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BAI CONSULTANTS INC MONROEVILLE PA

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NATIONAL DAM INSPECTION PROGRAM UPPER BRIDGEPORT DAM NDI I.D. N--ETC(U)

DACW31-79-C-0013

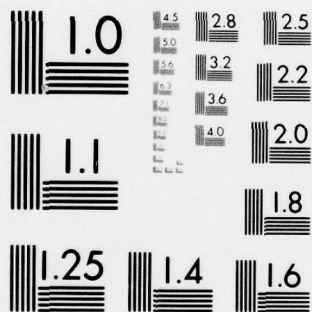
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## PREFACE

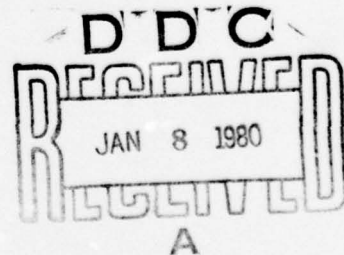
This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team.

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

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

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PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

ABSTRACT

Upper Bridgeport Dam: NDI I.D. No. PA-00465

Owner: Municipal Authority of Westmoreland  
County

State Located: Pennsylvania (PennDER I.D. No. 65-5)

County Located: Westmoreland

Stream: Jacobs Creek

Inspection Date(s): 12 December 1978  
23 April 1979

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

*[Contd from  
p. 1]*

Based on the visual inspection, operational history, and available engineering data, the dam is considered to be in poor condition. The facility has been essentially abandoned by the current owner and has not been in operation or maintained since 1972.

The size classification of the facility is intermediate and its hazard classification is considered to be high. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) for this facility is the Probable Maximum Flood (PMF). Results of the hydrologic and hydraulic analysis indicate that the facility can accommodate approximately 20 percent of the PMF before overtopping of the embankment occurs. Since the dam's hazard rating is high, and embankment failure would result in an increase in the potential for loss of life downstream from the dam, the present spillway system is assessed as being seriously inadequate. The facility, on the whole, is considered unsafe, but dam failure is not considered imminent. Consequently, it is recommended that the owner immediately develop an emergency warning system to notify downstream residents in the event hazardous conditions develop. Included in the plan should be provisions for around-the-clock surveillance during periods of unusually heavy precipitation.



Since the dam no longer serves its original purpose (water supply), and, in essence, has been abandoned, it is recommended that the owner immediately:

a. Reactivate or rehabilitate the drawdown facilities and subsequently drawdown and maintain the reservoir at a minimum pool level.

b. Formulate plans and initiate procedures for demolishing and removing the entire facility in accordance with the regulations of PennDER's Division of Dam Safety.

If the facility is to be reactivated for water supply or for other purposes, it is recommended that the owner:

c. Retain the services of a registered professional engineer experienced in hydraulics and hydrology to study the facility, and take appropriate measures to make the facility hydraulically adequate.

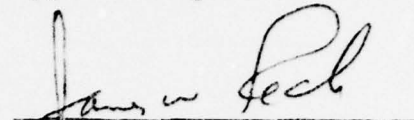
d. Retain the services of a registered professional engineer experienced in the design of earth dams to perform a detailed geotechnical evaluation of the facility and take appropriate remedial measures as dictated by the study.

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GAI Consultants, Inc.

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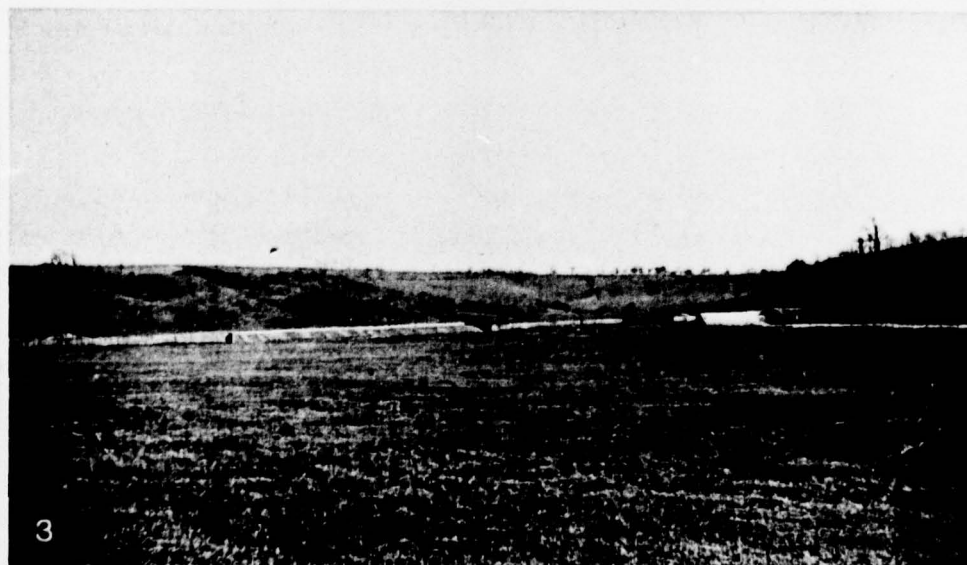
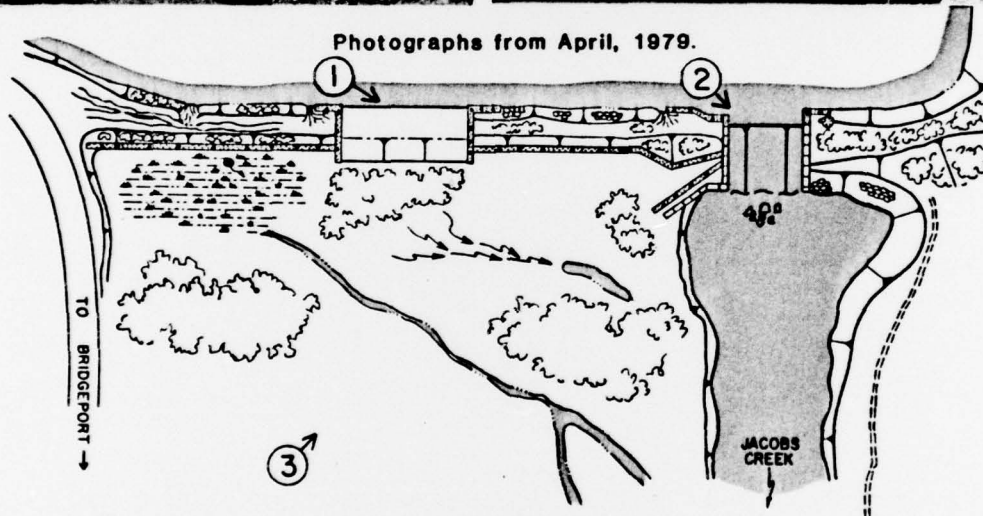
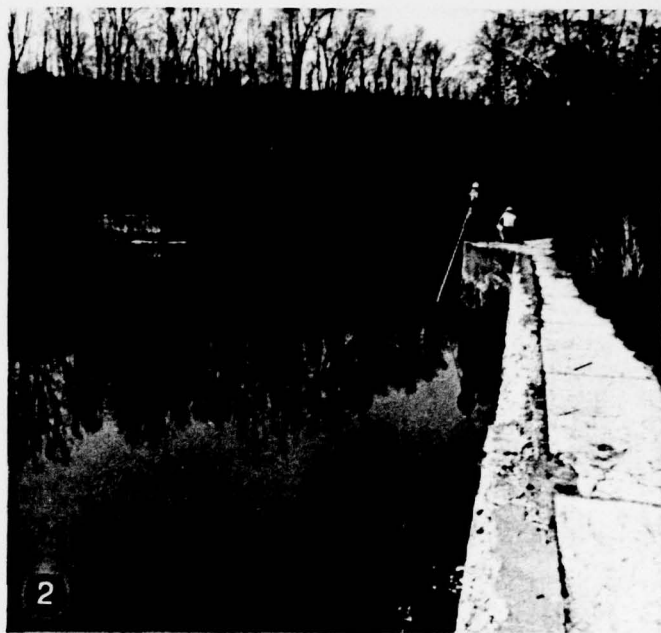
  
Bernard M. Mihalcin, P.E.

  
JAMES W. PECK  
Colonel, Corps of Engineers  
District Engineer



Date 25 July 1979

Date 13 August 1979



Photograph from April, 1923.

OVERVIEW PHOTOGRAPH



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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
UPPER BRIDGEPORT DAM  
NDI# PA-465, PENNDER# 65-5

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. Upper Bridgeport Dam is an earth embankment approximately 1,020 feet long (including spillways), with a maximum height of 21 feet. The embankment is divided into three sections by two spillways (see Figure 1, Appendix F). The service spillway is a combination masonry and concrete trapezoidal-shaped weir structure with a 101-foot long crest located about 140 feet from the left abutment. The emergency spillway is a concrete broad-crested weir structure with a 250-foot crest length located about 320 feet to the left of the right abutment.

The dam has two 16-inch diameter cast iron pipe (C.I.P.) outlets, one located in each of the service spillway abutments. Each conduit is controlled by a 16-inch diameter gate valve, with the valves contained in valve pits along either wingwall (see Figures 3 and 4).

b. Location. Upper Bridgeport Dam is located on Jacobs Creek, Mount Pleasant Township, Westmoreland County, Pennsylvania, about two miles south of Mount Pleasant. The dam and reservoir are located on the Connellsville and Mount Pleasant, Pennsylvania, U.S.G.S. 7.5 minute topographic quadrangles (see Appendix G). The coordinates of the dam are N40° 8.0' and W79° 31.0'.

c. Size Classification. Intermediate (21 feet high, 1,250 acre-feet storage capacity at top of dam).

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

e. Ownership. Municipal Authority of Westmoreland County  
P. O. Box 730  
Greensburg, Pennsylvania 15601

f. Purpose. Originally water supply (now defunct); presently used for unauthorized recreation.

g. Historical Data. Upper Bridgeport Dam was constructed in 1886 as a domestic and industrial water supply facility serving the communities of Mount Pleasant and Scottdale, Pennsylvania. The facility was originally owned and operated by the Mount Pleasant Water Company which was, at that time, a wholly owned subsidiary of the H. C. Frick Coke Company of Scottdale, Pennsylvania. Construction of the facility was performed by Stark Brothers, contractors from Greensburg, Pennsylvania.

The dam has been modified several times since its completion in 1886. In 1888, the embankment was raised by two feet, and it was again raised in 1894. The service spillway was modified and a concrete corewall was installed during an 1894 reconstruction. In 1906, the present emergency spillway was constructed in direct response to a flood which overtopped the dam. No recent modifications have been made to the facility under its current ownership.

In 1942, the Municipal Authority of Westmoreland County acquired the facility and immediately established it, along with the Lower Bridgeport Dam, as an integral part of their water supply system. The facility remained in operation until 1972 when the owner began to fulfill the water demands of the local area via their Youghiogheny system.

### 1.3 Pertinent Data.

a. Drainage Area (square miles). 28.9 (local)  
31.5 (total)

b. Discharge at Dam Site. Discharge records are not available.

c. Elevation (feet above mean sea level). The following elevations were obtained through field measurements that

were based on the elevation of the service spillway crest at 1053.5 feet.

|                                      |                                                                                                                    |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Top of Dam                           | 1059 (measured low spot along embankment)                                                                          |
| Maximum Pool Design                  | Not known                                                                                                          |
| Maximum Pool of Record               | Not known                                                                                                          |
| Service Spillway Crest               | 1053.5                                                                                                             |
| Emergency Spillway Crest             | 1056.6                                                                                                             |
| Normal Pool                          | 1053.5                                                                                                             |
| Upstream Outlet Invert               | 1040                                                                                                               |
| Downstream Outlet Invert             | 1038                                                                                                               |
| Streambed at Dam Centerline          | 1039                                                                                                               |
| Streambed at Emergency Spillway      | 1038                                                                                                               |
| Maximum Tailwater                    | Not known                                                                                                          |
| d. <u>Reservoir Length (miles).</u>  |                                                                                                                    |
| Top of Dam                           | 2.3                                                                                                                |
| Normal Pool                          | 1.0                                                                                                                |
| e. <u>Storage (acre-feet).</u>       |                                                                                                                    |
| Top of Dam                           | 1250                                                                                                               |
| Service Spillway Crest               | 530                                                                                                                |
| Emergency Spillway Crest             | 870                                                                                                                |
| f. <u>Reservoir Surface (acres).</u> |                                                                                                                    |
| Top of Dam                           | 180                                                                                                                |
| Service Spillway Crest               | 80                                                                                                                 |
| Emergency Spillway Crest             | 140                                                                                                                |
| g. <u>Dam.</u>                       |                                                                                                                    |
| Type                                 | Earth embankment                                                                                                   |
| Length                               | 1020 feet (field measured; includes service and emergency spillways)                                               |
| Height                               | Maximum field measured section = 21 feet.                                                                          |
| Top Width                            | Varies; 15 to 25 feet to the right of the service spillway and 70 to 140 feet to the left of the service spillway. |



|                            |                                                                                                                                                                                                                         |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Zoning                     | Homogeneous earth with concrete corewall.                                                                                                                                                                               |
| Impervious Core            | A concrete core wall, according to PennDER records, was installed in 1894. No other information pertaining to its design or construction are available.                                                                 |
| Cutoff                     | According to available information the embankment is founded on clay; however, there is no specific mention of a cutoff.                                                                                                |
| Grout Curtain              | None indicated.                                                                                                                                                                                                         |
| h. <u>Diversion Canal.</u> | None                                                                                                                                                                                                                    |
| i. <u>Outlet Conduit.</u>  |                                                                                                                                                                                                                         |
| Type                       | Two 16-inch diameter cast iron outlets, one located in each of the abutments of the service spillway.                                                                                                                   |
| Length                     | Each outlet pipe is 40 feet, inlet to gate valve control. Beyond the gate valves, discharge is channeled into masonry tunnels and eventually released at the downstream bases of the wingwalls of the service spillway. |
| Closure                    | Discharge through the outlets is controlled by 16-inch diameter gate valves housed at the bases                                                                                                                         |

|                               |                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               | of two separate valve pits located on either side of the service spillway crest.                                                                                                                                                                                                                                                                        |
| Access                        | The valve pits are accessible from the embankment crest.                                                                                                                                                                                                                                                                                                |
| j. <u>Spillways.</u>          |                                                                                                                                                                                                                                                                                                                                                         |
| Types                         | Service: Concrete faced stone masonry, trapezoidal-shaped weir structure, with a cut stone coped crest.<br><br>Emergency: concrete broad-crested weir structure.                                                                                                                                                                                        |
| Crest Lengths                 | Service: 101 feet<br>Emergency: 250 feet                                                                                                                                                                                                                                                                                                                |
| Upstream Channels             | Not applicable                                                                                                                                                                                                                                                                                                                                          |
| Downstream Channels           | Service: the service spillway discharges flow directly into the pool formed by the Lower Bridgeport Dam.<br><br>Emergency: the emergency spillway discharges into the heavily wooded area to the right of the Lower Bridgeport Reservoir, and eventually into the lower reservoir several hundred feet downstream from the Upper Bridgeport embankment. |
| k. <u>Regulating Outlets.</u> | See "Outlet Conduit" above.                                                                                                                                                                                                                                                                                                                             |

## SECTION 2 ENGINEERING DATA

### 2.1 Design.

a. Design Data Availability and Sources. No design data, calculations, or reports are available concerning any aspect of this facility. Design features, presented below, are derived from information and correspondence contained in PennDER files. Included in the files were drawings, dated photographs, and state inspection reports.

#### b. Design Features.

1. Embankment. The embankment, as shown on Figure 1, was constructed of earth atop a clay foundation. No records of compaction procedures or construction techniques are available. A concrete corewall was installed in 1894 which reportedly extends from the right abutment to the left wingwall of the service spillway, a length of about 800 feet. No outer corewall details are available. Cross-sectional dimensions, specifically, heights, crest widths, and slope angles vary significantly along the embankment.

#### 2. Appurtenant Structures.

a. Service Spillway. The service spillway is a concrete faced cut stone masonry, trapezoidal-shaped weir structure located approximately 140 feet from the left abutment (see Photograph 4). The overflow section is 101 feet long and 6.7 feet below the top of the wingwall (5.5 feet below the low spot of the embankment).

b. Emergency Spillway. The emergency spillway is a concrete broad-crested weir structure (see Photograph 2) located about 320 feet from the right abutment, and approximately 215 feet to the right of the service spillway. The crest measures 250 feet across, and is about 3 feet deep (2.4 feet below the low spot of the embankment).

c. Outlet Conduits. The dam was designed with two 16-inch diameter C.I.P. outlet conduits, one located in each of the abutments of the service spillway (see Figure 4). The conduits are controlled by 16-inch diameter gate valves located at the bases of valve pits built into the spillway wingwalls. The inlet ends of the conduits are apparently equipped with trash screens. The outlet ends terminate below the surface of the water in the reservoir formed by the Lower Bridgeport Dam.



c. Design Data and Procedures. No specific design data are available for any aspect of this facility.

2.2 Construction Records.

No construction records are available.

2.3 Operating Records.

No records of operation are available.

2.4 Other Investigations.

Aside from periodic Pennsylvania State Inspection Reports contained in PennDER files, no records of other investigations are available.

2.5 Evaluation.

No formal engineering data are available; however, sufficient information, in the form of drawings and historical records, are available to make a reasonable Phase I assessment of the facility.



## SECTION 3 VISUAL INSPECTION

### 3.1 Observations.

a. General. The general appearance of the structure, based on the visual inspection, suggests that it is in poor condition.

b. Embankment. Observations made during the visual inspection revealed the embankment to be in poor condition. The embankment is heavily overgrown with trees as well as thick brush (see Photographs 1 and 3). The crest is extensively rutted between the emergency spillway and right abutment where vehicular access is available (see Photograph 1). Several of the ruts were measured to be in excess of 12 inches deep. Several eroded areas, completely void of riprap protection, were observed along the upstream slope. The exposed concrete retaining wall, which defines the downstream slope along most of the embankment, displays numerous cracks and spalls, but overall, was considered to be in fair condition (see Photograph 6). The downstream toe area was found to be heavily wooded (see Photograph 7). Seepage was observed in the swamp-like area between the right abutment and emergency spillway. A sinkhole, approximately 3 feet in diameter and 3 feet deep, was observed several feet to the left of the service spillway (see Figure 1). In general, the embankment, as observed during the inspection, displays numerous signs of deterioration and a lack of maintenance.

### c. Appurtenant Structures.

1. Service Spillway. Based on the visual inspection, the service spillway is considered to be in fair condition. The block masonry and concrete structure is well aligned along the crest and at both wingwalls. Extensive cracking and spalling were, however, observed along concrete portions of both wingwalls upstream from the crest (see Photograph 9).

2. Emergency Spillway. The emergency spillway is in a poor condition, characterized by extensive spalling, cracking, and overall concrete deterioration (see Photographs 2 and 8).

3. Outlet Conduits. The intakes and outlets of the outlet conduits are submerged by design and, consequently, were not observed by the inspection team. The valve pit at

the right wingwall was covered with a steel door and locked, making it inaccessible. The valve pit at the left wingwall was not covered; however, the valve was equally unobservable due to several feet of debris within the pit. The owner's representative did not know whether or not either conduit valve was operable, as neither has been operated since at least 1972.

d. Reservoir Area. The reservoir is surrounded by moderate to steep slopes comprised of pastureland and moderate to thickly wooded areas. No evidence of slope distress was observed in the surrounding area.

e. Downstream Area. Discharge from both spillways of Upper Bridgeport Dam flows into the pool formed by the Lower Bridgeport Dam. The lower dam is located approximately 2,400 feet downstream from the upper dam (see Photographs 10 and 12). The southern (left) shore of the Lower Bridgeport Reservoir is lined by approximately six homes (see Photograph 11) which could possibly be affected by an embankment breach of the Upper Bridgeport Dam. Another seven structures are located along the northern (right) bank of the lower reservoir at somewhat higher elevations. In addition, the bulk of the community of Bridgeport is located along the right bank of Jacobs Creek downstream from the Lower Bridgeport Dam. Thus, the hazard classification of the facility is considered to be "high".

### 3.2 Evaluation.

The overall appearance of the facility indicates it to be in poor condition. The facility is minimally maintained and has, in essence, been abandoned. In accordance with PennDER, Division of Dam Safety regulations, the facility should be drained and the embankment dismantled.

## SECTION 4 OPERATIONAL PROCEDURES

### 4.1 Normal Operational Procedures.

The facility has not been in active operation since 1972. As a result, there are no formal operating procedures associated with it. Presently, excess inflow is discharged over the service spillway and into the pool formed by the Lower Bridgeport Dam. If the reservoir level reaches elevation 1056.6, or 3.1 feet above the service spillway crest, the emergency spillway will discharge excess inflow into the Lower Bridgeport Reservoir in tandem with the service spillway. The outlet conduits were last operated in 1972.

### 4.2 Maintenance of Dam.

Since the facility was phased out of operation in 1972, no formal maintenance has been routinely performed.

### 4.3 Maintenance of Operating Facilities.

See "Maintenance of Dam" above.

### 4.4 Warning System.

No formal warning system is in effect.

### 4.5 Evaluation.

No formal operational or maintenance procedures are available relative to any aspect of the facility. The facility was phased out of active operation in 1972, and is now defunct. Additionally, there is no formal warning system in effect.



## SECTION 5 HYDROLOGIC/HYDRAULIC EVALUATION

### 5.1 Design Data.

No design data, calculations, or reports are available. Information relative to the design of the facility is limited to that which can be inferred from the several drawings, photographs, and state inspection reports available in PennDER files.

### 5.2 Experience Data.

No records of spillway and/or outlet conduit discharges are available. Data contained in PennDER files indicates that the emergency spillway was constructed in 1906 in direct reaction to a flood which overtopped the embankment. Photographs dated 1941 indicate damage to the emergency spillway, presumably after a significant discharge.

### 5.3 Visual Observations.

On the date of inspection no conditions were observed that would indicate the service spillway would not perform satisfactorily during a flood event. The discharge capacity of the emergency spillway, on the other hand, may be reduced due to the dense overgrowth immediately beyond the downstream embankment toe (see Photograph 7). The present operability of the outlet works is questionable.

### 5.4 Method of Analysis.

The facility has been analyzed in accordance with the procedures and guidelines established by the U. S. Army, Corps of Engineers, Baltimore District, for Phase I hydrologic and hydraulic evaluations. The analysis has been performed utilizing a modified version of the HEC-1 program developed by the U. S. Army, Corps of Engineers, Hydrologic Engineering Center, Davis, California. Analytical capabilities of the program are briefly outlined in the preface contained in Appendix C.

### 5.5 Summary of Analysis.

a. Spillway Design Flood (SDF). In accordance with procedures and guidelines contained in the National Guidelines



for Safety Inspection of Dams for Phase I Investigations, the Spillway Design Flood (SDF) for Upper Bridgeport Dam is the PMF. That is, based on the relative size (intermediate) and hazard potential (high) of Upper Bridgeport Dam, the facility is required to have sufficient spillway and storage capabilities to safely discharge the PMF without embankment overtopping.

b. Results of Analysis. Upper Bridgeport Dam was analyzed under assumed normal operating conditions. That is, the Upper Bridgeport Dam reservoir was initially at its normal pool or service spillway elevation of approximately 1053.5 feet (MSL), with the low-level blowoff lines closed. The service spillway of the facility is composed of a combination masonry and concrete trapezoidal-shaped weir structure which discharges directly into the Lower Bridgeport Dam reservoir. The emergency spillway of the facility is composed of a concrete broad-crested weir structure which discharges into the woods that are located directly beyond the embankment toe.

The PA-657 Dam, located about 9.0 miles upstream from the Upper Bridgeport Dam, was also evaluated in this analysis to assess its effects on the Upper Bridgeport Dam. It too was investigated under near normal operating conditions. That is, the PA-657 Dam reservoir was initially at its normal or recreation pool elevation of 1827.5 feet (MSL) with the service spillway (drop-inlet structure) assumed to be non-functional for the purpose of analysis. Design information concerning the PA-657 Dam reservoir's elevation-storage relationship was available and used in the evaluation. Design information was also available regarding the elevation-discharge relationship of the emergency spillway, but this data was felt to be too conservative for analysis and was not used. The emergency spillway is a vegetated chute channel with a flat, vegetated, critical flow control crest.

Finally, the effects of the Lower Bridgeport Dam on the Upper Bridgeport facility were considered via the computation of a tailwater curve, since the Lower Bridgeport Dam's reservoir extends to the toe of the upper dam's service spillway. All downstream channel routing was done under the assumption that the stream was dry prior to the inflow of the dam outflows. All pertinent engineering calculations relative to the evaluation of Upper Bridgeport Dam are provided in Appendix C, while calculations relative to the evaluation of the upstream PA-657 Dam are provided in Appendix C-1. (Lower Bridgeport Dam computations are contained on Sheets 16 through 22 of Appendix C.)

Overtopping analysis (using the Modified HEC-1 computer program) indicated that the discharge/storage capacity of Upper Bridgeport Dam can accommodate only about 20 percent of the PMF (the SDF) prior to the overtopping of its embankment, while the discharge/storage capacity of PA-657 Dam can accommodate the full PMF (Appendix C, Summary Input/Output Sheets, Sheets S and R). The low top of embankment of Upper Bridgeport Dam was inundated by depths of water of 1.1 feet under 1/2 PMF conditions, and 5.0 feet under full PMF conditions. Therefore, since the SDF of each of these facilities is the PMF, only the Upper Bridgeport Dam has a high potential for overtopping, and thus, for breaching under floods of much less than SDF magnitude.

Since the Upper Bridgeport Dam facility cannot safely handle a flood of at least 1/2 PMF magnitude, the possibility of embankment failure under floods of 1/2 PMF intensity or less was investigated (in accordance with ETL-1110-2-234). Several feasible alternatives were analyzed, since it is difficult, if not impossible, to determine exactly how or if a specific dam will fail. The major concern of the breaching evaluations is with the impact of the various breach discharges on increasing downstream water surface elevations above those to be expected if breaching did not occur.

The Modified HEC-1 computer program was used for the breaching analysis with the assumption that the breaching of a dam would begin once its reservoir level reached the low top of dam elevation.

Two sets of breach geometry were analyzed for the Upper Bridgeport Dam for each of two failure times (Appendix C, Sheet 23). The two sets of breach sections chosen were considered to be the minimum and maximum probable failure sections. The two failure times (total time for each breach section to reach its final dimensions) under which the two breach sections were evaluated were assumed to be a moderately rapid time (0.75 hours) and a prolonged time (4.0 hours), so that the possible upper and lower limits of this most sensitive variable might be examined. In addition, an average or more probable set of breach conditions was analyzed, with a failure time of 1.5 hours.

The Upper Bridgeport Dam peak breach outflows (resulting from a 0.22 PMF overtopping) ranged from about 8020 cfs for the minimum section-prolonged fail time scheme, to about 18550 for the maximum section-minimum fail time scheme (Summary Input/Output Sheets, Sheet BB). The outflow for the average breach condition was about 11890 cfs compared to the non-breach 0.22 PMF peak facility outflow of about 8180 cfs (Summary Input/Output Sheets, Sheet S). The water surface elevation corresponding to the non-breach 0.22 PMF

peak discharge at a section (Section 7) located 550 feet downstream from the dam was approximately 1053.1 feet (MSL) and approximately 1051.3 feet (MSL) at a section (Section 8) located 2,400 feet downstream from the dam (Summary Input/Output Sheets, Sheet S). The water surface elevations corresponding to the average condition peak breach outflow at the two above-mentioned downstream sections were about 1054.5 feet (MSL) and 1052.6 feet (MSL), respectively (Summary Input/Output Sheets, Sheet BB). The approximate elevation of the first house at Section 7, as well as of the other structures which line the left bank of the Lower Bridgeport Dam Reservoir is 1050 feet (MSL). The approximate elevation of the structure at Section 8 (excluding the abandoned building which abuts the lower dam) as well as of the other structures which line the right bank of the Lower Bridgeport Dam reservoir is 1053 feet (MSL), as determined by field measurement and observation. Therefore, the increase in the water surface at Section 7 caused by the failure of Upper Bridgeport Dam was about 1.4 feet, with the breach water surface above the damage levels of the structures along the left bank of the lower reservoir. The increase in the water surface at Section 8, caused by the failure of the dam, was about 1.3 feet with the approximate breach water surface just below the damage levels of the structures along the right bank of the lower reservoir. Although the houses along the left bank area would probably be somewhat damaged even if the dam did not fail, the water surface increases resulting from dam breaching could conceivably cause much more significant damage to the structures, if not only the increase in the height of the flood-wave, but also the increase in the momentum of the larger and probably swifter moving volume of water was considered.

Analysis of embankment breaching under 1/2 PMF base conditions indicated that failure of the dam during a flood of such magnitude would probably not increase the damage to downstream structures (Appendix C, Sheets 25 and 26). However, the analysis indicated that there is a flood between the 0.22 PMF and the 1/2 PMF under which dam failure would result in increased damage to the residences on the right bank of the Lower Reservoir. Therefore, the failure of Upper Bridgeport Dam caused by floods of less than 1/2 PMF magnitude is quite possible, and will most probably lead to increased property damage and loss of life in the downstream community.

#### 5.6 Spillway Adequacy.

As presented previously, under existing conditions Upper Bridgeport Dam can accommodate only about 20 percent



of the PMF (the SDF) prior to overtopping of its embankment. Should a 0.22 PMF or somewhat larger event occur, the dam will be overtopped and will possibly fail, endangering many residences in the immediate downstream area. Therefore, the spillway system of Upper Bridgeport Dam is considered to be seriously inadequate.



SECTION 6  
EVALUATION OF STRUCTURAL INTEGRITY

6.1 Visual Observations.

a. Embankment. The conditions observed during the field inspection suggest the embankment is in poor condition and suffers from a general lack of maintenance and care. This condition is considered serious in light of the age and hazard classification of the facility.

Specific deficiencies which are related to a lack of maintenance include: 1) heavy vegetation and overgrowth along the embankment and downstream toe area; 2) deep rutting of the embankment crest between the emergency spillway and right abutment; and 3) several eroded areas along the upstream face that are completely void of riprap protection. The above items are undesirable, and over the long term, could present a serious threat to embankment stability.

Other deficiencies include the: 1) 3-foot deep sink-hole located several feet to the left of the service spillway; and 2) the seepage and swamp-like condition along the downstream toe between the emergency spillway and right abutment indicating possible structural deficiencies which may pose a threat to embankment stability under flood conditions.

b. Appurtenant Structures.

1. Service Spillway. The service spillway is in fair condition. Its general appearance suggests it to be structurally stable. The major deficiency associated with the structure is its extensively cracked and badly spalled concrete wingwalls.

2. Emergency Spillway. The emergency spillway is in poor condition. The concrete structure is badly deteriorated as evidenced by extensive spalling, scaling and deep structural cracking. Its structural integrity and overall stability under high flows is questionable.

3. Outlet Conduits. The outlet conduits were last operated in 1972, and their present operability is questionable.

6.2 Design and Construction Techniques.

No information is available that details the methods of design and/or construction.

### 6.3 Past Performance.

Correspondence contained in PennDER files indicate that the facility was constructed in 1886. In 1906, the embankment was overtopped which prompted the construction of the present emergency spillway. Two photographs contained in PennDER files indicate that in 1941, the emergency spillway suffered a partial collapse from apparent settlement (possibly internal piping) of the supporting soil. Otherwise, since 1906, the facility has apparently performed adequately. However, no flood records are available.

### 6.4 Seismic Stability.

The dam is located within Seismic Zone No. 1 and may be subject to minor earthquake induced dynamic forces. Due to its relatively small cross-section, it is believed the embankment can withstand the expected minor earthquake induced forces. However, no calculations or investigations were performed to confirm this opinion.

SECTION 7  
ASSESSMENT AND RECOMMENDATIONS FOR REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. Visual observations indicate the structure to be in poor condition. The facility, which was originally designed to serve the water supply needs of nearby communities, has not been in operation since 1972. Its physical condition has deteriorated steadily over the last decade as it has essentially been abandoned by the present owner.

The general lack of maintenance has contributed to many of the deficiencies presently associated with the facility including: 1) an overgrown embankment and downstream areas; 2) rutted crest; 3) bare unprotected areas along the upstream slope; 4) severely deteriorated concrete; 5) questionable operability of the outlet conduits; and 6) an apparent sinkhole and other low areas along the crest.

Hydrologic and hydraulic calculations indicate the spillways can accommodate approximately 20 percent of the Probable Maximum Flood (PMF) before overtopping of the embankment occurs. As the facility's hazard rating is high, the present spillway system is assessed as being seriously inadequate and the facility is considered to be unsafe, non-emergency.

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

c. Urgency. Because of the seriously inadequate spillway system, a formal warning system should be implemented immediately. It is further recommended that the actions required by the recommendations listed in Section 7.2 be promptly initiated.

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

7.2 Recommendations/Remedial Measures.

Because of the seriously inadequate spillway system, the facility is considered unsafe. Embankment failure is not considered imminent; however, failure could significantly increase the hazard to downstream communities. As a consequence, it is recommended that the owner immediately develop a warning system to notify downstream residents



should hazardous conditions develop. Included in the plan should be provisions for around-the-clock surveillance of the facility during periods of unusually heavy precipitation.

In light of the fact that the dam no longer serves its original purpose, and has, in essence, been abandoned, it is recommended that the owner immediately:

a. Reactivate or rehabilitate the drawdown facilities and subsequently drawdown and maintain the reservoir at a minimum pool level.

b. Formulate plans and initiate procedures for demolishing and removing the entire facility in accordance with the regulations of PennDER's, Division of Dam Safety.

If the facility is to be reactivated for water supply or for other purposes, it is recommended that the owner:

c. Retain the services of a registered professional engineer experienced in hydraulics and hydrology to study the facility, and take appropriate measures to make the facility hydraulically adequate.

d. Retain the services of a registered professional engineer experienced in the design of earth dams to perform a detailed geotechnical evaluation of the facility, and take appropriate remedial measures as dictated by the study.



APPENDIX A  
CHECK LIST - ENGINEERING DATA

CHECK LIST  
ENGINEERING DATA  
PHASE I

NAME OF DAM: Upper Bridgeport Dam  
NDI#: PA-465 PENNDR#: 65-5

PAGE 1 OF 5

| ITEM                                             | REMARKS                                                                                                                                                                                                                       | NDI# PA - 465 |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| PERSONS INTERVIEWED<br>AND TITLE                 | Ken Baker - Engineer, Municipal Authority of Westmoreland County<br>Paul Mance - Assistant Superintendent of Scottsdale Division                                                                                              |               |
| REGIONAL VICINITY<br>MAP                         | Dam and reservoir contained on Connellsville and Mount Pleasant, PA.,<br>7.5 minute U.S.G.S topographic quadrangles (see Appendix G).                                                                                         |               |
| CONSTRUCTION HISTORY                             | Good historical report in PennDER files, dated April 7, 1915.<br>Dam built in 1886 for Mount Pleasant Water Company (owned by H. C. Frick<br>Coke Company)<br>Eventually purchased by Westmoreland Authority in 1942 or 1943. |               |
| AVAILABLE DRAWINGS<br>from                       | Owner: 1971 Land Survey                                                                                                                                                                                                       |               |
| from                                             | PennDER: Four (4) drawings showing plans of dam and spillways with few<br>details.                                                                                                                                            |               |
| TYPICAL DAM SECTIONS                             | No drawings. Described in 1915 PennDER report.                                                                                                                                                                                |               |
| OUTLETS:<br>PLAN<br>DETAILS<br>DISCHARGE RATINGS | See Figure 4, Appendix F.                                                                                                                                                                                                     |               |

## ENGINEERING DATA (CONTINUED)

PAGE 2 OF 5

| ITEM                                                                                          | REMARKS                              | NDI# PA - 465 |
|-----------------------------------------------------------------------------------------------|--------------------------------------|---------------|
| SPILLWAY:<br>PLAN<br>SECTION<br>DETAILS                                                       | See Figures 3 through 6, Appendix F. |               |
| OPERATING EQUIPMENT<br>PLANS AND DETAILS                                                      | See Figure 4, Appendix F.            |               |
| DESIGN REPORTS                                                                                | None                                 |               |
| GEOLOGY REPORTS                                                                               | None                                 |               |
| DESIGN COMPUTATIONS:<br>HYDROLOGY AND<br>HYDRAULICS<br>STABILITY ANALYSES<br>SEEPAGE ANALYSES | None                                 |               |
| MATERIAL<br>INVESTIGATIONS:<br>BORING RECORDS<br>LABORATORY TESTING<br>FIELD TESTING          | None                                 |               |

## ENGINEERING DATA (CONTINUED)

PAGE 3 OF 5

| ITEM                                                    | REMARKS                                                                                                                                                                                      | NDI# PA - 465 |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| BORROW SOURCES                                          | Not known. Probably from within reservoir.                                                                                                                                                   |               |
| POST CONSTRUCTION<br>DAM SURVEYS                        | 1917 property survey conducted, available from PennDER files.                                                                                                                                |               |
| POST CONSTRUCTION<br>ENGINEERING<br>STUDIES AND REPORTS | None by present owner.                                                                                                                                                                       |               |
| HIGH POOL RECORDS                                       | PennDER files infer emergency spillway passed flow in 1941.<br>Representatives of present owner cannot recall any flow over emergency spillway (since 1942).                                 |               |
| MONITORING SYSTEMS                                      | None                                                                                                                                                                                         |               |
| MODIFICATIONS                                           | None since acquired by Westmoreland Authority. Several modifications described in 1915 PennDER report include re.ovation of service spillway and construction of emergency spillway in 1916. |               |



## ENGINEERING DATA (CONTINUED)

PAGE 4 OF 5

| ITEM                                           | REMARKS                                                                                                                                                                                                                                   | NDI# | PA - | 465 |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-----|
| PRIOR ACCIDENTS OR FAILURES                    | <p>None during use by present owner.</p> <p>PennDER files indicate:</p> <p>a) Overtopped in 1906 - emergency spillway added</p> <p>b) Downstream face of emergency spillway lost support and collapsed in 1941 - apparently repaired.</p> |      |      |     |
| MAINTENANCE: RECORDS MANUAL                    | None                                                                                                                                                                                                                                      |      |      |     |
| OPERATION: RECORDS MANUAL                      | None                                                                                                                                                                                                                                      |      |      |     |
| OPERATIONAL PROCEDURES                         | Currently out of operation. Previously, right drain (16" diameter outlet) was used to supplement water supply to Lower Bridgeport Dam where supply was drawn off and filtered. Valve was operated manually with 20-foot long key.         |      |      |     |
| WARNING SYSTEM AND/OR COMMUNICATION FACILITIES | None - No observers during flood conditions.                                                                                                                                                                                              |      |      |     |
| MISCELLANEOUS                                  | Water supply now taken from Youghiogheny system.                                                                                                                                                                                          |      |      |     |

CHECK LIST  
HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

NDI ID # PA-00465  
PENN DER ID # 65-5  
PAGE 5 OF 5

SIZE OF DRAINAGE AREA: 28.9 square miles (local); 31.5 square miles (total)

ELEVATION TOP NORMAL POOL: 1053.5 STORAGE CAPACITY: 530 acre-feet

ELEVATION TOP FLOOD CONTROL POOL: - STORAGE CAPACITY: -

ELEVATION MAXIMUM DESIGN POOL: - STORAGE CAPACITY: -

ELEVATION TOP DAM: 1059.0 STORAGE CAPACITY: 1250 acre-feet  
(measured low point)

SPILLWAY DATA

CREST ELEVATION: 1053.5 (service); 1056.6 (emergency)

TYPE: service: concrete and masonry, trapezoidal-shaped weir  
structure; emergency: concrete, broad-crested weir

WIDTH: 101 feet (service); 250 feet (emergency)

LENGTH: N/A

SPILOVER LOCATION: service: about 140 feet right of left abutment;  
emergency: about 320 feet left of right abutment

NUMBER AND TYPE OF GATES: Neither spillway is gated

OUTLET WORKS

TYPE: two 16-inch diameter CIP outlets

LOCATION: one outlet located in each of the abutments of the  
service spillway

ENTRANCE INVERTS: approximately 1040 feet (estimated)

EXIT INVERTS: approximately 1038 feet (estimated)

EMERGENCY DRAWDOWN FACILITIES: Each 16-inch pipe is valved within  
pits along either spillway wingwall.  
Operability of the valves is question-  
able.

HYDROMETEOROLOGICAL GAGES

TYPE: None

LOCATION: -

RECORDS: -

MAXIMUM NON-DAMAGING DISCHARGE: Not known

APPENDIX B .

CHECK LIST - VISUAL INSPECTION

CHECK LIST  
VISUAL INSPECTION  
PHASE 1

PAGE 1 OF 8

NAME OF DAM Upper Bridgeport Dam STATE Pennsylvania COUNTY Westmoreland  
NDI# PA - 465 PENNER# 65-5  
TYPE OF DAM earth SIZE intermediate HAZARD CATEGORY high  
DATE(S) INSPECTION 12 December 1978 WEATHER overcast TEMPERATURE 30° @ 9:00AM.  
POOL ELEVATION AT TIME OF INSPECTION 1053.5 M.S.L.  
TAILWATER AT TIME OF INSPECTION 1042.5 M.S.L.

INSPECTION PERSONNEL

B. M. Mihalcin  
D. L. Bonk  
W. J. Veon  
S. R. Michalski  
\_\_\_\_\_

OWNER REPRESENTATIVES

Ken Baker  
Paul Mance  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

OTHERS

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

RECORDED BY D. L. Bonk



# EMBANKMENT

PAGE 2 OF 8

| ITEM                                                   | OBSERVATIONS AND/OR REMARKS                                                                                                                                                                                                                                                                                                                           | NDI# PA - 465 |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| SURFACE CRACKS                                         | None observed. Deep and extensive rutting is evident across the embankment crest between the right abutment and the emergency spillway.                                                                                                                                                                                                               |               |
| UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE      | None observed.                                                                                                                                                                                                                                                                                                                                        |               |
| SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES | <p>1) Upstream face approximately 75 feet from the right abutment. 10 to 15 feet of this area is unprotected and without riprap, and it is evident that there has been a loss of soil.</p> <p>2) Behind left wingwall of service spillway (nearest left abutment).</p> <p>3) Slight erosion observed behind right wingwall of emergency spillway.</p> |               |
| VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST         | Horizontal alignment generally conforms to available drawings. Vertical alignment, as indicated by field measurements, is irregular with apparent differential settlements in excess of 1-foot. The lowest area is located at the right abutment.                                                                                                     |               |
| RIPRAP FAILURES                                        | Hand-placed slabby sandstones provide riprap protection along the upstream face of the embankment. The riprap extends across the entire length of the embankment and approximately 3 feet above pool level. Several areas (near the right abutment and near the spillway wingwalls) are lacking any riprap protection and display signs of erosion.   |               |
| JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM  | Good condition.                                                                                                                                                                                                                                                                                                                                       |               |

# EMBANKMENT

PAGE 3 OF 8

| ITEM                                                        | OBSERVATIONS AND/OR REMARKS                                                                                                                                                                                                                                        | NDI# PA - 465 |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| DAMP AREAS<br>IRREGULAR VEGETATION<br>(LUSH OR DEAD PLANTS) | Swamp-like area immediately downstream of emergency spillway and right portion of embankment. (see Seepage below)                                                                                                                                                  |               |
| ANY NOTICEABLE<br>SEEPAGE                                   | None through face of embankment. However, area below and to right of emergency spillway is swamp-like with several concentrated seeps as close as 5 feet to the downstream retaining wall. This could be significant as there is little head that is causing flow. |               |
| STAFF GAGE AND<br>RECORDER                                  | None                                                                                                                                                                                                                                                               |               |
| DRAINS                                                      | Weep holes observed in concrete wall along downstream face of embankment. All were apparently clear; however none were discharging.                                                                                                                                |               |
|                                                             |                                                                                                                                                                                                                                                                    |               |
|                                                             |                                                                                                                                                                                                                                                                    |               |

## OUTLET WORKS

| ITEM                                                                   | OBSERVATIONS AND/OR REMARKS                                                                                                                                                                                                                                                                                                                                                                                                                            | NDI# PA - 465 |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| INTAKE STRUCTURE                                                       | Submerged - not observed.                                                                                                                                                                                                                                                                                                                                                                                                                              |               |
| OUTLET CONDUIT<br>(CRACKING AND SPALL-<br>ING OF CONCRETE<br>SURFACES) | Submerged - not observed.                                                                                                                                                                                                                                                                                                                                                                                                                              |               |
| OUTLET STRUCTURE                                                       | Separate identical outlet conduits are located on either side of the service spillway near the left abutment. Control valves are located at the base of masonry chambers located several feet to each side of the spillway wingwalls.                                                                                                                                                                                                                  |               |
| OUTLET CHANNEL                                                         | see Sheet 6 of 8 - "Discharge Channel"                                                                                                                                                                                                                                                                                                                                                                                                                 |               |
| GATE(S) AND OPERA-<br>TIONAL EQUIPMENT                                 | Left conduit valve is covered with debris and the chamber is unprotected. The right chamber was covered with a steel plate that was locked and bolted in place. The owner did not have a key to allow the field team to observe the valve. The present operability of the outlet works is not known. The dam and reservoir no longer serve a useful purpose, and consequently, there has been no reason to operate the outlets. Reportedly, the outlet |               |
|                                                                        | conduits have not been operated since at least 1972, although even this date is in doubt.                                                                                                                                                                                                                                                                                                                                                              |               |

# EMERGENCY SPILLWAY

PAGE 5 OF 8

| ITEM                           | OBSERVATIONS AND/OR REMARKS                                                                                                              | NDI# PA - 465 |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| TYPE AND CONDITION             | Concrete broad-crested weir structure in poor condition.                                                                                 |               |
| APPROACH CHANNEL               | No actual channel. However, flow could be obstructed by brush, trees, and tall grass observed along upstream side of spillway structure. |               |
| SPILLWAY CHANNEL AND SIDEWALLS | Spillway crest severely deteriorated. Sidewalls show severe cracking.                                                                    |               |
| STILLING BASIN PLUNGE POOL     | None                                                                                                                                     |               |
| DISCHARGE CHANNEL              | Heavily overgrown with trees and brush.                                                                                                  |               |
| BRIDGE AND PIERS               | None                                                                                                                                     |               |
| EMERGENCY GATES                | None                                                                                                                                     |               |



## SERVICE SPILLWAY

PAGE 6 OF 8

| ITEM               | OBSERVATIONS AND/OR REMARKS                                                                                                                                                          | NDI# PA - 465 |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| TYPE AND CONDITION | Concrete and cut stone trapezoidal-shaped weir structure. Crest is 5-foot wide stone coping. Upstream walls are concrete in fair to poor condition. Crest section in good condition. |               |
| APPROACH CHANNEL   | N/A                                                                                                                                                                                  |               |
| OUTLET STRUCTURE   | N/A                                                                                                                                                                                  |               |
| DISCHARGE CHANNEL  | Flows discharged into rock-lined stilling basin and which is contained within upstream portion of Lower Bridgeport Reservoir.                                                        |               |
|                    |                                                                                                                                                                                      |               |

## INSTRUMENTATION

PAGE 7 OF 8

NDI# PA - 465

| ITEM                     | OBSERVATIONS AND/OR REMARKS |
|--------------------------|-----------------------------|
| MONUMENTATION<br>SURVEYS | None observed.              |
| OBSERVATION WELLS        | None observed.              |
| WEIRS                    | None observed.              |
| PIEZOMETERS              | None observed.              |
| OTHERS                   |                             |

# RESERVOIR AREA AND DOWNSTREAM CHANNEL

PAGE 8 OF 8

| ITEM                                                  | OBSERVATIONS AND/OR REMARKS                                                                                                                                                                                                                                                                                                                                                                                             | NDI# | PA - 465 |
|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|
| SLOPES:<br>RESERVOIR                                  | Moderate to steep. Primarily thickly wooded (75 percent) with some pasturelands (25 percent). No instability noted around reservoir.                                                                                                                                                                                                                                                                                    |      |          |
| SEDIMENTATION                                         | None observed.                                                                                                                                                                                                                                                                                                                                                                                                          |      |          |
| DOWNSTREAM CHANNEL<br>(OBSTRUCTIONS,<br>DEBRIS, ETC.) | Unobstructed reservoir pool to Lower Bridgeport Dam which is located about 2,400 feet downstream. Highway bridge crosses Jacobs Creek about 500 feet further downstream.                                                                                                                                                                                                                                                |      |          |
| SLOPES:<br>CHANNEL<br>VALLEY                          | Downstream channel slope is gentle. Downstream valley slopes are quite variable. A broad, flat floodplain occurs just downstream from the nearest residential center (see below).                                                                                                                                                                                                                                       |      |          |
| APPROXIMATE NUMBER<br>OF HOMES AND<br>POPULATION      | Approximately 6 homes are located along the southern (left) shore of the Lower Bridgeport Reservoir which could be affected by high flows (estimated population of 20). Another seven structures are located along the higher northern (right) shore of the Lower Reservoir. The remainder of the community of Bridgeport is located along the northern bank of Jacobs Creek, downstream from the Lower Bridgeport Dam. |      |          |
|                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                         |      |          |

APPENDIX C  
HYDRAULICS/HYDROLOGY



## PREFACE

The modified HEC-1 program is capable of performing two basic types of hydrologic analyses: (1) the evaluation of the overtopping potential of the dam; and (2) the estimation of the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. Briefly, the computational procedures typically used in the dam overtopping analysis are as follows:

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

The evaluation of the hydrologic-hydraulic consequences resulting from an assumed structural failure (breach) of the dam is typically performed as outlined below.

- a. Development of an inflow hydrograph(s) to the reservoir.
- b. Routing of the inflow hydrograph(s) through the reservoir.
- c. Development of a failure hydrograph(s) based on specific breach criteria and normal reservoir outflow.
- d. Routing of the failure hydrograph(s) to desired downstream locations. The results provide estimates of the peak discharge(s), time(s) to peak, and maximum water surface elevation(s) of the failure hydrograph(s) for each location.

SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM  
BY WJY DATE 4-24-79 PROJ. NO. 78-617-465  
CHKD. BY DLB DATE 6-4-79 SHEET NO. 1 OF 26



## DAM STATISTICS

HEIGHT OF DAM  $\approx$  21 FT (FIELD MEASURED)  
(FROM BASE OF SPILLWAY TO  
LOW POINT OF EMBANKMENT)

MAXIMUM POOL STORAGE CAPACITY  $\approx$  1250 AC-FT (SHEET 5)  
@ TOP OF DAM

NORMAL POOL STORAGE CAPACITY  $\approx$  530 AC-FT (SEE NOTE 1)

DRAINAGE AREA  $\approx$  31.5 SQ. MI. (TOTAL)  
29.9 SQ. MI. (LOCAL)

PLANIMETERED OFF USGS 7.5  
MINUTE SERIES QUADS: CONNE  
MAMMOTH, MOUNT PLEASANT, AND  
CONNELSVILLE, PA

NOTE 1: STORAGE CAPACITY VALUE OBTAINED FROM "REPORT  
UPON THE UPPER BRIDGEPORT DAM OF THE MOUNT  
PLEASANT WATER COMPANY" AS FOUND IN PENN DCA  
FILES. THE ACTUAL GIVEN VALUE WAS 172 MILLION  
GALLONS OF STORAGE

## DAM CLASSIFICATION

DAM SIZE - INTERMEDIATE  
(DUE TO STORAGE POTENTIAL)

(REF 1, TABLE 1)

HAZARD CLASSIFICATION - HIGH

(FIELD OBSERVATION)

REQUIRED SDF - PMF

(REF 1, TABLE 3)

SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE

4-25-79

PROJ. NO.

79-617-465

CHKD. BY DLB

DATE

6-4-79

SHEET NO.

2

OF

26

Engineers • Geologists • Planners  
Environmental SpecialistsHYDROGRAPH PARAMETERSLENGTH OF LONGEST WATERCOURSE (L)  $\approx$  10.9 MILCA  $\approx$  4.9 MI

|                                                                                |
|--------------------------------------------------------------------------------|
| MEASURED ALONG THE LONGEST WATERCOURSE<br>TO THE CENTROID OF THE DRAINAGE AREA |
|--------------------------------------------------------------------------------|

NOTE 2: VALUES OF L AND LCA ARE MEASURED FROM USGS 7.5 MINUTE QUADS - DONEGAL, MAMMOTH, MOUNT PLEASANT, AND CONNELLSVILLE, PA. ALL VARIABLES ARE DEFINED IN REFERENCE 2 IN THE SECTION ENTITLED "SNYDER SYNTHETIC UNIT HYDROGRAPH".

$$\left. \begin{array}{l} C_t \approx 1.0 \\ C_p \approx 0.40 \end{array} \right\}$$

|                                              |
|----------------------------------------------|
| SUPPLIED BY COE; ZONE 25<br>OHIO RIVER BASIN |
|----------------------------------------------|

$$t_p = \text{SNYDER'S STANDARD LAG} \approx 1.0 (L \times LCA)^{0.3}$$

$$\therefore t_p \approx 1.0 (10.9 \times 4.9)^{0.3} \approx 3.30 \text{ HRS.}$$
RESERVOIR STORAGE VOLUMESNORMAL POOL STORAGE CAPACITY @ EL. 1053.5  $\approx$  530 AC FT

NOTE 3: NORMAL POOL ELEVATION OF 1053.5 OBTAINED FROM THE U.S. SOIL CONSERVATION SERVICE, WASHINGTON, PA OFFICE WHICH HAS RECENTLY CONDUCTED A SURVEY OF THE AREA. ALTHOUGH FIGURES 3 TO 6 IN APPENDIX F HAVE THE NORMAL POOL LEVEL @ EL 1063.5 (TOP OF MASONRY SERVICE SPILLWAY), THE DATUM THAT THIS ELEVATION WAS BASED ON IS UNKNOWN. THEREFORE, NORMAL POOL LEVEL WILL BE ASSUMED TO BE @ EL 1053.5 THROUGHOUT THE CALCULATIONS.

SUBJECT DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV DATE 4-30-79 PROJ. NO. 73-617-465

CHKD. BY DLB DATE 6-4-79 SHEET NO. 3 OF 26



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- ASSUME THE RESERVOIR IS APPROXIMATELY PARABOLIC IN CROSS-SECTION (CROSS-SECTIONS ARE TAKEN PERPENDICULAR TO SPILLWAY), SO THAT CROSS-SECTIONAL AREA (BELOW EL 1053.5) CAN BE COMPUTED BY THE RELATIONSHIP:

$$A = \frac{4}{3} D W^{\frac{1}{2}} \quad (\text{REF. 14, PG 13})$$

WHERE  $A$  = AREA IN  $\text{FT}^2$ ,  $D$  = DEPTH OF RESERVOIR IN  $\text{FT}$  @ THE MOST DOWNSTREAM SECTION, AND  $W$  = AVERAGE TOP WIDTH OF THE RESERVOIR IN  $\text{FT}$ .

- MAXIMUM RESERVOIR DEPTH  $\approx 14 \text{ FT}$  (APPENDIX C, FIG 6)  
@ NORMAL POOL

AVERAGE RESERVOIR TOP WIDTH  $\approx 450 \text{ FT}$  (ESTIMATED FROM USGS MAP)  
@ NORMAL POOL

MAXIMUM RESERVOIR LENGTH (RL)  $\approx 5500 \text{ FT}$  (ESTIMATED FROM USGS MAP)  
@ NORMAL POOL

ASSUME THAT BOTH RESERVOIR LENGTH AND TOP WIDTH VARY LINEARLY WITH DEPTH. ALSO ASSUME THAT AREA VARIES FROM  $A$  @ THE MOST DOWNSTREAM SECTION TO  $0.0$  @ THE MOST UPSTREAM SECTION.

$$\Rightarrow \frac{\Delta RL}{\Delta D} = \frac{5500 \text{ FT}}{14 \text{ FT}} \approx 393 \text{ FT/FT} ; \frac{\Delta W}{\Delta D} = \frac{450 \text{ FT}}{14 \text{ FT}} \approx 32 \text{ FT/FT}$$

$\therefore$  COMPUTED STORAGE VOLUME @ NORMAL POOL EL. 1053.5:

$$\text{VOLUME} = \text{AVERAGE AREA} \times \text{RESERVOIR LENGTH} / 43560 \frac{\text{FT}^2}{\text{AC}}$$

$$V = \left( \frac{A + 0.0}{2} \right) \times \left( \frac{\Delta RL}{\Delta D} \times D \right) / 43560$$



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$$A = \frac{4}{3} D \left( \frac{4W}{2D} \times D \right) / 2 = \frac{4}{3} (14 \text{ FT}) (32 \frac{\text{FT}}{\text{FT}} \times 14 \text{ FT}) / 2$$

$$\approx 4200 \text{ FT}^2$$

$$V = \left( \frac{4200 + 0}{2} \right) \times (393 \frac{\text{FT}}{\text{FT}} \times 14 \text{ FT}) / 43500$$

$$\approx 265 \text{ AC-FT}$$

- ACTUAL ASSUMED STORAGE VOLUME  $\approx 530 \text{ AC-FT}$  (SHEET 1)  
 $\Rightarrow$  CORRECTION FACTOR  $\approx 530 \text{ AC-FT} / 265 \text{ AC-FT} \approx 2.0$

- ELEVATION-STORAGE RELATIONSHIP BELOW NORMAL POOL EL 1053.5:

| ELEVATION<br>(FT) | MAXIMUM<br>RESERVOIR<br>DEPTH<br>D<br>(FT) | AVERAGE<br>RESERVOIR<br>WIDTH<br>W<br>(FT) | MAXIMUM<br>RESERVOIR<br>X-SECT. AREA<br>A<br>(FT <sup>2</sup> ) | MAXIMUM<br>RESERVOIR<br>LENGTH<br>RL<br>(FT) | COMPUTED<br>STORAGE<br>VOLUME<br>V<br>(AC-FT) | CORRECTED<br>STORAGE<br>VOLUME<br>V<br>(AC-FT) | } $V \times 2.0$ |
|-------------------|--------------------------------------------|--------------------------------------------|-----------------------------------------------------------------|----------------------------------------------|-----------------------------------------------|------------------------------------------------|------------------|
|                   |                                            |                                            |                                                                 |                                              |                                               |                                                |                  |
| 1039.5            | 0                                          | -                                          | -                                                               | -                                            | 0                                             | 0                                              |                  |
| 1041.5            | 2                                          | 64                                         | 95                                                              | 786                                          | 0.8                                           | 1.6                                            |                  |
| 1043.5            | 4                                          | 128                                        | 341                                                             | 1572                                         | 6.2                                           | 12.4                                           |                  |
| 1045.5            | 6                                          | 192                                        | 763                                                             | 2358                                         | 20.8                                          | 41.6                                           |                  |
| 1047.5            | 8                                          | 256                                        | 1365                                                            | 3144                                         | 49.3                                          | 98.6                                           |                  |
| 1049.5            | 10                                         | 320                                        | 2133                                                            | 3930                                         | 96.2                                          | 192                                            |                  |
| 1051.5            | 12                                         | 384                                        | 3072                                                            | 4716                                         | 166                                           | 332                                            |                  |
| 1053.5            | 14                                         | 450                                        | 4200                                                            | 5500                                         | 265                                           | 530                                            |                  |

- ABOVE EL 1053.5  $\Rightarrow$  ASSUME THE MODIFIED PRISMOIDAL RELATIONSHIP CAN ADEQUATELY REPRESENT THE TRUE STORAGE VALUES:

$$\Delta V_{1,2} = \frac{h}{3} (A_1 + A_2 + \sqrt{A_1 \times A_2}) \quad (\text{REF 14, P. 15})$$

WHERE  $\Delta V_{1,2}$  = INCREMENTAL VOLUME BETWEEN ELEVATIONS 1 AND 2,  
 $A_1$  = SURFACE AREA @ ELEVATION 1,  
 $A_2$  = SURFACE AREA @ ELEVATION 2, AND  
 $h$  = ELEVATION 2 - ELEVATION 1

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- SURFACE AREA (SA) @ EL 1053.5 = 91 AC  
(SEE REF IN NOTE, SHEET 1)

SURFACE AREA @ EL 1060 = 200 AC

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USGS QUADS: CONNELSVILLE

AND MOUNT PLEASANT, PA

∴ RATE OF RESERVOIR SA CHANGE PER FOOT OF RESERVOIR RISE:

$$\Delta SA / \Delta h \approx (200 \text{ AC} - 91 \text{ AC}) / (1060 \text{ FT} - 1053.5 \text{ FT}) \approx 19.3 \text{ AC/FT}$$

$$\Rightarrow A_i \approx 91 \text{ AC} + (19.3 \text{ AC/FT} \times h)$$

WHERE  $h$  = ELEVATION 2 - 1053.5 FT

- ELEVATION-STORAGE RELATIONSHIP ABOVE EL 1053.5:

|                              | ELEVATION<br>(FT) | $h$<br>(FT) | $A_i$<br>(ACRES) | $\Delta V_{i-2}$<br>(AC-FT) | CUMULATIVE<br>VOLUME<br>(AC-FT) |
|------------------------------|-------------------|-------------|------------------|-----------------------------|---------------------------------|
| SERVICE<br>SPILLWAY<br>CREST | - 1053.5          | 0           | 91               | -                           | 530 *                           |
|                              | 1054.0            | 0.5         | 90               | 43                          | 570                             |
|                              | 1055.0            | 1.5         | 103              | 99                          | 670                             |
|                              | 1056.0            | 2.5         | 127              | 117                         | 790                             |
|                              | 1057.0            | 3.5         | 145              | 136                         | 930                             |
|                              | 1058.0            | 4.5         | 163              | 154                         | 1080                            |
| LOW<br>TOP OF<br>DAM         | - 1059.0          | 5.5         | 182              | 172                         | 1250                            |
|                              | 1060.0            | 6.5         | 200              | 191                         | 1440                            |
|                              | 1061.0            | 7.5         | 218              | 209                         | 1650                            |
|                              | 1062.0            | 8.5         | 237              | 227                         | 1880                            |
|                              | 1063.0            | 9.5         | 255              | 246                         | 2130                            |
|                              | 1064.0            | 10.5        | 273              | 264                         | 2390                            |
|                              | 1065.0            | 11.5        | 291              | 282                         | 2670                            |

\* SEE SHEET 4

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### PMP CALCULATIONS

- APPROXIMATE RAINFALL INDEX = 24 IN  
 (CORRESPONDING TO A DURATION OF 24  
 HOURS AND AN AREA OF 200 SQ MI IN  
 SOUTHWESTERN PENNSYLVANIA) (REF 3, FIG 1)
- DEPTH - AREA - DURATION ZONE #7 (REF 3, FIG 1)
- LOCAL DRAINAGE AREA  $\approx$  23.9 SQ MI. HOWEVER, THE STORM WILL  
 BE CENTERED OVER THE TOTAL DRAINAGE AREA OF 31.5 SQ MI.  
 $\Rightarrow$  DEPTH-DURATION RELATIONSHIP BASED ON  $DA = 31.5$  SQ MI.:

| DURATION<br>(HR) | PERCENT OF<br>INDEX RAINFALL<br>(%) |
|------------------|-------------------------------------|
| 6                | 90                                  |
| 12               | 108                                 |
| 24               | 118                                 |
| 48               | 128                                 |

(REF 3, FIG 2)

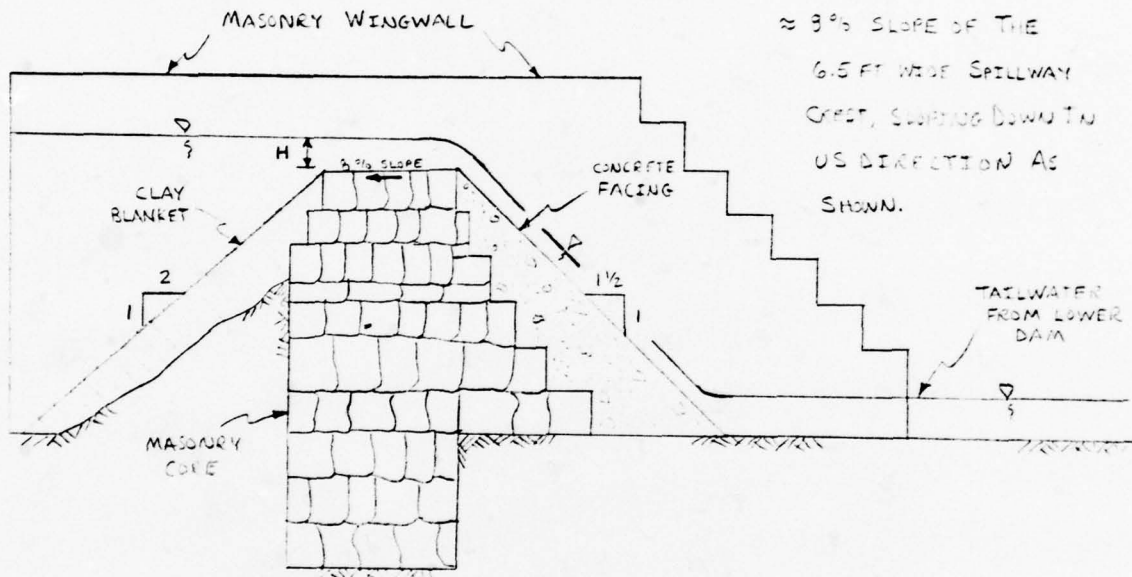
- HOB BROOK FACTOR (ADJUSTMENT FOR BASIN SHAPE AS WELL AS  
 FOR THE LESSE LIKELIHOOD OF A SEVERE STORM CENTERING  
 OVER A SMALLER BASIN) CORRESPONDING TO A  $DA \approx 31.5$  SQ MI.  
 $\Rightarrow$  0.937 (AS COMPUTED BY HEC-1)

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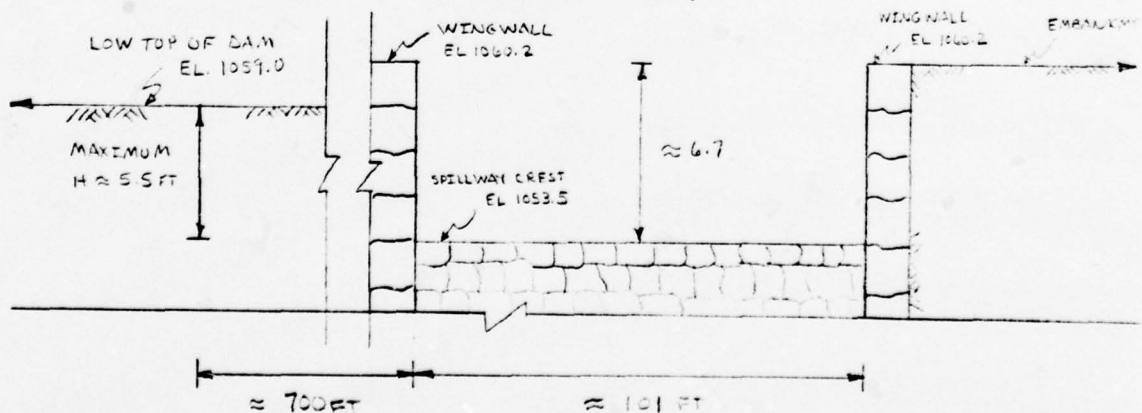
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## SPILLWAY CAPACITY (SERVICE)

- PROFILE OF SERVICE SPILLWAY : (NOT TO SCALE)  
 (FROM FIG 3 AS WELL AS FIELD MEASUREMENT AND OBSERVATION)



- CROSS-SECTION OF SERVICE SPILLWAY : (NOT TO SCALE)  
 (FROM FIG 4 AS WELL AS FIELD MEASUREMENT AND OBSERVATION)



SECTION IS TAKEN LOOKING UPSTREAM  
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- THE DISCHARGE OVER THE TRAPEZOIDAL-SHAPED SPILLWAY WEIR CAN BE DEFINED BY THE EQUATION:

$$Q = CLH^{3/2} \quad (\text{REF 5, PG 5-3})$$

WHERE C = DISCHARGE COEFFICIENT = f (WEIR SHAPE),  
 L = LENGTH OF WEIR  $\approx$  101 FT, AND  
 H = HEAD OVER THE WEIR OR THE HEIGHT OF THE RESERVOIR LEVEL ABOVE THE CREST OF THE WEIR IN FT (SEE SKETCH ON SHEET 7). (ASSUME APPROX. VELOCITY IS NEGLIGIBLE)

- THE APPROXIMATE DISCHARGE COEFFICIENT (C) FOR THE WEIR SHAPE GIVEN IN THE SKETCH ON SHEET 7 IS ASSUMED TO BE 3.6 (REF 5, PG 5-49, TABLES 5-9 AND 5-10) FOR THE MAXIMUM HEAD OF 5.5 FT.

$$\therefore Q = CLH^{3/2} = (3.6)(101\text{ft})(5.5\text{ft})^{3/2}$$

$$Q \approx 4690 \text{ cfs} = \text{SERVICE SPILLWAY CAPACITY}$$

### SPILLWAY RATING CURVE (SERVICE)

AS THE HEAD OVER THE WEIR BECOMES SMALL, THE ROUGHNESS OF THE CREST AND THE CONTACT PRESSURE BETWEEN THE WATER AND THE CREST EXERT A LARGER INFLUENCE ON DISCHARGE. THAT IS, THE C-VALUES DECREASE WITH DECREASING HEAD. THE OPPOSITE TREND OCCURS FOR HIGHER HEADS. THEREFORE, ASSUME THAT THE DISCHARGE COEFFICIENT - HEAD RELATIONSHIP FOR AN OGEE-CRESTED WEIR (REF 4, PG 378, FIG 25) CAN REPRESENT THE ACTUAL DISCHARGE COEFFICIENT - HEAD RELATIONSHIP

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FOR THIS TRAPEZOIDAL WEIR, THE MAXIMUM HEAD PRIOR TO OVERTOPPING OF THE DAM, 5.5 FT, WILL BE ASSUMED TO BE THE DESIGN HEAD ( $H_0$ ). THE DESIGN STRANDE COEFFICIENT ( $C_0$ ) OF 3.6 IS GIVEN ON SHEET 8.

ALL DISCHARGES ARE DEFINED BY  $Q = CLH^{3/2}$  AS ON SHEET 8, W/ THE C-VALUE ADJUSTED FOR SUBMERGENCE ACCORDING TO TAILWATER LEVEL AND THE SUBMERGENCE RELATIONSHIP FOR AN Ogee-CRESTED SPILLWAY (REF 4, PG 332)

| RESERVOIR<br>ELEVATION<br>(FT) | H<br>(FT) | H/H <sub>0</sub><br>(F/F) | (A)<br>C/C <sub>0</sub> | (B)<br>C | (C)<br>INITIAL<br>"UNSUBMERGED"<br>Q<br>(CFS) | (D)<br>TAILWATER<br>ELEVATION<br>(FT) | (E)<br>h <sub>d</sub><br>(FT) | (F)<br>h <sub>0</sub> /H<br>(F/F) | (G)<br>C <sub>s</sub> /C | (H)<br>FINAL<br>Q<br>(CFS) |
|--------------------------------|-----------|---------------------------|-------------------------|----------|-----------------------------------------------|---------------------------------------|-------------------------------|-----------------------------------|--------------------------|----------------------------|
| 1053.5                         | 0         | -                         | -                       | -        | 0                                             | -                                     | -                             | -                                 | -                        | 0                          |
| 1054.5                         | 1         | 0.2                       | 0.85                    | 3.1      | 310                                           | 1043.3                                | 10.7                          | 10.7                              | 1.0                      | 310                        |
| 1055.5                         | 2         | 0.4                       | 0.90                    | 3.2      | 910                                           | 1045.0                                | 10.5                          | 5.3                               | 1.0                      | 910                        |
| 1056.5                         | 3         | 0.55                      | 0.93                    | 3.3      | 1730                                          | 1046.6                                | 9.9                           | 3.3                               | 1.0                      | 1730                       |
| 1057.5                         | 4         | 0.7                       | 0.96                    | 3.5      | 2830                                          | 1048.9                                | 8.6                           | 2.2                               | 1.0                      | 2830                       |
| 1058.5                         | 5         | 0.9                       | 0.99                    | 3.6      | 4070                                          | 1051.6                                | 6.9                           | 1.4                               | 1.0                      | 4070                       |
| 1059.5                         | 5.5       | 1.0                       | 1.0                     | 3.6      | 4690                                          | 1052.6                                | 6.4                           | 1.2                               | 1.0                      | 4690                       |
| 1059.5                         | 6         | 1.1                       | 1.01                    | 3.6      | 5340                                          | 1053.5                                | 6.0                           | 1.0                               | 1.0                      | 5340                       |
| 1060.5                         | 7         | 1.3                       | 1.04                    | 3.7      | 6920                                          | 1055.3                                | 5.2                           | 0.74                              | 1.0                      | 6920                       |
| 1061.5                         | 8         | 1.5                       | 1.06                    | 3.8      | 8690                                          | 1057.2                                | 4.3                           | 0.54                              | 0.98                     | 8460                       |
| 1062.0                         | 8.5       | 1.55                      | 1.07                    | 3.9      | 9760                                          | 1058.3                                | 3.7                           | 0.44                              | 0.96                     | 8260                       |
| 1063.0                         | 9.5       | 1.7                       | 1.07                    | 3.9      | 11530                                         | 1060.3                                | 2.7                           | 0.28                              | 0.92                     | 10650                      |
| 1064.0                         | 10.5      | 1.9                       | 1.08                    | 3.9      | 13400                                         | 1062.2                                | 1.8                           | 0.17                              | 0.81                     | 11000                      |
| 1065.0                         | 11.5      | 2.1                       | 1.08                    | 3.9      | 15360                                         | 1064.2                                | 0.8                           | 0.07                              | 0.54                     | 8275                       |

(A) FROM REF 4, FIG 246 (PG 378), BASED ON  $H/H_0$  VALUE

(B)  $C = 3.6 \times C/C_0$  (C)  $Q = CLH^{3/2}$

(D) TW ELEVATION BASED ON TOTAL "UNSUBMERGED" FLOWS OVER THE SERVICE + EMERGENCY SPILLWAYS + EMBANKMENT (SHEETS 12, 14 AND 15)

(E)  $h_d = \text{ELEVATION OF RESERVOIR} - \text{TAILWATER ELEVATION}$

(F) FROM REF 4, FIG 254 (PG 332), BASED ON  $h_0/H$  VALUE

(G)  $C_s = C \times C_s/C$

(H)  $Q = C_s L H^{3/2}$

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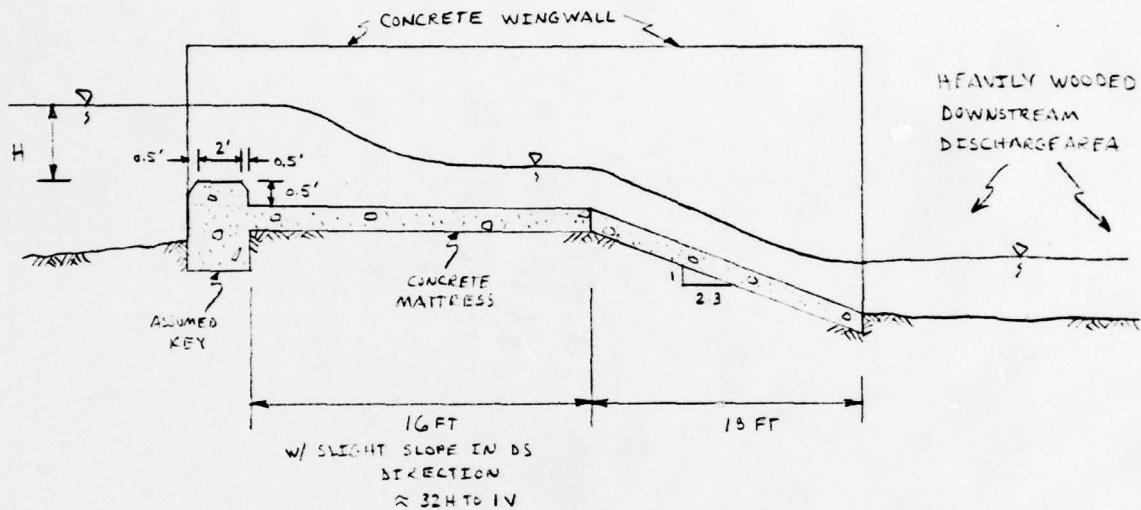
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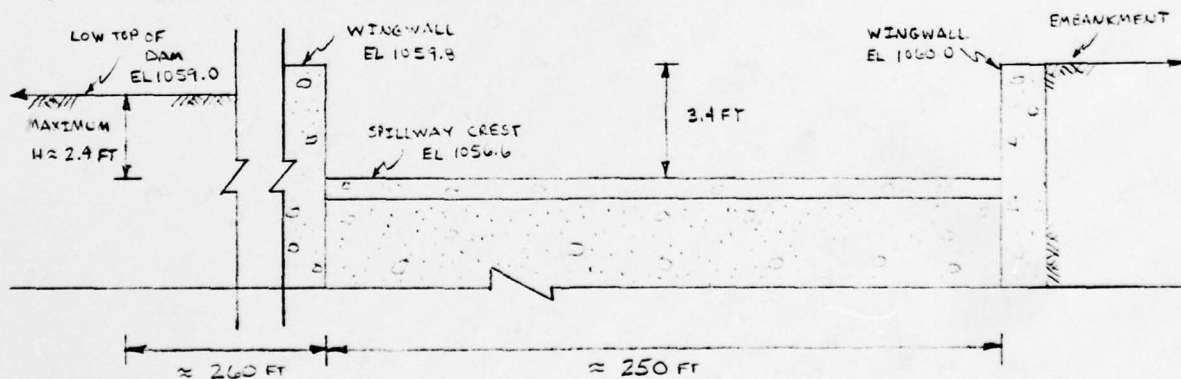
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## SPILLWAY CAPACITY (EMERGENCY)

- PROFILE OF EMERGENCY SPILLWAY : (NOT TO SCALE)  
(FROM FIG 5 AS WELL AS FIELD MEASUREMENT AND OBSERVATION)



- CROSS-SECTION OF EMERGENCY SPILLWAY : (NOT TO SCALE)  
(FROM FIG 5 AS WELL AS FIELD MEASUREMENT AND OBSERVATION)



SECTION IS TAKEN LOOKING UPSTREAM  
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- THE DISCHARGE OVER THE "BROAD-CRESTED" EMERGENCY SPILLWAY WEIR IS ALSO DEFINED BY THE EQUATION:

$$Q = CLH^{3/2} \quad (\text{SHEET 8})$$

HOWEVER, IN THIS CASE  $L \approx 250 \text{ FT}$

- SINCE THE WEIR IS ESSENTIALLY BROAD-CRESTED W/ A CREST WIDTH OF  $\approx 16 \text{ FT}$ , AND A MAXIMUM HEAD OF  $2.4 \text{ FT} \Rightarrow "C" \approx 2.63$  (REF 6, PG 21-71).

$$\therefore Q = CLH^{3/2} \approx (2.63)(250 \text{ FT})(2.4 \text{ FT})^{3/2} \approx 2440 \text{ CFS}$$

- TOTAL DAM DISCHARGE PRIOR TO OVERTOPPING:

$$Q_{\text{TOTAL}} = 2440 \text{ CFS} + 4690 \text{ CFS} \approx 7130 \text{ CFS}$$

↳ (SHEET 9)

$\Rightarrow$  TAILWATER ELEVATION CORRESPONDING TO 7130 CFS  
 $\approx \text{EL } 1052.6$  (SHEET 19).

SINCE THE BROAD-CREST OF THE EMERGENCY SPILLWAY IS @  $\approx \text{EL } 1056.1 \text{ FT} \Rightarrow$  NO SUBMERGENCE EFFECTS

$\therefore$  EMERGENCY SPILLWAY CAPACITY  $\approx 2440 \text{ CFS}$



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AS INDICATED IN REF 6 (TABLE 21-15, PG 21-71), THE DISCHARGE COEFFICIENT FOR A 16 FT WIDE BROAD-CRESTED WEIR DOES NOT VARY TOO MUCH FROM THE VALUE OF 2.63  $\Rightarrow$  ALL DISCHARGES ARE DEFINED BY  $Q = CLH^{3/2}$  AS ON SHEET 11 W/  $C \approx 2.63$ .

THE EFFECT OF SUBMERGENCE ON DECREASING DISCHARGE CAPACITY WILL BE CONSIDERED AS IT WAS FOR THE SERVICE SPILLWAY (SHEET 11). THE ELEVATION OF THE BROAD CREST OF THE SPILLWAY IS  $\approx 1056.1$  FT

| ELEVATION<br>(FT)          | H<br>(FT) | INITIAL Q<br>"UNSUBMERGED"<br>(CFS) | (A)<br>TAILWATER<br>ELEVATION<br>(FT) | (B)<br>$h_d$<br>(FT) | $h_d/H$ | (C)<br>$C_s/C$ | (D)<br>$C_s$ | (E)<br>FINAL<br>Q |
|----------------------------|-----------|-------------------------------------|---------------------------------------|----------------------|---------|----------------|--------------|-------------------|
| * 1056.6                   | 0         | 0                                   | 1046.7                                | —                    | —       | —              | —            | 0                 |
| 1057.5                     | 0.9       | 560                                 | 1048.9                                | 8.6                  | 9.6     | 1.0            | 2.63         | 560               |
| 1058.5                     | 1.9       | 1720                                | 1051.6                                | 6.9                  | 3.6     | 1.0            | 2.63         | 1720              |
| LOW TOP<br>OF DAM = 1059.0 | 2.4       | 2440                                | 1052.6                                | 6.4                  | 2.7     | 1.0            | 2.63         | 2440              |
| 1059.5                     | 2.9       | 3250                                | 1053.5                                | 6.0                  | 2.1     | 1.0            | 2.63         | 3250              |
| 1060.5                     | 3.9       | 5060                                | 1055.3                                | 5.2                  | 1.3     | 1.0            | 2.63         | 5060              |
| 1061.5                     | 4.9       | 7130                                | 1057.2                                | 4.3                  | 0.88    | 1.0            | 2.63         | 7130              |
| 1062.0                     | 5.4       | 8250                                | 1058.3                                | 3.7                  | 0.69    | 1.0            | 2.63         | 8250              |
| 1063.0                     | 6.4       | 10650                               | 1060.3                                | 2.7                  | 0.42    | 0.96           | 2.52         | 10200             |
| 1064.0                     | 7.4       | 13240                               | 1062.2                                | 1.8                  | 0.24    | 0.90           | 2.37         | 11930             |
| 1065.0                     | 8.4       | 16010                               | 1064.2                                | 0.8                  | 0.10    | 0.65           | 1.71         | 10410             |

(A) TWELEV BASED ON TOTAL UNSUBMERGED FLOW (SEE (D) ON SHEET 9)

(B)  $h_d$  = ELEVATION OF RESERVOIR - ELEVATION OF TAILWATER(C)  $C_s/C$  OBTAINED FROM REF 4, PG 382, BASED ON  $h_d/H$  VALUE(D)  $C_s = 2.63 \times (C_s/C)$ (E)  $Q = C_s (250 \text{ FT}) (H)^{3/2}$ 

\* ELEVATION OF 1056.6 CORRESPONDS TO THE ELEVATION OF THE TOP OF THE SMALL 0.5' CONCRETE WEIR SECTION AT THE U. END OF THE EMERGENCY SPILLWAY (SEE SKETCH ON SHEET 10).

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## EMBANKMENT RATING CURVE

- LENGTH OF EMBANKMENT SUBMERGED VS RESERVOIR ELEVATION (BASED ON FIELD MEASUREMENTS)

| EMBANKMENT<br>LENGTH<br>(FT) | RESERVOIR<br>ELEVATION<br>(FT) |
|------------------------------|--------------------------------|
| 50                           | 1059.0                         |
| 250                          | 1059.5                         |
| 320                          | 1060.0                         |
| 620                          | 1060.5                         |
| 670                          | 1061.0                         |
| 670                          | 1061.5                         |
| 670                          | 1062.0                         |
| 670                          | 1063.0                         |

- ASSUME THE EMBANKMENT ACTS LIKE A BROAD-CRESTED WEIR WHEN OVERTOPPED W/ DISCHARGE DEFINED BY:

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

(SHEET 11)

HOWEVER IN THIS CASE (ASSUMING A TRAPEZOIDAL SHAPED WEIR W/ BOTTOM WIDTH  $\approx$  50 FT),  $H$  = WEIGHTED VALUE =  $\frac{[(H_1 \text{ ABOVE LEVEL, 50 FT, SECTION} \times \text{CORRESPONDING FLOW AREA}) + (\text{AVERAGE } H_2 \text{ ABOVE INCLINED SECTION WHICH VARIES FROM 0 TO } H_1, \times \text{CORRESPONDING FLOW AREA})]}{(\text{TOTAL FLOW AREA})}$   
 $C$  = DISCHARGE COEFFICIENT =  $\frac{1}{4}$  ( $H/2$ ,  $w/2$  = CREST WIDTH  $\approx$  25 FT; AND REF 12, PG 46)  
 POSSIBLE SUBMERGENCE UNDER HIGH FLOWS WILL BE CONSIDERED W/ ADJUSTMENTS MADE TO  $C$  VIA THE SUBMERGENCE CURVE OF REF 12, PG 46.

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PROJ. NO.

78-617-465

CHKD. BY JCB

DATE

6-11-79

SHEET NO.

14

OF 26

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| RESERVOIR<br>ELEVATION<br>(FT) | LEVEL CREST PORTION    |                                      | INCLUDED CREST PORTION                                |                        |                                      | WEIGHTED<br>H<br>(FT)                                 | H/L<br>(FT/FT) | C<br>(FT) | L<br>(FT) | INITIAL<br>UNSUBMERGED<br>Q<br>(CFS) | TAILWATER<br>ELEVATION<br>(FT) | C <sub>s</sub> /C<br>(%) | C <sub>s</sub> | Q<br>(CFS) |
|--------------------------------|------------------------|--------------------------------------|-------------------------------------------------------|------------------------|--------------------------------------|-------------------------------------------------------|----------------|-----------|-----------|--------------------------------------|--------------------------------|--------------------------|----------------|------------|
|                                | H <sub>1</sub><br>(FT) | A <sub>1</sub><br>(FT <sup>2</sup> ) | H <sub>1</sub> × A <sub>1</sub><br>(FT <sup>3</sup> ) | H <sub>2</sub><br>(FT) | A <sub>2</sub><br>(FT <sup>2</sup> ) | H <sub>2</sub> × A <sub>2</sub><br>(FT <sup>3</sup> ) |                |           |           |                                      |                                |                          |                |            |
| 1051.0                         | 0                      | -                                    | -                                                     | 0                      | -                                    | -                                                     | -              | -         | 50        | 0                                    | 1052.9                         | -                        | -              | 0          |
| 1054.5                         | 0.5                    | 25                                   | 12.5                                                  | 0.25                   | 50                                   | 12.5                                                  | 0.01           | 2.99      | 250       | 140                                  | 1053.5                         | 1.0                      | 2.99           | 140        |
| 1060.0                         | 1.0                    | 50                                   | 50                                                    | 0.50                   | 135                                  | 67.5                                                  | 0.03           | 3.02      | 320       | 490                                  | 1054.4                         | 1.0                      | 3.02           | 490        |
| 1060.5                         | 1.5                    | 75                                   | 112.5                                                 | 0.75                   | 428                                  | 321                                                   | 0.03           | 3.03      | 620       | 1500                                 | 1055.3                         | 1.0                      | 3.03           | 1500       |
| 1061.0                         | 2.0                    | 100                                  | 200                                                   | 1.00                   | 620                                  | 620                                                   | 0.05           | 3.04      | 670       | 2480                                 | 1056.3                         | 1.0                      | 3.04           | 2480       |
| 1061.5                         | 2.5                    | 125                                  | 312.5                                                 | 1.50                   | 930                                  | 1395                                                  | 0.06           | 3.04      | 670       | 4200                                 | 1057.2                         | 1.0                      | 3.04           | 4200       |
| 1062.0                         | 3.0                    | 150                                  | 450                                                   | 2.00                   | 1240                                 | 2480                                                  | 0.08           | 3.05      | 670       | 6260                                 | 1058.3                         | 1.0                      | 3.05           | 6260       |
| 1063.0                         | 4.0                    | 200                                  | 800                                                   | 3.00                   | 1360                                 | 5580                                                  | 0.12           | 3.05      | 670       | 11150                                | 1060.3                         | 1.0                      | 3.05           | 11150      |
| 1064.0                         | 5.0                    | 250                                  | 1250                                                  | 4.00                   | 2480                                 | 9920                                                  | 0.16           | 3.06      | 670       | 17020                                | 1062.2                         | 0.64                     | 3.06           | 17020      |
| 1065.0                         | 6.0                    | 300                                  | 1800                                                  | 5.00                   | 3100                                 | 15500                                                 | 0.20           | 3.07      | 670       | 23000                                | 1064.2                         | 0.87                     | 2.98           | 23000      |

①  $A_1 = H_1 \times 50 \text{ FT}$  w/  $H_1 = \text{RESERVOIR ELEVATION} - 1054.0 \text{ FT}$ ; ②  $H_2 = \left( \frac{0 + H_1}{2} \right)$  BELOW FL 1061;  
AND  $H_2 = \left[ H_1 + \left( \text{RESERVOIR ELEVATION} - 1064.0 \right) \right] / 2$  ABOVE FL 1061; ③  $A_2 = [(L - 50 \text{ FT}) \times H_1] / 2$  BELOW  
FL 1061, AND  $A_2 = [(L - 50 \text{ FT}) \times 2H_1 / 2] + [( \text{ELEVATION OF RESERVOIR} - 1061 ) \times (L - 50 \text{ FT})]$  w/  $L = 670 \text{ FT}$   
ABOVE FL 1061; d.  $H = [(H_1 \times A_1) + (H_2 \times A_2)] / (A_1 + A_2)$ ; 5. REF 12, PG 46; 6.  $Q = CLH^{3/2}$ ;  
⑦ TAILWATER ELEVATION IS BASED ON TOTAL "UNSUBMERGED" FLOWS OVER THE SPILLWAY EFFICIENCY  
SPILLWAY EFFICIENCY (SHEETS 1, 12 AND 19); ⑧  $C_s/C$  FROM REF 12, PG 46, BASED ON  $M^2/H_1$  (SEE SHEET 12);  
⑨  $Q$  FROM SHEET 12

SUBJECT DAM SAFETY INSPECTIONUPPER BRIDGEPORT DAMBY WJV DATE 5-15-79 PROJ. NO. 78-617-465CHKD. BY DLB DATE 6-4-79 SHEET NO. 15 OF 26Engineers • Geologists • Planners  
Environmental SpecialistsTOTAL FACILITY RATING CURVETOTAL DISCHARGE = SERVICE SPILLWAY Q + EMERGENCY  
SPILLWAY Q + EMBANKMENT Q

| ELEVATION<br>(FT) | SERVICE SPILLWAY<br>Q<br>(CFS) | EMERGENCY SPILLWAY<br>Q<br>(CFS) | EMBANKMENT<br>Q<br>(CFS) | TOTAL<br>Q<br>(CFS) |
|-------------------|--------------------------------|----------------------------------|--------------------------|---------------------|
| 1053.5            | 0                              | -                                | -                        | 0                   |
| 1054.5            | 310                            | -                                | -                        | 310                 |
| 1055.5            | 910                            | -                                | -                        | 910                 |
| 1056.5            | 1730                           | -                                | -                        | 1730                |
| 1057.5            | 2830                           | 560                              | -                        | 3390                |
| 1058.5            | 4070                           | 1720                             | -                        | 5790                |
| 1059.0            | 4690                           | 2440                             | 0                        | 7130                |
| 1059.5            | 5340                           | 3250                             | 140                      | 8730                |
| 1060.0            | 6130                           | 4160                             | 490                      | 10780               |
| 1060.5            | 6920                           | 5060                             | 1500                     | 13480               |
| 1061.0            | 7690                           | 6100                             | 2490                     | 16270               |
| 1061.5            | 8460                           | 7130                             | 4200                     | 19790               |
| 1062.0            | 9260                           | 8250                             | 6260                     | 23770               |
| 1063.0            | 10650                          | 10200                            | 11150                    | 32000               |
| 1064.0            | 11000                          | 11930                            | 17020                    | 39950               |
| 1065.0            | 8270                           | 10410                            | 23000                    | 41680               |



SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM  
BY WJV DATE 5-3-79 PROJ. NO. 78-617-445  
CHKD. BY DLB DATE 6-4-79 SHEET NO. 16 OF 26



## LOWER BRIDGEPORT DAM

THE CREST OF LOWER BRIDGEPORT DAM IS LOCATED ABOUT 2400 FT DS FROM THE UPPER BRIDGEPORT DAM. THE RESERVOIR OF THE LOWER DAM EXTENDS FOR THE ENTIRE 2400 FT AND IS APPROXIMATELY 100 TO 150 FT WIDE THROUGHOUT. THE DAM IS A "RUN OF THE RIVER" OVERFLOW STRUCTURE. THE DAM IS ESSENTIALLY ABOUT A 90-FT CONCRETE WEIR WITH A 6.5-FT FORBAY DEPTH, AND A 3.5 FT DESIGN HEAD. THE VALLEY SECTION WHICH INCLUDES THE DAM IS SKETCHED ON SHEET 21, SECTION 4.0.

IN ORDER TO CONSIDER THE EFFECTS OF THE LOWER IMPOUNDMENT ON THE UPPER BRIDGEPORT DAM OUTFLOWS, BACKWATER CURVES WILL BE DEVELOPED FOR VARIOUS ASSUMED FLOWS. THE BACKWATER CURVES WILL BE COMPUTED VIA THE HEC-2 WATER SURFACE PROFILE COMPUTER PROGRAM\*. HEC-2 CALCULATES BACKWATER CURVES BY THE STANDARD STEP METHOD (REF 7, PG 274-280) BASED ON VALLEY AND CHANNEL CROSS-SECTION INFORMATION. THE SPLETFC CROSS-SECTION INFORMATION TO BE USED IS GIVEN ON SHEETS 20 AND 21. (THE SHAPE OF THE RESERVOIR PORTIONS OF THE SECTIONS WERE ASSUMED FOR THE MOST PART.)

A RATING CURVE FOR THE DAM SECTION (SECTION 4) WILL BE COMPUTED AND USED AS THE STARTING POINT OF THE CALCULATIONS. THE PROFILES WILL THEN PROCEED UPSTREAM 50 FT TO SECTION 3.0, THEN 1100 FT MORE UPSTREAM TO SECTION 2 THEN 700 FT FURTHER UPSTREAM TO SECTION 1.0 (THE LOCATION OF THE 1<sup>ST</sup> STRUCTURE DOWNSTREAM FROM THE UPPER DAM). FINALLY, THE PROFILES WILL PROCEED THE REMAINING 50 FT UPSTREAM TO SECTION 0.0 @ THE UPPER DAM.

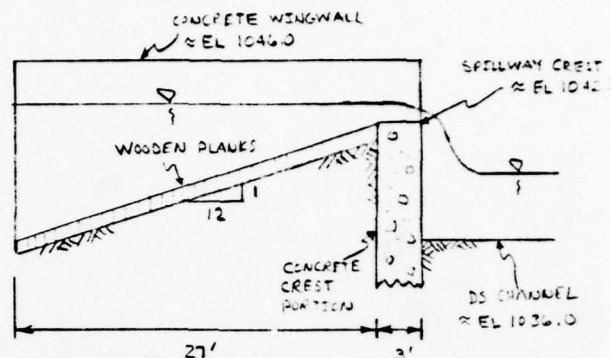
\* HEC-2 WATER SURFACE PROFILES (USER'S MANUAL), HYDROLOGIC ENGINEERING CENTER, U.S. ARMY CORPS OF ENGINEERS, DAVIS, CALIFORNIA, NOV. 1976

SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM  
 BY WJV DATE 5-11-79 PROJ. NO. 73-617-465  
 CHKD. BY DLB DATE 6-4-79 SHEET NO. 17 OF 26

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- SECTION 4.0 RATING CURVE:

LOWER DAM PROFILE  $\Rightarrow$   
 (FROM FIELD MEASUREMENT AND  
 OBSERVATION)



- a) DISCHARGE OVER THE DAM IS GOVERNED BY THE RELATIONSHIP:

$$Q = CLH^{3/2} \quad (\text{REF 5, PG 5-22})$$

WHERE  $Q$  = DISCHARGE IN CFS,  
 $L$  = LENGTH OF SPILLWAY  $\approx 90$  FT,  
 $H$  = DEPTH OF WATER ABOVE SPILLWAY CREST, AND  
 $C \approx 3.1$  (REF 5, PG 5-11; ESTIMATED FROM TABLE 5-11).

- b) ASSUME THAT BY THE TIME  $H \approx 7.5$  FT (WSEL  $\approx 1050.0$  @ SECT 4.0) THE TAILWATER ON THE DAM WILL BE HIGH ENOUGH TO DROWN OUT THE WEIR, SO THAT OPEN CHANNEL FLOW WILL CONTROL THE DISCHARGE CAPABILITIES OF THE SECTION.
- c) OPEN CHANNEL DISCHARGES FOR THE OVERLAND SECTIONS BELOW EL 1050.0, AND FOR THE ENTIRE SECTION ABOVE EL 1050.0 WILL BE GOVERNED BY MANNING'S EQUATION:

$$Q = 1.49/n AR^{2/3} S^{1/2} \quad (\text{REF 7, PG 129})$$

WHERE  $Q$  = DISCHARGE IN CFS,  
 $n$  = ROUGHNESS COEFFICIENT (SHEET 21, SECTION 4),  
 $A$  = CROSS-SECTIONAL AREA IN  $\text{FT}^2$ ,  
 $R$  =  $\frac{\text{CROSS-SECTIONAL AREA}}{\text{WETTED PERIMETER}}$  IN FT, AND  
 $S$  = CHANNEL SLOPE  $\approx 0.001$  (ASSUMED)

SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM  
 BY WJV DATE 5-11-79 PROJ. NO. 78-617-465  
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d) RATING INFORMATION BELOW EL 1050 FT :

| CREST OF LOWER DAM | WATER SURFACE ELEVATION (FT) | WEIR FLOW |         | OVERBANK FLOW           |                        |          | TOTAL SECTION FLOW (CFS) |
|--------------------|------------------------------|-----------|---------|-------------------------|------------------------|----------|--------------------------|
|                    |                              | H (FT)    | Q (CFS) | MAXIMUM FLOW DEPTH (FT) | A * (FT <sup>2</sup> ) | R * (FT) |                          |
|                    | 1042.5                       | 0         | 0       | 0                       | -                      | -        | 0                        |
|                    | 1043.5                       | 1         | 290     | 0                       | -                      | -        | 290                      |
|                    | 1044.5                       | 2         | 790     | 0                       | -                      | -        | 790                      |
|                    | 1045.5                       | 3         | 1450    | 0                       | -                      | -        | 1450                     |
|                    | 1046.5                       | 4         | 2230    | 0.5                     | 6.6                    | 0.4      | 2230                     |
|                    | 1047.5                       | 5         | 3120    | 1.5                     | 29.1                   | 1.0      | 3140                     |
|                    | 1048.5                       | 6         | 4100    | 2.5                     | 64.1                   | 1.5      | 4170                     |
|                    | 1049.5                       | 7         | 5170    | 3.5                     | 111.6                  | 1.9      | 5300                     |
|                    | 1050.0                       | 7.5       | 5730    | 4                       | 140.0                  | 2.2      | 5920                     |

\* FROM SECTION 4.0 GEOMETRY (SHEET 21)

e) RATING INFORMATION ABOVE EL 1050 FT :

MAIN CHANNEL (ABOVE DAM CREST) ⇒

TOTAL AREA BELOW EL 1050 FT ≈ 675 FT<sup>2</sup>

TOTAL WETTED PERIMETER BELOW EL 1050 FT ≈ 97 FT

$n \approx 0.02$

$S \approx 0.001$  FT/FT

OVERBANK AREA ⇒

TOTAL AREA BELOW EL 1050 FT ≈ 140 FT<sup>2</sup>

TOTAL WETTED PERIMETER BELOW EL 1050 FT ≈ 64 FT

$n \approx 0.125$

$S \approx 0.001$  FT/FT



SUBJECT DAM SAFETY INSPECTIONUPPER BRIDGEPORT DAMBY WJV DATE 5-11-79 PROJ. NO. 78-617-465CHKD. BY DLB DATE 6-4-79 SHEET NO. 19 OF 26Engineers • Geologists • Planners  
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| WATER<br>SURFACE<br>ELEVATION<br>(FT) | MAXIMUM<br>DEPTH<br>ABOVE<br>ELEV 1050<br>(FT) | MAIN CHANNEL            |           |            | OVBANK AREA             |           |            | TOTAL<br>SECTION<br>FLOW<br>(CFS) |
|---------------------------------------|------------------------------------------------|-------------------------|-----------|------------|-------------------------|-----------|------------|-----------------------------------|
|                                       |                                                | A<br>(FT <sup>2</sup> ) | R<br>(FT) | Q<br>(CFS) | A<br>(FT <sup>2</sup> ) | R<br>(FT) | Q<br>(CFS) |                                   |
| 1050                                  | 0                                              | —                       | —         | —          | —                       | —         | —          | 5920                              |
| 1051                                  | 1                                              | 765                     | 7.9       | 7150       | 840                     | 0.6       | 230        | 7380                              |
| 1052                                  | 2                                              | 855                     | 8.8       | 8590       | 2320                    | 1.5       | 1150       | 9740                              |
| 1053                                  | 3                                              | 945                     | 9.7       | 10130      | 3940                    | 2.5       | 2660       | 12790                             |
| 1054                                  | 4                                              | 1035                    | 10.7      | 11840      | 5370                    | 3.4       | 4580       | 16420                             |
| 1055                                  | 5                                              | 1125                    | 11.6      | 13580      | 6940                    | 4.4       | 7030       | 20610                             |
| 1056                                  | 6                                              | 1215                    | 12.5      | 15420      | 8540                    | 5.3       | 9780       | 25200                             |
| 1057                                  | 7                                              | 1305                    | 13.5      | 17430      | 10160                   | 6.2       | 12920      | 30350                             |
| 1058                                  | 8                                              | 1395                    | 14.4      | 19450      | 11810                   | 7.0       | 16290      | 35740                             |
| 1059                                  | 9                                              | 1485                    | 15.3      | 21560      | 13490                   | 7.9       | 20160      | 41720                             |
| 1060                                  | 10                                             | 1575                    | 16.2      | 23760      | 15190                   | 8.8       | 24410      | 48170                             |
| 1061                                  | 11                                             | 1665                    | 17.2      | 26140      | 16930                   | 9.7       | 29030      | 55170                             |
| 1062                                  | 12                                             | 1755                    | 18.1      | 28500      | 18700                   | 10.6      | 34010      | 62510                             |

- HEC-2 ELEVATION-DISCHARGE RELATIONSHIP @ SECTION 0.0

( @ UPPER BRIDGEPORT DAM )

| ELEVATION<br>(FT) | FLOW<br>(CFS) |
|-------------------|---------------|
| 1043.7            | 230           |
| 1046.2            | 1450          |
| 1048.6            | 3140          |
| 1051.1            | 5300          |
| 1051.7            | 5920          |
| 1052.8            | 7380          |
| 1054.0            | 9740          |
| 1055.1            | 12790         |
| 1056.3            | 16420         |
| 1057.4            | 20610         |
| 1058.5            | 25200         |
| 1059.7            | 30350         |
| 1060.8            | 35740         |
| 1063.0            | 48170         |

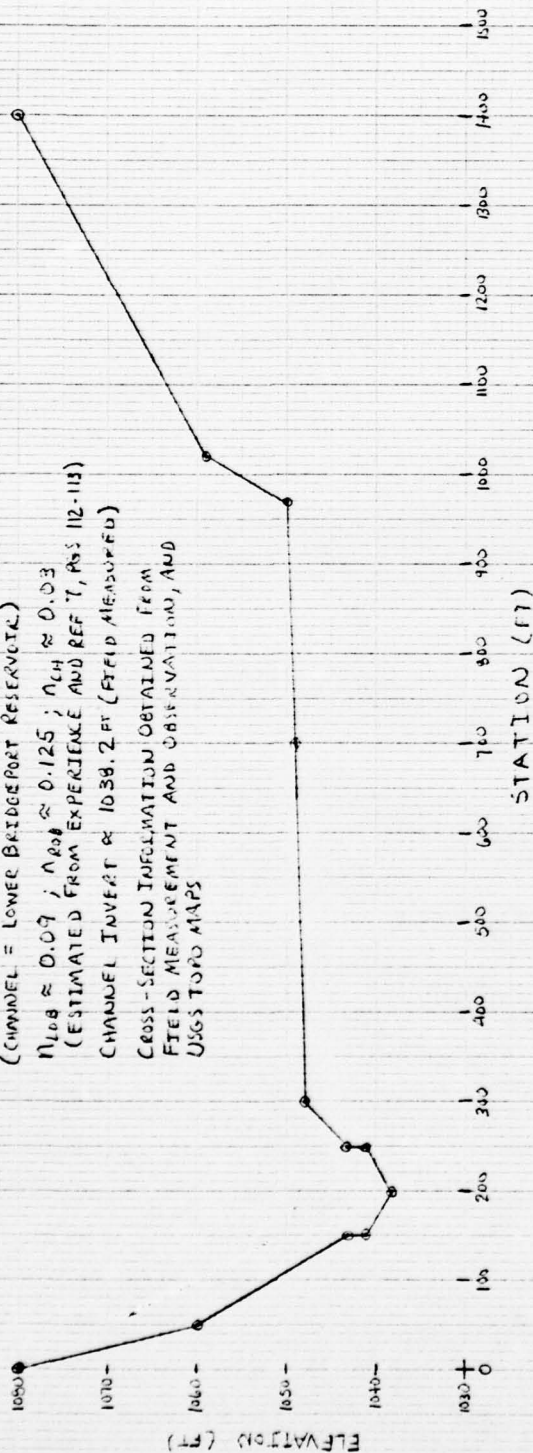
| ELEVATION<br>(FT) | FLOW<br>(CFS) |
|-------------------|---------------|
| 1064.2            | 55170         |
| 1065.3            | 62510         |



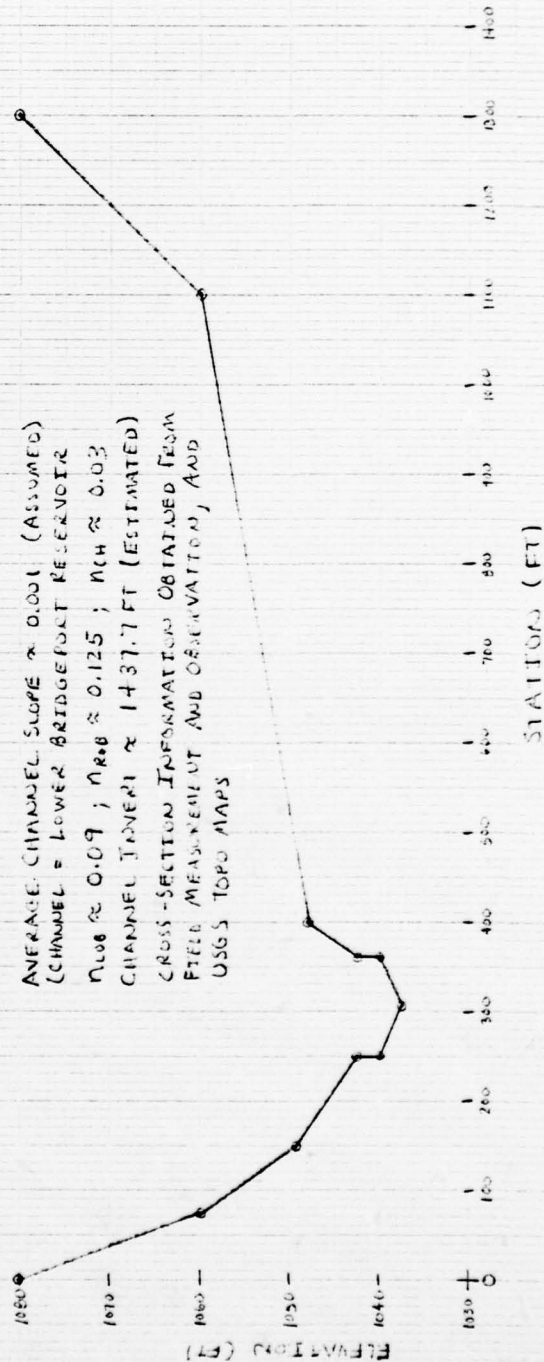
# DOWNSTREAM ROUTING SECTIONS

20 OF 26

SECTION 0.0  $\Rightarrow$  JUST DS FROM EMBANKMENT  
 AVERAGE CHANNEL SLOPE  $\approx 0.001$  (ASSUMED)  
 (CHANNEL = LOWER BRIDGEPORT RESERVOIR)  
 $n_{100} \approx 0.09$ ;  $n_{200} \approx 0.125$ ;  $n_{400} \approx 0.03$   
 (ESTIMATED FROM EXPERIENCE AND REF 7, PGS 112-113)  
 CHANNEL INVERT  $\approx 1038.2$  FT (FIELD MEASURED)  
 CROSS-SECTION INFORMATION OBTAINED FROM  
 FIELD MEASUREMENT AND OBSERVATION, AND  
 USGS TOPO MAPS



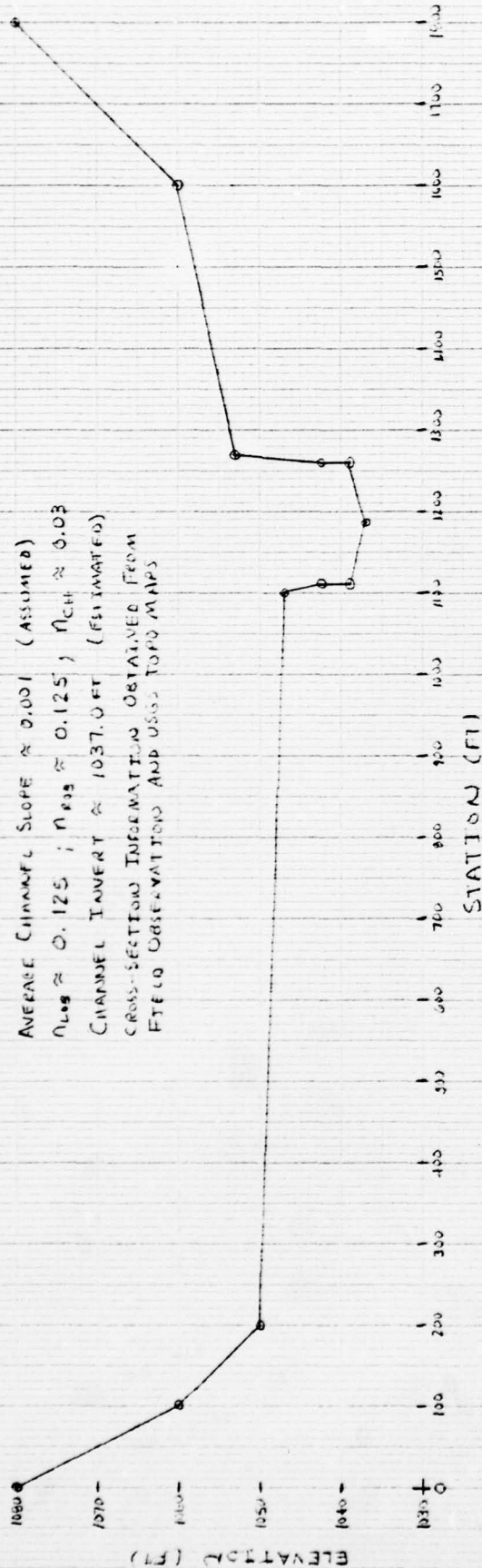
SECTION 1.0  $\Rightarrow$   $\approx 550'$  DS FROM UPPER DAM (@ 1<sup>ST</sup> STRUCTURE)  
 AND  $\approx 1350'$  DS FROM LOWER DAM  
 AVERAGE CHANNEL SLOPE  $\approx 0.001$  (ASSUMED)  
 (CHANNEL = LOWER BRIDGEPORT RESERVOIR)  
 $n_{100} \approx 0.09$ ;  $n_{200} \approx 0.125$ ;  $n_{400} \approx 0.03$   
 CHANNEL INVERT  $\approx 1437.7$  FT (ESTIMATED)  
 CROSS-SECTION INFORMATION OBTAINED FROM  
 FIELD MEASUREMENT AND OBSERVATION, AND  
 USGS TOPO MAPS



SECTION 2.0  $\Rightarrow$   $\approx$  1250' DS FROM UPPER DAM  
AND  $\approx$  1150' US FROM LOWER DAM

AVERAGE CHANNEL SLOPE  $\approx$  0.001 (ASSUMED)  
 $n_{log} \approx 0.125$ ;  $n_{reg} \approx 0.125$ ;  $n_{ch} \approx 0.03$   
CHANNEL INVERT  $\approx$  1037.0 FT (ESTIMATED)

CROSS-SECTION INFORMATION OBTAINED FROM  
FIELD OBSERVATIONS AND USGS TOPO MAPS

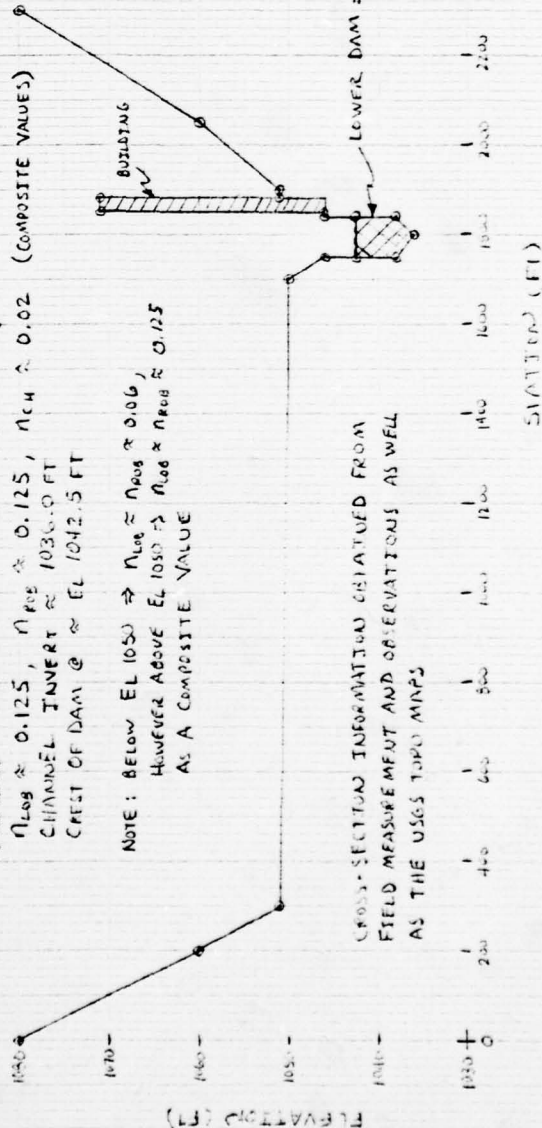


SECTION 4.0  $\Rightarrow$  LOWER BRIDGEPORT DAM SECTION  $\approx$  2400 FT DS FROM UPPER DAM

AVERAGE CHANNEL SLOPE  $\approx$  0.001 (ASSUMED)  
 $n_{log} \approx 0.125$ ,  $n_{reg} \approx 0.125$ ,  $n_{ch} \approx 0.02$  (COMPOSITE VALUES)  
CHANNEL INVERT  $\approx$  1036.0 FT  
CREST OF DAM  $\approx$  EL 1042.5 FT

NOTE: BELOW EL 1050  $\Rightarrow$   $n_{log} \approx n_{reg} \approx 0.06$ ,  
HOWEVER ABOVE EL 1050  $\Rightarrow$   $n_{log} \approx n_{reg} \approx 0.125$   
AS A COMPOSITE VALUE

NOTE: SECTION 3.0 LOCATED  
 $\approx$  50 FT US FROM THIS  
LOWER DAM HAS THE  
SAME SECTION CONFIGURATION  
W/ THE DAM REMOVED  
AND  $n_{ch} \approx 0.03$



CROSS-SECTION INFORMATION OBTAINED FROM  
FIELD MEASUREMENT AND OBSERVATIONS AS WELL  
AS THE USGS TOPO MAPS

LOWER DAM  $\Rightarrow$   $\approx$  6.5' "RIP OF THE RIVER"  
CONCRETE OVERFLOW DAM  
W/  $\approx$  3.5' MAXIMUM HEAD

SUBJECT DAM SAFETY INSPECTIONUPPER BRIDGEPORT DAMBY WJV DATE 6-4-79 PROJ. NO. 78-617-465CHKD. BY DLB DATE 6-4-79 SHEET NO. 22 OF 26Engineers • Geologists • Planners  
Environmental SpecialistsDOWNSTREAM ROUTING RELATIONSHIPS

STORAGE VS OUTFLOW INFORMATION FOR THE DOWNSTREAM ROUTING SECTIONS WAS OBTAINED FROM THE HEC-2 TAILWATER OUTPUT. (SEE SUMMARY INPUT/OUTPUT SHEETS, SHEETS A TO C).

- SECTION 1: LOCATED @ 1<sup>ST</sup> STRUCTURE @ 550 FT DS FROM UPPER BRIDGEPORT DAM (OR @ 1350 FT US FROM LOWER BRIDGEPORT DAM)

| STORAGE<br>(AC-FT) | OUTFLOW<br>(CFS) | STORAGE<br>(AC-FT) | OUTFLOW<br>(CFS) |
|--------------------|------------------|--------------------|------------------|
| 0                  | 0                | 70.9               | 12790            |
| 6.1                | 280              | 82.2               | 16420            |
| 10.3               | 1450             | 94.1               | 20610            |
| 17.4               | 3140             | 106.3              | 25200            |
| 34.3               | 5300             | 119.2              | 30350            |
| 39.4               | 5920             | 132.3              | 35740            |
| 49.7               | 7330             | 157.9              | 43170            |
| 60.1               | 9740             | 174.1              | 55170            |
|                    |                  | 183.6              | 62510            |

- SECTION 4: LOCATED @ LOWER BRIDGEPORT DAM @ 2100 FT DS FROM UPPER BRIDGEPORT DAM

| STORAGE<br>(AC-FT) | OUTFLOW<br>(CFS) | STORAGE<br>(AC-FT) | OUTFLOW<br>(CFS) |
|--------------------|------------------|--------------------|------------------|
| 0                  | 0                | 263.8              | 12790            |
| 30.1               | 280              | 307.9              | 16420            |
| 44.1               | 1450             | 354.4              | 20610            |
| 65.7               | 3140             | 402.5              | 25200            |
| 116.4              | 5300             | 453.5              | 30350            |
| 136.6              | 5920             | 505.6              | 35740            |
| 190.0              | 7330             | 616.8              | 43170            |
| 221.4              | 9740             | 673.8              | 55170            |
|                    |                  | 732.1              | 62510            |



SUBJECT DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV DATE 6-23-79 PROJ. NO. 73-617-465

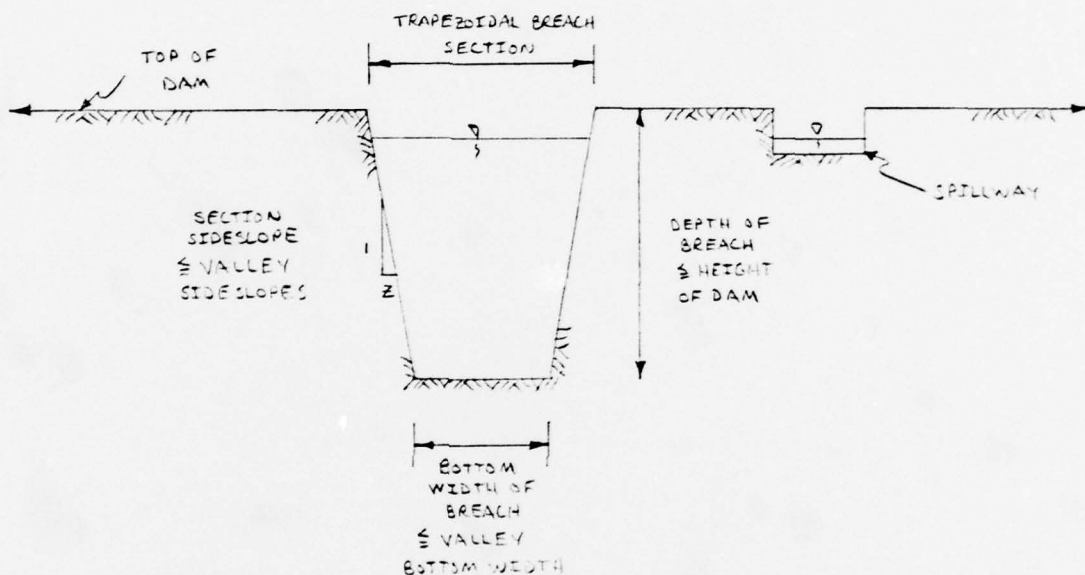
CHKD. BY DLB DATE 6-22-79 SHEET NO. 23 OF 26



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## BREACHING ASSUMPTIONS

- TYPICAL BREACH SECTION :



- HEC-1-DAM BREACHING ANALYSIS INPUTS :

(BREACHING BEGINS WHEN RESERVOIR LEVEL REACHES THE TOP OF DAM ELEVATION)

| PLAN NUMBER<br>AND COMMENT       | BREACH BOTTOM<br>WIDTH<br>(FT) | BREACH<br>DEPTH<br>(FT) | SECTION<br>SIDESLOPES | * BREACH<br>TIME<br>(HR) | WSEL @ START<br>OF FAILURE<br>(FT) |
|----------------------------------|--------------------------------|-------------------------|-----------------------|--------------------------|------------------------------------|
| ① MIN BREACH SECT; MIN FAIL TIME | 10                             | 7                       | 1/2 TO 1              | 0.75                     | 1059.0                             |
| ② MAX BREACH SECT; MIN FAIL TIME | 460                            | 7                       | 4 TO 1                | 0.75                     | 1059.0                             |
| ③ MIN BREACH SECT; MAX FAIL TIME | 10                             | 7                       | 1/2 TO 1              | 4.00                     | 1059.0                             |
| ④ MAX BREACH SECT; MAX FAIL TIME | 460                            | 7                       | 4 TO 1                | 4.00                     | 1059.0                             |
| ⑤ AVERAGE POSSIBLE CONDITIONS    | 200                            | 7                       | 2 TO 1                | 1.50                     | 1059.0                             |
| ** ⑥ AVERAGE POSSIBLE CONDITIONS | 200                            | 7                       | 2 TO 1                | 1.50                     | 1059.0                             |

\* BREACH TIME = TOTAL TIME NECESSARY TO REACH FINAL BREACH DIMENSIONS

\*\* PLANS ①-⑤ EVALUATED UNDER 0.22 PMF, PLAN ⑥ EVALUATED UNDER 0.5 PMF



SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT LAM  
 BY WJV DATE 6-23-79 PROJ. NO. 78-617-465  
 CHKD. BY DLB DATE 6-22-79 SHEET NO. 24 OF 26



- THE ASSUMPTIONS OF SHEET 23 ARE BASED SOMEWHAT ON INFORMATION CONCERNING EARTH DAM BREACHING PROVIDED BY THE COE, BALTIMORE DISTRICT, AND ALSO ON THE PHYSICAL CONSTRAINTS OF THE DAM AND SURROUNDING TERRAIN:

| CONSTRAINT                                                                                              | VALUE                             |
|---------------------------------------------------------------------------------------------------------|-----------------------------------|
| - HEIGHT OF DAM                                                                                         | ≈ 21 FT (FIELD MEASURED)          |
| - APPROXIMATE ELEVATION OF TAILWATER ON DAM PRIOR TO BREACHING (CORRESPONDING TO DISCHARGE OF 7130 CFS) | ≈ 1052.6 FT (FROM REC-2 SHEET 19) |
| - EFFECTIVE POSSIBLE BREACH DEPTH BELOW LOW TOP OF DAM EL 1059.0 FT                                     | ≈ 7 FT                            |
| - EMBANKMENT CREST LENGTH:                                                                              |                                   |
| TO RIGHT OF EMERGENCY SPWY                                                                              | ≈ 320 FT                          |
| BETWEEN SERVICE AND EMERGENCY SPWY                                                                      | ≈ 200 FT                          |
| TO LEFT OF SERVICE SPWY                                                                                 | ≈ 150 FT                          |
|                                                                                                         | } FIELD MEASURED                  |
| - VALLEY BOTTOM WIDTH @ EL 1052.6 FT                                                                    | ≈ 1020 FT (FIELD MEASURED)        |
| - VALLEY SIDESLOPES ADJACENT TO DAM:                                                                    |                                   |
| RIGHT SIDE                                                                                              | ≈ 5.5 to 1                        |
| LEFT SIDE                                                                                               | ≈ 6 to 1 (SHEET 20)               |

SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM  
 BY WJV DATE 6-25-79 PROJ. NO. 78-617-465  
 CHKD. BY DLB DATE 7-1-79 SHEET NO. 25 OF 26



# HEC-1 - DAM BREACHING ANALYSIS OUTPUT:

## RESERVOIR DATA

UNDER 0.22 PMF CONDITIONS (W/ PA-657 DAM ABLE TO PASS THE ENTIRE FLOOD WITHOUT BREACHING) -

| * PLAN NUMBER | VARIABLE<br>BREACH<br>BOTTOM<br>WIDTH<br>(FT) | ACTUAL MAX FLOW<br>DURING FLOOD TIME<br>(CFS) | CORRESPONDING<br>TIME OF FLOW<br>(HR) | INTERPOLATED OR<br>HEC-1 ROUTED MAX<br>FLOW DURING FLOOD<br>TIME<br>(CFS) | CORRESPONDING<br>TIME OF FLOW<br>(HR) | ACTUAL PEAK<br>FLOW THROUGH DAM<br>(CFS) | CORRESPONDING<br>TIME OF PEAK<br>(HR) | TIME OF<br>INITIAL BREACH<br>(HR) |
|---------------|-----------------------------------------------|-----------------------------------------------|---------------------------------------|---------------------------------------------------------------------------|---------------------------------------|------------------------------------------|---------------------------------------|-----------------------------------|
| (1)           | 10                                            | 9326                                          | 43.50                                 | 9326                                                                      | 43.50                                 | 9326                                     | 43.50                                 | 42.75                             |
| (2)           | 460                                           | 18546                                         | 43.50                                 | 18546                                                                     | 43.50                                 | 18546                                    | 43.50                                 | 42.75                             |
| (3)           | 10                                            | 8023                                          | 44.17                                 | 8023                                                                      | 44.25                                 | 8023                                     | 44.17                                 | 42.75                             |
| (4)           | 460                                           | 9837                                          | 44.50                                 | 9837                                                                      | 44.50                                 | 9837                                     | 44.50                                 | 42.75                             |
| (5)           | 200                                           | 11890                                         | 44.25                                 | 11890                                                                     | 44.25                                 | 11890                                    | 44.25                                 | 42.75                             |

UNDER 0.50 PMF BASE FLOW CONDITIONS (W/ PA-657 DAM ABLE TO PASS THE ENTIRE FLOOD WITHOUT BREACHING) -

| * PLAN NUMBER | VARIABLE<br>BREACH<br>BOTTOM<br>WIDTH<br>(FT) | ACTUAL MAX FLOW<br>DURING FLOOD TIME<br>(CFS) | CORRESPONDING<br>TIME OF FLOW<br>(HR) | INTERPOLATED OR<br>HEC-1 ROUTED MAX<br>FLOW DURING FLOOD<br>TIME<br>(CFS) | CORRESPONDING<br>TIME OF FLOW<br>(HR) | ACTUAL PEAK<br>FLOW THROUGH DAM<br>(CFS) | CORRESPONDING<br>TIME OF PEAK<br>(HR) | TIME OF<br>INITIAL BREACH<br>(HR) |
|---------------|-----------------------------------------------|-----------------------------------------------|---------------------------------------|---------------------------------------------------------------------------|---------------------------------------|------------------------------------------|---------------------------------------|-----------------------------------|
| (6)           | 200                                           | 19065                                         | 41.75                                 | 19065                                                                     | 41.75                                 | 19065                                    | 43.50                                 | 40.25                             |

SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM  
 BY WJV DATE 6-25-79 PROJ. NO. 78-617-465  
 CHKD. BY DLB DATE 7-1-79 SHEET NO. 26 OF 26



# HEC-1- DAM BREACHING ANALYSIS OUTPUT :

## DOWNSTREAM ROUTING DATA

UNDER 0.22 PMF BASE FLOW CONDITIONS (W/ PA-657 DAM ABLE TO PASS THE ENTIRE FLOOD WITHOUT BREACHING) -

| VARIABLE<br>BREACH<br>BOTTOM<br>WIDTH<br>(FT) | OUTPUT @ SECTION 7 LOCATED 550 FT DS FROM DAM |                                  |                               |                      | OUTPUT @ SECTION 8 (LOWER BRIDGEPORT DAM SECTION) |                                  |                               |                      |
|-----------------------------------------------|-----------------------------------------------|----------------------------------|-------------------------------|----------------------|---------------------------------------------------|----------------------------------|-------------------------------|----------------------|
|                                               | PEAK FLOW<br>(CFS)                            | CORRESPONDING<br>WSEL 2.<br>(FT) | WSEL 3.<br>W/O BREACH<br>(FT) | 4.<br>Δ ELEV<br>(FT) | PEAK FLOW<br>(CFS)                                | CORRESPONDING<br>WSEL 2.<br>(FT) | WSEL 3.<br>W/O BREACH<br>(FT) | 4.<br>Δ ELEV<br>(FT) |
| ①<br>10                                       | 8316                                          | 1053.1                           | 1053.1                        | 0.0                  | 8229                                              | 1051.4                           | 1051.3                        | +0.1                 |
| ②<br>460                                      | 18227                                         | 1056.2                           | 1053.1                        | +2.1                 | 16454                                             | 1054.0                           | 1051.3                        | +2.7                 |
| ③<br>10                                       | 8023                                          | 1053.1                           | 1053.1                        | 0.0                  | 8006                                              | 1051.3                           | 1051.3                        | 0.0                  |
| ④<br>460                                      | 9836                                          | 1054.8                           | 1053.1                        | +0.7                 | 9794                                              | 1052.0                           | 1051.3                        | +0.7                 |
| ⑤<br>200                                      | 11891                                         | 1054.5                           | 1053.1                        | +1.4                 | 11652                                             | 1052.6                           | 1051.3                        | +1.3                 |

UNDER 0.50 PMF BASE FLOW CONDITIONS (W/ PA-657 DAM ABLE TO PASS THE ENTIRE FLOOD WITHOUT BREACHING) -

|   |     |       |        |        |     |       |        |     |
|---|-----|-------|--------|--------|-----|-------|--------|-----|
| ⑥ | 200 | 19692 | 1056.6 | 1054.6 | 0.0 | 19686 | 1054.8 | 0.0 |
|---|-----|-------|--------|--------|-----|-------|--------|-----|

1.) SEE TABLE ON SHEET 23 . 2.) WATER SURFACE ELEVATIONS CORRESPONDING TO THE BREACH OUTFLOWS AS INTERPOLATED FROM THE HEC-2 TAILWATER OUTPUT, SUMMARY INPUT/OUTPUT SHEETS, SHEETS B AND C. 3.) BASE FLOW ELEVATIONS CORRESPONDING TO THE PEAK 0.22 PMF FOR PLANS ①-⑤, AND CORRESPONDING TO THE PEAK 0.5 PMF FOR PLAN ⑥. FOR OUTFLOW ANALYSIS, SUMMARY TABLE/OUTPUT SHEETS. 4.) AELEV = ELEVATION WSEL -



## DAM SAFETY INSPECTION

## UPPER BRIDGEPORT DAM

BY WJV

DATE 6-27-79

PROJ. NO. 78-617-465

CHKD. BY DLB

DATE 6-29-79

SHEET NO. A OF BB



Engineers • Geologists • Planners  
Environmental Specialists

## SUMMARY INPUT/OUTPUT SHEETS

111 DAM SAFETY INSPECTION - TAILWATER ON UPPER BRIDGEPORT DAM  
112 STARTING WELLS BASED ON HAND COMPUTED RATING CURVE FOR LOWER BRIDGT DAM  
113 JACOB'S CREEK, BRIDGEPORT, PA

TAILWATER ON  
DAM AND  
DOWNSTREAM  
ROUTING  
CRITERIA VIA  
HEC-2

0.0  
FQ  
ITRACE

WSEL  
043.500  
CHNIM

0

IC H

RT

0.

ANNUAL  
0.  
PREVIOUS

INO

J1 J2

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

|        |        |        |        |       |       |       |        |        |       |
|--------|--------|--------|--------|-------|-------|-------|--------|--------|-------|
| 38,000 | 39,000 | 42,000 | 43,000 | 1,000 | 2,000 | 3,000 | 26,000 | 25,000 | 7,000 |
|--------|--------|--------|--------|-------|-------|-------|--------|--------|-------|

| J5 | LPRNT | NUMSEC | *****REQUESTED SECTION NUMBERS***** |
|----|-------|--------|-------------------------------------|
|----|-------|--------|-------------------------------------|

[illegible]

|     | 4.000    | 15.000   | 1750.000 | 1840.000 | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      |
|-----|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| X1  |          |          |          |          |          |          |          |          |          |          |
| GR  | 1080.000 | 0.0      | 1060.000 | 200.000  | 1051.000 | 300.000  | 1050.000 | 1700.000 | 1046.000 | 1750.000 |
| GM  | 1042.500 | 1750.000 | 1042.500 | 1940.000 | 1046.000 | 1840.000 | 1046.000 | 1850.000 | 1071.000 | 1850.000 |
| GER | 1071.000 | 1880.000 | 1051.000 | 1880.000 | 1051.000 | 1900.000 | 1060.000 | 2050.000 | 1080.000 | 2300.000 |
| NC  | 0.125    | 0.125    | 0.030    | 0.300    | 0.500    | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      |

|     | 3.000    | 14.000   | 1750.000 | 1840.000 | 50.000   | 50.000   | 50.000   | 0.0      | 0.0      | 0.0      |
|-----|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| EX1 | 1080.000 | 0.0      | 1060.000 | 200.000  | 1051.000 | 300.000  | 1050.000 | 1700.000 | 1046.000 | 1750.000 |
| EXR | 1038.000 | 1750.000 | 1036.000 | 1900.000 | 1038.000 | 1840.000 | 1046.000 | 1840.000 | 1046.000 | 1850.000 |
| EXI | 1051.000 | 1880.000 | 1051.000 | 1900.000 | 1060.000 | 2050.000 | 1080.000 | 2300.000 | 0.0      | 0.0      |
| EXC | 0.125    | 0.125    | 0.030    | 0.100    | 0.300    | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      |

|    | 2.000    | 12.000   | 1110.000 | 1260.000 | 700.000  | 1250.000 | 1100.000 | 0.0      | 0.0      |
|----|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| K1 | 1080.000 | 0.0      | 1050.000 | 100.000  | 1050.000 | 200.000  | 1047.000 | 1100.000 | 1042.500 |
| GR | 1039.000 | 1110.000 | 1037.000 | 1185.000 | 1039.000 | 1260.000 | 1042.500 | 1260.000 | 1053.000 |
| GR | 1060.000 | 1600.000 | 1080.000 | 1800.000 | 0.0      | 0.0      | 0.0      | 0.0      | 0.0      |
| NC | 0.090    | 0.125    | 0.030    | 0.300    | 0.500    | 0.0      | 0.0      | 0.0      | 0.0      |

|    | 1,000    | 11,000   | 250,000  | 360,000 | 700,000  | 700,000 | 0.0      | 0.0     | 0.0      |
|----|----------|----------|----------|---------|----------|---------|----------|---------|----------|
| K1 | 1,000    | 11,000   | 250,000  | 360,000 | 700,000  | 700,000 | 0.0      | 0.0     | 0.0      |
| GR | 1080.000 | 0.0      | 1060.000 | 75.000  | 1049.000 | 150.000 | 1042.500 | 250.000 | 250.000  |
| GR | 1037.700 | 305.000  | 1040.000 | 360.000 | 1042.500 | 360.000 | 1048.000 | 400.000 | 1100.000 |
| GR | 1080.000 | 1300.000 | 0.0      | 0.0     | 0.0      | 0.0     | 0.0      | 0.0     | 0.0      |
| NC | 0.090    | 0.125    | 0.330    | 0.100   | 0.300    | 0.0     | 0.0      | 0.0     | 0.0      |



SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJY

DATE

6-27-79

PROJ. NO.

78-617-465

CHKD. BY DLB

DATE

6-29-79

SHEET NO.

B OF 22


Engineers • Geologists • Planners  
Environmental Specialists0.0  
200.000  
970.000  
0.0  
0.00.0  
1038.200  
1050.000  
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150.000  
700.000  
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0.0550.000  
1041.000  
1049.000  
0.0  
0.0550.000  
150.000  
300.000  
0.0  
0.0550.000  
1042.500  
1048.000  
0.0  
0.0250.000  
50.000  
250.000  
100.000  
0.0150.000  
1060.000  
1042.500  
1080.000  
0.012.000  
0.0  
250.000  
1020.000  
0.00.0  
1080.000  
1041.000  
1059.000  
0.0X1  
GR  
GR  
GR  
EJLOWER  
BRIDGEPORT  
DAM  
SECTION~ 50 FT  
US FROM  
LOWER  
BRIDGEPORT  
DAM

SUMMARY OUTPUT

CUMULATIVE  
SIGNATURE VOLUME

VOL

AREA

VCH

EG

CRIMS

ELEVATION  
CHSELFLOW VS  
Q

ELMIN

XLCH

SECNO

|       |     |         |          |         |         |         |       |          |     |
|-------|-----|---------|----------|---------|---------|---------|-------|----------|-----|
| 4.000 | 0.0 | 1042.50 | 280.00   | 1043.50 | 0.0     | 1043.65 | 3.11  | 90.00    | 0.0 |
| 4.000 | 0.0 | 1042.50 | 1450.00  | 1045.50 | 0.0     | 1045.95 | 5.37  | 270.00   | 0.0 |
| 4.000 | 0.0 | 1042.50 | 3140.00  | 1047.50 | 0.0     | 1048.25 | 6.95  | 479.06   | 0.0 |
| 4.000 | 0.0 | 1042.50 | 5300.00  | 1049.50 | 0.0     | 1050.56 | 8.31  | 741.56   | 0.0 |
| 4.000 | 0.0 | 1042.50 | 5920.00  | 1050.00 | 0.0     | 1051.14 | 8.64  | 815.00   | 0.0 |
| 4.000 | 0.0 | 1042.50 | 7380.00  | 1051.00 | 1048.44 | 1052.26 | 9.23  | 1655.00  | 0.0 |
| 4.000 | 0.0 | 1042.50 | 9740.00  | 1052.00 | 1051.10 | 1053.32 | 9.90  | 3248.89  | 0.0 |
| 4.000 | 0.0 | 1042.50 | 12790.00 | 1053.00 | 0.0     | 1054.37 | 10.60 | 4860.55  | 0.0 |
| 4.000 | 0.0 | 1042.50 | 16420.00 | 1054.00 | 0.0     | 1055.40 | 11.27 | 6500.00  | 0.0 |
| 4.000 | 0.0 | 1042.50 | 20610.00 | 1055.00 | 0.0     | 1056.45 | 11.94 | 8167.22  | 0.0 |
| 4.000 | 0.0 | 1042.50 | 25200.00 | 1056.00 | 0.0     | 1057.49 | 12.54 | 9862.22  | 0.0 |
| 4.000 | 0.0 | 1042.50 | 30350.00 | 1057.00 | 0.0     | 1058.54 | 13.17 | 11585.00 | 0.0 |
| 4.000 | 0.0 | 1042.50 | 35740.00 | 1058.00 | 0.0     | 1059.57 | 13.69 | 13335.55 | 0.0 |
| 4.000 | 0.0 | 1042.50 | 48170.00 | 1060.00 | 0.0     | 1061.68 | 14.85 | 16920.00 | 0.0 |
| 4.000 | 0.0 | 1042.50 | 55170.00 | 1061.00 | 0.0     | 1062.74 | 15.42 | 18751.25 | 0.0 |
| 4.000 | 0.0 | 1042.50 | 62510.00 | 1062.00 | 0.0     | 1063.80 | 15.96 | 20605.00 | 0.0 |

|       |       |         |          |         |     |         |       |          |       |
|-------|-------|---------|----------|---------|-----|---------|-------|----------|-------|
| 3.000 | 50.00 | 1036.00 | 280.00   | 1043.69 | 0.0 | 1043.70 | 0.46  | 602.31   | 0.40  |
| 3.000 | 50.00 | 1036.00 | 1450.00  | 1046.03 | 0.0 | 1046.08 | 1.78  | 812.85   | 0.62  |
| 3.000 | 50.00 | 1036.00 | 3140.00  | 1048.30 | 0.0 | 1048.45 | 3.07  | 1089.29  | 0.90  |
| 3.000 | 50.00 | 1036.00 | 5300.00  | 1050.54 | 0.0 | 1050.82 | 4.26  | 1657.06  | 1.38  |
| 3.000 | 50.00 | 1036.00 | 5920.00  | 1051.12 | 0.0 | 1051.42 | 4.45  | 2434.22  | 1.86  |
| 3.000 | 50.00 | 1036.00 | 7380.00  | 1052.29 | 0.0 | 1052.58 | 4.66  | 4315.56  | 3.43  |
| 3.000 | 50.00 | 1036.00 | 9740.00  | 1053.31 | 0.0 | 1053.65 | 5.23  | 6006.00  | 5.31  |
| 3.000 | 50.00 | 1036.00 | 12790.00 | 1054.30 | 0.0 | 1054.69 | 5.90  | 7658.57  | 7.18  |
| 3.000 | 50.00 | 1036.00 | 16420.00 | 1055.28 | 0.0 | 1055.73 | 6.57  | 9331.43  | 9.09  |
| 3.000 | 50.00 | 1036.00 | 20610.00 | 1056.28 | 0.0 | 1056.77 | 7.21  | 11055.97 | 11.03 |
| 3.000 | 50.00 | 1036.00 | 25200.00 | 1057.27 | 0.0 | 1057.81 | 7.79  | 12804.05 | 13.01 |
| 3.000 | 50.00 | 1036.00 | 30350.00 | 1058.28 | 0.0 | 1058.86 | 8.34  | 14672.51 | 15.04 |
| 3.000 | 50.00 | 1036.00 | 35740.00 | 1059.29 | 0.0 | 1059.90 | 8.81  | 16449.70 | 17.09 |
| 3.000 | 50.00 | 1036.00 | 48170.00 | 1061.37 | 0.0 | 1062.03 | 9.69  | 20304.82 | 21.36 |
| 3.000 | 50.00 | 1036.00 | 55170.00 | 1062.41 | 0.0 | 1063.10 | 10.12 | 22279.75 | 23.55 |
| 3.000 | 50.00 | 1036.00 | 62510.00 | 1063.45 | 0.0 | 1064.17 | 10.52 | 24218.68 | 25.76 |

SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE 6-27-79

PROJ. NO. 78-617-465

CHKD. BY DLB

DATE 7-2-79

SHEET NO. C OF BB

Engineers • Geologists • Planner  
Environmental Specialists

| SECNO | XLCN    | ELMIN   | Q        | CWSL    | CRWS | EG      | VCH   | AREA     | CUMULATIVE<br>STORAGE VOLUME |                                                      |
|-------|---------|---------|----------|---------|------|---------|-------|----------|------------------------------|------------------------------------------------------|
|       |         |         |          |         |      |         |       |          | VOL                          |                                                      |
| 2.000 | 1100.00 | 1037.00 | 280.00   | 1043.70 | 0.0  | 1043.70 | 0.33  | 857.32   | 18.82                        | ~ 1150 FT<br>US FROM<br>LOWER<br>BRIDGEPORT<br>DAM   |
| 2.000 | 1100.00 | 1037.00 | 1450.00  | 1046.12 | 0.0  | 1046.14 | 1.19  | 1238.54  | 26.47                        |                                                      |
| 2.000 | 1100.00 | 1037.00 | 3140.00  | 1048.52 | 0.0  | 1048.58 | 1.96  | 1977.83  | 37.81                        |                                                      |
| 2.000 | 1100.00 | 1037.00 | 5300.00  | 1050.91 | 0.0  | 1050.99 | 2.50  | 4199.29  | 63.80                        |                                                      |
| 2.000 | 1100.00 | 1037.00 | 5920.00  | 1051.51 | 0.0  | 1051.60 | 2.59  | 4849.71  | 76.61                        |                                                      |
| 2.000 | 1100.00 | 1037.00 | 7380.00  | 1052.66 | 0.0  | 1052.76 | 2.82  | 6103.05  | 105.23                       |                                                      |
| 2.000 | 1100.00 | 1037.00 | 9740.00  | 1053.72 | 0.0  | 1053.86 | 3.31  | 7290.67  | 132.12                       |                                                      |
| 2.000 | 1100.00 | 1037.00 | 12790.00 | 1054.76 | 0.0  | 1054.94 | 3.91  | 8505.97  | 159.27                       |                                                      |
| 2.000 | 1100.00 | 1037.00 | 16420.00 | 1055.79 | 0.0  | 1056.03 | 4.55  | 9767.12  | 187.38                       |                                                      |
| 2.000 | 1100.00 | 1037.00 | 20610.00 | 1056.81 | 0.0  | 1057.11 | 5.20  | 11089.59 | 216.87                       |                                                      |
| 2.000 | 1100.00 | 1037.00 | 25200.00 | 1057.82 | 0.0  | 1058.19 | 5.83  | 12447.00 | 247.24                       | ~ 1850 FT<br>US FROM<br>LOWER<br>BRIDGEPORT<br>DAM ; |
| 2.000 | 1100.00 | 1037.00 | 30350.00 | 1058.84 | 0.0  | 1059.28 | 6.46  | 13881.30 | 279.33                       |                                                      |
| 2.000 | 1100.00 | 1037.00 | 35740.00 | 1059.84 | 0.0  | 1060.34 | 7.04  | 15339.04 | 312.03                       |                                                      |
| 2.000 | 1100.00 | 1037.00 | 48170.00 | 1061.88 | 0.0  | 1062.52 | 8.17  | 18424.95 | 381.62                       |                                                      |
| 2.000 | 1100.00 | 1037.00 | 55170.00 | 1062.91 | 0.0  | 1063.62 | 8.73  | 19993.75 | 417.30                       |                                                      |
| 2.000 | 1100.00 | 1037.00 | 62510.00 | 1063.94 | 0.0  | 1064.72 | 9.24  | 21610.92 | 453.80                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 280.00   | 1043.70 | 0.0  | 1043.71 | 0.52  | 550.48   | 30.13                        |                                                      |
| 1.000 | 700.00  | 1037.70 | 1450.00  | 1046.15 | 0.0  | 1046.19 | 1.76  | 954.64   | 44.09                        |                                                      |
| 1.000 | 700.00  | 1037.70 | 3140.00  | 1048.56 | 0.0  | 1048.68 | 2.78  | 1492.90  | 65.70                        |                                                      |
| 1.000 | 700.00  | 1037.70 | 5300.00  | 1050.95 | 0.0  | 1051.13 | 3.57  | 2345.57  | 116.39                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 5920.00  | 1051.55 | 0.0  | 1051.74 | 3.75  | 2617.63  | 136.61                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 7380.00  | 1052.67 | 0.0  | 1052.92 | 4.16  | 3202.77  | 180.00                       | ~ 550 FT<br>US FROM<br>UPPER<br>BRIDGEPORT<br>DAM    |
| 1.000 | 700.00  | 1037.70 | 9740.00  | 1053.76 | 0.0  | 1054.08 | 4.95  | 3824.32  | 221.43                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 12790.00 | 1054.79 | 0.0  | 1055.23 | 5.91  | 4499.29  | 263.76                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 16420.00 | 1055.81 | 0.0  | 1056.40 | 6.93  | 5232.13  | 307.89                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 20610.00 | 1056.83 | 0.0  | 1057.59 | 7.98  | 6030.14  | 354.43                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 25200.00 | 1057.82 | 0.0  | 1058.76 | 8.99  | 6875.70  | 402.50                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 30350.00 | 1058.82 | 0.0  | 1059.96 | 9.99  | 7794.84  | 453.50                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 35740.00 | 1059.80 | 0.0  | 1061.12 | 10.92 | 8750.00  | 505.58                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 48170.00 | 1061.82 | 0.0  | 1063.46 | 12.54 | 10846.16 | 616.81                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 55170.00 | 1062.84 | 0.0  | 1064.63 | 13.32 | 11925.02 | 673.16                       |                                                      |
| 1.000 | 700.00  | 1037.70 | 62510.00 | 1063.87 | 0.0  | 1065.80 | 14.04 | 13020.94 | 732.06                       | @ TOE<br>OF<br>UPPER<br>BRIDGEPORT<br>DAM            |
| 0.0   | 550.00  | 1038.20 | 280.00   | 1043.71 | 0.0  | 1043.72 | 0.68  | 421.75   | 36.27                        |                                                      |
| 0.0   | 550.00  | 1038.20 | 1450.00  | 1046.20 | 0.0  | 1046.27 | 2.16  | 759.58   | 54.91                        |                                                      |
| 0.0   | 550.00  | 1038.20 | 3140.00  | 1048.64 | 0.0  | 1048.80 | 3.33  | 1257.63  | 83.06                        |                                                      |
| 0.0   | 550.00  | 1038.20 | 5300.00  | 1051.05 | 0.0  | 1051.26 | 3.94  | 3089.11  | 150.70                       |                                                      |
| 0.0   | 550.00  | 1038.20 | 5920.00  | 1051.66 | 0.0  | 1051.87 | 4.02  | 3623.19  | 176.01                       |                                                      |
| 0.0   | 550.00  | 1038.20 | 7380.00  | 1052.84 | 0.0  | 1053.05 | 4.26  | 4667.44  | 229.69                       |                                                      |
| 0.0   | 550.00  | 1038.20 | 9740.00  | 1053.97 | 0.0  | 1054.24 | 4.86  | 5692.09  | 281.50                       |                                                      |
| 0.0   | 550.00  | 1038.20 | 12790.00 | 1055.11 | 0.0  | 1055.44 | 5.60  | 6729.53  | 334.65                       |                                                      |
| 0.0   | 550.00  | 1038.20 | 16420.00 | 1056.25 | 0.0  | 1056.66 | 6.37  | 7787.43  | 390.09                       |                                                      |
| 0.0   | 550.00  | 1038.20 | 20610.00 | 1057.41 | 0.0  | 1057.90 | 7.15  | 8873.32  | 448.52                       |                                                      |
| 0.0   | 550.00  | 1038.20 | 25200.00 | 1058.54 | 0.0  | 1059.13 | 7.90  | 9959.66  | 508.78                       | ~ 1150 FT<br>US FROM<br>LOWER<br>BRIDGEPORT<br>DAM   |
| 0.0   | 550.00  | 1038.20 | 30350.00 | 1059.70 | 0.0  | 1060.38 | 8.64  | 11079.80 | 572.65                       |                                                      |
| 0.0   | 550.00  | 1038.20 | 35740.00 | 1060.82 | 0.0  | 1061.59 | 9.31  | 12198.07 | 637.83                       |                                                      |
| 0.0   | 550.00  | 1038.20 | 48170.00 | 1063.04 | 0.0  | 1064.00 | 10.71 | 14479.52 | 776.69                       |                                                      |
| 0.0   | 550.00  | 1038.20 | 55170.00 | 1064.15 | 0.0  | 1065.21 | 11.41 | 15656.65 | 847.89                       |                                                      |
| 0.0   | 550.00  | 1038.20 | 62510.00 | 1065.25 | 0.0  | 1066.41 | 12.08 | 16847.29 | 920.62                       |                                                      |

SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM  
 BY WJV DATE 6-27-79 PROJ. NO. 78-617-465  
 CHKD. BY DLB DATE 7-2-79 SHEET NO. D OF BB



# OVERTOPPING ANALYSIS

DAM SAFETY INSPECTION  
 UPPER BRIDGEPORT DAM #/ US PA-657 DAM + DS LOWER BRIDGEPORT DAM #OVERTOPPING#  
 15-MINUTE TIME STEP AND 48-HOUR STORM DURATION

JOB SPECIFICATION  
 IDAY 15 IDAY 15 IDAY 15 IDAY 15 IDAY 15  
 JUPER 5 JUPER 5 JUPER 5 JUPER 5 JUPER 5  
 NWT 0 NWT 0 NWT 0 NWT 0 NWT 0  
 LKOPT 0 LKOPT 0 LKOPT 0 LKOPT 0 LKOPT 0  
 TRACE 0 TRACE 0 TRACE 0 TRACE 0 TRACE 0  
 METRC 0 METRC 0 METRC 0 METRC 0 METRC 0  
 IPRT 0 IPRT 0 IPRT 0 IPRT 0 IPRT 0  
 NSTAN 0 NSTAN 0 NSTAN 0 NSTAN 0 NSTAN 0

MULTI-PLAN ANALYSES TO BE PERFORMED  
 NPLAN= 1 NRTIO= 5 LRTIO= 1  
 RTIOS= .10 .20 .30 .50 1.00

\*\*\*\*\*

## SUB-AREA RUNOFF COMPUTATION

INFLOW INTO PA-657 RESERVOIR

ISTAQ 1 ICOMP 0 IECON 0 IIAPE 0 IPLT 0 JPRT 0 INAME 1 ISTAGE 1 IAUTO 0

HYDROGRAPH DATA  
 JHYDG 1 JUNG 1 TAREA 2.60 TRSDA 31.50 TRSPC 0.00 RATIO 0.000 ISNOW 0 ISAME 1 LOCAL 0

PRECIP DATA  
 SPTS 0.00 PMS 24.00 R6 90.00 R12 108.00 R24 118.00 R72 128.00 R96 0.00

TRSPC COMPUTED BY THE PROGRAM IS .837

LOSS DATA  
 LROPT 0 SEKR 0.00 ULTR 0.00 RTIOL 1.00 FRAIN 0.00 STKS 0.00 RTION 1.00  
 STRLE 1.00 CRSTL .05  
 LOSSES, AS PER COE  
 ALSMX 0.00 RTIMP 0.00

INITIAL AND CONSTANT RATIO FALL

UNIT HYDROGRAPH DATA  
 TP= 1.54 CP= .40 HTA= 0

BASE FLOW PARAMETERS  
 AS PER COE

RECESSION DATA  
 STRIO= -1.50 ORCSM= -.05 RTIO= 2.00  
 APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNIDER CP AND TP ARE TC= 6.53 AND RT=11.49 INTERVALS

| UNIT HYDROGRAPH 65 END-OF-PERIOD ORDINATES, UAG= 1.55 HOURS, CP= .40 VME= 1.00 | 343. | 375. |
|--------------------------------------------------------------------------------|------|------|
| 24.                                                                            | 315. | 144. |
| 315.                                                                           | 144. | 60.  |
| 132.                                                                           | 55.  | 25.  |
| 55.                                                                            | 21.  | 11.  |
| 21.                                                                            | 9.   | 5.   |
| 9.                                                                             | 4.   | 4.   |



SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE 6-27-79

PROJ. NO. 78-617-465

CHKD. BY DLB

DATE 7-2-79

SHEET NO. E OF 2B

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MO. DA HR. MN PERIOD RAIN EXCS LOSS END-OF-PERIOD FLOW  
CUMP U MO. DA HR. MN PERIOD RAIN EXCS LOSS CUMP U

SUM 25.71 23.27 2.44 156730.  
( 653. ) ( 591. ) ( 62. ) ( 4438.10 )

PMF

TOTAL VOLUME  
156731.  
4438.  
23.36  
593.47  
3238.  
3994.

0.2 PMF

TOTAL VOLUME  
31346.  
888.  
4.67  
118.69  
648.  
799.

0.5 PMF

TOTAL VOLUME  
78366.  
2219.  
11.68  
296.73  
1619.  
1997.

72-HOUR  
544.  
15.  
23.36  
593.47  
3238.  
3994.

72-HOUR  
109.  
3.  
4.67  
118.69  
648.  
799.

72-HOUR  
272.  
8.  
11.68  
296.73  
1619.  
1997.

24-HOUR  
1541.  
44.  
22.05  
560.09  
3056.  
3770.

24-HOUR  
308.  
9.  
4.41  
112.02  
611.  
754.

24-HOUR  
770.  
22.  
11.03  
280.05  
1528.  
1865.

6-HOUR  
3809.  
108.  
13.63  
346.18  
1889.  
2330.

6-HOUR  
762.  
22.  
2.73  
69.24  
378.  
466.

6-HOUR  
1905.  
54.  
6.81  
173.09  
944.  
1165.

PEAK  
5170.  
146.  
CFS  
CNS  
INCHES  
MM  
AC-FT  
THOUS CU M

PEAK  
1034.  
29.  
CFS  
CNS  
INCHES  
MM  
AC-FT  
THOUS CU M

PEAK  
2585.  
73.  
CFS  
CNS  
INCHES  
MM  
AC-FT  
THOUS CU M

PA-657

DAM

LOCAL INFLOW

HYDROGRAPHS

## HYDROGRAPH ROUTING

ROUTE THROUGH PA-657 RESERVOIR

| ISLAD                | ICOMP | IECON | IIAPE | JPLI  | JPRT  | INAME | ISTAGE | IAUTO |
|----------------------|-------|-------|-------|-------|-------|-------|--------|-------|
| 101                  | 1     | 0     | 0     | 0     | 0     | 1     | 0      | 0     |
| ROUTING DATA         |       |       |       |       |       |       |        |       |
| GLSS                 | CLOSS | AVG   | IRFS  | ISAME | IOPI  | IPMP  | ISTR   |       |
| 9.0                  | 0.000 | 0.00  | 1     | 1     | 0     | 0     | 0      |       |
| ROUTING DATA         |       |       |       |       |       |       |        |       |
| ISTPS                | NSTDL | LAG   | AMSKK | X     | ISK   | STORA | ISPRAT |       |
| 1                    | 0     | 0     | 0.000 | 0.000 | 0.000 | 93.   | 1      |       |
| 95.                  | 140.  | 240.  | 360.  | 460.  | 740.  | 1100. | 1540.  |       |
| 1818.                | 1829. | 1832. | 1834. | 1835. | 1838. | 1841. | 1844.  |       |
| CREL                 | SPRHD | CUM   | EXPW  | ELEV  | COGL  | CAREA | EXPL   |       |
| 1935.0               | 100.0 | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0    |       |
| IABCOA ISPTW ISPECTW |       |       |       |       |       |       |        |       |
| 0 0 0                |       |       |       |       |       |       |        |       |

CAPACITY=

ELEVATION=



SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE

6-27-79

PROJ. NO.

78-617-465

CHKD. BY DLB

DATE

7-2-79

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| SS      | ACGATES | DESHD | APEL   | APWID  | APLOSS | PUPTH |
|---------|---------|-------|--------|--------|--------|-------|
| 1818.00 | 2.75    | 1     | 0.0    | 0.0    | 0.0    | 0.0   |
| 1827.50 | 0.0     | 0.0   | 0.0    | 0.0    | 0.0    | 0.0   |
| 1829.30 | 0.0     | 0.0   | 0.0    | 0.0    | 0.0    | 0.0   |
| 1831.50 | 0.0     | 0.0   | 0.0    | 0.0    | 0.0    | 0.0   |
| 1833.50 | 0.0     | 0.0   | 0.0    | 0.0    | 0.0    | 0.0   |
| 1835.00 | 0.0     | 0.0   | 0.0    | 0.0    | 0.0    | 0.0   |
| 1836.20 | 0.0     | 0.0   | 0.0    | 0.0    | 0.0    | 0.0   |
| 1841.20 | 1864.   | 0.0   | 1864.  | 1864.  | 1864.  | 0.0   |
| 1844.40 | 5242.   | 0.0   | 5242.  | 5242.  | 5242.  | 0.0   |
|         | 10182.  | 0.0   | 10182. | 10182. | 10182. | 0.0   |

DAM DATA  
TOPEL 1844.4  
COOD 0.0  
EXPD 0.0  
DAMWID 0.0

PEAK OUTFLOW IS 4413. AT TIME 42.75 HOURS

| PEAK  | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|-------|--------|---------|---------|--------------|
| 4413. | 3574.  | 1439.   | 482.    | 138955.      |
| 125.  | 101.   | 41.     | 14.     | 3935.        |
|       | 12.79  | 20.59   | 20.71   | 526.16       |
|       | 324.81 | 522.93  | 526.16  | 2871.        |
|       | 1772.  | 2853.   | 3541.   | 3541.        |
|       | 2186.  | 3520.   |         |              |

PMF

PEAK OUTFLOW IS 493. AT TIME 44.75 HOURS

| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------|--------|---------|---------|--------------|
| 493. | 397.   | 141.    | 47.     | 13574.       |
| 14.  | 11.    | 4.      | 1.      | 384.         |
|      | 1.42   | 2.02    | 2.02    | 2.02         |
|      | 36.05  | 51.31   | 51.40   | 51.40        |
|      | 197.   | 280.    | 280.    | 280.         |
|      | 243.   | 345.    | 346.    | 346.         |

0.2 PMF

PEAK OUTFLOW IS 2029. AT TIME 43.00 HOURS

| PEAK  | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|-------|--------|---------|---------|--------------|
| 2029. | 1658.  | 630.    | 210.    | 60598.       |
| 57.   | 47.    | 18.     | 6.      | 1716.        |
|       | 5.93   | 9.01    | 9.03    | 9.03         |
|       | 150.67 | 228.84  | 229.45  | 229.45       |
|       | 822.   | 1249.   | 1252.   | 1252.        |
|       | 1014.  | 1540.   | 1544.   | 1544.        |

0.5 PMF

PA-657

DAM

OUTFLOW

HYDROGRAPHS

SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE

6-27-79

PROJ. NO.

78-617-465

CHKD. BY DLB

DATE

7-2-79

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## HYDROGRAPH ROUTING

ROUTE FROM PA-657 DAM TO SECTION A-A \* 2300 FT DS FROM PA-657 DAM

| ISTAU        | ICOMP | IECUM | ITAPE | JPLT  | JPRF  | INAME | ISTAGE | IAUTO |
|--------------|-------|-------|-------|-------|-------|-------|--------|-------|
| 102          | 1     | 0     | 0     | 0     | 0     | 1     | 0      | 0     |
| ROUTING DATA |       |       |       |       |       |       |        |       |
| GLASS        | AVG   | IRIS  | ISAME | IOPT  | IPMP  |       | ISTR   |       |
| 0.0          | 0.00  | 1     | 1     | 0     | 0     |       | 0      |       |
| ROUTING DATA |       |       |       |       |       |       |        |       |
| NSTPS        | NSTDL | LAG   | AMSKK | X     | TSK   | STORA | ISPRAT |       |
| 1            | 0     | 0     | 0.000 | 0.000 | 0.000 | -1.   | 0      |       |

## NORMAL DEPTH CHANNEL ROUTING

| W(1) | W(2)  | W(3)  | ELEV   | ELERR  | RLNTH | SEL     |
|------|-------|-------|--------|--------|-------|---------|
| 0.00 | 0.000 | 0.000 | 1796.0 | 1826.0 | 2300. | 0.01400 |

## CROSS SECTION COORDINATES--STA, ELEV, STA, ELEV--ETC

0.00 1820.00 250.00 1810.00 500.00 1800.00  
520.00 1800.00 600.00 1810.00 800.00 1820.00

| STORAGE | 0.00    | 86.99    | 114.42  | 143.14  | 175.14  | 2.95     | 5.42     | 11.14    | 20.14    | 32.42    | 47.99    |
|---------|---------|----------|---------|---------|---------|----------|----------|----------|----------|----------|----------|
| OUTFLOW | 0.00    | 14/35.11 | 88.31   | 293.08  | 608.25  | 32219.76 | 40125.19 | 49180.48 | 59449.03 | 70992.62 | 83871.51 |
| STAGE   | 1796.00 | 1800.63  | 1809.89 | 1811.16 | 1812.42 | 1813.68  | 1814.95  | 1816.21  | 1817.47  | 1818.74  | 1819.99  |
| FLOW    | 0.00    | 14/35.11 | 88.31   | 293.08  | 608.25  | 32219.76 | 40125.19 | 49180.48 | 59449.03 | 70992.62 | 83871.51 |

| PEAK       | 4409.  | 125.   |
|------------|--------|--------|
| CFS        | 101.   | 41.    |
| CMS        | 12.79  | 20.59  |
| INCHES     | 324.77 | 522.93 |
| MM         | 1772.  | 2853.  |
| AC-FT      | 2186.  | 3520.  |
| THOUS CU N |        |        |

| 72-HOUR      | 482.    | 14.   | 20.71 | 526.15 | 2871. | 3541. |
|--------------|---------|-------|-------|--------|-------|-------|
| TOTAL VOLUME | 138954. | 3935. | 20.71 | 526.15 | 2871. | 3541. |

FLOW

@ 2300 FT

DS FROM

PA-657

DAM

MAXIMUM STORAGE =

28.

MAXIMUM STAGE IS 1804.4

PMF

SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE 6-27-79

PROJ. NO. 78-617-465

CHKD. BY DLB

DATE 7-2-79

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PEAK 493. 14. 397. 141. 47. 13574. 384. 2.02 51.40 280. 346. 0.2 PMF

CFS  
CMS  
INCHES  
MM  
AC-FT  
THOUS CU M

MAXIMUM STORAGE = 3.

MAXIMUM STAGE IS 1799.3

FLOWS

@ 2300 FT

DS FROM

PA-657

DAM

PEAK 2030. 57. 1658. 629. 210. 60597. 1716. 9.03 229.45 1252. 1544. 0.5 PMF

CFS  
CMS  
INCHES  
MM  
AC-FT  
THOUS CU M

MAXIMUM STORAGE = 11.

MAXIMUM STAGE IS 1802.4

## HYDROGRAPH ROUTING

ROUTE FROM SECTION A-A TO SECTION B-B + 7900 FT DS FROM PA-657 DAM

| INSTAG       | ICUMP | IECON | IEAPE | JPLT  | JPRT  | INAME | ISTAGE | IAUTU |
|--------------|-------|-------|-------|-------|-------|-------|--------|-------|
| 203          | 1     | 0     | 0     | 0     | 0     | 1     | 0      | 0     |
| ROUTING DATA |       |       |       |       |       |       |        |       |
| AVG          | 0.00  | 1     | 1     | 0     | 0     |       |        |       |
| CLASS        | 0.00  | 1     | 1     | 0     | 0     |       |        |       |
| NSIPS        | 1     | 0     | 0.000 | X     | TSK   | STORA | ISPRAT |       |
|              |       |       | 0.000 | 0.000 | 0.000 | -1.   | 0      |       |

NORMAL DEPTH-CHANNEL ROUTING

QN(1) QN(2) QN(3) ELNVT ELMAX RLNTH SEL

0.000 0.000 0.000 1700.0 1800.0 5600. 00300

SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE

6-27-79

PROJ. NO.

78-617-465

CHKD. BY DLB

DATE

7-2-79

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## CROSS SECTION COORDINATES--STA. ELEV., STA. ELEV.--ETC

|         | 0.00     | 3.00     | 12.11    | 38.42    | 655.00   | 1760.00   | 665.00    | 1760.00   |
|---------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| STORAGE | 0.00     | 3.00     | 12.11    | 38.42    | 655.00   | 1760.00   | 665.00    | 1760.00   |
|         | 165.91   | 939.69   | 1124.87  | 1321.45  | 1529.42  | 1748.79   | 2221.71   | 2475.27   |
| OUTFLOW | 0.00     | 104.24   | 428.67   | 1199.02  | 2641.95  | 4951.11   | 8297.82   | 18722.59  |
|         | 35473.90 | 46920.41 | 60023.47 | 74809.98 | 91312.97 | 109569.51 | 129619.32 | 151503.94 |
| STAGE   | 1760.00  | 1762.11  | 1764.21  | 1766.32  | 1768.42  | 1770.53   | 1772.63   | 1774.74   |
|         | 1761.05  | 1763.16  | 1765.26  | 1767.37  | 1769.47  | 1771.58   | 1773.68   | 1775.79   |
| FLOW    | 0.00     | 104.24   | 428.67   | 1199.02  | 2641.95  | 4951.11   | 8297.82   | 18722.59  |
|         | 35473.90 | 46920.41 | 60023.47 | 74809.98 | 91312.97 | 109569.51 | 129619.32 | 151503.94 |

| PEAK  | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|-------|--------|---------|---------|--------------|
| 4369. | 3554.  | 1438.   | 482.    | 138950.      |
| 124.  | 101.   | 41.     | 14.     | 3935.        |
|       | 12.71  | 20.58   | 20.71   | 20.71        |
|       | 322.94 | 522.70  | 526.14  | 526.14       |
|       | 1762.  | 2852.   | 2871.   | 2871.        |
|       | 2174.  | 3518.   | 3541.   | 3541.        |

PMF

MAXIMUM STORAGE = 133.

MAXIMUM STAGE IS 1770.0

| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------|--------|---------|---------|--------------|
| 485. | 393.   | 141.    | 47.     | 13573.       |
| 14.  | 11.    | 4.      | 1.      | 384.         |
|      | 1.41   | 2.02    | 2.02    | 2.02         |
|      | 35.71  | 51.29   | 51.39   | 51.39        |
|      | 195.   | 280.    | 280.    | 280.         |
|      | 240.   | 345.    | 346.    | 346.         |

0.2 PMF

MAXIMUM STORAGE = 14.

MAXIMUM STAGE IS 1764.4

| PEAK  | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|-------|--------|---------|---------|--------------|
| 1999. | 1645.  | 629.    | 210.    | 60595.       |
| 57.   | 47.    | 18.     | 6.      | 1716.        |
|       | 5.89   | 9.01    | 9.03    | 9.03         |
|       | 149.50 | 228.75  | 229.44  | 229.44       |
|       | 816.   | 1248.   | 1252.   | 1252.        |
|       | 1006.  | 1540.   | 1544.   | 1544.        |

0.5 PMF

FLWS  
@ 740 FT  
DS FROM  
RA-657  
DAM



SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJVDATE 6-27-79PROJ. NO. 79-617-465CHKD. BY DLBDATE 7-2-79SHEET NO. J OF 33Engineers • Geologists • Planner  
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## HYDROGRAPH ROUTING

ROUTE FROM SECTION B-B TO SECTION C-C \* 31700 FT DS FROM PA-657 DAM

| ISTAQ        | ICUMP  | IECON | ITAPE | JPLT  | JPRF  | INAME | ISTAGE | IAUTU |
|--------------|--------|-------|-------|-------|-------|-------|--------|-------|
| 304          | 1      | 0     | 0     | 0     | 0     | 1     | 0      | 0     |
| ROUTING DATA |        |       |       |       |       |       |        |       |
| QLOSS        | CLLOSS | AVG   | IRFS  | ISAME | IOPT  | IPMP  | LSIR   |       |
| 0.0          | 0.000  | 0.00  | 1     | 1     | 0     | 0     | 0      |       |
| NSHS         | WSTDL  | LAG   | ANSKK | X     | TSK   | SIUKA | ISPRAT |       |
| 1            | 0      | 0     | 0.000 | 0.000 | 0.000 | -1.   | 0      |       |

## NORMAL DEPTH CHANNEL ROUTING

Q(1) Q(2) Q(3) ELMAX R(1)H SEL  
1200 .0350 .1200 1280.0 1320.0 23800. .03100

CROSS SECTION COORDINATES--STA, ELEV, STA, ELEV--ETC  
0.00 1320.00 250.00 1300.00 350.00 1284.00 355.00 1280.00 365.00 1280.00  
370.00 1284.00 430.00 1300.00 550.00 1320.00

| STORAGE | Q(1)     | Q(2)     | Q(3)     | ELMAX    | R(1)H    | SEL      | 6-HOUR    | 24-HOUR   | 72-HOUR   | TOTAL VOLUME |
|---------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|--------------|
|         | 0.00     | 14.53    | 35.22    | 74.57    | 141.16   | 235.00   | 356.08    | 504.40    | 679.97    |              |
|         | 1114.72  | 1307.15  | 1701.96  | 2059.14  | 2458.71  | 2900.65  | 3384.97   | 3911.67   | 4480.74   |              |
| OUTFLOW | Q(1)     | Q(2)     | Q(3)     | ELMAX    | R(1)H    | SEL      | 6-HOUR    | 24-HOUR   | 72-HOUR   | TOTAL VOLUME |
|         | 0.00     | 271.37   | 959.76   | 2295.75  | 4281.45  | 7019.98  | 10604.50  | 15122.61  | 20657.79  |              |
|         | 34831.13 | 43550.01 | 53867.25 | 65891.67 | 79737.90 | 95521.03 | 113354.63 | 133350.08 | 155616.35 |              |
| STAGE   | Q(1)     | Q(2)     | Q(3)     | ELMAX    | R(1)H    | SEL      | 6-HOUR    | 24-HOUR   | 72-HOUR   | TOTAL VOLUME |
|         | 1280.00  | 1282.11  | 1284.21  | 1286.32  | 1288.42  | 1290.53  | 1292.63   | 1294.74   | 1296.84   |              |
|         | 1301.05  | 1303.16  | 1305.26  | 1307.37  | 1309.47  | 1311.58  | 1313.68   | 1315.79   | 1317.89   |              |
| FLOW    | Q(1)     | Q(2)     | Q(3)     | ELMAX    | R(1)H    | SEL      | 6-HOUR    | 24-HOUR   | 72-HOUR   | TOTAL VOLUME |
|         | 0.00     | 271.37   | 959.76   | 2295.75  | 4281.45  | 7019.98  | 10604.50  | 15122.61  | 20657.79  |              |
|         | 34831.13 | 43550.01 | 53867.25 | 65891.67 | 79737.90 | 95521.03 | 113354.63 | 133350.08 | 155616.35 |              |

FLOW

@ 31700 FT

DS FROM

PA-657

DAM

MAXIMUM STORAGE =

142.

MAXIMUM STAGE IS

1288.4

PMF

SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE

6-27-79

PROJ. NO.

73-617-465

CHKD. BY DLB

DATE

7-2-79

SHEET NO.

K OF 33

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Environmental Specialists

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME  
478. 383. 141. 47. 13572.  
14. 11. 4. 1. 384.  
INCHES 1.37 2.02 2.02 2.02  
MM 34.83 51.27 51.39  
AC-FT 190. 280. 280.  
THOUS CU M 234. 345. 346.

0.2 PMF

MAXIMUM STORAGE = 21.

MAXIMUM STAGE IS 1202.7

FLOWS

@ 31700 FT

DS FROM

PA-657

DAM

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME  
1977. 1635. 629. 210. 60591.  
56. 46. 18. 6. 1716.  
INCHES 5.85 9.00 9.03  
MM 148.61 228.64 229.43  
AC-FT 111. 1248. 1252.  
THOUS CU M 1000. 1539. 1544.

0.5 PMF

MAXIMUM STORAGE = 65.

MAXIMUM STAGES 1205.8

## HYDROGRAPH ROUTING

ROUTE FROM SECTION C-C TO SECTION D-D \* 46500 FT DS FROM PA-657 DAM

| ISRO  | ICUM  | IFCUN | ITAPE        | JPLT  | JPRF  | INAME | ISTAGE | IAUTU |
|-------|-------|-------|--------------|-------|-------|-------|--------|-------|
| 405   | 1     | 0     | 0            | 0     | 0     | 1     | 0      | 0     |
| GLSS  | CLSS  | AVG   | ROUTING DATA |       |       |       |        |       |
| 0.0   | 0.000 | 0.00  | IRIS         | ISAME | IOPI  | IPMP  | LSTR   |       |
|       |       |       | 1            | 1     | 0     | 0     | 0      |       |
| MSIES | MSIDL | LAG   | ANSKK        | X     | ISK   | SIORA | ISPRAT |       |
| 1     | 0     | 0     | 0.000        | 0.000 | 0.000 | -1.   | 0      |       |

## NORMAL DEPTH CHANNEL ROUTING

| QN(1) | QN(2) | QN(3) | ELNVT  | ELMAX  | RLNTH  | SEL    |
|-------|-------|-------|--------|--------|--------|--------|
| .1000 | .0500 | .1100 | 1000.0 | 1100.0 | 14800. | .01000 |

CROSS SECTION COORDINATES--STA, ELEV, STA, ELEV--ETC

|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0.00    | 1100.00 | 500.00  | 1080.00 | 1500.00 | 1063.00 | 1505.00 | 1060.00 | 1515.00 | 1066.00 |
| 1520.00 | 1063.00 | 1650.00 | 1080.00 | 1750.00 | 1100.00 |         |         |         |         |

SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE 6-27-79

PROJ. NO. 78-617-465

CHKD. BY DLB

DATE 7-2-79

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| STORAGE | 0.00     | 9.68      | 40.06     | 161.97    | 383.98    | 706.08    | 1128.27   | 1650.56   | 2272.95   |
|---------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|         | 311.15   | 4678.91   | 5591.84   | 6549.95   | 7553.23   | 8601.69   | 9695.33   | 10834.14  | 12016.13  |
| OUTFLOW | 0.00     | 190.32    | 797.03    | 2400.54   | 5607.88   | 10920.98  | 18781.73  | 29594.37  | 43736.16  |
|         | 84715.71 | 113160.49 | 145532.51 | 181854.64 | 222167.56 | 266524.20 | 314986.04 | 367620.70 | 424500.28 |
| STAGE   | 1060.00  | 1062.11   | 1064.21   | 1066.32   | 1068.42   | 1070.53   | 1072.63   | 1074.74   | 1076.84   |
|         | 1081.05  | 1083.16   | 1085.26   | 1087.37   | 1089.47   | 1091.58   | 1093.68   | 1095.79   | 1097.89   |
| FLOW    | 0.00     | 190.32    | 797.03    | 2400.54   | 5607.88   | 10920.98  | 18781.73  | 29594.37  | 43736.16  |
|         | 84715.71 | 113160.49 | 145532.51 | 181854.64 | 222167.56 | 266524.20 | 314986.04 | 367620.70 | 424500.28 |

| PEAK  | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|-------|--------|---------|---------|--------------|
| 4100. | 3436.  | 1436.   | 482.    | 138934.      |
| 116.  | 97.    | 41.     | 14.     | 3934.        |
|       | 12.29  | 20.55   | 20.71   | 20.71        |
|       | 312.24 | 521.95  | 526.08  | 526.08       |
|       | 1704.  | 2848.   | 2871.   | 2871.        |
|       | 2102.  | 3513.   | 3541.   | 3541.        |

PMF

MAXIMUM STORAGE = 280.

| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------|--------|---------|---------|--------------|
| 460. | 375.   | 141.    | 47.     | 13570.       |
| 13.  | 11.    | 4.      | 1.      | 384.         |
|      | 1.34   | 2.02    | 2.02    | 2.02         |
|      | 34.10  | 51.25   | 51.38   | 51.38        |
|      | 186.   | 280.    | 280.    | 280.         |
|      | 229.   | 345.    | 346.    | 346.         |

0.2 PMF

MAXIMUM STORAGE = 23.

| PEAK  | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|-------|--------|---------|---------|--------------|
| 1858. | 1587.  | 629.    | 210.    | 60587.       |
| 53.   | 45.    | 18.     | 6.      | 1716.        |
|       | 5.68   | 9.00    | 9.03    | 9.03         |
|       | 144.18 | 228.54  | 229.41  | 229.41       |

FLOWS

@ 46500 FT

DS FROM

PA-651

DAM

SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE

6-27-79

PROJ. NO.

78-617-465

CHKD. BY DLB

DATE

7-2-79

SHEET NO.

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## SUB-AREA RUNOFF COMPUTATION

## LOCAL INFLOW INTO UPPER BRIDGEPORT RESERVOIR

| 1STAQ | ICUMP | IECON | ITAPE | JPLT | JPRT | INAME | ISTAGE | IAUTO |
|-------|-------|-------|-------|------|------|-------|--------|-------|
| 0     | 0     | 0     | 0     | 0    | 0    | 1     | 0      | 0     |

## HYDROGRAPH DATA

| 1HYDG | 1ONG | 1AREA | SNAP | TRSDA | TRSPC | RATIO | ISNUM | ISAME | LOCAL |
|-------|------|-------|------|-------|-------|-------|-------|-------|-------|
| 1     | 1    | 28.90 | 0.00 | 31.50 | 0.00  | 0.000 | 0     | 1     | 0     |

## PRECIP DATA

| SPPC | PWS   | K6    | R12    | R24    | R48    | R72  | K96  |
|------|-------|-------|--------|--------|--------|------|------|
| 0.00 | 24.00 | 90.00 | 108.00 | 118.00 | 128.00 | 0.00 | 0.00 |

TRSPC COMPUTED BY THE PROGRAM IS .837

## LOSS DATA

| LEOPT | STRES | DETNR | RTIOL | FRAIN | STRES | RTIOL | SETPL | CNSTL | ALSMX | RTIMP |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0     | 0.00  | 0.00  | 1.00  | 0.00  | 0.00  | 1.00  | 1.00  | .05   | 0.00  | 0.00  |

## UNIT HYDROGRAPH DATA

TP= 3.30 CP= .40 NTA= 0

## RECESSION DATA

STRIKE= -1.50 ORCSM= -.05 RTIOL= 2.00  
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC=13.64 AND R=24.54 INTERVALS

| UNIT  | HYDROGRAPH | 100   | END-OF-PERIOD | ORDINATES, | LAGE  | 3.33  | HOURS, | CP=   | .40   | VOL= | .98 |
|-------|------------|-------|---------------|------------|-------|-------|--------|-------|-------|------|-----|
| 42.   | 158.       | 328.  | 531.          | 760.       | 1009. | 1276. | 1539.  | 1775. | 1974. |      |     |
| 2134. | 2251.      | 2319. | 2313.         | 2242.      | 2153. | 2067. | 1984.  | 1905. | 1829. |      |     |
| 1756. | 1686.      | 1618. | 1554.         | 1492.      | 1432. | 1375. | 1320.  | 1267. | 1217. |      |     |
| 1168. | 1122.      | 1077. | 1034.         | 993.       | 953.  | 915.  | 878.   | 843.  | 810.  |      |     |
| 777.  | 746.       | 716.  | 688.          | 660.       | 634.  | 609.  | 584.   | 561.  | 539.  |      |     |
| 517.  | 496.       | 477.  | 458.          | 439.       | 422.  | 405.  | 389.   | 373.  | 358.  |      |     |
| 344.  | 330.       | 317.  | 304.          | 292.       | 281.  | 269.  | 259.   | 248.  | 238.  |      |     |
| 229.  | 220.       | 211.  | 203.          | 194.       | 187.  | 179.  | 172.   | 165.  | 159.  |      |     |
| 152.  | 146.       | 140.  | 135.          | 129.       | 124.  | 119.  | 114.   | 110.  | 106.  |      |     |
| 101.  | 97.        | 93.   | 90.           | 86.        | 83.   | 79.   | 76.    | 73.   | 70.   |      |     |

## END-OF-PERIOD FLOW

| MO.DA | HR.MM | PERIOD | RAIN | EXCS     | LOSS | COMP Q | MO.DA    | HR.MM | PERIOD  | RAIN     | EXCS | LOSS | COMP Q |
|-------|-------|--------|------|----------|------|--------|----------|-------|---------|----------|------|------|--------|
| 0     |       |        |      |          |      |        | 0        |       |         |          |      |      |        |
| SUM   | 25.71 | 23.27  | 2.44 | 1704191. |      |        | ( 653.1) | 591.1 | ( 62. ) | 48257.32 |      |      |        |

## LOCAL INFLOW

## TOTAL UPPER

## BRIDGEPORT

## DAM RESERVOIR

## TOTAL VOLUME

| PEAK       | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------------|--------|---------|---------|--------------|
| 36921.     | 31561. | 16031.  | 5917.   | 1704104.     |
| 1045.      | 894.   | 454.    | 168.    | 48255.       |
| INCHES     | 10.16  | 20.64   | 22.85   | 22.85        |
| AC-FT      | 258.04 | 544.28  | 580.51  | 580.51       |
| THOUS CU M | 15650. | 31798.  | 35209.  | 35209.       |
|            | 19304. | 39222.  | 43429.  | 43429.       |

PMF



## DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE 6-27-79

PROJ. NO. 78-617-465

CHKD. BY DLB

DATE 7-2-79

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| LOCAL INFLOWS | PEAK  | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|---------------|-------|--------|---------|---------|--------------|
| CFS           | 7384. | 6312.  | 3206.   | 1183.   | 340821.      |
| CMS           | 209.  | 179.   | 91.     | 34.     | 9651.        |
| INCHES        |       | 2.03   | 4.13    | 4.57    |              |
| MM            |       | 51.61  | 104.86  | 116.10  | 4.57         |
| AC-FT         |       | 3130.  | 6360.   | 7042.   | 116.10       |
| THOUS CU M    |       | 3861.  | 7844.   | 8086.   | 7042.        |

| BRIDGEPORT | PEAK   | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------------|--------|--------|---------|---------|--------------|
| CFS        | 18460. | 15781. | 8016.   | 2959.   | 852052.      |
| CMS        | 523.   | 447.   | 227.    | 84.     | 24127.       |
| INCHES     |        | 5.08   | 10.32   | 11.43   | 11.43        |
| MM         |        | 129.02 | 262.14  | 290.26  | 290.26       |
| AC-FT      |        | 7825.  | 15899.  | 17604.  | 17604.       |
| THOUS CU M |        | 9652.  | 19611.  | 21715.  | 21715.       |

| DAM RESERVOIR | PEAK   | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|---------------|--------|--------|---------|---------|--------------|
| CFS           | 18460. | 15781. | 8016.   | 2959.   | 852052.      |
| CMS           | 523.   | 447.   | 227.    | 84.     | 24127.       |
| INCHES        |        | 5.08   | 10.32   | 11.43   | 11.43        |
| MM            |        | 129.02 | 262.14  | 290.26  | 290.26       |
| AC-FT         |        | 7825.  | 15899.  | 17604.  | 17604.       |
| THOUS CU M    |        | 9652.  | 19611.  | 21715.  | 21715.       |

## COMBINE HYDROGRAPHS

COMBINE LOCAL INFLOW HYDROGRAPH W/ ROUTED PA-657 OUTFLOW HYDROGRAPH

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| TOTAL INFLOW |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

# DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE 6-27-79

PROJ. NO. 79-617-465

CHKD. BY DLB

DATE 7-2-79

SHEET NO. 0 OF 33



Engineers • Geologists • Planners  
Environmental Specialists

## HYDROGRAPH ROUTING

# ROUTE COMBINED HYDROGRAPH THROUGH UPPER BRIDGEPORT RESERVOIR

| STAGE      | 1053.50  | 1054.50  | 1055.50  | 1056.50  | 1057.50  | 1058.50  | 1059.00 | 1059.50 | 1060.00  |
|------------|----------|----------|----------|----------|----------|----------|---------|---------|----------|
|            | 1061.00  | 1061.50  | 1062.00  | 1063.00  | 1064.00  | 1065.00  |         |         |          |
| FLOW       | 0.00     | 310.00   | 910.00   | 1730.00  | 3390.00  | 5790.00  | 7130.00 | 8730.00 | 10780.00 |
|            | 16270.00 | 19790.00 | 23770.00 | 32000.00 | 39950.00 | 41680.00 |         |         |          |
| CAPACITY=  | 0.       | 2.       | 12.      | 42.      | 99.      | 192.     | 332.    | 530.    | 670.     |
|            | 790.     | 930.     | 1080.    | 1250.    | 1440.    | 1650.    | 1880.   | 2130.   | 2670.    |
| ELEVATION= | 1040.    | 1042.    | 1044.    | 1046.    | 1048.    | 1050.    | 1052.   | 1054.   | 1055.    |
|            | 1056.    | 1057.    | 1058.    | 1059.    | 1060.    | 1061.    | 1062.   | 1063.   | 1064.    |
|            |          |          |          |          |          |          |         |         | 1065.    |

**L'AM DA'IA**

|        |      |      |       |
|--------|------|------|-------|
| TOPEL  | COOD | EXPD | DAMID |
| 1059.0 | 0.0  | 0.0  | 0.    |

PEAK OUTFLOW IS 3995/. AT TIME 43.75 HOURS

|            | PEAK   | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL, VOLUME |
|------------|--------|--------|---------|---------|---------------|
| CFS        | 39957. | 34706. | 17426.  | 6386.   | 1839107.      |
| CMS        |        | 983.   | 493.    | 181.    | 52078.        |
| JACHES     |        | 10.25  | 20.58   | 22.63   |               |
| MP         |        | 260.33 | 522.85  | 574.79  | 574.79        |
| AC+P1      |        | 17210. | 34564.  | 37998.  | 37998.        |
| CHOUS C011 |        | 21228. | 42634.  | 46870.  | 46870.        |

PMF

UPPER

BRIDGEPORT

DAM

OUTFLOW

PEAK OUTFLOW IS 7120. AT TIME 44.00 HOURS

|               | PEAK  | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|---------------|-------|--------|---------|---------|--------------|
| CF5           | 1126. | 6369.  | 3312.   | 1227.   | 353342.      |
| CM5           | 252.  | 180.   | 94.     | 35.     | 10006.       |
| INCHES        |       | 1.88   | 3.91    | 4.35    | 4.35         |
| MM            |       | 47.77  | 99.37   | 110.43  | 110.43       |
| AC-FT         |       | 3138.  | 6564.   | 7300.   | 7300.        |
| THOUS. CU. M. |       | 895.   | 6103.   | 9005.   | 9005.        |

0.2 PMF

 $\phi \approx 0.2 \text{ PMF}$

SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM  
 BY WJV DATE 6-27-79 PROJ. NO. 73-617-465  
 CHKD. BY DLB DATE 7-2-79 SHEET NO. P OF 88



Engineers • Geologists • Planners  
 Environmental Specialists

PEAK OUTFLOW IS 19653. AT LINE 43.75 HOURS

UPPER  
 BRIDGEPORT  
 DAM  
 OUTFLOW  
 HYDROGRAPH

| 6-HOUR                                                               | 24-HOUR                                              | 72-HOUR                                             | TOTAL VOLUME                                             |
|----------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------|
| PEAK<br>19653.<br>CFS<br>556.<br>INCHES<br>MM<br>AC-FT<br>THOUS CU M | 8601.<br>244.<br>10.16<br>258.06<br>17060.<br>21043. | 3160.<br>89.<br>11.20<br>284.47<br>18806.<br>23196. | 910195.<br>25774.<br>11.20<br>284.47<br>18806.<br>23196. |

0.5 PMF

# HYDROGRAPH ROUTING

ROUTE FROM UPPER BRIDGEPORT DAM TO SECTION 1.0 \* 550 FT DS FROM U.B. DAM

| ISTAU<br>OUT | ICOMP | IECON | ITAPE | JPLT  | JPRT  | INANE | ISTAGE | IAUTU |
|--------------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0.0          | 0.000 | 0     | 0     | 0     | 0     | 1     | 0      | 0     |
| ROUTING DATA | AVG   | IRIS  | ISAME | IOPT  | IPMP  | LSTR  |        |       |
| 0.0          | 0.000 | 1     | 1     | 0     | 0     | 0     |        |       |
| NSIPS        | NSIDL | LAG   | ANSKK | X     | TSK   | STURA | ISPRAT |       |
| 1            | 0     | 0     | 0.000 | 0.000 | 0.000 | -1.   | 0      |       |

| STORAGE | 0.00     | 6.10     | 10.80    | 17.40    | 34.30    | 39.40    | 49.70    | 60.10   | 70.90    |
|---------|----------|----------|----------|----------|----------|----------|----------|---------|----------|
| OUTFLOW | 0.00     | 280.00   | 1450.00  | 3140.00  | 5300.00  | 5920.00  | 7380.00  | 9740.00 | 12790.00 |
|         | 20610.00 | 25200.00 | 30350.00 | 35740.00 | 48170.00 | 55170.00 | 62510.00 |         |          |

FLWSQ

550 FT

DS FROM

UPPER

BRIDGEPORT DAM

(SECTION 7)

| 6-HOUR                                                               | 24-HOUR                                              | 72-HOUR                                             | TOTAL VOLUME                                             |
|----------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------|
| PEAK<br>19657.<br>CFS<br>557.<br>INCHES<br>MM<br>AC-FT<br>THOUS CU M | 8601.<br>244.<br>10.16<br>258.05<br>17059.<br>21042. | 3160.<br>89.<br>11.20<br>284.40<br>18801.<br>23191. | 909982.<br>25768.<br>11.20<br>284.40<br>18801.<br>23191. |

PMF

MAXIMUM STORAGE = 91.

| 6-HOUR                                                       | 24-HOUR                                         | 72-HOUR                                          | TOTAL VOLUME                                          |
|--------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------|-------------------------------------------------------|
| PEAK<br>7125.<br>202.<br>INCHES<br>MM<br>AC-FT<br>THOUS CU M | 3302.<br>94.<br>3.91<br>99.37<br>6561.<br>8103. | 1227.<br>35.<br>4.35<br>110.40<br>7248.<br>9002. | 353234.<br>10062.<br>4.35<br>110.40<br>7248.<br>9002. |

0.2 PMF

MAXIMUM STORAGE = 48.



SUBJECT DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV DATE 6-27-79 PROJ. NO. 78-617-465

CHKD. BY DLB DATE 7-2-79 SHEET NO. Q OF BB



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0.5 PMF

| PEAK   | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|--------|--------|---------|---------|--------------|
| 39968. | 34701. | 17425.  | 6385.   | 1838812.     |
| 1132.  | 983.   | 493.    | 181.    | 52069.       |
|        | 10.25  | 20.58   | 22.63   |              |
|        | 260.29 | 522.83  | 574.70  |              |
|        | 17207. | 34563.  | 37992.  |              |
|        | 21225. | 42633.  | 46862.  |              |

MAXIMUM STORAGE = 142.

### HYDROGRAPH ROUTING

ROUTE FROM SECTION 1.0 TO SECTION 4.0 (L.B. DAM SECT) \* 2400FT DS U.H. DAM

| ISIAQ    | ICOMP    | IECON    | ITAPE    | JPLI     | JPRT     | INAME   | ISTAGE   | IAUTO |
|----------|----------|----------|----------|----------|----------|---------|----------|-------|
| 708      | 1        | 0        | 0        | 0        | 0        | 1       | 0        | 0     |
| CLASS    | AVG      | INES     | ISAME    | IUPT     | IPMP     | LSTR    |          |       |
| 0.00     | 0.00     | 1        | 1        | 0        | 0        | 0       |          |       |
| WSTPS    | WSTDL    | LAG      | AMSKK    | X        | TSK      | STURA   | ISPRAT   |       |
| 1        | 0        | 0        | 0.000    | 0.000    | 0.000    | -1.     | 0        |       |
|          |          |          |          |          |          |         |          |       |
| 0.00     | 44.10    | 65.70    | 116.40   | 136.60   | 180.00   | 221.40  | 263.80   |       |
| 354.40   | 453.50   | 505.60   | 616.80   | 673.80   | 732.10   |         |          |       |
|          |          |          |          |          |          |         |          |       |
| 0.00     | 1450.00  | 3140.00  | 5300.00  | 5920.00  | 7380.00  | 9740.00 | 12790.00 |       |
| 20610.00 | 30350.00 | 35740.00 | 48170.00 | 55170.00 | 62510.00 |         |          |       |

PMF

| PEAK   | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|--------|--------|---------|---------|--------------|
| 39964. | 34684. | 17422.  | 6380.   | 1837360.     |
| 1132.  | 982.   | 493.    | 181.    | 52029.       |
|        | 10.24  | 20.56   | 22.61   |              |
|        | 260.20 | 522.74  | 574.25  |              |
|        | 17201. | 34557.  | 37962.  |              |
|        | 21217. | 42625.  | 46825.  |              |

MAXIMUM STORAGE = 543.

| PEAK  | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|-------|--------|---------|---------|--------------|
| 7084. | 6351.  | 3312.   | 1224.   | 352520.      |
| 201.  | 180.   | 94.     | 35.     | 9982.        |
|       | 1.88   | 3.91    | 4.34    |              |
|       | 47.64  | 99.37   | 110.18  |              |
|       | 3149.  | 6569.   | 7283.   |              |
|       | 3884.  | 6103.   | 8984.   |              |

MAXIMUM STORAGE = 171.

FLOW @

550 FT

DS FROM

UPPER

BRIDGEPORT DAM

(SECTION 7)

FLWS @

2400 FT

DS FROM

UPPER BRIDGEPORT

DAM

(SECTION 5)

LOWER BRIDGEPORT

DAM SECTION)



SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE

6-27-79

PROJ. NO.

79-617-465

CHKD. BY DLB

DATE

7-2-79

SHEET NO.

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|            | PEAK   | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------------|--------|--------|---------|---------|--------------|
| CFS        | 19633. | 17055. | 8601.   | 3155.   | 908731.      |
| CMS        | 556.   | 483.   | 244.    | 89.     | 25732.       |
| INCHES     |        | 5.04   | 10.16   | 11.18   | 11.18        |
| MM         |        | 127.93 | 258.05  | 284.01  | 284.01       |
| AC-FT      | 8457.  | 17059. | 18775.  | 18775.  | 18775.       |
| THOUS CU M | 10431. | 21042. | 23159.  | 23159.  | 23159.       |

MAXIMUM STORAGE = 344.

## SUMMARY OF DAM SAFETY ANALYSIS

## PA-657 DAM

|           | INITIAL VALUE | SPILLWAY CREST | TOP OF DAM |
|-----------|---------------|----------------|------------|
| ELEVATION | 1827.50       | 1835.00        | 1844.40    |
| STORAGE   | 93.           | 460.           | 1540.      |
| OUTFLOW   | 0.            | 0.             | 10182.     |

|      | RATIO OF PMF | MAXIMUM RESERVOIR W.S. ELEV | MAXIMUM DEPTH OVER DAM | MAXIMUM STORAGE AC-FT | MAXIMUM OUTFLOW CFS | DURATION OVER TOP HOURS | TIME OF MAX OUTFLOW HOURS | TIME OF FAILURE HOURS |
|------|--------------|-----------------------------|------------------------|-----------------------|---------------------|-------------------------|---------------------------|-----------------------|
| .10  | .10          | 1834.35                     | 0.00                   | 417.                  | 0.                  | 0.00                    | 0.00                      | 0.00                  |
| .20  | .20          | 1835.85                     | 0.00                   | 534.                  | 493.                | 0.00                    | 44.75                     | 0.00                  |
| .30  | .30          | 1836.18                     | 0.00                   | 616.                  | 1036.               | 0.00                    | 43.75                     | 0.00                  |
| .50  | .50          | 1838.35                     | 0.00                   | 758.                  | 2029.               | 0.00                    | 43.00                     | 0.00                  |
| 1.00 | 1.00         | 1840.46                     | 0.00                   | 1012.                 | 4413.               | 0.00                    | 42.75                     | 0.00                  |

| PLAN 1 |                  |                  |            | PLAN 3 |                  |                  |            |
|--------|------------------|------------------|------------|--------|------------------|------------------|------------|
| RATIO  | MAXIMUM FLOW,CFS | MAXIMUM STAGE,FT | TIME HOURS | RATIO  | MAXIMUM FLOW,CFS | MAXIMUM STAGE,FT | TIME HOURS |
| .10    | 0.               | 1796.0           | .25        | .10    | 0.               | 1280.0           | .25        |
| .20    | 493.             | 1799.3           | 44.75      | .20    | 478.             | 1282.7           | 45.75      |
| .30    | 1036.            | 1800.8           | 43.75      | .30    | 1006.            | 1284.3           | 44.50      |
| .50    | 2030.            | 1802.4           | 43.25      | .50    | 1977.            | 1285.8           | 44.00      |
| 1.00   | 4409.            | 1804.4           | 42.75      | 1.00   | 4309.            | 1286.4           | 43.50      |

| PLAN 1 |                  |                  | STATION 2   |       | PLAN 1           |                  |             | STATION 4 |  |
|--------|------------------|------------------|-------------|-------|------------------|------------------|-------------|-----------|--|
| RATIO  | MAXIMUM FLOW,CFS | MAXIMUM STAGE,FT | TIME, HOURS | RATIO | MAXIMUM FLOW,CFS | MAXIMUM STAGE,FT | TIME, HOURS |           |  |
| .10    | 0.               | 1760.0           | .25         | .10   | 0.               | 1060.0           | .25         |           |  |
| .20    | 485.             | 1764.4           | 45.25       | .20   | 460.             | 1063.0           | 46.50       |           |  |
| .30    | 1019.            | 1765.8           | 44.25       | .30   | 954.             | 1064.4           | 45.50       |           |  |
| .50    | 1999.            | 1767.5           | 43.50       | .50   | 1858.            | 1065.6           | 45.00       |           |  |
| 1.00   | 4469.            | 1770.0           | 43.25       | 1.00  | 4100.            | 1067.4           | 44.50       |           |  |

ROUTING  
SECTIONS  
BETWEEN  
PA-657  
AND  
UPPER  
BRIDGEPORT  
DAMS

# DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

WJV

DATE 6-27-79

PROJ. NO. 73-617-465

DLB

DATE 7-2-79

SHEET NO. 5 OF 23



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## SUMMARY OF DAM SAFETY ANALYSIS

UPPER BRIDGEPORT DAM

| RATIO<br>OF<br>P&F | MAXIMUM<br>RESERVOIR<br>W.S.ELEV | MAXIMUM<br>DEPTH<br>OVER DAM | MAXIMUM<br>STORAGE<br>AC-FT | MAXIMUM<br>OUTFLOW<br>CFS | DURATION<br>OVER TOP<br>HOURS | TIME OF<br>MAX OUTFLOW<br>HOURS | TIME OF<br>FAILURE<br>HOURS |
|--------------------|----------------------------------|------------------------------|-----------------------------|---------------------------|-------------------------------|---------------------------------|-----------------------------|
|                    | ELEVATION                        |                              | INITIAL VALUE               | SPILLWAY CRIST            |                               | TOP OF DAM                      |                             |
|                    | STORAGE                          |                              | 1053.50                     | 1053.50                   |                               | 1059.00                         |                             |
|                    | OUTFLOW                          |                              | 530.                        | 530.                      |                               | 1250.                           |                             |
|                    |                                  |                              | 0.                          | 0.                        |                               | 7130.                           |                             |
| .10                | 1057.52                          | 0.00                         | 1007.                       | 3426.                     | 0.00                          | 44.25                           | 0.00                        |
| .20                | 1059.00                          | 0.00                         | 1250.                       | 7128.                     | 0.00                          | 44.00                           | 0.00                        |
| .30                | 1060.12                          | 1.12                         | 1464.                       | 11403.                    | 6.75                          | 44.00                           | 0.00                        |
| .50                | 1061.48                          | 2.48                         | 1761.                       | 19653.                    | 11.50                         | 43.75                           | 0.00                        |
|                    | 1064.00                          | 5.00                         | 2391.                       | 39957.                    | 17.75                         | 43.75                           | 0.00                        |

STATION 607

~ 550 FT  
DS FROM UPPER  
BRIDGEPORT DAM  
@ 1<sup>st</sup> STRUCTURE

(SECTION 7)

| RATIO | MAXIMUM<br>FLOW, CFS | MAXIMUM<br>STAGE, FT |
|-------|----------------------|----------------------|
| 0.1   | 3422                 | 1048.9               |
| 0.2   | 7125                 | 1052.5               |
| 0.3   | 11407                | 1054.3               |
| 0.5   | 19657                | 1056.6               |
| 1.0   | 34969                | 1060.5               |

STATION 708

· ~ 2400 FT  
DS FROM UPPER  
BRIDGEPORT DAM  
@ LOWER BRIDGE  
DAM

(SECTIONS)

| RATIO | MAXIMUM<br>FLOW, CFS | MAXIMUM<br>STAGE, FT |
|-------|----------------------|----------------------|
| 0.1   | 3405                 | 1047.7               |
| 0.2   | 7084                 | 1050.8               |
| 0.3   | 11378                | 1052.5               |
| 0.5   | 14633                | 1054.8               |
| 1.0   | 34464                | 1056.7               |

\* FROM SLIFTS B AND C

SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV

DATE

6-27-79

PROJ. NO.

78-617-465

CHKD. BY DLB

DATE

7-2-79

SHEET NO.

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## BREACHING ANALYSIS

BREACHING OF UPPER  
BRIDGEPORT DAMONLY, SINCE THE  
PA-657 DAM WILL  
NOT BE OVERTOPPED  
BY THE PMF. (SAME  
INPUT DATA AS FOR THE  
OVERTOPPING ANALYSIS  
W/ THE ADDITION  
OF THE BREACH  
DATA GIVEN HERE)

\*BREACHING\*

DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM BY US PA-657 DAM + DS LOWER BRIDGEPORT DAM  
15-MINUTE TIME STEP AND 48-HOUR STORM DURATION

JOB SPECIFICATION

| NO  | NHR | NMIN | IDAY  | IHR | IMIN  | METRC | IPLT | IPRT | NSTAN |
|-----|-----|------|-------|-----|-------|-------|------|------|-------|
| 208 | 0   | 15   | 0     | 0   | 0     | 0     | 0    | 0    | 0     |
|     |     |      | JUPER | NMT | LROPT | TRACE |      |      |       |
|     |     |      | 5     | 0   | 0     | 0     |      |      |       |

MULTI-PLAN ANALYSES TO BE PERFORMED  
NPLAN= 5 NRTIU= 1 RATIO= 1

RTIUS= .22

## HYDROGRAPH ROUTING

ROUTE COMBINED HYDROGRAPH THROUGH UPPER BRIDGEPORT RESERVOIR

| DAM DATA |        |
|----------|--------|
| TOPEL    | COUD   |
| 1059.0   | 0.0    |
| DAM DATA |        |
| EXPD     | DAMWID |
| 0.0      | 0.0    |

| DAM BREACH DATA |         |
|-----------------|---------|
| Z               | ELBM    |
| .50             | 1052.00 |
| DAM BREACH DATA |         |
| TFAIL           | WSEL    |
| .75             | 1053.50 |

STATION 606, PLAN 1, RATIO 1

BEGIN DAM FAILURE AT 42.75 HOURS

PEAK OUTFLOW IS 0326. AT TIME 43.50 HOURS

| DAM BREACH DATA |         |
|-----------------|---------|
| Z               | ELBM    |
| 4.00            | 1052.00 |
| DAM BREACH DATA |         |
| TFAIL           | WSEL    |
| .75             | 1053.50 |

STATION 606, PLAN 2, RATIO 1

BEGIN DAM FAILURE AT 42.75 HOURS

PEAK OUTFLOW IS 18540. AT TIME 43.50 HOURS

| DAM BREACH DATA |         |
|-----------------|---------|
| Z               | ELBM    |
| .50             | 1052.00 |
| DAM BREACH DATA |         |
| TFAIL           | WSEL    |
| 4.00            | 1053.50 |

STATION 606, PLAN 3, RATIO 1

BEGIN DAM FAILURE AT 42.75 HOURS

PEAK OUTFLOW IS 6073. AT TIME 44.17 HOURS

PLAN

①

②

③



SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM  
 BY WJV DATE 6-27-79 PROJ. NO. 78-617-465  
 CHKD. BY DLB DATE 7-2-79 SHEET NO. U OF BB



DAM BREACH DATA  
 Z ELUM TFAIL WSEL FAFLEL  
 4.00 1052.00 4.00 1053.50 1059.00  
 STATION 606, PLAN 4, RATIO 1

BEGIN DAM FAILURE AT 42.75 HOURS  
 PEAK OUTFLOW IS 9837. AT TIME 44.50 HOURS

DAM BREACH DATA  
 Z ELUM TFAIL WSEL FAFLEL  
 2.00 1052.00 1.50 1053.50 1059.00  
 STATION 606, PLAN 5, RATIO 1

BEGIN DAM FAILURE AT 42.75 HOURS  
 PEAK OUTFLOW IS 11690. AT TIME 44.25 HOURS

THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .031 HOURS DURING BREACH FORMATION.  
 DOWNSTREAM CALCULATIONS WILL USE A TIME INTERVAL OF .250 HOURS.  
 THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.  
 INTERMEDIATE FLOWS ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

| TIME<br>(HOURS) | TIME FROM<br>BEGINNING<br>OF BREACH<br>(HOURS) | INTERPOLATED<br>BREACH<br>HYDROGRAPH<br>(CFS) | COMPUTED<br>BREACH<br>HYDROGRAPH<br>(CFS) | ERROR<br>(CFS) | ACCUMULATED<br>ERROR<br>(CFS) | ACCUMULATED<br>ERROR<br>(AC-F) |
|-----------------|------------------------------------------------|-----------------------------------------------|-------------------------------------------|----------------|-------------------------------|--------------------------------|
| 42.750          | 0.000                                          | 7133.                                         | 7133.                                     | 0.             | 0.                            | 0.                             |
| 42.781          | .031                                           | 7261.                                         | 7212.                                     | 49.            | 49.                           | 0.                             |
| 42.813          | .063                                           | 7390.                                         | 7319.                                     | 71.            | 120.                          | 0.                             |
| 42.844          | .094                                           | 7519.                                         | 7442.                                     | 77.            | 197.                          | 1.                             |
| 42.875          | .125                                           | 7646.                                         | 7575.                                     | 72.            | 269.                          | 1.                             |
| 42.906          | .156                                           | 7777.                                         | 7716.                                     | 60.            | 330.                          | 1.                             |
| 42.936          | .188                                           | 7905.                                         | 7862.                                     | 43.            | 373.                          | 1.                             |
| 42.969          | .219                                           | 8039.                                         | 8011.                                     | 23.            | 396.                          | 1.                             |
| 43.000          | .250                                           | 8163.                                         | 8163.                                     | 0.             | 396.                          | 1.                             |
| 43.031          | .281                                           | 8311.                                         | 8316.                                     | -5.            | 391.                          | 1.                             |
| 43.063          | .313                                           | 8459.                                         | 8468.                                     | -9.            | 382.                          | 1.                             |
| 43.094          | .344                                           | 8607.                                         | 8619.                                     | -13.           | 370.                          | 1.                             |
| 43.125          | .375                                           | 8755.                                         | 8769.                                     | -15.           | 355.                          | 1.                             |
| 43.156          | .406                                           | 8902.                                         | 8917.                                     | -15.           | 341.                          | 1.                             |
| 43.188          | .438                                           | 9050.                                         | 9063.                                     | -12.           | 328.                          | 1.                             |
| 43.219          | .469                                           | 9198.                                         | 9206.                                     | -7.            | 321.                          | 1.                             |
| 43.250          | .500                                           | 9346.                                         | 9346.                                     | -0.            | 321.                          | 1.                             |
| 43.281          | .531                                           | 9471.                                         | 9484.                                     | -14.           | 307.                          | 1.                             |

PLAN

(4)

(5)

(5)



SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY

WJV

DATE

6-27-79

PROJ. NO.

78-617-465

CHKD. BY

DLB

DATE

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| TIME<br>(HOURS) | TIME FROM<br>BEGINNING<br>OF BREACH<br>(HOURS) | INTERPOLATED<br>BREACH<br>HYDROGRAPH<br>(CFS) | COMPUTED<br>BREACH<br>HYDROGRAPH<br>(CFS) | ERROR<br>(CFS) | ACCUMULATED<br>ERROR<br>(CFS) | ACCUMULATED<br>ERROR<br>(AC-FT) |
|-----------------|------------------------------------------------|-----------------------------------------------|-------------------------------------------|----------------|-------------------------------|---------------------------------|
| 43.313          | .563                                           | 9595.                                         | 9619.                                     | -23.           | 284.                          | 1.                              |
| 43.344          | .594                                           | 9720.                                         | 9749.                                     | -29.           | 255.                          | 1.                              |
| 43.375          | .625                                           | 9845.                                         | 9876.                                     | -31.           | 223.                          | 1.                              |
| 43.406          | .656                                           | 9969.                                         | 9999.                                     | -30.           | 194.                          | 0.                              |
| 43.438          | .688                                           | 10094.                                        | 10117.                                    | -24.           | 170.                          | 0.                              |
| 43.469          | .719                                           | 10218.                                        | 10232.                                    | -14.           | 156.                          | 0.                              |
| 43.500          | .750                                           | 10343.                                        | 10343.                                    | 0.             | 156.                          | 0.                              |
| 43.531          | .781                                           | 10437.                                        | 10450.                                    | -13.           | 143.                          | 0.                              |
| 43.563          | .813                                           | 10530.                                        | 10552.                                    | -22.           | 121.                          | 0.                              |
| 43.594          | .844                                           | 10624.                                        | 10651.                                    | -27.           | 94.                           | 0.                              |
| 43.625          | .875                                           | 10718.                                        | 10745.                                    | -28.           | 67.                           | 0.                              |
| 43.656          | .906                                           | 10811.                                        | 10836.                                    | -25.           | 42.                           | 0.                              |
| 43.688          | .938                                           | 10905.                                        | 10923.                                    | -18.           | 25.                           | 0.                              |
| 43.719          | .969                                           | 10999.                                        | 11006.                                    | -7.            | 17.                           | 0.                              |
| 43.750          | 1.000                                          | 11092.                                        | 11092.                                    | 0.             | 17.                           | 0.                              |
| 43.781          | 1.031                                          | 11167.                                        | 11180.                                    | -13.           | 4.                            | 0.                              |
| 43.813          | 1.063                                          | 11242.                                        | 11265.                                    | -22.           | -18.                          | -0.                             |
| 43.844          | 1.094                                          | 11318.                                        | 11345.                                    | -27.           | -45.                          | -0.                             |
| 43.875          | 1.125                                          | 11393.                                        | 11421.                                    | -29.           | -74.                          | -0.                             |
| 43.906          | 1.156                                          | 11468.                                        | 11494.                                    | -27.           | -101.                         | -0.                             |
| 43.938          | 1.188                                          | 11543.                                        | 11564.                                    | -21.           | -122.                         | -0.                             |
| 43.969          | 1.219                                          | 11618.                                        | 11630.                                    | -12.           | -134.                         | -0.                             |
| 44.000          | 1.250                                          | 11693.                                        | 11693.                                    | 0.             | -134.                         | -0.                             |
| 44.031          | 1.281                                          | 11718.                                        | 11753.                                    | -35.           | -169.                         | -0.                             |
| 44.063          | 1.313                                          | 11742.                                        | 11781.                                    | -39.           | -208.                         | -1.                             |
| 44.094          | 1.344                                          | 11767.                                        | 11802.                                    | -35.           | -243.                         | -1.                             |
| 44.125          | 1.375                                          | 11792.                                        | 11822.                                    | -30.           | -273.                         | -1.                             |
| 44.156          | 1.406                                          | 11816.                                        | 11840.                                    | -24.           | -297.                         | -1.                             |
| 44.188          | 1.438                                          | 11841.                                        | 11857.                                    | -16.           | -313.                         | -1.                             |
| 44.219          | 1.469                                          | 11866.                                        | 11873.                                    | -8.            | -321.                         | -1.                             |
| 44.250          | 1.500                                          | 11890.                                        | 11890.                                    | 0.             | -321.                         | -1.                             |

5

SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY

WJV

DATE

6-27-79

PROJ. NO.

78-617-465

CHKD. BY

DLB

DATE

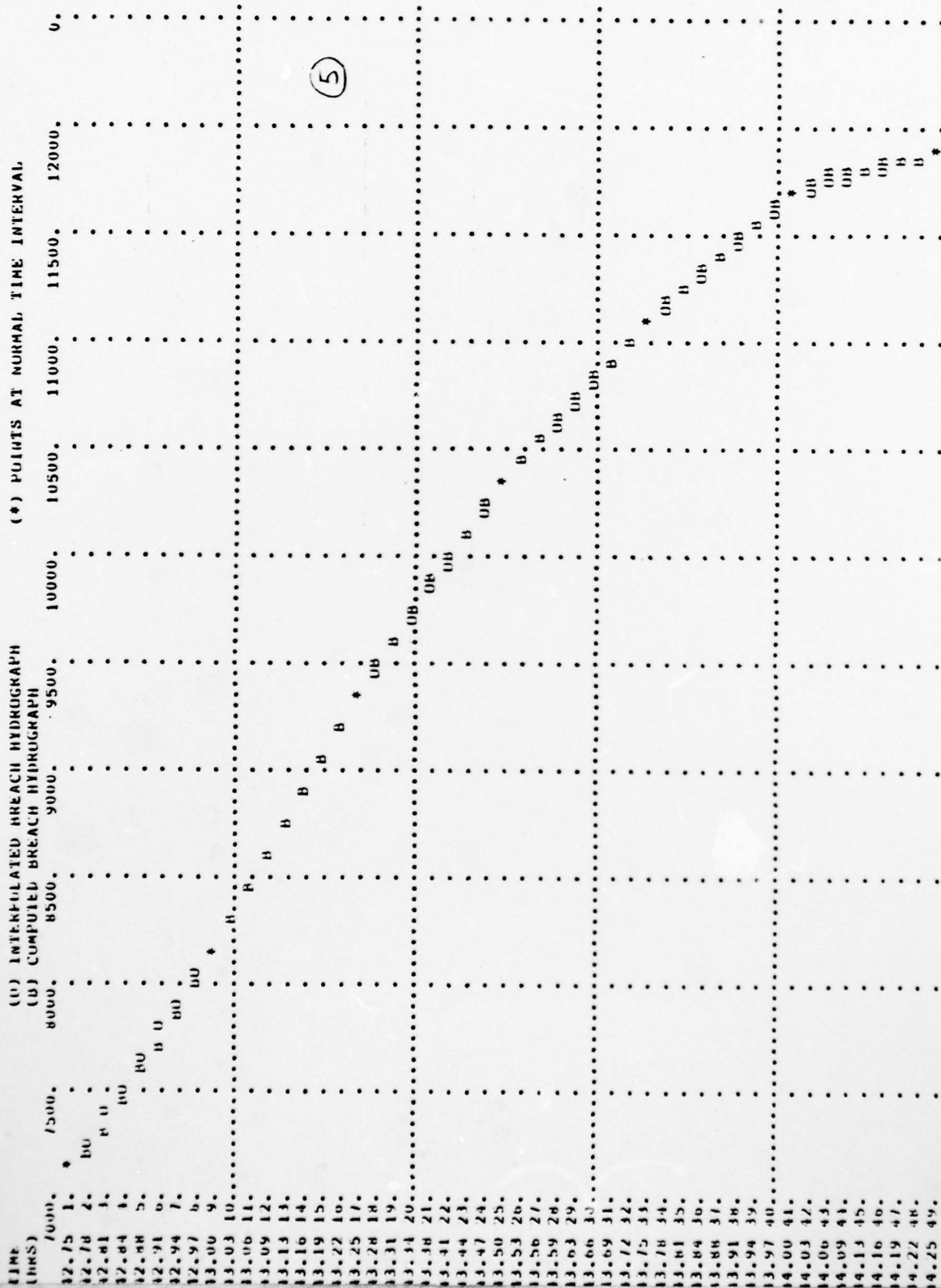
7-2-79

SHEET NO.

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SUBJECT DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV DATE 6-27-79 PROJ. NO. 78-617-465

CHKD. BY DLB DATE 7-2-79 SHEET NO. X OF BB



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NOTE:  
UNDER  
Y2 PMF  
BASE  
CONDITIONS

DAM BREACH DATA  
Z ELEM TFAIL WSEL TFAILED  
200. 2.00 1052.00 1.50 1053.50 1059.00

BELOW DAM FAILURE AT 40.25 HOURS

PEAK UTILIZED IS 19093. AT TIME 43.50 HOURS

THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .031 HOURS DURING BREACH FORMATION.  
DOWNSTREAM CALCULATIONS WILL USE A TIME INTERVAL OF .250 HOURS.  
THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.  
INTERPOLATED FLOOD ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

| TIME<br>(HOURS) | TIME FROM<br>BEGINNING<br>OF BREACH<br>(HOURS) | INTERPOLATED<br>BREACH<br>HYDROGRAPH<br>(CFS) | COMPUTED<br>BREACH<br>HYDROGRAPH<br>(CFS) | ERROR<br>(CFS) | ACCUMULATED<br>ERROR<br>(CFS) | ACCUMULATED<br>ERROR<br>(AC-FT) |
|-----------------|------------------------------------------------|-----------------------------------------------|-------------------------------------------|----------------|-------------------------------|---------------------------------|
| 40.250          | 0.000                                          | 7573.                                         | 7573.                                     | 0.             | 0.                            | 0.                              |
| 40.281          | .031                                           | 7797.                                         | 7744.                                     | 53.            | 53.                           | 0.                              |
| 40.313          | .063                                           | 8020.                                         | 7939.                                     | 81.            | 134.                          | 0.                              |
| 40.344          | .094                                           | 8244.                                         | 8152.                                     | 92.            | 226.                          | 1.                              |
| 40.375          | .125                                           | 8468.                                         | 8378.                                     | 90.            | 316.                          | 1.                              |
| 40.406          | .156                                           | 8692.                                         | 8614.                                     | 78.            | 394.                          | 1.                              |
| 40.438          | .188                                           | 8915.                                         | 8858.                                     | 58.            | 452.                          | 1.                              |
| 40.469          | .219                                           | 9139.                                         | 9108.                                     | 31.            | 484.                          | 1.                              |
| 40.500          | .250                                           | 9363.                                         | 9363.                                     | -0.            | 484.                          | 1.                              |
| 40.531          | .281                                           | 9628.                                         | 9622.                                     | 6.             | 490.                          | 1.                              |
| 40.563          | .313                                           | 9893.                                         | 9885.                                     | 9.             | 498.                          | 1.                              |
| 40.594          | .344                                           | 10158.                                        | 10149.                                    | 9.             | 507.                          | 1.                              |
| 40.625          | .375                                           | 10423.                                        | 10415.                                    | 8.             | 516.                          | 1.                              |
| 40.656          | .406                                           | 10688.                                        | 10682.                                    | 6.             | 522.                          | 1.                              |
| 40.688          | .438                                           | 10954.                                        | 10950.                                    | 4.             | 525.                          | 1.                              |
| 40.719          | .469                                           | 11219.                                        | 11217.                                    | 2.             | 527.                          | 1.                              |
| 40.750          | .500                                           | 11484.                                        | 11484.                                    | 0.             | 527.                          | 1.                              |
| 40.781          | .531                                           | 11745.                                        | 11750.                                    | -4.            | 523.                          | 1.                              |
| 40.813          | .563                                           | 12007.                                        | 12015.                                    | -8.            | 515.                          | 1.                              |
| 40.844          | .594                                           | 12269.                                        | 12279.                                    | -10.           | 505.                          | 1.                              |
| 40.875          | .625                                           | 12531.                                        | 12542.                                    | -12.           | 493.                          | 1.                              |
| 40.906          | .656                                           | 12792.                                        | 12804.                                    | -11.           | 482.                          | 1.                              |
| 40.938          | .688                                           | 13054.                                        | 13064.                                    | -9.            | 472.                          | 1.                              |

(6)

Y2 PMF

CONDITIONS

PLAN

(6)

SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM  
 BY WJV DATE 6-27-79 PROJ. NO. 78-617-465  
 CHKD. BY DLB DATE 7-2-79 SHEET NO. Y OF BB

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| TIME<br>(HOURS) | TIME FROM<br>BEGINNING<br>OF BREACH<br>(HOURS) | INTERPOLATED<br>BREACH<br>HYDROGRAPH<br>(CFS) | COMPUTED<br>BREACH<br>HYDROGRAPH<br>(CFS) | = | ERROR<br>(CFS) | ACCUMULATED<br>ERROR<br>(CFS) | ACCUMULATED<br>ERROR<br>(AC-FT) |
|-----------------|------------------------------------------------|-----------------------------------------------|-------------------------------------------|---|----------------|-------------------------------|---------------------------------|
| 40.969          | .719                                           | 13316.                                        | 13322.                                    |   | -6.            | 467.                          | 1.                              |
| 41.000          | .750                                           | 13578.                                        | 13578.                                    |   | 0.             | 467.                          | 1.                              |
| 41.031          | .781                                           | 13825.                                        | 13832.                                    |   | -7.            | 459.                          | 1.                              |
| 41.063          | .813                                           | 14072.                                        | 14083.                                    |   | -12.           | 447.                          | 1.                              |
| 41.094          | .844                                           | 14319.                                        | 14334.                                    |   | -15.           | 432.                          | 1.                              |
| 41.125          | .875                                           | 14566.                                        | 14582.                                    |   | -17.           | 415.                          | 1.                              |
| 41.156          | .906                                           | 14813.                                        | 14828.                                    |   | -16.           | 399.                          | 1.                              |
| 41.186          | .938                                           | 15060.                                        | 15072.                                    |   | -13.           | 387.                          | 1.                              |
| 41.219          | .969                                           | 15307.                                        | 15314.                                    |   | -7.            | 380.                          | 1.                              |
| 41.250          | 1.000                                          | 15554.                                        | 15554.                                    |   | 0.             | 380.                          | 1.                              |
| 41.281          | 1.031                                          | 15783.                                        | 15791.                                    |   | -8.            | 371.                          | 1.                              |
| 41.313          | 1.063                                          | 16012.                                        | 16026.                                    |   | -14.           | 358.                          | 1.                              |
| 41.344          | 1.094                                          | 16242.                                        | 16259.                                    |   | -17.           | 340.                          | 1.                              |
| 41.375          | 1.125                                          | 16471.                                        | 16489.                                    |   | -18.           | 322.                          | 1.                              |
| 41.406          | 1.156                                          | 16700.                                        | 16717.                                    |   | -17.           | 305.                          | 1.                              |
| 41.438          | 1.188                                          | 16929.                                        | 16941.                                    |   | -14.           | 291.                          | 1.                              |
| 41.469          | 1.219                                          | 17158.                                        | 17166.                                    |   | -8.            | 283.                          | 1.                              |
| 41.500          | 1.250                                          | 17388.                                        | 17388.                                    |   | 0.             | 283.                          | 1.                              |
| 41.531          | 1.281                                          | 17597.                                        | 17607.                                    |   | -9.            | 274.                          | 1.                              |
| 41.563          | 1.313                                          | 17807.                                        | 17823.                                    |   | -16.           | 259.                          | 1.                              |
| 41.594          | 1.344                                          | 18016.                                        | 18036.                                    |   | -19.           | 239.                          | 1.                              |
| 41.625          | 1.375                                          | 18226.                                        | 18247.                                    |   | -20.           | 219.                          | 1.                              |
| 41.656          | 1.406                                          | 18436.                                        | 18455.                                    |   | -19.           | 200.                          | 1.                              |
| 41.688          | 1.438                                          | 18645.                                        | 18661.                                    |   | -15.           | 185.                          | 0.                              |
| 41.719          | 1.469                                          | 18855.                                        | 18861.                                    |   | -9.            | 176.                          | 0.                              |
| 41.750          | 1.500                                          | 19065.                                        | 19065.                                    |   | 0.             | 176.                          | 0.                              |

6  
 1/2 PAF  
 CONDITIONS



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F/G 13/2

NATIONAL DAM INSPECTION PROGRAM UPPER BRIDGEPORT DAM NDI I.D. N--ETC(U)

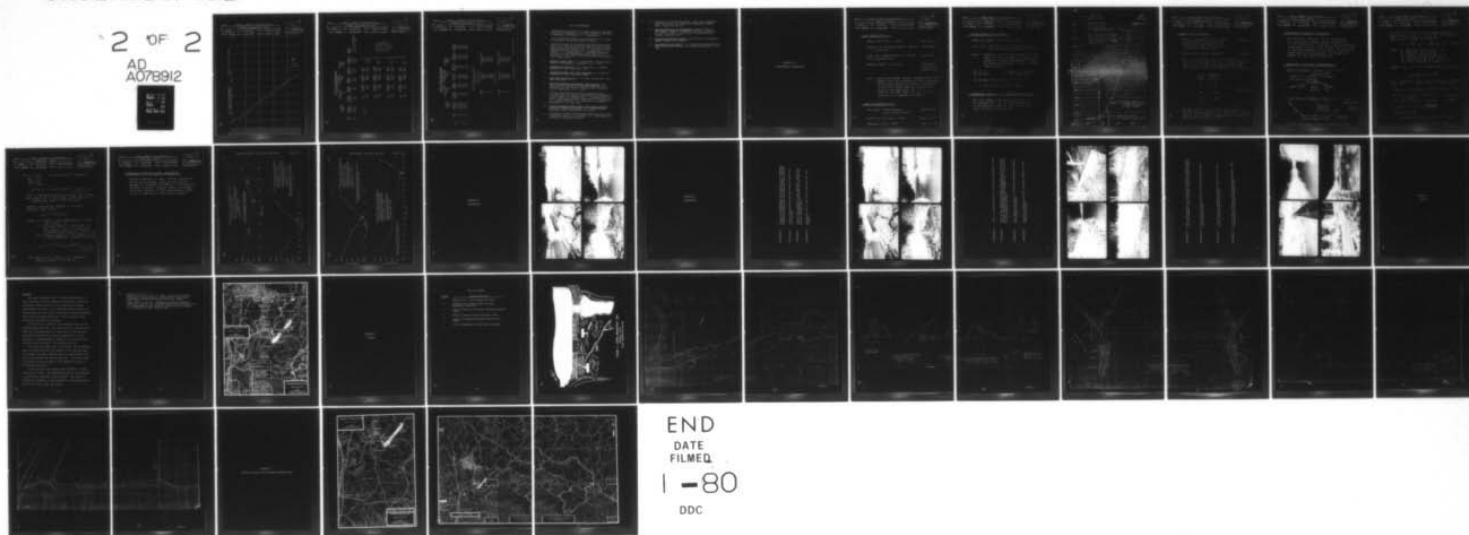
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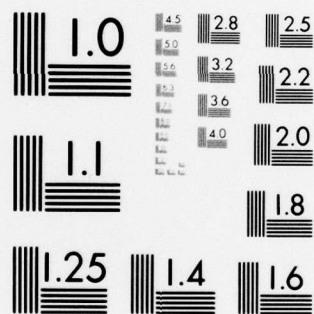


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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

SUBJECT

DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY

WJV

DATE

6-27-79

PROJ. NO.

78-617-465

CHKD. BY

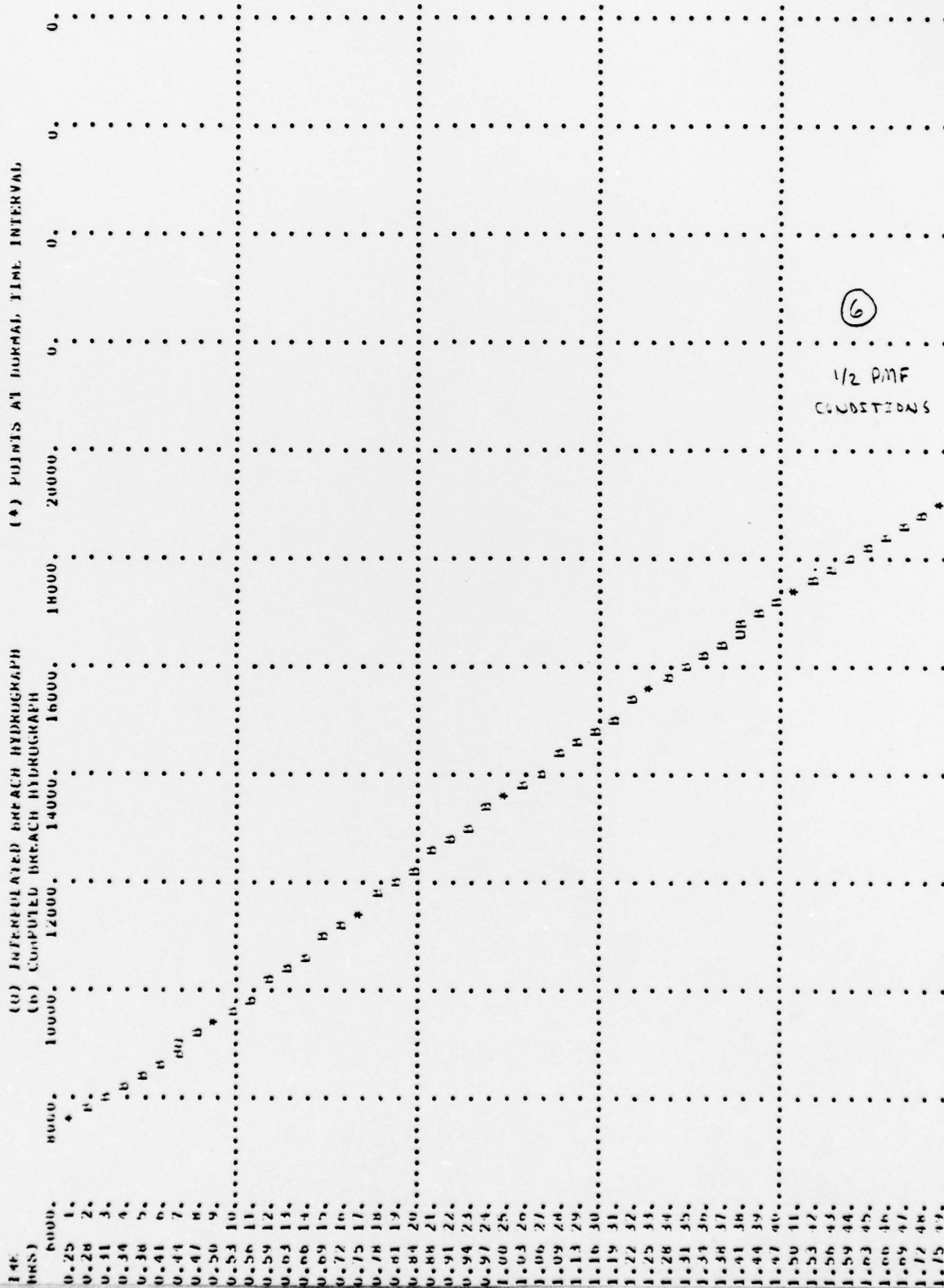
DLB

DATE

7-2-79

SHEET NO.

Z OF BB

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SUBJECT DAM SAFETY INSPECTION

UPPER BRIDGEPORT DAM

BY WJV DATE 6-27-79 PROJ. NO. 78-617-465

CHKD. BY DLB DATE 7-2-79 SHEET NO. AA OF BB



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SUMMARY OF DAM SAFETY ANALYSIS

PA-657 DAM

INITIAL VALUE  
1827.50  
93.  
0.

SPILLWAY CREST  
1835.00  
460.  
0.

TOP OF DAM  
1844.40  
1540.  
10182.

ELEVATION  
STORAGE  
OUTFLOW

| RATIO<br>OF<br>PMF | MAXIMUM<br>RESERVOIR<br>W.S. ELEV | MAXIMUM<br>DEPTH<br>OVER DAM | MAXIMUM<br>STORAGE<br>AC-FT | MAXIMUM<br>OUTFLOW<br>CFS | DURATION<br>OVER TOP<br>HOURS | TIME OF<br>MAX OUTFLOW<br>HOURS | TIME OF<br>FAILURE<br>HOURS |
|--------------------|-----------------------------------|------------------------------|-----------------------------|---------------------------|-------------------------------|---------------------------------|-----------------------------|
| .22                | 1836.04                           | 0.00                         | 551.                        | 605.                      | 0.00                          | 44.50                           | 0.00 ← PLANS (D) → (E)      |
| .50                | 1838.35                           | 0.00                         | 758.                        | 2029.                     | 0.00                          | 43.00                           | 0.00 ← PLAN (E)             |

SECTION

2

| RATIO | MAXIMUM<br>FLOW, CFS | MAXIMUM<br>STAGE, FT | TIME<br>HOURS   |
|-------|----------------------|----------------------|-----------------|
| .22   | 605.                 | 1799.8               | 44.50 (D) → (E) |
| .50   | 2030.                | 1802.4               | 43.25 (E)       |

3

| RATIO | MAXIMUM<br>FLOW, CFS | MAXIMUM<br>STAGE, FT | TIME<br>HOURS   |
|-------|----------------------|----------------------|-----------------|
| .22   | 595.                 | 1764.7               | 45.00 (D) → (E) |
| .50   | 1999.                | 1767.5               | 43.50 (E)       |

4

| RATIO | MAXIMUM<br>FLOW, CFS | MAXIMUM<br>STAGE, FT | TIME<br>HOURS   |
|-------|----------------------|----------------------|-----------------|
| .22   | 587.                 | 1283.1               | 45.25 (D) → (E) |
| .50   | 1977.                | 1285.8               | 44.00 (E)       |

5

| RATIO | MAXIMUM<br>FLOW, CFS | MAXIMUM<br>STAGE, FT | TIME<br>HOURS   |
|-------|----------------------|----------------------|-----------------|
| .22   | 566.                 | 1063.4               | 46.00 (D) → (E) |
| .50   | 1858.                | 1065.6               | 45.00 (E)       |

ROUTING  
SECTIONS  
BETWEEN  
PA-657 DAM  
AND UPPER  
BRIDGEPORT  
DAM



SUBJECT DAM SAFETY INSPECTION  
UPPER BRIDGEPORT DAM  
 BY WJV DATE 6-27-79 PROJ. NO. 78-617-465  
 CHKD. BY DLB DATE 7-2-79 SHEET NO. 88 OF 88

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SUMMARY OF DAM SAFETY ANALYSIS

| <u>UPPER BRIDGEPORT DAM</u> |              |                             |                        |                       |                     |                         |                           |                       |  |
|-----------------------------|--------------|-----------------------------|------------------------|-----------------------|---------------------|-------------------------|---------------------------|-----------------------|--|
| PLAN                        | RATIO OF PNE | MAXIMUM RESERVOIR W.S. ELEV | MAXIMUM DEPTH OVER DAM | MAXIMUM STORAGE AC-FT | MAXIMUM OUTFLOW CFS | DURATION OVER TOP HOURS | TIME OF MAX OUTFLOW HOURS | TIME OF FAILURE HOURS |  |
| 1                           | .22          | 1059.14                     | .14                    | 1277.                 | 8326.               | 2.25                    | 43.50                     | 42.75                 |  |
| 2                           | .22          | 1059.02                     | .02                    | 1254.                 | 18546.              | .40                     | 43.50                     | 42.75                 |  |
| 3                           | .22          | 1059.23                     | .23                    | 1295.                 | 8023.               | 3.00                    | 44.17                     | 42.75                 |  |
| 4                           | .22          | 1059.08                     | .08                    | 1265.                 | 9837.               | .97                     | 44.50                     | 42.75                 |  |
| 5                           | .22          | 1059.06                     | .06                    | 1261.                 | 11890.              | .72                     | 44.25                     | 42.75                 |  |
| 6                           | .50          | 1059.46                     | .46                    | 1338.                 | 19693.              | 3.22                    | 43.50                     | 40.25                 |  |
|                             |              | ELEVATION STORAGE OUTFLOW   | INITIAL VALUE          |                       | SPILLWAY CHEST      | TOP OF DAM              |                           |                       |  |
|                             |              |                             | 1053.50                |                       | 1053.50             | 1059.00                 |                           |                       |  |
|                             |              |                             | 530.                   |                       | 530.                | 1250.                   |                           |                       |  |
|                             |              |                             | 0.                     |                       | 0.                  | 7130.                   |                           |                       |  |

DOWNSTREAM CHANNEL ROUTING

SECTION 7

| PLAN | FLOW (CFS) * | ELEVATION (FT) ** |
|------|--------------|-------------------|
| 1    | 8316         | 1053.1            |
| 2    | 18227        | 1056.2            |
| 3    | 8023         | 1053.1            |
| 4    | 9836         | 1053.8            |
| 5    | 11891        | 1054.5            |
| 6    | 19692        | 1056.6            |

SECTION 8

| PLAN | FLOW (CFS) * | ELEVATION (FT) ** |
|------|--------------|-------------------|
| 1    | 8229         | 1051.4            |
| 2    | 16454        | 1054.0            |
| 3    | 8006         | 1051.3            |
| 4    | 9794         | 1052.0            |
| 5    | 11652        | 1052.6            |
| 6    | 19686        | 1054.8            |

\* FLOWS FROM DETAILED  
 HEC-1 OUTPUT  
 \*\* FROM SHEETS B AND C

## LIST OF REFERENCES

1. "Recommended Guidelines for Safety Inspection of Dams," prepared by Department of the Army Office of the Chief of Engineers, Washington, D. C. (Appendix D).
2. "Unit Hydrograph Concepts and Calculations," by Corps of Engineers, Baltimore District (L-519).
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8. Weir Experiments, Coefficients, and Formulas, R. E. Horton, Water Supply and Irrigation Paper No. 200, Department of the Interior, United States Geological Survey, Washington, D. C., 1907.
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APPENDIX C-1  
SUPPLEMENTAL CALCULATIONS



SUBJECT DAM SAFETY INSPECTION

PA-657 DAM

BY WJV DATE 5-16-79 PROJ. NO. 79-617-929

CHKD. BY DLB DATE 6-2-79 SHEET NO. 1 OF 10



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### DAM STATISTICS

HEIGHT OF DAM  $\approx$  33 FT (FIELD MEASURED)

MAXIMUM POOL STORAGE CAPACITY  $\approx$  1540 AC-FT (SEE SHEET 3)  
@ TOP OF DAM

NORMAL POOL STORAGE CAPACITY  $\approx$  93 AC-FT (SEE NOTE 1)  
@ TOP OF RECREATION POOL

DRAINAGE AREA  $\approx$  2.6 SQ MI.

PLANIMETERED OFF  
USGS 7.5 MINUTE  
DONEGAL, PA QUAD

NOTE 1: NORMAL POOL STORAGE CAPACITY OBTAINED FROM THE  
"REPORT UPON THE APPLICATION OF THE COMMISSIONERS  
OF WESTMORLAND COUNTY [TO CONSTRUCT AND MAINTAIN  
A DAM ACROSS JACOB'S CREEK IN MOUNT PLEASANT  
TOWNSHIP, WESTMORELAND COUNTY]" (1972), AS  
FOUND IN PENN DER FILES; AND ALSO FROM DESIGN  
INFORMATION AS PRESENTED ON SHEET 3

### DAM CLASSIFICATION

DAM SIZE - INTERMEDIATE (REF 1, TABLE 1)  
(DUE TO STORAGE CAPACITY)

HAZARD CLASSIFICATION - HIGH (FIELD OBSERVATION)

REQUIRED SDF - PMF (REF 1, TABLE 3)

SUBJECT DAM SAFETY INSPECTION  
PA-657 DAM  
BY WJV DATE 5-21-79 PROJ. NO. 78-617-829  
CHKD. BY DLB DATE 6-2-79 SHEET NO. 2 OF 10



### HYDROGRAPH PARAMETERS

LENGTH OF LONGEST WATERCOURSE  $\approx 3.0$  MI

$L_{CA} \approx 1.4$  MI. (MEASURED ALONG THE LONGEST WATERCOURSE  
FROM THE DAM CREST TO THE CENTROID OF THE BASIN)

NOTE 2: VALUES OF L AND  $L_{CA}$  ARE MEASURED FROM THE  
USGS 7.5 MINUTE DONEGAL, PA QUAD. ALL  
HYDROGRAPH VARIABLES ARE DEFINED IN REF. 2  
IN THE SECTION ENTITLED "SNYDER SYNTHETIC  
UNIT HYDROGRAPH".

$$C_t \approx 1.0$$
$$C_p \approx 0.40$$

[ SUPPLIED BY COE ; ZONE 25 ]  
OHIO RIVER BASIN

$$T_p = \text{SNYDER'S STANDARD LAG} \approx 1.0 (L \times L_{CA})^{0.2}$$

$$\therefore T_p = 1.0 (3.0 \times 1.4)^{0.2} \approx 1.54 \text{ HRS}$$

### RESERVOIR ELEVATION - STORAGE RELATIONSHIP

THE ACTUAL DESIGN RELATIONSHIP FOR THE DAM  
WAS OBTAINED FROM THE SCS DESIGN FILES AND  
IS PROVIDED ON SHEET 3. THIS RELATIONSHIP  
WILL BE USED IN THE ANALYSIS.

DA-657  
Jacobs Creek

WPC  
Feb 16, 1966

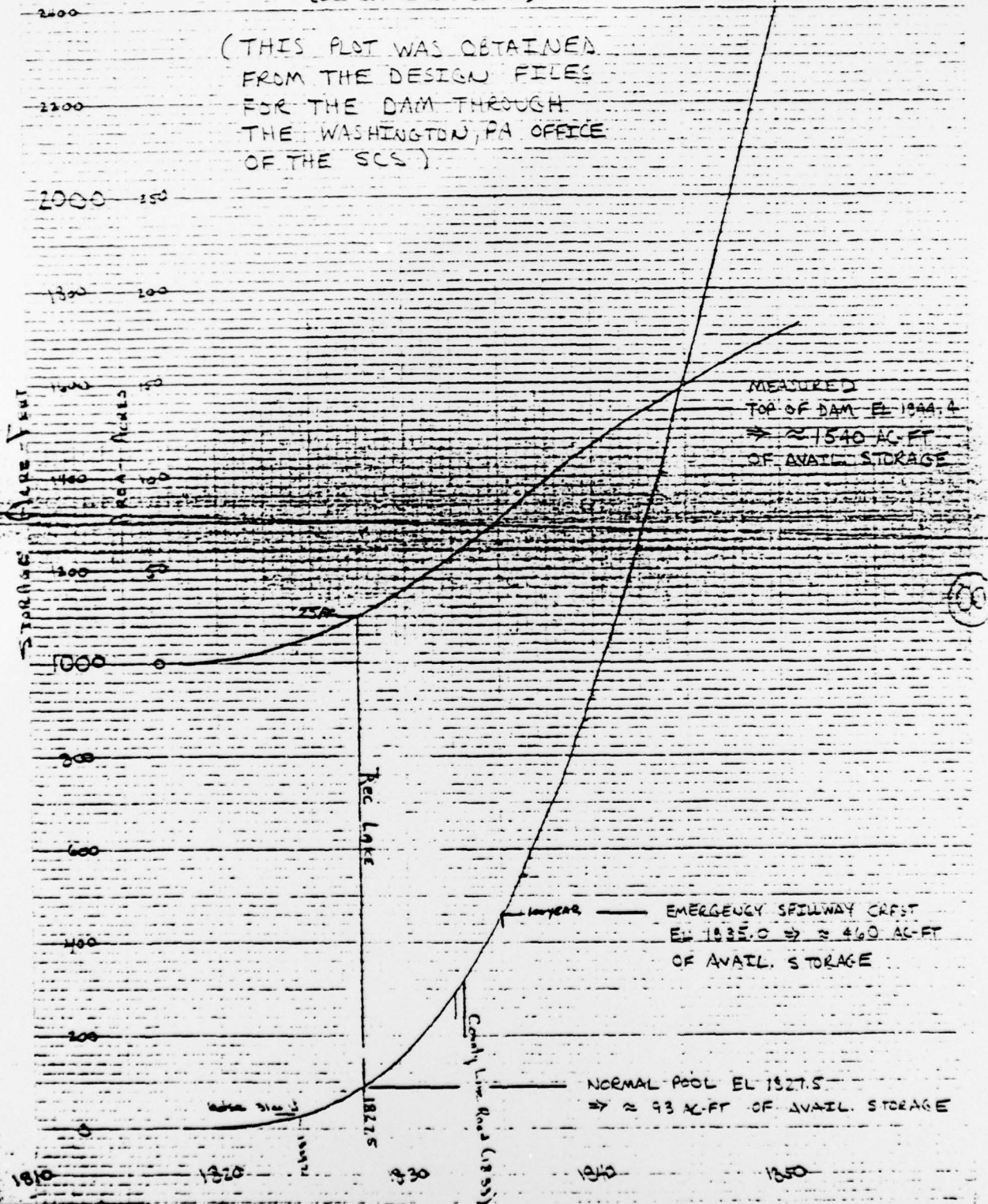
# Stage vs Storage

EA - DAM IN PLACE

NOTE - CHANGE TO EB INSIGNIFICANT JG 3/15/66  
(SEE OFFICE COPY OF MAP)

SHEET 3 OF 10

(THIS PLOT WAS OBTAINED  
FROM THE DESIGN FILES  
FOR THE DAM THROUGH  
THE WASHINGTON, PA OFFICE  
OF THE SCS)





SUBJECT DAM SAFETY INSPECTION  
PA-657 DAM  
 BY WJV DATE 5-21-79 PROJ. NO. 79-617-929  
 CHKD. BY DLB DATE 6-7-79 SHEET NO. 4 OF 10



## PMP CALCULATIONS

- APPROXIMATE RAINFALL INDEX = 24 IN (REF 3, FIG 1)  
 (CORRESPONDING TO A DURATION OF 24  
 HOURS AND AN AREA OF 200 SQ. MI. IN  
 SOUTHWESTERN PENNSYLVANIA)
- DEPTH - AREA - DURATION ZONE #7 (REF 3, FIG 1)
- LOCAL DRAINAGE AREA  $\approx$  2.6 SQ MI. HOWEVER, THE STORM  
 WILL BE CENTERED OVER THE TOTAL DRAINAGE AREA OF  
 31.5 SQ MI ABOVE THE UPPER BRIDGEPORT DAM  $\Rightarrow$   
 DEPTH - DURATION RELATIONSHIP BASED ON DA = 31.5 SQ MI. :

| DURATION<br>(HR) | PERCENT OF<br>INDEX RAINFALL<br>(%) |
|------------------|-------------------------------------|
| 6                | 90                                  |
| 12               | 109                                 |
| 24               | 119                                 |
| 48               | 128                                 |

(REF 3, FIG 2)

- HOP BROOK FACTOR (ADJUSTMENT FOR BASIN SHAPE AS WELL AS  
 FOR THE LESSER LIKELIHOOD OF A SEVERE STORM CENTERING  
 OVER A SMALLER BASIN) CORRESPONDING TO A DA  $\approx$  31.5 SQ MI  
 $\Rightarrow$  0.937 (AS COMPUTED BY HEC-1)



SUBJECT DAM SAFETY INSPECTION  
PA-657 DAM  
 BY WJV DATE 5-21-79 PROJ. NO. 78-617-020  
 CHKD. BY DLB DATE 6-2-79 SHEET NO. 5 OF 10

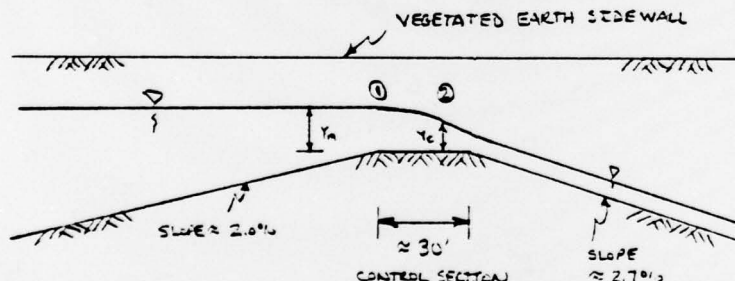
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## SPILLWAY CAPACITY (SERVICE)

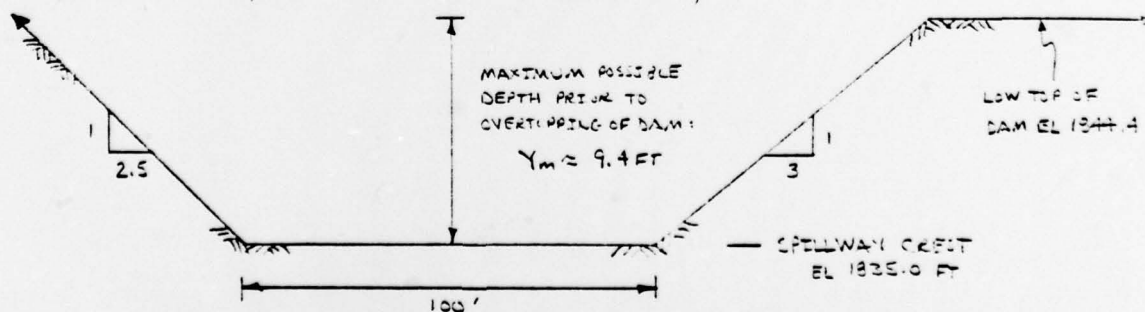
THE PRINCIPAL SPILLWAY IS A CONVENTIONAL SCS DROP-INLET, VERTICAL RISER STRUCTURE W/ A 30" OUTLET PIPE. ACCORDING TO DESIGN INFORMATION (OBTAINED FROM THE SCS), THE CAPACITY OF THE SERVICE OR PRINCIPAL SPILLWAY IS ONLY ABOUT 120 CFS PRIOR TO OVERTOPPING OF THE EMBANKMENT  $\Rightarrow$  IGNORE THE EFFECTS OF THE SERVICE SPILLWAY.

## SPILLWAY CAPACITY (EMERGENCY)

- PROFILE OF EMERGENCY SPILLWAY: (NOT TO SCALE)  
 (FROM DESIGN DRAWINGS, AND FIELD MEASUREMENT AND OBSERVATION)



- CROSS-SECTION OF EMERGENCY SPILLWAY: (NOT TO SCALE)  
 (FROM DESIGN DRAWINGS, AND FIELD MEASUREMENT AND OBSERVATION)



SECTION TAKEN LOOKING DOWNSTREAM @ EMERGENCY SPILLWAY

SUBJECT

DAM SAFETY INSPECTION

PA-657 DAM

BY

WJV

DATE

5-21-79

PROJ. NO.

73-617-828

CHKD. BY

DLB

DATE

6-7-79

SHEET NO.

6 OF 10



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- ASSUME THAT THE WATER SURFACE PROFILE PASSES THROUGH CRITICAL DEPTH @ ② (AS SHOWN ON SKETCH ON SHEET 5):  
ENERGY BALANCE BETWEEN ① AND ②  $\Rightarrow$

$$Y_m + \frac{V_1^2}{2g} + Z_1 = Y_c + \frac{V_c^2}{2g} + Z_2 + H_L \quad (\text{REF 7, PG 40})$$

WHERE  $V_1$  = RESERVOIR APPROACH VELOCITY  $\approx 0$

$Z_1$  = ELEVATION @ ① IN FT,

$V_c$  = CRITICAL VELOCITY @ ② IN FPS,

$Z_2$  = ELEVATION @ ② IN FT, AND

$H_L$  = HEAD LOSS BETWEEN ① AND ②  $\approx 0$  FT

SINCE  $Z_1 - Z_2 \approx 0$  (BOTH LOCATED ON FLAT CONTROL SECTION)

$$\therefore Y_m \approx 9.4 \text{ FT} \approx Y_c + \frac{V_c^2}{2g}$$

- FOR A TRAPEZOIDAL SHAPED CONTROL SECTION W/ CRITICAL DEPTH  $\Rightarrow \frac{V_c^2}{2g} = \frac{\Delta_c}{2}$  (REF 7, PG 43)

WHERE  $\Delta_c$  = HYDRAULIC DEPTH = FLOW AREA / TOP WIDTH =  $A_c / W_c$

$$A_c = 100 Y_c + \frac{1}{2} (3 Y_c \times Y_c) + \frac{1}{2} (2.5 Y_c \times Y_c)$$

$$= 100 Y_c + 2.75 Y_c^2$$

$$W_c = 100 + 3 Y_c + 2.5 Y_c = 100 + 5.5 Y_c$$

FROM GEOMETRY  
ON  
SHEET 5

$$\therefore 9.4 = Y_c + \frac{\Delta_c}{2} = Y_c + \frac{100 Y_c + 2.75 Y_c^2}{2(100 + 5.5 Y_c)}$$

SOLVE FOR  $Y_c \Rightarrow$

$$9.4 (200 + 11 Y_c) = Y_c (200 + 11 Y_c) + (100 Y_c + 2.75 Y_c^2)$$

$$0 = 13.75 Y_c^2 + 196.6 Y_c - 1880$$

SUBJECT

DAM SAFETY INSPECTION

PA-657 DAM

BY WJV

DATE

5-21-79

PROJ. NO.

79-617-929

CHKD. BY

DLB

DATE

6-2-79

SHEET NO.

7

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$$\Rightarrow Y_c \approx 6.6 \text{ FT} \quad (\text{VIA THE QUADRATIC EQUATION})$$

$$A_c \approx 730 \text{ FT}^2$$

$$v_c^2/2g \approx 2.9 \text{ FT}$$

$$v_c \approx 13.4 \text{ FPS}$$

$$\therefore Q = A_c v_c \approx (730 \text{ FT}^2)(13.4 \text{ FPS}) \approx 10450 \text{ CFS} \quad (\approx 10182 \text{ CFS})$$

AS COMPUTED BY HEC-1 DUE TO  
COMPUTER ACCURACY

- CHECK TO SEE IF CRITICAL FLOW ACTUALLY DOES CONTROL  
 $\Rightarrow$  CHANNEL SLOPE DS FROM CONTROL SECTION SHOULD BE A  
 SUPERCRITICAL SLOPE ( $>$  CRITICAL SLOPE)

CRITICAL SLOPE CAN BE DEFINED BY MANNING'S  
EQUATION (REF 13, PG 143) :

$$S_c \approx \left( n v_c / 1.49 R_c^{2/3} \right)^2$$

WHERE  $S_c$  = CRITICAL SLOPE CORRESPONDING TO A FLOW  
WITH VELOCITY  $v_c$ ,

$n$  = ROUGHNESS FACTOR  $\approx 0.032$  BASED ON

$v_c R_c$  PRODUCT  $\approx 75.0$  AND VEGETATIVE  
RETARDANCE CLASSIFICATION "C" (REF 15, PG 7-12)

$$R_c = \text{HYDRAULIC RADIUS} = \text{FLOW AREA} / \text{WETTED PERIMETER}$$

$$= 730 \text{ FT}^2 / [100 + \sqrt{3(60)^2 + (60)^2} + \sqrt{25(60)^2 + (60)^2}] \approx 5.6 \text{ FT}$$

$$\therefore S_c \approx \left[ (0.032)(13.4) / 1.49 (5.6)^{2/3} \right]^2 \approx 0.01 \text{ FT/FT}$$

$< 0.027 \text{ FT/FT}$   
(ACTUAL)

$\Rightarrow$  CRITICAL FLOW CONTROLS AND EMERGENCY  
SPILLWAY CAPACITY  $\approx 10450 \text{ CFS}$

SUBJECT DAM SAFETY INSPECTION

PA-657 DAM

BY WJV DATE 5-21-79 PROJ. NO. 78-G17-829

CHKD. BY DLB DATE 6-2-79 SHEET NO. 8 OF 10



Engineers • Geologists • Planner  
Environmental Specialists

### SPILLWAY RATING CURVE (EMERGENCY)

COMPUTED INTERNALLY BY HEC-1 VIA THE TRAPEZOIDAL  
RATING CURVE ROUTINE, BASED ON THE SPILLWAY  
GEOMETRY AS PRESENTED ON SHEET 5. THE TRAPEZOIDAL  
ROUTINE CALCULATES CRITICAL CONTROL DISCHARGES  
IN A WAY SIMILAR TO THAT OUTLINED ON SHEETS  
6 AND 7 (SEE SUMMARY INPUT/OUTPUT SHEETS)



# DOWNSTREAM ROUTING SECTIONS

SHEET 9 OF 10

SECTION A-A  $\approx$  2300 FT DS FROM PA-657

INVERT ELEVATION  $\approx$  1796 FT

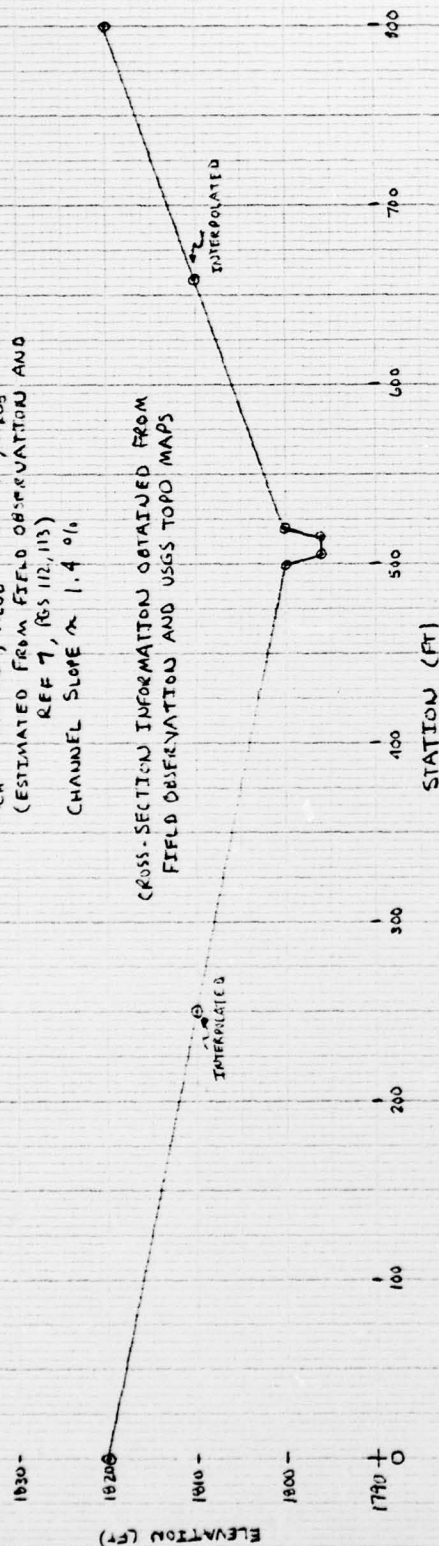
$n_{ch} \approx 0.030$ ,  $m_{0.0} \approx 0.09$ ,  $m_{0.08} \approx 0.07$

(ESTIMATED FROM FIELD OBSERVATION AND

REF 7, PG 112, 113)

CHANNEL SLOPE  $\approx$  1.4 %

CROSS-SECTION INFORMATION OBTAINED FROM  
FIELD OBSERVATION AND USGS TOPO MAPS



SECTION B-B  $\approx$  5000 FT DS FROM SECTION A-A  
( $\approx$  7900 FT DS FROM PA-657)

INVERT ELEVATION  $\approx$  1760 FT

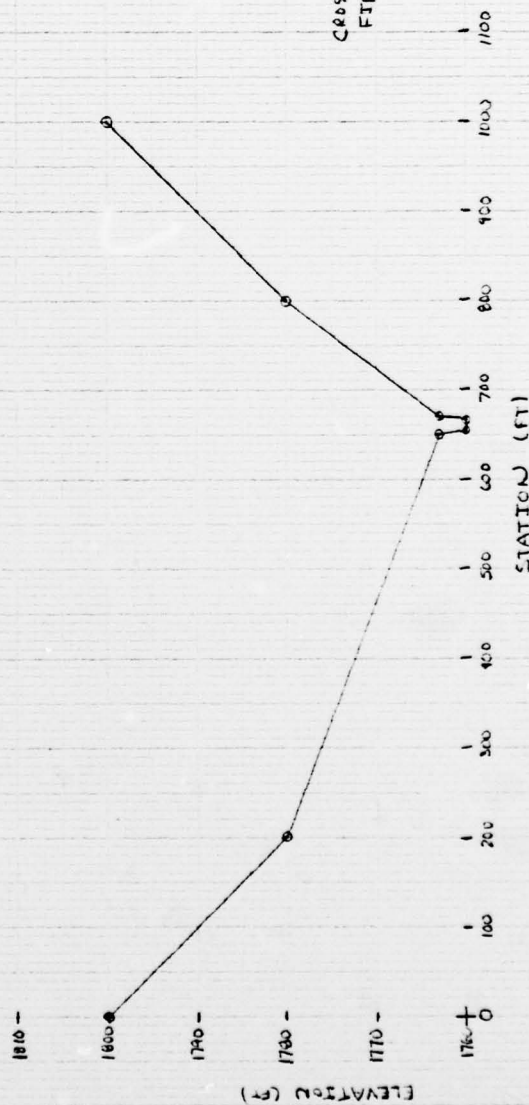
$n_{ch} \approx 0.030$ ,  $m_{0.0} \approx 0.07$ ,  $m_{0.08} \approx 0.06$

(ESTIMATED FROM FIELD OBSERVATION

AND REF 7, PG 112, 113)

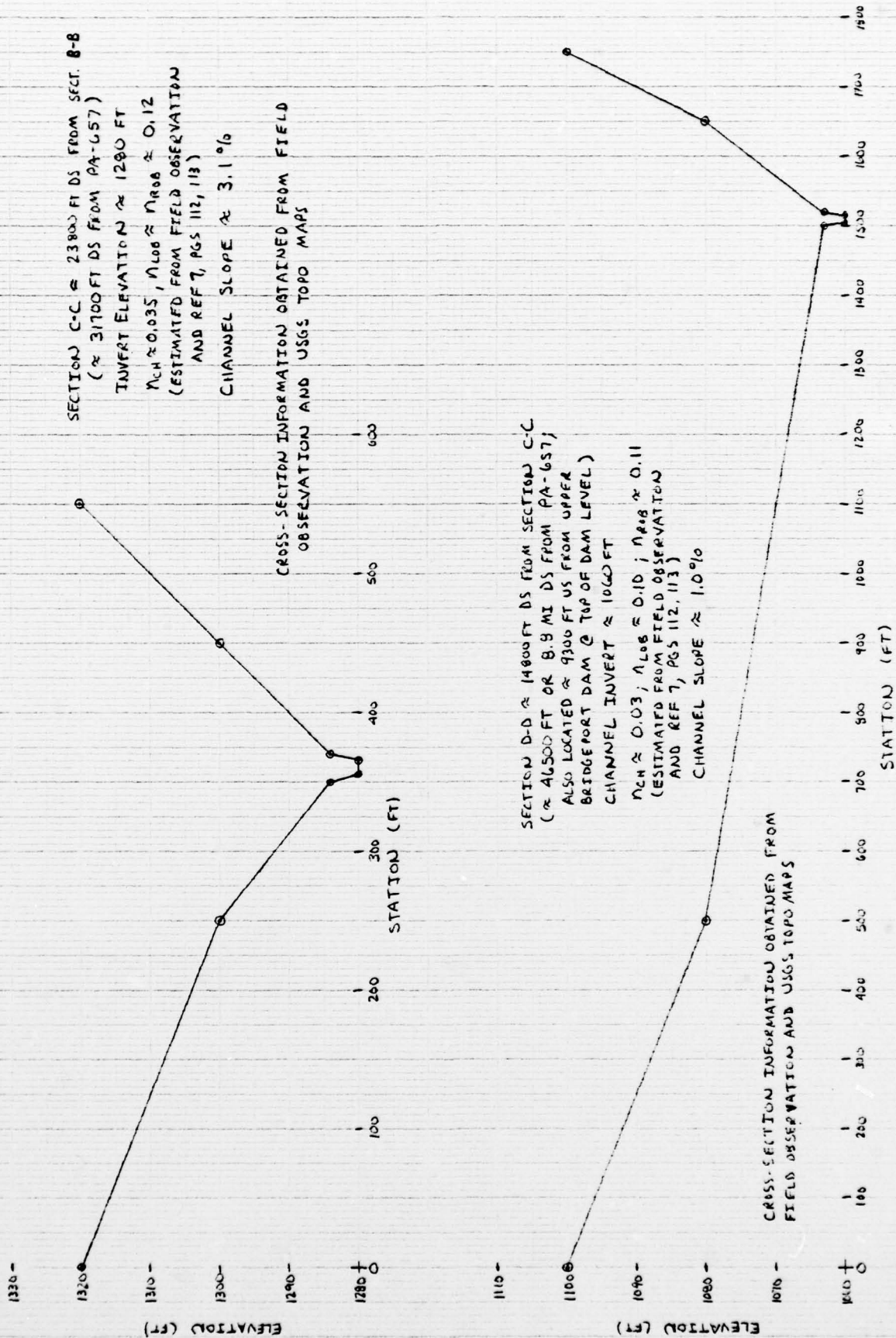
CHANNEL SLOPE  $\approx$  0.3 %

CROSS-SECTION INFORMATION OBTAINED FROM  
FIELD OBSERVATION AND USGS TOPO MAPS



# DOWNSTREAM ROUTING SECTIONS

SHEET 10 OF 10



APPENDIX D  
PHOTOGRAPHS





2



1





APPENDIX D  
PHOTOGRAPHS

PHOTOGRAPH 1

View of the embankment to the right of the emergency spillway, as seen from the right abutment. Note the eroded and unprotected area along the upstream face.

PHOTOGRAPH 2

View of the emergency spillway looking toward the left abutment.

PHOTOGRAPH 3

View of that portion of the embankment between the service and emergency spillways, as seen from the service spillway area.

PHOTOGRAPH 4

Downstream view of the service spillway and left abutment.



2



1



PHOTOGRAPH 5      View of a typical section of the upstream embankment slope.

PHOTOGRAPH 6      View of the concrete retaining wall along the downstream slope of the embankment section between the two spillways. The wall extends to the right abutment but is interrupted by the emergency spillway.

PHOTOGRAPH 7      View showing the extent of overgrowth immediately beyond the emergency spillway.

PHOTOGRAPH 8      View of the deteriorated left concrete wingwall of the emergency spillway.





6



8



5



7

PHOTOGRAPH 9 View, from upstream, of the service spillway looking toward the left abutment. Note the badly spalled concrete wingwall.

PHOTOGRAPH 10 View from the service spillway looking downstream toward Lower Bridgeport Dam.

PHOTOGRAPH 11 View of several residences situated along the left shore of the Lower Bridgeport Reservoir.

PHOTOGRAPH 12 View of Lower Bridgeport Dam situated approximately 2,400 feet downstream from Upper Bridgeport Dam.



9



10



11



12



APPENDIX E

GEOLOGY



## Geology<sup>1</sup>

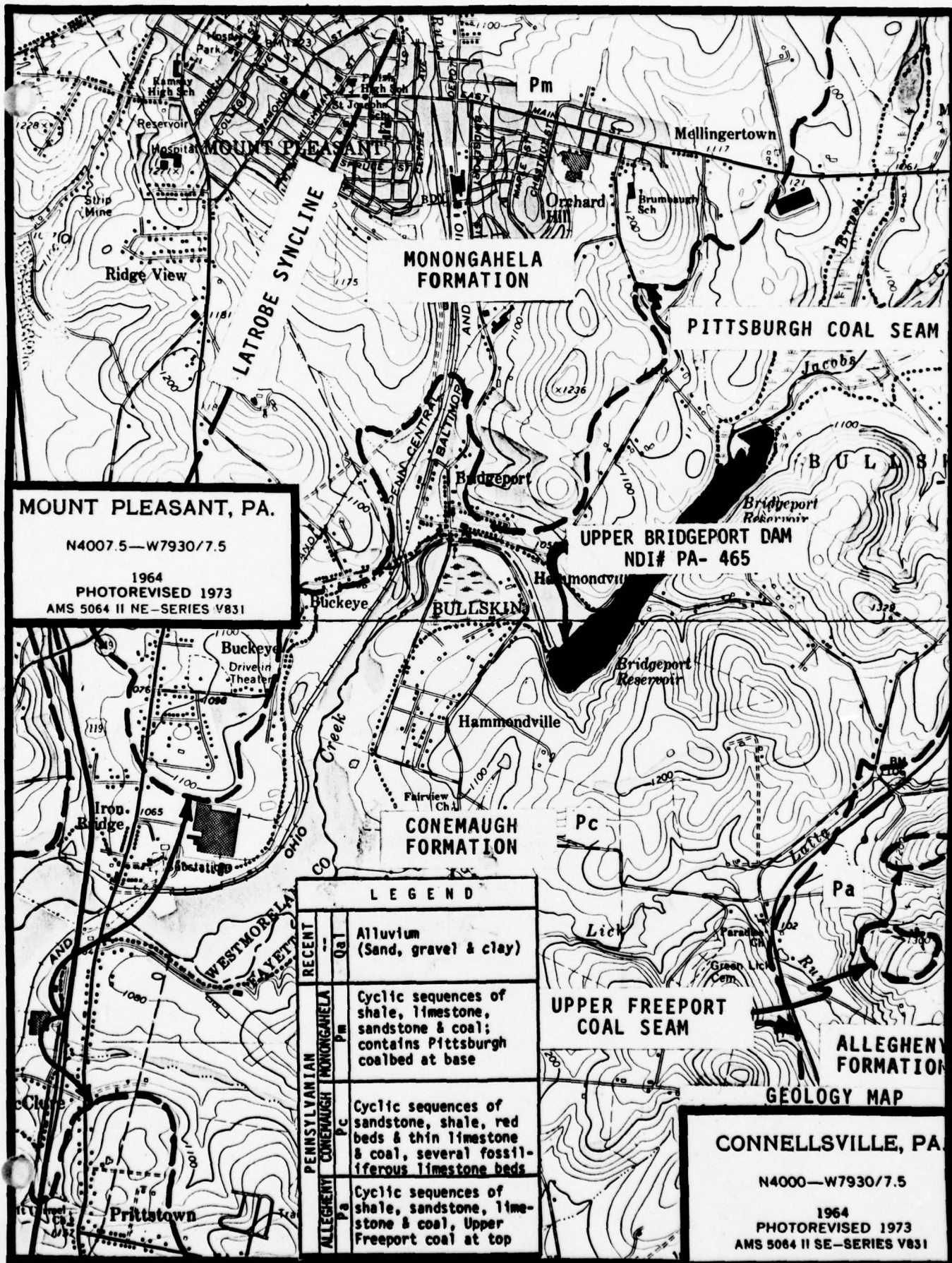
The Upper Bridgeport Dam is located approximately 1.5 miles southeast of Mount Pleasant, Pennsylvania, within the Pittsburgh Plateaus Section of the Appalachian Plateaus Physiographic Province. The Pittsburgh Plateaus Section is characterized by flat-lying to very gently folded sedimentary rock strata of Pennsylvanian age. Major structural axes strike from southwest to northeast.

The dam site is located on the northwest flank of the Chestnut Ridge Anticline. The anticlinal axis strikes about N30°E and lies approximately 4 miles east of the dam site. Rock strata underlying the dam and reservoir dip to the northwest, at approximately 6 degrees, to a structural low elevation along the axis of the Latrobe Syncline.

Two major coal seams occur in the area. The Pittsburgh seam lies above drainage with respect to the dam and reservoir whereas the Upper Freeport seam lies approximately 400 to 500 feet beneath the dam and reservoir. The latter seam is currently not being mined in the immediate vicinity of the dam and reservoir.<sup>2</sup>

At the dam site, the Jacobs Creek floodplain is about 1,000 feet in width. The floodplain below the dam increases in width and is generally poorly drained. The valley is floored with moderate to thick deposits of alluvium consisting of clay, silt, sand, and gravel.

- <sup>1</sup>Hickok, IV, W. O., and F. T. Moyer, "Geology and Mineral Resources of Fayette County, Pennsylvania," Harrisburg: Topographic and Geologic Survey, Bul. C-26, 1940.
- <sup>2</sup>Dowd, James J., et. al., "Estimate of Known Recoverable Reserves of Coking Coal in Westmoreland County, Pennsylvania," U. S. Department of the Interior, Bureau of Mines, Report of Investigations 4803, January 1951.





APPENDIX F

FIGURES



## LIST OF FIGURES

| <u>Figure</u> | <u>Description/Title</u>                                    |
|---------------|-------------------------------------------------------------|
| 1             | General Plan - Field Inspection Notes                       |
| 2             | Property Plan Showing Upper and Lower Bridgeport Reservoirs |
| 3             | Plan for Revision to Service Spillway Wingwalls (1894)      |
| 4             | Plan for Raising Service Spillway (1894)                    |
| 5             | Details of Emergency Spillway Return Walls (1906)           |
| 6             | Plan of Embankment and Spillways (undated)                  |

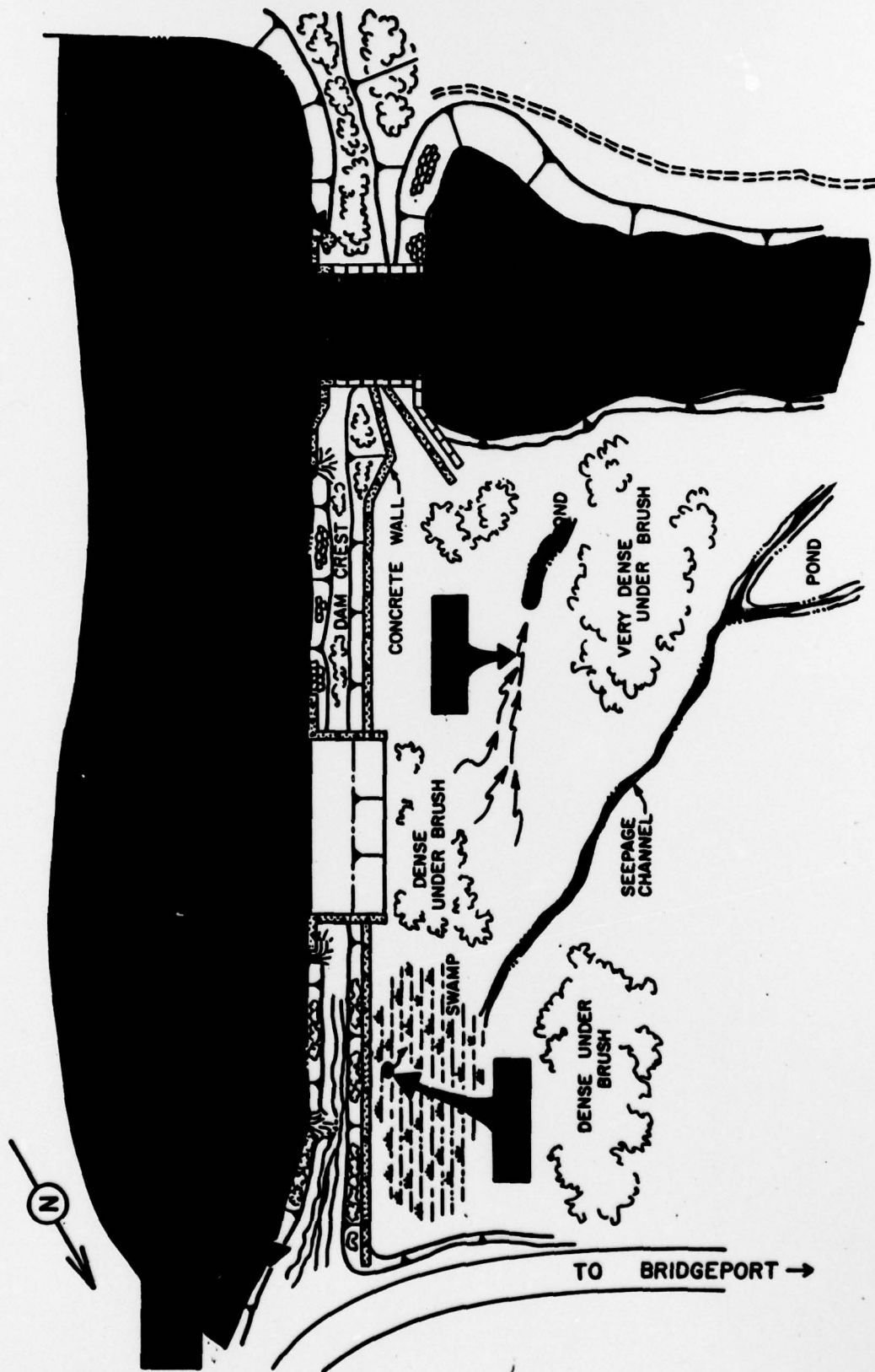
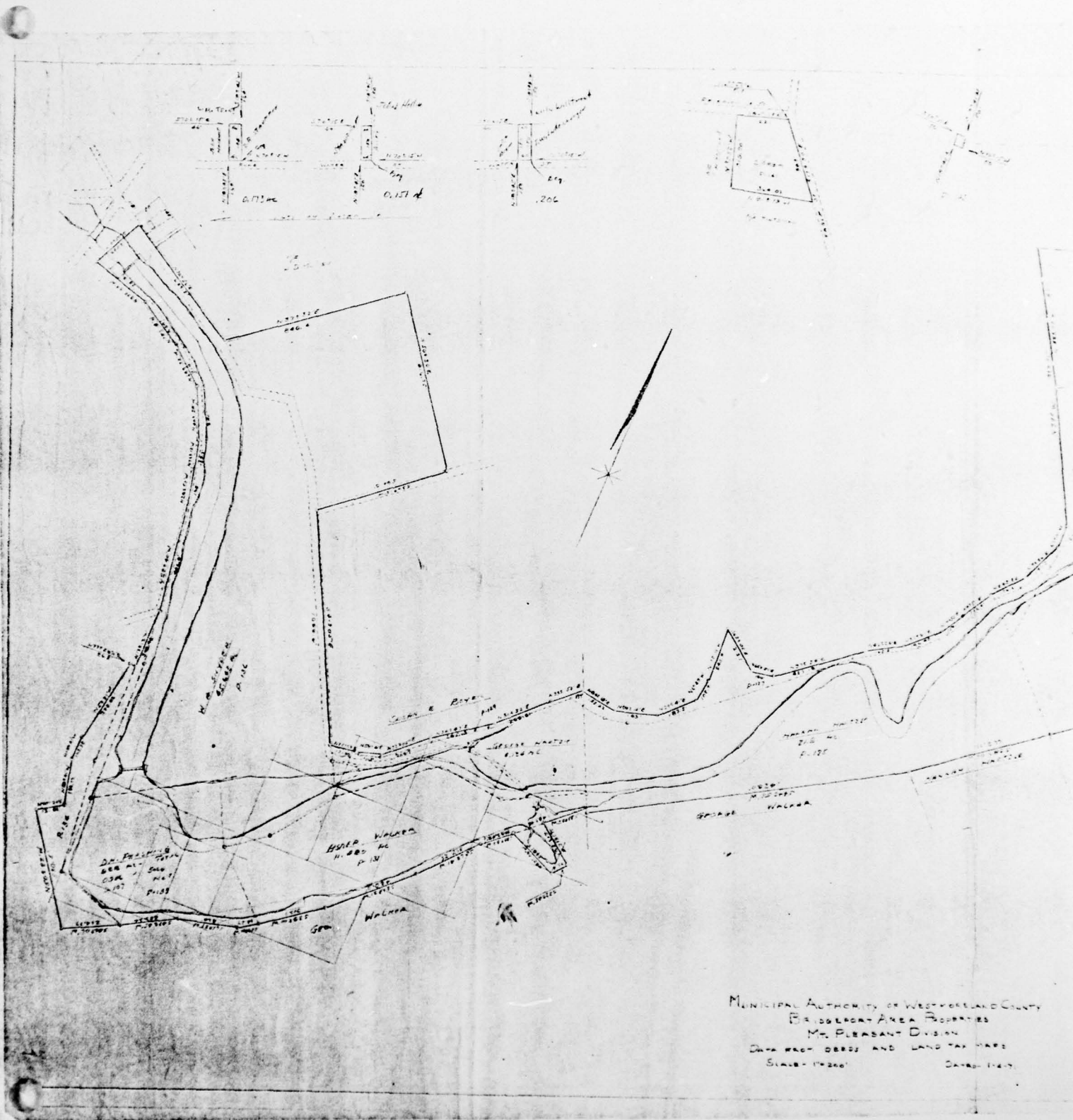


FIGURE 1 - UPPER BRIDGEPORT DAM  
GENERAL PLAN  
FIELD INSPECTION NOTES





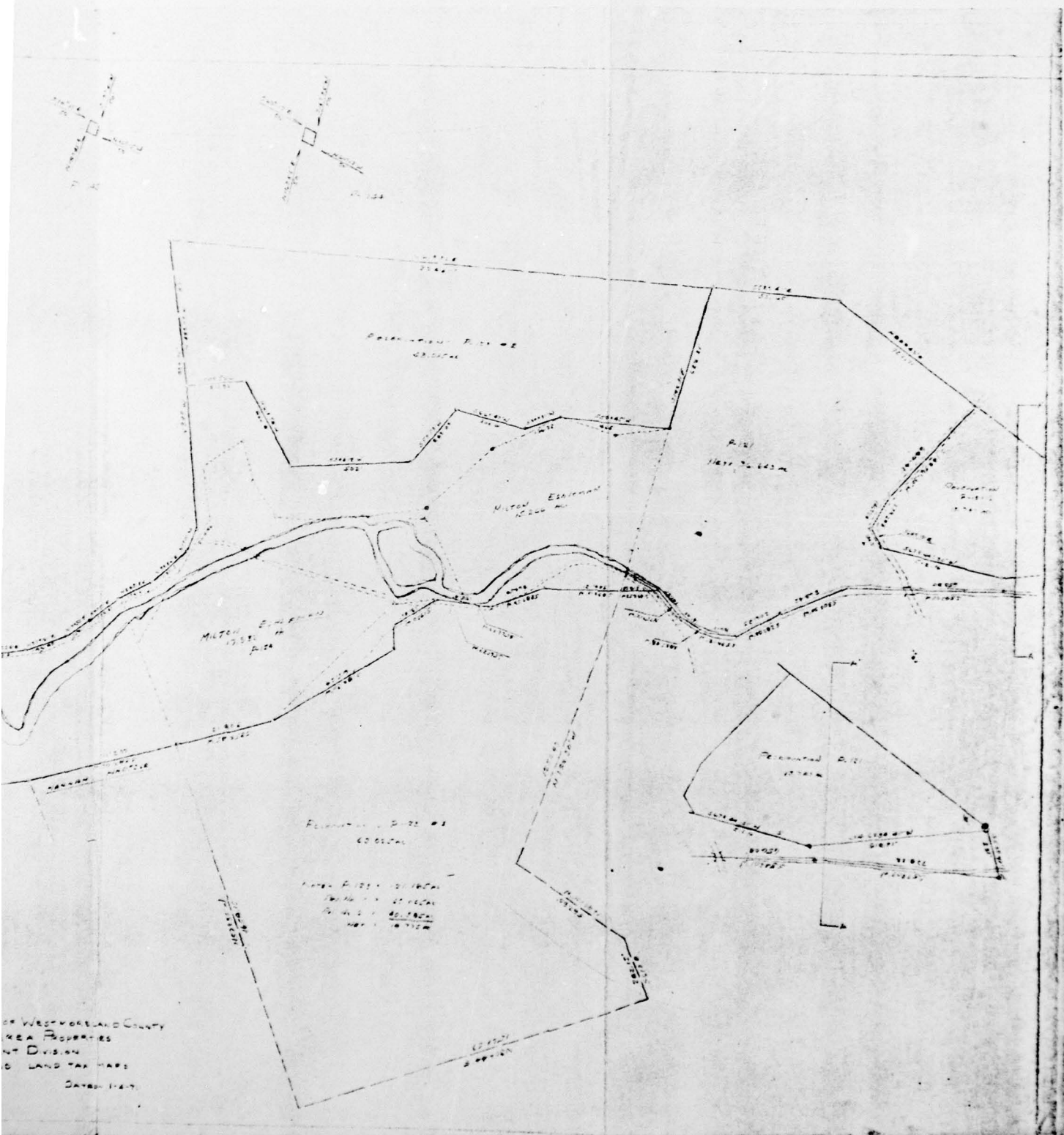
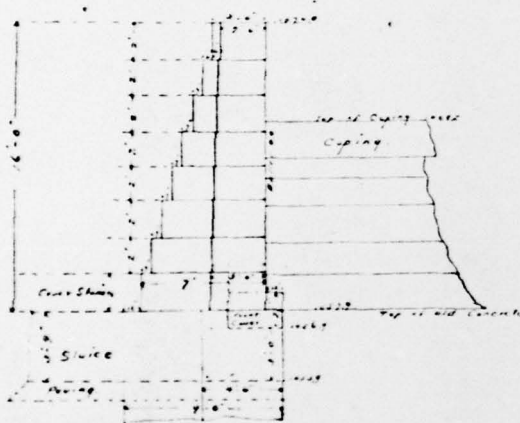


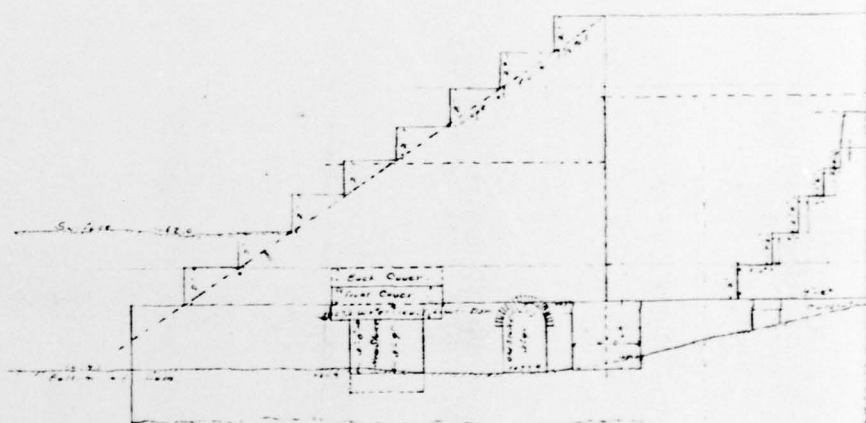
FIGURE 2

2



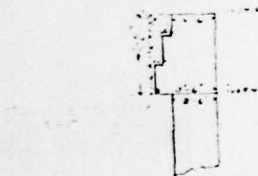
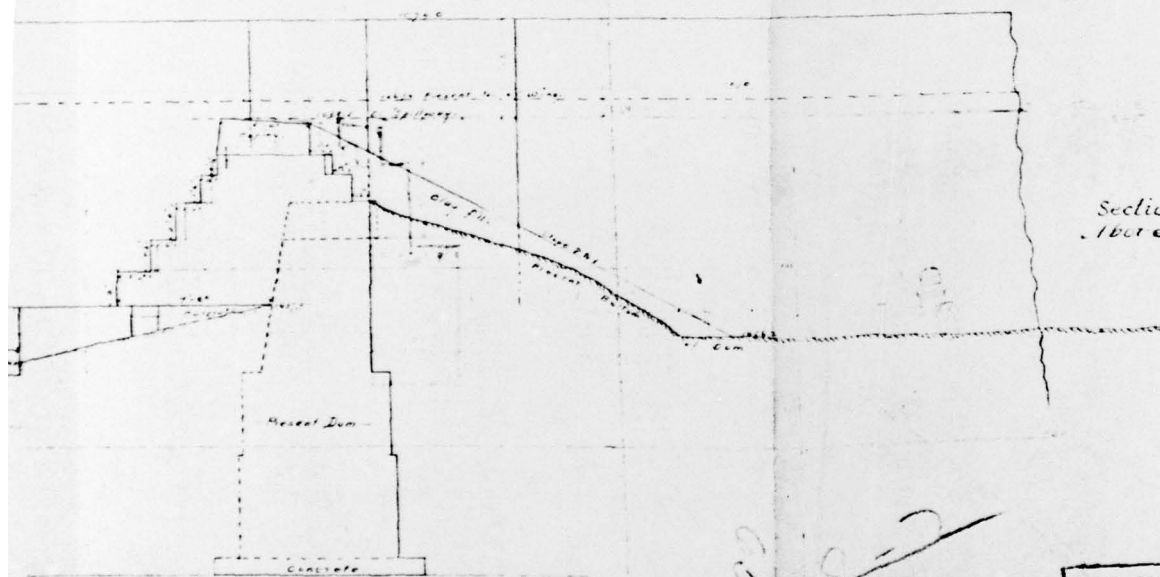


End View of  
Wing Wall.



Side Elevation  
Section of  
(See pl

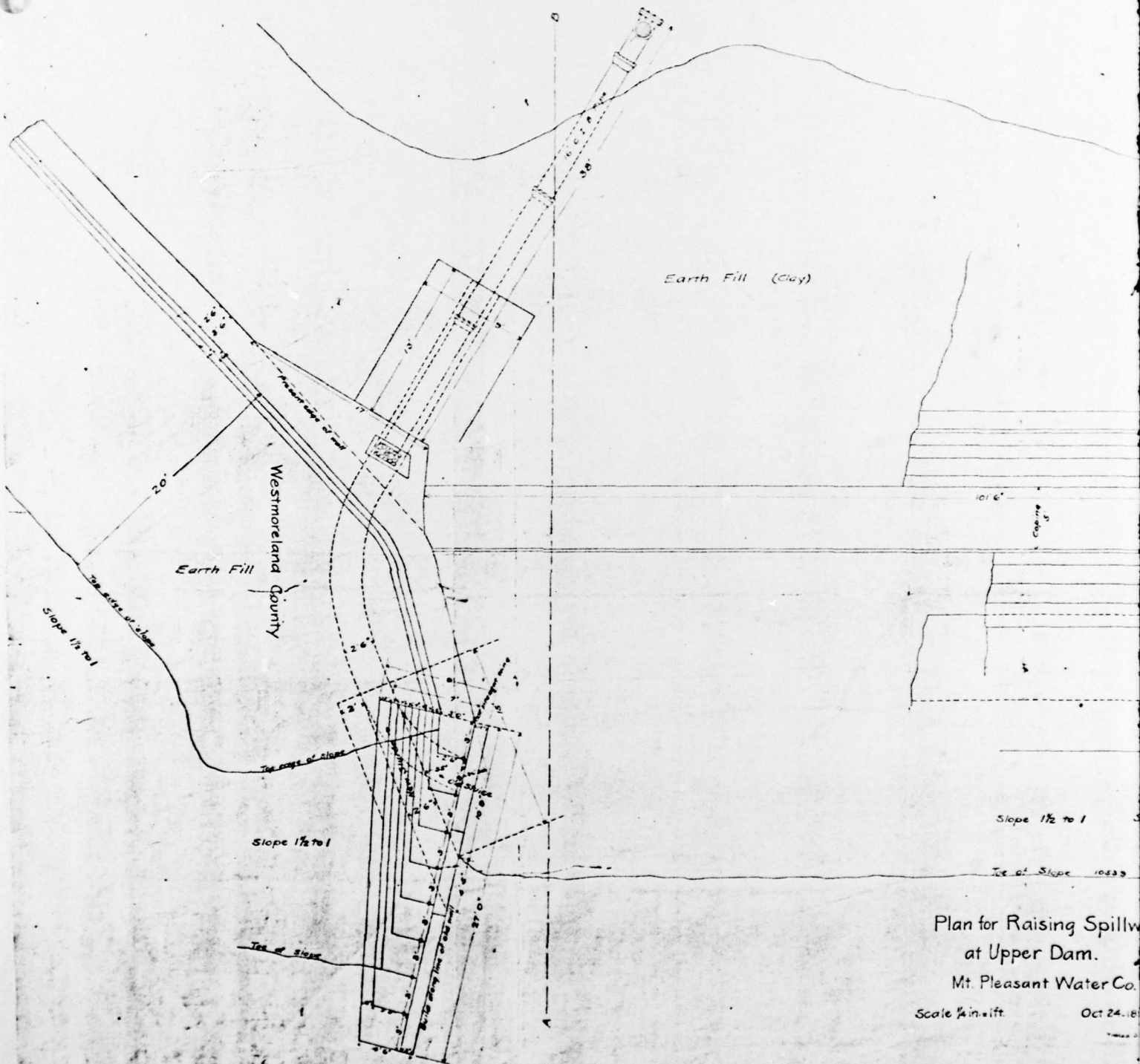
Plan for changing Wing Walls.  
Upper Dam.  
Mt. Pleasant Water Co.  
Scale 1/4 in per foot.  
Oct. 21, 1887. H. A. A.



Section of Wing Wall Dam.

Side Elevation of Wing Wall, and  
Section of Dam on line A-B.  
(See plan for raising spillway)

H. O. FRICK COKE CO.  
DRAWING NO. 4  
DATE 8-1-31 DRAWN BY 3



Plan for Raising Spillw  
at Upper Dam.

Mt. Pleasant Water Co.

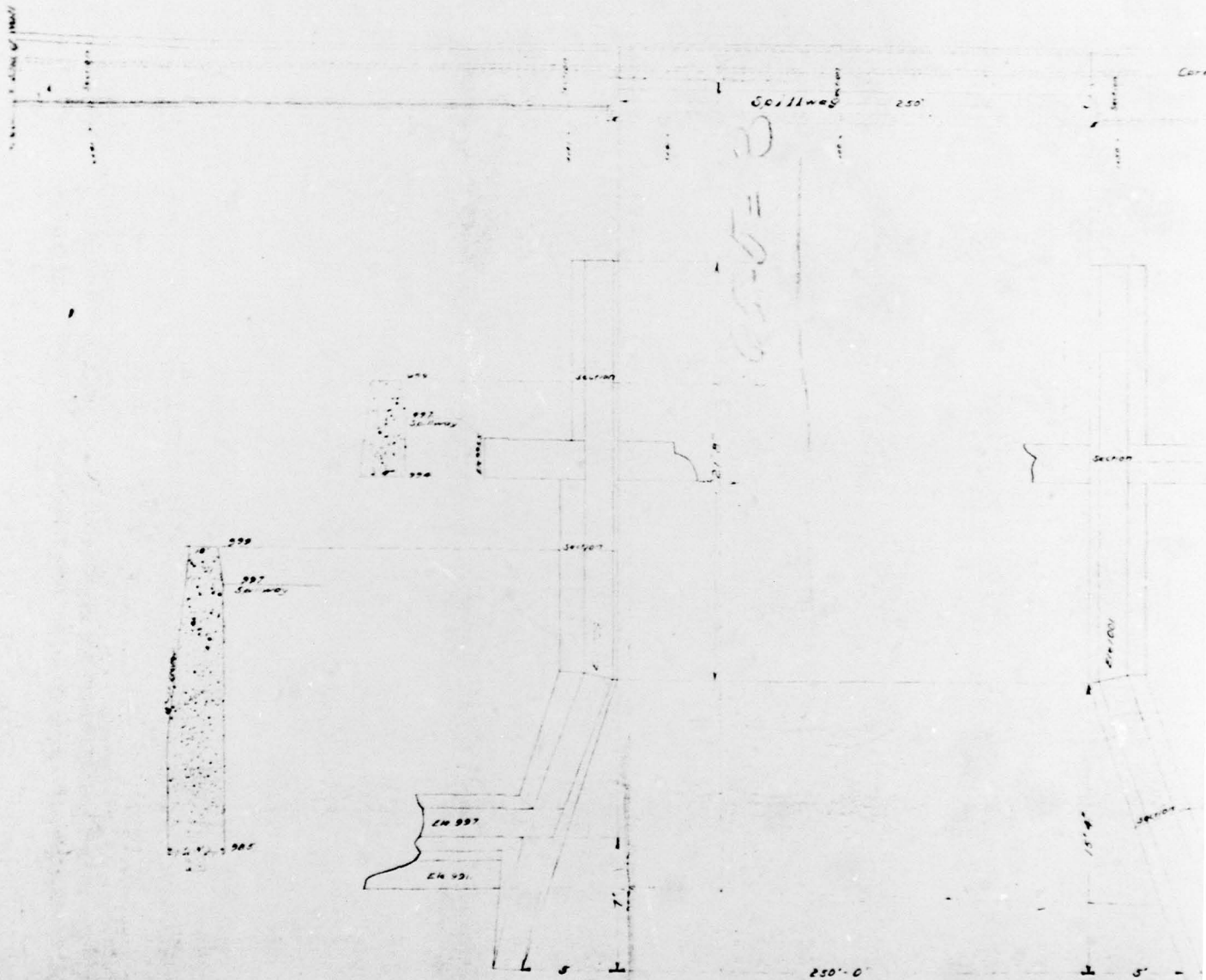
Scale 1/4" = 1 ft

Oct 24, 18

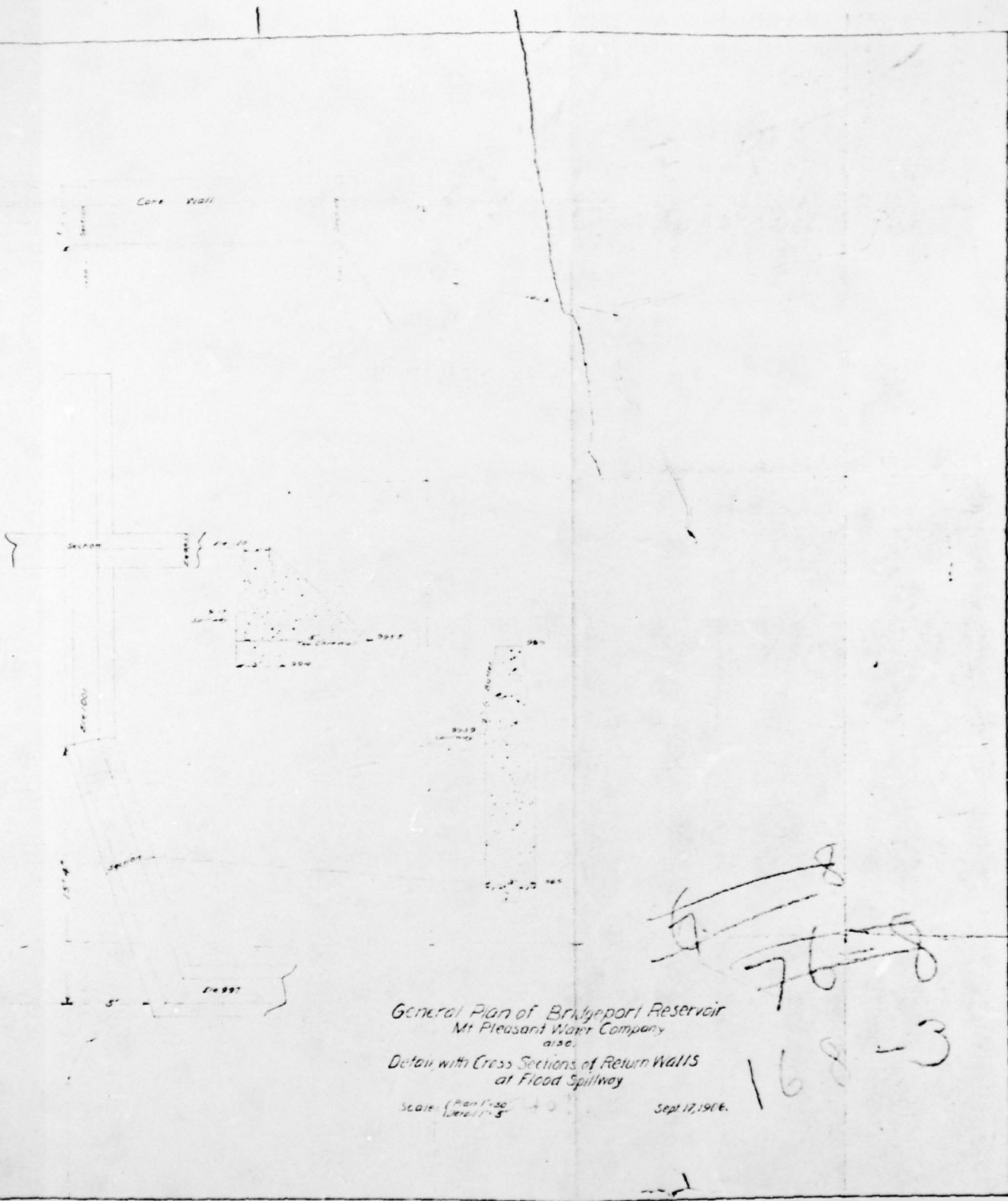








11-C-216

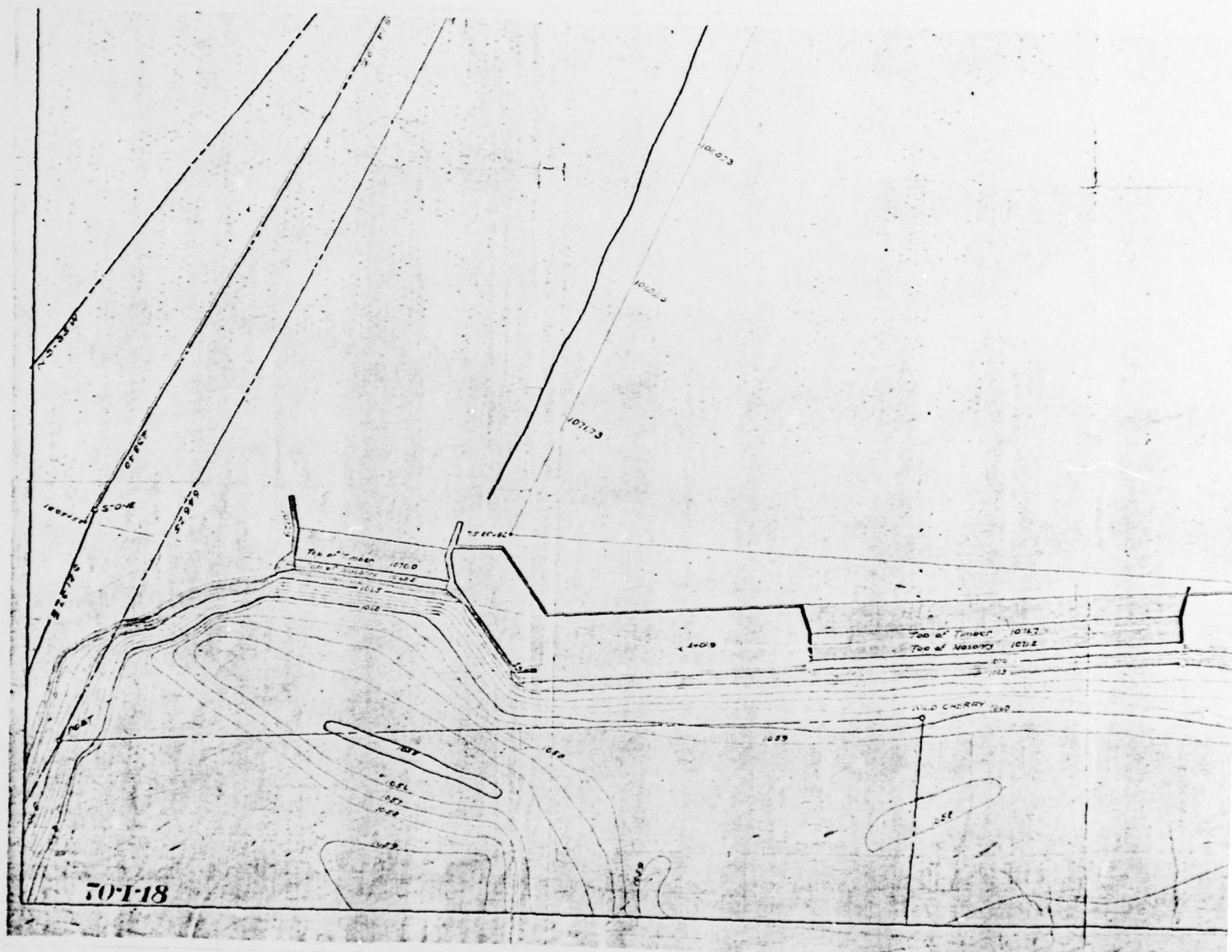


General Plan of Bridgeport Reservoir  
Mt Pleasant Water Company  
also.  
Detail with Cross Sections of Return Walls  
at Flood Spillway  
Scale: (Plan 1"=50'  
Detail 1"=5'  
Sept 17, 1906.

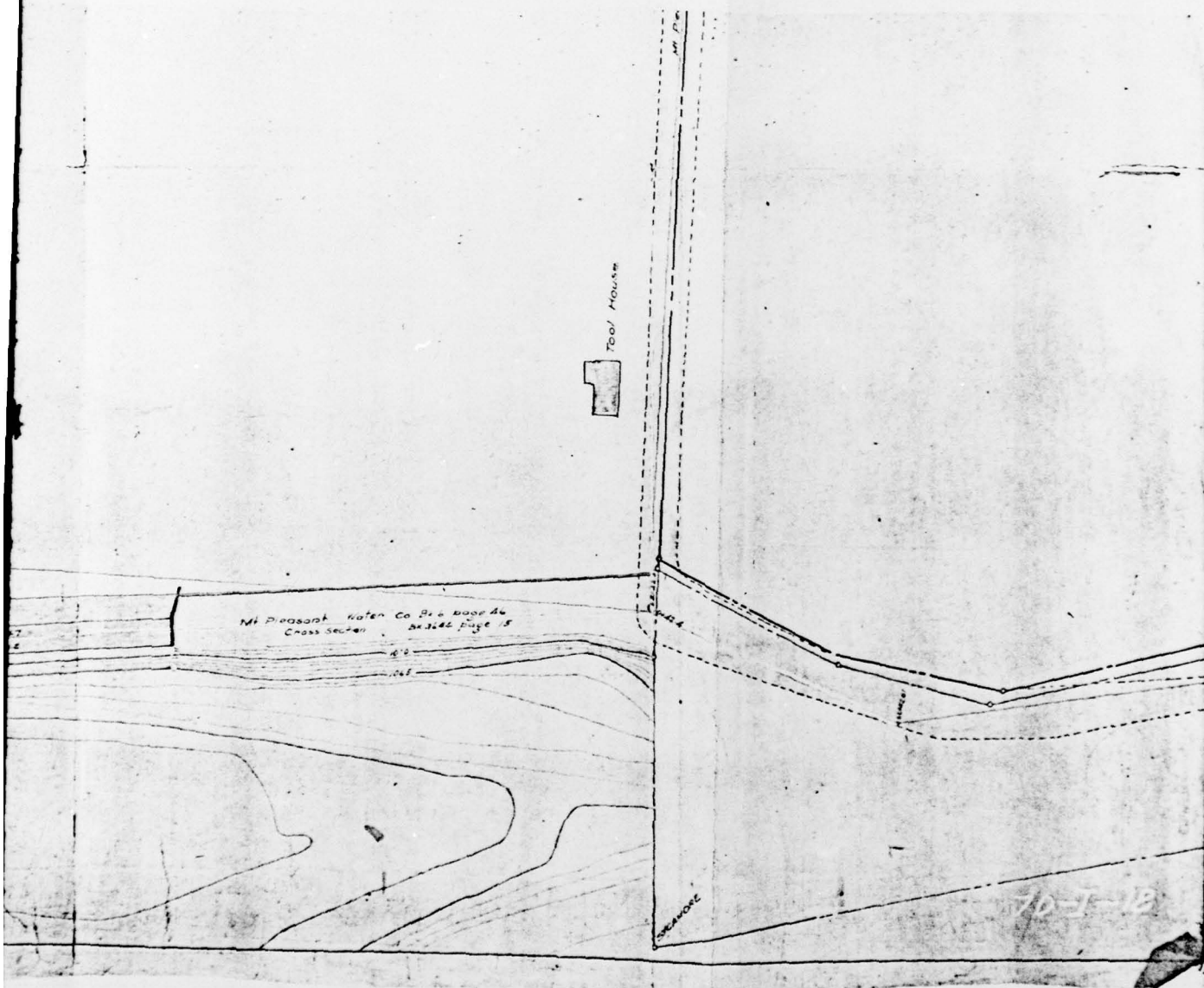
76-8  
168-3

2

FIGURE 5







2.

FIGURE 6



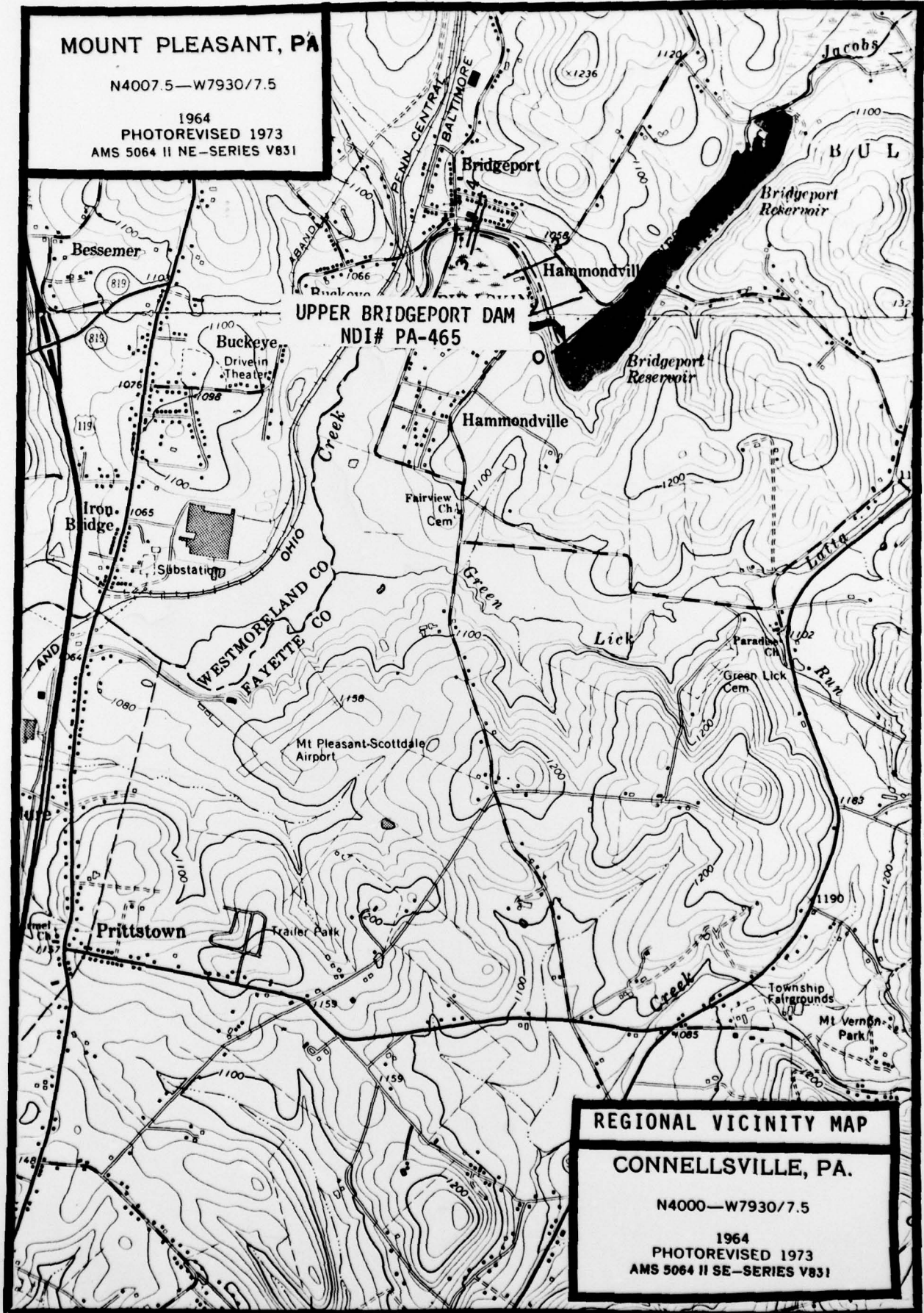
APPENDIX G

REGIONAL VICINITY AND WATERSHED BOUNDARY MAPS

**MOUNT PLEASANT, PA**

N4007.5—W7930/7.5

1964  
PHOTOREVISED 1973  
AMS 5064 II NE—SERIES V831



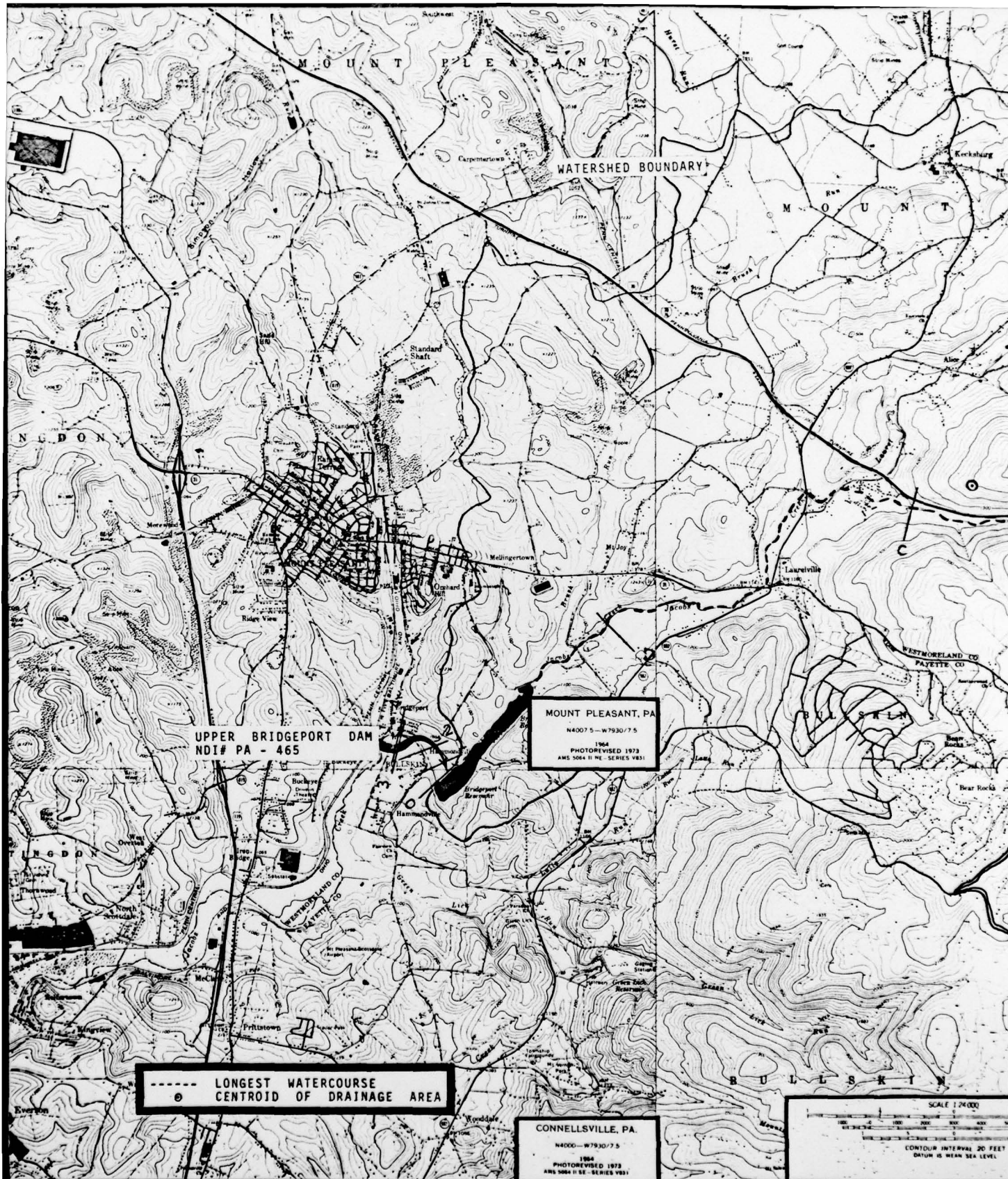
**REGIONAL VICINITY MAP**

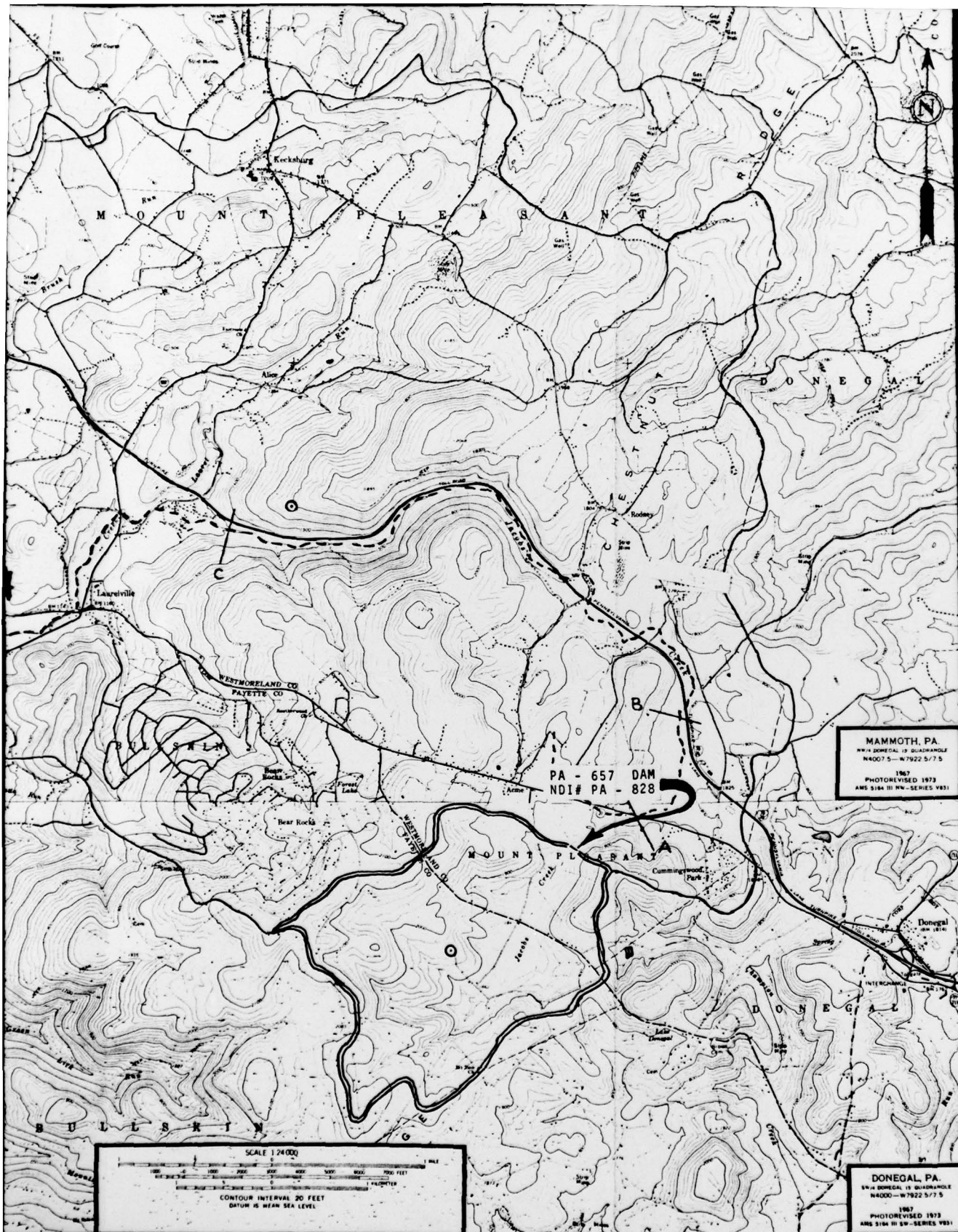
**CONNELLSVILLE, PA.**

N4000—W7930/7.5

1964  
PHOTOREVISED 1973  
AMS 5064 II SE—SERIES V831







MAMMOTH, PA.  
SW-4 DONEGAL 15 QUADRANGLE  
NADOD-5-W7922 5/7 5  
1967  
PHOTOGRAPHED 1973  
AMS 5164 III NW-SERIES 981

SCALE 1:24,000  
1 2 3 4 5 6 7 8 9 10  
100 200 300 400 500 600 700 800 900 1000  
1 MILE  
CONTOUR INTERVAL 20 FEET  
DATUM IS MEAN SEA LEVEL

DONEGAL, PA.  
SW-4 DONEGAL 15 QUADRANGLE  
NADOD-5-W7922 5/7 5  
1967  
PHOTOGRAPHED 1973  
AMS 5164 III NW-SERIES 981