

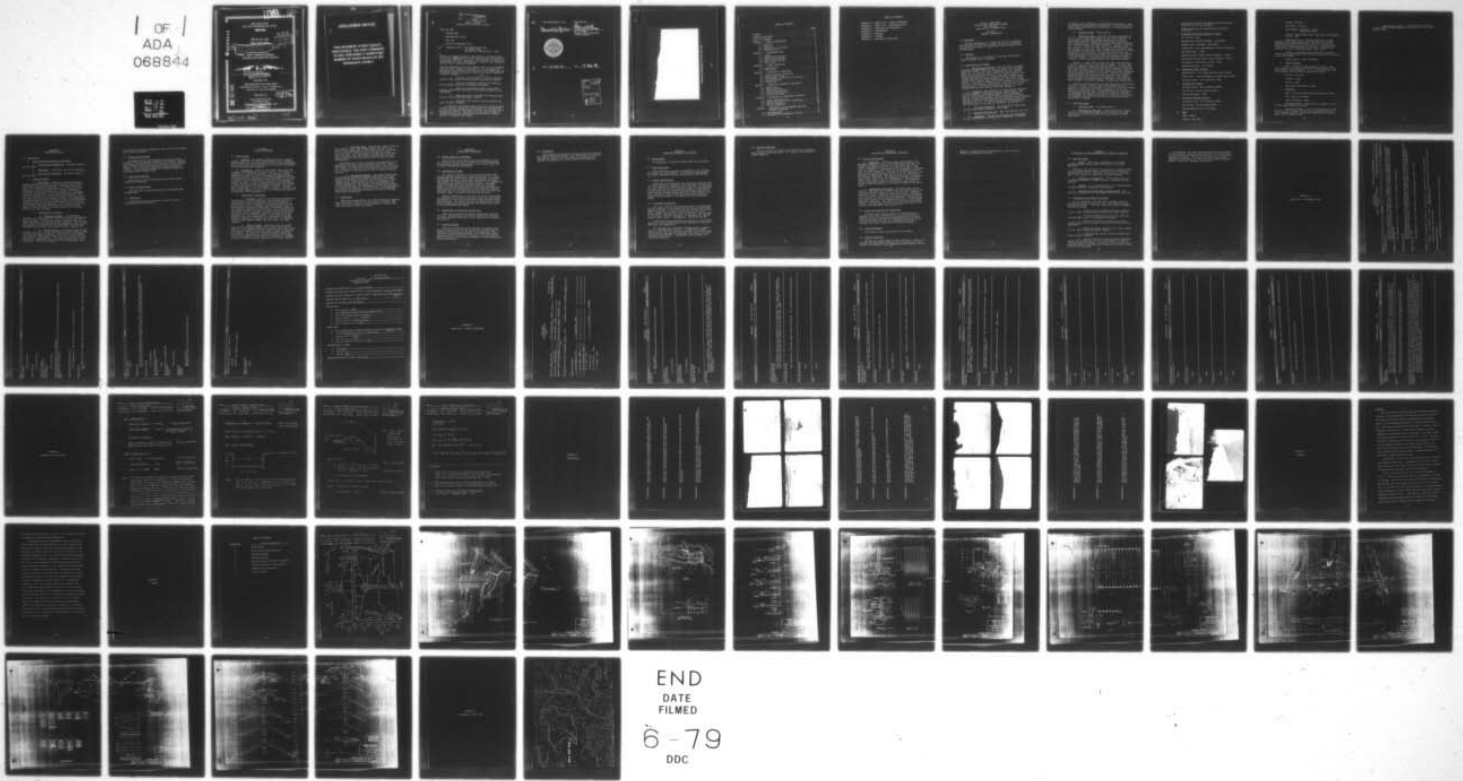
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GAI CONSULTANTS INC MONROEVILLE PA  
NATIONAL DAM INSPECTION PROGRAM. BULL RUN DAM (NDI PA-463), OHI--ETC(U)  
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**OHIO RIVER BASIN  
BULL RUN, WESTMORELAND COUNTY  
PENNSYLVANIA**

**AD A 068844**

**NDI No. Pa. - 463  
BULL RUN DAM**

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National Dam Inspection Program. Bull Run Dam (NDI PA-463), Ohio River Basin, Bull Run, Westmoreland County, Pennsylvania. Phase I Inspection Program.

**PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM**



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*(15)*

**PREPARED FOR**

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

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**PREPARED BY**

*(12) 73 p.*

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PHASE I REPORT  
National Dam Inspection Program

Bull Run Dam

Pennsylvania

Westmoreland County

Bull Run

20 and 22 September 1978

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

ABSTRACT  
↓

Based on a visual inspection and review of available engineering data, <sup>Bull Run</sup> the dam and its appurtenances are considered to be in good structural condition. The spillway is capable of discharging the flow resulting from a storm of PMF intensity and is, thus, considered adequate.

Required maintenance is poor, however, and it is recommended that the owner develop a program that will implement the procedures and operations provided for in the "Operation and Maintenance Manual." Specific items that require immediate attention include:

ABSTRACT

1. Clearing silt and debris currently obstructing the inlet end and possibly within the outlet conduit.
2. Clearing overgrowth from both the approach and discharge areas of the emergency spillway.
3. Removing overgrowth and soil cover which currently obstructs a portion of the rock toe drain of the embankment.
4. Repairing and/or replacing the riprap protection at the spillway-embankment contact.
5. Correcting the erosion occurring behind the right spillway wingwall.

In addition, the owners and/or operators should develop a formal warning system that provides for the notification of both upstream and downstream residents in the event of an emergency situation. The details of the system should be incorporated into the "Operation and Maintenance Manual," Section V, Emergency Operations.

GAI Consultants, Inc.

Approved by:

Bernard M. Mihalcin  
Bernard M. Mihalcin, P.E.

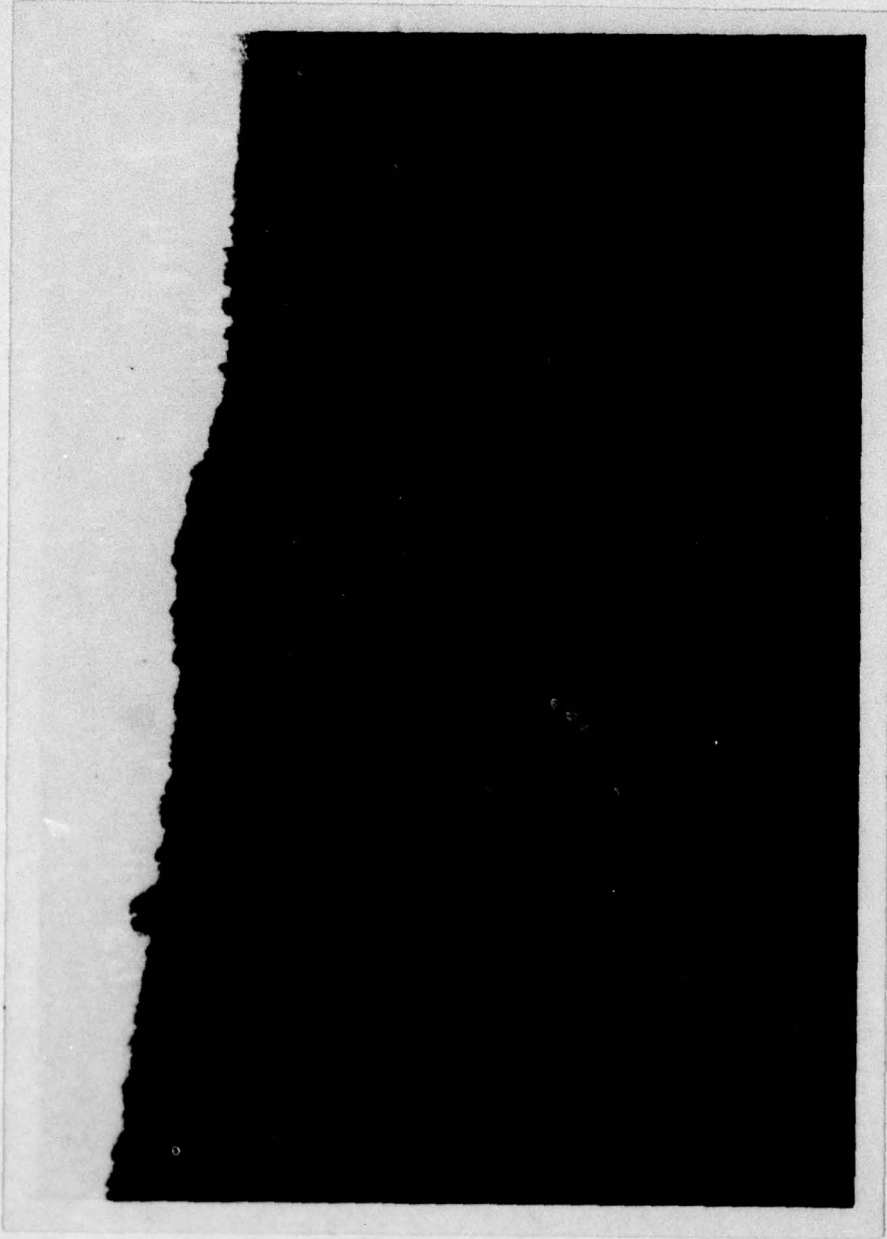
G. K. Withers  
G. K. WITHERS  
Colonel, Corps of Engineers  
District Engineer



Date 21 Nov 78

Date 10 Dec 78

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Overview Photograph of Bull Run Dam

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PHASE I INSPECTION  
NATIONAL DAM INSPECTION PROGRAM  
BULL RUN DAM  
NDI# PA-463, PENNDER# 65-89

SECTION 1  
GENERAL INFORMATION

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.

a. Dam and Appurtenances. Bull Run Dam is an earth embankment approximately 520 feet in length with a maximum height of 44 feet. The dam is operated as a dry impoundment, that is, without valve control and the rate of discharge is regulated by the size of the outlet conduit. The outlet works consists of a 48-inch diameter concrete pipe through the dam, an energy dissipator at the outlet of the culvert and a tubular steel trash rack at the inlet of the culvert. The inlet is un gated, but the entrance is constricted with a 24-inch diameter orifice pipe. The facility is also equipped with a concrete emergency spillway with an ogee-shaped crest cut into rock at the right abutment.

b. Location. Bull Run Dam is located across Bull Run in Penn Township, Westmoreland County, Pennsylvania. The City of Jeannette lies approximately 1 mile downstream (south) of the facility while Bushy Run Battlefield State Park is located approximately 3 miles upstream to the northeast. The dam, reservoir, and watershed are contained within the Greensburg U.S.G.S. 7.5-minute quadrangle (see Appendix G). The coordinates of the dam are N40°20'53" and W79°36'17".

c. Size Classification. Intermediate (44 feet high, 383 acre-feet total storage at top of dam).

d. Hazard Classification. High (see Section 3.1.c.4).

e. Ownership. The dam was designed and constructed by the Commonwealth of Pennsylvania, Department of Forests

and Waters (now Department of Environmental Resources) under an agreement with the City of Jeannette. Jeannette agreed to assume responsibilities for the operation and maintenance of this facility.

f. Purpose of Dam. Flood control.

g. Historical Data. Bull Run Dam was constructed in 1934. It was originally designed as the second (Dam No. 2) in a series of three dams whose purpose was to control floodwaters entering the Borough of Jeannette along Bull Run. This area had a history of floods resulting in substantial economic losses and undue hardships. Storage reservoirs No. 1 and No. 2 (Bull Run Dam) were to be located on the main stream 1/2 mile and 1 mile, respectively, upstream from the northern borough line while storage reservoir No. 3 was to be located on a tributary, 1/2 mile upstream of the line. These three reservoirs were designed to control flow through a 6-foot diameter culvert that diverted discharge beneath Jeannette Borough. No permits were ever issued for dams No. 1 and No. 3 and consequently they were never constructed.

Dam No. 2, known today as Bull Run Dam, was originally a 39-foot high structure, 520 feet in length. In 1957, the facility underwent significant modifications. The rehabilitation consisted of increasing the overall height of the dam five feet, construction of a new concrete spillway, adding a toe drain and improvements to the intake and outlet structures of the existing concrete pipe culvert. The work was deemed necessary after the flood resulting from Hurricane Hazel (1954) proved the spillway to be inadequate. The redesign was performed by PennDER engineers and the construction was done by Amber Construction Company, Greensburg, Pennsylvania.

Since the reconstruction the only deficiency consistently reported has been a general lack of maintenance at the facility. According to PennDER officials the current agreement between the State and the City of Jeannette is that the State will assume the major responsibilities and liabilities of ownership provided that the City of Jeannette provides the equipment and manpower necessary to maintain the facility in accordance with the "Operations and Maintenance Manual" developed by PennDER.

1.3 Pertinent Data.

a. Drainage Area. 1.1 square miles.

b. Discharge at Dam Site. Discharge and pool elevations are not recorded at this facility, therefore, there are no daily records available nor any record of maximum high water.

Outlet Works Conduit at Operating Pool Elevation -  
Discharge curve not available.

Spillway capacity at maximum pool elevation  $\approx$   
5,000 cfs.

c. Elevation (feet above mean sea level).

Top of Dam - 1097.

Maximum Pool Design Surcharge - Not known.

Maximum Pool of Record - Not known.

Normal Pool - Dry impoundment; no pool maintained.

Spillway Crest - 1088.

Upstream Portal Invert Outlet Conduit - 1054.5.

Downstream Portal Invert Outlet Conduit - 1053.5.

Streambed at Centerline of Dam  $\approx$  1054.

Maximum Tailwater - Not known.

d. Reservoir Length (miles).

Maximum Pool  $\approx$  0.6 (elevation 1097 top of dam).

Normal Pool  $\approx$  Dry impoundment; no pool maintained.

Spillway Crest  $\approx$  0.5 (elevation 1088).

e. Storage (acre-feet).

Spillway Crest  $\approx$  180 (elevation 1088).

Top of Dam  $\approx$  383 (elevation 1097).

Design Surcharge  $\approx$  203.

f. Reservoir Surface (acres).

Spillway Crest  $\approx$  20 (elevation 1088).

Top of Dam  $\approx$  25 (elevation 1097).

Maximum Design Pool - Not known.

g. Dam.

Type - Earth.

Length  $\approx$  520 feet.

Height  $\approx$  44 feet.

Top Width - 20 feet.

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

Zoning - Homogeneous earth. Toe drain from Station 1+78 to 3+50.

Impervious Core - Available records including numerous construction photographs indicate the original embankment was constructed with a core wall of concrete blocks filled and faced with concrete on a concrete foundation under the upstream edge of the crest. Photographs indicate the wall is approximately 2 feet thick.

Cutoff - Available records indicate a concrete cutoff wall extends below the core wall to impervious material in the substratum.

Grout Curtain - None indicated.

h. Outlet Conduit.

Type - Ungated 48-inch diameter concrete, low-level conduit with intake located at the upstream toe near the center of the embankment. Flow is controlled by a 24-inch diameter orifice pipe at the culvert inlet.

Length  $\approx$  168 feet.

Closure - None.

Access - None.

Regulating Facilities - None.

i. Spillway.

Type - Concrete channel with ogee-shaped crest.

Weir Length - 50 feet.

Crest Elevation - 1088.

Upstream Channel - Short natural channel cut out of the right abutment hillside.

Downstream Channel - Flow is discharged over the spillway crest through the concrete channel and over the right abutment hillside beyond the embankment toe where it enters the streambed below.

j. Regulating Outlets. 48-inch diameter concrete conduit with a 24-inch diameter constricted (orifice pipe) inlet opening.

SECTION 2  
ENGINEERING DATA

2.1 Design Data.

a. Design Data Availability and Sources.

1. Hydrology and Hydraulics. No design reports are available.
2. Embankment. No design reports are available.
3. Appurtenant Structures. No design reports are available.

b. Design Features.

1. Embankment. Numerous construction photographs and design drawings of the original facility dated 1934 along with design drawings of the present facility dated 1957 indicate the embankment is a homogeneous earth structure. Along the length of its base, a trench was excavated and the foundation for a concrete and concrete block core wall placed. A concrete cutoff wall reportedly extends below the core wall to impervious material. The core wall foundation is reported to consist of shale at the ends and blue clay in the central section. The embankment is constructed with 2H to 1V slopes on both the upstream and downstream faces while the crest measures 20 feet across (see Figures 6 and 8, Appendix F). A toe drain is provided on the downstream slope between Stations 1+78 and 3+50. There are no provisions for seepage control from Station 3+50 to the right abutment.

2. Appurtenant Structures.

- a) Emergency Spillway. The emergency spillway is a concrete channel type 50 feet wide and approximately 80 feet in length. It is cut into rock along the right abutment. The drawings indicate concrete keys to have been constructed at both ends of the structure. Flow through the spillway is controlled by an ogee-shaped concrete weir located at its entrance (see Figures 3 and 4, Appendix F).

- b) Outlet Conduit. The outlet works at the facility consists of a 48-inch diameter concrete pipe through the dam, an energy dissipator at the outlet of the culvert, and a tubular steel trash rack at the inlet of the culvert (see Figure 5, Appendix F). The culvert is ungated, but the entrance is constricted with a 24-inch diameter inlet (orifice pipe). The dam is operated as a dry impoundment with

the amount of discharge regulated by the size of the ungated outlet conduit opening.

## 2.2 Construction Records.

No records of the 1957 construction of the present facility aside from design drawings are available. Records pertaining to construction of the original facility include design drawings, pre-construction and construction photographs. This information along with various memoranda relative to construction progress at different stages are contained within PennDER files.

## 2.3 Operational Records.

The facility is self-regulating and no operational records are available.

## 2.4 Other Investigations.

Several state inspection reports are available from PennDER files.

## 2.5 Evaluation.

Sufficient data were available to make a Phase I assessment of the facilities.

SECTION 3  
VISUAL INSPECTION

3.1 Observations.

a. General. The general appearance of the facility suggests that it is in good structural condition. Observations noted during the inspection indicate those deficiencies that do exist are related primarily to a lack of maintenance and require immediate attention.

b. Embankment. Based on the visual inspection, the embankment is considered in good condition. No evidence of sloughing or erosion was observed. No evidence of past seepage during periods when the embankment impounded water could be detected. Since no water was impounded at the time of inspection, the performance of the dam could not be fully evaluated. The crest was well aligned and the embankment slopes consistent. Lack of regular maintenance was obvious in that both the upstream and downstream slopes were covered by dense vegetation (see Photographs 1 and 10). Several small maple trees (1.0 to 1.5 feet in diameter) were observed growing from stumps of older trees near the left wingwall of the spillway (see Photograph 9).

c. Appurtenant Structures.

1. Spillway. The visual inspection revealed the spillway to be in fair condition. The concrete was relatively unmarred and displayed few signs of weathering. Nevertheless, both the approach and discharge areas of the spillway were heavily overgrown (see Photographs 5 and 6). The excessive overgrowth could have a significant effect on the discharge capacity of the spillway. Other deficiencies associated with the spillway are that the riprap protecting the corner of the embankment near the junction of the embankment and left spillway wingwall just upstream of the spillway crest (see Photograph 5) is displaced, affording somewhat inadequate protection for the slope. In addition, there is some erosion evident near the top of the right wingwall.

2. Outlet Conduit. Both the inlet and outlet ends of the discharge conduit were visible during the inspection. The concrete surfaces associated with these areas were in good condition with only minor patches of spalling in evidence. The inlet was found to be near totally obstructed (see Photograph 3) with approximately three quarters of the conduit covered with silt and debris. Evidence of minor siltation was also observed in the outlet channel.

3. Reservoir Area. Photograph 7 shows a view of the reservoir area. The stream channel located in the center of the photograph is partially hidden by the thick, 4- to 5-foot high vegetation that typifies the entire reservoir area. No large trees were observed in the reservoir indicating that some effort has been made over the years to maintain the area and to keep it clear of major obstructions.

Approximately 1/4 mile upstream of the embankment two residences are located along the east shoreline. Field measurements indicate both residences and in particular the one closest the reservoir are sufficiently low to be partially inundated if the pool level rises to near the top of the dam.

4. Downstream Channel. The channel downstream of the embankment passes alongside both heavy and light industries and small residential areas before it enters a conduit on the outskirts of the City of Jeannette. The conduit diverts flow beneath the city and discharges it further downstream. The extent of the development within the flood plain below the embankment is more than sufficient to classify the facility a "high" hazard. The downstream population that could be effected by a breach of the dam would easily exceed 100.

### 3.2 Evaluation.

Observations made during the visual inspection suggests that the overall condition of the facility is good. The major deficiencies found are due primarily to poor maintenance and can be readily rectified.

SECTION 4  
OPERATIONAL PROCEDURES

4.1 Normal Operating Procedure.

The facility is designed to be self-regulating, that is, inflow is discharged in accordance with the capacities of the outlet conduit and spillway. As a result there are no normal operational procedures.

4.2 Maintenance of Dam.

The present condition of the facility suggests that little regular maintenance is being performed. Mr. Jack M. Hugendubler who serves as an inspector of state-owned dams for PennDER, Bureau of Operations, accompanied the field team during its inspection of this facility. Mr. Hugendubler stated that the facility has had a history of problems generally associated with determining who is its legal owner. He told the field team that the state accepted the responsibility of ownership back in the mid-1960's contingent upon the City of Jeannette providing the equipment and manpower needed to properly maintain the facility.

Regular maintenance of the facility is to be performed in accordance with a manual entitled "Operation and Maintenance Manual for Bull Run Flood Control Dam" available from PennDER files. The manual contains information and instructions regarding routine maintenance and inspection as well as flood emergency procedures.

4.3 Maintenance of Operating Facilities.

There are no mechanical systems associated with this facility. Maintenance of the outlet conduit and spillway are detailed within the text of the "Operation and Maintenance Manual."

4.4 Warning Systems.

There are no formal warning systems in effect at the facility that provide for the protection of downstream (or upstream) inhabitants in the case of an emergency. The "Operation and Maintenance Manual" does cover extensively the procedures to follow with regards to the dam during a flood event and likely could be adapted to include emergency warning procedures.

#### 4.5 Evaluation.

Observations made during the visual inspection indicate that the provisions outlined in the "Operations and Maintenance Manual" have been loosely adhered to and that the facility is presently in a poorly maintained condition.

SECTION 5  
HYDROLOGIC/HYDRAULIC EVALUATION

5.1 Design Data.

No hydrologic or hydraulic design data are available.

5.2 Experience Data.

Data relative to the past performance of the facility are minimal and inconclusive. All observed appurtenances are intact indicating probable adequate past performance.

5.3 Visual Observations.

Conditions observed during the inspection indicate that the outlet conduit or emergency spillway could not function with the efficiency intended by their designs. Specifically, the inlet end of the outlet conduit (shown in Photograph 3) is obstructed and the approach and discharge areas associated with the emergency spillway shown in Photographs 5 and 6 are overgrown. None of the above-mentioned conditions should exist according to the Operation and Maintenance Manual.

5.4 Overtopping Potential.

The ratio "PMF Peak Flow/Drainage Area" was determined from an empirical curve supplied by the Corps of Engineers, Baltimore District. The curve used was the Ohio River Basin Curve. Based on this curve and a drainage area of 1.1 square miles, Peak PMF  $Q/A = 1950$  cfs/sq. mi., and Peak PMF  $Q = 2145$  cfs. The size category is "intermediate" and the hazard rating "high". Consequently, the SDF is the PMF.

Calculations were performed to evaluate the overtopping potential using spillway and storage capacities during the PMF event (see Appendix C).

The spillway has a maximum discharge capacity equivalent to approximately 5,000 cfs. A comparison of peak inflow (2,145 cfs) with maximum discharge (5,036 cfs) shows the discharge capacity to be greater than the peak inflow resulting from the PMF. Consequently, the spillway is considered adequate.



SECTION 6  
EVALUATION OF STRUCTURAL INTEGRITY

6.1 Visual Observations.

a. Embankment. Based on visual observations, the embankment appears to be in good structural condition. No evidence of seepage, erosion, or crest settlement was observed, although there was no pool behind the dam at the time of inspection. Maintenance of the embankment, nevertheless, has been neglected. The lack of maintenance is contrary to the procedures and objectives of the "Operation and Maintenance Manual" prepared for the City of Jeannette by the designer (PennDER). The manual specifically recommends, among other things, that the embankment be mowed at least twice a year (spring and fall preferably). The appearance of the vegetation presently covering the slopes seems to indicate that this policy is not being carried out as specified.

b. Appurtenant Structures. The appurtenant structures of this facility including both the outlet conduit and emergency spillway appear to be in good overall condition. Only minor areas of concrete deterioration were observed on either structure. These are presently considered insignificant relative to their structural integrity. Erosion along the right wingwall of the emergency spillway is evident and should be rectified. The conduit and spillway both suffer, however, from the same neglect and lack of maintenance that afflicts the embankment (see Section 5.3).

6.2 Design and Construction Techniques.

No design data, design reports, or computations are available for either the present or original facility. A limited amount of construction photographs and memoranda along with design drawings are available pertaining to the original facility but are not considered sufficient to evaluate the actual construction techniques applied.

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 of the structure is sufficient to withstand minor earthquake-induced dynamic forces.

However, no calculations, investigations, etc., were performed to confirm this opinion.

7.1 Dam Assessment

- a. Safety. The visual inspection and available engineering data suggest that the facility is in good condition.
- b. Hydraulic and hydrologic calculations performed as part of this investigation indicate the facility is capable of discharging the inflow resulting from a storm of 100 year return period. As a result, the spillway is deemed adequate.
- c. Adequacy of Information. The available data are considered sufficient to make a Phase I assessment of the facility.
- d. Urgency. It is suggested that the recommendations indicated herein be implemented immediately.
- e. Necessary for Additional Investigations. No additional investigations are deemed necessary at this time.

7.2 Recommendations/Keyhole Notes

- It is recommended that the owner implement the procedures and operations provided for in the Operation and Maintenance Manual. Specific items that require immediate attention include:
1. Clearing silt and debris currently obstructing the inlet and possibly within the outlet conduit.
  2. Clearing overgrowth from both the approach and discharge areas of the emergency spillway.
  3. Removal overgrowth and soil cover which currently obstructs a portion of the rock toe drain of the embankment.
  4. Repairing and/or replacing the riprap protection at the spillway-embankment contact.
  5. Correcting the erosion occurring behind the right spillway wingwall.
  6. The dam should be inspected during high peak levels (as suggested by the operation manual) to detect possible areas of seepage. If any are found to exist, the condition should be evaluated to determine the extent of the integrity of the dam.

SECTION 7  
ASSESSMENT AND RECOMMENDATIONS FOR REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. The visual inspection and available engineering data suggest that the facility is in good condition.

Hydraulic and hydrologic calculations performed as part of this investigation indicate the facility is capable of discharging the inflow resulting from a storm of PMF magnitude. As a result, the spillway is deemed adequate.

b. Adequacy of Information. The available data are considered sufficient to make a Phase I assessment of the facility.

c. Urgency. It is suggested that the recommendations indicated below be implemented immediately.

d. Necessity for Additional Investigations. No additional investigations are deemed necessary at this time.

7.2 Recommendations/Remedial Measures.

It is recommended that the owner implement the procedures and operations provided for in the "Operation and Maintenance Manual." Specific items that require immediate attention include:

1. Clearing silt and debris currently obstructing the inlet end and possibly within the outlet conduit.

2. Clearing overgrowth from both the approach and discharge areas of the emergency spillway.

3. Removing overgrowth and soil cover which currently obstructs a portion of the rock toe drain of the embankment.

4. Repairing and/or replacing the riprap protection at the spillway-embankment contact.

5. Correcting the erosion occurring behind the right spillway wingwall.

6. The dam should be inspected during high peak levels (as suggested by the operations manual) to detect possible areas of seepage. If any are found to exist, the condition should be evaluated to determine its effect on the integrity of the dam.

In addition, the owner and/or operators should develop a formal warning system that provides for the notification of both upstream and downstream residents in the event of an emergency situation. The details of the warning system should be incorporated into the "Operation and Maintenance Manual," Section V, Emergency Operations.

APPENDIX A

CHECK LIST - ENGINEERING DATA

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

NAME OF DAM Bull Run Dam

ID # NDI #PA-463, PennDER #65-89

ITEM

REMARKS

SHEET 1

AS-BUILT DRAWINGS

Drawings of the original facility by J. R. Daugherty, B.S.S.E. (Sanitary Engineer) dated circa 1934 (several dates including many revisions) along with drawings of the present facility by the Pennsylvania Department of Forests and Waters dated 1957 are available from PennDER.  
REGIONAL VICINITY MAP

See Appendix G (U.S.G.S. 7.5 minute series, Greensburg Quadrangle)

CONSTRUCTION HISTORY

Photographs along with various correspondence and memoranda pertaining to the construction of the original facility are contained within PennDER files. Only a limited amount of correspondence is available in these same files that pertains to the reconstruction.

TYPICAL SECTIONS OF DAM

See Appendix F, Figure 8 (DWG C65.5-1.9 "Cross Sections," dated 7/7/57)

OUTLETS - PLAN See Appendix F, Figure 1 (DWG C65-5-1.1, "General Plan," revised 7/19/57)

- DETAILS See Appendix F, Figure 5 (DWG C65-5-1.6, "Stilling Basin and Outlet Structure," revised 7/19/57)

- DISCHARGE RATINGS None available.

RAINFALL/RESERVOIR RECORDS

Rainfall/Reservoirs records are not kept for this facility.

## DESIGN REPORTS

None available.

## GEOLOGY REPORTS

None available.

DESIGN COMPUTATIONS  
HYDROLOGY & HYDRAULICS  
DAM STABILITY  
SEEPAGE STUDIES

None available.

MATERIALS INVESTIGATIONS None available.  
BORING RECORDS See Figure 7; Test Pit Data for the original dam available in Pennder files.  
LABORATORY None available.  
FIELD

## POST-CONSTRUCTION SURVEYS OF DAM

Survey performed on the old dam prior to rehabilitation.

## BORROW SOURCES

Available records indicate the borrow materials to have been taken from within the reservoir area.

ITEM

MONITORING SYSTEMS  
None.

MODIFICATIONS

The facility was partially reconstructed in 1957. The only pertinent engineering data available are "As-built" and "Design" drawings contained within PennDER files.

HIGH POOL RECORDS

None available.

POST CONSTRUCTION ENGINEERING  
STUDIES AND REPORTS

None.

PRIOR ACCIDENTS OR FAILURE OF DAM  
DESCRIPTION  
REPORTS

None available.

MAINTENANCE  
OPERATION  
RECORDS

None available.  
Maintenance manual available from PennDER files.

ITEM

REMARKS

ID # NDI #PA-463

SHEET 4

SPILLWAY PLAN See Appendix F, Figure 3

SECTIONS

DETAILS See Appendix F, Figure 4

OPERATING EQUIPMENT  
PLANS & DETAILS

None.

NDI #PA-463

CHECK LIST ID # PennDER #65-89  
HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1.1 square miles.  
ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): Dry reservoir, no pool maintained.  
ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 180 ac-ft (EL 1088 spillway crest)  
ELEVATION MAXIMUM DESIGN POOL: Not known.  
ELEVATION TOP DAM: 383 ac-ft (EL 1097).

SPILLWAY DATA:

- a. Crest Elevation 1088.
- b. Type Concrete channel with ogee-shaped crest.
- c. Weir Length Crest length 50 feet.
- d. Channel Length 80 feet.
- e. Location Spillover Right abutment.
- f. Number and Type of Gates None.

OUTLET WORKS:

- a. Type Ungated 48"  $\phi$  concrete conduit with 24'  $\phi$  constricted inlet opening.
- b. Location Approximate center of embankment.
- c. Entrance Inverts 1054.5
- d. Exit Inverts 1053.5
- e. Emergency Draindown Facilities Same.

HYDROMETEOROLOGICAL GAGES:

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

MAXIMUM NON-DAMAGING DISCHARGE: Not known.

APPENDIX B

CHECK LIST - VISUAL INSPECTION

CHECK LIST  
VISUAL INSPECTION  
PHASE 1

NDI #PA-463  
ID # PennDER #65-89

DAM NAME Bull Run Dam COUNTY Westmoreland STATE PA  
TYPE OF DAM Rolled earth HAZARD CATEGORY High

DATE(S) INSPECTION September 20 & 22 WEATHER Partly Cloudy TEMPERATURE 80°F  
1978

POOL ELEVATION AT TIME OF INSPECTION Dry M.S.L. TAILWATER AT TIME OF INSPECTION 1053.8 M.S.L.

INSPECTION PERSONNEL:

20 September 1978 J. Hugendubler (DER)

D. L. Bonk (GAI)

S. R. Michalski (GAI)

R. E. Gray (GAI)

3 October 1978 D. L. Bonk RECORDER

B. M. Mihalcin (GAI)

J. P. Nairn (GAI)

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

GENERAL EXAMINATION OF

FACE CRACKS

- 1. None visible.
- 2. Embankment completely overgrown with weed-like vegetation.

GENERAL MOVEMENT OR SLIDING AT OR BEYOND TOE

None observed.

SLIDING OR EROSION OF EMBANKMENT AND ABUTMENT TYPES

None observed.

GENERAL CONDITION OF THE CREST

Good.

FAILURE MODES

No riprap on embankment slopes. The only riprap associated with this structure is designed to protect the upstream right corner of the embankment at the spillway-embankment junction. The riprap has been partially dislodged from the embankment in this area.

EMBANKMENT

ID # NDI #PA-463

SHEET 2

VISUAL EXAMINATION OF

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

FUNCTION OF EMBANKMENT  
AND ABUTMENT, SPILLWAY  
AND DAM

Left abutment junction with embankment is in good condition. Right side embankment junction with left spillway wingwall in good condition. Right abutment junction with right spillway wingwall has separated and requires some repair.

ANY NOTICEABLE SEEPAGE

None observed. Reservoir empty during inspection. No evidence of past seepage noted.

STAFF GAGE AND RECORDER

None.

RAINS

None.

OUTLET WORKS

ID # NDI #PA-463

SHEET 3

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

CRACKING AND SPALLING OF  
CONCRETE SURFACES IN  
OUTLET CONDUIT

Minor isolated areas of spalling and scaling were observed on some of the exposed surfaces. Not viewed as significant.

INTAKE STRUCTURE

Outlet pipe blocked by silt and debris at the inlet.

OUTLET STRUCTURE

Good condition.

OUTLET CHANNEL

Unobstructed. Evidence of minor silting viewed immediately downstream of the culvert outlet.

EMERGENCY GATE

None.

USUAL EXAMINATION OF OBSERVATIONS REMARKS OR RECOMMENDATIONS

CONCRETE WEIR

Good condition. Minor cracking and scaling observed. The weir is partially obstructed by vegetation along the right side of the forebay where no concrete apron protects the approach. Needs cleared.

APPROACH CHANNEL

1. Riprap slope protection thrown into the approach channel by vandals. Needs cleared.
2. Some debris and vegetation.

DISCHARGE CHANNEL

Moderately overgrown with trees and brush. Needs cleared.

RIDGE AND PIERS

None.

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

CONCRETE SILL

N/A

APPROACH CHANNEL

N/A

DISCHARGE CHANNEL

N/A

BRIDGE AND PIERS

N/A

GATES AND OPERATION  
EQUIPMENT

N/A

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION

MONUMENTATION/SURVEYS

None.

OBSERVATION WELLS

None.

WEIRS

None.

PIEZOMETERS

None.

OTHERS

None.

RESERVOIR

ID # NDI PA#-463

SHEET 7

USUAL EXAMINATION OF

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

SLOPES

Moderate to steep side slopes, heavily vegetated on the east. Farm and pasture land on the north and west.

SEDIMENTATION

None other than siltation at inlet structure.

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

USUAL EXAMINATION OF

CONDITION

(OBSTRUCTIONS,  
DEBRIS, ETC.)

The downstream channel follows a near straight path on its route to the conduit that will divert its flow beneath the City of Jeannette. Along the route the stream passes through a well developed urban valley and is twiced spanned by township roads before reaching the diversion conduit.

LOPES

The downstream channel is surrounded by sparsely wooded farmland with moderate slopes that become increasingly urbanized as the stream approaches the city.

APPROXIMATE NO. OF HOMES AND POPULATION

Approximately 1/4 mile upstream of the embankment two residences are located along the east shoreline. Field measurements indicate both residences and in particular, the one closest the reservoir are sufficiently low to be partially inundated if the pool level rises to near the top of the dam. The City of Jeannette lies approximately 1 mile downstream of the embankment. Its population is estimated by the Department of the Interior at approximately 16,300 persons. It is likely that a fair percentage of this population would be affected by an embankment breach.

APPENDIX C  
HYDROLOGY AND HYDRAULICS

SUBJECT DAM SAFETY INSPECTION  
Bull Run Dam  
 BY DLB DATE 9-22-78 PROJ. NO. 78-501-463  
 CHKD. BY EJM DATE 10-18-78 SHEET NO. 1 OF 4



DAM STATISTICS

MAXIMUM HEIGHT - 44 FEET (FIELD MEASURED)

DRAINAGE AREA - 1.1 SQ. MI. [ PLANIMETERED OFF U.S.G.S. GREENSBURG QUADRANGLE, 7.5 MINUTE SERIES ]

STORAGE CAPACITY -

@ Spillway Crest (EL 1088) ≈ 180 ACRE- FEET (SEE NOTE AT BOTTOM)  
 @ Top of Dam (EL 1097) ≈ 383 ACRE- FEET " " " "

SIZE CLASSIFICATION

DAM SIZE - INTERMEDIATE (REF 2: TABLE 1)

HAZARD RATING - HIGH (FIELD OBSERVATION REF 2: TABLE 2)

REQUIRED SDF - PMF (REF 2: TABLE 3)

NOTE: THE VALUE FOR STORAGE CAPACITY AT NORMAL POOL HAS BEEN TAKEN FROM PAGE 97 OF REFERENCE 1. VERIFICATION HAS BEEN MADE UTILIZING THE FORMULA FOR DETERMINING STORAGE CAPACITIES RECOMMENDED BY U.S. ARMY CORPS OF ENGINEERS, PITTSBURGH DISTRICT; THAT IS,  $\frac{1}{3} (\text{RESERVOIR AREA})(\text{HEIGHT}) = \text{STORAGE}$ . THE RESERVOIR AREA @ NORMAL POOL WAS PLANIMETERED OFF FIG. 7, APPENDIX F. TOP OF DAM STORAGE IS BASED ON RESERVOIR AREA AT NORMAL POOL OF 20 ACRES AND AT TOP OF DAM OF 25 ACRES (PLANIMETERED OFF U.S.G.S. 7.5 MINUTE SERIES, GREENSBURG QUADRANGLE). AVAILABLE FREEBOARD IS 9 FEET (SHEET 2). THUS  $[(25+20)/2](9) = 203 \text{ AC-FEET} = \text{SURCHARGE STORAGE}$ .  $180 \text{ AC-FEET (NORMAL POOL)} + 203 \text{ (SURCHARGE)} = 383 \text{ AC-FEET (TOTAL STORAGE)}$

SUBJECT DAM SAFETY INSPECTION  
BULL RUN DAM  
 BY DLB DATE 9-22-78 PROJ. NO. 78-501-463  
 CHKD. BY EJM DATE 10-13-78 SHEET NO. 2 OF 4

**gai**  
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 Engineers • Geologists • Planners  
 Environmental Specialists

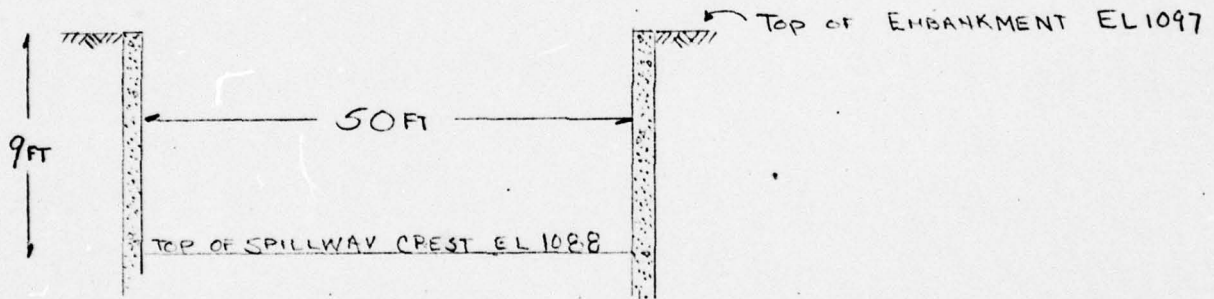
$$PMF(\text{PEAK FLOW})/\text{AREA} = 1950 \text{ CFS}/\text{SQ. MI.}$$

(REF: COF E CURVE,  
OHIO RIVER BASIN)

$$PMF = (1950 \text{ CFS}/\text{SQ. MI.})(1.1 \text{ SQ. MI.}) = 2145 \text{ CFS}$$

$$\text{PEAK PMF } Q = 2145 \text{ CFS} = Q_{\text{IMAX}}$$

SPILLWAY CAPACITY



NOT TO SCALE

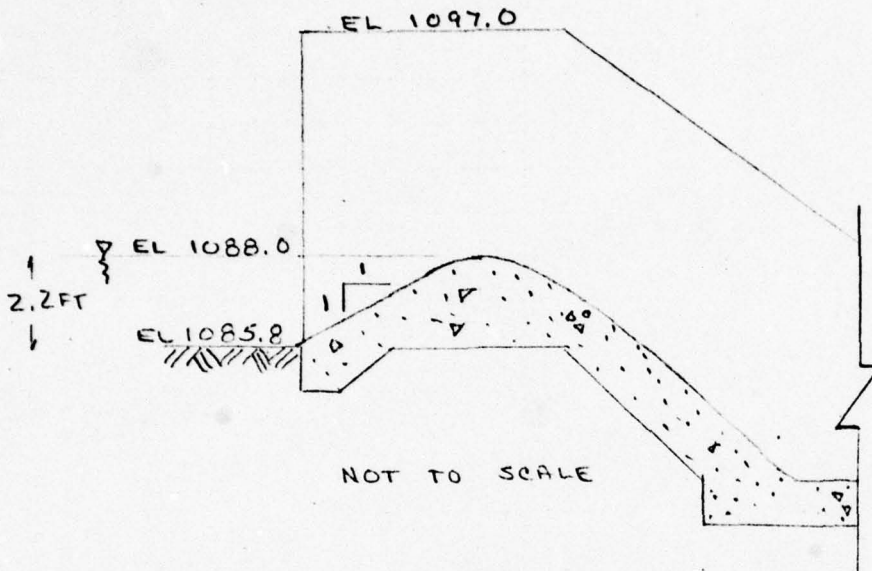
NOTE: ALL ELEVATIONS ARE TAKEN FROM DESIGN DRAWINGS PREPARED BY THE PENNSYLVANIA DEPT OF FORESTS AND WATERS AND 7-19-57. (REF DRWG NO C65:5-1.3). DIMENSIONS ARE FIELD VERIFIED.

SUBJECT DAM SAFETY INSPECTION

BULL RUN DAM

BY DLB DATE 9-22-78 PROJ. NO. 78-501-463

CHKD. BY EJM DATE 10-18-78 SHEET NO. 3 OF 4



REF: CREST DETAIL  
DRAWING NO.  
CG5:5-1.3  
BY PA. DEPT. OF  
FORESTS AND WATERS  
DATED 7-19-57

$$Q = CLH^{3/2}$$

(REF 3: EQ 21-121)

L = LENGTH OF SPILLWAY CREST = 50 FT

H = MAXIMUM HEAD OVER SPILLWAY CREST =  
= (1097.0 - 1088.0) = 9 FT

(SHEET 2, SKETCH)

C = COEFFICIENT OF DISCHARGE

(FROM REF 3: FIGURE 21-69 COMES THE FOLLOWING)

$P/H_0$  = FOREBAY DEPTH / MAXIMUM HEAD

$$= 2.2 \text{ FT} / 9.0 \text{ FT} = 0.24$$

(SEE FIGURE ABOVE)

SUBJECT DAM SAFETY INSPECTION  
BULL RUN DAM  
BY DLB DATE 9-22-78 PROJ. NO. 78-501-463  
CHKD. BY EJM DATE 10-18-78 SHEET NO. 4 OF 4

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$$\frac{C_{\text{INCLINED}}}{C_{\text{VERTICAL}}} \approx 1.03$$

(FROM REF 3; FIGURE 21-67)

$$C_{\text{VERTICAL}} \approx 3.62$$

$$C_{\text{INCLINED}} \approx (1.03)(3.62) \approx 3.73$$

$$Q = (3.73)(50\text{FT})(9\text{FT})^{3/2} = 5036 \text{ CFS}$$

PEAK PMF  $Q$  (2145 CFS) < MAXIMUM DISCHARGE (5036 CFS)

#### REFERENCES

- 1 : "WATER RESOURCES BULLETIN; DAMS, RESERVOIRS AND LAKES"  
PENNA. DEPT. OF FORESTS AND WATERS; BULLETIN No. 5, COMPREHENSIVE  
WATER RESOURCES PLANNING INVENTORY No. 1, 1970
- 2 : "RECOMMENDED GUIDELINES FOR SAFETY INSPECTIONS OF DAMS"  
DEPT OF THE ARMY - OFFICE OF CHIEF ENGINEER, APPENDIX D
- 3 : STANDARD HANDBOOK FOR CIVIL ENGINEERS  
F. S. MERRITT, MCGRAW-HILL 1976

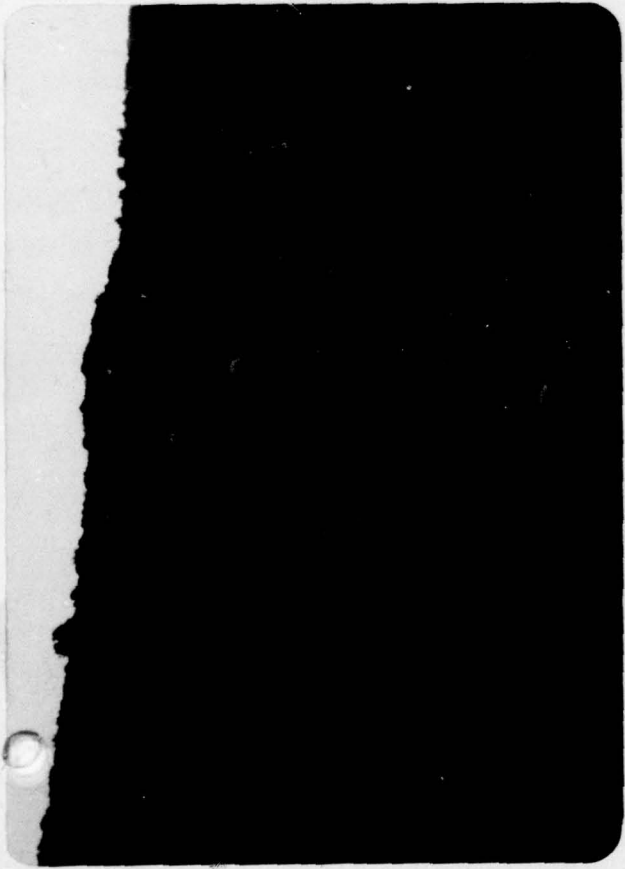
APPENDIX D  
PHOTOGRAPHS

PHOTOGRAPH 1 View looking southeast at the upstream slope of the dam. The heavy growth of vegetation completely obscures the ground.

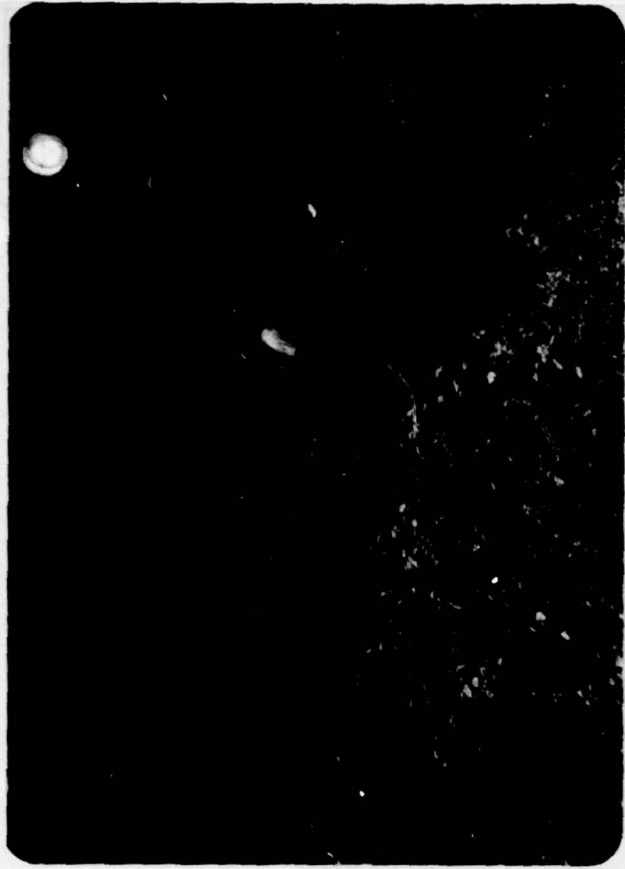
PHOTOGRAPH 2 Detail view showing the trashrack which protects the 24-inch inlet pipe. Note the floatson on top of the trashrack.

PHOTOGRAPH 3 Detailed view showing the partially obstructed inlet end of the outlet pipe.

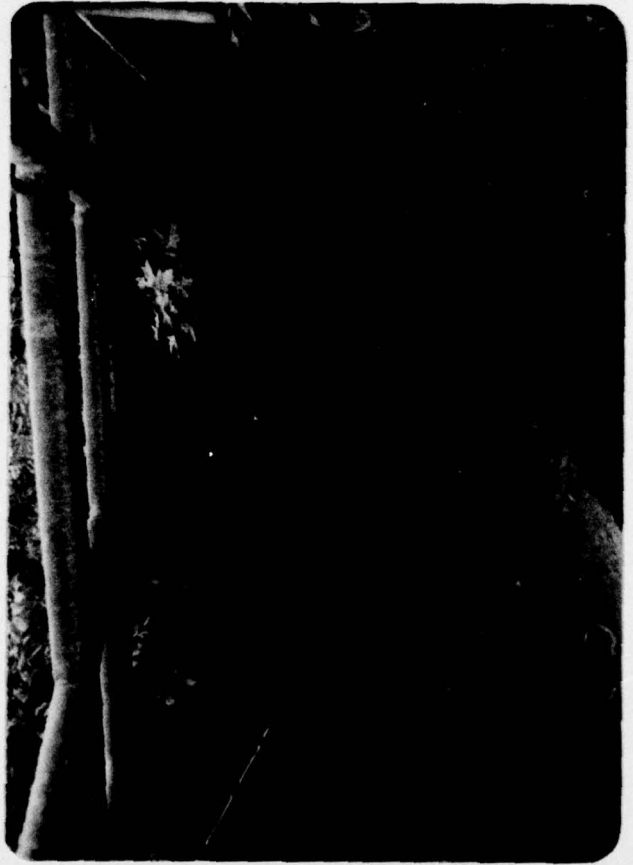
PHOTOGRAPH 4 This detailed view shows the outlet wingwalls and 48-inch diameter outlet pipe. Note the concrete weir in the foreground and provisions for externally mounted sluice gate.



1



2



3



4

PHOTOGRAPH 5

This view is looking downstream (southeast) across the approach channel to the emergency spillway. Riprap and other debris in the spillway is due to vandalism.

PHOTOGRAPH 6

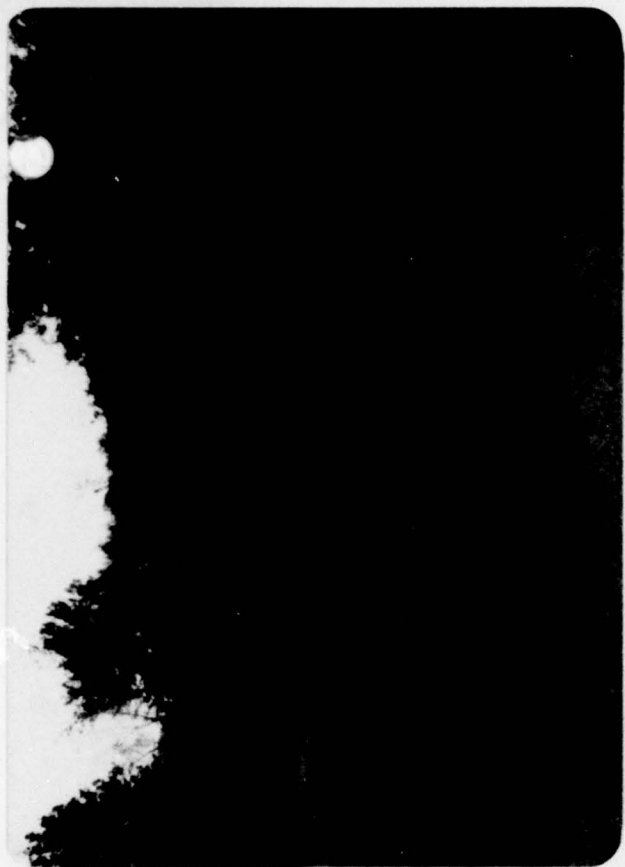
Detailed view of the outlet end of the spillway. Note the encroachment of trees both below and within the spillway.

PHOTOGRAPH 7

View looking northeast from the top of the embankment to the upstream reach of Bull Run.

PHOTOGRAPH 8

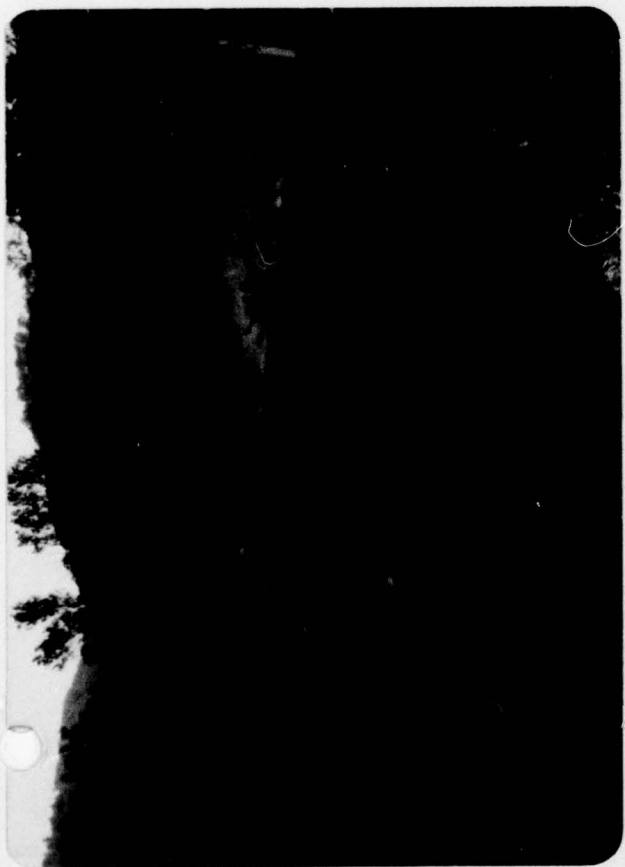
View looking south from the top of the dam and showing the area immediately downstream of the embankment. The city of Jeannette lies in the notch between the hills just right of center in the far background. The outlet wingwall and discharge pipe lie at the toe of the slope just right of center.



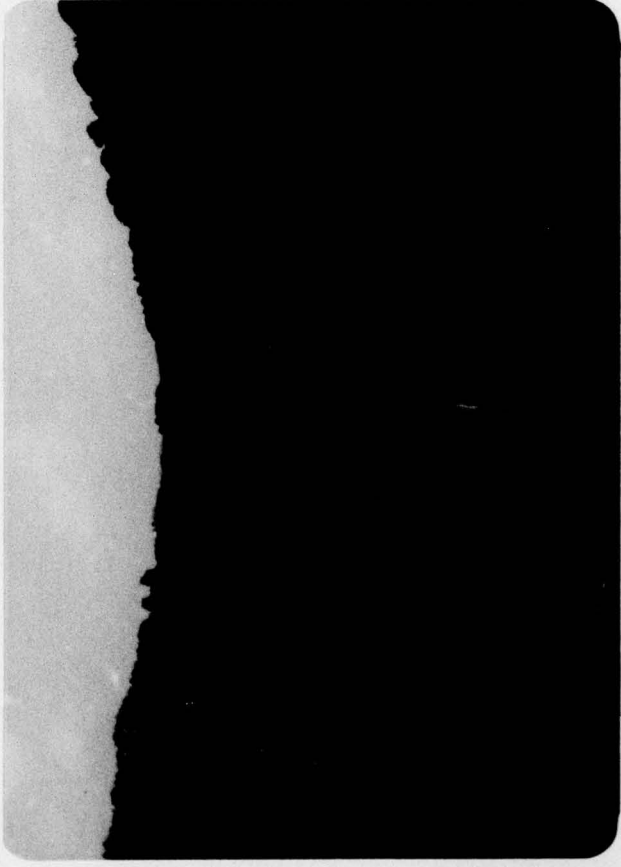
6



8



5



7

PHOTOGRAPH 9 Detail showing maple tree growing on the embankment near the forebay of the spillway. Although periodic cutting keeps the total height down, the stumps continue to increase in size as this picture shows.

PHOTOGRAPH 10 View looking northwest at the downstream slope of the embankment and the area immediately below the dam. This view is from the parking area of the industrial building shown in Photograph 8.

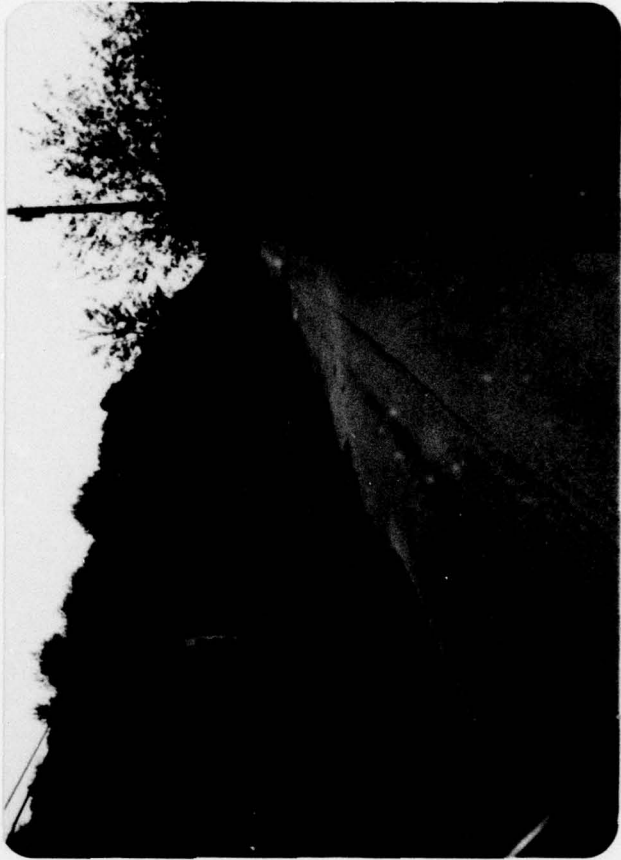
PHOTOGRAPH 11 View looking south from a point 1400 feet upstream of the dam. A full reservoir discharging over the spillway would flood the first floor level of this upstream dwelling.



9



10



11

APPENDIX E

GEOLOGY

## Geology

Bull Run Dam is located within the Pittsburgh Plateaus Section of the Appalachian Plateaus Physiographic Province. The dam and reservoir area are immediately underlain by strata of the Conemaugh Formation of middle Pennsylvanian age. The strata underlying the watershed, therefore, can be expected to consist of a sedimentary sequence of rocks composed of alternating beds of sandstone, siltstone, shale and lesser amounts of limestone and coal. In the immediate vicinity of the dam site, the strata are thought to consist of the Saltsburg sandstone and underlying siltstone and shale of the lower portion of the Conemaugh. No mineable coal outcrops within the watershed, although mineable coal reportedly exists beneath the site.

Structurally, the site is situated on the west flank of the Grapeville Anticline. Consequently, the strata underlying the dam and reservoir area gently dip to the northwest at approximately 375 feet per mile or 4 degrees.

Prior to construction of the original embankment, a series of five test pits were dug in the immediate vicinity of the dam. All of the test pits were generally confined to the valley floor and ranged from 6.0 to 8.0 feet in depth. Four of the five test pits were excavated in alluvial valley fill consisting of "yellow grey and blue clay" with varying amounts of "gravel till". Test Pit No. 1 near the right abutment contained approximately 4.2 feet of "yellow and grey clay," with a "yellow clay and gravel" seam either

alluvial and/or colluvial in origin. The lowermost 2.3 feet is composed of "thin sandstone" bedrock.

In preparation for the embankment raising and outlet works rehabilitation work performed in 1957, eleven auger borings were made to determine subsurface conditions. Two borings were made at the dam site, one was drilled in the original embankment while the other was drilled immediately upstream of the original embankment. Boring 1 located on the crest of the embankment, indicates the upper 16 feet of the original embankment to be constructed of brown sandy silt with sandstone rock fragments. The upstream boring indicates 16 feet of alluvium with the uppermost six feet consisting of sandy silt with rock fragments and the lower ten feet consisting of gray, clayey silt. Beneath the alluvium, a soft black shale indicates the top of rock. nine additional auger borings were drilled in the valley flood plain upstream of the embankment in order to evaluate the borrow materials used in raising the embankment in 1957. In general, these borings indicate the top 6 to 9 feet consists of brown sandy silt often with rock fragments whereas the underlying material is composed of a uniform, gray clayey silt. The ground water level was encountered at a depth of 6 to 7 feet below the ground surface in three of the nine upstream borings.

APPENDIX F  
FIGURES

TABLE OF CONTENTS

<u>Figure No.</u>	<u>Description/Title</u>
1	Field Sketch
2	Outlet Works Rehabilitation
3	Spillway General
4	Spillway Details
5	Stilling Basin and Outlet Structure
6	Plan and Profile of Dam Raising
7	Borrow Area and Borings
8	Cross Sections

SUBJECT Bull Run Drain PA # - 163

BY SRM DATE 9-20-78 PROJ. NO. 78-54-163

CHKD. BY DLB DATE 10-27-78 SHEET NO. 1 OF 1



Engineers • Geologists • Planners  
Environmental Specialists

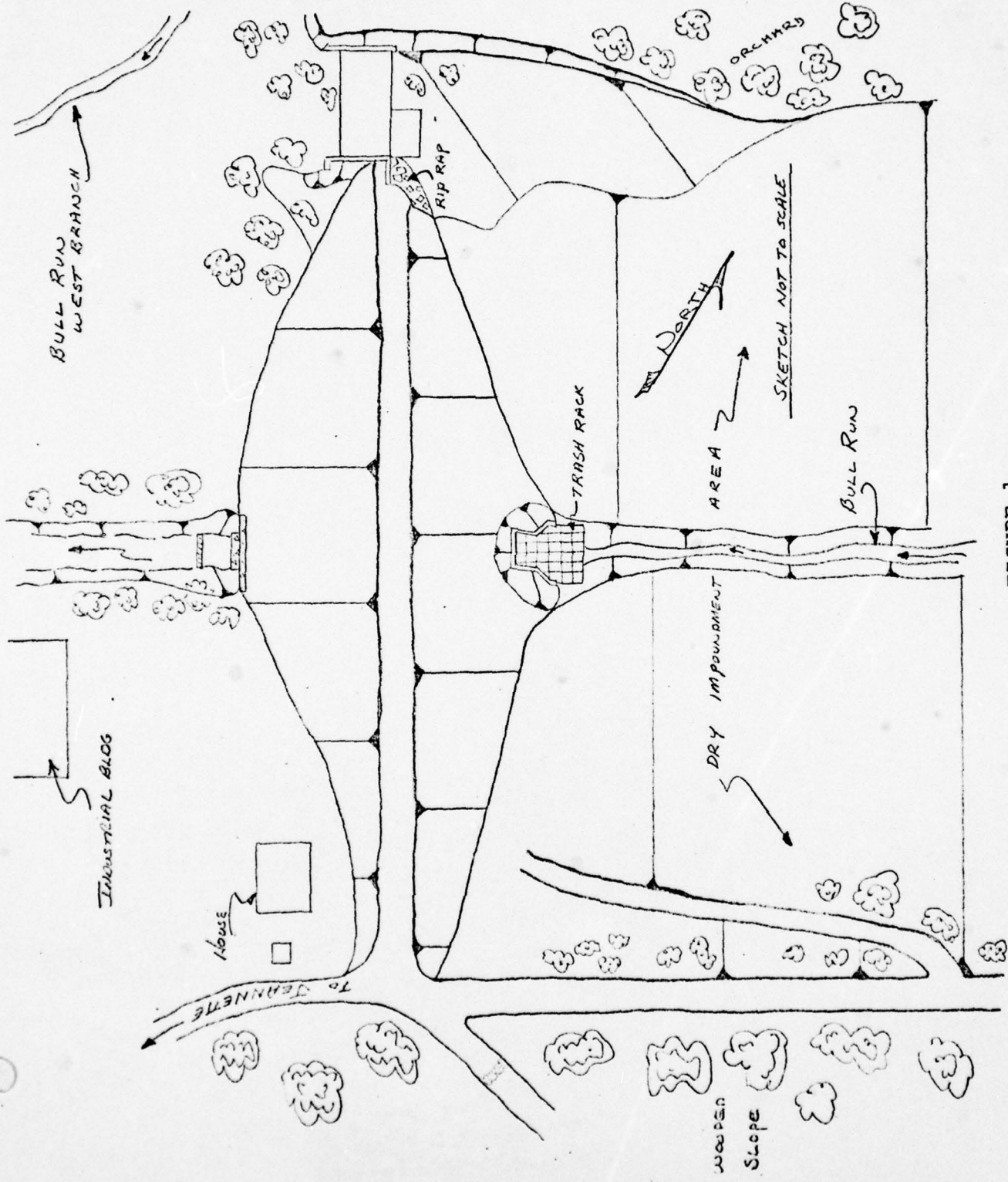
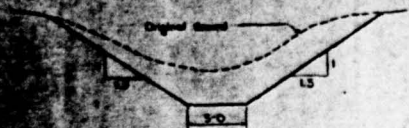


FIGURE 1

NOTE: Channel excavation to depth as directed by the engineer.

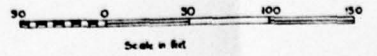
NOTE: Channel excavation as directed by the engineer.

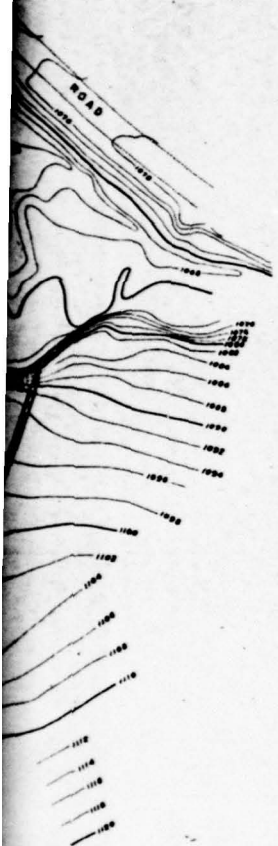
NOTE:  
For



TYPICAL SECTION

to Scale





**NOTE** - This sheet shows SCHEME "A" only.  
For SCHEME "B" see drawings 01.2B and 01.3



LOCATION  
Scale 1:50,000

**GENERAL NOTES**

- 1- The contract for scheme "A" includes:  
Removal of existing outlet works  
Construction of new outlet works  
Removal of existing masonry blocks  
Extension of concrete new trash rack  
Construction of new trash rack  
Excavation in reservoir intake  
Construction of stilling basin  
Excavation downstream
- 2- All concrete shall be finished otherwise noted.
- 3- All elevation data are of top of work unless otherwise noted.
- 4- The contract for scheme "B" includes:  
In note 1 paragraph 1  
Only a part of the dam will be removed.  
Dam will be raised to original height in the reservoir.
- 5- Borrow area for SCHEME "B" is located in the reservoir.
- 6- The contract for scheme "B" has been amended and the following changes were made to plans:  
Drawing 2A has been removed.  
Drawing 2B has been changed to show dimensions related to SCHEME "A" have been removed from Drawings 3 and 4.  
Drawing 7 has been replaced by drawing 7A.

Approved for construction

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS AND PUBLIC WORKS  
DIVISION OF FLOOD CONTROL

**BULL RUN DAM  
OUTLET WORKS REHABILITATION  
GENERAL PLAN**

BULL RUN DAM  
WESTMORELAND COUNTY

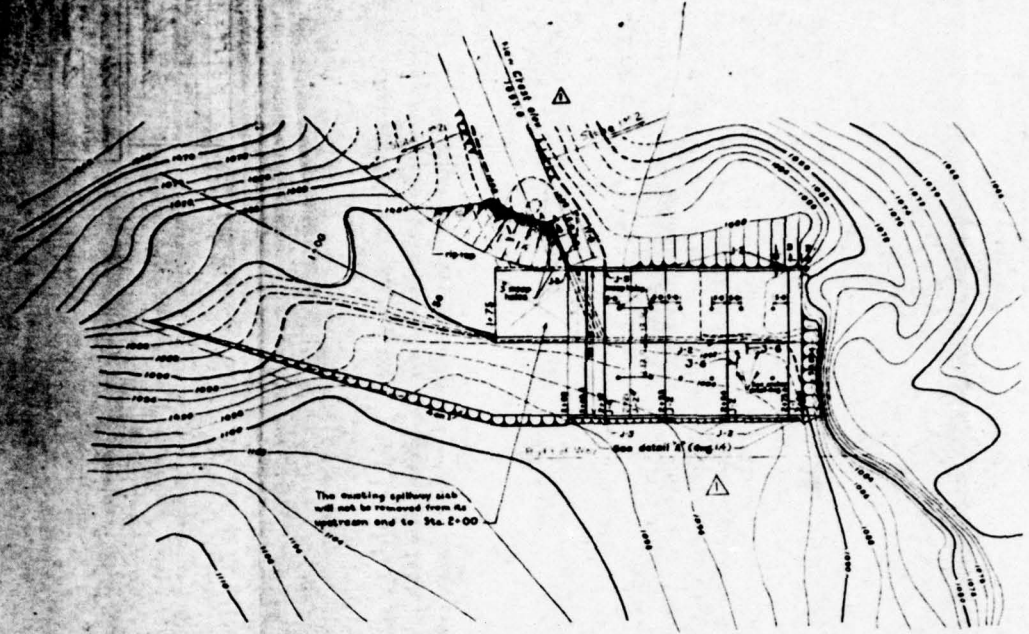
**FIGURE 2**

NO.	DATE	REVISION	REV.	CHK.	APPR.

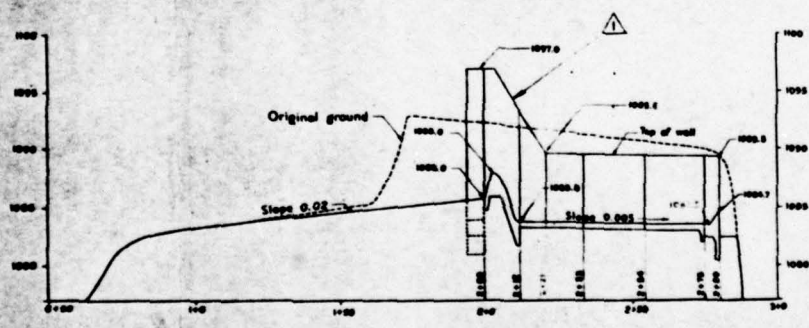
DESIGNED BY *Edith A. ...*  
CHECKED BY *M. ...*  
APPROVED BY *M. ...*

DWG. NO. 01.2A

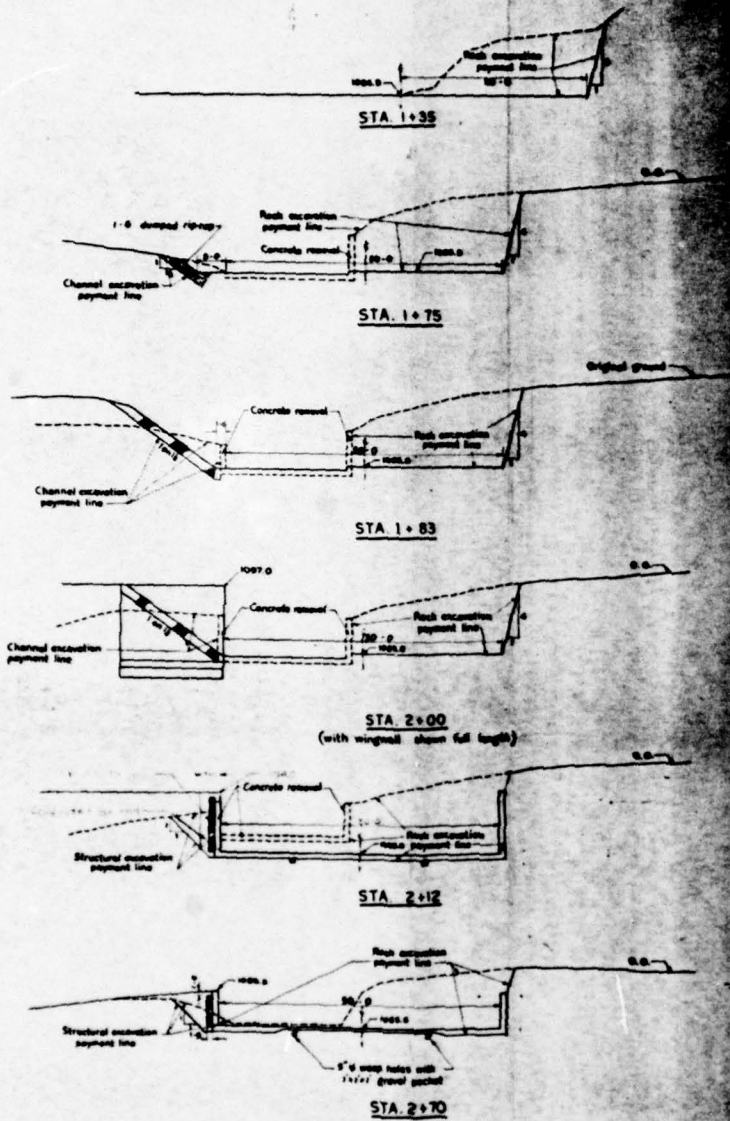




**PLAN**  
Scale 1" = 20 ft.



**PROFILE**  
Scale vert. 1" = 5 ft. hor. 1" = 20 ft.  
(along C-C of channel and spillway)



**CROSS SECTIONS**

Scale vert and hor. 1"=10'R.

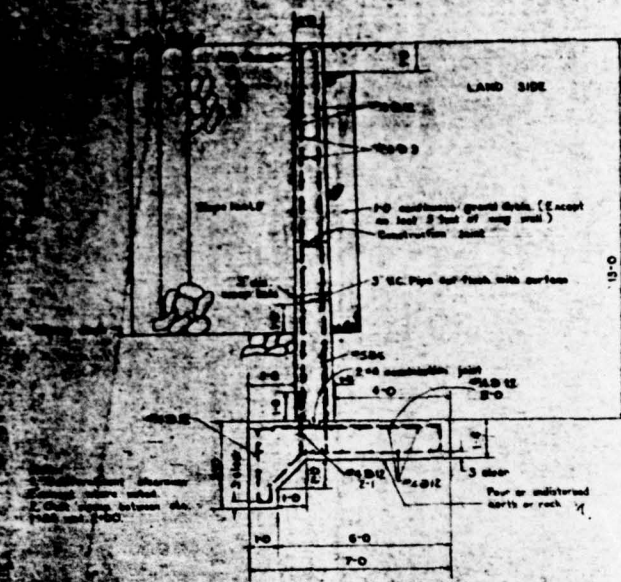
**FIGURE 3**

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS AND TRANSPORTATION  
 DIVISION OF PUBLIC WORKS  
**BULL RUN DAM  
 OUTLET WORKS REPAIRS  
 SPILLWAY GENERAL**  
 BULL RUN  
 WESTMORELAND COUNTY

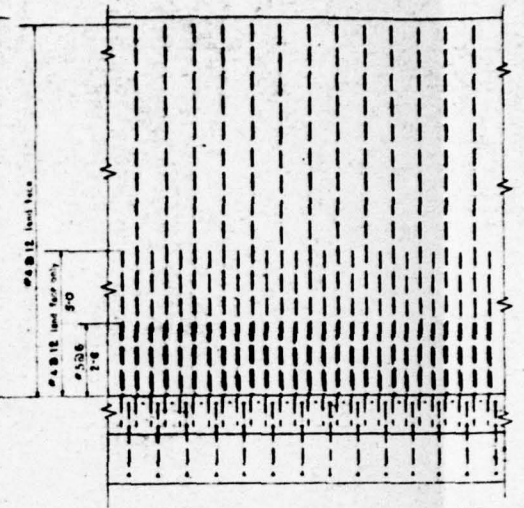
NO	DATE	REVISION	REV	CHKD	APPR

DESIGNED BY *[Signature]*  
 DRAWN BY *[Signature]*  
 CHECKED BY *[Signature]*  
 APPROVED BY *[Signature]*

DWG. NO. *[Number]*

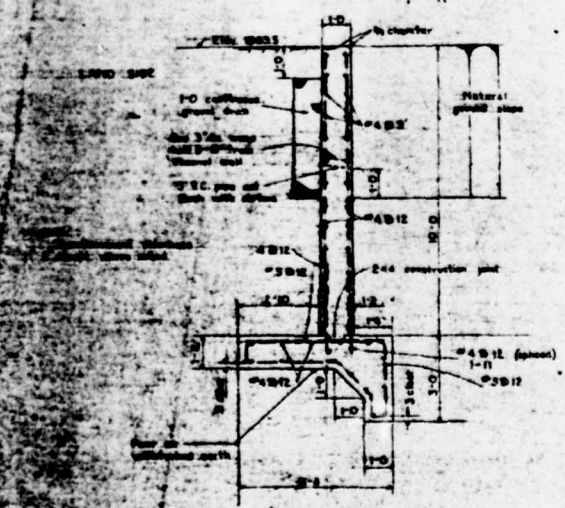


SECTION A-A (See Dwg. No. 12)  
Scale 1/4"=1'-0"

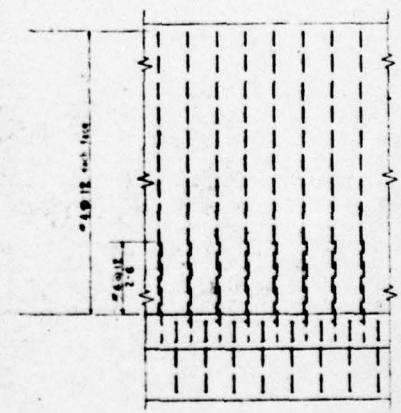


REINFORCING DETAIL  
(Land Face) Scale 1/4"=1'-0"

Note: Longitudinal reinforcement has been omitted

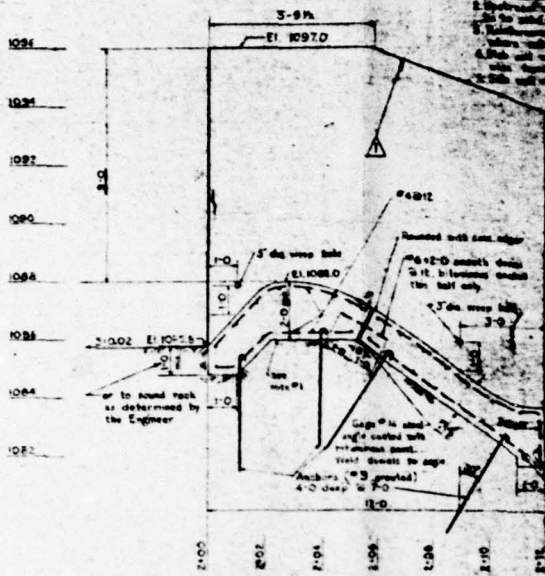


SECTION B-B (See Dwg. No. 12)  
Scale 1/4"=1'-0"

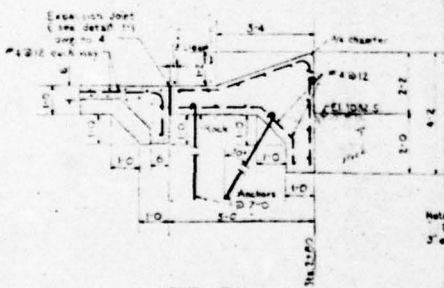


REINFORCING DETAIL  
(Land Face) Scale 1/4"=1'-0"

Note: Longitudinal reinforcement has been omitted



CREST  
Scale 1/4" = 1'-0"



END SILL  
Scale 1/4" = 1'-0"

CREST ELEVATIONS

Station	Elevation
2+00	1097.00
2+01.75	1097.00
2+02.00	1097.00
2+02.75	1097.00
2+03.00	1097.00
2+03.75	1097.00
2+04.00	1097.00
2+05.00	1097.00
2+05.50	1097.00
2+06.00	1097.00
2+06.50	1097.00
2+07.00	1097.00
2+07.50	1097.00
2+08.00	1097.00

Note:  
Underlined elevations are to be used.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF PUBLIC AND WAREHOUSE  
DIVISION OF PUBLIC CONSTRUCTION

**BULL RUN DAM  
OUTLET WORKS REHABILITATION  
SPILLWAY - DETAIL**

BULL RUN  
WESTMORELAND COUNTY

FIGURE 4

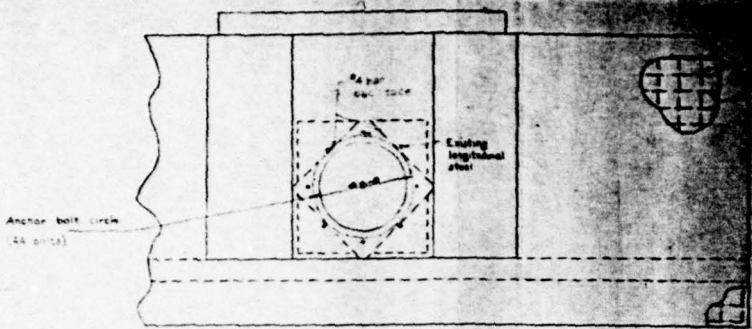
DATE	DESCRIPTION	BY	CHECKED



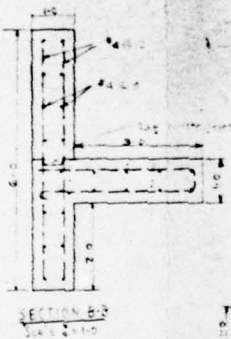
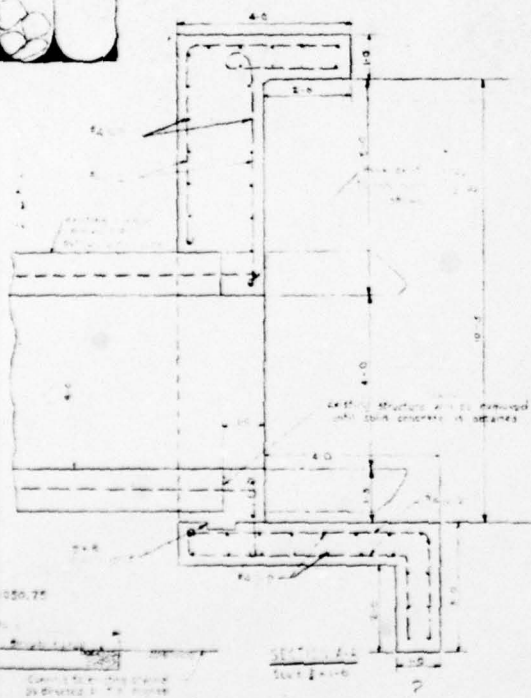
**NOTES:**

*Handwritten notes:*  
 1. All reinforcement  
 2. Clearer all  
 3. Anchor bolts  
 4. Dumped rock to be  
 5. The contractor will  
 6. Flange for gate  
 7. Payment for

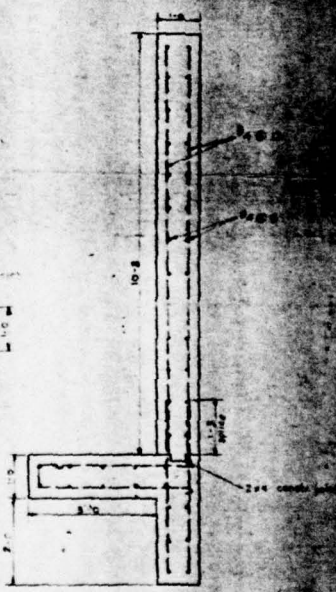
- 1- All reinforcement
- 2- Clearer all
- 3- Anchor bolts
- 4- Dumped rock to be
- 5- The contractor will
- 6- Flange for gate
- 7- Payment for



**END VIEW**  
Scale 2'-1'-0"



**SECTION B-B**  
Scale 2'-1'-0"



**SECTION C-C**  
Scale 2'-1'-0"

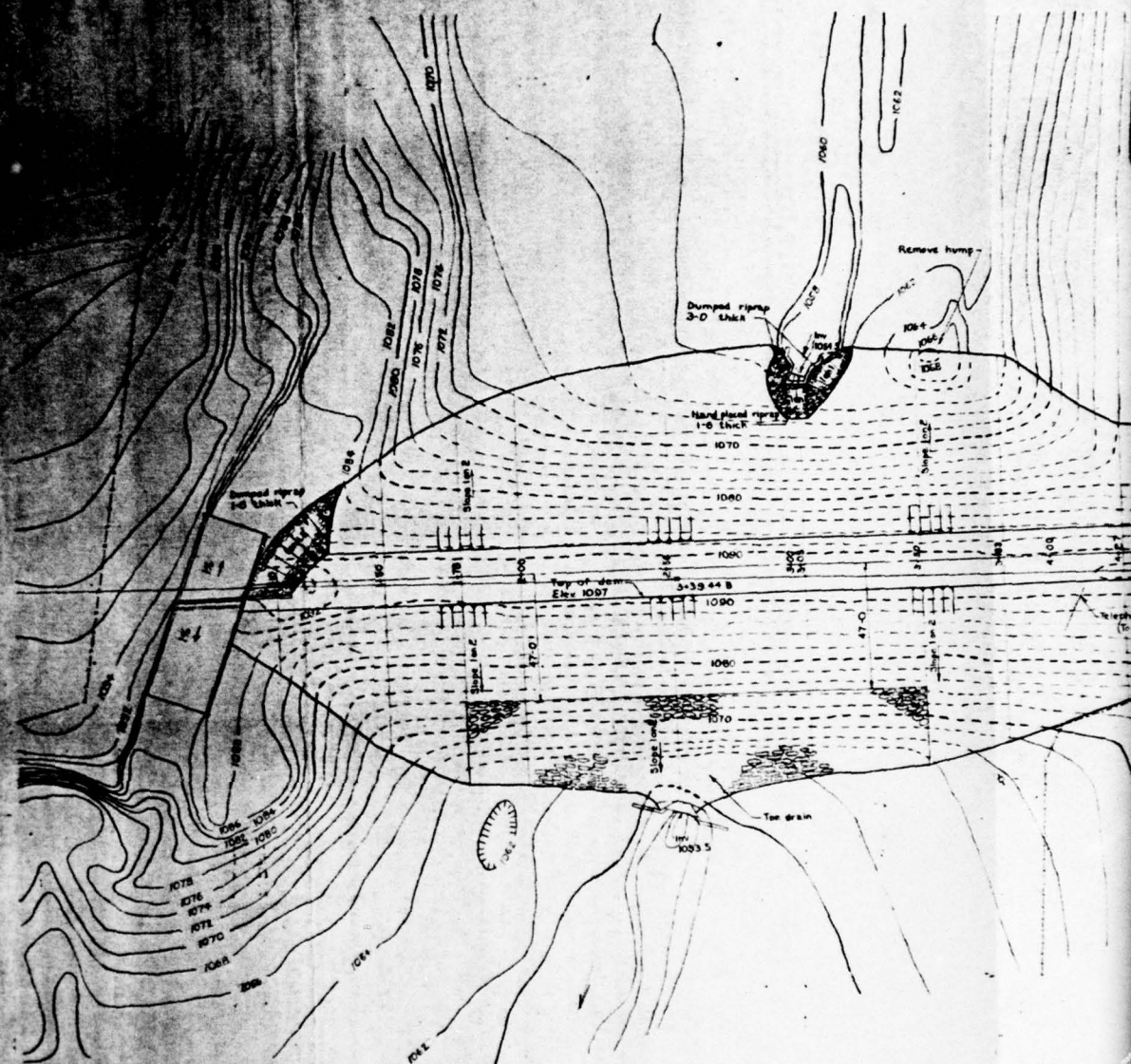
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF FORESTS AND WILDLIFE  
 DIVISION OF FLOOD CONTROL  
**BULL RUN DAM**  
**OUTLET WORKS REHABILITATION**  
**STILLING BASIN AND OUTLET STRUCTURE**  
 BULL RUN      JEANETTE  
 WESTMORELAND COUNTY

**FIGURE 5**

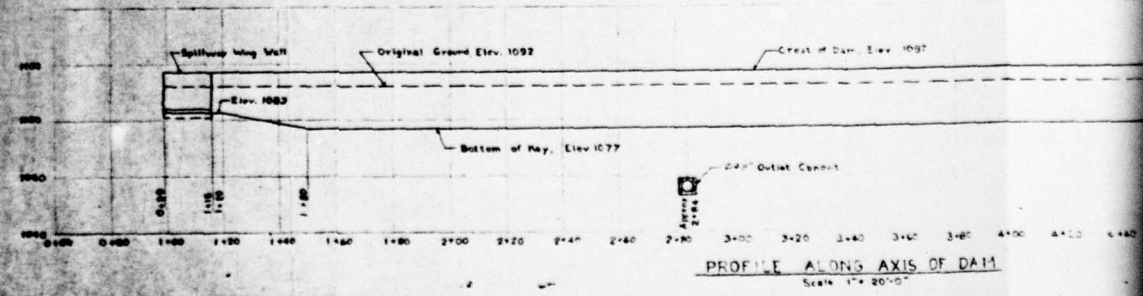
NO.	DATE	REVISION	REV.	CHK.	APP.

DESIGNED BY: *[Signature]*  
 DRAWN BY: *[Signature]*  
 CHECKED BY: *[Signature]*  
 APPROVED BY: *[Signature]*  
 Chief Design Engineer

DWG. NO. C-6518-V



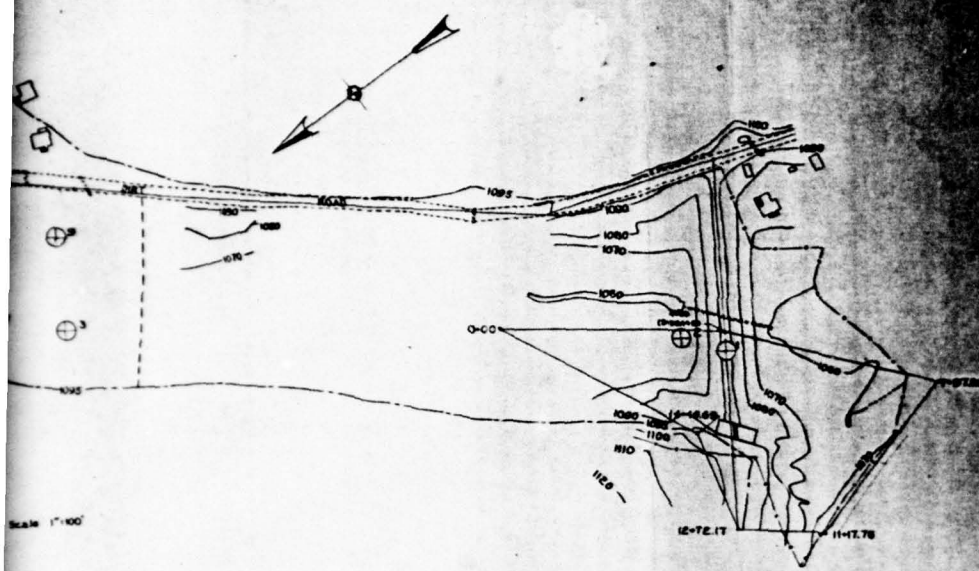
PLAN  
 Scale 1" = 20'-0"



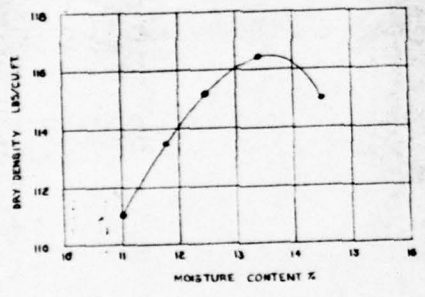
PROFILE ALONG AXIS OF DAM  
 Scale 1" = 20'-0"





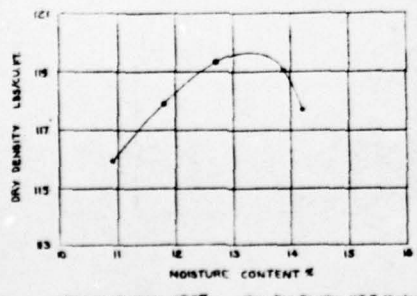


NOTE: Moisture content of borrow material during compaction shall be controlled in accordance with the specifications and kept as close as possible to the optimum moisture content as shown on this drawing.



Optimum Moisture 13.7% Max. Dry Density 116.4 lbs/cu ft.  
 STANDARD PROCTOR AASHTO DENSITY CURVE

Combined sample of gravely clayey sand from borings 4-3



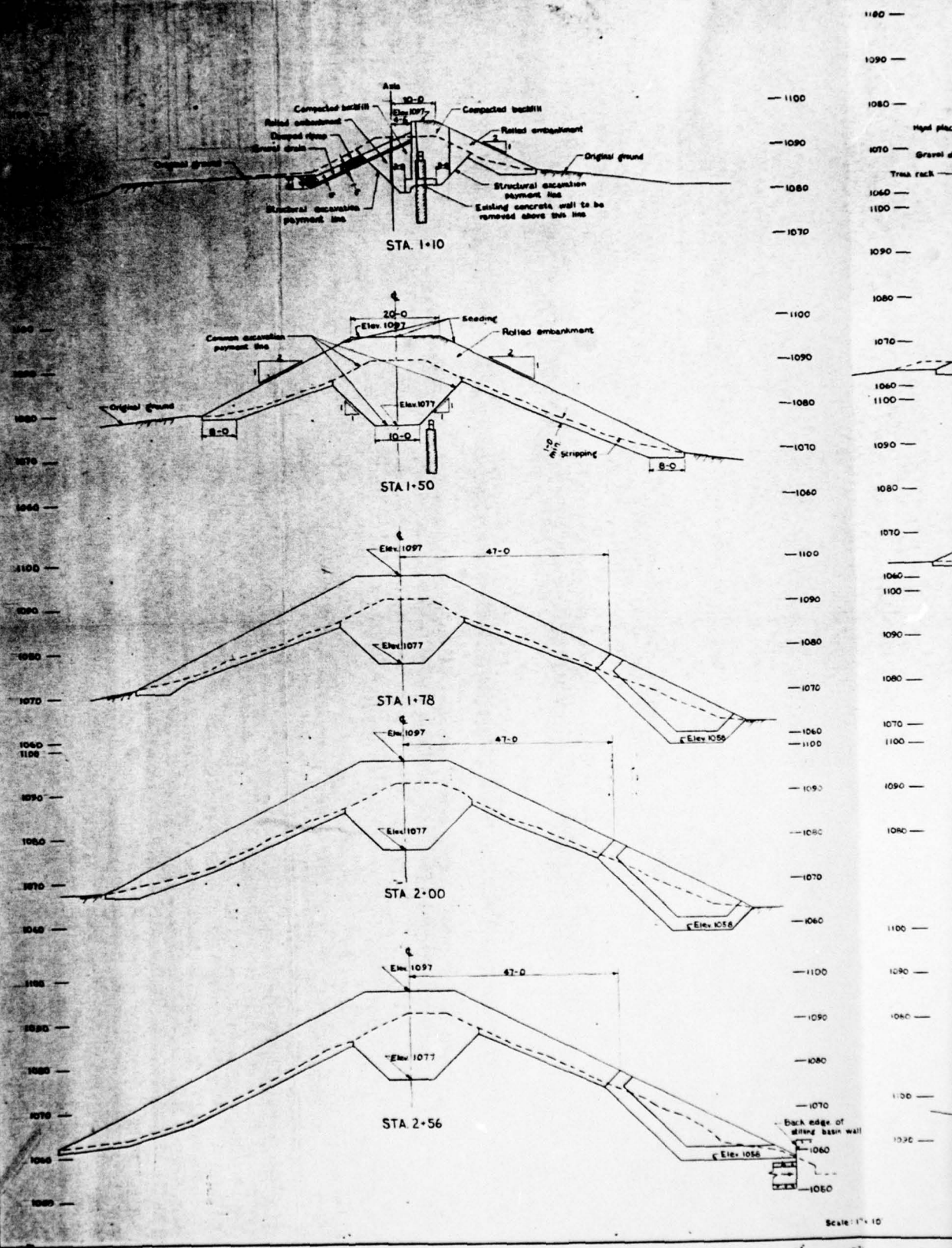
Optimum Moisture 13.3% Max. Dry Density 119.7 lbs/cu ft.  
 STANDARD PROCTOR AASHTO DENSITY CURVE

Combined sample of gravely clayey sand from borings 6-5

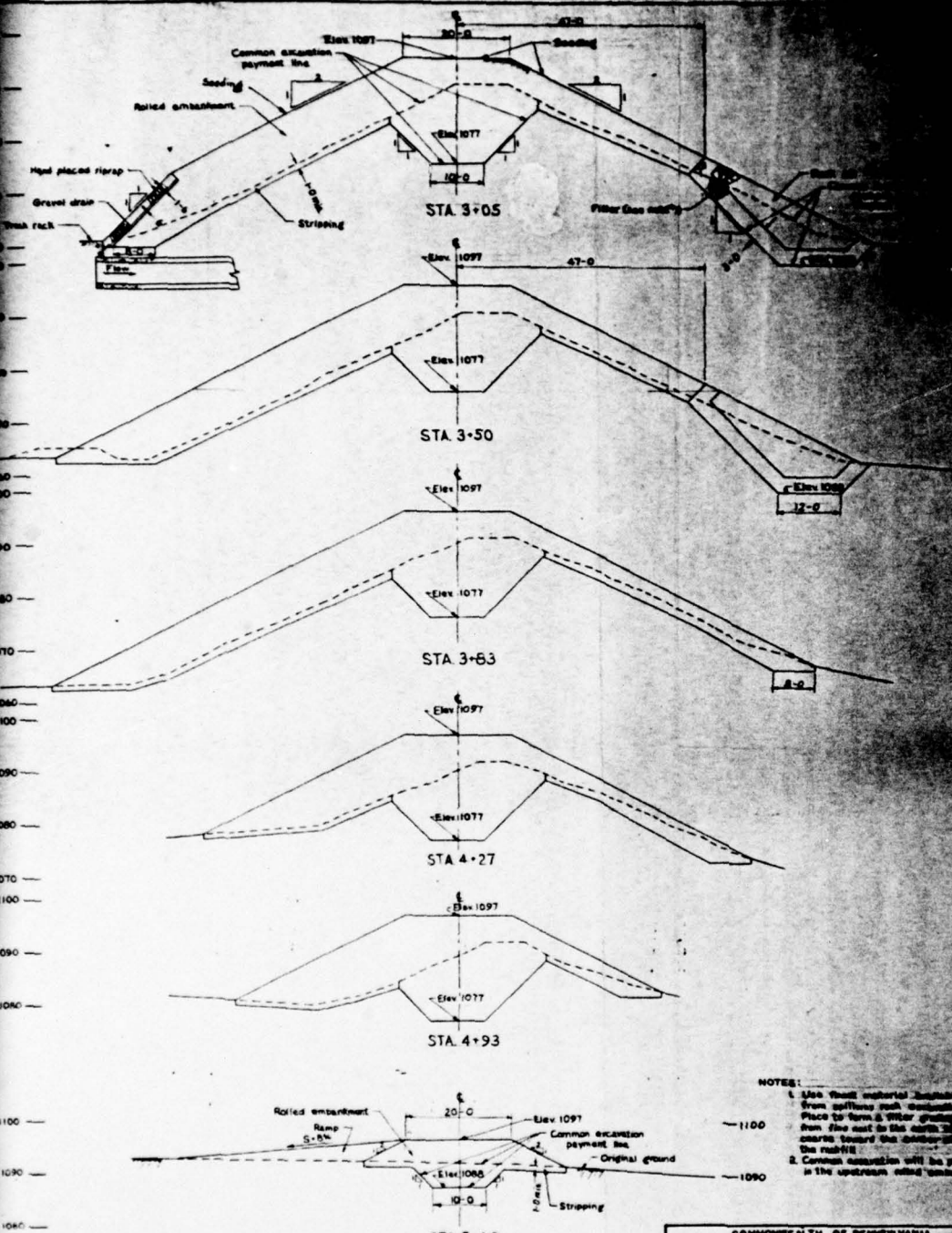
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF FORESTS AND WATERS  
 DIVISION OF ROAD CONSTRUCTION  
**BULL RUN DAM**  
 BORROW AREA AND BORINGS  
 BULL RUN JENNETTE  
 WESTMORELAND COUNTY

FIGURE 7

DESIGNED BY	ILLIUM CONSULTING
CHECKED BY	J.L.R.
APPROVED BY	H. H. ...
DATE	7-1-55
SCALE	AS SHOWN



Scale: 1" = 10'



NOTES:  
 1. Use steel exported materials from offshore rock excavation. Place to form & filter grating from five feet to the north 25 yards toward the abutment the rubble.  
 2. Common excavation will be placed in the upstream called "excavation".

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF FORESTS AND WATERS  
 DIVISION OF FLOOD CONTROL

**BULL RUN DAM**  
**OUTLET WORKS REHABILITATION**  
**CROSS SECTIONS**

BULL RUN      JEANNETTE, PA.  
 WESTMORELAND COUNTY

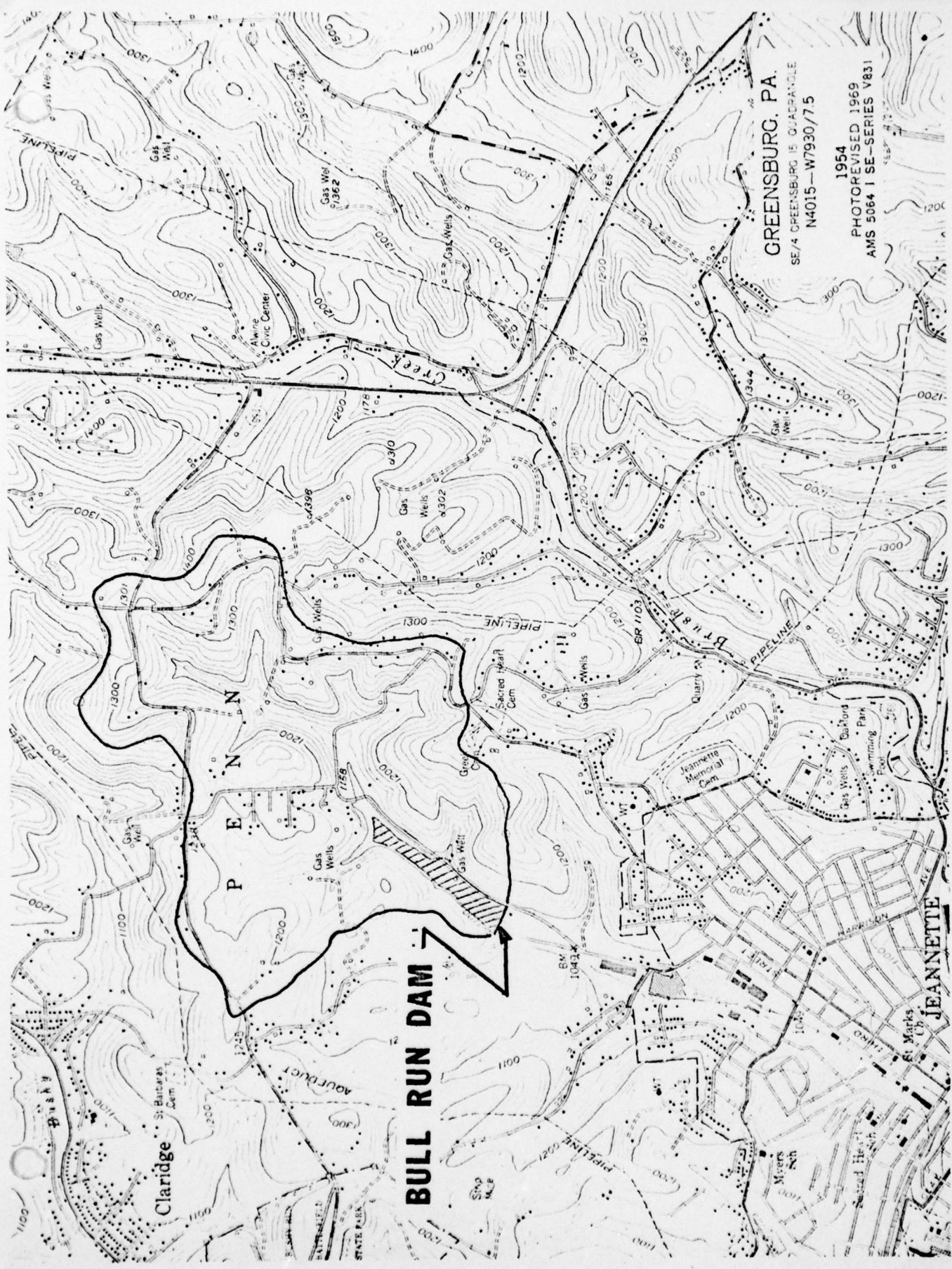
FIGURE 8

NO	DATE	REVISION	REV	CHK	APPN

DESIGNED BY: *Allen Connolly*  
 CHECKED BY: *Allen Connolly*  
 APPROVED BY: *Allen Connolly*

DWG. NO. C651543

APPENDIX G  
REGIONAL VICINITY MAP



GREENSBURG, PA.  
SE/4 GREENSBURG 15 QUADRANGLE  
N4015—W7930/75

1954  
PHOTOREVISED 1969  
AMS 5064 I SE—SERIES V831

**BULL RUN DAM**

Claridge

GREENSBURG, PA.

1954

PHOTOREVISED 1969

AMS 5064 I SE—SERIES V831

JEANNETTE