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NATIONAL DAM INSPECTION PROGRAM. MAUCH CHUNK LAKE DAM (PA00605)--ETC(U)
SEP 78

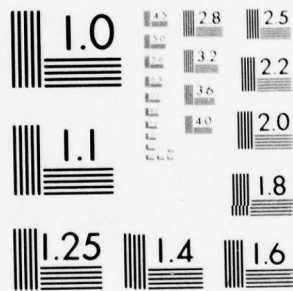
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PENNSYLVANIA
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PREPARED
BY
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MAUCH CHUNK LAKE DAM

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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

SEPTEMBER 1978

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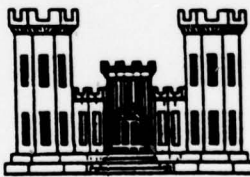
MAUCH CHUNK LAKE DAM
CARBON COUNTY, PENNSYLVANIA
NATIONAL I.D. NO. PA 00605

6 National Dam Inspection Program.
Mauch Chunk Lake Dam (PA00605),
Delaware River Basin, Mauch Chunk Creek,
Carbon County, Pennsylvania. Phase I
Inspection Report.

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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11 SEP 1978

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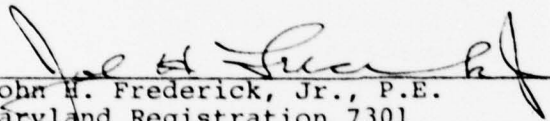
Several seepage zones were noted beyond the downstream toe of the embankment. However, discussions with Park Representatives and a review of the records indicates that these springs were noted before construction and that the dam was relocated 125 feet upstream to avoid this seepage. These conditions are not considered to be of major concern, but they should be monitored for changes in flow rates or turbidity.

As the dam is judged to be in good condition, the recommendations presented below are suggested to insure that the dam continues to function as designed and to insure that residents downstream are notified when impending high flows are expected along the creek. These recommendations are presented in order of priority, but does not infer that the latter recommendations are not important.

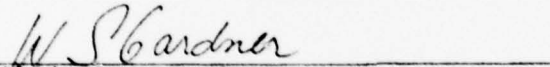
1. The marshy areas located to the left of the principal spillway discharge channel should be graded and drained. Discharge should be periodically collected and checked for changes in flow rates or in turbidity.
2. The marshy area designated by an area of dead trees downstream of the principal spillway should be monitored periodically for unusual changes in seepage. Considering the extent of this area, it is impractical to collect the water and check for flow rates. However, the area should be checked for concentrated flows and unusual changes in seepage rates which may lead to piping.
3. The riprap channel immediately below the principal spillway impact basin should be monitored after any significant discharge passes through the channel. As necessary, the principal spillway discharge channel should be rehabilitated to insure that it operates properly in time of need.
4. Periodic checks of the emergency spillway should be performed and the woody vegetation removed before it effects the discharge capacity.

Recommendations concerning the operation and maintenance of the dam are as follows.

1. Because the dam is located upstream of a highly populated area, Jim Thorpe, Pennsylvania, a formal procedure of observation and warning during periods of high precipitation should be developed and implemented. These procedures should include methods of warning downstream residents that high flows are to be expected; and, if necessary, procedures for evacuating residents along the creek in Jim Thorpe.
2. The Owner should develop an inspection checklist as an amendment to the current maintenance procedure to insure that all critical items are inspected and maintained on a regular and periodic basis.

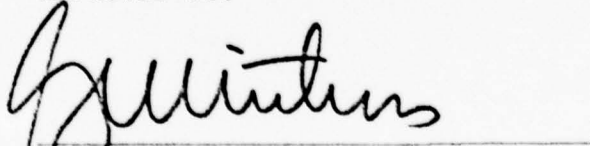

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OVERVIEW
MAUCH CHUNK CREEK DAM, CARBON COUNTY, PENNSYLVANIA

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
MAUCH CHUNK CREEK DAM
NATIONAL ID #PA 00605
DER #13-106

SECTION I
PROJECT INFORMATION

1.1 General.

a. 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.

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

1.2 Description of Project.

a. Dam and Appurtenances. Mauch Chunk Creek Dam is a 50-foot high rolled earth dam, 1,710 feet long and impounds a 320 acre reservoir. The dam was constructed with local borrow materials and contains one primary material zone with a secondary zone concentrated around the discharge pipes. The primary zone, Zone 2, consists of clayey silty sands and sandy silts classified by the Unified Classification System as SC-SM and SM or ML. Zone 1 materials, classified as low plastic silts (ML), are located around the pond drain and principal spillway discharge pipes, and were placed to minimize seepage along the length of the pipe.

ABSTRACT
↓

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→ The dam contains a rectangular drainage trench, ~~shown on Plate 3~~, located downstream from the centerline. The embankment also contains a cutoff trench under the centerline of the dam.

→ The upstream slope was constructed to 2.9H:1V with an 8-foot wide bench at elevation 1007.7. The crest is 17 feet wide at elevation 1019.8. The upstream slope is protected with riprap between elevations 1014.7 and the bench. The 18-inch thick riprap overlies a 6-inch thick filter bed. The downstream slope was constructed to 1.93H:1V, and is grass/Crownvetch covered. ←

ABSTRACT

Water is normally discharged through the principal spillway. The intake riser is located within the embankment, approximately 51 feet upstream of the centerline. Water overflows the riser weirs (elevation 1009.7) and discharges through a 36-inch I.D. reinforced concrete pipe which extends under the dam and discharges into an impact basin at the downstream toe. A 24-inch I.D. reinforced concrete pond drain conduit extends from the base of the riser to the reservoir. The pond drain discharge, controlled by a sluice gate in the riser, flows through the principal spillway pipe. The sluice gate contains a 2-5/8-inch orifice which discharges water at a rate of not less than 0.9 cubic feet per second to maintain minimum flow requirements in Mauch Chunk Creek. The riser also contains a gated 8-inch orifice 18 inches below normal pool for municipal water supply purposes.

During severe storms, excess water can also be discharged over the emergency spillway at the left abutment. The spillway crest elevation is 1013.7.

b. Location. The dam is located on Mauch Chunk Creek in Mauch Chunk Township, Carbon County, Pennsylvania. The dam site is 3 miles west of the confluence of Mauch Chunk Creek with the Lehigh River. The dam site and reservoir are shown on USGS Quadrangle entitled, "Nesquehoning, Pennsylvania", at coordinates N 40° 51.9', W 75° 47.3'. A regional location plan of Mauch Chunk Creek Dam and reservoir is enclosed as Plate I, Appendix E.

c. Size Classification. The dam is classified as an "Intermediate" size structure by virtue of its 50-foot maximum height and 4,169 acre-foot normal storage capacity.

d. Hazard Classification. A "High" hazard classification is assigned consistent with the potential for extensive property damage and loss of life downstream in Jim Thorpe, Pennsylvania.

e. Ownership. Mauch Chunk Creek Dam is owned by Carbon County and maintained by Mauch Chunk Lake Park representatives. The water supply system is maintained by the County Municipal Authority. All correspondence should be sent to Mr. Dennis DeMara, Park Director, Mauch Chunk Lake Park, 529 Lentz Trail, Jim Thorpe, Pennsylvania 18229.

f. Purpose of Dam. The purpose of this dam is for flood control, recreation and water supply.

g. Design and Construction History. The dam was designed by the United States Department of Agriculture, Soil Conservation Service, in 1967. The application to construct Mauch Chunk Creek Dam was submitted on 26 February 1968, and the "Report Upon the Application of the Commissioners of Carbon County" was issued by the State of Pennsylvania on 2 May 1968, by Mr. Joseph J. Ellam, Hydraulic Engineer for the Department of Environmental Resources. The Permit to construct the dam was issued on 11 January 1968. Records indicate that construction by Feeser Construction Company began in June 1969, and during the summer and fall of 1969 work was limited to predominantly foundation preparation and grouting operations. All grouting was performed by Layne Company of New York during the summer of 1969. During the summer of 1970, earthworks were well underway and fill was being placed at an average rate of 5,000 cubic yards per day.

By 1 May 1971, the construction was approximately 85 percent complete when the Operator's Union went on strike. This strike lasted until the end of June 1971, during which time there was no work performed on the dam. In July

1971, operations resumed and a final inspection of the dam was made by State of Pennsylvania representatives on 29 October 1971. The dam and appurtenant structures were officially completed on 19 November 1971. According to park representatives, all construction, including the seeding of slopes, was completed 30 days before Tropical Storm Agnes (June 1972). This storm filled the reservoir.

h. Normal Operating Procedures. Reservoir outflow is controlled by the principal and emergency spillways. Under normal conditions, water flows over the two 9-foot long riser weirs and drops to the base of the riser discharging through a 36-inch reinforced concrete pipe into an impact basin at the downstream toe. The required minimum flow release is through a 2-5/8 inch diameter hole in the pond drain sluice gate at the base of the riser.

Excess water is stored up to the spillway elevation of 1013.7. Thereafter, water is discharged over the emergency spillway located at the left abutment.

The reservoir can be lowered or drained by opening the sluice gate from the top of the riser to allow water to pass through the 24-inch I.D. reinforced concrete pipe at the base of the dam. This water discharges into the 36-inch principal spillway conduit and then into the impact basin.

1.3 Pertinent Data.

A summary of the pertinent data for Mauch Chunk Creek Dam is presented as follows.

- | | | |
|----|---------------------------------|---------------------------------|
| a. | Drainage Area (sq. miles) | 5.95 |
| b. | Discharge at Dam Site (cfs) | |
| | Maximum Known Flood (June 1972) | Filled reservoir (no discharge) |

	Maximum Design Discharge	5,610
	Maximum Discharge at Top of Dam	10,533
	Minimum Required Flow	0.9
c.	Elevation (feet above MSL)	
	Top of Dam	1019.8
	Design High Water	
	Emergency Spillway Crest	1013.7
	Principal Spillway Crest	1009.7
	Pond Drain Entrance Invert	970.2
	Riser Floor Elevation	969.7
	Discharge Conduit Exit Invert	967.0
	Water Supply Orifice	1008.5
d.	Reservoir (miles)	
	Length at Normal Pool	2.7
	Fetch at Normal Pool	2.7
e.	Storage (acre-feet)	
	Normal Pool	4,169
	Design Maximum Flood	5,763
	Top of Dam	8,300
f.	Reservoir Surface Area (acres)	
	Normal Pool	320
g.	Dam Data	
	Type	Rolled earth with drain trench
	Length	1,710 feet
	Height	50 feet
	Crest Width	17 feet
	Volume	283,000 cubic yards
	Freeboard at Normal Pool	10.1 feet

Side Slopes	
Upstream	2.9H:1V with 8-foot bench at elevation 1007.7.
Downstream	1.93H:1V
Riprap (upstream)	Elev. 1014.7 to elev. 1007.7.
Cutoff	Cutoff trench below centerline.
Grout Curtain	Yes. Triple line curtain; 5 ft. staggered spacing; split spaced technique.
h. Diversion	Initial diversion by channeling and then via pipe at base of dam.
i. Outlet Works	
Principal Spillway	
Type	Standard Soil Conservation Service riser.
Discharge	36-inch RCP; 150 foot long into impact basin.
Emergency Spillway	
Type	Channel excavated into decom- posed rock.
Location	Left abutment
Width	246 feet
Approach Slope	0.1% and 2.0%
Discharge Slope	3.2%
Control Section	30 feet wide
Channel Side Slopes	Slightly less than 3H:1V.
Pond Drain	
Type	Concrete pipe at base of dam to riser structure.
Pipe Length	100 feet
Pipe Diameter	24 inches

SECTION 2
ENGINEERING DATA

2.1 Design.

A summary of engineering data for Mauch Chunk Creek Dam is presented in the checklist attached as Appendix A. Principal documents containing pertinent data used for this report are as follows.

1. "Report Upon the Application of the Commissioners of Carbon County", by Joseph J. Ellam, *Hydraulic Engineer, Department of Environmental Resources (DER)*, dated 2 May 1968.
2. "Design Report, Site PA-462, Pennsylvania", prepared by the U.S. Department of Agriculture, Soil Conservation Service (SCS). This *design report* contains such items as the hydrologic and hydraulic design calculations, foundation and embankment design, soil investigation data, soil testing and analysis, and the structural design calculations for the dam and appurtenant structures, and complete set of specifications.
3. "Permit" prepared by the Commonwealth of Pennsylvania, Department of Environmental Resources, dated 11 June 1968.
4. A 25-page set of drawings prepared by the U.S. Department of Agriculture, Soil Conservation Service, Job #PA-462-P, dated 1967.
5. Miscellaneous letters, correspondence, memos, including construction progress reports located in the DER files in Harrisburg, Pennsylvania, and in the SCS files in Mechanicsburg, Pennsylvania.

The available data was comprehensive and included a complete design analysis for the dam and appurtenant structures. In addition, County Park files contained a set of as-built drawings, which were compared to the preliminary drawings in DER files. There were no differences observed between the two sets of drawings. Selected portions of these drawings are included in Appendix E of this report.

b. Design Features. The principal design features are illustrated on the plan, profile and cross-section plates of the embankment and appurtenant structures that are enclosed in Appendix E as Plates 2 through 10. These plates are reproduced from the design drawings which were compared with the as-built plans reviewed at the County Park office. A detailed description of the design features is presented in Section 1.2, "Description of Project", and elaborated upon as follows.

The dam is a rolled earth embankment containing a cutoff trench and drainage trench. The drainage trench has a rectangular cross-section and is located downstream of the centerline. Plates 3 and 4 show the location of this trench. The purpose of the trench is to control embankment seepage. The water is discharged through two 6-inch diameter pipes into the impact basin at the downstream toe. The dam also contains a cutoff trench located under the centerline and a triple line grout curtain between Stations 9 + 50 and 13 + 70. Details of the grout curtain are shown on Plate 10 of Appendix E. The split spacing, stage grouting method was utilized where the upstream and downstream holes were drilled and grouted first. Holes were staggered 5 feet on center, and occasionally, the grout hole spacing was reduced to 2-1/2 feet on center.

The upstream embankment slope is 2.9H:1V, with an 8-foot bench at elevation 1007.7. Riprap extends from the bench to elevation 1014.7. The riprap is 18 inches thick and is underlain by 6-inch thick filler bedding. The downstream embankment slope is 1.93H:1V from the crest to the toe. The crest is 17 feet wide and serves as a roadway for Park personnel. Design features of the spillway systems are discussed in Sections 1.2 and 5.

2.2 Construction.

A description of the construction history is presented in Section 1.2. Construction was performed under the supervision of Mr. John Mickley, Project Engineer for the Soil Conservation Service. SCS inspectors included Mssrs. Henry Hurett, Russell Campbell, and Austin Blakeslee. Mr. Feeser, of the Feeser Construction Company, supervised all construction, except for the grouting which was performed by Layne of New York.

2.3 Operation Data.

The construction permit and the "Report Upon the Application" require the discharge system to maintain a minimum flow of 0.9 cfs, equivalent to 581,400 gallons per day, unless reservoir inflow is less than 0.9 cfs. If reservoir inflow is measured, the discharge may be reduced accordingly. A 2-5/8 inch orifice through the pond drain sluice gate releases the minimum required flow.

Since the dam was designed to operate without the use of a dam tender, there are no operational records maintained at the site. The emergency spillway has never been used.

2.4 Evaluation.

a. Availability. All engineering data reproduced in this report and studied for this investigation were provided by DER, SCS, and Mauch Chunk Lake Park representatives.

b. Adequacy. The design data provided was comprehensive and well documented. Construction data was adequate to evaluate the construction history. In summary, the data obtained is considered adequate to evaluate the dam and appurtenant structures.

c. Validity. There is no reason to question the validity of the data.

SECTION 3
VISUAL INSPECTION

3.1 Findings.

a. General. The observations and comments of the field inspection team are contained in the checklist enclosed herein as Appendix B, and are summarized and evaluated as follows. In general, the appearance of the facility indicates that the dam and its appurtenances were properly constructed, are well maintained and in good condition.

b. Dam. During the visual survey, there were no indications or evidence observed of distortions in alignment or grade that would be indicative of movement of the embankment or the foundations. There were no surface cracks, sloughing, erosion or misalignment observed. The riprap was in very good condition and stable. There was no noticeable seepage observed along the downstream toe or through the embankment. However, seepage zones were noted, as shown on Sheet 5a of Appendix B. These seepage zones were noted during the foundation investigation and during the grouting operations. It is noted that Park representatives indicated that the dam was relocated approximately 125 feet upstream because of the seepage noted during the foundation investigation phase.

Since the filling of the reservoir, a wet zone has emerged approximately 300 feet downstream from the impact basin. This zone, as shown on Sheet 5a, is delineated by an area of dead trees. *Original geologic and soils investigation disclosed the flood plain to be a swamp and there were many springs on the abutments. Field permeability tests in test holes on the left side of the flood plain indicated permeability rates in the range of 60 feet per day through highly fractured and jointed sandstone. Therefore, this seepage and marshy area could have developed as a result of the hydrostatic forces from the reservoir. Park personnel reported that the marshy zones located to the left of the discharge basin have remained unchanged since construction.*

The two drain outlets located on either side of the impact basin were functioning and clear water was flowing. There were no external indications inferring that internal drainage systems were not functioning as designed.

c. Appurtenant Structures.

1. Principal Spillway. The exposed portions of the principal spillway are in excellent condition, with no signs of cracked or spalled concrete. All gates were exercised and appeared to be in good condition. The gate valves for both the pond drain and water supply pipes were painted, clean and well lubricated. An operations and maintenance manual is located in the Park Office files. The pond drain valve was manufactured by Armco, Model 22505A.

2. Emergency Spillway. The emergency spillway was observed to be in good condition, being excavated into erosion resistant materials and grass lined. There were no signs of significant erosion, channel deterioration, or other evidence that would indicate that the spillway would not function as designed. The vegetation was lush and it appears that the spillway is well maintained. A check of the spillway width indicated it to be 246 feet wide instead of the 250-foot design width (see Section 5).

d. Reservoir. Reconnaissance of the reservoir disclosed no evidence of significant siltation, slope instability, or other features that would significantly affect the flood storage capacity of the reservoir. All slopes are well vegetated, and in some cases trees are growing to the water's edge. The drainage area surrounding the reservoir was also inspected. In general, the drainage basin is well vegetated, contains wooded areas and farmlands. There is little industry. The upper elevations of the drainage were once stripped for coal.

e. Downstream Channel. Immediately downstream of the impact basin, Mauch Chunk Creek Dam discharges water into a riprap-lined channel. There is no

evidence of major erosion or slope instability of the channel. The channel is lined for a distance of approximately 50 feet prior to discharging into the natural streambed.

The emergency spillway discharges about 200 feet below the downstream toe of the dam. The stream bank and channel are stable and well vegetated.

The flood plain below the dam is a swamp, unchanged from the original geologic and soils investigation report. The flood plain is approximately 200 feet wide. The channel banks are roughly 2 feet high, with side slopes ranging from near vertical to 1:1. Further downstream, Mauch Chunk Creek flows through the town of Jim Thorpe, which would be flooded in the event of high flows or failure of the dam. Photograph 14 of Appendix D shows a typical view of the Mauch Chunk Creek through Jim Thorpe, Pennsylvania.

3.2 Evaluation.

In summary, the visual survey of the dam disclosed no evidence of apparent past or present movements to indicate instability of the dam. The wet areas located left of the principal spillway discharge channel were reportedly there prior to construction and during the grouting operations. Since then, Park personnel indicated that there has been very little or no noticeable change in the size of these marshy areas. The exposed portions of the principal spillway and the emergency spillway were inspected and observed to be in good condition. It is noted that the inside of the riser could not be inspected, nor could the 36-inch discharge pipe or the pond drain pipe. It is reported by Park personnel that the principal spillway trash racks are cleaned each spring. It is also noted that the valve is exercised two times per year, at which time the valves are cleaned and lubricated.

SECTION 4
OPERATION PROCEDURES

4.1 Procedures.

Normal operating procedures do not require a dam tender. The normal water level is maintained by two 9-foot long parallel weirs at the top of the intake riser. In the event of high flows, excess water is stored to the crest of the emergency spillway. Thereafter, water is also discharged through the emergency spillway into Mauch Chunk Creek.

The intake riser contains one 24-inch pond drain sluice gate at the base of the riser, elevation 970.2. Minimum flow is provided by a 2-5/8 inch diameter orifice located in the pond drain sluice gate. Water passing through the orifice flows through the principal spillway conduit and discharges into the impact basin.

Access to the intake tower riser structure is achieved by a manhole at the top of the tower. There is also an 8-inch gate in the riser located 18 inches below normal pool to supply water for municipal purposes.

4.2 Maintenance of the Dam.

The dam is maintained by the Mauch Chunk Creek State Park representatives, and is periodically inspected by the State of Pennsylvania and the Soil Conservation Service.

4.3 Maintenance of Operating Facilities. Maintenance of the operating facilities is performed by the Mauch Chunk Creek State Park representatives. However, the dam is relatively new, in good condition, with little maintenance having been

required since its completion. During the inspection, an operations manual was found in the Park office and reviewed by the inspection team. This manual contained all of the essential guidelines necessary to operate, repair and rehabilitate the control systems within the control tower.

4.4 Warning Systems in Effect.

There are no formal warning systems or procedures established to be followed during periods of exceedingly heavy rainfall. However, the Park office overlooks the dam and the Park Director lives at the office and can observe the dam during periods of high flow. The Park Director indicated that in the event that an emergency condition develops, the County Civil Defense Authority would be notified and residents of Jim Thorpe would be notified by the Civil Defense Department, the Police, or the fire department.

4.5 Evaluation.

The procedures used by the Park Director for inspecting the dam are adequate and the fact that a representative familiar with the dam and operation of the dam lives immediately adjacent to the emergency spillway helps to insure that the discharge during periods of extreme runoff can be observed and monitored.

Since a formal warning procedure does not exist, a procedure should be developed and implemented during periods of extreme rainfall. This procedure should consist of a detailed method of notifying residents downstream, particularly in the town of Jim Thorpe, Pennsylvania.

SECTION 5
HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features.

a. Design Data. Most calculations for the hydrologic/hydraulic design of this structure are in the design report in the State files. The flood routing was obtained from the Soil Conservation Service (SCS) State office in Harrisburg, Pennsylvania. The watershed is approximately 8.5 miles long and averages 1.3 miles wide with a total area of 5.95 square miles. Elevations range from 1600 feet in the upper reaches to 1009.7 at normal pool elevation. The stream gradient varies from less than 1 percent in the upper reaches to 3 percent in Jim Thorpe, Pennsylvania. The watershed is approximately 80 percent wooded, about 5 percent residential, and the rest open/farmland. Inactive strip mining operations cover approximately 100 acres on the northwestern edge of the watershed in the vicinity of Summit Hill, Pennsylvania. Some new residential construction is taking place in the vicinity of the park, but it is not expected to significantly alter the watershed runoff characteristics in the foreseeable future.

In accordance with the criteria established by the Federal (OCE) Guidelines, the recommended spillway design flood for this "Intermediate" size dam and "High" hazard potential classification, is a probable maximum flood (PMF). A review of the SCS design report indicates that the dam was designed to pass the probable maximum flood (PMF).

b. Experience Data. No rainfall records or reservoir water level records are kept. The dam was completed in November 1971, and the reservoir was filled during Tropical Storm Agnes, June 1972. Tropical Storm Agnes is frequently the storm of record in eastern Pennsylvania. It is estimated from Weather Service publications that between 7 and 8 inches of rain fell in two days over this area.

c. Visual Observations. On the date of the inspection, there were no conditions observed that would indicate that the outlet capacity would be reduced during a flood occurrence. It was noted that the emergency spillway measured 246 feet wide instead of the 250-foot designed width. As shown on Sheet 10, Appendix C, the change in the discharge capacity of the emergency spillway as a result of this reduced channel width is insignificant. Observations regarding the condition of the downstream channel, spillway conditions, and reservoir are located in Appendix D.

d. Overtopping Potential. This dam was designed to contain the PMF without overtopping. The spillway capacity with the reservoir water level at the top of the dam is 10,533 cfs, which is sufficient with storage to pass the calculated PMF inflow of 21,733 cfs. Calculations and flood routing were reviewed and are judged to be adequate.

e. Spillway Adequacy. As the dam does not overtop during the passing of the PMF storm, the spillway systems are considered to be "Adequate". The tailwater is estimated to be approximately 45 feet below the top of the dam during the passing of the PMF event.

f. Downstream Conditions. The primary purpose of Mauch Chunk Creek Dam is to provide flood protection to the town of Jim Thorpe, Pennsylvania, located approximately 3.5 miles downstream. Mauch Chunk Creek enters an underground channel near the western edge of the town (see Photograph No. 14). From that point, the creek flows a distance of approximately 4,500 feet through Jim Thorpe through a combination of channels and culverts until it joins the Lehigh River.

The Soil Conservation Service estimated when discharge from the dam exceeds 207 cfs, and combined with discharge from the intervening area between the dam and Jim Thorpe, out-of-bank flows would occur in Jim Thorpe, resulting in damage. The work plan for Mauch Chunk Creek Watershed, prepared by SCS, estimated that a storm of 7 inches of rainfall, approximately the rainfall produced by Tropical Storm Agnes, over two days would damage over 200 homes and 37 businesses, causing at least a half million dollars worth of damage. Therefore, a "High" hazard classification is justified.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. The visual observations did not indicate any existing embankment stability problems. The riprap on the upstream slope was quite stable and is in good condition. Similarly, the Crownvetch on the downstream slope was thick and evenly distributed over the embankment slope. There are no exterior signs indicating that internal drainage systems were not operating as designed.

As discussed in Appendix B and in Section 3, marshy zones were noted on the left side of the principal spillway discharge channel, and further downstream along the channel. Discussions with Park representatives and a review of the records indicate that these seepage zones were noted before construction and that the dam was relocated 125 feet upstream to avoid the seepage. Although the reports indicate that these zones existed before construction of the dam, it is not known if the flow rates have increased since the reservoir has filled. The water should be collected and monitored for changes in rates or in turbidity.

Further downstream, a zone of dead trees was noted. See sheet 5a of 11, Appendix B. The surrounding ground is marshy and presently contains some cattails. It is assessed, based on the visual inspection, construction photographs, and discussions with Park representatives, that this zone probably developed since filling of the reservoir. Therefore, this area should be carefully monitored for changes in flow rates or turbidity.

The principal spillway and appurtenant facilities within the structure were inspected and evaluated to be in good condition. Since water was flowing through the principal spillway, the intake riser could not be inspected, nor could the 36-inch pipe beneath the embankment be inspected. Park personnel report that the

Soil Conservation Service representatives inspect these systems when reservoir water levels permit. The impact basin was inspected and no signs of concrete deterioration, spalling, cracking or other signs of structural movement were observed. It was assessed that this structure is in good condition, as is the riprap-lined channel below the impact basin.

The emergency spillway is also judged to be in good condition. There are no signs of channel slope instability, channel bottom instability, erosion, or other features that would adversely affect the performance of the spillway.

b. Design and Construction Data. Available design documentation included preliminary design reports, design reports, soil testing results, foundation investigations, and a geologic profile through the dam site. The Department of Environmental Resources (DER) files contained a complete set of design drawings, which were compared with the as-built drawings located at the Park Office. There were no significant differences between these drawings. Slope stability and hydrologic/hydraulic calculations were reviewed for completeness and validity of the assumptions. The scope of the calculations were found to be adequate and are assumed to be correct.

The design documentation was, for the most part, complete. It is judged that construction documentation, including DER photographs, inspection memorandums, and Soil Conservation Service (SCS) progress reports were sufficient to conclude that the embankment was constructed in accordance with the design requirements. Records in the DER files indicate that the embankment materials were to be constructed to a density of at least 95 percent of the maximum density as defined by ASTM D-698, Method "A". It is also understood and documented in the as-built plans that the required placement water content tolerance was from -1 percent to +2 percent of the optimum moisture content. Evaluation of these requirements indicated that the placement criteria for the types of material described on the drawings is appropriate. The limited records in the design files indicate that all density test results were at least 97 percent of the specification requirements, and within the moisture content requirements.

A review of the stability analysis indicates that the minimum factor of safety on the upstream slope is 1.66 for rapid draw down conditions. And for steady state conditions, the downstream slope has a minimum factor of safety of 1.71. The input parameters used for this stability analysis were reviewed and are assessed to be reasonable. The structural calculations were reviewed for completeness, found to be adequate and assumed to be correct.

c. Operating Records. There are no operating records maintained, such as high flows, high water levels, or other features associated with the discharge of water.

d. Post-Construction Changes. There are no reports nor is there any evidence that modifications were made to the dam or appurtenant facilities.

e. Seismic Stability. This dam is located in Seismic Zone I. Normally it can be considered that if a dam in this zone is stable under static loading conditions, it can be assumed safe for any expected earthquake conditions. Since the static stability analysis indicates that the dam is stable under static loading conditions, by definition of the Corps of Engineers criteria, the seismic stability of the dam is also adequate.



SECTION 7
ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Evaluation. The visual inspection and review of design and as-built documentation indicate that the dam, foundation, and appurtenant structures of Mauch Chunk Creek Dam are in good condition. The hydrologic and hydraulic computations presented in the design documents and summarized herein in Appendix C indicate that the dam was designed to pass the probable maximum flood (PMF). Therefore, the discharge systems of the structure are considered to be "Adequate". It is noted that although the structure has been designed to pass the PMF, significant property damage is likely to occur due to high flows in Mauch Chunk Creek through the town of Jim Thorpe, Pennsylvania. The work plan prepared by the Soil Conservation Service (SCS) for the Mauch Chunk Creek Watershed indicates that when discharges from the dam exceed 207 cfs, significant property damage is likely to occur. Since the probable maximum flood will have a flow on the order of 10,000 cfs, extreme property damage is inevitable and loss of life in Jim Thorpe is possible.

b. Adequacy of Information. The design information available for this inspection was adequate and comprehensive. It is noted that construction data included photographs, Department of Environmental Resources (DER) inspection memoranda and several SCS progress reports, together with inspection reports performed by SCS representatives. Summaries of construction test results were noted in SCS progress reports. These reports indicate that sufficient testing was performed by SCS representatives to insure that the dam was built in accordance with the specification criteria.

c. Urgency. It is concluded that the recommendations presented in Section 7.2 be implemented as soon as practical.

7.2 Remedial Measures.

a. Facilities. It is recommended that the marshy areas located to the west of the principal spillway discharge channel be graded and drained. This drainage should be periodically collected and checked for changes in flow rates or changes in turbidity.

Similarly, the marshy area designated by the dead trees downstream of the emergency spillway should be monitored periodically. Although it is impractical to monitor flows in this area, it is recommended that the area be regraded and drained so the overall condition of the area can be periodically monitored for any gross changes in flow rates or turbidity. The area should be checked for concentrated flows which may lead to piping.

Periodic checks of the emergency spillway system should be made, and the woody vegetation removed before it affects the discharge capacity of the spillway. The riprapped channel immediately below the principal spillway impact basin should be monitored after any significant discharge passes through the channel. As necessary, the principal spillway channel should be rehabilitated to insure that it operates properly in time of need.

b. Warning and Inspection Procedures. Because of the location of the dam upstream of a highly populated area, Jim Thorpe, Pennsylvania, a formal procedure of observation and warning during periods of high precipitation should be developed and implemented. This procedure should include a method of warning downstream residents that high flows are to be expected along the creek. If abnormally high flows are expected, procedures for evacuating persons within Jim Thorpe should be implemented.

The Owner should develop an inspection checklist as an ammendment to the maintenance procedure to insure that all critical items are inspected and maintained on a regular and periodic basis.

APPENDIX

A

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Mauch Chunk Dam
ID # PA 00605

Sheet 1 of 4

REMARKS

ITEM

AS-BUILT DRAWINGS *None available in DER files. DER files contain construction drawings labeled "For Review Only"*

REGIONAL VICINITY MAP *Dam located on USGS Quadrangle entitled "Nesquehoning, Pennsylvania". See Appendix E, Plate 1.*

CONSTRUCTION HISTORY *SCS weekly summaries of construction and DER inspection reports summarized the construction history of this project.*

TYPICAL SECTIONS OF DAM *Yes. Data obtained from SCS. See Plate 3, Appendix E.*

OUTLETS - PLAIN } *Data obtained from SCS. See Plates 5 through 7 of Appendix E.*

DETAILS

CONSTRAINTS

DISCHARGE RATINGS *None available.*

RAINFALL/RESERVOIR RECORDS *None.*

ITEM	REMARKS
DESIGN REPORTS	Yes. The report was prepared by SCS (Site PA-462) contained a summary of the hydrologic, hydraulic, structural and soils data. The report also contains a geologic investigation and specifications for construction. A summary of the slope stability analyses is also contained in the report.
GEOLOGY REPORTS	Yes. Geology report is contained in the "Design Report", also refer to Appendix F.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Yes. A summary of all these analyses is presented in the "Design Report" prepared by SCS.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Yes.. The drawings contain logs of test borings, compaction data and other basic soils tests. There were also four drawings in DER files which contained geologic sections through the dam facilities. The "Design Report" contains summaries of soils tests and calculations.
POST-CONSTRUCTION SURVEYS OF DAM	None performed.
BORROW SOURCES	These sources are designated on the drawings.

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	Yes. Stilling basin was repaired after Tropical Storm Agnes, July, 1972.
HIGH POOL RECORDS	None
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	Yes

ITEM	REMARKS
SPILLWAY PLAN	Yes. See Plate 9, Appendix E.
SECTIONS	No
DETAILS	Yes. See Plate 9, Appendix E.
} All drawings prepared by SCS.	
OPERATING EQUIPMENT PLANS & DETAILS	
Yes. See Appendix E. for drawings.	
MISCELLANEOUS	
1.	"Watershed Work Plan", Mauch Chunk Creek Watershed prepared by SCS, April 1965.
2.	Construction drawings labeled "For Review Only", prepared by SCS, Site PA-462, Spring 1967, 25 sheets out of 27 sheets enclosed.
3.	"Permit" to construct was issued 28 February 1968 by the State.
4.	"Application" to construct a dam by Carbon County Commissioners, 26 February 1968.
5.	Consulting Engineer, A.L. Wiesenberger Associates, Inc., Allentown, Pennsylvania.
6.	"Report Upon the Application" dated 2 May 1968, by J.J. Ellam, Hydraulic Engineer.
7.	SCS Inspection Reports and "Drawdown Applications".
8.	Grouting performed by Layne of New York.
9.	General Contractor was Feeser Construction Company, Schuylkill Haven, Pennsylvania.

APPENDIX

B

CHECK LIST
VISUAL INSPECTION
PHASE I

Sheet 1 of 11

Name Dam Mauch Chunk Dam County Carbon State Pennsylvania National ID # PA 00605
Type of Dam Rolled Earth Hazard Category I (High)
Date(s) Inspection 17 Aug. 78 Weather Partly Cloudy Temperature 90's

Pool Elevation at Time of Inspection 1010.0 M.S.L. Tailwater at Time of Inspection 967.5 M.S.L.

Inspection Personnel:

Mary Beck (Hydrologist) John Boschuk, Jr. (Geotechnical/Civil)
Vince McKeever (Hydrologist)
John Boschuk, Jr. Recorder

Remarks:

Mr. Dennis DeMaro-Park Superintendent
Lou Ginder } Members of the Board
Theodore Hinger }

CONCRETE/MASONRY DAMS

Sheet 2 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	N/A	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

CONCRETE/MASONRY DAMS

Sheet 3 of 11

VISUAL EXAMINATION OF OBSERVATIONS REMARKS OR RECOMMENDATIONS

SURFACE CRACKS
CONCRETE SURFACES N/A

STRUCTURAL CRACKING N/A

VERTICAL AND HORIZONTAL
ALIGNMENT N/A

MASONRY JOINTS N/A

CONSTRUCTION JOINTS N/A

EMBANKMENT

Sheet 4 of 11

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

SURFACE CRACKS

None observed.

UNUSUAL MOVEMENT OR
CRACKING AT OR BEYOND
THE TOE

None observed.

SLOUGHING OR EROSION OF
EMBANKMENT AND ABUTMENT
SLOPES

None observed and downstream slope is covered with Crowbetch. Some minor erosion gullies less than 12 inches deep were uncovered below the vegetation but they do not present a current hazard to the dam.

VERTICAL AND HORIZONTAL
ALIGNMENT OF THE CREST

No unusual movements in vertical or horizontal alignment were observed.

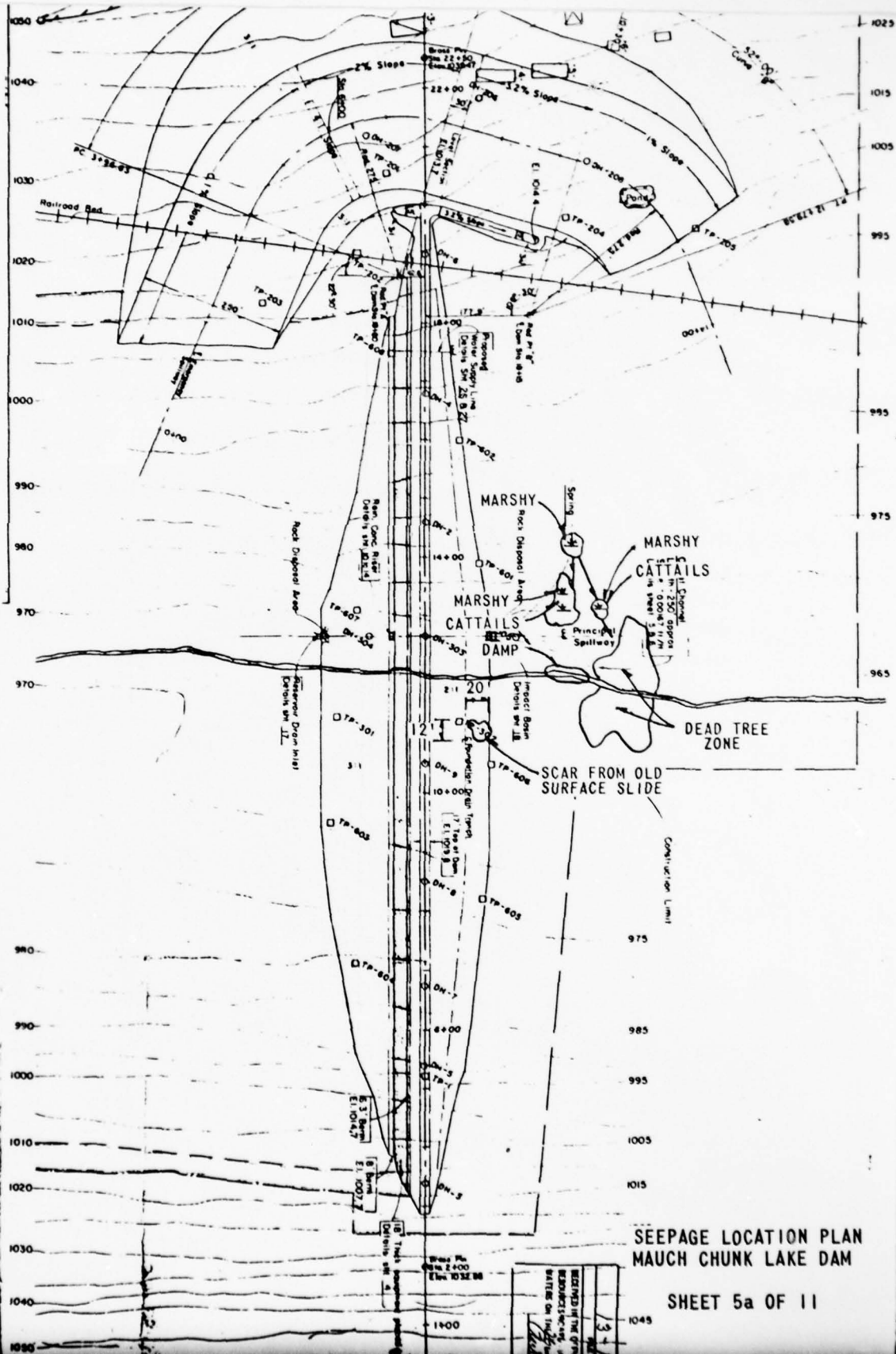
RIPRAP FAILURES

None observed.

EMBANKMENT

Sheet 5 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	<i>There were no unusual movements, distortions or nonconformities observed.</i>	
ANY NOTICEABLE SEEPAGE	<i>See Sheet 5a. Wet zones were noted mostly on the left side of the discharge channel. Discussions with the Owners representative indicated that these seeps were there before construction and springs were in the foundation during grouting. Cattails and other vegetation changes denote the seepage areas. This seepage should be monitored for changes in rate.</i>	
STAFF GAGE AND RECORDER	None	
DRAINS	<i>Embankment drainage is conveyed via 12 inch pipes to the impact basin wing walls. Seepage discharge was equal in both pipes and clear.</i>	



SEEPAGE LOCATION PLAN
MAUCH CHUNK LAKE DAM

OUTLET WORKS
(PRINCIPAL SPILLWAY)

Sheet 6 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed of any significant nature.	
INTAKE STRUCTURE	Good condition; no signs of spalling or deterioration.	
OUTLET STRUCTURE	The impact basin was observed to be in good condition with no significant spalling or deterioration.	
OUTLET CHANNEl	This channel was reconstructed after Tropical Storm Agnes, June 1972, and some deterioration would be expected if a similar storm occurred in the area. For normal conditions the pool is assessed to be stable.	
EMERGENCY GATE (POND DRAIN)	The gate was exercised and operated properly. The city water supply drop inlet could not be inspected.	

UNGATED SPILLWAY

Sheet 7 of 11

VISUAL EXAMINATION OF OBSERVATIONS REMARKS OR RECOMMENDATIONS

CONCRETE WEIR N/A. Natural channel cut into rock. The control section was measured to be 246 feet which is four feet narrower than the designed section.

APPROACH CHANNEL Good condition and well vegetated. Side slopes are stable.

DISCHARGE CHANNEL Good condition and well vegetated. Side slopes are stable.

BRIDGE AND PIERS None.

GATED SPILLWAY

Sheet 8 of 11

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

INSTRUMENTATION

Sheet 9 of 11

VISUAL EXAMINATION OBSERVATIONS REMARKS OR RECOMMENDATIONS

MONUMENTATION/SURVEYS *None*

OBSERVATION WELLS *None*

WEIRS *None*

PIEZOMETERS *None*

OTHER *None*

RESERVOIR

Sheet 10 of 11

VISUAL EXAMINATION OF OBSERVATIONS REMARKS OR RECOMMENDATIONS

SLOPES

Reservoir side slopes are flat to moderate, stable, well vegetated, generally with trees.

SEDIMENTATION

Very little sedimentation, no significant effect on flood water storage.

DOWNSTREAM CHANNEL

Sheet 11 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	<p>Flood plain immediately below the dam is swampy with many uprooted trees, both in the flood plain and in the channel. The flood plain is approximately 200 feet wide.</p>	
SLOPES	<p>Valley slope immediately below the dam is 0.5%. The channel banks are about two feet high with side slopes ranging vertical to 1:1.</p>	
APPROXIMATE NO. OF HOMES AND POPULATION	<p>The town of Jim Thorpe would be flooded in event of high flows or failure of the dam.</p>	

APPENDIX

C

MAUCH CHUNK DAM
CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATADRAINAGE AREA CHARACTERISTICS: About 75% wooded, little residential development.ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1009.7 (4220 Acre-Feet).ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1019.8 (8333 Acre-Feet).ELEVATION MAXIMUM DESIGN POOL: 1015.7ELEVATION TOP DAM: 1019.8

EMERGENCY SPILLWAY

a. Elevation 1013.7b. Type Trapezoidal channel.c. Width 250 foot design, 246 feet measured.d. Length 650 feet.e. Location Spillover Right abutment.f. Number and Type of Gates None.

PRINCIPAL SPILLWAY

a. Type Reinforced concrete riser, conduit and impact basin.b. Location 975 feet from right abutment.c. Entrance inverts 1009.7 (weir crest elevation).d. Exit inverts 967.0e. Emergency draindown facilities 24 inch pond drain.

HYDROMETEOROLOGICAL GAGES:

a. Type None.

b. Location _____

c. Records _____

MAXIMUM NON-DAMAGING DISCHARGE: 270 cfs, flows greater than this produce out of bank flows in downstream Jim Thorpe.

DAM SAFETY ANALYSIS
HYDROLOGIC/HYDRAULIC DATA

Date: 8/31/78
By: MEB
Sheet: 2 of 13

DAM Mauch Chunk Nat. ID No. PA 00605 DER No. 13-106

ITEM/UNITS	Permit/Design Files (A)	Calc. from Files/Other (B)	Calc. from Observations (C)
1. Min. Crest Elev., ft.	<u>1019.8</u>		
2. Freeboard, ft.	<u>0 (PMF)</u>		
3. Spillway ⁽¹⁾ Crest Elev, ft.	<u>1009.7</u>		
3a. Secondary ⁽²⁾ Crest Elev, ft.	<u>1013.7</u>		
4. Max. Pool Elev., ft.	<u>1019.8 (PMF)</u>		
5. Max. Outflow ⁽³⁾ , cfs	<u>10,533</u>		
6. Drainage Area, mi ²	<u>5.95</u>		<u>5.96</u>
7. Max Inflow ⁽⁴⁾ , cfs	<u>21,733 (PMF)</u>		
8. Reservoir Surf. Area, Acre	<u>333</u>		<u>362</u>
9. Flood Storage ⁽⁵⁾ , Acre-Feet	<u>4170</u>		
10. Inflow Volume, inches	<u>21.94</u>		

Reference all figures by number or calculation on attached sheets:

Example: 3A - Drawing No. xxx by J. Doe, Engr., in State File No. yyyy.

NOTES:

- (1) Main emergency spillway.
- (2) Secondary ungated spillway.
- (3) At maximum pool, with freeboard, ungated spillways only.
- (4) For columns B, C, use PMF.
- (5) Between lowest ungated spillway and maximum pool.

Date: 8/31/78
By: MFB
Sheet: 3 of 13

HYDROLOGIC/HYDRAULIC CALCULATIONS (cont.)

Item (from Sheet 2)

Source

1A thru 10A

Design Report prepared by
Soil Conservation Service

6C, 8C

USGS Maps
Nesquehoning (1976)
Tamaqua (1976)

BY MEB DATE 8/31/78 SUBJECT _____ SHEET 4 OF 13
 CH'D BY _____ DATE _____ Mauch Chunk JOB No. _____
Hydrology/Hydraulics _____

Classification (Ref. - Recommended Guidelines for Safety Inspection of Dams)

1. The hazard potential is rated as "High" as there would be loss of life if the dam failed.
2. The size classification is "Intermediate" based on its 50 ft height and 4220 Ac-Ft normal storage.
3. The spillway design flood, based on size and hazard classification, is the probable maximum flood (PMF).

Hydrologic and Hydraulic Analysis

1. The design folder contained calculations for rating curves, elevation-storage curve, and calculations for freeboard (PMF) inflow hydrograph.
2. Flood routing thru the reservoir were obtained from the Soil Conservation Service State Office.
3. Evaluation of data

Emergency spillway discharge calculations.
 The original calculations were based on a bottom width (b) of 250 ft a z (side slope) of 2. The construction drawings indicated b = 250 ft and z = 3. Field check indicated b = 246 ± ft and z ~ 3. As shown on sheet 10, the difference in discharge is negligible.

PMF Peak Inflow:
 Information from Corps of Engineers, Bath Dist. indicated comparing this watershed to Penn Forest, D.A = 16.1 mile,
 & PMF = 16,800 cfs

Mauch Chunk PMF inflow =

$$\left(\frac{5.950.8}{16.1}\right) 16,800 = 7,576 \text{ cfs} < 21,733 \text{ cfs}$$
 used in design, see sheet 7

BY MFB DATE 8/31/78 SUBJECT _____ SHEET 5 OF 13
CHKD BY _____ DATE _____ Mauah Creek JOB No. _____
Hydrology / Hydraulics

Therefore, the design PMF peak inflow is conservative.

Sheets 6 thru 10 and sheet 13 are from the design report prepared by SCS and on file in Dept. of Environmental Resources Office and sheets 11 & 12 were supplied by SCS.

The Spillway is Rated as "Adequate" as the dam passes the PMF storm without overtopping.

Downstream Conditions

The maximum non-damaging discharge has been determined by SCS to be 270 cfs (sheet 8). See Section 5 of the text for description of downstream conditions.

U. S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

DESIGN REPORT SUMMARY PA 462
MAUCH CHUNK

I. Watershed data

A. Structure class	C	
B. Drainage area	<u>3808</u>	Ac.
C. Time of concentration - T _c	<u>2.60</u>	Hrs.
D. Hydrologic curve number - C _n		
1. Moisture condition II	<u>77</u>	
2. Moisture condition III	<u>92</u>	

II. Principal spillway

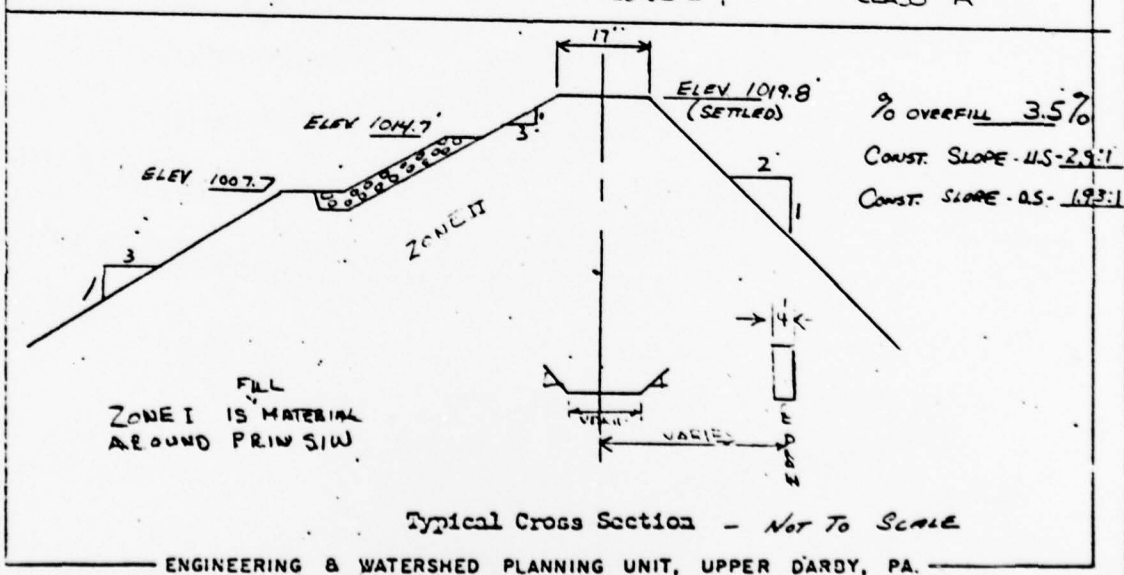
A. Conduit		
1. Size (I.D.)	<u>36</u>	In.
2. Length	<u>100</u>	Ft.
B. Risers		
1. Size	<u>3'49"</u>	Ft.
2. Height	<u>40</u>	Ft.
C. Weir length	<u>16.33</u>	Ft.
D. Orifice size	<u>-</u>	In.
E. Pond drain size	<u>24</u>	In.
F. Type of energy dissipator	<u>IMPACT BASIN - 225 cfs</u>	

III. Emergency spillway

A. Width	<u>250</u>	Ft.
B. Side slopes	<u>3:1</u>	
C. Length of level section	<u>30</u>	Ft.
D. Crest slope	<u>32</u>	Ft./Ft.
E. Maximum velocity at control section (D.H.W.)	<u>5.8</u>	Ft./Sec.
F. Duration of flow (D.H.W.) through emergency spillway	<u>19.8</u>	Hrs.
G. Frequency of use	<u>100 YR.</u>	

IV. Earth fill

A. Height	<u>50</u>	Ft.
B. Volume	<u>225,000</u>	C.Y.
C. Compaction	<u>ZONE I & II CLASS A</u>	



HYDROLOGIC & HYDRAULIC SUMMARY PA 462

PA
 DGS 2/10/67 A. SNYDER 2/20/67
 HYDROLOGIC & HYDRAULIC SUMMARY
 MARION CHURCH

PA 462
 I-3

ELEMENT OF STRUCTURE	DETERMINING FACTOR	ELEV	SURFACE AREA, AC.	STORAGE		INFLOW VOLUME, IN RATE, CFS	PEAK OUTFLOW CFS
				ACFE- FEET	INCHES*		
CREST OF "KISLER" RIVER	100-YR SEDIMENT ACCUMULATION + 4169 AC-FT BENEFICIAL STOR	1009.7	333	4220	13.3	-	-
CREST OF ENL. SW	100 YEAR FREQUENCY STORM	1013.7	392	4169 5724	18.4	-	222.4
DESIGN HIGH WATER	1.00X VALUE FROM 83-1020 SHEET 4165 DIST COND II	1015.7	421	6690	21.05	7.13	1759 1574
TOP OF DAM	1.0 X VALUE FROM 83-1020 SHEET 4165 DIST COND II	1019.8	480	8390	26.4	21.94	10,533

* VOLUME EXPRESSED IN INCHES OF RUNOFF FROM CONTROLLED WATERSHED AREA OF 3508 ACRES.

1) DOES NOT INCLUDE 9.5 AC-FT SEDIMENT STORAGE ALLOCATED TO FLOOD POOL

2) 61 AC-FT SEDIMENT + 3794 RECREATIONAL DEVELOPMENT + 975 AC-FT WATER SUPPLY + 1574 AC-FT FLOOD STORAGE

3) TOTAL - INCLUDES PIPE FLOW

SPEED-MEMO

December 28, 1965

Lewis Wall, Civil Engineer

SUBJECT

Howard W. Miller, Hydraulic Engineer

WATERSHEDS (P. L. 566) - Nauch Chunk

MESSAGE (Write concise message. Sign and forward parts 1 and 2 to addressee. Retain part 3)

The principal outlet release rate on structure PA-462 should not exceed 270 c.f.s.
in order to contain the 100-year frequency flood at Jim Thorpe within bank.

SIGNATURE

Howard W. Miller

REPLY (Use this space for reply. Sign and date. Return part 2 to sender. Retain part 1)

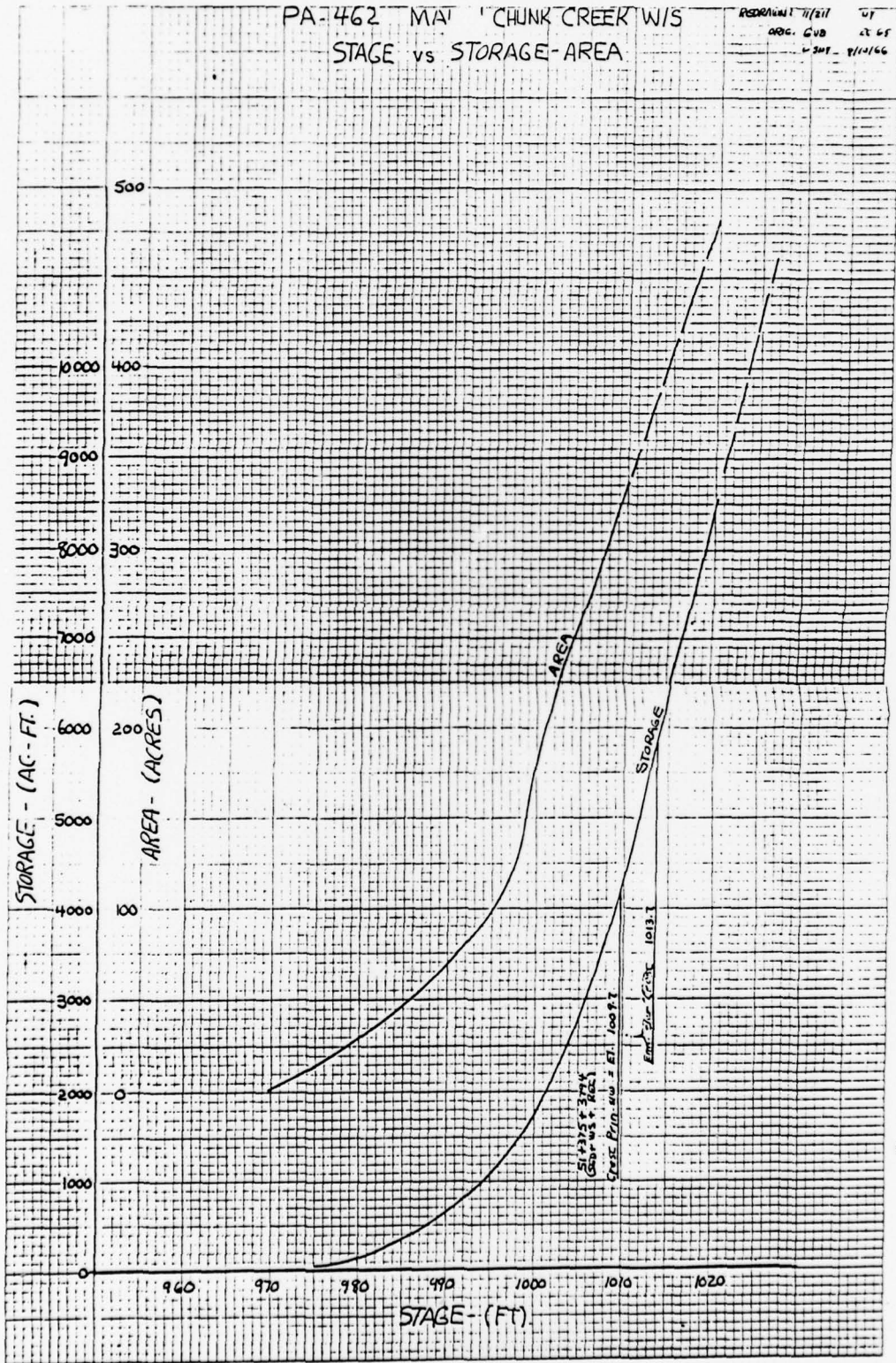
HW

TIME

DATE

PA-462 MAT 'CHUNK CREEK W/S
STAGE vs STORAGE-AREA

REVISION 11/21/67
ORIG. CUB 28 65
L-307 - 8/11/66



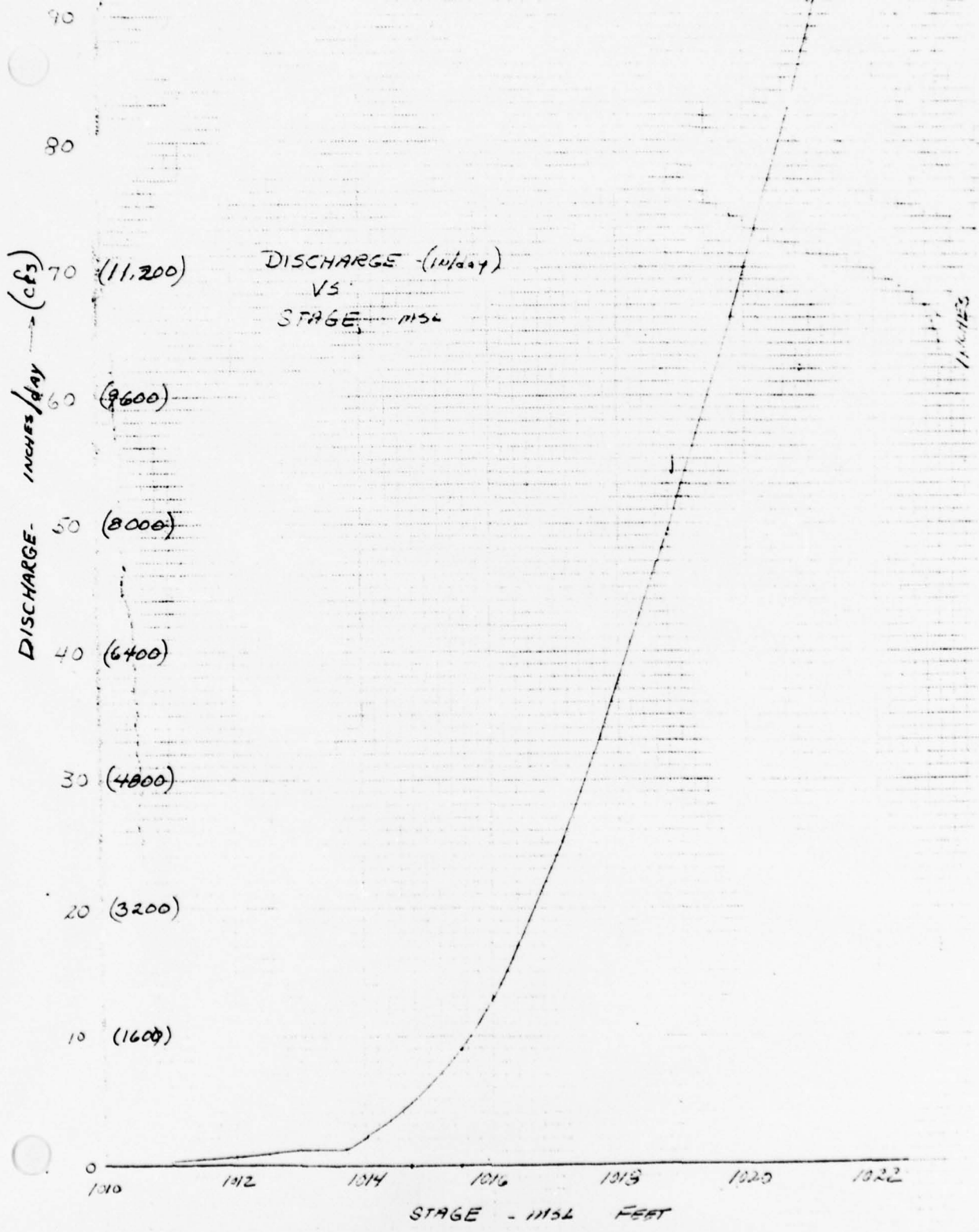
1/27/67

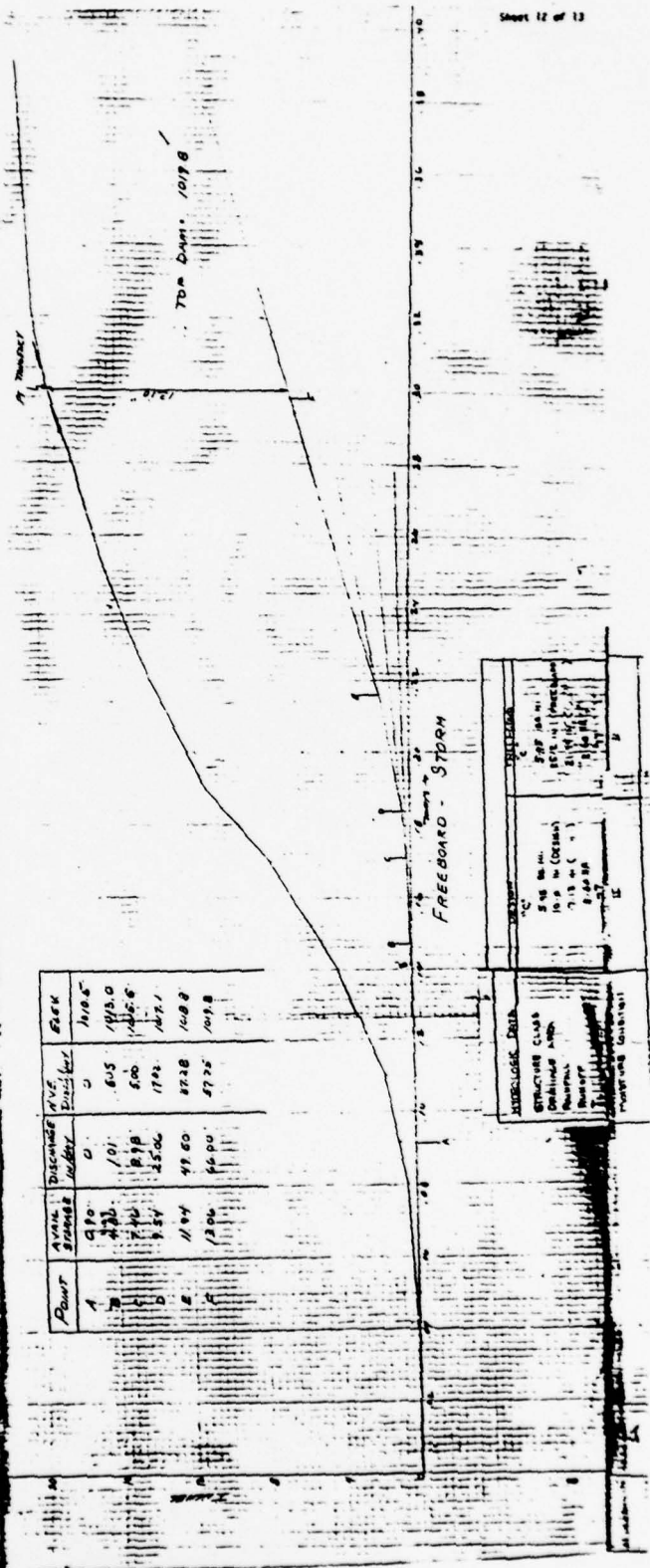
DES
1/27/67

STAGE VS DISCHARGE
COMPUTATIONS

PA 462 1/27/67 check

STAGE Feet	EMERGENCY HP FEET	SENEY L = 250 Q/6 ft ² /s	SPILLWAY L = 220 TK = 2 ft	WICHOITA CASE 2 - 2% EN CASE 2 - 2% EN Q _{em} = W _{8c}	EMERGENCY Q _{em} = 57.5d Q _{em} (at)	Total Q _{em} Pipe + E.S.W.	Q m ³ /day	
1012.7				246		0	0	
1019.5				3		0	0	
1011.0						3	.02	
1011.5						73	.46	
1012.0						88	.55	
1012.5						139	.87	
1013.0					1.9% diff.	161	1.01	
1013.7	0	0	0	246 230	0	162	1.02	
1015.5	1.76	5	0.92	248.76 251.84	1243 1259	1183 1199	1410 1426	8.81 8.93
1016.4	2.65	10	1.46	250.38 252.92	2504 2529	2444 2467	2673 2698	16.71 17.00
1017.1	3.39	15	1.90	251.7 253.80	3776 3807	3716 3747	3947 3978	24.67 25.04
1017.7	4.04	20	2.32	252.96 254.64	5059 5093	4999 5033	5231 5265	32.70 33.17
1018.3	5.14	30	3.05	255.15 256.10	7633 7683	7393 7623	7829 7857	48.83 49.50
1019.3	6.14	40	3.70	257.1 257.40	10,284 10,296	10,224 10,236	10,461 10,473	65.39 66.00
1020.7	7.00	50	4.30	258.9 259.60	13,943 12,950	12,883 12,870	13,124 13,109	82.03 82.59
1021.5	7.30	60	4.85	259.70	15,582	15,522	15,763	92.30
<p>Note: bottom width 'A' field checked to be 246 ± feet z = 3 on construction plans and the spillway side slopes appear to be constructed 5H:1V</p>								
<p>Therefore, the difference in discharge is negligible</p>								
<p>MFB 8/31/78</p>								
<p>0.6% difference</p>								





Point	AVAIL. STRESS	DISCHARGE	PLUS	STRESS	STRENGTH
A	970	0	0	1105	1105
B	420	101	605	1435	1435
C	770	878	500	1270	1270
D	854	3506	1782	1072	1072
E	1144	4960	2728	1088	1088
F	1304	6400	4728	1078	1078

STRUCTURE DATA	DESIGN DATA
STRUCTURE CLASS	200' DIA. (1)
DESIGN CLASS	10.0' DIA. (2)
DESIGN CLASS	7.13' DIA. (3)
DESIGN CLASS	5.48' DIA. (4)
DESIGN CLASS	4.26' DIA. (5)
DESIGN CLASS	3.41' DIA. (6)
DESIGN CLASS	2.84' DIA. (7)
DESIGN CLASS	2.41' DIA. (8)
DESIGN CLASS	2.07' DIA. (9)
DESIGN CLASS	1.80' DIA. (10)
DESIGN CLASS	1.57' DIA. (11)
DESIGN CLASS	1.38' DIA. (12)
DESIGN CLASS	1.22' DIA. (13)
DESIGN CLASS	1.09' DIA. (14)
DESIGN CLASS	0.98' DIA. (15)
DESIGN CLASS	0.89' DIA. (16)
DESIGN CLASS	0.81' DIA. (17)
DESIGN CLASS	0.74' DIA. (18)
DESIGN CLASS	0.68' DIA. (19)
DESIGN CLASS	0.63' DIA. (20)
DESIGN CLASS	0.59' DIA. (21)
DESIGN CLASS	0.55' DIA. (22)
DESIGN CLASS	0.51' DIA. (23)
DESIGN CLASS	0.48' DIA. (24)
DESIGN CLASS	0.45' DIA. (25)
DESIGN CLASS	0.42' DIA. (26)
DESIGN CLASS	0.39' DIA. (27)
DESIGN CLASS	0.37' DIA. (28)
DESIGN CLASS	0.34' DIA. (29)
DESIGN CLASS	0.32' DIA. (30)
DESIGN CLASS	0.30' DIA. (31)
DESIGN CLASS	0.28' DIA. (32)
DESIGN CLASS	0.26' DIA. (33)
DESIGN CLASS	0.24' DIA. (34)
DESIGN CLASS	0.23' DIA. (35)
DESIGN CLASS	0.21' DIA. (36)
DESIGN CLASS	0.20' DIA. (37)
DESIGN CLASS	0.18' DIA. (38)
DESIGN CLASS	0.17' DIA. (39)
DESIGN CLASS	0.16' DIA. (40)
DESIGN CLASS	0.15' DIA. (41)
DESIGN CLASS	0.14' DIA. (42)
DESIGN CLASS	0.13' DIA. (43)
DESIGN CLASS	0.12' DIA. (44)
DESIGN CLASS	0.11' DIA. (45)
DESIGN CLASS	0.10' DIA. (46)
DESIGN CLASS	0.09' DIA. (47)
DESIGN CLASS	0.08' DIA. (48)
DESIGN CLASS	0.07' DIA. (49)
DESIGN CLASS	0.06' DIA. (50)
DESIGN CLASS	0.05' DIA. (51)
DESIGN CLASS	0.04' DIA. (52)
DESIGN CLASS	0.03' DIA. (53)
DESIGN CLASS	0.02' DIA. (54)
DESIGN CLASS	0.01' DIA. (55)

PA. PA-462 MAUCH CHUNK WIS
 A. SNYDER 11/21/67
 DRAWDOWN COMPUTATIONS 12

$$\text{TIME DAYS} = (0.505)(\text{AC. FT}) / (\text{CFS})$$

ELEV. FT	STORAGE AC-FT	EFT DISCHARGE CFS	STOR. INCREMENT AC-FT.	AVE DISCHARGE CFS	TIME DAYS	ACCUM TIME
1013.7	1600	162				
1013.5	1500	162	100	162	0.312	0.312
1013.0	1280	161	220	161	0.670	1.002
1012.5	1030	139	250	150	0.942	1.944
1012.0	880	88	150	113	0.670	2.514
1011.5	630	42.6	250	65.3	1.953	4.447
1011.0	430	2.9	200	22.7	4.409	8.896
1010.9	420	0	10	1.5	3.37	12 DAYS.

10 DAY DRAWDOWN ELEV \approx 1010.9'

EDGE FLOW ELEV.

$$Q_w = 59.5 = 42.5 H_w^{3/2}$$

$$H \approx 1.2$$

$$EL = 1009.7 + 1.2 = 1010.9$$

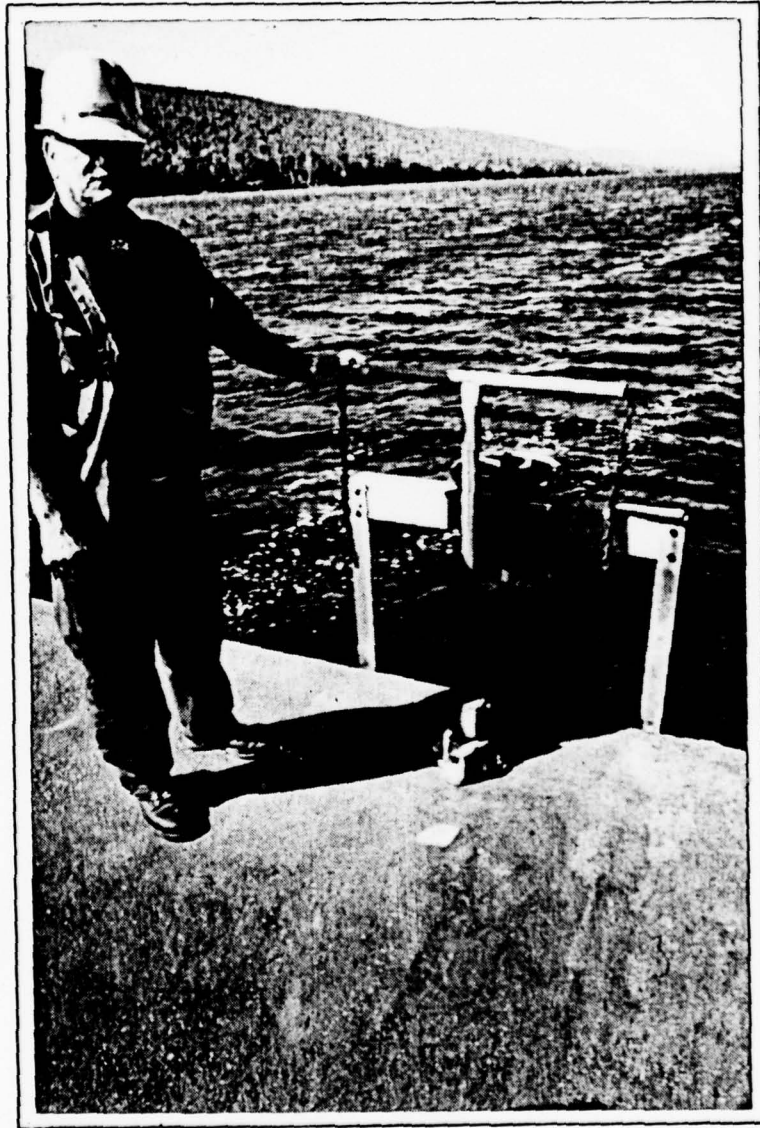
APPENDIX

D



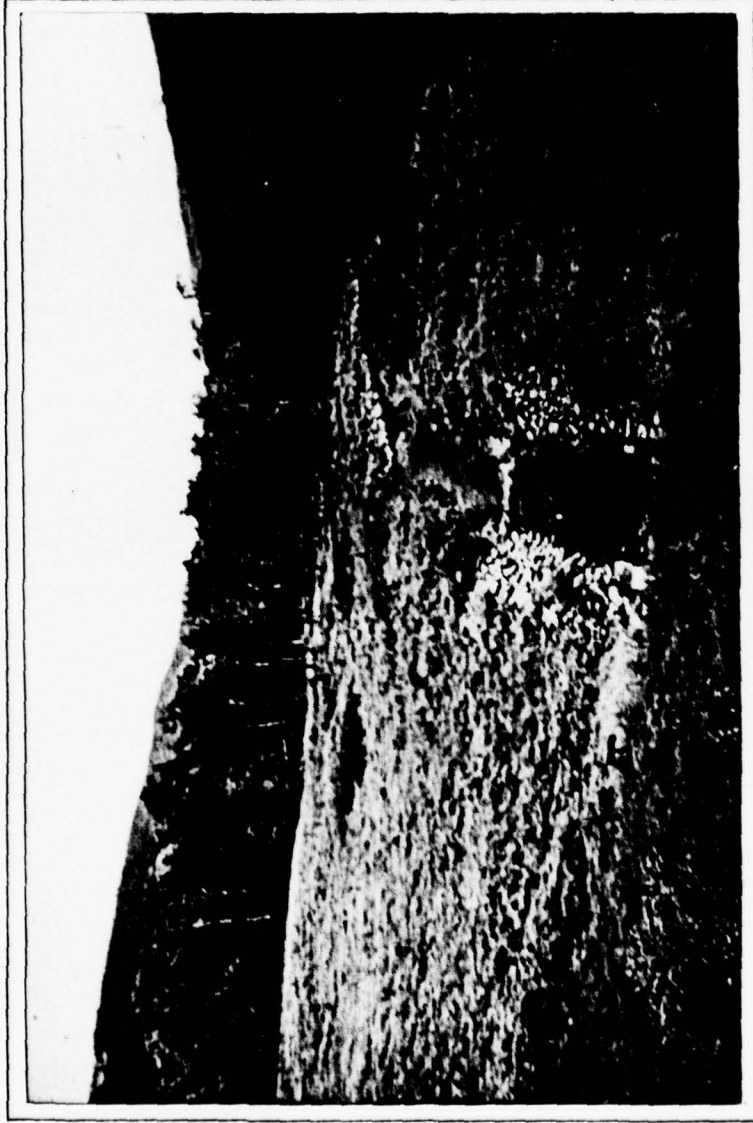
PRINCIPAL SPILLWAY

PHOTOGRAPH NO. 1



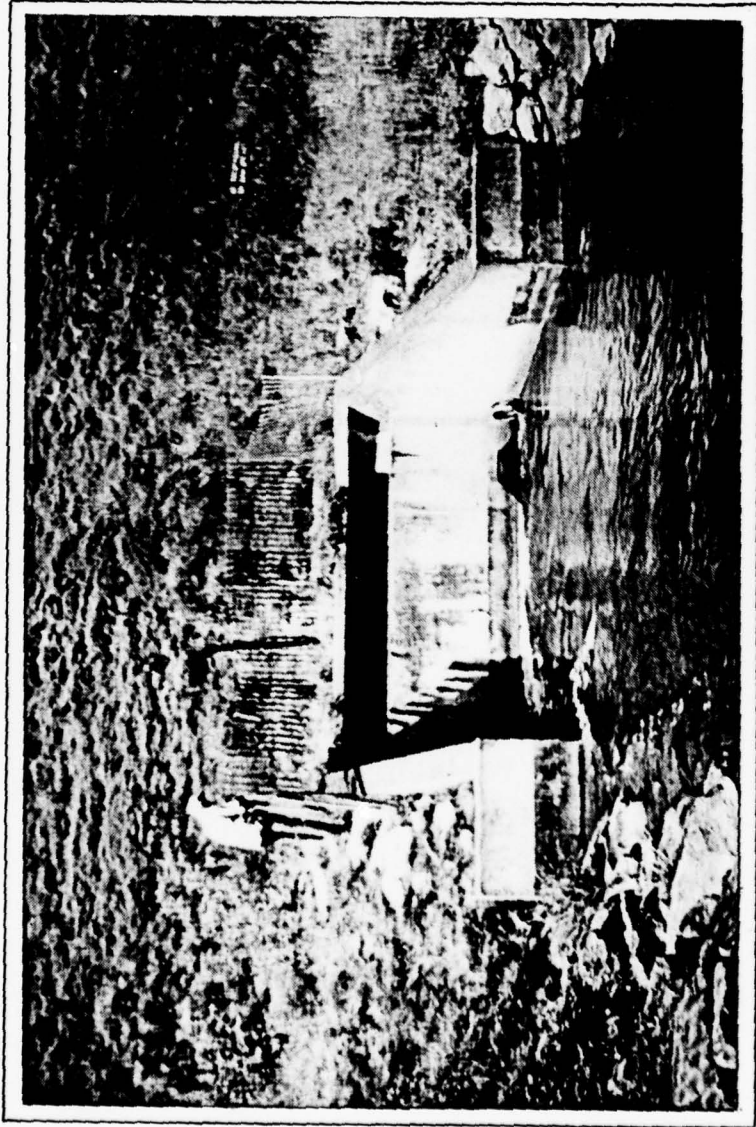
POND DRAIN VALVE LOCATED
ON TOP OF PRINCIPAL SPILL-
WAY RISER.

PHOTOGRAPH NO. 2



VIEW OF PRINCIPAL SPILLWAY DISCHARGE CHANNEL
FROM TOP OF DAM. NOTE PATCHES OF CATTAILS
TO THE LEFT OF THE CHANNEL.

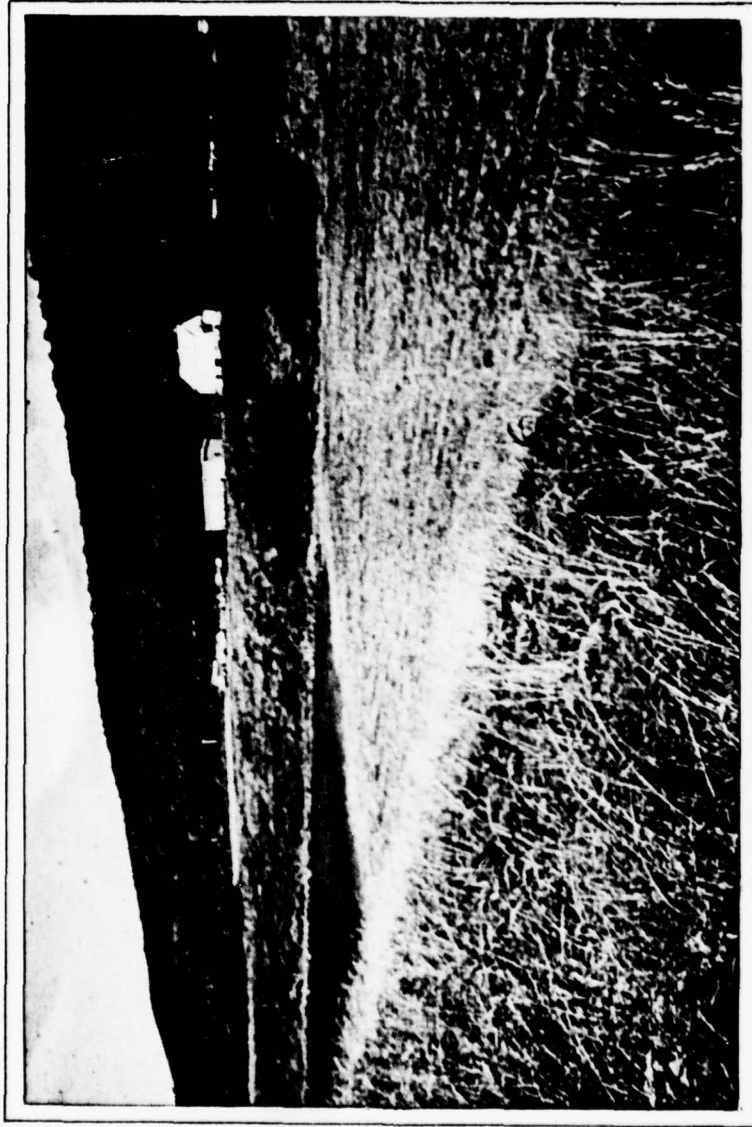
PHOTOGRAPH NO. 3



PRINCIPAL SPILLWAY OUTLET STRUCTURE. NOTE
SEEPAGE OUTLET PIPES FOR TOE DRAIN SYSTEM.

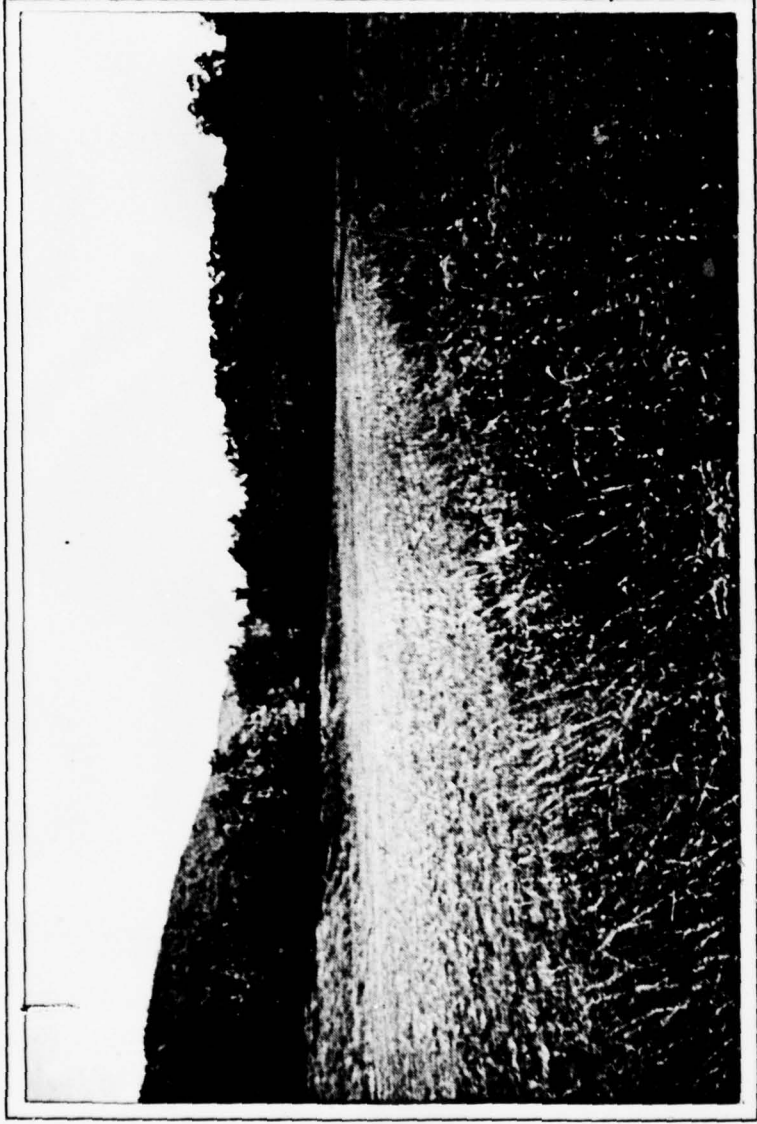


VIEW OF PRINCIPAL SPILLWAY DISCHARGE CHANNEL, NOTE CATTAILS TO THE LEFT OF THE DISCHARGE CHANNEL.



APPROACH CHANNEL TO EMERGENCY
SPILLWAY.

PHOTOGRAPH NO. 6



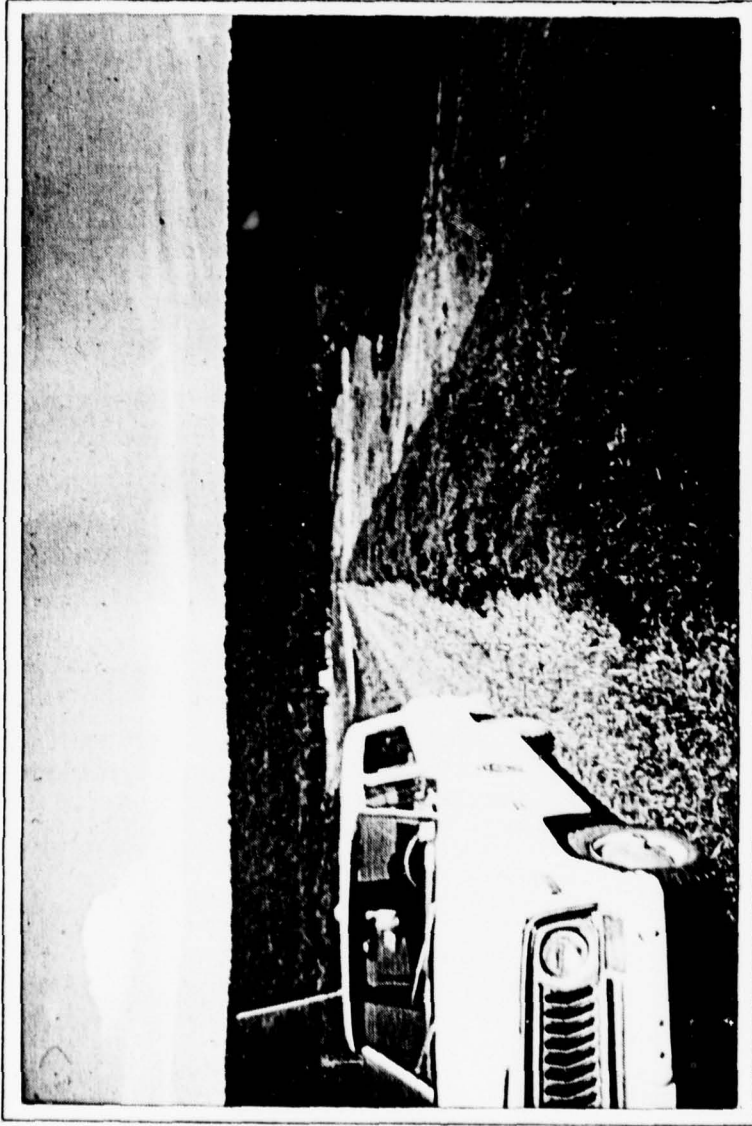
DOWNSTREAM VIEW OF EMERGENCY SPILLWAY.

PHOTOGRAPH NO. 7



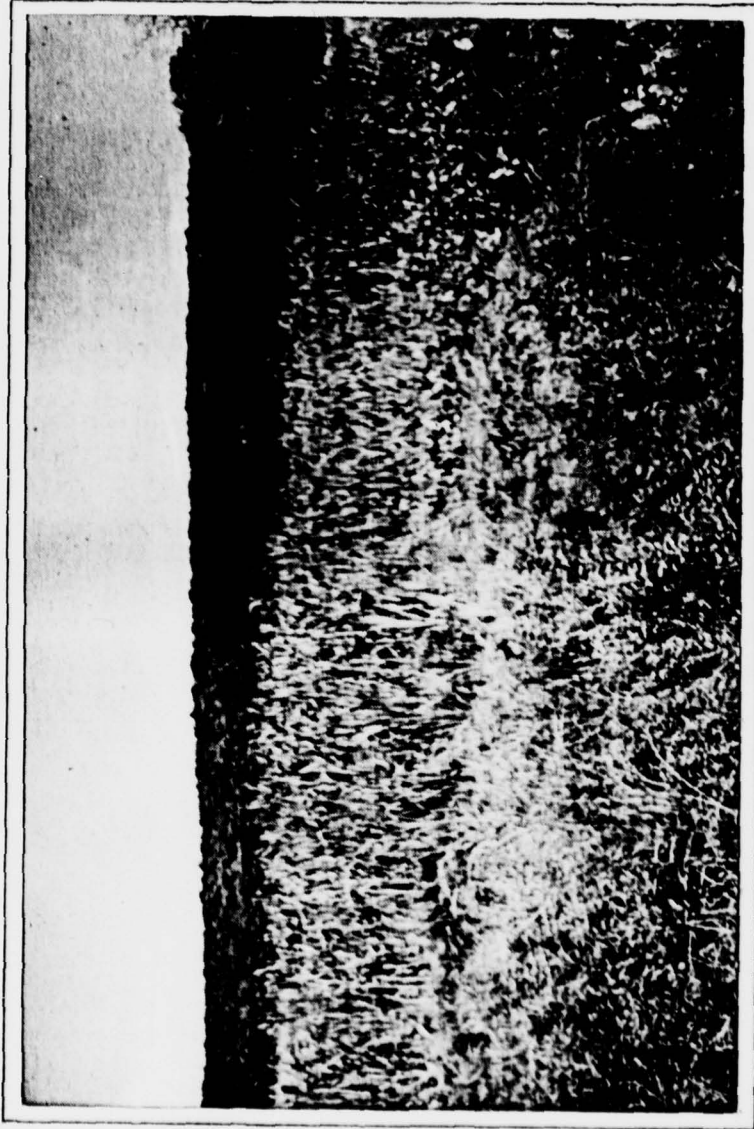
VIEW OF UPSTREAM SLOPE LOOKING
TOWARDS RIGHT ABUTMENT.

PHOTOGRAPH NO. 8



VIEW OF DOWNSTREAM SLOPE. NOTE
DENSE COVER OF CROWNVETCH.

PHOTOGRAPH NO. 9



VIEW OF CATTAILS DENOTING SEEPAGE
ZONES. SEE SHEET 5a, APPENDIX B
FOR LOCATIONS.



CLOSEUP OF SEEPAGE SOURCES WITHIN
MARSHY AREAS DOWNSTREAM OF DAM.
SEE SHEET 5a, APPENDIX B FOR
LOCATIONS.

PHOTOGRAPH NO. 11



VIEW OF STREAM DOWNSTREAM OF DAM
JUST ABOVE FIRST BRIDGE BELOW THE
DAM.

PHOTOGRAPH NO. 12



VIEW OF FIRST HIGHWAY BRIDGE
DOWNSTREAM OF DAM.

PHOTOGRAPH NO. 13

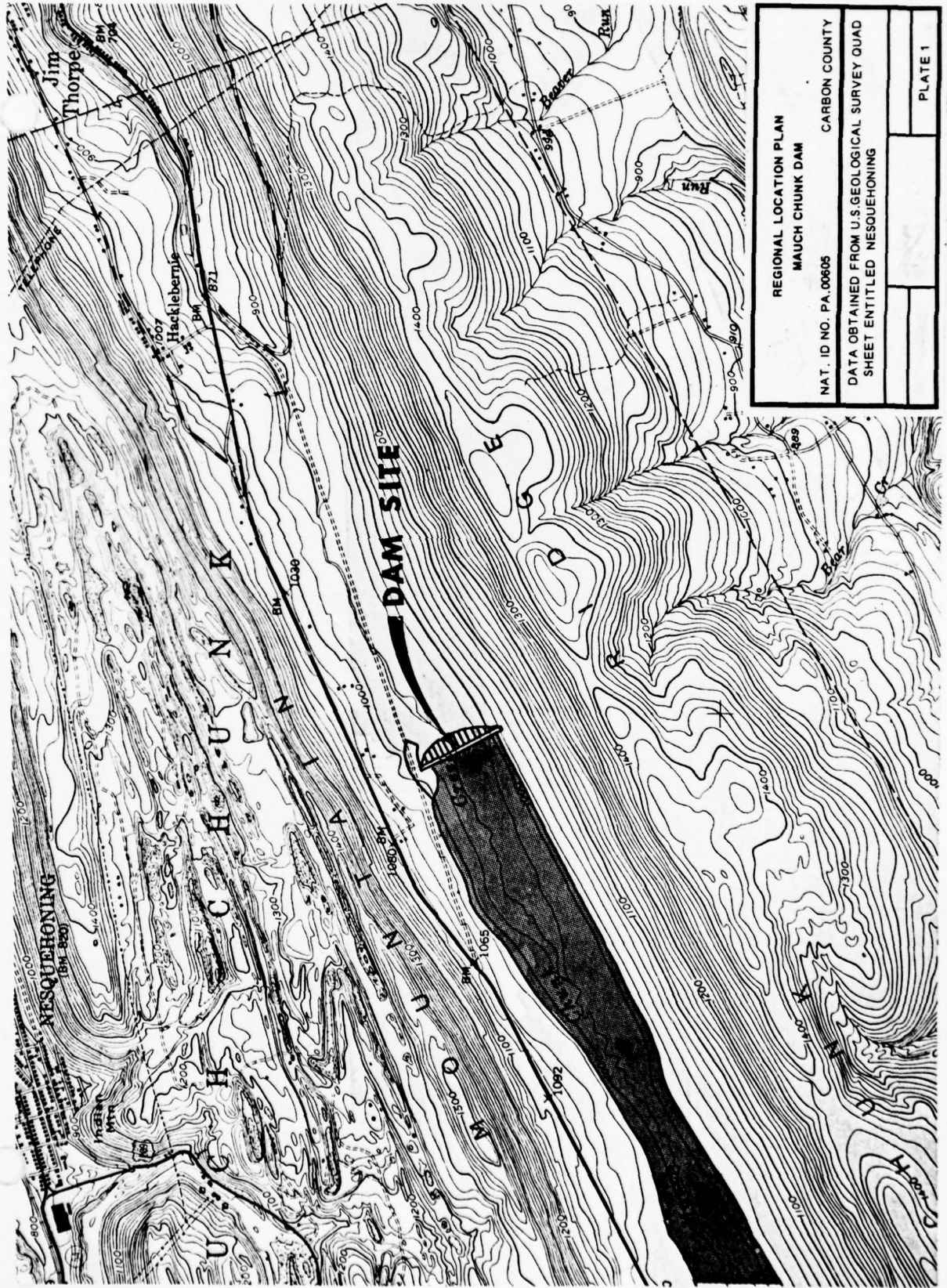


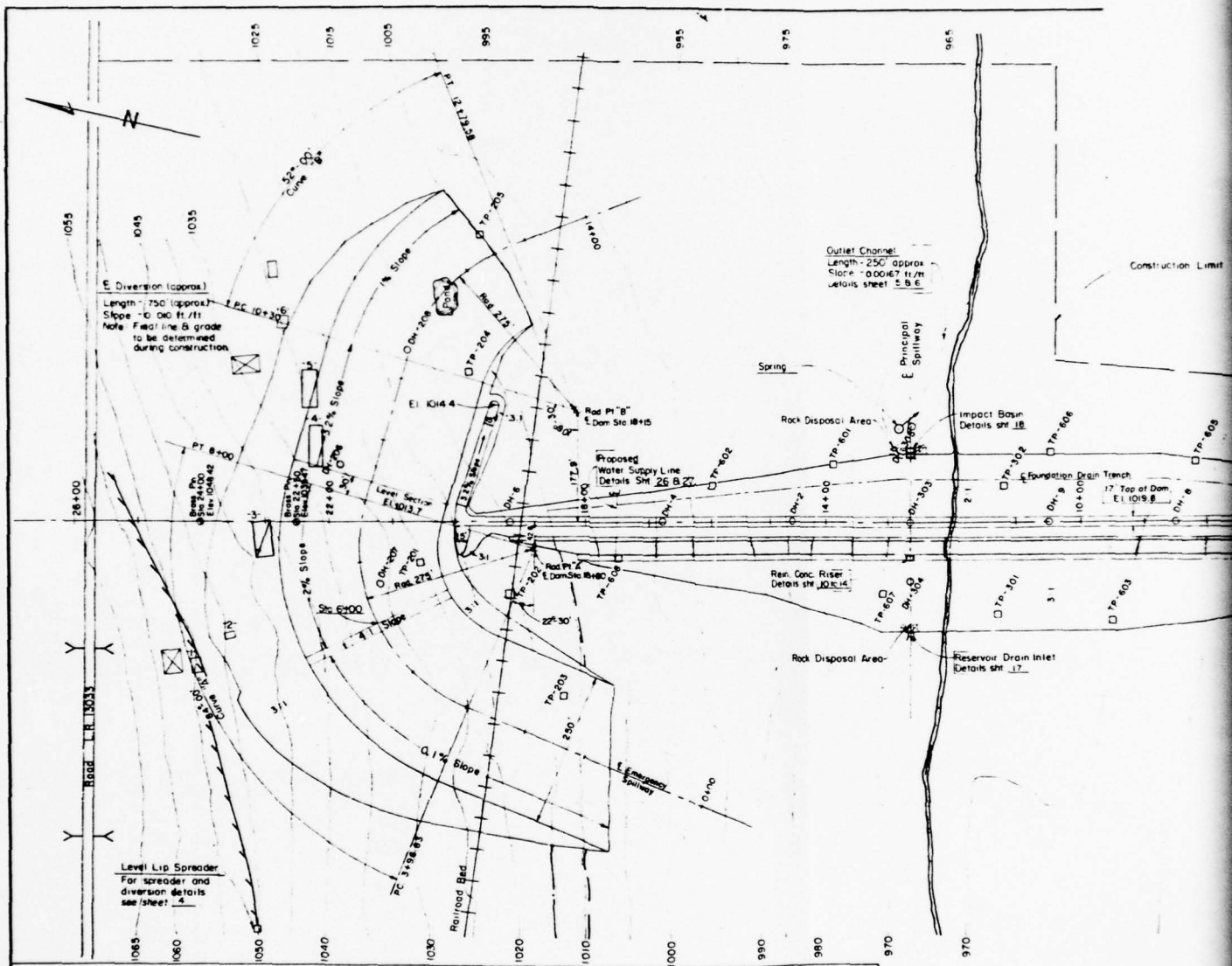
TYPICAL VIEW OF MAUCH CHUNK CREEK
AS IT PASSES THROUGH JIM THORPE,
PENNSYLVANIA.

PHOTOGRAPH NO. 14

APPENDIX

E



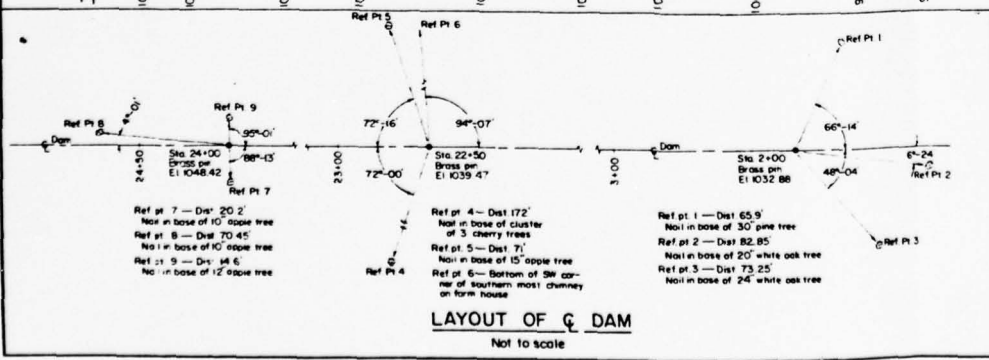


Outlet Channel
 Length: 250' approx
 Slope: 0.00067 ft/m
 Details sheet 5, 6, 6

Diversion (approx)
 Length: 750' approx
 Slope: 0.0011 ft/m
 Note: Field line B grade to be determined during construction

Level Lip Spreader
 For spreader and diversion details see sheet 4

- Construction Notes**
1. E. Dam = E. Cut-off trench = E. Grout Curtain
 2. For logs of test holes see sheets 19 thru 24
 3. Contour interval = 5'
 4. Buildings number 1, 2, 3, 4, 5, 6 shall be removed
 5. Disposition of railroad bed, see notes sheet 2



Ref pt 7 — Dist 20.2'
 Nail in base of 10' aspen tree

Ref pt 8 — Dist 70.45'
 Nail in base of 10' aspen tree

Ref pt 9 — Dist 41.6'
 Nail in base of 12' aspen tree

Ref pt 4 — Dist 172'
 Nail in base of cluster of 3 cherry trees

Ref pt 5 — Dist 71'
 Nail in base of 15' apple tree

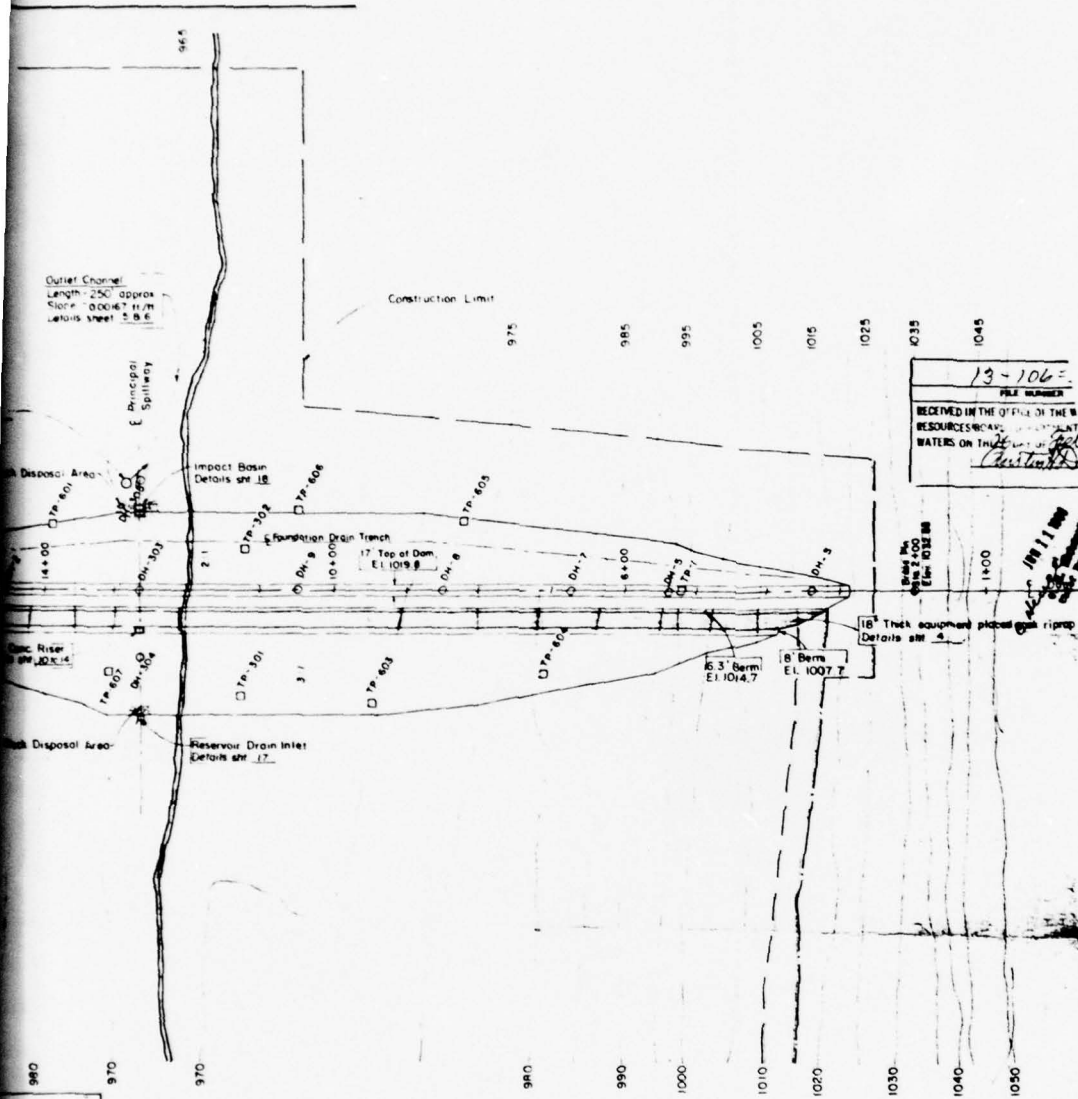
Ref pt 6 — Bottom of SW corner of southern most chimney on farm house

Ref pt 1 — Dist 65.5'
 Nail in base of 30' pine tree

Ref pt 2 — Dist 82.85'
 Nail in base of 20' white oak tree

Ref pt 3 — Dist 73.25'
 Nail in base of 24' white oak tree

LAYOUT OF G DAM
 Not to scale



13-106
 FILE NUMBER
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 RESOURCES DIVISION OF THE
 WATERS ON THE
Christie

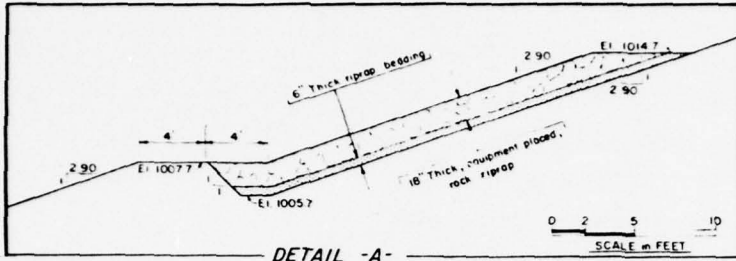
- Construction Notes**
1. E. Dam - E. Cut-off trench - E. Grout Curtain
 2. For logs of test holes see sheets 19 thru 24
 3. Contour interval = 5'
 4. Buildings number 1, 2, 3, 4, 5, & 6 shall be removed
 5. Disposition of railroad bed, see notes sheet 2

- LEGEND**
- House
 - Barn
 - Other Buildings
 - Design High W
El. 1015.7
 - Normal Pool
El. 1009.7
 - Test Holes
 - Stream
 - Culvert
 - Diversion

FOR REVIEW ONLY
 0 50 100 200
 SCALE IN FEET

2

PLAN OF DAM & APPURTENANCES	
MAUCH CHUNK LAKE DAM	
NAT. ID NO. PA.00605	CARBON COUNTY
DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, DRAWING NO. PA-462-P, SHEET NO. 3 OF 27, DATED MARCH, 1967	
PLATE 2	

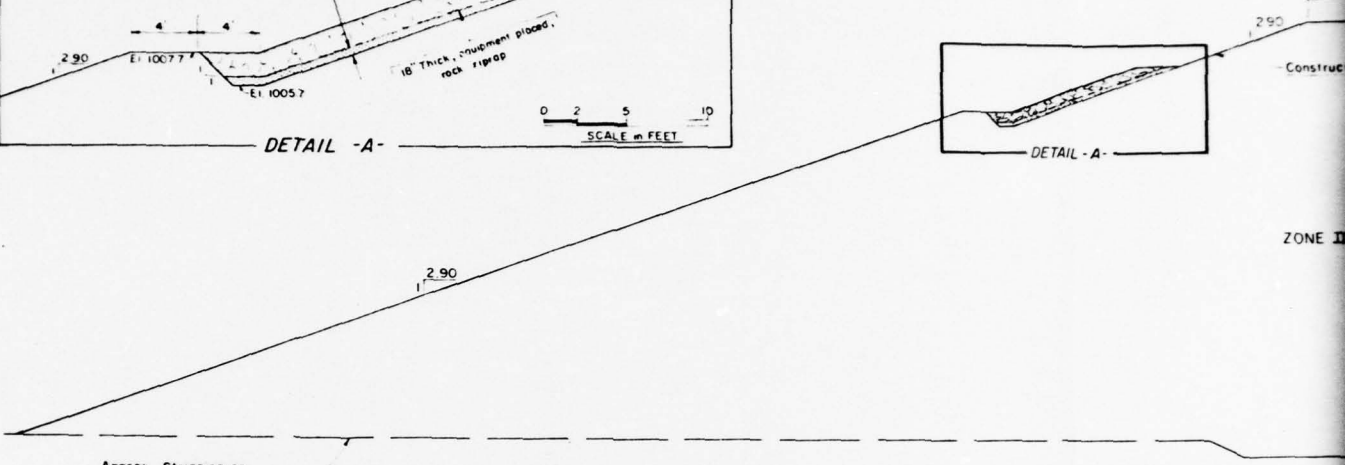


DETAIL -A-

0 2 5 10
SCALE in FEET



DETAIL -A-



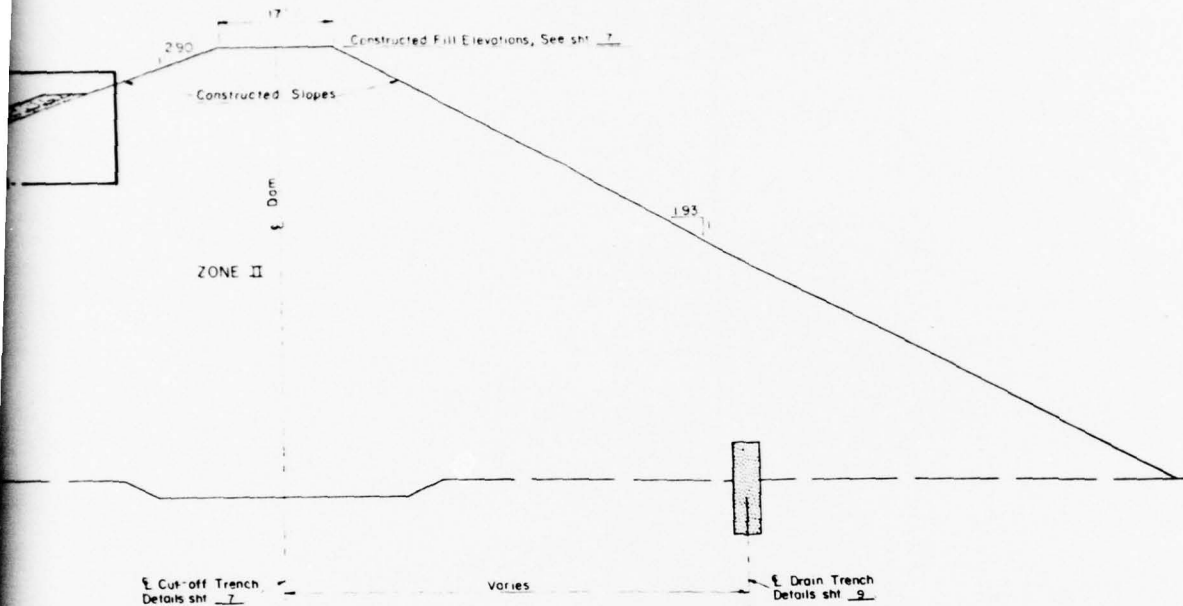
Approx. Stripping or
Foundation Excavation Line

NOTE
Zone I (Not shown)
Details sht. 6

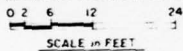
1 Cut-off Trench
Details sht. 7

TYPICAL SECTION OF

0 2 6 12
SCALE in FEET



TYPICAL SECTION OF EMBANKMENT



CONSTRUCTION DETAILS

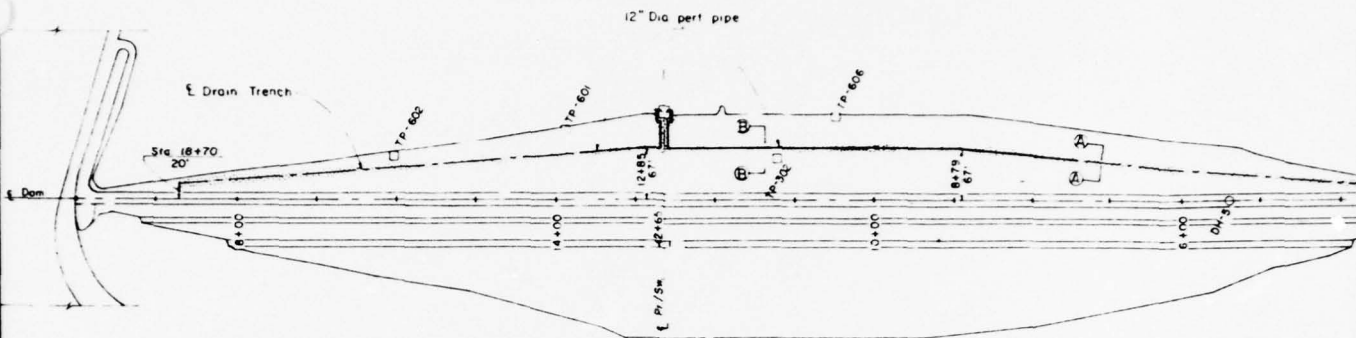
- 1 Zone II material shall be selectively placed so that the coarser material will be in the upstream & downstream portions of Zone II
- 2 Bedding for rock riprap as shown on this sheet and sheet 5 shall meet drain fill gradation limits, see sheet 9

Zone	MATERIAL	Max rock Size	Max Lift	Required Content	COMPACTION	
					Class	Definition
I	Material as represented by TP 205, depth 1-2.5 classified as ML	6"	9'	Optimum \pm 2.0%	A	100% Max. density by ASTM D-698 Method A
II	Material as represented by TP 205, depth 1-2.5, classified as ML. Also material as represented by TP 127 depth 4-8.5 classified as SC-SM and material represented by TP 102, depth 2.5-6 classified as SM or ML	6"	9'	Optimum \pm 2.0%	A	95% Max. density by ASTM D-698 Method A

1 Maximum permissible lift thickness before compaction.
2 Water content of fill matrix at time of compaction.

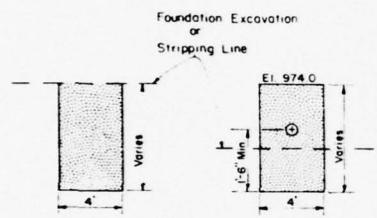
2

TYPICAL SECTION OF EMBANKMENT	
MAUCH CHUNK LAKE DAM	
NAT. ID NO. PA.00605	CARBON COUNTY
DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, DRAWING NO. PA-462-P, SHEET NO. 4 OF 27, DATED MARCH, 1967	
PLATE 3	



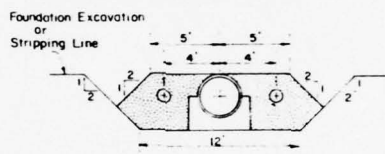
PLAN OF DRAINAGE SYSTEM

0 25 50 100 200
SCALE in FEET

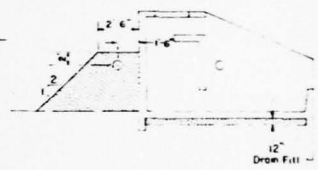


SECTION A-A
Typical between approx Sta 3+55 to 7+30 and Sta 13+75 to 18+70

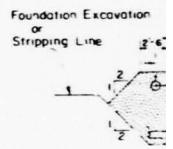
SECTION B-B
Typical between approx Sta 7+30 to 13+75



SECTION C-C

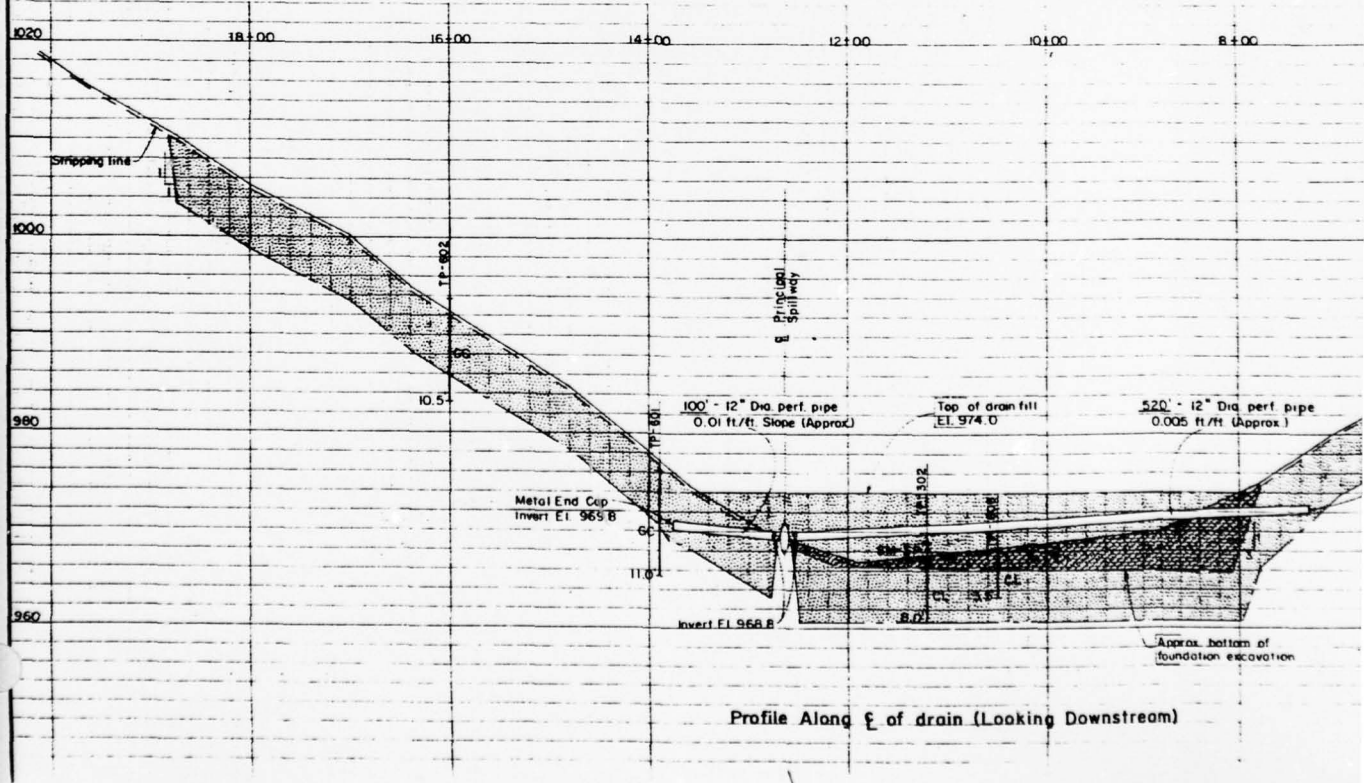


SECTION D-D



SECTION E-E

Sections not to scale

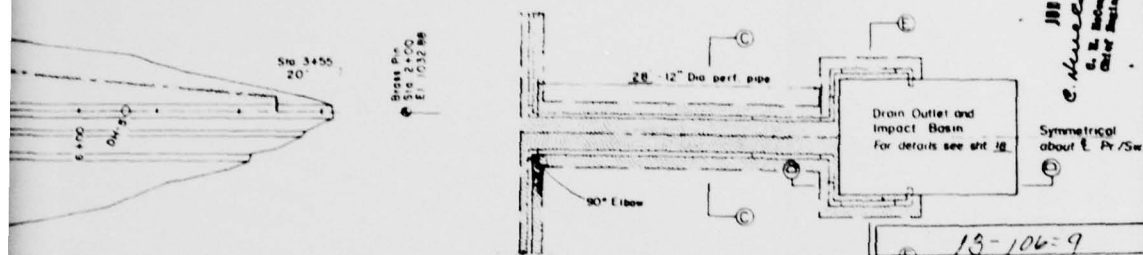


Profile Along E of drain (Looking Downstream)

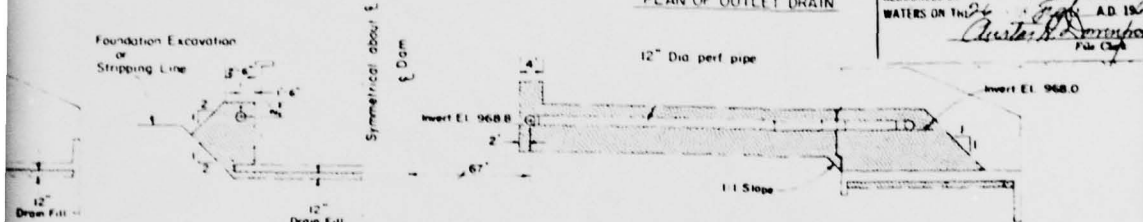
QUANTITY SUMMARY

- 20 Sections of 12" dia perf pipe
 - 4 - 90° Elbows (1 x 1) 12" dia
 - 2 - 90° Elbows (2 1/2" x 1-6") 12" dia
 - 2 - 90° Elbows (2 1/2" x 1-6") 12" dia
 - 2 - 90° Elbows (1 1/2" x 3'-0") 12" dia
 - 2 - Metal end caps
 - 2 - Small animal guards (Details sht 14)
- 722'-8" Total (Use standard coupling bands)

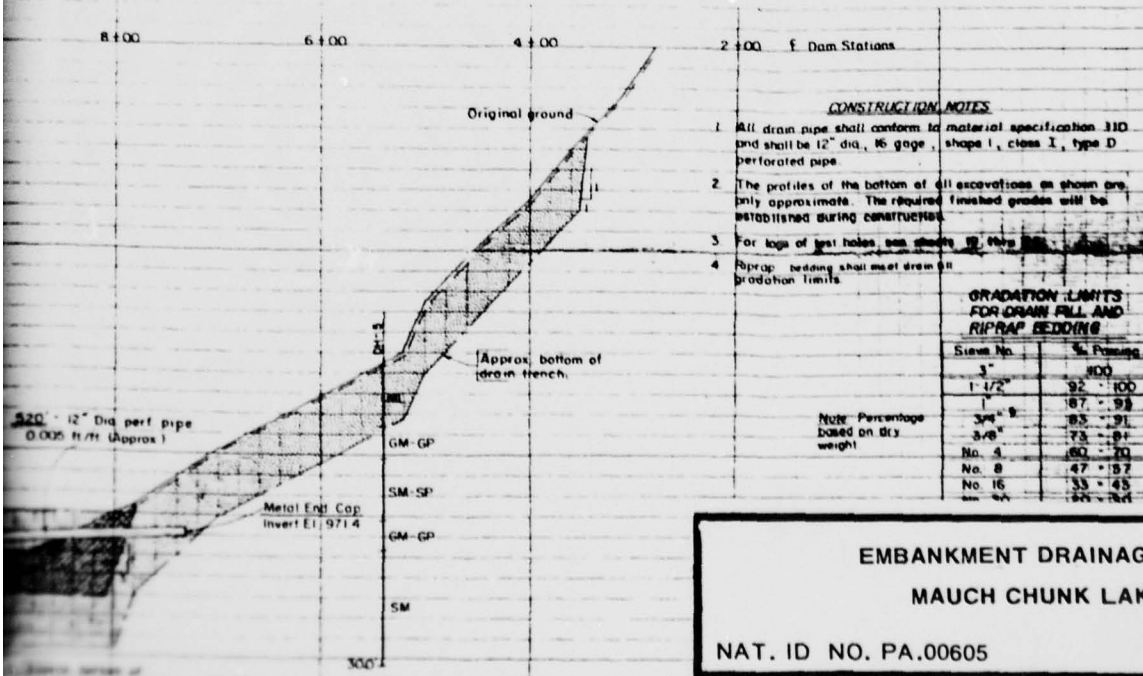
JOB 11 000
 C. H. H. H. H. H.
 H. H. H. H. H. H.
 H. H. H. H. H. H.



15-106-9
 FILE NUMBER
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 RESOURCES IN THE DEPARTMENT OF FORESTS &
 WATERS ON THE 24th DAY OF APRIL A.D. 1967
 Charles R. Dorman
 File Clerk



SECTION E-E TYPICAL SECTION ALONG OUTLET DRAIN



- CONSTRUCTION NOTES
1. All drain pipe shall conform to material specification 310 and shall be 12" dia, 16 gage perforated pipe.
 2. The profiles of the bottom of all excavations as shown are only approximate. The required finished grades will be established during construction.
 3. For logs of test holes see sheets 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
 4. Riprap bedding shall meet drain fill gradation limits.

GRADATION LIMITS FOR DRAIN FILL AND RIPRAP BEDDING

Sieve No.	% Passing
3"	100
1 1/2"	92 - 100
1"	87 - 99
3/4"	83 - 91
3/8"	73 - 81
No. 4	60 - 70
No. 8	47 - 57
No. 16	33 - 43
No. 30	20 - 30

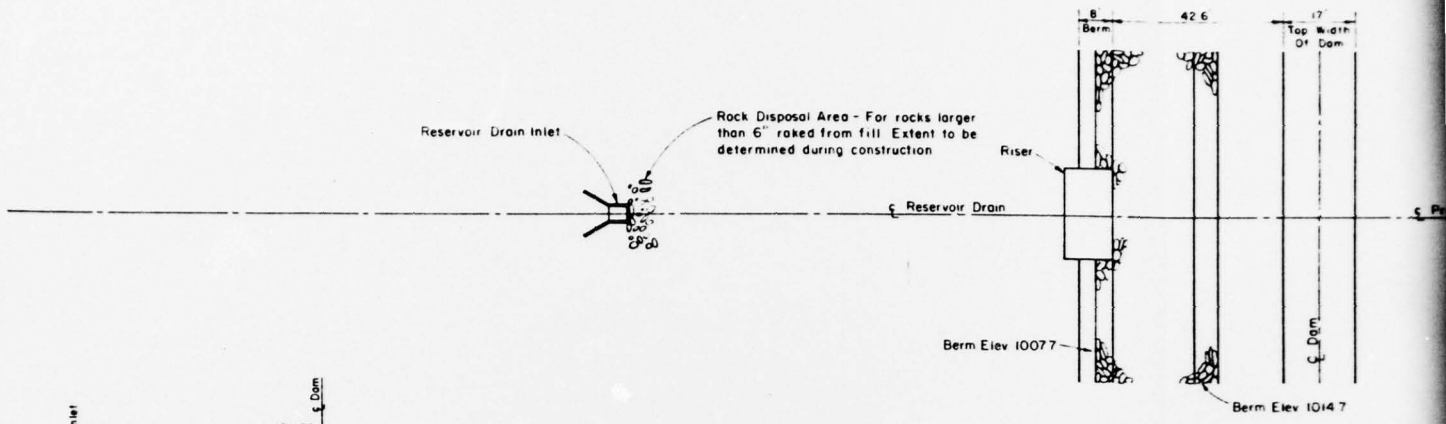
Note: Percentage based on dry weight

EMBANKMENT DRAINAGE DETAILS
MAUCH CHUNK LAKE DAM

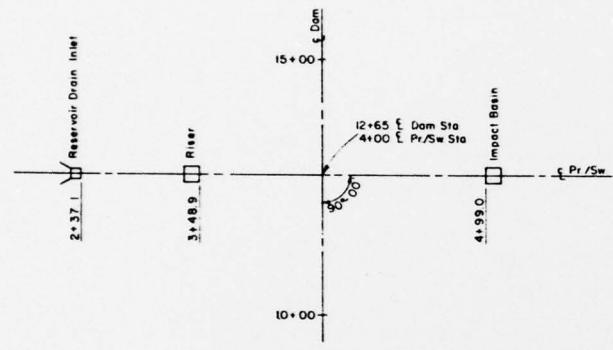
NAT. ID NO. PA.00605 CARBON COUNTY

DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, DRAWING NO. PA-462-P, SHEET NO. 9 OF 27, DATED MARCH, 1967

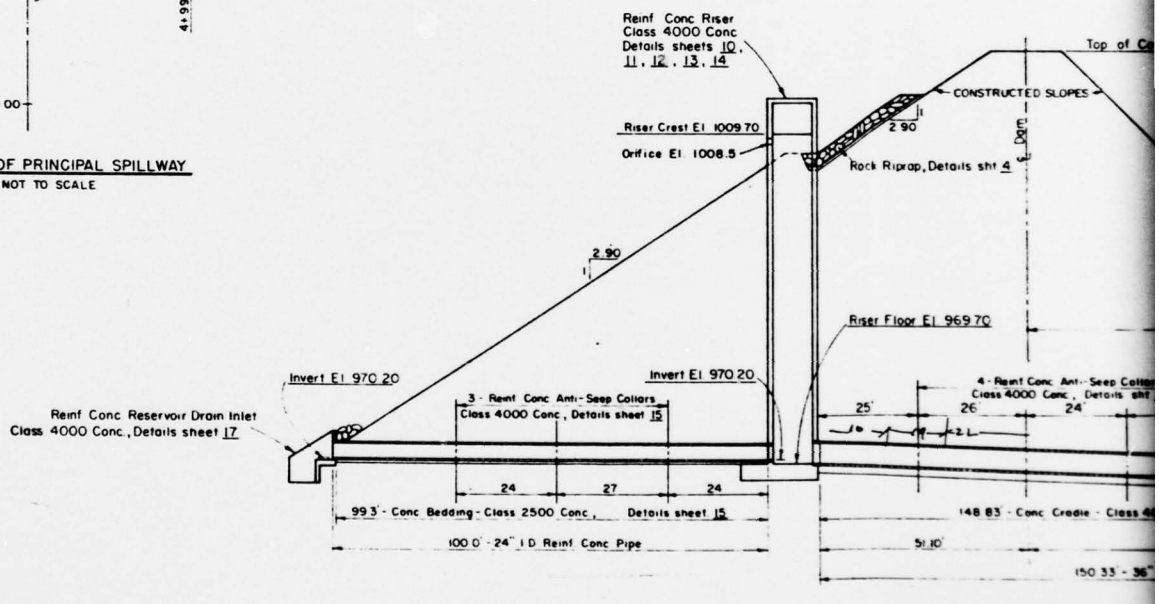
PLATE 4



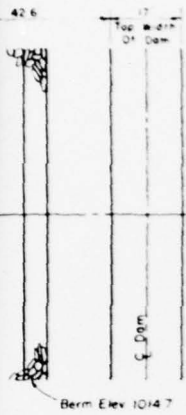
PLAN VIEW OF PRINCIPAL SPILLWAY
 0 5 10 20 40
 SCALE in FEET



LAYOUT OF PRINCIPAL SPILLWAY
 NOT TO SCALE

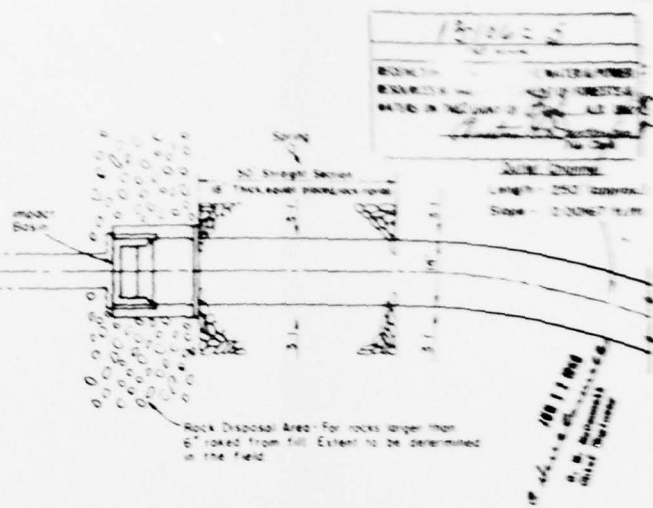


PROFILE ALONG C OF PRINCIPAL SPILLWAY
 0 5 10 20 40 Feet
 HORIZ SCALE
 0 5 10
 VERT SCALE



Impact Basin
 Details sheet 2

Principal Spillway



36" I.D. REINFORCED CONCRETE PRESSURE PIPE SPILLWAY CONDUIT
 150.33' Total length
 Slope = 1:0.33767

PLAN VIEW OF PRINCIPAL SPILLWAY

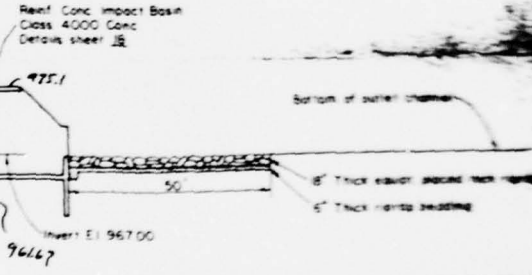
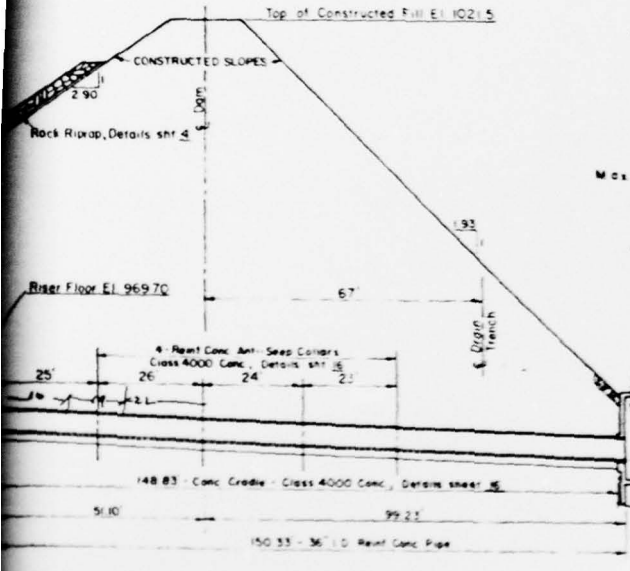
0 5 10 20 40
 SCALE IN FEET

36" I.D. REINFORCED CONCRETE PRESSURE PIPE SPILLWAY CONDUIT
 9 - 16 Sections (Straight) 1 - 20 Sections (Straight)
 1 - 6 Section (Straight) 1 - 10 Section (Straight)
 1 - Spigot Ring Wall Fitting (For 21" wall) 1 - Spigot Ring Wall Fitting (For 21" wall)

Max. Pressure head = 46', Min. pressure head = 0'
 Load = 56,265 lbs per lin. ft based on O.D. of 3.67'
 Min. 3 edge bearing strength for
 0.01" Crack non-prestressed pipe = 19,000 lbs per lin. ft
 0.001" Crack prestressed pipe = 14,300 lbs per lin. ft
 150.33' Total length

24" I.D. REINFORCED CONCRETE PRESSURE PIPE CONDUIT
 6 - 16 Sections (Straight) 5 - 20 Sections (Straight)
 1 - 4 Section (Straight) 1 - Bell Wall Fitting (For 13" wall)
 1 - Bell Wall Fitting (For 13" wall)

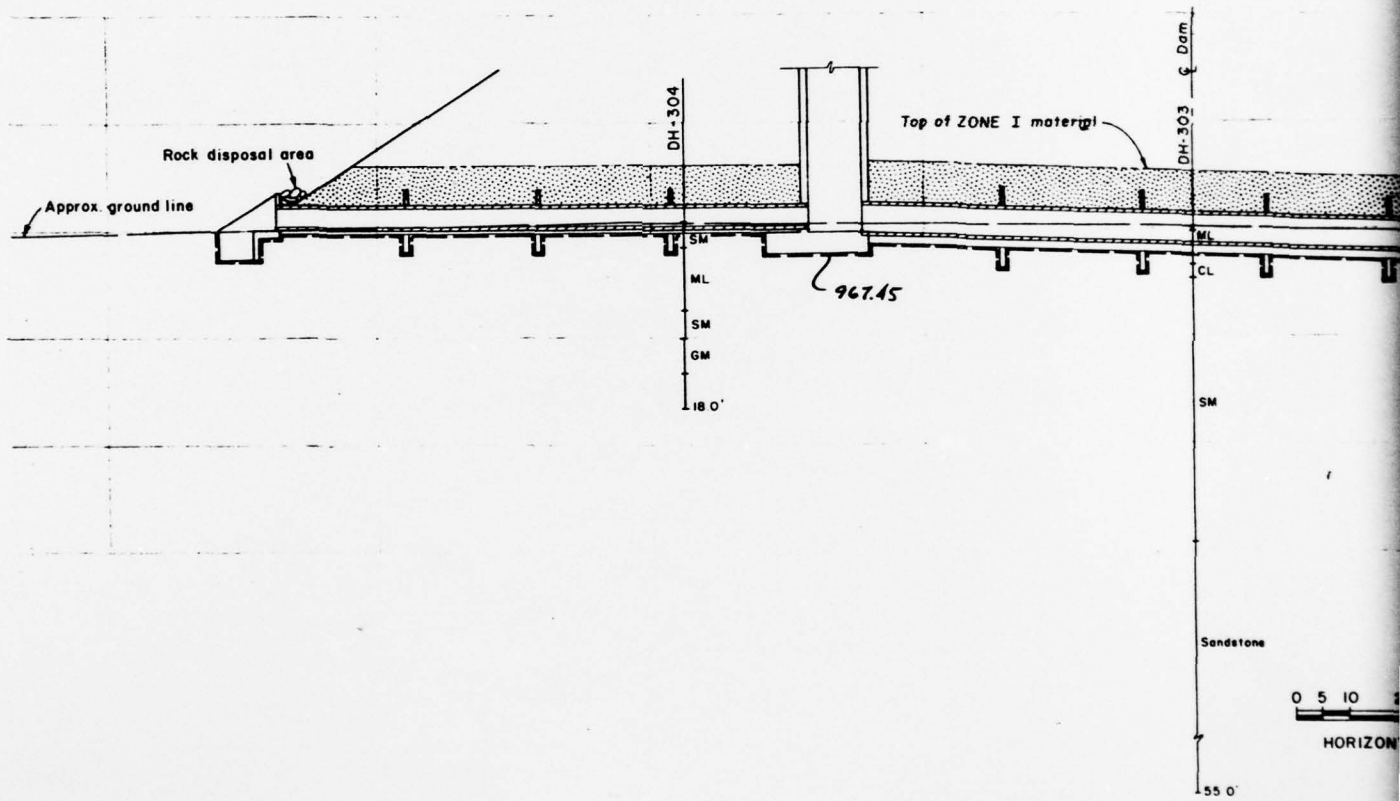
Max. Pressure head = 46', Min. pressure head = 0'
 Load = 24,650 lbs per lin. ft based on O.D. of 2.52'
 Min. 3 edge bearing strength for
 0.01" Crack non-prestressed pipe = 12,900 lbs per lin. ft
 0.001" Crack prestressed pipe = 9,700 lbs per lin. ft
 100.0' Total length

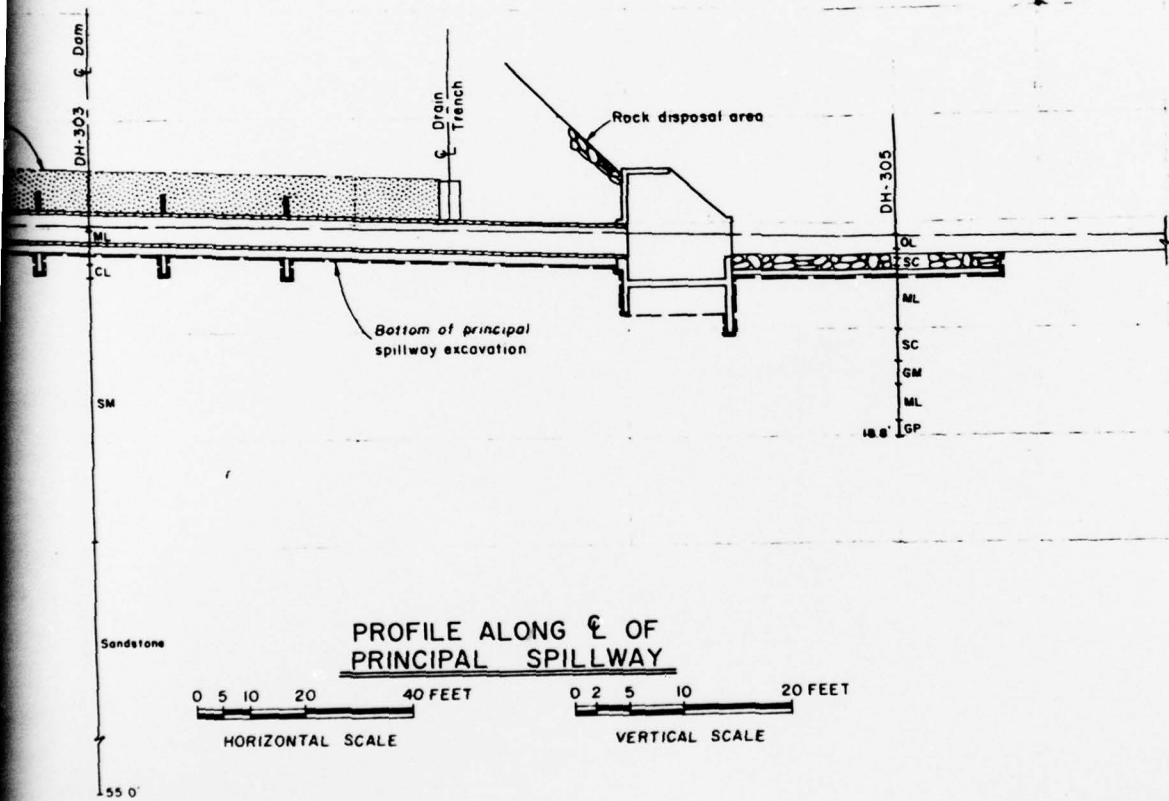


ELEVATION VIEW OF PRINCIPAL SPILLWAY

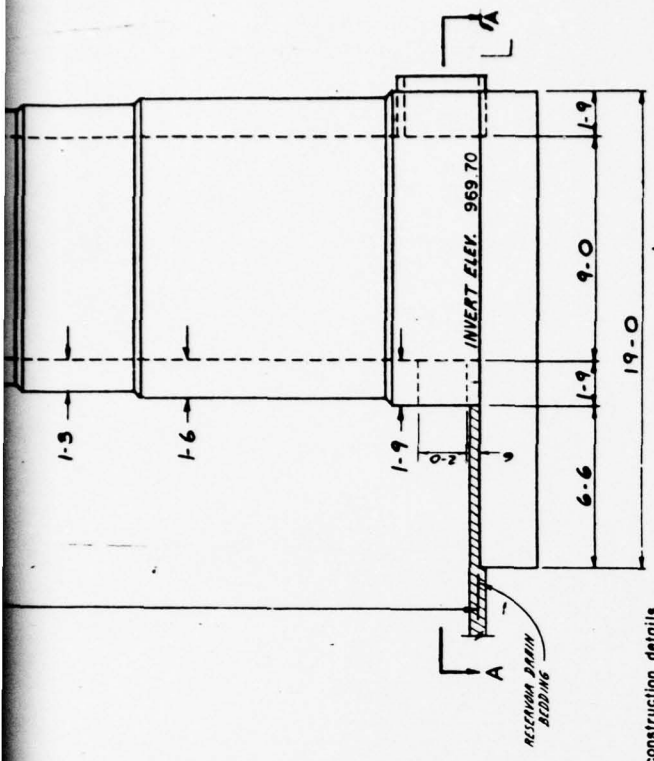
0 20 40 feet 0 5 10 20 Feet
 HORIZ SCALE VERT SCALE

PRINCIPAL SPILLWAY	
MAUCH CHUNK LAKE DAM	
NAT. ID NO. PA.00605	CARBON COUNTY
DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, DRAWING NO. PA-462-4, SHEET NO. 5 OF 27, DATED MARCH, 1967	
PLATE 5	

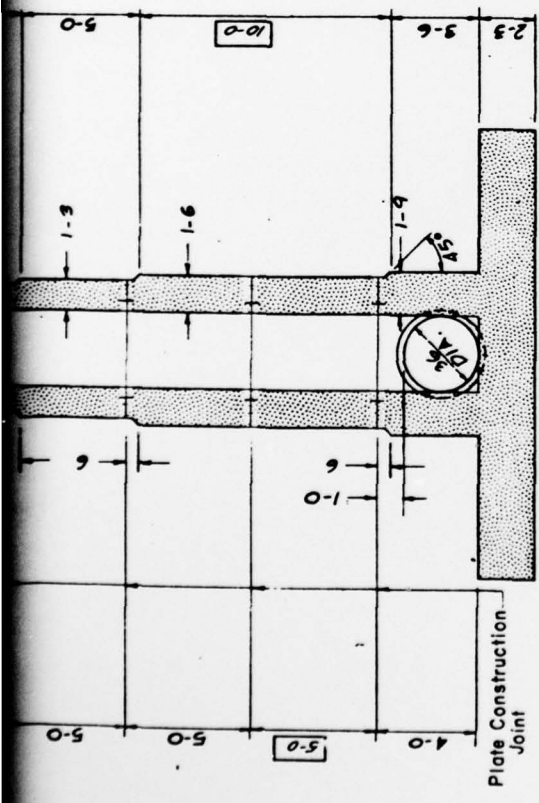
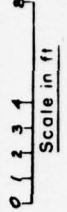




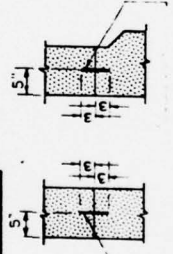
PRINCIPAL SPILLWAY CONSTRUCTION DETAILS		
MAUCH CHUNK LAKE DAM		
NAT. ID NO. PA.00605		CARBON COUNTY
<small>DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, DRAWING NO. PA-462-P, SHEET NO. 6 OF 27, DATED MARCH, 1967</small>		
		PLATE 6



SIDEWALL ELEVATION



SECTION B-B

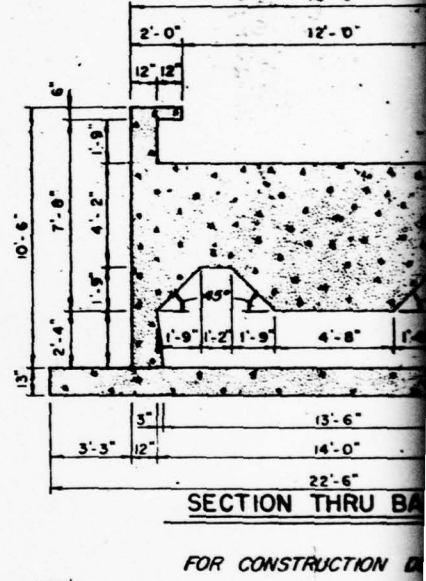
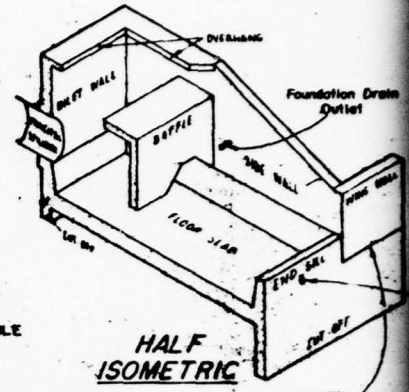
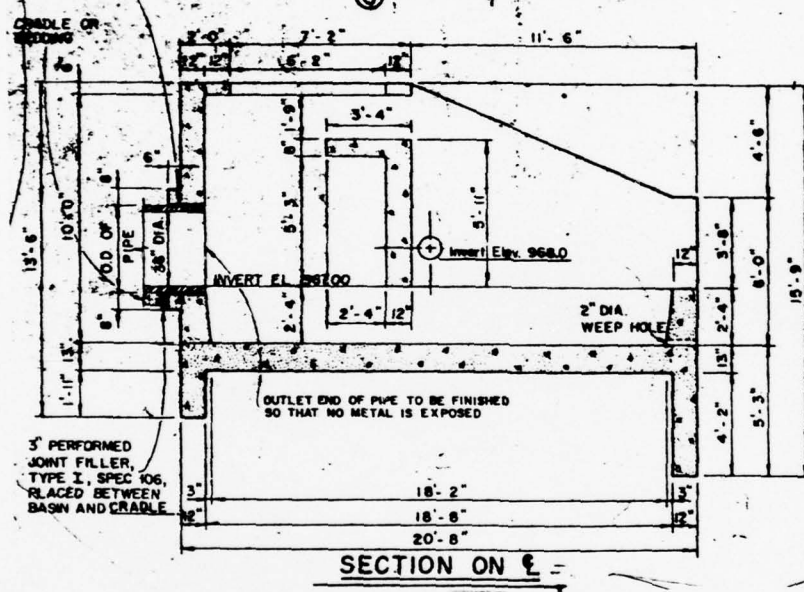
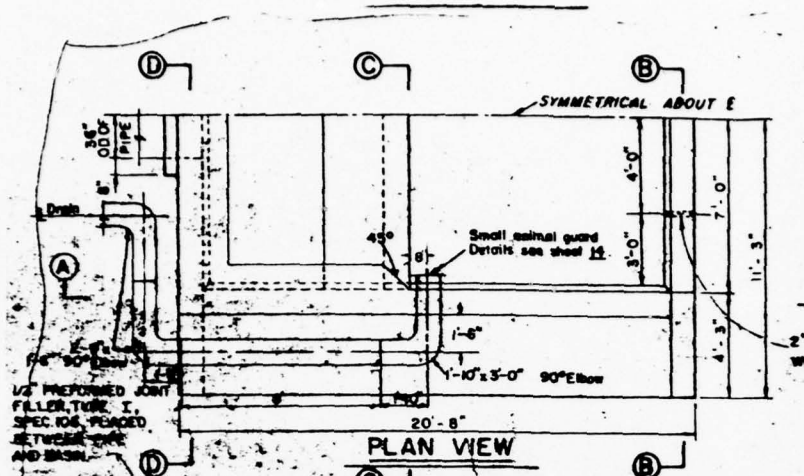


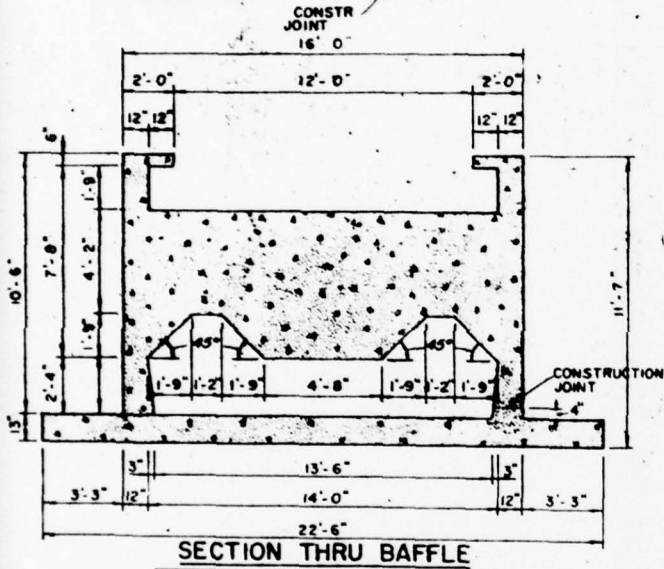
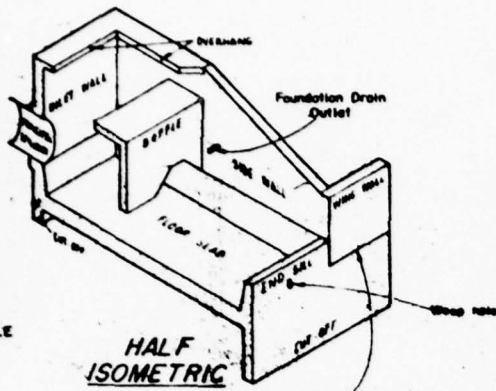
DETAIL CONSTR. JOINT

NOTE: For construction details see sheet 13.

1/4" x 5" Steel Plate,
Continuous Thru Constr. Joint
Splices Shall Be Either:
1. Butt Welded

RISER STRUCTURE DETAILS	
MAUCH CHUNK LAKE DAM	
NAT. ID NO. PA.00605	CARBON COUNTY
DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, DRAWING NO. PA-462-P, SHEET NO. 10 OF 27, DATED MARCH, 1967	
PLATE 7	





FOR CONSTRUCTION DETAILS.

2

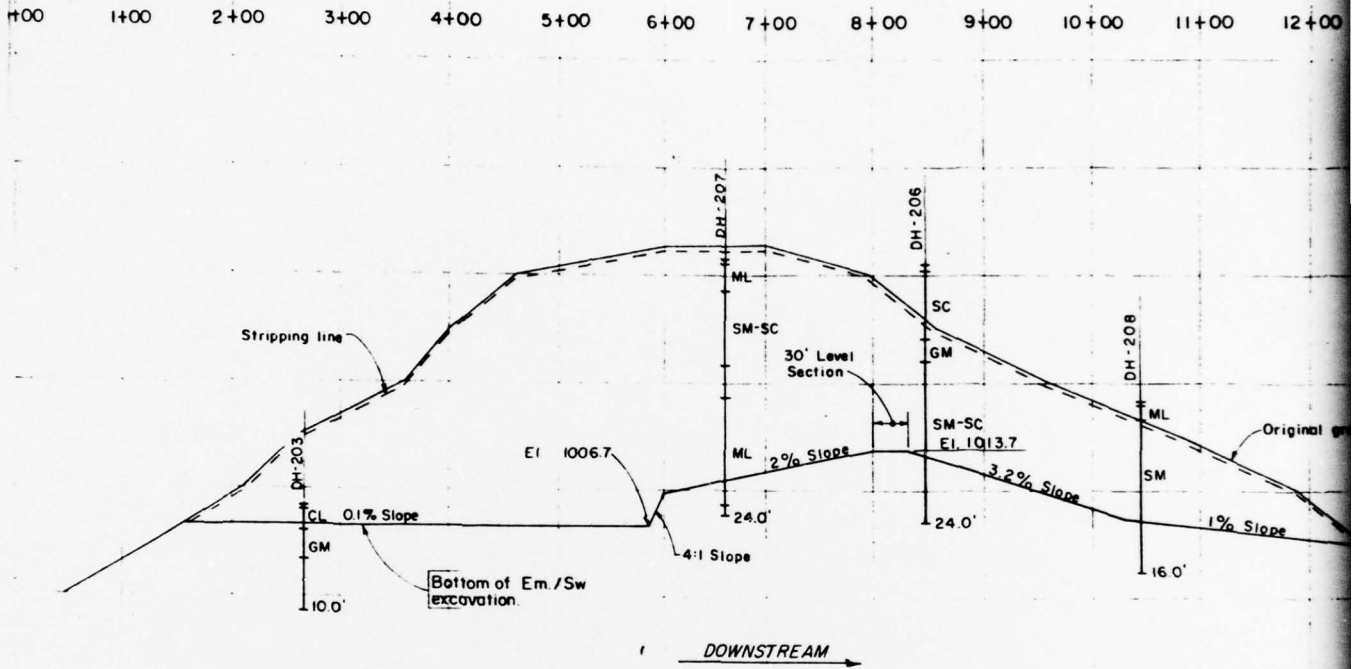
IMPACT BASIN DETAILS
MAUCH CHUNK LAKE DAM

NAT. ID NO. PA.00605

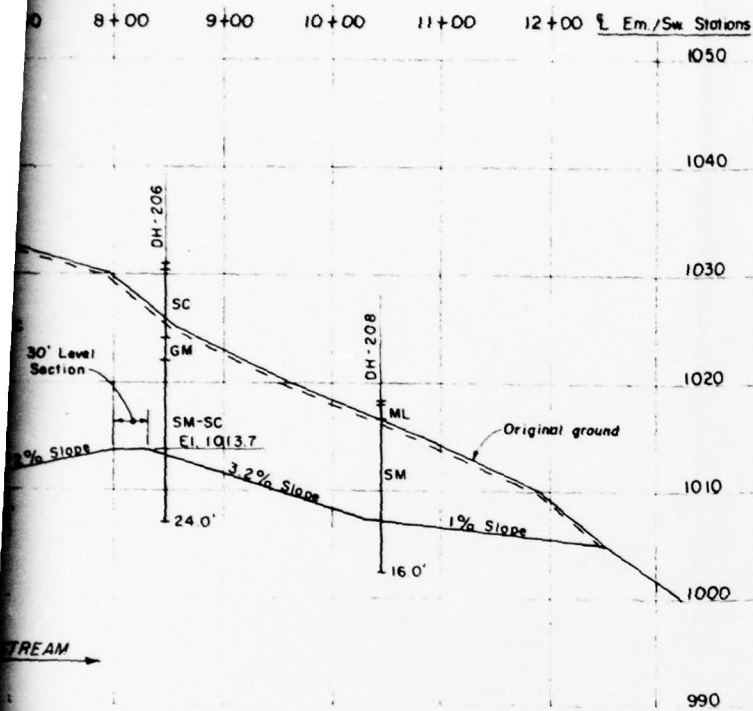
CARBON COUNTY

DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL
CONSERVATION SERVICE, DRAWING NO. PA-462-P, SHEET
NO. 18 OF 27, DATED MARCH, 1967

PLATE 8



PROFILE ALONG CL OF EMERGENCY SPILLWAY



EMERGENCY SPILLWAY

2

<p>PROFILE ALONG CENTERLINE OF EMERGENCY SPILLWAY MAUCH CHUNK LAKE DAM</p>		
<p>NAT. ID NO. PA.00605</p>		<p>CARBON COUNTY</p>
<p>DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, DRAWING NO. PA-462-P, SHEET NO. 6 OF 27, DATED MARCH, 1967</p>		
		<p>PLATE 9</p>

20+00

16+00

12+00

8+00

4+00

0+00 E Dam Station

1010

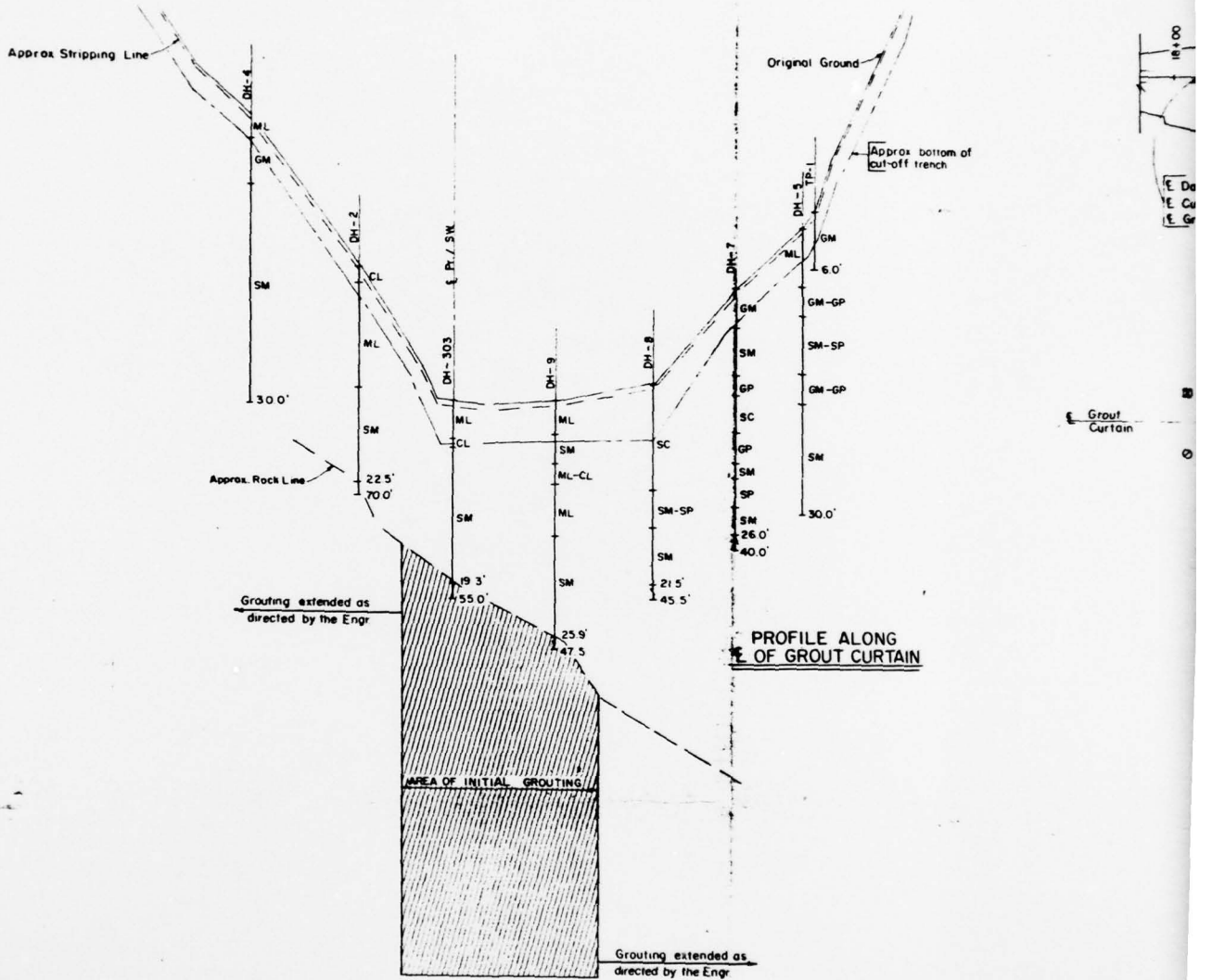
990

970

950

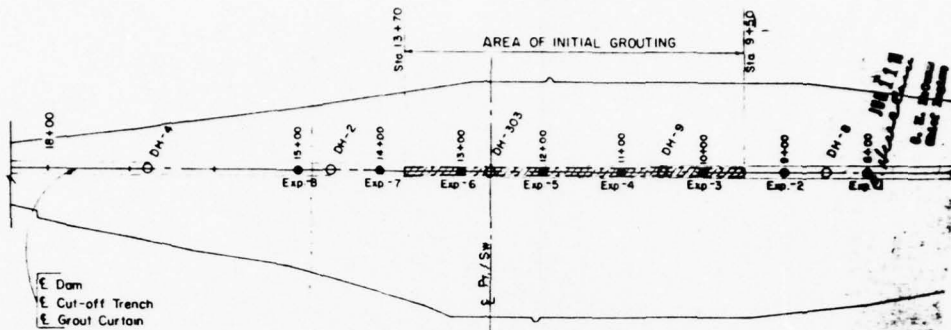
930

910

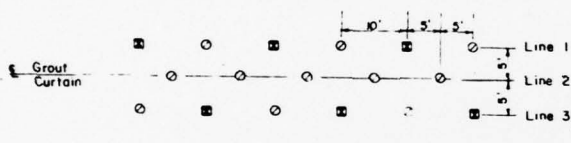
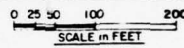


PROFILE ALONG OF GROUT CURTAIN

0+00 E Dam Stations



PLAN VIEW OF GROUT CURTAIN



GROUT HOLE DRILLING PATTERN

NOT TO SCALE

LEGEND

- Primary Hole
- Secondary Hole
- Exploratory Drill Hole
- Exp Geology Drill Hole
- _{DH} Geology Test Pit
- _{TP} Geology Test Pit

CONSTRUCTION DETAILS

1. Exploratory holes no. 1, 2, 7 & 8 shall be drilled early in the grouting work to help establish the need for extension of the grout curtain
2. Drilling the grout holes will be done by the split spacing method. All grout hole drilling and grouting shall be accomplished on lines 1 & 3 before any grout hole drilling and grouting is done on line 2. The need for grouting line 2 will be determined by the Engineer based on results of pressure tests & grout take in exploratory holes no. 3, 4, 5 & 6 or at other locations designated by the Engineer & drilled after completion of the grouting on both lines 1 & 3.
3. In general, stage grouting will be used to establish the grout curtain.
4. Primary & secondary holes will generally be drilled to the same depth.
5. Depth and extent of grout curtain shown is approximate. Actual depth and extent determined after examination of conditions encountered.
6. Cement shall be type I.
7. At the Contractor's option, drilling for exploration or grouting may be started at or above the bottom of the cut-off trench except that within 30' of the principal spillway the grouting operation shall be completed prior to fill placement above the principal spillway conduit. Pay limits shall be as defined by Spec. 215.

GROUTING DETAILS

MAUCH CHUNK LAKE DAM

NAT. ID NO. PA.00605

CARBON COUNTY

DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, DRAWING NO. PA-462-P, SHEET NO. 8 OF 27, DATED MARCH, 1967

PLATE 10

LEGEND

TEST HOLE NUMBERING SYSTEM

Centerline of dam	1 - 99
Borrow area	101 - 199
Emergency spillway	201 - 299
Centerline of outlet structure	301 - 399
Stream channel	401 - 499
Relief wells	501 - 599
	601 - 699
	701 - 799

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

GW	Well graded gravels, gravel-sand mixtures
GP	Poorly graded gravels
GM	Silty gravels; gravel-sand-silt mixtures
GC	Clayey gravels; gravel-sand-clay mixtures
SW	Well graded sands, sand-gravel mixtures
SP	Poorly graded sands
SM	Silty sands, sand-silt mixtures
SC	Clayey sands, sand-clay mixtures
ML	Silts, silty, very fine sands, sandy or clayey silts
CL	Clays of low to medium plasticity; silty, sandy or gravelly clay
CH	Clays of high plasticity, fat clays
MH	Elastic silts; micaceous or diatomaceous silts
OL	Organic silts and organic silty clays of low plasticity
OH	Organic clays or silts of medium to high plasticity

BEDROCK SYMBOLS

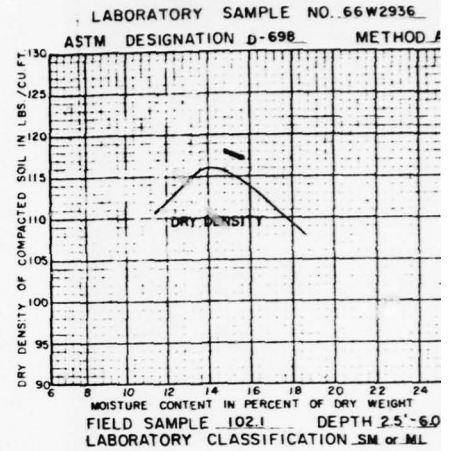
B	Basalt	Sc	Schist
Gn	Gneiss	Sh	Shale
Gr	Granite	Si	Siltstone
Ls	Limestone	Sl	Slate
Ma	Marble	Ss	Sandstone

SAMPLES

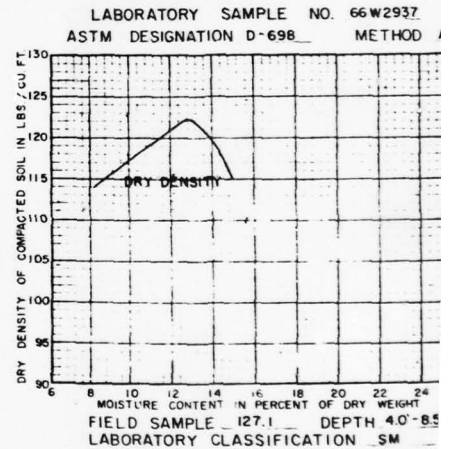
DS	Disturbed
US	Undisturbed

NOTE:
All soil and rock classification were determined by visual examination. The percentage of gravel, sand, and fines in the matrix are estimated on the basis of 100% passing three inches.

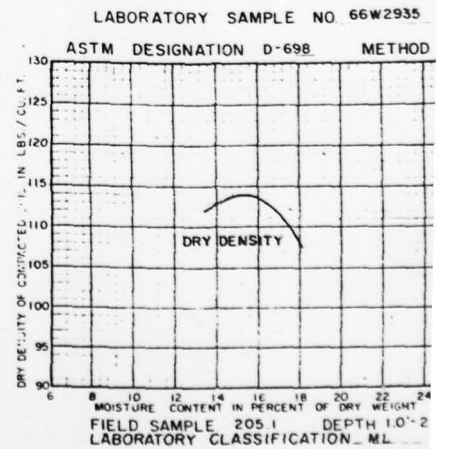
COMPACTION CURVE



COMPACTION CURVE



COMPACTION CURVE



AD-A068 643

WOODWARD-CLYDE CONSULTANTS PLYMOUTH MEETING PA
NATIONAL DAM INSPECTION PROGRAM. MAUCH CHUNK LAKE DAM (PA00605)--ETC(U)
SEP 78

F/G 13/2
DACW31-78-C-0048

NL

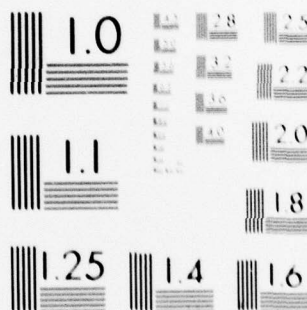
UNCLASSIFIED

2 OF 2

AD
A068643



END
DATE
FILMED
6-79
DDC

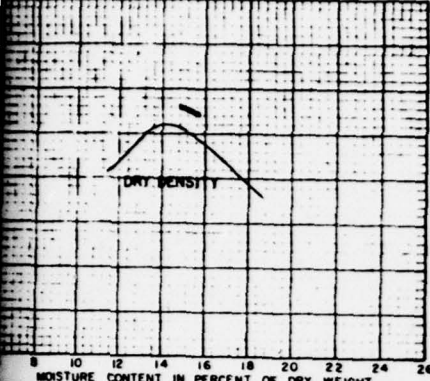


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

COMPACTION CURVE

LABORATORY SAMPLE NO. 55W2936

ASTM DESIGNATION D-698 METHOD A

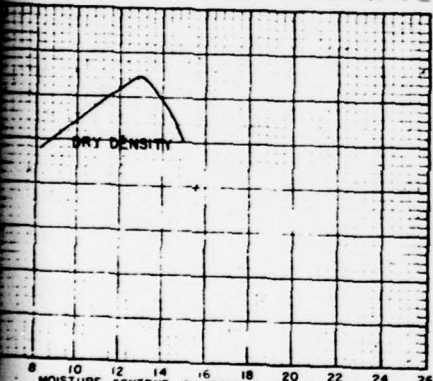


FIELD SAMPLE 102.1 DEPTH 2.5'-5.0'
LABORATORY CLASSIFICATION SM or ML

COMPACTION CURVE

LABORATORY SAMPLE NO. 66W2937

ASTM DESIGNATION D-698 METHOD A

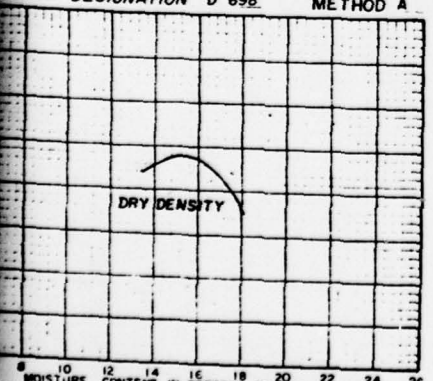


FIELD SAMPLE 127.1 DEPTH 4.0'-8.5'
LABORATORY CLASSIFICATION SM

COMPACTION CURVE

LABORATORY SAMPLE NO. 66W2935

ASTM DESIGNATION D-698 METHOD A



FIELD SAMPLE 205.1 DEPTH 1.0'-2.5'
LABORATORY CLASSIFICATION ML

2

COMPACTION DATA		
MAUCH CHUNK LAKE DAM		
NAT. ID NO. PA.00605		CARBON COUNTY
DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, DRAWING NO. PA-462-P, SHEET NO. 24 OF 27, DATED MARCH, 1967		
		PLATE 11

APPENDIX

F

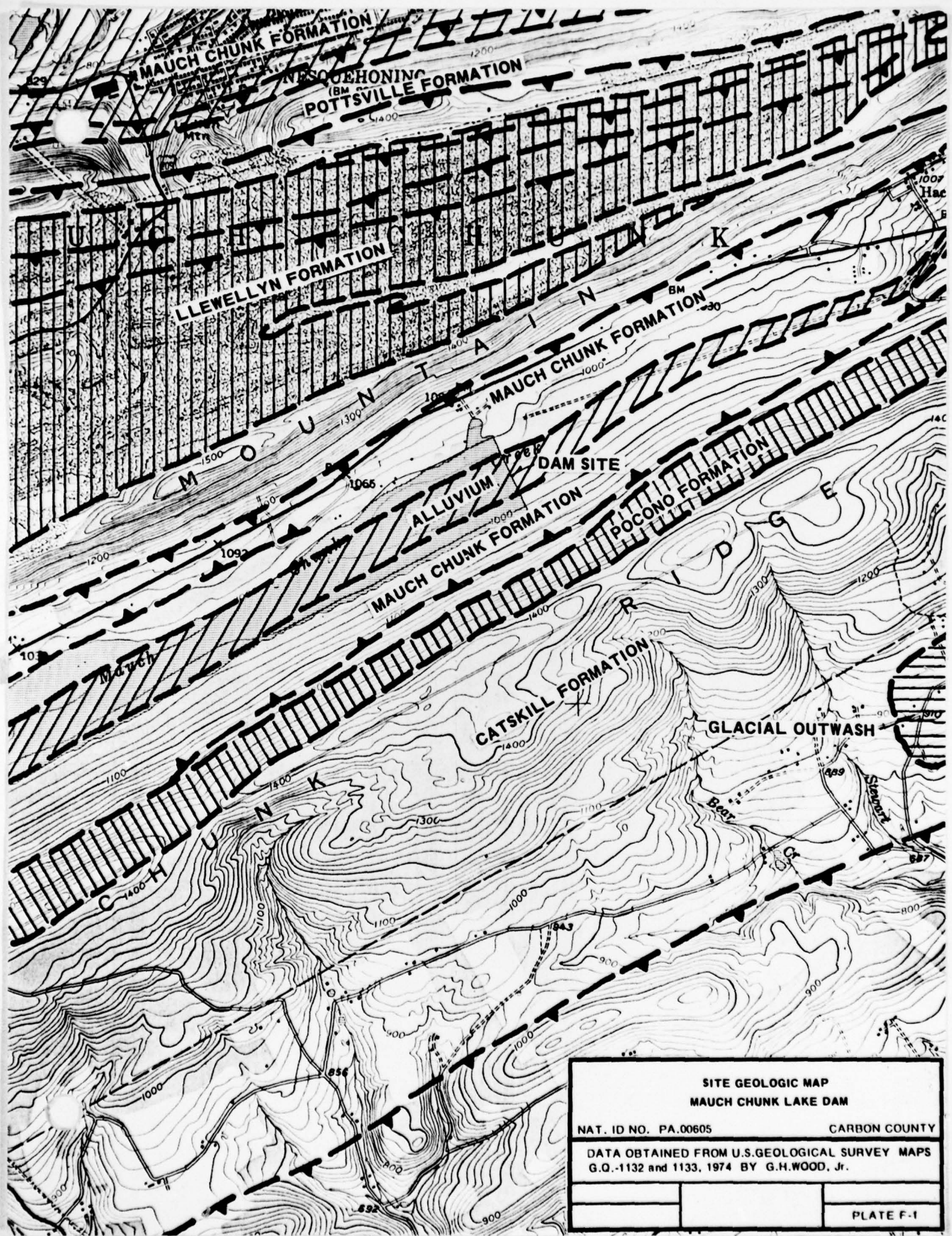
SITE GEOLOGY
MAUCH CHUNK CREEK DAM

Mauch Chunk Creek Dam is located in the Appalachian Mountain section of the Valley and Ridge Physiographic Province. The bedrock at the dam site is reported to consist of the red and brown sandstones, siltstones and shales of the Mississippian Mauch Chunk Formation (see Plate F-1). The Mauch Chunk Formation is bounded to the northwest by the sandstones and conglomerates of the Pennsylvanian Pottsville Formation and to the southeast by the sandstones, siltstones and shales of the Devonian Catskill Formation. Bedding strikes to the northeast and dips to the northwest (Wood, 1974). Two open, variably spaced sets of joints have been reported in the area: one set oriented approximately along the strike of bedding with variable dips ranging from 53° SE to 65° NW, and a second set striking to the northwest with a near vertical dip (Wood, 1974). No faults have been mapped beneath the dam or the reservoir, although thrust faults on either side of the Mauch Chunk Creek valley, striking parallel to the reservoir have been observed.

Downstream seepage should not be a major problem unless the reported northeast trending (perpendicular to the dam) is well developed beneath the dam structure.

References:

1. Wood, G.H., 1978, *Geologic Map of the Nesquehoning Quadrangle, Carbon and Schuylkill Counties, Pennsylvania: USGS Geologic Map GQ-1132, 1:24,000.*



**SITE GEOLOGIC MAP
MAUCH CHUNK LAKE DAM**

NAT. ID NO. PA.00605 CARBON COUNTY

DATA OBTAINED FROM U.S.GEOLOGICAL SURVEY MAPS
G.O.-1132 and 1133, 1974 BY G.H.WOOD, Jr.

PLATE F-1	