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NATIONAL DAM INSPECTION PROGRAM. CHERRY RUN DAM (NDS I.D. NUMBE--ETC(U)
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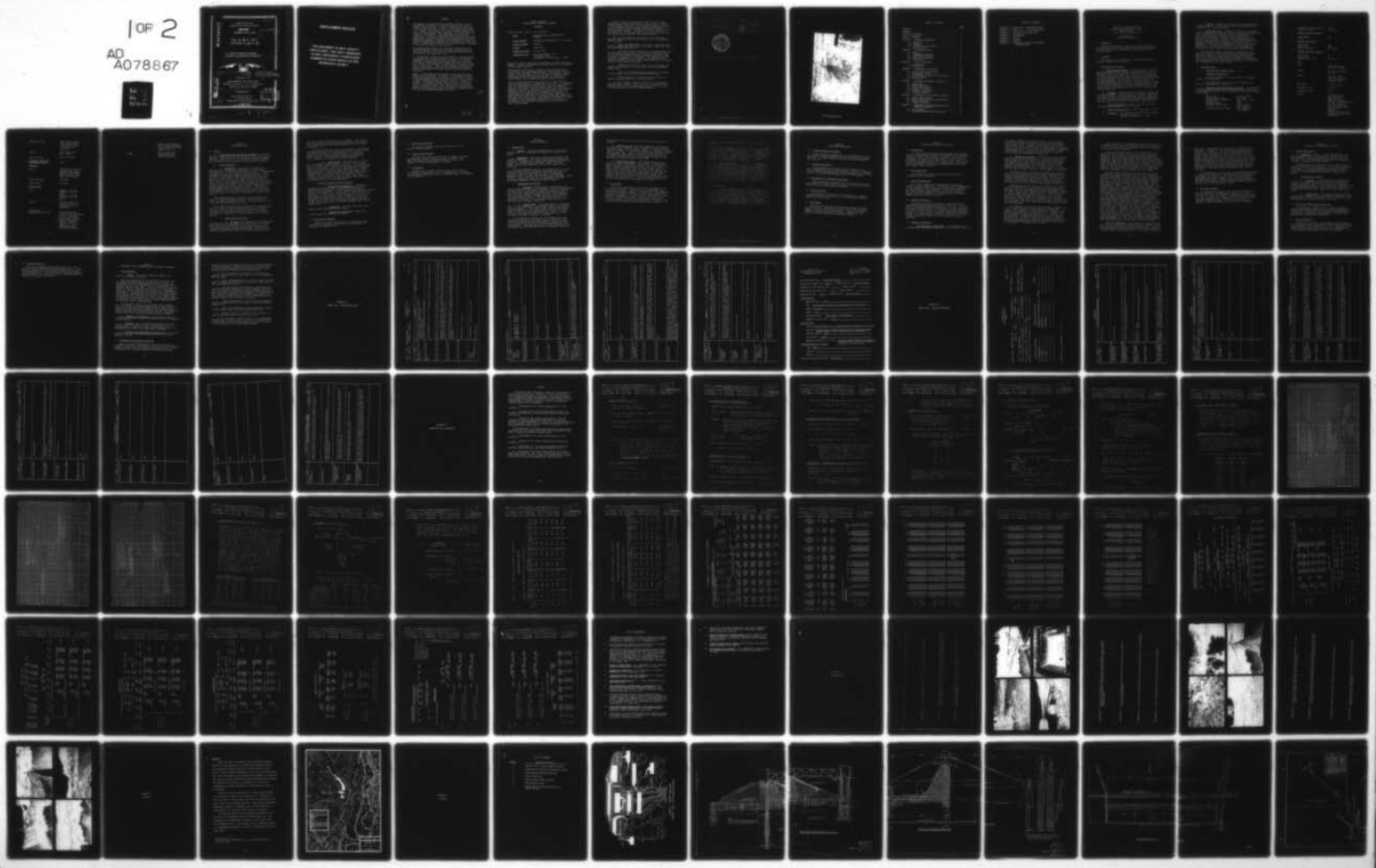

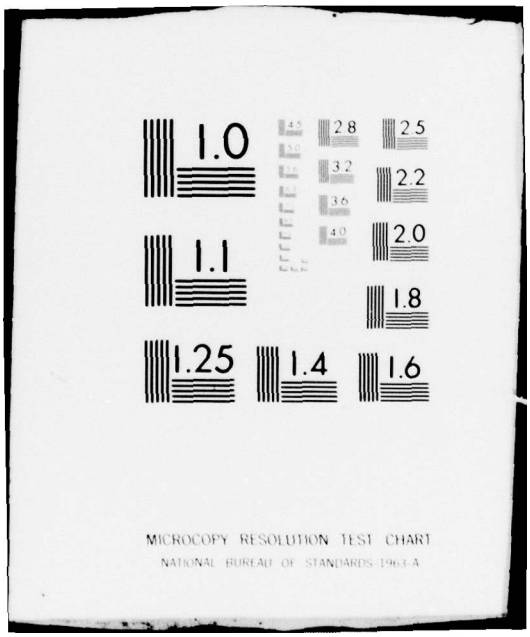
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OHIO RIVER BASIN
CHERRY RUN, INDIANA COUNTY
PENNSYLVANIA

CHERRY RUN DAM

NDS I.D. Number PA - 00278
PENNDER I.D. Number 32 - 40

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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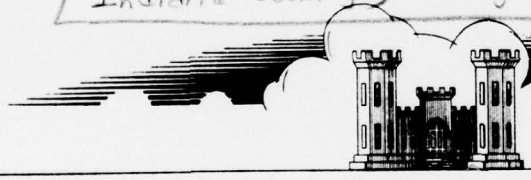

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PREPARED FOR

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

Bernard M. Mihalcin
PREPARED BY

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AUGUST 1979

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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.

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

ABSTRACT

Cherry Run Dam: NDI I.D. No. PA-00278

Owner:	Rochester and Pittsburgh Coal Company
State Located:	Pennsylvania (PennDER I.D. No. 32-40)
County Located:	Indiana
Stream:	Cherry Run
Inspection Date:	13 July 1979
Inspection Team:	GAI Consultants, Inc. 570 Beatty Road Monroeville, Pennsylvania 15146

Based on a visual inspection, maintenance of Cherry Run Dam appears minimal to non-existent and the facility is considered to be in poor condition.

Deficiencies noted by the inspection team included heavy overgrowth of the embankment sections (particularly to the right of the spillway), delamination of the spillway surface, cracking and misalignment of the spillway wingwalls, heavy overgrowth within the discharge channel, an inoperable outlet works, and no emergency warning system in effect.

The size classification of the facility is small and its hazard classification is considered to be high. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) for the facility is considered to be the Probable Maximum Flood (PMF). Results of the hydrologic and hydraulic analysis indicate the facility will pass and/or store only 40 percent of the PMF prior to embankment overtopping. A breach analysis indicates that failure under less than 1/2 PMF conditions could lead to increased downstream damage and potential for loss of life. Thus, based on screening criteria provided in the recommended guidelines, the spillway is considered to be seriously inadequate and the facility unsafe, non-emergency.

Due to its poorly maintained condition and seriously inadequate spillway classification, the facility is considered unsafe. Failure is not considered imminent; however, 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.

If it is the intent of the owner to reclaim and/or maintain useful function of the facility, it is recommended that the owner:

a. Clear the embankment of all brush, trees, and high weeds to enable expedient visual evaluation, particularly of the right embankment section.

b. Have the facility evaluated by a registered professional engineer experienced in the hydraulics and hydrology of dams and take remedial measures deemed necessary to make the facility hydraulically adequate. The study should also include an assessment of the structural integrity of the existing spillway structure and/or recommendations for remedial repairs to the concrete surfaces.

c. Assess the condition of the outlet structures and restore the operability of the system to provide drawdown capabilities.

d. Clear the downstream channel immediately adjacent to the stilling basin to provide unrestricted flow.

e. Develop manuals of operation and maintenance to ensure continual proper care of the facility.

In lieu of items a through e above, it is recommended that the owner dispose of the facility in accordance with PennDER Division of Dam Safety regulations with due regard to the disposition of the impounded sediment.

GAI Consultants, Inc.

Bernard M. Mihalcin, P. E.

Date 28 August 1979

Approved by:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date 18 Sep 79

Overview Photograph

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
CHERRY RUN DAM
NDI# PA-278, PENNDER# 32-40

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. Cherry Run Dam is a zoned earth embankment with a central concrete corewall. The embankment measures approximately 430 feet long (including spillway) and 22 feet high. The facility is provided with an ogee-shaped concrete spillway located about 100 feet from the right abutment. The spillway crest is 132 feet long. A reinforced concrete control tower is located along the upstream embankment toe to the left of the spillway. Access to the tower is provided by a steel framed footbridge. The outlet works housed within the tower consists of a 12-inch diameter cast iron supply pipe and a 24-inch diameter cast iron blowoff pipe.

b. Location. Cherry Run Dam is located on Cherry Run in Center Township, Indiana County, Pennsylvania, about one mile west of Homer City, Pennsylvania. The dam, reservoir, and watershed are contained within the Indiana, Pennsylvania, U.S.G.S. 7.5 minute topographic quadrangle (see Appendix G). The coordinates of the dam are N 40° 32.5' and W 70° 10.8'.

c. Size Classification. Small (22 feet high, 390 acre-feet storage capacity at top of dam).

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

e. Ownership. Rochester and Pittsburgh Coal Company
655 Church Street
Indiana, Pennsylvania 15701

f. Purpose. Formerly water supply for power production; currently used as a recreational facility for Rochester and Pittsburgh Coal Company personnel.

g. Historical Data. Information contained in PennDER files indicates that Cherry Run Dam was designed and constructed by the Rochester and Pittsburgh Coal and Iron Company in 1923. The construction history is well documented in memoranda, semi-monthly progress reports submitted by the owner's chief engineer, and about 70 construction photographs. The data indicate that the facility was constructed as designed. A major flood incident did, however, occur during construction, causing the embankment to be overtopped and resulting in the partial breaching of the embankment and destruction of the corewall to the right of the spillway.

Available data dated subsequent to completion of the facility pertains primarily to flashboard installation and reservoir siltation. No major deficiencies were recorded until 1971, when a PennDER inspection revealed that the facility was not being adequately maintained. Correspondence also indicates that the water supply function of the facility was discontinued in the early 1960's.

1.3 Pertinent Data.

a. Drainage Area (square miles). 11.4

b. Discharge at Dam Site.

Discharge Capacity of Outlet Conduit - Discharge curves are not available.

Discharge Capacity of Spillway at Maximum Pool ≈ 5800 cfs (see Appendix C, Sheet 6).

c. Elevation (feet above mean sea level). The following elevations were obtained from available drawings and through field measurements based on the elevation of the spillway crest at 1025 feet.

Top of Dam	1030.0 (field)
Maximum Design Pool	Not known
Maximum Pool of Record	1028 (April, 1936)
Normal Pool	1025
Spillway Crest	1025
Upstream Inlet Invert	1009 (blowoff) 1012 (supply)
Downstream Outlet Invert	1008 (blowoff) N/A (supply)

Streambed at Dam Centerline	1009
Maximum Tailwater	Not known

d. Reservoir Length (miles).

Top of Dam	1.0
Normal Pool	0.5

e. Storage (acre-feet).

Top of Dam	390
Normal Pool	185
Design Surcharge	Not known

f. Reservoir Surface (acres).

Top of Dam	50
Normal Pool	31
Maximum Design Pool	Not known

g. Dam.

Type	Zoned earth with concrete corewall.
Length	430 feet (including spillway).
Height	22 feet; (field measured; crest to top of plunge pool overflow sill).
Top Width	12 feet (field)
Upstream Slope	2-1/2H:1V
Downstream Slope	2H:1V
Zoning	Two zones plus concrete corewall (see Figure 2). Selected material defined in specifications as "good quality of clay (not fire clay) mixed with some sand and gravel." Balance of embankment material defined as "earth, clay and gravel."

	Impervious Core	Reinforced concrete wall extends from 1-foot below crest into rock (see Figure 2).
	Cutoff	See "Impervious Core" above.
	Grout Curtain	None indicated.
h.	Diversion Canal and Regulating Tunnels.	None.
i.	Spillway.	
	Type	Uncontrolled concrete spillway with ogee-shaped crest located about 100 feet from the right abutment.
	Crest Elevation	1025 feet
	Crest Length	132 feet
j.	Outlet Works.	
	Type	Supply - 12-inch diameter cast iron pipe. Blowoff - 24-inch diameter cast iron pipe.
	Length	100 feet (inlet to blowoff outlet; not including 80-foot extension).
	Closure and Regulating Facilities	Flow through both conduits were controlled at the inlet end by sluice gates and/or gate valves located within a concrete control tower (see Figure 2). The mechanisms within the tower presently

	appear nonfunctional and valves are reported to be closed (see Photographs 3 and 4).
Access	Steel framed footbridge from crest (see Photograph 3).

SECTION 2
ENGINEERING DATA

2.1 Design.

a. Design Data Availability and Sources. No design reports or calculations are available for any aspects of the facility. Design drawings are available from both PennDER and the owner's files. A 1923 report by PennDER predecessors discusses design features of the facility in detail.

b. Design Features.

1. Embankment. The contract drawings and specifications indicate the embankment is a zoned earth structure with a reinforced concrete core wall. The embankment is composed of two soil zones as shown on Figure 2. The selected material placed adjacent the upstream face of the core wall is described in the specifications as "a good quality of clay (not fire clay) mixed with some sand and gravel, with all large stones three inches in diameter or over, removed, (the material) shall be deposited in horizontal layers not over six inches thick, sprinkled and rolled with a spiked roller or tractor, and to be well rammed at all points which cannot be reached by roller". The balance of the embankment was to be constructed of "earth, clay and gravel placed in 6-inch layers, sprinkled and rolled (with) no stones over 2-1/2 inches to be allowed to remain in the fill."

The upstream slope is 2-1/2H:1V with a 12-inch thick layer of riprap protection extending from the crest to 4-1/2 feet below normal pool level. The downstream slope is 2H:1V and the crest width is 12 feet.

The corewall along the dam centerline is 12 inches wide at its top (one foot below the crest) and is battered to 2 feet in a depth of about 15 feet, below which a uniform thickness of 2 feet was maintained to rock. Both faces of the wall are reinforced by 5/8-inch square rods on 4-foot centers.

2. Appurtenant Structures.

a) Spillway. The spillway is an uncontrolled concrete weir with an ogee-shaped crest located about 100 feet from the right abutment. It consists of a 2-1/2-foot thick base slab underlying a massive ogee-shaped section flanked by sidewalls of varying thickness. Cutoffs on the upstream and downstream sides of the spillway extend into

the hard clay upon which the slab is founded. The spillway was incised below the existing stream channel to provide a 7-foot deep stilling basin approximately 20 feet in length (see Figure 3).

The slab and spillway face are reinforced. The massive weir section was built of "cyclopean masonry, using not over 30 percent of plums, and balance being 1-3-5 concrete, except that the wearing surface should be finished with 1-2-4 concrete". The slab and wingwalls were built of "1-3-5 concrete and finished with 1-2-4 concrete".

b. Outlet Works. The outlet works consist of a reinforced concrete riser, 7 feet by 9 feet in plan, and is located on the upstream toe adjacent to the left wingwall of the spillway. A 24-inch sluice gate was provided to control flow into the tower on the upstream side. Outflow was provided by a 12-inch diameter cast iron supply line controlled with a gate valve within the riser and a 24-inch diameter cast iron blowoff line controlled by a 24-inch diameter sluice gate also within the riser (see Figure 2). A concrete cutoff collar was placed around both pipes within the upstream section of the embankment.

c. Specific Design Data and Criteria.

1. Hydrology and Hydraulics. Although no calculations are available, correspondence contained in PennDER files indicate that prevailing spillway design criteria were considered. A 1923 report by PennDER predecessors states "the capacity of the spillway, 132 feet long and 5 feet deep, is 5,725 cubic feet per second, or 475 cubic feet per second per square mile. With a depth of 4 feet and a freeboard of 1-foot, the capacity is 4,100 cubic feet per second, or 340 cubic feet per second per square mile, which is the runoff shown on our curves for maximum runoff for 12 square miles".

2. Embankment. No design data other than material specifications are available.

3. Appurtenant Structures. Other than concrete mixes, no data are available.

2.2 Construction Records.

Contract drawings, specifications, construction progress reports and about 70 construction photographs are available in PennDER files.

2.3 Operational Records.

No records of present day-to-day operation of the facility are maintained.

2.4 Other Investigations.

The owner has conducted soundings to assess the available storage; however, records are not available. The owner estimated that the average depth of water in the reservoir in 1957 was between 4 to 8 feet.

2.5 Evaluation.

PennDER files contain excellent historical accounts of the facility particularly of its construction. The data are considered adequate to make a reasonable Phase I assessment of the facility.

SECTION 3
VISUAL INSPECTION

3.1 Observations

a. General. The general appearance of the facility suggests that it is minimally maintained and in poor condition.

b. Embankment. The visual inspection indicated that the main embankment to the left of the spillway was in fair condition. No seepage or slumping was observed although the slopes are overgrown with high weeds, grass, and some shrubs. The riprap appeared to be in fair condition and functional.

The right embankment section was observed to be in poor condition being heavily overgrown with brush and trees to the extent that its boundaries are barely discernible. Swamplike conditions were observed near the embankment-abutment contact (possibly due to poor surface drainage) while an erosion gulley was noted at what appeared to be the downstream embankment toe-natural ground contact.

c. Appurtenant Structures.

1. Spillway. The spillway is considered to be in poor condition suffering from general concrete deterioration. The overflow weir (reportedly gunnited in the early 1950's) is extensively cracked and has begun delaminating (peeling) near its center (see Photographs 8 and 9). The wingwalls are extensively spalled, cracked and noticeably misaligned (see Photographs 9 and 10). The downstream channel is overgrown with shrubs and trees which could restrict flow and cause high tailwater conditions.

2. Outlet Works. The outlet works at Cherry Run Dam is in poor condition. The access bridge to the control riser is hazardous with missing and/or deteriorated planking (see Photograph 3). The control tower is open (see Photograph 4) and all control mechanisms are missing. Probing with the level rod indicated the control riser may be surrounded by substantial amounts of sediment.

The discharge end of the cast iron blowoff line was found to be partially obstructed and not connected to the terra-cotta pipe extension (Photograph 5) which terminates in the stream about 120 feet from the downstream toe (see Photograph 6). The pump house structure was observed to be dilapidated and the apparent subject of extensive vandalism.

Operability of any of the valves within the pump house is doubtful.

d. Reservoir Area. The area immediately surrounding the reservoir is characterized by moderate to steep, heavily forested slopes. The watershed, however, is composed primarily (about 75 percent) of agricultural lands (see Appendix G, Watershed Boundary Map). Years of farmland runoff has resulted in substantial sedimentation of the Cherry Run Reservoir. The owner estimates that the average depth of water in the reservoir is currently about 4 to 8 feet.

e. Downstream Channel. The channel downstream of Cherry Run Dam is contained within a gently sloped, broad, tree and brush filled valley. Normal flow is confined in a small meandering stream about 25 feet wide and 5 feet in depth. Four residential dwellings and a power plant are located along the stream within 1-1/2 miles of the dam. At least three of the residential dwellings are sufficiently close to the stream that they could suffer damage with possible loss of life from high flows associated with a dam failure (see Photograph 12). Thus, the hazard classification of the facility is considered to be "high".

3.2 Evaluation.

The overall appearance of the facility suggests it to be in poor condition. Maintenance of the embankment and appurtenances appears minimal to non-existant. The reservoir is heavily sedimented although the owner had installed two sedimentation ponds in the 1940's at the upstream end of the reservoir presumably to control further siltation of the facility. Major deficiencies include heavy overgrowth of the embankment, cracking and delamination of the spillway concrete and an apparent non-functional outlet works.

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SECTION 4
OPERATIONAL PROCEDURES

4.1 Normal Operating Procedure.

Cherry Run Dam is essentially a self-regulating facility with excess inflow discharged over the uncontrolled concrete spillway. No formal operating manuals are associated with the facility.

4.2 Maintenance of Dam.

Visual inspection indicates that maintenance of the dam is presently minimal to non-existent. Records in PennDER files indicate some maintenance to the embankment was performed in 1972. No formal maintenance manual is in existence.

4.3 Maintenance of Operating Facilities.

Visual inspection indicates that the operating facilities are presently not maintained and appear to be non-functional. There is no maintenance manual available.

4.4 Warning System.

Discussions with Rochester and Pittsburgh Coal Company personnel indicate that there is no formal warning system in effect for the facility.

4.5 Evaluation.

There are no operating or maintenance manuals available for the facility. Maintenance of the dam and appurtenances appears to be minimal to non-existent. There is no warning system in effect for the notification of downstream residents in the event emergency conditions develop.

SECTION 5
HYDROLOGIC/HYDRAULIC EVALUATION

5.1 Design Data

No formal design reports or calculations are available; however, correspondence contained in PennDER files indicates that the spillway, as designed, would pass, with 1-foot of freeboard, "4,100 cubic feet per second, or 340 cubic feet per second per square mile, which is the runoff shown on our curves for maximum runoff for 12 square miles". The statement implies that the spillway was adequately designed for the criteria then in effect.

5.2 Experience Data.

Daily records of reservoir levels and/or spillway discharge are not available.

5.3 Visual Observations.

The visual inspection indicated that the spillway system is in poor condition. Deficiencies include delamination of the overflow surface (applied in early 1950), cracking and misalignment of the wingwalls, and dense overgrowth of the stream channel immediately below the stilling basin. Due to its poor condition, it is possible that structural damage could occur under high flows.

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 Cherry Run Dam ranges between the 1/2 PMF (Probable Maximum Flood) and the PMF. This classification is based on the relative size of the dam (small), and the potential hazard of dam failure to downstream developments (high). Due to the high potential for damage to the downstream residences and structures, the SDF for this facility is considered to be the PMF.

b. Results of Analysis. Cherry Run Dam was evaluated under normal operating conditions. That is, the reservoir was initially at its normal pool or spillway elevation of approximately 1025 feet (MSL), with the low level blowoff and supply lines closed. Although most of the available storage volume behind the dam is sediment filled, it was assumed that the sediment is in a liquid state. The spillway is a free overfall, concrete, ogee-shaped weir structure.

Downstream routing information (discharge vs storage data) for the selected valley and channel cross-sections of concern was computed via the HEC-2 Computer Program. The necessary downstream routing was done under the assumption that the stream was dry prior to the inflow of the dam outflow. All pertinent engineering calculations relative to the evaluation of this facility are provided in Appendix C.

Overtopping analysis (using the Modified HEC-1 Computer Program) indicated that the discharge/storage capacity of Cherry Run Dam can accommodate only about 40 percent of the PMF (SDF) prior to the overtopping of the embankment (Appendix C, Summary Input/Output Sheets, Sheet K). The low top of dam was inundated by depths of water of 0.6 and 3.0 feet under the 1/2 PMF and PMF events, respectively (Summary Input/Output Sheets, Sheet K). Therefore, since the SDF for this facility is the PMF, Cherry Run Dam has a high potential for overtopping and, thus, for breaching under floods of less than PMF magnitude.

Since Cherry Run Dam 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's water level reached the low top of dam elevation.

Two sets of breach geometry were evaluated for the Cherry Run Dam for each of two failure times (Appendix C, Sheet 12). 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 investigated, were assumed to be a rapid time (0.5 hours) and a prolonged time (4.0 hours), so that a range 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 1.0 hour.

The peak breach outflows (resulting from a 0.41 PMF overtopping) ranged from about 5970 cfs for the minimum section - prolonged fail time scheme, to about 18410 cfs for the maximum section - minimum fail time scheme (Appendix C, Sheet 14). The outflow from the average breach condition was about 11630 cfs, compared to the non-breach 0.41 PMF peak facility outflow of about 5960 cfs (Summary Input/ Output Sheets, Sheet K). The water surface elevation corresponding to the non-breach 0.41 PMF peak discharge at a section (Section 2) located 2640 feet downstream from the dam was approximately 1013.5 feet (MSL); and approximately 1012.1 feet (MSL) at a section (Section 3) located 4000 feet downstream from the dam (Summary Input/Output Sheets, Sheet K). The water surface elevations corresponding to the average condition peak breach outflow at the two above-mentioned downstream sections were 1016.1 feet (MSL) and 1014.4 feet (MSL), respectively (Appendix C Sheet 15). The approximate elevations of the first two residences located at Section 2 are about 1017 feet (MSL); while the approximate elevation of the house located at Section 3 is about 1009 feet (MSL). Therefore, the increase in the water surface at Section 2, caused by the failure of Cherry Run Dam, was about 2.6 feet, with the breach water surface just below the damage levels of the two houses. The increase in the water surface at Section 3, caused by the failure of the dam was about 2.3 feet, with the breach water surface above the damage level of the home (although the structure would experience some flooding even without breaching).

Since the embankment is provided with a concrete corewall, a near instantaneous type of failure (under 0.41 PMF base conditions) was also considered (Appendix C, Sheet 12). The peak breach outflow was about 20720 cfs, which resulted in water surface elevations of 1017.5 feet (MSL) and 1015.1

feet (MSL) at downstream Sections 2 and 3, respectively (Appendix C, Sheet 15). The increase in the water surface at Section 2, caused by the near instantaneous breach of Cherry Run Dam, was about 4.0 feet, with the breach water surface above the damage levels of both houses. The increase in the water surface at Section 3, caused by the near instantaneous failure of the dam, was about 3.0 feet, with the breach water surface again above the damage level of the house. In addition, it can be surmised that the same consequences as expected from an instantaneous type of failure can also occur during an embankment breach under average conditions, if the base flood is somewhat larger than the 0.41 PMF.

The consequences of dam failure can be better envisioned if not only the increase in the height of the floodwave is considered, but, also the great increase in the momentum of the larger and probably swifter moving volume of water. Therefore, the failure of Cherry Run Dam is quite possible and will most probably lead to increased property damage and loss of life in the downstream regions.

5.6 Spillway Adequacy.

As presented previously, under existing conditions Cherry Run Dam can accommodate only about 40 percent of the PMF (the SDF) prior to embankment overtopping. Should a 0.41 PMF or larger event occur, the dam could be overtopped and could possibly fail, endangering the residences in the immediate downstream area. Therefore, the spillway of Cherry Run Dam is considered to be seriously inadequate.

SECTION 6
EVALUATION OF STRUCTURAL INTEGRITY

6.1 Visual Observations.

a. Embankment. Based on visual observations, the main embankment section to the left of the spillway is in fair condition. The only apparent deficiency noted was the lack of regular maintenance resulting in an overgrowth of weeds, high grass, and some shrubs.

The embankment section to the right of the spillway is considered to be in poor condition. It is heavily overgrown with shrubs and trees and appears to be poorly drained, particularly at the embankment-abutment contact. Some erosion at the embankment-natural slope interface was also noted.

b. Appurtenant Structures.

1. Spillway. Visual observations indicate the spillway is in poor structural condition. Deficiencies include delamination of the overflow surface, structural cracking and misalignment of the wingwalls and a partially obstructed downstream channel. Due to its poor condition, it is possible that structural damage could occur under high flows.

2. Outlet Works. The outlet works was observed to be in poor condition and is presumably inoperable. Field measurements indicate that sediment levels may be above the sluice gate that controls inflow to the riser.

6.2 Design and Construction Techniques.

Correspondence, specifications, contract drawings, construction progress reports and construction photographs indicate that the facility was adequately engineered and constructed. Construction problems were openly discussed and resolved with PennDER predecessors.

6.3 Past Performance.

According to available correspondence and discussions with representatives of the owner, the facility has performed satisfactorily since construction in 1923. Reservoir siltation has been a persistent problem and is apparently due to the extensive agricultural use of the watershed.

6.4 Seismic Stability.

The dam is located within Seismic Zone No. 1 and is subject to minor earthquake induced dynamic forces. As the facility appears well constructed and sufficiently stable, it is believed that it can withstand the expected dynamic forces; however, no calculations and/or investigations were performed to confirm this opinion.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS FOR REMEDIAL MEASURES

7.1 Dam Assessment

a. Safety. The visual inspection suggests the facility is in poor condition.

The size classification of the facility is small and its hazard classification is considered to be high. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) for the facility is considered to be the Probable Maximum Flood (PMF). Results of the hydrologic and hydraulic analysis indicate the facility will pass and/or store only about 40 percent of the PMF prior to embankment overtopping. A breach analysis indicates that failure under less than 1/2 PMF conditions could lead to increased downstream damage and potential for loss of life. Thus, based on screening criteria contained in the recommended guidelines, the spillway is considered to be seriously inadequate and the facility unsafe, non-emergency.

Deficiencies noted by the inspection team included heavy overgrowth of the embankment sections (particularly to the right of the spillway), delamination of the spillway surface, cracking and misalignment of the spillway wingwalls, heavy overgrowth within the discharge channel, inoperable outlet works, and no emergency warning system in effect.

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

c. Urgency. Due to its poorly maintained condition and seriously inadequate spillway, implementation of a warning system, along with studies and/or remedial action as recommended below should be immediately undertaken.

d. Necessity for Additional Investigations. Additional investigations are considered necessary and are listed in Section 7.2 below.

7.2 Recommendations/Remedial Measures.

Due to its poorly maintained condition and seriously inadequate spillway classification, the facility is considered unsafe. Failure is not considered imminent; however, it is recommended that the owner immediately develop a warning

system to notify downstream residents in the event hazardous conditions develop. Included in the plan should be provisions for around-the-clock surveillance of the facility during periods of unusually heavy precipitation.

If it is the intent of the owner to reclaim and/or maintain useful function of the facility, it is recommended that the owner:

a. Clear the embankment of all brush, trees, and high weeds to enable expedient visual evaluation, particularly of the right embankment section.

b. Have the facility evaluated by a registered professional engineer experienced in the hydraulics and hydrology of dams and take remedial measures deemed necessary to make the facility hydraulically adequate. The study should also include an assessment of the structural integrity of the existing spillway structure and/or recommendations for remedial repairs to the concrete surfaces.

c. Assess the condition of the outlet structures and restore the operability of the system to provide drawdown capabilities.

d. Clear the downstream channel immediately adjacent to the stilling basin to provide unrestricted flow.

e. Develop manuals of operation and maintenance to ensure continual proper care of the facility.

In lieu of items a through e above, it is recommended that the owner dispose of the facility in accordance with PennDER Division of Dam Safety regulations with due regard to the disposition of the impounded sediment.

APPENDIX A

CHECK LIST - ENGINEERING DATA

NAME OF DAM: Cherry Run Dam

NDI#: PA-278 PENNDER# : 32-40

CHECK LIST
ENGINEERING DATA
PHASE I

ITEM	REMARKS NDI# PA - 278
PERSONS INTERVIEWED AND TITLE	Rochester and Pittsburgh Coal Company James Schaffer, Chief Engineer Ed Sokol, Engineer James G. Wiley, Chief of Maintenance
REGIONAL VICINITY MAP	See Appendix G (U.S.G.S. 7.5 minute topographic quadrangle, Indiana, PA)
CONSTRUCTION HISTORY	Designed and constructed by Rochester and Pittsburgh Coal and Iron Company. Detailed correspondence, about 70 photograph, specifications, and progress drawings concerning the construction of the facility are available in PennDER files (see Section 1.2.g.)
AVAILABLE DRAWINGS	Numerous design, construction progress, and proposed change drawings are available in PennDER files. Representative drawings are provided in Appendix F.
TYPICAL DAM SECTIONS	See Appendix F, Figure 2.
OUTLETS: PLAN DETAILS DISCHARGE RATINGS	See Appendix F, Figures 2, 4, 5 and 6. Not available.

ITEM	REMARKS NDI# PA - 278
SPILLWAY: PLAN SECTION DETAILS	 See Appendix F, Figure 4. See Appendix F, Figure 3. See Appendix F, Figure 3.
OPERATING EQUIPMENT PLANS AND DETAILS	See Appendix F, Figures 2 and 6.
DESIGN REPORTS	None available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS: HYDROLOGY AND HYDRAULICS STABILITY ANALYSES SEEPAGE ANALYSES	None available.
MATERIAL INVESTIGATIONS: BORING RECORDS LABORATORY TESTING FIELD TESTING	Boring information discussed in correspondence available in PennDER files. Some subsurface information given on Figure 3, Appendix F. No laboratory or field testing information available.

ITEM	REMARKS NDI# PA - 278
BORROW SOURCES	Not known. Possibly from within reservoir.
POST CONSTRUCTION DAM SURVEYS	None.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	An in-house evaluation of the reservoir bottom, in 1957, concluded that the maximum reservoir depth was about 8 feet, and the overall average depth was about 4 feet. Data not available. Reservoir bottom soundings were taken between 1968 and 1970 to determine silt level. Data not available.
HIGH POOL RECORDS	None presently available. Water level records were previously kept when facility was still used for water supply and power generation. Water was reported by the owner to have risen high enough to fail the flashboards on occasion.
MONITORING SYSTEMS	None.
MODIFICATIONS	Flashboards were added to the spillway shortly after construction, but have been removed since the 1960's. Provisions for flashboards still exist. Spillway weir and wingwalls were gunited in the early 1950's. A spillway was reported by the owner to have been cut into the right abutment, possibly at the time of the guniting, however, it must have been filled in since that time.

ITEM	REMARKS	NDI# PA 278
PRIOR ACCIDENTS OR FAILURES	None since facility was completed. However, during construction, the entire embankment section to the right of the spillway failed. (PennDER files contain photographs of the breached dam).	
MAINTENANCE: RECORDS MANUAL	When the facility was still used for water supply and power generation, a full time dam tender performed routine and other necessary maintenance. Presently, no formal maintenance and/or operation program exists. Maintenance and operation manuals are not available.	
OPERATION: RECORDS MANUAL	See "Maintenance" above.	
OPERATIONAL PROCEDURES	No formal procedures. Facility is no longer used for its original purpose.	
WARNING SYSTEM AND/OR COMMUNICATION FACILITIES	None.	
MISCELLANEOUS	Present function of dam is reported by the owner to be that of a limited recreational facility for select company personnel. Facility is not open to the public.	

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

NDI ID # PA-278
PENN DER ID # 32-40

SIZE OF DRAINAGE AREA: 11.4 square miles

ELEVATION TOP NORMAL POOL: 1025 STORAGE CAPACITY: 185 acre-feet

ELEVATION TOP FLOOD CONTROL POOL: -- STORAGE CAPACITY: --

ELEVATION MAXIMUM DESIGN POOL: -- STORAGE CAPACITY: --

ELEVATION TOP DAM: 1030 STORAGE CAPACITY: 390 acre-feet

SPILLWAY DATA

CREST ELEVATION: 1025

TYPE: Free overall, concrete, ogee-shaped weir structure

WIDTH: 132 feet

LENGTH: N/A

SPILLOVER LOCATION: Near center of embankment

NUMBER AND TYPE OF GATES: None

OUTLET WORKS

TYPE: 24-inch diameter C.I.P. blowoff;12-inch diameter C.I.P. supply

LOCATION: Control tower located just to left of spillway; outlet located about 75 feet downstream from embankment.

ENTRANCE INVERTS: 1009

EXIT INVERTS: 1008

EMERGENCY DRAWDOWN FACILITIES: Inlet of outlet conduit is supposedly equipped with a sluice gate which is presently non-functional.

HYDROMETEOROLOGICAL GAGES

TYPE: None

LOCATION: --

RECORDS: --

MAXIMUM NON-DAMAGING DISCHARGE: Not known

APPENDIX B

CHECK LIST - VISUAL INSPECTION

CHECK LIST
VISUAL INSPECTION
PHASE 1

NAME OF DAM Cherry Run Dam STATE Pennsylvania COUNTY Indiana

NDI# PA - 278 PENNDER# 32-40

TYPE OF DAM Zoned Earth SIZE Small HAZARD CATAGORY High

DATE(S) INSPECTION 13 July 1979 WEATHER Hot and Humid TEMPERATURE 80 @ 10:00 a.m.

POOL ELEVATION AT TIME OF INSPECTION 1025 M.S.L.

TAILWATER AT TIME OF INSPECTION N/A M.S.L.

INSPECTION PERSONNEL	OWNER REPRESENTATIVES	OTHERS
B. M. Mihalcin	Rochester & Pittsburgh Coal Company	
W. J. Veon	Ed Sokol	
D. L. Bonk	Jim Wiley	

RECORDED BY D. L. Bonk

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 278
SURFACE CRACKS	None observed.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Slight erosion at right abutment-embankment contact. Possibly the result of poor drainage conditions.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Horizontal - good. Vertical - slightly lower near spillway wingwalls.
RIPRAP FAILURES	Hand placed cut stone riprap with some mortared facing.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Embankment - spillway abutments; good condition. Embankment - valley abutments; left abutment good condition; right abutment is poorly drained, minor erosion observed.

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 278
DAMP AREAS IRREGULAR VEGETATION (LUSH OR DEAD PLANTS)	No damp or wet areas due to seepage observed along downstream embankment face. Right abutment is poorly drained. Embankment left of spillway is overgrown with high weeds and brush. Embankment right of spillway is heavily overgrown with trees and brush.
ANY NOTICEABLE SEEPAGE	None through embankment.
STAFF GAGE AND RECORDER	None.
DRAINS	None.

OUTLET WORKS

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 278
INTAKE STRUCTURE	Control tower dilapidated and non-functional. Access bridge hazardous.
OUTLET CONDUIT (CRACKING AND SPALLING OF CONCRETE SURFACES)	24-inch diameter cast iron pipe; outlet end observed to the left of the stream about 75 feet downstream of the embankment. 80-foot long terra-cotta pipe extends further downstream. Terra-cotta and cast iron pipes are presently not connected.
OUTLET STRUCTURE	Dilapidated tile block pump house located about 75 feet downstream of the embankment left of the spillway. Basement level is flooded while the interior has been thoroughly vandalized. Operability of the valves is doubtful.
OUTLET CHANNEL	Discharge is diverted into Cherry Run which, immediately below the dam, is a small gently sloping stream at the base of a heavily overgrown valley
GATE(S) AND OPERATIONAL EQUIPMENT	Gates and valves in control tower appear to be non-functional with gate control mechanisms missing. Gates and valves within pump house may be functional, but, have not been operated since 1964.

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 278
TYPE AND CONDITION	Free overfall, concrete, ogee-shaped weir structure in poor condition.
APPROACH CHANNEL	Not applicable.
SPILLWAY CHANNEL AND SIDEWALLS	Sidewalls in poor condition exhibiting extensive cracking, spalling, and bulging. The left sidewall has a major structural crack on its upstream end, and the end has rotated somewhat.
STILLING BASIN PLUNGE POOL	Good condition.
DISCHARGE CHANNEL	See "Outlet Channel", page 4 of 8.
BRIDGE AND PIERS	None.
EMERGENCY GATES	None.

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 278
TYPE AND CONDITION	N/A
APPROACH CHANNEL	N/A
OUTLET STRUCTURE	N/A
DISCHARGE CHANNEL	N/A

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 278
MONUMENTATION SURVEYS	None.
OBSERVATION WELLS	None.
WEIRS	None.
PIEZOMETERS	None.
OTHERS	

RESERVOIR AREA AND DOWNSTREAM CHANNEL

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 278
SLOPES: RESERVOIR	Moderate to steep, and heavily forested in immediate vicinity of dam. Total watershed is primarily agricultural (about 75 percent).
SEDIMENTATION	Reservoir displays signs of heavy sedimentation. Dense vegetal growth within the reservoir about 600 feet or so upstream from the embankment.
DOWNSTREAM CHANNEL (OBSTRUCTIONS, DEBRIS, ETC.)	Cherry Run flows beneath 3 bridge structures prior to its confluence with Two Lick Creek. The first bridge is located about 3900 feet downstream from the dam.
SLOPES: CHANNEL VALLEY	Broad wooded valley with steep, partially wooded, confining slopes for 3900 feet downstream from the dam.
APPROXIMATE NUMBER OF HOMES AND POPULATION	Three homes that could possibly be affected by the floodwave resulting from a breach in the embankment are located within the first 3900 feet downstream from the dam. Estimated population is about 9 or 10.

APPENDIX C

HYDROLOGY AND HYDRAULICS

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 shown 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 specified 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 elevations of failure hydrographs for each location.

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM

BY WJV DATE 7-31-79 PROJ. NO. 78-617-278

CHKD. BY DLB DATE 8-4-79 SHEET NO. 1 OF 15

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DAM STATISTICS

HEIGHT OF DAM ≈ 22 FT (FIELD MEASURED)
(MEASURED FROM INVERT OF OUTLET)

MAXIMUM POOL STORAGE CAPACITY ≈ 390 AC-FT (FROM HEC-1)
@ TOP OF DAM

NORMAL POOL STORAGE CAPACITY ≈ 185 AC-FT (SEE NOTE 1)
(DESIGN)

DRAINAGE AREA ≈ 11.4 SQ. MI.

PLANIMETERED OFF USGS
7.5 MINUTE INDIANA,
PA. QUAD

NOTE 1: DESIGN NORMAL STORAGE CAPACITY OBTAINED FROM "REPORT UPON THE APPLICATION OF THE ROCHESTER AND PITTSBURGH COAL AND IRON COMPANY (FOR CONSTRUCTION OF A DAM ACROSS CHERRY RUN, ABOUT ONE MILE WEST OF HOMER CITY IN CENTER TOWNSHIP, INDIANA COUNTY, PENNSYLVANIA", DATED 1923, AS FOUND IN PENNDEL FILES. THE ACTUAL REPORTED VALUE WAS 60 MILLION GALLONS. HOWEVER, MOST OF THE AVAILABLE STORAGE VOLUME IS PRESENTLY SEDIMENT FILLED.

DAM CLASSIFICATION

DAM SIZE - SMALL (REF 1, TABLE 1)

HAZARD CLASSIFICATION - HIGH (FIELD DETERMINATION)

REQUIRED SDF - 1/2 PMF TO PMF (REF 1, TABLE 3)

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM

BY WJM DATE 7-31-79 PROJ. NO. 78-617-278

CHKD. BY DLB DATE 8-4-79 SHEET NO. 2 OF 15

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HYDROGRAPH PARAMETERS

LENGTH OF LONGEST WATERCOURSE ≈ 6.8 MI

L_{CA} ≈ 3.4 MI (MEASURED ALONG THE LONGEST WATERCOURSE FROM THE DAM TO THE CENTROID OF THE BASIN

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

C_t ≈ 1.6
C_p ≈ 0.45

[SUPPLIED BY COE; ZONE 24 OHIO RIVER BASIN]

t_p = SNYDER'S STANDARD LAG ≈ $1.6(L \times L_{CA})^{0.3}$

∴ $t_p \approx 1.6(6.8 \times 3.4)^{0.3} \approx 4.11$ HRS

RESERVOIR SURFACE AREAS

SURFACE AREA (SA) @ NORMAL POOL EL 1025.0 FT ≈ 31.2 AC

NOTE 3: NORMAL POOL EL 1025.0 FT OBTAINED FROM APPENDIX F, FIGURE 2. NORMAL POOL SA OBTAINED FROM THE REFERENCE GIVEN IN NOTE 1, SHEET 1.

SA @ EL 1040 ≈ 98.4 AC (PLANIMETERED OFF INDIANA, PA QUAD

LOW TOP OF DAM ELEVATION ≈ 1030.0 FT (FIELD MEASURED)

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RATE OF SA INCREASE PER FOOT OF RESERVOIR RISE =>

$$\Delta SA/\Delta H \approx (88.1 - 31.2)/(1040.0 - 1025.0) \approx 3.8 \frac{AC}{FT}$$

SA @ LOW TOP OF DAM EL 1030.0 $\approx$ 31.2 AC + [(3.8 $\frac{AC}{FT}$)(1030 - 1025)]
$\approx$ 50.2 AC

RESERVOIR ELEVATION @ "0" STORAGE

NORMAL POOL VOLUME $\approx$ 1/3 HA $\approx$ 195 AC-FT (CONIC METHOD)

SA @ NORMAL POOL EL 1025.0 $\approx$ 31.2 AC

$\therefore$ H $\approx$ 3 (195 AC-FT)/31.2 AC $\approx$ 17.8 FT

ZERO VOLUME ELEVATION $\approx$ 1025.0 - 17.8 FT $\approx$ 1007.2 FT

NOTE 4: ALTHOUGH THE ACTUAL DESIGN MINIMUM RESERVOIR ELEVATION APPEARS TO BE ABOUT EL 1009.5 (FIG 2), IN ORDER TO COMPUTE AN ELEVATION-STORAGE RELATIONSHIP AND STILL MAINTAIN A STORAGE OF 195 AC-FT @ EL 1025.0, THE ABOVE "0" STORAGE ELEVATION MUST BE INPUT INTO THE HEC-1 PROGRAM.

RESERVOIR ELEVATION-STORAGE RELATIONSHIP

COMPUTED INTERNALLY BY THE HEC-1 PROGRAM BASED ON THE GIVEN ELEVATION VS SURFACE AREA INFORMATION (SEE SUMMARY INPUT/OUTPUT SHEETS).

NOTE 5: ALTHOUGH MOST OF THE AVAILABLE DESIGN STORAGE VOLUME IS PRESENTLY SEDIMENT FILLED, IT IS FELT THAT THE SEDIMENT HAS NOT CONSOLIDATED TO A POINT

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WHERE IT CAN RESIST FLOW. THEREFORE, THE ENTIRE DESIGN STORAGE VOLUME CAN STILL POTENTIALLY FLOW DOWNSTREAM IF RELEASED VIA A DAM BREACH.

PMP CALCULATIONS

- APPROXIMATE RAINFALL INDEX = 24 IN (REF 3, FIG 1)
  (CORRESPONDING TO A DURATION OF 24 HR AND AN AREA OF 200 SQMI, LOCATED IN SOUTHWESTERN PENNSYLVANIA)

- DEPTH-AREA-DURATION ZONE # 7 (REF 3, FIG 1)

- STORM WILL BE CENTERED OVER THE 11.4 SQMI BASIN WITH A DEPTH-DURATION RELATIONSHIP OF:

DURATION (HR)	PERCENT OF INDEX RAINFALL (%)
6	101
12	119
24	129
48	139

- HOP BROK 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 ≈ 11.4 SQMI ⇒ 0.805 (FROM HEC-1 OUTPUT)

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM

BY WJV DATE 7-31-79 PROJ. NO. 72-617-279

CHKD. BY DLB DATE 8-4-79 SHEET NO. 5 OF 15

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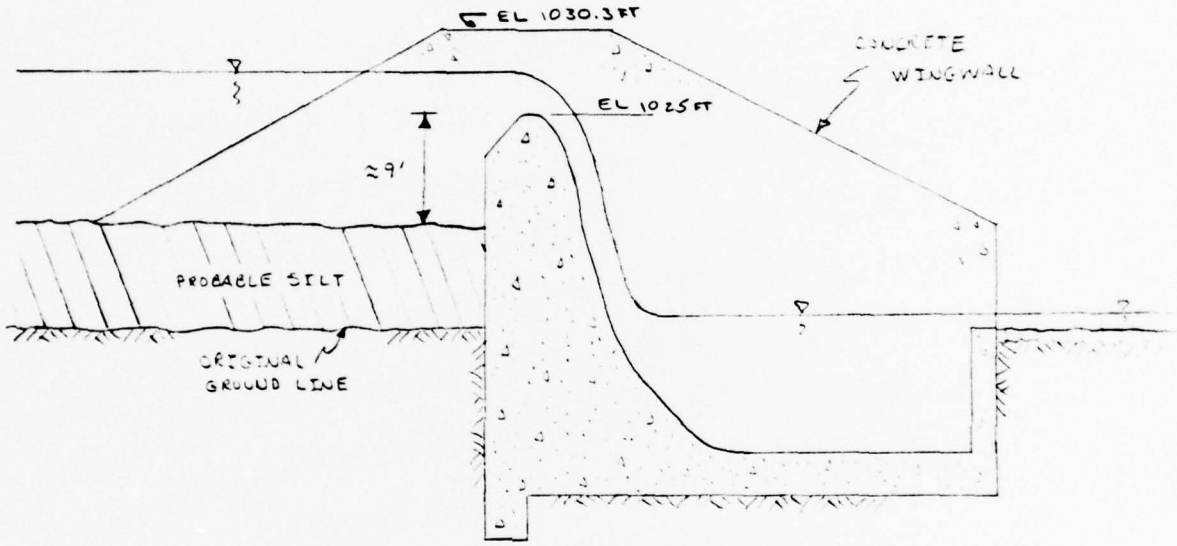
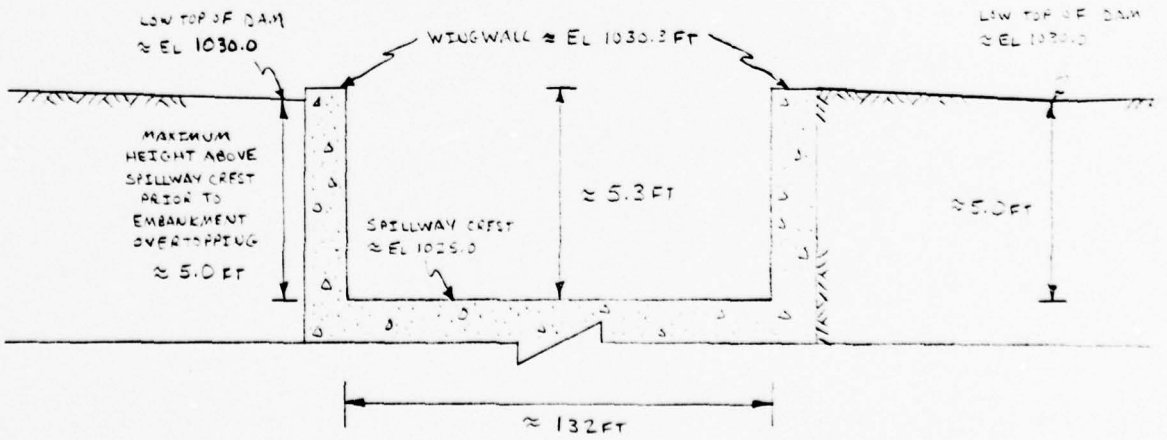
SPILLWAY CAPACITY

- PROFILE OF SPILLWAY : (NOT TO SCALE)
(FROM FIELD MEASUREMENTS AND OBSERVATION, AND FIG 3)



- CROSS-SECTION OF SPILLWAY : (NOT TO SCALE)
(FROM FIELD MEASUREMENTS AND OBSERVATIONS, AND FIG: 3 AND 4)



SECTION TAKEN LOOKING UPSTREAM TOWARD SPILLWAY

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM

BY WJV DATE 7-31-79 PROJ. NO. 79-617-279

CHKD. BY DLB DATE 8-9-79 SHEET NO. 6 OF 15

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- THE SPILLWAY IS A FREE OVERFALL, CONCRETE, OGEE-SHAPED WEIR STRUCTURE. DISCHARGE OVER A WEIR IS DEFINED BY THE RELATIONSHIP:

$$Q = CLH^{3/2} \qquad \text{(REF 4, 5-3)}$$

WHERE Q = DISCHARGE IN CFS;
L = LENGTH OF WEIR CREST ≈ 132 FT;
H = HEIGHT OF RESERVOIR ABOVE SPILLWAY CREST ≈ 5.0 FT PRIOR TO EMBANKMENT OVERTOPPING; AND
C = DISCHARGE COEFFICIENT = f (DESIGN HEAD, ACTUAL HEAD, SLOPE OF US FACE, DS APRON EFFECTS, AND SUBMERGENCE).

- DETERMINATION OF "C":

FIELD MEASURED FOREBAY DEPTH (P) ≈ 9.0 FT
ASSUMED DESIGN HEAD (H_D) ≈ 5.0 FT

$\Rightarrow$ $P/H_D \approx 9.0/5.0 \approx 1.8 \Rightarrow C_D \approx 3.93$ (REF 4 PG 3-7

SINCE THE SLOPE OF US WETA FACE ADJUSTMENT DOES NOT APPLY, AND DETRIMENTAL DS APRON EFFECTS AND SUBMERGENCE ARE NOT LIKELY $\Rightarrow$ C ≈ 3.93

- APPROACH CHANNEL LOSSES ARE NEGLIGIBLE DUE TO THE LARGE SPILLWAY DEPTH

$\therefore$ SPILLWAY CAPACITY = $Q \approx (3.93)(132\text{FT})(5.0\text{FT})^{3/2}$

$$Q \approx 5800 \text{ CFS}$$

(Q ≈ 5899 AS COMPUTED BY HEC-1, DUE TO COMPUTER ACCURACY)

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM

BY WJV DATE 7-31-79 PROJ. NO. 78-617-278

CHKD. BY DLB DATE 8-4-79 SHEET NO. 7 OF 15

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SPILLWAY RATING CURVE

COMPUTED INTERNALLY BY HEC-1 VIA THE OGEE RATING CURVE ROUTINE. THE OGEE ROUTINE COMPUTES DISCHARGES IN A MANNER SIMILAR TO THAT OUTLINED ON SHEET 6, BASED ON THE INPUT INFORMATION: DESIGN HEAD ≈ 5.0, APRON ELEVATION ≈ 1009 FT (INITIAL TW ELEVATION, FIG 3), APRON WIDTH ≈ 132 FT, APPROACH CHANNEL LOSS & DESIGN HEAD ≈ 0.0FT, AND FOREBAY DEPTH ≈ 9.0FT.

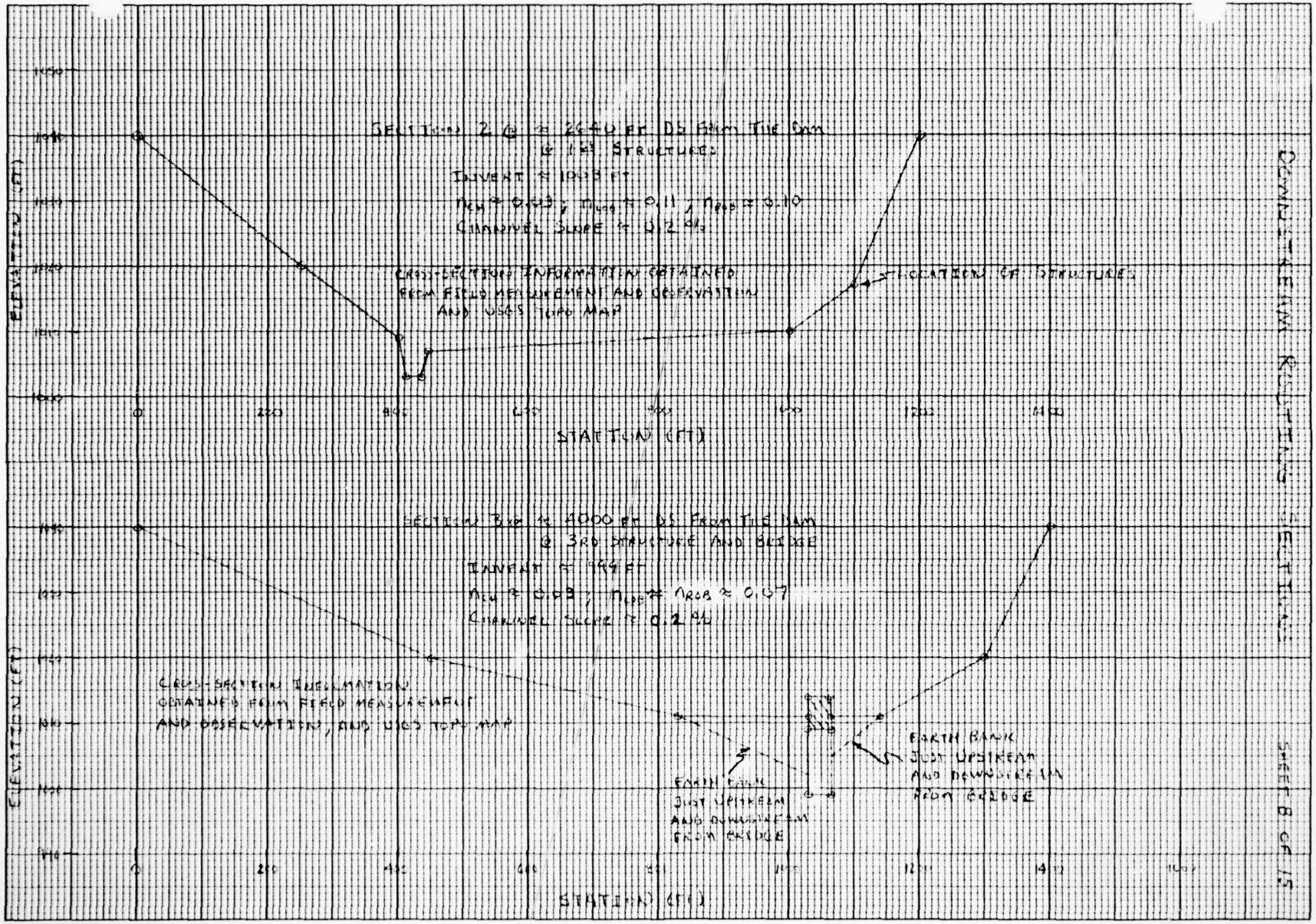
EMBANKMENT RATING CURVE

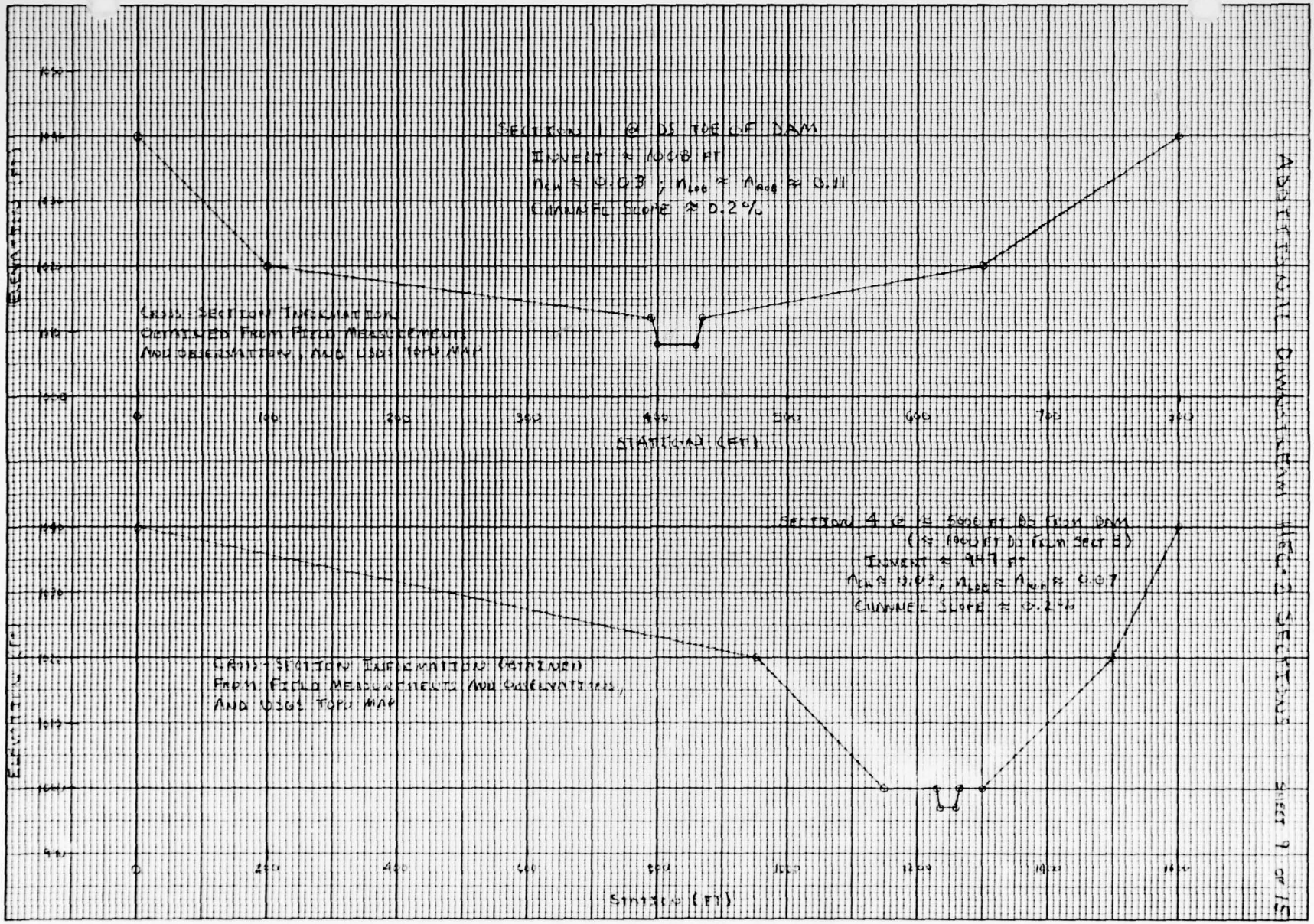
- COMPUTED INTERNALLY BY HEC-1 VIA THE ASSUMPTION THAT CRITICAL DEPTH ON THE CREST CONTROLS POSSIBLE OVERTOPPING FLOWS. THE CREST PROFILE IS REPRESENTED BY A SERIES OF TRAPEZOIDS (SEE SUMMARY INPUT/OUTPUT SHEETS FOR RATING INFORMATION)

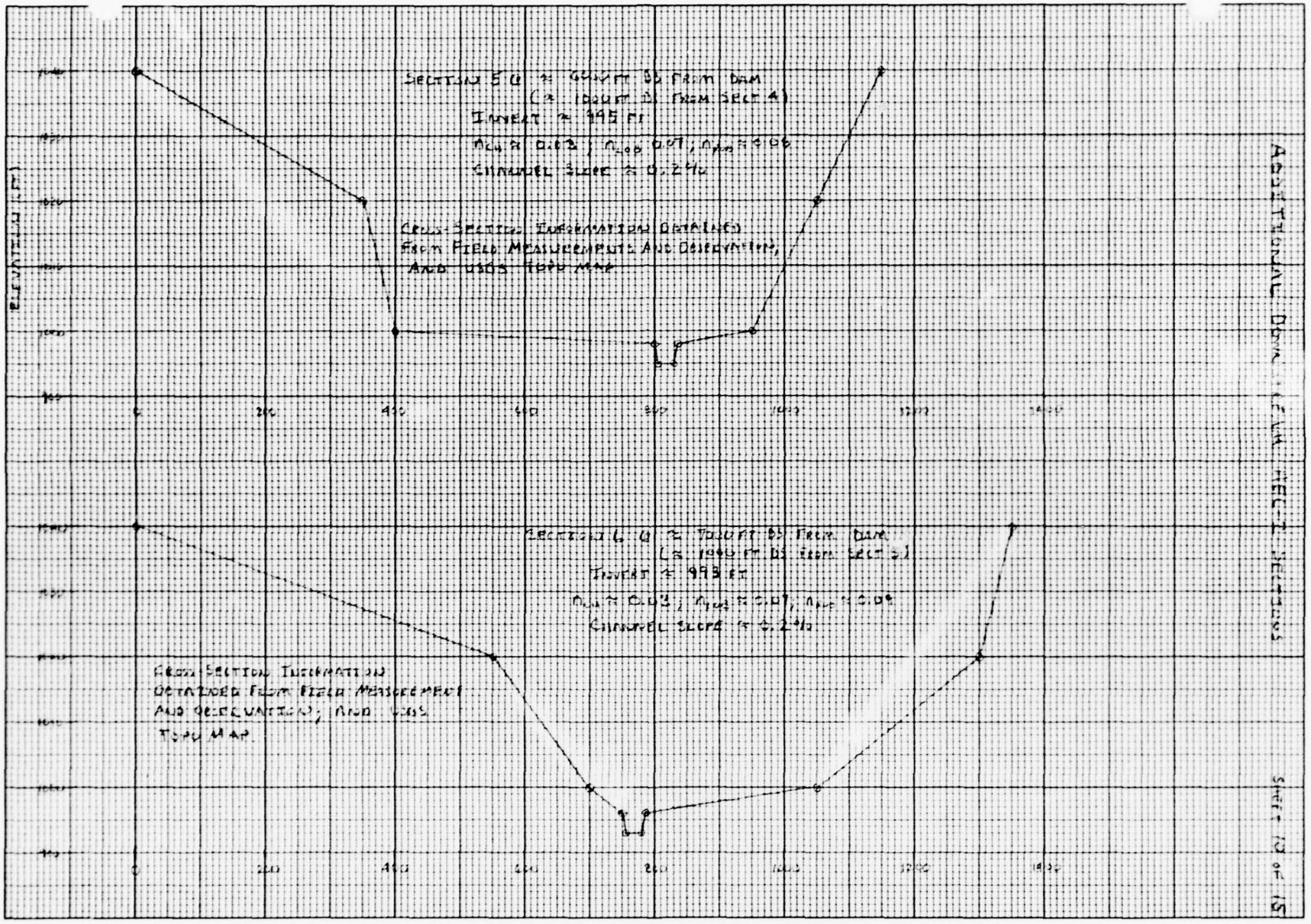
- INPUT INFORMATION: (BASED ON FIELD MEASUREMENTS)

RESERVOIR ELEVATION (FT)	HEIGHT ABOVE CREST (FT)	INUNDATED CREST LENGTH (FT)	
1030.0	0	25	
1030.1	0.1	70	
1030.3	0.3	105	
1030.4	0.4	120	
1030.8	0.8	195	
1030.9	0.9	270	
1031.1	1.1	305	BASED PARTIALLY
1032.0	2.0	340	ON ESTIMATED
1033.0	3.0	375	ABUTMENT SIDESLOPES
1034.0	4.0	410	OF ≈ 17H:1V

FROM USGS TOPO MAP


SECTION 2 @ ≈ 2650 FT DS FROM THE DAM
@ 1ST STRUCTURE:
INVERT ≈ 1013 FT
n_CH ≈ 0.03 ; n_LOB ≈ 0.11 ; n_ROB ≈ 0.10
CHANNEL SLOPE ≈ 0.2 %
CROSS-SECTIONAL INFORMATION OBTAINED
FROM FIELD MEASUREMENT AND OBSERVATION
AND USGS TOPO MAP
LOCATIONS OF STRUCTURES
ELEVATION (FT)
STATION (FT)
SECTION B @ ≈ 4000 FT DS FROM THE DAM
@ 3RD STRUCTURE AND BRIDGE
INVERT ≈ 994 FT
n_CH ≈ 0.03 ; n_LOB ≈ n_ROB ≈ 0.07
CHANNEL SLOPE ≈ 0.2 %
CROSS-SECTIONAL INFORMATION
OBTAINED FROM FIELD MEASUREMENT
AND OBSERVATION, AND USGS TOPO MAP
EARTH BANK
JUST UPSTREAM
AND DOWNSTREAM
FROM BRIDGE
ELEVATION (FT)
STATION (FT)
DOWNSTREAM RIVERINE SECTIONS
SHEET B OF 15


SECTION 1 @ DS TOE OF DAM
INVERT ≈ 1008 FT
n_CH ≈ 0.03 ; n_LOB ≈ n_ROB ≈ 0.11
CHANNEL SLOPE ≈ 0.2%
LAST SECTION INTERPOLATION
OBTAINED FROM FIELD MEASUREMENTS
AND OBSERVATIONS, AND USGS TOPO MAP
ELEVATION (FT)
STATION (FT)
SECTION 4 @ 15,500 FT DS FROM DAM
(≈ 1000 FT DS FROM SECT 3)
INVERT ≈ 947 FT
n_CH ≈ 0.03 ; n_LOB ≈ n_ROB ≈ 0.07
CHANNEL SLOPE ≈ 0.2 %
LAST SECTION INTERPOLATION (CONTINUED)
FROM FIELD MEASUREMENTS AND OBSERVATIONS,
AND USGS TOPO MAP
ELEVATION (FT)
STATION (FT)
ASSESSMENT OF DOWNSTREAM HAZARD POTENTIAL
SHEET 9 OF 15


SECTION 5 (2 = 6 MILES DS FROM DAM
(= 10 MILES DS FROM SECT 4)
INVERT = 995 FT
n_CH = 0.032; n_OB = 0.07; n_BANK = 0.08
CHANNEL SLOPE = 0.2%
CROSS-SECTIONAL INFORMATION OBTAINED
FROM FIELD MEASUREMENTS AND OBSERVATIONS,
AND USGS TOPO MAP
SECTION 6 (2 = 9 MILES DS FROM DAM
(= 19 MILES DS FROM SECT 5)
INVERT = 993 FT
n_CH = 0.03; n_OB = 0.07; n_BANK = 0.08
CHANNEL SLOPE = 0.2%
CROSS-SECTIONAL INFORMATION
OBTAINED FROM FIELD MEASUREMENTS
AND OBSERVATIONS; AND USGS
TOPO MAP
ELEVATION (FT)
ADDITIONAL DATA - FLOW THROUGH SECTIONS
SHEET 13 OF 15

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM

BY WJV DATE 9-4-79 PROJ. NO. 78-617-278

CHKD. BY DLB DATE 9-4-79 SHEET NO. 11 OF 15

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DOWNSTREAM ROUTING RELATIONSHIPS

DOWNSTREAM ROUTING INFORMATION (DISCHARGE VS STORAGE RELATIONSHIPS) WAS 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 DATA. THE SPECIFIC CROSS-SECTION INFORMATION USED IS GIVEN ON SHEETS 9 TO 10. THE VARIOUS PROFILES WERE INITIATED VIA THE SLOPE-AREA METHOD (REF 7, PG 146-148) APPLIED TO SECTION 6. THE CALCULATIONS THEN PROCEEDED UPSTREAM TO SECTIONS 5 AND 4, AND AND THEN TO THE BRIDGE @ SECTION 3. THE BRIDGE WAS MODELLED BY THE "SPECIAL BRIDGE" ROUTINE OF THE PROGRAM. COMPUTATIONS THEN PROCEEDED TO SECTION 2, AND FINALLY TO SECTION 1 AT THE TOE OF THE DAM. SINCE THE RESIDENCES OF CONCERN ARE LOCATED AT SECTIONS 2 AND 3, ONLY THESE SECTIONS WILL BE CONSIDERED IN THE DOWNSTREAM ROUTING. DISCHARGE VS STORAGE RELATIONSHIPS FOR SECTIONS 2 AND 3 ARE (FROM HEC-2 OUTPUT OF SHEETS D AND E, SUMMARY INPUT/OUTPUT SHEETS):

SECTION 2

DISCHARGE (CFS)	@STORAGE (AC-FT)	DISCHARGE (CFS)	@STORAGE (AC-FT)
0	0	17800	247
400	5.7	22900	283
1400	18.5	28000	323
2500	40.0	32000	354
5000	89.1	40000	411
7600	132	45000	444
10200	165	49000	470
12700	201		

SECTION 3

DISCHARGE (CFS)	@STORAGE (AC-FT)	DISCHARGE (CFS)	@STORAGE (AC-FT)
0	0	17800	175
400	3.0	22900	203
1400	10.3	28000	229
2500	23.5	32000	251
5000	74.9	40000	298
7600	106	45000	327
10200	129	49000	349
12700	145		

① SEE SHEET E, SUMMARY INPUT/OUTPUT SHEETS

* HEC-2 WATER SURFACE PROFILES (USER'S MANUAL), HYDROLOGIC ENGINEERING [illegible]

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM

BY WJV DATE 8-4-79 PROJ. NO. 78-617-273

CHKD. BY DLB DATE 8-4-79 SHEET NO. 12 OF 15

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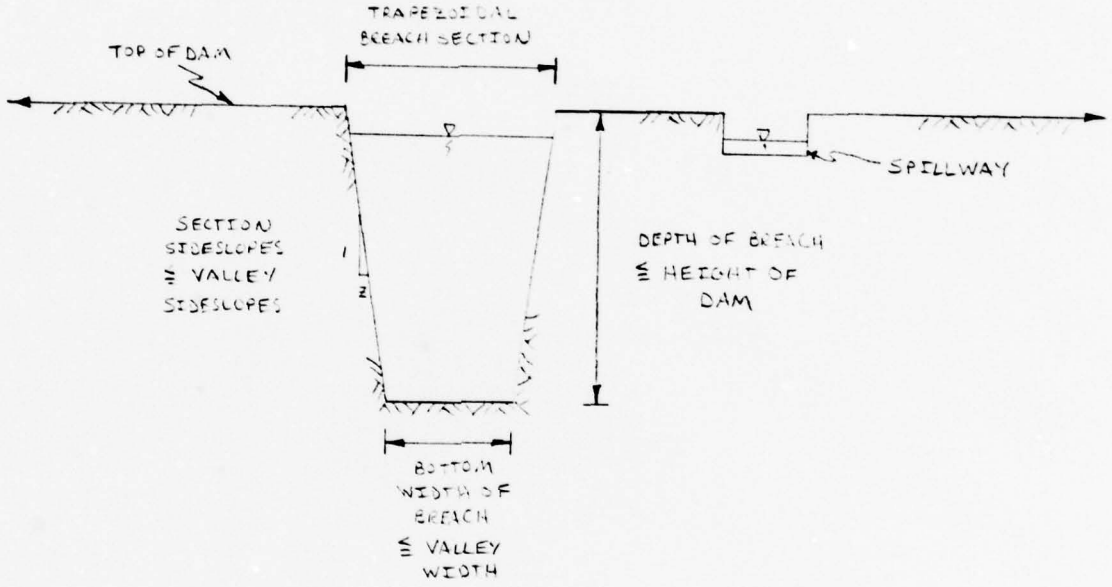
BREACH ASSUMPTIONS

- TYPICAL BREACH SECTION:



- HEC-1-DAM BREACHING ANALYSIS INPUTS:

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

PLAN NUMBER AND COMMENT	BREACH BOTTOM WIDTH (FT)	MAX BREACH DEPTH (FT)	SECTION SIDESLOPES	*BREACH TIME (HR)	WSEL @ TIME OF FAILURE (FT)
① MIN BREACH SECT; MIN FAIL TIME	0	18	1H TO 1V	0.5	1030.0
② MAX BREACH SECT; MIN FAIL TIME	300	18	3H TO 1V	0.5	1030.0
③ MIN BREACH SECT; MAX FAIL TIME	0	18	1H TO 1V	4.0	1030.0
④ MAX BREACH SECT; MAX FAIL TIME	300	18	3H TO 1V	4.0	1030.0
⑤ AVERAGE POSSIBLE CONDITIONS	150	18	1H TO 1V	1.0	1030.0
⑥ INSTANTANEOUS FAILURE	100	18	1H TO 1V	0.25	1030.0

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

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM

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- THE BREACH ASSUMPTIONS LISTED ON SHEET 11 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	≈ 22 FT (FIELD MEASURED)
- AVERAGE HEIGHT OF EMBANKMENT	≈ 18 FT (FIG 7)
- EMBANKMENT CREST LENGTH:	
LEFT OF SPWY	≈ 200 FT } FIELD MEASURED
RIGHT OF SPWY	≈ 100 FT } FIELD MEASURED
TOTAL	≈ 300 FT } FIELD MEASURED
- VALLEY BOTTOM WIDTH	≈ 300 FT (FIG 7)
- VALLEY SIDESLOPES ADJACENT TO DAM:	
RIGHT WALL	3H TO 1V } FIG 7
LEFT WALL	3H TO 1V } FIG 7

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM
BY WJV DATE 8-4-79 PROJ. NO. 79-617-278
CHKD. BY DLB DATE 8-11-79 SHEET NO. 14 OF 15

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HEC-1 - DAM BREACHING ANALYSIS OUTPUT :

RESERVOIR DATA

UNDER 0.41 PMF BASE FLOW CONDITIONS -

* PLAN NUMBER	VARIABLE BREACH BOTTOM WIDTH (FT)	ACTUAL MAX FLOW DURING FAIL TIME (CFS)	CORRESPONDING TIME OF FLOW (HR)	INTERPOLATED OR HEC-1 ROUTED MAX FLOW DURING FAIL TIME (CFS)	CORRESPONDING TIME OF FLOW (HR)	ACTUAL PEAK FLOW THROUGH DAM (CFS)	CORRESPONDING TIME OF PEAK (HR)	TIME OF INITIAL BREACH (HR)
(1)	0	8032	44.25	8032	44.25	8032	44.25	43.75
(2)	300	18410	44.11	17127	44.00	18410	44.11	43.75
(3)	0	5967	44.09	5966	44.00	5967	44.08	43.75
(4)	300	7213	44.58	7196	44.50	7213	44.58	43.75
(5)	150	11628	44.56	11459	44.50	11628	44.56	43.75
(6)	100	20722	44.00	20722	44.00	20722	44.00	43.75

* SEE TABLE ON SHEET 12

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM
BY WJV DATE 8-4-79 PROJ. NO. 79-617-275
CHKD. BY DLB DATE 8-4-79 SHEET NO. 15 OF 15

HEC-1- DAM BREACHING ANALYSIS OUTPUT :

DOWNSTREAM ROUTING DATA

UNDER 0.41 PMF BASE FLOW CONDITIONS -

1. PLAN NUMBER	VARIABLE BREACH BOTTOM WIDTH (FT)	OUTPUT @ SECTION 2 LOCATED 2640 FT DS FROM DAM				OUTPUT @ SECTION 3 LOCATED 4000 FT DS FROM DAM			
		PEAK FLOW (CFS)	CORRESPONDING WSEL 2. (FT)	WSEL 3. W/O BREACH (FT)	4. Δ ELEV (FT)	PEAK FLOW (CFS)	CORRESPONDING WSEL 2. (FT)	WSEL 3. W/O BREACH (FT)	4. Δ ELEV (FT)
①	0	7274	1014.4	1013.5	+0.9	7079	1012.9	1012.1	+0.8
②	300	14765	1017.4	1013.5	+3.9	13489	1014.9	1012.1	+2.8
③	0	5952	1013.5	1013.5	+0.0	5944	1012.1	1012.1	+0.0
④	300	7153	1014.3	1013.5	+0.8	7143	1012.9	1012.1	+0.8
⑤	150	10840	1016.1	1013.5	+2.6	10964	1014.4	1012.1	+2.3
⑥	100	14980	1017.5	1013.5	+4.0	14509	1015.1	1012.1	+3.0

1. SEE TABLE ON SHEET 12
2. WATER SURFACE ELEVATIONS CORRESPONDING TO BREACH FLOWS AS INTERPOLATED FROM SHEETS D AND E, SUMMARY INPUT / OUTPUT SHEETS
3. BASE FLOW ELEVATIONS CORRESPONDING TO THE PEAK 0.41 PMF AS INTERPOLATED FROM SHEETS D AND E, SUMMARY INPUT / OUTPUT SHEETS (0.41 PMF FLOW FROM SHEET K)
4. Δ ELEV = CORRESPONDING WSEL - WSEL W/O BREACH

SUMMARY INPUT/OUTPUT SHEETS

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM
BY WJV DATE 8-6-79
CHKD. BY DLB DATE 8-6-79
PROJ. NO. 79-617-273
SHEET NO. A OF M

DOWNSTREAM ROUTING DATA VIA HEC-2

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T1 DAM SAFETY INSPECTION - DOWNSTREAM ROUTING INFORMATION
T2 START CALCULATIONS VIA SLOPE-AREA METHOD, MODEL BRIDGE VIA SPECIAL BRIDGE
T3      CHERRY RUN BELOW CHERRY RUN DAM

J1  ICHECK     INQ        NINV       IDIR       SILT       METRIC     HVINS      U          WSEL       FQ
        0.       2.         0.         0.   0.002000        0.0        0.0        0.   996.000        0.0

J2  NPROF      IPLOT      PRFVS      XSECV      XSECH      FN         ALLDC      IBW        CHNIM      ITRACE
    1.000        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0

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  LERWT      NUMSEC                        ********REQUESTED SECTION NUMBERS********
      -10.000    -10.000        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
NC      0.070      0.090      0.030      0.200      0.400        0.0        0.0        0.0        0.0        0.0
OT     14.000    400.000   1400.000   2500.000   5000.000   7600.000  10200.000  12700.000  17800.000  22900.000
GT  28000.000  32000.000  40000.000  45000.000  49000.000        0.0        0.0        0.0        0.0        0.0

X1      6.000     10.000    750.000    785.000        0.0        0.0        0.0        0.0        0.0        0.0
GR   1040.000      0.0      1020.000    550.000   1000.000    700.000    996.000    750.000    993.000    755.000
GR    993.000    780.000    996.000    785.000   1000.000   1050.000   1020.000   1300.000   1040.000   1350.000
NC      0.070      0.080      0.030      0.300      0.500        0.0        0.0        0.0        0.0        0.0

X1      5.000     10.000    800.000    835.000   1300.000    650.000   1000.000        0.0        0.0        0.0
GR   1040.000      0.0      1020.000    350.000   1000.000    400.000    998.000    800.000    995.000    805.000
GR    995.000    830.000    998.000    835.000   1000.000    950.000   1020.000   1050.000   1040.000   1150.000
NC      0.070      0.070      0.030      0.300      0.500        0.0        0.0        0.0        0.0        0.0

X1      4.000     10.000   1230.000   1265.000   1000.000   1000.000   1000.000        0.0        0.0        0.0
GR   1040.000      0.0      1020.000    950.000   1000.000   1150.000   1000.000   1230.000    997.000   1235.000
GR    997.000   1260.000   1000.000   1265.000   1000.000   1300.000   1020.000   1500.000   1040.000   1600.000
NC      0.070      0.070      0.030      0.300      0.500        0.0        0.0        0.0        0.0        0.0

X1      3.200     10.000   1030.000   1065.000    750.000   1050.000    950.000        0.0        0.0        0.0
GR   1040.000      0.0      1020.000    450.000   1011.000    830.000   1002.000   1030.000    999.000   1030.000
GR    999.000   1065.000   1005.000   1065.000   1011.000   1140.000   1020.000   1300.000   1040.000   1400.000
NC      0.070      0.070      0.030      0.500      0.700        0.0        0.0        0.0        0.0        0.0

X1      3.100        0.0        0.0        0.0     50.000     50.000     50.000        0.0        0.0        0.0
X3     10.000        0.0        0.0        0.0        0.0        0.0        0.0   1010.000   1010.000        0.0
NC      0.070      0.070      0.030      0.200      0.400        0.0        0.0        0.0        0.0        0.0
SS      5.000      1.500      2.000        0.0     45.000        0.0    450.000        0.0        0.0        0.0
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SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM

BY WJV DATE 8-6-79 PROJ. NO. 79-617-273

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X1	3.000	0.0	0.0	0.0	35.000	35.000	35.000	0.0	0.0	0.0
X2	0.0	0.0	1.000	1009.000	1011.000	0.0	0.0	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	1011.000	1011.000	0.0
RT	10.000	0.0	1040.000	1040.000	450.000	1020.000	1020.000	830.000	1011.000	1011.000
RI	1030.000	1011.000	1011.000	1030.000	1014.000	1009.000	1065.000	1014.000	1009.000	1065.000
RI	1011.000	1011.000	1140.000	1011.000	1011.000	1300.000	1020.000	1020.000	1400.000	1040.000
RT	1040.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.070	0.070	0.030	0.500	0.700	0.0	0.0	0.0	0.0	0.0
X1	2.900	0.0	0.0	0.0	50.000	50.000	50.000	0.0	0.0	0.0
NC	0.110	0.100	0.030	0.300	0.500	0.0	0.0	0.0	0.0	0.0
X1	2.000	9.000	400.000	445.000	1360.000	1360.000	1360.000	0.0	0.0	0.0
GR	1040.000	0.0	1020.000	250.000	1009.000	400.000	1003.000	410.000	1003.000	435.000
GR	1007.000	445.000	1010.000	1000.000	1017.000	1100.000	1040.000	1200.000	0.0	0.0
NC	0.110	0.110	0.030	0.300	0.500	0.0	0.0	0.0	0.0	0.0
X1	1.000	6.000	395.000	435.000	2300.000	1800.000	2640.000	0.0	0.0	0.0
GR	1040.000	0.0	1020.000	100.000	1012.000	395.000	1008.000	400.000	1008.000	430.000
GR	1012.000	435.000	1020.000	650.000	1040.000	800.000	0.0	0.0	0.0	0.0
EJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CHERRY RUN BELOW CHERRY RUN DAM

SUMMARY PRINTOUT

SECTION @ ≈ 1000 FT DS FROM DAM

SECNO	XLCH	ELMIN	DISCHARGE Q	ELEVATION CRSEL	CRIWS	EG	VCH	AREA	CUMULATIVE VOLUME VOL
6.000	0.0	993.00	400.00	996.14	0.0	996.41	4.22	95.62	0.0
6.000	0.0	993.00	1400.00	998.59	0.0	999.12	6.41	444.56	0.0
6.000	0.0	993.00	2500.00	1000.00	0.0	1000.61	7.52	860.00	0.0
6.000	0.0	993.00	5000.00	1001.88	0.0	1002.56	8.93	1552.87	0.0
6.000	0.0	993.00	7600.00	1003.37	0.0	1004.12	9.94	2154.63	0.0
6.000	0.0	993.00	10200.00	1004.59	0.0	1005.41	10.81	2677.47	0.0
6.000	0.0	993.00	12700.00	1005.66	0.0	1006.52	11.46	3159.96	0.0
6.000	0.0	993.00	17800.00	1007.53	0.0	1008.50	12.60	4061.42	0.0
6.000	0.0	993.00	22900.00	1009.14	0.0	1010.20	13.55	4892.37	0.0
6.000	0.0	993.00	28000.00	1010.58	0.0	1011.72	14.34	5684.04	0.0
6.000	0.0	993.00	32000.00	1011.63	0.0	1012.82	14.90	6281.30	0.0
6.000	0.0	993.00	40000.00	1013.51	0.0	1014.81	15.91	7412.33	0.0
6.000	0.0	993.00	45000.00	1014.59	0.0	1015.96	16.46	8093.84	0.0
6.000	0.0	993.00	49000.00	1015.40	0.0	1016.82	16.89	8621.27	0.0

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SUBJECT DAM SAFETY INSPECTION

CHERRY RUN DAM

BY WJV DATE 8-6-79 PROJ. NO. 79-617-279

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	SECNO	XLCH	XLMIN	DISCHARGE Q	ELEVATION CWSEL	CRITWS	EG	VCH	AREA	CUMULATIVE VOLUME VOL
SECTION @ ≈ 6000 FT DS FROM DAM	5.000	1000.00	995.00	400.00	998.16	0.0	998.43	4.18	98.73	2.23
	5.000	1000.00	995.00	1400.00	1000.44	0.0	1000.62	4.44	920.30	16.24
	5.000	1000.00	995.00	2500.00	1001.76	0.0	1001.89	4.36	1654.64	29.59
	5.000	1000.00	995.00	5000.00	1003.65	0.0	1003.79	5.00	2734.18	49.89
	5.000	1000.00	995.00	7600.00	1005.19	0.0	1005.34	5.55	3628.54	66.96
	5.000	1000.00	995.00	10200.00	1006.47	0.0	1006.65	6.04	4392.54	81.61
	5.000	1000.00	995.00	12700.00	1007.58	0.0	1007.78	6.45	5059.58	94.65
	5.000	1000.00	995.00	17800.00	1009.54	0.0	1009.76	7.18	6262.99	118.44
	5.000	1000.00	995.00	22900.00	1011.23	0.0	1011.51	7.82	7323.86	139.74
	5.000	1000.00	995.00	28000.00	1012.74	0.0	1013.06	8.39	8291.11	159.46
	5.000	1000.00	995.00	32000.00	1013.83	0.0	1014.17	8.81	8998.61	174.06
	5.000	1000.00	995.00	40000.00	1015.80	0.0	1016.20	9.57	10300.04	201.19
	5.000	1000.00	995.00	45000.00	1016.92	0.0	1017.36	10.01	11057.70	217.19
	5.000	1000.00	995.00	49000.00	1017.77	0.0	1018.24	10.35	11634.60	229.46
SECTION @ ≈ 5000 FT DS FROM DAM	4.000	1000.00	997.00	400.00	1000.15	0.0	1000.41	4.16	112.09	4.65
	4.000	1000.00	997.00	1400.00	1001.82	0.0	1002.33	6.67	395.20	31.34
	4.000	1000.00	997.00	2500.00	1002.77	0.0	1003.53	8.56	583.47	55.28
	4.000	1000.00	997.00	5000.00	1004.49	0.0	1005.56	10.91	967.35	92.37
	4.000	1000.00	997.00	7600.00	1005.92	0.0	1007.20	12.44	1330.26	123.87
	4.000	1000.00	997.00	10200.00	1007.14	0.0	1008.58	13.57	1672.41	151.23
	4.000	1000.00	997.00	12700.00	1008.19	0.0	1009.76	14.45	1988.74	175.55
	4.000	1000.00	997.00	17800.00	1010.07	0.0	1011.84	15.83	2615.40	220.35
	4.000	1000.00	997.00	22900.00	1011.71	0.0	1013.63	16.90	3218.98	260.75
	4.000	1000.00	997.00	28000.00	1013.19	0.0	1015.22	17.77	3808.26	298.35
	4.000	1000.00	997.00	32000.00	1014.26	0.0	1016.37	18.34	4266.49	326.32
	4.000	1000.00	997.00	40000.00	1016.20	0.0	1018.45	19.37	5149.40	378.52
	4.000	1000.00	997.00	45000.00	1017.32	0.0	1019.64	19.92	5690.21	409.43
	4.000	1000.00	997.00	49000.00	1018.16	0.0	1020.53	20.33	6115.16	433.20
SECTION @ ≈ 50FT DS FROM BRIDGE (LOCATED @ ≈ 4000 FT DS FROM DAM)	3.200	950.00	999.00	400.00	1001.96	0.0	1002.19	3.85	103.78	6.99
	3.200	950.00	999.00	1400.00	1004.32	0.0	1005.07	7.12	245.71	37.91
	3.200	950.00	999.00	2500.00	1005.80	0.0	1006.95	9.18	401.91	65.22
	3.200	950.00	999.00	5000.00	1007.87	1007.35	1009.66	12.21	745.31	109.47
	3.200	950.00	999.00	7600.00	1009.38	1009.11	1011.55	14.18	1088.11	147.94
	3.200	950.00	999.00	10200.00	1010.60	1010.27	1013.02	15.56	1423.58	182.01
	3.200	950.00	999.00	12700.00	1011.80	1011.80	1014.06	15.76	1812.48	213.31
	3.200	950.00	999.00	17800.00	1013.41	0.0	1015.75	16.98	2465.63	270.80
	3.200	950.00	999.00	22900.00	1014.97	0.0	1017.16	17.34	3246.10	324.89
	3.200	950.00	999.00	28000.00	1016.37	0.0	1018.42	17.51	4071.87	376.47
	3.200	950.00	999.00	32000.00	1017.55	0.0	1019.40	17.20	4859.79	416.73
	3.200	950.00	999.00	40000.00	1019.70	0.0	1021.26	16.67	6510.99	493.89
	3.200	950.00	999.00	45000.00	1020.92	0.0	1022.32	16.24	7561.86	540.47
	3.200	950.00	999.00	49000.00	1021.84	0.0	1023.13	15.95	8372.16	576.38

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM

BY WJY DATE 8-6-79 PROJ. NO. 79-617-279

CHKD. BY DLB DATE 8-6-79 SHEET NO. D OF M

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DS FACE OF BRIDGE

SECNO	XLCH	ELMIN	DISCHARGE Q	ELEVATION CWSEL	CRIWS	EG	VCH	AREA	CUMULATIVE VOLUME VOL
3.100	50.00	999.00	400.00	1002.06	0.0	1002.28	3.75	106.80	7.11
3.100	50.00	999.00	1400.00	1004.45	0.0	1005.28	7.33	190.99	38.16
3.100	50.00	999.00	2500.00	1005.85	0.0	1007.54	10.42	239.84	65.59
3.100	50.00	999.00	5000.00	1007.58	1007.58	1011.88	16.65	300.36	110.07
3.100	50.00	999.00	7600.00	1011.26	1010.14	1012.29	10.36	1630.51	149.50
3.100	50.00	999.00	10200.00	1013.04	0.0	1013.92	10.31	2301.17	184.15
3.100	50.00	999.00	12700.00	1013.81	0.0	1014.83	11.39	2653.45	215.87
3.100	50.00	999.00	17800.00	1015.28	0.0	1016.47	12.91	3418.03	274.18
3.100	50.00	999.00	22900.00	1016.34	0.0	1017.73	14.37	4056.28	329.08
3.100	50.00	999.00	28000.00	1017.34	0.0	1018.85	15.45	4716.00	381.52
3.100	50.00	999.00	32000.00	1018.16	0.0	1019.70	15.97	5296.69	422.56
3.100	50.00	999.00	40000.00	1020.03	0.0	1021.45	16.06	6790.29	501.53
3.100	50.00	999.00	45000.00	1021.18	0.0	1022.48	15.76	7789.41	549.28
3.100	50.00	999.00	49000.00	1022.04	0.0	1023.27	15.60	8559.48	586.10

US FACE OF BRIDGE @ 2ND STRUCTURE LOCATION

SECNO	XLCH	ELMIN	DISCHARGE Q	ELEVATION CWSEL	CRIWS	EG	VCH	AREA	CUMULATIVE VOLUME VOL
3.000	35.00	999.00	400.00	1002.13	0.0	1002.34	3.65	109.49	7.20
3.000	35.00	999.00	1400.00	1004.62	0.0	1005.40	7.12	196.57	38.32
3.000	35.00	999.00	2500.00	1006.22	0.0	1007.74	9.90	252.58	65.79
3.000	35.00	999.00	5000.00	1011.48	0.0	1011.88	6.56	1702.05	110.87
3.000	35.00	999.00	7600.00	1013.20	0.0	1013.66	7.49	2373.18	151.11
3.000	35.00	999.00	10200.00	1014.20	0.0	1014.77	8.63	2845.91	186.22
3.000	35.00	999.00	12700.00	1014.73	0.0	1015.46	9.95	3118.82	218.19
3.000	35.00	999.00	17800.00	1015.71	0.0	1016.74	12.15	3672.17	277.02
3.000	35.00	999.00	22900.00	1016.51	0.0	1017.82	14.05	4164.36	332.39
3.000	35.00	999.00	28000.00	1017.34	0.0	1018.85	15.42	4724.98	385.31
3.000	35.00	999.00	32000.00	1018.17	0.0	1019.70	15.93	5313.50	426.82
3.000	35.00	999.00	40000.00	1020.03	0.0	1021.45	16.05	6796.48	506.99
3.000	35.00	999.00	45000.00	1021.18	0.0	1022.48	15.76	7791.19	555.54
3.000	35.00	999.00	49000.00	1022.04	0.0	1023.27	15.60	8559.41	592.98

SECTION @ ≈ 50 FT US FROM BRIDGE (OR ≈ 3450 FT DS FROM DAM)

SECNO	XLCH	ELMIN	DISCHARGE Q	ELEVATION CWSEL	CRIWS	EG	VCH	AREA	CUMULATIVE VOLUME VOL
2.900	50.00	999.00	400.00	1002.21	0.0	1002.41	3.57	112.64	7.32
2.900	50.00	999.00	1400.00	1005.18	0.0	1005.67	5.86	328.88	38.62
2.900	50.00	999.00	2500.00	1007.95	0.0	1008.38	6.02	760.47	66.37
2.900	50.00	999.00	5000.00	1011.54	0.0	1011.93	6.49	1720.76	112.84
2.900	50.00	999.00	7600.00	1013.26	0.0	1013.71	7.41	2401.88	153.85
2.900	50.00	999.00	10200.00	1014.27	0.0	1014.83	8.55	2877.77	189.50
2.900	50.00	999.00	12700.00	1014.84	0.0	1015.54	9.79	3176.63	221.81
2.900	50.00	999.00	17800.00	1015.89	0.0	1016.86	11.85	3781.06	281.30
2.900	50.00	999.00	22900.00	1016.79	0.0	1017.99	13.55	4345.58	337.27
2.900	50.00	999.00	28000.00	1017.70	0.0	1019.05	14.76	4973.43	390.87
2.900	50.00	999.00	32000.00	1018.52	0.0	1019.91	15.27	5576.34	433.07
2.900	50.00	999.00	40000.00	1020.32	0.0	1021.63	15.49	7043.67	514.93
2.900	50.00	999.00	45000.00	1021.40	0.0	1022.62	15.38	7981.86	564.59
2.900	50.00	999.00	49000.00	1022.23	0.0	1023.40	15.29	8725.13	602.90

SUBJECT DAM SAFETY INSPECTION

CHERRY ROW DAM

BY WJV DATE 8-6-79 PROJ.NO. 79-617-279

CHKD. BY DLB DATE 8-6-79 SHEET NO. E OF M

	SECNO	XLOC	ELMIN	DISCHARGE Q	ELEVATION CWSEL	CRITS	EG	VCH	AREA	CUMULATIVE VOLUME VOL
SECTION @ 2640FT DS FROM DAM @ 1ST STRUCTURE LOCATION	2.000	1360.00	1003.00	400.00	1005.35	0.0	1005.85	5.70	70.18	10.18
	2.000	1360.00	1003.00	1400.00	1008.17	1007.06	1008.94	7.23	309.16	48.58
	2.000	1360.00	1003.00	2500.00	1009.87	0.0	1010.44	7.06	1030.28	94.32
	2.000	1360.00	1003.00	5000.00	1012.62	0.0	1013.06	5.71	2949.10	185.74
	2.000	1360.00	1003.00	7600.00	1014.61	0.0	1014.84	6.09	4227.16	257.34
	2.000	1360.00	1003.00	10200.00	1015.85	0.0	1016.11	6.69	5168.59	315.11
	2.000	1360.00	1003.00	12700.00	1016.74	0.0	1017.05	7.33	5878.00	363.16
	2.000	1360.00	1003.00	17800.00	1018.34	0.0	1018.71	8.40	7183.55	452.47
	2.000	1360.00	1003.00	22900.00	1019.68	0.0	1020.12	9.31	8319.33	534.98
	2.000	1360.00	1003.00	28000.00	1020.88	0.0	1021.37	10.09	9354.81	614.55
	2.000	1360.00	1003.00	32000.00	1021.74	0.0	1022.28	10.64	10120.95	678.12
	2.000	1360.00	1003.00	40000.00	1023.33	0.0	1023.95	11.61	11558.78	805.33
	2.000	1360.00	1003.00	45000.00	1024.21	0.0	1024.88	12.19	12371.30	882.32
	2.000	1360.00	1003.00	49000.00	1024.89	0.0	1025.60	12.61	13012.28	942.23
DS TOE OF DAM	1.000	2640.00	1008.00	400.00	1011.44	0.0	1011.62	3.39	118.03	15.88
	1.000	2640.00	1008.00	1400.00	1014.15	0.0	1014.65	5.84	373.22	67.11
	1.000	2640.00	1008.00	2500.00	1015.24	0.0	1016.15	8.17	602.83	134.30
	1.000	2640.00	1008.00	5000.00	1016.33	1016.33	1018.46	12.96	912.39	274.88
	1.000	2640.00	1008.00	7600.00	1018.00	1018.00	1020.28	14.30	1526.26	389.46
	1.000	2640.00	1008.00	10200.00	1019.13	1019.13	1021.68	15.73	2046.41	480.59
	1.000	2640.00	1008.00	12700.00	1020.64	1020.64	1022.72	15.11	2852.05	563.89
	1.000	2640.00	1008.00	17800.00	1021.91	1021.91	1024.35	17.19	3572.97	699.52
	1.000	2640.00	1008.00	22900.00	1022.66	1022.66	1025.75	19.84	4005.32	817.67
	1.000	2640.00	1008.00	28000.00	1023.86	0.0	1027.00	20.70	4716.78	937.52
	1.000	2640.00	1008.00	32000.00	1024.80	0.0	1027.93	21.17	5282.50	1031.87
	1.000	2640.00	1008.00	40000.00	1026.49	0.0	1029.68	22.11	6334.16	1216.66
	1.000	2640.00	1008.00	45000.00	1027.43	0.0	1030.70	22.73	6936.55	1326.41
	1.000	2640.00	1008.00	49000.00	1028.16	0.0	1031.48	23.21	7402.45	1411.96

NOTE: STORAGE VOLUMES @ SECTION 2 (BETWEEN DAM AND SECTION 2) WERE OBTAINED BY SUBTRACTING THE CUMULATIVE VOLUME VALUES OF SECTION 1.0 FROM THOSE OF SECTION 2.0. STORAGE VOLUMES @ SECTION 3 (BETWEEN SECTION 2 AND SECTION 3) WERE OBTAINED BY SUBTRACTING THE CUMULATIVE VOLUME VALUES OF SECTION 2.0 FROM THOSE OF SECTION 3.0.

DAM SAFETY INSPECTION
CHERRY RUN DAM ****** OVERTOPPING ANALYSIS ******
15-MINUTE TIME STEP AND 48-HOUR STORM DURATION

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
288	0	15	0	0	0	0	0	0	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 3 LRTIO= 1
RTIOS= .40 .50 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW INTO CHERRY RUN DAM RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	11.40	0.00	11.40	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	24.00	101.00	119.00	129.00	139.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .805

INITIAL AND CONSTANT RAINFALL LOSSES AS PER COE

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	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= 4.11 CP= .45 NTA= 0

BASE FLOW PARAMETERS AS PER COE

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC=17.13 AND R=26.16 INTERVALS

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 4.15 HOURS, CP= .45 VOL= .97

11.	42.	86.	140.	201.	267.	338.	412.	490.	564.
631.	689.	738.	777.	806.	824.	826.	809.	779.	750.
721.	694.	668.	643.	619.	596.	574.	552.	531.	511.
492.	474.	456.	439.	422.	407.	391.	377.	363.	349.
336.	323.	311.	299.	288.	277.	267.	257.	247.	238.
229.	221.	212.	204.	197.	189.	182.	175.	169.	162.
156.	150.	145.	139.	134.	129.	124.	120.	115.	111.
107.	103.	99.	95.	92.	88.	85.	82.	79.	76.
73.	70.	67.	65.	62.	60.	58.	56.	54.	52.
50.	48.	46.	44.	43.	41.	39.	38.	37.	35.

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM
OVERTOPPING
BY WJV DATE 8-6-79 PROJ. NO. 79-627-275
CHKD. BY DLB DATE 8-6-79 SHEET NO. F OF M

SUBJECT DAM SAFETY INSPECTION
CHERRY POND DAM
BY WJV DATE 8-6-79 PROJ. NO. 79-077-279
CHKD BY DLR DATE 8-6-79 SHEET NO. 6 OF M

Engineers • Geologists • Planners
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O MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	26.84	24.42	2.42	700683.
										(682.)(620.)(62.)(19841.13)			
				PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME					
			CFS	14659.	12737.	6605.	2433.	700642.					
			CMS	415.	361.	187.	69.	19840.					
			INCHES		10.39	21.56	23.82	23.82					
			MM		264.00	547.56	605.07	605.07					
			AC-FT		6316.	13100.	14476.	14476.					
			THOUS CU M		7791.	16159.	17856.	17856.					
				PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME					
			CFS	5864.	5095.	2642.	973.	280257.					
			CMS	166.	144.	75.	28.	7936.					
			INCHES		4.16	8.62	9.53	9.53					
			MM		105.60	219.02	242.03	242.03					
			AC-FT		2526.	5240.	5790.	5790.					
			THOUS CU M		3116.	6463.	7142.	7142.					
				PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME					
			CFS	7329.	6369.	3302.	1216.	350321.					
			CMS	208.	180.	94.	34.	9920.					
			INCHES		5.20	10.78	11.91	11.91					
			MM		132.00	273.78	302.53	302.53					
			AC-FT		3158.	6550.	7238.	7238.					
			THOUS CU M		3895.	8079.	8928.	8928.					

INFLOWS INTO RESERVOIR

PMF

0.4 PMF.

0.5 PMF

HYDROGRAPH ROUTING

ROUTE INFLOW THROUGH RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
101	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1025.	2

SURFACE AREA=	0.	31.	35.	39.	43.	47.	51.	58.	66.	70.
CAPACITY=	0.	185.	218.	256.	297.	341.	390.	498.	622.	690.
ELEVATION=	1007.	1025.	1026.	1027.	1028.	1029.	1030.	1032.	1034.	1035.

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
1025.0	132.0	0.0	0.0	0.0	0.0	0.0	0.0

SUBJECT DAM SAFETY INSPECTION
CHERRY ROW DAM
BY WJV DATE 8-6-79 PROJ. NO. 79-617-272
CHKD. BY DLP DATE 8-6-79 SHEET NO. H OF M

					IABCUA	ISPITW	ISPCIW			
					10	10	10			
				SS	NGATES	DESHD	APEL	APWID	APLOSS	PDPTH
				0.00	1	5.0	1008.0	132.0	0.0	9.0
1007.20	0.	0.	0.0	0.	0.	0.0	0.	0.	0.	
1025.00	185.	0.	0.0	0.	0.	0.0	0.	0.	0.	
1026.00	218.	439.	1008.1	439.	0.	0.0	0.	439.	439.	
1027.00	256	1316	1008.3	1316.	0.	0.0	0.	1316.	1316.	
1028.00	297.	2547.	1008.6	2547.	0.	0.0	0.	2547.	2547.	
1029.00	341.	4097.	1008.9	4097.	0.	0.0	0.	4097.	4097.	
1030.00	390.	5899.	1009.3	5899.	0.	0.0	0.	5899.	5899.	
1032.00	498.	9980.	1010.1	9980.	0.	0.0	0.	9980.	9980.	

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1030.0	0.0	0.0	0.

CREST LENGTH	25.	70.	105.	120.	195.	270.	305.	340.	375.	410.
AT OR BELOW ELEVATION	1030.0	1030.1	1030.3	1030.4	1030.8	1030.9	1031.1	1032.0	1033.0	1034.0

RESERVOIR OUTFLOW HYDROGRAPHS

PEAK OUTFLOW IS 14601. AT TIME 44.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	14601.	12292.	6603.	2432.	700403.
CMS	413.	348.	187.	69.	19833.
INCHES		10.03	21.55	23.81	23.81
MM		254.77	547.41	604.86	604.86
AC-FT		6095.	13097.	14471.	14471.
THOUS CU M		7518.	16154.	17850.	17850.

PMF

PEAK OUTFLOW IS 5816. AT TIME 44.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5816.	5077.	2641.	973.	280185.
CMS	165.	144.	75.	28.	7934.
INCHES		4.14	8.62	9.53	9.53
MM		105.23	218.93	241.97	241.97
AC-FT		2518.	5238.	5789.	5789.
THOUS CU M		3105.	6461.	7141.	7141.

0.4 PMF

PEAK OUTFLOW IS 7292. AT TIME 44.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7292.	6348.	3301.	1216.	350212.
CMS	206.	180.	93.	34.	9917.
INCHES		5.18	10.77	11.91	11.91
MM		131.58	273.65	302.44	302.44
AC-FT		3148.	6547.	7236.	7236.
THOUS CU M		3883.	8076.	8925.	8925.

0.5 PMF

SUBJECT DAM SAFETY INSPECTION
CHERRY ROW DAM
BY WJV DATE 8-6-79 PROJ.NO. 79-617-273
CHKD.BY DLB DATE 9-6-79 SHEET NO. 1 OF M

CONSULTANTS
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HYDROGRAPH ROUTING

ROUTE FROM DAM TO SECTION 2 * 2640 FT DS FROM DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
102	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

STORAGE	0.00	5.70	18.50	40.00	89.10	132.00	165.00	201.00	247.00
	324.00	354.00	411.00	444.00	470.00				
OUTFLOW	0.00	400.00	1400.00	2500.00	5000.00	7600.00	10200.00	12700.00	17800.00
	28000.00	32000.00	40000.00	45000.00	49000.00				

HYDROGRAPHS @ SECTION 2 @ 1ST HOUSES

PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	14591.	12283.	6602.	2432.	700343.
CMS	413.	348.	187.	69.	19832.
INCHES		10.02	21.55	23.81	23.81
MM		254.57	547.35	604.81	604.81
AC-FT		6091.	13095.	14470.	14470.
THOUS CU M		7513.	16153.	17848.	17848.

MAXIMUM STORAGE = 218.

0.4 PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5802.	5069.	2641.	973.	280162.
CMS	164.	144.	75.	28.	7933.
INCHES		4.14	8.62	9.53	9.53
MM		105.05	218.92	241.95	241.95
AC-FT		2513.	5238.	5788.	5788.
THOUS CU M		3100.	6460.	7140.	7140.

MAXIMUM STORAGE = 102.

0.5 PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7270.	6338.	3301.	1216.	350183.
CMS	206.	179.	93.	34.	9916.
INCHES		5.17	10.77	11.91	11.91
MM		131.36	273.64	302.42	302.42
AC-FT		3143.	6547.	7235.	7235.
THOUS CU M		3876.	8075.	8924.	8924.

MAXIMUM STORAGE = 127.

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM
BY WJV DATE 8-6-79 PROJ. NO. 79-677-279
CHKD. BY DLR DATE 8-6-79 SHEET NO. 1 OF M

HYDROGRAPH ROUTING

ROUTE FROM SECTION 2 TO SECTION 3 = 4000 FT DS FROM DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
203	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

STORAGE	0.00	3.00	10.30	28.50	74.90	106.00	129.00	145.00	175.00
	229.00	251.00	298.00	327.00	349.00				
OUTFLOW	0.00	400.00	1400.00	2500.00	5000.00	7600.00	10200.00	12700.00	17800.00
	28000.00	32000.00	40000.00	45000.00	49000.00				

PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	14572.	12278.	6602.	2432.	700312.
CMS	413.	348.	187.	69.	19831.
INCHES		10.02	21.55	23.81	23.81
MM		254.47	547.31	604.78	604.78
AC-FT		6088.	13094.	14469.	14469.
THOUS CU M		7510.	16151.	17848.	17848.

MAXIMUM STORAGE = 156.

HYDROGRAPHS
@ SECTION 3
@ 3RD STRUCTURE

0.4 PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5790.	5061.	2641.	973.	280149.
CMS	164.	143.	75.	28.	7933.
INCHES		4.13	8.62	9.52	9.52
MM		104.89	218.91	241.93	241.93
AC-FT		2509.	5237.	5788.	5788.
THOUS CU M		3095.	6460.	7140.	7140.

MAXIMUM STORAGE = 84.

0.5 PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7259.	6330.	3301.	1216.	350167.
CMS	206.	179.	93.	34.	9916.
INCHES		5.17	10.77	11.91	11.91
MM		131.20	273.64	302.40	302.40
AC-FT		3149.	6547.	7235.	7235.
THOUS CU M		3872.	8075.	8924.	8924.

MAXIMUM STORAGE = 102.

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM
BY WJV DATE 8-6-79 PROJ. NO. 79-617-273
CHKD. BY DLB DATE 8-6-79 SHEET NO. K OF M

GAI CONSULTANTS
Engineers • Geologists • Planners
Environmental Specialists

SUMMARY OF DAM SAFETY ANALYSIS

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1025.00	1025.00	1030.00
STORAGE	185.	185.	390.
OUTFLOW	0.	0.	5899.

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
.40	1029.95	0.00	368.	5816.	0.00	44.00	0.00
.50	1030.62	.62	422.	7292.	4.00	44.00	0.00
1.00	1033.01	3.01	561.	14601.	11.75	44.00	0.00

SECTION 2

@ 1ST TWO HOUSES

RATIO	MAXIMUM * FLOW, CFS	MAXIMUM ** STAGE, FT
0.4	5802	1013.4
0.5	7270	1014.4
1.0	14591	1017.3

SECTION 3

@ 3RD HOUSE AND 1ST BRIDGE

RATIO	MAXIMUM * FLOW, CFS	MAXIMUM ** STAGE, FT
0.4	5790	1012.0
0.5	7259	1013.0
1.0	14572	1015.1

* FLOWS OBTAINED FROM DETAILED HEC-1 OUTPUT

** ELEVATIONS INTERPOLATED FROM SHEETS D AND E

DAM SAFETY INSPECTION
CHERRY RUN DAM ****** BREACHING ANALYSIS ******
15-MINUTE TIME STEP AND 48-HOUR STORM DURATION

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
288	0	15	0	0	0	0	0	-4	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 6 NRTIO= 1 LRTIO= 1

RTIOS= .41

BREACHING ANALYSIS CONSISTS OF SAME INPUT DATA AS FOR THE OVERTOPPING ANALYSIS W/ THE ADDITION OF THE BREACH DATA GIVEN HERE

HYDROGRAPH ROUTING

ROUTE INFLOW THROUGH RESERVOIR

PLAN

DAM DATA

TOPEL	COOD	EXPD	DAMWID
1030.0	0.0	0.0	0.

(1)

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
0.	1.00	1012.00	.50	1025.00	1030.00

BEGIN DAM FAILURE AT 43.75 HOURS

PEAK OUTFLOW IS 8032. AT TIME 44.25 HOURS

(2)

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
300.	3.00	1012.00	.50	1025.00	1030.00

BEGIN DAM FAILURE AT 43.75 HOURS

PEAK OUTFLOW IS 16410. AT TIME 44.11 HOURS

(3)

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
0.	1.00	1012.00	4.00	1025.00	1030.00

BEGIN DAM FAILURE AT 43.75 HOURS

PEAK OUTFLOW IS 5967. AT TIME 44.08 HOURS

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM
BREACHING
BY WJV DATE 8-6-79 PROJ. NO. 79-617-278
CHKD. BY DLB DATE 8-6-79 SHEET NO. 1 OF M

GAI CONSULTANTS
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Environmental Specialists

PLAN

④

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
300.	3.00	1012.00	4.00	1025.00	1030.00

BEGIN DAM FAILURE AT 43.75 HOURS

PEAK OUTFLOW IS 7213. AT TIME 44.58 HOURS

⑤

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
150.	1.00	1012.00	1.00	1025.00	1030.00

BEGIN DAM FAILURE AT 43.75 HOURS

PEAK OUTFLOW IS 11628. AT TIME 44.56 HOURS

⑥

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
100.	1.00	1012.00	.25	1025.00	1030.00

BEGIN DAM FAILURE AT 43.75 HOURS

PEAK OUTFLOW IS 20722. AT TIME 44.00 HOURS

SUMMARY OF DAM SAFETY ANALYSIS

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1025.00	1025.00	1030.00
STORAGE	185.	185.	390.
OUTFLOW	0.	0.	5899.

PLAN	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
①	.41	1030.02	.02	391.	8032.	.45	44.25	43.75
②	.41	1030.01	.01	391.	18410.	.27	44.11	43.75
③	.41	1030.03	.03	391.	5967.	.83	44.08	43.75
④	.41	1030.01	.01	391.	7213.	.33	44.58	43.75
⑤	.41	1030.02	.02	391.	11628.	.29	44.56	43.75
⑥	.41	1030.02	.02	391.	20722.	.28	44.00	43.75

NOTE: SEE SHEET 15 OF 15 FOR DOWNSTREAM ROUTING SUMMARY

SUBJECT DAM SAFETY INSPECTION
CHERRY RUN DAM

BY WJV DATE 8-6-79 PROJ. NO. 79-617-278

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

GAI CONSULTANTS
Engineers • Geologists • Planners
Environmental Specialists

* PLAN NUMBER
① ② ③ ④ ⑤ ⑥

LIST OF REFERENCES

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2. "Unit Hydrograph Concepts and Calculations," by Corps of Engineers, Baltimore District (L-519).

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12. "Hydraulics of Bridge Waterways," BPR, 1970, Discharge Coefficient Based on Criteria for Embankment Shaped Weirs, Figure 24, page 46.

13. Applied Hydraulics in Engineering, Morris, Henry M. and Wiggert, James N., Virginia Polytechnic Institute and State University, 2nd Edition, The Ronald Press Company, New York, 1972.

14. Standard Mathematical Tables, 21st Edition, The Chemical Rubber Company, 1973, page 15.

15. Engineering Field Manual, U. S. Department of Agriculture, Soil Conservation Service, 2nd Edition, Washington, D. C. 1969.

APPENDIX D

PHOTOGRAPHS

PHOTOGRAPH 1 View of the downstream embankment face as seen from the left abutment.

PHOTOGRAPH 2 View of the upstream embankment face to the left of the spillway.

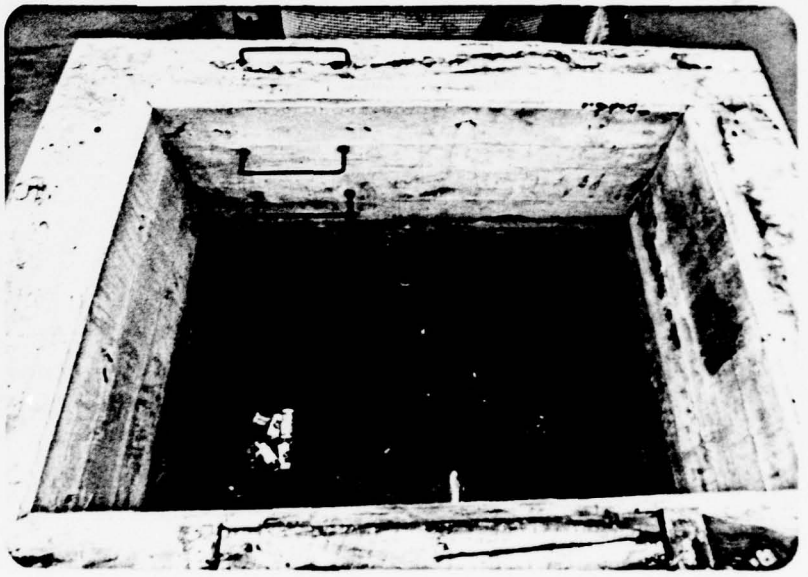
PHOTOGRAPH 3 View of the reservoir behind Cherry Run Dam as seen from the embankment crest. The structure in the center of the view is what remains of the control tower. Note the deteriorated condition of the access footbridge.

PHOTOGRAPH 4 View of the interior of the control tower that formerly housed all of the valving mechanisms for the outlet works.

1

2

3



4

DS FACE OF BRIDGE

US FACE OF BRIDGE @ 2ND STRUCTURE LOCATION

SECTION @ ≈ 50 FT US FROM BRIDGE (OR ≈ 315 FT DS FROM DAM)

PHOTOGRAPH 5 View of the discharge end of the 24-inch diameter C.I.P. blowoff located to the left of the spillway about 75 feet downstream of the embankment.

PHOTOGRAPH 6 View of the discharge end of the 80-foot terra-cotta extension of the blowoff conduit.

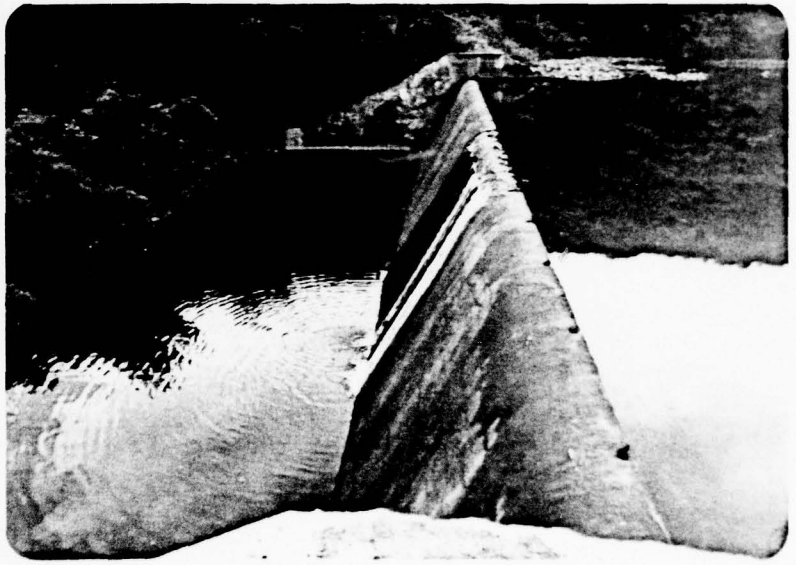
PHOTOGRAPH 7 View of the dilapidated pump house located downstream of the embankment.

PHOTOGRAPH 8 View of the spillway as seen from atop the left wingwall.

5

6

7



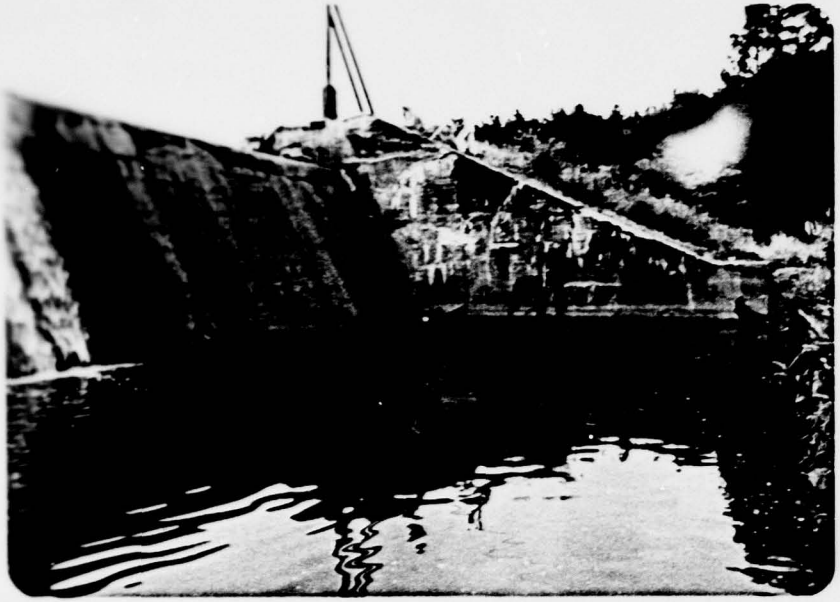
8

PHOTOGRAPH 9 View of the deteriorated left wingwall of the spillway. Note the extensive cracking, spalling, and efflorescence.

PHOTOGRAPH 10 Close-up view of the left wingwall of the spillway. Note the outward bow in the center portion of the wall and the spalling near the top.

PHOTOGRAPH 11 View of the heavily overgrown spillway discharge channel.

PHOTOGRAPH 12 View of a bridge and low lying house located less than one mile downstream of the embankment.



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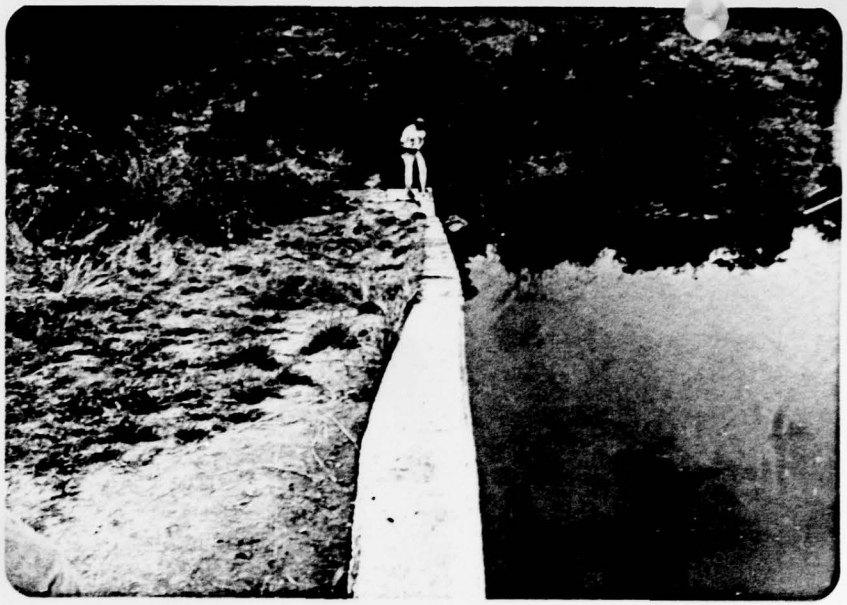

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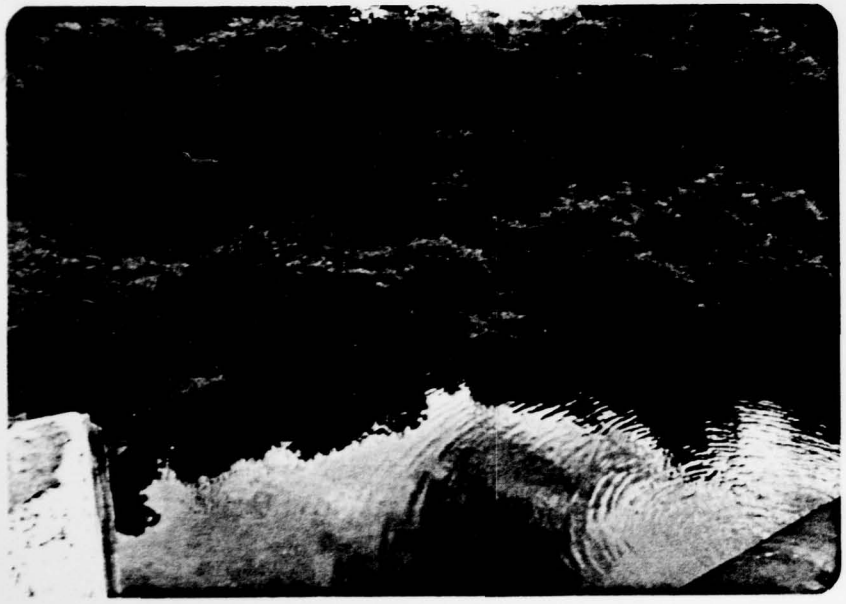

11

12

APPENDIX E

GEOLOGY

Geology*

Cherry Run Dam is located in the Pittsburgh Plateaus Section of the Appalachian Plateaus Physiographic Province. The Pittsburgh Plateaus Section is characterized by flat lying to gently folded sedimentary rock strata of Pennsylvania age. Major structural axes strike from southwest to northeast with the rock strata generally dipping northwest and southeast. The amplitude of folding in this section is quite low, consequently, surface expression of the anticlinal axes is not evident.

Cherry Run Dam and reservoir are located approximately one mile west of Homer City on Cherry Run, a tributary of Two Lick Creek. Structurally, the dam lies just west of the axial trace of the Latrobe syncline. Rock strata underlying thedam and reservoir, therefore, dip to the southeast at approximately 133 feet per mile or about one degree.

The dam and reservoir are located on sedimentary rock strata of the Conemaugh Group of Pennsylvanian age. The embankment is constructed on bedrock of the lower half of the Conemaugh group. This section of the Conemaugh consists of interbedded sandstones, a few thin limestones and minor coal beds.

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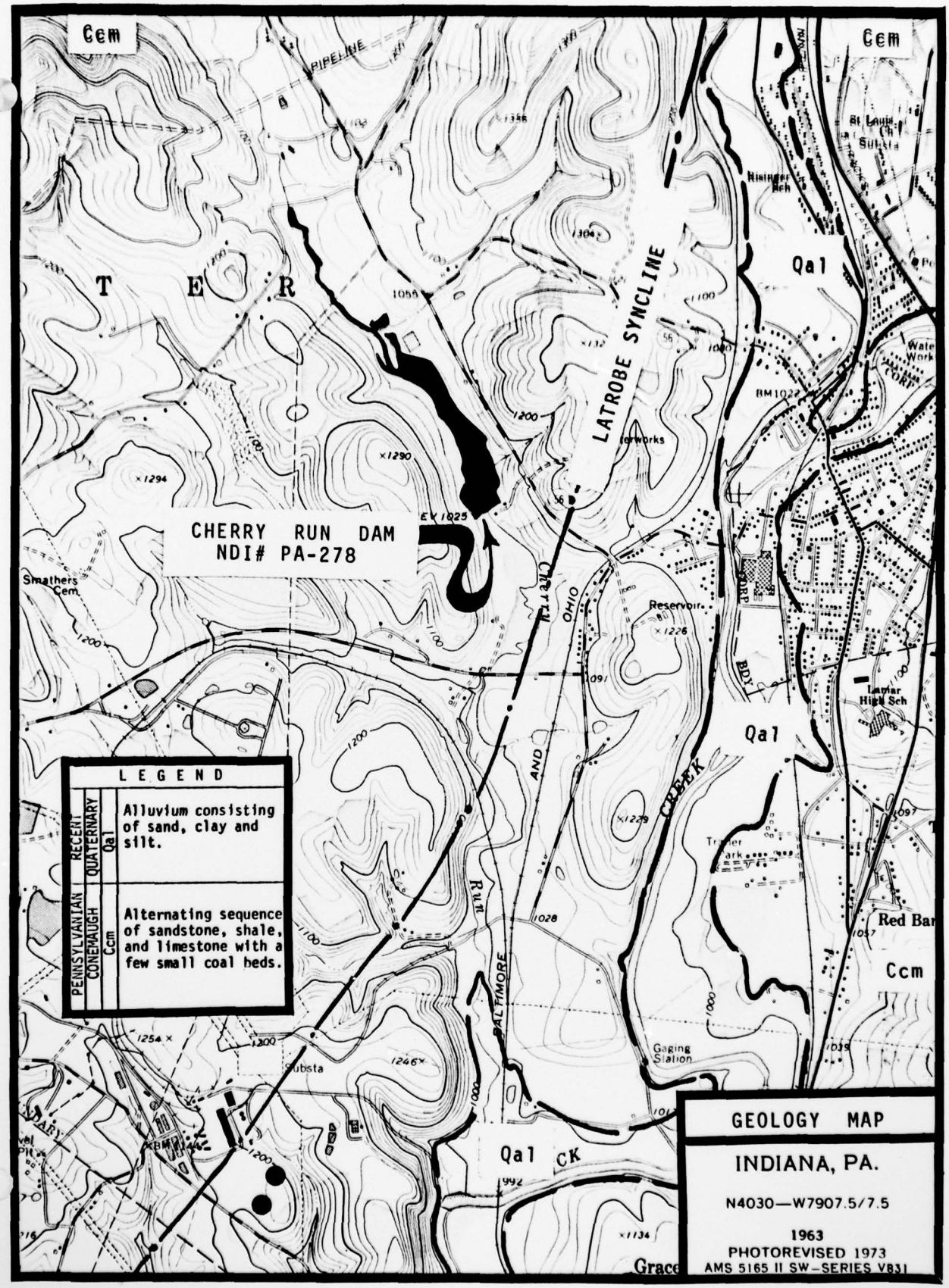
*Indiana Folio, Pennsylvania, U. S. Geological Survey, No. 102, 1904.


Cem
PIPELINE
T E R
LATROBE SYNCLINE
Qal
CHERRY RUN DAM
NDI# PA-278
EV 1025
Smathers Cem
OHIO
CHERRY RUN AND BALTIMORE
Reservoir
BDY
Lamar High Sch
CREEK
Qal
Red Bar
Ccm
Gaging Station
Substa
Qal
CK
Grace
LEGEND
PENNSYLVANIAN
RECENT
QUATERNARY
Qal
Alluvium consisting of sand, clay and silt.
CONEMAUGH
Ccm
Alternating sequence of sandstone, shale, and limestone with a few small coal beds.
GEOLOGY MAP
INDIANA, PA.
N4030—W7907.5/7.5
1963
PHOTOREVISED 1973
AMS 5165 II SW—SERIES V831

APPENDIX F

FIGURES

LIST OF FIGURES

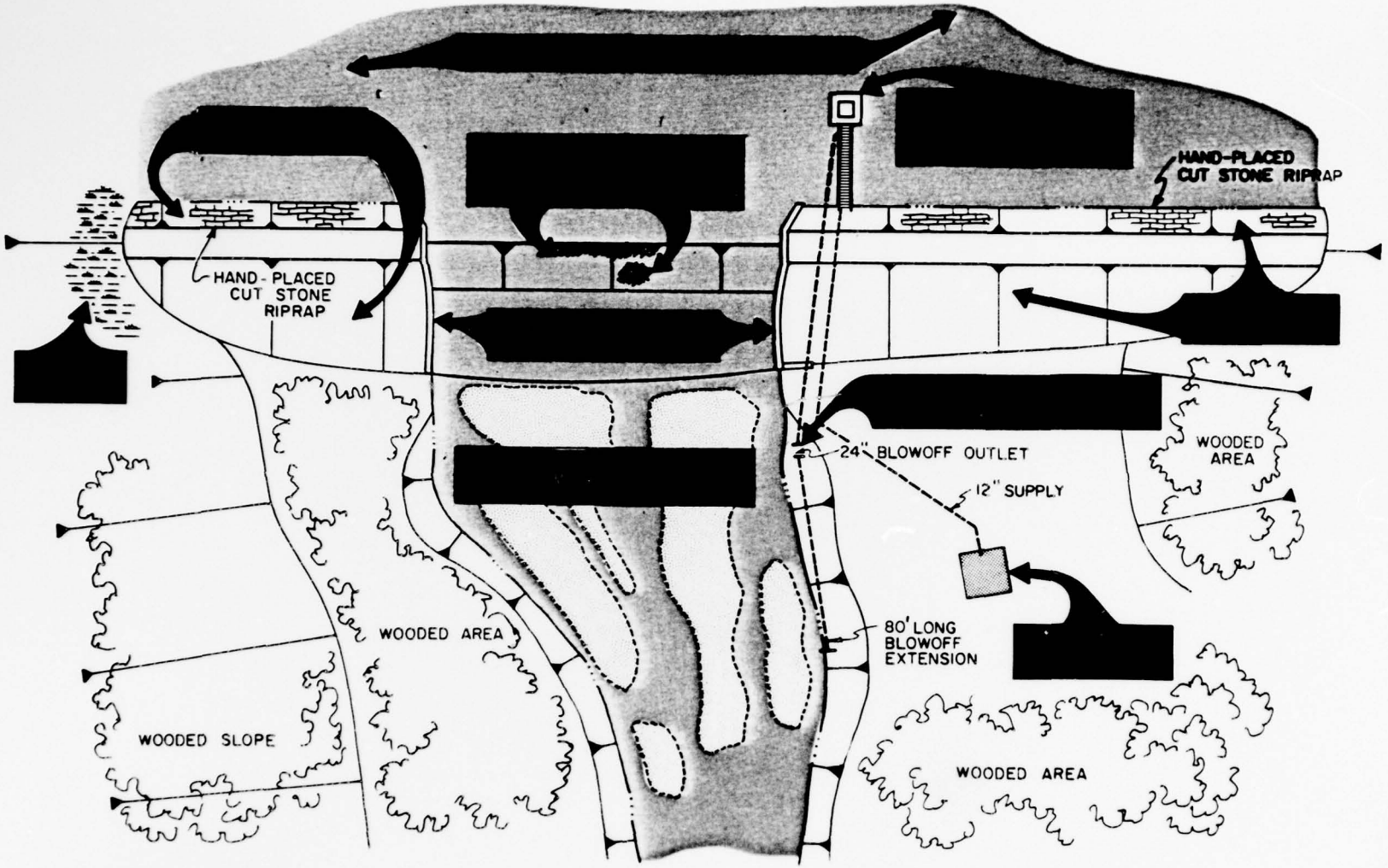
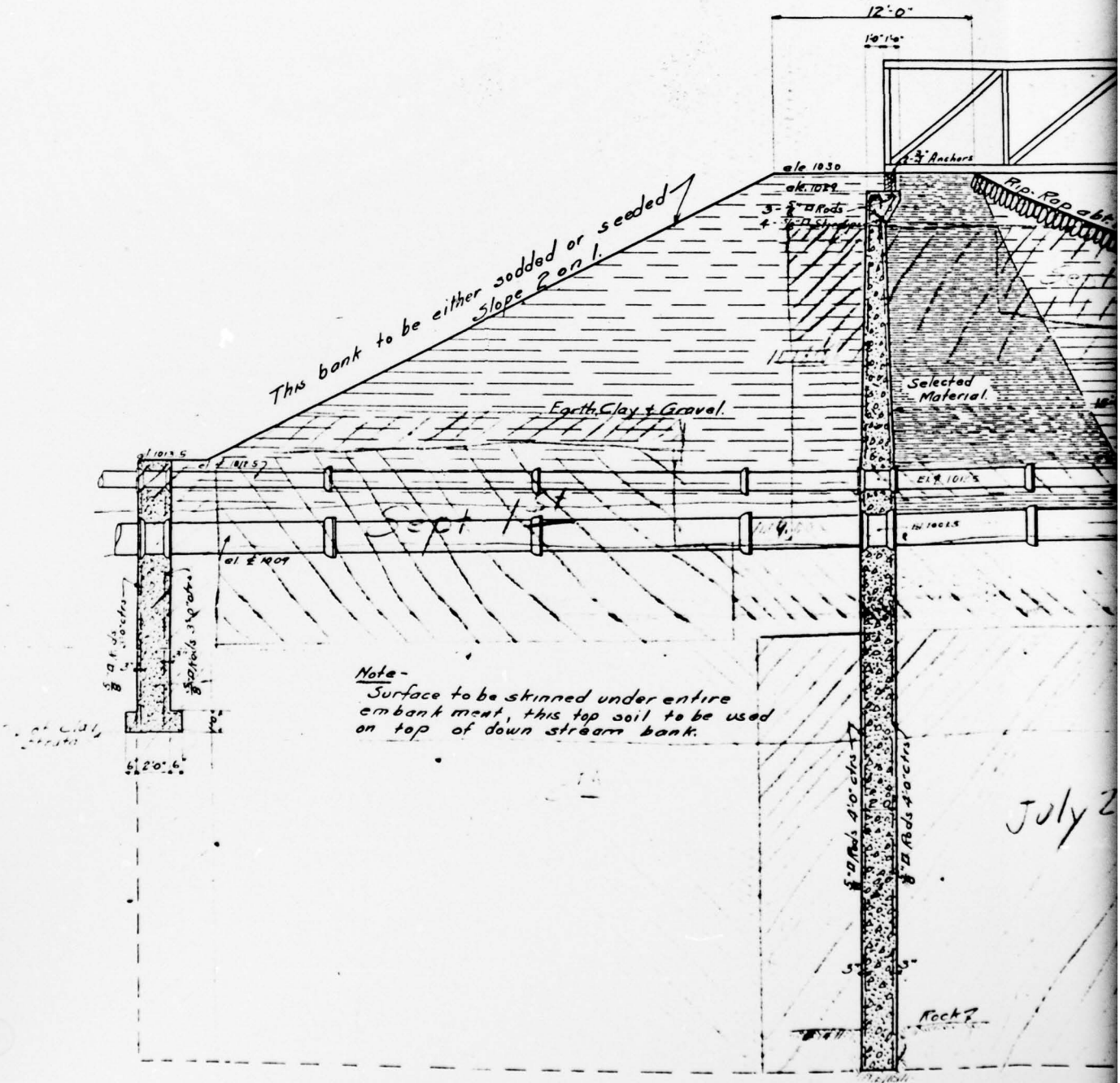
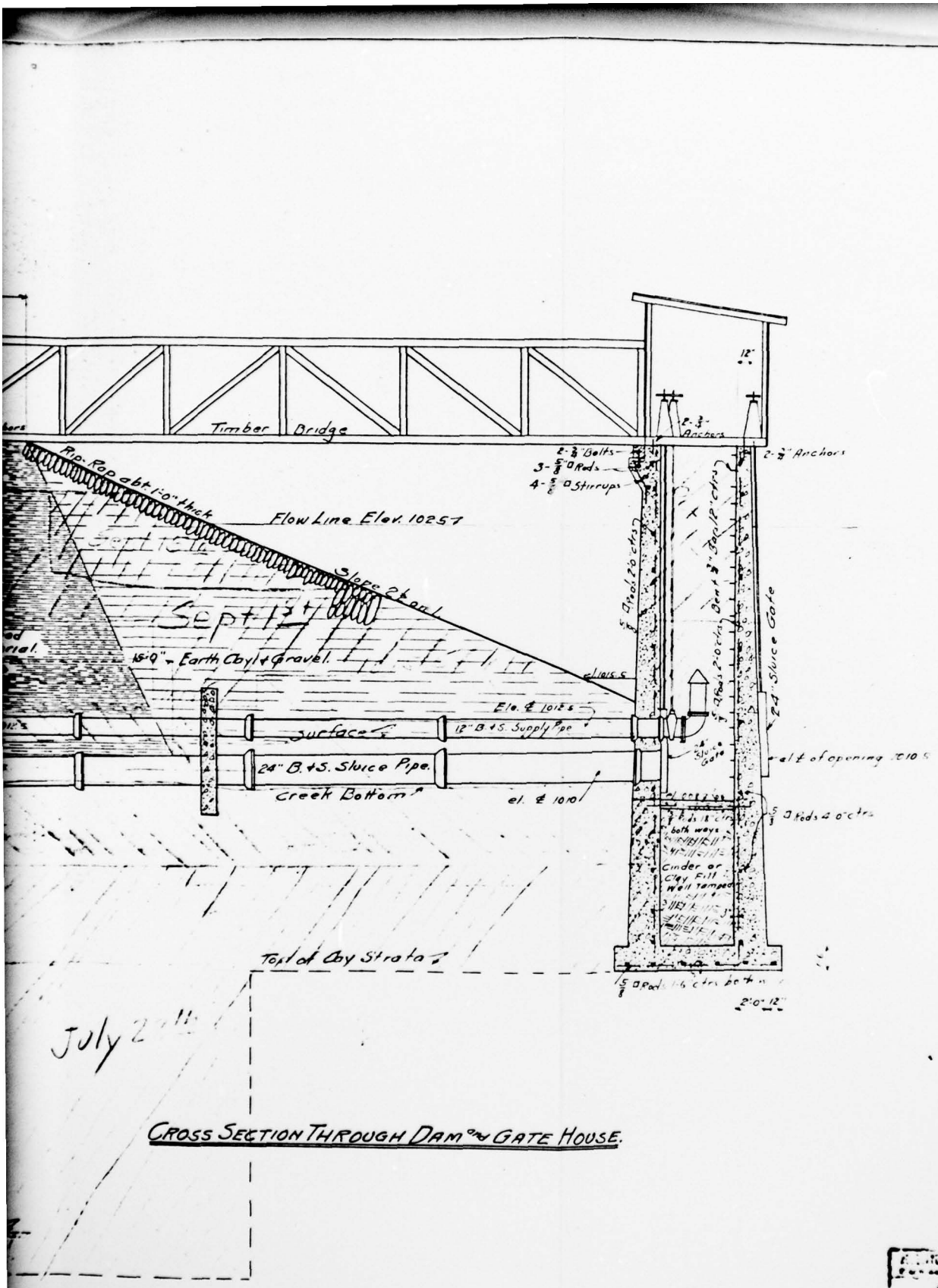


FIGURE 1 - CHERRY RUN DAM

GENERAL PLAN : FIELD INSPECTION NOTES

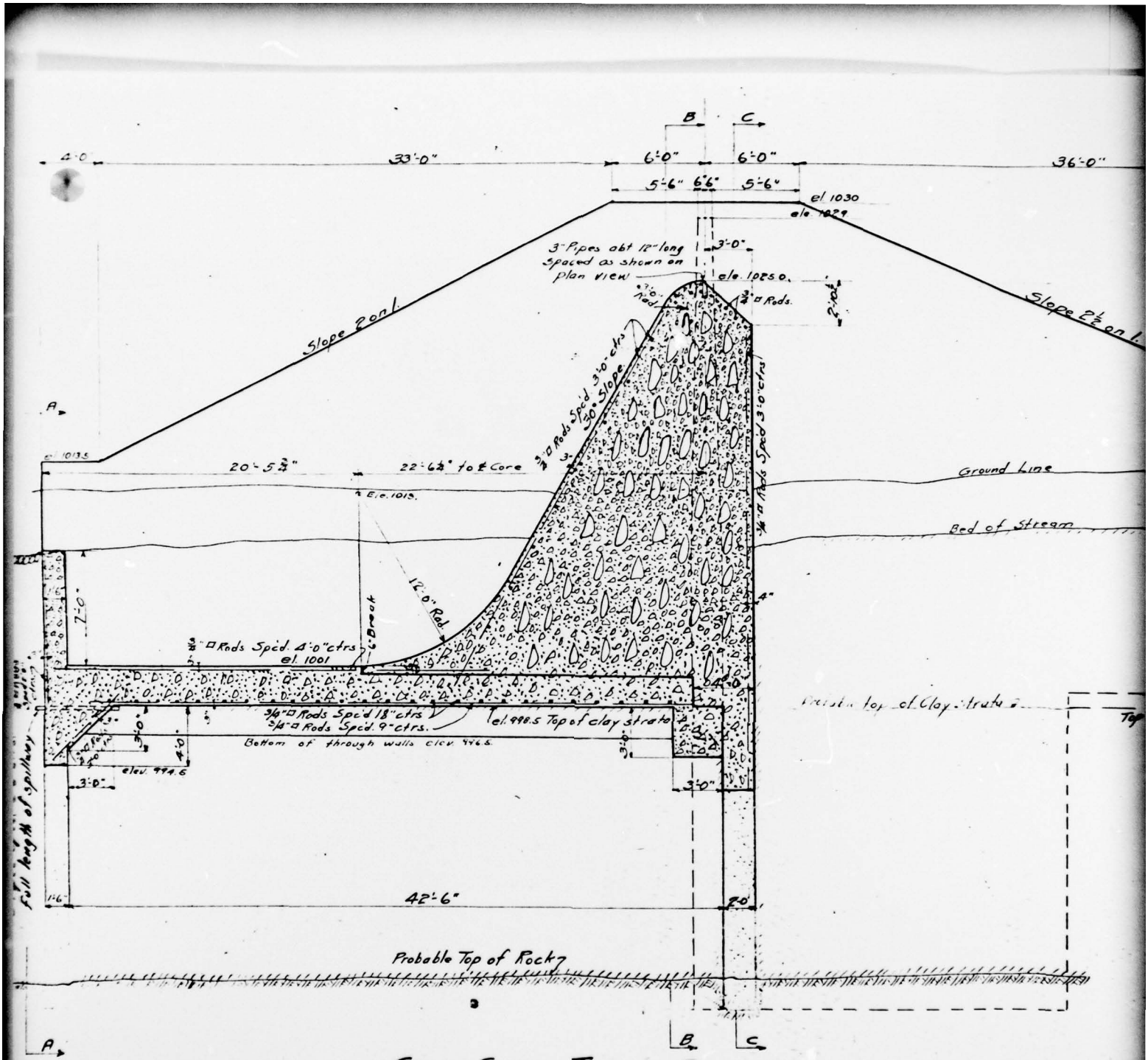

12'-0"
1'-0"
1'-0"
Elev 1030
Elev 1029
3-¾" □ Rods
4-¾" □ Stirrups
2-1¼" Anchors
Rip-Rap abt
This bank to be either sodded or seeded
Slope 2 on 1.
Earth, Clay & Gravel.
Selected Material
Elev 1013.5
Elev 1011.5
Elev 1009
Elev 1001.5
Sept 1
Note-
Surface to be stripped under entire embankment, this top soil to be used on top of down stream bank.
2'-0"
6"
July 2
Rock



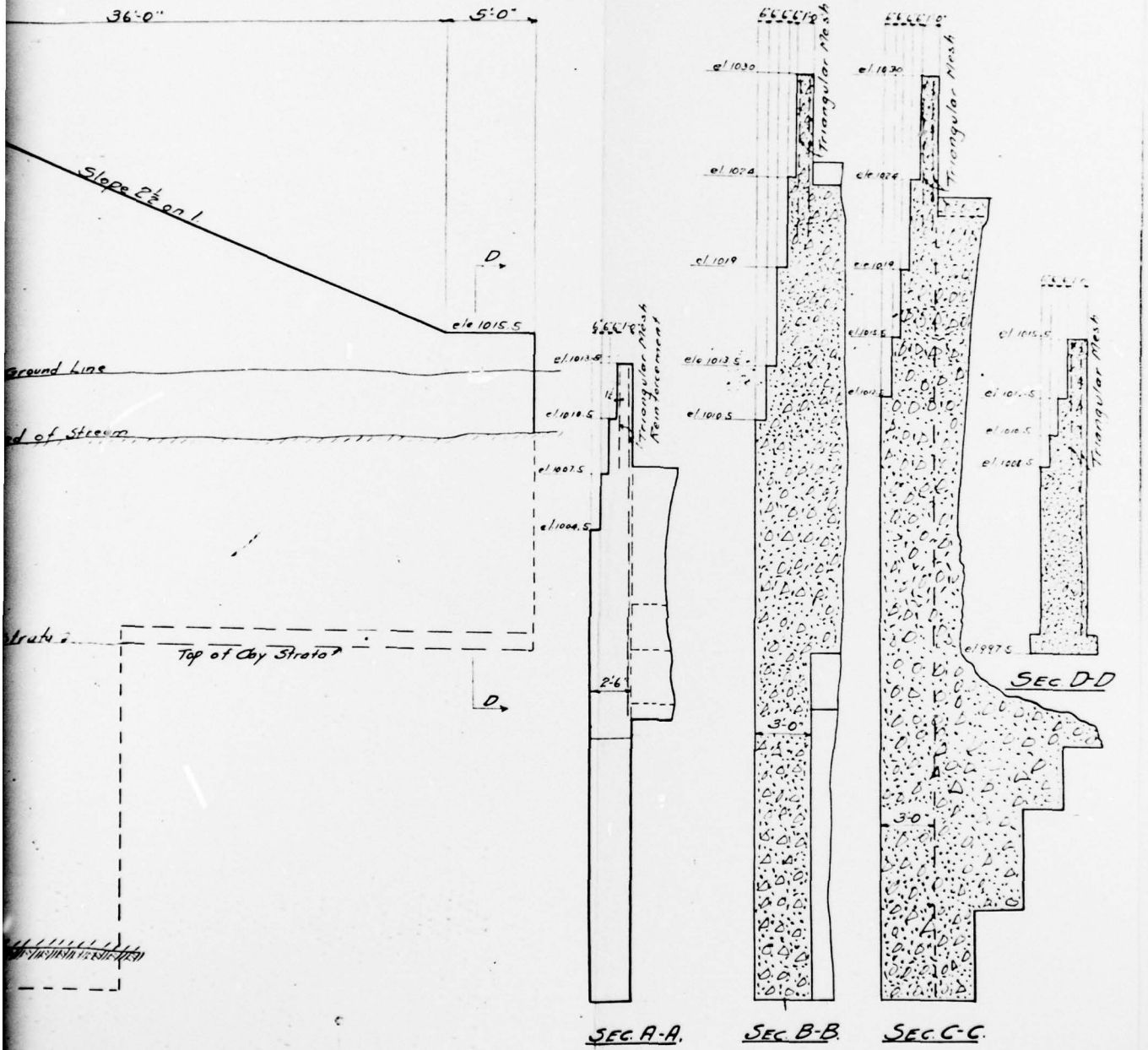
CROSS SECTION THROUGH DAM AND GATE HOUSE.

FIGURE 2

PROPOSED
CHERRY RUN D



CROSS SECTION THROUGH SPILLWAY

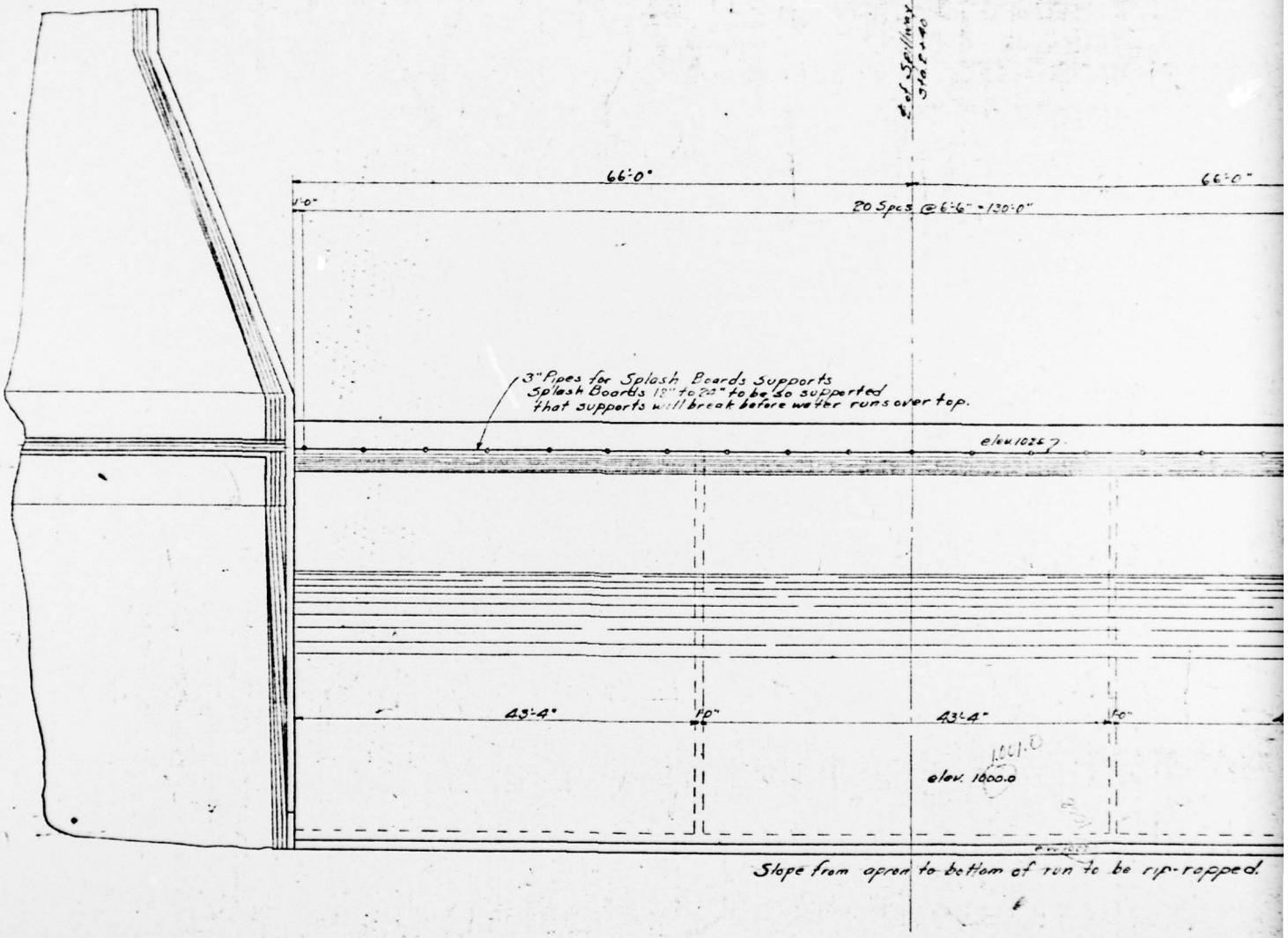


Note-
Triangular Mesh Reinforcement for wing walls to have a total effective longitudinal sectional area of .12 square inch per foot of width. To be placed in Horizontal strips.

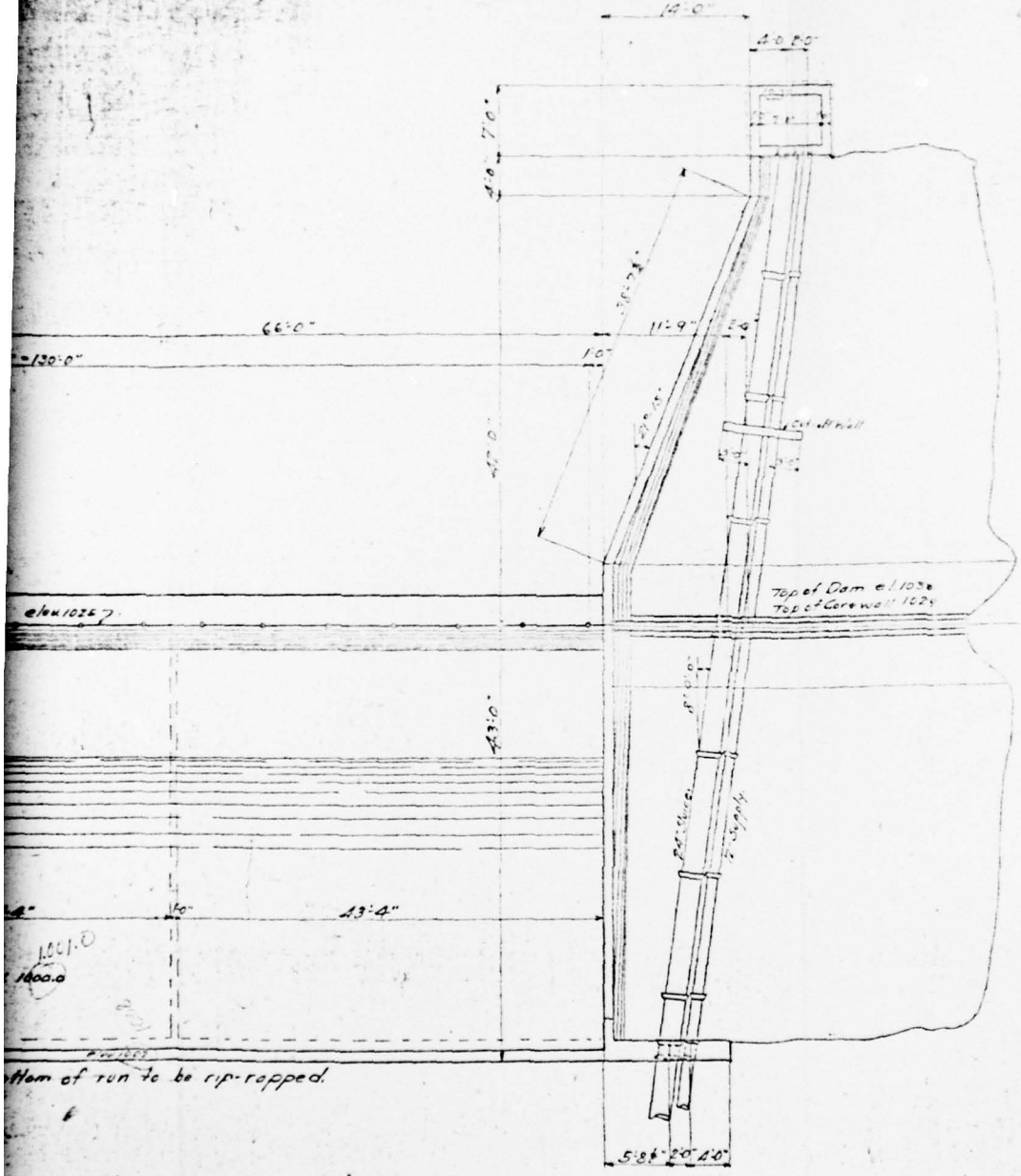
Revised Sept 20th
Revised Aug 31st 1937
Rev. Apr 29th

PROPOSED
CHERRY RUN DAM
Luster
Luster
Jan 18 1937 E 378-6

FIGURE 3



PLAN VIEW OF SPILLWAY



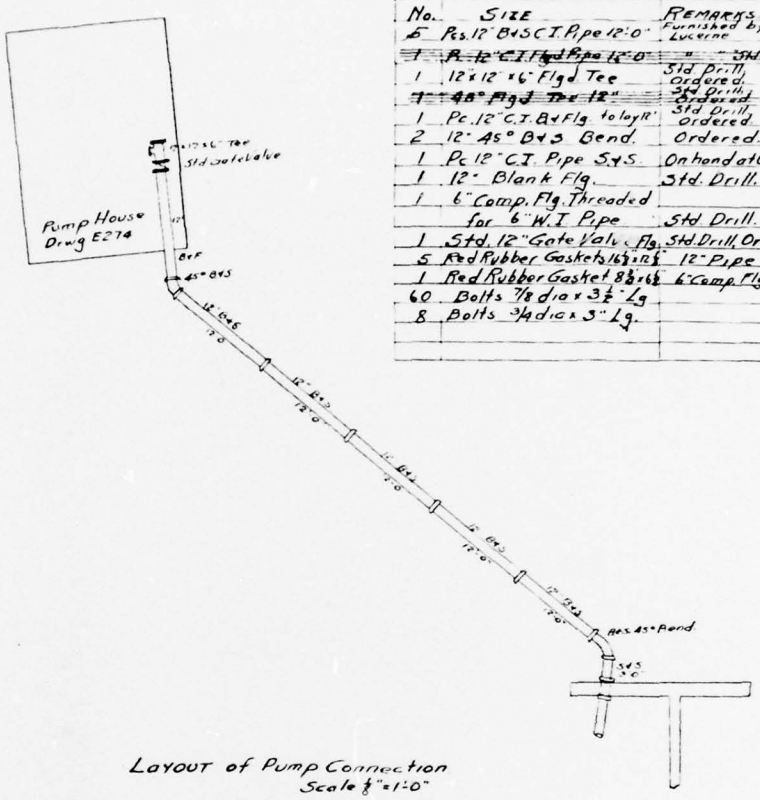
bottom of run to be rip-rapped.

SPILLWAY

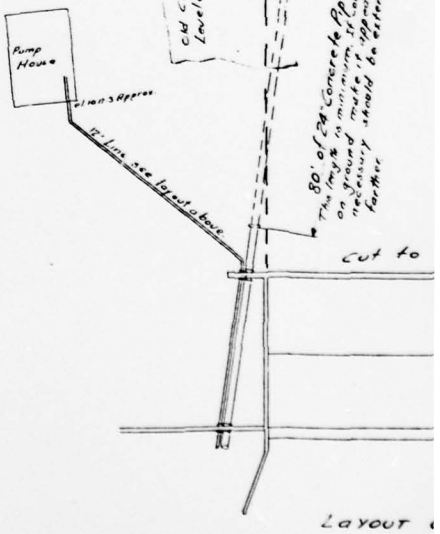
FIGURE 4

REQUIRED LIST

No.	SIZE	REMARKS Furnished by Lucerne
6	Pcs. 12" B&S C.I. Pipe 12'-0"	
~~1~~	~~Pc. 12" C.I. Flgd Pipe 12'-0"~~	~~" "~~ Shown
1	12"x12"x6" Flgd Tee	Std. Drill. Ordered.
~~1~~	~~45° Flgd Bx 12"~~	~~Std. Drill. Ordered.~~
1	Pc. 12" C.I. B&Flg to lay 12"	Std. Drill. Ordered.
2	12" 45° B&S Bend.	Ordered.
1	Pc 12" C.I. Pipe S.&S.	On hand at C.R.
1	12" Blank Flg.	Std. Drill.
1	6" Comp. Flg. Threaded for 6" W.I. Pipe	Std. Drill.
1	Std. 12" Gate Valve Flg.	Std. Drill. Ord.
5	Red Rubber Gaskets 16½"x12½"	12" Pipe
1	Red Rubber Gasket 8⅝"x6⅝"	6" Comp. Flgs.
60	Bolts ⅞" dia x 3½" Lg.	
8	Bolts ¾" dia x 3" Lg.	



Layout of Pump Connection
Scale ½" = 1'-0"



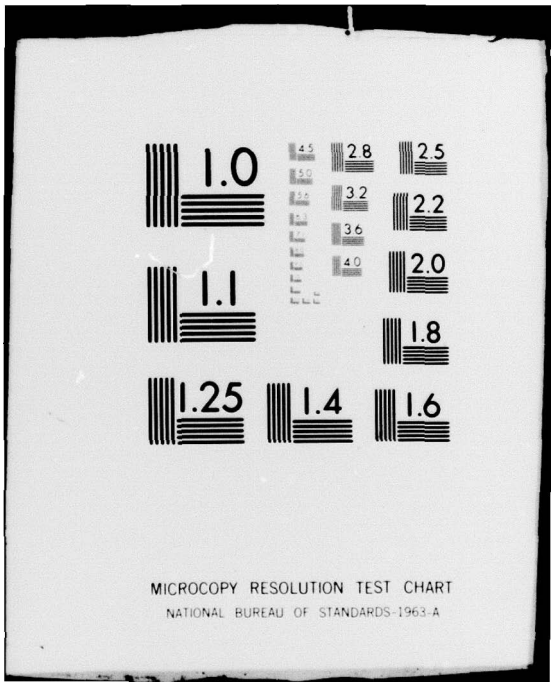
Layout

AD-A078 867 GAI CONSULTANTS INC MONROEVILLE PA F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. CHERRY RUN DAM (NDS I.D. NUMBE--ETC(U)
AUG 79 B M MIHALCIN DACW31-79-C-0013

UNCLASSIFIED NL

2 OF 2
AD
A 078867

END
DATE
FILMED
1-80
DDC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

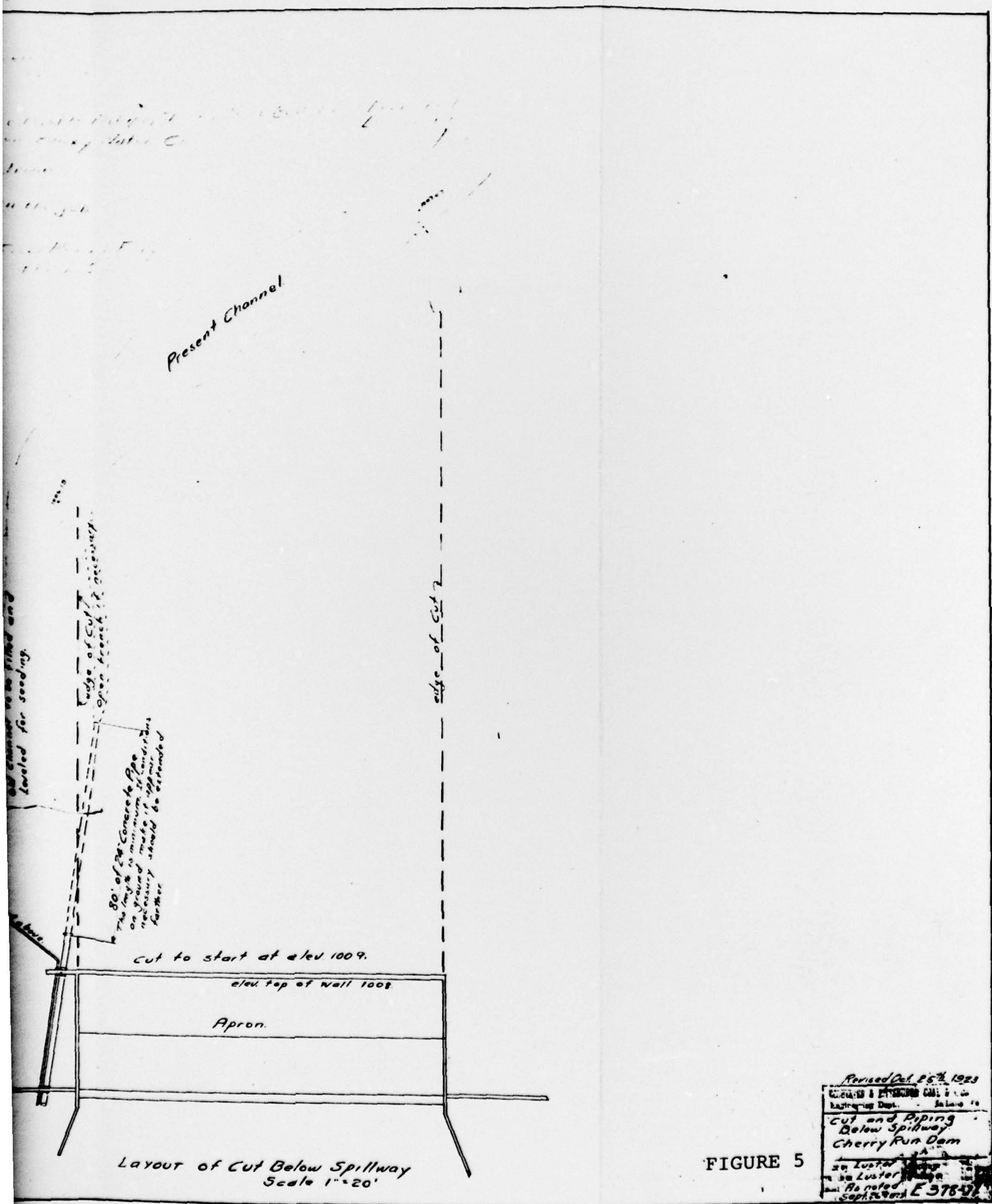
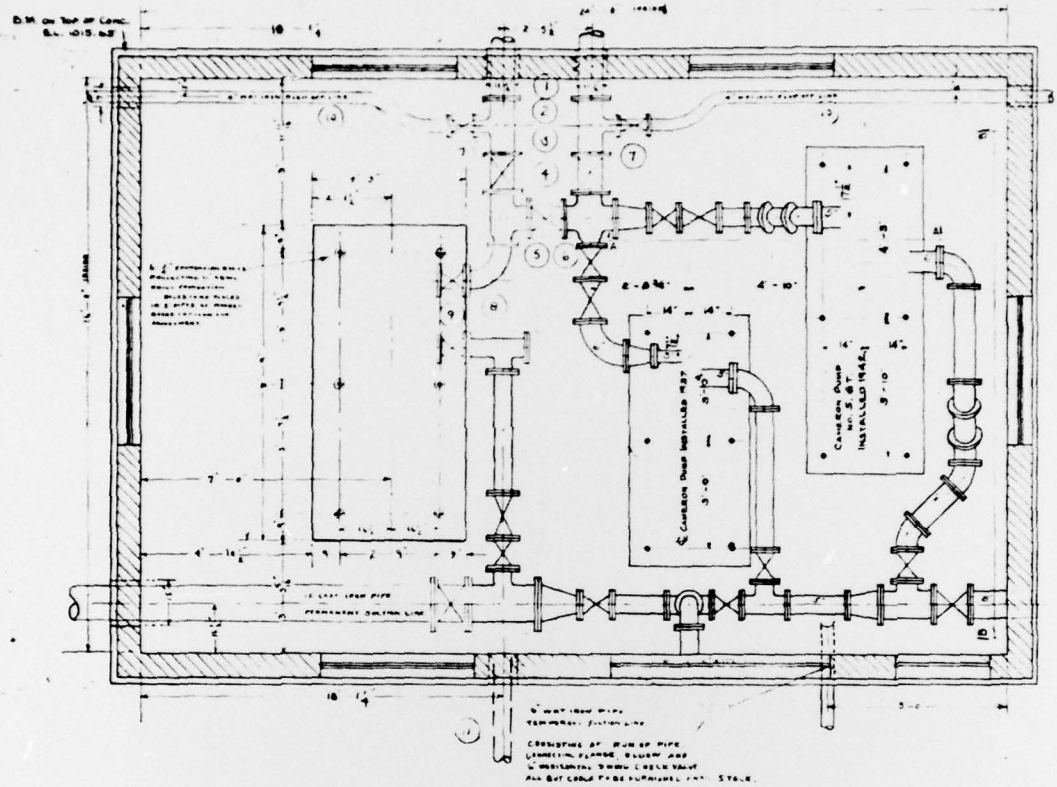
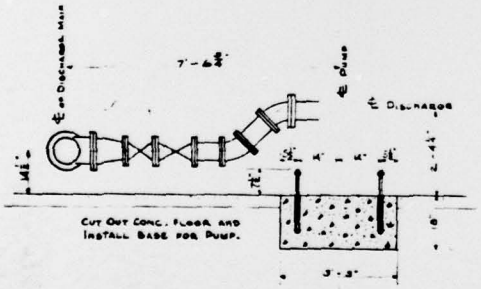


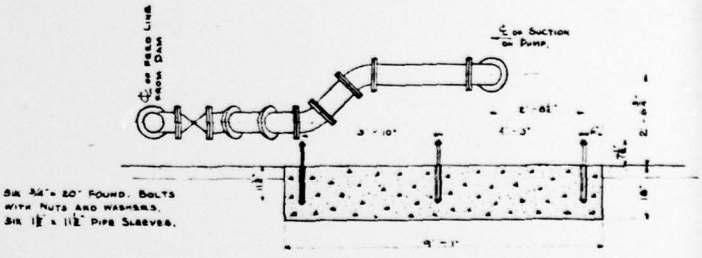
FIGURE 5

627.8-632-59



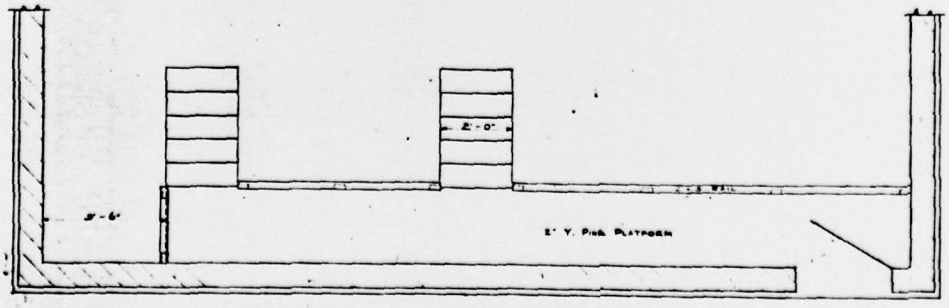


ELEVATION OF DISCHARGE PIPING
MKD. A-A ON PLAN.

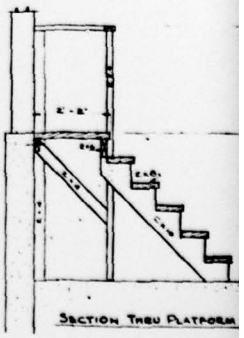


ELEVATION OF SUCTION PIPING
MKD. B-B ON PLAN.

PIPING ARRANGEMENT FOR CAMERON PUMP NO. 5 GT.



PLAN VIEW - WEST SIDE OF BLDG. - SHOWING NEW PLATFORM AND STEPS.



SECTION THRU PLATFORM

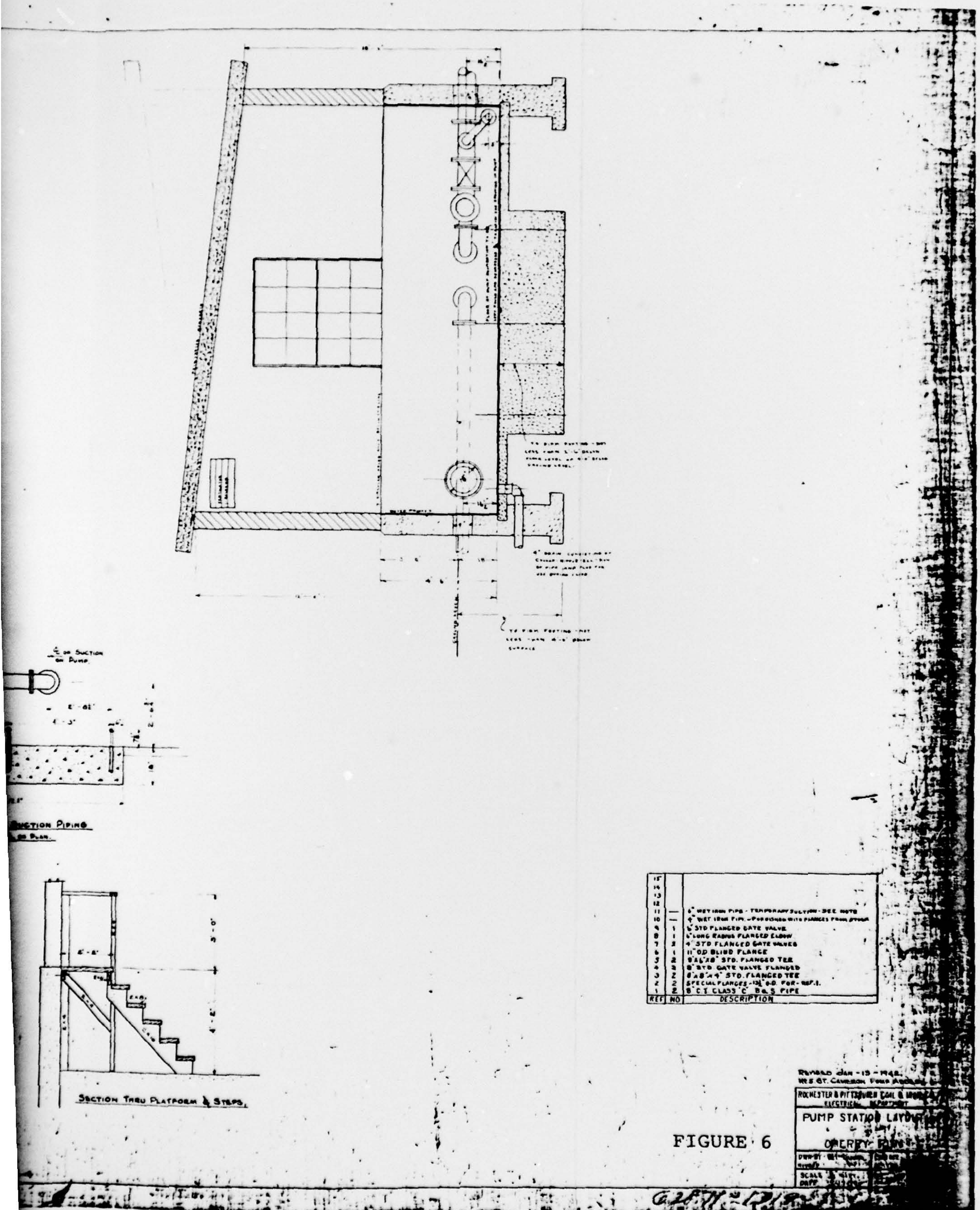
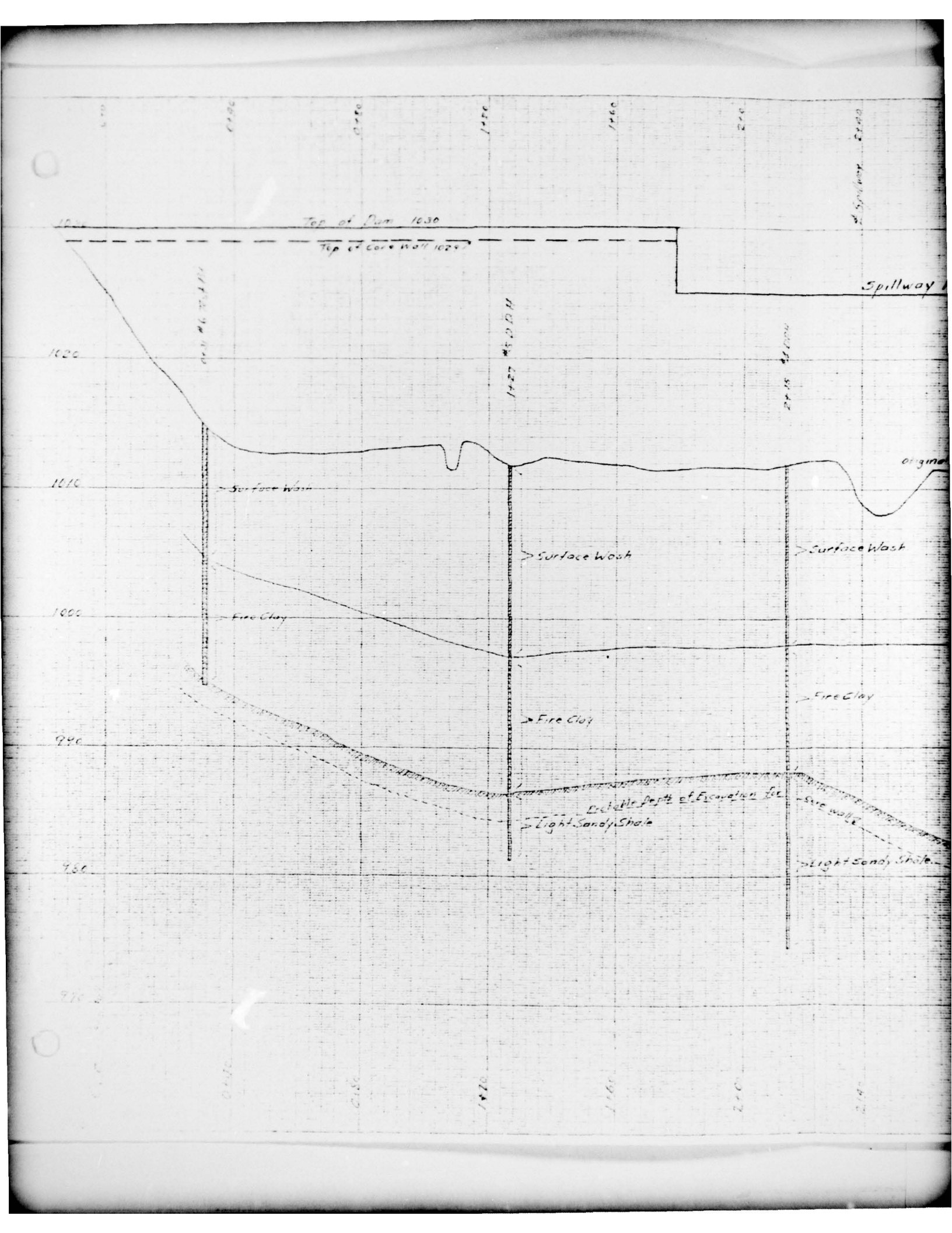

SECTION THRU PLATFORM & STEPS.
15
14
13
12
11 — 6" WET IRON PIPE - TEMPORARY SUCTION - SEE NOTE
10 — 4" WRT IRON PIPE - FURNISHED WITH FLANGES FROM STOCK
9 1 6" STD FLANGED GATE VALVE
8 1 6" LONG RADIUS FLANGED ELBOW
7 2 4" STD FLANGED GATE VALVES
6 1 11" OD BLIND FLANGE
5 2 8"x6"x8" STD. FLANGED TEE
4 2 8" STD GATE VALVE FLANGED
3 2 8"x8"x4" STD. FLANGED TEE
2 2 SPECIAL FLANGES - 13½" O.D. FOR - REF. 1.
1 2 8" C.I. CLASS "C" B&S PIPE
REF NO DESCRIPTION
REVISED JAN - 13 - 1942.
ROCHESTER & PITTSBURGH COAL & IRON CO.
ELECTRICAL DEPARTMENT
PUMP STATION LAYOUT
SCALE
DATE

FIGURE 6


Top of Dam 1030
Top of core wall 1029
Spillway
1020
1010
1000
990
980
Surface Wash
Surface Wash
Surface Wash
Fire Clay
Fire Clay
Fire Clay
Probable depth of Excavation for core wall
Slight Sandy Shale
Slight Sandy Shale

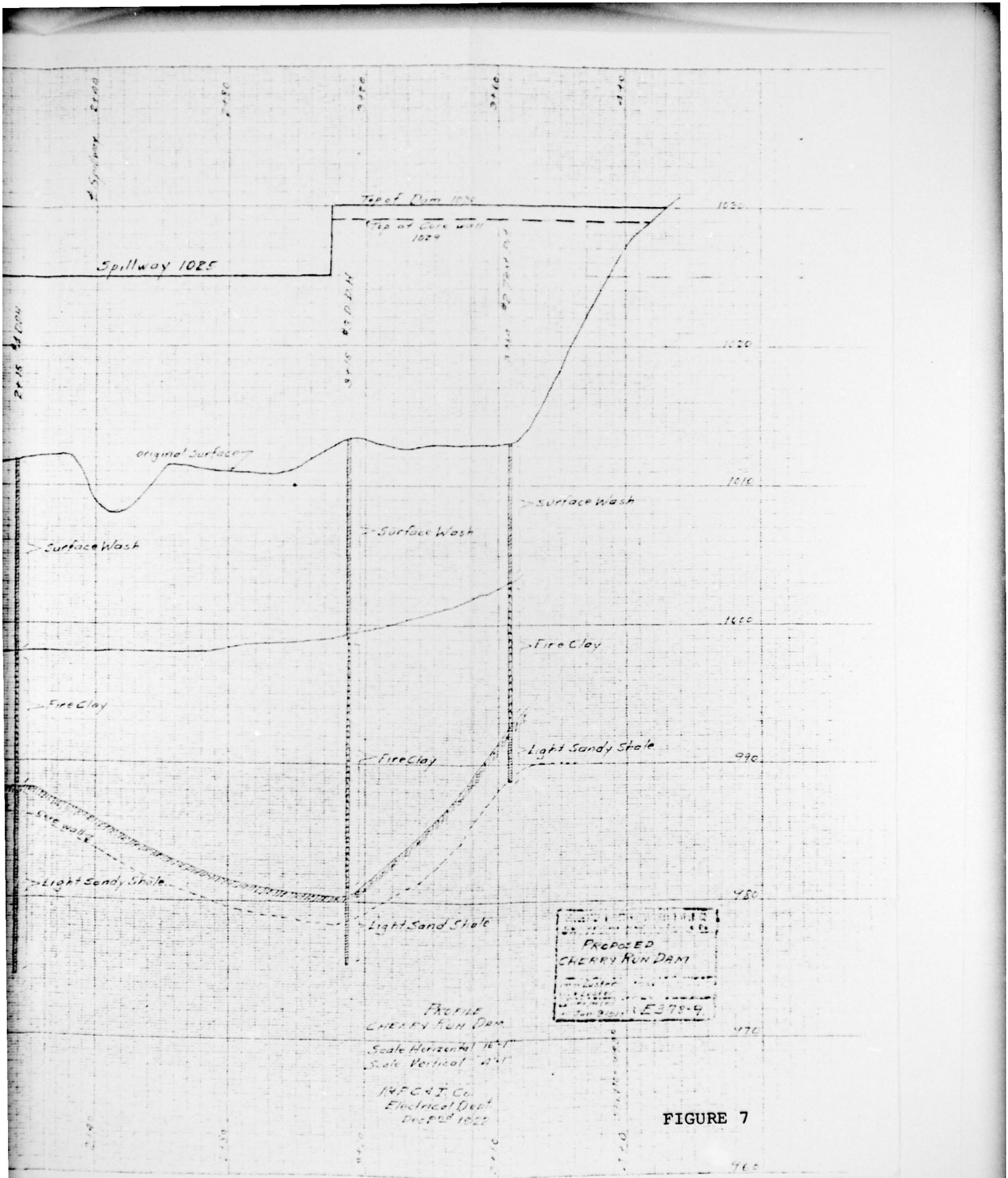
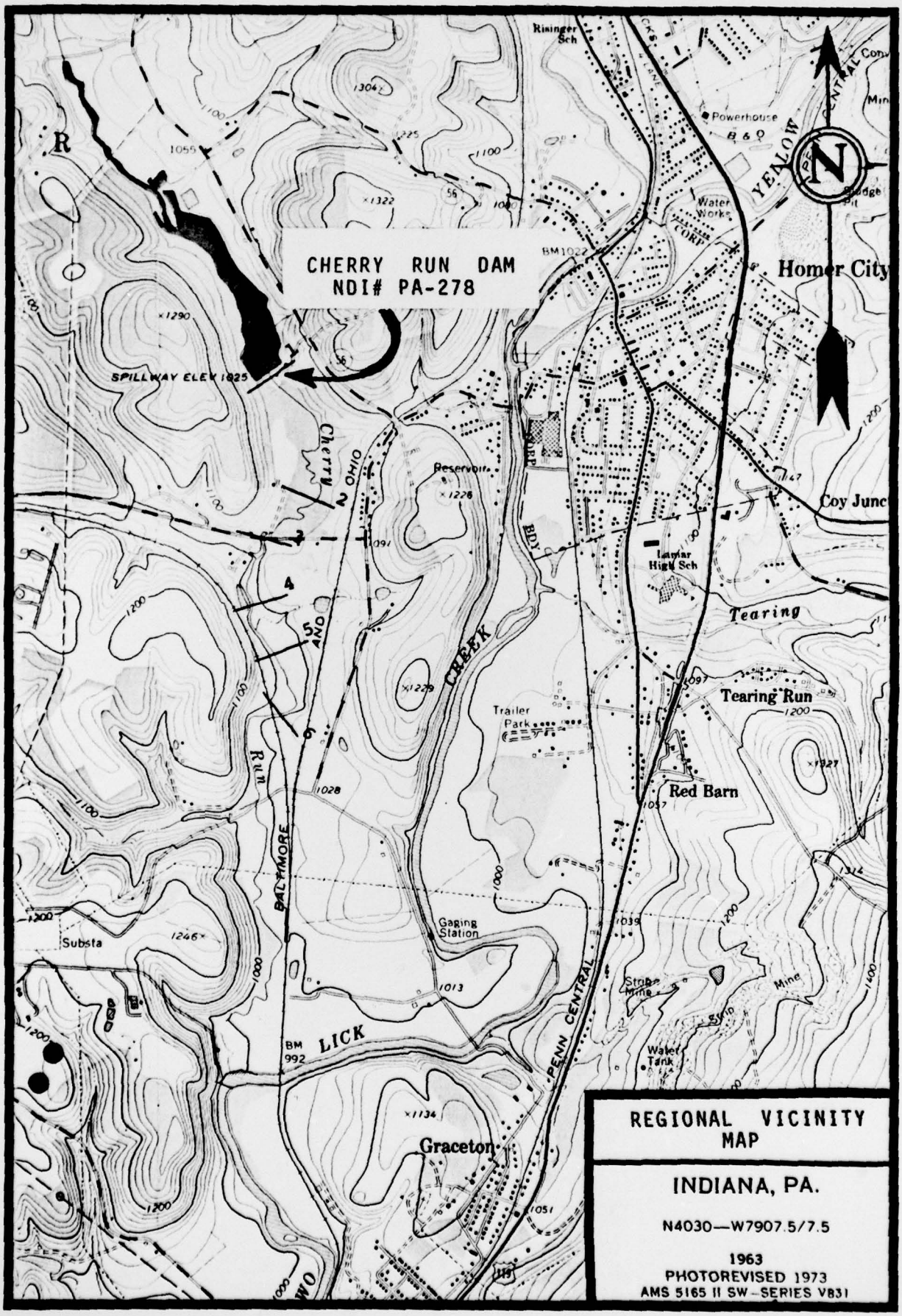

Top of Dam 1030
Top of Core Wall 1029
Spillway 1025
original surface
Surface Wash
Surface Wash
Surface Wash
Fire Clay
Fire Clay
Fire Clay
Light Sandy Shale
Light Sandy Shale
Light Sand Shale
Core Wall
1030
1020
1010
1000
990
980
970
960
PROPOSED CHERRY RUN DAM
E 378-9
PROFILE CHERRY RUN DAM
Scale Horizontal 1" = 1'
Scale Vertical 1" = 1'
R.F.C. & I. Co.
Electrical Dept.
Dec. 22nd 1922

FIGURE 7

APPENDIX G

REGIONAL VICINITY
AND
WATERSHED BOUNDARY MAPS

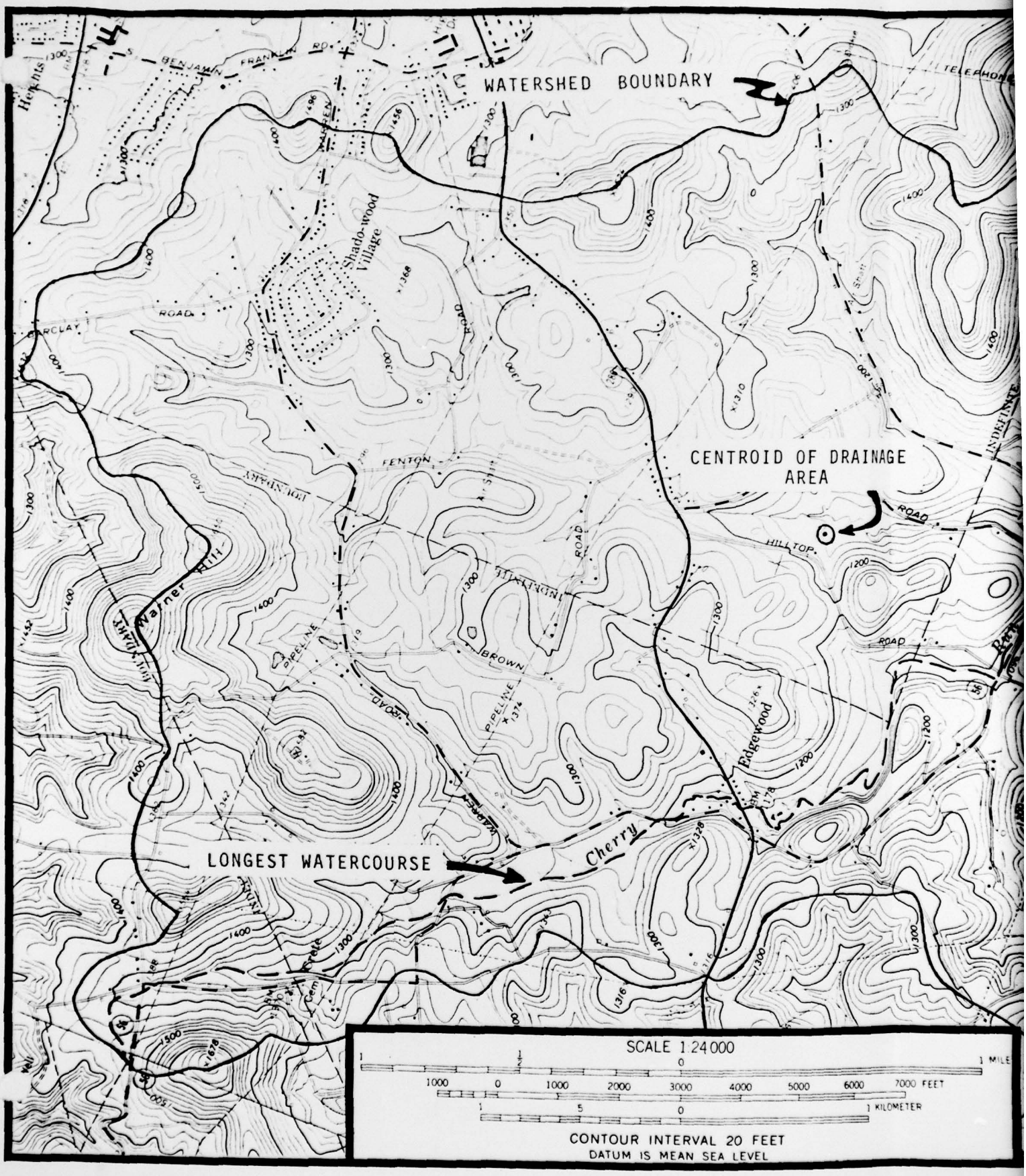


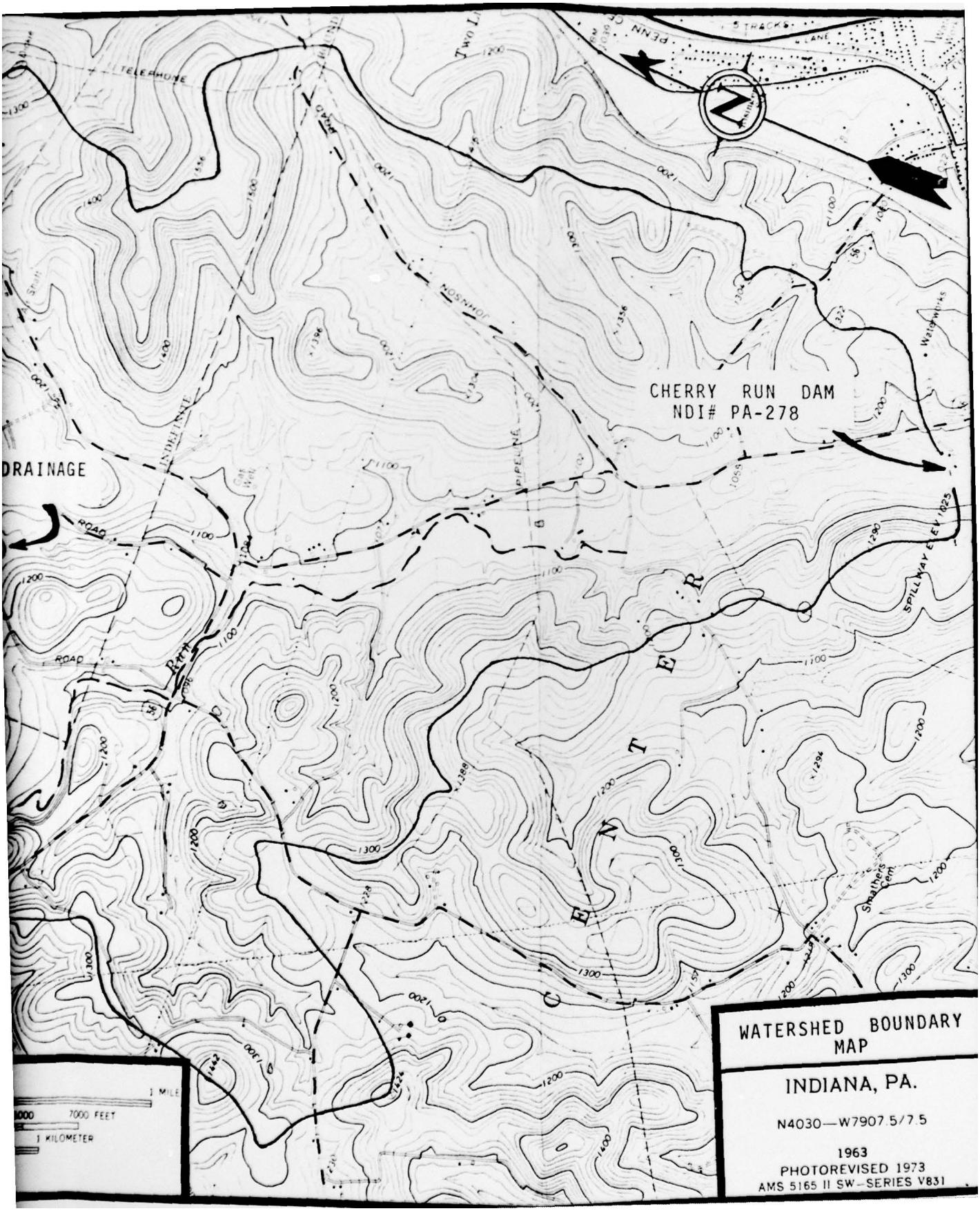
REGIONAL VICINITY MAP

INDIANA, PA.

N4030—W7907.5/7.5

1963
PHOTOREVISED 1973
AMS 5165 II SW—SERIES V831


WATERSHED BOUNDARY
CENTROID OF DRAINAGE AREA
LONGEST WATERCOURSE
Shadowood Village
Edgewood
Cherry
Warner Run
BENJAMIN FRANKLIN RD.
BARCLAY ROAD
FENTON ROAD
HILLTOP ROAD
BROWN ROAD
PIPELINE
SCALE 1:24000
1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL


CHERRY RUN DAM
NDI# PA-278
DRAINAGE
ROAD
ROAD
PIPELINE
SPILLWAY ELEV. 1025
TELEPHONE
1 MILE
7000 FEET
1 KILOMETER
WATERSHED BOUNDARY MAP
INDIANA, PA.
N4030—W7907.5/7.5
1963
PHOTOREVISED 1973
AMS 5165 II SW—SERIES V831