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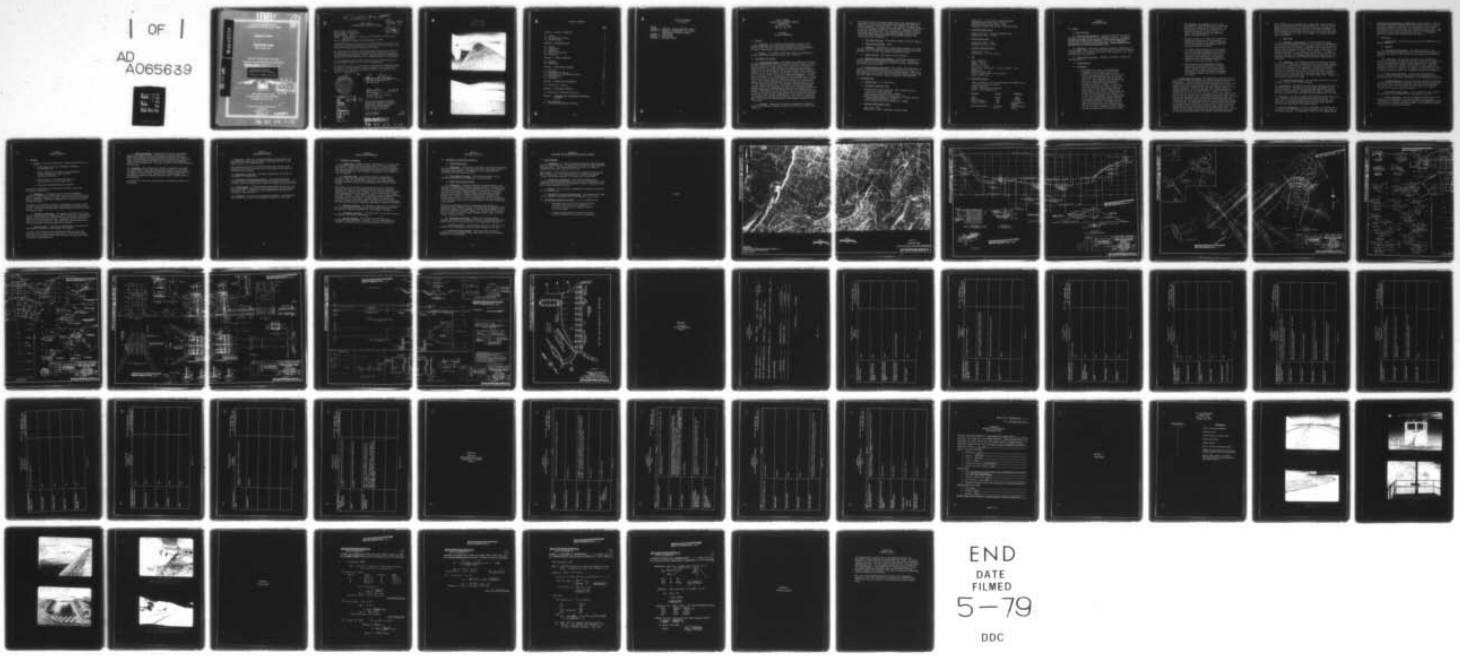

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SUSQUEHANNA RIVER BASIN
SHAWNEE BRANCH OF JUNIATA RIVER

PENNSYLVANIA

SHAWNEE DAM

NDI I.D. NO: 832

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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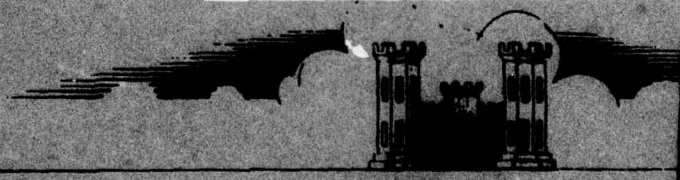

PREPARED FOR

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

BY

D'APPOLONIA CONSULTING ENGINEERS
10 DUFF ROAD
PITTSBURGH, PA. 15235

SEPTEMBER 1978

(15) DACW31-78-C-0049

(11) Sep 78

(12) 63p.

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: Shawnee Dam
STATE LOCATED: Pennsylvania
COUNTY LOCATED: Bedford
STREAM: Shawnee Branch, a tributary of the Raystown Branch of the Juniata River
DATE OF INSPECTION: August 30 and September 8, 1978

ASSESSMENT: Based on the evaluation of the conditions as they existed on the dates of inspection, and as revealed by visual observations, the condition of Shawnee Dam is assessed to be good.

No conditions were observed that would require attention at this time. A swampy area was found in the emergency spillway discharge channel which appeared to be surface runoff. This area should be periodically observed to document whether or not a seepage condition is developing.

It is recommended that a formal warning system be developed to alert the downstream residents in the event of emergencies.

The spillway capacity is classified to be "inadequate" (90 percent PMF) according to the recommended criteria. However, the spillway is not considered to be "seriously inadequate" because the capacity is in excess of 50 percent PMF.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
Lawrence D. Andersen
ENGINEER
No. 17458-E

Lawrence D. Andersen, P.E.
Vice President

29 Nov 78

G. K. WITHERS
Colonel, Corps of Engineers
District Engineer

ACCESSION for	
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(6) National Dam Inspection Program. Shawnee Dam (NDI-832). Susquehanna River Basin, Shawnee Branch of Juniata River, Pennsylvania. Phase I Inspection Report.

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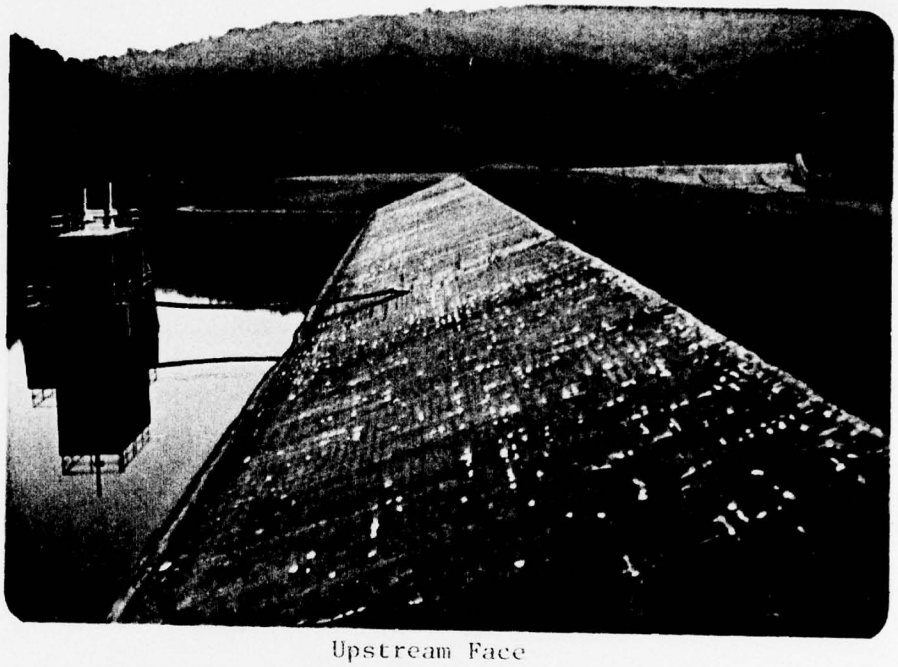
SHAWNEE DAM
NDI I.D. NO. 832
AUGUST 30, 1978



Upstream Face

Downstream Face

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(Continued)

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM
SHAWNEE DAM
NDI I.D. NO. 832
DER I.D. NO. 5-70

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. The inspection was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct 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 or property.

1.2 Description of Project

a. Dam and Appurtenances. The Shawnee Dam consists of an earth embankment approximately 900 feet long with a maximum height of 56 feet from the downstream toe and a crest width of 14 feet. The flood discharge facility for the dam consists of a siphon primary spillway located near the right abutment (looking downstream) and an emergency spillway on the left abutment. The primary spillway of the reservoir consists of two siphons located on an intake structure which discharges into a 10-foot by 6-foot box culvert through the embankment. The box culvert terminates at a stilling basin at the downstream toe of the dam. The crests of the siphons are located at a level 25 feet below the dam crest. The emergency spillway of the dam consists of a semicircular concrete ogee section approximately 365 feet long located at a level 7.5 feet below the dam crest. The emergency spillway discharges into an earth channel 196 feet wide. The side of the spillway discharge channel closest to the embankment is protected by a concrete wall which extends approximately 350 feet downstream from the spillway control section. The outlet works for the dam consist of two manually operated sluice gates located at the intake structure which would also discharge to the box culvert through the embankment. The sluice gate entrances are equipped with trash racks and provisions were made to install stop logs. The two sluice gates constitute the emergency drawdown facility for the dam.

b. Location. Shawnee Dam is located in Shawnee State Park six miles west of Bedford in Napier Township, Bedford County, Pennsylvania (Plate 1).

Downstream from the dam, Shawnee Branch flows south approximately one mile where it passes under the Pennsylvania Turnpike and joins the Raystown Branch of the Juniata River. The community of Manns Choice, three miles from the dam along the Raystown Branch of the Juniata River, is the first community downstream from the dam. Bedford is 10 miles downstream from Shawnee Dam. It is estimated that failure of the dam would cause large loss of life and property damage in Manns Choice, residential areas along the valley of the Raystown Branch of the Juniata River, and in Bedford.

c. Size Classification. Intermediate (based on 56-foot height).

d. Hazard Classification. High.

e. Ownership. Commonwealth of Pennsylvania (address: Mr. James Boswell, Chief of Operations, Pennsylvania Department of Environmental Resources, P.O. Box 2063, Harrisburg, Pennsylvania 17120).

f. Purpose of Dam. Flood control and recreation.

g. Design and Construction History. The dam was designed by The Chester Engineers of Pittsburgh, Pennsylvania in 1949. The dam was constructed by Latrobe Construction Company of Latrobe, Pennsylvania, with completion in June 1950.

h. Normal Operating Procedure. Under normal flow conditions, the reservoir is maintained within one foot of the normal pool level at Elevation 1170 by self-activated primary spillway siphons. During low flow conditions when the pool level is below the primary spillway crest, the sluice gates are partially opened to maintain flow downstream.

1.3 Pertinent Data

a. Drainage Area - 37.5 square miles

b. Discharge at Dam Site (cfs)

Maximum known flood at dam site - 980 (estimated outflow, capacity of siphon spillway)
Outlet conduit at maximum pool - Unknown
Gated spillway capacity at maximum pool - N/A
Ungated spillway capacity at maximum pool - Primary spillway: 1070; emergency spillway: 27,700
Total spillway capacity at maximum pool - 28,800

c. Elevation (USGS Datum) (feet)

Top of dam - 1195
Maximum pool - 1187.5 (emergency spillway crest)

Normal pool - 1170 (crest of primary spillway)
Upstream invert outlet works - 1140.6
Downstream invert outlet works - 1139.3
Streambed at center line of dam - 1138 (estimated)

d. Reservoir Length (feet)

Normal pool level - 10,000 at Elevation 1170
Maximum pool level - 17,000

e. Storage (acre-feet)

Normal pool level - 3750
Maximum pool level - 25,250

f. Reservoir Surface (acres)

Normal pool - 450
Maximum pool - 1330 (El. 1187.5)

g. Dam

Type - Earthfill
Length - 900 feet
Height - 56 feet
Top width - 14 feet
Side slopes - Downstream: 2.5H:1V; upstream: 3H:1V
Zoning - Yes
Impervious core - Yes
Cutoff - Cutoff trench to top of rock
Grout Curtain - Yes

h. Regulating Outlets

Type - Two 3-foot by 5-foot sluice gates discharging into a 6-foot by 10-foot box culvert
Length - 200± feet
Closure - Sluice gates (upstream)
Access - From downstream end

i. Spillway

	Primary	Emergency
Type -	Siphon	Ogee
Length -	N/A	365 feet
Crest elevation -	1170	1187.5
Upstream channel -	Lake	Earth approach channel
Downstream channel -	6'x10' box culvert	Earth discharge channel

SECTION 2
ENGINEERING DATA

2.1 Design

a. Data Available

(1) Hydrology and Hydraulics. Available hydrology and hydraulic information is summarized in the two engineer's reports: (1) Report and Study on Design of Dam and Lake for Flood Control and Recreation, October 1948, by The Chester Engineers, Inc., and (2) Hydrologic Calculations of the Outlet Siphon and Culvert, Shawnee Branch Project, February 1949, by The Chester Engineers, Inc.

(2) Embankment. Available information includes a complete set of design drawings, boring logs, construction progress reports, and various correspondence. The construction specifications prepared by The Chester Engineers were also available.

(3) Appurtenant Structures. Available information includes the design drawings.

b. Design Features

(1) Embankment

a. As designed, the dam is a zoned embankment consisting of an impervious central zone extending to top of rock through a cutoff trench, an upstream random fill, and a pervious zone forming the downstream slope of the dam (Plate 2). These materials were designated as Class A, B, and C materials, respectively. In the specifications these materials were described as follows: Class A - 50 percent clay and 50 percent soft shale; Class B - not less than 30 percent clay and the remainder shale; Class C - any material which is not classified as Class A or B. The specifications further stated that if the shale material to be used for the embankment were in large pieces it was to be broken up by suitable machinery and thoroughly mixed with a proper amount of clay before compaction. The design incorporated a concrete cutoff wall located at the base of the cutoff trench for seepage control. The above-referenced engineer's reports did not include information on the embankment design.

b. The embankment was designed to have a 2.5:1 (horizontal to vertical) slope on the downstream face and a 3:1 slope on the upstream face. The upstream face of the dam is protected by concrete blocks placed on a six-inch layer of gravel. This paving extends from Elevation 1167.5 to Elevation 1187.5.

c. As shown in Plate 2, at least nine borings were drilled for the subsurface investigation. As illustrated in Plate 2, the typical subsurface profile consisted of approximately 10 feet of overburden underlain by shale.

d. An as-built sketch indicates that the foundation rock was grouted through holes drilled at five-foot centers extending to a depth of 50 feet at the valley floor and 20 feet on the abutments. The grouting was also extended along the axis of the emergency spillway to a depth of 65 feet below the weir level.

e. Soils testing for the embankment materials consisted of classification tests, modified Proctor compaction tests, and direct consolidated quick shear tests, and was directed by Professor B. K. Hough from Cornell University. The results of these tests were not available for review.

c. Appurtenant Structures. The appurtenant structures for the dam consist of a siphon type primary spillway, emergency spillway, and outlet gates. The siphon primary spillway and outlet gates are located at the intake structure near the upstream toe of the dam. The spillway and outlet works discharge into a six-foot by ten-foot box culvert through the embankment near the right abutment (Plate 3). The emergency spillway, on the left abutment, is a 365-foot-long ogee section with its crest at Elevation 1187.5, leaving 7-1/2 feet of freeboard to the top of the dam. The ogee section is a circular arc in plan view and discharges into a converging concrete apron which terminates at the beginning of the earth spillway discharge channel (Plate 4). The spillway discharge channel is 196 feet wide and 350 feet long discharging into the valley approximately 150 feet downstream from the toe of the dam. The embankment side of the spillway discharge channel is protected against erosion by a concrete wall. Plate 5 illustrates the details of the concrete intake structure which includes the two siphons of the primary spillway and two low-level sluice gates. The primary spillway siphons and the sluice gates discharge into a six-foot by ten-foot reinforced concrete box culvert through the embankment

which terminates at a stilling basin equipped with energy dissipator blocks at the downstream toe of the dam (Plate 6). The crest of the siphon spillways are located at Elevation 1170 and are designed to maintain the pool level within one foot of the crest elevation. The siphon spillways self-activate when the pool level rises to Elevation 1171, submerging the air vents of the siphons. The sluice gates are manually operated.

d. Design Data

(1) Hydrology and Hydraulics. The 1949 engineer's report indicates that the emergency spillway of the dam was designed based on the two successive occurrences of the design flood while the primary spillway was sized on the single occurrence of the design flood. The design flood corresponded to 10.8 inches of runoff in six days with a maximum daily runoff of 7.3 inches in the first day. The siphon spillways were sized to pass the design flood without activating the emergency spillway. The emergency spillway was designed to pass two successive occurrences of the design flood without overtopping the embankment.

(2) Embankment. The embankment design was apparently based on the results of a subsurface investigation and soils testing. However, the engineer's report does not include any geotechnical information relative to the design of the embankment. Available information indicates that Professor B. K. Hough from Cornell University was retained by The Chester Engineers as a soils consultant. References were found to indicate that soils testing included classification, modified Proctor compaction tests, and direct shear tests. However, no results were available for review.

(3) Appurtenant Structures. The available information includes hydrologic design of the siphon spillways.

2.2 Construction. Construction of the dam was apparently conducted in accordance with the drawings and specifications as prepared by The Chester Engineers. The construction was supervised by The Chester Engineers' field personnel. No reference was found to indicate that any unusual problems were encountered during construction of the dam.

2.3 Operation. The lake is normally maintained within one foot of the crest level of the self-activating primary spillway siphons. Only under low-flow conditions, when the pool level is below the crest elevation of the siphon spillways, are the sluice gates opened to maintain flow downstream in the Shawnee Branch.

2.4 Other Investigations. In 1950, a settlement, or low area, was observed on the upstream face of the dam beneath the access bridge to the intake structure. The engineer's report entitled, Report on the

Settlement of the Embankment of Shawnee Dam, dated November 9, 1950, by The Chester Engineers, indicates that this settlement was the result of the manner in which the embankment was constructed. A part of the embankment behind the intake tower was originally omitted to permit the construction of the tower and this area was filled to grade later. This explanation suggests that the settlement was due to the inadequate compaction of the backfill around the intake tower.

2.5 Evaluation

a. Availability. Available data were provided by PennDER and The Chester Engineers.

b. Adequacy

(1) Hydrology and Hydraulics. The reported results of the hydrology and hydraulics analysis are not considered to be adequate to assess the conformity of the analysis to the current spillway design criteria.

(2) Embankment. The available documents on the geotechnical aspects of the design of Shawnee Dam are very limited and in general do not provide quantitative values to aid the assessment of the design. Although references were found indicating that a certain amount of laboratory testing was conducted, the results of these tests were not available for review. Similarly, no documents or references were found to indicate whether any stability or seepage analyses were conducted.

(3) Appurtenant Structures. Review of the design drawings indicates that as designed no significant design deficiencies exist that should affect the overall performance of the appurtenant structures.

c. Operating Records. It was reported that operating records for the dam consist of lake level readings. The records were not available for review. The state park foreman reported that, to his knowledge, the maximum pool level in the lake has never reached the emergency spillway crest elevation (Elevation 1187.5).

d. Post-Construction Changes. It is reported that steel plates were installed in the throats of the siphon spillway in 1972.

e. Seismic Stability. The dam is located in Seismic Zone 1, and based on visual observations, the static stability of the dam is considered to be adequate. Therefore, based on the recommended criteria for evaluation of seismic stability of dams, the structure is presumed to present no hazard from earthquakes.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The on-site inspection of Shawnee Dam consisted of:

1. Visual inspection of the embankment, abutments, and embankment toe.

2. Visual examination of siphon spillway discharge conduit, emergency spillway, and other appurtenant features.

3. Observations of the factors affecting the runoff potential of the drainage basin.

4. Evaluation of downstream hazard potential.

The specific observations are illustrated in Plate 7 and in the photographs in Appendix C.

b. Embankment. The general inspection of the embankment consisted of searching for indications of structural distress, such as cracks, subsidence, bulging, wet areas, seeps and boils, and observing general maintenance conditions, vegetative cover, erosion, and other surficial features.

In general, the condition of the dam is considered to be good. Only one minor swampy area was observed in the emergency spillway discharge channel. No flow was observed and it appeared that the probable source was surface runoff.

c. Appurtenant Structures. The spillway structures, the primary spillway intake structure, discharge conduit, plunge pool, and emergency spillway were examined for deterioration or other signs of distress and obstructions that would limit flow. In general, the structures were found to be in good condition. The outlet pipe valve was operated by the park personnel and was observed to be functional.

d. Reservoir Area. A map review indicates that the watershed is predominantly covered with pasturelands and woodlands.

A review of the regional geology (Appendix E) indicates that the shorelines are not likely to be susceptible to massive slides which would affect the storage volume of the reservoir or cause overtopping of the dam by displaced water.

e. Downstream Channel. Downstream from the dam, the Shawnee Branch flows south for about one mile where it passes under the Pennsylvania Turnpike and joins the Raystown Branch of the Juniata River. The community of Manns Choice with a population of 350 is the first community located downstream from the dam along the Raystown Branch of the Juniata River. The town of Bedford is 10 miles downstream from the dam.

3.2 Evaluation. The condition of the dam is considered to be good. No conditions were found that would require attention at this time. The swampy area in the emergency spillway discharge channel appeared to be caused by surface runoff. However, this condition should be periodically observed to determine whether or not a seepage condition is developing.

The operation of the outlet sluice gates was observed and found to be functional.

SECTION 4
OPERATIONAL FEATURES

4.1 Procedure. State park personnel reported that during low flow conditions the sluice gates are opened to maintain the flow of the Shawnee Branch of the Juniata River.

One operational feature of the dam which may affect safety is the operational condition of the low-level outlet gates in the event the reservoir must be lowered.

4.2 Maintenance of the Dam. The general maintenance of the dam is considered to be satisfactory.

4.3 Maintenance of Operating Facilities. The field observations indicated that the operating facilities are adequately maintained. The low flow outlet sluice gates were operated and observed to be functional.

4.4 Warning System. No formal warning system exists for the dam. The park superintendent, responsible for the operation of the dam, resides in the park area. Telephone and radio communication facilities are available at the park office.

4.5 Evaluation. The dam is satisfactorily maintained. No conditions were observed that would require immediate attention at this time.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Shawnee Dam has a watershed of 37.5 square miles and impounds a reservoir with a surface area of 450 acres at normal pool level. A siphon type primary spillway and open channel emergency spillway constitute the flood discharge facilities for the reservoir. The combined capacity of the spillways was determined to be 28,800 cfs with no freeboard.

b. Experience Data. As previously stated, Shawnee Dam is classified to be an "intermediate" size dam in the "high" hazard category. Under the recommended criteria for evaluating emergency spillway discharge capacity, such impoundments are required to pass the PMF.

The adequacy of the spillway was analyzed based on the simplified procedure developed by the Baltimore District, Corps of Engineers (Appendix D). Based on this procedure, it was determined that the PMF inflow hydrograph would have a peak of 56,250 cfs and a total volume of 52,000 acre-feet. These values are greater than the maximum spillway discharge capacity of 27,700 cfs and surcharge storage volume of 21,500 acre-feet, respectively. Further analysis according to the procedure indicated that the emergency spillway can pass a maximum flow of 90 percent PMF without overtopping, assuming the siphons are blocked.

c. Visual Observations. On the date of inspection, no conditions were observed that would indicate that the emergency spillway of the dam could not function satisfactorily in the event of a flood.

d. Overtopping Potential. As stated above, the spillway can pass 90 percent of PMF without overtopping.

e. Spillway Adequacy. The spillway is classified to be "inadequate" (90 percent PMF). However, it is not considered to be "seriously inadequate" since the capacity exceeds 50 percent PMF.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

(1) Embankment. As discussed in Section 3, the field observations did not reveal any signs of distress that would significantly affect the overall performance of the embankment and no unsatisfactory conditions were reported in the past.

(2) Appurtenant Structures. Structural performance of the appurtenant structures is considered to be satisfactory.

b. Design and Construction Data

(1) Embankment. The dam was apparently designed based on the evaluation of subsurface conditions and the results of laboratory tests. Although limited boring logs were available for review, no information was found on the soils testing program. Similarly, no documents or references were found to indicate whether any stability or seepage analyses were conducted. References were found to indicate that Professor B. K. Hough from Cornell University was retained by The Chester Engineers, Inc., as the soils consultant, and the construction of the dam was conducted under the supervision of The Chester Engineers' field personnel.

Review of the available information indicates that the dam was constructed with reasonable care and the design incorporated such basic elements as zoning of the embankment, cutoff trench extending to top of rock, and foundation grouting. However, it was found that the design did not include a positive internal drainage system, such as a filter blanket or chimney drains.

(2) Appurtenant Structures. Review of the design drawings indicates that there are no apparent structural deficiencies that would significantly affect the performance of the appurtenant structures.

c. Operating Records. The structural stability of the dam is not considered to be affected by the operational features of the dam.

d. Post-Construction Changes. There have been no reported modifications to the original design that would affect the structural stability of the embankment.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Assessment. The visual observations indicate that the Shawnee Dam is in good condition. It appears that the dam was constructed with reasonable care. Field observations did not reveal any signs of distress and none were reported in the past.

The capacity of the spillway was found to be "inadequate" (90 percent PMF). However, it is not considered to be "seriously inadequate" because the spillway capacity is in excess of 50 percent PMF.

b. Adequacy of Information. The available information in conjunction with visual observations and the previous experience of the inspectors are considered to be sufficient to make a reasonable assessment of the condition of the dam.

c. Urgency. The following recommendations should be implemented on a continuing basis.

d. Necessity for Further Investigation. The condition of the dam is not considered to require further investigation at this time.

7.2 Recommendations/Remedial Measures. It is recommended that:

1. The swampy area noted in the emergency spillway discharge channel should be periodically observed to document that a seepage condition is not developing.

2. A formal warning should be developed to alert downstream residents in the event of emergencies.

PLATES

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	9-5-78	APPROVED BY	[illegible]	10-10-78		

REFERENCE

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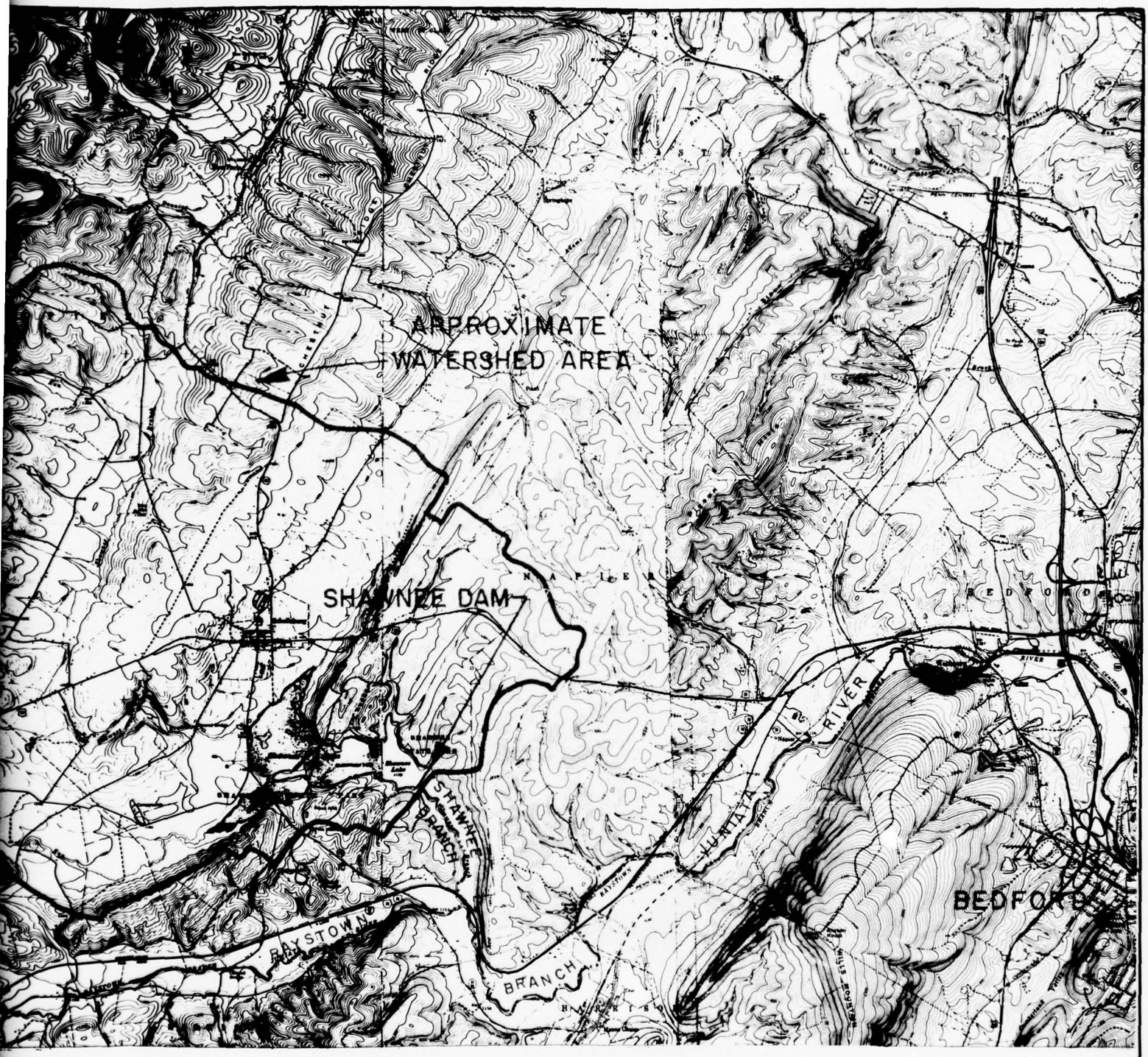

SCALE

0 4000 8000 FT

PLATE I

SHAWNEE DAM

VICINITY, FLOOD PLAIN AND WATERSHED MAP

D'APPOLONIA

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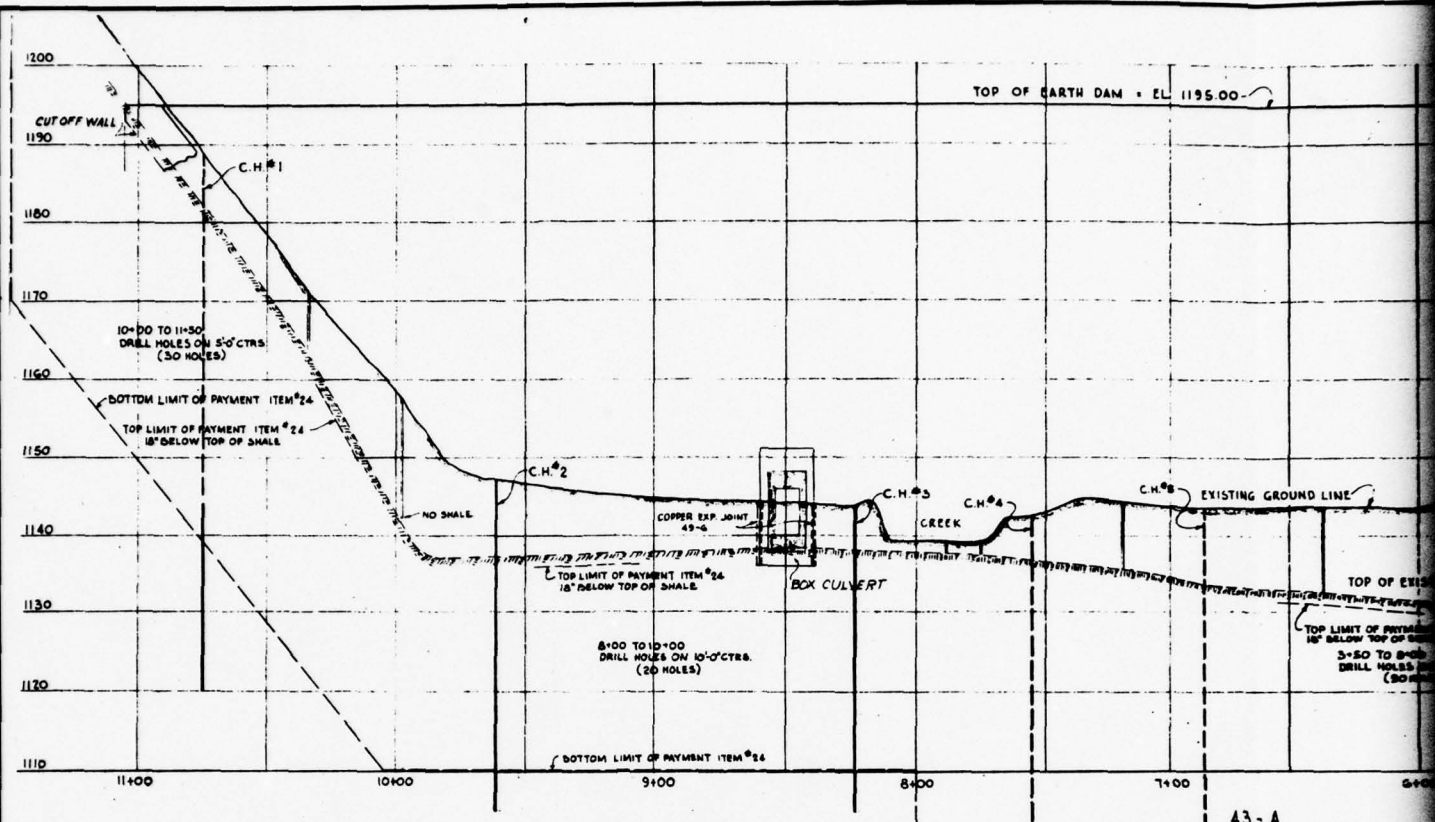
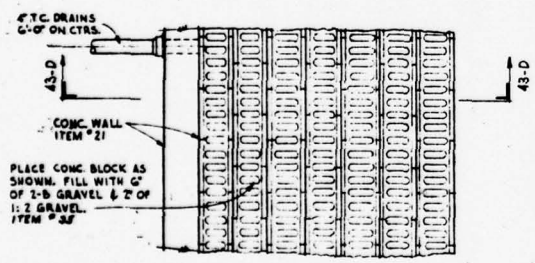
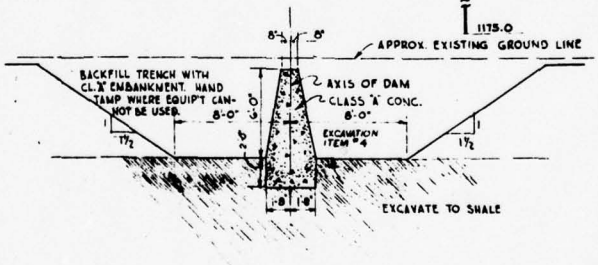
9-5-78	APPROVED BY	10-16-78



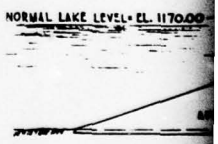
43-A
PROFILE ON AXIS OF DAM
SCALES: HORIZ. 1" = 30'
VERT. 1" = 10'

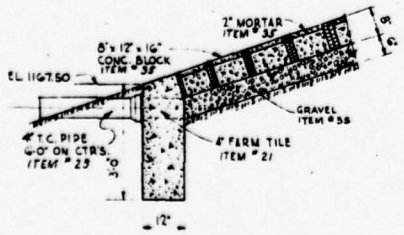


DETAIL 43-C
PAVING OF UPSTREAM FACE OF DAM
SCALE: 1/2" = 1'-0"

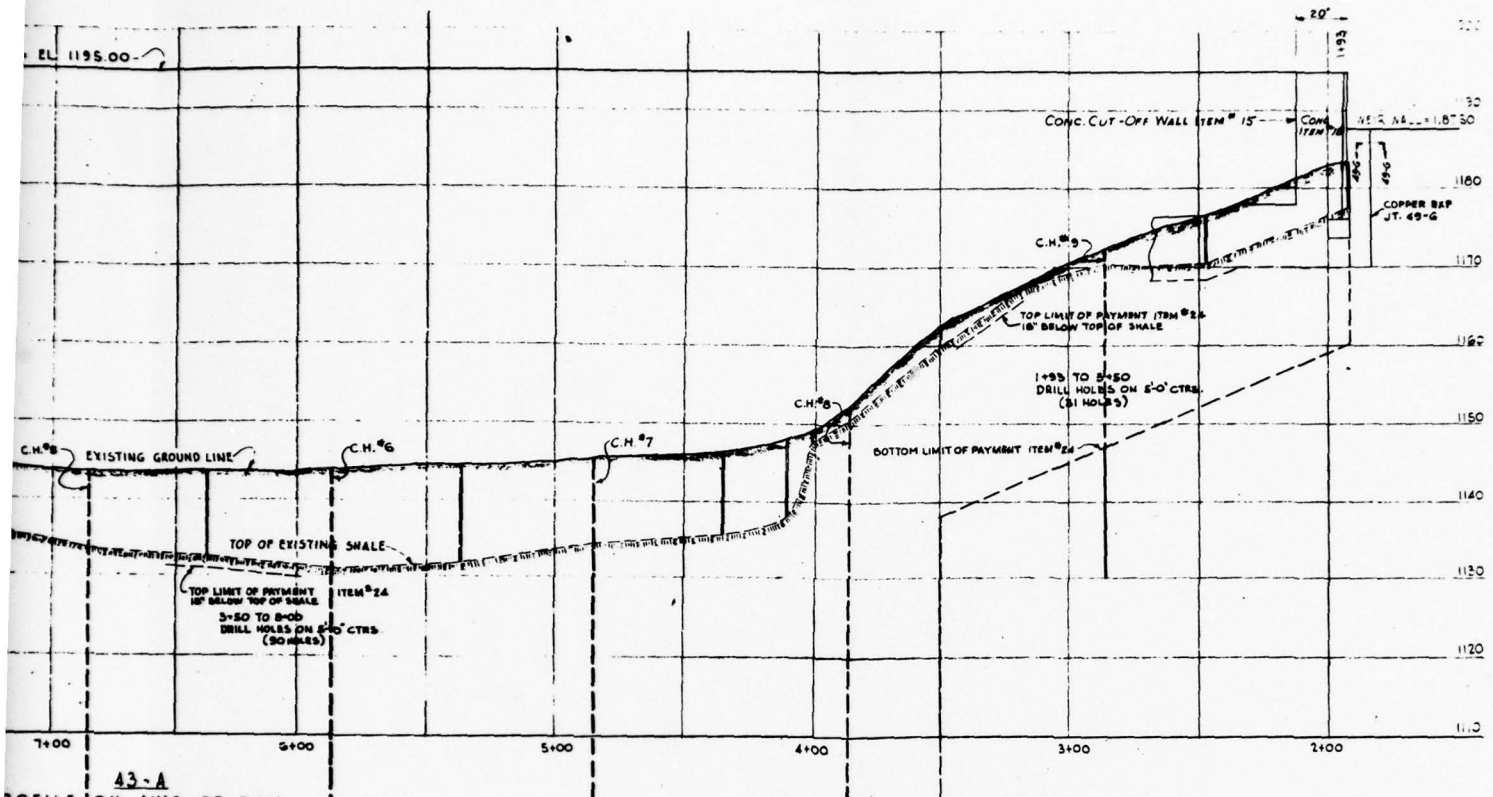


DETAIL 43-E
CUT-OFF WALL DETAIL
SCALE: 3/16" = 1'-0"





SECTION 43-D
SCALE: 1/2" = 1'-0"

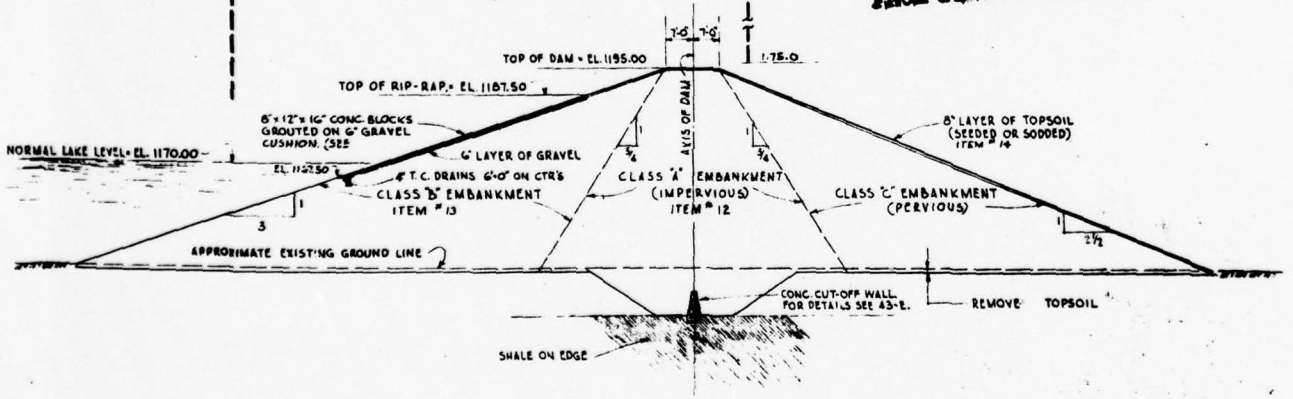


43-A

ROFILE ON AXIS OF DAM

SCALES: HORIZ. 1" = 30'
VERT. 1" = 10'

BOTTOM LIMIT OF PAYMENT ITEM #24 TIGHT HOLE



SECTION 43-B
TYPICAL SECTION THRU DAM
SCALE: 1" = 20'

REVISED		

APPROVED _____ SECRETARY, FOREST & WATERS

APPROVED _____ CHIEF ENGR. FORESTS & WATERS

SUBMITTED John T. Campbell THE CHESTER ENGINEERS

PREPARED THE CHESTER ENGINEERS

ACCEPTED _____ CONTRACTOR

JOHN T. CAMPBELL

EARTH DAM - SECTIONS

SHAWNEE BRANCH PROJECT
JUNIATA RIVER — BEDFORD COUNTY
PENNSYLVANIA

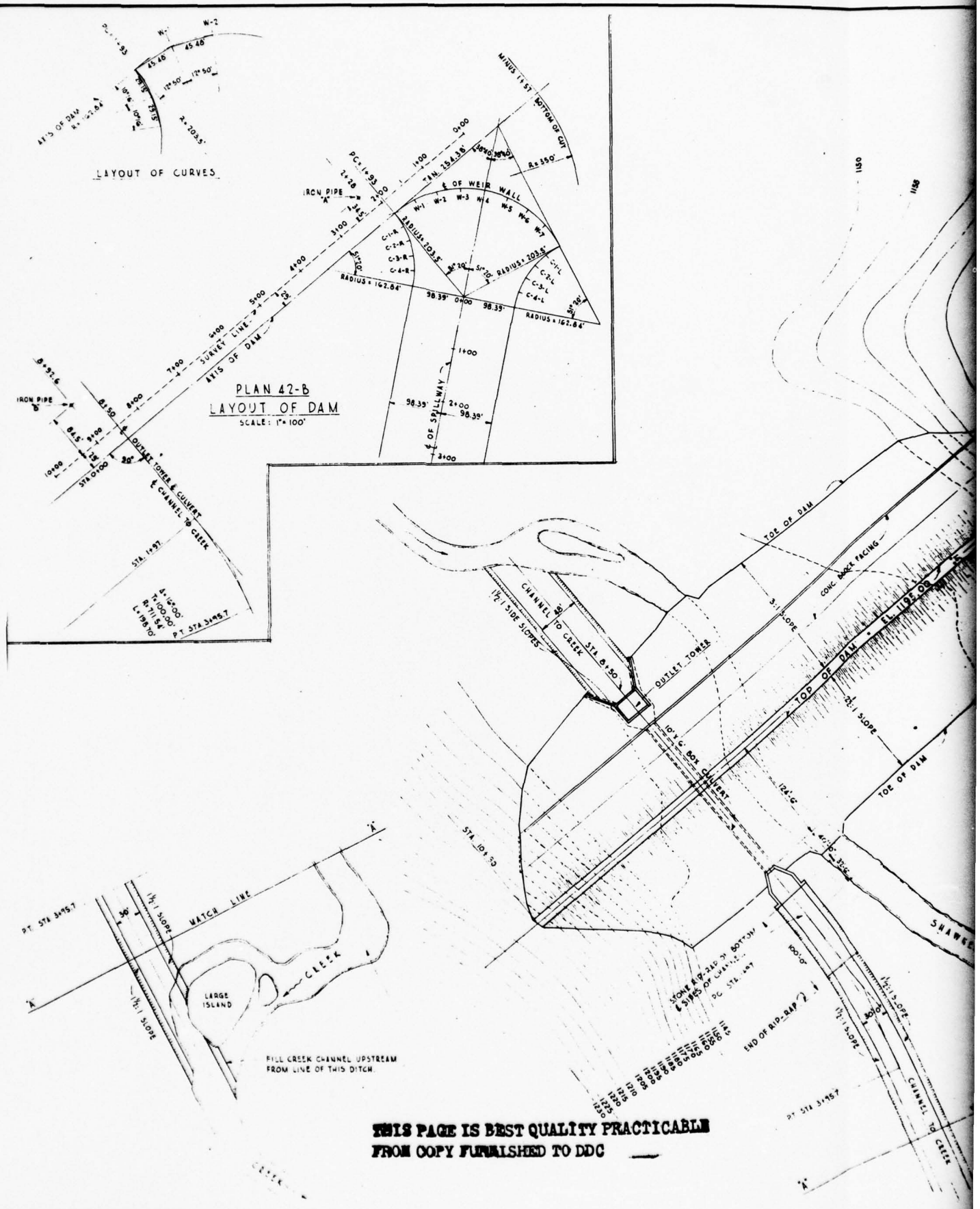
THE CHESTER ENGINEERS
PITTSBURGH - PENNSYLVANIA

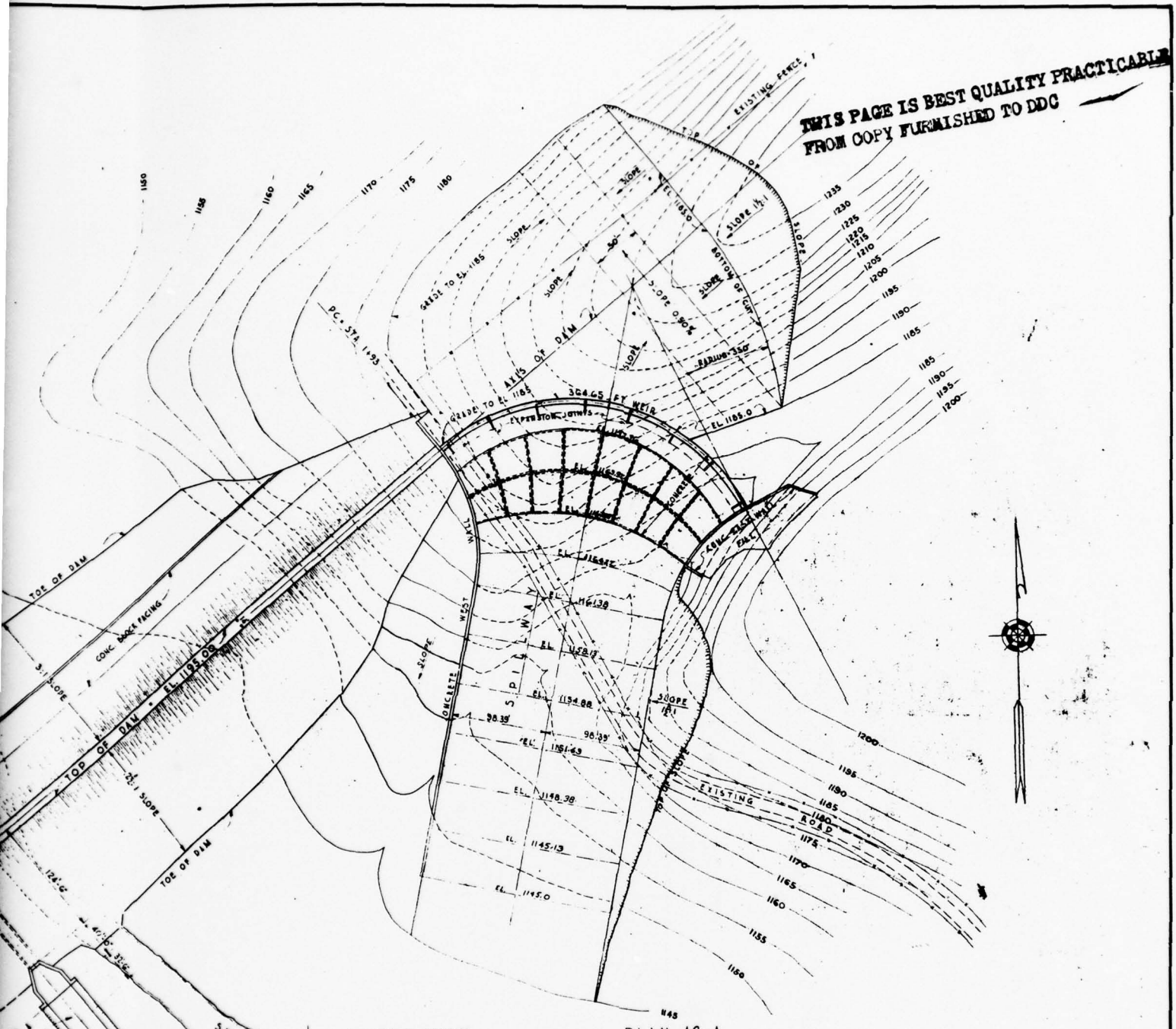
DATE	COMMONWEALTH OF PENNSYLVANIA	SHEET NO.
JAN. 49	JAMES H. DUFF GOVERNOR	
SCALE AS NOTED	DEPARTMENT OF FORESTS & WATERS M. F. DRAEMEL SECRETARY HARRISBURG, PENNA.	4

PLATE 2

D'APPOLONIA

DRAWN BY	trs	CHECKED BY	BE	10-10-78	DRAWING NO.	14-B166
	9-5-78	APPROVED BY	[illegible]	10-12-78		





PLAN 42-A

PLAN OF DAM & SPILLWAY

SCALE: 1" = 60'

REVISED		

APPROVED _____ SECRETARY FORESTS & WATERS

APPROVED _____ CHIEF ENGR. FORESTS & WATERS

SUBMITTED John N. Bauchill THE CHESTER ENGINEERS

PREPARED THE CHESTER ENGINEERS

ACCEPTED _____ CONTRACTOR

EARTH DAM - PLAN

SHAWNEE BRANCH PROJECT

JUNIATA RIVER — BEDFORD COUNTY

PENNSYLVANIA

THE CHESTER ENGINEERS

PITTSBURGH - PENNSYLVANIA

DATE	COMMONWEALTH OF PENNSYLVANIA	SHEET
JAN. 49	JAMES H. DUFF GOVERNOR	NO.
SCALE	DEPARTMENT OF FORESTS & WATERS	3
1" = 60'	M. F. DRAEMEL SECRETARY	
	HARRISBURG, PENNA.	

PLATE 3

D'APPOLONIA

2

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
trs			114-B164
9-5-78	10-10-78	10-10-78	7

END OF SPILLWAY PAVING
58 MESH
4'-0"
SECTION 48-A
SCALE ½"=1'-0"

APPROX PRES. GROUND
2'-0" 2'-0" 2'-0"
DITCH TOP OF SLOPES ON UPHILL SIDES WHERE SHOWN
SECTION 48-D
SCALE ½"=1'-0"

1½" MASTIC JOINT
58 MESH
2'-6"
SECTION 48-B
TRANSVERSE JOINT
SCALE ½"=1'-0"

1½" MASTIC JOINT
58 MESH
2'-6"
4" I.C. DRAIN LAID IN GRAVEL
SECTION 48-C
LONGITUDINAL JOINT
SCALE ½"=1'-0"

TOP OF DAM EL 1195.00
EXIST. GROUND LINE
C.H. #11
C.H. #10
W.1
W.2
W.3
W.4
TOP OF WEIR WALL = EL. 1187.50
GROUND EXCAVATED TO EL. 1185.0 UNDER ITEM No. 5
TOP LIMIT OF PAYMENT ITEM #24
0+00 TO 1+00 DRILL HOLES ON 5'-0" CTRS (20 HOLES)
CORE HOLE #9
BOTTOM LIMIT OF PAYMENT ITEM #24
1200
1190
1180
1170
1160
1150
0+00
1+00
2+00
53A
1160.0
WEIR WALL
L=364.2'
AXIS OF DAM
37'-0"
COPPER EXP. JOINT SECT. 49-G
CONSTRUCTION
48C
ANCHOR SLEEPER
ANCHOR SLEEPER
48A
END OF SPILLWAY PAVING
TOE WALL
RADIUS = 162.84'
RADIUS = 340'
RIGHT SIDE WALL
98.39'
STA 3+00

EXC. ITEM "8
BACKFILL ITEM "11
EXCAV. ITEM "9
1180
1170

1195.0
TOP OF DAM
1190
24" CUT OFF WALL
TOP OF WEIR WALL 1187.50
49-G
49G
APPROX. PRES. GROUND
CONCRETE ITEM "18
EXCAVATE ITEM "C"
CONC. ITEM "19
BACKFILL ITEM "11
CONCRETE CUT OFF WALL ITEM "15
EXCAVATE ITEM "8E"
36" CUT OFF WALL
1180
1170
SECTION AT PC
SCALE ½"=1'-0"

BACKFILL ITEM "11
EXC. ITEM "6
EXC. ITEM "9
FL. 1172.76
10"
1180
1170
STATION C-1-R
SCALE ⅛"=1'-0"

BACKFILL ITEM "11
1179.91
EXC. ITEM "6
EXC. ITEM "9
FL. 1168.91
10"
1180
1170
STATION C-2-R
SCALE ⅛"=1'-0"

1180
BACKFILL ITEM "11
1177.07
EXC. ITEM "6
EXC. ITEM "9
FL. 1167.07
10"
1170
STATION C-3-R
SCALE ⅛"=1'-0"

1174.22
BACKFILL ITEM "11
EXC. ITEM "6
EXC. ITEM "9
1170
STATION C-4-R
SCALE ⅛"=1'-0"

1156.63
BACKFILL ITEM "11
EXC. ITEM "6
1151.63
EXC. ITEM "8
SHALE
EXCAV. ITEM "9
1150
1140
STATION 1+50 R
SCALE ⅛"=1'-0"

FL. 1164.22
BACKFILL ITEM "11
EXC. ITEM "6
EXC. ITEM "9
FL. 1161.38
1160
STATION 0+00 R
SCALE ⅛"=1'-0"

1153.38
BACKFILL ITEM "11
EXC. ITEM "6
FL. 1148.38
EXC. ITEM "8
SHALE
EXC. ITEM "9
1150
1140
STATION 2+00 R
SCALE ⅛"=1'-0"

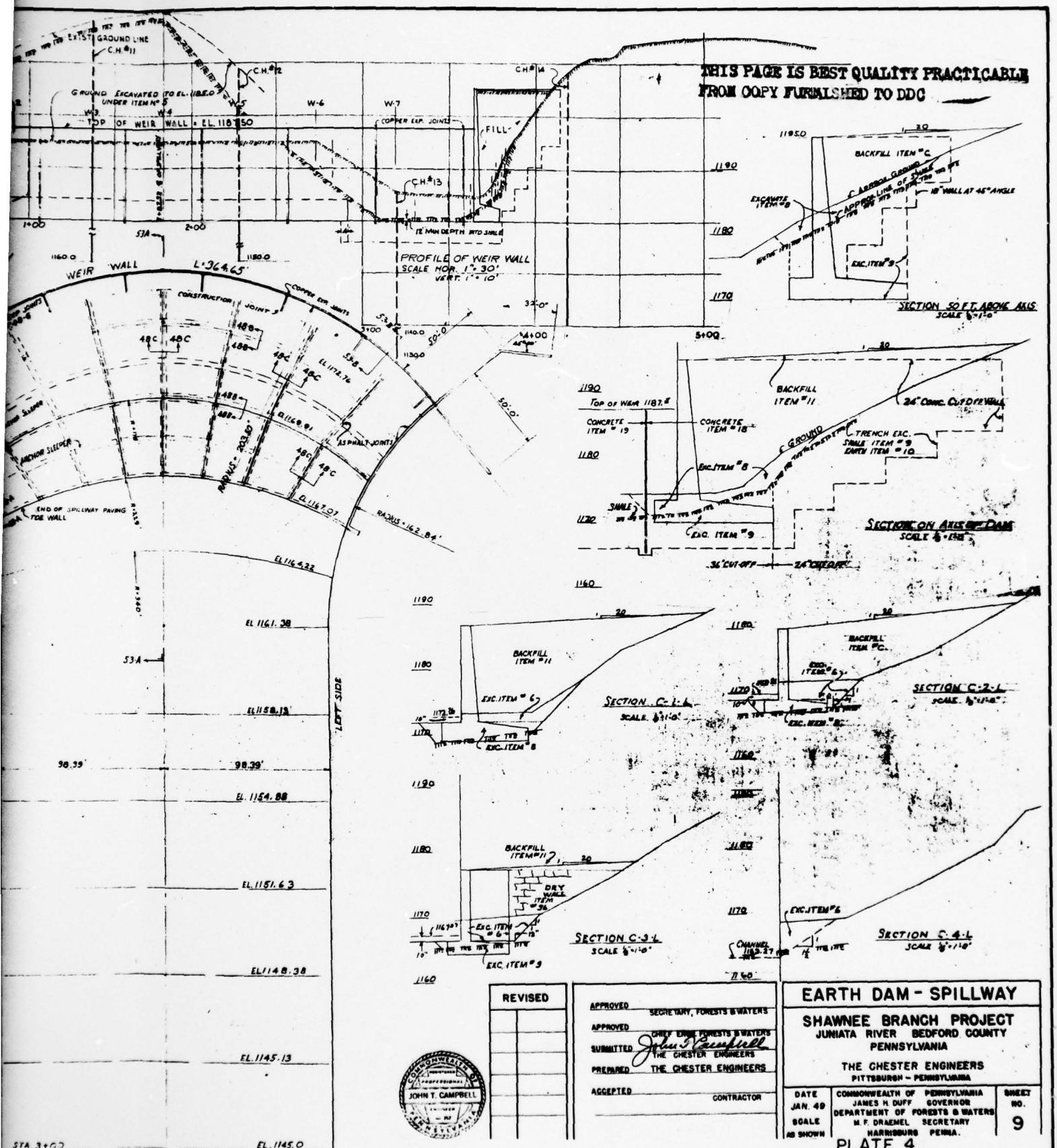
BACKFILL ITEM "11
EXC. ITEM "6
EXC. ITEM "9
FL. 1158.13
1160
1150
STATION 0+50 R
SCALE ⅛"=1'-0"

1150.78
BACKFILL ITEM "11
EXC. ITEM "A
FL. 1145.13
EXC. ITEM "8
EXC. ITEM "9
1140
STATION 2+50 R
SCALE ⅛"=1'-0"

1163.18
BACKFILL ITEM "11
1158.25
BACKFILL ITEM "11
EXC. ITEM "6
FL. 1153.25
EXC. ITEM "6
1154.88
EXC. ITEM "8
EXC. ITEM "9
EXC. ITEM "9
1160
1150
STATION 1+00 R
SCALE ⅛"=1'-0"
STATION 1+25 R
SCALE ⅛"=1'-0"
1140

1150.78
1150
GROUND
EXC. ITEM "6
BACKFILL ITEM "11
FL. 1145.0
EXC. ITEM "8
SHALE
EXC. ITEM "9
1140
STATION 3+00 R
SCALE ⅛"=1'-0"

PLAN OF SPILLWAY
SCALE 1"=30'



REVISED

APPROVED _____ SECRETARY, FORESTS & WATERS

APPROVED _____ CHIEF, BUR. FORESTS & WATERS

SUBMITTED John T. Campbell THE CHESTER ENGINEERS

PREPARED THE CHESTER ENGINEERS

ACCEPTED _____ CONTRACTOR

COMMONWEALTH OF PENNSYLVANIA — PROFESSIONAL — JOHN T. CAMPBELL — REGISTERED — PENNSYLVANIA

EARTH DAM - SPILLWAY

SHAWNEE BRANCH PROJECT

JUNIATA RIVER BEDFORD COUNTY
PENNSYLVANIA

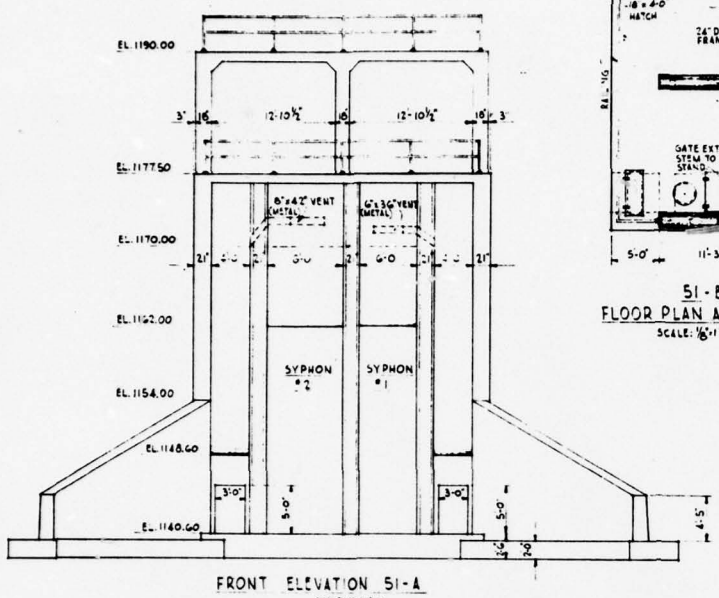
THE CHESTER ENGINEERS
PITTSBURGH - PENNSYLVANIA

DATE	COMMONWEALTH OF PENNSYLVANIA	SHEET NO.
JAN. 49	JAMES H. DUFF GOVERNOR	
SCALE AS SHOWN	DEPARTMENT OF FORESTS & WATERS M. F. DRAEMEL SECRETARY HARRISBURG PENNA.	9

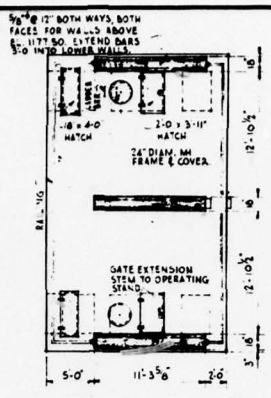
PLATE 4

D'APPOLONIA

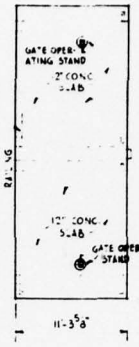
DRAWN BY	trs	CHECKED BY	BE	10-10-78	DRAWING NUMBER	14-B165
	9-5-78	APPROVED BY				



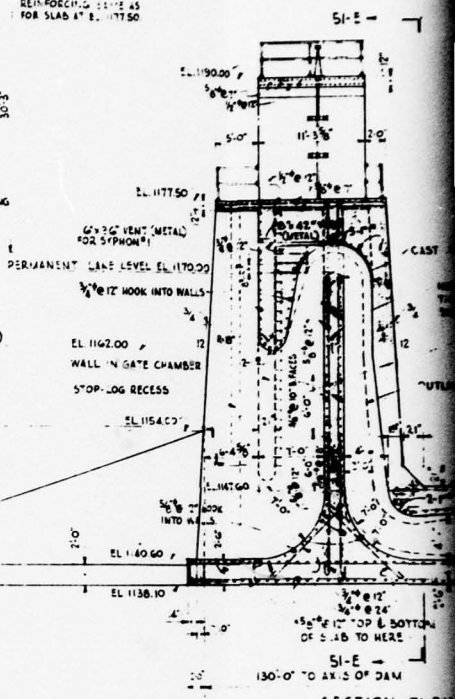
FRONT ELEVATION 51-A
SCALE: 1/8"=1'-0"



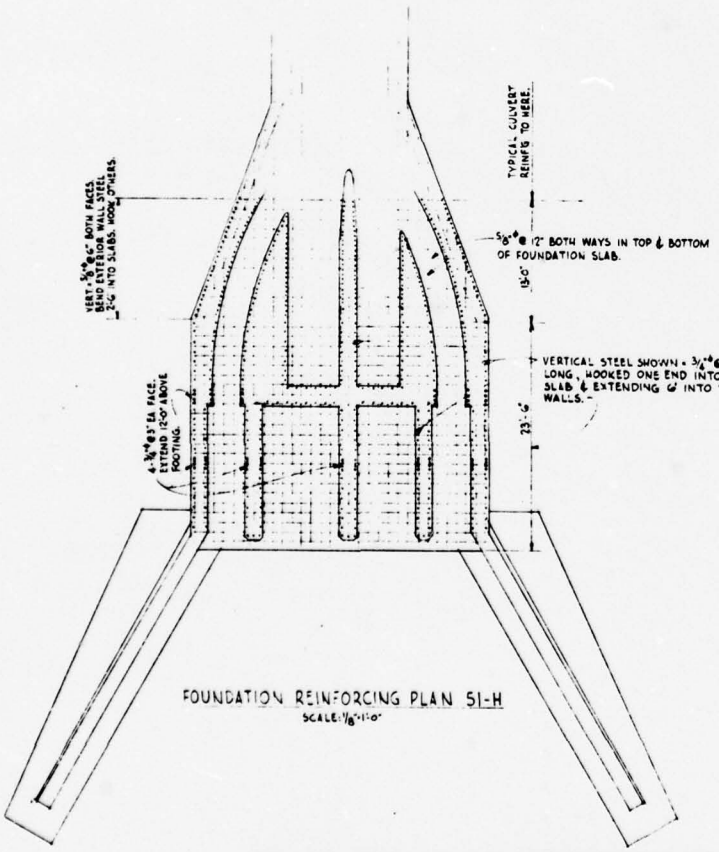
51-B
FLOOR PLAN AT EL. 1177.5
SCALE: 1/8"=1'-0"



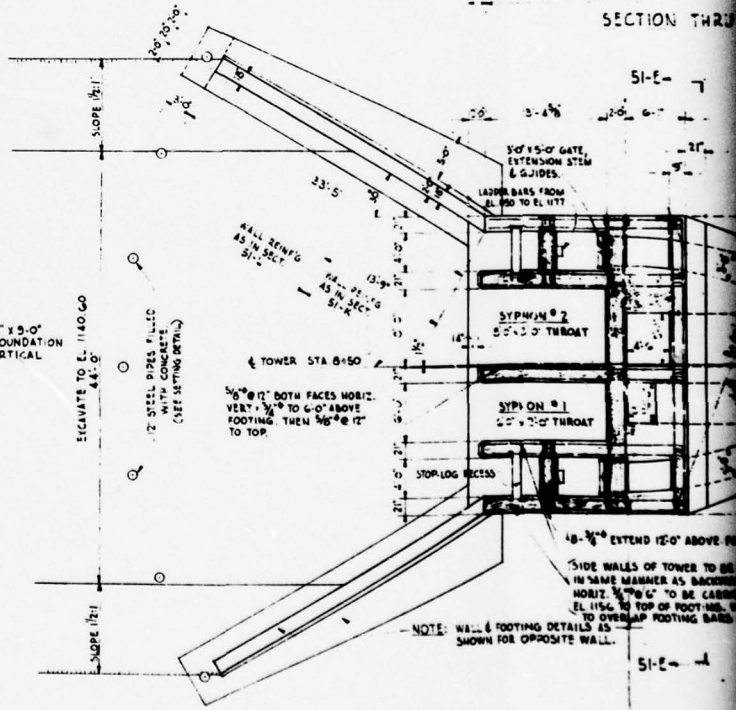
51-C
FLOOR PLAN AT EL. 1190
SCALE: 1/8"=1'-0"

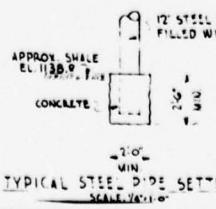


SECTION THRU

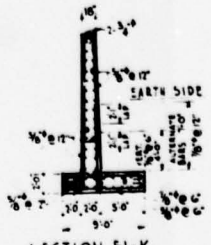


FOUNDATION REINFORCING PLAN 51-H
SCALE: 1/8"=1'-0"

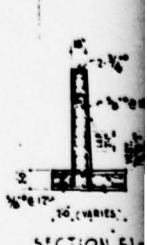




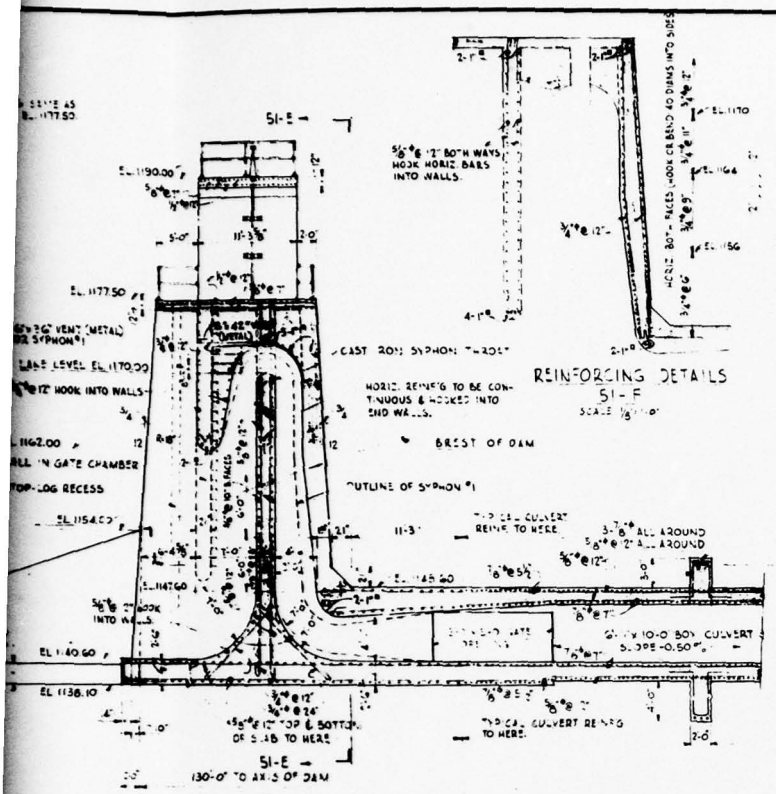
TYPICAL STEEL PIPE SETTING
SCALE: ½"=1'-0"



SECTION 51-K
SCALE: 1/8"=1'-0"

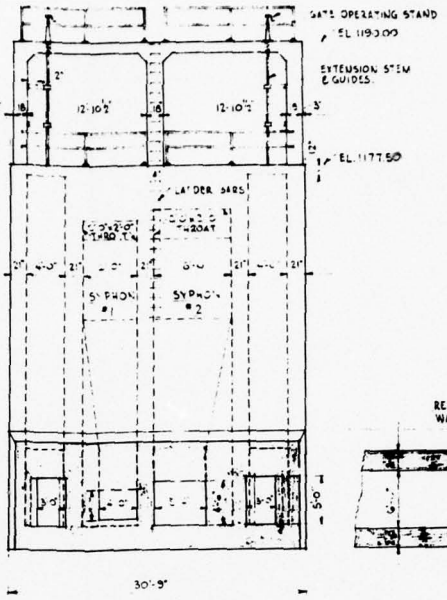


SECTION 51-
SCALE: 1/8"=1'-0"

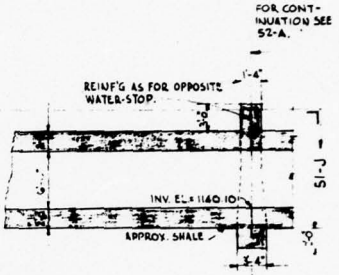


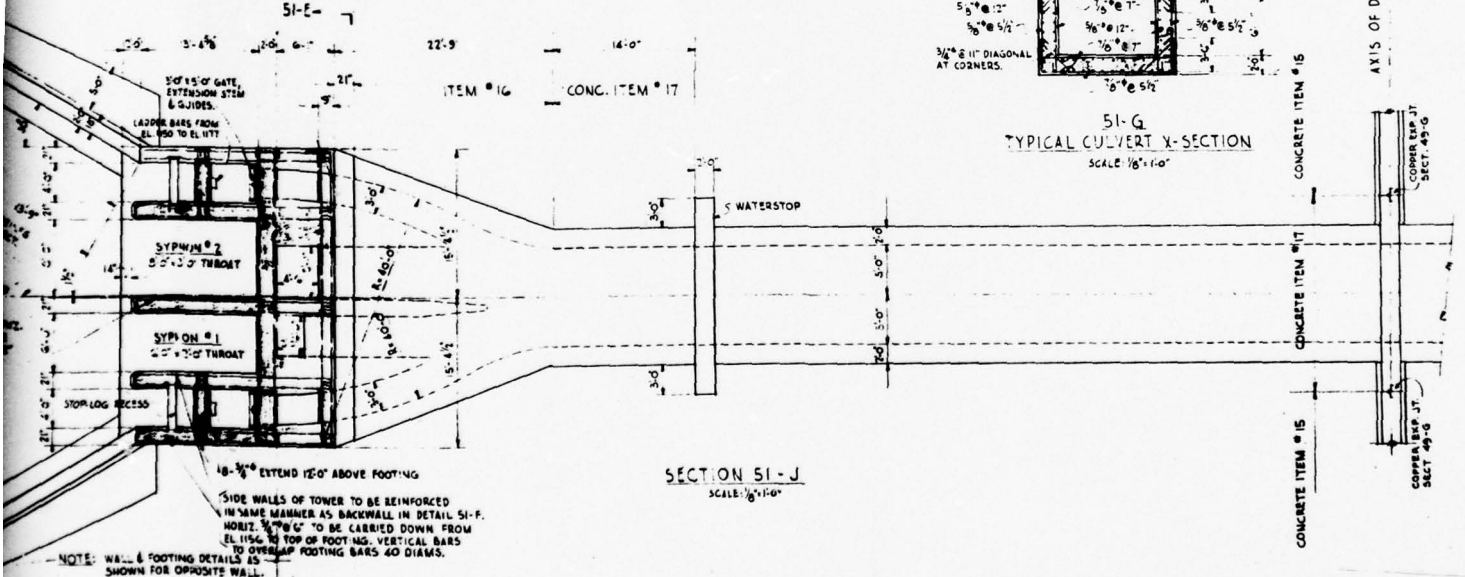
SECTION THRU TOWER & BOX CULVERT 51-D
SCALE 1/8"=1'-0"

REINFORCING DETAILS
51-F
SCALE 1/8"=1'-0"

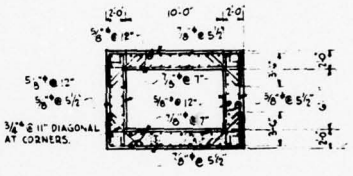


CROSS SECTION 51-E
SCALE 1/8"=1'-0"





SECTION 51-J
SCALE 1/8"=1'-0"

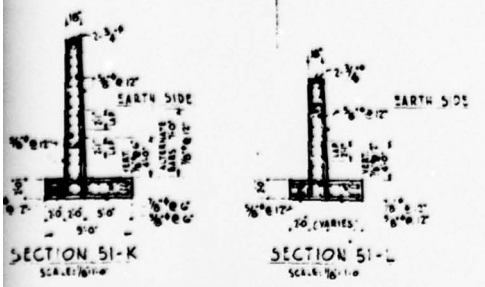


51-G
TYPICAL CULVERT X-SECTION
SCALE 1/8"=1'-0"

18-3/8"@ EXTEND 12'-0" ABOVE FOOTING

SIDE WALLS OF TOWER TO BE REINFORCED IN SAME MANNER AS BACKWALL IN DETAIL 51-F. HORIZ. 5/8"@12" TO BE CARRIED DOWN FROM EL. 1156 TO TOP OF FOOTING. VERTICAL BARS TO OVERLAP FOOTING BARS 40 DIAMS.

NOTE: WALL & FOOTING DETAILS AS SHOWN FOR OPPOSITE WALL.



SECTION 51-K
SCALE 1/8"=1'-0"

SECTION 51-L
SCALE 1/8"=1'-0"

REVISED

APPROVED SECRETARY, FORESTS & WATERS
APPROVED CHIEF ENGR FORESTS & WATERS
SUBMITTED THE CHESTER ENGINEERS
PREPARED THE CHESTER ENGINEERS
ACCEPTED CONTRACTOR

OUTLET TOWER & CULVERT

SHAWNEE BRANCH PROJECT

JUNIATA RIVER — BEDFORD COUNTY
PENNSYLVANIA

THE CHESTER ENGINEERS
PITTSBURGH — PENNSYLVANIA

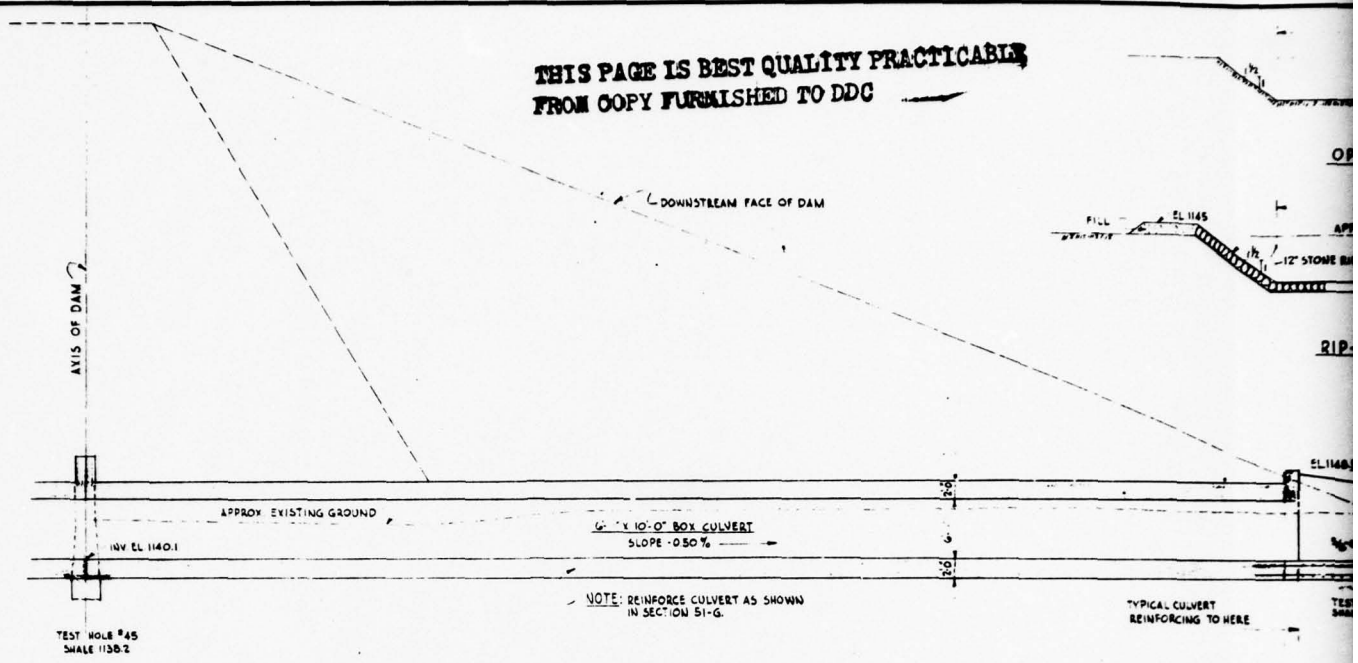
DATE	COMMONWEALTH OF PENNSYLVANIA	SHEET NO.
JAN. 49	JAMES H. DUFF GOVERNOR	13
SCALE 1/8"=1'-0"	DEPARTMENT OF FORESTS & WATERS H. F. DRAEMEL SECRETARY HARRISBURG, PENNA.	

PLATE 5

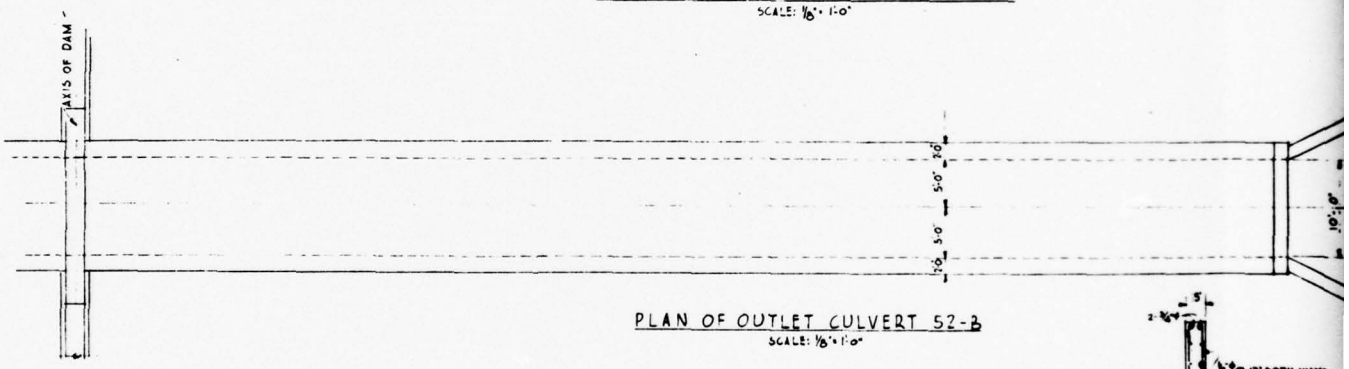
D'APPOLONIA

2

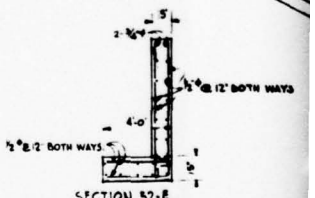
DRAWN BY	trs	CHECKED BY	BE	10-10-78	DRAWING NUMBER 7 14-B167
	9-5-78	APPROVED BY			



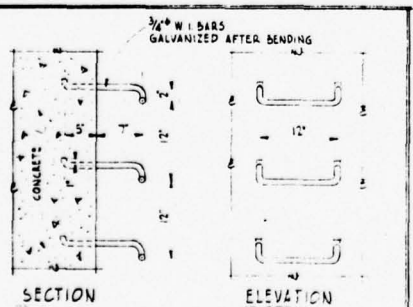
SECTION THRU OUTLET CULVERT 52-A
SCALE: 1/8" = 1'-0"



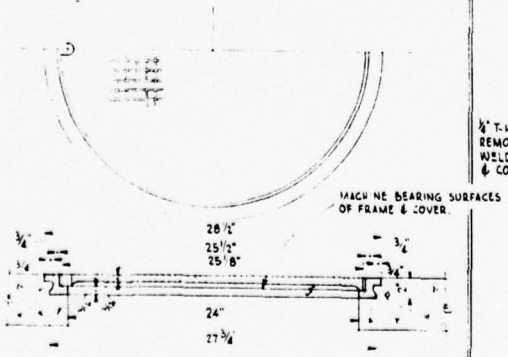
PLAN OF OUTLET CULVERT 52-B
SCALE: 1/8" = 1'-0"



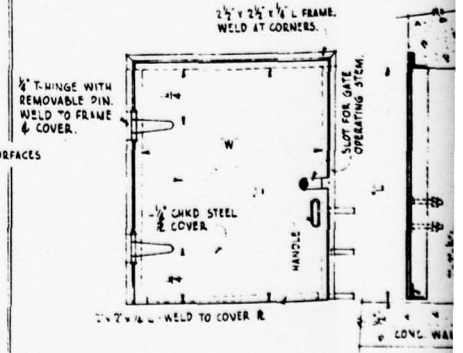
SECTION 52-E



STANDARD LADDER BAR DETAILS



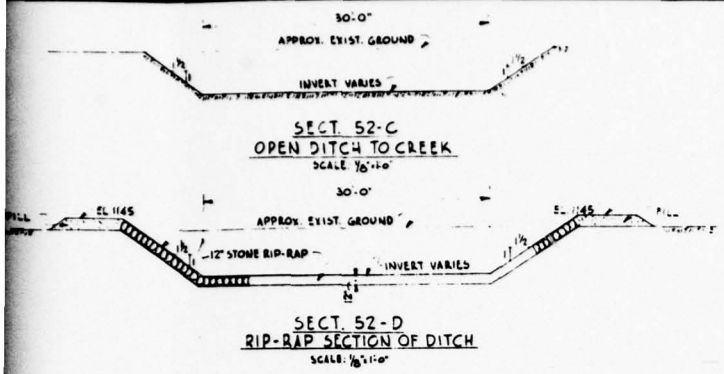
STANDARD FLUSH-TYPE MANHOLE FRAME & COVER



PLAN

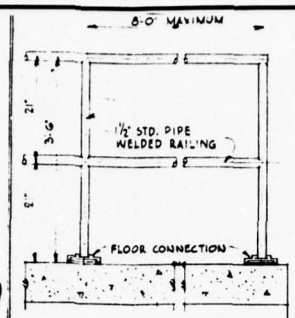
SECTION

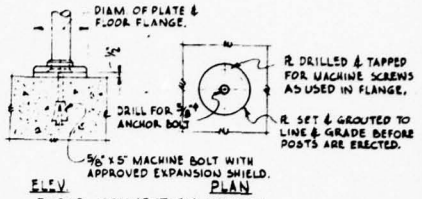
STANDARD STE



SECT. 52-C
OPEN DITCH TO CREEK
SCALE 1/8"=1'-0"

SECT. 52-D
RIP-RAP SECTION OF DITCH
SCALE: 1/8"=1'-0"





FLOOR CONNECTION DETAILS

STANDARD PIPE RAILING & FITTINGS

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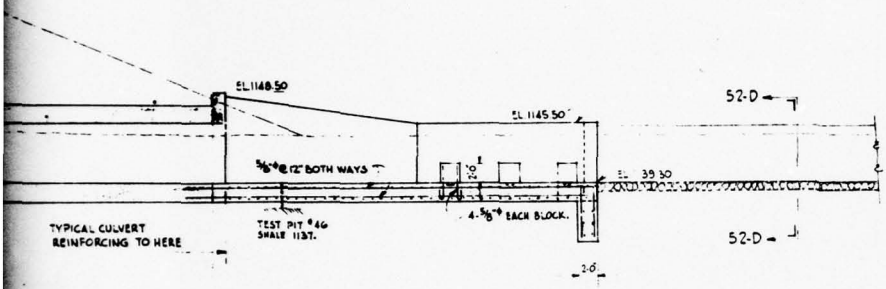
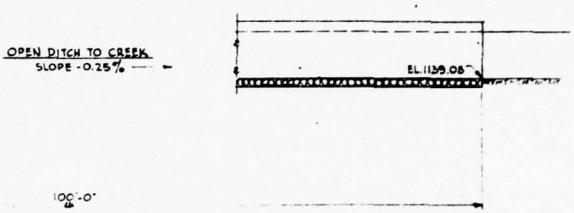
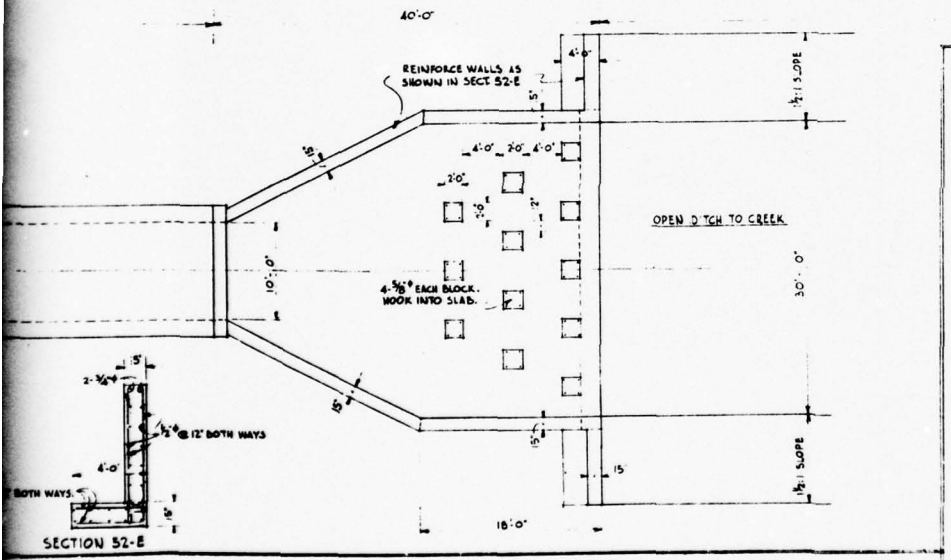




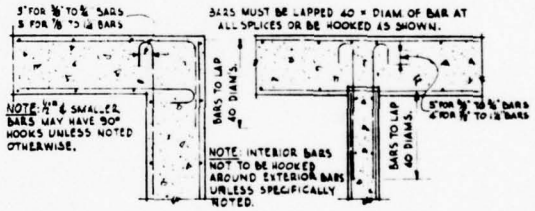


SECTION 52-E

REINFORCING STEEL SHOWN THUS: ——
SQUARE BARS AND SPACING NOTED THUS: - ½"ø @ 6"
ROUND " " " " : - ½"ø @ 6"
STRESS STEEL ALWAYS SHOWN NEXT TO THE SURFACE OF THE WALL AND SHALL HAVE THE FOLLOWING COVER FROM CENTER OF STRESS BAR TO SURFACE AS FOLLOWS:-

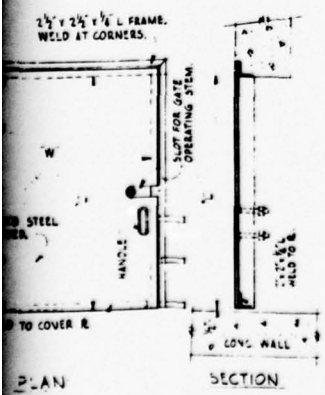
	IF WHEN MEMBER IS	
½"	LESS THAN 12"	THICK.
2"	12" TO 18"	" "
3"	18" TO 24"	" "
	OVER 24"	" "

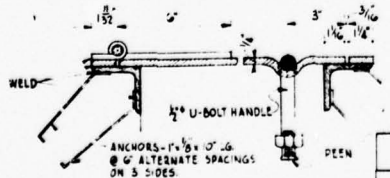
ALL CORNERS & INTERSECTIONS OF WALLS & INTERSECTIONS OF FLOORS OR FLUME SLABS WITH WALLS SHALL HAVE ARRANGEMENT OF STEEL SHOWN BELOW:-



- ONLY DEFORMED BARS SHALL BE USED.
- THE AMOUNT OF STEEL SHOWN SHALL BE DOUBLED THRU CONSTRUCTION JOINTS & FOR A DISTANCE NOT LESS THAN 40 x DIAM. OF BAR EITHER SIDE OF JOINT.
- ALL BARS WHERE JOINED SHALL BE LAPPED 40 x DIAM. OF BAR.
- DOWEL BARS TRANSMITTING SHEAR ONLY SHALL BE LAPPED 24 x DIAM. OF BAR.
- ALL BARS SHALL BE BENT AROUND OPENINGS OR SUFFICIENT ADDITIONAL BARS PROVIDED TO TRANSMIT STRESS.
- ALL EXPOSED EDGES OF CONCRETE WALLS SHALL BE BEVELED ¾" UNLESS OTHERWISE NOTED.
- WHERE EQUIPMENT OR ACCESSORIES EMBEDDED IN CONCRETE PRODUCE THIN OR CONFINED SECTIONS AS AT THE WALL CORNERS ADJACENT TO C.I. STOP PLANK GROOVES, THESE SECTIONS SHALL BE REINFORCED WITH ½"ø BARS @ 6", OR WIRE MESH EQUIVALENT.
- KEYWAYS SHALL BE PROVIDED AT ALL CONSTRUCTION JOINTS, & UNLESS NOTED SHALL BE A MINIMUM OF 2½" DEEP & ⅓ SECTION WIDTH.
- DOWEL BARS TO BE SAME SIZE AS CORRESPONDING WALL BARS UNLESS NOTED.

STANDARD CONCRETE DETAILS





DETAIL OF HINGE & HANDLE

STANDARD STEEL HATCHWAY COVERS

REVISED

APPROVED _____ SECRETARY FORESTS & WATERS
APPROVED _____ CHIEF, FLOR FORESTS & WATERS
SUBMITTED Gus D'Ambrosio THE CHESTER ENGINEERS
PREPARED THE CHESTER ENGINEERS
ACCEPTED _____ CONTRACTOR

OUTLET CULVERT & DITCH

SHAWNEE BRANCH PROJECT
JUNIATA RIVER — BEDFORD COUNTY
PENNSYLVANIA

THE CHESTER ENGINEERS
PITTSBURGH — PENNSYLVANIA

DATE JAN 49
SCALE 1/8" = 1'-0"

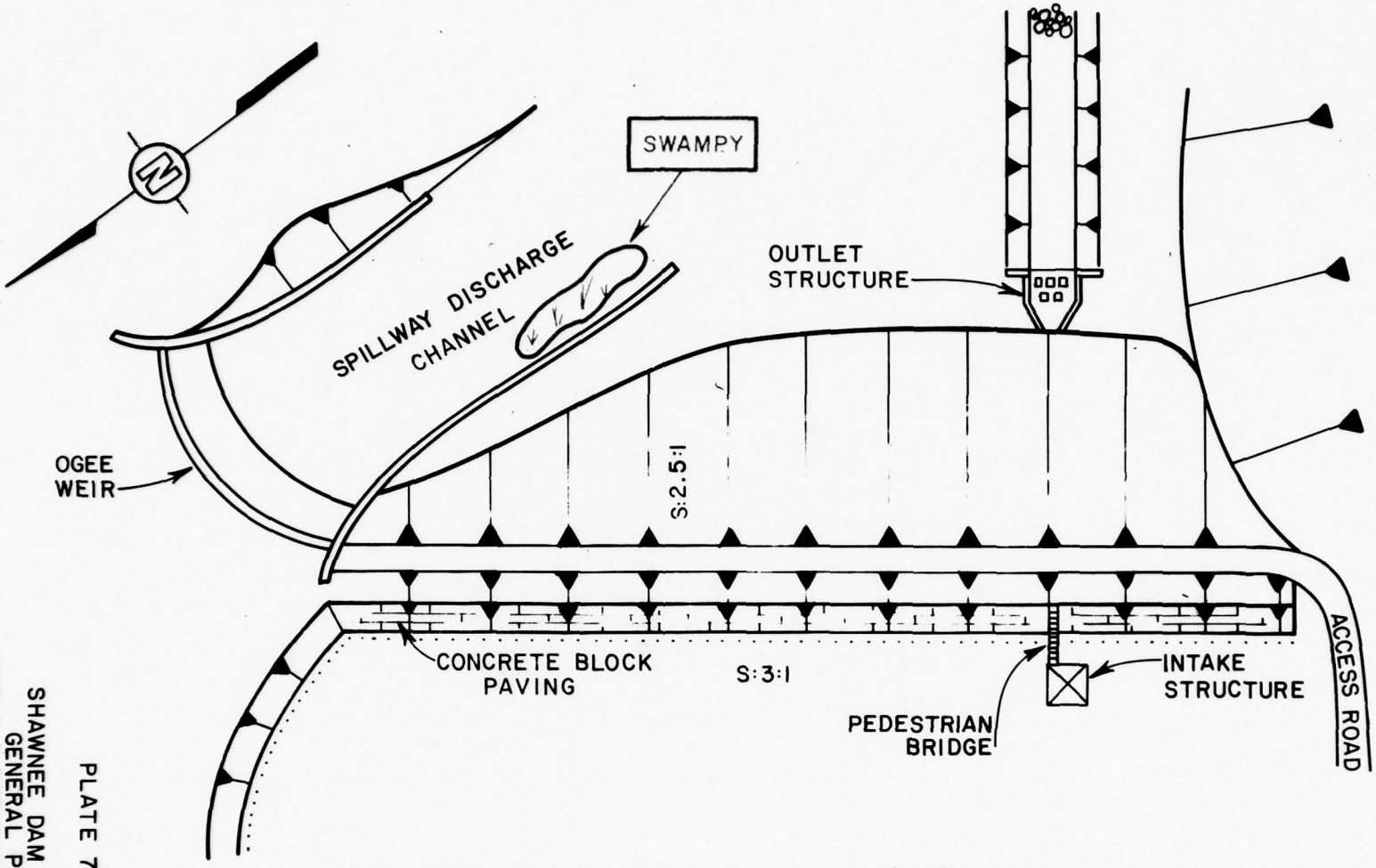
COMMONWEALTH OF PENNSYLVANIA
JAMES H. DUFF GOVERNOR
DEPARTMENT OF FORESTS & WATERS
M. F. DRAEMEL SECRETARY
HARRISBURG, PENNA.

SHEET NO. 14

PLATE 6

D'APPOLONIA

DRAWN BY	MBM	CHECKED BY	BE	10-10-78	DRAWING NUMBER 7[illegible]14-A27
	9-7-78	APPROVED BY	JHP	10-10-78	



POOL LEVEL DATE OF INSPECTION: 25'-4" BELOW CREST

PLATE 7

SHAWNEE DAM NDI: 832
GENERAL PLAN
FIELD INSPECTION SKETCH
FIELD INSPECTION DATE: 8-30-78

D'APPOLONIA

APPENDIX A

CHECKLIST
VISUAL INSPECTION
PHASE I

CHECKLIST
VISUAL INSPECTION
PHASE I

NAME OF DAM Shawnee Dam COUNTY Bedford STATE Pennsylvania ID# NDI 832
DER 5-70

TYPE OF DAM Earthfill HAZARD CATEGORY High

DATE(S) INSPECTION August 30, 1978 WEATHER Cloudy TEMPERATURE 80's

POOL ELEVATION AT TIME OF INSPECTION 1169.7 M.S.L. TAILWATER AT TIME OF INSPECTION 1139+ M.S.L.

INSPECTION PERSONNEL:

Bilgin Erel	Review Inspection by:	Elio D'Appolonia
Wah-Tak Chan	(September 8, 1978)	L. D. Andersen
		J. H. Poellot

Bilgin Erel RECORDER

VISUAL INSPECTION
PHASE I
EMBANKMENT

NAME OF DAM Shawnee Dam

ID# NDI 832, DER 5-70

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	No perceivable misalignment.	
RIPRAP FAILURES	None	

VISUAL INSPECTION
PHASE I
EMBANKMENT

NAME OF DAM Shawnee Dam

ID# NDI 832, DER 5-70

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No signs of distress or seepage.	
ANY NOTICEABLE SEEPAGE	A swampy area in the emergency spillway discharge channel. It appears to be due to surface runoff.	
STAFF GAGE AND RECORDER	Located in the outlet works intake structure.	
DRAINS	None	

VISUAL INSPECTION
PHASE I
CONCRETE/MASONRY DAMS

NAME OF DAM Shawnee Dam
ID# NDI 832, DER 5-70

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	(Earth-fill Dam) N/A	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

VISUAL INSPECTION
PHASE I
CONCRETE/MASONRY DAMS

NAME OF DAM Shawnee Dam

ID# NDI 832, DER 5-70

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	(Earth-fill Dam) N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL AND HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS STAFF GAGE OF RECORDER:	N/A	

VISUAL INSPECTION
PHASE I
OUTLET WORKS

NAME OF DAM Shawnee Dam
ID# NDI 832, DER 5-70

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	6-foot by 10-foot reinforced concrete culvert. In good condition. The construction joints are wet but there is no measureable seepage.	
INTAKE STRUCTURE	Most of the structure is submerged. The visible portions are in good condition.	
OUTLET STRUCTURE	Stilling basin; good condition.	
OUTLET CHANNEL	Trapezoidal masonry channel; free of debris; no apparent obstructions.	
EMERGENCY GATE	The sluice gates were operated by the state personnel and observed to be functional.	

VISUAL INSPECTION
PHASE I
UNGATED SPILLWAY

NAME OF DAM Shawnee Dam
ID# NDI 832, DER 5-70

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Siphon spillway weirs are not visible. Emergency spillway weir is in good condition.	
APPROACH CHANNEL	Emergency spillway approach channel is free of obstructions.	
DISCHARGE CHANNEL	Emergency spillway discharge channel is in good condition; no apparent obstructions.	
BRIDGE AND PIERS	None	

VISUAL INSPECTION
PHASE I
GATED SPILLWAY

NAME OF DAM Shawnee Dam
ID# NDI 832, DER 5-70

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A (No gated spillway)	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

VISUAL INSPECTION
PHASE I
INSTRUMENTATION

NAME OF DAM Shawnee Dam

ID# NDI 832, DER 5-70

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

VISUAL INSPECTION
PHASE I
RESERVOIR

NAME OF DAM Shawnee Dam

ID# NDI 832, DER 5-70

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderate to gentle slopes. No apparent stability problems.	
SEDIMENTATION	Unknown	

VISUAL INSPECTION
PHASE I
DOWNSTREAM CHANNEL

NAME OF DAM Shawnee Dam
ID# NDI 832, DER 5-70

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	No apparent obstructions immediately downstream from the dam.	
SLOPES	No apparent instablity immediately downstream from the dam.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	Manns Choice (first community downstream from the dam - 3 miles downstream along Raystown Branch of Juniata River). Population: 350 (approximately). Approximately 50 mobile homes along Raystown Branch of the Juniata River would also be affected in the event of a flood due to dam failure.	

APPENDIX B

CHECKLIST
ENGINEERING DATA, DESIGN,
CONSTRUCTION, OPERATION
PHASE I

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Shawnee Dam
ID# NDI 832, DER 5-70

ITEM	REMARKS
AS-BUILT DRAWINGS	A complete set of design drawings is available in state files.
REGIONAL VICINITY MAP	See Plate 1.
CONSTRUCTION HISTORY	Designed by The Chester Engineers, Inc., of Pittsburgh, Pennsylvania in 1949. The dam was constructed by Latrobe Construction Company of Latrobe, Pennsylvania, with completion in June 1950.
TYPICAL SECTIONS OF DAM	See Plate 2.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See Plates 5 and 6.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Shawnee Dam
ID# NDI 832, DER 5-70

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	Reservoir records are maintained by the state. The records were not available for review.
DESIGN REPORTS	1) Report and Study on Design of Dam and Lake for Flood Control and Recreation Purposes, Shawnee Branch Project, October 1948, by The Chester Engineers, Inc., of Pittsburgh, Pennsylvania. 2) Supplemental Report to Report of October 16, 1948 on Design of Dam and Lake for Flood Control and Recreational Purposes, Shawnee Branch Project, November 1948.
GEOLOGY REPORTS	Not available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	The hydrology and hydraulic calculations were available in the engineers' report. Stability and seepage analyses were not available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Boring logs are available in state files.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Shawnee Dam
ID# NDI 832, DER 5-70

ITEM	REMARKS
POST CONSTRUCTION SURVEYS OF DAM	None reported.
BORROW SOURCES	Unknown
MONITORING SYSTEMS	None
MODIFICATIONS	None
HIGH POOL RECORDS	Not available. According to state park personnel, pool level has never reached emergency spillway crest elevation (Elevation 1187.5).

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Shawnee Dam
ID# NDI 832, DER 5-70

ITEM	REMARKS
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Report of Settlement of the Embankment of Shawnee Dam, by The Chester Engineers, Inc., November 9, 1950.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported.
MAINTENANCE OPERATION RECORDS	Not available.
SPILLWAY PLAN SECTIONS DETAILS	See Plates 3 and 4.
OPERATING EQUIPMENT PLANS AND DETAILS	See Plate 5.

NAME OF DAM Shawnee Dam

ID# NDI 832, DER 5-70

CHECKLIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Pastureland 37.5 square miles

ELEVATION; TOP NORMAL POOL AND STORAGE CAPACITY: 3750 acre-feet at El. 1170

ELEVATION; TOP FLOOD CONTROL POOL AND STORAGE CAPACITY: Same as above

ELEVATION; MAXIMUM DESIGN POOL: El. 1187.5 (crest of emergency spillway)

ELEVATION; TOP DAM: El. 1190

CREST: (Emergency Spillway)

a. Elevation 1187.5

b. Type Ogee weir

c. Width 365 feet

d. Length N/A

e. Location Spillover Left abutment

f. Number and Type of Gates None

OUTLET WORKS:

a. Type Two 3-foot by 5-foot sluice gates discharging into 6-foot by 10-foot box culvert.

b. Location Near right abutment

c. Entrance Inverts El. 1140.6

d. Exit Inverts El. 1139.3

e. Emergency Draindown Facilities Two 3-foot by 5-foot sluice gates

HYDROMETEOROLOGICAL GAGES:

a. Type None

b. Location None

c. Records None

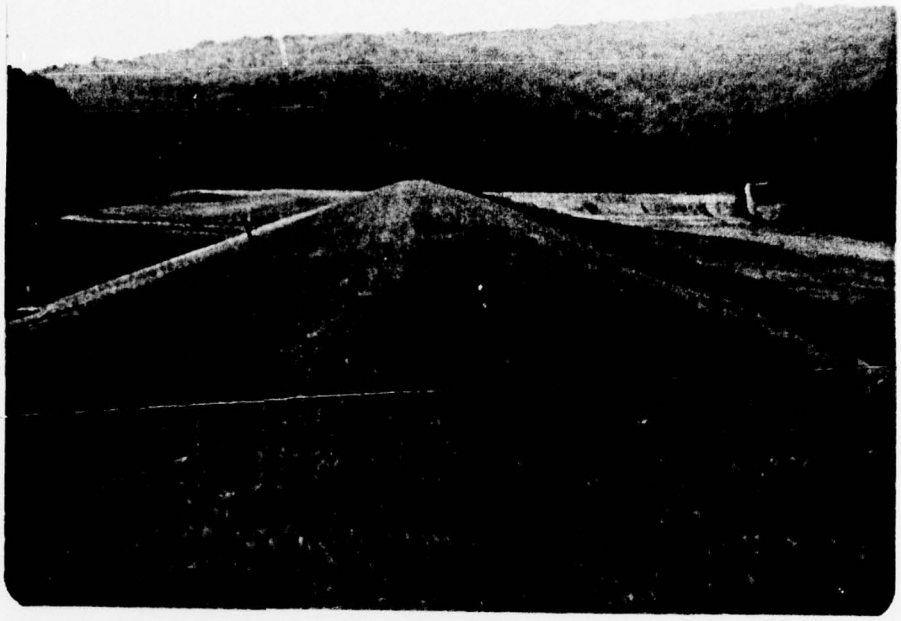
MAXIMUM NONDAMAGING DISCHARGE: Combined spillway capacity (28,800 cfs)

APPENDIX C

PHOTOGRAPHS

LIST OF PHOTOGRAPHS
SHAWNEE DAM
NDI I.D. NO. 832
AUGUST 30, 1978

PHOTOGRAPH NO.	DESCRIPTION
1	Crest (looking northeast).
2	Spillway crest.
3	Siphon spillway intake tower.
4	Outlet gate hoist.
5	Outlet conduit.
6	Outlet conduit discharge channel.
7	Bridge on Pennsylvania Turnpike over Shawnee Branch (one mile downstream).
8	Town of Manns Choice (two miles downstream along Raystown Branch of the Juniata River).

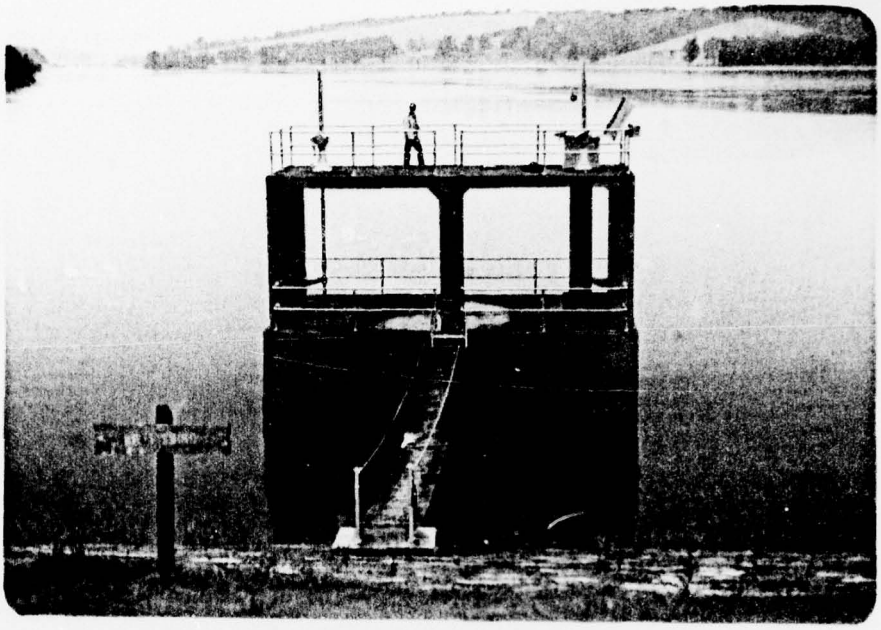


Photograph No. 1

Crest (looking northeast).

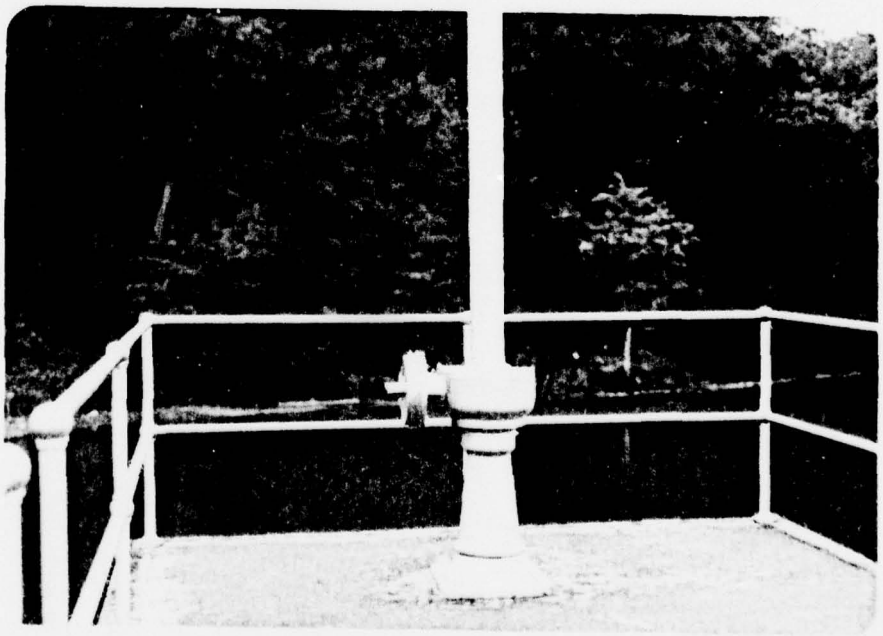
Photograph No. 2

Spillway crest.



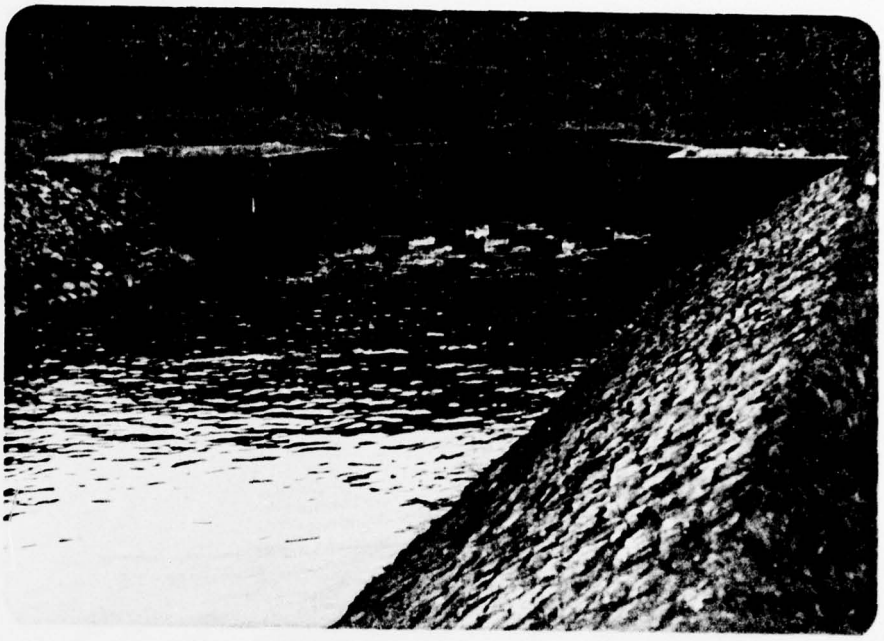
Photograph No. 3

Siphon spillway intake tower.



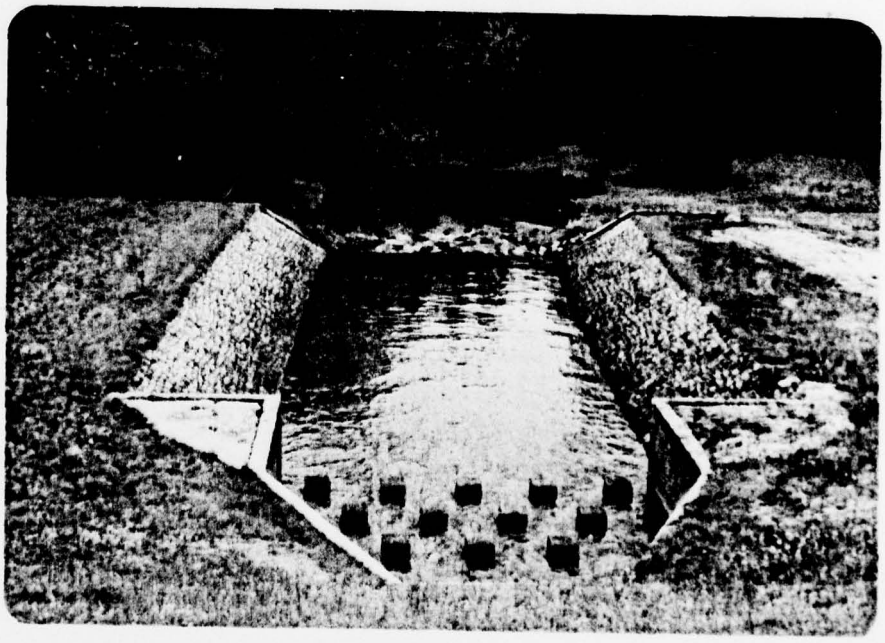
Photograph No. 4

Outlet gate hoist.



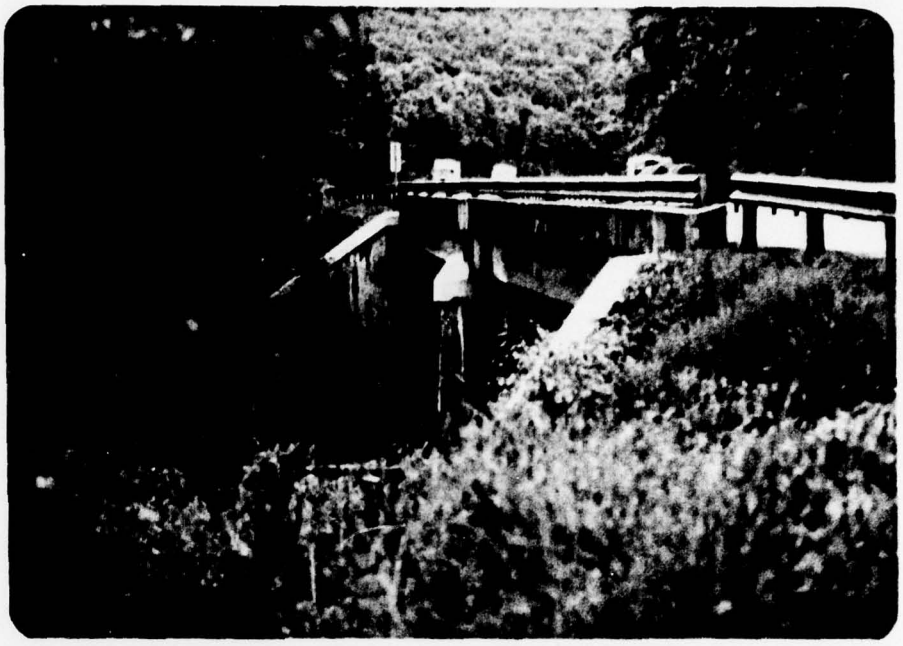
Photograph No. 5

Outlet conduit.



Photograph No. 6

Outlet conduit discharge channel.



Photograph No. 7

Bridge on Pennsylvania Turnpike over Shawnee Branch (one mile downstream).

Photograph No. 8

Town of Manns Choice (two miles downstream along Raystown Branch of the Juniata River).

APPENDIX D
CALCULATIONS

D'APPOLONIA
CONSULTING ENGINEERS, INC

By MB Date 10/6/78 Subject SHAWNEE LAKE DAM Sheet No. 1 of 2
Chkd. By WJG Date 10/9/78 HYDROLOGY & HYDRAULICS Proj. No. 78-114-26

WATERSHED AREA

REF. USGS 7.5' TOPOMAPS - SCHELLSBURG, BEDFORD AND CENTRAL CITY QUADRANGLES.

A) WATERSHED AREA

SECTION	AREA	SECTION	AREA
1	33.64 IN^2	5	90.02 IN^2
2	49.47 IN^2	6	34.85 IN^2
3	33.22 IN^2	7	18.60 IN^2
4	20.28 IN^2	8	23.42 IN^2

$A_T = 253.50\ IN^2$

$= 253.5 \times \left(\frac{2000}{5280}\right)^2$

$A_T = 36.4$ SQ. MILES

REPORTED AREA = 37.5 SQ. MILES

USE 37.5 SQ MILES

B) LAKE AREA - EL. 1170

$A_L = 4.88\ IN^2$

$= 4.88 \times \left(\frac{2000}{5280}\right)^2 \times 640$

$A_L = 448$ ACRES

REPORTED AREA = 451 ACRES

USE 450 ACRES

C) AREA OF DAM - TOP OF DAM - EL. 1195

$A_{EL.1200} = 15.5\ IN^2$

$= 15.5 \times \left(\frac{2000}{5280}\right)^2 \times 640$

$A_{EL\,1200} = 1423$ acres

DIAPPOLONIA
CONSULTING ENGINEERS, INC

By AMB Date 10/6/78 Subject SHAWNEE LAKE DAM Sheet No. 2 of 2
Chkd. By WTC Date 10/9/78 HYDROLOGY & HYDRAULICS Proj. No. 78-119-26

$$A_D = \left[\frac{(1423-450)}{1200-1170}\right](1195-1170) + 450$$

A_D = 1261 ACRES
REPORTED A_D = 1330 ACRES

USE A_D = 1330

D) SURCHARGE VOLUME

$$V_{OL} = \frac{25}{3}\left(450 + 1330 + \sqrt{(450)(1330)}\right)$$

V_{OL} = 21,280 ACRE-FT
REPORTED VOLUME = 21,500 ACRE-FT

USE V_{OL} = 21,500 AC-FT

DIAPPOLONIA
CONSULTING ENGINEERS, INC

By WTC Date 9-15-78 Subject SHAWNEE DAM Sheet No. 1 of 2
Chkd. By MG Date 9/29/78 HYDROLOGY & HYDRAULIC Proj. No 78-114-[illegible]

DAM: SHAWNEE DAM

BASIN: SHAWNEE BRANCH OF RAYSTOWN BRANCH JUNIATA RIVER, SUSQUEHANNA RIVER BASIN — REGION 1

WATERSHED AREA = 37.5 SQ. MI

ACCORDING TO CHARTS PROVIDED BY COE BALTIMORE DIST

MAX PMF INFLOW = 1500 cfs/SQ MI
= 56250 cfs say 56250 cfs

26" RUNOFF $V_1 = \frac{26}{12} \times 37.5 \times 640$
= 52000 ac. ft

Spillway

PRIMARY SPILLWAY — TWO SIPHONS

EL		Q_p cfs
1170		750
1120		890
1187.5	(spillway)	980
1195		1070

also

$Q_p = 0.6 A \sqrt{2gH} = (0.6)(15.75 \times 2)\sqrt{64.4}\sqrt{EL - 1145.5}$
$= 151.7 \sqrt{EL - 1145.5}$ cfs

Ref Plate NO 2 of "OPERATION AND MAINTENANCE MANUAL FOR SHAWNEE DAM BEDFORD CO PA" By DEPT OF FORESTS & WATERS Aug 1960

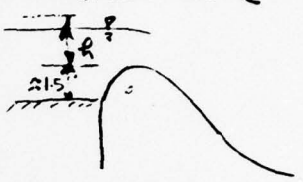
DAPPOLONIA
CONSULTING ENGINEERS, INC

By WJC Date 9-1578 Subject SHAWNEE DAM Sheet No. 2 of 2
Chkd. By MS Date 10/6/78 HYDROLOGY & HYDRAULICS Proj. No 73-114-26

EMERGENCY SPILLWAY — OGEE CRESTED OVERFLOW WEIR

$Q_E = (3.6)(375)(h)^{1.5}$ ← Field measurement

$= 1350\ h^{1.5}$



ELEV	h	Q_E
1187.5	0	0
1195	7.5	27728

Say 27700 cfs

COMBINED SPILLWAY CAPACITY @ TOP/DAM EL 1195

$Q_S = Q_P + Q_E$

$= 1070 + 27700$

$= \boxed{28770\ cfs}$

ELEVATION VS AREA, VOLUME (Ref. OPERATION & MAINTENANCE MANUAL)

ELEV	AREA	Volume
1170	451 acres	3750 ac-ft
1187.5	1070	16750
1195	1330	25250

PERCENT OF PMF WITHOUT OVERTOP (ASSUME BLOCKED SIPHONS)

$= \left(\frac{27700}{56250} + \frac{25250-3750}{52000}\right) 100\%$

$= (0.49 + 0.41)\,100\%$

$= 90.6\%$

Say 90% PMP

APPENDIX E
REGIONAL GEOLOGY

APPENDIX E
REGIONAL GEOLOGY

The Shawnee Dam is located east of the Allegheny Front in the Appalachian Mountain Section on Devonian Age rock strata. The dam is located at or near the crest of the Deer Park Anticline, a northeast trending structure. The rock strata in the vicinity of the dam strike approximately north 5 to 10 degrees east and dip 12 to 17 degrees to the east-southeast. These strata are the Portage Formation, a gray interbedded quartzite, siliceous shale, and siliceous limestone, commonly flaggy to thick bedded. The rock is resistant to weathering and forms moderately steep slopes.

The rock strata around the reservoir consist of the Mahantango Formation, a dark gray shale with thin interbedded sandstone seams. These strata are less resistant to weathering and form more gentle slopes.