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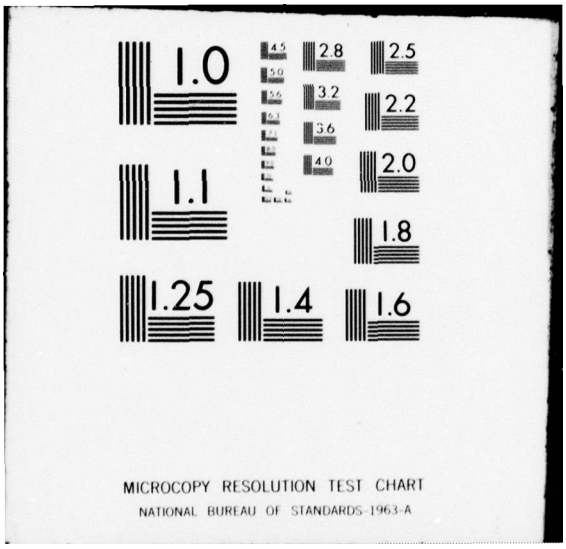
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LEVEL II

OHIO RIVER BASIN
SPEERS RUN, WASHINGTON COUNTY

PENNSYLVANIA

SPEERS RUN DAM
NDI No. Pa – 505.
Number

Ohio River Basin, Speers Run, Washington County, Pennsylvania.

PHASE I INSPECTION REPORT,
NATIONAL DAM INSPECTION PROGRAM.

(6)

(10) Bernard M. Mihalcin

PREPARED FOR

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

(15) DACW31-78-C-0052

PREPARED BY

GAI CONSULTANTS, INC.
570 BEATTY ROAD
MONROEVILLE, PENNSYLVANIA 15146

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LEVEL II

(1)

PHASE I REPORT
National Dam Inspection Program

Speers Run Dam

Pennsylvania

Washington County

Speers Run (Tributary of Little Chartiers Creek)

9 June 1978 (visual inspection)

Inspection Team - GAI Consultants, Inc.
570 Beatty Road
Monroeville, Pennsylvania 15146

Based on visual inspection and available data, the dam and spillway works appear to be in good condition. The outlet appurtenances (intake tower, supply line, and blow-off line) present a potentially hazardous condition in that they are inaccessible at normal pool level, and probably inoperable and (in case of the blow-off line) of unknown location. Thus, an assessment of their condition and remedial measures to restore these appurtenances to operability are recommended.

The project is capable of passing 58 percent of the flow resulting from a storm of the PMF magnitude (recommended spillway design flood) without overtopping the dam if the crest of the dam is regraded to the elevation of the spillway wingwall at its crest; thus, the spillway capacity is considered inadequate but not seriously inadequate, however, if the area is allowed to remain below design height, the embankment would be overtopped by 1/2 PMF and the spillway capacity would then be considered seriously inadequate. A detailed hydrologic and hydraulic study of Speers Run Dam and Canonsburg No. 2 Dam, which is located just upstream of Speers Run Dam, is recommended to evaluate the capacity of the outlet systems. This study should be carried out by a registered professional engineer. The owner should then be required to make any modifications necessary to make the spillway hydraulically adequate.

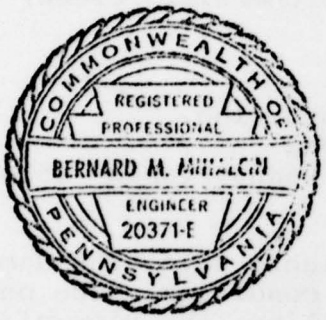
It is also recommended that the owner develop a formal maintenance and operations manual to insure continued operability of the facility. In addition, the water company's proposed emergency plan for maintenance of a safe potable water supply should be amended to include warning and evacuation plans for downstream residences. The dam should be inspected on a periodic basis to check for hazardous conditions which might develop.

GAI Consultants, Inc.

Bernard M. Mihalcin, P.E.

Approved:

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



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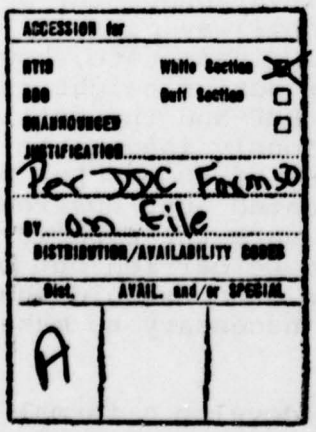

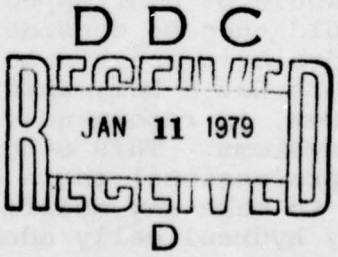

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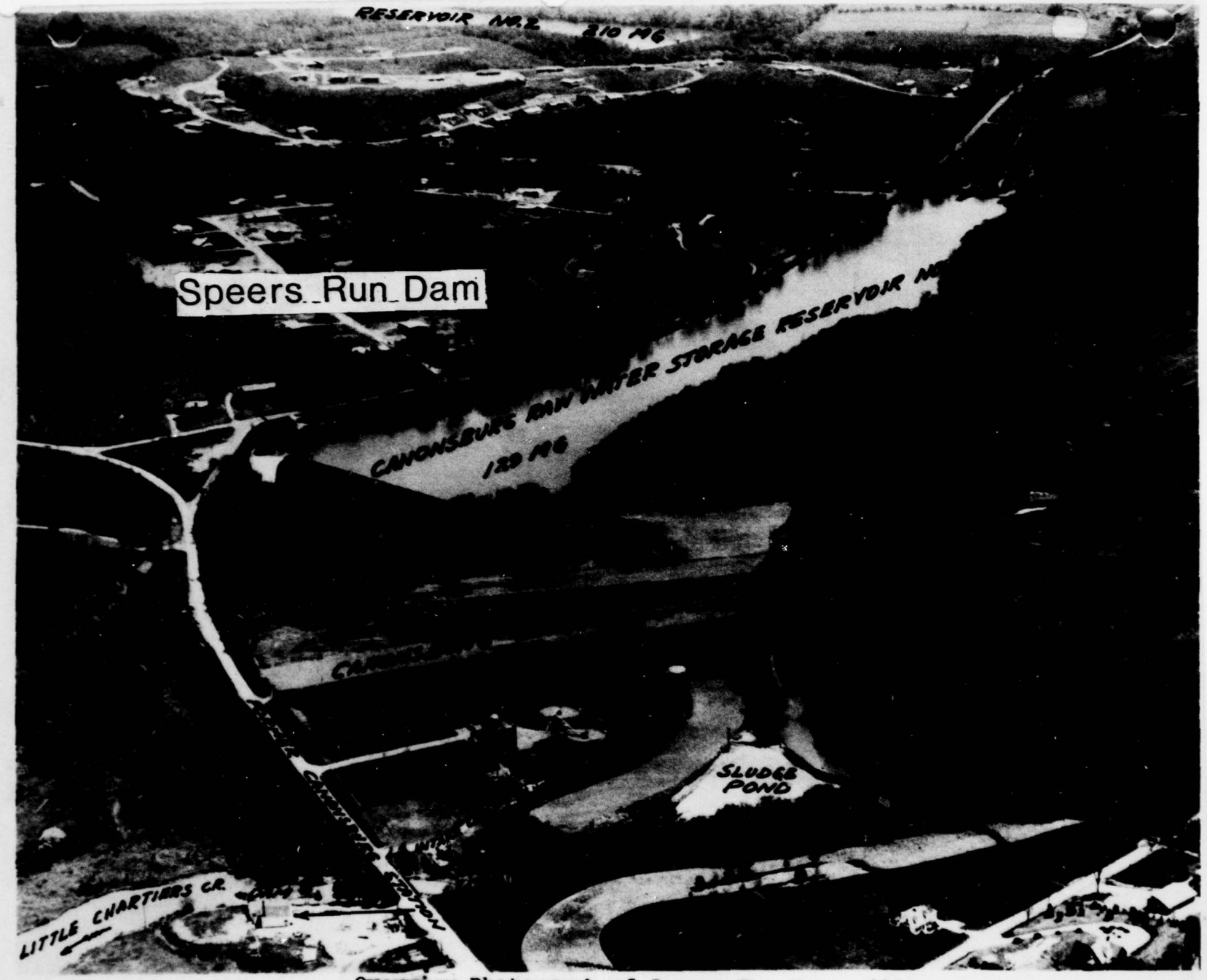

Overview Photograph of Speers Run Dam iii

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TABLE OF CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
SPEERS RUN DAM
NDI# PA-505, PENNDER# 63-6

ABSTRACT

1.0 Authority.

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

~~1.1 Purpose~~.

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

1.2 Description of Project.

ABSTRACT

a. Dam and Appurtenances. Speers Run Dam is a rolled earthfill embankment approximately 765 feet in length with a maximum height (upstream) of approximately 42 feet and an effective height of 21 feet (downstream). A concrete spillway with an ogee-shaped crest at the entrance is located along the right end of the embankment. The outlet works are reportedly comprised of an 18-inch diameter supply pipe and a 24-inch diameter blow-off line originating at a submerged intake tower located along the left side of the embankment.

b. Location. Speers Run Dam is located approximately two miles east of Canonsburg, Washington County, Pennsylvania. The dam is located at the northwest end of the reservoir about 1 mile south of Donaldson Crossroads. Dam, reservoir, and watershed are contained within the Canonsburg, Washington East, Bridgeville, and Hackett U.S.G.S. 7.5 minute quadrangles as shown on the Regional Vicinity Map (Appendix G). The coordinates of the dam are N40° 15' 30", W80° 8' 00".

c. Size Classification. Intermediate - 42 feet high, 375 acre-feet storage at spillway crest).

d. Hazard Classification. High (see Section 3.1.c).

e. Ownership. Western Pennsylvania Water Company
62 East Wheeling Street
Washington, Pennsylvania 15301

f. Purpose of the Dam. The dam serves as a storage reservoir for the water supply system of Canonsburg, Pennsylvania and surrounding communities. Fishing is permitted on a restricted basis.

g. Design and Construction History. Little historical information on Speers Run Dam is available. Limited data is presented and/or inferred on drawings of the facility dated 1911, 1927, and 1957 (Figures 1 through 5) and an undated sketch (Figure 6) presented in Appendix F.

Data provided on proposed drawing (mentioned above) indicates that design proposals for Speers Run Dam were presented circa 1911. At that time, consideration was given to constructing the dam in conjuction with a railroad embankment. However, it appears that both were eventually built independently, with Speers Run Dam being constructed first. As no documents relative to as-built conditions are available, it is not known whether the cross-section (Section A-A) indicated on Figure 1 is in fact representative of the initial embankment. The location of the spillway, however, appears consistent with subsequent drawings from a 1927 renovation of the facility.

Figure 2 of Appendix F shows a plan of the 1927 renovation which included raising the original embankment by 5.6 feet, constructing a new spillway, and raising the intake tower. The top of the embankment as indicated on this drawing was at elevation 964.0 which does not agree with the proposed embankment crest shown on Figure 1 submitted in 1911. Thus, it is possible that the original embankment was not constructed as proposed in Figure 1 or was modified between 1911 and 1927. In addition, the railroad subgrade is indicated on Figure 2 at elevation 965.0+ and the ground contours between the railroad and dam embankment are rather gentle, indicating substantial fill was placed between the two embankments.

Consequently, the railroad embankment and fill act as a massive buttress on the downstream face. As a result, the actual embankment height as presently observed is in the order of 21 feet measured on the downstream side.

h. Normal Operation Procedure. (See Section 4.1.)

1.3 Pertinent Data.

a. Drainage Area. 2.8 square miles (U.S.G.S.).

b. Discharge at Dam Site. Records not available.

Maximum Spillway Discharge Capacity to Top of Wingwall - 2875 cfs.

Maximum Discharge at Outlets - Not known.

c. Elevation (feet above mean sea level).

Top of Dam - 969.6 (plan elevation), 968.1 (field measurement with top of spillway as datum = 964.6).

Maximum Pool Design Surcharge - Not known.

Maximum Pool of Record - Not known.

Normal Pool - 964.6.

Upstream Portal Invert of Outlet Conduit - 935 (rough estimate).

Downstream Portal Invert of Outlet Conduit - Not known.

Streambed at Centerline of Dam - 933 (rough estimate).

Maximum Tailwater - Not known.

d. Reservoir.

Length of Maximum Pool ≈ 0.64 miles (elevation 968.1).

Length of Normal Pool ≈ 0.55 miles (elevation 964.6).

e. Storage (acre-feet).

Spillway Crest ≈ 375.

Design Surcharge - Not known.

Top of Dam ≈ 515 (estimate).

f. Reservoir Surface (acres).

Top of Dam ≈ 40.

Maximum Pool ≈ 40.

Spillway Crest ≈ 37.

g. Dam.

Type - Rolled earth.

Length - 765 feet.

Top Width - 12 feet.

Side Slopes - Upstream 2.5H:1V
Downstream 2H:1V

Zoning - Original embankment zoning unknown (proposal of 1911 indicates concrete core wall). The 1927 addition indicates homogeneous earthfill.

Impervious Core - None verified.

Cutoff - 5-foot wide puddle trench proposed under old spillway in 1927; not verified.

Grout Curtain - None.

h. Outlet Conduit.

Type - One 24-inch blow-off line and one 18-inch supply pipe originate at intake (brick valve chamber) as indicated on Figure 3. Chamber submerged at time of inspection.

Closure - Reportedly valved at intake but open. Probably inoperable.

Access - Inaccessible by foot.

Regulating Facilities - Outlet of 24-inch blow-off pipe unknown. Supply line (18-inch) can be regulated at treatment plant.

i. Spillway.

Type - Concrete chute with ogee crest.

Length of Weir - 79.3 feet.

Crest Elevation - 964.6 feet.

Upstream Channel - Natural approach.

Downstream Channel - Discharges into natural channel.

j. Regulating Outlets. 24-inch blow-off line reportedly open in valve chamber, outlet end not located. 18-inch supply line opened in valve chamber and regulated at treatment plant (could use supply line as blow-off at treatment plant).

SECTION 2
ENGINEERING DATA

2.1 Design.

a. Design Data Availability and Sources.

1. Hydrology and Hydraulics. No design reports are available.

2. Embankment. Design drawings dated July 1927 by D. C. Morrow, Engr., are available from PennDER files. No design reports or construction specifications are available.

3. Appurtenant Structures. Same as 2 (above).

b. Design Features.

1. Embankment. Drawings indicate the embankment was constructed of rolled earthfill with a crest width of 12 feet. The original embankment which was constructed prior to 1927 (no records are available) was incorporated into the present structure and currently functions as a part of the upstream portion of the dam (see Figure 5). Presumably, near the time of construction of the original embankment, the Chartiers Southern Railroad constructed an embankment that ran tangent to the dam at the left end angling downstream as it moved from left to right relative to the dam (see Figure 2).

The upstream face of the present embankment is at a slope of 2.5H on 1V and is faced with 12-inch thick stone riprap. The downstream face is shown with slopes at 2.H on 1V.

During the 1927 renovation, the old spillway structure was sealed with a 5-foot wide puddle trench (presumably extending to impervious material) and a concrete upstream face dowelled into the existing weir crest (see Figure 3).

2. Appurtenant Structures.

a) Spillway. The spillway is a concrete structure with an ogee-shaped crest at the entrance located along the right abutment (see Figures 2 and 4, Photographs 1, 4, and 5).

b) Outlet Conduits. An 18-inch diameter supply line and a 24-inch diameter blow-off line originate at the intake tower reportedly located along the left side of the embankment. Both lines probably pass beneath both the dam and railroad embankment and reportedly emerge at some point downstream (not located by the field team) (see Figure 6).

c) Intake Tower. The intake tower is submerged at normal pool level (elevation 964.6). Gate valves located within this structure are open but have not been operated for many years. The owner assumes these valves to be non-operational.

2.2 Construction Records.

No construction records are available.

2.3 Operating Records.

No operational records are available.

2.4 Other Investigations.

None available.

2.5 Evaluation.

The information available is considered sufficient to make a general Phase I assessment of the structure.

SECTION 3
VISUAL INSPECTION

3.1 Observations.

a. General. The general appearance of the structure and related appurtenances suggests that the facility is in fair to good condition.

b. Embankment. The upstream slope of the dam is mantled with a well graded limestone riprap which is patchy in areas. Both the crest and downstream slope of the embankment were apparently constructed of impervious or semi-pervious materials and are covered with a thick growth of grassy vegetation.

A survey of the embankment crest during the field inspection indicated a localized depression of about one foot adjacent the spillway wingwall. This condition is not considered serious under normal operating conditions. However, it significantly reduces the maximum storage capacity of the facility (see Section 5).

According to records supplied by PennDER, the Speers Run embankment is 42 feet high. The field survey, however, indicated a maximum height of 21 feet. This condition has apparently resulted from the construction of the railroad embankment which encroached over a portion of the downstream slope of the dam (see Photograph 2 and Figures 2 and 6).

Seepage was noted downstream of the left abutment at the bottom of the railroad grade (see Photograph 6). The seepage flow could not be measured and is considered insignificant relative to the integrity of the dam structure.

c. Appurtenant Structures.

1. Spillway. The spillway, spillway abutments, apron and plunge pool all appeared to be in good condition. Some minor cracking and spalling of the concrete was observed and most of the construction joints were bitumen filled.

2. Gate Controls, Blow-off, and Supply Line. At the time of inspection, approximately one inch of water was discharging over the spillway. The valve chamber which houses the controls on the 24-inch blow-off and 18-inch supply lines were submerged and could not be observed.

According to a water company representative, the supply pipe is open at the reservoir and discharge is controlled at the treatment plant. Mr. McAdams (water company engineer) reported that the operability of any valves on the intake structure was questionable since they had not been operated in years. He was not able to provide any information on the location of the control valve for the blow-off line but suggested that it too was open within the reservoir and was gated downstream. No control mechanisms were located. However, a terra-cotta pipe of unknown function was observed downstream of the dam at the toe of the railroad embankment (see Photograph 7).

3. Reservoir Area. The slopes adjoining the reservoir are moderate to steep and are equally divided between wooded and residential or agricultural areas. No signs of slope distress were observed at the time of inspection. A build up of sediment and vegetation just upstream of the ogee crest had effectively decreased the width of the spillway approach channel. According to water company personnel, sedimentation within the reservoir is appreciable.

4. Downstream Channel. After passing beneath an abandoned railroad grade approximately 400 feet downstream of the dam flow from Speers Run Dam discharges into Little Chartiers Creek before entering Alcoa Dam approximately 2,500 feet downstream. The Little Chartiers Creek Valley is characterized as a broad (600 to 1,000 feet) sparsely wooded valley containing only one permanent dwelling. Discharge from Speers Run passes beneath two paved roads before entering Alcoa Dam (one road is a heavily traveled four-lane highway).

Because of the proximity of the highway improvements and the aforementioned dwelling, the dam was placed in the high hazard category.

3.2 Evaluation.

Although the dam was thickly vegetated, it did not preclude the opportunity to make a general assessment of the site conditions. Lack of access to the intake structure prohibited its evaluation. Settlement near the spillway wingwall significantly effects the storage and discharge capacity of the facility.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Normal Operational Procedure.

According to water company personnel, there are no established operational procedures at the facility. Excess inflow passes over an ungated concrete ogee crested weir and discharges into the Speers Run channel. The supply and blow-off pipe outlets are reportedly open at their intake ends and flow through the supply pipe is regulated at the treatment plant. The discharge end of the blow-off pipe was not observed and its operability is suspect.

4.2 Maintenance of Dam.

There is no formal maintenance procedure concerning the dam. There is apparently some clearing and grubbing of the embankment slopes since no trees or bushes had become established as might be expected on a structure of this age.

4.3 Maintenance of Operating Facilities.

Maintenance of operating facilities at the site is apparently provided on an as-needed basis.

4.4 Warning System.

There are no formal warning systems in effect at the site.

4.5 Evaluation.

Established operational procedures are non-existent at the facility. It is doubtful whether the supply and blow-off pipes can be controlled at the intake end. The controls at the intake structures are submerged when the water is at the normal operating pool (spillway crest).

SECTION 5
HYDROLOGIC/HYDRAULIC EVALUATION

5.1 Design Data.

No hydrologic or hydraulic design data are available.

5.2 Experience Data.

No data pertinent to the past performance of the spillway and/or outlet conduit are available.

5.3 Visual Observations.

The dam and its appurtenances appeared to be in satisfactory condition relative to the hydrologic and hydraulic analysis. Specifically, the spillway is in good condition with little sign of deterioration. The approach to the spillway is silted and to some degree obstructed by heavy growth along the right side. The siltation is accounted for in the analysis.

Settlement of the crest was measured and found to range from 2 inches to 12 inches. Using the top of the left wingwall of the spillway as a datum, the lowest point along the embankment is located adjacent to the left wingwall of the spillway and is approximately 12 inches below the datum. The hydraulic analysis assumed that all low areas would be regraded to the datum so that the embankment elevation will be uniform across its entire length.

5.4 Overtopping Potential.

The "PMF Peak Flow" for this watershed was determined based on data supplied by the Corps of Engineers, Baltimore District. Specifically, the data pertains to a stream gage station located on Chartiers Creek at Washington, Pennsylvania. Based on a drainage area of 28.6 square miles the PMF at this location is 27,200 cfs.

Utilizing this data and applying it the following equation yields a value of PMF for the watershed in this analysis. That is:

$$Q_1 = \left[\frac{D_1}{D_2}\right]^n Q_2$$

where

Q_1 = PMF at Speers Run Dam
Q_2 = 27,200 cfs
D_1 = drainage area of Speers Run Dam
D_2 = 28.6 square miles
n = empirical constant = 0.7.

The value of n chosen for this analysis is 0.7. This value falls between those values recommended by the Corps of Engineers, Pittsburgh District, for comparison of watersheds within the Ohio River Basin. Based on this information, PMF Q = 5,347 cfs.

Calculations were performed to evaluate the overtopping potential using spillway and storage capacities during the PMF.

Based on the above values, the resulting inflow volume for this storm is calculated to equal 7,733 acre-feet. This figure appears to be excessive. Consequently, the inflow volume was recalculated based on an average runoff of 26 inches for the PMF. The resulting inflow is equal to 3,883 acre-feet.

The spillway has a maximum discharge of 2875 cfs. In this case, it can be seen that maximum inflow is greater than the maximum discharge capacity. Consequently, some storage capacity is required.

Estimating the volume of storage available and comparing this to the volume of storage required reveals the dam is not capable of passing and/or storing a storm of PMF magnitude. In fact, the analysis shows that this facility is sufficiently designed to pass and/or contain only 58 percent of the PMF. Consequently, it can be concluded that the embankment will overtop if subjected to a storm of PMF magnitude.

5.5 Spillway Adequacy.

The dam is able to pass and/or contain approximately 58 percent of the PMF. As a result, the spillway is deemed inadequate but not seriously inadequate.

SECTION 6
EVALUATION OF STRUCTURAL INTEGRITY

6.1 Visual Observations.

a. Embankment. Based on visual observations, the embankment appears to be in fair to good condition. No indication of seepage is evident. One detrimental factor is the approximate one foot of settlement on the dam crest adjacent to the left wingwall of the spillway.

b. Appurtenant Structures. Based on the visual inspection, the spillway appeared to be in good condition with only some minor scaling visible.

The intake structure shown on Figure 3 is submerged and cannot be inspected at the present reservoir level. Outlet appurtenances could not be located and as such pose a potentially hazardous condition, since they are under full hydraulic head beneath the embankment and apparently cannot be closed.

6.2 Design and Construction Techniques.

a. Embankment. Minimal information is available in the form of design drawings dated August 1927. These drawings appear to indicate the dam to be adequately designed and constructed. Features such as mild slopes and adequate riprap protection serve to confirm its structural integrity.

b. Appurtenant Structures. The drawings appear to indicate the spillway to be adequately designed.

6.3 Past Performance.

No records of past performance are available.

6.4 Seismic Stability.

The dam is located within Seismic Zone No. 1 and it is thought that the static stability is sufficient to withstand minor earthquake induced dynamic forces. However, no calculations, investigations, etc., were performed to confirm this conclusion.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. The visual inspection indicates that the Speers Run embankment and spillway works are in good condition. Seepage was noted along the left abutment. However, as the embankment toe was dry, the seepage probably is passing around and through the abutment. The effective height of the embankment at the downstream toe has been reduced to about 21 feet by an abutting railroad embankment and apparent fill.

Lack of operable regulating facilities and/or their location or disposition is a problem of potentially hazardous consequences. The intake structure is not visible at normal pool and the valves contained within it are presumably inoperable and full open, thus, the pipes are under full hydraulic head beneath the dam. The location of the exit end of a purported 24-inch blow-off line is unknown but it is presumably valved at its exit. The 18-inch supply line (which reduces to 12 inches just downstream of the embankment) can be regulated only at the treatment plant. It reportedly could function as a blow-off line.

The spillway works are considered in good condition requiring minor surficial maintenance. There is approximately 1 foot of settlement of the embankment over a small area adjacent to the spillway wall. The embankment would be overtopped by 1/2 PMF flow if the low area were allowed to remain and the spillway capacity would then be considered seriously inadequate. However, the facility can pass and/or store a flood of 58 percent of the PMF magnitude if the crest is regraded to correct the present condition. Its adequacy, however, is a function of the integrity of Canonsburg No. 2 reservoir, located approximately one mile upstream. A brief analysis of Canonsburg No. 2 dam indicates that its capabilities of accommodating a 1/2 PMF storm are marginal.

b. Adequacy of Information. The available information is considered sufficient for a general assessment of the project.

c. Urgency. It is recommended that the remedial measures listed below be implemented as soon as possible.

d. Necessity for Additional Investigation. An additional study to more accurately ascertain the adequacy of the outlet works of Speers Run Dam as well as the upstream Canonsburg No. 2 facility is necessary.

7.2 Recommendations/Remedial Measures.

It is recommended that:

a. The owner enlist the services of a registered professional engineer to inspect and assess the condition of the intake and outlet works and perform those remedial measures deemed necessary to restore their operability including closing the outlet works at their intake ends.

b. The owner regrade the embankment crest to achieve the maximum discharge capacity of the spillway.

c. The owner develop a formal program of maintenance to ensure continued operability of the above appurtenances and provide necessary overall care.

d. The owner enlist the services of a registered professional engineer experienced in hydraulic and hydrologic design to more accurately determine the capacity of the spillway and outlet works for Speers Run and Canonsburg No. 2 Dam (located upstream of Speers Run Dam). Subsequently, the owner should make any modifications deemed necessary to make the spillway and outlet works hydraulically adequate.

e. The owner adapt their proposed emergency plan for the maintenance of a safe potable water supply to include a warning and evaluation procedure in case hazardous embankment conditions should develop. This plan should include provisions for round-the-clock surveillance during periods of high water.

f. The dam be inspected periodically to check for deleterious or hazardous conditions which might develop.

APPENDIX A

CHECK LIST - ENGINEERING DATA

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Speers Run (Canonsburg #1)

ID # PA-505; PennDER-63-6

ITEM	REMARKS	SHEET 1

AS-BUILT DRAWINGS

1957 drawing of repairs to spillway apron and one untitled drawing provided by owner.
Four construction drawings provided by PennDER.

REGIONAL VICINITY MAP

U.S.G.S. 7.5 minute quadrangle - located at the S.E. 1/4; S.E. 1/4; S.E. 1/4 of the Canonsburg quadrangle.

CONSTRUCTION HISTORY

Compiled from drawings in PennDER files.
Original structure constructed circa 1911. Raised in 1927.

TYPICAL SECTIONS OF DAM

Sections indicated on 1927 revision.
Section on 1911 proposal is questionable.

OUTLETS - PLAN — Shown on Sheet 1 of 1927 revision

- DETAILS — Shown on Sheet 2 of 1927 revision
- DISCHARGE RATINGS — Not available.

RAINFALL/RESERVOIR RECORDS

Gaging station on Chartiers Creek at Washington Treatment Plant.
Station operated for National Weather Service until last year.

ITEM	REMARKS	ID # PA-505	SHEET 2

DESIGN REPORTS

None available

GEOLOGY REPORTS

None available

DESIGN COMPUTATIONS
HYDROLOGY & HYDRAULICS
DAM STABILITY — None available
SEEPAGE STUDIES

MATERIALS INVESTIGATIONS
BORING RECORDS
LABORATORY — None available
FIELD

POST-CONSTRUCTION SURVEYS OF DAM

None

BORROW SOURCES

Unknown, but probably from within reservoir

MONITORING SYSTEMS

None

MODIFICATIONS

Structure raised in 1927
Modifications to the spillway made in 1957

HIGH POOL RECORDS

Not readily available

POST CONSTRUCTION ENGINEERING
STUDIES AND REPORTS

None

PRIOR ACCIDENTS OR FAILURE OF DAM
DESCRIPTION
REPORTS

Unknown

MAINTENANCE
OPERATION
RECORDS

None

ITEM	REMARKS	ID # PA-505	SHEET 4

SPILLWAY PLAN

SECTIONS

Sheet 1 and 3 of 1927 revision

DETAILS

1 Drawing in 1957 showing spillway repairs

OPERATING EQUIPMENT PLANS & DETAILS

Untitled drawing by owner showing location of piping and valves

NDI# PA-505

CHECK LIST ID # PennDER 63-6
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 50% wooded; 50% residential.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 964.6 (375 acre-feet).

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): Not known.

ELEVATION MAXIMUM DESIGN POOL: Not known.

ELEVATION TOP DAM: 969.6 (designed); 968.1 at low point (field measured).

SPILLWAY DATA:

a. Crest Elevation 964.6 feet.
b. Type concrete chute with ogee-shaped weir.
c. Weir Length 79.0 feet.
d. Channel Length 145 feet.
e. Location Spillover right abutment.
f. Number and Type of Gates ungated.

OUTLET WORKS:

a. Type 24-inch blow-off line and 18-inch supply line from brick valve chamber (not visible at normal pool).
b. Location Approx. 150 feet from left abutment - 150 ft. into reservoir.
c. Entrance Inverts ele. 935+ (rough estimate).
d. Exit Inverts Not known.
e. Emergency Draindown Facilities 24-inch blow-off (unable to locate infield).

HYDROMETEOROLOGICAL GAGES:

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

MAXIMUM NON-DAMAGING DISCHARGE: Not known.

APPENDIX B

CHECK LIST - VISUAL INSPECTION

CHECK LIST
VISUAL INSPECTION
PHASE 1

DAM NAME Speer's Run (Canonsburg #1) COUNTY Washington STATE PA ID # NDI# PA-505 PennDER# 63-6

TYPE OF DAM Earth HAZARD CATEGORY

DATE(S) INSPECTION 9 June 1978 WEATHER Overcast (Rained at night) TEMPERATURE

POOL ELEVATION AT TIME OF INSPECTION 964.7 M.S.L. TAILWATER AT TIME OF INSPECTION ≈935' M.S.L.

INSPECTION PERSONNEL:

Western Pennsylvania Water

B. M. Mihalcin
W. H. McAdams - Engineer
J. P. Nairn
J. Orlando
D. L. Bonk
R. Newman
J. T. Sebastian
B. M. Mihalcin RECORDER

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed - Vegetation of crest partially obscured crest.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Vertical alignment - Low point in embankment near spillway wingwall. Horizontal alignment - Good.	
RIPRAP FAILURES	Limestone riprap patchy (5 - 10 ft^2) in areas.	

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Low point at embankment - Left spillway wall contact.	
ANY NOTICEABLE SEEPAGE	Minor seepage noted at left abutment downstream of old railroad grade.	
STAFF GAGE AND RECORDER	None.	
DRAINS	None.	

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS

CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT

Note: The outlet works are submerged when the water level is at the crest of the spillway (normal pool).

Outlet works submerged at the time of inspection.

INTAKE STRUCTURE

Submerged.

OUTLET STRUCTURE

None observed - Reportedly a blow-off and supply line pass through the dam near the center of the embankment.

OUTLET CHANNEL

None.

EMERGENCY GATE

Reportedly open at the inlet end and controlled from the treatment plant. Valves apparently have not been operated in years and their condition is suspect.

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR		
Concrete ogee weir - Good condition.		
APPROACH CHANNEL		
Inundated - Appears to be natural soil.		
DISCHARGE CHANNEL		
Slight scaling - Generally good condition. Construction joints are bitumen filled.		
BRIDGE AND PIERS		
Note.		

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL		
N/A.		
APPROACH CHANNEL		
N/A.		
DISCHARGE CHANNEL		
N/A.		
BRIDGE AND PIERS		
N/A.		
GATES AND OPERATION EQUIPMENT		
N/A.		

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS		
None.		
OBSERVATION WELLS		
None.		
WEIRS		
None observed.		
PIEZOMETERS		
None.		
OTHERS		

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS

SLOPES

Roughly equally divided between wooded and residential or farming acreage - Generally 7 to 10 percent slopes.

SEDIMENTATION

According to Mr. Newman, the sedimentation is appreciable within the reservoir based on observations made at low water levels.

GENERAL OBSERVATIONS

The dam embankment was apparently constructed in stages and is tied into an abandoned railroad embankment - The maximum height of the embankment at this time appears to be 21 feet rather than the 42 feet mentioned in PennDER records.

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Spillway discharges into plunge pool - Water then passes beneath railroad grade and paved road (≈400 feet downstream of spillway crest) before entering the broad Little Chartiers Creek Valley.	
SLOPES	Steep and wooded - First 500 feet. Gentle - After flow enters Little Chartiers Creek Valley.	
APPROXIMATE NO. OF HOMES AND POPULATION	Only one dwelling is immediately downstream of the dam. However, two paved roads, one being a heavily travelled four-laned highway, are located within 3,000 feet of the structure. Population - exceeds 3.	

APPENDIX C

HYDROLOGY AND HYDRAULICS

SUBJECT Dam Safety Inspection
Speer's Run Dam

BY DLB DATE 6-12-78 PROJ. NO. 78-501-505

CHKD. BY FPT DATE 6-21-78 SHEET NO. 1 OF 8

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Speer's Run Dam

DAM LOCATION – Canonsburg Quadrangle
DRAINAGE AREA – Washington East "
Bridgeville "
Hackett "

Dam Statistics

Maximum Height of Dam = 42 ft (see Note below)

Drainage Area = 2.80 sq. mi. (Planimetered off USGS 7.5 Quads shown above)

Storage Capacity = 375 ac-ft (Ref: Basic Contract Data)
@ Normal Pool

Size Classification

Dam Size – Intermediate (Ref 1, Table 1)

Standard Design Flood (SDF) (Ref 1, Table 2)

Hazard Rating – High

Required SDF – PMF (Ref 1, Table 3)

Note: This is a field measurement. See section of report for explanation.

Ref 1: "Recommended Guidelines for Safety Inspection of Dams" by Dept of the Army

SUBJECT DAM SAFETY INSPECTION
SPEER'S RUN DAM

BY DLB DATE 7-18-78 PROJ. NO. 78-501-505

CHKD. BY JFN DATE 7-19-78 SHEET NO. 2 OF 8

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$$Q_1 = \left[\frac{D_1}{D_2}\right]^n Q_2$$

Q_1 = PMF AT SPEER'S RUN DAM

Q_2 = PMF FROM STATION AT CHARTIER'S CREEK (WASH., PA)
= 27,200 CFS (SUPPLIED BY CORPS)

D_1 = DRAINAGE AREA OF SPEER'S RUN = 2.80 SQ. MI.

D_2 = DRAINAGE AREA OF CHARTIERS CREEK (WASHINGTON, PA.)
= 28.6 SQ. MI. (SUPPLIED BY CORPS)

n = 0.6 TO 0.8

FOR $n = 0.6$

$$Q_1 = \left[\frac{2.8}{28.6}\right]^n (27{,}200 \text{ CFS}) = 6746 \text{ CFS}$$

FOR $n = 0.8$

Q_1 = = 4238 CFS

ACTUAL Q FROM COPE CURVE = 5250 CFS

6746 CFS > 5250 CFS > 4238 CFS

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USE $n = 0.7$ (MEDIAN OF VALUES SUGGESTED by CofE & SUBSTANTIATED BY HYDROLOGIC DATA FOR THE OHIO RIVER BASIN)

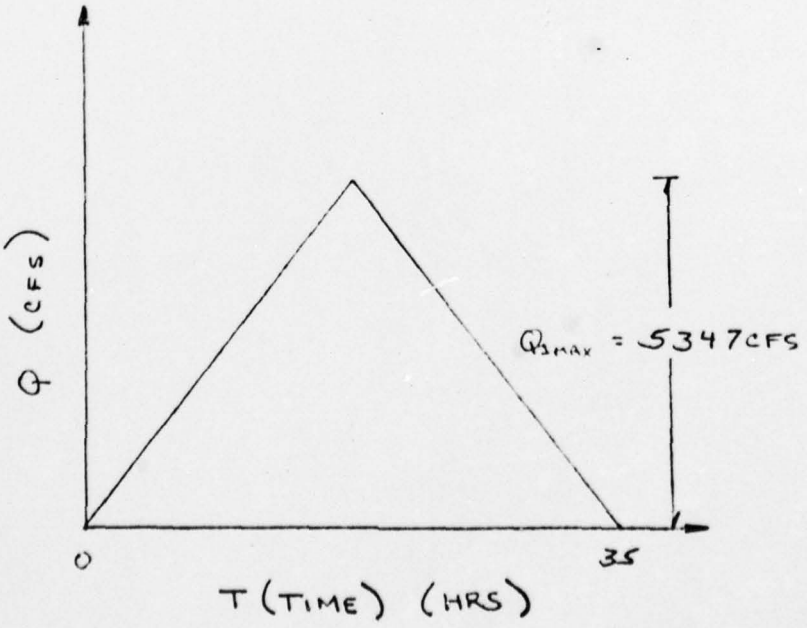
$$Q_1 = \left[\frac{2.8}{28.6}\right]^{0.7} (27,200 \text{ CFS}) = 5,347 \text{ CFS}$$

PMF = 5,347 CFS

DEVELOP INFLOW HYDROGRAPH

MAXIMUM INFLOW Q_{IMAX} = 5,347 CFS

TOTAL TIME OF FLOW = 35 HRS (REF: CofE CURVE)



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VOLUME OF INFLOW HYDROGRAPH

$V = \frac{1}{2}(Q_{I\,MAX})(TIME)$

$= \frac{1}{2}(5347\,CFS)(3.5\,HRS)(3600\,SEC/HR)(1\,ACRE/43{,}560\,FT^2)$

$= 7733$ ACRE-FEET

DETERMINE THE AVERAGE RAINFALL IN INCHES REQUIRED TO PRODUCE THE VOLUME ABOVE.

$\frac{(7733\,AC\cdot FT)}{(2.80\,SQ.MI)}(1\,SQ.MI./640\,ACRES)(12\,IN/FT) = 51.8$ INCHES

VOLUMES PRODUCED BY PMF RAINFALLS IN EXCESS OF 26 INCHES ARE TO BE RECALCULATED USING 26 INCHES AS AN UPPER BOUND.

$(26\,INCHES)(2.80\,SQ.MI)(640\,ACRES/SQ.MI)(1\,FT/12\,IN) = 3883$ AC-FT

VOLUME OF INFLOW (RECALCULATED) = 3883 AC-FT

NOTE: $Q_{I\,MAX}$ REMAINS CONSTANT.
STORM DURATION DECREASES IN ACCORDANCE WITH THE DECREASE IN INFLOW VOLUME.

EQUIVALENT STORM DURATION $= (3883\,AC\cdot FT)(2)(43{,}560\,FT^2/ACRE)/(3600\,SEC/HR)(5347\,CFS) =$

$= 17.6$ HRS

JECT DAM SAFETY INSPECTION
SPEER'S RUN DAM

BY DLB DATE 6-12-78 PROJ. NO. 78-501-505

CHKD. BY FPT DATE 6-21-78 SHEET NO. 5 OF 8

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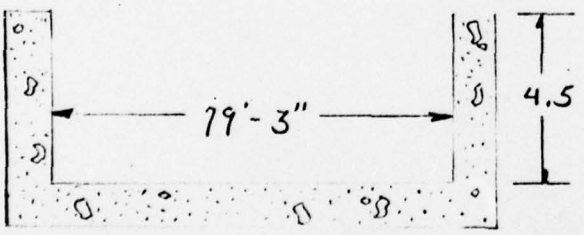
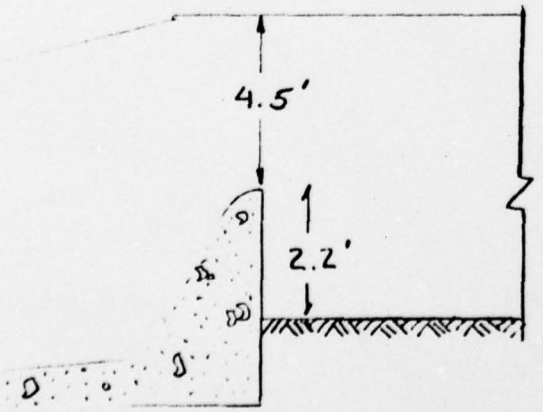
ASSUME THE EMBANKMENT WILL BE LEVELED OFF AND MADE EVEN WITH THE SPILLWAY WING-WALLS. (SEE SECTION 5.3)

SPILLWAY





(DIMENSIONS TAKEN FROM DRWG 26-216 DATED 11-23-57 by AMER. WATER WORKS SERVICE CO., INC, AND VERIFIED DURING FIELD INSPECTION)

SUBJECT DAM SAFETY INSPECTION
SPEER'S RUN DAM

BY DLB DATE 6-12-78 PROJ. NO. 78-501-505

CHKD. BY FPT DATE 6-21-78 SHEET NO. 6 OF 8

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SPILLWAY CAPACITY

$Q = C L H^{3/2}$ (REF 2, EQ 21-121)

H = MAXIMUM POSSIBLE WATER HEAD = 4.5FT

L = CREST LENGTH = 79.25FT

C = DISCHARGE COEFFICIENT

FROM REF 2, FIG 21-67

$P/H_D = 2.2/4.5 = 0.49$

$\therefore \quad C = 3.8$

$Q_{MAX} = (3.8)(79.25)(4.5)^{3/2}$

$Q_{MAX} = 2875$ CFS

PEAK OUTFLOW < PEAK INFLOW
2875CFS < 5347 CFS

REF 2: "STANDARD HANDBOOK FOR CIVIL ENGINEERS" by F. S. MERRITT

SUBJECT DAM SAFETY INSPECTION
SPECK'S RUN DAM

BY DLB DATE 7-18-78 PROJ. NO. 78-501-505

CHKD. BY JRN DATE 7-19-78 SHEET NO. 7 OF 8

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CONSIDER INFLOW RELATIVE TO BOTH OUTFLOW AND STORAGE. USING THE SHORT CUT METHOD RECOMENDED BY NAD.

$P = \frac{\text{MAXIMUM DISCHARGE}}{\text{PMF PEAK INFLOW}} = \frac{2875 \text{ CFS}}{5347 \text{ CFS}}$ (SHEET 6) (SHEET 3)

$P = 0.54$

$(1-P) = \frac{\text{REQUIRED STORAGE}}{\text{INFLOW VOLUME}} = (1 - 0.54) = 0.46$

VOLUME OF INFLOW = 3883 AC-FT (SHEET 4)

REQUIRED STORAGE = (3883 AC-FT)(0.46) = 1786 AC-FT

CALCULATE AVAILABLE STORAGE

FREEBOARD AVAILABLE = 4.5 FT (FIELD MEASURED)

RESERVOIR SURFACE AREA (@ NORMAL POOL) = 37 ACRES (PLANIMETERED OFF U.S.G.S.)

STORAGE AVAILABLE $\simeq$ (37 ACRES)(4.5 FT) $\simeq$ 167 AC-FT

STORAGE REQUIRED > STORAGE AVAILABLE

1786 AC-FT > 167 AC-FT

SUBJECT DAM SAFETY INSPECTION
SPEER'S RUN DAM

BY DLC DATE 7-18-78 PROJ. NO. 78-501-505

CHKD. BY [illegible] DATE 7-19-78 SHEET NO. 8 OF 8

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ESTABLISH WHAT PERCENT PMF THE DAM WILL CONTAIN AND/OR PASS

$$P = \frac{\text{MAXIMUM DISCHARGE}}{Q_{I\,MAY}} = \frac{2875}{Q_{I\,MAY}}$$ (SHEET 6)

$$1-P = \frac{\text{AVAILABLE STORAGE VOLUME}}{\text{INFLOW VOLUME}}$$ (SHEET 7) (SHEET 4)

$$1 - \frac{2875\,CFS}{Q_{I\,MAX}} = \frac{167\,AC\text{-}FT}{\frac{1}{2}(Q_{I\,MAX})(17.6\,HRS)(3600\,SEC/HR)(1\,ACRE/43{,}560\,FT^2)}$$

$$1 - \frac{2875\,CFS}{Q_{I\,MAX}} = \frac{167}{0.727\,Q_{I\,MAX}}$$

$$0.727\,Q_{I\,MAX} - 2090 = 167$$

$$0.727\,Q_{I\,MAX} = 2257$$

$$Q_{I\,MAX} = 3104\,CFS$$

PMF (PEAK INFLOW) = 5347 CFS (SHEET 3)

$Q_{I\,MAX}$ = 58% PMF

APPENDIX D

PHOTOGRAPHS

PHOTOGRAPH 1 View of Speers Run Dam from the right abutment.

PHOTOGRAPH 2 View of the downstream slope of the Speers Run embankment showing the abundant vegetation which covered the slope at the time of inspection.

PHOTOGRAPH 3 View of the upstream portion of the Speers Run embankment taken from the left abutment.

PHOTOGRAPH 4 View of the upstream portion of the Speers Run spillway. Note the ogee-crested weir in the background of the photograph.

1

2

3

4

PHOTOGRAPH 5 View of the downstream portion of the Speers Run spillway. Spillway overflow discharges into the plunge pool at the center of the photograph before re-entering the natural downstream drainage.

PHOTOGRAPH 6 View of an area of seepage and prolific vegetation located a few hundred feet downstream of the dam near its juncture with the left abutment. The mound immediately behind the field team member is abandoned railroad embankment which parallels the crest of the Speers Run Dam.

PHOTOGRAPH 7 View of a terra-cotta pipe located approximately 300 feet downstream of the Speers Run embankment near the toe of the abandoned railroad grade. We were not able to discern its function although it may contain a valve control for the outlet works at the facility.

PHOTOGRAPH 8 View of an abandoned railroad bridge located approximately 400 feet downstream of the crest of the Speers Run spillway. This bridge represents the first downstream restriction to flow from the spillway.

NOTE No photographs of the outlet works at Speers Run Dam were provided since the outlet was reportedly submerged at the time of inspection.

5

6

7

8

APPENDIX E

GEOLOGY

Speers Run Dam is located in an area of nearly flat lying sedimentary rocks of the Pennsylvanian age, Monongahela Group. Strata of the Monongahela Group are best characterized as dense and massive to thin-bedded limestone, discontinuous shales and sandstones and several minable coal seams.

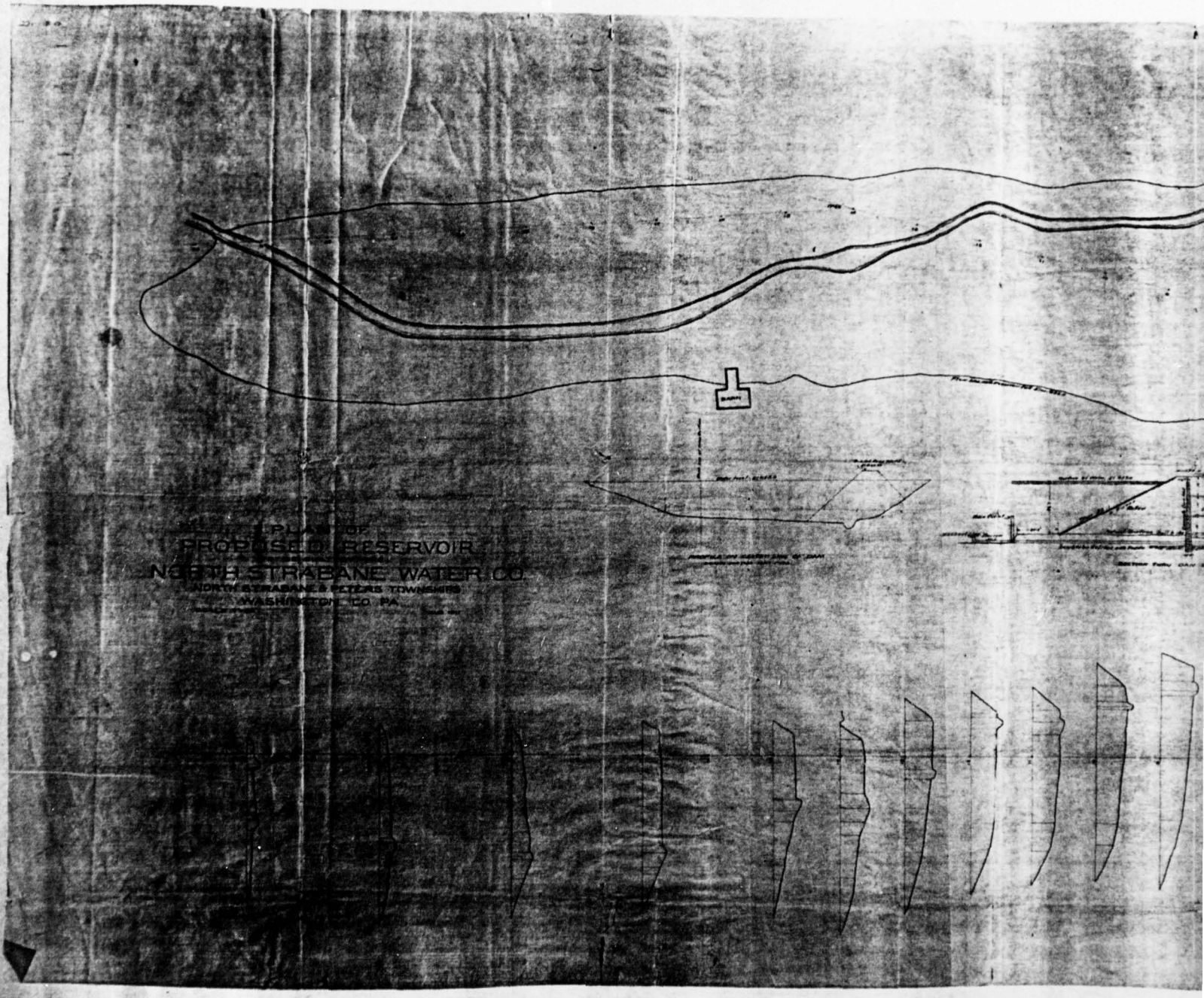
Jointing is commonly not well developed in these rocks since water wells in the area are poor producers. Low well yields could also be attributed in part to dewatering for coal mining operations. Both the Waynesburg and Uniontown coal units are mined locally.

APPENDIX F

FIGURES

Speers

LIST OF FIGURES



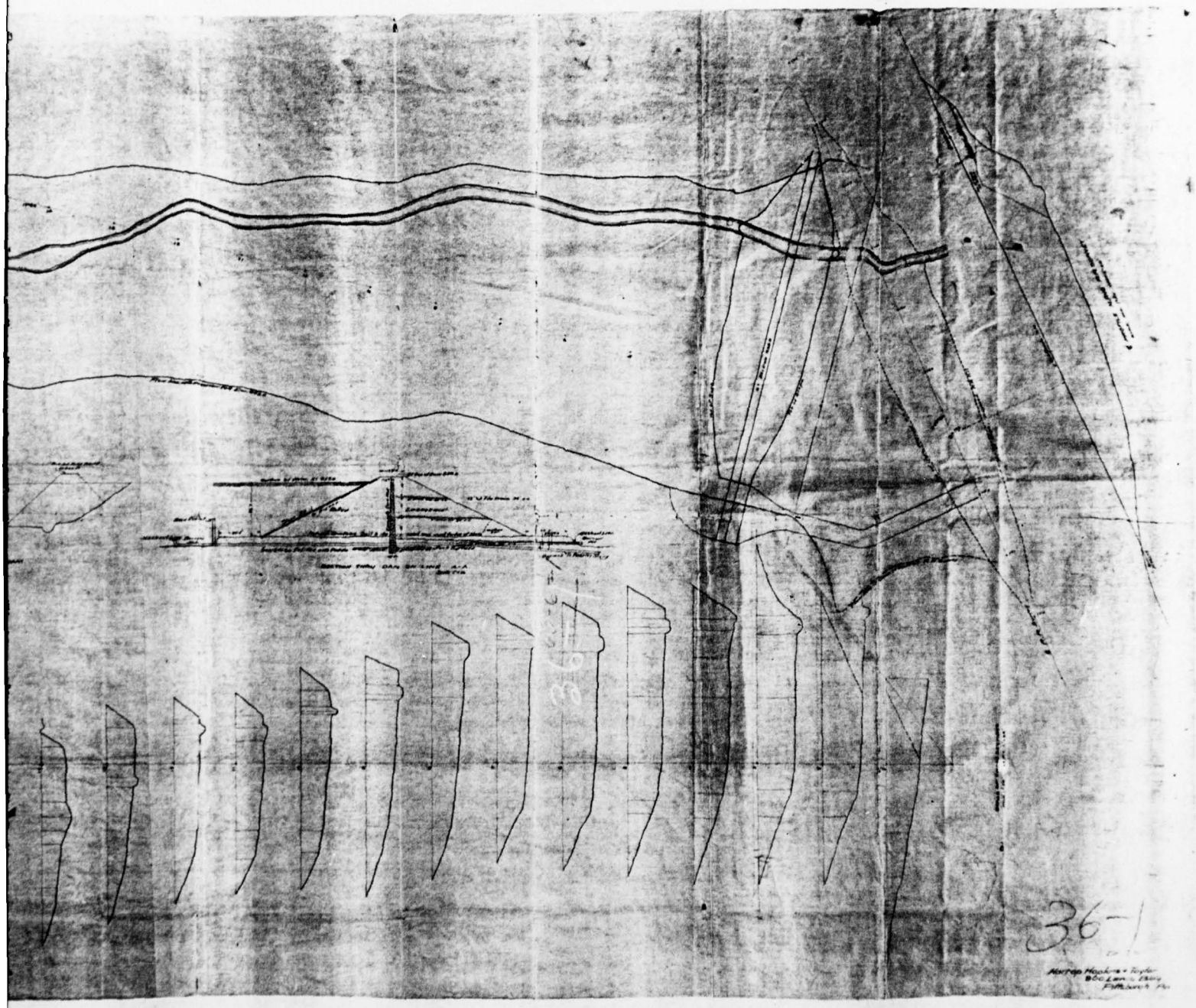
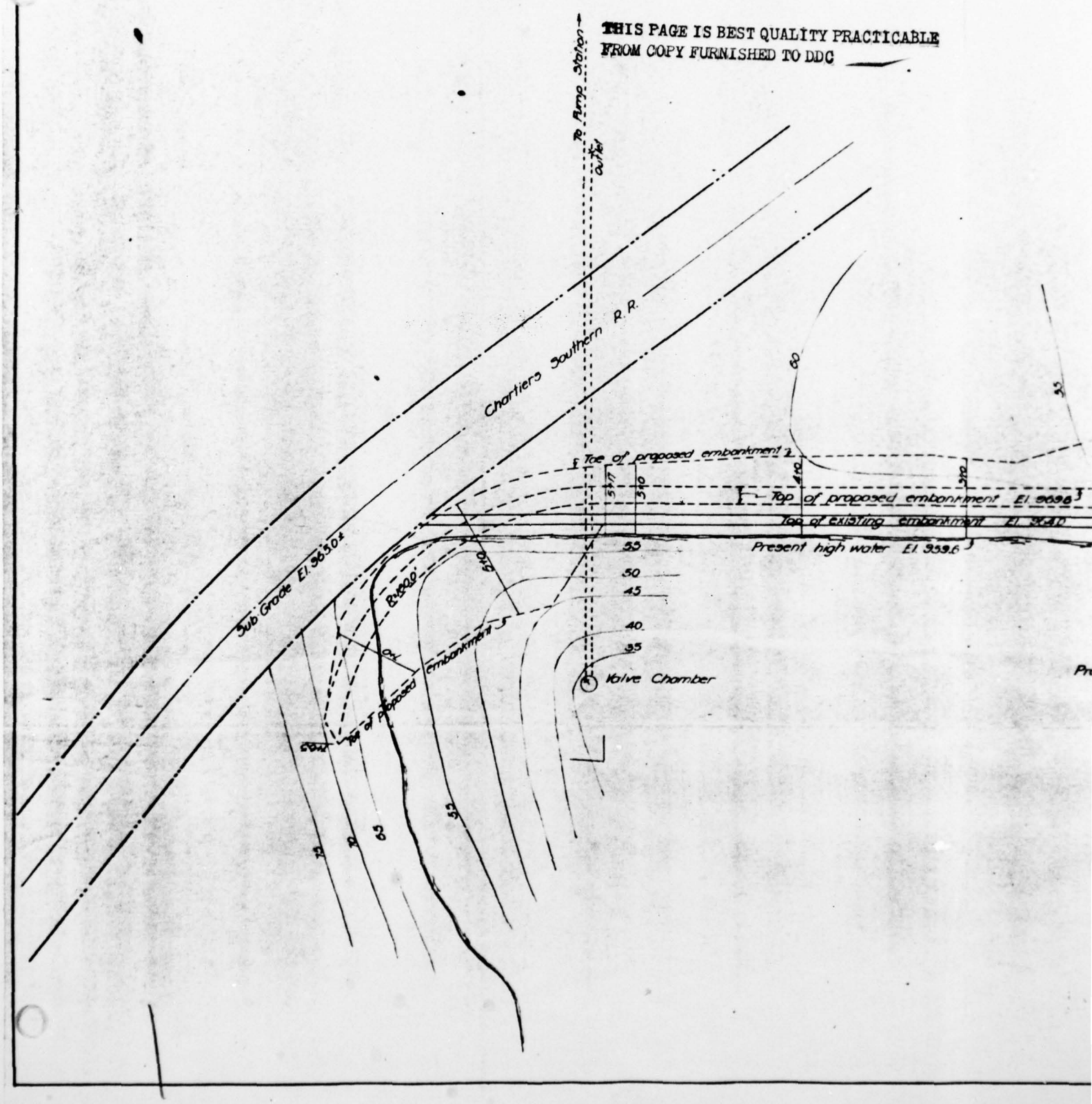
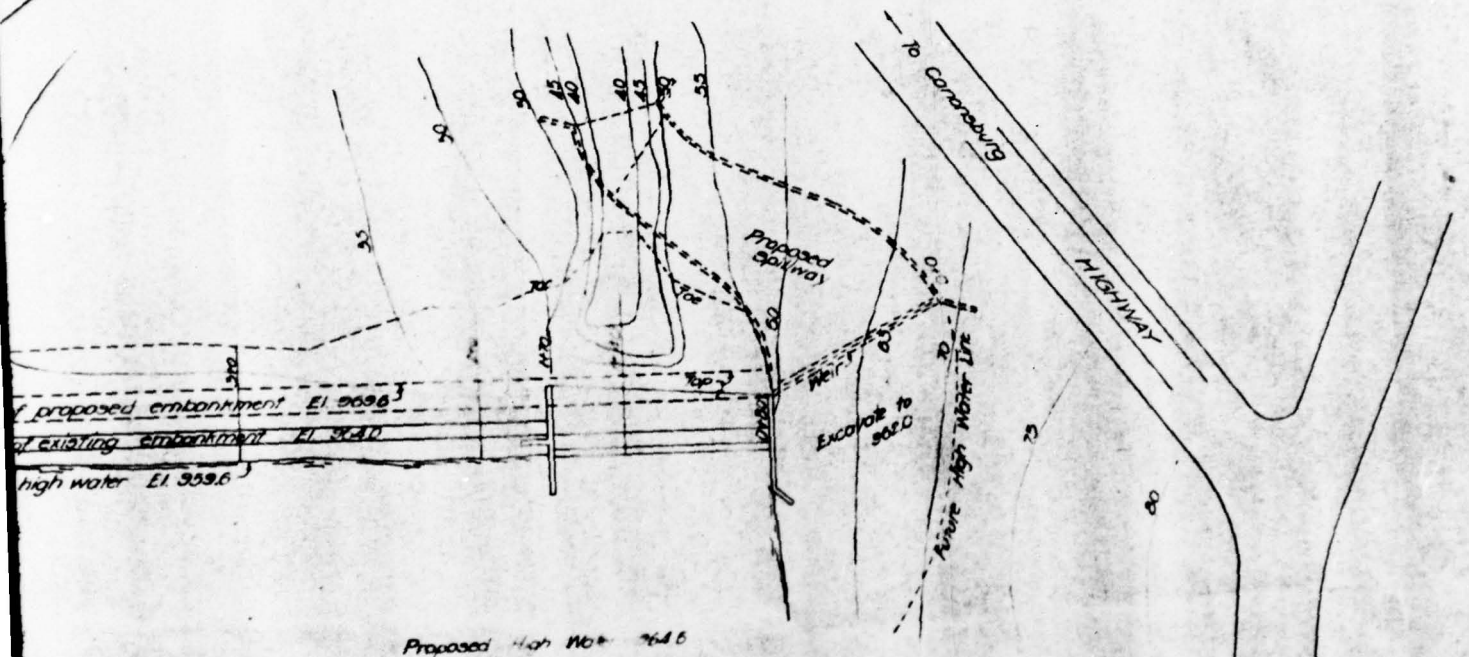


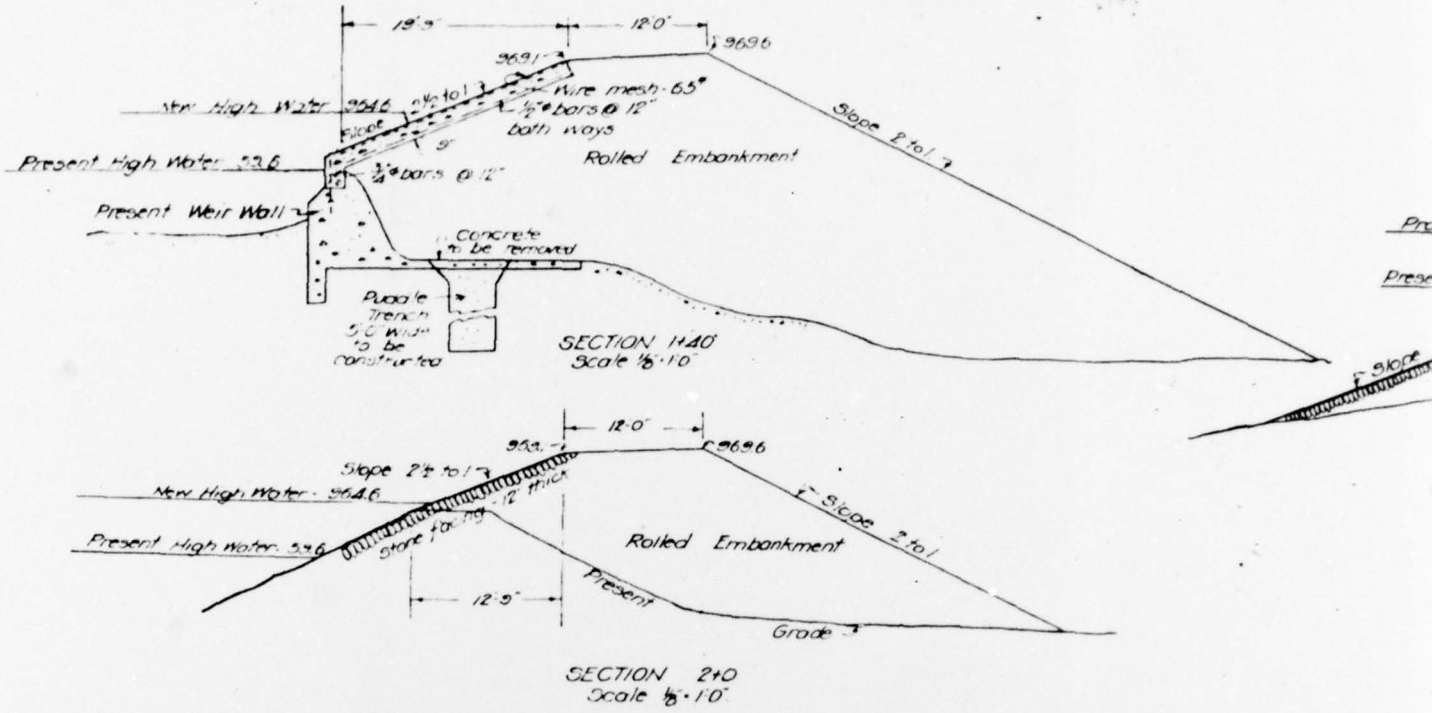
FIGURE 1

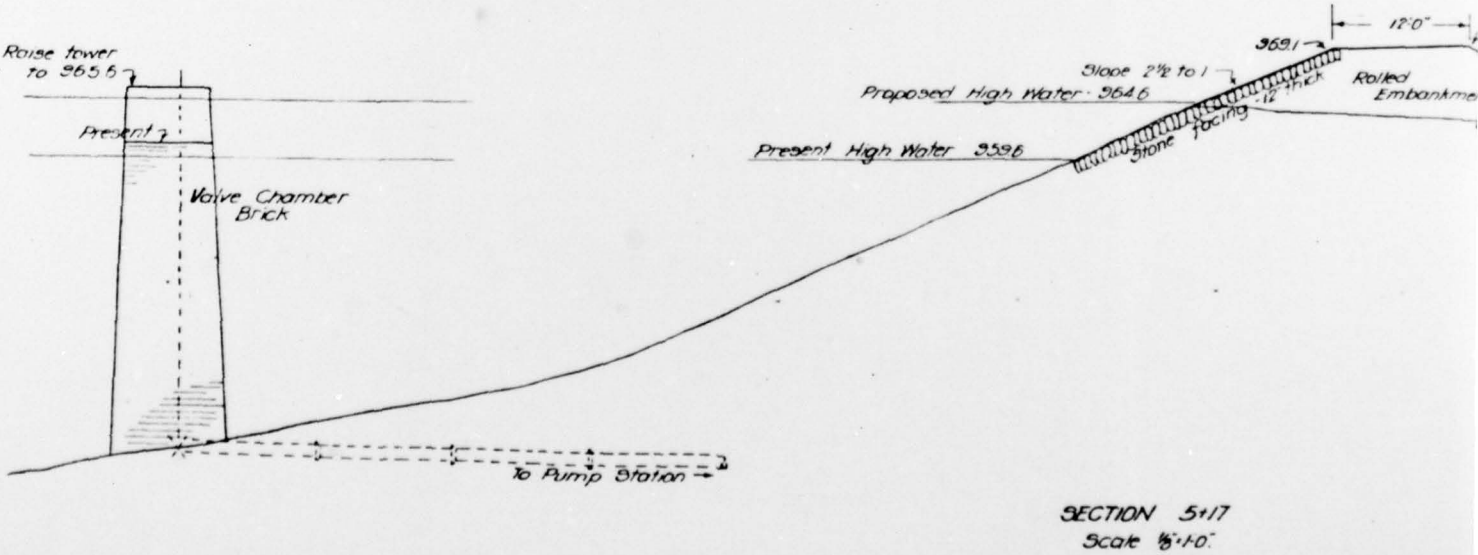


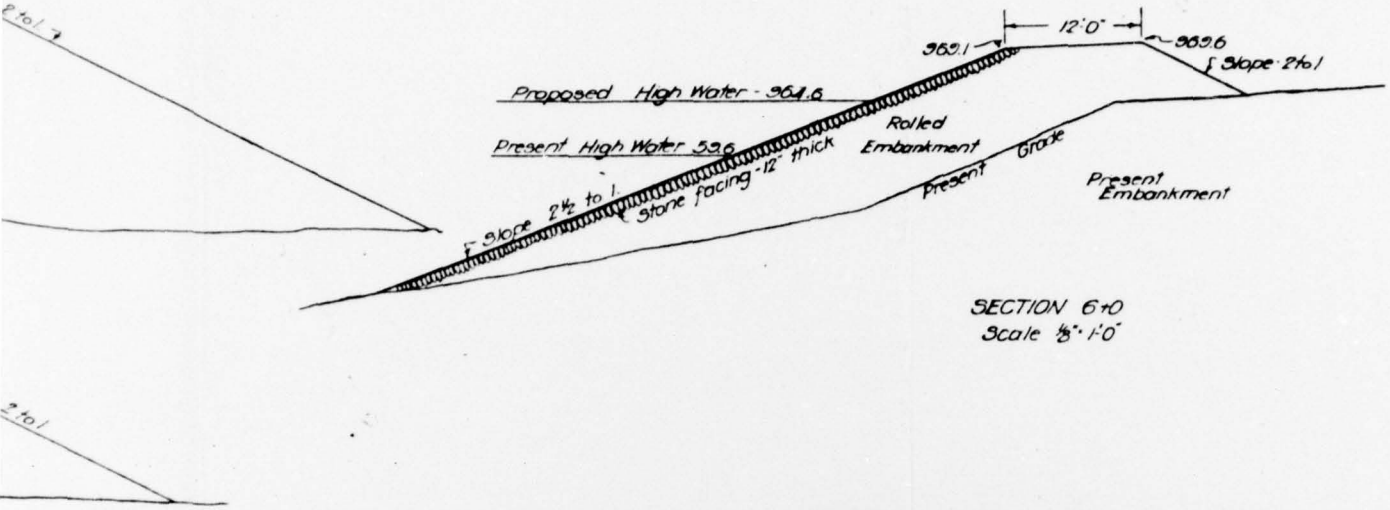


CITIZENS WATER CO.
STORAGE RESERVOIR AT CANONSBURG
Scale 1:40' Aug. 1927
Sheet (1) D.C. Morrow, Engr.

FIGURE 2







SECTION 6+0
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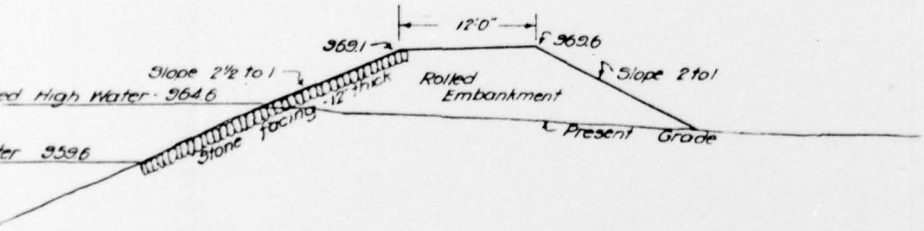
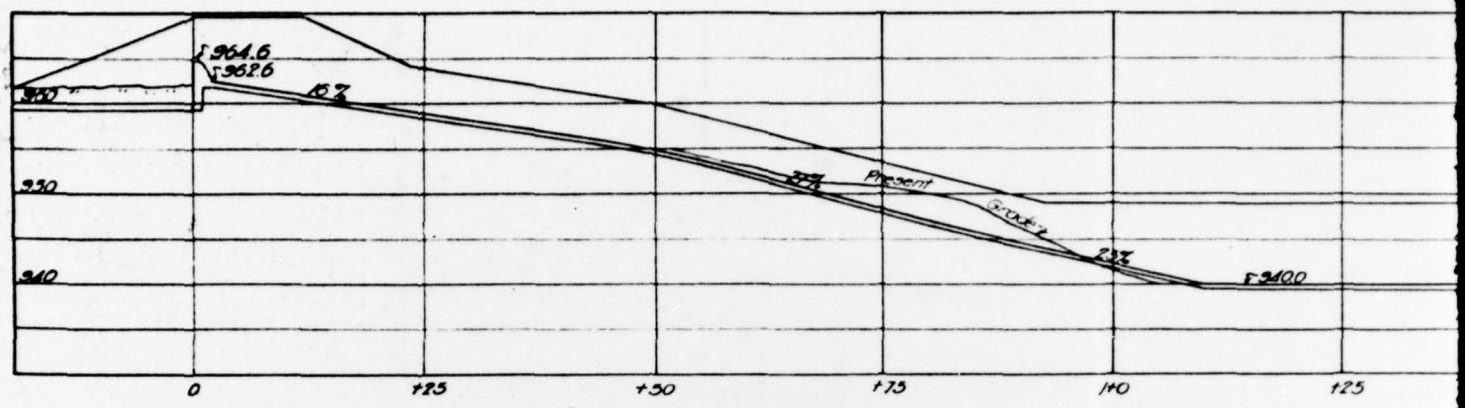


SECTION 5+17
Scale ⅛" = 1'-0"

CITIZENS WATER CO.
STORAGE RESERVOIR AT CANONSBURG
Scales as indicated — Aug 1927
Sheet (2) — D.C. Morrow, Engr.
9-177

FIGURE 3



PROFILE
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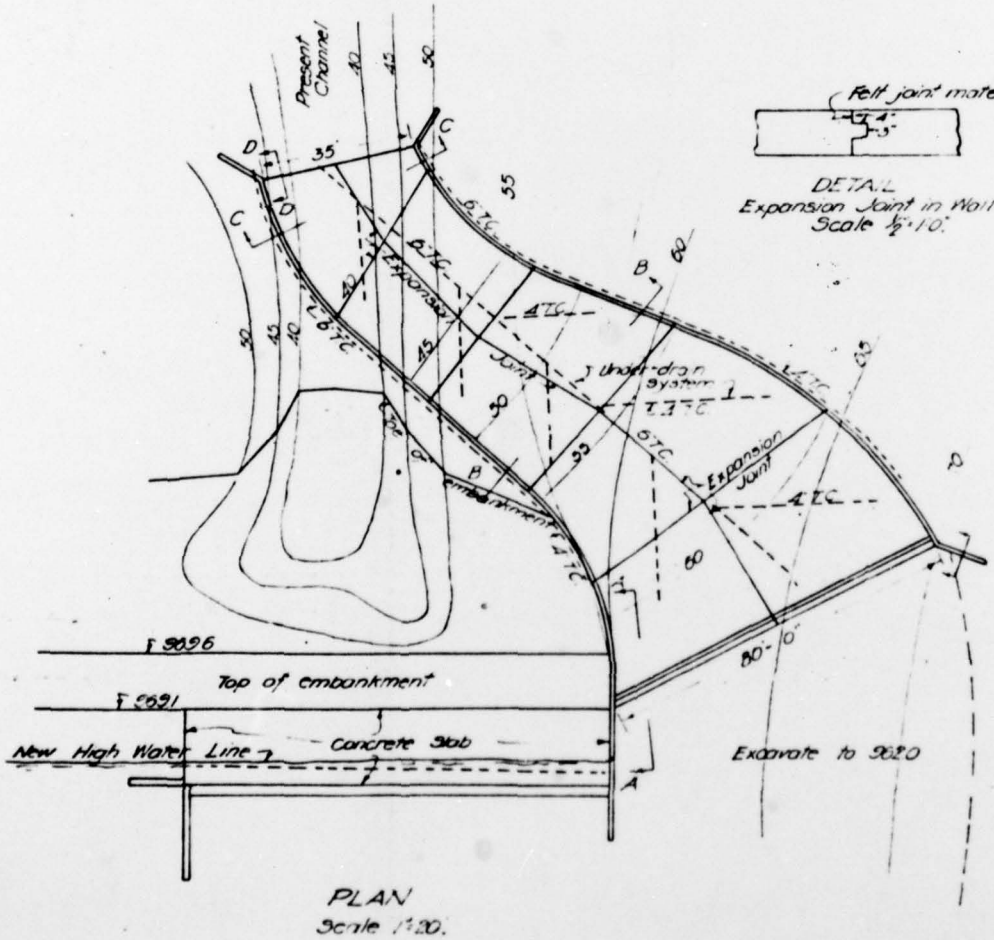
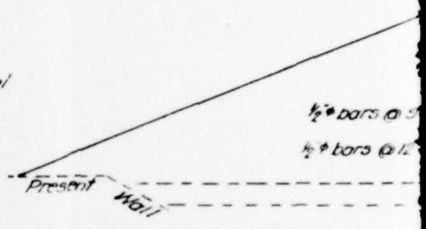
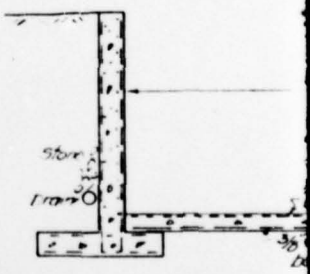
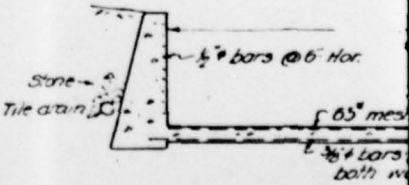


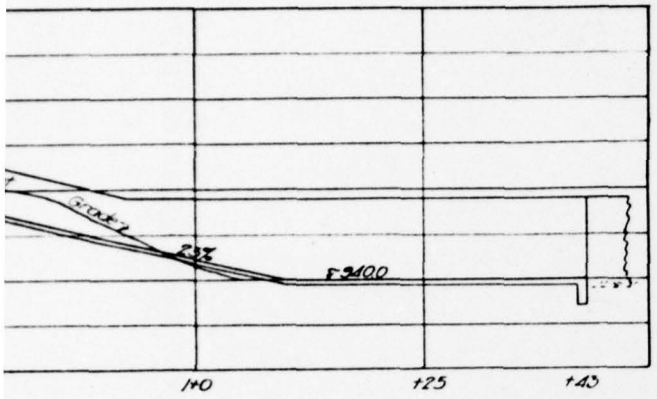
PLAN
Scale 1"=20'

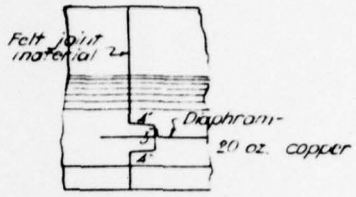
DETAIL
Expansion Joint in Wall
Scale 1"=1'0"



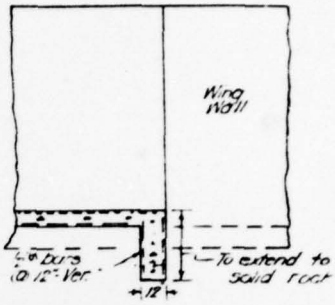








DETAIL
Expansion Joint in Weir Wall
Scale 1"=1'-0"



SECTION D-D
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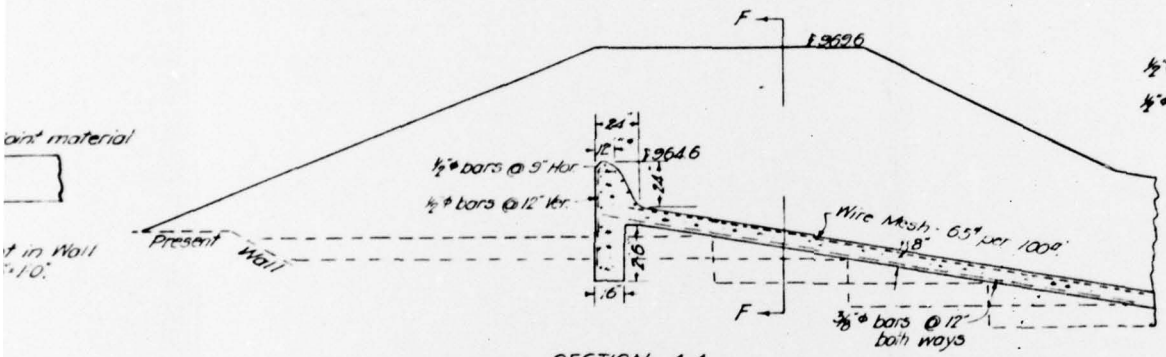

SECTION A-A
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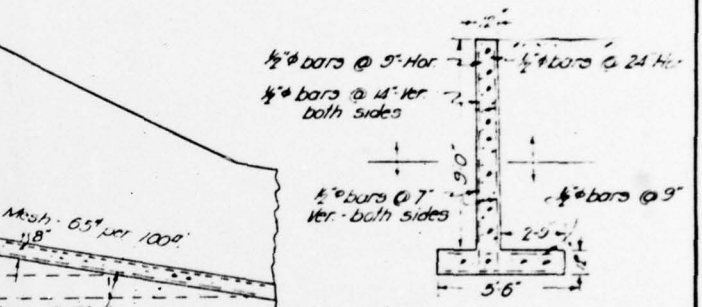

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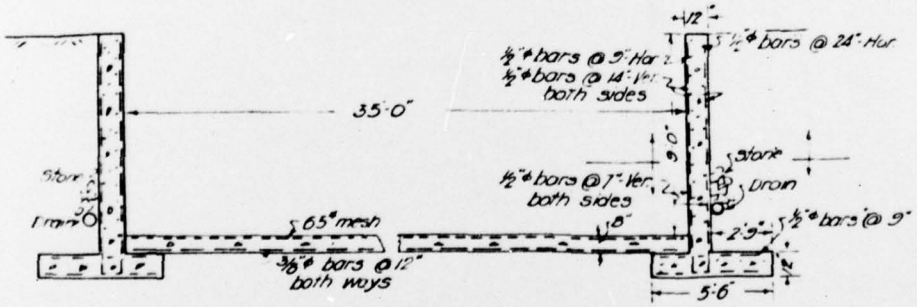

SECTION C-C
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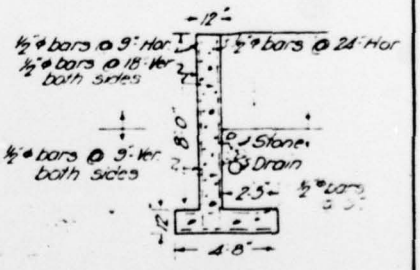

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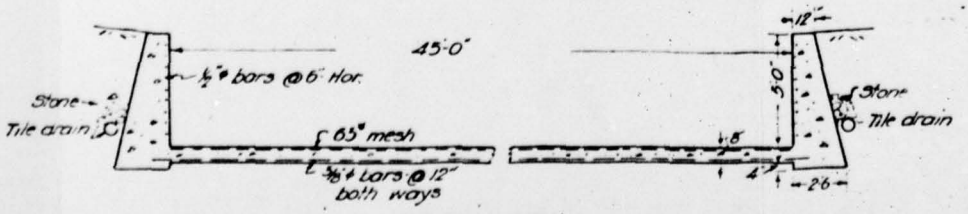
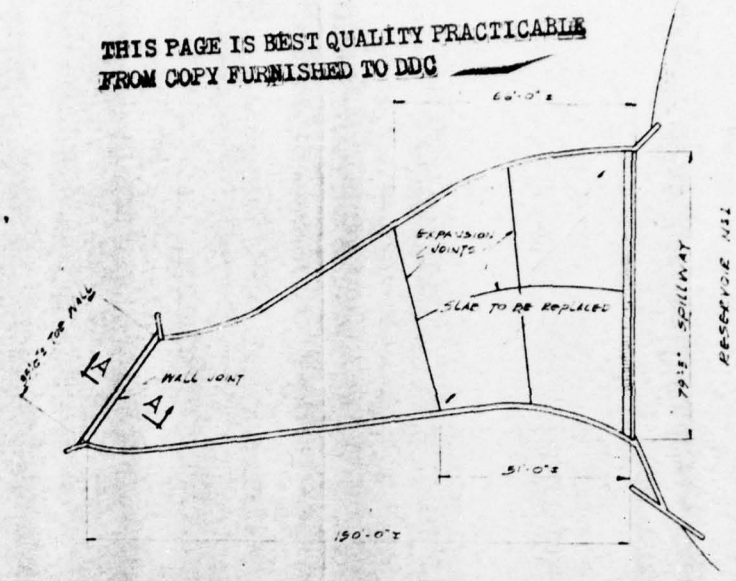


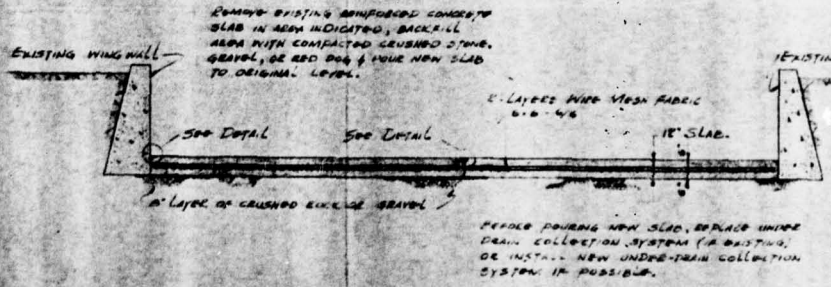
SECTION - B-B
Scale ½"=1'-0"

CITIZENS WATER CO.
STORAGE RESERVOIR AT CUYAHOGA FALLS
Scales as indicated — Aug 1927
Sheet (3) — D.C. Morrow, Engr.

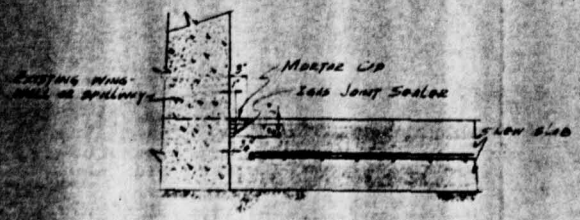
FIGURE 4



PLAN - SPILLWAY APRON
SCALE 1" = 20'-0"

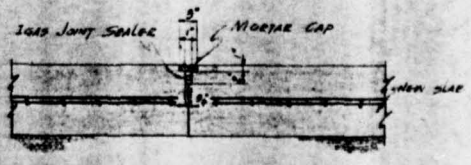


TYPICAL SPILLWAY APRON SECTION
SCALE 1/4"=1'-0"

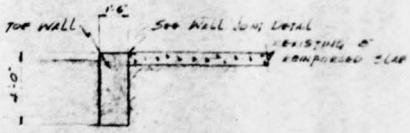


WALL JOINT DETAIL
SCALE 1"=1'-0"

NEW REINFORCED CONCRETE SLAB TO BE POURED IN FOUR APPROX. EQUAL SECTIONS WITH EXPANSION JOINT BETWEEN EACH SECTION.



EXPANSION JOINT DETAIL
SCALE 1"=1'-0"



SECTION - AA
SCALE 1/4" = 1'-0"

...G GRAVITY TYPE RETAINING WALL

...CONCRETE SLAB TO BE ... APRON, EQUAL SPACING ... JOINT BETWEEN EACH

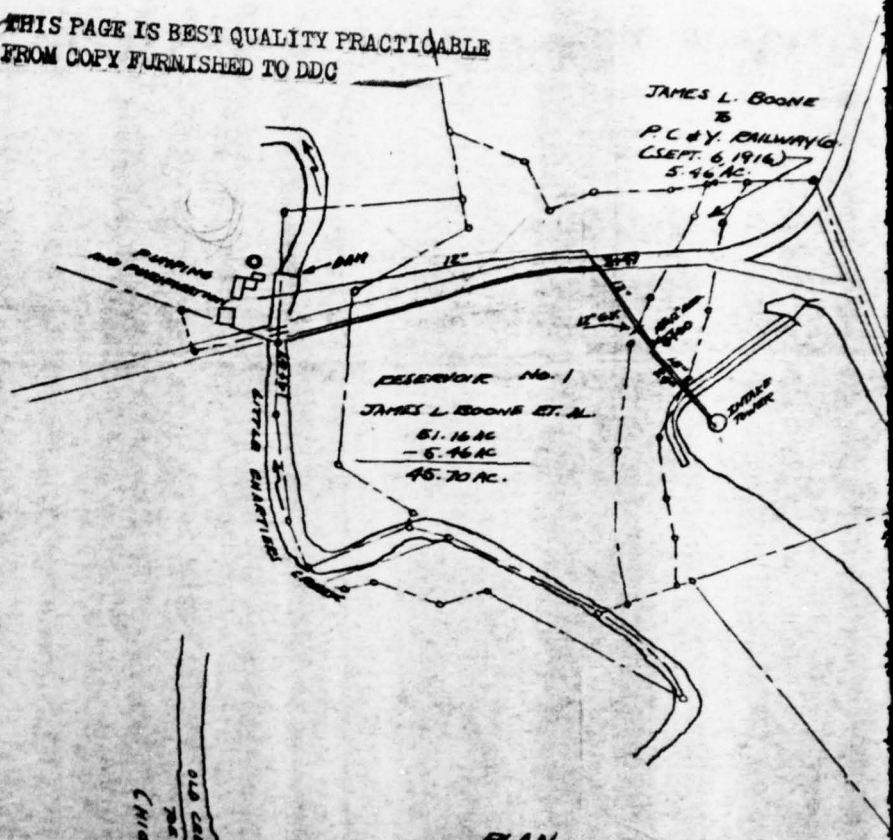
MORTAR CAP

...NEW SLAB

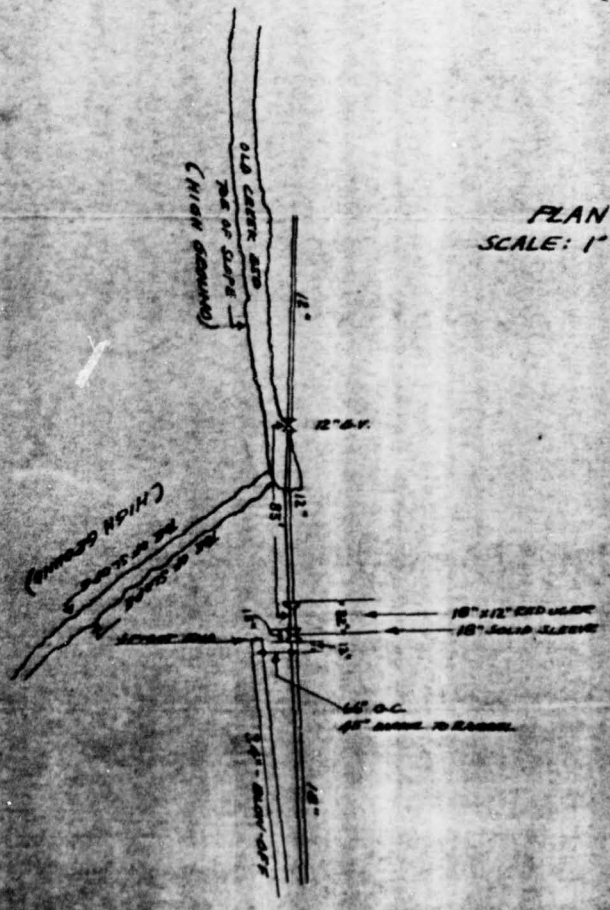
JOINT DETAIL
...1'-0"

REVISIONS	CANONSBURG DIVISION RESERVOIR No. 1 REPAIRS TO SPILLWAY APRON PLAN, SECTIONS & DETAILS
	THE CITIZENS' WATER COMPANY OF WASHINGTON, PA. WASHINGTON, PA.
	AMERICAN WATER WORKS SERVICE COMPANY, INC. THREE PENN CENTER PLAZA — PHILADELPHIA, PA.
	SCALE: AS NOTED — USE DIMENSIONS ONLY DRAWN BY S.SMITH — DATE: 11-13-67 — CHECKED BY E.A.S. APPROVED A.J.C. — PROJECT — DISP. BY
	USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES — 26-216

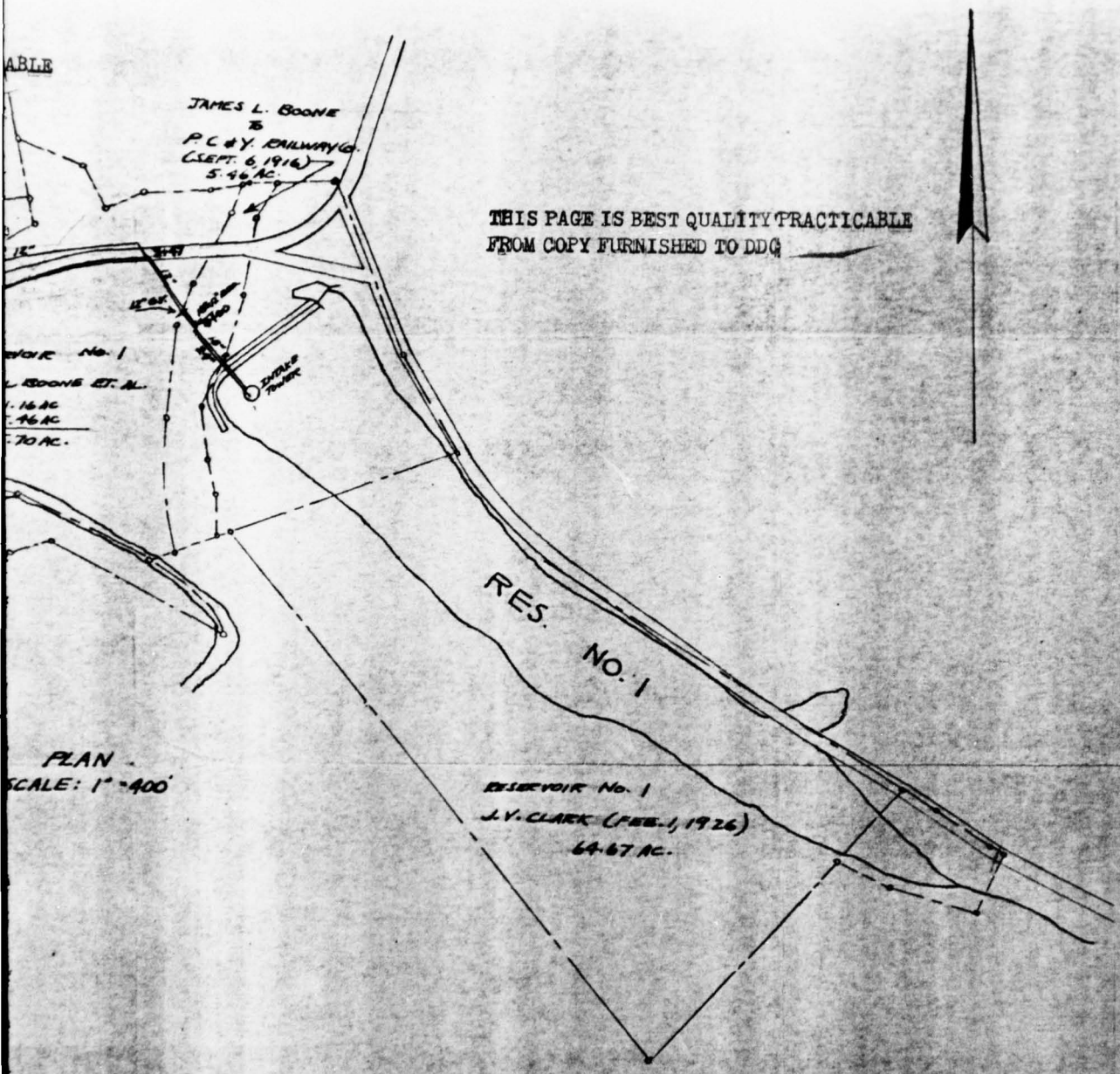
FIGURE 5



PLAN
SCALE: 1" = 400'



DETAIL No SCALE

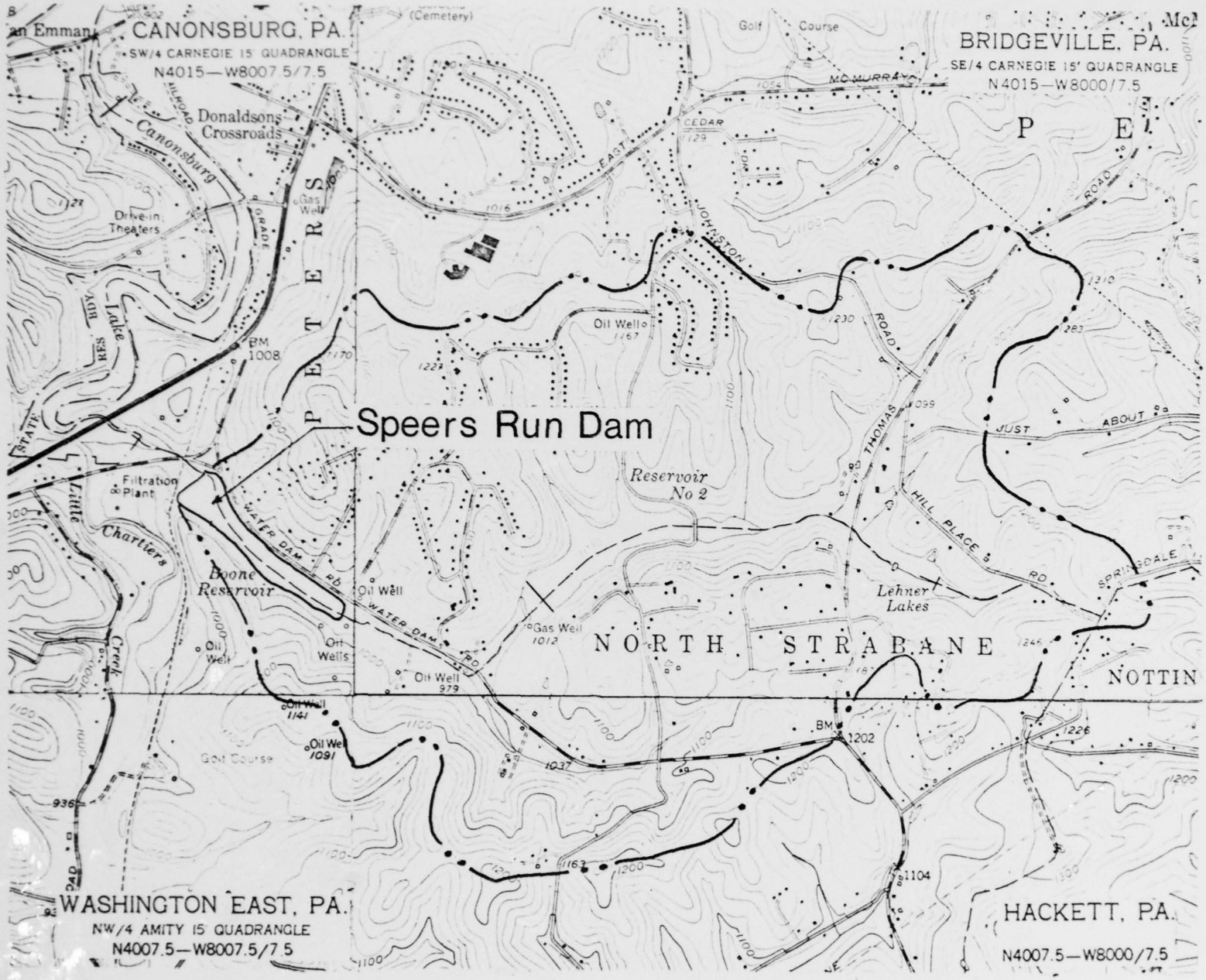


PLAN
SCALE: 1" = 400'

FIGURE 6

APPENDIX G

REGIONAL VICINITY MAP


CANONSBURG, PA.
SW/4 CARNEGIE 15 QUADRANGLE
N4015—W8007.5/7.5
BRIDGEVILLE, PA.
SE/4 CARNEGIE 15' QUADRANGLE
N4015—W8000/7.5
Speers Run Dam
Reservoir No 2
Boone Reservoir
Lehner Lakes
Donaldsons Crossroads
Drive-in Theaters
Filtration Plant
Chartiers Creek
Golf Course
Golf Course
Cemetery
McMURRAY
CEDAR
EAST
JOHNSTON
ROAD
THOMAS
HILL PLACE
RD
SPRINGDALE
JUST ABOUT
WATER DAM RD
Oil Wells
Oil Well
Gas Well
BM 1008
BM 1202
NORTH STRABANE
PETERS
NOTTIN
WASHINGTON EAST, PA.
NW/4 AMITY 15 QUADRANGLE
N4007.5—W8007.5/7.5
HACKETT, PA.
N4007.5—W8000/7.5