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D'APPOLONIA CONSULTING ENGINEERS INC PITTSBURGH PA
NATIONAL DAM INSPECTION PROGRAM. PA-482 DAM (NDI I.D. NUMBER PA--ETC(U)
MAY 79

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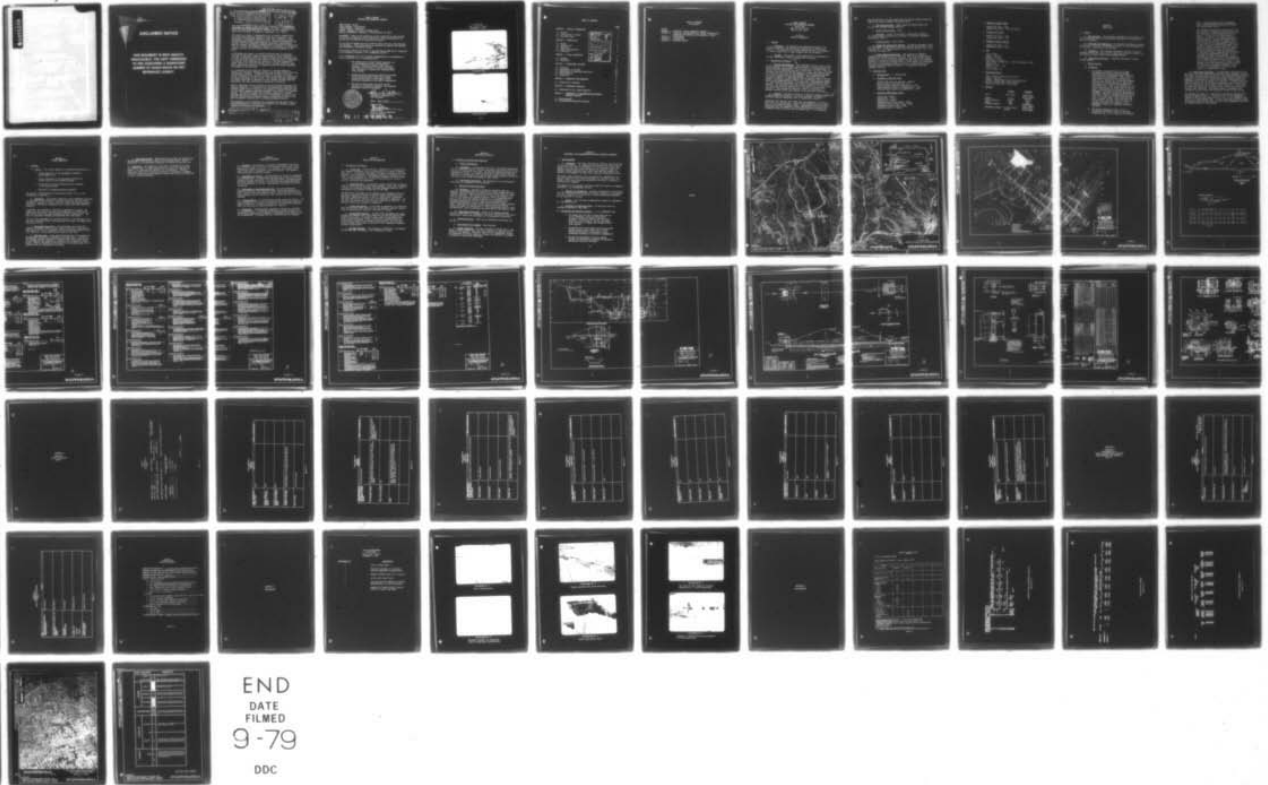
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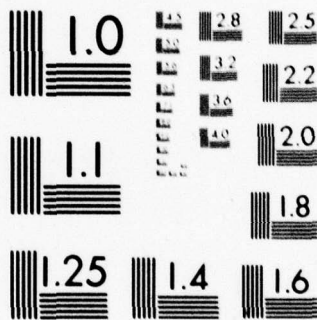
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6 National Dam Inspection Program.
PA-482 Dam (NDI I.D. Number PA-469,
DER I.D. Number 63-72), Ohio River
Basin, Tributary of Harmon Creek,
Washington County, Pennsylvania.
Phase I inspection Report.

11 May 79

12 72p

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 Department of the Army, 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 visual observations and review of available data. Detailed investigation and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

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. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are 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.

The assessment of the conditions and recommendations was made by the consulting engineer in accordance with generally and currently accepted engineering principles and practices.

15 DACW31-79-C-0014

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: PA-482
STATE LOCATED: Pennsylvania
COUNTY LOCATED: Washington
STREAM: Unnamed tributary of Harmon Creek
DATE OF INSPECTION: December 1, 1978 and April 16, 1979

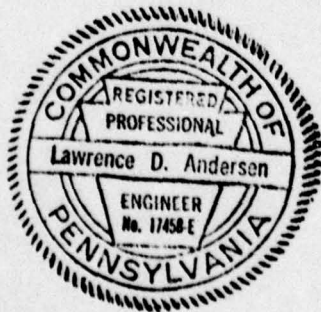
ASSESSMENT: Based on the evaluation of the conditions as they existed on the date of inspection and as revealed by visual observations, the condition of PA-482 dam is considered to be good.

One wet and one swampy area were observed below the toe of the dam near the abutments. These areas should be periodically observed and remedial work performed if conditions worsen.

The spillway capacity was found to pass 100 percent PMF and is classified to be adequate according to the recommended criteria.

It is recommended that the following recommendations be implemented as soon as possible or on a continuing basis:

1. The swampy and wet areas located along the toe of the embankment should be periodically observed. Necessary remedial work should be performed if the extent of the wet and swampy areas increases or seepage and sloughing conditions develop.
2. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert downstream residents in the event of emergencies.
3. The dam and appurtenant structures should continue to be inspected regularly and necessary maintenance should be performed.



Lawrence D. Andersen

Lawrence D. Andersen, P.E.
Vice President

Date: May 3, 1979

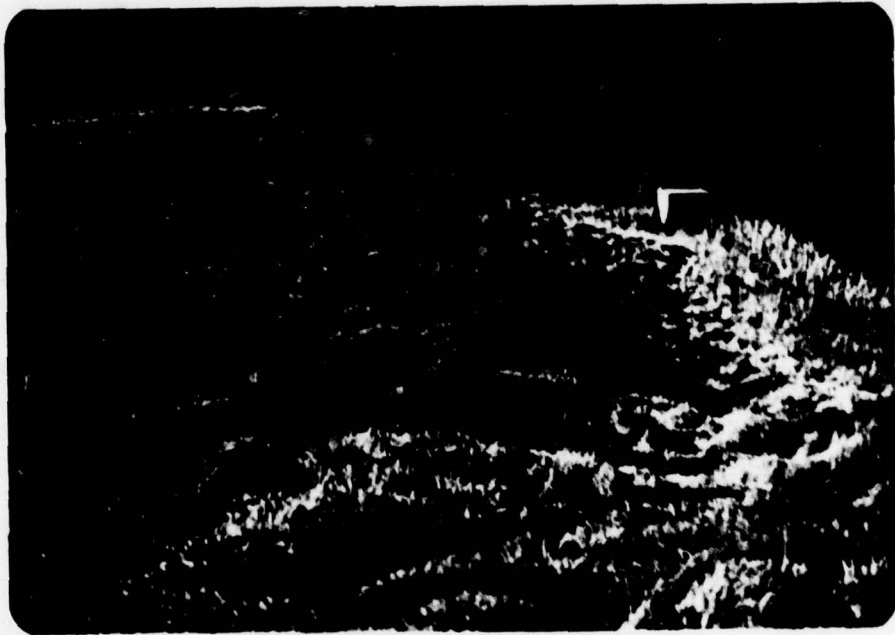
Approved By:

G. R. Withers

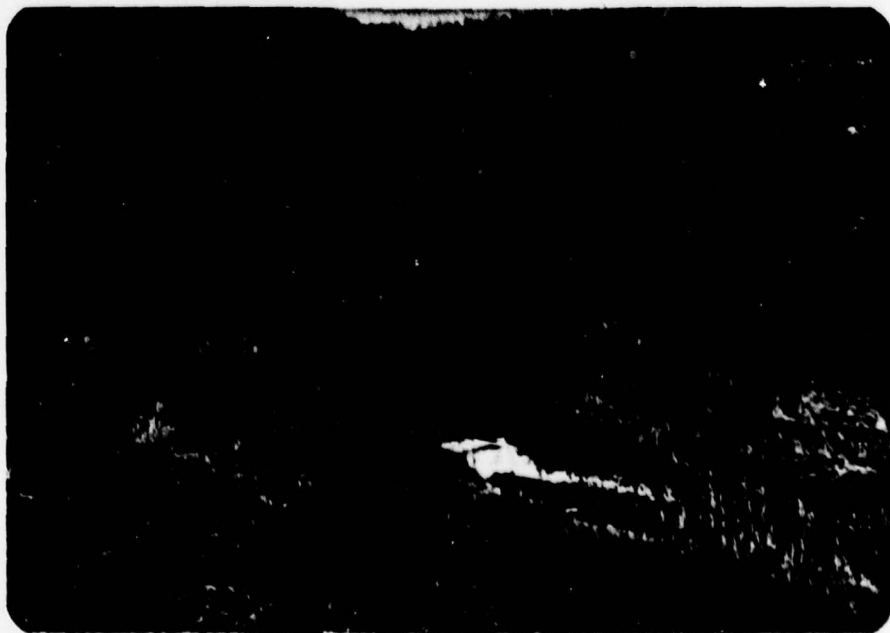
G. R. WITHERS
Colonel, Corps of Engineers
District Engineer

79 08 06 11:00 31 May 79

PA-482 DAM
NDI I.D. NO. PA-469
DECEMBER 1, 1978



Upstream Face



Downstream Face

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM
PA-482 DAM
NDI I.D. NO. PA-469
DER I.D. NO. 63-72

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. The inspection was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

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

1.2 Description of Project

a. Dam and Appurtenances. The PA-482 dam is one of the 14 flood control projects in the Harmon Creek watershed. The dam consists of an earth embankment approximately 460 feet long with a maximum height of 38 feet from the downstream toe and a crest width of 14 feet. The flood discharge facilities for the dam consist of a drop inlet primary spillway located at the center of the embankment and an emergency spillway on the left abutment (looking downstream). The primary spillway structures consist of a two-stage reinforced concrete riser, a 24-inch-diameter reinforced concrete conduit, and a reinforced concrete impact basin at the downstream end of the outlet pipe. The emergency spillway is a 200-foot-wide trapezoidal earth channel excavated into the left abutment. The reservoir outlet for the dam consists of a 15-inch steel pipe extending from the upstream toe of the dam to the drop inlet structure. Flow through the reservoir outlet is controlled by a manually operated sluice gate located in the drop inlet structure.

b. Location. The dam is located on a northerly unnamed tributary of Harmon Creek approximately 1-1/2 miles northeast of Dinsmore in Jefferson Township, Washington County, Pennsylvania (Plate 1).

Downstream from the dam, the stream flows approximately 1-1/2 miles south and joins Harmon Creek. There are two residences at the confluence of this stream and Harmon Creek. Approximately one mile further downstream near the community of Hanlin Station there are about ten residences within the flood plain of Harmon Creek. It is estimated

that the failure of the dam would cause the loss of several lives and substantial property damage along Harmon Creek.

c. Size Classification. Small (based on 38-foot height and 352 acre-feet maximum storage capacity).

d. Hazard Classification. High.

e. Ownership. County of Washington, Pennsylvania (address: Mr. Joseph Giecek, Administrative Assistant, Courthouse, Washington, Pennsylvania 15301).

f. Purpose of Dam. Flood control.

g. Design and Construction History. The dam was designed by the U.S. Department of Agriculture, Soil Conservation Service (SCS), during 1966 and 1967. The dam was constructed by Gavlik and Sons, Inc., with completion in August 1970.

h. Normal Operating Procedure. The reservoir is normally maintained at Elevation 1054.0, the crest level of an orifice on the upstream face of the drop inlet structure. The crest of the primary spillway is located at Elevation 1060.2 and the crest of the emergency spillway is located at Elevation 1070.6. Under normal flow conditions, the inflow is discharged through the orifice. Flood flows are discharged through the primary spillway or in combination with the emergency spillway.

1.3 Pertinent Data

a. Drainage Area - 1.3 square miles

b. Discharge at Dam Site (cfs)

Maximum known flood at dam site - Unknown
Outlet conduit at maximum pool - 59
Gated spillway capacity at maximum pool - N/A
Ungated spillway capacity at maximum pool - 6911
Total spillway capacity at maximum pool - 6970

c. Elevation (USGS Datum) (feet)

Top of dam - 1075.9
Maximum pool - 1075.9
Normal pool - 1054.0
Upstream invert outlet works - 1042.5
Downstream invert outlet works - 1038.5
Streambed at center line - 1038+
Maximum tailwater - Unknown

d. Reservoir Length (feet)

Normal pool level - 800
Maximum pool level - 2000 (estimated)

e. Storage (acre-feet)

Normal pool level - 31.8
Maximum pool level - 352

f. Reservoir Surface (acres)

Normal pool level - 6.2
Maximum pool level - 28.5

g. Dam

Type - Earth
Length - 460 feet
Height - 38 feet
Top width - 14 feet
Side slopes - Downstream: 2.5H:1V; Upstream: 3H:1V
Zoning - Yes
Impervious core - Yes
Cutoff - Yes
Grout curtain - No

h. Regulating Outlet

Type - 15-inch reservoir outlet pipe
Length - 50+ feet
Closure - Sluice gate at drop inlet structure
Access - Through drop inlet structure
Regulating facilities - Sluice gate

i. Spillway

	<u>Primary</u>	<u>Emergency</u>
Type -	Drop inlet	Trapezoidal earth channel
Length -	12 feet	200 feet
Crest elevation -	1060.2	1070.6
Gates -	None	None
Upstream channel -	Lake	Trapezoidal earth channel
Downstream channel -	24-inch outlet conduit	Trapezoidal earth channel

SECTION 2
DESIGN DATA

2.1 Design

a. Data Available. The available information was provided by the Soil Conservation (SCS) and Pennsylvania Department of Environmental Resources (PennDER).

(1) Hydrology and Hydraulics. The available information consists of principal, freeboard, and emergency spillway inflow hydrographs and the results of associated flood routings.

(2) Embankment. The available information consists of design drawings, geology and soils reports, laboratory soil test results, and the results of slope stability and seepage analyses.

(3) Appurtenant Structures. Available information includes design drawings.

b. Design Features

(1) Embankment

a. As designed, the dam (Plate 2) is a zoned embankment including an internal drainage system beneath the downstream slope (Plate 3). Three zones were identified. Zone I, which is classified as silty clay with a plasticity index of 20, consists of a 2-foot-thick blanket starting from the upstream toe of the dam and terminating at the trench drain beneath the downstream slope. Zone I also extends into the cutoff trench along the center line of the dam. Zone II constitutes the core section of the embankment. The Zone II material was described as highly weathered siltstone and classified as silty clay. Zone II, extending from the top of Zone I to a level about 5 feet below the dam crest, is about 60 feet wide at the base and 16 feet wide at the top. Zone II, which constitutes the outer shell sections of the embankment, consists of compacted, weathered siltstone.

b. The dam was designed to have a 2.5 to 1 (horizontal to vertical) slope on the downstream face and a 3 to 1 slope on the upstream

face. A 20-foot-wide berm on the upstream slope is located between Elevations 1056 and 1054 (normal pool level).

- c. The subsurface investigation conducted for the dam consisted of numerous borings and test pits. The locations of these borings are shown in Plate 2. Boring logs are illustrated in Plates 4, 5, and 6. The typical subsurface profile (Plate 7) consists of medium stiff to hard sandy clayey silts on the valley sides (up to 7 feet on the right abutment and up to 13 feet on the left abutment) and about 5 feet of loose to dense sand and gravel and clayey sands in the valley bottom. The rock beneath the site includes siltstone and sandstones. In the valley bottom, sandstone was encountered to a depth of approximately 10 feet. It is reported that while the permeability of the siltstone was found to be low, the permeability of the sandstone ranged from 5.5 to 43 feet per day (2×10^{-3} cm/sec to 2×10^{-2} cm/sec). These permeabilities were measured at a depth of about 12 feet into the weathered sandstone. Below this zone, the permeability of the rock was found to be significantly lower.

(2) Appurtenant Structures. The appurtenant structures of the dam consist of a drop inlet primary spillway and an emergency spillway. The primary spillway structures include a two-stage reinforced concrete riser and a 24-inch-diameter reinforced concrete conduit through the embankment terminating at a reinforced concrete impact basin at the downstream toe of the dam (Plates 8, 9, and 10). A 15-inch steel pipe from the upstream toe of the dam and discharging into the drop inlet structure constitutes the reservoir outlet facilities. Flow through the reservoir outlet pipe is controlled by a sluice gate located in the drop inlet structure. The outlet conduit is supported on a continuous concrete cradle with reinforced concrete cutoff collars.

The emergency spillway is a trapezoidal earth channel excavated into the left abutment (Plate 2). The bottom width of the trapezoidal channel is 200 feet with side slopes of 3 to 1 on the embankment side and 2 to 1 on the abutment side. A 30-foot-wide level section located at Elevation 1070.6 in line with the axis of the embankment constitutes the control section of the spillway.

c. Design Features

(1) Hydrology and Hydraulics. Available information indicates that the emergency spillway was designed to pass a hydrograph with a peak of 7188 cfs, corresponding to 25.8 inches of precipitation in six hours without overtopping the embankment. This hydrograph was routed through the reservoir starting at normal pool (Elevation 1054.0) and producing a maximum pool at Elevation 1075.9 with a peak emergency spillway outflow of 6911 cfs. The top of the dam was established at Elevation 1079.5.

(2) Embankment. Available information indicates that laboratory tests for the embankment design consisted of classification, compaction, and shear strength tests. Shear strength parameters for the highly weathered siltstone were obtained from consolidated-undrained triaxial shear tests. Tests were conducted on samples compacted to 95 percent Standard Proctor dry density. The total stress strength parameters for this material were friction angle 16 degrees and cohesion 750 psf. On less weathered siltstone, two sets of triaxial tests were conducted on samples containing 40 percent and 60 percent plus No. 4 sieve material, respectively. Total stress strength parameters were reported to be friction angle 24 degrees and cohesion 350 psf and friction angle 21 degrees and cohesion 675 psf, respectively. It was reported that a slope stability analysis was conducted by the modified Swedish circle procedure. The stability of the downstream slope under steady-state seepage and the stability of the upstream slope under rapid drawdown conditions were considered. For steady-state seepage, the pool level was taken at Elevation 1070.6, which is the emergency spillway crest level. The minimum computed factors of safety were 1.8 for the downstream slope under steady-state seepage conditions and 1.7 for the upstream slope under rapid drawdown conditions.

Later, additional stability analyses were performed based on the strength parameters obtained from a field test. Prior to the construction of the embankment, field test fills were constructed to study the degradation characteristics of the less weathered siltstone under field compactive effort. The maximum field dry density was found to be lower than the dry density used in shear strength tests. Additional triaxial and new total stress shear strength parameters were obtained: internal friction angle, 21 degrees and cohesion, 200 psf. Using the modified strength parameters, reduced factors of safety were reported: downstream slope under steady seepage, 1.46; upstream slope under rapid drawdown conditions, 1.42.

(3) Appurtenant Structures. Available information indicates that the appurtenant structures were standard SCS designs.

2.2 Construction. As-built drawings and construction progress reports were available for review. To the extent that can be determined, the construction of the dam was in conformance with SCS specifications. No unusual construction difficulties were reported. The dam was constructed

under the supervision of a SCS field representative. It is reported that the earthwork was monitored by field density tests. However, the results were not available for review.

Available information indicates no post-construction changes.

2.3 Operation. No records of operation are kept.

2.4 Other Investigations. None reported.

2.5 Evaluation

a. Availability. Available information was obtained from SCS and PennDER.

b. Adequacy

(1) Hydrology and Hydraulics. The available information is considered to be adequate to assess the conformity of the design to the current spillway design criteria.

(2) Embankment. Review of the geotechnical aspects of the design indicates that the design generally followed currently accepted practice for subsurface investigation, laboratory testing, analysis, and construction.

(3) Appurtenant Structures. Review of the design drawings indicates that the appurtenant structures were designed and constructed in conformance with currently accepted engineering practices.

**SECTION 3
VISUAL INSPECTION**

3.1 Findings

a. General. The on-site inspection of PA-482 dam consisted of:

1. Visual inspection of the embankment, abutments, and embankment toe.
2. Visual examination of the emergency spillway and visible portion of the primary spillway.
3. Observation of factors affecting runoff potential of the drainage basin.
4. Evaluation of downstream hazard potential.

The specific observations are illustrated in Plate 11 and in the photographs in Appendix C.

b. Embankment. The general inspection of the embankment consisted of searching for indications of structural distress, such as cracks, subsidence, bulging, wet areas, seeps and boils, and observing general maintenance conditions, vegetative cover, erosion and other surficial features.

In general, the condition of the dam is considered to be good. One swampy area and one wet area were found along the toe of the dam on each side of the outlet pipe discharge structure, respectively. However, no measurable seepage was associated with these areas.

The top of the embankment was surveyed relative to the emergency spillway crest elevation (1070.6) and was found to be above the design crest elevation of 1075.9.

c. Appurtenant Structures. The appurtenant structures were examined for deterioration or other signs of distress or obstructions that would limit flow. In general, the structures were found to be in good condition. No deficiencies were noted at this time.

d. Reservoir Area. A map review indicates that the watershed is predominantly covered with reclaimed strip mined areas. A review of the regional geology (Appendix E) indicates that only a minor portion of the slopes of the reservoir are likely to be susceptible to landslides. Massive landslides which may affect the storage volume of the reservoir are not considered to be likely.

e. Downstream Channel. Downstream from the dam, the stream flows approximately one mile south where it joins Harmon Creek. Further description of the downstream conditions is included in Section 1.2b.

3.2 Evaluation. The condition of the dam is considered to be good. The present extent of swampy areas along the toe of the dam does not appear to be affecting the stability of the embankment. However, these areas should be periodically observed to document if a seepage condition is developing and necessary remedial work should be undertaken if such a condition develops.

SECTION 4
OPERATIONAL FEATURES

4.1 Procedure. The reservoir is normally maintained at the crest level of the orifice of the drop inlet structure with excess inflow discharging through the orifice. The reservoir outlet pipe can be used to draw down the permanent pool when required. The reservoir outlet pipe gate is normally closed.

4.2 Maintenance of the Dam. The maintenance of the dam is considered to be satisfactory. The downstream and upstream faces of the dam are covered with grass and appear to be annually mowed. Washington County personnel reported that there is no full-time dam tender responsible for the maintenance of the dam. Maintenance is performed by outside contractors.

4.3 Maintenance of Operating Facilities. The only operational feature of the dam is the reservoir outlet sluice gate operated by a hoist located on the drop inlet structure. Since the top of the drop inlet structure was not accessible, this facility could not be closely examined.

4.4. Warning System. No formal warning system exists for the dam. The dam is accessible via a haul road which may not be passable under all weather conditions. Telephone communication facilities are available about two miles north of the site near U.S. Route 22.

4.5 Evaluation. The maintenance condition of the dam is considered to be satisfactory. The dam and appurtenances should continue to be periodically inspected with emphasis on the swampy areas along the toe of the embankment to document that the conditions are not changing.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. PA-482 dam has a watershed of 1.3 square miles and impounds a reservoir with a surface area of 6.2 acres at normal pool level. The emergency spillway of the dam is located on the right abutment. The capacity of the emergency spillway is reported to be 6911 cfs with no freeboard. The emergency spillway was sized to pass a flood corresponding to 25.8 inches of precipitation in 6 hours without overtopping the embankment.

b. Experience Data. As previously stated, PA-482 dam is classified as a small dam in the high hazard category. Under the recommended criteria for evaluating emergency spillway discharge capacity, such impoundments are required to pass half to full PMF.

The PMF inflow hydrograph for the reservoir was determined using the Dam Safety Version of the HEC-1 computer program, developed by the Hydrologic Engineering Center of the U.S. Army, Corps of Engineers. The data used for the computer input are presented in Appendix D. The PMF inflow hydrograph was found to have a peak flow of 2863 cfs. The computer outputs are included in Appendix D.

c. Visual Observations. On the date of inspection, no conditions were observed that would indicate that the emergency spillway capacity would be significantly reduced in the event of a flood.

d. Overtopping Potential. The PMF inflow hydrograph was routed through the reservoir and it was found that the dam can pass the PMF without overtopping. To obtain an upper bound on the maximum pool level during the passage of PMF, the spillway discharge rating was conservatively based on a rectangular cross section, with the base of the rectangle taken equal to the base of the trapezoidal emergency spillway cross section.

e. Spillway Adequacy. The spillway is classified to be adequate (100 percent PMF) according to the recommended criteria.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

(1) Embankment. As discussed in Section 3, the field observations did not reveal any signs of distress that would significantly affect the stability of the dam at this time. The dam was inspected during normal operating pool level. It should be noted that flood control dams are subjected to significantly less stress under normal operating conditions than would occur during the passage of major floods.

(2) Appurtenant Structures. The performance of the appurtenant structures is considered to be satisfactory.

b. Design and Construction Data

(1) Embankment. Available information indicates that the stability of the embankment was analyzed for steady seepage and rapid drawdown conditions using the modified Swedish circle method of slope stability analysis. The minimum factor of safety was reported to be 1.46 for the steady-state seepage stability of the downstream slope and 1.42 for the rapid drawdown condition of the upstream slope. Strength parameters for the core material were obtained from consolidated-undrained triaxial shear tests with pore pressure measurements. Construction progress reports indicate that the dam was constructed under the supervision of a Soil Conservation Service field representative, and the earthwork was monitored by field density tests.

(2) Appurtenant Structures. Review of the design drawings indicates that there are no apparent structural deficiencies that would significantly affect the performance of the appurtenant structures.

c. Operating Records. There are no operating records kept for the dam.

d. Post-Construction Changes. None reported.

e. Seismic Stability. The dam is located in Seismic Zone 1, and based on visual observations, the static stability of the dam is considered to be adequate. Therefore, based on the recommended criteria for evaluation of seismic stability of dams, the structure is presumed to present no hazard from earthquakes.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Assessment. The visual observations indicate that PA-482 dam is in good condition. No conditions were observed that would significantly affect the overall performance of the structure at this time. However, as previously noted, the dam was not inspected under its maximum loading condition, which would occur when the reservoir is raised to the emergency spillway crest elevation during major storms.

The swampy areas observed at the toe area are not considered to be serious relative to the overall performance of the dam at this time. However, these areas should be periodically observed to determine if conditions are changing.

The capacity of the spillway (100 percent PMF) was found to be adequate according to the recommended criteria.

b. Adequacy of Information. Available information in conjunction with the visual observations and the previous experience of the inspectors are considered to be sufficient to make a reasonable assessment of the condition of the dam.

c. Urgency. The following recommendations should be implemented on a continuing basis.

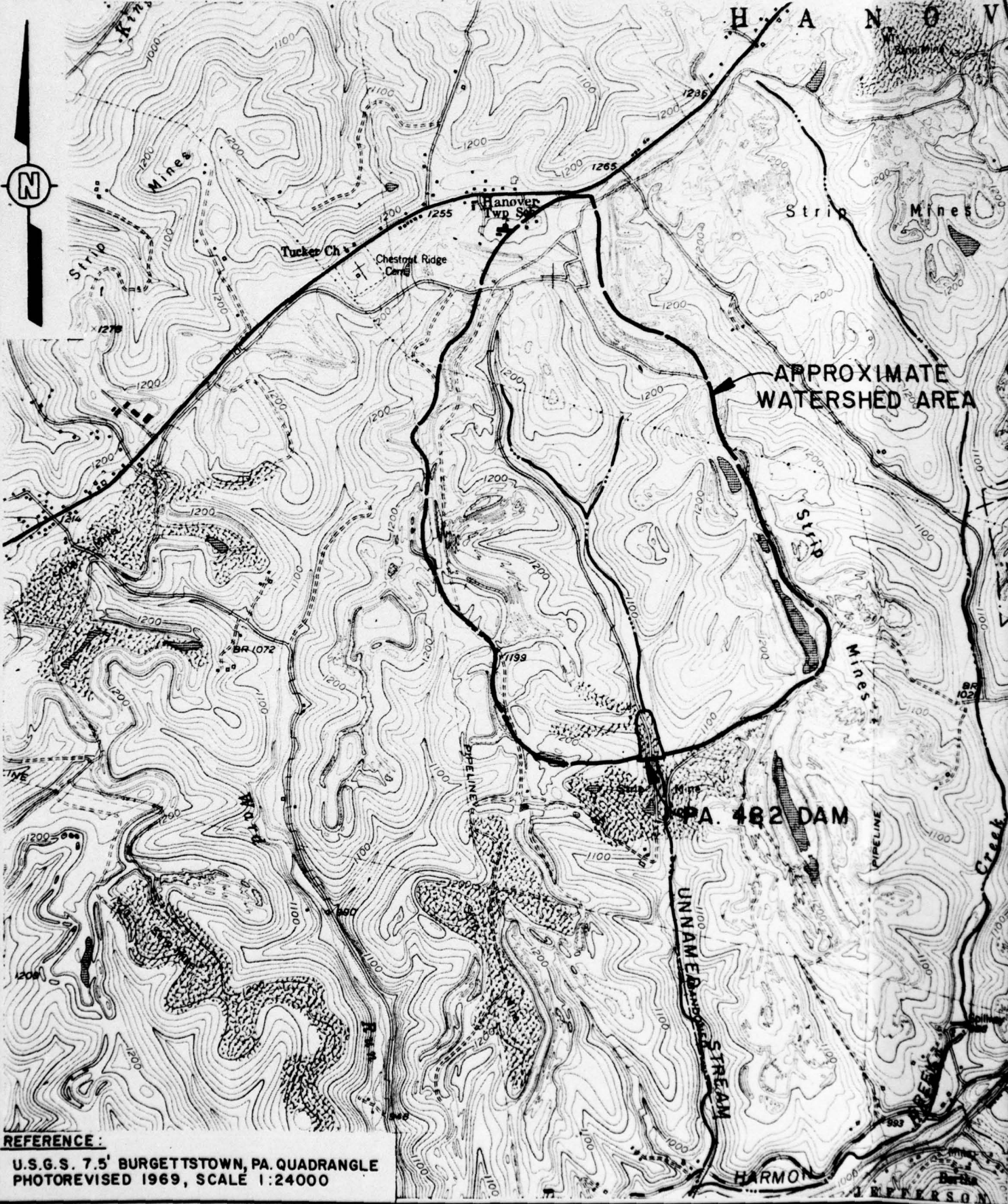
d. Necessity for Additional Data. No additional data are considered required at this time.

7.2 Recommendations/Remedial Measures. It is recommended that:

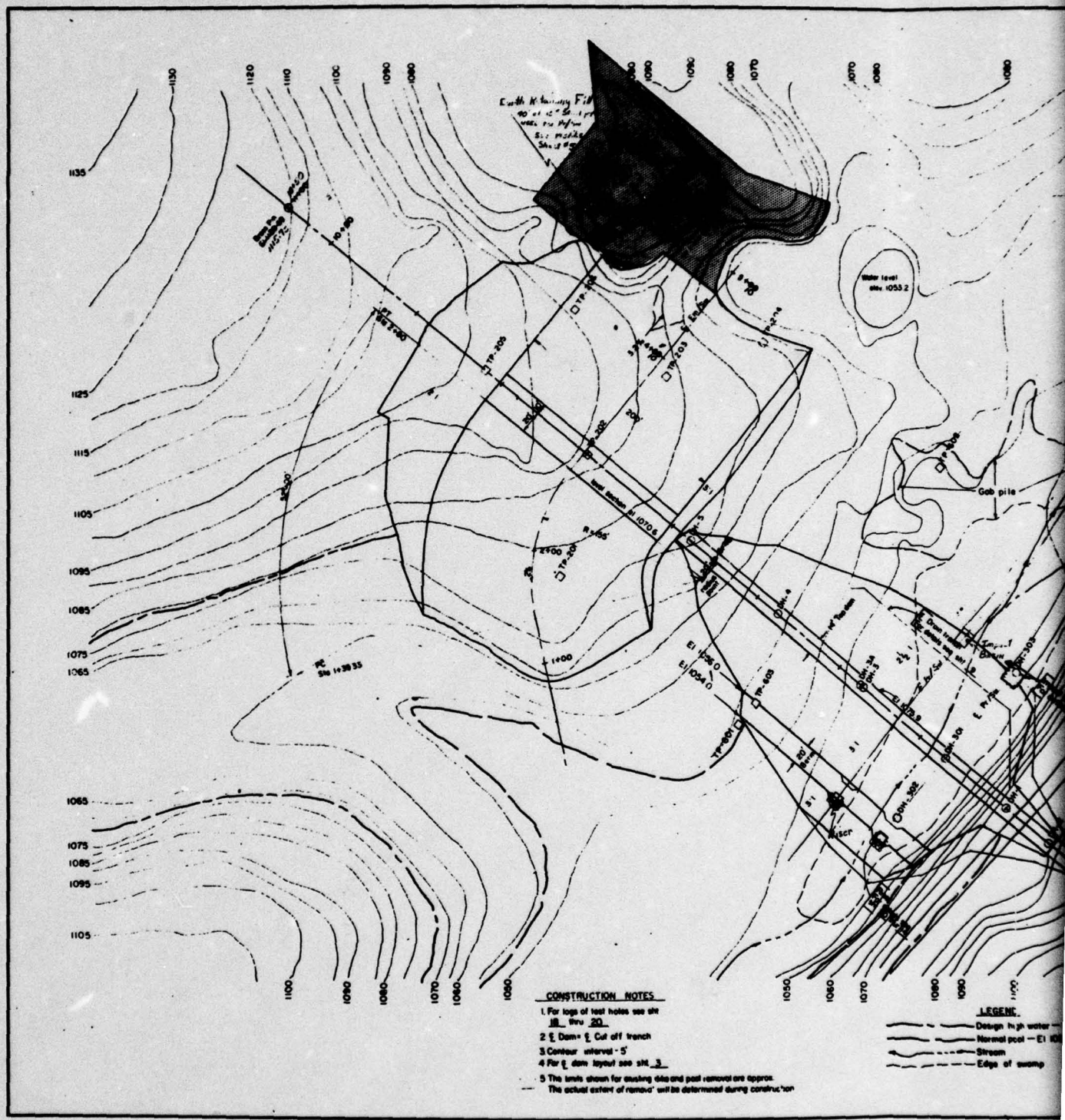
1. The swampy and wet areas located along the toe of the embankment should be periodically observed. Necessary remedial work should be performed if the extent of the wet and swampy areas increases or seepage and sloughing conditions develop.
2. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert downstream residents in the event of emergencies.
3. The dam and appurtenant structures should continue to be inspected regularly and necessary maintenance should be performed.

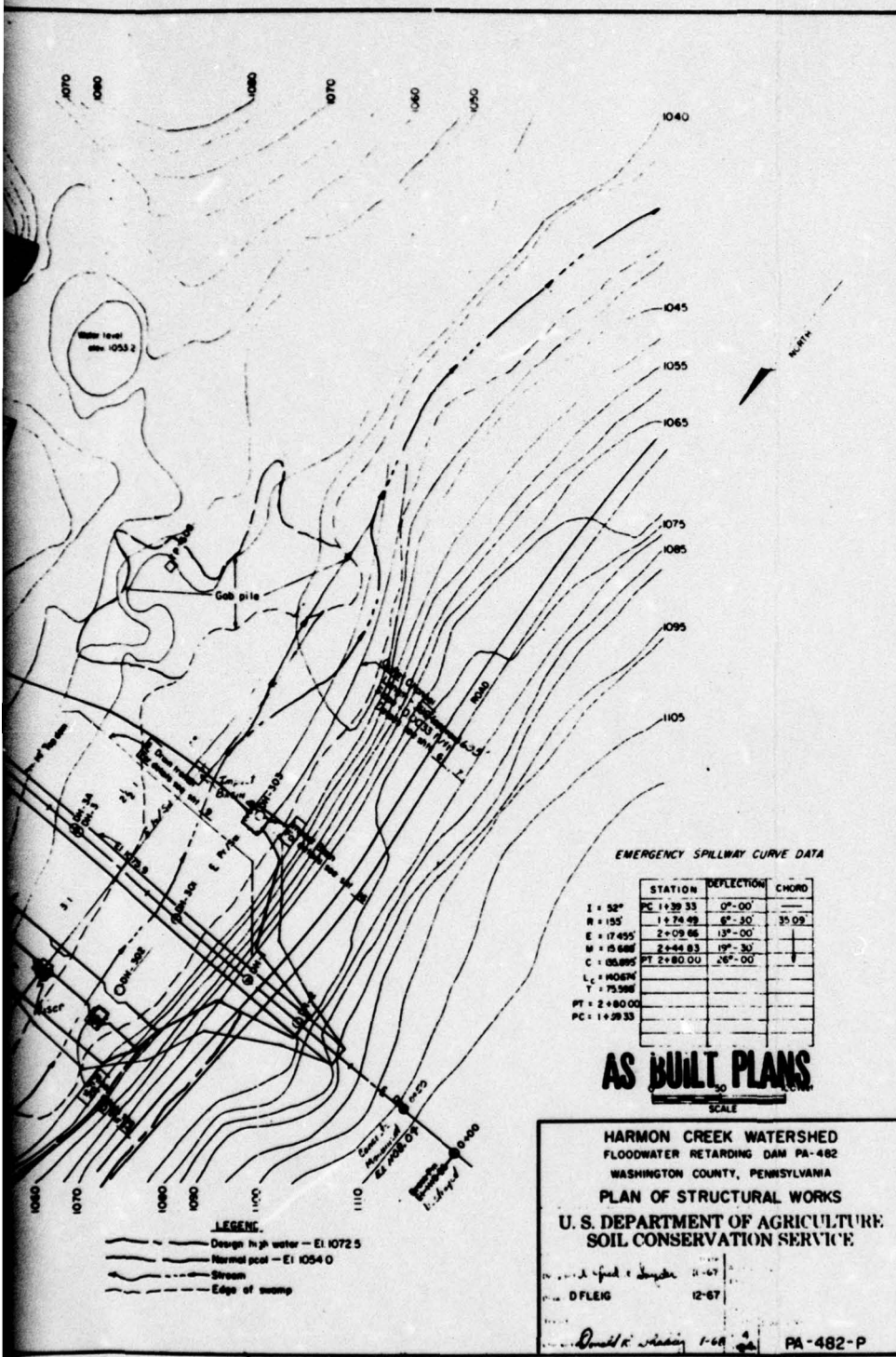
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BY 1-3-79 APPROVED BY [Signature]



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PHOTOREVISED 1969, SCALE 1:24000





EMERGENCY SPILLWAY CURVE DATA

	STATION	DEFLECTION	CHORD
I = 52°	PC 1+39.33	0°-00'	
R = 155'	1+74.99	6°-30'	35.09
E = 17.495'	2+09.96	13°-00'	
M = 15.648'	2+44.93	19°-30'	
C = 108.895'	PT 2+80.00	26°-00'	
L _c = 75.598'			
T = 75.598'			
PT = 2+80.00			
PC = 1+39.33			

AS BUILT PLANS
SCALE

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-482
WASHINGTON COUNTY, PENNSYLVANIA

PLAN OF STRUCTURAL WORKS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

... A. F. ... 11-67
D. FLEIG 12-67
... 1-68 ... PA-482-P

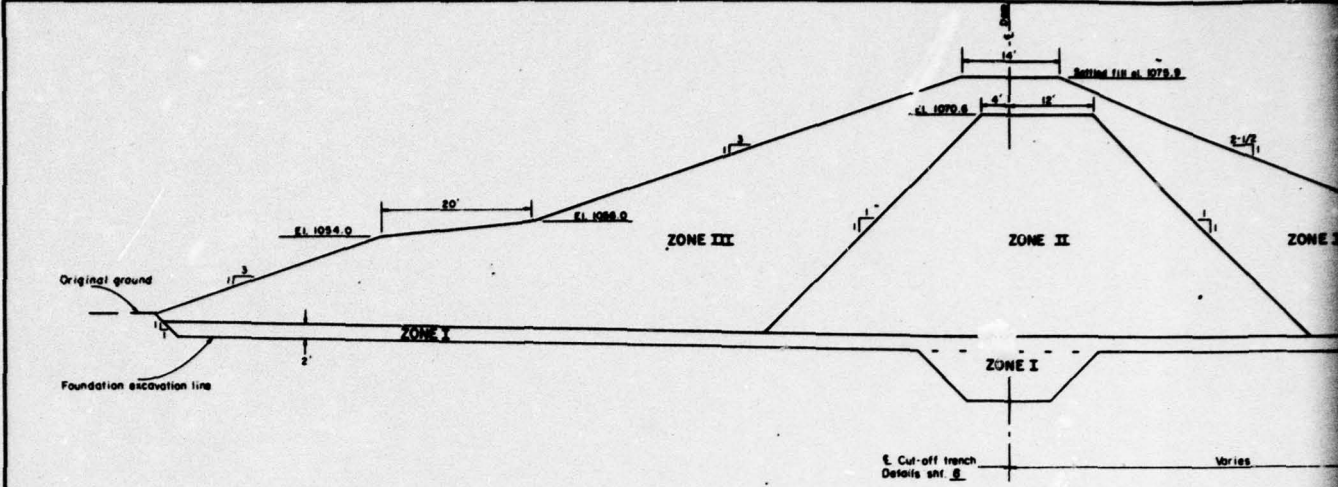
LEGEND
 - - - - - Design high water - El 1072.5
 - - - - - Normal pool - El 1054.0
 - - - - - Stream
 - - - - - Edge of swamp

2

PLATE 2

D'APPOLONIA

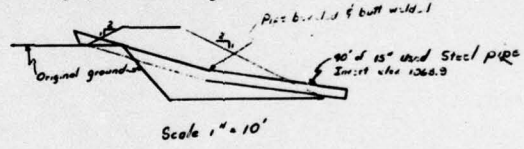
DRAWN BY
 1-3-79
 CHECKED BY
 4-7-79
 APPROVED BY
 4-17-79
 DRAWING NUMBER
 78-367-B 78



TYPICAL SECTION OF DAM

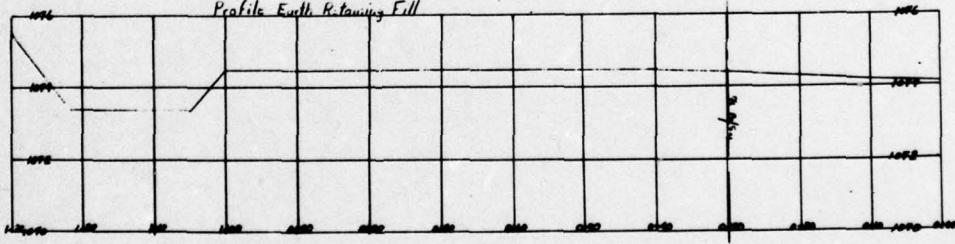
0 2 4 10
 SCALE: 1" = 10'

Profile along P/Su-Earth Retaining Fill

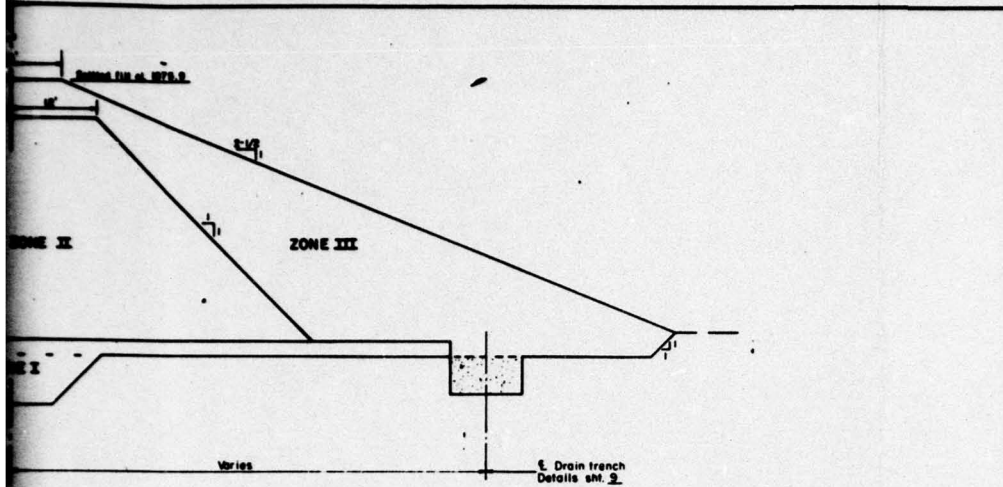


Scale 1" = 10'

Profile Earth Retaining Fill



Scale 1" = 2' Vert.
 1" = 10' Horiz.



CONSTRUCTION NOTES

1. 2' layer of ZONE I material required, as shown, where embankment material contacts weathered rock (approx. \pm dam stations 2+40 to 3+90)
2. For constructed fill elevations see sht. B.
3. Constructed slopes are:
 2.93 : 1 upstream
 2.44 : 1 downstream

ZONE	MATERIAL	1. MAX ROCK SIZE	2. MAX LIFT	3. REQ'D WATER CONTENT - 3% - 0% OF Optimum	4. COMPACTION	
					Class	Definition
I	Material as represented by TP 208.1, depth 1'-7", classified as C ₁ and by M 1, depth 5.2'-10', classified as CL.	6"	9'	+ 3% - 0% OF Optimum	A	95% of Max. Density by ASTM D-698 Method A
II	Material as represented by TP 208.1, depth 1'-5", classified as CL.	6"	9'	+ 3% - 0% OF Optimum	A	100% of Max. Density by ASTM D-698 Method C
III	Material as represented by TP 208.2, depth 6.8'-10.5', classified as weathered siltstone.	-	-	See Spec. 5	T	See Spec. 5

- a. For fill adjacent to structure, max. rock size = 3"
- b. Maximum permissible lift thickness before compaction.
- c. Water content of fill matrix at time of compaction.
- d. For typical compaction curves see sht. 2.

AS BUILT PLANS

HARMON CREEK WATERSHED
 FLOODWATER RETARDING DAM PA-482
 WASHINGTON COUNTY, PENNSYLVANIA
 FILL PLACEMENT
 U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

... 11-67
 C CRISE 12-67

Ronald K. ... 1-68 PA-482-P

2

PLATE 3

D'APPOLONIA

DRAWING 4-17-73 CHECKED BY [Signature] APPROVED BY [Signature] NUMBER 78-367-B 79
 DRAWN BY [Signature]

MI 1. 1079.5. 2-00. Contamination
 Logged by: K. G. Hirshey 6/16/66
 Drilling Equipment: Sargent & Hammond 30C

Hole Depth From To	Description of Materials	Unif. Soil Class	STANDARD PENETRATION		SAMPLES				
			Blows Per 6"	Used No.	Type	From To	%		
0.0 1.0	Topsoil and mine spoil. Sand fill contains approx. 20% cobbles (1/2 over 6") - continuous down slope to valley floor.		6-12-13 12-11-1 11-12-4 7-11-15	Spt 2 3 4	1 2 3 4	Jar Jar Jar Jar	0.0 1.5 3.0 4.5	1.5 3.0 4.5 6.0	80 80 80 80
1.0 2.5	Clay, sand with gravel, horn, moist, 10% fine to med. gravel. 15% sand, fines are plastic, coarse particles are nondurable, coarse particles are plastic, coarse particles are nondurable & readily breaks down with fingers. Below there is some highly weathered coal strata - dk. gry to black - weathered to Cl.	CL	25-55-75 62-104/0.2	MOI MOI	1 1	Jar Jar	0.0 12.0	12.0 17.0	85 50
2.5 7.5	Clay, sand with gravel, horn with some dk. gry, moist, average composition, trace of small cobbles, 20% gravel, 20% sand, fines are plastic, coarse particles are nondurable & readily breaks down with fingers. Below there is some highly weathered coal strata - dk. gry to black - weathered to Cl.	CL	62-104/0.2	MOI	1	Jar	0.0	12.0	85
7.5 22.1	Siltstone, dk. gry and sandstone, lt. gry strata. Siltstone, dk. gry, moist, average composition, trace of small cobbles, 20% gravel, 20% sand, fines are plastic, coarse particles are nondurable & readily breaks down with fingers. Below there is some highly weathered coal strata - dk. gry to black - weathered to Cl.	CL	62-104/0.2	MOI	1	Jar	0.0	12.0	85
22.1 27.7	Siltstone, dk. gry and sandstone, lt. gry strata. Siltstone, dk. gry, moist, average composition, trace of small cobbles, 20% gravel, 20% sand, fines are plastic, coarse particles are nondurable & readily breaks down with fingers. Below there is some highly weathered coal strata - dk. gry to black - weathered to Cl.	CL	62-104/0.2	MOI	1	Jar	0.0	12.0	85
27.7 47.0	Siltstone, dk. gry and sandstone, lt. gry strata. Siltstone, dk. gry, moist, average composition, trace of small cobbles, 20% gravel, 20% sand, fines are plastic, coarse particles are nondurable & readily breaks down with fingers. Below there is some highly weathered coal strata - dk. gry to black - weathered to Cl.	CL	62-104/0.2	MOI	1	Jar	0.0	12.0	85
47.0 7.0	Bottom of hole - wet hole. WL (8/24/66) 26.0' WL (8/22/66) 28.0' WL (8/25/66) 27.5' WL (7/22/66) 21.0'								

MI 2. 1075.5. 2-50. Contamination
 Logged by: K. G. Hirshey 7/17/66
 Drilling Equipment: Sargent & Hammond 30C

Hole Depth From To	Description of Materials	Unif. Soil Class	STANDARD PENETRATION		SAMPLES				
			Blows Per 6"	Used No.	Type	From To	%		
0.0 0.5	Forest litter, roots with mine spoil.		1-1-16	Spt	1	Jar	0.0	1.5	100
0.5 3.7	Clay, sandy, horn from 0.1-1.5' sand, 15% sand, fines are moderately plastic.	CL	21-26-100	MOI	2	Jar	1.5	3.0	100
3.7 5.2	Clay, horn and gry, moist, 10% gravel, 20% sand, fines are plastic, coarse particles are nondurable siltstone.	CL		MOI	1	Jar	0.0	1.5	100
5.2 10.2	Clay, sandy, horn with some siltstone, trace of fine gravel, 15% sand, fines are plastic, coarse highly weathered coal particles about 0.5'.	CL		MOI	1	Jar	0.0	1.5	100
10.2 12.0	Sand, clay with gravel, horn, moist, average composition, trace of cobbles, 15' fine to med. gravel, 20% sand, 4% plastic fines. One 0.5' strata reaches GC proportions with 18' cobbles, 35' gravel, 29' sand and 30% fines. Coarse particles are nondurable sandstone.	CL		MOI	1	Jar	0.0	1.5	100
12.0 21.7	Sandstone, lt. to med. gry, weathered horn to 14.5' with horn along some bedding plane breaks to bottom of hole. Sandstone is fine to med. grained with some coarse. Nodules, especially along some bedding planes. Core can be scratched with fingernail to 15.5' and scratched with knife from 15.5' to bottom of hole. Below 15.0' core fits fairly well together, sandstone is fine limy. Sandstone is fine limy.	CL		MOI	1	Jar	0.0	1.5	100
21.7 27.7	Bottom of hole - wet hole. WL (8/24/66) 11.3' WL (8/21/66) 11.6' WL (8/30/66) 11.5'								

MI 3. 1083.7. 3-70. Contamination
 Logged by: K. G. Hirshey 6/22/66
 Drilling Equipment: Sargent & Hammond 30C

Hole Depth From To	Description of Materials	Unif. Soil Class	STANDARD PENETRATION		SAMPLES				
			Blows Per 6"	Used No.	Type	From To	%		
0.0 0.4	Forest litter, roots, etc.		1-1-2	Spt	1	Jar	0.0	1.5	95
0.4 1.5	Clay, sand, horn to 0.1, moist, trace of fine gravel, 15% sand, fines are plastic.	CL	11-66	MOI	3	Jar	3.0	4.0	70
1.5 2.0	Clay, sand with gravel, horn with some gry, moist, trace of small sandstone cobbles, 15' fine to med. gravel, 25' fairly	CL		MOI	1	Jar	0.0	1.5	100

MI 3. Cont. A

Hole Depth From To	Description of Materials	Unif. Soil Class	STANDARD PENETRATION		SAMPLES				
			Blows Per 6"	Used No.	Type	From To	%		
2.0 14.7	well-grained sand, fines are plastic, coarse particles nondurable, cobbles moderately durable, some coal particles present, grades into GC at approx. 2.0'. Sandstone, highly weathered to GC with 35% fine to 4.0', lt. to med. gry with heavy horn weathering and iron staining to 10.4', some vertical fractures noted to 10.4', some horn weathering along bedding planes to 17.7', coarse pieces fit fairly well together but moderately broken to 12.0'. Coarse pieces 0.3-12.0' are 0.1 to 0.5' long, 12.0-15.7' pieces are 0.1 to 1.2' long. Contains some thin coal strata. From 15.8-15.7' highly pitted coal seam noted. Sandstone is crossbedded and can be scratched with knife. Bottom of hole - wet hole. WL (8/24/66) 0.5'±								

MI 4. 1083.0. 3-70. Contamination
 Logged by: K. G. Hirshey 6/22/66
 Drilling Equipment: Sargent & Hammond 30C

Hole Depth From To	Description of Materials	Unif. Soil Class	STANDARD PENETRATION		SAMPLES				
			Blows Per 6"	Used No.	Type	From To	%		
0.0 4.5	Earth boring.								
4.5 16.6	Sandstone, lt. to med. gry, horn where highly weathered, along bedding plane breaks and some vertical fractures. Fractures noted from 8.3-9.4' and 10.5-11.0', rock can be scratched with knife, whereas horn can be barely scratched with fingernail, horn weathering slight below 11.3'. Coarse pieces 0.05 to 0.6' long with a highly fractured one from 8.3-9.4'. Contains some thin coal strata. Sandstone is crossbedded. Bottom of hole - wet hole. WL (8/24/66) 0.5'								

MI 5. 1056.0. 4-75. Contamination
 Logged by: K. G. Hirshey 7/27/66
 Drilling Equipment: Sargent & Hammond 30C

Hole Depth From To	Description of Materials	Unif. Soil Class	STANDARD PENETRATION		SAMPLES				
			Blows Per 6"	Used No.	Type	From To	%		
0.0 0.5	Hand-dug for setup. Forest litter, roots with mine spoil.		2-2-5	Spt	1	Jar	1.5	2.0	95
0.5 3.7	Clay, sandy, horn from 0.1-1.5' sand, 15% sand, fines are moderately plastic.	CL	21-25-56 33-51-30 6-11-14 10-15-16 13-16-18 15-16-17	MOI	3 4 5 6 7 8	Jar Jar Jar Jar Jar Jar	3.0 5.0 6.5 8.0 9.5 11.0	5.0 6.0 7.0 8.0 9.0 10.0	100 100 100 100 100 100
3.7 5.2	Clay, horn and gry, moist, 10% gravel, 20% sand, fines are plastic, coarse particles are nondurable siltstone.	CL		MOI	1	Jar	0.0	1.5	100
5.2 10.2	Clay, sandy, horn with some siltstone, trace of fine gravel, 15% sand, fines are plastic, coarse highly weathered coal particles about 0.5'.	CL		MOI	1	Jar	0.0	1.5	100
10.2 12.0	Sand, clay with gravel, horn, moist, average composition, trace of cobbles, 15' fine to med. gravel, 20% sand, 4% plastic fines. One 0.5' strata reaches GC proportions with 18' cobbles, 35' gravel, 29' sand and 30% fines. Coarse particles are nondurable sandstone.	CL		MOI	1	Jar	0.0	1.5	100
12.0 21.7	Sandstone, lt. to med. gry, weathered horn to 14.5' with horn along some bedding plane breaks to bottom of hole. Sandstone is fine to med. grained with some coarse. Nodules, especially along some bedding planes. Core can be scratched with fingernail to 15.5' and scratched with knife from 15.5' to bottom of hole. Below 15.0' core fits fairly well together, sandstone is fine limy. Sandstone is fine limy.	CL		MOI	1	Jar	0.0	1.5	100
21.7 27.7	Bottom of hole - wet hole. WL (8/24/66) 11.3' WL (8/21/66) 11.6' WL (8/30/66) 11.5'								

MI 6. 1073.0. 5-80. Contamination
 Logged by: K. G. Hirshey 6/22/66
 Drilling Equipment: Sargent & Hammond 30C

Hole Depth From To	Description of Materials	Unif. Soil Class	STANDARD PENETRATION		SAMPLES				
			Blows Per 6"	Used No.	Type	From To	%		
0.0 1.7	Mine spoil, red-dog, 40% gravel, 35' thin and platy sand, 25% nonplastic fines, red to yellow and horn, moist.	GM	2-2-1 2-2-3 6-10-10 11-12-16	Spt	1 2 3 4	Jar Jar Jar Jar	0.0 1.5 3.0 4.5	1.5 3.0 4.5 6.0	85 85 85 85
1.7 3.0	Clay, gravel with sand, horn, moist, 10% fine gravel, 20% sand, fines are plastic, coarse particles are nondurable siltstone particles.	CL	21-23-31 11-13-37 10-14-37-66	MOI	5 6 7	Jar Jar Jar	6.0 7.5 9.0	7.5 9.0 11.0	85 85 85
3.0 4.7	Clay, gravel with sand, horn, moist, 20% fine to med. gravel, 20% sand, fines are plastic, coarse particles are thin and platy, silty sandstone.	CL		MOI	1	Jar	0.0	1.5	100
4.7 12.0	Clay, sand, gry and horn, red-brown from 7.5', moist, trace of gravel, 20% sand, coarse particles are nondurable and readily break down to plastic fines with sanding. Several laminated from 7.5', contains some lenses with 20% gravel, 20% sand, particles readily break down when sanding.	CL		MOI	1	Jar	0.0	1.5	100
12.0 18.2	Siltstone, horn to gry-gry, highly weathered, easily scratched with knife, iron staining noted along bedding planes, coarse pieces .05' to 0.1' long. Core highly broken in spots with some gravel size pieces. Contains some thin clay strata. Some vertical fractures. Bedding planes consist of small siltstone. Contains some thin clay strata. Core fits fairly well together with some broken sand. Some vertical fractures, especially from 23.2 to 25.1'. Iron staining noted along bedding and fracture planes. Some sandstone strata from 21.8-23.0' and 24.2-25.7'. Sandstone is fine to med. grained and can be barely scratched with fingernail. Nodules and crossbedded. Some thin coal seams noted.	CL		MOI	1	Jar	0.0	1.5	100

Continued

particles unobtainable, cobble
 gravel, grades from 0.5 to approx. 2.0"
 fine to 1/4", to and gray with
 10.5", some vertical fractures noted
 to planes to 17.3", curved pieces fit fairly
 well. Curved pieces 0.5-12.5" are 0.1 to 0.1"
 long. Contains some thin coal strata.
 Sandstone is crossbedded and can be
 scratched with fingernail.

H. S. CORN'A
 26.4 37.5 Sandstone, fine to med. grained and lt. gray to 34.3', fine to coarse grained and
 med. gray from 34.3 to 37.5'. Some sandy shale strata to 34.7'. Crossbedded, 15"
 from 26.3-29.0' and 32.3-36.3'. Contains some thin clay and thin coal strata,
 only slight from strata noted below 26.3' except for some of shale to 34.3-34.8'.
 37.5 Bottom of hole - wet hole. **UL (8/24/66) 13.3' AL (8/25/66) 23.7' AL (8/30/66)**
 17.9'

UL 101, ELV. 1082.3, 2-70, CORN'LIGE
 Logged by: F. G. Hirshey 8/28/66
 Drilling Equipment: Sweeney & Howard 400

highly weathered,
 vertical fractures.
 rock can be
 easily scratched
 with fingernail. Curved
 pieces 0.5-12.5" are
 0.1 to 0.1" long.
 Sandstone

Hole Depth From To	Description of Materials	UNIF. STANDARD PENETRATION		SAMPLE	
		Soil Class	Type	From To	%
0.0 1.0	Topsoil, sand and roots, etc.	L/Fee 1.5'	Spt 1	Jan 0.0 1.5	20
1.0 2.7	Clay, sand and gravel, gray, wet, slight organic odor, some decaying plant remains, some coal particles, 15% gravel, 15% sand, fines are plastic.	2-1-3 6-7-9 8-14-100	2 3 4	Jan 1.5 3.0 3.0 4.5 4.5 6.0	40 100 85
2.7 4.8	Gravel, sand with clay, brown, wet and material contains organic and decaying material, approx. 40% gravel, 30% sand, 10% moderately plastic fines. Coarse particles are sandstone.			Jan 3.0 4.5 4.5 6.0	100 70
4.8 5.3	Clay, gravel with sand, gray, wet, 15% gravel, 20% sand, fines are moderately plastic, material is siliceous.			Jan 4.5 6.0 6.0 8.5	70 95
5.3 18.5	Sandstone, brown from 5.3-9.5', med. gray from 9.5-12.2' & 13.1-18.5', lt. gray from 12.2-13.1'. Fine to coarse sand size particles, highly weathered to 9.5', highly broken to 8.9', below 8.9' curved pieces fit fairly well together, some brown weathering noted along bedding planes to 12.2', curved pieces .1 to 1.5' long. 15% from 12.2-13.1', siliceous and crossbedded, some thin interbedded coal strata on strata 12.1-12.2', 15% 12.2-13.1'.			Jan 6.0 8.5 8.5 13.5 13.5 18.5	100 100 100

63-77-17
 RECORD...
 RESOURCES...
 WATERS ON THE...
 FOREST...
 AD 1968
 H. S. CORN'A

STANDARD PENETRATION

Type	From To	%
Spt 1	Jan 1.5 2.7	20
" 2	" 3.0 4.5	40
" 3	" 3.0 4.5	100
" 4	" 4.5 6.0	85
" 5	" 6.0 8.5	70
" 6	" 8.5 13.5	100
" 7	" 13.5 18.5	100

UL 102, ELV. 1081.1, 2-70, 70' U.S.
 Logged by: F. G. Hirshey 8/28/66
 Drilling Equipment: Sweeney & Howard 400

Hole Depth From To	Description of Materials	UNIF. STANDARD PENETRATION		SAMPLE	
		Soil Class	Type	From To	%
0.0 1.0	Topsoil, roots, etc. ground partly undercut by stream and action, material wet.	L/1.5'	Spt 1	Jan 0.0 1.5	15
1.0 3.4	Clay, sandy, gray, wet, trace of fine gravel, 15% sand, fines are plastic, slight organic odor to material.	0-1-2 1-2-3 7-12-100	2 3 4	Jan 1.5 3.0 3.0 4.5 4.5 6.0	45 100 80
3.4 5.0	Clay, gravel with sand, gray, wet, 20% gravel, 20% sand, fines are plastic. Material brown from 4.5', coarse particles are shale and sandstone.			Jan 3.0 4.5 4.5 6.0	100 90
5.0 11.0	Sandstone, med. gray, weathered brown, siliceous to base to 4.9', fine to med. sand size grains. Fines 0.5' contains 25% plastic fines, rock highly broken to 7.3', core fit fairly well together below 8.9', curved pieces 0.05 to 0.5' long with some brown weathering along bedding plane breaks. Can be scratched with knife, some thin coal and clay strata, rock is crossbedded.			Jan 6.0 8.5 8.5 11.0	100 100
11.0	Bottom of hole - wet hole.				

29' sand and 30' fines. Coarse particles
 bedding plane breaks to bottom of hole,
 some coarse. Veneous, especially along
 bed with fingernail to 15.5' and
 top of hole. Below 15.0' core fits fairly
 well. Thin coal some noted. Crossbedding
 13.3' AL (8/27/66) 13.6' AL (8/30/66) 23.5'

UL 103, ELV. 1081.1, 2-70, 70' U.S.
 Logged by: F. G. Hirshey 8/30/66
 Drilling Equipment: Sweeney & Howard

Hole Depth From To	Description of Materials	UNIF. STANDARD PENETRATION		SAMPLE	
		Soil Class	Type	From To	%
0.0 1.0	Topsoil, roots, etc., wet.	L/1.5'	Spt 1	Jan 0.0 1.5	0
1.0 2.6	Clay, sandy, gray and wet, trace of fine gravel, 15% sand, fines are plastic, wet refusal with Shelby tube at 2.6'. Bottom of hole - wet hole.	0-1-2 1-2-3	2 3	Jan 1.5 2.6 2.6 2.6	100 100

with weathering. Material laminated from 7.5',
 sand, particles readily broken down when
 sand, easily scratched with knife, iron
 and pieces .05' to 0.1' long. Core highly
 sandy. Contains some thin clay strata. Some
 thin some gravel. Siliceous.
 with fingernail. Contains some thin clay
 with some broken some. Some vertical
 from strata noted along bedding and
 from 21.0-22.0' and 29.0-29.7'. Sandstone
 scratched with fingernail. Veneous and

See also 21 for note.

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-482
 WASHINGTON COUNTY, PENNSYLVANIA
LOGS OF DRILL HOLES AND TEST PITS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed by: **F. G. HIRSHHEY** Date: **8-30**
 Drawn by: _____
 Traced by: _____
 Checked by: **J. C. Johnson** Date: **1-68**
 Approved by: _____
 Title: _____
 Sheet: _____ Drawing No: **PA-482-P**
 No. **18** of **23**

2

PLATE 4

D'APPOLONIA

DRAWING 78-367-B 80
 4-17-79
 4-17-79
 DRAWN BY
 CHECKED BY
 APPROVED BY
 1-3-79

Hole Depth From To	Description of Materials	Unif. Soil Class.	STANDARD PENETRATION		SAMPLER		From To	N	Remarks
			Blows Per Ft	Type	Use	No.			
TP 101. ELEV. 1041.5. 2+75. 100' U.S.									
0.0	1.0		1/1.5'	SPT	1	Jar	0.0	1.5	20
1.0	2.7	CL	1-1-2		2		1.5	3.0	25
2.7	4.5	CL	3-10-100	Asp.	1		4.5	6.0	85
4.5	10.0			100%			6.0	10.0	100
<p>Topsoil, roots, etc., material undercut by stream action, wet. Clay, sandy, gray, wet, trace of gravel, 15% sand, fines are plastic. Slight organic odor. Gravel, sand with clay, brown, wet, 35% gravel, 25% sand, 15% plastic fines. Coarse particles are fairly well-graded siltstone and sandstone particles. Sandstone, lt. gray from 4.5-7.5' and gray from 7.5-10.0', weathered brown from 5.0-6.1', thin, some interbedded thin coal streaks from 8.8-9.1' and at 9.5'. Can be scratched with knife, micaceous. Some brown weathering noted along bedding plane breaks to 6.8', coiled pieces 1.1-1.1' long, some gravel sized pieces at 6.0'. Bottom of pit - wet hole.</p>									
TP 102. ELEV. 1051.3. 4+40. 100' U.S.									
0.0	0.5								
0.5	4.5	CL							
4.5	7.0	SC			1	L	1.0	1.5	
7.0	8.0				2	H	4.5	7.0	
8.0									
<p>Forest litter, roots, etc. Clay, sandy, brown, slightly moist to moist, trace of gravel, 15% sand, fines are plastic, coarse particles are non-durable. Sand, gravel with clay, moist, brown, 15% sand, 20% gravel, 15% plastic fines. Coarse particles are thin and platy with some subround, particles are in random orientation, particles are non-durable and moderately durable, contains some coal particles. Sandstone, gray, fine to med. sand size particles, can be scratched with knife. Bottom of pit - wet hole.</p>									
TP 103. ELEV. 1063.3. 6+75. 100' U.S.									
0.0	0.5								
0.5	7.0	CL							
7.0	8.0								
8.0									
<p>Forest litter, roots, etc. Gravel, sand and silt, 55% gravel, 15% sand, and 25% micaceous fines, moist, red to gray and gray. Clay, sand, brown and gray from 2.0-6.8', moist to wet? 15% sand, fines are plastic. Sedge coming from first foot - probably surface runoff. Sandstone, gray, wet, fine to med. sand, particles can be scratched with knife, durable, refusal with backhoe at 7.2'. Bottom of pit - wet hole. cinders plus are found, both upstream and downstream from test pit. 10' above pit. Piles are 9 to 15' wide and contain numerous cobble and boulder size particles. A number of 1 cu. yd. boulders - cinders were observed in cinder pile.</p>									
TP 104. ELEV. 1069.8. 4+40. 75' U.S.									
0.0	0.5								
0.5	4.5	ML or CL			1	H	1.0	3.5	
4.5	5.5								
5.5									
<p>Forest litter, roots, etc. Clay, sand with gravel, brown, slightly moist, 10% fine gravel, 15% sand, fines are moderately plastic. From 3.5-4.5' coarse particles increase to 25% gravel and 20% cobble size pieces. At 4.5' material grades into firm bedrock. Sandstone, gray, wet, contains fine to med. sand size particles, can be scratched with knife. Excavates as cobble size pieces, pieces are durable. 5' refusal with backhoe. Bottom of pit - dry hole.</p>									
TP 105. ELEV. 1048.0. 2+50. 550' U.S.									
0.0	0.5								
0.5	2.0								
2.0	5.0								
5.0									
<p>Forest litter, roots, etc. Silt, sand, brown, moist, trace of gravel, 15% fine sand, fines are low plastic. Shale, med. gray, wet, moderate seepage into pit from this zone. Shale is highly weathered, easily scratched and broken with finger-nail. Excavates as gravel and sand with 10% fines. Coarse particles are non-durable. 5' refusal with backhoe. Bottom of pit - wet hole.</p>									
TP 106. ELEV. 1048.0. 4+40. 550' U.S.									
0.0	0.5								
0.5	5.5	CL							
5.5	8.5	SC							
8.5	10.0								
10.0									
<p>Forest litter, roots, etc. Clay, sand with gravel, brown-gray-brown below 1.5', moist, 10% gravel, 20% sand, fines are plastic. Fines were moderately plastic from 0.5-2.0'. Coarse particles were non-durable shale. A few sandstone cobbles noted. Sand, gravel with clay, brown, wet, moderate seepage into pit, 10% sand, 15% gravel, 15% plastic fines, coarse particles are thin and platy and non-durable. Shale, med. gray, wet, slight seepage into pit, can be scratched with knife excavates as platy gravel with some sand, particles are moderately durable but non-durable on highly weathered portion. Bottom of pit - wet hole.</p>									
TP 107. ELEV. 1052.0. 4+60. 750' U.S.									
0.0	0.5								
0.5	7.5	CL							
7.5	9.0								
9.0									
<p>Forest litter, roots, etc. Clay, gravel with sand, brown and gray-brown from 5.1-7.5', slightly moist to 1.1' and moist from 1.0-7.5'. 15% gravel, 20% sand, fines are plastic. Coarse particles are thin and platy shale - non-durable. Trace of small sandstone cobble size particles in thin beds through material. Shale, med. gray, wet, slight seepage into pit, can be scratched with knife, excavates as platy gravel with some sand. Particles are moderately durable. Particles are non-durable on highly weathered portions and is easily broken with fingers. Bottom of pit - wet hole.</p>									
TP 108. ELEV. 1057.6. 3+45. 550' U.S.									
0.0	0.4								
0.4	7.0	CL							
7.0									
<p>Topsoil, roots, etc. Clay, sandy, gray, wet, excavates as gravel and sand with some fines, highly weathered. Excavates on weathered surface. 7.0' refusal with backhoe. Bottom of pit - wet hole. NE (7/24/66) 5.7'</p>									
TP 109. ELEV. 1069.8. 2+10. 400' U.S.									
0.0	0.3								
0.3	6.5	CL							
6.5									
<p>Forest litter, roots, etc. Gravel, sand with clay, brown, moist, 40% gravel, fine to med., 20% sand, 20% plastic fines, coarse particles are thin and platy shale, non-durable - can be scratched with finger-nail, bedding planes still evident. Shale, gray, moist, sandy - fine grained, slightly micaceous, excavates as thin and platy with gravel with some sand and a trace of fines. Coarse particles are moderately durable, can be barely scratched with finger-nail. Open cavity noted in lower sandier unit of this horizon. Cavity 0.2' wide and 0.4' high. Bottom of pit - dry hole.</p>									
TP 110. ELEV. 1108.5. 2+10. 100' U.S.									
0.0	0.4								
0.4	9.5	CL							
9.5									
<p>Topsoil, roots, etc. Clay, gravel and sand, brown, gray from 0.5-0.5' and red-gray from 0.5-7.5', slightly moist to 1.0', moist from 1.0-0.5', 0.4-1.0' 15% gravel, 20% sand, and contains some coal particles, 1.0-1.5' trace of gravel, 15% sand, fines are plastic. Coarse particles are shale - thin and platy. Bottom of pit - dry hole.</p>									
TP 111. ELEV. 1115.5. 10+50. 250' U.S.									
0.0	0.5								
0.5	7.0	CL							
7.0									
9.5									
<p>Forest litter, roots, etc. Clay, sand with gravel, reddish-brown with some red-gray, slightly moist from 0.5-2.0', moist to 7.0', trace of gravel, 15% sand, fines are plastic, coarse particles are non-durable shale. At 7.0' CL grades into GP. Shale, brown, moist, excavates as gravel and sand with a trace of plastic fines. Coarse particles are thin and platy and easily scratched and broken with finger-nail. From 7.0-7.5' interval contained 25% fines. Bottom of pit - dry hole.</p>									
TP 112. ELEV. 1123.2. 11+50. 250' U.S.									
0.0	0.4								
0.4	5.5	CL							
5.5									
<p>Forest litter, roots, etc. Clay, sand with gravel, brown, moist, average composition, 10% gravel, 15% sand, 15% plastic fines, coarse particles are non-durable shale particles. From 1.5-3.7' sandstone bedrock, gray, fine to med. grained, can be scratched with knife, excavates as durable cobbles. Refusal with backhoe in sandstone. Bottom of pit - dry hole.</p>									
TP 113. ELEV. 1127.5. 11+50. 250' U.S.									
0.0	0.5								
0.5	4.0	CL							
4.0	5.0	SC							
5.0	5.5								
5.5									
<p>Forest litter, roots, etc. Clay, sand with gravel, brown, slightly moist, 10% gravel, 15% sand, fines are plastic, coarse particles are non-durable. Sand, gravel with clay, brown, moist, 20% fine to med. gravel, 20% moderately plastic fines. Coarse particles are sandstone. Sandstone, gray, moist, fine to med. grained, can be scratched with knife, excavates as durable cobbles. Backhoe refusal at 5.5'. Bottom of pit - dry hole.</p>									
TP 114. ELEV. 1051.5. 11+50. 250' U.S.									
0.0	0.1								
0.1	2.2	CL							
2.2	5.4	CL							
5.4	0.7	GP							
0.7									
<p>Topsoil, roots, etc. Gravel, sand with clay, brown, slightly moist, 35% gravel, 25% sand, 40% moderately plastic fines, coarse particles are platy and moderately durable sandstone particles. Clay, sandy, brown and gray, moist, trace of gravel, 5% sand, fines are plastic. Coarse particles are non-durable shale. Shale, gray, moist, excavates as gravel and sand with a trace of fines, coarse particles are thin and platy, easily scratched and broken with finger-nail, non-durable. Bottom of pit - dry hole.</p>									
TP 115. ELEV. 1081.5. 10+50. 550' U.S.									
0.0	0.5								
0.5	5.0	CL							
5.0	7.0	SC							
7.0	8.5								
8.5									
<p>Forest litter, roots, etc. Clay, sand with gravel, brown, moist, 10% gravel, 15% sand, fines are moderately plastic. Trace of small sandstone cobble size pieces found in thin beds in this material. Gravel, sand with clay, gray, moist, bedding planes evident, excavates as 40% gravel, 30% sand, 30% plastic fines, coarse particles can barely be scratched with finger-nail, moderately durable, highly weathered shale. Clay, sandy, gray, moist, very compact, trace of gravel, 15% sand, fines are plastic. Bottom of pit - dry hole.</p>									

TP 110. E.W. 1081.1. 1175. 300' U.S.	
0.0	0.2 Forest litter, roots, etc.
0.2	0.2 Clay, sand and gravel, brn, moist, 20% gravel, 15% sand, fines are plastic, coarse particles are shaly and platy and moderately durable. Bedding planes are thin and platy and moderately durable. This horizon is highly weathered. Contains a few coal particles.
0.2	0.2 Shale, gray, wet, coarse particles can be scratched with fingernail - this horizon breaks readily along bedding planes, contains with 20% plastic shales and 10% sand and clay particles and gravel. Particles are nondurable. On this horizon, clay can be scraped into pit is slight.
0.0	Bottom of pit - refusal with headlog - 2.0' (4/28/58) 2.0'
TP 110. E.W. 1081.1. 1175. 300' U.S.	
0.0	0.2 Forest litter, roots, etc.
0.2	0.2 Clay, sand and gravel, brn, moist, bedding planes are evident, the gravel is 20% sand, 15% moderately plastic fines, coarse particles are platy shales and can be barely scratched with fingernail. Gravel ranges from coarse to fine.
3.5	0.5 Clay, gravel with sand, gray, moist, compact, 20% fine to med. gravel, 15% sand, 15% moderately plastic fines. Coarse particles are shaly, material is highly weathered.
6.5	7.5 Shale, gray, moist, barely scratched with fingernail, excavates as gravel with some sand and a trace of fines. Particles are moderately durable.
7.5	Bottom of pit - dry hole.
TP 110. E.W. 1081.1. 1175. 300' U.S.	
0.0	0.2 Forest litter, roots, etc.
0.2	2.5 Clay, gravel with sand, brn, moist and wet below 2.0', 20% gravel, large to med., 20% sand, fines are moderately plastic, coarse particles are platy and moderately durable. Contains a few coal particles.
2.5	6.5 Gravel, sand with clay, gray, wet, from 2.5-5.5' 10% platy small cobbles, 20% gravel, 20% sand and 40% plastic fines, from 5.5-8.5' gravel is fine to med. and fines are 20%, coarse particles are moderately durable shale and can be barely scratched with fingernail, coarse particles are platy. Bedding planes are evident.
6.5	8.0 Shale, gray, wet, excavates as gravel with some sand and a trace of fines. Shale readily breaks along bedding planes and along cleavage planes. Particles are nondurable, can be scratched with fingernail.
8.0	Bottom of pit - wet hole. Slow seepage into pit below 2.0'. Stream side of pit - slowly collapsing.
TP 110. E.W. 1081.1. 1175. 300' U.S.	
0.0	0.2 Forest litter, roots, etc.
0.2	2.0 Clay, sandy, brn, slightly moist, trace of gravel, 15% sand, fines are moderately plastic.
2.0	3.0 Shale, gray, moist, excavates as gravel with some sand and a trace of fines. Particles can be scratched with fingernail, nondurable, particles break readily along bedding planes.
3.0	6.0 Siltstone, gray, wet, excavates as large cobbles with some small cobbles and gravel, particles are durable, can be scratched with knife, cobbles separated by gray clay seams - up to 0.6" thick - seams contain 15% fine sand and the fines are plastic. Seams are soft. Slow seepage into pit from this horizon.
6.0	Bottom of pit - wet hole.
TP 117. E.W. 1117.1. 670. 430' U.S.	
0.0	0.3 Forest litter, roots, etc.
0.3	2.0 Clay, sand and gravel, brn, slightly moist, 20% gravel, 15% sand, fines are plastic, coarse particles are moderately durable.
2.0	4.5 Clay, sandy, moist, brn and gray, trace of gravel, 15% sand, fines are plastic, a few small sandstone cobbles noted in this hole with this material.
4.5	9.0 Clay, sandy, gray, moist, from 4.5-6.0' material contains 25% sand size particles and a trace of fine gravel. From 6.0-9.0' 25% sand, trace of fine gravel. Fines are plastic. Coarse particles are nondurable shale, easily scratched and broken with fingernail. This bedding planes still evident.
9.0	Bottom of pit - dry hole.
TP 118. E.W. 1108.3. 540. 750' U.S.	
0.0	0.4 Forest litter, roots, etc.
0.4	7.0 Clay, sand with gravel, brn to 3.0', gray and brn below 3.0', slightly moist to 3.0', moist from 3.0-7.0', from 3.0-5.5' trace of gravel, 15% fine sand, from 5.5-7.0' 10% gravel and 20% sand, fines are plastic, coarse particles are nondurable shale. Trace of small cobbles, sandstone, and siltstone (both durable and can be scratched with knife) are found in thin beds through material. Thin 0.2' clay bed at 6.5'.
7.0	Bottom of pit - dry hole.

0.5' trace of gravel, 15% sand, and with some fines, highly platy and moderately durable. 2.0' refusal with headlog.

are plastic. 20% gravel, 20% plastic fines, moderate with some moderately durable sand. Particles are easily scratched with fingernail. Open horizon. Cavity 0.2' wide and

0.5' fine to med., 20% sand, and platy shale, nondurable - some still evident. Slightly excavates, excavates and a trace of fines. Coarse particles scratched with fingernail. Open horizon. Cavity 0.2' wide and

0.5' and red-gray from 6.5-7.5', 0.4-1.0' 15% gravel, 20% sand, trace of gravel, 15% sand, fines shaly and platy.

DEPTH		From To	
CL	GP	ft.	ft.
0.0	1.0	1.0	1.0
1.0	1.0	1.0	1.0

composition, 10% gravel, 15% sand, moderate shale particles. From 3.5-4.5' grains, can be scratched with fingernail. Bottom of pit - dry hole.

15% gravel, 15% sand, fines shaly, 20% fine to med. gravel, 20% sand, can be scratched with knife, head at 5.5'.

15% gravel, 20% sand, 40% platy and moderately durable. Gravel, 5% sand, fines are plastic. Sand and with a trace of fines, scratched and broken with fingernail.

15% sand, fine are shaly, cobbles are pieces found in thin bedding planes evident, excavates as coarse particles can barely be scratched, highly weathered shale. Trace of gravel, 15% sand, fine are

See sheet 2L for note
* Unified classification by laboratory analysis

HARMON CREEK WATERSHED FLOODWATER RETARDING DAM PA-482 WASHINGTON COUNTY, PENNSYLVANIA LOGS OF DRILL HOLES AND TEST PITS	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Drawn by <i>H. B. J. J. J.</i> Date <i>8-26</i> Title <i>PA-482-P</i>	Approved by <i>[Signature]</i> Date <i>8-26</i> Title <i>PA-482-P</i>
Traced by <i>[Signature]</i> Date <i>1-68</i> Sheet <i>19</i> of <i>23</i>	Drawing No. <i>PA-482-P</i>

2

PLATE 5

D'APPOLONIA

HARMON CREEK WATERSHED
PA-482
Summary of Field Permeability Tests

DATE	TIME	TYPE	FROM	TO	PERM.
1-1-54	1	Jan	0.0	2.0	90
1-1-54	2	"	2.0	4.0	100
1-1-54	3	"	4.0	8.0	100
1-1-54	4	"	8.0	8.0	100
1-1-54	5	"	0.0	10.4	90
1-1-54	"	"	10.4	15.4	75
1-1-54	"	"	15.4	18.0	70
1-1-54	"	"	18.0	21.0	70
1-1-54	"	"	21.0	24.0	100
1-1-54	"	"	24.0	27.5	100

Well No.	Type of Test	Depth of Test (ft.)	Permeability (%)
1	Open Hole	2.0-6.0	11.50
	"	6.0-7.5	0.70
	"	7.5-8.0	1.50
	"	8.0-12.0	0.71
	"	12.0-17.0	0.60
	"	17.0-22.0	0.22
	Pressure	22.0-27.0	0.81
	"	27.0-32.0	0.60
	"	32.0-37.0	0.25
	"	37.0-42.0	0.21
2	Open Hole	2.0-3.0	Essentially zero
	"	3.0-10.0	0.77
	Pressure	10.0-15.0	0.27
	"	15.0-24.0	Essentially zero
	"	24.0-27.0	1.00
3	Open Hole	0.0-3.0	Essentially zero
	"	3.0-10.0	0.50
4	Open Hole	0.0-3.0	Essentially zero
	"	3.0-9.0	Essentially zero
	"	9.0-12.5	Essentially zero
	"	12.5-17.0	3.55
	"	17.0-21.7	0.16
5	Open Hole	5.0-12.0	0.24
	"	12.0-22.0	0.20
	"	22.0-27.0	0.05
	"	27.0-32.2	1.00
	"	32.2-37.5	0.70
205	Open Hole	0.0-10.5	0.65
202	Open Hole	3.0-4.5	Essentially zero
	"	4.5-8.0	Essentially zero
	"	7.5-8.1	10.62
	"	8.1-13.5	0.22
302	Open Hole	3.5-4.5	52.0
	"	4.5-10.0	5.45
	"	8.0-11.0	10.10
303	Open Hole	3.0-4.5	Essentially zero

See 11 11 11
C. H. H. C.

Soils with numerous gravel size pieces to top vertical fracture. Easily scratched and with fingerwall below 25.0'. This core fits fairly well together, pieces 0.7' along fracture and bedding plane. (1/22/54) 21.2' at (1/22/54) 24.5'

*Indicates permeability rate questionable
Conditions did not fit all criteria for valid test

See sheet 11 for notes

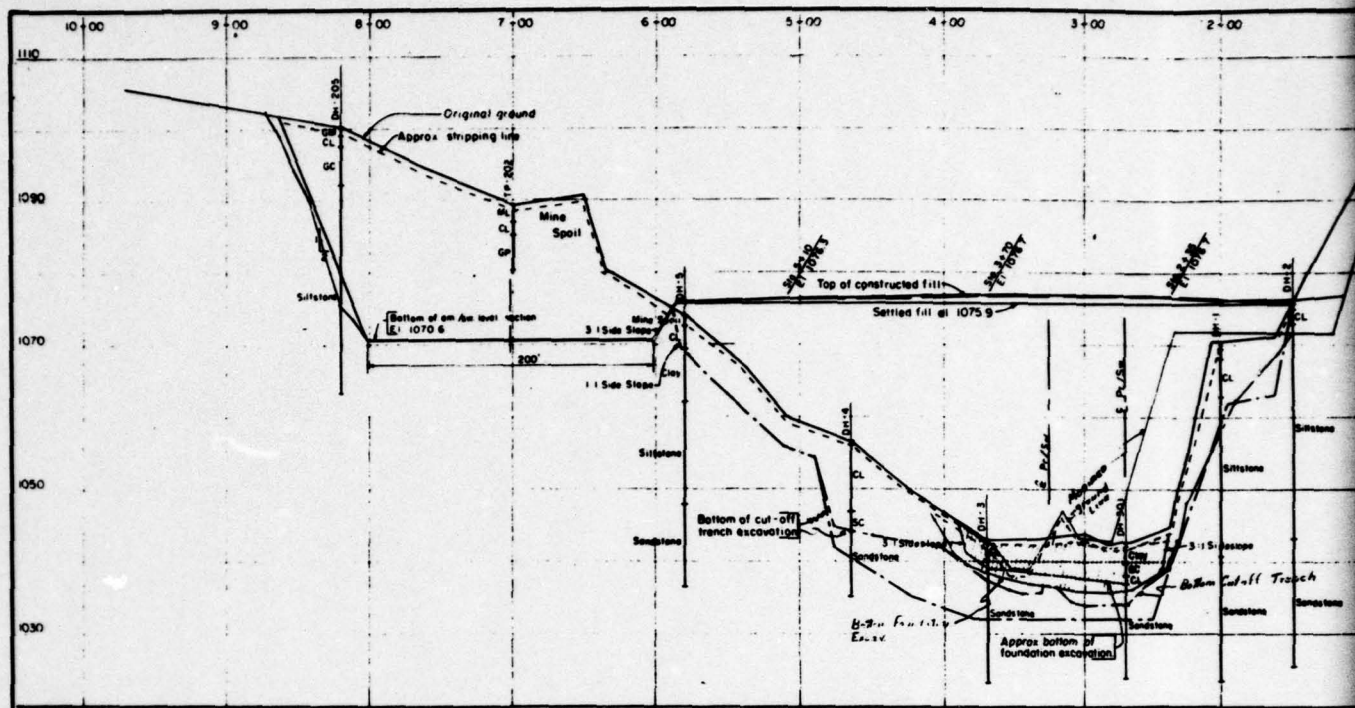
HARMON CREEK WATERSHED FLOODWATER RETARDING DAM PA-482 WASHINGTON COUNTY, PENNSYLVANIA LOGS OF DRILL HOLES AND TEST PITS U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Designed by: <i>P. R. HOFFMAN</i>	Date: <i>6-26</i>
Drawn: _____	Approved by: _____
Traced: _____	Title: _____
Checked: <i>Jefferson</i>	Scale: <i>1:60</i>
Sheet: <i>23</i>	PA-482 - P

2

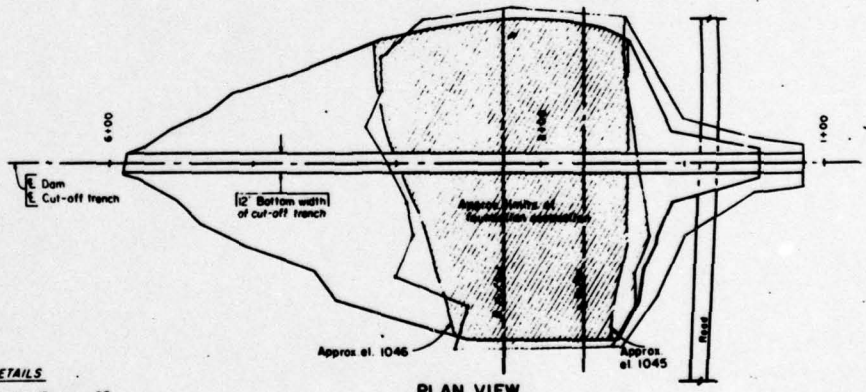
PLATE 6

D'APPOLONIA

DRAWN BY
 1-3-79
 CHECKED BY
 4-17-79
 APPROVED BY
 DRAWING NUMBER
 78-367-B82

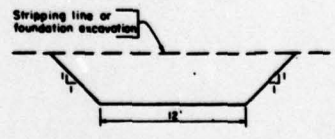


PROFILE ALONG E CUT-OFF TRENCH



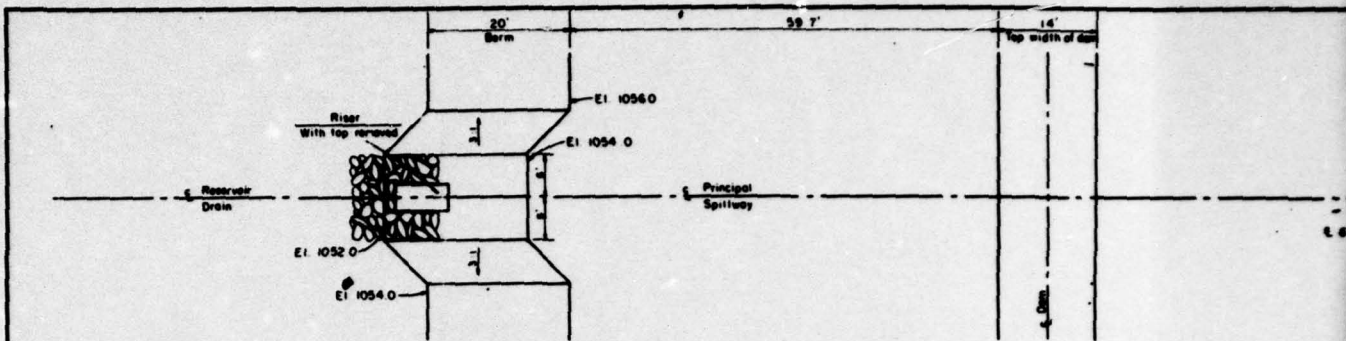
PLAN VIEW
 0 10 20 30 40 50 60 70 80 90 100
 SCALE IN FEET

CONSTRUCTION DETAILS
 For logs of test holes see sheets 18 thru 20.

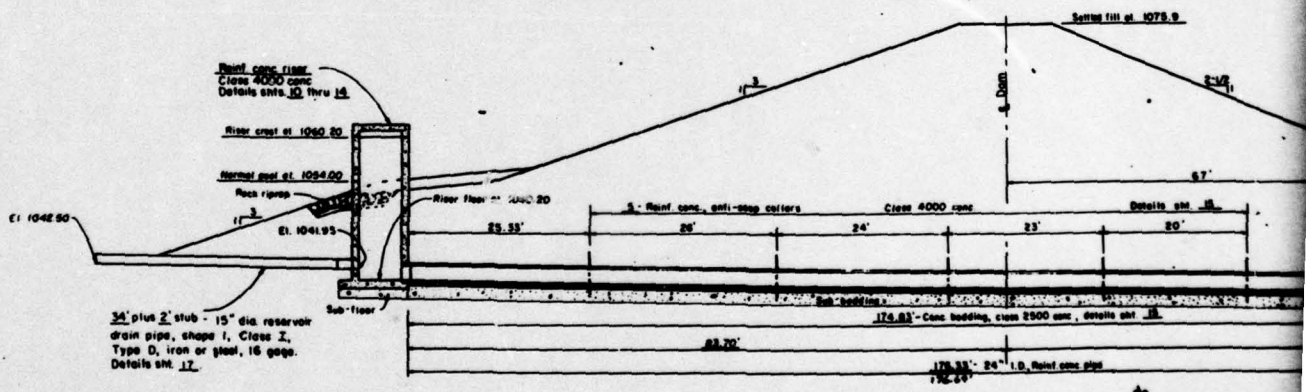


SECTION OF CUT-OFF TRENCH
 Typical from E dam stations 1+50 to 5+50

DRAWING 78-367-B83
 NUMBER 4.1.7.7
 CHECKED BY [Signature]
 APPROVED BY [Signature]
 1-3-79
 DRAWN BY [Signature]



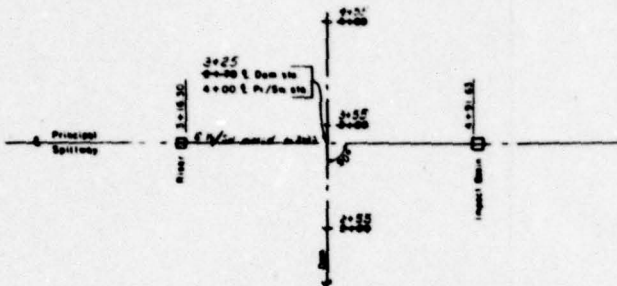
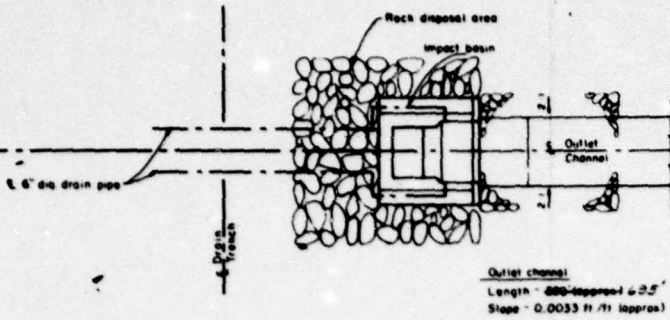
PLAN VIEW
 SCALE IN FEET



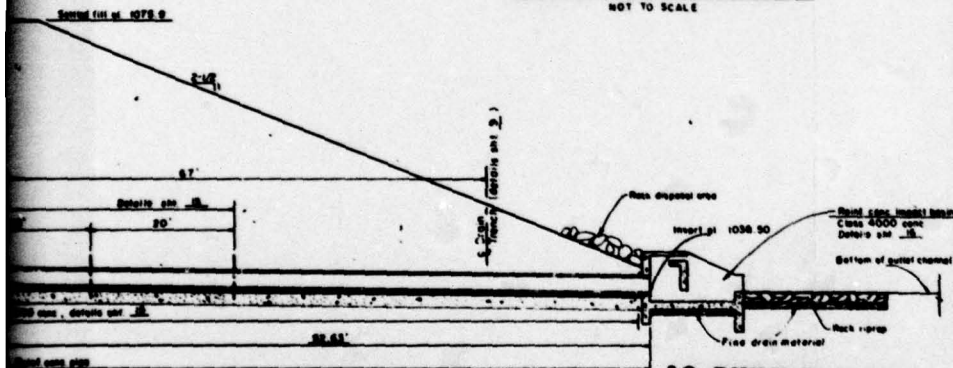
PROFILE ALONG E PRINCIPAL SPILLWAY
 SCALE IN FEET

24" I.D. PIPE JOINT DATA (AS BUILT)

JOINT	DISTANCE FROM RISER WALL	INVERT ELEV.
1	0.00	1050.00
2	20.00	1050.00
3	40.00	1050.00
4	60.00	1050.00
5	80.00	1050.00
6	100.00	1050.00
7	120.00	1050.00
8	140.00	1050.00
9	160.00	1050.00
10	180.00	1050.00
11	200.00	1050.00
12	220.00	1050.00
13	240.00	1050.00
14	260.00	1050.00
15	280.00	1050.00
16	300.00	1050.00
17	320.00	1050.00
18	340.00	1050.00
19	360.00	1050.00
20	380.00	1050.00
21	400.00	1050.00
22	420.00	1050.00
23	440.00	1050.00
24	460.00	1050.00
25	480.00	1050.00
26	500.00	1050.00
27	520.00	1050.00
28	540.00	1050.00
29	560.00	1050.00
30	580.00	1050.00
31	600.00	1050.00
32	620.00	1050.00
33	640.00	1050.00
34	660.00	1050.00
35	680.00	1050.00
36	700.00	1050.00
37	720.00	1050.00
38	740.00	1050.00
39	760.00	1050.00
40	780.00	1050.00
41	800.00	1050.00
42	820.00	1050.00
43	840.00	1050.00
44	860.00	1050.00
45	880.00	1050.00
46	900.00	1050.00
47	920.00	1050.00
48	940.00	1050.00
49	960.00	1050.00
50	980.00	1050.00
51	1000.00	1050.00
52	1020.00	1050.00
53	1040.00	1050.00
54	1060.00	1050.00
55	1080.00	1050.00
56	1100.00	1050.00
57	1120.00	1050.00
58	1140.00	1050.00
59	1160.00	1050.00
60	1180.00	1050.00
61	1200.00	1050.00
62	1220.00	1050.00
63	1240.00	1050.00
64	1260.00	1050.00
65	1280.00	1050.00
66	1300.00	1050.00
67	1320.00	1050.00
68	1340.00	1050.00
69	1360.00	1050.00
70	1380.00	1050.00
71	1400.00	1050.00
72	1420.00	1050.00
73	1440.00	1050.00
74	1460.00	1050.00
75	1480.00	1050.00
76	1500.00	1050.00
77	1520.00	1050.00
78	1540.00	1050.00
79	1560.00	1050.00
80	1580.00	1050.00
81	1600.00	1050.00
82	1620.00	1050.00
83	1640.00	1050.00
84	1660.00	1050.00
85	1680.00	1050.00
86	1700.00	1050.00
87	1720.00	1050.00
88	1740.00	1050.00
89	1760.00	1050.00
90	1780.00	1050.00
91	1800.00	1050.00
92	1820.00	1050.00
93	1840.00	1050.00
94	1860.00	1050.00
95	1880.00	1050.00
96	1900.00	1050.00
97	1920.00	1050.00
98	1940.00	1050.00
99	1960.00	1050.00
100	1980.00	1050.00
101	2000.00	1050.00
102	2020.00	1050.00
103	2040.00	1050.00
104	2060.00	1050.00
105	2080.00	1050.00
106	2100.00	1050.00
107	2120.00	1050.00
108	2140.00	1050.00
109	2160.00	1050.00
110	2180.00	1050.00
111	2200.00	1050.00
112	2220.00	1050.00
113	2240.00	1050.00
114	2260.00	1050.00
115	2280.00	1050.00
116	2300.00	1050.00
117	2320.00	1050.00
118	2340.00	1050.00
119	2360.00	1050.00
120	2380.00	1050.00
121	2400.00	1050.00
122	2420.00	1050.00
123	2440.00	1050.00
124	2460.00	1050.00
125	2480.00	1050.00
126	2500.00	1050.00
127	2520.00	1050.00
128	2540.00	1050.00
129	2560.00	1050.00
130	2580.00	1050.00
131	2600.00	1050.00
132	2620.00	1050.00
133	2640.00	1050.00
134	2660.00	1050.00
135	2680.00	1050.00
136	2700.00	1050.00
137	2720.00	1050.00
138	2740.00	1050.00
139	2760.00	1050.00
140	2780.00	1050.00
141	2800.00	1050.00
142	2820.00	1050.00
143	2840.00	1050.00
144	2860.00	1050.00
145	2880.00	1050.00
146	2900.00	1050.00
147	2920.00	1050.00
148	2940.00	1050.00
149	2960.00	1050.00
150	2980.00	1050.00
151	3000.00	1050.00
152	3020.00	1050.00
153	3040.00	1050.00
154	3060.00	1050.00
155	3080.00	1050.00
156	3100.00	1050.00
157	3120.00	1050.00
158	3140.00	1050.00
159	3160.00	1050.00
160	3180.00	1050.00
161	3200.00	1050.00
162	3220.00	1050.00
163	3240.00	1050.00
164	3260.00	1050.00
165	3280.00	1050.00
166	3300.00	1050.00
167	3320.00	1050.00
168	3340.00	1050.00
169	3360.00	1050.00
170	3380.00	1050.00
171	3400.00	1050.00
172	3420.00	1050.00
173	3440.00	1050.00
174	3460.00	1050.00
175	3480.00	1050.00
176	3500.00	1050.00
177	3520.00	1050.00
178	3540.00	1050.00
179	3560.00	1050.00
180	3580.00	1050.00
181	3600.00	1050.00
182	3620.00	1050.00
183	3640.00	1050.00
184	3660.00	1050.00
185	3680.00	1050.00
186	3700.00	1050.00
187	3720.00	1050.00
188	3740.00	1050.00
189	3760.00	1050.00
190	3780.00	1050.00
191	3800.00	1050.00
192	3820.00	1050.00
193	3840.00	1050.00
194	3860.00	1050.00
195	3880.00	1050.00
196	3900.00	1050.00
197	3920.00	1050.00
198	3940.00	1050.00
199	3960.00	1050.00
200	3980.00	1050.00
201	4000.00	1050.00
202	4020.00	1050.00
203	4040.00	1050.00
204	4060.00	1050.00
205	4080.00	1050.00
206	4100.00	1050.00
207	4120.00	1050.00
208	4140.00	1050.00
209	4160.00	1050.00
210	4180.00	1050.00
211	4200.00	1050.00
212	4220.00	1050.00
213	4240.00	1050.00
214	4260.00	1050.00
215	4280.00	1050.00
216	4300.00	1050.00
217	4320.00	1050.00
218	4340.00	1050.00
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248	4940.00	1050.00
249	4960.00	1050.00
250	4980.00	1050.00
251	5000.00	1050.00
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253	5040.00	1050.00
254	5060.00	1050.00
255	5080.00	1050.00
256	5100.00	1050.00
257	5120.00	1050.00
258	5140.00	1050.00
259	5160.00	1050.00
260	5180.00	1050.00
261	5200.00	1050.00
262	5220.00	1050.00
263	5240.00	1050.00
264	5260.00	1050.00
265	5280.00	1050.00
266	5300.00	1050.00
267	5320.00	1050.00
268	5340.00	1050.00
269	5360.00	1050.00
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272	5420.00	1050.00
273	5440.00	1050.00
274	5460.00	1050.00
275	5480.00	1050.00
276	5500.00	1050.00
277	5520.00	1050.00
278	5540.00	1050.00
279	5560.00	1050.00
280	5580.00	1050.00
281	5600.00	1050.00
282	5620.00	1050.00
283	5640.00	1050.00
284	5660.00	1050.00
285	5680.00	1050.00
286	5700.00	1050.00
287	5720.00	1050.00
288	5740.00	1050.00
289	5760.00	1050.00
290	5780.00	1050.00
291	5800.00	1050.00
292	5820.00	1050.00
293	5840.00	1050.00
294	5860.00	1050.00
295	5880.00	1050.00
296	5900.00	1050.00
297	5920.00	1050.00
298	5940.00	1050.00
299	5960.00	1050.00
300	5980.00	1050.00
301	6000.00	1050.00
302	6020.00	1050.00
303	6040.00	1050.00
304	6060.00	1050.00
305	6080.00	1050.00
306	6100.00	1050.00
307	6120.00	1050.00
308	6140.00	1050.00
309	6160.00	1050.00
310	6180.00	1050.00
311	6200.00	1050.00
312	6220.00	1050.00
313	6240.00	1050.00
314	6260.00	1050.00
315	6280.00	1050.00
316	6300.00	1050.00
317	6320.00	1050.00



LAYOUT OF PRINCIPAL SPILLWAY
NOT TO SCALE



HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-482
WASHINGTON COUNTY, PENNSYLVANIA
PRINCIPAL SPILLWAY
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

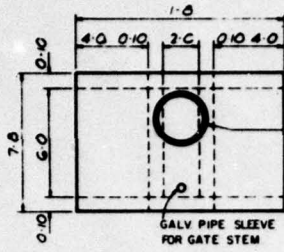
PA-482-P

2

PLATE 8

D'APPOLONIA

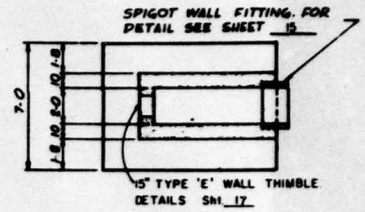
DRAWN BY [] CHECKED BY [] DRAWING NUMBER 78-367-B 84
 1-3-79 APPROVED BY []



MANHOLE FRAME FOR
DETAIL SEE SHEET 17

FOR DETAIL OF TRASH
RACK ANGLES AND GRATING
SEE SHEET 14

TOP PLAN



SECTION A-A

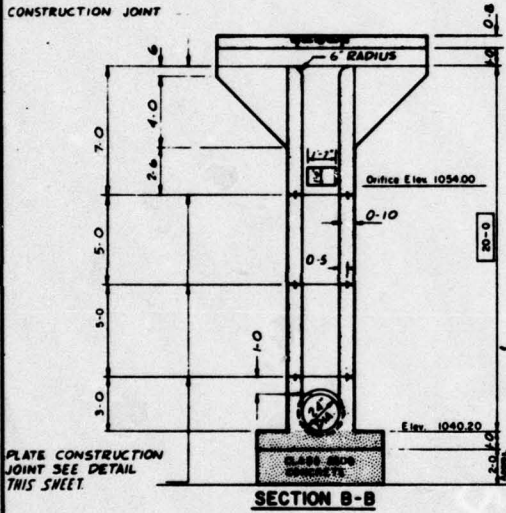
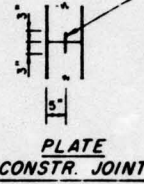


PLATE CONSTRUCTION
JOINT SEE DETAIL
THIS SHEET.

SECTION B-B

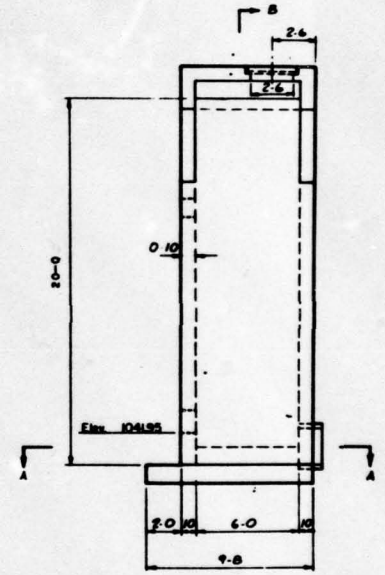
1/4" x 6" Steel Plats, Spec 117
Continuous Thru Constr Joint
Splices Shall Be Either:
1. Butt Welded
2. Lapped 3" And Bolted
3. Lapped 3" And Fillet Welded



**PLATE
CONSTR. JOINT**



**CONSTR.
JOINT**



SIDEWALL ELEVATION

CONSTRUCTION DETAILS

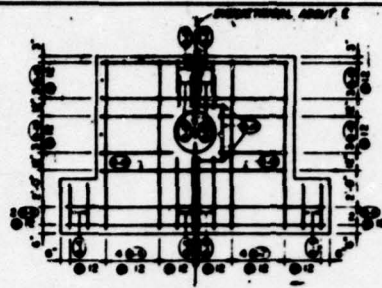
1. Portland cement Type II, A or Type II with an air-entraining admixture shall be used.
2. All Reinforcing Steel placed in Concrete placed against the ground shall have a minimum of 3" clear cover. All Reinforcing Steel placed in Concrete placed in forms shall have a minimum of 2" clear cover.
3. All exposed edges of concrete to have 3/4" chamfer unless otherwise noted.
4. Bar dimensions are out to out of bar.
5. Radius of bonds:
3 bar diams. for sizes \leq No 7

0 2 4 6
SCALE IN FEET

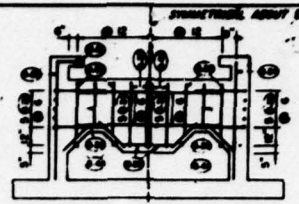
STEEL

CLASS 4000 - CONC
(300-RIBBED FIBER) - CLASS 2500 - CONC

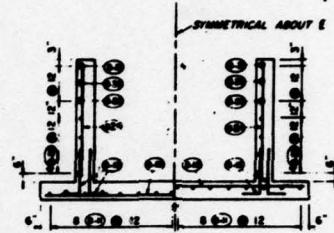
DRAWN BY ACS CHECKED BY JF 4-17-79 DRAWING NUMBER 78-367-B85
 1-3-79 APPROVED BY JAP 4-17-79



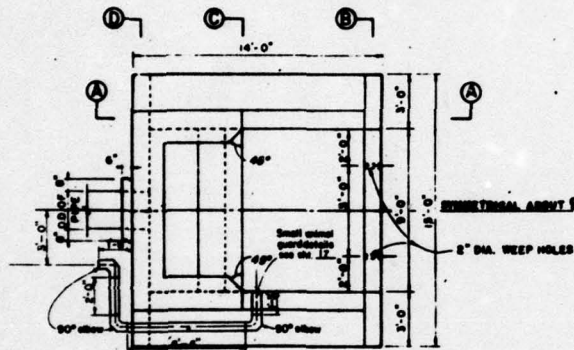
UPSTREAM FACE SECTION D-D DOWNSTREAM FACE



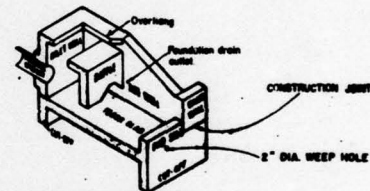
DOWNSTREAM FACE SECTION THRU BAFFLE UPSTREAM FACE



OUTSIDE FACE SECTION C-C INSIDE FACE



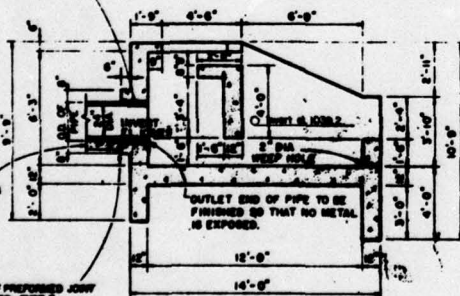
PLAN VIEW



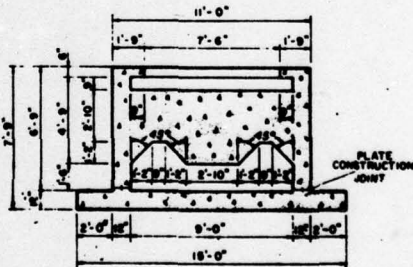
HALF ISOMETRIC

1/2" PREFORMED JOINT
 FILLER, TYPE 1,
 SPEC 100, PLACED BETWEEN
 PIPE AND BARR.

5" OF PREFORMED JOINT
 FILLER, TYPE 2,
 SPEC 100, PLACED
 BETWEEN BARR AND
 BARRING.

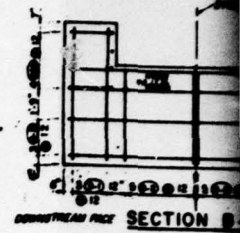


SECTION ON E

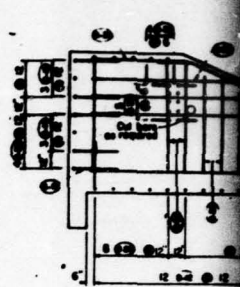


SECTION THRU BAFFLE

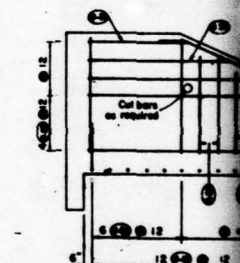
FOR CONSTRUCTION DETAILS SEE SHEET 10.



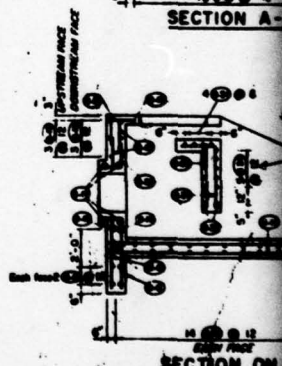
SECTION B



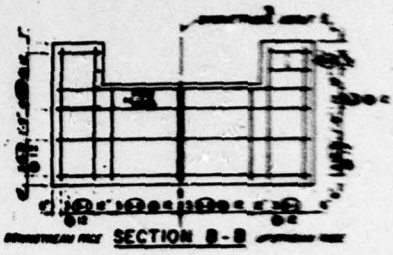
SECTION A



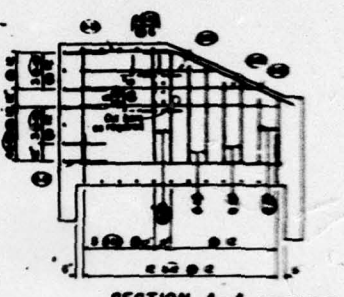
SECTION A



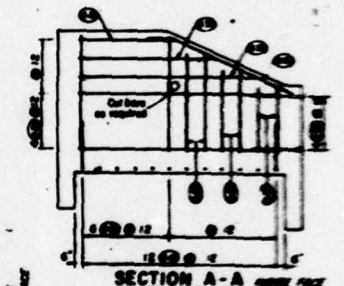
SECTION ON



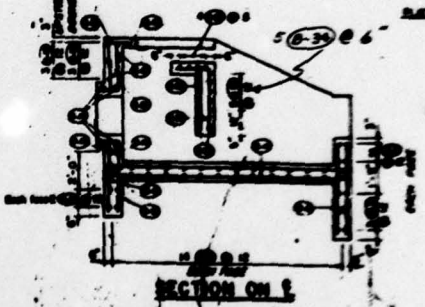
SECTION B-B



SECTION A-A



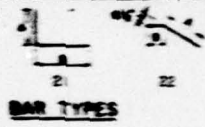
SECTION A-A



SECTION ON S

STEEL SCHEDULE

NO.	DESCRIPTION	QTY	UNIT	WEIGHT	TOTAL WEIGHT
1	10 # 10	10	FT	100	1000
2	10 # 10	10	FT	100	1000
3	10 # 10	10	FT	100	1000
4	10 # 10	10	FT	100	1000
5	10 # 10	10	FT	100	1000
6	10 # 10	10	FT	100	1000
7	10 # 10	10	FT	100	1000
8	10 # 10	10	FT	100	1000
9	10 # 10	10	FT	100	1000
10	10 # 10	10	FT	100	1000
11	10 # 10	10	FT	100	1000
12	10 # 10	10	FT	100	1000
13	10 # 10	10	FT	100	1000
14	10 # 10	10	FT	100	1000
15	10 # 10	10	FT	100	1000
16	10 # 10	10	FT	100	1000
17	10 # 10	10	FT	100	1000
18	10 # 10	10	FT	100	1000
19	10 # 10	10	FT	100	1000
20	10 # 10	10	FT	100	1000
21	10 # 10	10	FT	100	1000
22	10 # 10	10	FT	100	1000
23	10 # 10	10	FT	100	1000
24	10 # 10	10	FT	100	1000
25	10 # 10	10	FT	100	1000
26	10 # 10	10	FT	100	1000
27	10 # 10	10	FT	100	1000
28	10 # 10	10	FT	100	1000
29	10 # 10	10	FT	100	1000
30	10 # 10	10	FT	100	1000
31	10 # 10	10	FT	100	1000
32	10 # 10	10	FT	100	1000
33	10 # 10	10	FT	100	1000
34	10 # 10	10	FT	100	1000
35	10 # 10	10	FT	100	1000
36	10 # 10	10	FT	100	1000
37	10 # 10	10	FT	100	1000
38	10 # 10	10	FT	100	1000
39	10 # 10	10	FT	100	1000
40	10 # 10	10	FT	100	1000
41	10 # 10	10	FT	100	1000
42	10 # 10	10	FT	100	1000
43	10 # 10	10	FT	100	1000
44	10 # 10	10	FT	100	1000
45	10 # 10	10	FT	100	1000
46	10 # 10	10	FT	100	1000
47	10 # 10	10	FT	100	1000
48	10 # 10	10	FT	100	1000
49	10 # 10	10	FT	100	1000
50	10 # 10	10	FT	100	1000



QUANTITIES THIS SHEET ONLY

REINFORCING STEEL
 NO. 10 BARS 200 LBS. PER 100 FT. 200 LBS. PER 100 FT.
 CONCRETE
 CLASS 4000 2.07 24.100

AS BUILT PLANS

HARRISON CREEK INTERSECTED
 FLOODWATER RETARDING DAM NO. 402
 WASHINGTON COUNTY, PENNSYLVANIA
IMPACT BASIN DETAILS

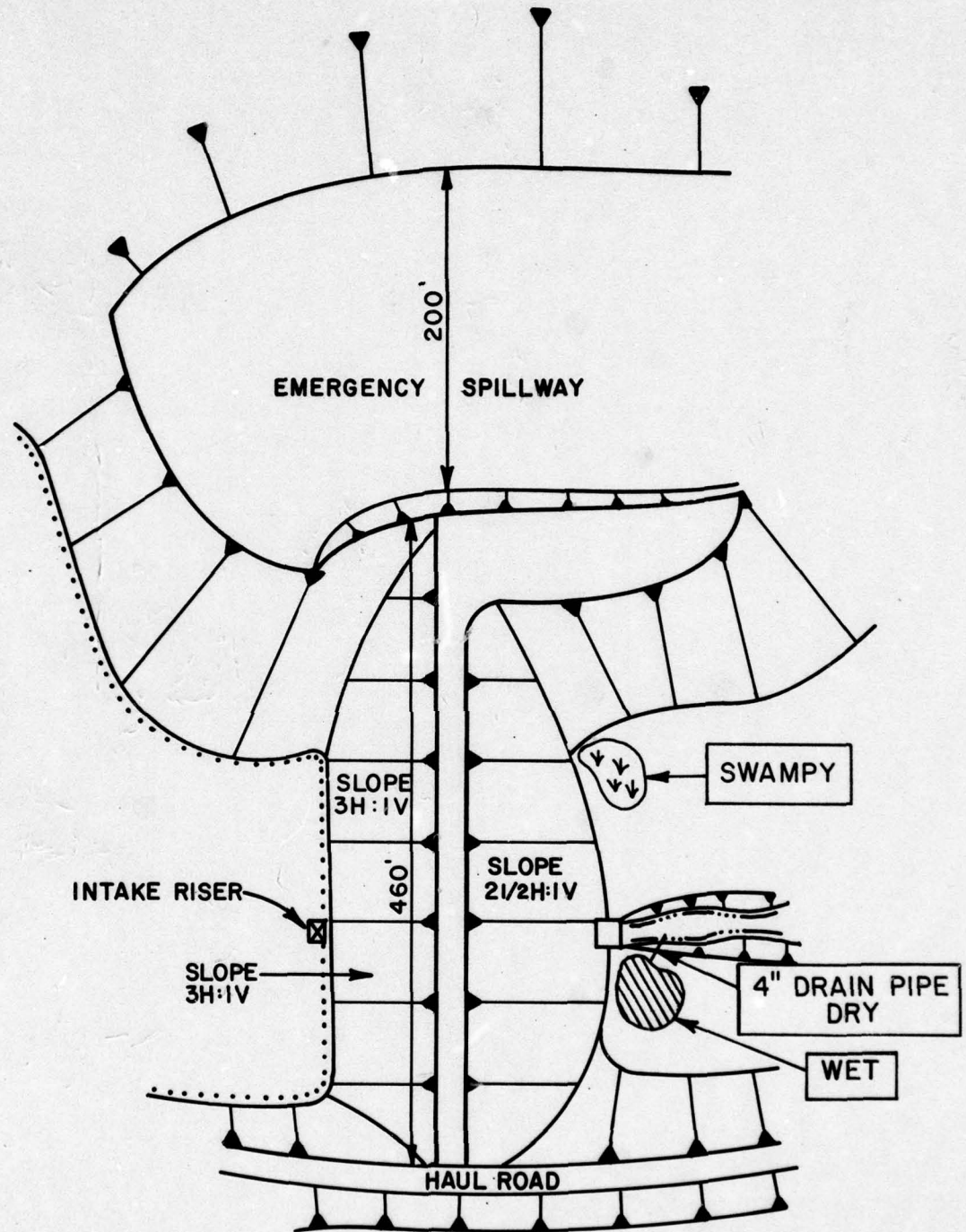
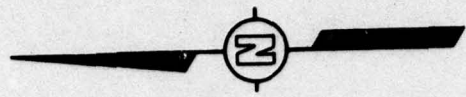
U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

Handwritten: [Signature]
 C. O. [Handwritten]
 [Handwritten]

PL-492-P

2

DRAWN BY
MEM 1-2-79
CHECKED BY BT
APPROVED BY SMD
4-17-79
DRAWING NUMBER 78-367-A10



- NOTES:**
1. EMERGENCY SPILLWAY
FREEBOARD: 5.1 FT.
 2. POOL LEVEL DATE OF
INSPECTION: 22 FT. BELOW
CREST OF DAM

PLATE II
PA.482 DAM
GENERAL PLAN
FIELD INSPECTION NOTES
FIELD INSPECTION DATE: DEC. 1, 1978

D'APPOLONIA

APPENDIX A
CHECKLIST
VISUAL INSPECTION
PHASE I

APPENDIX A
CHECKLIST
VISUAL INSPECTION
PHASE I

NAME OF DAM PA-482 COUNTY Washington STATE Pennsylvania ID# NDI I.D. NO. PA-469
DER I.D. NO. 63-72

TYPE OF DAM Earth HAZARD CATEGORY High

DATE(S) INSPECTION December 1, 1978 WEATHER Sunny TEMPERATURE 40s

POOL ELEVATION AT TIME OF INSPECTION 1054.3 M.S.L. TAILWATER AT TIME OF INSPECTION 1039.5+ M.S.L.

INSPECTION PERSONNEL:
Bligin Erel REVIEW INSPECTION PERSONNEL:
(April 16, 1979)

Wah-Tak Chan I. D. Andersen

B. Erel J. H. Pochlot

Bligin Erel RECORDER

**VISUAL INSPECTION
PHASE 1
EMBANKMENT**

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None.	
SLOUGHING OR EROSION OF EMBANKMENT AND ADJACENT SLOPES	None.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Crest elevation is 0.2 to 0.4 feet above the design crest elevation relative to the emergency spillway crest level.	
RIPRAP FAILURES	No riprap on the dam.	

VISUAL INSPECTION
 PHASE I
 EMBANKMENT

VISUAL EXAMINATION OF JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	No signs of distress. Two seamy areas along the toe level of the dam on each side of the outlet pipe discharge structure. No measurable seepage.	These areas should be closely examined to document if a seepage condition is developing.
STAFF GAGE AND RECORDER	None.	
DRAINS	Embankment underdrain pipes drain into the side of the outlet structure. There is acid mine precipitate in the pipes. The flow in the left pipe is 5 to 10 gallons per minute; the right pipe is dry.	

VISUAL INSPECTION
 PHASE 1
 OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Visible portions of the outlet works are in good condition.	
INTAKE STRUCTURE	In good condition.	
OUTLET STRUCTURE	In good condition.	
OUTLET CHANNEL	No significant obstructions.	
EMERGENCY GATE	Reservoir drainpipe gate hoist is located in the drop inlet structure. Not accessible for inspection.	The operational condition of the reservoir drainpipe gate should be periodically evaluated.

VISUAL INSPECTION
 PHASE I
 DUGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The emergency spillway has no concrete overflow structure.	
APPROACH CHANNEL	Trapezoidal earth channel. In good condition.	
DISCHARGE CHANNEL	Trapezoidal earth channel. In good condition.	
BRIDGE AND PILES	None.	

VISUAL INSPECTION
 PHASE I
 GATED SPILLWAY

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

VISUAL INSPECTION
 PHASE I
 INSTRUMENTATION

VISUAL EXAMINATION OF INSTRUMENTATION/SURVEYS	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
	None found.	
OBSERVATION WELLS	None.	
WELLS	None.	
PIEZOMETERS	None.	
OTHER	See Page A3 of 9 for description of the embankment drainpipes.	

VISUAL INSPECTION
 PHASE I
 RESERVOIR
 OBSERVATIONS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Steep to moderate.	
SEDIMENTATION	Unknown.	
UPSTREAM RESERVOIRS	None.	

VISUAL INSPECTION
 PHASE I
 DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	OBSERVATIONS	REPAIRS OR RECOMMENDATIONS
	No apparent obstructions immediately downstream from the dam.	
SLOPES	No apparent instability (immediately downstream from the dam).	
APPROXIMATE NUMBER OF HOMES AND POPULATION	The first one-mile reach downstream from the dam is uninhabited. There are two residences at the confluence of the stream and Harmon Creek. Five residences are along Harmon Creek approximately one mile downstream from the confluence. Population: Approximately 35.	

**APPENDIX B
CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
AND HYDROLOGIC AND HYDRAULIC
PHASE I**

APPENDIX B
CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM PA-482

ID# NDI I.D. NO. PA-469

DER I.D. NO. 63-72

ITEM	REMARKS
AS-BUILT DRAWINGS	The drawings are available in the state and SCS files.
REGIONAL VICINITY MAP	See Plate 1.
CONSTRUCTION HISTORY	The dam was designed by the U.S. Department of Agriculture, Soil Conservation Service, during 1966 to 1969. It was constructed by Frank Gavlik and Sons, Inc., with completion in August 1970.
TYPICAL SECTIONS OF DAM	See Plate 3.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See Plates 8, 9, and 10.

**CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I**

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	Not available.
DESIGN REPORTS	Soil Conservation Service internal memo dated January 17, 1967, and March 4, 1969.
GEOLOGY REPORTS	Detailed Geologic Investigation of Dam Sites, SCS Form 376, dated November 23, 1966.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Hydrology, hydraulics, geotechnical, and structural calculations are available in SCS files.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Included in design and geology reports (see Plates 4 through 6 for boring logs).

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION SURVEYS OF DAM	None reported.
BARROW SOURCES	Described in engineer's report.
MONITORING SYSTEMS	None.
NOTIFICATIONS	None reported.
HIGH POOL RECORDS	Not recorded.

**CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1**

ITEM	REMARKS
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None reported.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported.
MAINTENANCE OPERATION RECORDS	Not available.
SPILLWAY PLAN SECTIONS DETAILS	See Plates 2 and 7.
OPERATING EQUIPMENT PLANS AND DETAILS	Available in SCS files.

CHECKLIST
ENGINEERING DATA
HYDROLOGIC AND HYDRAULIC

DRAINAGE AREA CHARACTERISTICS: 1.3 square miles (reclaimed strip mined area)
ELEVATION; TOP NORMAL POOL AND STORAGE CAPACITY: 1054.0 (31.8 acre-feet)
ELEVATION; TOP FLOOD CONTROL POOL AND STORAGE CAPACITY: 1070.6 (220 acre-feet)
ELEVATION; MAXIMUM DESIGN POOL: 1075.9
ELEVATION; TOP DAM: 1075.9 (without overflow)
SPILLWAY: (Emergency Spillway)

- a. Elevation 1070.6
- b. Type Trapezoidal open channel (critical depth overflow section)
- c. Width 200 feet (base width perpendicular to flow direction)
- d. Length 200⁺ feet (from crest to end of trapezoidal section)
- e. Location Spillover Adjacent to emergency spillway
- f. Number and Type of Gates None

OUTLET WORKS:

- a. Type 15-inch reservoir drainpipe, 24-inch reinforced concrete outlet conduit
- b. Location At center of embankment
- c. Entrance Inverts El. 1042.5 (invert of 15-inch pipe)
- d. Exit Inverts El. 1039.5 (exit invert of 24-inch pipe)
- e. Emergency Draindown Facilities 15-inch pipe

HYDROMETEOROLOGICAL GAGES:

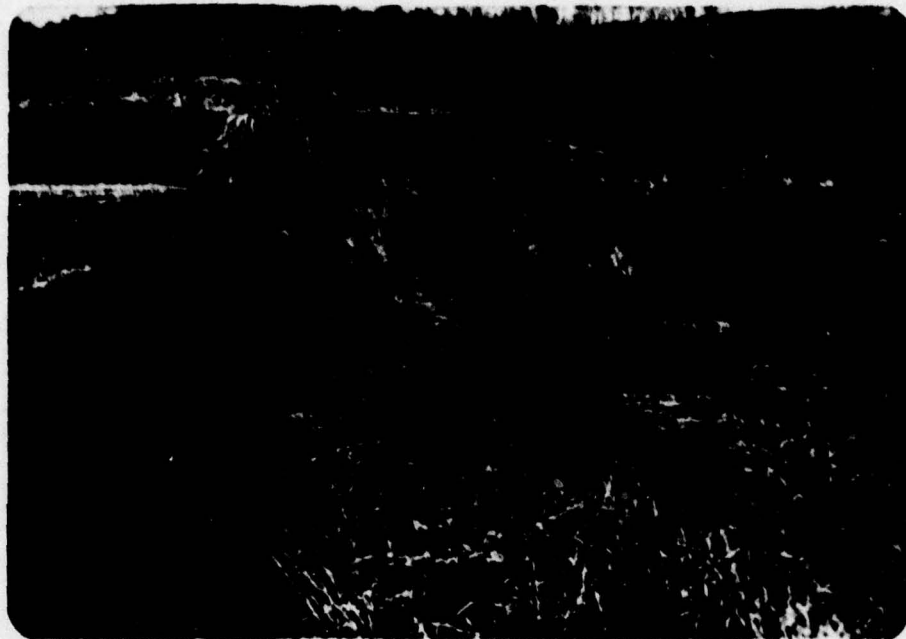
- a. Type None
- b. Location None
- c. Records None

MAXIMUM NONDAMAGING DISCHARGE: Emergency spillway discharge capacity (8000⁺ cfs)

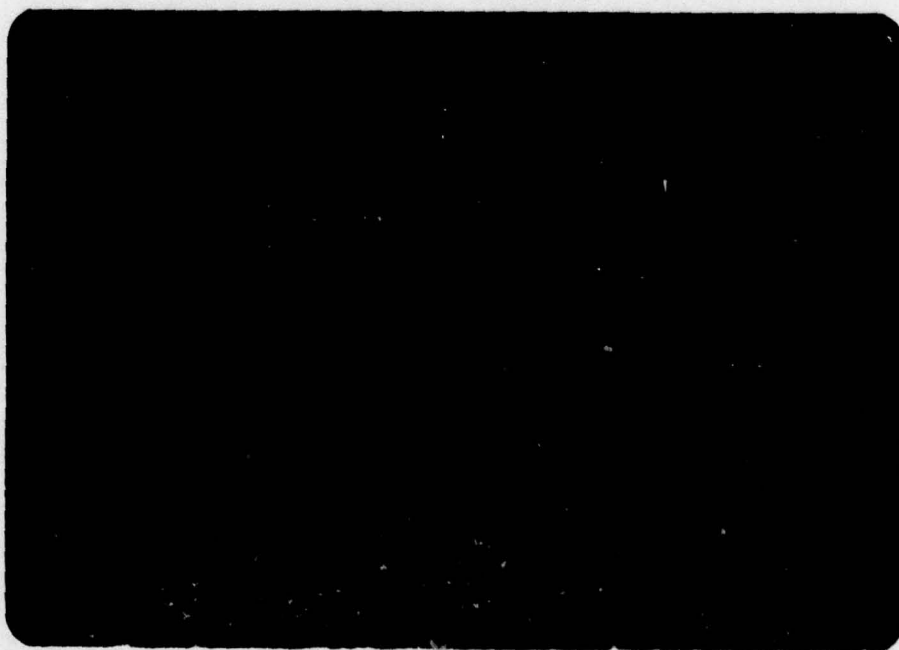
APPENDIX C
PHOTOGRAPHS

LIST OF PHOTOGRAPHS
PA-482 DAM
NDI I.D. NO. PA-469
DECEMBER 1, 1978

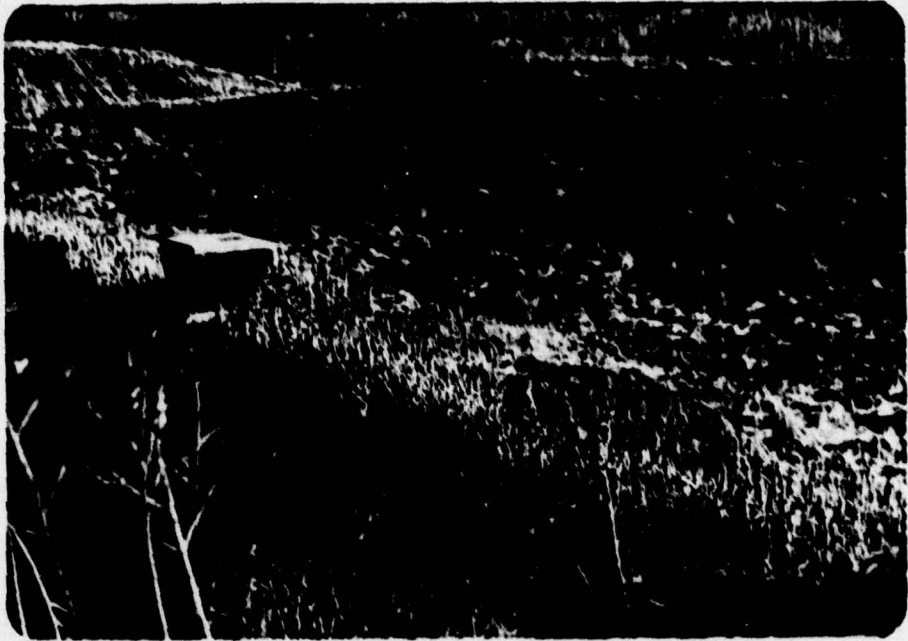
<u>PHOTOGRAPH NO.</u>	<u>DESCRIPTION</u>
1	Crest (looking east).
2	Emergency spillway in foreground; crest in background (looking west).
3	Primary spillway drop inlet structure.
4	Outlet pipe impact basin.
5	One house and one commercial building approximately 1.5 miles downstream.
6	Community of Hanlin Station approxi- mately 2.5 miles downstream.



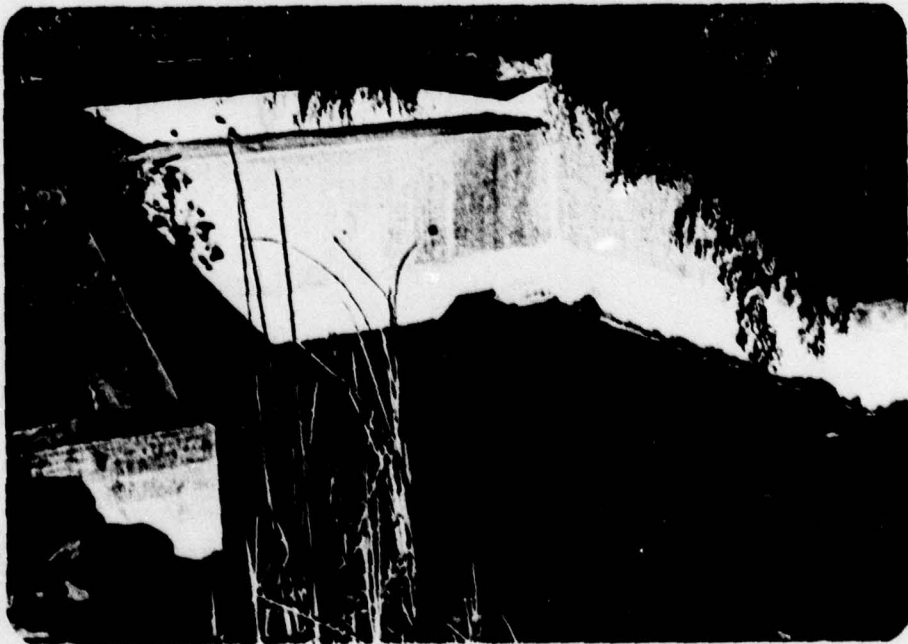
Photograph No. 1
Crest (looking east).



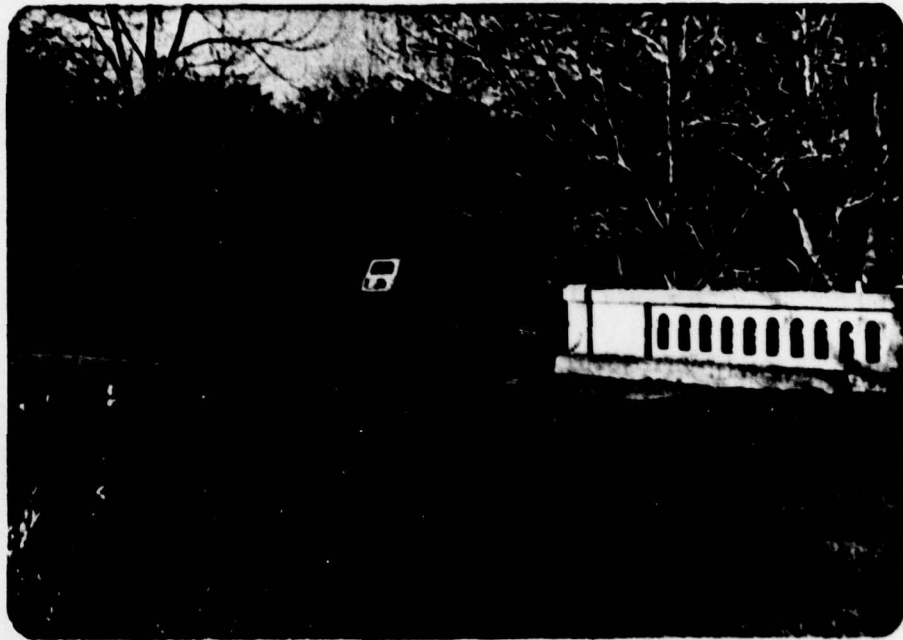
Photograph No. 2
Emergency spillway in foreground;
crest in background (looking west).



Photograph No. 3
Primary spillway drop inlet structure.

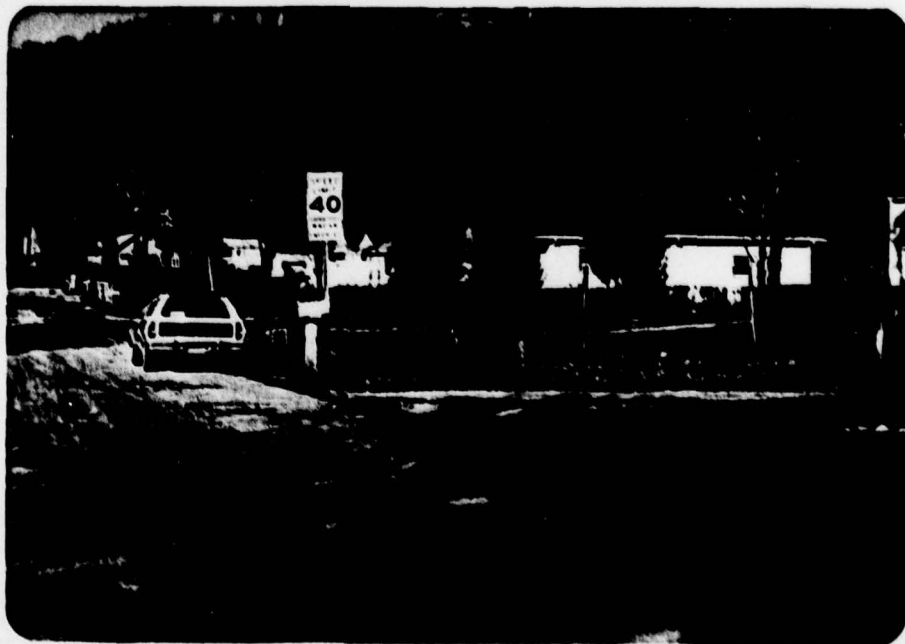


Photograph No. 4
Outlet pipe impact basin.



Photograph No. 5

**One house and one commercial building
approximately 1.5 miles downstream.**



Photograph No. 6

**Community of Hanlin Station approximately
2.5 miles downstream.**

APPENDIX D
CALCULATIONS

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: PA-482 (NDI I.D. PA-509)

PROBABLE MAXIMUM PRECIPITATION (PMP) = 24.2 INCHES/24 HOURS⁽¹⁾

STATION	1	2	3	4	5
Station Description	Reservoir	PA-482 Dam			
Drainage Area (square miles)	1.26	0			
Cumulative Drainage Area (square miles)	1.26	1.26			
Adjustment of PMP for Drainage Area (%) ⁽²⁾					
6 Hours	102	-			
12 Hours	120	-			
24 Hours	130	-			
48 Hours	140	-			
72 Hours	-	-			
Snyder Hydrograph Parameters					
Zone ⁽³⁾	28B	-			
C_p/C_t ⁽⁴⁾	0.57/1.7	-			
L (miles) ⁽⁵⁾	1.8	-			
L_{ca} (miles) ⁽⁵⁾	0.8	-			
$t_p = C_t(L \cdot L_{ca})^{0.3}$ (hours)	2.2	-			
Spillway Data					
Crest Length (ft)	-	200			
Freeboard (ft)	-	5.3			
Discharge Coefficient	-	3.1			
Exponent	-	1.5			

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.

L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8
				30	40	50	60	70	80	90	1.00
HYDROGRAPH AT ROUTED TO	1	1.24 (3.26)	1	859 (24.32)	1145 (32.43)	1432 (40.54)	1718 (48.65)	2004 (56.75)	2291 (64.86)	2577 (72.97)	2863 (81.08)
	2	1.24 (3.26)	1	757 (21.45)	1114 (31.56)	1413 (40.01)	1700 (48.13)	1985 (56.21)	2271 (64.30)	2556 (72.38)	2842 (80.46)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	ELEVATION STORAGE OUTFLOW	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM	DURATION OVER TOP HOURS	MAXIMUM OUTFLOW CFS	MAXIMUM STORAGE AC-FT	MAXIMUM DEPTH OVER DAM	MAXIMUM RESERVOIR U. S. ELEV	RATIO OF PWF	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
		1054.00	1070.60	1075.90	0.00	757	292	0.00	1071.74	30	42.83	0.00
		32	263	397	0.00	1114	300	0.00	1072.08	40	42.17	0.00
		0	0	7565	0.00	1413	306	0.00	1072.33	50	42.00	0.00
					0.00	1700	312	0.00	1072.56	60	42.00	0.00
					0.00	1985	318	0.00	1072.77	70	42.00	0.00
					0.00	2271	323	0.00	1072.98	80	42.00	0.00
					0.00	2556	328	0.00	1073.17	90	42.00	0.00
					0.00	2842	332	0.00	1073.26	1.00	42.00	0.00

OVERTOPPING ANALYSIS SUMMARY

PAGE D4 of 4

APPENDIX E
REGIONAL GEOLOGY

**APPENDIX E
REGIONAL GEOLOGY**

Pennsylvania Dam 482 is located on the southeast flank of the Aunt Clara Dome structure. In general, the rock bedding planes strike northeast with a dip to the southeast of approximately 50 feet per mile.

The stratigraphic column consists of members of the Upper Conemaugh and Lower Monongahela groups (Upper Pennsylvanian Age). The dam is founded on the Morgantown Sandstone, a gray locally calcareous thick-bedded sandstone which has a high permeability where weathered. The Morgantown Sandstone is underlain by a sequence of gray to green-gray interbedded sandstone and shale-claystone. The rock above the sandstone is soft siltstone.

The Pittsburgh coal seam outcrops on the upper portions of the slope and has been strip mined.

There are a few landslides in the immediate vicinity of the reservoir, probably due to the presence of the Morgantown Sandstone. Old, poorly defined slides occur in the slopes above the reservoir and only approximately one to two percent of the land is covered by landslide deposits, as indicated on the U.S. Geological Survey map of Landslides for Washington County, Pennsylvania, dated 1978.

DRAWING NUMBER 78-357-A19

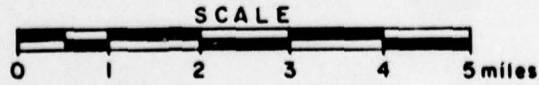
2-6-77

CHECKED BY BE

APPROVED BY

ACS 2-5-79

DRAWN BY



PA 479, PA 482, PA 484, NEW, OLD AND CHERRY VALLEY DAMS
GEOLOGY MAP

REFERENCE:
GREATER PITTSBURGH REGION GEOLOGIC MAP
COMPILED BY W.R. WAGNER, J.L. CRAFT, L. HEYMAN
AND J.A. HARPER, DATED 1975, SCALE 1:125 000

IDA M P O I A O N L A

DRAWING NUMBER 367-A22
 CHECKED BY BE 2-5-79
 APPROVED BY JHP 2-8-79
 ACS 2-5-79
 DRAWN BY

GROUP FORMATION			DESCRIPTION
Alluvium		Ql	Sand, gravel, clay.
Terrace deposits			Sand, clay, gravel on terraces above present rivers; includes Carmichaels Formation.
DUNKARD	Greene		Cyclic sequences of sandstone, shale, red beds, thin limestones and coals.
	Washington	Pw	Cyclic sequences of sandstone, shale, limestone, and coal; contains Washington coal bed at base.
	Waynesburg		Cyclic sequences of sandstone, shale, limestone and coal; contains Waynesburg coal bed at base.
MONONGAHELA		Pm	Cyclic sequences of shale, limestone, sandstone and coal; contains Pittsburgh coal bed at base.
P: CONEMAUGH	Casselman	Pcc	Cyclic sequence of sandstone, shale, red beds and thin limestone and coal.
	Ames		
	Glenshaw	Pcg	Cyclic sequences of sandstone, shale, red beds and thin limestone and coal; several fossiliferous limestone; Ames limestone bed at top.
ALLEGHENY	Vanport		Cyclic sequences of shale, sandstone, limestone, and coal; contains Brookville coal at base and Upper Freeport coal at top; within group are the commercial Vanport limestone and Kittanning and Clarion coals.
		Pa	

GEOLOGY MAP LEGEND

REFERENCE:
 GREATER PITTSBURGH REGION GEOLOGIC MAP
 COMPILED BY W.R. WAGNER, J.L. CRAFT, L. HEYMAN
 AND J.A. HARPER, DATED 1975, SCALE 1:125 000

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