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NATIONAL DAM INSPECTION PROGRAM. CORE CREEK DAM (PA00802), DELA--ETC(U)
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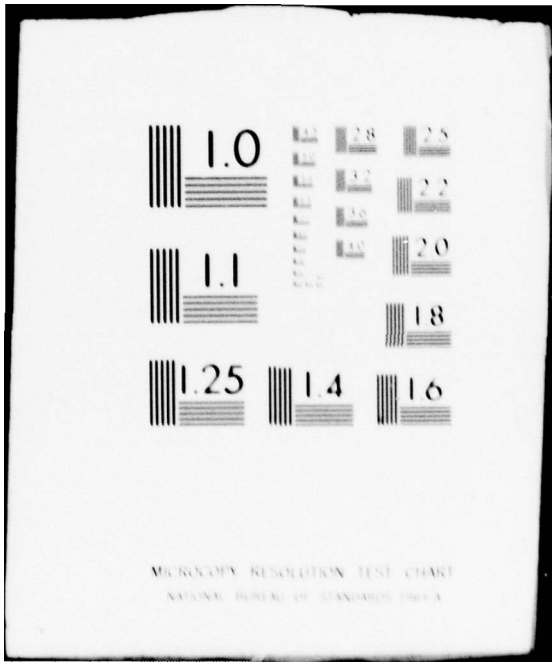
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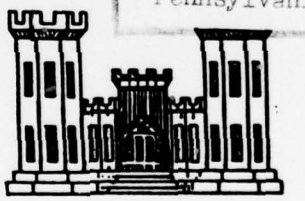
DELAWARE RIVER BASIN

CORE CREEK DAM
BUCKS COUNTY, PENNSYLVANIA
NATIONAL I.D. NO. PA 00802

(15) DACW31-78-C-0048

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

(6) National Dam Inspection Program. Core Creek Dam (PA00802), Delaware River Basin, Core Creek, Bucks County, Pennsylvania. Phase 1 Inspection Report.



Prepared by:

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Submitted to:

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

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Name of Dam: Core Creek Dam
State Located: Pennsylvania
County Located: Bucks County
Stream: Core Creek
Coordinates: Latitude 40° 13.8' Longitude 74° 54.0'
Date of Inspection: 7 June 1978

Core Creek is owned by the Neshaminy Water Resources Authority located in Doylestown, Pennsylvania. The dam was designed by an engineering firm experienced in dam practice and was completed in 1977. The facility is in good condition and is currently being maintained at its conservation pool elevation which is approximately 13.5 feet below the normal pool. The spillway has been designed to accommodate a flood approximating the probable maximum flood (PMF) and is considered "Adequate".

A comprehensive package of design records were available and were reviewed and assessed. Although construction records were not readily available for this inspection, it is understood from the Soil Conservation Service that these records are maintained in the archives in Mechanicsburg, Pennsylvania. A visual inspection of the dam and reservoir facilities did not detect symptoms of uncontrolled seepage, instability, deterioration or other conditions that would suggest an impending hazardous condition.

In summary, with the exception of the riprap on the upstream slope of the dam, examination of the available records and the visual inspection revealed no evidence or conditions detrimental to the integrity of Core Creek Dam and its appurtenances. With respect to the riprap, it is recommended that this open-graded material be choked with finer rock to prevent the undermining of the filter material and degradation of the slope. Similarly, the erosion at the junction of the dam and abutments on the upstream side should be repaired. It is recommended that this work be performed before the reservoir elevation is raised to the recreation pool. It is recommended that a plan for around-the-clock surveillance be implemented during periods of un-

usually heavy rainfall to montior this structure. It is also recommended that a formal warning system be established to notify appropriate personnel when a predetermined critical condition develops.

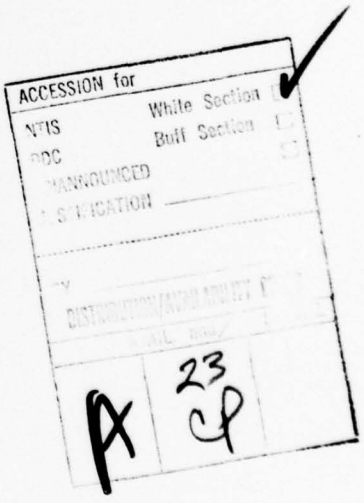
John H. Frederick, Jr., P.E.
Maryland Registration 7301

8/2/78
Date

W S Gardner

William S. Gardner, P.E.
Penna. Registration 004302E

8/2/78
Date



usually heavy rainfall to monitor this structure. It is also recommended that a formal warning system be established to notify appropriate personnel when a predetermined critical condition develops.

for John H. Frederick, Jr., P.E.
Maryland Registration 7301

7/13/78
Date

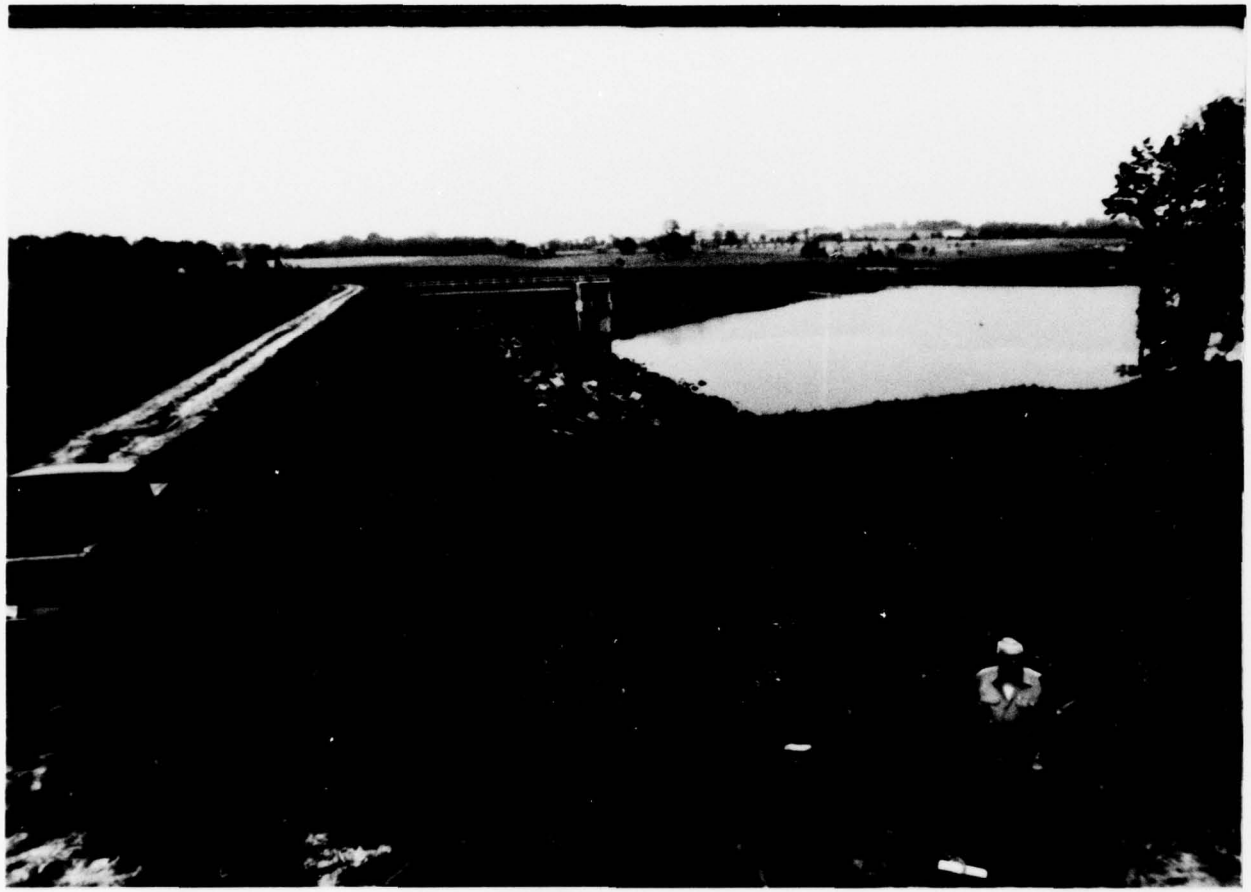
William S. Gardner, P.E.
Penna. Registration 004302E

7/13/78
Date

APPROVED BY:

31 Jul 78

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



OVERVIEW
CORE CREEK, BUCKS COUNTY, PENNSYLVANIA

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
CORE CREEK DAM
NATIONAL ID #PA 00802
DER ID #9-172

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

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

1.2 Description of Project

a. Dam and Appurtenances. Core Creek Dam is a zoned rolled earth dam with an interior inclined downstream (chimney) drain. The dam is approximately 860 feet long and 47 feet high as measured from the streambed to the crest. The dam was designed to use locally available borrow materials and contains two primary soil zones. The interior zone (Zone 1) is composed of clays and silty clays derived from local borrow sources. The exterior section (Zone 2) consists of silty sand, also from local sources. The dam contains a cut off trench and a triple line grout curtain. On the downstream side between Zone 1 & 2, the embankment has a two layer chimney drain connecting to a drain trench. The upstream slope is riprapped.

Water is normally released from the dam through a principal spillway consisting of reinforced concrete drop inlet structure with water supply gates below the weir crest, a 60-inch diameter prestressed concrete conduit and a reinforced concrete, 82-feet long, SAF type stilling basin.

b. Location. The dam is located on Core Creek in the area between the Boroughs of Newtown and Langhorne. The embankment is located approximately 0.6 miles upstream of the intersection of Core Creek and Newtown Pike (Route 413). The dam site and reservoir are shown on U.S.G.S. Quadrangle, Langhorne, Pennsylvania at coordinates N40° 13.8', W74° 54'. A Regional Location Plan of Core Creek Dam and Reservoir is enclosed as Plate 1, Appendix E.

c. Size Classification. Intermediate (height is 47 feet and reservoir is 1215 acre-feet).

d. Hazard Classification. A high hazard classification is assigned consistent with the potential for extensive property damage and loss of life downstream along Core Creek and Neshaminy Creek.

e. Ownership. Neshaminy Water Resource Authority.

f. Purpose of Dam. Flood Control, Water Supply and Recreation.

g. Design and Construction History. Core Creek Dam was designed by E.H. Bourguard Associates, Inc., Pickering, Corts and Summerson, Inc., and Justin & Courtney for the Soil Conservation Service. Final design drawings were reviewed by the Soil Conservation Service and specifications were prepared by the designers.

The dam was completed on June 30, 1976, and filling began in the summer of 1977. The pool level is currently being held at elevation 89 until the boat ramps construction is completed. It is reported that James D. Morrissey of Philadelphia, Pennsylvania performed the construction work.

h. Normal Operating Procedures. Provisions were made in the design to allow for an uncontrolled minimum release of 1.5 cfs to satisfy DER's low flow requirements. Excess flow is directed through sluice gates in the control tower to a 5-foot diameter discharge conduit which empties into Core Creek until the gates are closed and the reservoir water level reaches the recreation pool level at which time the excess flow will flow through the ungated weir.

It is planned to have 1215 acre-feet of storage for water supply between the recreation pool (Elevation 102.5) and the conservation pool (Elevation 89.0). Sluice gates will be used to drawdown the pool as necessary to meet demand requirements, except during the summer recreation months when the reservoir will be maintained at Elevation 102.5.

For recreation the reservoir has an area of 150 acres (recreation pool, Elevation 102.5). The lake will be the focal point of a proposed park development whose major facilities will consist of golf courses, swimming beaches, picnic and boating facilities.

Flood control benefits will include provisions for storage of 2086 acre-feet, equivalent to 4.1 inches of runoff, between normal pool and the crest of the emergency spillway, Elevation 111.9.

1.3 Pertinent Data

A summary of pertinent data is presented as follows:

a. Drainage Area (sq. miles)	9.57
b. Discharge at Dam Site (ungated flow only; cfs)	
At elev. 102.5 (normal pool)	0
At elev. 111.9 (crest emergency spillway)	606
At elev. 118.0 (top of dam)	23,987
c. Elevations (feet above MSL)	
Top of Dam	118.0
Normal Pool	102.5
Conservation Pool	89
Design High Water	114.0
Principal Spillway	
Pond Drain	71
Gated Intakes	88
	91
Ungated	102.5
Emergency Spillway	111.9

d.	Reservoir (miles)	
	Length at Maximum Pool	2.3
	Length at Normal Pool	1.8
	Fetch at Normal Pool	1.2
e.	Storage (acre-feet)	
	Conservation Pool (89)	261
	Normal Pool (102.5)	1,476
	Flood Storage (to 111.9)	3,562
	Design High Water (114)	4,442
	Top of Dam (118)	5,599
f.	Reservoir Surface (acres)	
	Conservation Pool (89)	43
	Normal Pool (102.5)	150
	Design High Water (114)	332
	Top of Dam (118)	477
g.	Dam Data	
	Type	Zoned earth fill
	Length	860 feet
	Maximum Height	47 feet
	Top Width	24 feet
	Side Slopes upstream	3:1 (H:V)
	above El. 107	3:1 (H:V)
	below El. 107	3.5:1 (H:V)
	Side Slope downstream	2.5:1 (H:V)
	Cutoff	Trench to rock, 28 feet wide
	Grout Curtain	Triple line grout curtain. Hole depths range up to 40 feet deep
h.	Diversion	Principal spillway constructed approximately 300 feet west of original stream. Then the stream flow was routed through principal spillway during construction of dam

i. Spillway

Principal Spillway	All flow discharges through a 60" pipe
Emergency drawdown	Emergency drawdown intake (gated)
Size	5' x 5'
Elevation (above MSL)	71
Gated Intakes	
Size	36" x 42" and 36" x 48"
Elevation (above MSL)	88 x 91 feet
Ungated Intake	
Size	2-15 foot weirs
Elevation (above MSL)	102.5
Emergency Spillway	
Type	earth/rock channel with riprap control section
Size	550 feet
Elevation (above MSL)	111.9

SECTION 2
ENGINEERING DATA

2.1 Design

a. Data Available. A summary of engineering data on Core Creek Dam is presented in the checklist, attached as Appendix A. Engineering design data available for the dam was contained primarily in a 43-sheet set of design drawings dated March, 1971. A set of these drawings is in the Owner's possession and at the Commonwealth of Pennsylvania, Department of Environmental Resources main office in Harrisburg, Pennsylvania.

All other available documents reviewed are listed in Appendix A. In this data there was reference to, but no documentation of, physical and strength properties of embankment materials. The design-analysis package included an engineering analysis of embankment stability, design criteria, construction specifications, hydrologic and hydraulic analysis and structural design calculations.

b. Design Features. The principal design features of Core Creek Dam are illustrated on the Plan, Profile and Cross-Section of the embankment that are enclosed in Appendix E as Plates 2 through 4. These plates are reproduced from SCS drawings. The drawings show the embankment having a maximum height of 47 feet. The dam contains a central impervious core, Zone 1.

Underseepage is controlled by a 28-foot wide, Zone 1 core trench keyed into rock with a triple line, staggered grout curtain. Seepage through the dam is controlled by a 2-layer inclined (1.5H:1V) filter drain sandwiched between the Zone 1 clay core and the Zone 2 silty sands. Each layer is 8 feet thick and connected to a drain trench.

The upstream slope is protected by a filter layer and a riprap shell. The upstream slope varies from 3H:1V from the crest to elevation 107 and 3.5H:1V below elevation 107. There is a 30-foot wide bench upstream at elevation 87. The downstream slope is 2.5H:1V and covered with crown vetch.

Design features of the spillways are discussed in Section 5.

Coe Creek Dam

2.2 Construction

Reviewed construction documentation was limited to a series of miscellaneous letters, notes and memoranda. The date of commencement is unknown and is assumed to be early in 1975 or, possibly, late 1974. Construction photographs indicate that the dam and appurtenant structures were most likely constructed in general accordance with the design drawings. Records indicate that the dam was completed June 30, 1976, and photographs indicate that construction was performed by James D. Morrissey, Philadelphia, Pennsylvania. The only significant deviation noted was in the gradation of the riprap. This is discussed in Section 3. Construction records and field testing records were not available from the designers/SCS Project Engineer for review. In consideration of the good condition of the dam and sufficiency of other data obtained from DER files, it was determined that it would not be necessary to attempt to retrieve the additional SCS data.

2.3 Operation Data

The construction permit indicates that the discharge system must maintain a minimum stream flow of 1.5 cfs. The discharge system is reportedly designed to maintain this minimum flow.

Since the reservoir has only reached the conservation pool elevation, there are no discharge records available. There was no other operational data available at the time of inspection.

2.4 Evaluation

a. Availability. All engineering data reproduced in this report and studied for this investigation were provided by the Pennsylvania Department of Environmental Resources and the Soil Conservation Service.

b. Adequacy. The design data provided was quite comprehensive and well documented. However, construction data was very limited, and details confirming that construction was performed in accordance with the design requirements and specifications could not be ascertained.

c. Validity. Design drawings show the proposed borrow source and quarry location for the embankment. Records infer their use but do not directly confirm the location of borrow sources. Based on the visual inspection, construction photographs and design drawings, it is concluded that the dam and appurtenances were most likely constructed as designed except for the riprap on the upstream slope (See Section 6).

SECTION 3
VISUAL INSPECTION

3.1 Findings

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

b. Dam. During the visual survey, there were no indications or evidence observed of distortions in alignment or grade that would be indicative of movement of the embankment or the foundation. Ruts in the roadway were evident across the dam crest and should be repaired. It is recommended that the crest be surfaced with stone or other suitable material to prevent further deterioration of the crest and, perhaps a chain or gate erected across the crest to prevent unauthorized traffic from traversing the dam. A careful inspection of the dam disclosed no evidence of seepage emergence on the downstream slope. Erosion was observed at the junction between the embankment and the abutment on both the upstream and downstream slopes. The more critical erosion is noted on the upstream slope where the filter blanket is being undermined and the riprap is sliding into the erosion gullies.

The inspection of the riprap slope revealed that some of the riprap appears to be susceptible to slaking with time. The riprap gradation also appears questionable in that it is very large with sizes that range up to 6' x 5' x 3'. The filter bedding beneath the riprap does not appear to be compatible with the larger rock. It was also observed that the density and distribution of the rock matrix is poor with many voids and loose rocks. A review of the SCS drawings shows that the riprap slope was designed to be 2-feet thick. Considering the size of the rock observed during the inspection, it is obvious that the riprap does not meet specifications. The specified rock size could not be located in the contract documents or on the construction drawings.

c. Appurtenant Structures. At the time of this inspection the reservoir was at the conservation pool elevation of 89. Water was flowing into the lower sluice gate with flow approximately 8 inches above the invert of the gate. Both the lower and the upper sluice gates were inspected and found to be in very good condition. The reservoir drain sluice gate was under water and could not be inspected. The trash racks on the intake tower were inspected and found to be clear of trash. Both the upper and lower sluice gate valves were exercised and found to operate properly, each was painted, cleaned and well greased. The lower sluice gate (drainage gate) was not exercised because debris collection at the base of the gate prevents the gate from closing once it is open. It is understood that the owner's engineer is in the process of correcting this condition. The outlet tunnel could not be inspected beneath the dam because of the flow.

The stilling basin was inspected and found to be in excellent condition. There were no signs of cracks, distortions, spalling or deterioration. Six drainage pipes embedded into the wing walls of the stilling basin were also inspected, and two of the flap gates were observed to be broken. This condition, however, did not impede flow. The riprap stilling basin downstream of the wing walls was also inspected. There were no signs of riprap distortion or deterioration.

d. Reservoir. Reconnaissance of the reservoir disclosed no evidence of significant siltation, slope instability or other features that would significantly affect the flood storage capacity of the reservoir. It is noted, however, that cropland adjacent to the reservoir, may contribute to sedimentation if proper planting techniques and maintenance are not exercised.

e. Downstream Channel. Approximately 100 feet downstream of the stilling basin, principal spillway flow enters the original streambed. Core Creek flows in a rock streambed with no evidence of major erosion. The stream flows through a fairly wide (300 foot) tree-covered plain for about 1000 feet to a 14 foot long bridge opening under Park Road, a road located completely within the park boundaries. Approximately 3500 feet downstream of the dam is a stone arch bridge under Pennsylvania State Route 413; about 600 feet below Route 413 Core Creek enters Neshaminy Creek.

Immediately prior to reaching Park Road the emergency spillway channel discharges water into Core Creek. Considering the dense vegetation and the number of trees along the creek, it is possible that debris may collect and block flow under the stone arch bridge. During and after periods of high flow, the bridge should be checked for debris and the appropriate authorities notified, if necessary. Discharge then enters Neshaminy Creek. Several homes and businesses are located within the flood plain of these creeks. For further details describing downstream conditions see Section 5.

3.2 Evaluation

Although the reservoir is not filled, a survey of the dam disclosed no evidence of apparent past or present movement to indicate instability of the dam embankment. This inspection revealed that the overall condition of the project is good. The only major deficiency noted by this inspection was the gradation of the upstream riprap. It appeared that the riprap contained too many large stones, some exceeding 3 to 4 feet, and was not well graded with intermediate sizes. The filter material beneath the riprap was exposed along the slope. While walking on the slope much of the riprap was loose and could easily be moved. Considering the impending wave action on the slope, the voids between the rock and the probable incompatibility between the riprap and the filter course, slope sloughing should be expected. This potential maintenance problem should be corrected by choking or chinking the riprap with finer rock and recompacting the slope.

SECTION 4
OPERATION PROCEDURES

4.1 Procedures

The dam has a principal spillway and an emergency spillway. The normal reservoir level will be regulated by discharge over the riser weir at elevation 102.5. This is considered the recreation pool level. Two sluice gates at elevations 91 and 87 will only be opened to lower the pool when necessary.

The principal spillway is a drop-inlet structure consisting of a single stage riser with water supply sluice gates added below the crest of the weir, a 60-inch diameter prestressed concrete water pipe and a reinforced concrete stilling basin that will dissipate the energy of high velocity discharge at the end of the conduit. A prestressed concrete access bridge is provided, which spans between the top of the dam and the operating platform located at the top of the riser. The operating platform contains control valves to operate the sluice gates.

The emergency spillway is 550 feet wide and is cut into the right abutment of the dam. The trapezoidal channel has 3H to 1V side slopes. A 600-foot long approach channel will convey flow to the control section which has been set at elevation 111.9. The slope of the exit channel is 0.028. To date there are no operation records for the control of the water in this reservoir.

4.2 Maintenance of the Dam

The dam will be maintained by the Neshaminy Water Resources Authority (NWRA) and periodically checked by the County Department of Parks and Recreation as well as the NWRA. At the time of this inspection there was no maintenance procedure available. It is understood that a procedure similar to other NWRA dam projects is being written and will be at the dam site by the time the reservoir reaches the recreation pool. It is understood that the procedure is modeled after Soil Conservation Service guidelines.

4.3 Maintenance of Operating Facilities

Since the structure is new the valve control mechanisms and appurtenant structures are all in excellent condition. They are clean, painted and well lubricated. All valves in the intake tower, with the exception of the drainage valve, were exercised and appeared to operate properly.

4.4 Warning Systems in Effect

There are no formal warning systems or procedures established to be followed during periods of exceedingly heavy rainfall. However, personnel are at the park daily and available to inspect the dam during periods of critical conditions. A representative of the Neshaminy Water Resources Authority lives nearby and keeps appropriate keys and valve-control devices in his automobile to be used to operate the valves. It is understood that responsible people will always be in the area and available if a potentially hazardous condition develops.

4.5 Evaluation

Since the reservoir is not filled, and since the system has not operated at the design levels, operating records are not available. In addition, operating procedures were also not available from representatives of the Neshaminy Water Resources Authority or the Parks and Recreation Commission. A formal warning procedure to be implemented during periods of extreme rainfall was also unavailable. Both an operating procedure and warning procedure should be formulated so that residents downstream could be amply warned of possible high volumes of flow in Core Creek. Downstream bridges (as described in Appendix B) which constitute potential hydraulic constrictions during flood flows should be monitored.

SECTION 5
HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features

a. Design Data. Original design data was fairly complete, consisting of the preliminary design report, "Dam PA-620", Neshaminy Creek Watershed. The final design report indicates that the hydrologic/hydraulic design, as found in the preliminary report, remains unchanged.

(1) The watershed is leaf-shaped, 4.9 miles long and 1.6 to 2.3 miles wide, covering approximately 9.6 square miles. Elevations range from 295, in the upper reaches, to about 76, at the upstream toe of the dam. The amount of storm runoff as of 1963, reflecting soil type and land use, is characterized by the use of Soil Conservation Service Runoff Curve Number CN-79. This curve number represents land use of approximately 10 percent wooded, 29 percent urban or commercial and the remaining land open or farm land. The estimated development of the water shed is reflected by a future curve number of CN-82, which assumes 7.5 percent commercial/industrial and 66.5 percent of the water shed to be residential. Current U.S.G.S. maps and observations within the water shed disclose that residential development is starting to take place. There are no upstream reservoirs or ponds on this watershed.

(2) The spillway system for this dam consists of a principal spillway with gated low stage intakes and an ungated weir at the normal pool elevation of 102.5. An ungated spillway is cut through the right abutment and is known as the emergency spillway. The rating curves indicate a flow through the principal spillway (ungated flow only) of 606 cfs when the reservoir water level is at the crest of the emergency spillway. The design high water level is 114.0, with a combined flow through the principal and emergency spillways of 5034 cfs. These values were determined from a six hour 10.5-inch storm producing 8.26 inches of runoff. The combined discharge of 23,987 cfs occurs when the reservoir water level is at the crest of the dam. In accordance with the criteria established by the Federal (OCE) Guidelines, the recommended spillway design flood for this intermediate size dam and high hazard potential classification is the probable maximum flood (PMF).

b. Experience Data. This dam has been in operation for about one year and has been allowed to fill to the conservation pool level only, approximately elevation 89. Debris along the edges of the reservoir indicate that the water level has been a few feet above elevation 89 but well below the recreation pool level of 102.5.

c. Visual Observations. On the date of the inspection no conditions were observed that would indicate that the outlet capacity would be significantly reduced during a flood. Observations regarding the downstream channel, spillway condition and reservoir are located in Appendix B.

d. Overtopping Potential. Hydraulic/hydrologic aspects of this structure were designed by the Soil Conservation Service (SCS). The PMF peak inflow is determined to be 29,732 cfs resulting from a six-hour storm of 26 inches producing 23.54 inches of runoff (future conditions). The flood routing analysis appears reasonable and indicates that the available flood water storage and spillway capacity are adequate to pass the PMF without overtopping (see Appendix C). As the SCS procedures are conservative for a small watershed, and the triangular inflow hydrograph approximation is not appropriate for a two-stage discharge system, the flood routing is judged acceptable based on a review of the calculations.

e. Spillway Adequacy.

(1) Based on the above observations, which show that the spillway can pass the PMF, the spillway capacity is judged "Adequate." The tailwater is estimated to be 30 feet or more below the top of the dam during the passing of the PMF.

(2) As this structure is located approximately 4,000 feet above the confluence of Core Creek with Neshaminy Creek and since there are only a few houses adjacent to Core Creek, the downstream sections potentially subject to damage are concentrated along Neshaminy Creek.

The storm of record, August, 1955, flooded the stone arch bridge mentioned in Section 3.1 and at least six houses located between the dam and 2,000 feet downstream of the confluence of Core Creek and Neshaminy Creek. Failure of the structure during the PMF would damage, and probably cause loss of life, to another 10 to 12 homes in the same reach along Neshaminy Creek.

Core Creek Dam is but one of 10 structures proposed and/or built to control flooding along Neshaminy Creek. Since the potential for extensive property damage and loss of life exists along Core Creek and Neshaminy Creek, the dam constitutes a high hazard potential.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. The visual observations did not indicate any existing embankment stability problems. However, a potential maintenance problem of the riprap slopes is evident in that the oversize rock contains many voids and not compatible with the underlying filter material. It is believed that long-term wave action against the riprap would eventually wash the finer filter material allowing the riprap to creep or slide down the embankment slope. Erosion was also observed at the junction between the abutment and the embankment. At the upstream face this is manifested in the form of erosion gullies at this juncture. At this location the filter bedding is beginning to wash from under the riprap causing the riprap to slide into the gullies. These areas should be regraded, the filter bedding replaced and a suitable riprap protection placed at this contact zone.

There was no seepage observed along the downstream slope or around any of the outlet structures. It is noted, however, that the reservoir is not at full pool and as indicated in Appendix F under Geology, the rock formations beneath the foundation may be conducive to seepage.

b. Design and Construction Data. Available design documentation included a preliminary design report for Core Creek Dam entitled "Preliminary Design Report, Dam PA-620", for Neshaminy Creek Watershed, Bucks County, Pennsylvania. Contained in this report was a complete set of embankment and foundation design calculations. This data included the following:

(1) Stability Analysis
(2) Design Values for Conduit Loading and Riser Loading
(3) Cracking and Piping Considerations
(4) Filter Design
(5) Settlement Analysis
(6) Time Rates of Settlement
(7) Differential Settlement
(8) Zoning Considerations and Permeability Rates
(9) Seepage Quantity in Critical Gradient Assessments
(10) Material Inventory

All calculations were performed by Justin & Courtney, Consulting Engineers of Philadelphia, Pennsylvania. These calculations were reviewed for completeness and reasonableness of the assumptions. They were found to be adequate and assumed to be correct.

The design documentation was complete. However, there was no documentation available in the DER files regarding construction of the embankment. Normal procedure is for the SCS field engineer to maintain such records until the project is completed, at which time the records are transferred to the archives in Mechanicsburg, Pennsylvania. Although there are no direct records, references in the limited available documentation indicates that the borrow sources noted in the design documents were used during construction. Photographs of the construction tend to confirm that proper placement and zoning was performed. The only deficiency noted in the construction was that of the riprap gradation and perhaps quality.

c. Operating Records. Since the dam and reservoir are not complete, and since the pool level is currently being held at the conservation pool elevation of 89, there are no performance records available.

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

e. Seismic Stability. This dam is located in Seismic Zone 1. Normally, it can be considered that if a dam in this zone is stable under static loading conditions it can be assumed safe for any expected earthquake conditions. Since the static stability analysis indicates that the dam is stable under static loading conditions, by definition of the Corps of Engineers criteria, seismic stability of the dam is also adequate.

SECTION 7
ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment

a. Safety. The visual inspection and review of the design documentation indicates that the dam embankment, foundation and appurtenant structures of Core Creek Dam are in good condition. The hydrologic and hydraulic computations presented in the design documents indicates that the dam will pass the PMF. Therefore, the discharge systems of the structure are considered "Adequate". It is noted here that although the structure has been designed to pass the PMF, significant property damage is still likely downstream due to the high flow rates along Core Creek and Neshaminy Creek.

It was noted that the upstream riprap slope protection is of marginal quality and will be the cause for future maintenance problems if not corrected before the reservoir is raised to the normal pool elevation. Erosion on the upstream slope between the riprap and abutment was also noted. The top of the dam is rutted and unprotected leaving the potential for crest deterioration and long-term maintenance problems.

b. Adequacy of Information. The design information available for this inspection was adequate and quite complete. It is noted that construction data was not readily available and that construction photographs and the visual inspection were the sole basis for evaluating as-built conditions. Since the reservoir has not reached the normal pool elevation, operational records were not available.

c. Urgency. It is considered that the recommendations presented in Section 7.2 be implemented before the reservoir is raised to minimize costs and future maintenance problems.

7.2 Recommendations and Remedial Measures

a. Remedial Work. It is recommended that the following measures be undertaken by the Owner:

(1) The crest of the dam should be regraded and protected against traffic and overall erosion. This can be accomplished by surfacing the crest and installing gates across the ends of the crest to prevent entrance of unauthorized traffic.

(2) Erosion gullies at the embankment/abutment junctures should be repaired.

(3) The flap gates on the drain pipes in the SAF basin should be repaired.

(4) An inspection program should be initiated to check and monitor all seepage which may develop after the reservoir reaches the normal operating pool.

b. Operation and Maintenance Procedures. Because of the location of the dam upstream from a populated area the following measures are recommended to be undertaken by the Owner.

(1) The Owner should develop an operational procedure to follow in the event of an emergency.

(2) A formal procedure of observation and warning during periods of high precipitation should be developed and implemented. This should include monitoring of bridges downstream.

(3) A maintenance inspection checklist should be developed to help insure that all critical items are inspected on a periodic basis.

(4) The upstream riprap slope should be repaired to minimize future maintenance problems. This can be accomplished by choking the large riprap with 6 to 10 inch stone and reworking the slope.

APPENDIX

A

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM *Core Creek Dam*

ID # *PA 00802*

ITEM	REMARKS
AS-BUILT DRAWINGS	*40 pages of a 43 page set of "AS-BUILT" plans were received from SCS. Dam No. PA-620-P.*
REGIONAL VICINITY MAP	*SCS drawings included a regional vicinity map.*
CONSTRUCTION HISTORY	*Data is sparse and limited to brief progress reports.*
TYPICAL SECTIONS OF DAM	*Typical Sections were included in the SCS design and as-built drawings.*
OUTLETS - PLAN	*This data was included with the SCS drawings.*
DETAILS	
CONSTRAINTS	
DISCHARGE RATINGS	*Some data was presented in the design documents.*
RAINFALL/RESERVOIR RECORDS	*None available.*

ITEM	REMARKS
DESIGN REPORTS	(1) " Report Upon the Application of the Neshaminy Water Authority ", dated December 20, 1972 to construct Core Creek Dam. Permit requires 1.5 cfs flow at all times and flow should be monitored and documented. (2) " Final Design Report PA-620 " by E. H. Bourquard Assoc. Inc. Most of the work presented was by Justin and Courtney, Consulting Engineers, Phila., Pennsylvania. (3) Specifications and Contract Documents.
GEOLOGY REPORTS	None avaiable in DER or SCS files.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	(1) Total design report by E. H. Bourquard Assoc. Inc, and Justin and Courtney dated October, 1970 included all major design computations. (2) " Erosion and Sedimentation Control Plan " for Neshaminy Creek and Watershed Site PA-620.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Original design data was available but construction data was not available.
POST-CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	Proposed sources were noted in the design drawings but could not be confirmed by construction documentation.

ITEM	REMARKS
MONITORING SYSTEMS	*None.*
MODIFICATIONS	*None known. However, riprap gradation does not meet design specification requirements and a change to the original specification could not be located.*
HIGH POOL RECORDS	*None. Reservoir is not yet filled.*
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	*None known.*
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	*N/A The dam was recently completed and the reservoir was not yet filled at the time of inspection.*
MAINTENANCE OPERATION RECORDS	*Reservoir structures are being completed and the reservoir is not yet filled.*

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	*Data was included with SCS drawings.*
OPERATING EQUIPMENT PLANS & DETAILS	*Application report requires a flow of 1.5 cfs and the flow to be monitored at all times.*
PHOTOGRAPHS	*24 color construction photos were in the DER files. Photos revealed that J.D. Morrissey constructed the dam. Photos showed core trench excavation, left abutment core trench (on rock), grout curtain, right abutment core trench, compaction operations, and riprap placement with filter blanket.*

APPENDIX

B

CHECK LIST
VISUAL INSPECTION
PHASE I

Name Dam *Core Creek Dam* County *Bucks* State *Pennsylvania* National ID # *PA 00802*

Type of Dam *Earth* Hazard Category *1 (High)*

Date(s) Inspection *June 7, 1978* Weather *cloudy, humid* Temperature *60-65° F*

Pool Elevation at Time of Inspection *88.5* M.S.L. Tailwater at Time of Inspection *71.5* M.S.L.

Inspection Personnel:

Mary Beck (Hydrologist) *Ray Lambert (Geologist)*

John Boschuk, Jr. (Geotechnical/Civil) *Vince McKeever (Hydrologist)*

John H. Frederick, Jr. (Geotechnical) *6/6/78*

John Boschuk, Jr. Recorder

Remarks:

Other attendees included: Al Goman (Penna DER) ; George Pfanstiel (Parks and Recreation)

William G. Major (NWRA) ; Jack Watson (Parks and Recreation)

Gary Falasca (NWRA) ; Ronald Chase (Parks and Recreation)

William Taylor (NWRA)

CONCRETE/MASONRY DAMS

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

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL AND HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	*None were observed but roadway ruts on the dam crest were noted and should be repaired. It is recommended that the crest be surfaced with stone or other suitable material and, perhaps, a chain or gate erected across the crest to prevent unauthorized traffic.*	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	*None observed.*	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	*Erosion was noted at the junction of the embankment and abutment. The upstream erosion at this juncture is beginning to erode the riprap and filter blanket. This upstream area should be repaired. The grass on the downstream slope is covering many small erosion gullies which could become larger. This slope should be mowed, inspected and gullies repaired as necessary.*	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	*None observed but the crest is rutted as described above.*	
RIPRAP FAILURES	*Some riprap appears as if it would be conducive to slaking. Riprap may fall into reservoir due to erosion of left abutment and embankment junction. Needs protective cover. The riprap gradation appears questionable in that it is very large with sizes up to 6'X5'X3'. Filter bedding does not appear to be compatible with the riprap. The density and compaction of the rock matrix is poor (many voids and loose rock).*	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RIPRAP (Cont.)	*Long term downward creep of the riprap is expected unless the voids are chocked with smaller rock and the slope recompacted.*	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	*Unauthorized vehicular traffic is causing ruts which develop into erosion gullies.*	
ANY NOTICEABLE SEEPAGE	*None.*	
STAFF GAGE AND RECORDER	*None.*	
DRAINS	*Drains leading into the spillway channel appear to be in good condition with the exception of the hatch doors. Two of these hatches are broken and should be repaired.*	

OUTLET WORKS

Principal Spillway

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	*None observed.*	
INTAKE STRUCTURE	*Multiple level concrete riser intake structure. All gates except the lower drain were exercised. The Owner's representative indicated that debris prevents the lower gate from closing again after opening. Reportedly, the Engineer is working on this problem.*	
OUTLET STRUCTURE	*The system consists of a 225 foot long, 5 foot diameter concrete pipe which discharges into an 82 foot long stilling basin. The basin is initially 5 feet wide and gradually flares to 10 feet wide. All concrete was observed to be in good condition. However, two doors of the pipe drainage system embedded in the concrete walls of the basin were broke and should be repaired.*	
OUTLET CHANNEL	*The channel bottom is stable and composed of rock. The surrounding flood plain to the downstream bridge is dense woods.*	
EMERGENCY GATE	*None.*	

UNGATED SPILLWAY

Emergency Spillway

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	*None.*	
APPROACH CHANNEL	*The minimum length of the curved approach channel is 250 feet. The side slopes near the control section are riprapped, the rest of the channel side slopes and floor are well vegetated and in good condition. The control section is 550 feet wide, with a 50 foot section of large rock fill at elevation 112.0 (as built).*	
DISCHARGE CHANNEL	*Below the control section the channel slopes at 2.67% for 100 to 200 feet, then the channel drops at greater than 10% through woods and brush into Core Creek. The channel appears to be stable.*	
BRIDGE AND PIERS	*None at the spillway but several bridges can be located downstream.*	

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

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	*None.*	
OBSERVATION WELLS	*None.*	
WEIRS	*None.*	
PIEZOMETERS	*None.*	
OTHER	*None.*	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	*All slopes were observed to be flat to moderate and stable with grass or trees.*	
SEDIMENTATION	*No appreciable sedimentation yet. However, this is a new dam and is not yet filled. There are several cultivated fields adjacent to the reservoir which may contribute to sedimentation if proper planting techniques and maintenance are not exercised.*	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	*A park road bridge is located approximately 1000 feet downstream. Flow over the emergency spillway would flood this bridge. The channel below this bridge is stable and the adjacent flood plain is heavily wooded. Fallen trees may block this bridge.*	
SLOPES	*The channel slope is estimated to be about 1/2 % for at least 1/4 mile below the dam.*	
APPROXIMATE NO. OF HOMES AND POPULATION	*Several homes lie along Core Creek with the concentration increasing to towards the confluence of Neshaminy Creek. Thereafter, many homes exist along Neshaminy Creek.*	

APPENDIX

C

CORE CREEK DAM
CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: *Mostly open land; currently developing as a residential area.*

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): *102.5 (1215 Ac-Ft w/o sed. storage)*

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): *114.0 (2966 Ac-Ft)*

ELEVATION MAXIMUM DESIGN POOL: *114.0*

ELEVATION TOP DAM: *118.0*

EMERGENCY SPILLWAY:

a. Elevation *111.9*

b. Type *Earth/ rock channel*

c. Width *550 ft.*

d. Length *600 ft. along centerline*

e. Location Spillover *Through right abutment*

f. Number and Type of Gates *None*

PRINCIPAL SPILLWAY:

a. Type *Reinforced concrete 15'X 5' riser, 60 inch conduit*

b. Location *approximately 300 ft. from right abutment*

c. Entrance inverts *102.5 ungated; 88 and 90, gated*

d. Exit inverts *70*

e. Emergency draindown facilities *entrance invert in tower at 71.0*

HYDROMETEOROLOGICAL GAGES:

a. Type *None*

b. Location

c. Records

MAXIMUM NON-DAMAGING DISCHARGE: *2000 cfs*

DAM SAFETY ANALYSIS
HYDROLOGIC/HYDRAULIC DATA

Date: 6/19/78
By: MFB
Sheet: 2 of 6

DAM Core Creek Nat. ID No. PA00802 DER No. 9-172

	ITEM/UNITS	Permit/Design Files (A)	Calc. from Files/Other (B)	Calc. from Observations (C)
1.	Min. Crest Elev., ft.		118.0 ft.	
2.	Freeboard, ft.			
3.	Spillway(1) Crest Elev, ft.		102.5 ft	
3a.	Secondary(2) Crest Elev, ft.		111.9 ft.	
4.	Max. Pool Elev., ft.	118 (PMF)		
5.	Max. Outflow(3), cfs	23,987 cfs		
6.	Drainage Area, mi²	9.57 mi²	9.57 mi²	9.62 mile²
7.	Max. Inflow(4), cfs		29,732 cfs	
8.	Reservoir Surf. Area	150 Ac. @ 102.5	150 Ac. @ 102.5	
9.	Flood Storage(5)	2086 Ac.-Ft	2086 Ac.-Ft	
10.	Inflow Volume, ft³			

Reference all figures by number or calculation on attached sheets:

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

NOTES:

(1) Main emergency spillway.

(2) Secondary ungated spillway.

(3) At maximum pool, with freeboard, ungated spillways only.

(4) For columns B, C, use PMF.

(5) Between lowest ungated spillway and maximum pool.

Date: 6/19/77
By: MFB
Sheet: 3 of 6

HYDROLOGIC/HYDRAULIC CALCULATIONS (cont.)

Item (from sheet 2)	Source
4A, 5A, 6A, 8A, 9A	Application Report dated March 19, 1975
1B, 3B, 3aB, 6B, 8B, 9B	As Built Drawings - the construction drawings with corrections
7B	See sheet 6
6C	USGS Maps Langhorne (1975) Lambertville (1975)

State PENNSYLVANIA	Project NESHAMINY		Sheet 4 of 6
By H.L.W. Date 10/21/68	Checked By	Date	Job No. PA-620
Subject WORK PLAN - DESIGN COMPARISON			Sheet 1 of

ITEM	UNIT	WORK PLAN	DESIGN	COMMENTS
DRAINAGE AREA	SQ MI.	9.57	9.57	
STORAGE CAPACITY				
SEDIMENT (INC AERATED)	AC.FT.	261	260.7	
BENEFICIAL	AC.FT.	1215	1215	changed to
RETARDING	AC.FT.	1965	~~1865~~	← 2086 by SCS
TOTAL	AC.FT.	~~34,440~~ 3441	33387	
BETWEEN HIGH & LOW S.	AC.FT.			
SURFACE AREA				
NORMAL POOL	ACRE	147	150	changed to
RETARDING POOL	ACRE	293	~~270~~	← 295 by SCS
DESIGN HIGH WATER	ACRE		332	
VOLUME OF FILL	CU.YD.	150,000		
TOP OF DAM ELEV.	FEET	117.5	118.0	
MAX. HEIGHT OF DAM	FEET	46.5	46.8	
EMERGENCY SPILLWAY				
CREST ELEVATION	FEET	110.8	111.9	
BOTTOM WIDTH	FEET	550	550	
TYPE	—	SOD	SOD	
PERCENT CHANCE OF USE	—	1.0	1.0	
AVE. CURVE NO. COND. II	—	82	82	
EM. SP. HYDROGRAPH				
STORM RAINFALL - 6 HR.	IN.	10.5	10.5	from:
STORM RUNOFF	IN.	8.26	8.26	Preliminary Design
VELOCITY OF FLOW - V	FPS	6.2	7.2	Report - Dam PA-620-
PEAK DISCHARGE RATE	CFS	3,200	5,034	Neshaminy Creek
MAX. WATER SURFACE EL.	FEET	113.2	114.0	Watershed
FREEBOARD HYDROGRAPH				by
STORM RAINFALL - 6 HR.	IN.	26	26.0	E.H. Bourquard Assoc.
STORM RUNOFF	IN.	23.54	23.54	Pickering, Corts &
VELOCITY OF FLOW - V	FPS	12.0	13.3	Summerson, Inc.
PEAK DISCHARGE RATE	CFS	22,500	23,987	Justin & Courtney
MAX. WATER SURFACE EL.	FEET	117.5	118.0	
PRINCIPAL SPILLWAY				
RISER SIZE	FT.		5' x 15'	
MAX. LOW STAGE FLOW	CFS	611	597	
ORIFICE SIZE	FT.			
MAX. HIGH STAGE FLOW	CFS			
PIPE SIZE	DIA		60"	
CAPACITY EQUIVALENTS				
TOTAL SEDIMENT VOL.	IN.	0.51	0.51	
RETARDING STORAGE	IN.	3.82	4.10	
EM. SPILLWAY STORAGE TO TOP OF DAM	IN.	4.7	4.37	
CLASS OF STRUCTURE	—	C	C	
CONSTRUCTION COSTS				

E. S. DESIGN AND FREEBOARD ROUTINGS.

P4620 NESHAMINY W.S. CL [illegible]

CURVE NO. 82. TC [illegible].92 STORM DURATION 6.00

EMER. SPW. RAINFALL 10.[illegible]0 FREEBOARD RAINFALL 26.00

CASE NO. 1. DRAINAGE AREA 9.57 EMER. SPW. CREST 111.9

BO1 550. L1 300. BO2 0. L2 0. BO3 0. L3 0.

ELEVATION	STORAGE	CFS	CFS	CFS
102.50	1476.	0.	0.	0.
103.30	1630.	87.	0.	0.
104.30	1860.	250.	0.	0.
105.30	2000.	451.	0.	0.
106.30	2200.	563.	0.	0.
111.20	3339.	602.	0.	0.
112.20	3550.	1127.	0.	0.
112.70	3800.	1835.	0.	0.
113.20	4000.	2817.	0.	0.
113.70	4150.	4075.	0.	0.
114.20	4300.	5596.	0.	0.
114.70	4500.	7284.	0.	0.
115.20	4650.	9210.	0.	0.
115.70	4900.	11361.	0.	0.
116.20	5050.	13675.	0.	0.
116.70	5300.	16263.	0.	0.
117.20	5450.	18907.	0.	0.
117.70	5650.	21826.	0.	0.
118.20	5950.	24964.	0.	0.
118.70	6150.	28213.	0.	0.
119.20	6300.	31571.	0.	0.
120.00	6637.	35000.	0.	0.

Computer input for freeboard routings to determine top of dam elevation. Note Elevation-Storage and Elevation-Discharge data is carried to elevation 120. Also note that Elevation-Storage values differ somewhat from those in Section 1.3 of the text.

Reference: Preliminary Design Report (See Sheet 4)

FREEBOARD ROUTING

Computer routing output to determine top of dam elevation.

Reference: Preliminary Design Report
(See Sheet 4)

SHEET 6 OF 6

FREEBOARD ROUTING.

PA620 NESHAMINY W.S. CL

BC = 55(L = 300.

TIME	INFLOW	AVE IN	OUTFLOW	ELEV.
0.25	14.	7.	0.	102.50
0.50	28.	21.	0.	102.50
0.75	93.	55.	0.	102.50
1.00	206.	145.	2.	102.52
1.25	329.	267.	5.	102.55
1.50	743.	536.	11.	102.60
1.75	1250.	997.	23.	102.71
2.00	1925.	1588.	41.	102.88
2.25	3622.	2773.	73.	103.17
2.50	5319.	4470.	133.	103.58
2.75	7795.	6557.	226.	104.15
3.00	10988.	9392.	459.	105.37
3.25	14179.	12583.	565.	106.57
3.50	17811.	15995.	576.	107.94
3.75	21490.	19650.	589.	109.64
4.00	24730.	23110.	851.	111.67
4.25	26862.	25796.	2509.	113.04
4.50	28994.	27928.	6607.	114.50
4.75	29719.	29357.	10896.	115.59
5.00	29732.	29726.	15137.	116.48
5.25	29694.	29713.	16951.	117.20
5.50	28546.	29120.	21615.	117.66
5.75	27399.	27972.	22909.	117.87
6.00	26098.	26748.	23658.	117.99
6.25	24590.	25344.	23987.	118.04
6.50	23082.	23836.	23957.	118.03

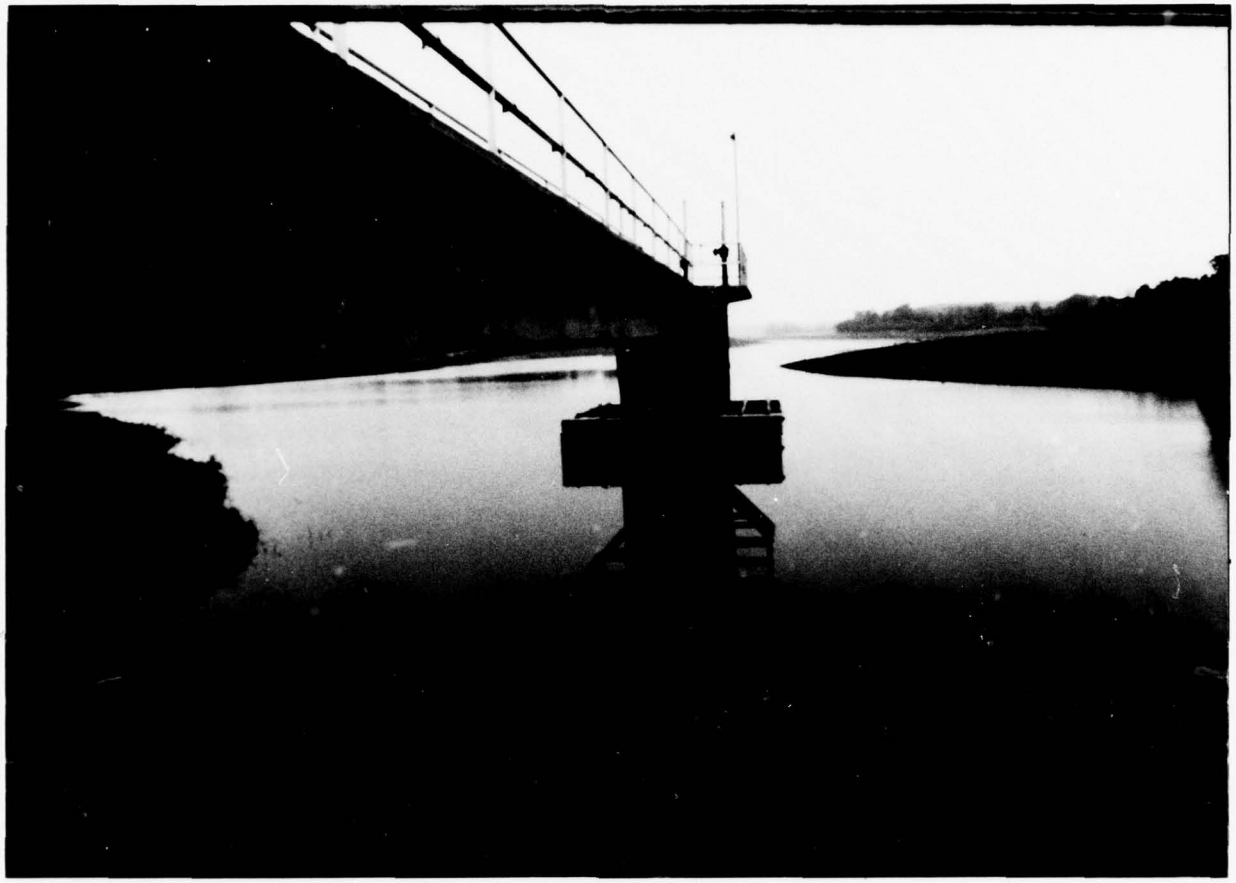
ELEV. TOP OF DAM

VOLUME CHECK AT HP IS 0.10 PERCENT.
COMPUTED HP 6.14

From Preliminary Design Report
(See Sheet 4)

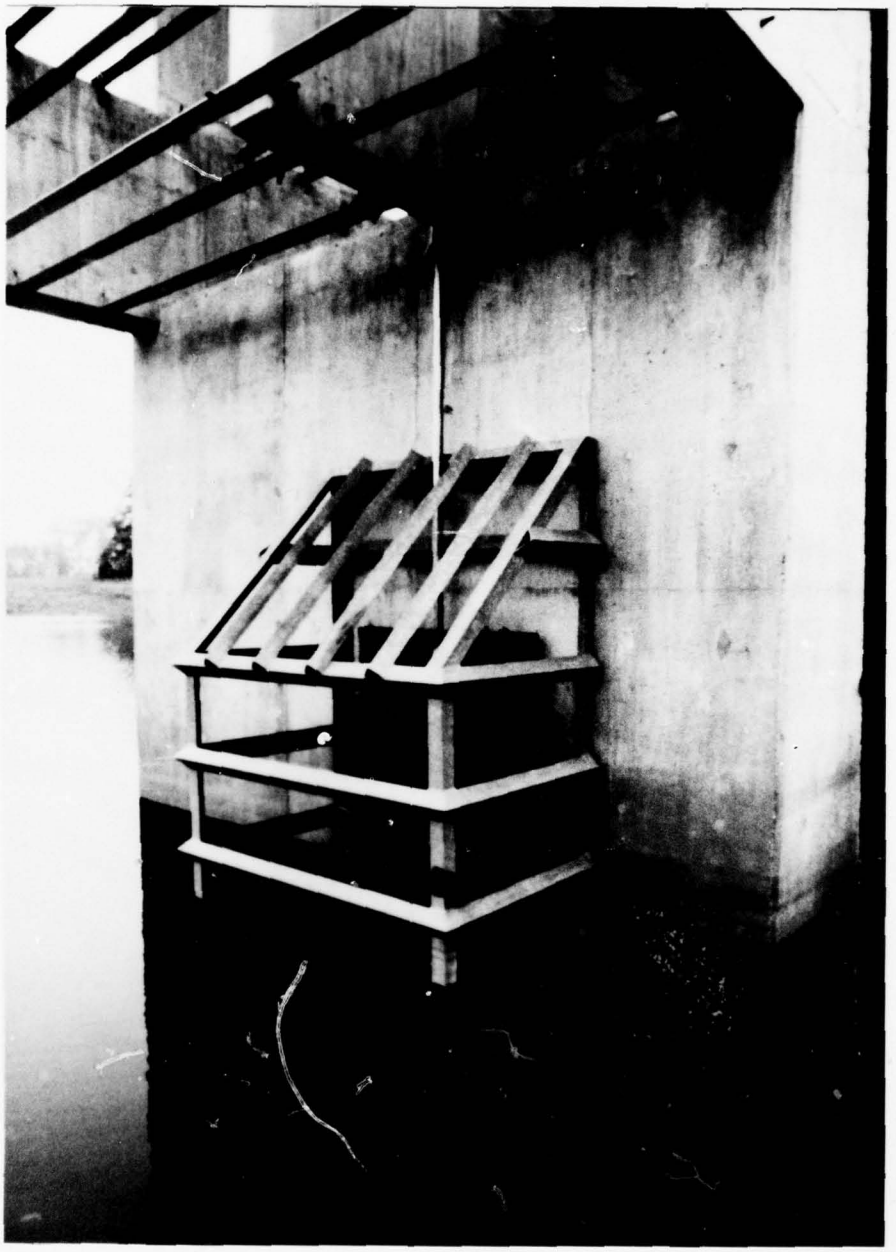
APPENDIX

D



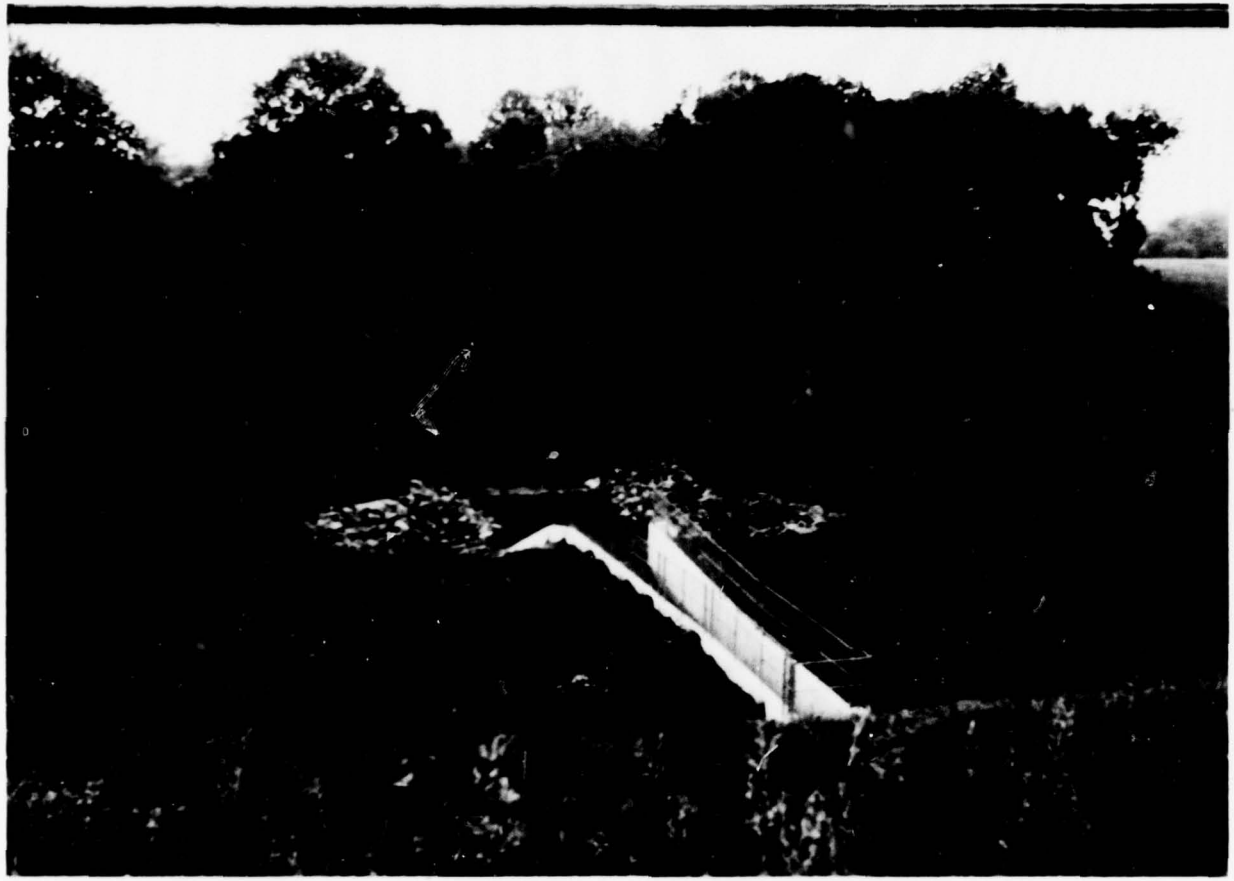
VIEW OF INTAKE RISER. TWO LOWER GATED INTAKES CAN BE SEEN WITH TRASH RACKS.

PHOTO NO. 1



CLOSE-UP VIEW OF LOWER INTAKE SLUICE GATE.

PHOTO NO. 2

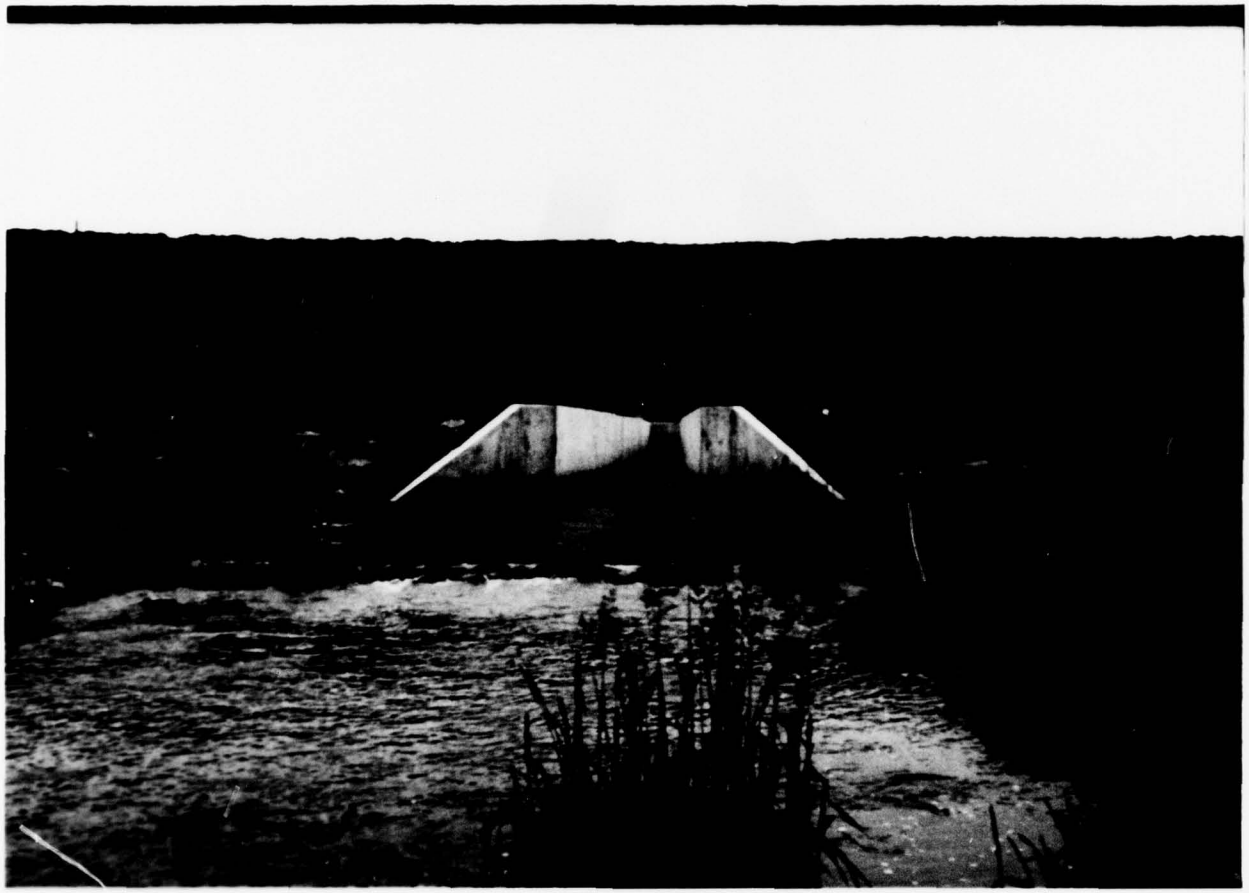


VIEW FROM CREST LOOKING AT SAF-TYPE STILLING BASIN.

PHOTO NO. 3

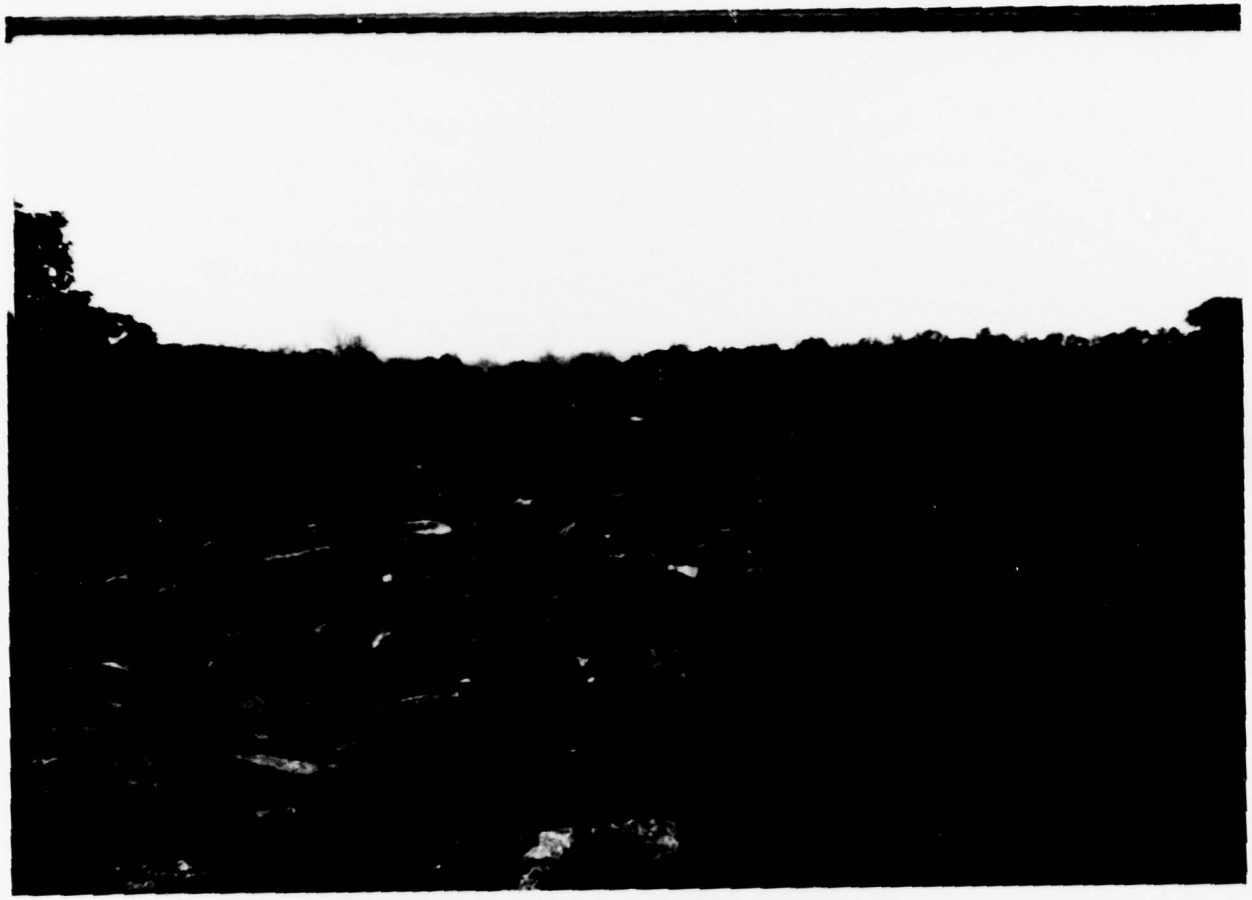
LOOKING DOWNSTREAM INTO SAF STILLING BASIN.

PHOTO NO. 4



VIEW LOOKING UPSTREAM AT SAF STILLING BASIN.

PHOTO NO. 5



VIEW LOOKING FROM LEFT ABUTMENT OF EMERGENCY SPILLWAY TOWARDS RIGHT ABUTMENT. RESERVOIR IS LOCATED ON THE RIGHT OUTSIDE OF CAMERA VIEW.

PHOTO NO. 6

VIEW LOOKING DOWNSTREAM AT DISCHARGE AREA OF EMERGENCY SPILLWAY. FLOW IS DISCHARGED INTO WOODS.

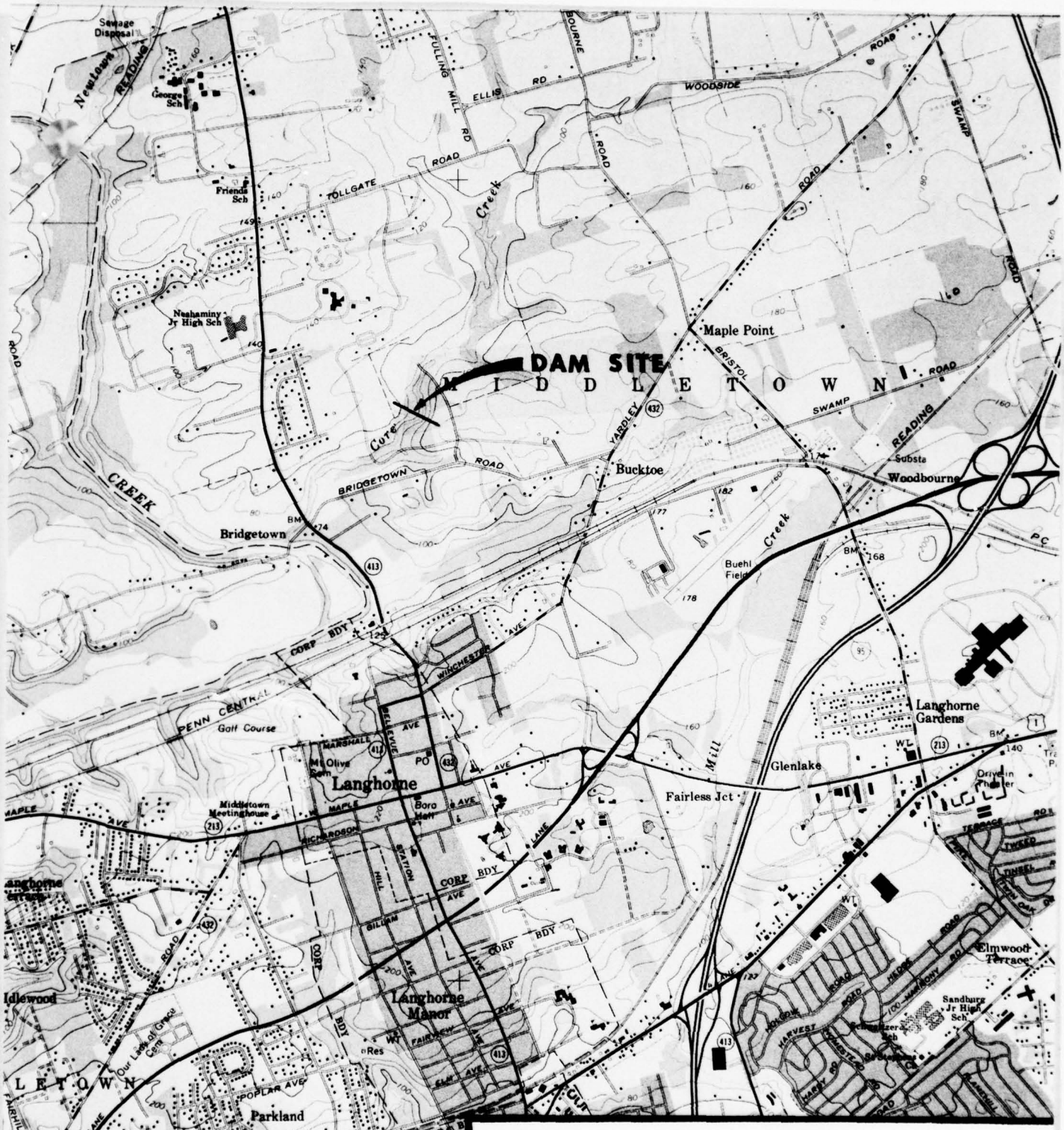
PHOTO NO. 7.

VIEW OF RIPRAP ON UPSTREAM SLOPE. NOTE FINE AGGREGATE FILTER LAYER BETWEEN RIPRAP.

PHOTO NO. 8

APPENDIX

E



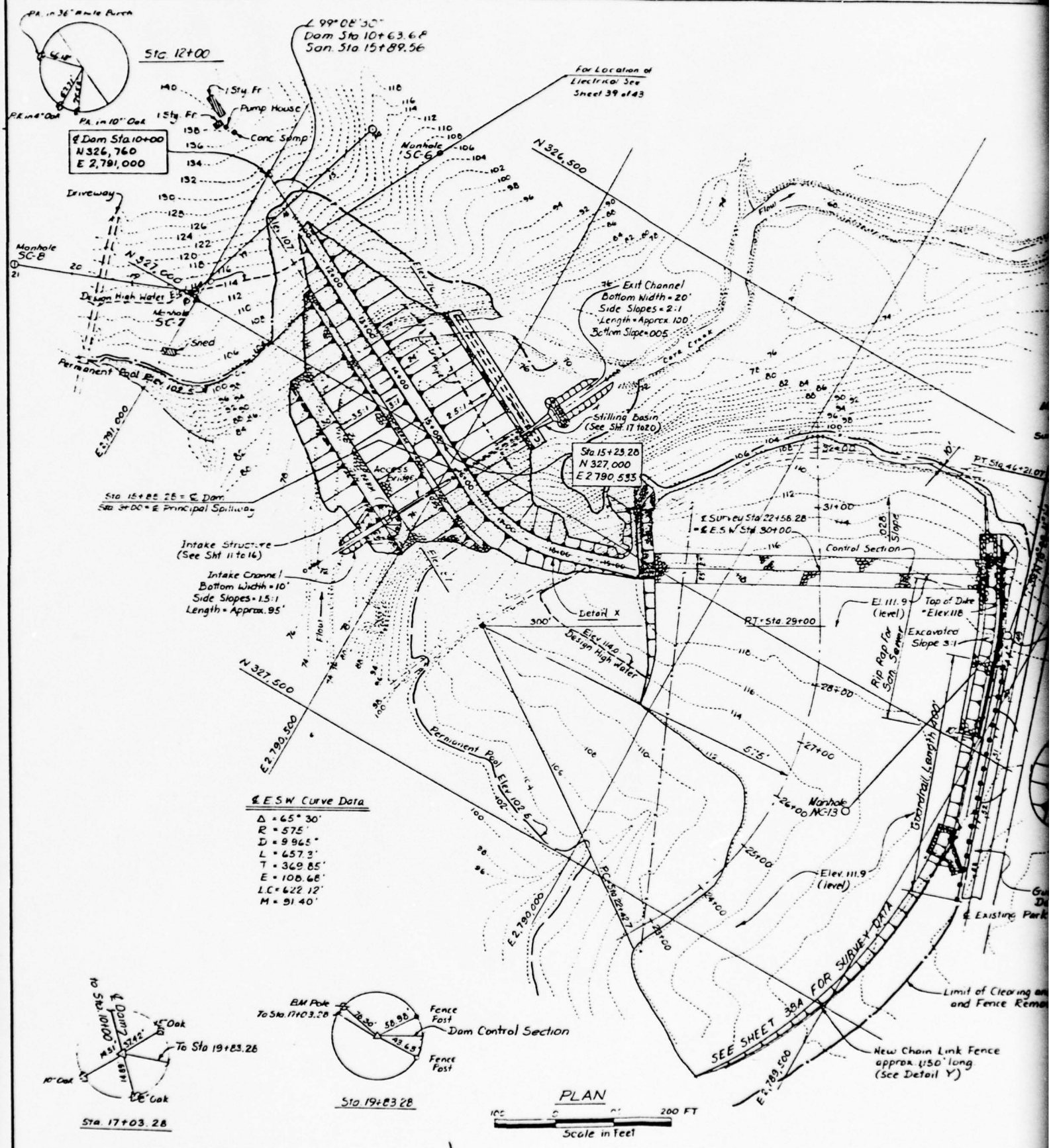
REGIONAL LOCATION MAP

CORE CREEK DAM

NAT. ID NO. PA.00802 BUCKS COUNTY

DATA OBTAINED FROM U.S.G.S. QUAD SHEET ENTITLED LANGHORNE

PLATE 1

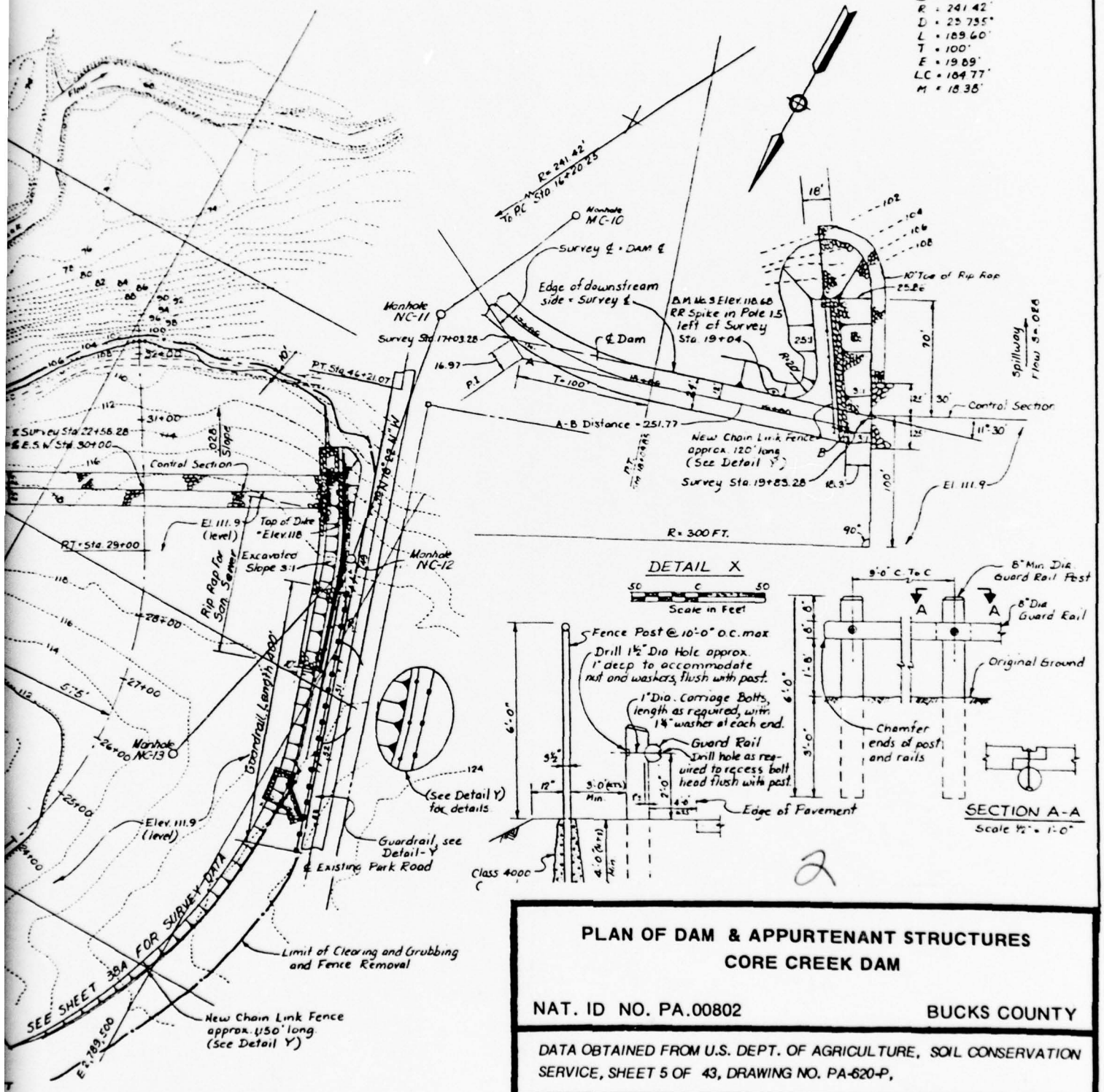

Sta. 12+00
℄ Dam Sta 10+00
N 326,760
E 2,791,000
Δ 99°08'30"
Dam Sta 10+63.68
San. Sta 15+89.56
For Location of Electrical See Sheet 39 of 43
1 Sty. Ft.
Pump House
Conc. Sump
Manhole SC-6
N 326,500
Driveway
Manhole SC-8
N 327,000
Design High Water El.
Manhole SC-7
Shed
Permanent Pool Elev. 102.5
E 2,791,000
Sta 15+88.28 = ℄ Dam
Sta 31+00 = ℄ Principal Spillway
Intake Structure (See Sht 11 to 16)
Intake Channel
Bottom Width = 10'
Side Slopes = 1.5:1
Length = Approx. 95'
Elev. 107
Elev. 76
Flow
Exit Channel
Bottom Width = 20'
Side Slopes = 2:1
Length = Approx. 100'
Bottom Slope = 005
Cane Creek
Stilling Basin (See Sht 17 to 20)
Sta 15+25.28
N 327,000
E 2790.593
Access Bridge
℄ Survey Sta 22+58.28
= ℄ E.S.W Sta 30+00
Control Section
PT Sta 46+21.07
Detail X
300'
Elev. 114.0 Design High Water
Elev. 111.9 (level)
Top of Dike Elev. 118
PT Sta 29+00
Excavated Slope 3:1
Rip Rap for Spillway
N 327,500
E 2,790,500
Permanent Pool Elev. 102 ℄
℄ E S W Curve Data
Δ = 65° 30'
R = 575'
D = 9.965°
L = 657.3'
T = 369.85'
E = 108.68'
LC = 622.12'
M = 91.40'
Manhole NC-13
Guardrail Length 200'
Elev. 111.9 (level)
PC Sta 22+47.7
E 2,790,000
℄ Existing Park
FOR SURVEY DATA
SEE SHEET 38A
Limit of Clearing and Fence Remo
New Chain Link Fence approx. 1:50' long (See Detail Y)
E 2,789,500
℄ Dam 2
To Sta 19+83.28
Oak
10" Oak
Sta. 17+03.28
BM Pole
To Sta. 17+03.28
Fence Post
Dam Control Section
Sta 19+83.28
PLAN
100 0 100 200 FT
Scale in Feet

Notes

1. For Location of Drill Holes See Sheet No 2
2. For Logs of Drill Holes, See Sheets 25 thru 34
3. For Location of Borrow Area See Sheet No 2
4. For Legend, Refer to sheet No 2
5. For San Sewer Details and Location, See Sheet 38A Thru 38E.

℄ Dam - Curve Data

Δ = 45°
R = 241.42'
D = 23.735°
L = 189.60'
T = 100'
E = 19.89'
LC = 184.77'
M = 18.38'



DETAIL X

SECTION A-A
Scale ½" = 1'-0"

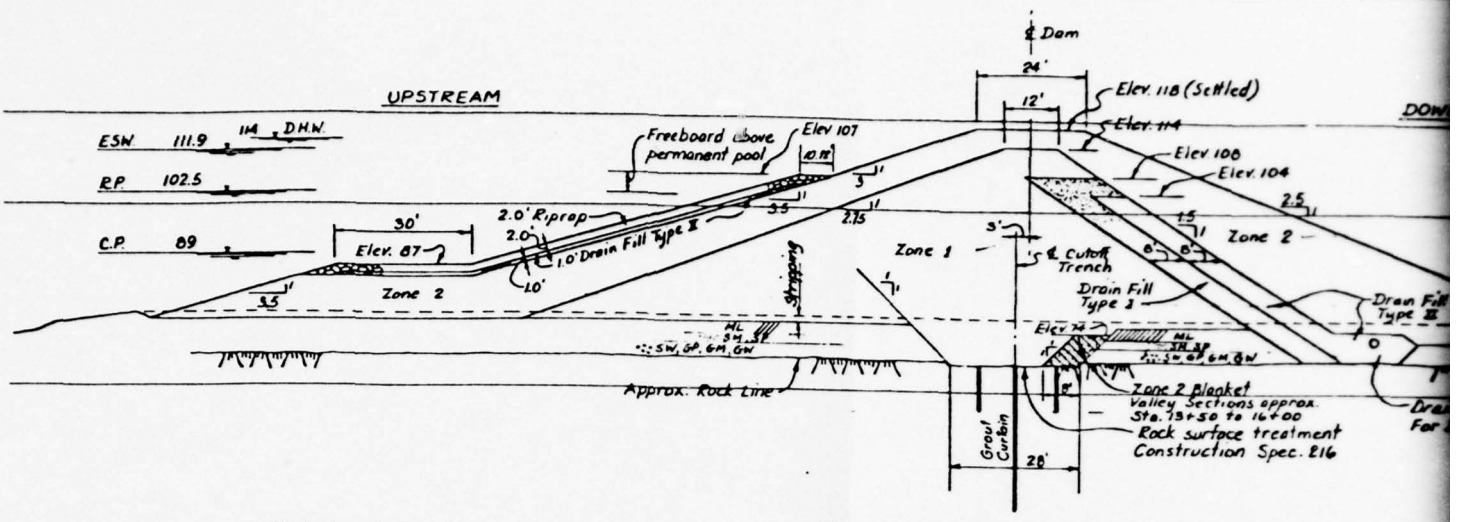
2

PLAN OF DAM & APPURTENANT STRUCTURES
CORE CREEK DAM

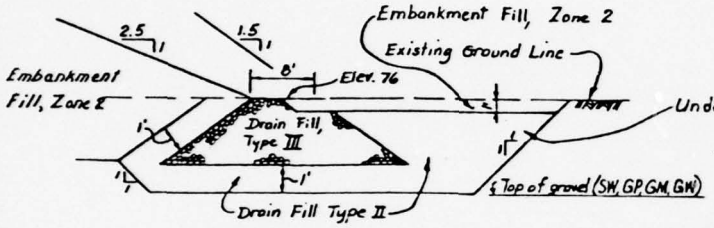
NAT. ID NO. PA.00802 BUCKS COUNTY

DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, SHEET 5 OF 43, DRAWING NO. PA-620-P,

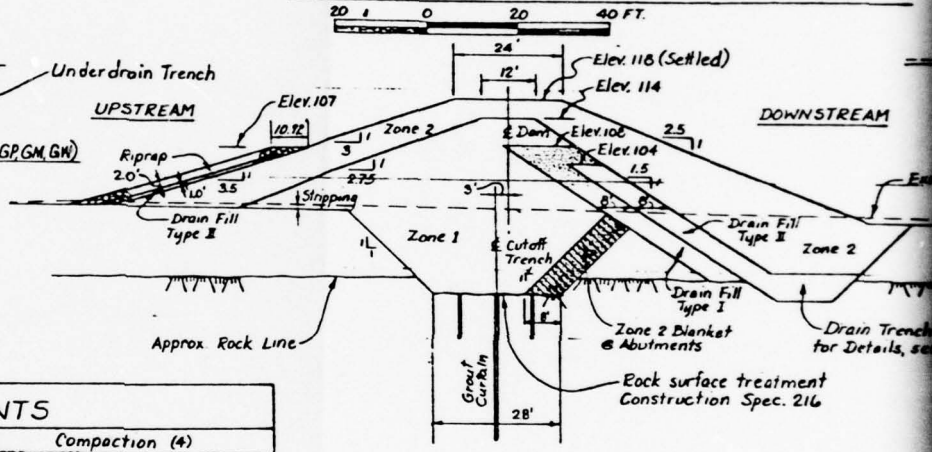
PLATE 2



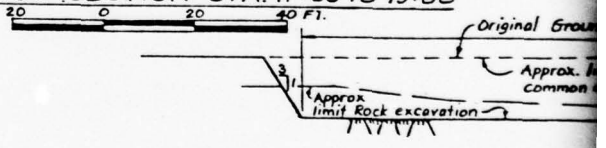
CROSS SECTION STA. FROM 13+08 ± TO 16+50 ±



DETAIL X
Scale: None



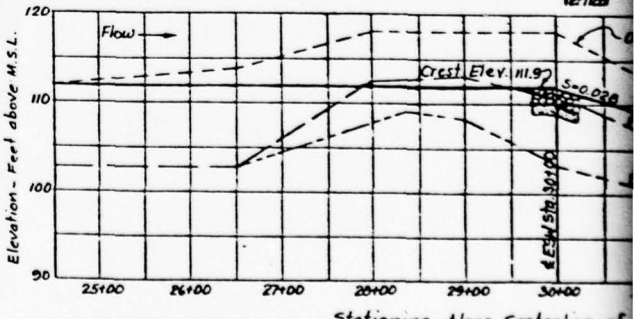
CROSS SECTION STA. 11+00 ± TO 13+08 ±



TYPICA

Horizonta

Vertical



Stationing Along Centerline of

PROFILE EMERGENCY S

EARTH FILL REQUIREMENTS

Zone	Material	Max. Rock Size (1)	Max. Lift (2)	Required Water Content (3)	Compaction (4)	
					Class	Definition
1	Clay (CL), clayey silt (ML) and Sandy Clay (SM-SC) from emergency Spillway and borrow areas as represented by test pits 136 (2.3'-6'), 115 (3'-5'), 138 (0.8'-4.6'), 211 (0.8'-5.5') and 137 (5.2'-9.5').	6"	9"	-1% percent to +2% percent of optimum	A	95% percent Max. density ASTM D-698 Method "A"
2	Silty sand from emergency spillway and borrow areas as represented by test pit 207 (6.3'-10'). SM	6"	9"	-1% percent to +2% percent of optimum	A	95% percent Max. density ASTM D-698 Method "A"
Spoil Fill Areas	Top Soil and Waste Materials	—	12"	(5)	C	See Construction specification 23

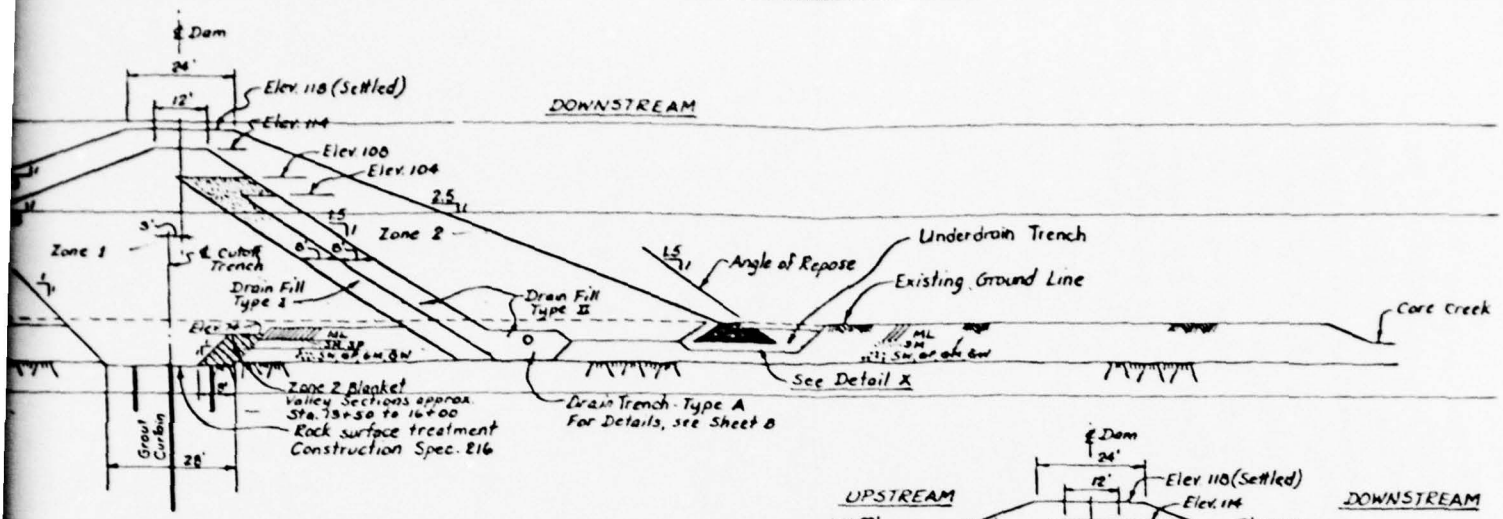
(1) For fill adjacent to structure max. rock size 3".

(2) Maximum permissible lift thickness prior to compaction.

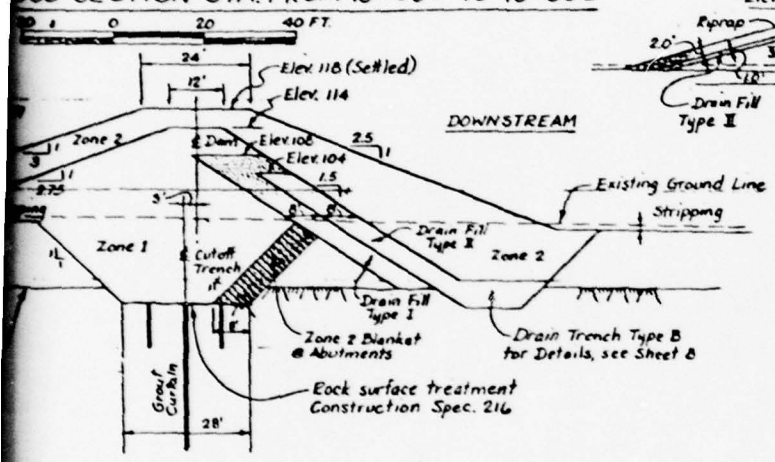
(3) Water content of fill matrix at time of compaction. Variation from water content shown may be approved by the Engineer.

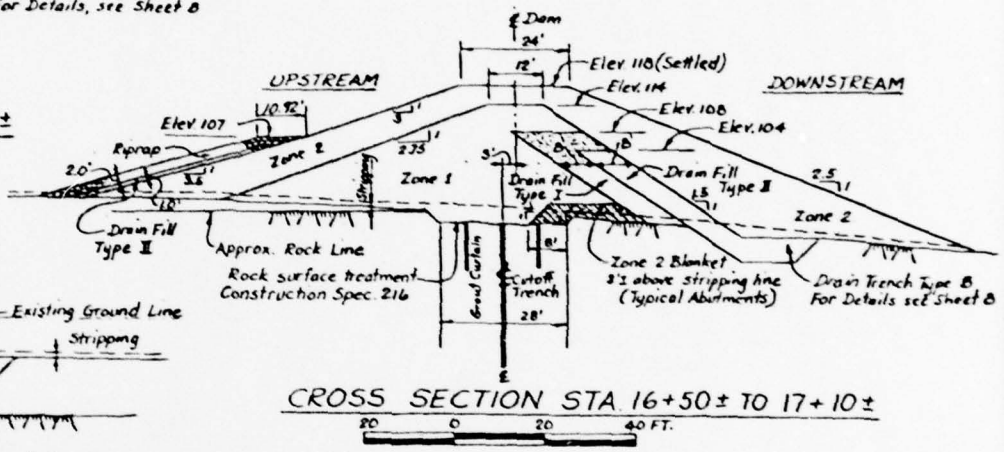
(4) For typical compaction curves, See Sheets 37 and 38.

(5) Moisture content to be approved by the Engineer.



OSS SECTION STA. FROM 13+08 ± TO 16+50 ±

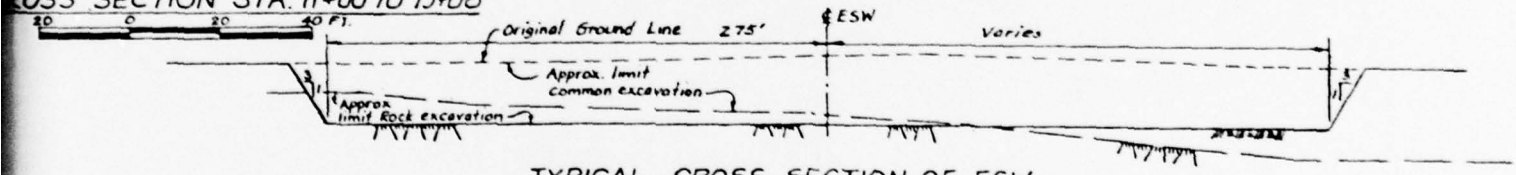




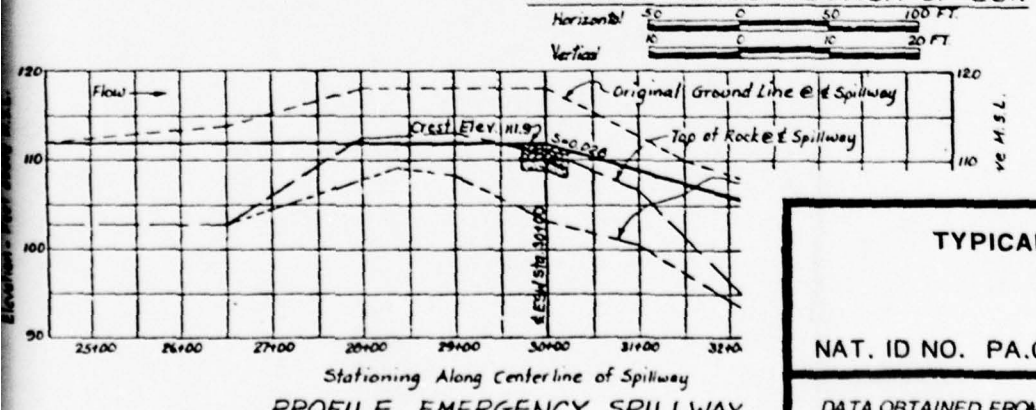
CROSS SECTION STA 16+50 ± TO 17+10 ±

20 0 20 40 FT.

ROSS SECTION STA. 11+00 ± TO 13+08 ±



TYPICAL CROSS SECTION OF ESW



Stationing Along Centerline of Spillway

PROFILE EMERGENCY SPILLWAY

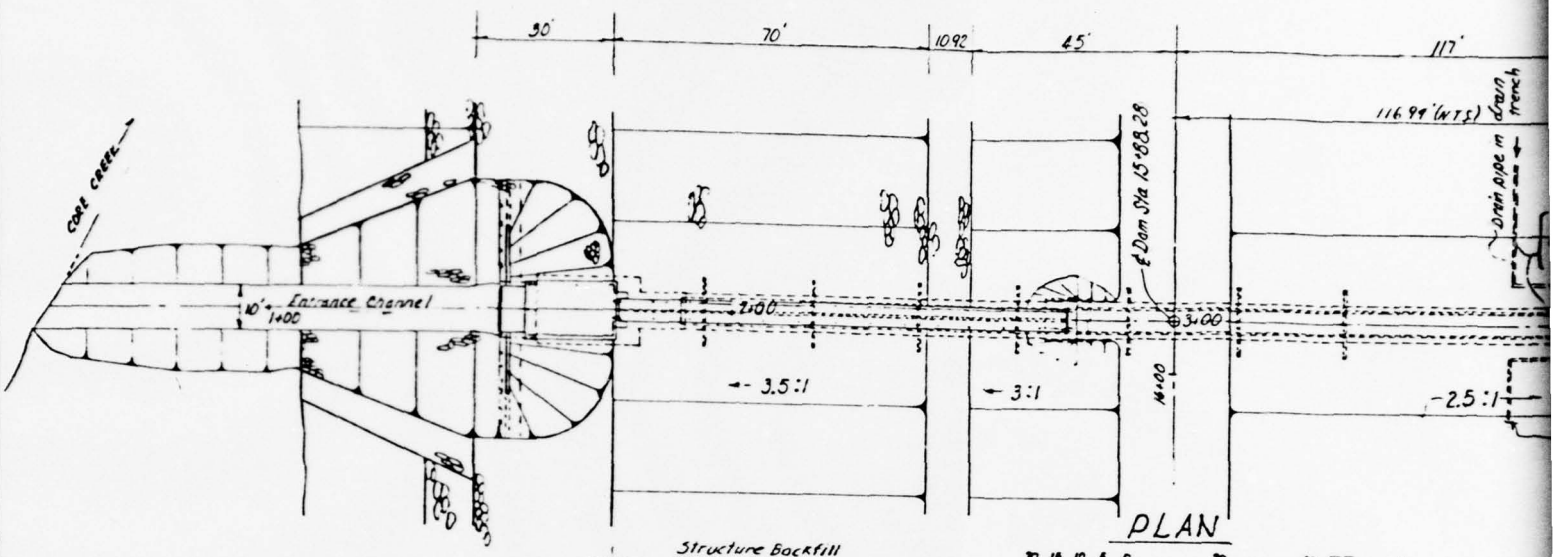
2

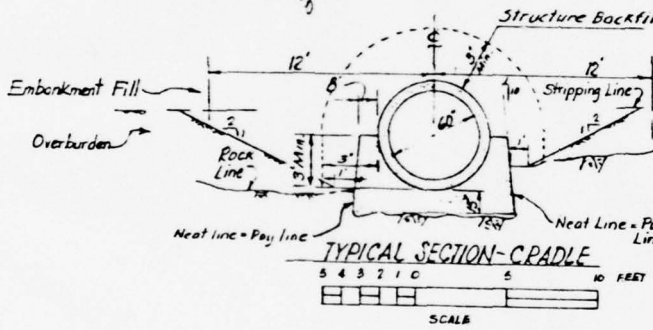
TYPICAL EMBANKMENT AND EMERGENCY SPILLWAY SECTIONS
CORE CREEK DAM

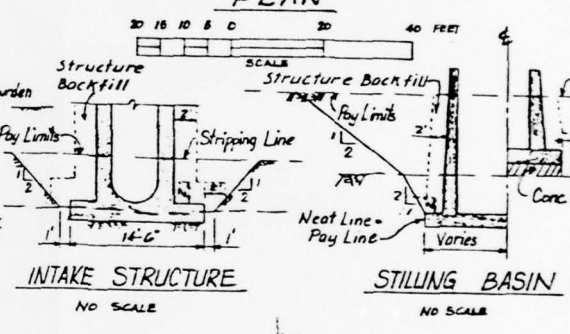
NAT. ID NO. PA.00802 BUCKS COUNTY

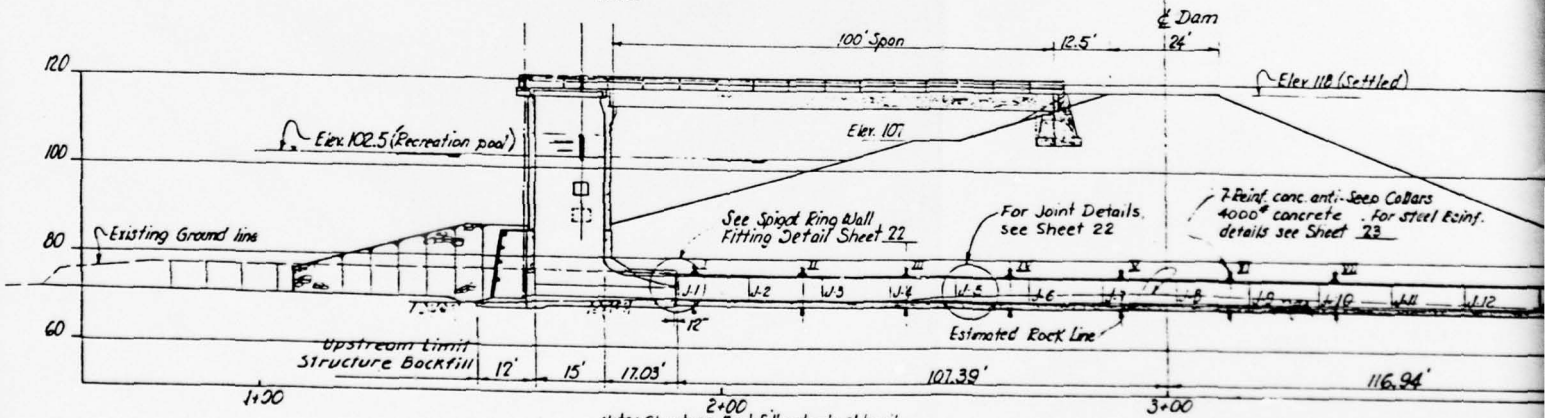
DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, SHEET 6 OF 43, DRAWING NO. PA-620-P

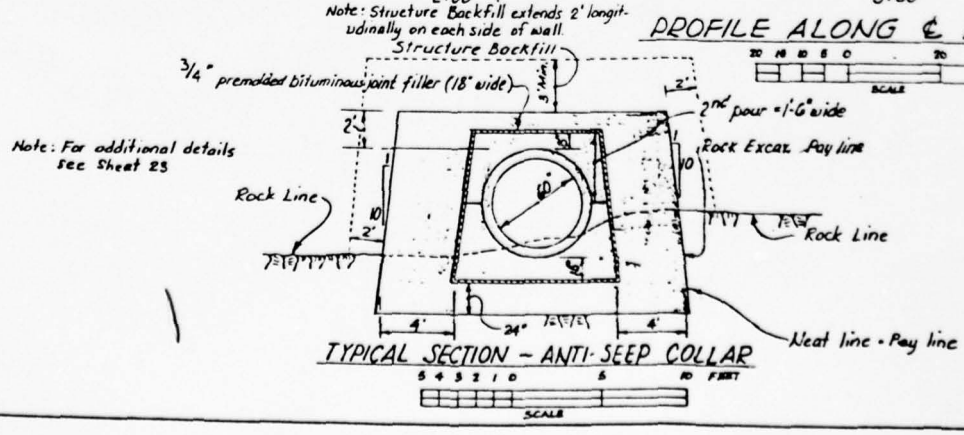
PLATE 3



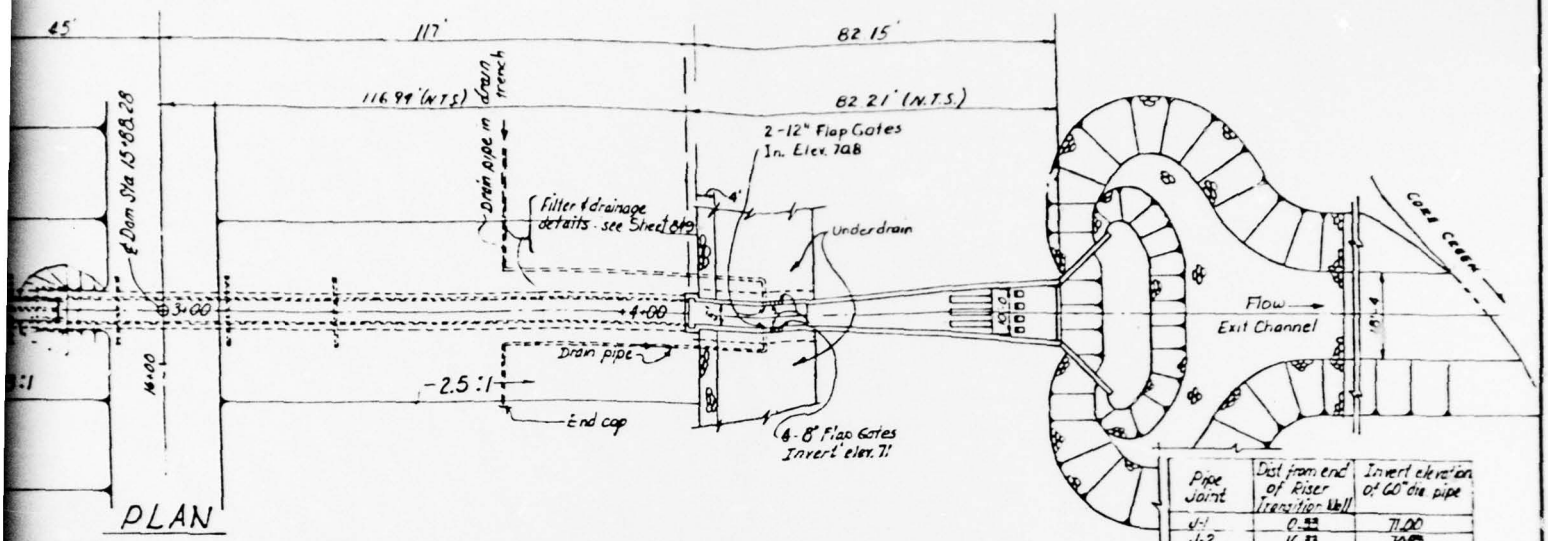


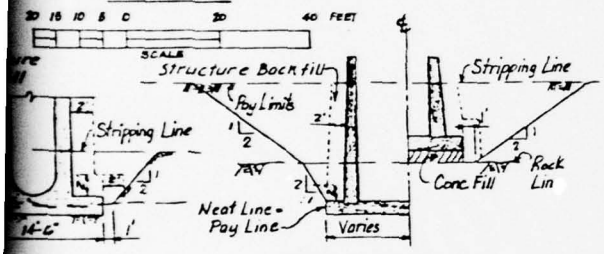






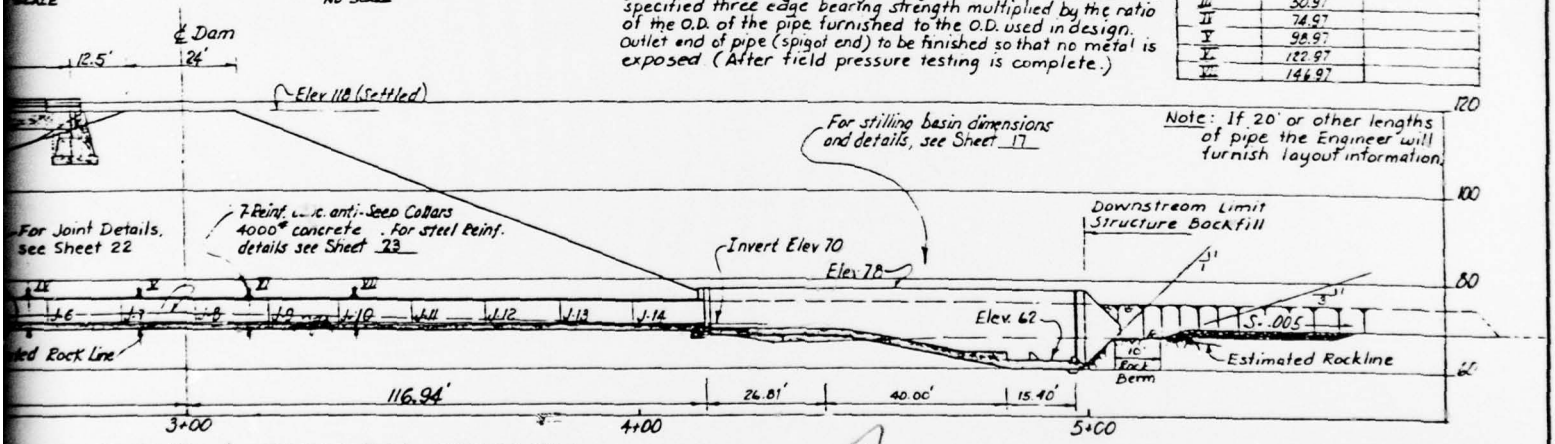
PROFILE ALONG ℄ PRINCIPAL SPILLWAY

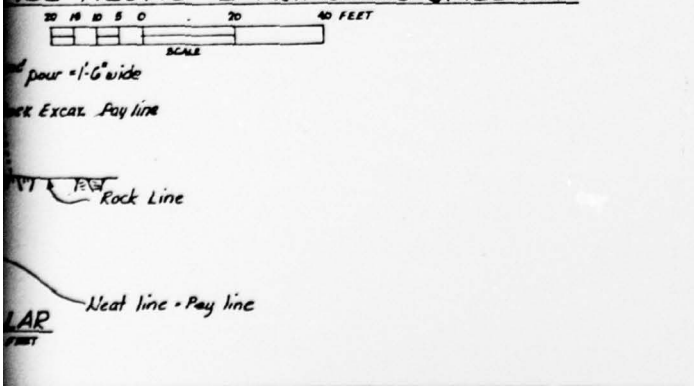




60" inside diameter reinf. conc. water pipe, Steel Cylinder type, Spec. 541
(1) Wall fitting (see detail, Sheet 22)
(14) 16'-0" Sections
Pressure Head = 41'
Load = 69,000 Lbs/Ln ft, based on O.D. of 6'-0"
Min 3 edge bearing strength for .001" crack
= 15,470 Lbs/Ln ft. for prestressed pipe AWWA C-301
Min 3 edge bearing strength for .01" crack
= 20,575 Lbs/Ln ft. for non-prestressed pipe AWWA C-300
The O.D. used in design is 72 inches. Where pipe furnished has greater O.D. the edge bearing strength must not be less than the specified three edge bearing strength multiplied by the ratio of the O.D. of the pipe furnished to the O.D. used in design.
Outlet end of pipe (spigot end) to be finished so that no metal is exposed (After field pressure testing is complete.)

Pipe Joint	Dist. from end of Riser Transition Wall	Invert elevation of 60" dia pipe
J-1	0.33	71.00
J-2	16.33	70.89
J-3	32.33	70.86
J-4	48.33	70.79
J-5	64.33	70.71
J-6	80.33	70.64
J-7	96.33	70.57
J-8	112.33	70.50
J-9	128.33	70.43
J-10	144.33	70.36
J-11	160.33	70.29
J-12	176.33	70.21
J-13	192.33	70.14
J-14	208.33	70.07
COLLAR		
I	2.97	
II	66.97	
III	50.97	
II	74.97	
I	98.97	
V	122.97	
VI	146.97	





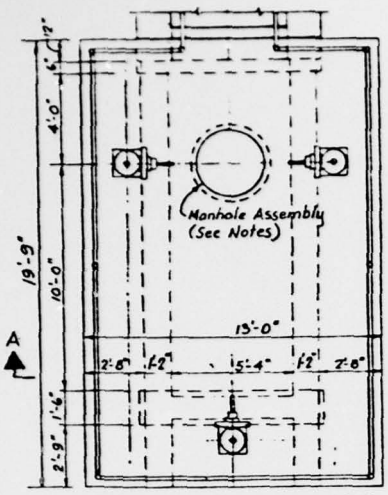
2

PRINCIPAL SPILLWAY PLAN
PROFILE AND SECTIONS
CORE CREEK DAM

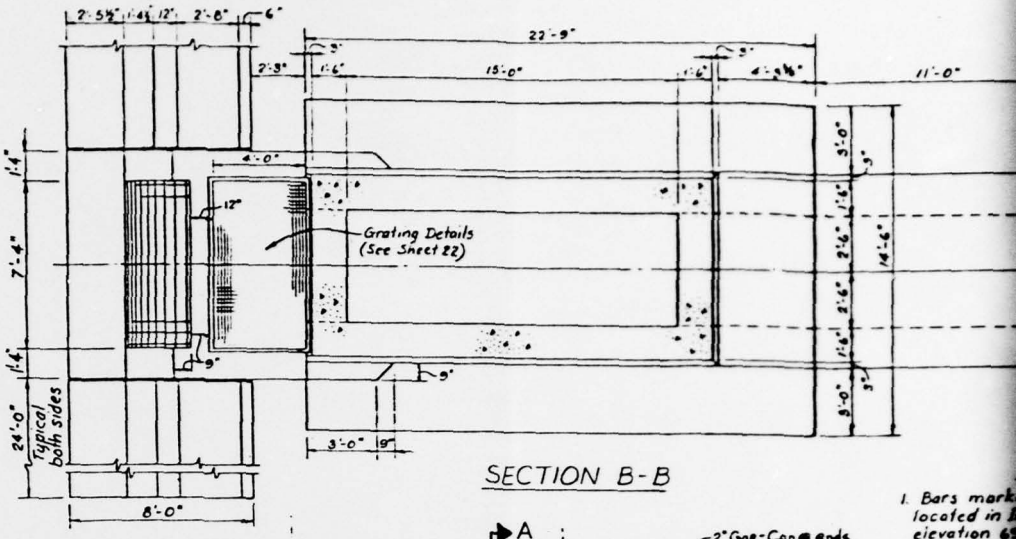
NAT. ID NO. PA.00802 BUCKS COUNTY

DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, SHEET 10 OF 43, DRAWING NO. PA-620-P

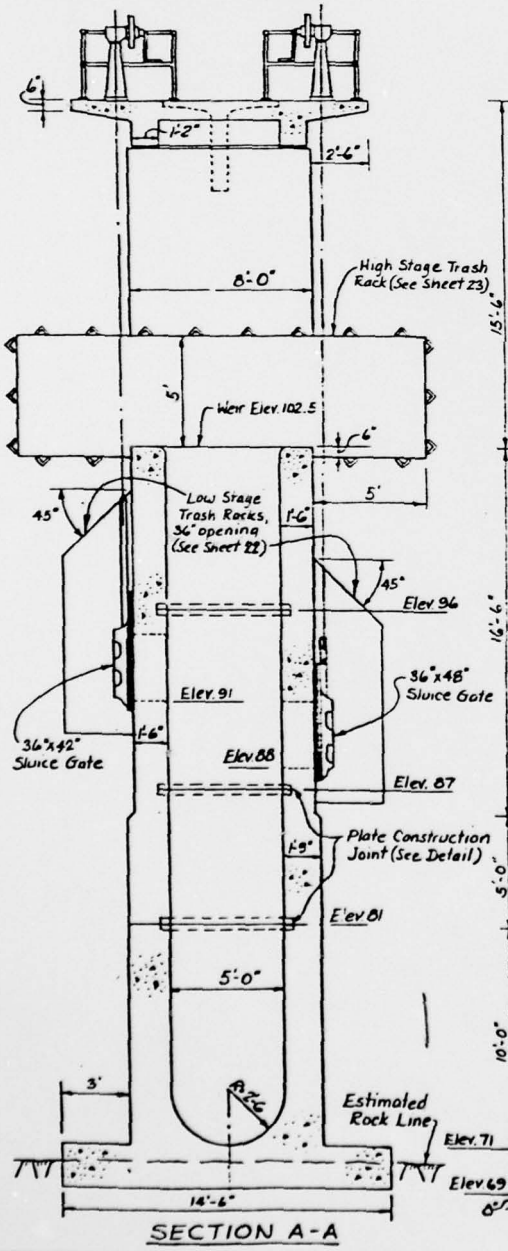
PLATE 4



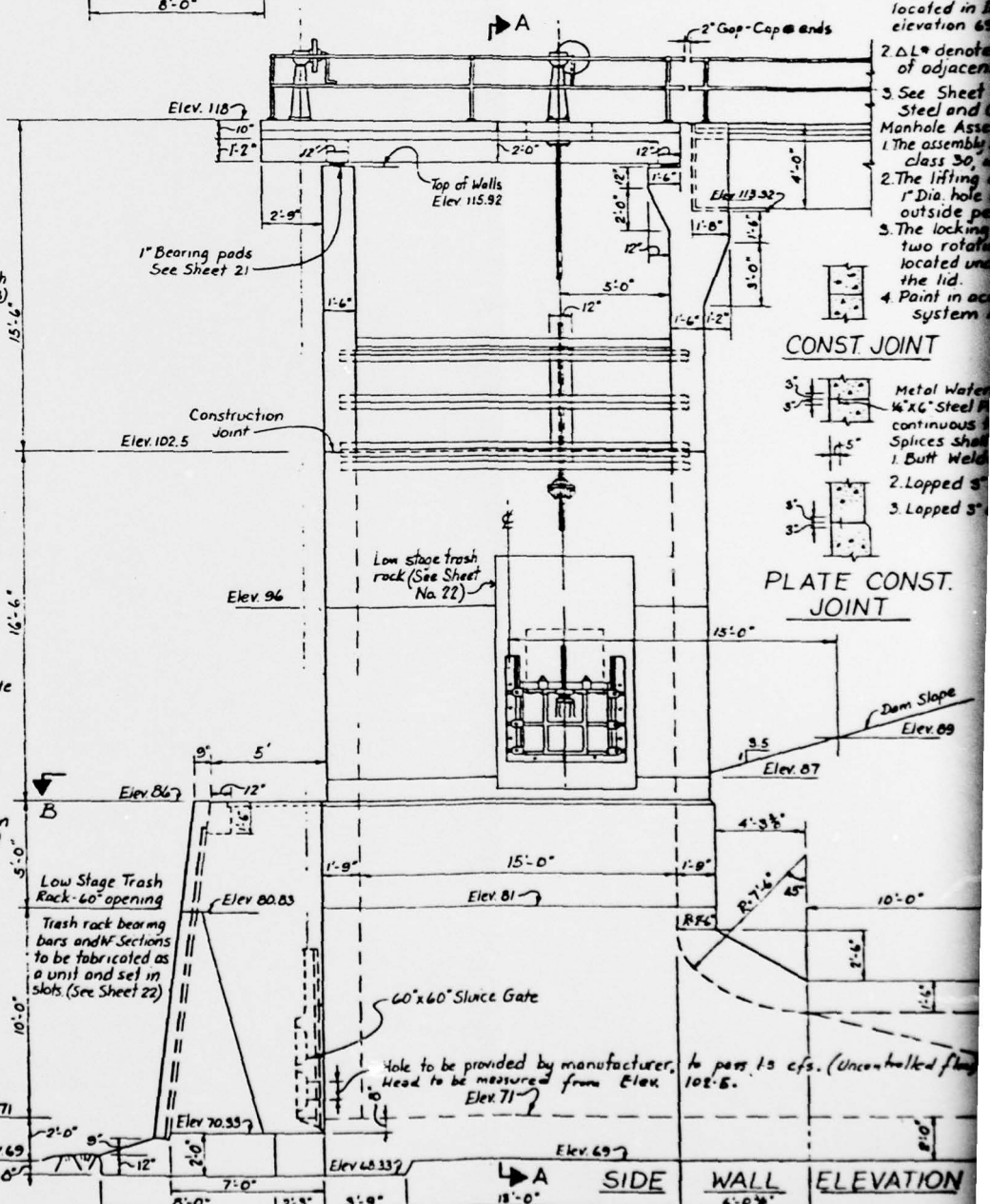
PLAN VIEW ELEV. 118



SECTION B-B



SECTION A-A



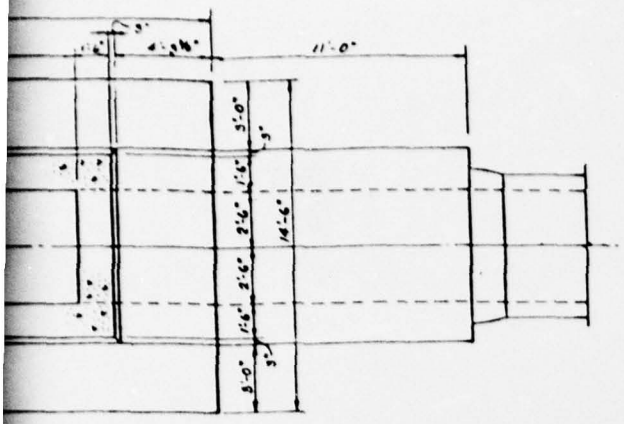
SIDE WALL ELEVATION

1. Bars mark... located in ... elevation 6...
2. ΔL* denote... of adjacen...
3. See Sheet ... Steel and ... Manhole Asse...
1. The assembly ... class 30, ...
2. The lifting ... 1" Dia. hole ... outside pe...
3. The locking ... two rotate... located und... the lid.
4. Paint in ac... system ...

CONST. JOINT

Metal Water... 1/4"x6" Steel P... continuous ... Splices shall ...
1. Butt Weld...
2. Lapped 3"...
3. Lapped 3"...

PLATE CONST. JOINT



B-B

NOTES

1. Bars marked (M7) indicate bars located in Intake Structure from elevation 69 to elevation 102.5.
2. ΔL" denotes the change in length of adjacent bars in a set.
3. See Sheet 16 for Reinforcing Steel and Concrete Quantities.

Manhole Assembly :-

1. The assembly shall be gray iron casting, class 30, with a 30" opening.
2. The lifting device shall consist of a 1" Dia. hole approx. 3" from the outside perimeter of the lid.
3. The locking device shall consist of two rotating bars with hex bolts located under opposite edges of the lid.
4. Paint in accordance with paint system A (Spec. 82).

2" Gap - Cap @ ends

Elev. 113.32

CONST. JOINT

Metal Waterstop
16"x6" Steel Plate, Spec 581
continuous thru constr. joint
Splices shall be either :-
1. Butt Welded
2. Lapped 3" and Bolted
3. Lapped 3" and welded

PLATE CONST. JOINT

15'-0"

Dam Slope

Elev. 89

3.5 : 1

Elev. 87

B

4'-3½"

10'-0"

12"

R 5'-6"

45°

2'-6"

For (S

manufacturer, to pass 15 cfs. (Uncontrolled flow)
Elev. 102.5.

60" Dia.

SIDE WALL ELEVATION

2

INTAKE STRUCTURE DETAILS
CORE CREEK DAM

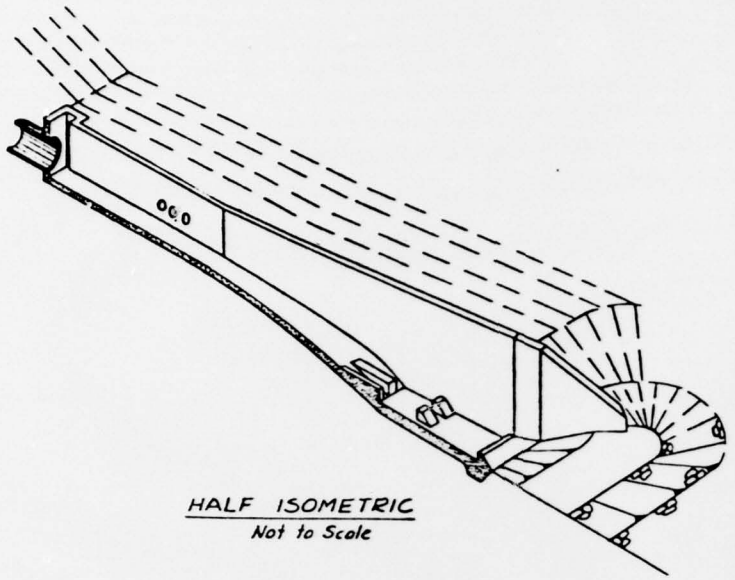
NAT. ID NO. PA. 00802 BUCKS COUNTY

DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, SHEET 11 OF 43, DRAWING NO. PA-620-P

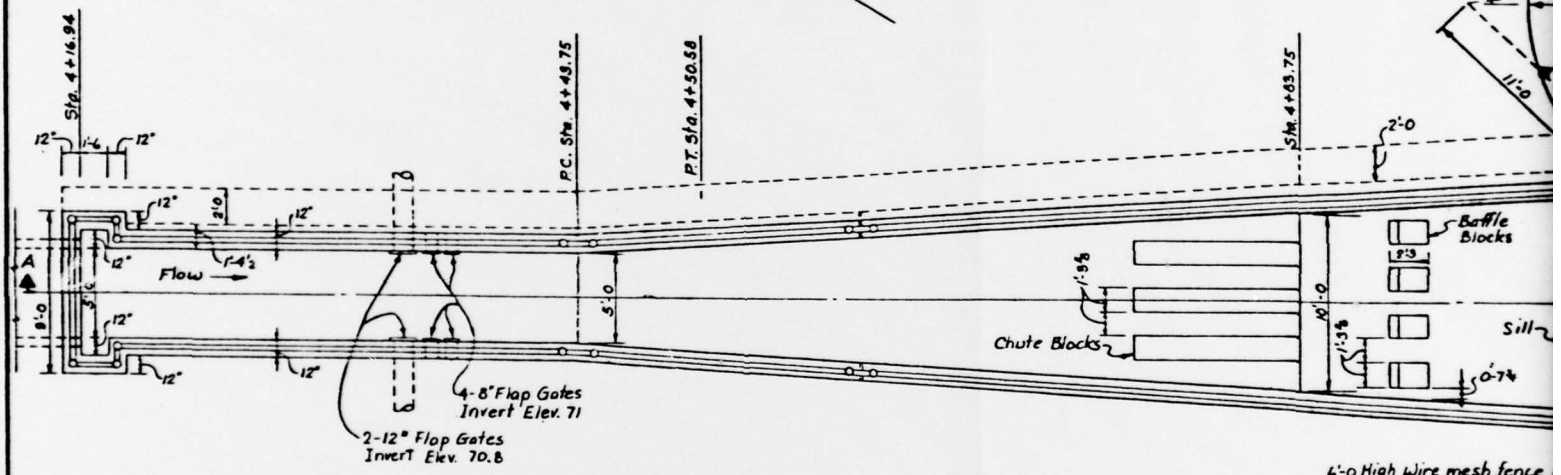
PLATE 5

NOTES

1. For Exit Channel layout data, see Table on Sheet No. 18.
2. For Sections B-B, C-C, D-D, and O-G see Sheet No. 18.

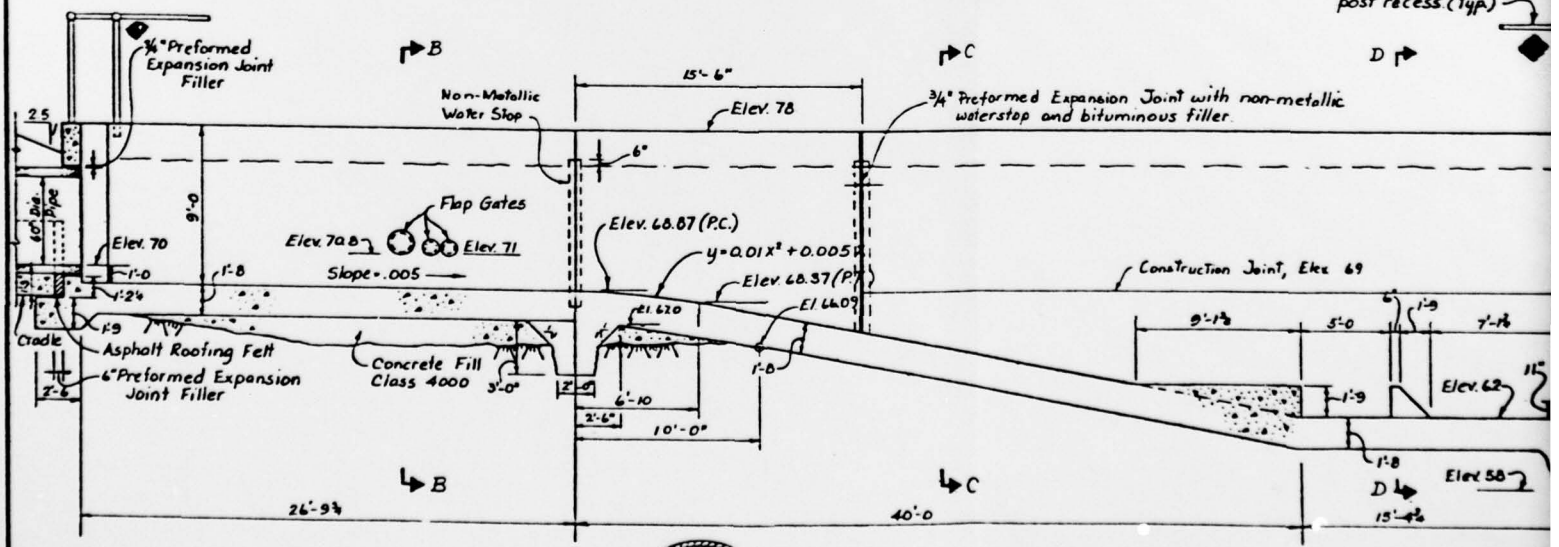


HALF ISOMETRIC
Not to Scale



PLAN

6'-0 High wire mesh fence
wall. Provide 4"ø x 9" dee
post recess. (Typ.)

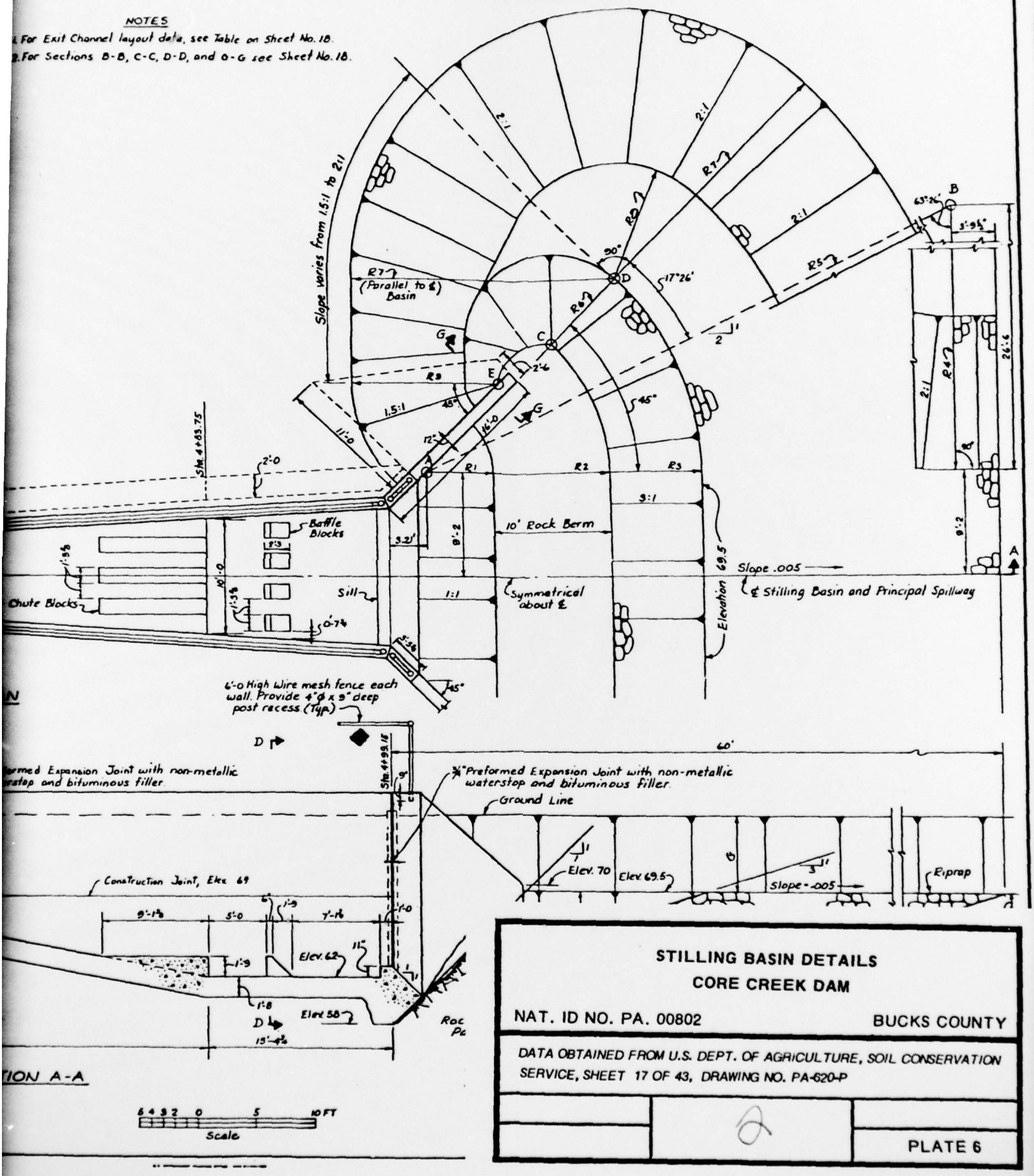


SECTION A-A

Scale 6 4 3 2 0 5 10 FT

NOTES

1. For Exit Channel layout data, see Table on Sheet No. 18.
2. For Sections B-B, C-C, D-D, and G-G see Sheet No. 18.

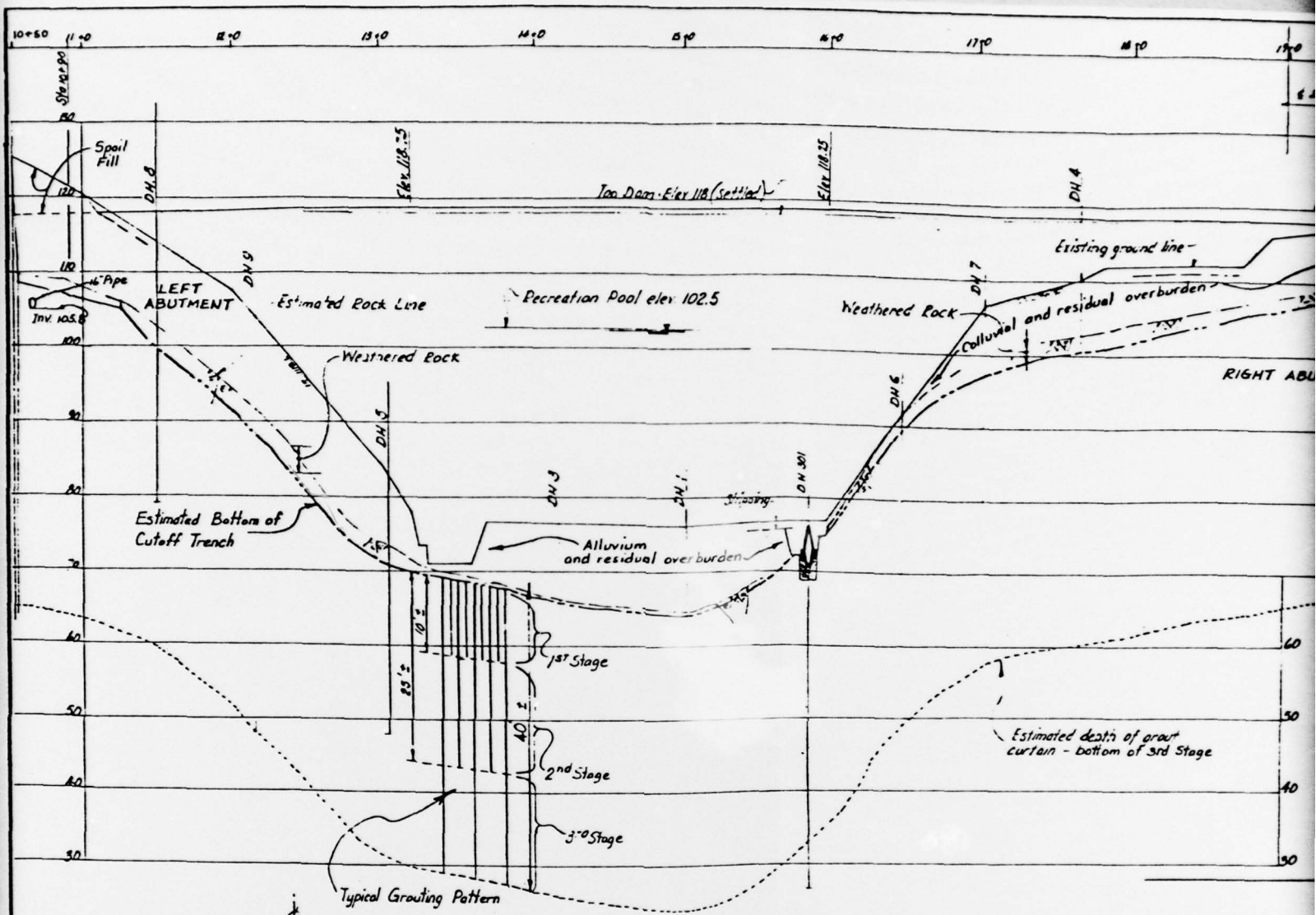


STILLING BASIN DETAILS
CORE CREEK DAM

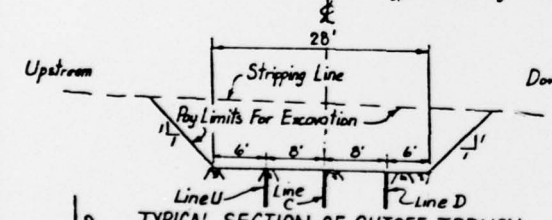
NAT. ID NO. PA. 00802 BUCKS COUNTY

DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, SHEET 17 OF 43, DRAWING NO. PA-620-P

PLATE 6

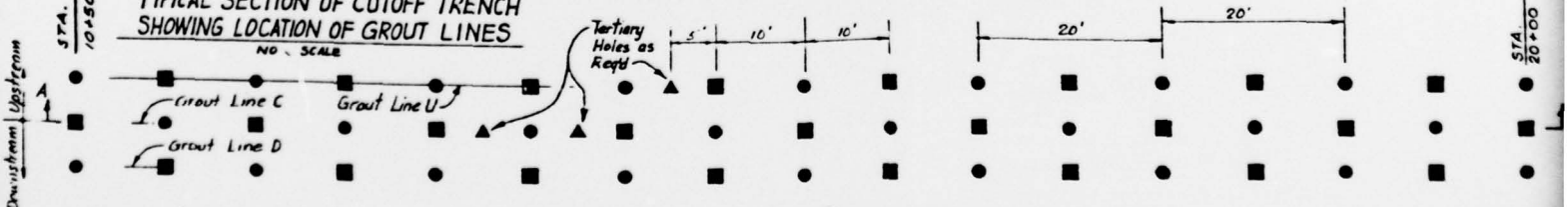


PROFILE - CENTERLINE DAM
(Looking Downstream)



TYPICAL SECTION OF CUTOFF TRENCH
SHOWING LOCATION OF GROUT LINES
NO SCALE

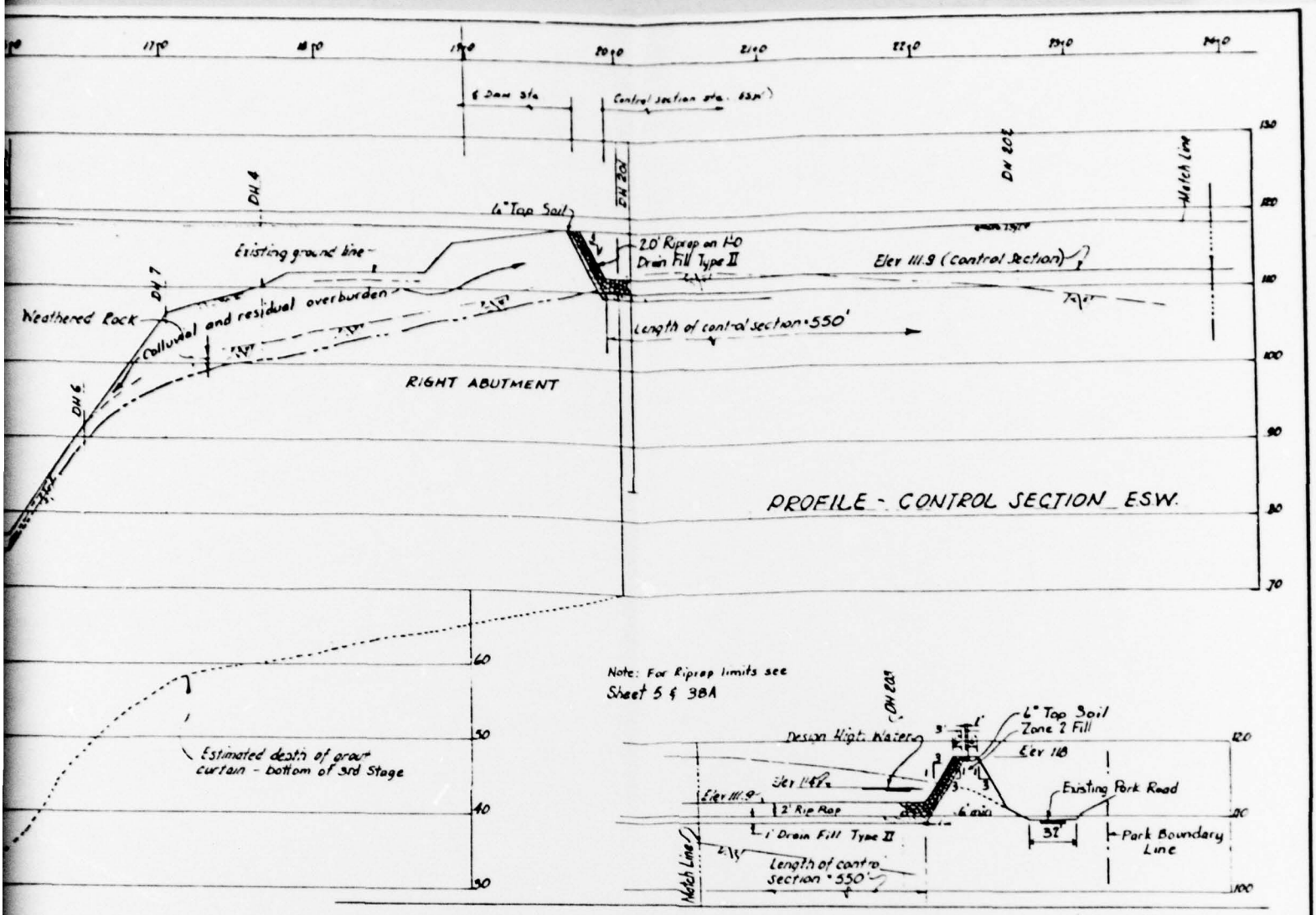
● EX primary Grout Hole
■ EX Secondary Grout Hole
▲ EX tertiary Grout Hole

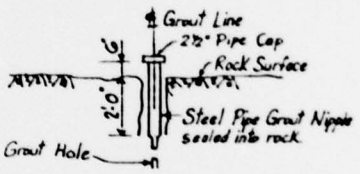


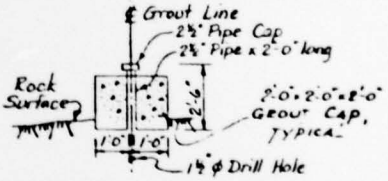
PLAN
DRILLING PATTERN

Grouting Notes:

1. First Step - Grout Line U in three increments : 0 to 10', 10' to 25', and 25' to 40'±.
2. Second Step - Grout Line D in three increments : 0 to 10', 10' to 25', and 25' to 40'±.
3. Third Step - Grout Line C as needed.
4. Spacing and depth of holes are shown for purposes of illustration; final direction, spacing & orientation of grout holes will depend on local rock conditions and will be determined in the field by the Engineer. Tertiary grout holes (split spacing) to be used as directed by the Engineer.
5. A 4th stage may be added to the final depth along Line U if conditions dictate.
6. All drilling and grouting operations shall be conducted from the bottom of the Cutoff Trench. Line C shall be the centerline of the trench.
7. Sewer Trenches and adjacent areas to be grouted as directed by the Engineer.

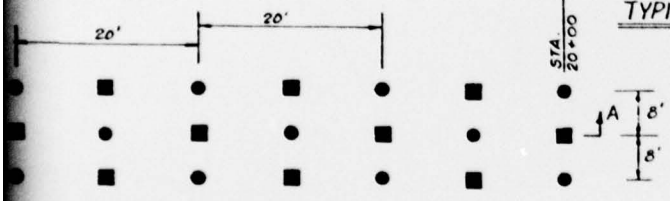






...VE DAM
...ram)

...mary Grout Hole
...ndary Grout Hole
...iary Grout Hole



TYPICAL NIPPLE SETTING FOR GROUT HOLES DRILLED FROM ROCK SURFACE

NO SCALE

2

2. Sewer Trenches and adjacent areas to be grouted as directed by the Engineer.

...tion of grout holes will depend ...t holes.

...rline of the trench.

CUT OFF TRENCH AND GROUTING DETAILS CORE CREEK DAM

NAT. ID NO. PA.00802 BUCKS COUNTY

DATA OBTAINED FROM U.S.DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, SHEET 7 OF 43, DRAWING NO. PA-620-P

PLATE 7

DH-201, (℄ DAM STA. 20+00,) ELEV. 118.0

Logged by: D.E. Bogan, 11-4-68
Drilling Equipment: S & H C 35

Hole Depth From	To	Description of Materials	Unif. Soil Class Symb.	STANDARD PENETRATION Type Bit Used	Blows Per 6"	SAMPLES No.	Type	From Ft	To Ft	% Rec.
0.0	0.5	Topsoil	SP	Sp.S	2-5-6	1	D	0.0	1.5	13
0.5	4.5	Brn. silty Sand, moist, stiff; some gravelly pieces become fragments of Sandstone at 3.0'; fragments <1" size	SP-SM	Sp.S	5-7-10	2	D	1.5	3.0	100
			SM	Sp.S	19-17-18	3	C	3.0	4.5	67
			SM	Sp.S	10-28-19/.0	4	D	4.5	5.5	100
4.5	5.5	Same as above but yellow, grades into highly weathered grey, brown Sandstone								
5.5	16.7	Yellow brn. m.-c. arkosic Sandstone; highly weathered fractured and jointed with many intersecting, 5.5'-16.0'; fe and mn stained. L.P. 0.3'		NXH	47-37-50/.2	1	RC	5.5	7.5	30
				NXH		2	RC	7.5	9.0	20
			SP	Sp.S		S5	D	9.0	11.0	75
				NXH		R3	RC	11.0	16.0	45
16.7	17.7	Yellow brn. arkosic Conglomerate w/1/2" rounded quartz pebbles; horiz. fractures 17.3'; open joint 17.3'-17.6'		NXH		4	RC	16.0	18.8	98
				NXH		5	RC	18.8	23.6	100
				NXH		6	RC	23.6	30.0	100
17.7	19.8	Gry. f.-m- Sandstone; horiz. fractures 18.0', 18.4', 18.8', fe stained; 80° joint fe-mn stained 19.1'-19.6' L.P.0.5' Lost water, 19.0'		NXH		7	RC	30.0	34.5	100
19.8	25.1	Gry. Conglomerate,80° joint, 22.6'-23.0' open weathered, stained and friable at 23.0'								
25.1	28.7	Gry. f.-m- Sandstone; horiz. fractures 25.1', 26.1',27.4',28.1'; intersecting angle joint 27.5'-28.5'								
28.7	34.5	Lt. gry. to gry. m. to c. interbedded Sandstone; occasional quartz pebble; closed vert. joints 33.7'-34.5'; open 80° joint 32.8'-33.3', stained								
		Bottom of hole 34.5'								

DH-202, (℄ DAM STA. 22+60) ELEV. 118.7

Logged by: D.E. Bogan, 11-6-68
Drilling Equipment: S & H C 35

Hole depth From	To	Description of Materials	Unif. Soil Class Symb.	STANDARD PENETRATION Type Bit Used	Blows per 6"	SAMPLES No.	Type	From Ft	To Ft	% Rec.
0.0	1.0	Topsoil		Sp.S	2-4-10	1	D	0.0	1.5	87
1.0	4.5	Red brn. orange silty Sand, poorly graded; average 50%-1/4" sizes; residual overburden; grades into highly weathered arkosic Sandstone at 4.5', moist	SP-SM	Sp.S	18-20-29	2	D	1.5	3.0	67
			SP-SM	Sp.S	27-22-17	3	D	3.0	4.5	73
			SM	Sp.S	12-13-14	4	D	4.5	6.0	73
			SP	Sp.S	17-25-30	5	D	6.0	7.5	73
			SP	Sp.S	51-50/.35	6	C	7.5	8.3	62
4.5	8.3	Orange brn. highly weathered Sandstone occuring as poorly graded Sand moist								
8.3	14.0	Gry. and brn. arkosic Sandstone; highly weathered and fe/mn stained, clay seams 8.8'-11.5'; vert. joints noted thruout; 70° angle joint 11.5'-13.0' L.P. 0.5'		NXH		1	RC	8.3	14.0	60
				NXH		2	RC	14.0	16.2	90
				NXH		3	RC	16.2	17.4	80
				NXH		4	RC	17.4	22.0	85
				NXH		5	RC	22.0	23.8	100
14.0	26.0	Gry. c. to conglomeratic Sandstone; partly weathered; fe/mn stained; fragmental 14.0'-16.2',17.0'-17.4', 18.9'-20.7';45° open joints. 16.2' 17.4',17.9',21.5'; horiz. joints and fractures 18.7',22.5' thru 25.1'		NXH		6	RC	25.8	28.0	100
26.0	27.4	Gry. f.-m. Sandstone, hard; 70° joint. 25.3'-26.6'; thin micaceous zone,27.3'-27.4)								
27.4	28.2	Lt. Gry. to yellow m. to c. arkosic Sandstone; hard. L.P. 1.3'								
		Bottom hole 28.2'								

DH 203. (℄ DAM STA. 25+20) ELEV.

Logged by: D.E. Bogan, 11-8-68
Drilling Equipment: S & H C 35

Hole Depth From	To	Description of Materi
0.0	1.0	Topsoil
1.0	4.0	Reddish to dk. brn. s moist, fairly stiff
4.0	7.5	Orange brn. silty San coarser at 6.0', subr w/max. size 3/4" fr
7.5	9.0	Orange brn. sandy Cla
9.0	12.8	Orange brn. poorly gr w/some gravel, 70%-90
12.8	29.5	Orange to brn. f. to highly to partly weat jointed thruout, frac and hi-angle joints p 16.5';17.5',17.5'-21. sive core losses, 25. 29.5' Recovered core to 1.1', the latter
		Bottom of hole 29.5'

BH 203, (℄ DAM STA 25+20) ELEV 115 2

Logged by D E Bogan, 11-8-68
Drilling Equipment S & H C 35

To Ft	% Rec	Hole Depth From	Hole Depth To	Description of Materials	Unif. Soil Class Symb	STANDARD PENETRATION Type Bit Used	Blows Per 6"	SAMPLES No.	Type	From Ft.	To Ft.	% Rec.
1 5	13	0 0	1 0	Topsoil	SM	So S	1-1-1	1	D	0 0	1.5	67
3.0	100	1 0	4 0	Reddish to dk brn silty Sand w/clay	SM	So S	4-10-13	2	D	1 5	3.0	0
4 5	67			moist, fairly stiff	SM	So S	9-13-12	3	D	3.0	4 5	67
5.5	100	4 0	7 5	Orange brn silty Sand, moist, becomes coarser at 6 0', subrounded particles w/max size 3/4" fr Clay	SM	So S	6-7-8	4	D	4 5	6 0	67
					SM	So S	7-4-6	5	D	6 0	7.5	73
					CL	So S	5-25-35	6	D	7.5	9 0	47
7.5	30	7 5	9 0	Orange brn sandy Clay, micaceous, moist	SP-SM	So S	15-12-16	7	D	9.0	10.5	73
9 0	20	9 0	12 8	Orange brn poorly graded silty Sand w/some gravel, 70%-90% 1/4" size	SP-SM	So S	18-24-26	8	D	10 5	12.0	73
11 0	75				SP-SM	So S	16-16-28	9	D	12 0	13 1	73
16.0	45	12 8	29 5	Orange to brn f. to c orkosic Sandstone, highly to partly weathered, fractured and jointed thruout, friable rock units, vert. and hi-angle joints prominent, notably 16 5';17.5',17 5'-21.5',28 8'-29 1', extensive core losses, 25.2'-27.0' and 29 0'-29 5' Recovered core ranges from fragments to 1 1', the latter in Run No. 4.		NXM		1	RC	13 1	16 8	30
18 8	98					NXM		2	RC	16 8	21.5	45
23 6	100					NXM		3	RC	21.5	25.2	40
30.0	100					NXM		4	RC	25.2	29.5	85
34 5	100											

Bottom of hole 29.5' Water level (11-11-68) 28.9'

To Ft	% Rec
1.5	87
3 0	67
4.5	73
6.0	73
7 5	73
8 3	62
4 0	60
5 2	90
7 4	80
2.0	85
5 8	100
8 0	100

2

TYPICAL LOGS OF TEST PITS
CORE CREEK DAM

NAT. ID NO. PA.00802 BUCKS COUNTY

DATA OBTAINED FROM U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, SHEET 33 OF 43, DRAWING NO. PA-620-P

PLATE 8

LEGEND

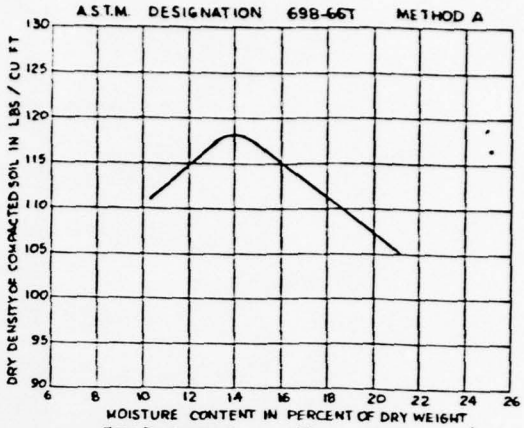
TEST HOLE NUMBERING SYSTEM

Centerline of Dam	1 - 99
Borrow area	101 - 199
Emergency Spillway	201 - 299
Principal Spillway	301 - 399
Stream channel	401 - 499
Relief wells	501 - 599
Foundation and outer structure	601 - 699
	701 - 799

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

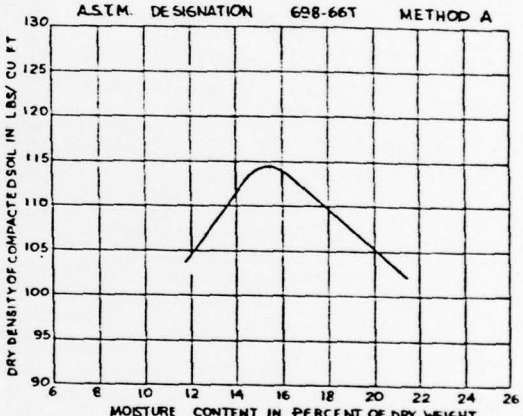
GW	Well graded gravels; gravel sand-mixtures
GP	Poorly graded gravels
GM	Silty gravels; gravel sand-silt mixtures
GC	Clayey gravels; gravel sand-clay mixtures
SW	Well graded sands; sand-gravel mixtures
SP	Poorly graded sands
SM	Silty sands; sand-silt mixtures
SC	Clayey sands; sand-clay mixtures
ML	Silts;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

COMPACTION CURVE



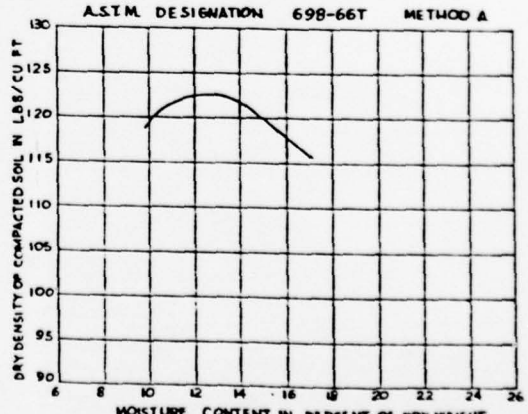
FIELD SAMPLE 115 DEPTH 3.0' TO 5.0'
LABORATORY CLASSIFICATION CL

COMPACTION CURVE



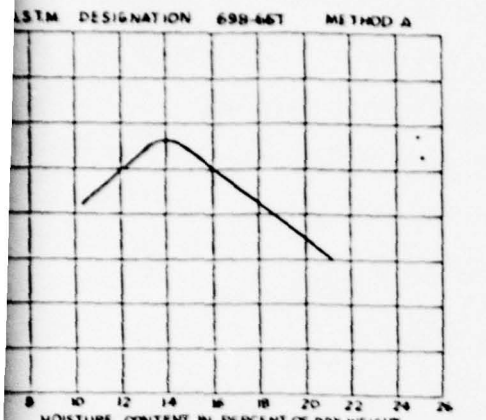
FIELD SAMPLE 136 DEPTH 2.3' TO 6.0'
LABORATORY CLASSIFICATION CL

COMPACTION CURVE



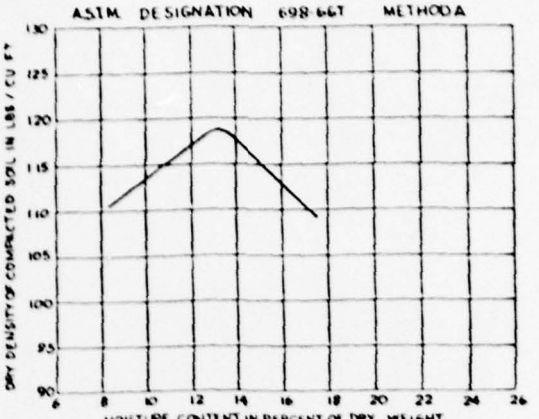
FIELD SAMPLE 137 DEPTH 5.2' TO 9.5'
LABORATORY CLASSIFICATION SM - SC

COMPACTION CURVE



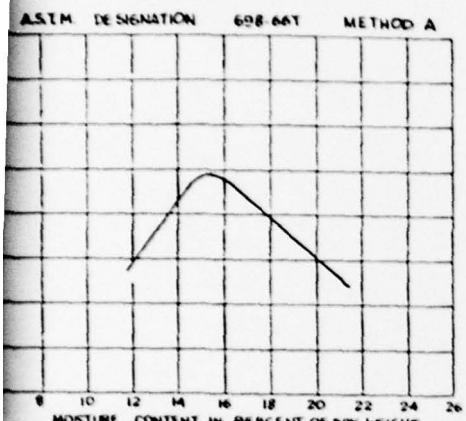
FIELD SAMPLE 115 DEPTH 3.0' TO 5.0'
LABORATORY CLASSIFICATION CL

COMPACTION CURVE



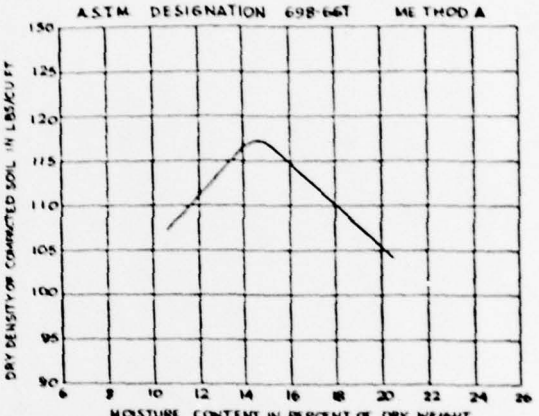
FIELD SAMPLE 122 DEPTH 1.8' TO 4.0'
LABORATORY CLASSIFICATION CL-ML

COMPACTION CURVE



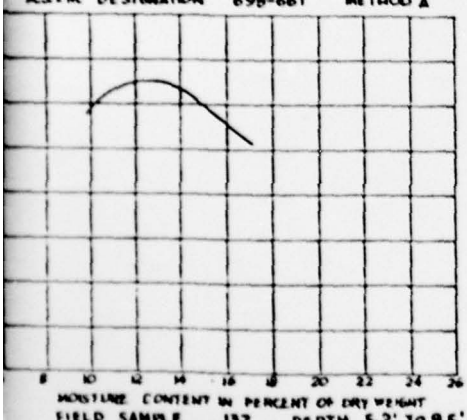
FIELD SAMPLE 136 DEPTH 2.3' TO 6.0'
LABORATORY CLASSIFICATION CL

COMPACTION CURVE



FIELD SAMPLE 136 DEPTH 0.9' TO 2.3'
LABORATORY CLASSIFICATION SC

COMPACTION CURVE



FIELD SAMPLE 137 DEPTH 5.2' TO 9.5'
LABORATORY CLASSIFICATION SM - SC

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TYPICAL SOIL COMPACTION DATA
CORE CREEK DAM

NAT. ID NO. PA.00802 BUCKS COUNTY

DATA OBTAINED FROM U.S.DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE, SHEET 37 OF 43, DRAWING NO. PA-620-P

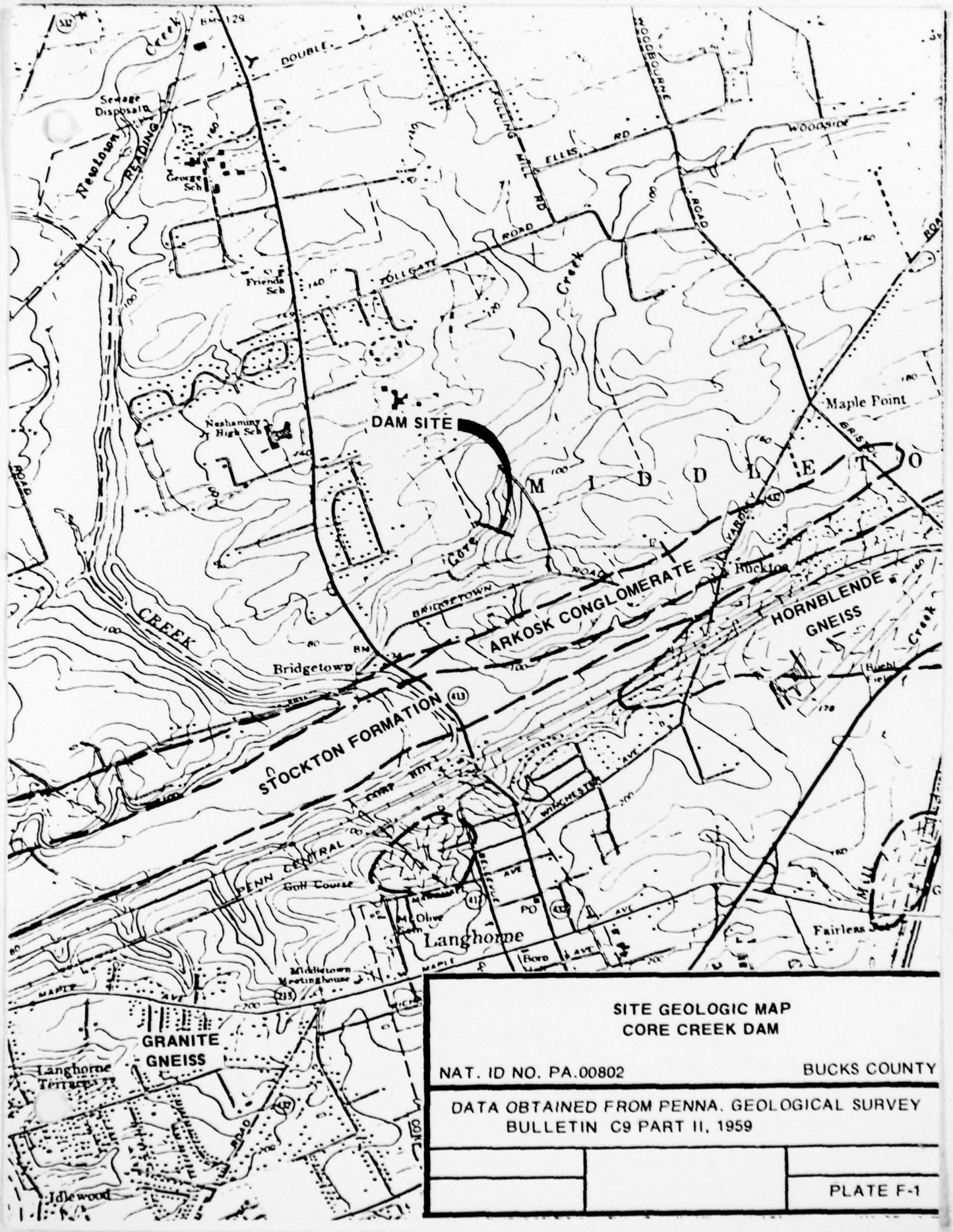
PLATE 9

APPENDIX

F

SITE GEOLOGY
CORE CREEK DAM

Core Creek Dam is located near the southern limit of the Triassic Lowland Section of the Piedmont Physiographic Province. As shown in Plate F-1, the bedrock upon which the dam is constructed consists of the interbedded conglomerate, arkosic sandstone and shale of the Stockton Formation of Triassic age. No rock outcrops were observed in the dam area, but the regional strike of rock bedding is to the northeast having a dip of approximately 10 degrees to the northwest. Having the axis of the dam diagonal to rock bedding and together with the variable character of weathered rock and joint planes, downstream seepage may occur upon reservoir filling.



SITE GEOLOGIC MAP
CORE CREEK DAM

NAT. ID NO. PA.00802 BUCKS COUNTY

DATA OBTAINED FROM PENNA. GEOLOGICAL SURVEY
BULLETIN C9 PART II, 1959

PLATE F-1