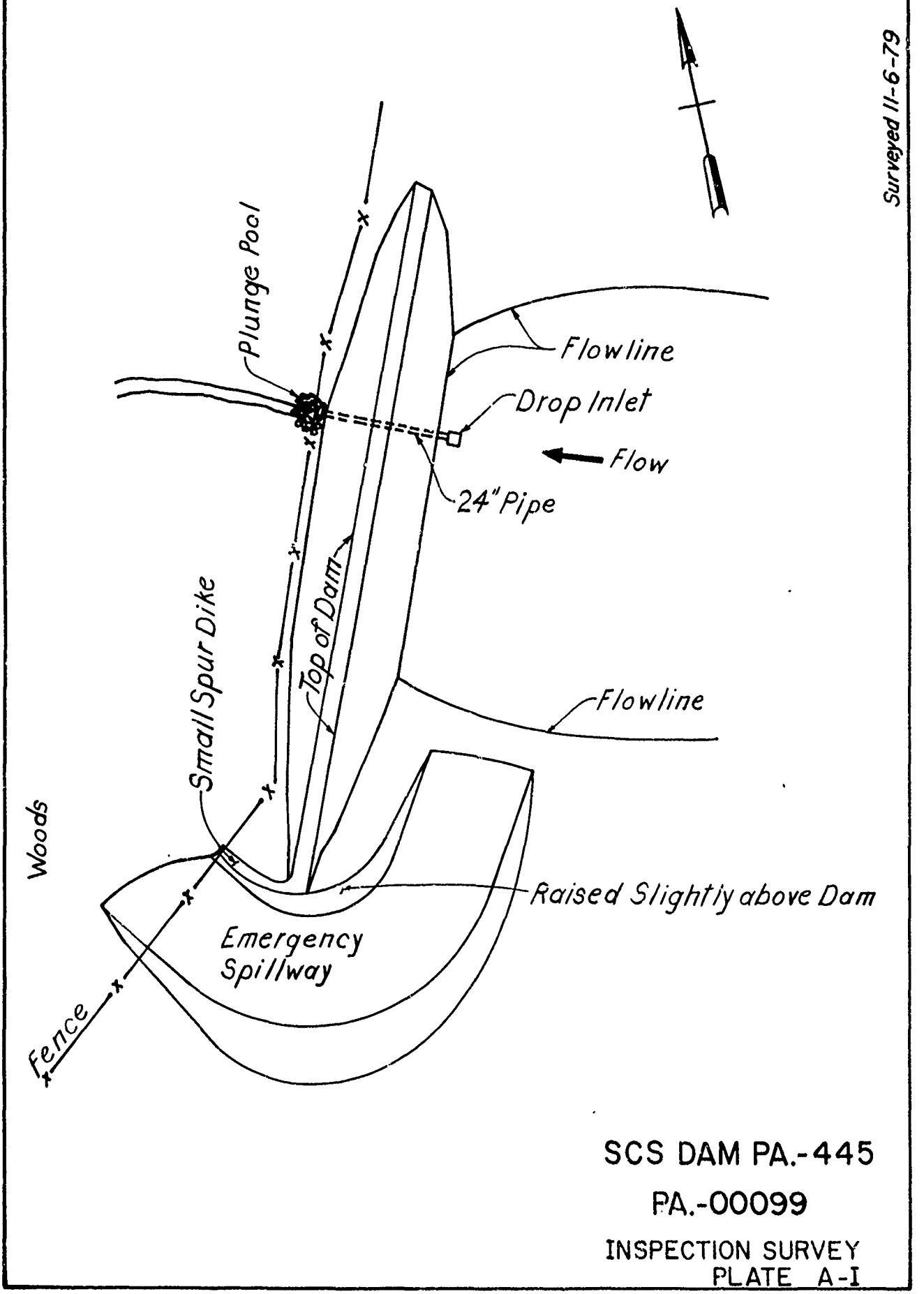
VISUAL INSPECTION
SPILLWAY
EMERGENCY SPILLWAY

	OBSERVATIONS AND REMARKS
A. APPROACH CHANNEL	Grassed approach direct from pool.
B. WEIR: Crest Condition Cracks Deterioration Foundation Abutments	Grassed surface with low grass. A few soggy spots from the hillside. None. None.
C. DISCHARGE CHANNEL: Lining Cracks Stilling Basin	Grassed surface with sloping sidewalls. At the end of the spillway outlet is a fence with woodland behind.
D. BRIDGE & PIERS	None.
E. GATES & OPERATION EQUIPMENT	None.
F. CONTROL & HISTORY	Never used.

NDI NO. PA-00099

VISUAL INSPECTION

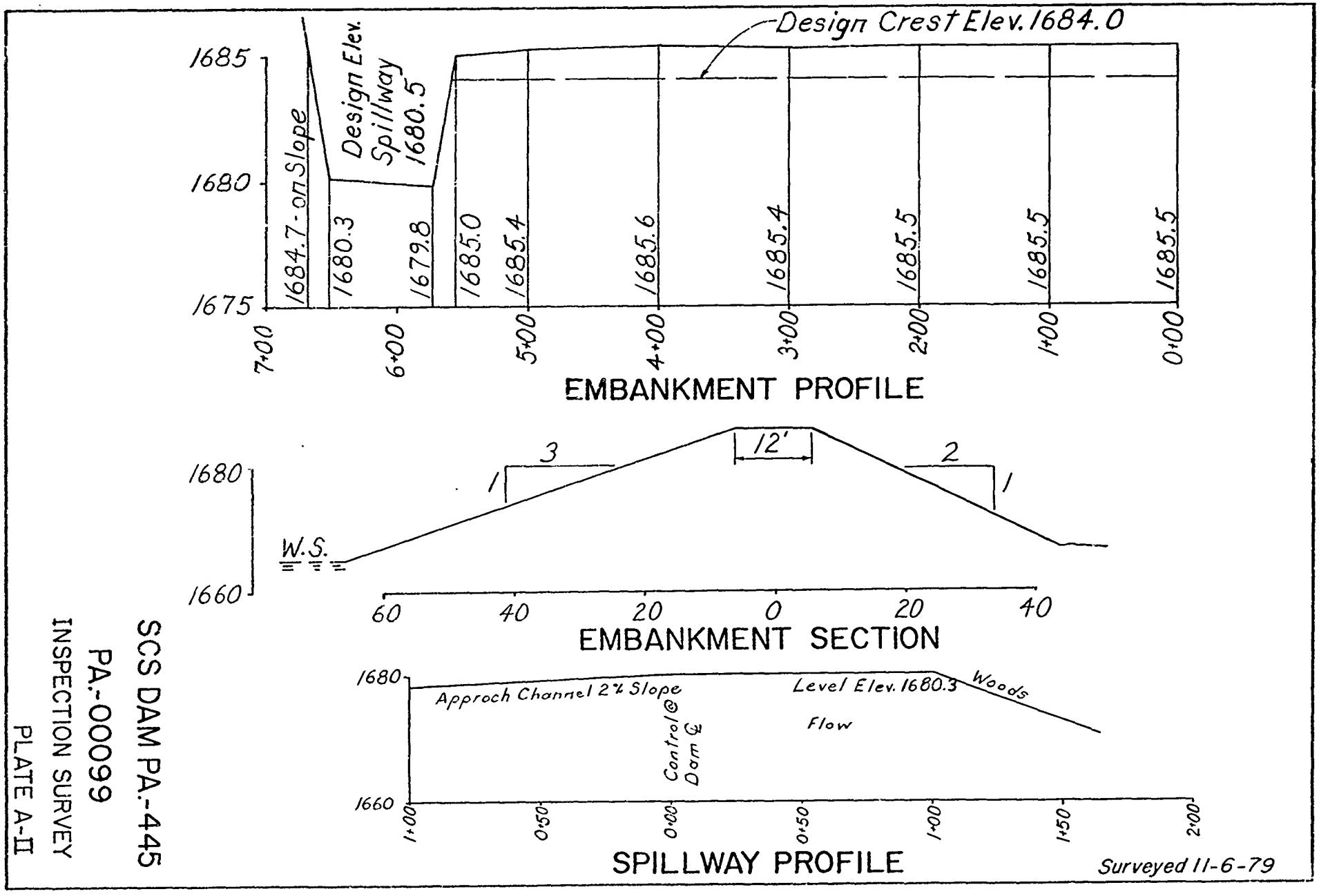
	OBSERVATIONS AND REMARKS
INSTRUMENTATION	
Monumentation	None.
Observation Wells	None.
Weirs	None.
Piezometers	None.
Staff Gauge	None.
Other	None.
RESERVOIR	
Slopes	Flat with light woods. Stable slopes.
Sedimentation	None reported.
Watershed Description	Mostly wooded, relatively flat slopes (6 to 10%)
DOWNSTREAM CHANNEL	
Condition	Natural stream with steep drop to Newfoundland.
Slopes	Flat, wooded, stable.
Approximate Population	At least 7, plus houses in Newfoundland.
No. Homes	2 homes near next township road crossing and additional homes in Newfoundland.



SCS DAM PA.-445

PA.-00099

INSPECTION SURVEY
PLATE A-I



SCS DAM PA.-445

PA.-00099

INSPECTION SURVEY

PLATE A-II

APPENDIX 1.

CHECKLIST OF ENGINEERING DATA

CHECK LIST
ENGINEERING DATA

PA DER # 64-176 NDI NO. PA-00 099

NAME OF DAM SCS DAM PA-445

ITEM	REMARKS
AS-BUILT DRAWINGS	Reduced copies in SCS files. Design drawings in PennDER files.
REGIONAL VICINITY MAP	U.S.G.S. Quadrangle - Newfoundland See Plate II, Appendix E
CONSTRUCTION HISTORY	Permit for construction issued May 17, 1961. Construction started in Summer 1961 and completed December 1961.
GENERAL PLAN OF DAM	Plate III, Appendix E.
TYPICAL SECTIONS OF DAM	Plate IV, Appendix E.
OUTLETS: PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	Emergency spillway - Plate V, Appendix E. Principal spillway - Plate VI, Appendix E. In files of PennDER.

NDI NO. PA-00 099

ENGINEERING DATA

ITEM	REMARKS
RAINFALL & RESERVOIR RECORDS	None.
DESIGN REPORTS	In SCS files. Design summary, geologic reports and borings also in PennDER files.
GEOLOGY REPORTS	See Design Report in SCS files and copies in PennDER files.
DESIGN COMPUTATIONS: HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	See Design Report. Yes. Yes. Yes.
MATERIALS INVESTIGATIONS: BORING RECORDS LABORATORY FIELD	See Design Report Yes. Yes. Yes.
POST CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	Excavation of Emergency Spillway and banks upstream of embankment. Refer to Plate III, Appendix E.

NDI NO. PA-00 099

ENGINEERING DATA

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	None.
HIGH POOL RECORDS	No records.
POST CONSTRUCTION ENGINEERING STUDIES & REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM Description: Reports:	None.
MAINTENANCE & OPERATION RECORDS	Maintenance Inspection Reports by owner.
SPILLWAY PLAN, SECTIONS AND DETAILS	Refer to plates in Appendix E.

NDI NO. PA-00099

ENGINEERING DATA

ITEM	REMARKS
OPERATING EQUIPMENT, PLANS & DETAILS	None. Drawdown pipe closed with bolted plate.
CONSTRUCTION RECORDS	2 progress reports.
PREVIOUS INSPECTION REPORTS & DEFICIENCIES	None.
MISCELLANEOUS	

NDI NO. PA-00099

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 85% wooded, 15% farmland

ELEVATION:

TOP NORMAL POOL & STORAGE CAPACITY: Elev. 1664.5 Acre-Feet 9

TOP FLOOD CONTROL POOL & STORAGE CAPACITY: Elev. 1685 Acre-Feet 408

MAXIMUM DESIGN POOL: Elev. 1684

TOP DAM: Elev. 1685

SPILLWAY:	SEDIMENT POOL	PRINCIPAL	EMERGENCY
a. Elevation	1664.5	1667	1679.8
b. Type	2' x 0.5' orifice	2 orifices 6' x 1' ea.	broadcrested weir
c. Width	2'	6' ea.	75'
d. Length	1'	1'	400'
e. Location Spillover	upstream toe center of dam	upstream toe center of dam	left abutment
f. Number and Type of Gates	none	none	none

OUTLET WORKS:

a. Type 14" cast iron pipe closed by plate bolted on downstream end

b. Location at drop inlet structure

c. Entrance inverts 1657

d. Exit inverts 1654.5

e. Emergency drawdown facilities none

HYDROMETEOROLOGICAL GAGES:

a. Type None

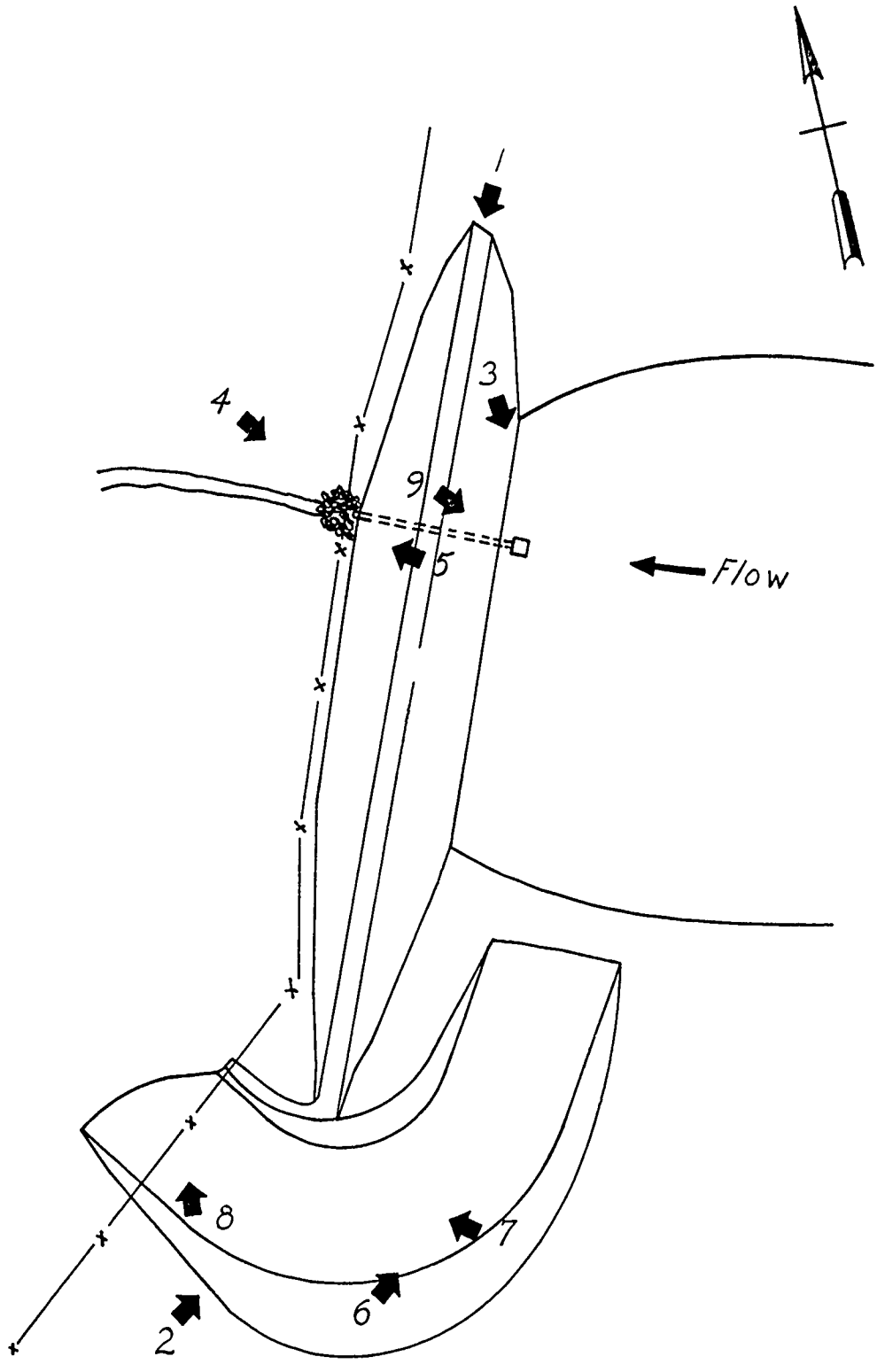
b. Location

c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 2956

APPENDIX C

PHOTOGRAPHS



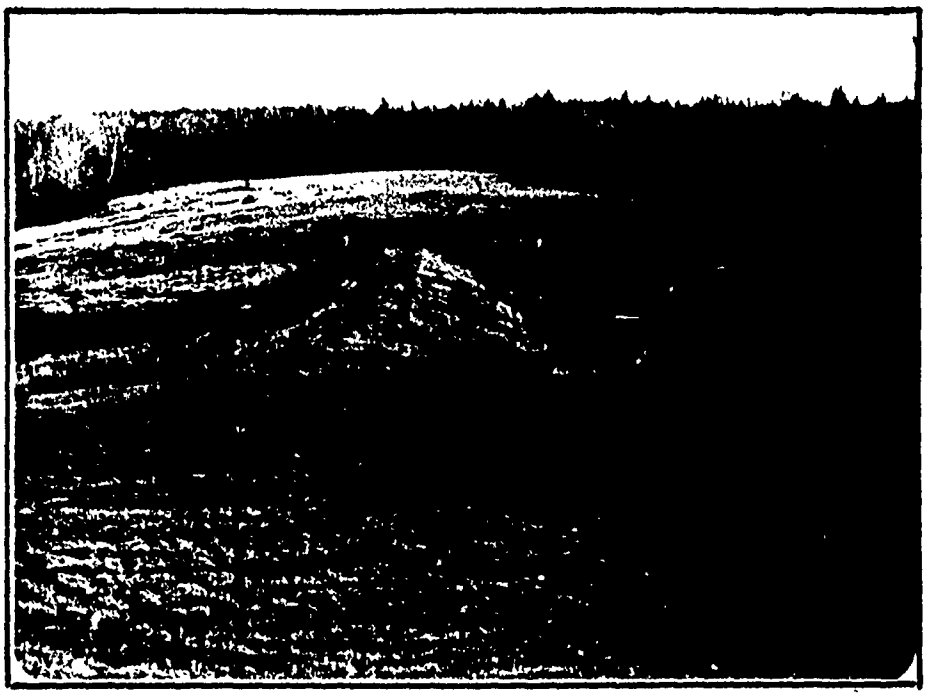
Surveyed 11-6-79

SOS DAM PA.-445

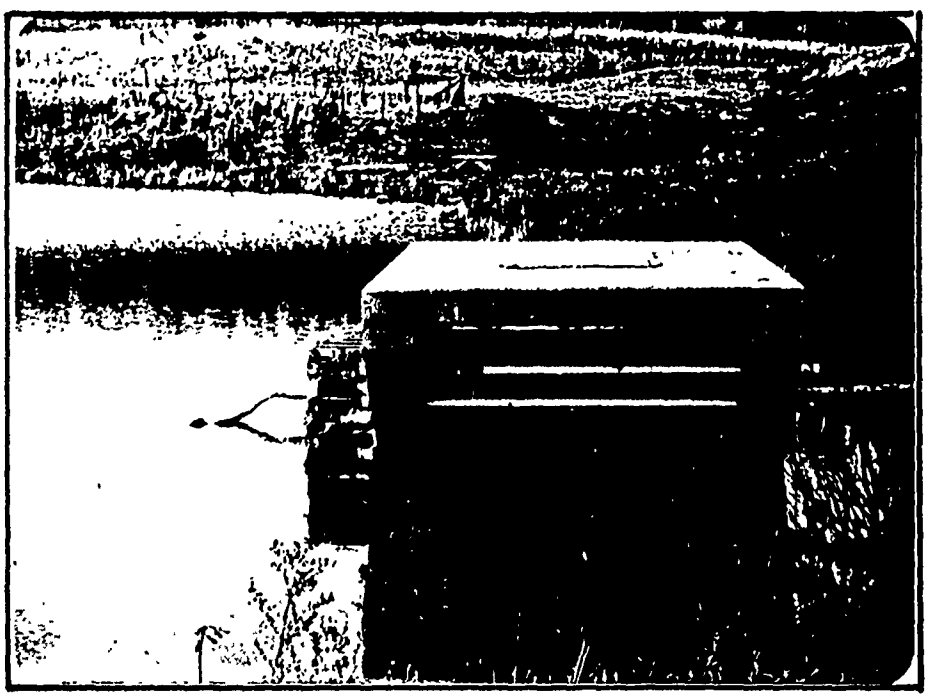
PA.-00099

KEY MAP OF PHOTOGRAPHS

PLATE C-I

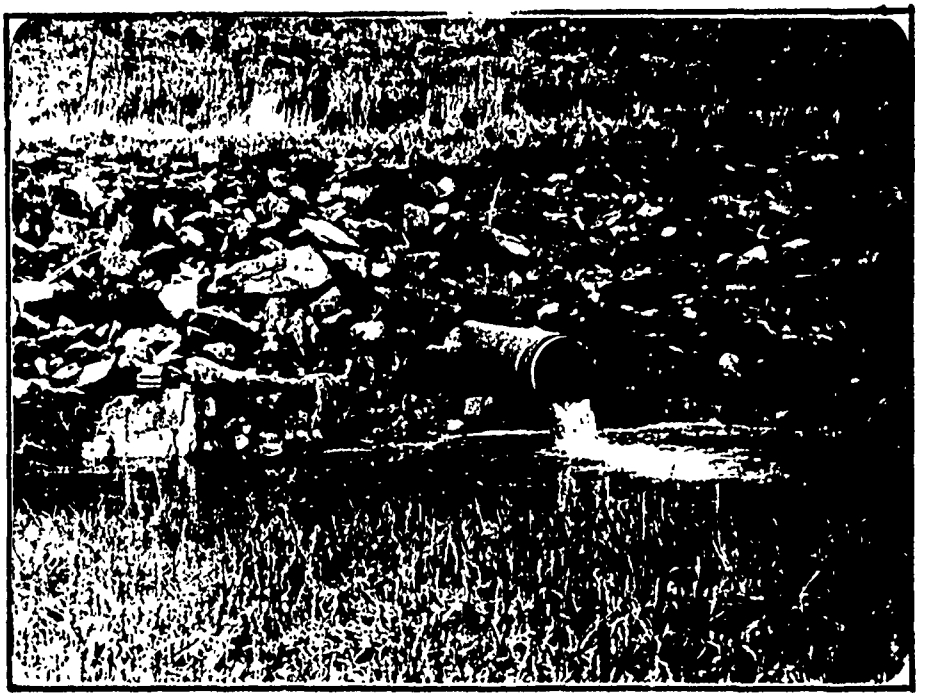


OVERVIEW FROM LEFT HILLSIDE
EMERGENCY SPILLWAY IN FOREGROUND - NO. 2



DETAIL PRINCIPAL SPILLWAY - DROP INLET STRUCTURE - NO. 3

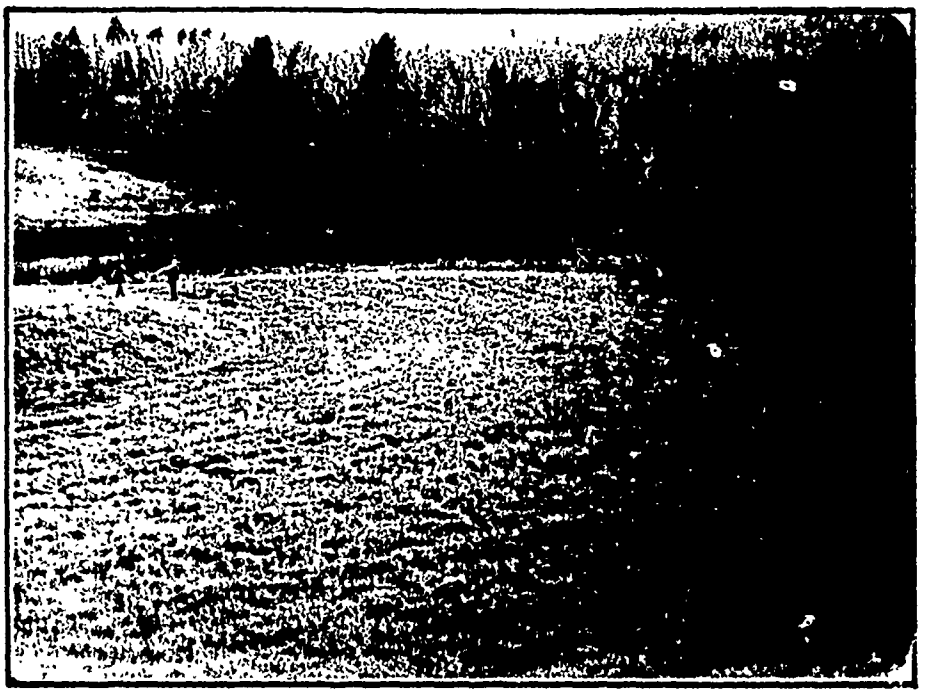
PA-00099
Plate C-II



OUTLET PIPE AND PLUNGE POOL - NO. 4

DOWNSTREAM CHANNEL - NO. 5

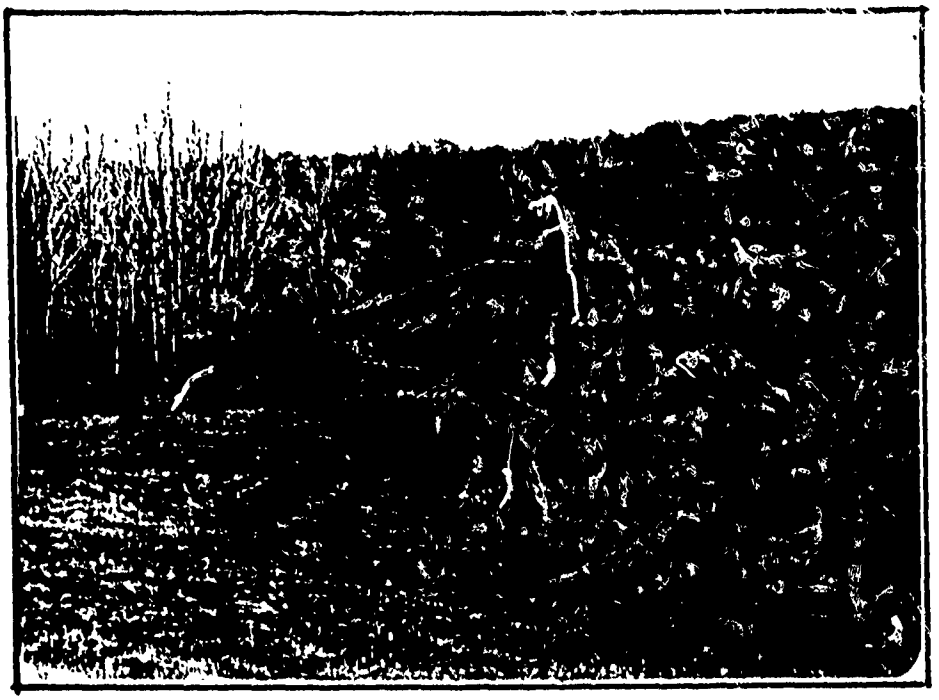
PA-00099
Plate C-III



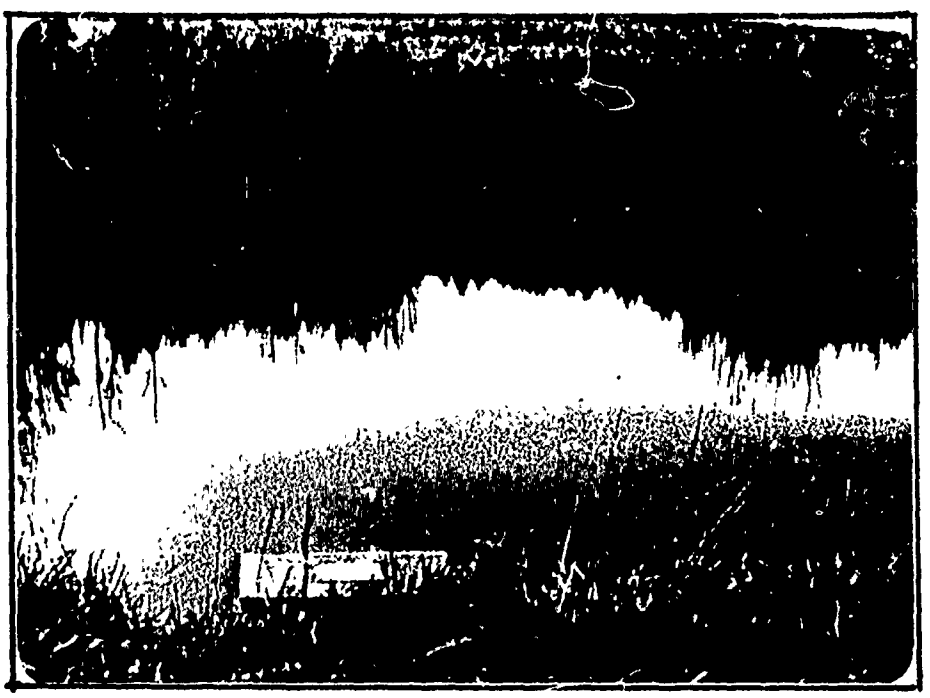
EMERGENCY SPILLWAY LOOKING UPSTREAM - NO. 6

EMERGENCY SPILLWAY LOOKING DOWNSTREAM
DAM AND SPUR DIKE ON RIGHT - NO. 7

PA-00099
Plate C-IV



END OF EMERGENCY SPILLWAY - NO. 8
NOTE FENCE



RESERVOIR AREA - NO. 9

PA-00099
Plate C-V

APPENDIX D

HYDROLOGY AND HYDRAULIC CALCULATIONS

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

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

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

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

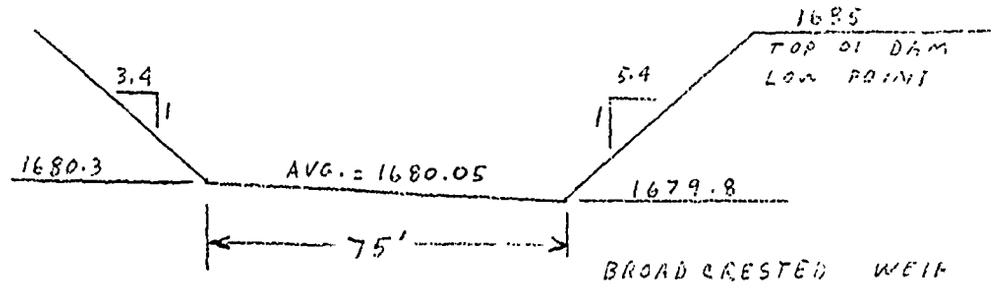
The output data provided by this program permits the comparison of downstream conditions just prior to a breach failure with that after a breach failure and the determination as to whether or not there is a significant increase in the hazard to loss of life as a result of such a failure.

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

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

BY RLS DATE 2/6/80 **BERGER ASSOCIATES** SHEET NO. 1 OF
CHKD. BY DATE PROJECT D965C
SUBJECT PA-AAS

EMERGENCY SPILLWAY RATING



BROAD CRESTED WEIR
C = 2.7 (KING'S HDBK.)

$L = (75 + 75 + 3.4H + 5.4H)/2$

AT LOW POINT TOP OF DAM

$H = 1685 - 1680.05$
$= 4.95'$

$L = (75 + 75 + 3.4(4.95) + 5.4(4.95))/2$
$= 96.78'$

$Q = C\,L\,H^{3/2}$

$= 2.7 \times 96.78 \times (4.95)^{1.5} = 2878$ CFS

BY RLS DATE 2/2/80 **BERGER ASSOCIATES** SHEET NO. 2 OF
CHKD. BY DATE PROJECT D9650
SUBJECT PA: 115

PRINCIPAL SPILLWAY RATING

Q ORIFICE = SEDIMENT POOL SPILLWAY DISCHARGE = $CA\sqrt{2gH}$, C = 0.6

Q P.S. = PRINCIPAL SPILLWAY DISCHARGE = $CA\sqrt{2gH}$, C = 0.6

TOTAL Q = Q ORIFICE + Q P.S.

OUTLET H = 1657 + HEAD ON DISCHARGE PIPE FROM RISER = $(Q/CA)^2/2g$, C = 0.6

ASSUMED WHEN SPILLWAY ORIFICES ARE SUBMERGED

OUTLET Q = FLOW THRU DISCHARGE PIPE FROM RISER = $CA\sqrt{2gH}$

ASSUMED Q P.S. = ASSUMED DISCHARGE THRU PRINCIPAL SPILLWAY ORIFICE

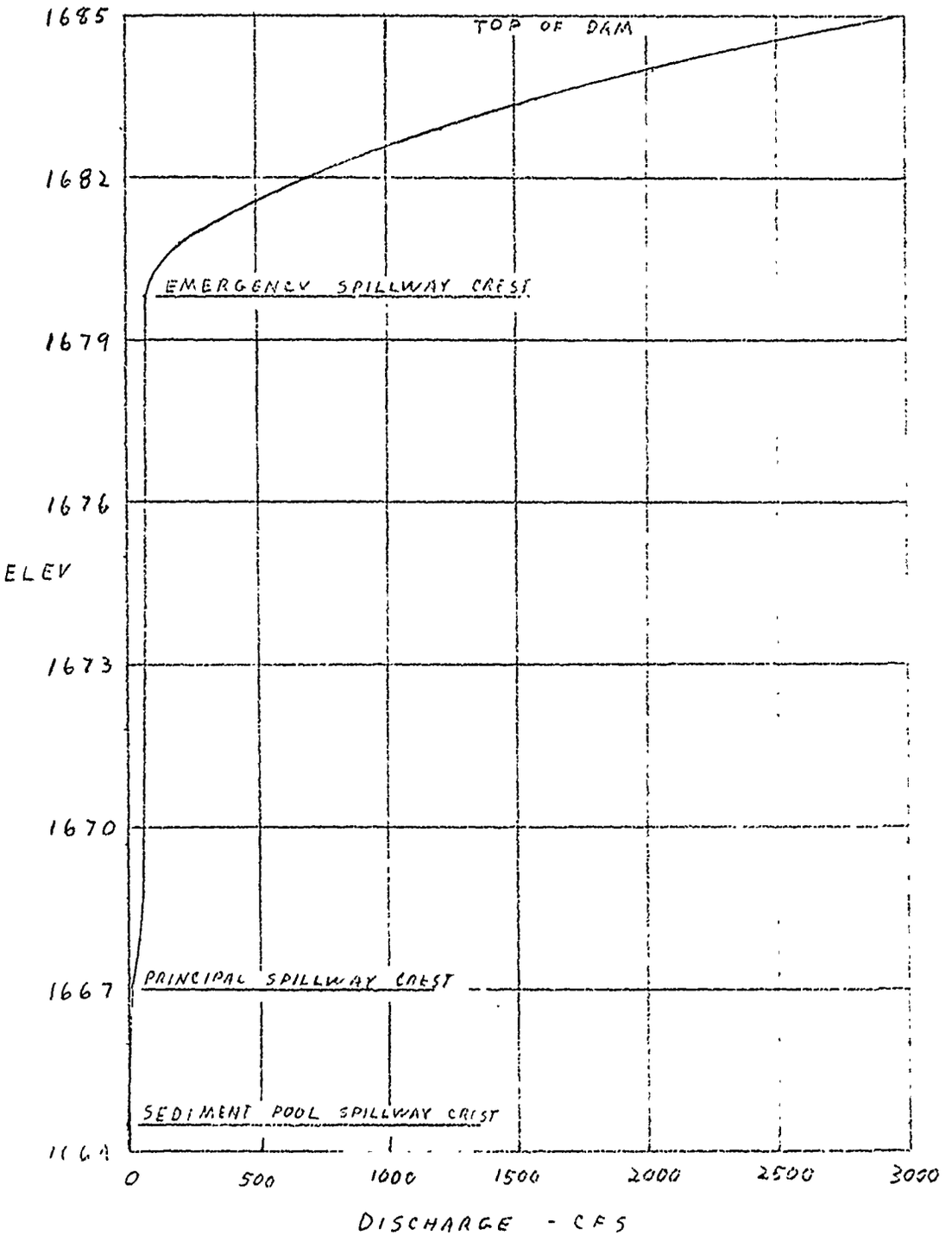
COMPUTED POOL ELEV. = OUTLET H + ((ASSUMED Q P.S.)/(CA))^2/2g

TOTAL Q = ASSUMED Q P.S. + Q ORIFICE = OUTLET Q +

POOL ELEV.	Q ORIFICE	Q P.S.	TOTAL Q	OUTLET H	OUTLET Q	ASSUMED Q P.S.	COMPUTED POOL ELEV.	Q ORIFICE	TOTAL Q
1664.5	0	0	0						
1666	5	0	5						
1667	7	0	7						
				1668	50	47	1669.7	4	51
				1669	52	48	1669.7	4	52
				1671	57	53	1671.8	4	57
				1674	62	57	1675	5	62
				1678.6	70	64	1679.8	5	69
				1679.5	72	66	1680.8	5	71
				1680.5	73	68	1681.9	6	74
				1681.5	75	69	1682.9	6	75
				1682.5	76	70	1684	6	76
				1683.5	78	72	1685	6	78

BY RLS DATE 2/7/80 **BERGER ASSOCIATES** SHEET NO. 3 OF
CHKD. BY DATE PROJECT D-9650
SUBJECT PP - 915

DISCHARGE RATING CURVE



BY RLS DATE 2/7/80 | BERGER ASSOCIATES | SHEET NO. 4 OF
CHKD. BY DATE | PROJECT D.9650
SUBJECT PA 495

DISCHARGE THRU POND DRAIN

14" DIA. ORIFICE

INVERT = 1657

$Q = CA\sqrt{2gH}$ $C = 0.6$

AT POOL ELEV 1664.5

$H = 1664.5 - (1657 + 7/12) = 6.917$

$Q = CA\sqrt{2gH}$
$= 0.6 \times \pi \times (1.17)^2/4 \times (2 \times 32.2 \times 6.917)^{0.5}$

$= 13$ CFS

AT LOW POOL ELEV 1659.5

$H = 1659.5 - (1657 + 7/12) = 1.917$

$Q = 0.6 \times \pi \times (1.17)^2/4 \times (2 \times 32.2 \times 1.917)^{0.5}$

$= 7$ CFS

BY RLS DATE 2/7/80 **BERGER ASSOCIATES** SHEET NO. 1 OF
CHKD. BY DATE PROJECT D9650
SUBJECT PA - 445

MAXIMUM KNOWN FLOOD AT DAMSITE

THERE ARE NO RECORDS OF POOL LEVELS FOR THIS DAM. BASED ON THE RECORDS OF THE GAGE STATION FOR MILL CREEK AT NEARBY MOUNTAINHOME, PA. (D.A. = 5.84 SQ.MI.) THE MAXIMUM DISCHARGE AT THE GAGE OCCURRED IN JULY 1969 WHEN A DISCHARGE OF 1650 CFS WAS OBSERVED. THE MAXIMUM INFLOW TO SCS DAM PA-445 IS ESTIMATED TO BE:

$$Q = \left(\frac{.9}{5.84}\right)^{0.8} \times 1650$$

$$= 370 \text{ CFS}$$

DESIGN FLOOD

SIZE CLASSIFICATION

MAXIMUM STORAGE = 408 ACRE-FEET
MAXIMUM HEIGHT = 31 FEET
SIZE CLASSIFICATION IS "SMALL"

HAZARD CLASSIFICATION

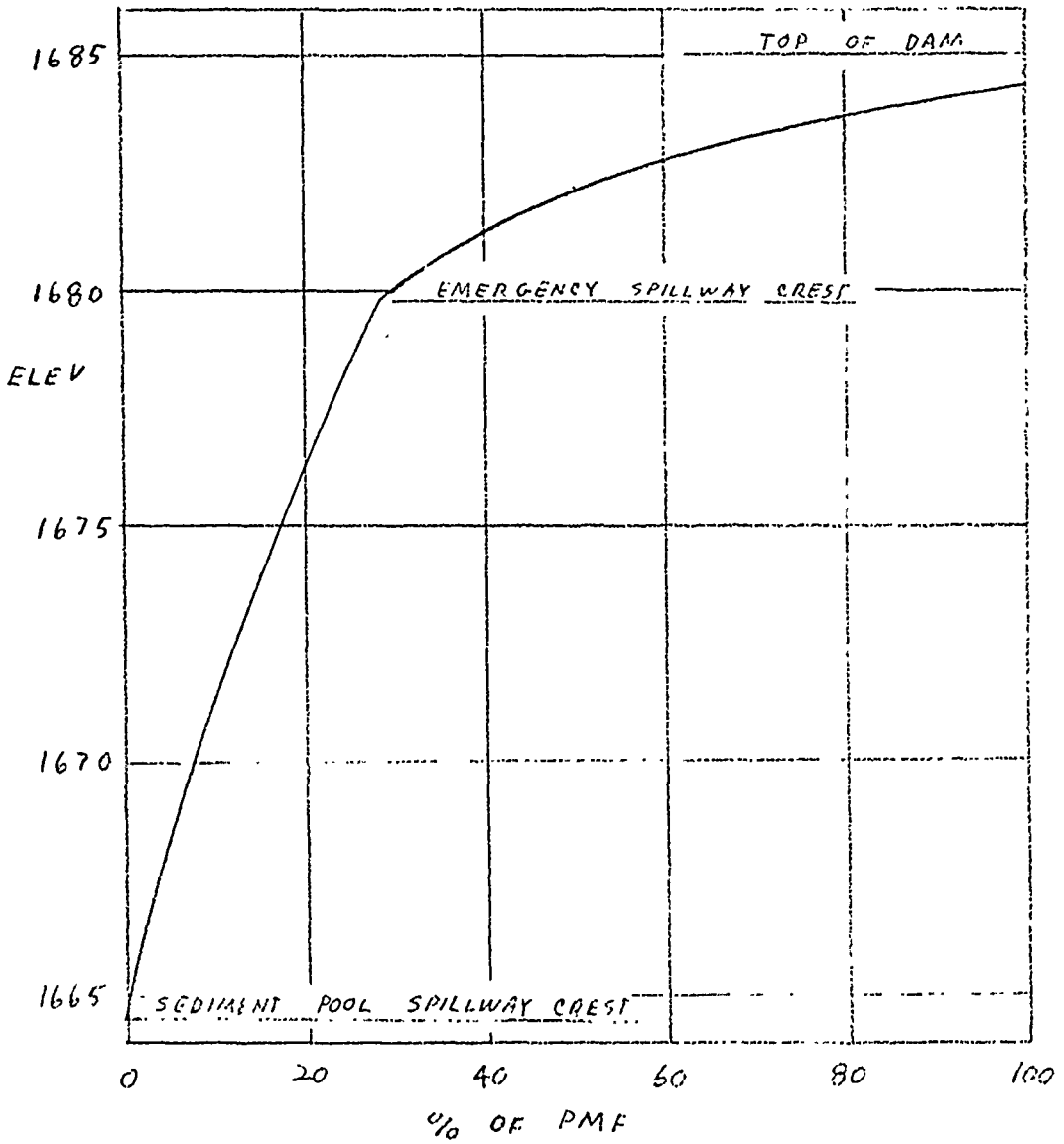
SEVERAL HOUSES AND THE VILLAGE OF NEWFOUNDLAND ARE LOCATED ALONG THE DOWNSTREAM CHANNEL.
USE "HIGH"

RECOMMENDED SPILLWAY DESIGN FLOOL

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

BY RLS DATE 2/8/80 **BERGER ASSOCIATES** SHEET NO. 6 OF
CHKD. BY DATE PROJECT D9656
SUBJECT PA 115

SPILLWAY CAPACITY CURVE



HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: PA-445 RIVER BASIN: DELAWARE

PROBABLE MAXIMUM PRECIPITATION (PMP) = 21.9 INCHES/24 HOURS[1]

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		LAKE	DAM		
DRAINAGE AREA (SQUARE MILES)		0.9			
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		0.9	0.9		
ADJUSTMENT OF PMP FOR DRAINAGE AREA (%)[2]	6 HOURS	111			
	12 HOURS	123			
	24 HOURS	133			
	48 HOURS	142			
	72 HOURS	--			
		Zone 1			
SNYDER HYDROGRAPH PARAMETERS	ZONE[3]	1			
	C_p / C_t[4]	0.45/1.23			
	L (MILES)[5]	1.02			
	L_{ca} (MILES)[5]	.46			
	$T_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	.98			
SPILLWAY DATA			SEDIMENT POOL	PRINCIPAL	EMERGENCY
	CREST LENGTH (FT.)		2	12	75
	FREEBOARD (FT.)		20.5	18	5.2
	DISCHARGE COEFFICIENT		0.6	0.6	2.7
	EXPONENT		--	--	1.5
	ELEVATION		1664.5	1667	1679.8
AREA[6] (ACRES)	NORMAL POOL		7.3		
	ELEV. 1672		16		
	ELEV. 1692		42		
STORAGE (ACRE-FEET)	NORMAL POOL[7]		9		
	ELEV. 1660.8[8]		0		
	ELEV. ____[8]				
	ELEV ____[8]				

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.
L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

(6) Planimetered area encompased by contour upstream of dam.

(7) PennDER files.

(8) Computed by conic method.

```
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
********************************
     1              A1     SCS DAM  PA 445   ****   GREEN CREEK
     2              A2     DREHER TWP., WAYNE COUNTY, PA.
     3              A3     NDI # PA-00099     PA DER # 64-176
     4              B   300      0     15      0      0      0      0      0     -4      0
     5              B1    5
     6              J     1      9      1
     7              J1    1     .8     .6     .5     .4     .3     .2    .15     .1
     8              K            1                                   1
     9              K1                INFLOW  HYDROGRAPH
    10              M     1      1     .9
    11              P         21.9    111    123    133    142
    12              T                                                1    .05
    13              W   .98    .45
    14              X  -1.5    .05      2
    15              K     1      2                                   1
    16              K1                RESERVOIR  ROUTING
    17              Y                         1
    18              Y1    1                                          9     -1
    19              Y41664.5   1666   1667 1668.7 1669.7 1671.8   1675 1677.8 1680.3 1681.9
    20              Y41682.9   1684   1685
    21              Y5    0      5      7     51     52     57     62     69    208    639
    22              Y5 1212   2034   2956
    23              $A    0    7.3     16     29     42     53
    24              $E1660.8 1664.5   1672   1682   1692   1702
    25              $$1679.8
    26              $D 1685
    27              K    99
1                                PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                          RUNOFF HYDROGRAPH AT            1
                                          ROUTE HYDROGRAPH TO             2
                                          END OF NETWORK


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

 RUN  DATE* 80/02/07.
      TIME* 15.42.23.


                              SCS DAM  PA-445   ****   GREEN CREEK
                              DREHER TWP., WAYNE COUNTY, PA.
                              NDI # PA-00099     PA DER # 64-176

                                                JOB SPECIFICATION
                        NQ     NHR    NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
                       300       0      15       0       0       0       0       0      -4       0
                                              JOPER     NWT   LROPT   TRACE
                                                  5       0       0       0


                                                 MULTI-PLAN ANALYSES TO BE PERFORMED
```

[illegible]
BREMER [illegible]
[illegible] FA-00079 [illegible]

JOB SPECIFICATION

NQ	NHR	NMIN	[illegible]	[illegible]	[illegible]	METRC	IPLT	IPRT	NSTAN
300	0	15	[illegible]	[illegible]	0	0	0	-4	0

[illegible]	[illegible]	LROPT	TRACE
[illegible]	[illegible]	[illegible]	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1
RTIOS= 1.00 .80 .60 .50 .40 .30 .20 .15 .10

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

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH

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

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.90	0.00	.90	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.90	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

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

UNIT HYDROGRAPH DATA
TP= .98 CP= .45 NTA= 0

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

UNIT HYDROGRAPH 33 END-OF-PERIOD ORDINATES, LAG= .98 HOURS, CP= .45 VOL= 1.00

29.	105.	198.	261.	262.	225.	191.	161.	137.	116.
98.	83.	70.	59.	50.	43.	36.	30.	26.	22.
18.	16.	13.	11.	9.	8.	7.	6.	5.	4.
3.	3.	2.	2.	2.					

0 END-OF-PERIOD FLOW

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

SUM 24.88 22.49 2.39 52013.
(632.)(571.)(61.)(1472.84)

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

0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	9.	-1

STAGE	1664.50	1666.00	1667.[illegible]0	1668.70	1669.70	1671.50	1675.00	1677.30	1680.00	1681.90
	1682.90	1684.00	1685.00							
FLOW	0.00	5.00	7.00	51.00	52.00	57.00	62.00	69.00	[illegible]	639.00
	1212.00	2034.00	2956.00							

SURFACE AREA=	0.	7.	15.	29.	42.	53.
CAPACITY=	0.	5.	54.	316.	657.	1143.
ELEVATION=	1661.	1665.	1672.	1682.	1692.	1702.

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
1679.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1685.0	0.0	0.0	0.

EAK OUTFLOW IS 2338. AT TIME 41.25 HOURS

EAK OUTFLOW IS 1739. AT TIME 41.50 HOURS

PEAK OUTFLOW IS 1109. AT TIME 42.25 HOURS

PEAK OUTFLOW IS 788. AT TIME 42.75 HOURS

EAK OUTFLOW IS 464. AT TIME 43.25 HOURS

EAK OUTFLOW IS 129. AT TIME 44.75 HOURS

EAK OUTFLOW IS 61. AT TIME 45.50 HOURS

EAK OUTFLOW IS 60. AT TIME 45.00 HOURS

EAK OUTFLOW IS 56. AT TIME 44.50 HOURS

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

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9
				RATIOS APPLIED TO FLOWS								
				1.00	.80	.60	.50	.40	.30	.20	.15	.10
HYDROGRAPH AT	1	.90	1	2627.	2102.	1576.	1314.	1051.	788.	525.	394.	263.
	(	2.33)	(	74.40)(	59.52)(	44.64)(	37.20)(	29.76)(	22.32)(	14.88)(	11.16)(	7.44)
ROUTED TO	2	.90	1	2338.	1739.	1109.	788.	464.	129.	64.	60.	56.
	(	2.33)	(	66.21)(	49.24)(	31.39)(	22.31)(	13.14)(	3.65)(	1.81)(	1.71)(	1.58)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1664.50	1679.60	1685.00
STORAGE	9.	256.	408.
OUTFLOW	0.	69.	2956.

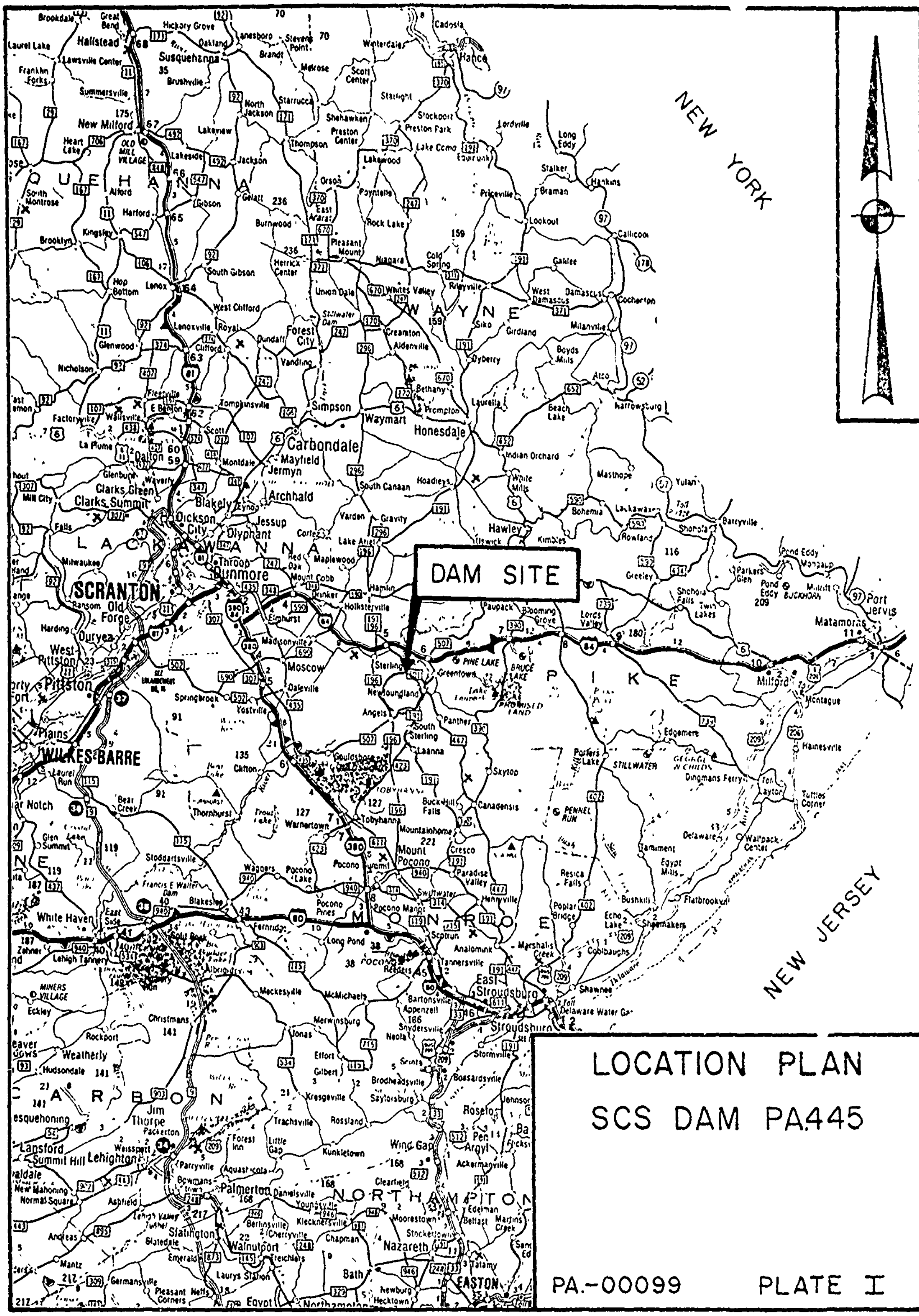
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1684.33	0.00	387.	2338.	0.00	41.25	0.00
.80	1683.61	0.00	364.	1739.	0.00	41.50	0.00
.60	1682.72	0.00	337.	1109.	0.00	42.25	0.00
.50	1682.16	0.00	321.	788.	0.00	42.75	0.00
.40	1681.25	0.00	295.	464.	0.00	43.25	0.00
.30	1680.02	0.00	261.	129.	0.00	44.75	0.00
.20	1676.27	0.00	173.	64.	0.00	45.50	0.00
.15	1673.94	0.00	127.	60.	0.00	45.00	0.00
.10	1671.32	0.00	84.	56.	0.00	44.50	0.00

IOI ENCOUNTERED.

RMINAL 110 TIME OUT.
E 80/02/08. 04.57.13.

APPENDIX E

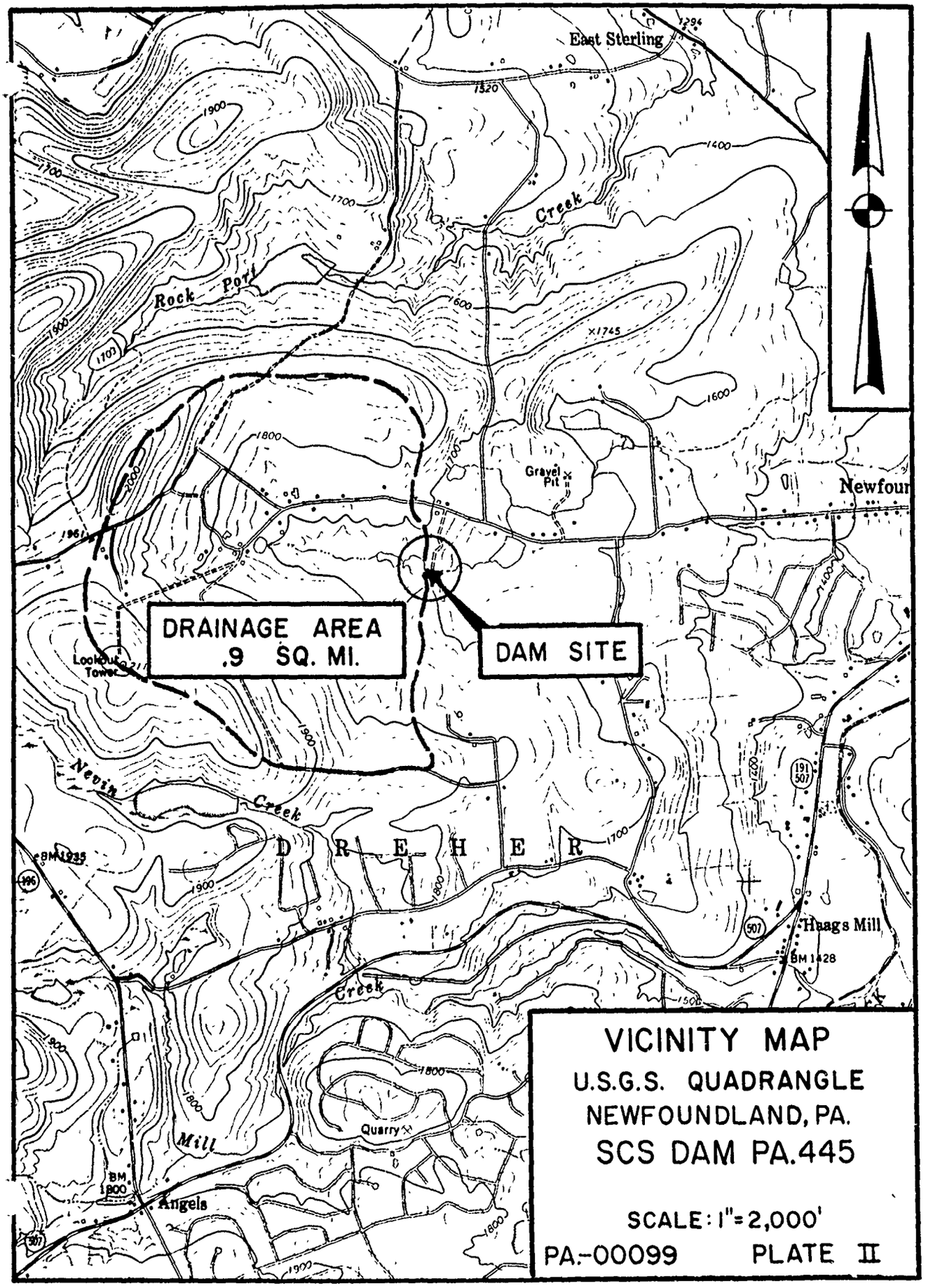
PLATES

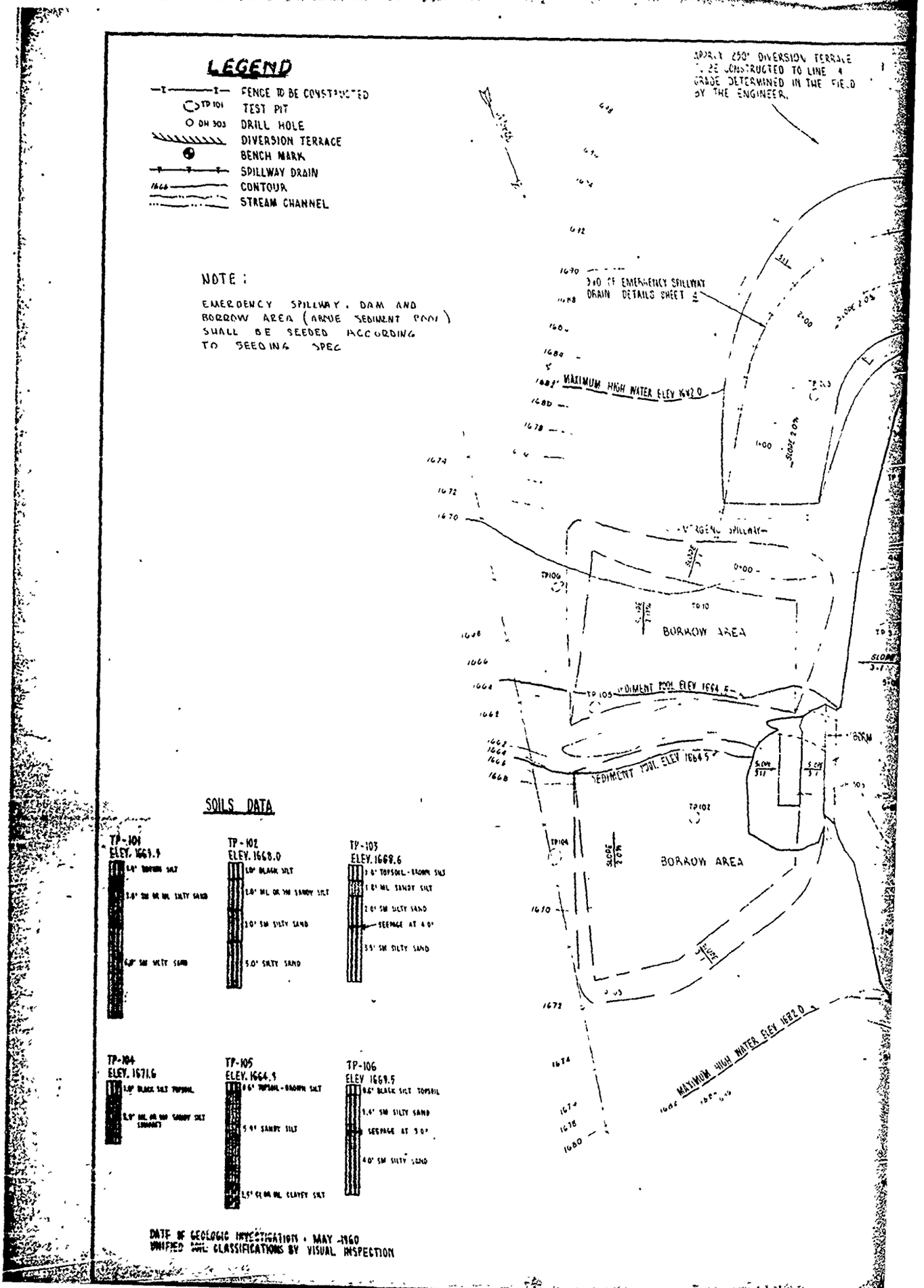


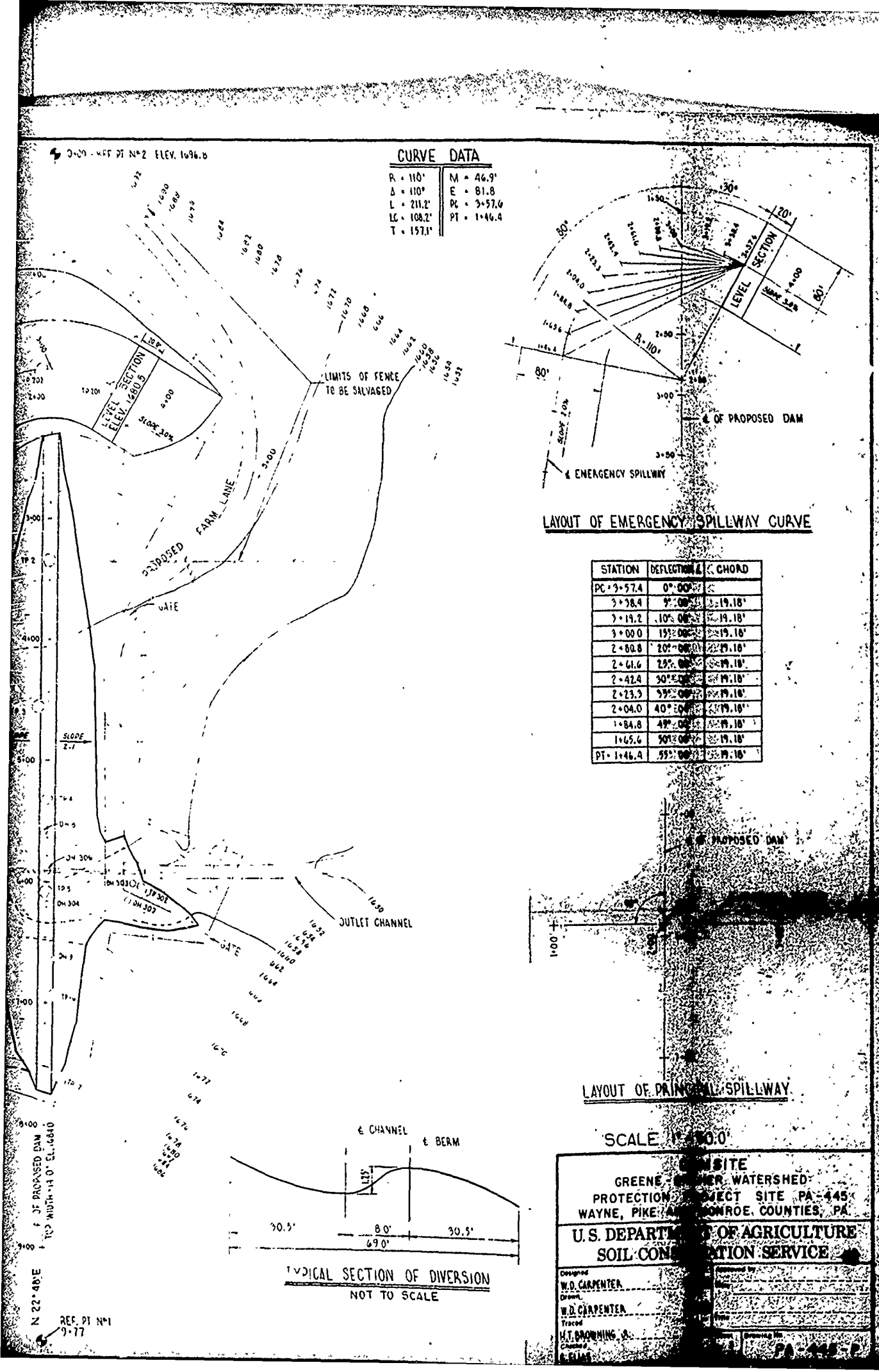
LOCATION PLAN

SCS DAM PA.445

PA.-00099 PLATE I


East Sterling
Rock Port
Creek
Gravel Pit
Newfoun
DRAINAGE AREA
.9 SQ. MI.
DAM SITE
Lookout Tower
Nevin
Creek
D R E H E R
BM 1935
Haags Mill
BM 1428
Creek
Quarry
Mill
BM 1800
Angels
VICINITY MAP
U.S.G.S. QUADRANGLE
NEWFOUNDLAND, PA.
SCS DAM PA.445
SCALE: 1"=2,000'
PA.-00099 PLATE II

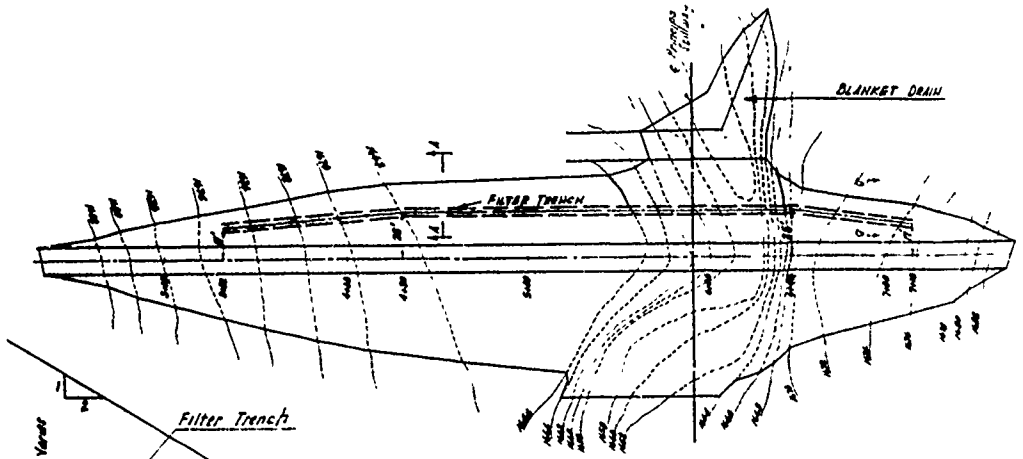

LEGEND
FENCE TO BE CONSTRUCTED
TP 101 TEST PIT
DH 303 DRILL HOLE
DIVERSION TERRACE
BENCH MARK
SPILLWAY DRAIN
1666 CONTOUR
STREAM CHANNEL
NOTE :
EMERGENCY SPILLWAY, DAM AND BORROW AREA (ARMUE SEDIMENT POOL) SHALL BE SEEDED ACCORDING TO SEEDING SPEC
APPROX 250' DIVERSION TERRACE TO BE CONSTRUCTED TO LINE & GRADE DETERMINED IN THE FIELD BY THE ENGINEER.
3+0 OF EMERGENCY SPILLWAY DRAIN DETAILS SHEET 5
MAXIMUM HIGH WATER ELEV 1682.0
EMERGENCY SPILLWAY
BORROW AREA
SEDIMENT POOL ELEV 1664.5
BORROW AREA
MAXIMUM HIGH WATER ELEV 1682.0
SOILS DATA
TP-101
ELEV. 1669.9
TP-102
ELEV. 1668.0
10.0' BLACK SILT
4.0' ML OR MH SANDY SILT
3.0' SM SILTY SAND
5.0' SILTY SAND
TP-103
ELEV. 1668.6
3.0' TOPSOIL - BROWN SILT
1.0' ML SANDY SILT
2.0' SM SILTY SAND
SEEPAGE AT 4.0'
3.5' SM SILTY SAND
TP-104
ELEV. 1671.6
TP-105
ELEV. 1664.5
6.0' TOPSOIL - BROWN SILT
5.0' SANDY SILT
TP-106
ELEV 1669.5
0.6' BLACK SILT TOPSOIL
9.4' SM SILTY SAND
SEEPAGE AT 5.0'
4.0' SM SILTY SAND
DATE OF GEOLOGIC INVESTIGATION - MAY 1960
UNIFIED SOIL CLASSIFICATIONS BY VISUAL INSPECTION



STATION	DEFLECTION ∠	∠ CHORD
PC • 3+57.4	0° 00'	
3+38.4	9° 00'	19.18'
3+19.2	10° 00'	19.18'
3+00.0	15° 00'	19.18'
2+80.8	20° 00'	19.18'
2+61.6	25° 00'	19.18'
2+42.4	30° 00'	19.18'
2+23.3	35° 00'	19.18'
2+04.0	40° 00'	19.18'
1+84.8	45° 00'	19.18'
1+65.6	50° 00'	19.18'
PT • 1+46.4	55° 00'	19.18'

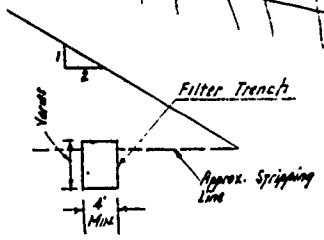
	SITE
	GREENE - [illegible] WATERSHED
	PROTECTION [illegible] JECT SITE PA-445
	WAYNE, PIKE, A[illegible] ONROE COUNTIES, PA.
	U.S. DEPARTM[illegible] OF AGRICULTURE
	SOIL CON[illegible] ATION SERVICE
Designed W.D. CARPENTER	Approved by
Drawn W.D. CARPENTER	Date
Traced H.T. BROWNING, JR.	Date
Checked	Sheet 1 Drawing No. PA-445-P

PA-00099
PLATE III



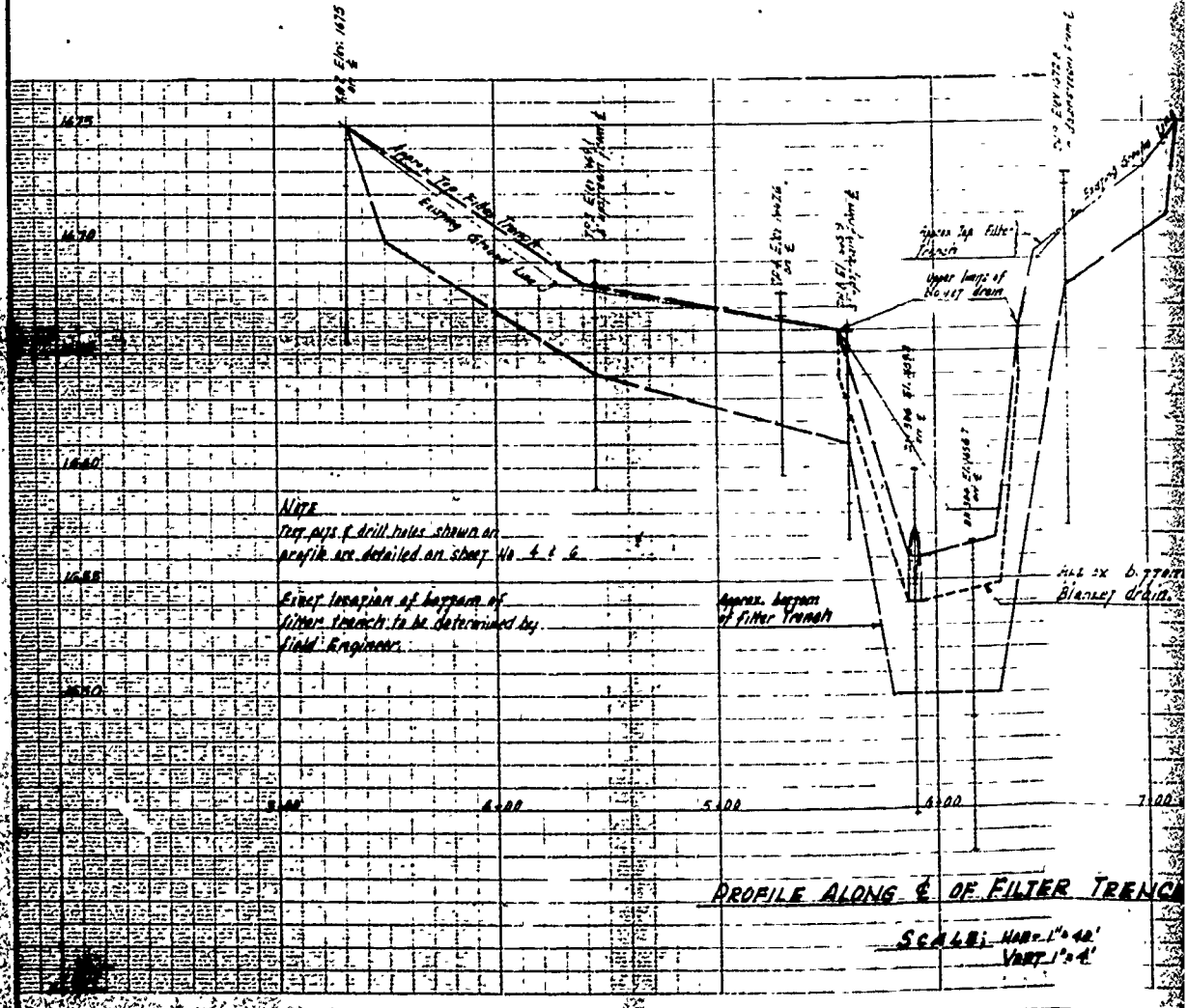
PLAN VIEW OF FILTER TRENCH & BLANKET DRAIN

SCALE 1"=50'



SECTION A-A & B-B

NOT TO SCALE



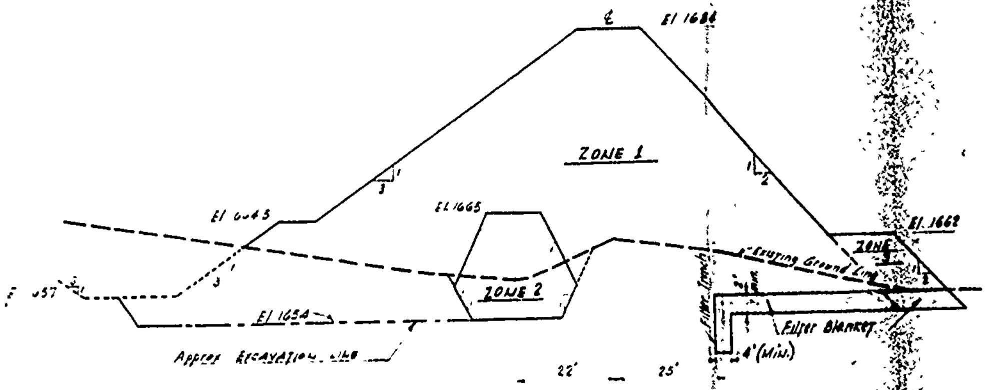
Note

Test pits & drill holes shown on profile are detailed on sheet No. 4 & 6

Exact location of bottom of filter trench to be determined by field Engineer.

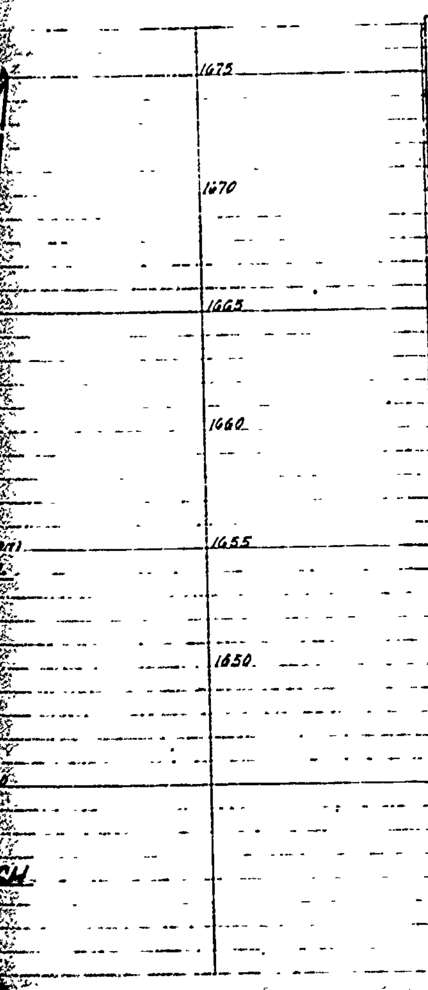
PROFILE ALONG ℄ OF FILTER TRENCH

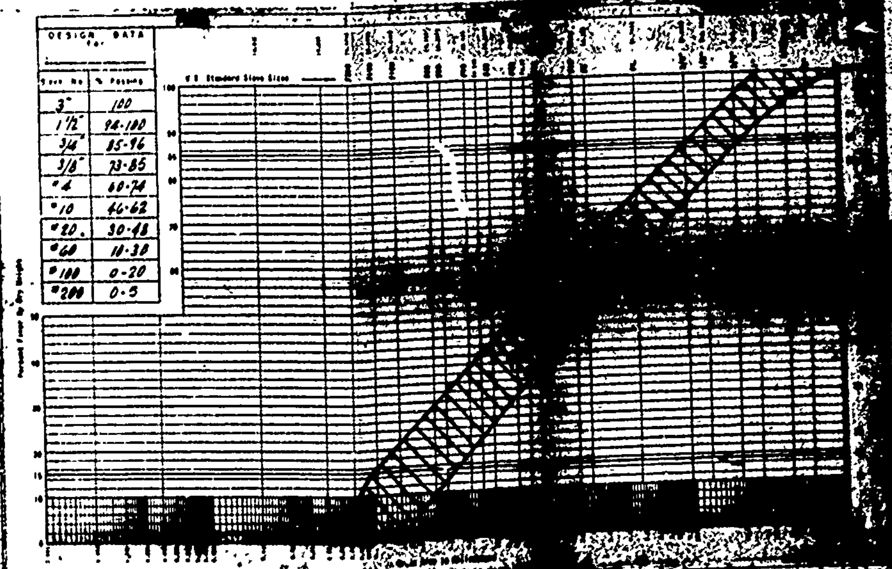
SCALES: HOR. 1"=40'
VERT. 1"=4'



Zone 1 Compacted Fill (Class B-2) SC-SM ML SM Material
Zone 2 Compacted Fill (Class B-2) ... Material
Zone 3 Rock Fill

SECTION ALONG ℄ PRINCIPAL SPILLWAY
Not To Scale





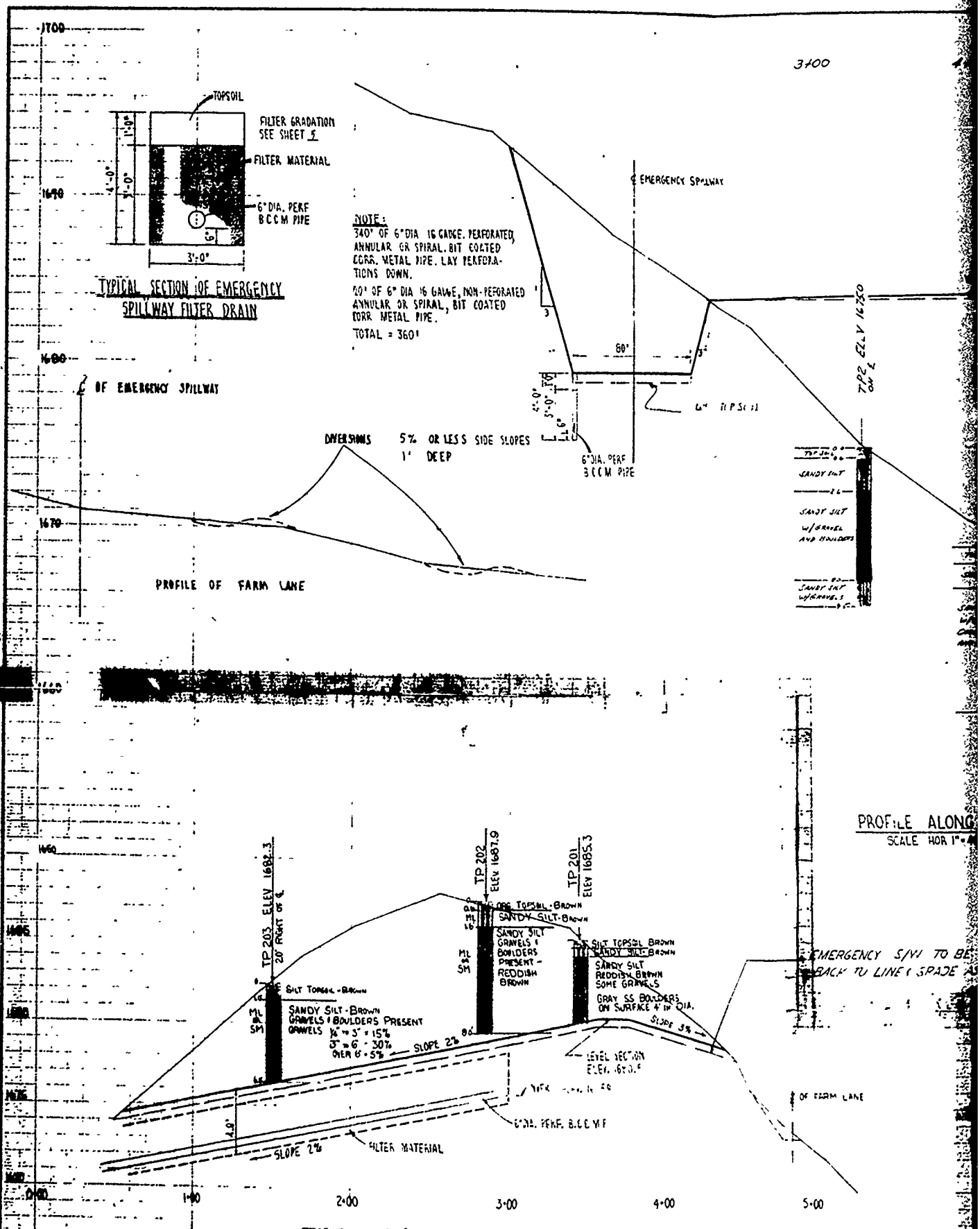
DESIGN DATA for

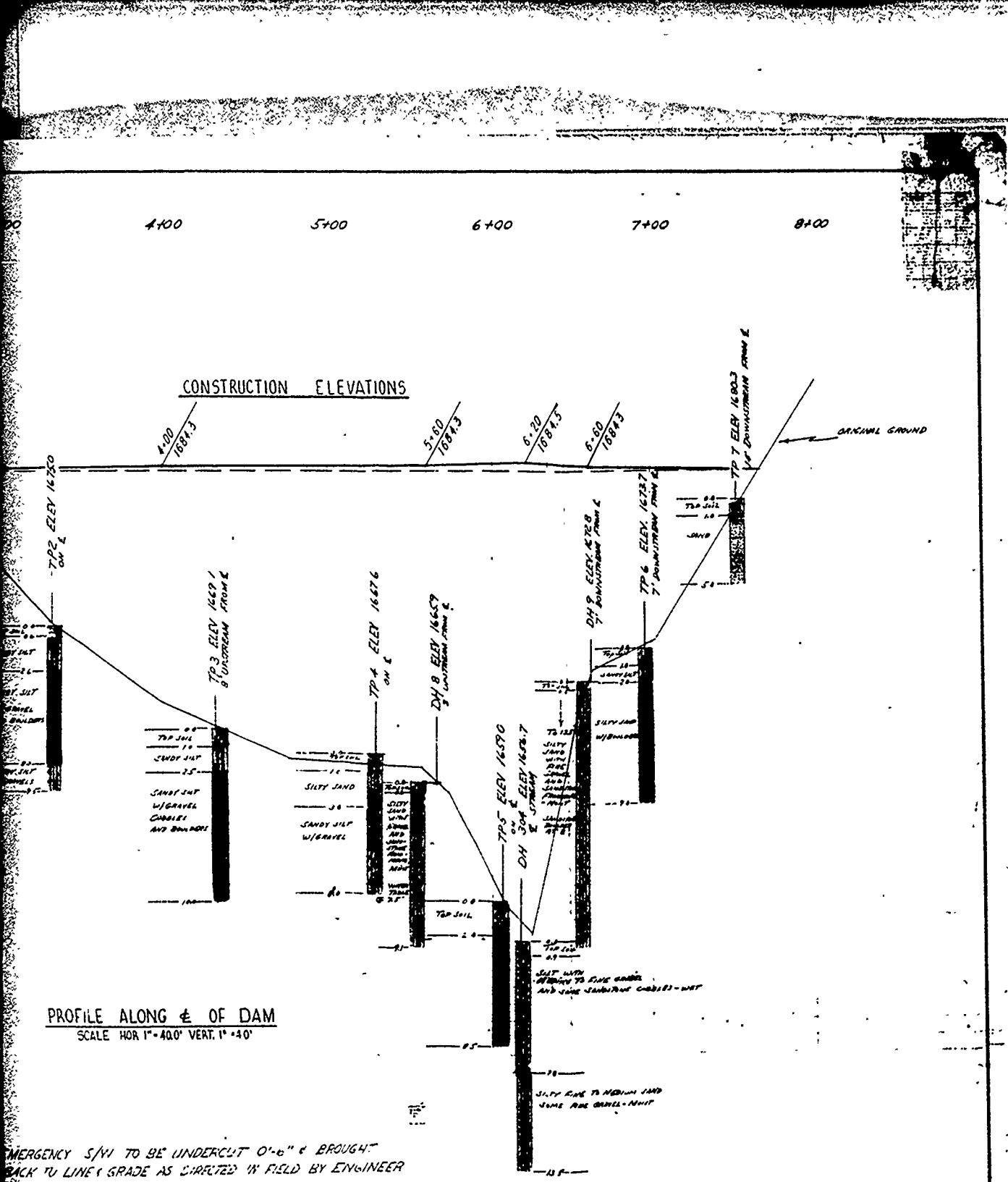
Sieve No.	% Passing
3"	100
1½"	94-100
3/4"	85-96
3/8"	73-85
#4	60-74
#10	46-62
#20	30-48
#60	11-30
#100	0-20
#200	0-5

SEE[illegible]GE DRAIN DETAILS
GREE[illegible] DREHER WATERSHED
PROTEC[illegible] PROJECT SITE PA-446
WAYNE, P[illegible] AND MONROE COUNTIES, PA
U.S. DEPA[illegible]MENT OF AGRICULTURE
SOIL [illegible]SERVATION SERVICE

Designed W.D. CARPE[illegible]
S. RUSSIER
Drawn G. ELIAS
Traced
Checked W. CARROLL
Date MAR. 71
Approved by
Title
Sheet 10
Drawing No. PA-446-[illegible]

PA-00099
PLATE IV


TOPSOIL
FILTER GRADATION SEE SHEET 5
FILTER MATERIAL
6" DIA. PERF B.C.C.M. PIPE
1'-0"
4'-0"
3'-0"
6"
3'-0"
TYPICAL SECTION OF EMERGENCY SPILLWAY FILTER DRAIN
NOTE:
340' OF 6" DIA 16 GAUGE, PERFORATED ANNULAR OR SPIRAL, BIT COATED CORR. METAL PIPE. LAY PERFORATIONS DOWN.
20' OF 6" DIA 16 GAUGE, NON-PERFORATED ANNULAR OR SPIRAL, BIT COATED CORR METAL PIPE.
TOTAL = 360'
3400
℄ EMERGENCY SPILLWAY
3
60'
3
4'-0"
5'-0"
1.6'
6" DIA. PERF B.C.C.M. PIPE
6" TOPSOIL
TOP ELEV 1675.0
SANDY SILT
SANDY SILT W/GRAVEL AND BOULDERS
SANDY SILT W/GRAVELS
1700
1690
1680
℄ OF EMERGENCY SPILLWAY
DIVERSIONS 5% OR LESS SIDE SLOPES 1' DEEP
1670
PROFILE OF FARM LANE
TP 202 ELEV 1687.9
TP 201 ELEV 1685.3
TP 203 ELEV 1682.3 20' RIGHT OF ℄
1660
1655
1650
1645
1640
0+00
1+00
2+00
3+00
4+00
5+00
0" TOPSOIL - BROWN
SANDY SILT - BROWN
SANDY SILT GRAVELS & BOULDERS PRESENT - REDDISH BROWN
SILT TOPSOIL BROWN
SANDY SILT BROWN
SANDY SILT REDDISH BROWN SOME GRAVELS
GRAY SS BOULDERS ON SURFACE 4' IN DIA.
SILT TOPSOIL - BROWN
SANDY SILT - BROWN GRAVELS & BOULDERS PRESENT GRAVELS ¼" TO 3" = 15% 3" TO 6" - 30% OVER 6" - 5%
ML & SM
SLOPE 2%
SLOPE 5%
LEVEL SECTION ELEV. 1645.5
6" DIA. PERF. B.C.C.M.P.
FILTER MATERIAL
SLOPE 2%
4.0'
OF FARM LANE
PROFILE ALONG
SCALE HOR 1"
EMERGENCY S/W TO BE BACK TO LINE & GRADE
PROFILE ALONG ℄ EMERGENCY SPILLWAY
SCALE HOR. 1"=40.0' VERT 1"=4.0'



PROFILE ALONG ℄ OF DAM

SCALE HOR 1" = 40.0' VERT. 1" = 4.0'

EMERGENCY S/W TO BE UNDERCUT 0'-6" & BROUGHT BACK TO LINE & GRADE AS DIRECTED IN FIELD BY ENGINEER

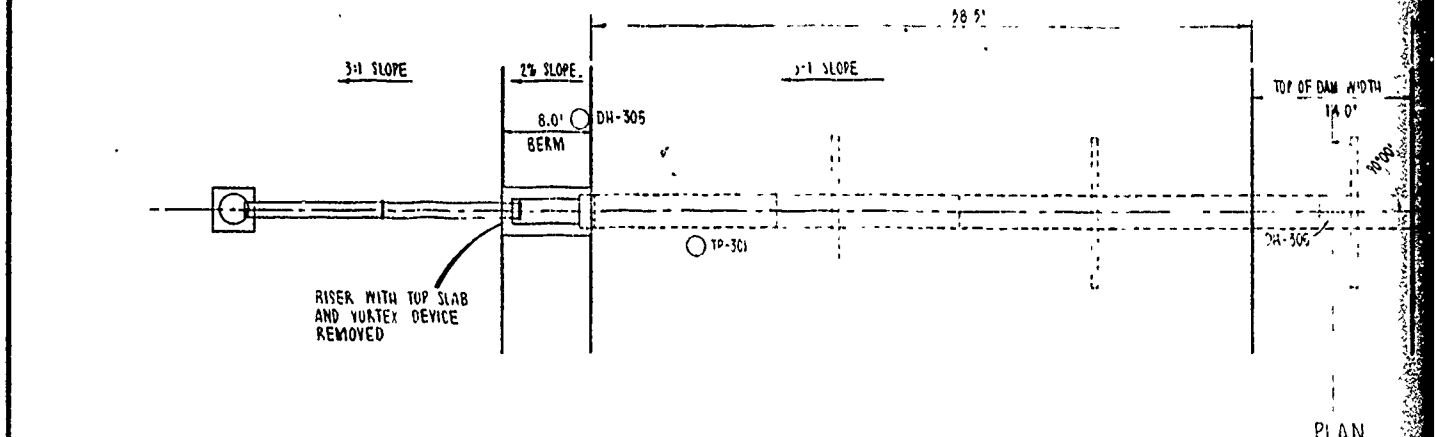
FARM LANE

PROFILES AND SOIL INFORMATION
GREENE - DREHER WATERSHED
PROTECTION PROJECT SITE PA-445
WAYNE, PIKE AND MONROE COUNTIES, PA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

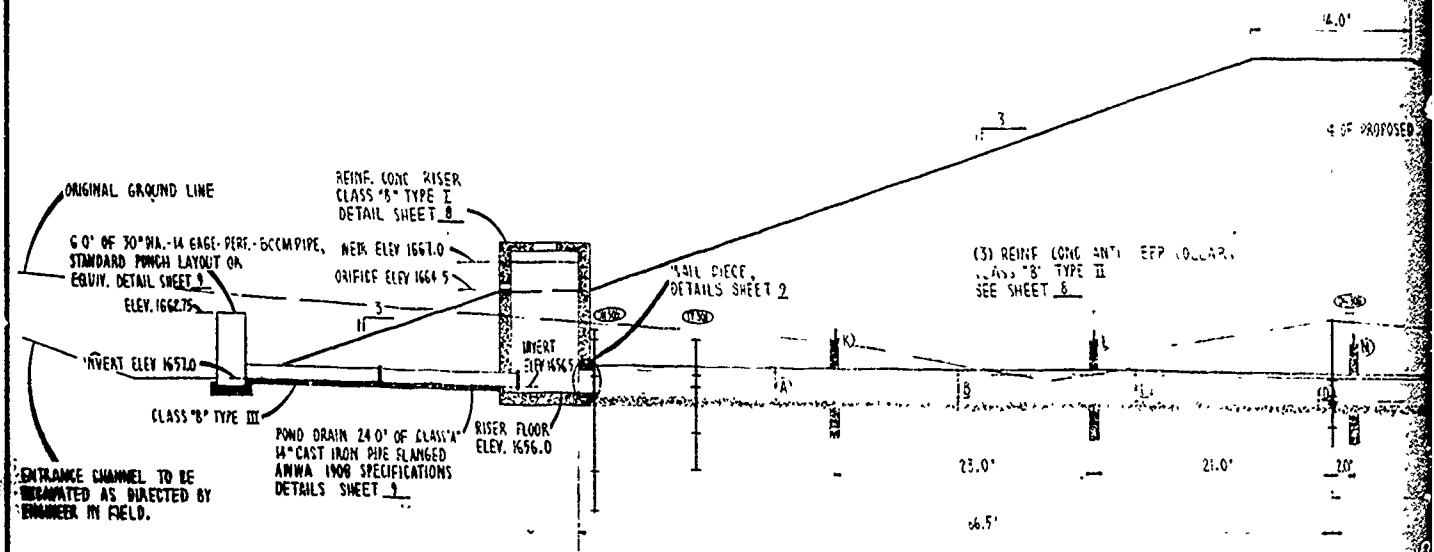
Designed W D CARPENTER	Date 9-M-60	Approved by	
Drawn G.E. VAN BUSKIRK	1-3-61	Title	
Traced		Title	
Checked		Sheet No. 4	Drawing No. PA-445

PA-00099
PLATE V



PLAN

SCALE: 1" = 80'



PROFILE ALONG ℄ OF PROPOSED

SCALE: 1" = 80'

SOILS DATA

DH-305
ELEV. 1661.2

- 0.9' OL, TOPSOIL
- 3.8' SM SILTY SAND, BROWN, MOIST
- WATER TABLE @ 2.1'
- 8.0' SM OR SP, SILTY SAND, BROWN, WET
- 3.3' SM OR ML, VERY FINE SAND AND SILT, BROWN, MOIST
- 4.7' SM OR ML, VERY FINE SAND AND SILT, GRAY MOIST

TP-301
ELEV. 1660.3

- 3.0' SANDY SILT
- 1.0' GRAVEL W/CLAYEY SAND
- WATER @ 4.0'
- 6.5' SM OR SP, REDDISH BROWN SILTY SAND, SOME ISOLATED GRAVEL

DH-306
ELEV 1661.7

- 5.1' SM, SANDY SILT W/ SANDSTONE FRAGMENTS AND COBBLES, MOIST, BROWN.
- WATER TABLE @ 2.1'
- 1.4' SM, SILTY SAND W/SAND STONE FRAG. MOIST
- 0.5' CL, SILTY CLAY, BROWN MOIST.
- 2.0' SM, FINE SILTY SAND W/ SMALL GRAVEL, BROWN, WET, VERY SOFT
- 5.4' SM, FINE SILTY SAND, GRAY

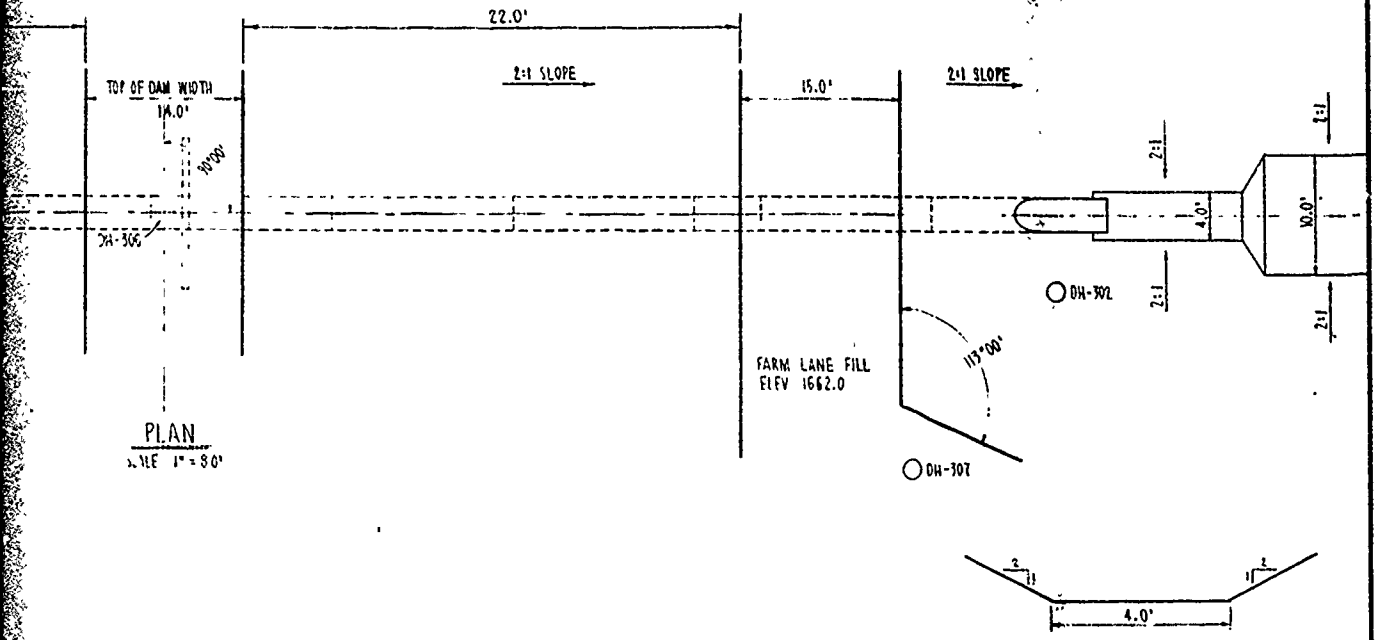
DH-307
ELEV. 1655.2

- 2.0' OL, TOPSOIL
- WATER TABLE@ 1.0'
- 7.6' SM OR GM, SILTY SAND AND GRAVEL WET, BROWN
- 4.4' SM, FINE SILTY SAND WITH GRAVELS, BROWN MOIST

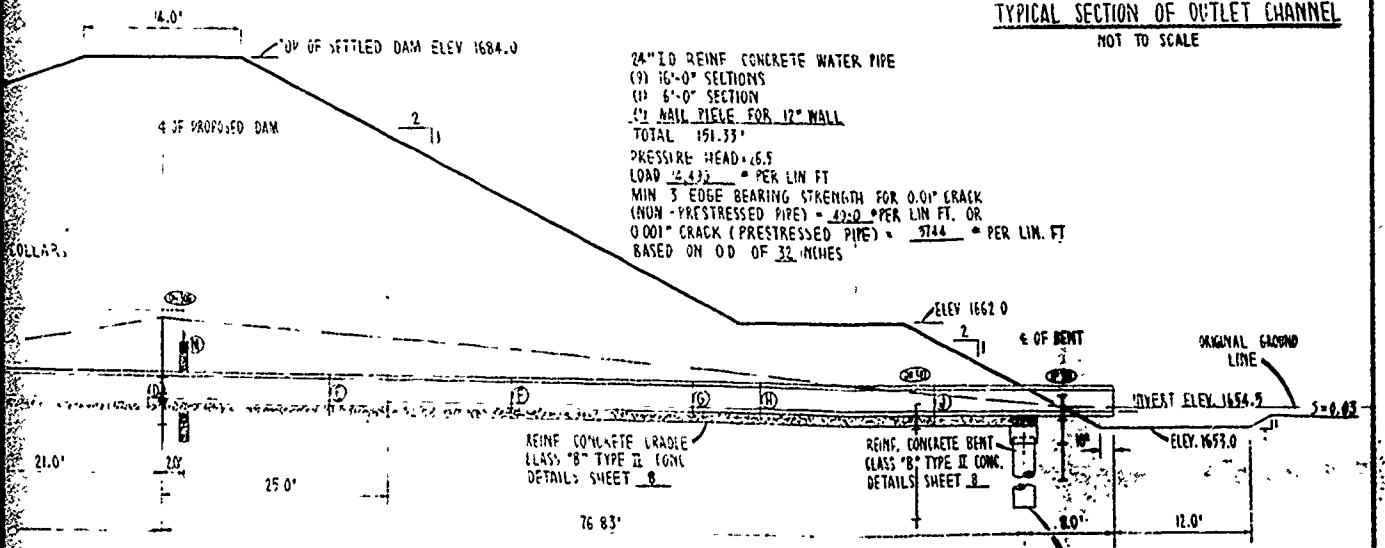
TP-302
ELEV. 1655.9

- 3' OL, BLACK SILT TOPSOIL
- 2.0' GM, SILTY SAND W/ GRAVEL
- WATER @ 3.5'
- 2.0' SM OR ML, SANDY SILT SOME GRAVEL FAIRLY COMPACT

DATE OF GEOLOGIC INVESTIGATION : MAY 1960
UNIFIED SOIL CLASSIFICATIONS BY VISUAL INSPECTION



TYPICAL SECTION OF OUTLET CHANNEL
NOT TO SCALE



24" ID REINF CONCRETE WATER PIPE
(9) 16'-0" SECTIONS
(1) 6'-0" SECTION
(7) NAIL PIELE FOR 12" WALL
TOTAL 151.33'
PRESSURE HEAD = 26.5
LOAD 12,492 # PER LIN FT
MIN 3 EDGE BEARING STRENGTH FOR 0.01" CRACK (NON-PRESTRESSED PIPE) = 4200 #PER LIN FT. OR
0.001" CRACK (PRESTRESSED PIPE) = 5744 # PER LIN. FT
BASED ON OD OF 32 INCHES

REINF CONCRETE CRADLE CLASS "B" TYPE II CONC DETAILS SHEET 8

REINF. CONCRETE BENT CLASS "B" TYPE II CONC. DETAILS SHEET 8

BOTTOM ELEVATION OF BENT TO BE DETERMINED BY ENGINEER IN FIELD.

PROFILE ALONG ℄ OF PRINCIPAL SPILLWAY
SCALE: 1" = 8.0'

NOTE PIPE LENGTHS ARE NOMINAL AND DO NOT INCLUDE CREEP.

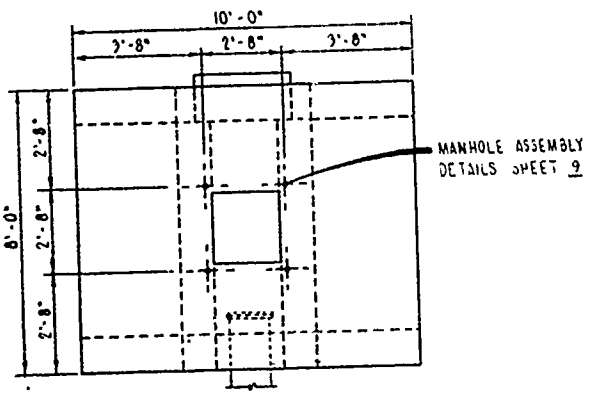
POINT	DISTANCE FROM DISCHARGE END OF 24" PIPE	INVERT ELEV OF 24" PIPE
OUTLET	0	1654.5
I	16	1654.96
H	32	1655.11
G	38	1655.32
F	54	1655.67
E	70	1655.81
D	86	1655.86
C	102	1655.90
B	118	1655.95
A	134	1655.97
RISER	151.33	1656.00
M	82.83	1655.52
L	105.83	1655.56
K	128.83	1655.79

PROFILE ALONG ℄ PRINCIPAL SPILLWAY
GREENE-DREHER WATERSHED
PROTECTION PROJECT SITE PA-445
WAYNE, PIKE AND MONROE COUNTIES, PA.

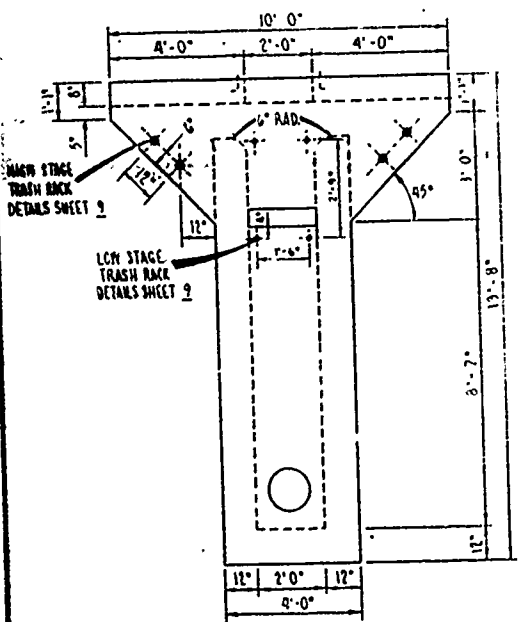
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed W.D. CARPENTER	Date 1960	Approved by
Drawn W.D. CARPENTER	1960	Title
W.H. MORGAN	1960	Title
Traced		Sheet No. 6
Checked E. ELIAS		Drawing No. PA-445

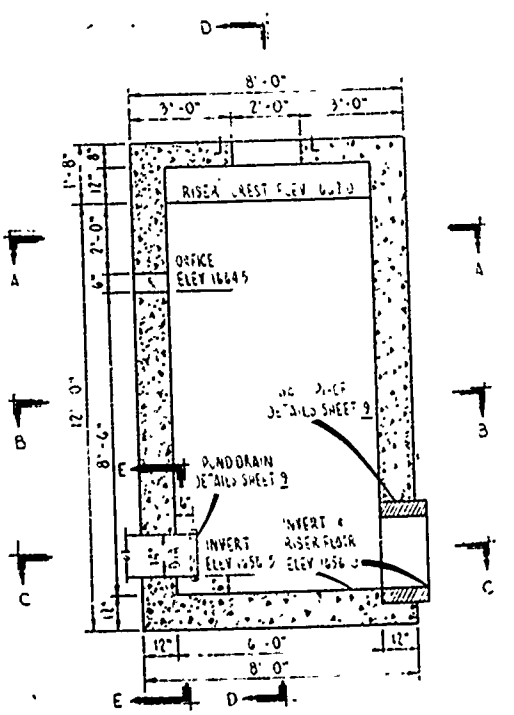
PA-00099
PLATE VI



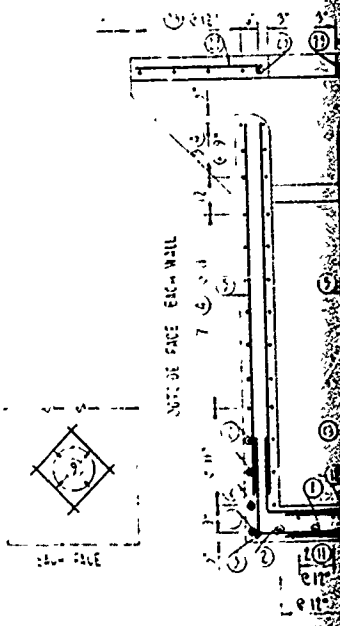
PLAN



UPSTREAM ELEVATION



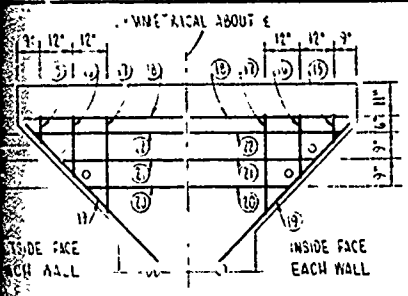
SECTION ALONG CENTERLINE



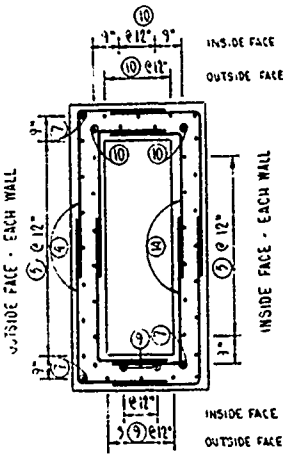
SECTION EE

SECTION

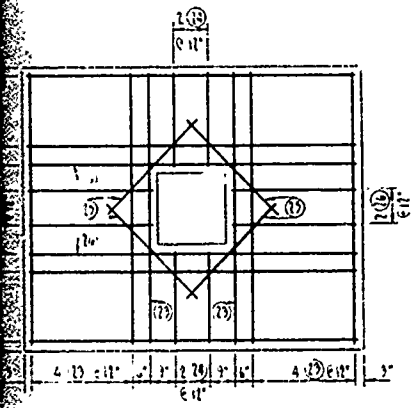
STRUCTURAL AND STEEL DETAILS OF REINFORCED CONCRETE



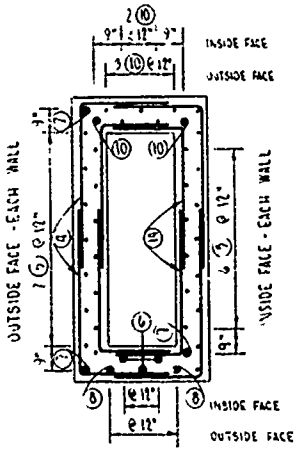
ANTI-VORTEX DEVICE STEEL DETAILS



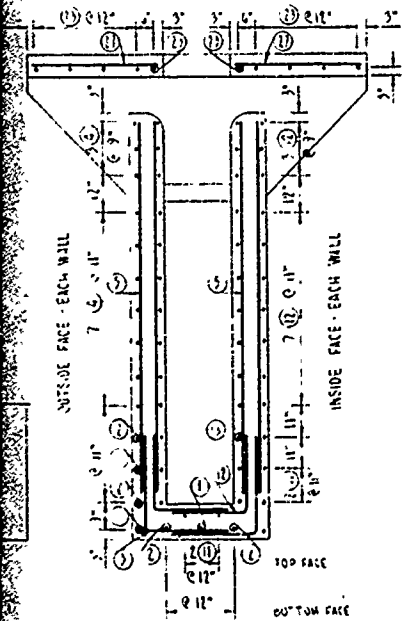
SECTION AA



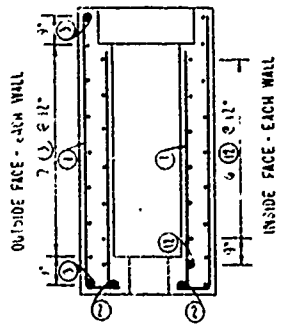
TOP SLAB STEEL DETAILS



SECTION BB



SECTION DD



SECTION CC

SCALE: 1"=1'-0"

CONCRETE RISER

STRUCTURAL AND STEEL DETAILS
GREENE-CONRER WATERSHED
PROTECTION PROJECT SITE PA-445
WAYNE, PIKE AND MONROE COUNTIES, PA.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed W.D.CARPENTER Date
Drawn H.T.BROWNING JR. Date
Traced
Checked
Approved by
Title
Date
Sheet No. 7 Drawing No. PA-445-S

PA-00099
PLATE VII

APPENDIX F

GEOLOGIC REPORT

GEOLOGIC REPORT

Bedrock - Dam and Reservoir

Formation Name: Poplar Gap Member, Catskill Formation.

Lithology: Predominantly fine- to medium-grained, gray sandstones, locally conglomeratic. Some interbeds of red siltstone and shale. Sandstones are generally well cemented with quartz, but calcareous cement is present at the base of some beds.

Structure

The site is within the Pocono Plateau area and the beds are essentially horizontal.

Air photo fracture traces trend: N5° to 10°E, N15°W and N80°W.

Overburden

The site is within the limits of Pleistocene glaciation and is underlain by quite thick deposits of glacial till and outwash. None of the test pits (nine to ten feet deep) or drill holes are reported to have reached bedrock. In the left abutment till, composed of compact sandy silt with cobbles and boulders, is twenty feet or more thick. In the center of the valley, 55 feet of mostly fine, silty sand and silty clay was penetrated. Some silty sand with gravel was found in the first eight feet. A test pit here, had strong ground water flows.

The right abutment and area is underlain by sand and silty sand. No notable seepages were observed.

Aquifer Characteristics

The rocks of the Catskill Formation are essentially impermeable, ground water movement is entirely along bedding planes and fractures. The most permeable aquifers in the area are in the glacial outwash materials in the valleys. At this site most of the glacial material is till, of low permeability. Some waterbearing gravels were noted near the center of the valley.

Discussion

The design of this dam provided for a cut-off trench which was dug into the fine silty and sandy till, and backfilled with impermeable material. The fact that the dam is founded mostly on compact, relatively impermeable till, suggests that leakage should not be a problem during the brief periods the reservoir is full.

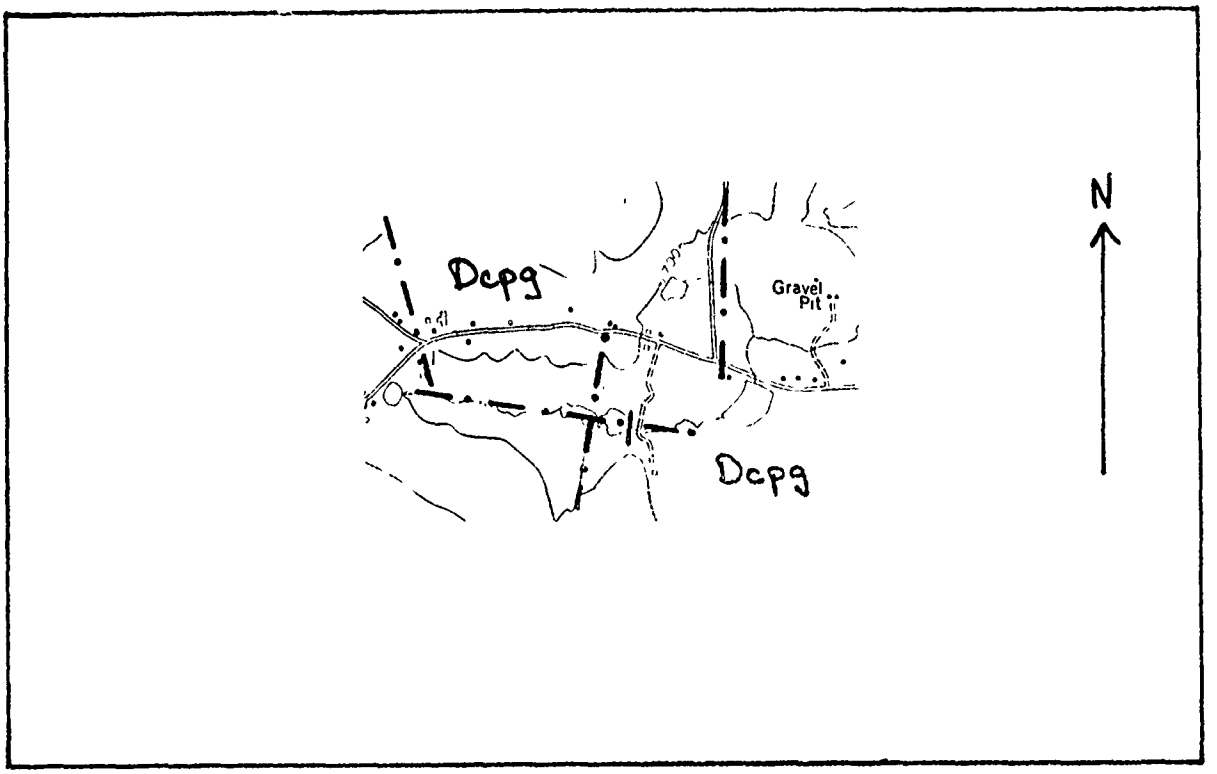
Sources of Information

1. Manuscript Geologic Map of the Newfoundland Quadrangle, in open file, Pa. Geological Survey, Harrisburg, Pa.

2. Geologic report by James R. Lauffer, July 13, 1960, and boring logs in file.

3. Air photographs, scale 1:40,000. Dated 1973.

GEOLOGIC MAP - SCS PA 145 Dam



Dcpg — Catskill Fm. - Poplar Gap member

— · — · air photo fracture trace

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET