

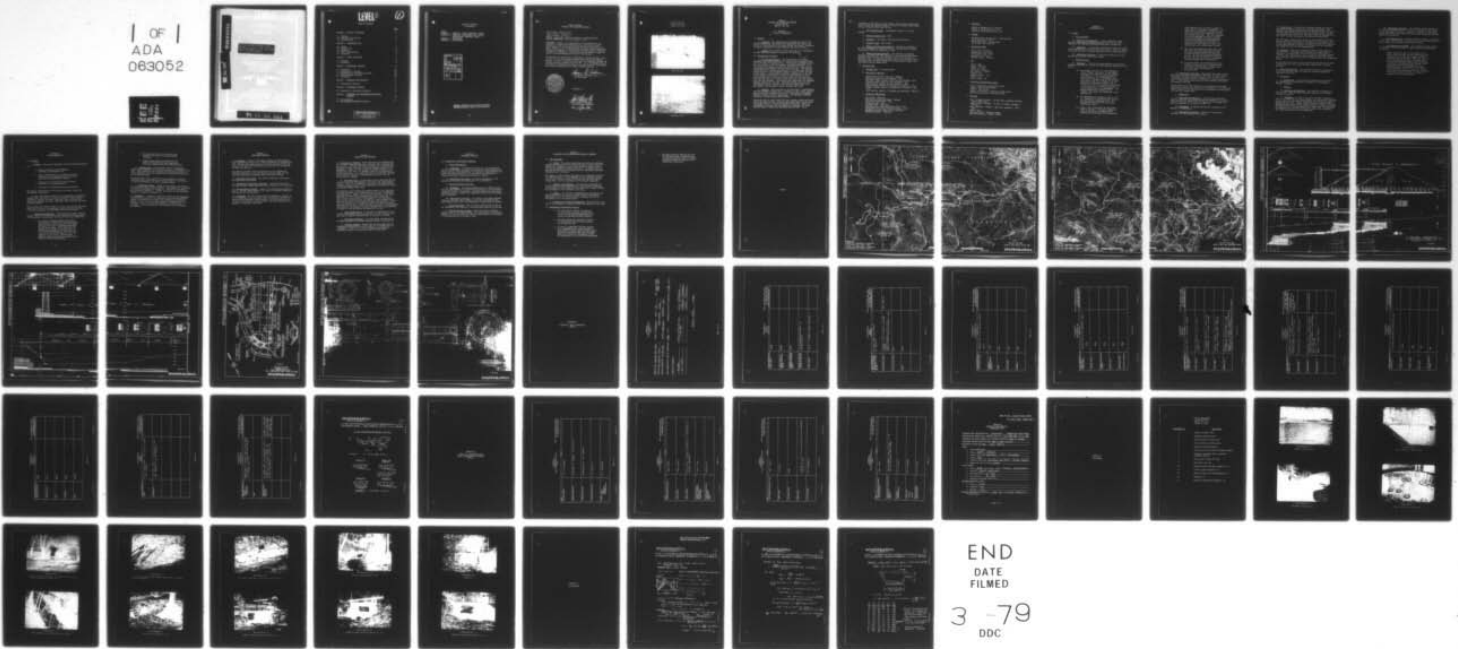
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D'APPOLONIA CONSULTING ENGINEERS PITTSBURGH PA  
NATIONAL DAM SAFETY PROGRAM. DALTON RUN DAM (NDS-I.D.-232), OHI--ETC(U)  
JUN 78

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National Dam Safety Program. Dalton  
Run Dam (NDS-I.D.-232), Ohio River Basin,  
Dalton Run, Somerset County, Pennsylvania  
Phase I Inspection Report.

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# LEVEL II



## TABLE OF CONTENTS

	<u>PAGE</u>
SECTION 1 - PROJECT INFORMATION	1
1.1 General	1
1.2 Description of Project	1
1.3 Pertinent Data	2
SECTION 2 - ENGINEERING DATA	4
2.1 Design	4
2.2 Construction	6
2.3 Operation	6
2.4 Other Investigations	6
2.5 Evaluation	6
SECTION 3 - VISUAL INSPECTION	8
3.1 Findings	8
3.2 Evaluation	9
SECTION 4 - OPERATIONAL FEATURES	10
4.1 Procedures	10
4.2 Maintenance of the Dam	10
4.3 Maintenance of Operating Facilities	10
4.4 Warning System in Effect	10
4.5 Evaluation	10
SECTION 5 - HYDRAULICS AND HYDROLOGY	11
5.1 Evaluation of Features	11
SECTION 6 - STRUCTURAL STABILITY	12
6.1 Evaluation of Structural Stability	12
SECTION 7 - ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES	13
7.1 Dam Assessment	13
7.2 Recommendations/Remedial Measures	

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TABLE OF CONTENTS  
(Continued)

PLATES

APPENDIX A - CHECKLIST, VISUAL INSPECTION, PHASE I

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

APPENDIX C - PHOTOGRAPHS

APPENDIX D - CALCULATIONS

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PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: Dalton Run Dam  
STATE LOCATED: Pennsylvania  
COUNTY LOCATED: Somerset  
STREAM: Dalton Run, tertiary tributary of Conemaugh River  
DATE OF INSPECTION: April 24 and May 4, 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 Dalton Run Dam is assessed to be good. However, it is recommended that the owner should immediately evaluate the adequacy of the spillway discharge channel lining and determine the appropriate repair measures that should be taken to correct the underseepage and erosion in the channel.

This spillway is classified as "inadequate" (80 percent PMF), since it will not pass the probable maximum flood without overtopping. However, it is not considered to be seriously inadequate because the spillway capacity exceeds 50 percent PMF. It is recommended that in the event of unusually high runoff, an around-the-clock surveillance plan should be implemented to detect possible problems.



*Lawrence D. Andersen*

Lawrence D. Andersen, P.E.  
Vice President

APPROVED BY:

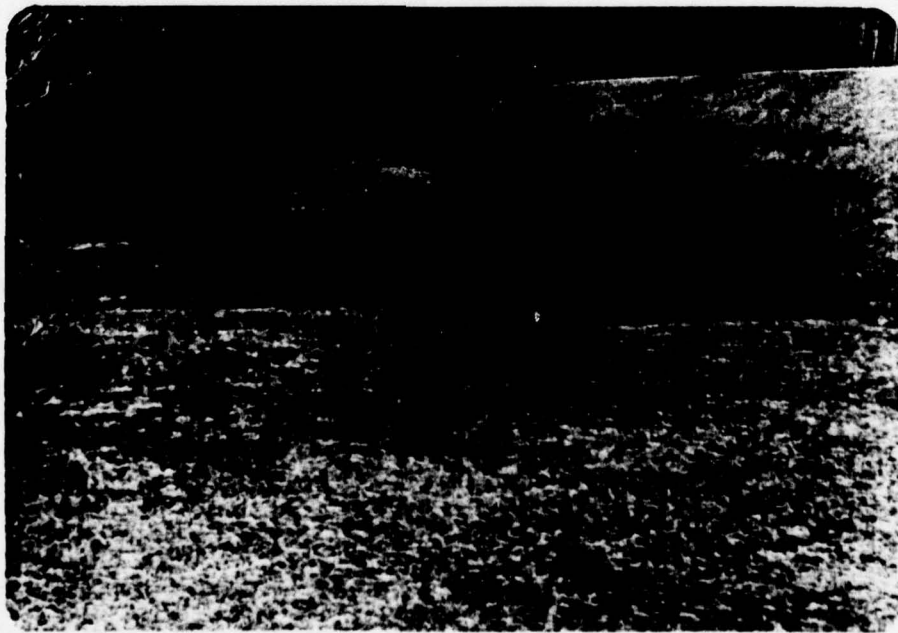
*John H. Kenworthy*  
JOHN H. KENWORTHY  
LTC, Corps of Engineers  
Acting District Engineer

DATE: 14 June 1978

DALTON RUN DAM  
NDS I.D. NO. 232  
APRIL 24, 1978



Upstream Face



Downstream Face

PHASE I  
NATIONAL DAM INSPECTION PROGRAM  
DALTON RUN DAM  
NDS I.D. NO. 232

SECTION 1  
PROJECT INFORMATION

ABSTRACT

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 hazard to human life or property.

1.2 Description of Project

ABSTRACT

a. Dam and Appurtenances. The dam consists of an earth embankment approximately 600 feet in length, with a maximum height of 61 feet from the downstream toe. The primary and emergency spillways are located on the left abutment (looking downstream). The flow through the primary spillway is controlled by an ogee weir at an elevation approximately six feet below dam crest. The spillway discharges into a channel approximately 58 feet wide with a masonry bottom, which in turn discharges through a concrete chute into the stream channel. The emergency spillway is immediately to the left of the primary spillway with a crest 100 feet wide and 3.5 feet below the dam crest. The outlet works consist of a 30-inch cast-iron blow-off pipe and a 30-inch cast-iron supply line both located near the right abutment. The blow-off pipe constitutes the emergency drawdown facility for the dam. Discharge through these pipes is controlled by valves located in the concrete intake tower. The dam impounds 399 acre-feet of water at normal pool level.

b. Location. Dalton Run Dam is located (Plate 1) approximately one mile upstream on Dalton Run, a tributary of Bens Creek, approximately four miles southwest of the city of Johnstown in Conemaugh Township, Somerset County, Pennsylvania. The impounded reservoir serves as a domestic water supply source.

Downstream from the dam, Dalton Run flows through a steep and narrow valley for about one mile, then into Bens Creek which in turn flows into Stoney Creek, 4.5 miles downstream from the dam. There are approximately 14 houses and one commercial building in the first one-mile reach of Dalton Run downstream from the dam. It is

estimated, in the event of a dam failure, there would be significant loss of lives and economic damage, not only in the Dalton Run valley, but also along the Bens Creek valley.

c. Size Classification. Intermediate (based on a 61-foot height).

d. Hazard Classification. High.

e. Ownership. The Greater Johnstown Water Authority.

f. Purpose of Dam. Water supply.

g. Design and Construction History. The dam was designed by Mr. John Birkenbine and constructed by the Johnstown Water Company beginning in 1902 with completion in 1905.

h. Normal Operating Procedure. The reservoir is normally maintained at Elevation 1485, the level of the uncontrolled primary spillway, leaving 6 feet of freeboard to the top of the dam at Elevation 1491. The emergency spillway crest is at Elevation 1487.5. The supply water is taken through the 24-inch-diameter supply line controlled from the intake tower.

### 1.3 Pertinent Data

a. Drainage Area - 4.3 square miles.

b. Discharge at Dam Site

Maximum known flood at dam site - Unknown.

Warm water outlet at pool elevation - N/A.

Diversion tunnel low pool outlet at pool elevation - N/A.

Diversion tunnel outlet at pool elevation - N/A.

Gated spillway capacity at pool elevation - N/A.

Gated spillway capacity at maximum pool elevation - N/A.

Ungated spillway capacity at maximum pool elevation - 4600 cfs.

Total spillway capacity at maximum pool elevation - 4600 cfs.

c. Elevation (USGS Datum)

Top of dam - 1491 feet.

Maximum pool-design surcharge - Unknown.

Full flood control pool - N/A.

Recreation pool - N/A.

Spillway crest - 1485 feet.

Upstream portal invert diversion tunnel - N/A.

Downstream portal invert diversion tunnel - N/A.

Streambed at center line of dam - 1430 feet.

Maximum tailwater - 1428 feet.

d. Reservoir

Length of maximum pool - 1500 feet.  
Length of recreation pool - N/A.  
Length of flood control pool - N/A.

e. Storage

Recreation pool (normal pool) - 399 acre-feet.  
Flood control pool - N/A.  
Design surcharge - 108 acre-feet.  
Top of Dam - 507 acre-feet.

f. Reservoir Surface

Top of dam - 18+ acres.  
Maximum pool - 18+ acres.  
Flood control pool - N/A.  
Recreation pool - N/A.  
Spillway crest - 18 acres.

g. Dam

Type - Earth.  
Length - 600 feet.  
Height - 61 feet.  
Top width - 22 feet.  
Side slopes - 1.75H:1V.  
Zoning - Yes.  
Impervious core - Yes.  
Cutoff - Yes.  
Grout curtain - No.

h. Diversion and Regulating Tunnel

Type - 30-inch cast-iron blow-off pipe.  
Length - 300 feet (estimated).  
Closure - Gate valve.  
Access - Gate valve is located on intake tower.  
Regulating Facilities - Spur gear valve.

i. Spillway

Type - Primary spillway: concrete ogee; emergency spillway:  
broad-crested weir.  
Length of weir - Primary: 57 feet, 10 inches; emergency:  
100 feet.  
Crest elevation - Primary: 1485 feet; emergency: 1487.5  
feet.  
Gates - None.  
Upstream channel - Approach channel.  
Downstream channel - Natural stream.

SECTION 2  
ENGINEERING DATA

2.1 Design

a. Data Available

(1) Hydrology and Hydraulics. A state inspection report entitled, Report Upon the Dalton Run Dam, dated June 23, 1914, summarized the available hydrology and hydraulic information.

(2) Embankment. The available information consists of various design drawings and past state inspection reports. The 1914 inspection report includes a detailed description of the design features.

(3) Appurtenant Structures. Structural design data for the appurtenant structures were not available.

b. Design Features

(1) Embankment. A review of design drawings and the correspondence files for the dam show the following main features of the project:

- (a) As designed, the dam is a zoned embankment with a "puddle" clay core. In the design drawings, four different zones were identified (Plate 3): (1) "select material" in the upstream half of the embankment with three feet of "puddle" clay on the upstream slope and bottom, (2) a "puddle" clay core extending to "impervious" strata, (3) a "select material" zone immediately downstream of the core, and (4) "ordinary material" in the downstream half of the embankment. The design drawings also indicate that a "puddle" clay cutoff was constructed at the upstream toe.
- (b) The embankment was designed to have a 1.75 to 1 (horizontal to vertical) slope on both the upstream and downstream faces. The upstream face was protected by 14-inch, hand-placed riprap.
- (c) Plates 3 and 4 illustrate the rock formations at the site. The right abutment is shown to consist of a sandstone layer extending from Elevation 1450 to Elevation

1420 underlain by a coal seam, a layer of slate, and a second layer of sandstone. The second layer of sandstone continues across the valley bottom and is underlain by slate and a second coal seam. The rock formations on the left abutment are shown to consist of slate approximately between Elevations 1460 and 1450 underlain by approximately 20 feet of sandstone which in turn is underlain by a coal seam, fire clay, sandstone, slate, and a second layer of coal.

- (d) The 1914 state inspection report notes that the 2-foot coal seam separating the upper and lower sandstone layers was excavated 60 feet back from the outcrop and replaced by clay. On the left abutment as shown in Plate 3, the coal and fire clay were sealed by grouted masonry and a masonry wall.
- (e) As shown in Plate 3, the foundation of the primary spillway consists of grouted masonry contained in masonry walls extending down to a slate layer approximately at Elevation 1460.

(2) Appurtenant Structures. Appurtenant structures for the dam consist of primary and emergency spillways and outlet works. The primary spillway structures consist of an ogee weir and a stone-paved discharge channel terminating at a concrete drop structure. A 100-foot-wide low area on the left abutment constitutes the emergency spillway.

Outlet works for the dam consist of two 30-inch-cast-iron pipes supported on masonry walls founded on rock (Plate 3). The inlet and outlet inverts of the blow-off pipe are approximately at Elevations 1432 and 1427, respectively.

c. Design Data

(1) Hydrology and Hydraulics. The 1914 state inspection report states that the primary spillway was designed for a flow of 670 cubic feet per second (cfs) per square mile of drainage area which corresponded to a capacity of 2860 cfs.

(2) Embankment. No engineering data are available on the design of the embankment.

(3) Appurtenant Structures. There are no design data available for the appurtenant structures.

2.2 Construction. A limited set of design drawings and various construction progress reports were available for review. The available information indicated that the embankment had been placed in thin layers sprinkled and rolled with a horse roller. It was also reported that the clay for the cutoff walls was obtained from the "flat" near the confluence of Dalton Run and Bens Creek.

The 1914 report states that a portion of the upstream slope failed when the water was drawn down in the summer of 1911 and that the failure was remedied by placing a 10-foot-thick shale-fill buttress on the upstream slope parallel to the design slope and extending from Elevation 1474.5 to the downstream toe.

2.3 Operation. There are no formal operating records available for this dam. As designed, the dam serves as a water supply reservoir. The supply water from the reservoir discharges through a 30-inch pipe, controlled by valves located in the intake tower and in the gate house at the toe of the dam and joins the transmission system.

The 30-inch blow-off pipe is also controlled from the intake tower. It discharges into the stream through a channel near the right abutment.

2.4 Other Investigations. The available information indicated no other investigations than the reports of periodic inspections conducted by the state.

## 2.5 Evaluation

a. Availability. The available information was provided by the Commonwealth of Pennsylvania, Department of Environmental Resources (PennDER).

### b. Adequacy

(1) Hydrology and Hydraulics. The available information is very limited. Only the design discharge capacity of the primary spillway is reported.

(2) Embankment. In view of the age of the dam, completed in 1905, it is clear that the design approach and construction techniques are not likely to have been in conformance with currently accepted engineering practices. Design documents lack such considerations as embankment slope stability and seepage analysis. However, the design incorporated such basic components as an "impervious" core extending to foundation rock, sealing of permeable zones in the foundation, and riprap protection of the upstream slope.

(3) Appurtenant Structures. The available design drawings do not include sufficient details to assess the adequacy of the design of the appurtenant structures. However, in general, no significant design deficiencies were found that would affect the overall performance of the structures.

c. Operating Records. No formal operating records are available for the dam. The dam tender, who has been at the site more than 20 years, stated that no major problems have occurred.

d. Post-Construction Changes. The following excerpt from the 1914 report is the only account of post-construction changes made to the dam.

"About three years ago, it was noticed in the summer, when the water was well drawn down, that a portion of the slope had slipped, the worst condition being at the berm. While the slip was not of alarming proportions, the company was desirous of employing remedial means to prevent a recurrence, and consulted Mr. Stearns, who at that time was Consulting Engineer on the Quemahoning Dam. In pursuance of his advice, a rock and shale fill, to a 1-3/4 to 1 slope, 10 feet deep, was made along the face, to within 10-1/2 feet of the flow line, and since its placement no slip has occurred."

SECTION 3  
VISUAL INSPECTION

3.1 Findings

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

1. Visual inspection of the embankment, abutments, and embankment toe.
2. Visual examination of the spillways and their components, the downstream end of the outlet pipe, and other appurtenant features.
3. Observation of factors affecting the runoff potential of the drainage basin.
4. Evaluation of downstream area hazard potential.

The specific observations are illustrated in Plate 5 and in the photographs in Appendix C.

b. Dam. 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.

Two wet areas were observed (Plate 5), one at the toe near the valve house and a second on the embankment adjacent the right abutment. No perceivable seepage was associated with these wet areas.

c. Appurtenant Structures. The spillway structures, spillway crests, channels, and plunge pools were examined for deterioration or other signs of distress and obstructions that would limit flow.

1. The spillway discharge channel was found to show signs of surficial and internal erosion. Various seeps at the lower end of the channel indicated that water is passing beneath the grouted stone paving. Flow from one of the seepage areas located on the right side of the channel approximately 25 feet below the crest of the dam was estimated to be in the range of 0.5 to 1.0 cfs. Flow was also observed coming up through the grouted stone paving of the discharge channel.

2. The outlet end of the blow-off pipe was inspected and found to be significantly corroded.
3. Orange-colored water was observed in the outlet pipe discharge channel suggesting acid mine drainage from the adjacent hillside.

d. Reservoir Area. The watershed area is predominantly covered with woodlands and infiltration capacity is estimated to be good. There appeared to be no major land clearing activities or other operations that would significantly increase the runoff rate of the drainage basin.

The shorelines are not considered to be susceptible to massive landslides which would affect the storage volume of the reservoir or cause overtopping of the dam by displaced water.

e. Downstream Channel. Dalton Run, for most of its course, flows through a rocky, steep streambed. The bridges over the stream are shown in Photographs 10 through 14. Sketches of the bridges are included in Appendix A. Further description of the downstream channel is included in Section 1.2.

3.2 Evaluation. In general, while the condition of the embankment is considered to be good, the condition of the spillway discharge channel is considered to be poor, with indications of internal erosion. As far as can be assessed from the downstream end, the condition of the outlet pipe also appears to be poor due to corrosion. Further evaluation of the condition of the drainpipe is required.

SECTION 4  
OPERATIONAL FEATURES

4.1 Procedures. Review of the design drawings and field observations indicate that there are no formal procedures for operating the dam. The only operational feature of the dam which may affect the safety of the dam is the outlet pipe valve, in case it is required to lower the reservoir.

The clearing of debris from the spillway as it is required and continued inspection of the facilities by the dam tender are the principal maintenance operations which would affect safety.

4.2 Maintenance of the Dam. The overall maintenance conditions of the dam appear satisfactory.

4.3 Maintenance of Operating Facilities. The blow-off pipe was operated by water company personnel and was observed to be functional.

4.4 Warning System in Effect. There is no formal warning system in effect. The dam tender resides at the site and telephone communication facilities are available.

4.5 Evaluation. The dam is satisfactorily maintained. However, it is not considered to be accessible under all weather conditions for inspection and emergency action purposes. The only access road to the site is located in the flood plain of Dalton Run and may not be passable in high water conditions.

SECTION 5  
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features. Dalton Run Dam has a watershed area of 4.26 square miles and impounds a reservoir with a surface area of 18 acres. A 58-foot-wide primary spillway and a 100-foot-wide emergency spillway constitute the flood discharge system for the impoundment. While the flow through the primary spillway is controlled by an ogee weir, the emergency spillway is essentially a broad-crested weir. As it presently exists, the dam has a maximum flood discharge capacity of approximately 4600 cubic feet per second with no freeboard.

b. Experience Data. As previously stated, Dalton Run Dam was 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 probable maximum flood (PMF).

The adequacy of the spillway was analyzed based on the simplified procedure developed by the Baltimore District, Corps of Engineers (see Appendix D). Based on this analysis procedure, it was determined that the PMF inflow hydrograph would have a peak flow of 7455 cfs and a total volume of approximately 11,700 acre-feet. These values are greater than the capacity of the combined spillways and the reservoir flood storage volume (108 acre-feet). Therefore, the spillway is not capable of passing the PMF flow without overtopping of the dam. Further analysis, according to the procedure, indicated that the spillway can pass a maximum flow of approximately 63 percent of the PMF without overtopping of the dam.

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

d. Overtopping Potential. As stated above, the dam will be overtopped during a flood whose magnitude exceeds 63 percent PMF.

e. Spillway Adequacy. Because the spillway cannot pass the recommended spillway design flood of PMF, it is classified to be "inadequate." However, it is not considered to be seriously inadequate because it can pass more than 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 short-term stability of the dam and no unsatisfactory conditions have been reported in the past (after the completion of repairs following an upstream slope failure in 1911).

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

b. Design and Construction Data

(1) Embankment. The dam was designed prior to 1902 when very limited understanding of the geotechnical behavior of earth retention structures existed. Consequently, available design and construction information does not provide any quantitative data to aid the assessment of stability.

(2) Appurtenant Structures. The review of the design drawings indicates that there are no apparent structural deficiencies that would significantly affect the performance of 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 structure other than the construction of a buttress on the upstream face of the dam in 1911.

SECTION 7  
ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Safety. The visual observations and review of available information indicate that the Dalton Run Dam is in good condition. However, the condition of the primary spillway channel is poor and requires immediate detailed evaluation. It appears that the dam was constructed with reasonable care and reportedly performed satisfactorily in the past.

The capacity of the spillway was found to be "inadequate" (63 percent PMF) relative to the recommended criteria requiring passage of full PMF. However, since the spillway can pass more than 50 percent PMF, it is not considered to be seriously inadequate.

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. Of the three recommendations listed below, further evaluation of the spillway channel should be implemented immediately, while the others should be considered as soon as practicable or 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

1. The owner should evaluate the adequacy of the spillway discharge channel lining in view of the existing underseepage condition and undertake necessary repairs.
2. The owner should also evaluate the extent of corrosion and the structural adequacy of the blow-off pipe.
3. In view of "inadequate" spillway capacity, it is recommended that during periods of high runoff the owner should provide around-the-clock surveillance and have contingency plans in the event of overtopping to warn the inhabitants of the flood plain downstream.

4. The owner should be advised that the dam and appurtenant structures should be inspected regularly and any unusual conditions should be reported to the appropriate authorities.

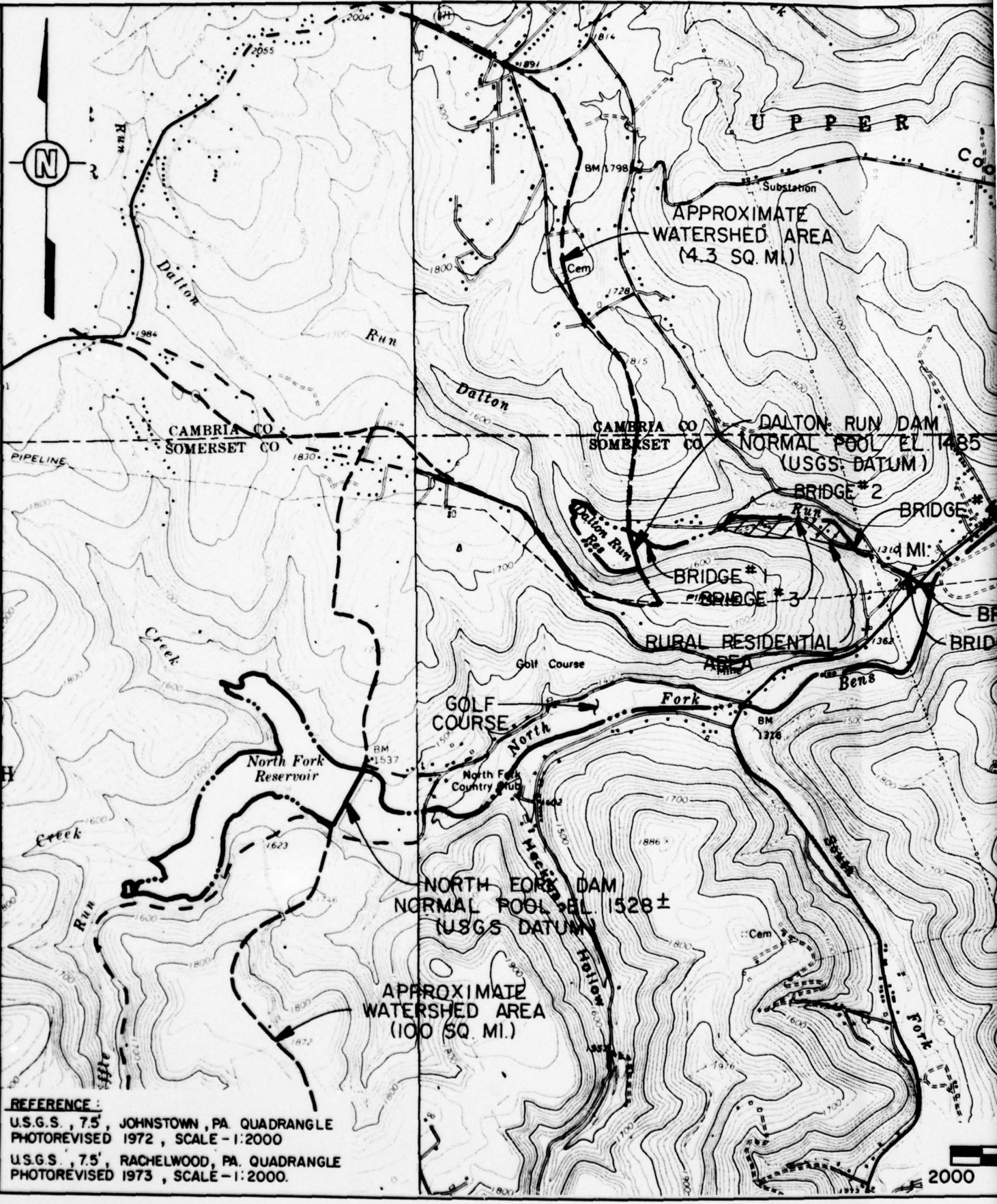
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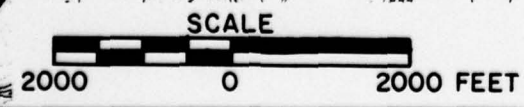
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 PHOTOREVISED 1972, SCALE - 1:2000  
 U.S.G.S., 7.5', RACHELWOOD, PA. QUADRANGLE  
 PHOTOREVISED 1973, SCALE - 1:2000.



PLATE I  
 DALTON RUN DAM  
 VICINITY AND FLOOD PLAIN MAP

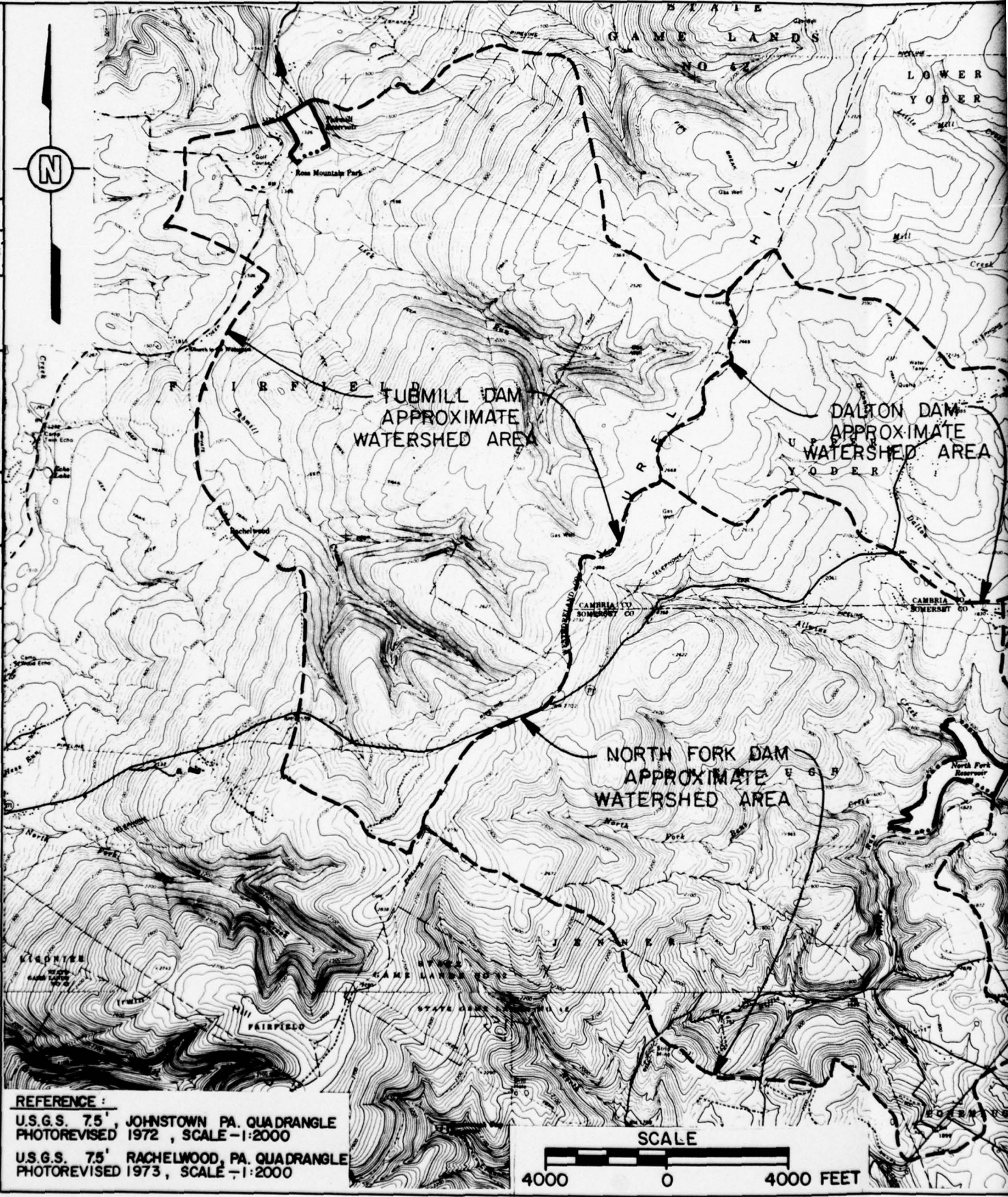


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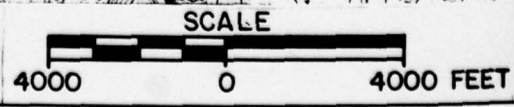


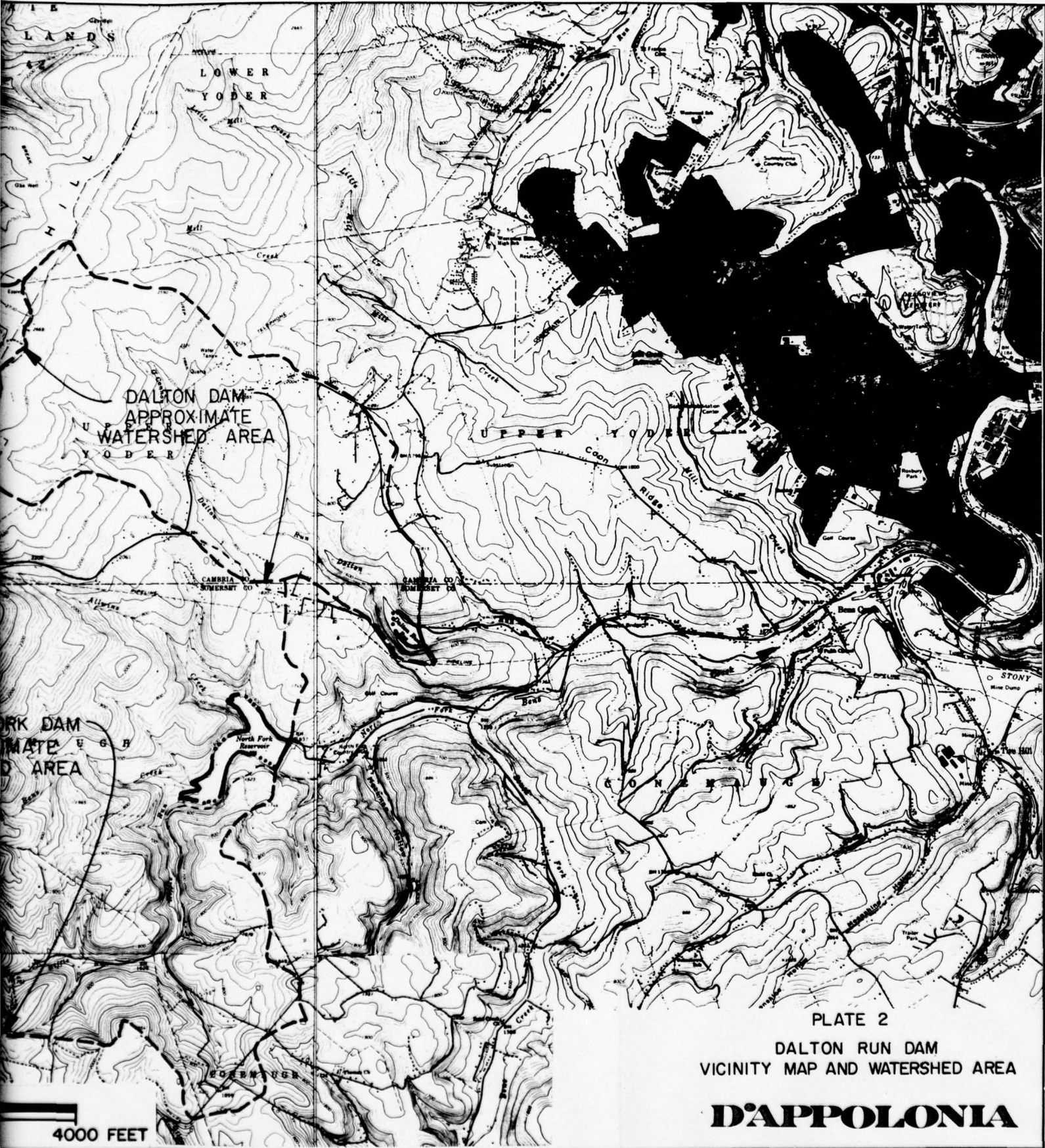
TUBMILL DAM  
APPROXIMATE  
WATERSHED AREA

DALTON DAM  
APPROXIMATE  
WATERSHED AREA

NORTH FORK DAM  
APPROXIMATE  
WATERSHED AREA

REFERENCE :  
U.S.G.S. 7.5' JOHNSTOWN PA. QUADRANGLE  
PHOTOREVISED 1972 , SCALE -1:2000  
U.S.G.S. 7.5' RACHELWOOD, PA. QUADRANGLE  
PHOTOREVISED 1973 , SCALE -1:2000





DALTON DAM  
APPROXIMATE  
WATERSHED AREA

PLATE 2

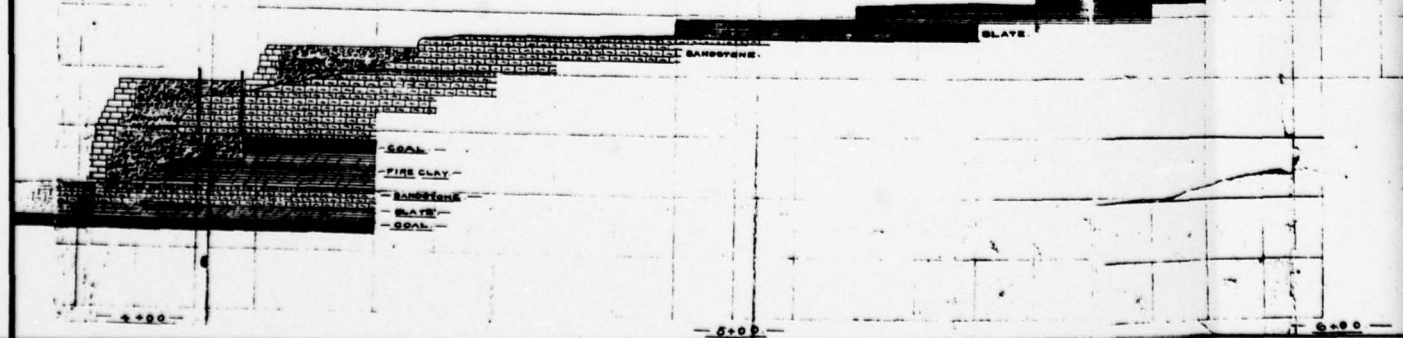
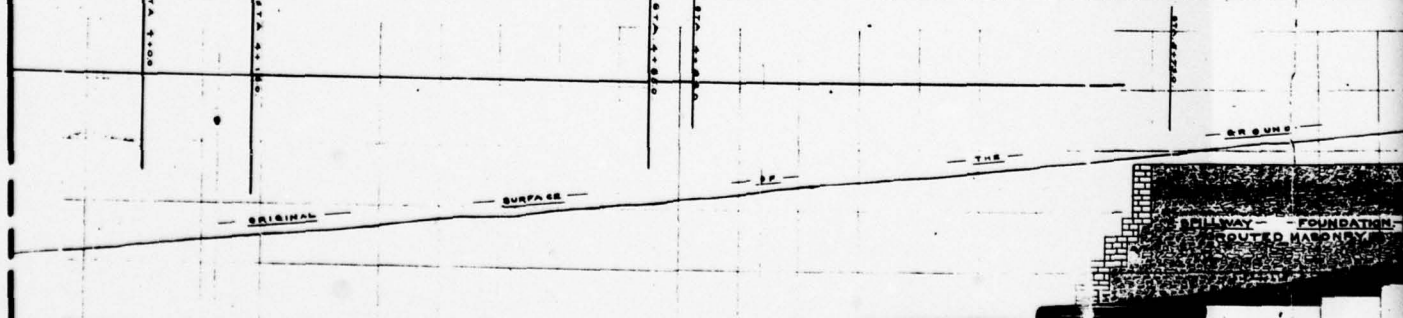
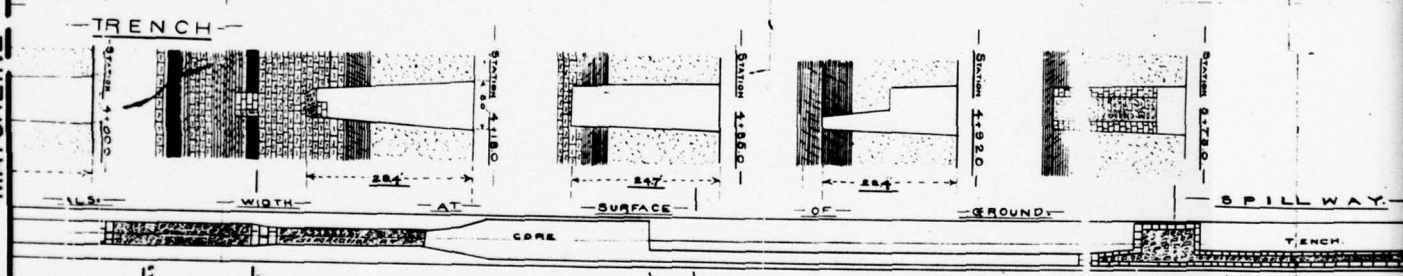
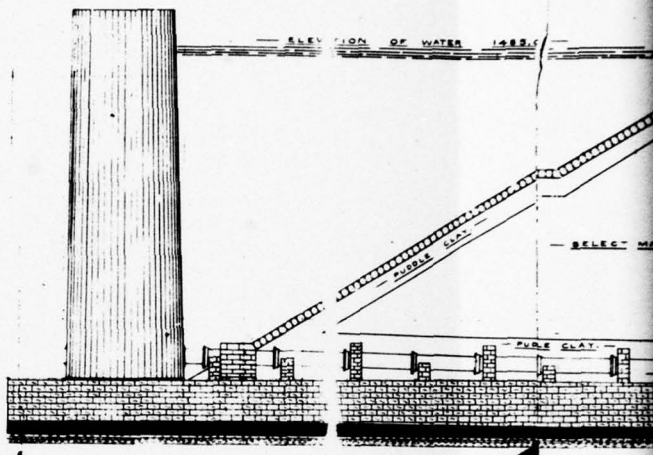
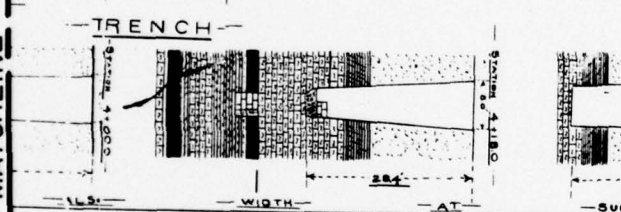
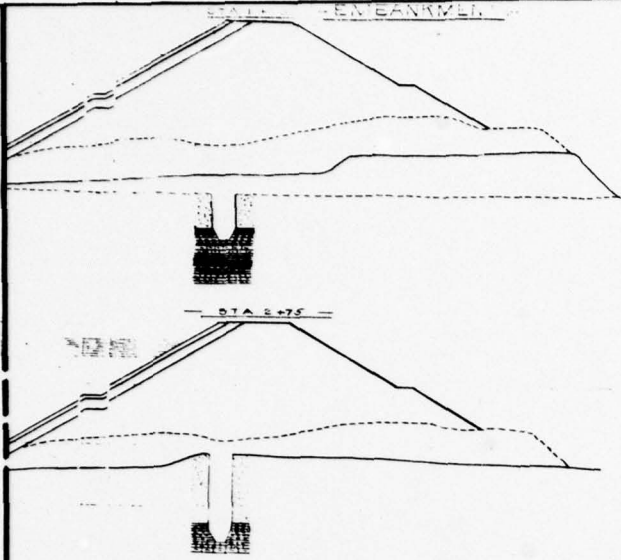
DALTON RUN DAM  
VICINITY MAP AND WATERSHED AREA

**D'APPOLONIA**

4000 FEET

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MATCHLINE A-A



CROSS

TRENCH

16.5

WIDTH

AT

SURFACE

OF

GROUND

SPILLWAY TRENCH

ORIGINAL

SURFACE

SLATE

GRAVEL

FIRE CLAY

SANDSTONE

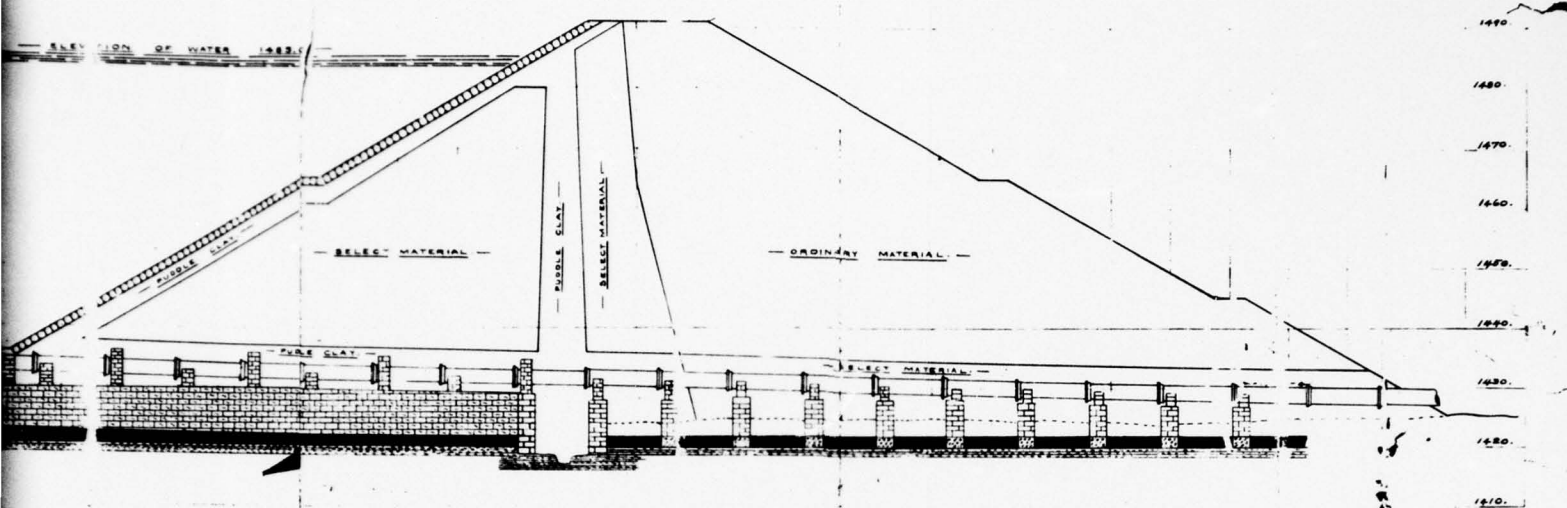
SLATE

GRAVEL

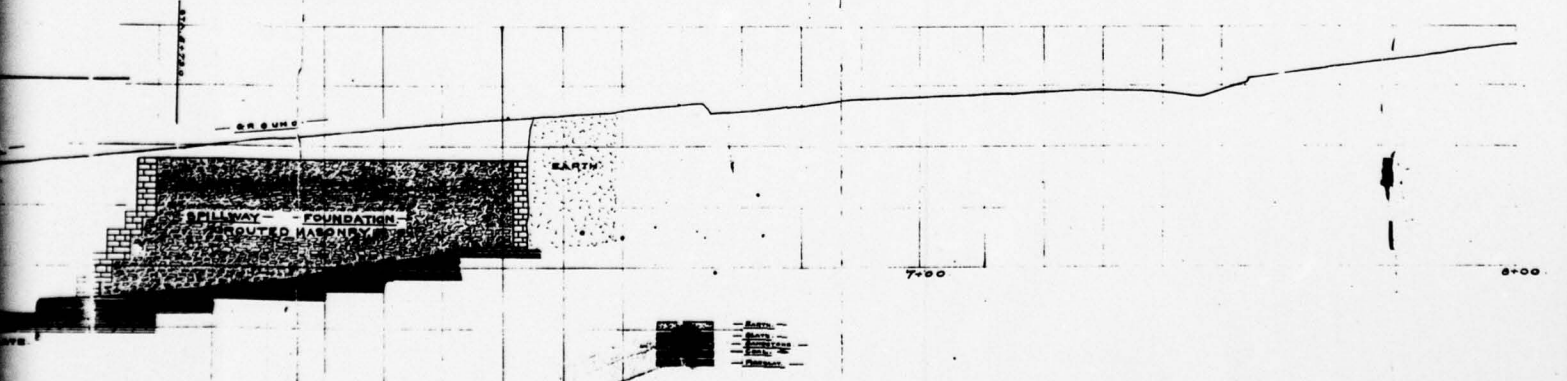
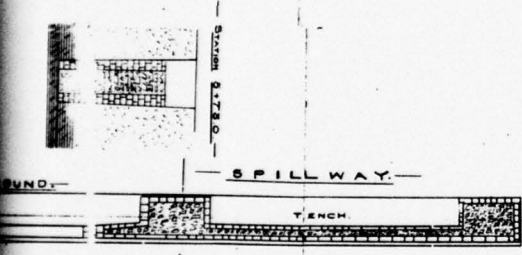
SPILLWAY FOUNDATION  
ROUTED MASONRY



— CROSS SECTION OF EMBANKMENT. —



Elevation	Area in Sq. Feet	Volume in Cubic Feet
1482	850	7,918,700
1480	30.0	26,748,000
1475	32.0	28,248,000
1470	45.0	38,220,000
1465	45.0	38,220,000
1460	75.0	66,780,000
1455	82.0	72,877,000



— DALTON RESERVOIR. —  
 PROFILES OF CORE AND TOE TRENCHES AND CROSS  
 SECTIONS OF THE EMBANKMENT.  
 SCALE 10"=80'-1"

PLATE 3

**D'APPOLONIA**

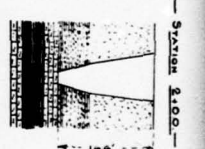
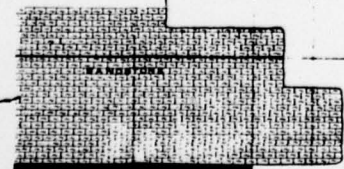
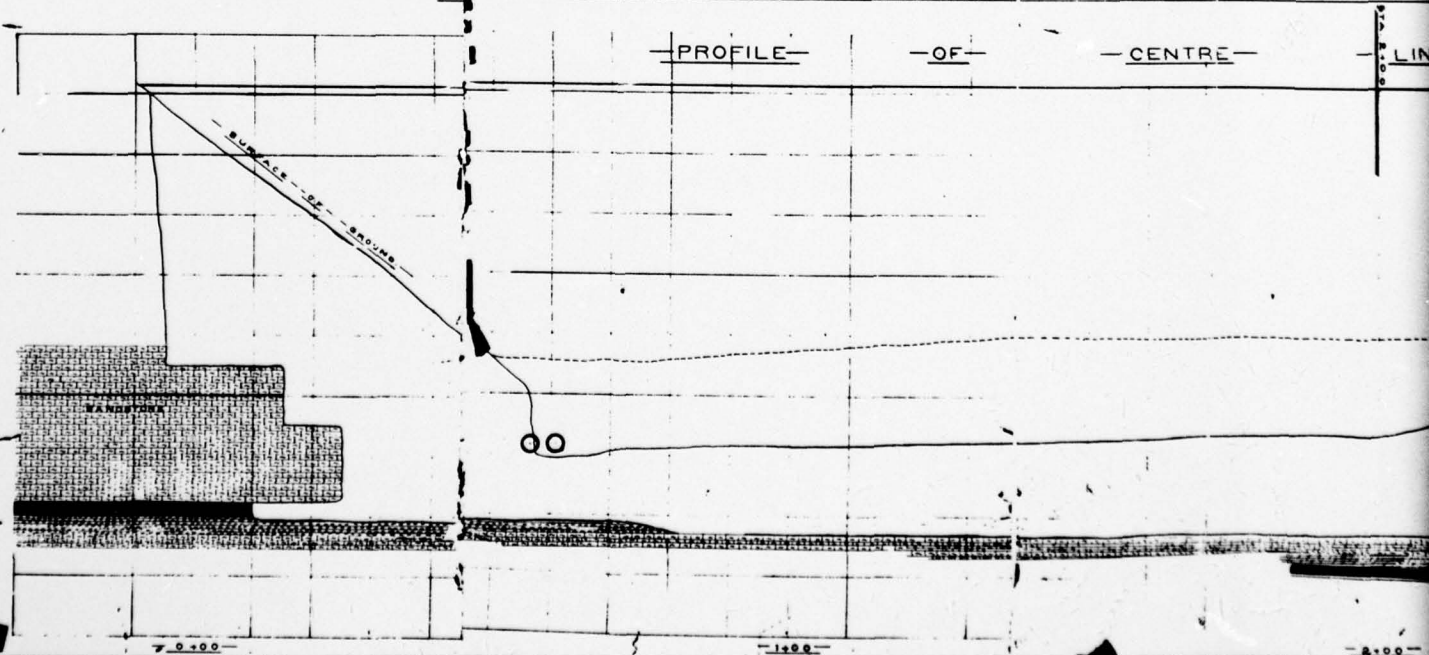
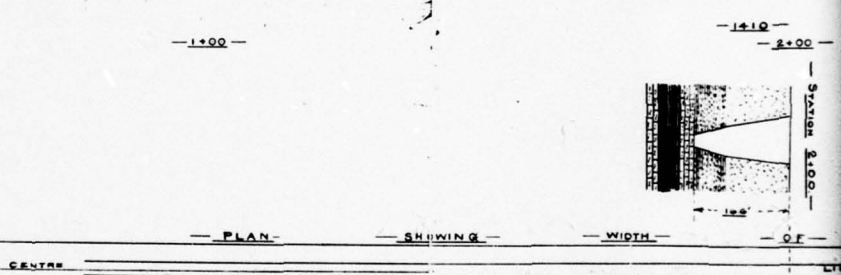
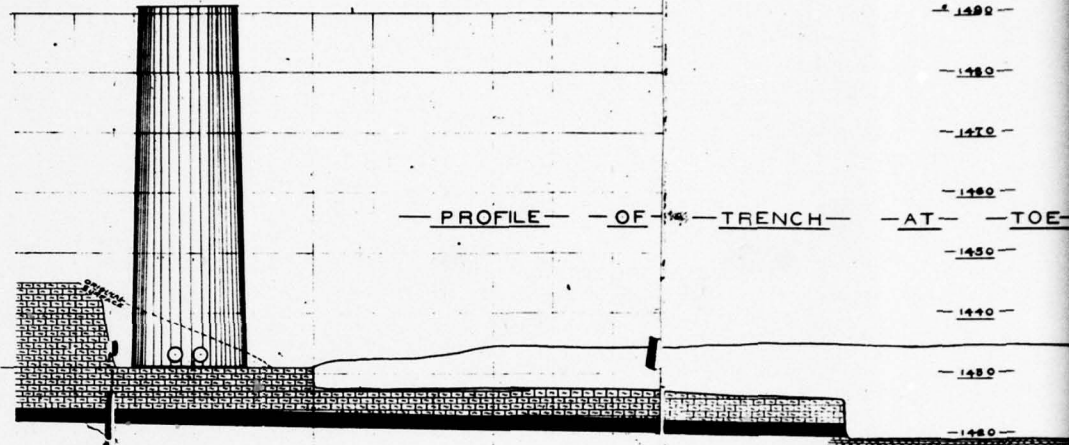
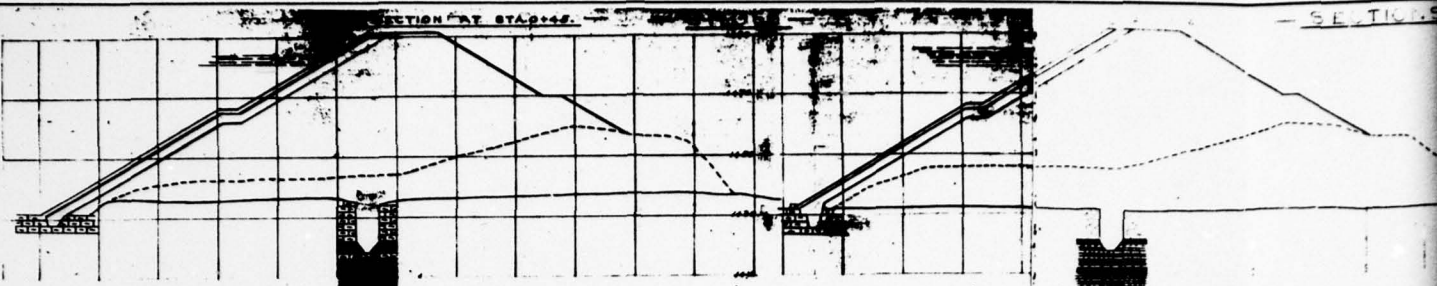
DRAWING NUMBER 78 + - B3

S-14-78  
J/M/73

CHECKED BY B.C.  
APPROVED BY J.H.P.

D.J.D.  
5-3-78

DRAWN BY



SECTIONS

STA 1114

-1490-

-1480-

-1470-

-1460-

-1450-

-1440-

-1430-

-1420-

-1410-

-1400-

-1390-

-1380-

-1370-

-1360-

-1350-

-1340-

-1330-

-1320-

-1310-

-1300-

-1290-

-1280-

-1270-

-1260-

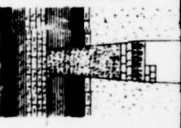
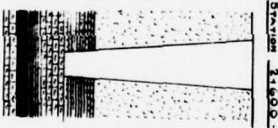
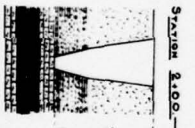
-1250-

-1240-

-1230-

TRENCH AT TOE OF EMBANKMENT

CROSS SECTIONS OF CORE



MATCHLINE A-A

WIDTH OF CORE TRENCH AT BOTTOM AND

CENTRE LINE OF CORE

1500 TRENCH

-1490-

-1480-

-1470-

-1460-

-1450-

-1440-

-1430-

PLATE 4

D'APPOLONIA

-2.00-

-3.00-

2

DRAWN BY	G. J. G.	CHECKED BY	B.E.	DRAWING NUMBER	78 4-AI
BY	5-4-78	APPROVED BY	VHP	DATE	5/11/78

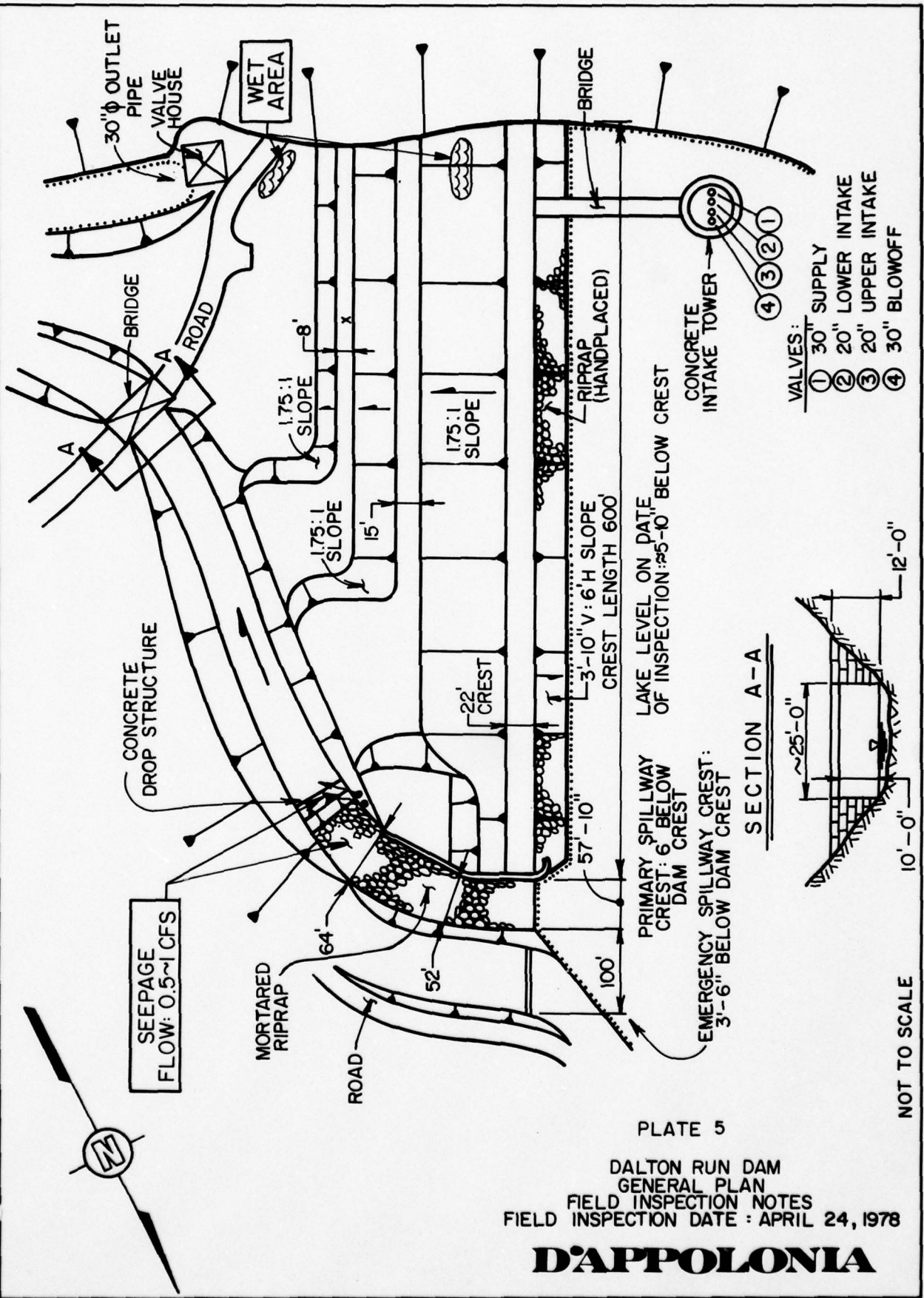
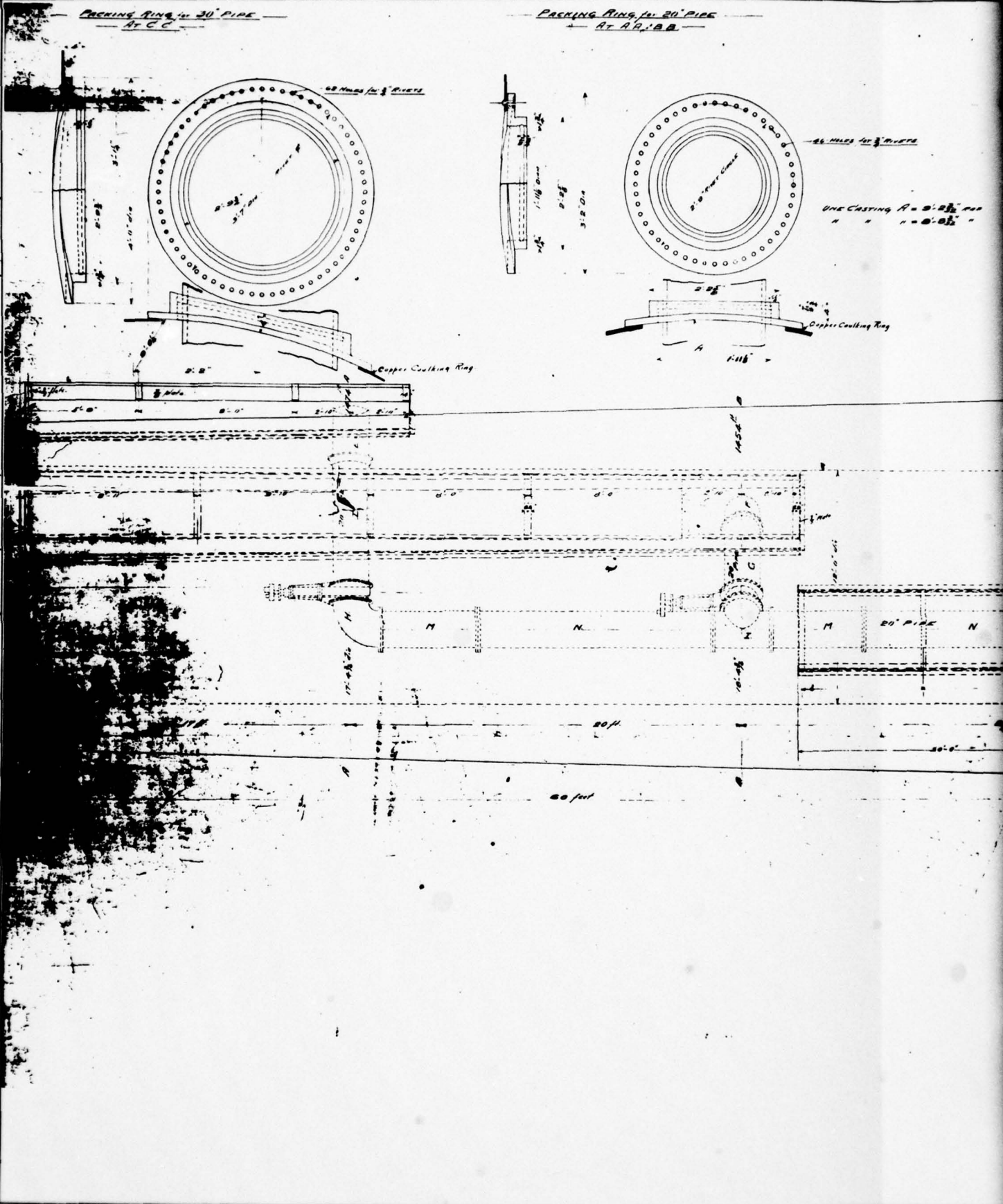


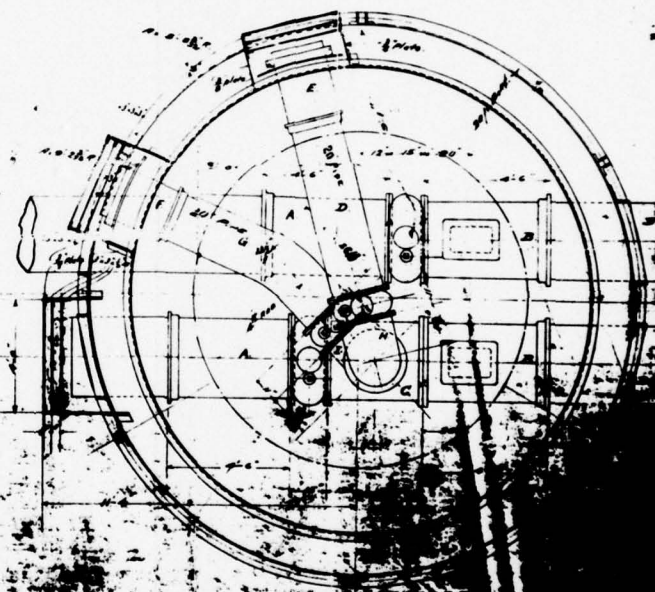
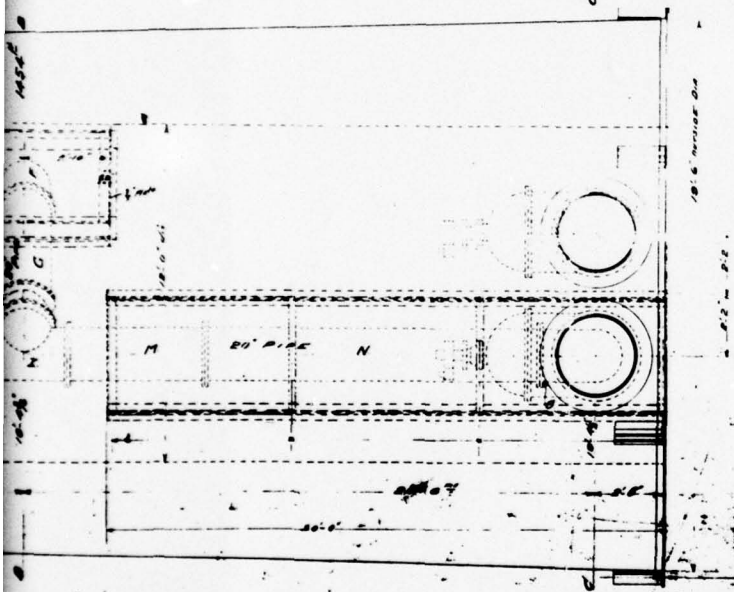
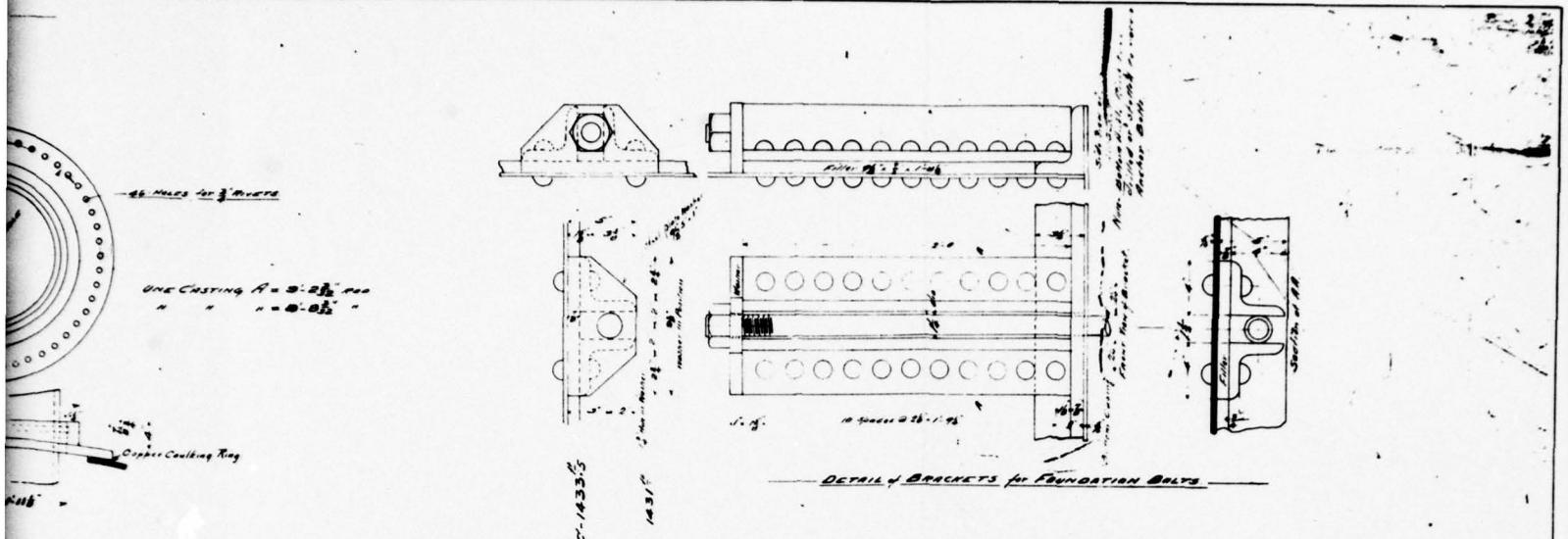
PLATE 5

DALTON RUN DAM  
 GENERAL PLAN  
 FIELD INSPECTION NOTES  
 FIELD INSPECTION DATE: APRIL 24, 1978

**D'APPOLONIA**

DRAWN BY  
 5-4-78  
 D.J.D.  
 CHECKED BY  
 JHP  
 APPROVED BY  
 BE  
 5-11-78  
 DRAWING NUMBER  
 78-1-B5





EFFLUENT PIPING  
 DALTON RUN RESERVOIR  
 JOHNSTOWN NATALCO  
 Scale 1/4" = 1'-0"

PLATE 6

D'APPOLONIA

2

APPENDIX A  
CHECKLIST, VISUAL INSPECTION  
PHASE I

CHECKLIST  
VISUAL INSPECTION  
PHASE I

NAME OF DAM DALTON RUN DAM COUNTY SOMERSET STATE PA. ID# NDS: 232  
TYPE OF DAM EARTH FILL HAZARD CATEGORY HIGH DER: 56-1  
DATE(S) INSPECTION 4-24-78 WEATHER OVERCAST TEMPERATURE 50'S  
POOL ELEVATION AT TIME OF INSPECTION 1485 M.S.L. TAILWATER AT TIME OF INSPECTION ~1428 M.S.L.

INSPECTION PERSONNEL:

B. EREL REVIEW INSPECTION BY ELIO D'APPOLONIA  
W.T. CHAN (5-4-78) LAWRENCE ANDERSEN  
JAMES POELLLOI

BILGIN EREL RECORDER

VISUAL INSPECTION  
 PHASE I  
 EMBANKMENT

NAME OF DAM DALTON RUN DAM  
 ID# NDS: 232 DER: 56-1

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 NOTICEABLE SETTLEMENT OR MISALIGNMENT.	
RIPRAP FAILURES	NONE - RIPRAP IN GOOD CONDITION .	

VISUAL INSPECTION  
 PHASE I  
 EMBANKMENT  
 OBSERVATIONS

NAME OF DAM DALTON RUN DAM  
 ID# NDS: 232, DER: 56-

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	NO VISUAL SIGNS OF DISTRESS. NO SEEPAGE	
ANY NOTICEABLE SEEPAGE	SEEPAGE WITHIN SPILLWAY DISCHARGE CHANNEL. FLOW (ESTIMATED): 0.5-1.0 CFS ELEV: ~ 25 FT. BELOW EMBANKMENT CREST	SEE PLATE -5
STAGE GAGE AND RECORDER	NONE	
DRAINS	NONE	

VISUAL INSPECTION  
 PHASE I  
 CONCRETE/MASONRY DAMS

NAME OF DAM DALTON RUN DAM  
 ID# NDS1232, DER: S6-

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	(DALTON RUN IS AN EARTHFILL 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 DALTON RUN DAM

ID# NDS:232, DER:SC-1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	(DALTON RUN IS AN 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 DALTON RUN DAM  
 ID# NDS: 232, DEP: 56-1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	OUTLET PIPE IS CAST IRON ( $\phi 30"$ )	
INTAKE STRUCTURE	VISIBLE PORTIONS ARE IN GOOD CONDITION.	
OUTLET STRUCTURE	NO ENERGY DISSIPATOR. OUTLET PIPE DISCHARGES INTO NATURAL CHANNEL.	
OUTLET CHANNEL	NATURAL CHANNEL. GOOD CONDITION NO SIGNS OF SIGNIFICANT EROSION.	
EMERGENCY GATE	REPORTED AS OPERATIONAL BY THE VICE PRESIDENT OF JOHNSTOWN WATER COMPANY ON 4/27/78 (OPERATED ANNUALLY)	OPERATED BY WATER COMPANY PERSONNEL ON 5/15/78 AND OBSERVED TO BE FUNCTIONAL

VISUAL INSPECTION  
 PHASE I  
 UNGATED SPILLWAY

NAME OF DAM DALTON RUN DAM

ID# NDS: 232, DER: 56-1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	NO VISUAL SIGNS OF DISTRESS. (NORTH END OF THE WEIR IS APPROXIMATELY 2-INCHES LOWER THAN SOUTH END)	NO REPAIRS ARE RECOMMENDED FOR WEIR SETTLEMENT PROBLEM.
APPROACH CHANNEL	GOOD CONDITION. NO OBSTRUCTIONS.	
DISCHARGE CHANNEL	MORTARED RIPRAP. SIGNS OF EROSION, WATER FLOWING BENEATH THE CHANNEL LINING AND DISCHARGING NEAR CONCRETE DROP STRUCTURE	REPAIRS RECOMMENDED.
BRIDGE AND PIERS	NONE (@ CONTROL SECTION)	

VISUAL INSPECTION  
 PHASE I  
 GATED SPILLWAY

NAME OF DAM DALTON RUN DAM

ID# NDS:232, DER:SG-

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	NO GATED SPILLWAY @ DALTON RUN DAM.	
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 DALTON EUN DAM

ID# NDS: 232 , DER: S6-1

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 DALTON RUN DAM  
 ID# NDS: 232, DER: 56-1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	WELL ESTABLISHED - NO SIGNS OF SLOPE EROSION .	
SEDIMENTATION	LAKE WAS CLEAR - SEDIMENTATION DOES NOT APPEAR TO BE A PROBLEM .	

VISUAL INSPECTION  
 PHASE I  
 DOWNSTREAM CHANNEL

NAME OF DAM DALTON RUN DAM.  
 ID# NDS: 232 DER: 56-1

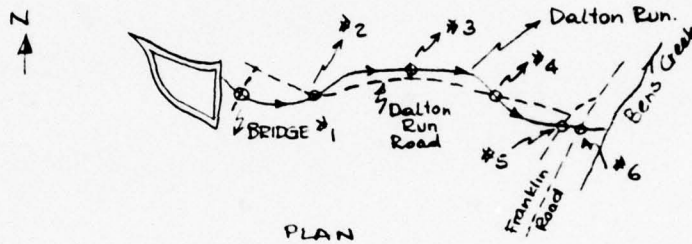
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	OBSTRUCTED BY FALLEN TREES. (APPROX. 1000 FT DOWNSTREAM. IN OTHER REACHES CHANNEL IS IN GOOD CONDITION.	
SLOPES		
APPROXIMATE NUMBER OF HOMES AND POPULATION	14 - HOMES AND ONE COMMERCIAL BLDG BETWEEN DAM AND CONFLUENCE OF DALTON RUN AND BENS CREEK ARE WITHIN FLOODPLAIN. POPULATION ≈ 60	DAMAGE TO ADDITIONAL BLDG'S ALONG DALTON RUN AND BENS CREEK ALSO POSSIBLE DUE TO A DAM FAILURE.

# D'APPOLONIA

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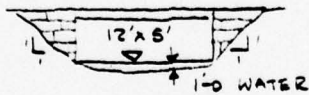
By BE Date 4-24-78 Subject DALTON RUN DAM DER ID: 561 Sheet No. 1 of 1  
 Chkd. By WTC Date 4-29-78 FIELD INSPECTION SKETCH. Proj. No. 78-114-01

## STREAM CROSS SECTIONS & BRIDGE LOCATIONS.

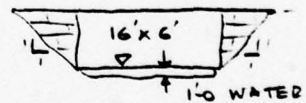


BRIDGE # 1 (SEE SECTION A-A PLATE 2)

BRIDGE # 2

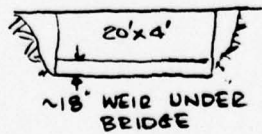


BRIDGE # 3  
(PRIVATE)

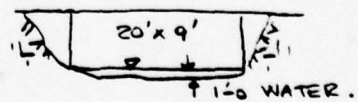


STREAM WAS 3'-0" DEEP  
ON JULY-77 FLOOD  
(PER RESIDENT)

BRIDGE # 4



BRIDGE # 5



BRIDGE # 6 : FLOW AREA : 20' x 6'-6"

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

CHECKLIST  
 ENGINEERING DATA  
 DESIGN, CONSTRUCTION, OPERATION  
 PHASE I

NAME OF DAM DALTON RUN DAM  
 ID# NDS: 232 DEP: 56-1

ITEM	REMARKS
AS-BUILT DRAWINGS	NOT AVAILABLE.
REGIONAL VICINITY MAP	ATTACHED TO REPORT. (SEE PLATE - 1)
CONSTRUCTION HISTORY	SUMMARIZED IN THE REPORT.
TYPICAL SECTIONS OF DAM	SEE PLATE - 3
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	NOT AVAILABLE.

CHECKLIST  
 ENGINEERING DATA  
 DESIGN, CONSTRUCTION, OPERATION  
 PHASE I

NAME OF DAM DALTON EUN DAM  
 ID# NDS:232, DER:56-1

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	NONE FOUND.
DESIGN REPORTS	NONE FOUND.
GEOLOGY REPORTS	NONE FOUND. LIMITED INFORMATION IS AVAILABLE IN DESIGN DRAWINGS.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	NONE FOUND.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	NONE FOUND

CHECKLIST  
 ENGINEERING DATA  
 DESIGN, CONSTRUCTION, OPERATION  
 PHASE I

NAME OF DAM DALTON RUM DAM  
 ID# NDS: 232 DER: 56-1

ITEM	REMARKS
POST CONSTRUCTION SURVEYS OF DAM	NONE FOUND.
BORROW SOURCES	UNKNOWN
MONITORING SYSTEMS	NONE
MODIFICATIONS	A ROCK FILL BUTTRESS WAS BUILT ON THE UPSTREAM SLOPE IN 1911.
HIGH POOL RECORDS	NOT AVAILABLE.

CHECKLIST  
 ENGINEERING DATA  
 DESIGN, CONSTRUCTION, OPERATION  
 PHASE I

NAME OF DAM DALTON RUN DAM  
 ID# NDS: 232 DER: 56-1

ITEM	REMARKS
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	NONE FOUND.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	AN UPSTREAM SLOPE FAILURE IN 1911 REPAIR MEASURES WERE TAKEN.
MAINTENANCE OPERATION RECORDS	NOT AVAILABLE.
SPILLWAY PLAN SECTIONS DETAILS	NOT AVAILABLE.
OPERATING EQUIPMENT PLANS AND DETAILS	NOT AVAILABLE.

NAME OF DAM DALTON RUN DAM

ID# NDS:232, DER:56-1

CHECKLIST  
HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: WOODLAND, AREA  $\approx$  4.3 SQ. MILES.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 399 ACRE-FEET @ EL 1485

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): SAME AS ABOVE.

ELEVATION MAXIMUM DESIGN POOL: EL. 1485 (USGS DATUM)

ELEVATION TOP DAM: EL 1491 (USGS DATUM)

CREST:

- a. Elevation EL. 1491
- b. Type EARTH, (GRASS)
- c. Width 20'-0" (AS DESIGNED), 22'-0" MEASURED.
- d. Length 600'
- e. Location Spillover NO VISIBLE LOW SPOTS  $\therefore$  ENTIRE LENGTH.
- f. Number and Type of Gates NONE

OUTLET WORKS:

- a. Type 30"  $\phi$  CAST IRON PIPE THROUGH EMBANKMENT
- b. Location RIGHT ABUTMENT.
- c. Entrance Inverts EL. 1432
- d. Exit Inverts EL 1427
- e. Emergency Draindown Facilities \_\_\_\_\_

HYDROMETEOROLOGICAL GAGES:

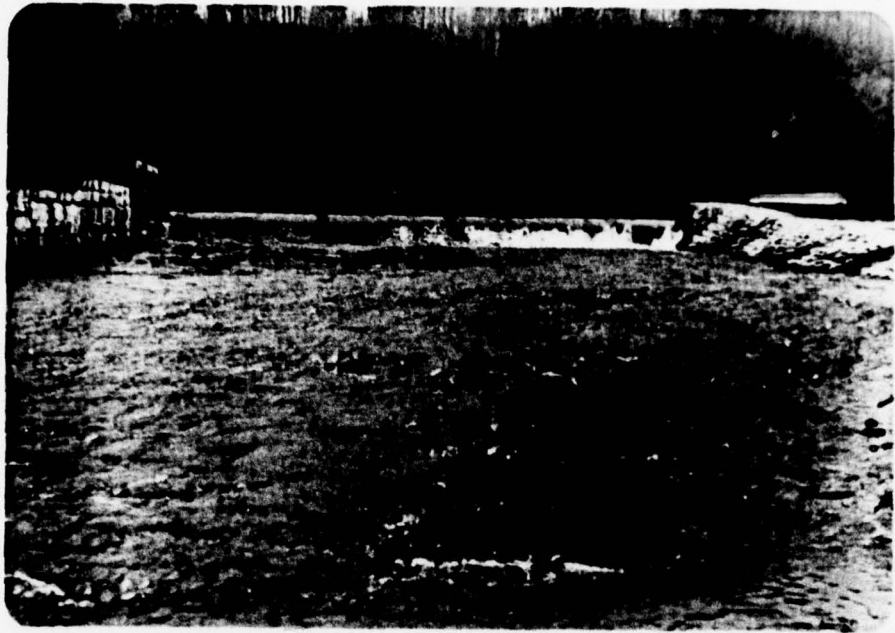
- a. Type NONE
- b. Location N/A
- c. Records N/A.

MAXIMUM NONDAMAGING DISCHARGE:  $\sim$  1300 CFS < SPILLWAY CAPACITY.  
(FLOOD PLAIN)

APPENDIX C  
PHOTOGRAPHS

LIST OF PHOTOGRAPHS  
DALTON RUN DAM  
NDS I.D. NO. 232  
APRIL 24, 1978

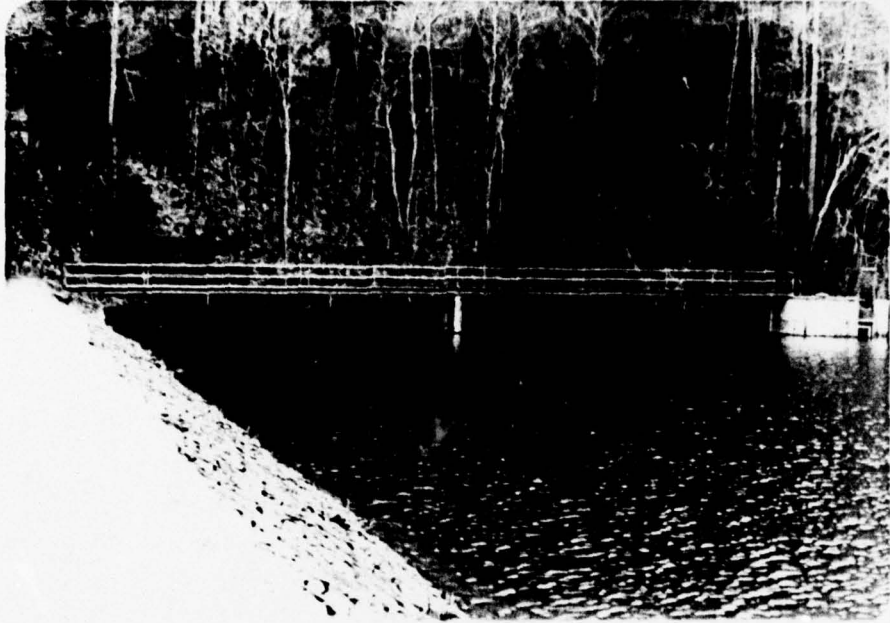
<u>PHOTOGRAPH NO.</u>	<u>DESCRIPTION</u>
1	Primary spillway crest.
2	Emergency spillway crest.
3	Access bridge to intake tower.
4	Valve controls on intake tower.
5	Spillway discharge channel.
6	Drop structure in spillway discharge channel.
7	Seepage on the right bank of spillway discharge channel.
8	Outlet end of "blow-off" pipe.
9	Wet area at the toe.
10	Bridge on Dalton Run Road (Bridge No. 2).
11	Private bridge (Bridge No. 3).
12	Bridge on Dalton Run Road (Bridge No. 4).
13	Bridge No. 5.
14	Bridge on County Road (Bridge No. 6).



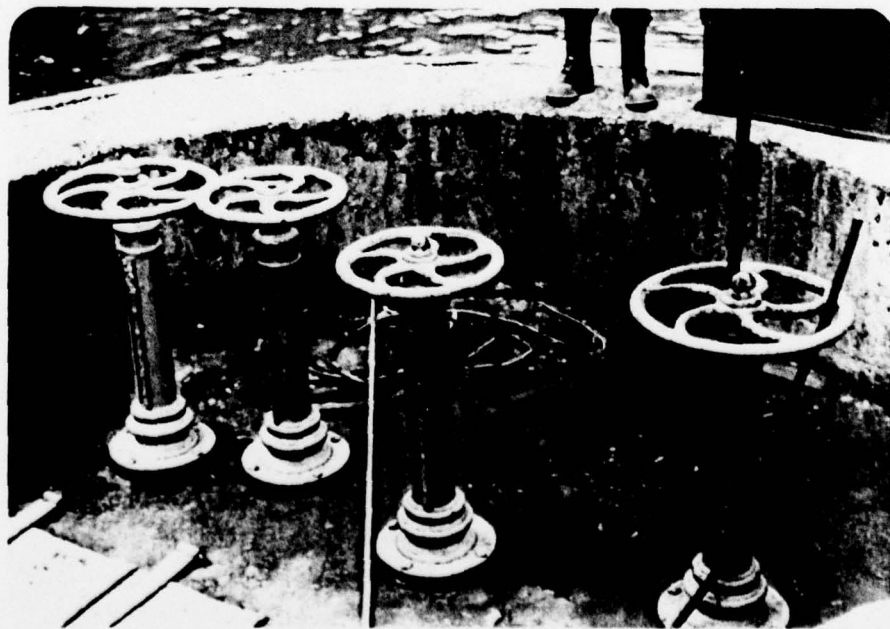
Photograph No. 1  
Primary spillway crest.



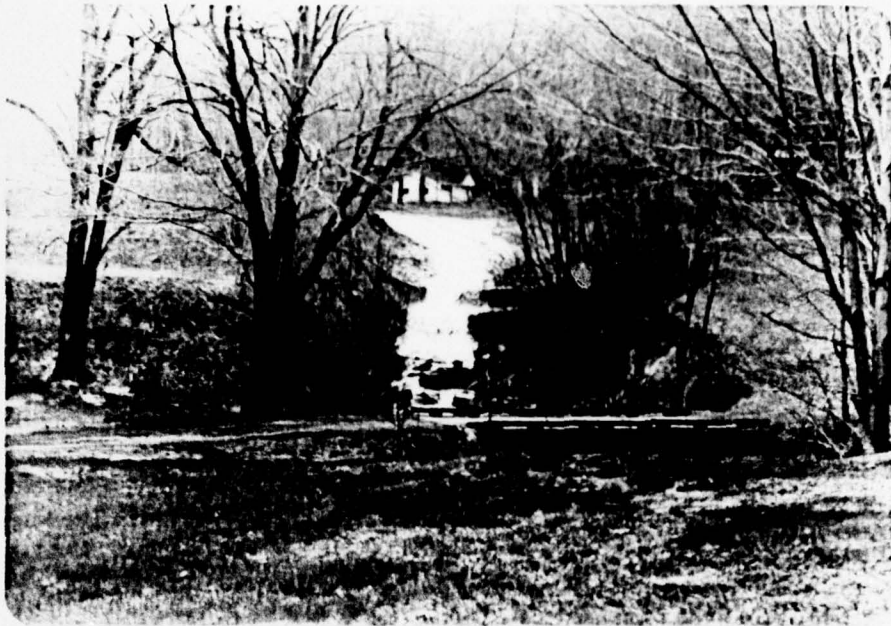
Photograph No. 2  
Emergency spillway crest.



Photograph No. 3  
Access bridge to intake tower.



Photograph No. 4  
Valve controls on intake tower.



Photograph No. 5

Spillway discharge channel. Note bridge on foreground.  
Bridge to gate house (Bridge No. 1).



Photograph No. 6

Drop structure in spillway discharge channel.



Photograph No. 7

Seepage on the right bank (looking downstream) of spillway discharge channel.



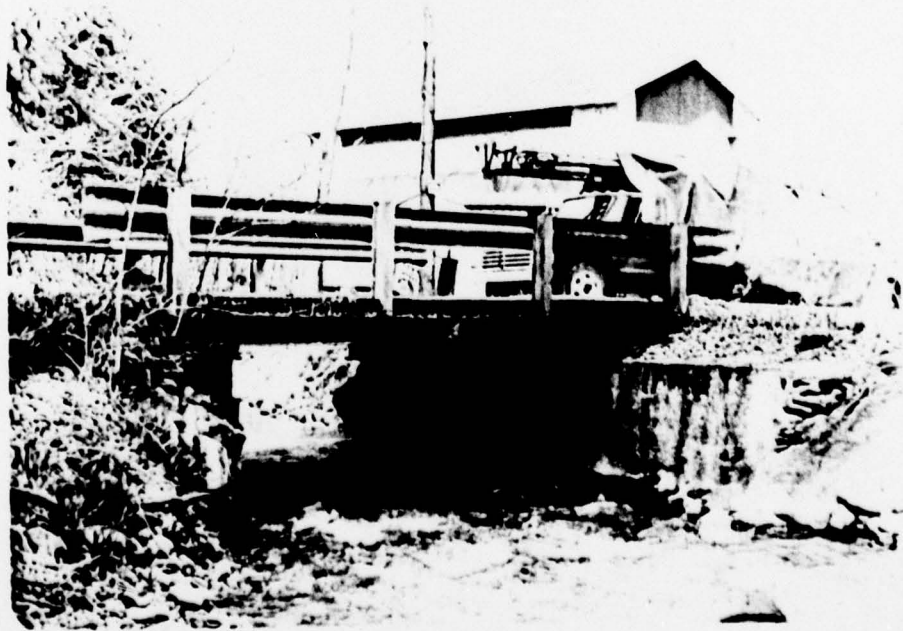
Photograph No. 8

Outlet end of "blow-off" pipe.



Photograph No. 9

Wet area at the toe. (See Plate 3 for location.)



Photograph No. 10

Bridge on Dalton Run Road (Bridge No. 2).



Photograph No. 11  
Private bridge (Bridge No. 3)



Photograph No. 12  
Bridge on Dalton Run Road (Bridge No. 4).



Photograph No. 13  
Bridge No. 5.



Photograph No. 14  
Bridge on County Road (Bridge No. 6).

APPENDIX D  
CALCULATIONS

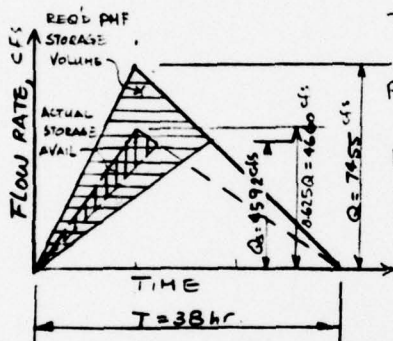
**D'APOLONIA**  
CONSULTING ENGINEERS, INC

1

By WTC Date 4-29-78 Subject DALTON RUN DAM, NDS ID: 232 Sheet No. 1 of 3  
Chkd. By BE Date 5-9-78 HYDROLOGY & HYDRAULIC Proj. No. 78-114-01

DAM : DALTON RUN DAM, NDS ID : 232 (DER ID : 56-1)  
SOMERSET COUNTY, PA.  
WATERSHED AREA, A: 4.26 SQ. MILE

INFLOW HYDROGRAPH BASIN : OHIO RIVER BASIN, DALTON RUN OF BEAS CREEK



TOTAL TIME, T, = 38 HOURS

PHF PEAK FLOW,  $q = 1750$  cfs/MI<sup>2</sup>

PMF PEAK FLOW,  $Q = q \cdot A = 7455$  cfs

VOLUME OF INFLOW HYDROGRAPH  
 $V_i = \frac{1}{2} T \times 3600 \times Q$  CF  
 $= 1800 T \times Q \times 10^{-6}$  MCF  
 $= 510.0$  MCF

SPILLWAY CAPACITY (PRIMARY & EMERGENCY)

PRIMARY

TYPE : MASONRY CREST WEIR ;  $C = 3.4$  (ASSUMED) (CGFS, CONCRETE)  
 LENGTH  $L = 57-10"$  (AS MEASURED DURING INSPECTION)  
 HEAD (MAX.)  $h = 6$  FT

$Q_{s1} = C L h^{1.5}$  cfs = 2890 cfs

EMERGENCY

TYPE : BOARD CREST WEIR & GRASSY CHANNEL  $C = 2.6$  (ESTIMATED)  
 LENGTH = 100' HEAD = 3'-6"

$Q_{s2} = C L h^{1.5} = 1702$  cfs

$Q_{s(TOTAL)} = 2890 + 1702$  cfs

RESERVOIR CAPACITY,  $V_R = 18 \text{ AC} / (\text{NORMAL POOL}) \times 6'$   
 $= 4.70 \times 10^6$  CF

REQ'D RESERVOIR CAPACITY =  $\left(1 - \frac{\text{MAX. SPILLWAY CAPACITY}}{\text{PMF PEAK FLOW}}\right) (\text{VOLUME OF INFLOW})$

$= \left(1 - \frac{Q_s}{Q}\right) (V_i) = \left(1 - \frac{4592}{7455}\right) (510 \times 10^6)$  ft<sup>3</sup>

$= 195.8$  MCF  $> V_R = 4.70$  MCF NG

# D'APPOLONIA

CONSULTING ENGINEERS, INC.

(2)

By WIC Date 4-29-78 Subject DALTON RUN DAM NDS ID: 232 Sheet No. 2 of 3  
 Chkd. By BE Date 5-9-78 HYDROLOGY & HYDRAULIC Proj. No. 78-14-01

PERCENT OF PMF WITHOUT OVERTOPPING

$$= \frac{\left(\frac{4592}{7455}\right)(510 \times 10^6) + 4.70 \times 10^6}{510 \times 10^6} \times 100\% = 62.5\% \text{ PMF} \quad 7.5\% \text{ over}$$

FOR  $\frac{1}{2}$  PMF

$$Q_{50\%} = \frac{7455}{2} = 3728 \text{ cfs}$$

$$V_{50\%} = \frac{510}{2} = 255 \text{ MILION CU. FT}$$

$$\text{MAX. SPILLWAY FLOW RATE @ } \frac{1}{2} \text{ PMF} = \left(1 - \frac{4.7 \times 10^6}{255 \times 10^6}\right)(3728) = 3660 \text{ cfs}$$

$$Q_s = (3.4)(57.8)(h)^{1.5} + (2.6)(100)(h-2.5)^{1.5} = 3660 \text{ cfs}$$

By TRIAL & ERROR;  $h = 5.332 \text{ FT}$

$$\text{Vol} = 18 \text{ ac} \times 5.332 = 4.18 \times 10^6 \text{ ft}^3 \quad \text{TRIAL VOL} < 4.7 \times 10^6 \text{ ft}^3$$

RE-CALC. SPILLWAY FLOW RATE BY USING  $V_i = 4.18 \times 10^6 \text{ cf}$

$$\text{MAX. SPILLWAY FLOW RATE} = \left(1 - \frac{4.18}{255}\right)(3728) = 3667 \text{ cfs}$$

CHECK  $h$  FOR  $Q_s = 3670 \text{ cfs}$   $h = 5.338 \text{ FT}$   
 $\text{Vol} = 4.19 \times 10^6 \text{ ft}^3 \approx V_i = 4.18 \times 10^6 \text{ ft}^3$  OK

Say FOR  $\frac{1}{2}$  PMF  $Q_s = 3670 \text{ cfs}$ ;  $h = 5.34 \text{ FT}$  OR 8' FREEBOARD  
 OK

# D'APPOLONIA

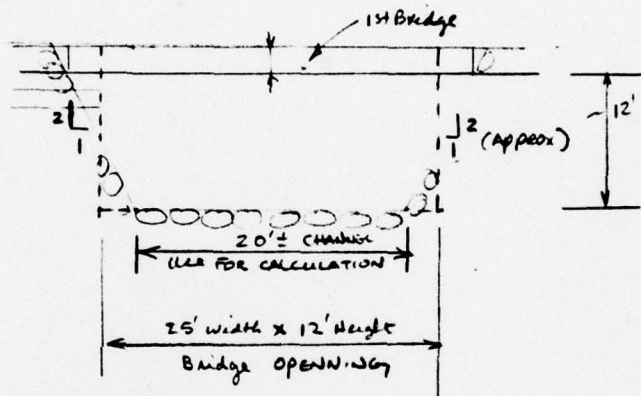
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3

By WTC Date 4/29/78 Subject DALTON RUN DAM NDS ID: 232 Sheet No. 3 of 3  
 Chkd. By BE Date 5-9-78 HYDROLOGY & HYDRAULIC Proj. No. 78-114-01

## ESTIMATE WATER DEPTH IN EXIT CHANNEL @ FIRST BRIDGE (x 500'/s)

CHANNEL SLOPE (FROM U.S.G.S.)  $\approx$  1% (ESTIMATE)



$n = 0.04$  (Miprad channel)

$$A = (20 + 0.5h)(h) ; \quad P = 20 + 2.24 h ; \quad V = \frac{1.486}{0.04} R^{2/3} (0.01)^{1/2}$$

$$Q = VA$$

h FT	A FT <sup>2</sup>	P FT	R FT	V fps	Q cfs
0.5	10.13	21.12	0.48	2.3	23.0
1.0	20.5	22.2	0.9	3.5	71.8
1.5	31.1	23.4	1.3	4.5	139.5
2.0	42.0	24.5	1.7	5.3	222.8
2.5	53.1	25.6	2.1	6.0	319.9
3.0	64.5	26.7	2.4	6.7	429.6
4.0	88.0	28.9	3.0	7.8	683.3
5.0	112.5	31.2	3.6	8.7	979.2
6.0	138.0	33.4	4.1	9.5	1314.3
7.0	164.5	35.7	4.6	10.3	1686.9
8.0	192.0	37.9	5.1	10.9	2095.9
10.0	250.0	42.4	5.9	12.1	3020.8
12.0	312.0	46.8	6.7	13.1	4087.2

CONCLUSION: FOR MAX. SPILLWAY CAPACITY (4600 cfs) THE WATER DEPTH WILL BE APPROXIMATELY 13' DEPTH OR START FLOW OVER THE 1<sup>ST</sup> BRIDGE & FLOOD APPROXIMATELY ONE FOOT @ TOE.

FOR 1/2 PMF THE WATER DEPTH (11.2') IS WELL WITHIN EXIT CHANNEL

DAMAGING DISCHARGE @ BRIDGE # 2  $\approx$  1300 CFS.