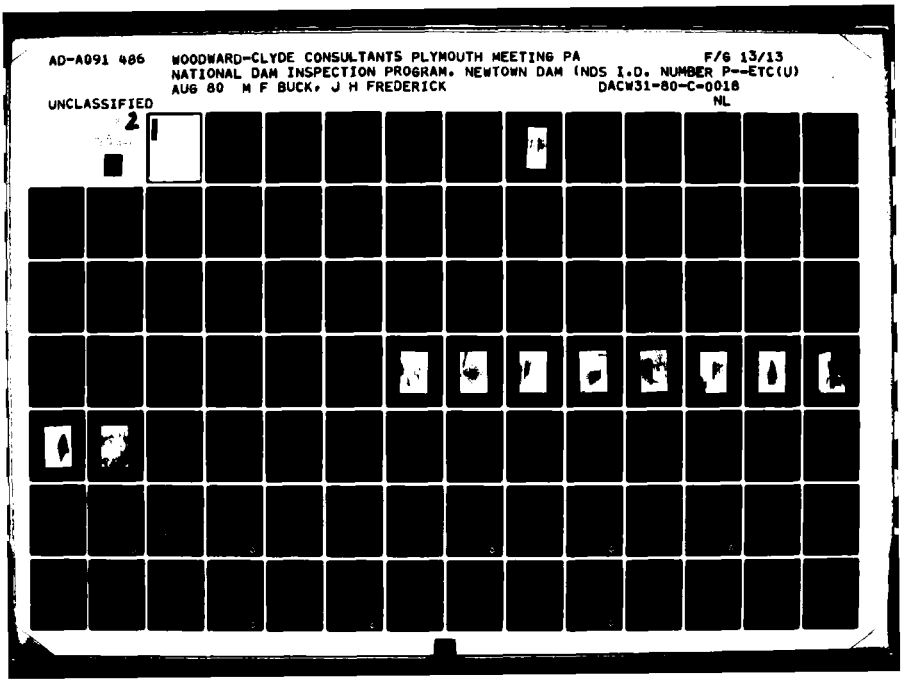

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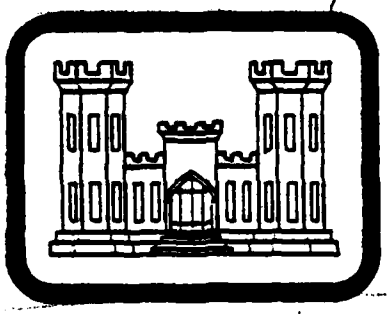
DELAWARE RIVER BASIN

NEWTOWN DAM, BUCKS COUNTY
PENNSYLVANIA

(6) National Dam Inspection Program. Newtown Dam
(NDS I.D. Number PA 01064,
DER I.D. No. 9-178,
SCS PA 621),
Delaware River Basin, Newtown Creek,
Bucks County, Pennsylvania.

PHASE I INSPECTION REPORT,
NATIONAL DAM INSPECTION PROGRAM

(10) Mark E. Buck, John H. Francis, Jr.



(12) 191

(15) DACW31-80-C-0018

Prepared by:

WOODWARD-CLYDE CONSULTANTS
5120 Butler Pike
Plymouth Meeting, Pennsylvania 19462

Submitted to:

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

(11) AUGUST 1980

PREFACE

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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety 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 a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected, and only through continued care and maintenance can these conditions be prevented or corrected.

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

A 23 CP

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Name of Dam:	Newtown Dam (SCS PA 621)
County Located:	Bucks County
State Located:	Pennsylvania
Stream:	Newtown Creek
Coordinates:	Latitude 40° 14.7'
	Longitude 74° 56.0'
Date of Inspection:	July 1, 1980

Newtown Dam is owned by the Neshaminy Water Resources Authority and maintained by Bucks County. The dam and reservoir are used as a flood control structure for the downstream town of Newtown, Pennsylvania. The impoundment was designed by the United States Department of Agriculture, Soil Conservation Service, in 1976-77, and the structure was officially completed in 1980.

The dam and its appurtenant facilities are considered to be in good condition. The dam is classified as an "Intermediate" size structure with a "High" hazard classification, consistent with its potential in the event of failure for extensive property damage and loss of life downstream of the dam and in Chalfont, Pennsylvania.

In accordance with criteria established by Federal (OCE) Guidelines, the recommended spillway design flood for this "Intermediate" size dam and "High" hazard classification is the Probable Maximum Flood (PMF). The Soil Conservation Service designed this dam as a Class C structure, which requires that the spillway systems be designed to pass the PMF.

The hydrologic and hydraulic computations presented in Appendix D indicate that the spillway structures are capable of discharging the PMF without overtopping the embankment. Therefore, the structure is considered to have an "Adequate" spillway system.

It is recommended that, during the period required for establishment of Crownvetch, the embankment, particularly the downstream berm, be periodically checked for erosion damage.

Neshaminy Water Resources Authority has an "Operations Manual" specifying agencies responsible for operation and maintenance of Neshaminy Watershed projects completed by 1977. The manual requires updating to include Newtown Dam. The Operations Manual refers to a "Development, Operation and

Maintenance Manual" prepared by SCS for a maintenance inspection checklist, which should be used to insure that all items are periodically inspected and maintained in the best possible condition. It is recommended that these procedures provide for a period of observation during and following impoundment of significant quantities of water behind the embankment. These observations should include monitoring discharge from the embankment drainage system and looking for sources of uncontrolled seepage.

A warning procedure has been developed and approved by the Neshaminy Water Resources Authority. This procedure indicates that the structure should be monitored on a 24 hour basis when the severity of a forecasted storm is predicted to be near, at or above the design capacity of the structure. The procedure also includes emergency telephone numbers and areas downstream of the dam which should be notified in the event a hazardous condition develops.

Mary F. Beck, P.E. — Date 8/7/80
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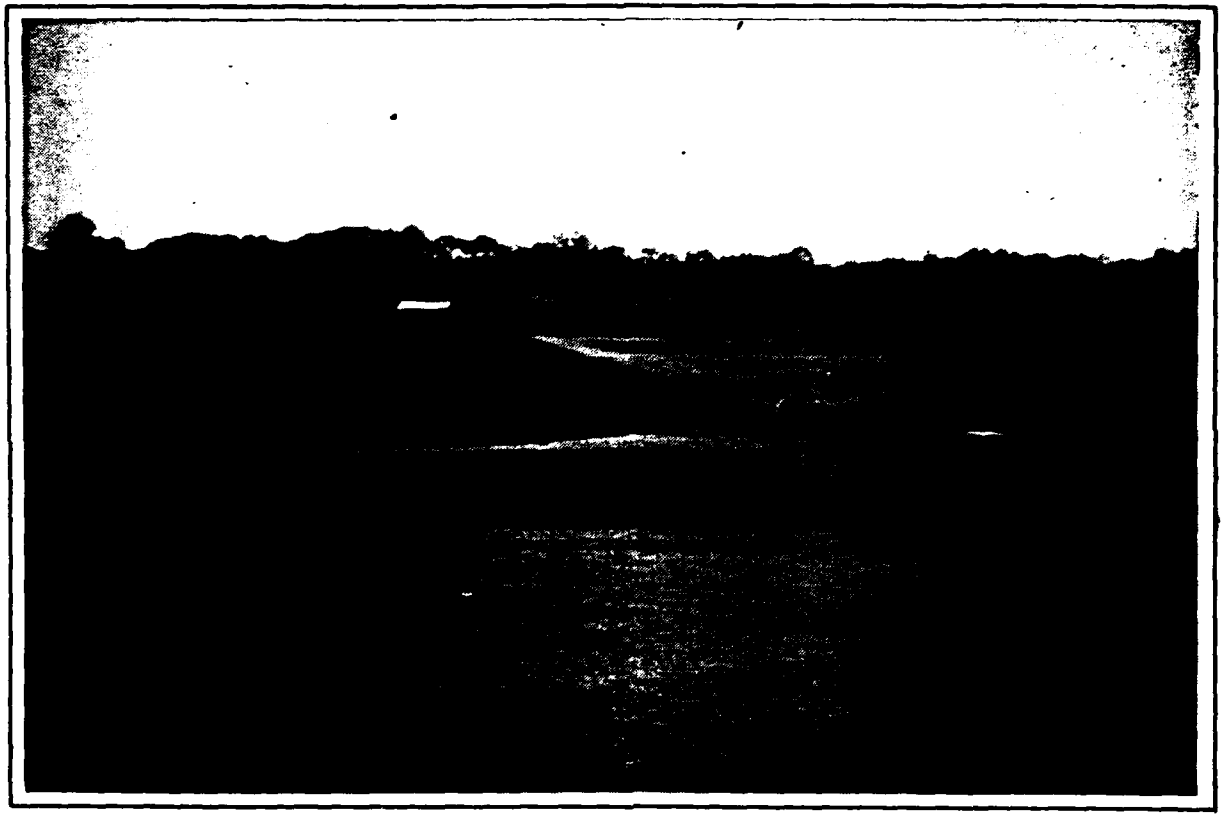
Maryland Registration 7301
Woodward-Clyde Consultants

APPROVED BY:

JAMES W. PECK — Date 5 Sep 80
Colonel, Corps of Engineers
District Engineer



OVERVIEW
NEWTOWN DAM (SCS PA 621), NEWTOWN TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

TABLE OF CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
NEWTOWN DAM
(SCS PA 621)
NATIONAL ID NO. PA 01064
DER NO. 9-178

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. Newtown Dam is a 44 foot high zoned earth embankment about 850 feet long, with an emergency spillway at the left end of the embankment. The embankment contains an impervious core constructed over a cutoff trench under the dam center line. The core and cutoff trench are composed of materials classified as clayey silts and silty gravels (Zone 1), and are encompassed by more permeable materials classified as silty gravels (Zone 2). Plate 5, Appendix E, identifies a Zone 3, which is a 12 inch thick layer of topsoil or clayey silt over the entire downstream face and above the riprap on the upstream face. The upstream design slope is 3H:1V with a ten foot berm at approximately elevation 213. The downstream design slope is 2.5H:1V. Surface runoff is intercepted by a berm on the downstream face. The berm has a positive one percent slope to the right. The cutoff trench bottom width is 12 feet, and upstream and downstream slopes are 2H:1V. The upstream and downstream slopes of the relatively impervious Zone 1 core are 1H:1V. The embankment crest is 14 feet wide and has a design settled fill elevation of 239.6. Both the upstream and downstream slopes are to be protected with Crownvetch, and the crest is protected by a gravel road.

Embankment seepage is controlled by a trench drain about midway between the dam center line and the downstream

toe. The trench drain is connected to the rock gutter at the downstream toe of the dam by a blanket drain. Embankment seepage in the vicinity of the principal spillway is to be discharged through two eight inch PVC drain pipes which outlet through the sidewalls of the impact basin. Plan and cross-section views of the dam are shown on Plates 2 through 7, Appendix E, and embankment drainage details are shown on Plate 8.

The principal spillway consists of a concrete drop inlet riser, 240 feet of 30 inch diameter reinforced concrete, steel cylinder pressure pipe, with nine anti-seep collars and an impact basin at the downstream toe. The reservoir drain located at the base of the riser has an invert elevation of 199.25, and the elevation of the riser weirs is 213.0. The outlet invert and impact basin end sill elevations are 196.0.

The emergency spillway is a trapezoidal channel excavated through rock around the left end of the embankment. The 185 foot wide channel has side slopes of 3H:1V, and the 50 foot level section (crest) is at elevation 231.9. A tributary to Newtown Creek enters the emergency spillway upstream of the control section through a channel excavated in rock, Photograph 8, Appendix C.

A 16 inch reinforced concrete pressure pipe sanitary sewer passes beneath the dam embankment, as shown on Plate 4, Appendix E. At the dam center line, the sanitary sewer is about 12 feet below the surface of the bedrock and about 10.5 feet below the dam cutoff trench. Four anti-seep collars have been constructed upstream of the dam center line around the sewer. A 12 to 16 foot thick concrete curtain wall was installed beneath the dam cutoff trench around the pipe. The sewer trench was backfilled with Zone 1 materials upstream of the center line and with Zone 2 materials downstream of the center line.

b. Location. The dam is located on Newtown Creek, a tributary to the Neshaminy Creek in Newtown Township, Bucks County, Pennsylvania. The dam is located 1.1 miles north of the center of Newtown, Pennsylvania, and is located on the USGS Quadrangle entitled "Langhorne, Pennsylvania", at coordinates N 40° 14.7' W 74° 56.0'. A regional location plan of Newtown Dam is included as Plate 1, Appendix E.

c. Size Classification. The dam is classified as an "Intermediate" size dam by virtue of its 44 foot height and 1,420 acre-foot total storage capacity.

d. Hazard Classification. A "High" hazard classification is assigned consistent with the potential for extensive

property damage and loss of life along Newtown Creek downstream of the dam.

e. Ownership. Newtown Dam is owned by the Neshaminy Water Resources Authority. All correspondence should be sent to Mr. William Taylor, Neshaminy Water Resources Authority, Post Office Box 6, Cross Keys Office Center, 4259 Swamp Road, Doylestown, Pennsylvania 18901.

f. Purpose of Dam. The purpose of this dam is flood control. The structure is one of ten dams in the Neshaminy Creek Watershed that are scheduled for construction with the assistance of the United States Department of Agriculture, Soil Conservation Service (SCS). This is the eighth project of the series.

g. Design and Construction History. The original work plan was developed by the SCS in the late 1960's for the ten flood control sites in the Neshaminy Creek Watershed. The final design for this dam was prepared by SCS in 1976 and 1977, with the final design drawings being completed in 1977. The application to construct a flood control dam and reservoir was submitted July 21, 1977. The Report Upon the Application was prepared by the State of Pennsylvania on September 28, 1977. The project was approved by the Delaware River Basin Commission on September 28, 1977, and the permit was issued on October 3, 1977. On July 13, 1978, the contractor, Riebe Construction Company, was given notice to proceed.

The design drawings for the sanitary sewer under the dam are dated June 30, 1978. On July 20, 1978, the engineer for the Newtown Sewer Authority requested that permission for construction of the sewer under the dam be added to the dam construction permit. On August 14, the state gave permission for the sewer to be constructed under the dam.

In October 1978, the impact basin footers and floor slab were removed and replaced as a result of low concrete strength. Work on the sewer line in the right abutment began November 29, 1978, after work on the dam had shut down for the winter. The embankment was completed by November 1979, and the SCS final inspection was held on July 2, 1980.

h. Normal Operating Procedures. Reservoir outflow is controlled by the principal and emergency spillways. Under normal conditions, the pond drain gate is closed and water flows through the principal spillway over the weirs. Excess water is stored to elevation 231.9, the emergency spillway crest. Water is discharged through the emergency spillway at the left abutment only during storms with recurrence intervals of once in 100 years or more.

1.3 Pertinent Data.

A summary of pertinent data for Newtown Dam is presented as follows.

a.	Drainage Area (square miles)	3.0
b.	Discharge at Dam Site (cfs)	
	Maximum Known Flood at Dam Site	Unknown
	Design High Water	2,092
	At Top of Dam (design)	10,967
c.	Elevation (feet above MSL)	
	Top of Dam (design)	239.6
	(existing)	240.4
	Design High Water	234.7
	Emergency Spillway Crest	231.9
	Principal Spillway	
	Weir Crest	213.0
	Pond Drain Inlet Invert	199.25
	Outlet Invert	196.0
	Downstream Toe	202.2
d.	Reservoir (feet)	
	Length at Normal Pool	1,600
	Length at Maximum Pool	4,000
e.	Storage (acre-feet)	
	Normal Pool	56
	To Top of Dam	1,420
f.	Reservoir Surface Area (acres)	
	Sediment Pool	11
	Design High Water	82
g.	Dam Data	
	Type	Zoned earth embankment
	Volume	87,600 cubic yards
	Length	850 feet
	Maximum Height	44 feet
	Top Width	14 feet
	Side Slopes	
	Upstream (design)	3H:1V
	Downstream (design)	2.5H:1V
	Cutoff	Trench beneath dam center line
	Grout Curtain	None

h.	Principal Spillway	
	Type	Concrete drop inlet riser with 30 inch conduit
	Reservoir Drain	Intake at base of riser
	Elevation	
	Weirs	213.0
	Pond Drain Inlet Invert	199.25
	Conduit Outlet Invert	196.0
	Energy Dissipator	Concrete impact basin at downstream toe
i.	Emergency Spillway	
	Type	Trapezoidal channel excavated through rock
	Width	185 feet
	Side Slopes	3H:1V

SECTION 2
ENGINEERING DATA

2.1 Design.

a. Data Available. A summary of the available engineering data on Newtown Dam (SCS PA 621) is attached as Appendix B. Engineering data available for review are contained in a several hundred page design folder and a 35 page set of design drawings. As-built drawings are in the process of being prepared by the Soil Conservation Service (SCS) project engineer, and were available for review. The design folder and plans are located in SCS files, and as-built drawings are to be located in the Department of Environmental Resources' (DER) and the Owner's files. All of these records were prepared by the United States Department of Agriculture, Soil Conservation Service. Additional information was obtained from miscellaneous letters, correspondence and monthly construction reports in DER files.

b. Design Features. The principal design features of Newtown Dam are illustrated on the plans and profiles enclosed in Appendix E as Plates 2 through 13. A detailed description of the design features is also presented in Section 1.2, paragraph a, and pertinent data relative to the structure are presented in Section 1.3. In addition to the plans of the dam, Plates 14 and 16 are enclosed to show the locations of the test borings and the results of typical compaction tests performed as part of the design. Typical test boring logs are shown on Plate 15.

2.2 Construction.

Construction history is presented in Section 1.2, paragraph g. Summary construction records are located in DER files. Complete construction records are located in SCS files and were reviewed for this investigation.

2.3 Operational Data.

There are no operational records maintained. There are no minimum flow requirements for the downstream channel. There are no water level measurements or rainfall records maintained within the watershed, although the Neshaminy Water Resources Authority maintains a rain gauge at their office in Cross Keys, Doylestown, Pennsylvania.

2.4 Evaluation.

a. Availability. All engineering data evaluated and reproduced for this report were provided by either DER or SCS, and were supplemented by conversations and data obtained from representatives of the Neshaminy Water Resources Authority.

b. Adequacy. Data included in state files, supplemented with data obtained from the Neshaminy Water Resources Authority and information received from state and authority representatives, are considered adequate to evaluate the dam and appurtenant structures.

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

SECTION 3
VISUAL INSPECTION

3.1 Findings.

a. General. Observations and comments of the field inspection team are contained in the checklist enclosed herein as Appendix A, and are summarized and evaluated as follows. In general, the dam and its appurtenant structures are considered to be in good condition. At the time of the inspection, the pond drain gate was open and stream flow was passing through the riser of the principal spillway.

b. Dam. The vegetation cover on the upstream and downstream faces is in fair condition. Very little Crownvetch is in evidence. The embankment was dormant seeded in the fall and reseeded again this spring. It will be another year before Crownvetch becomes abundant. Little or no damage to the embankment has occurred during the period of vegetation establishment. The crest is protected by a gravel road, Photograph 2, which is uniform with no vehicle ruts or depressions.

The vertical and horizontal alignments were checked and found to be satisfactory. The vertical alignment is shown on Sheet 5B, Appendix A. Junctions between the embankment and abutment and the embankment and spillway were judged to be in good condition, with no erosion or deterioration noted. In addition to the rock gutter at the downstream toe, a rock gutter was added to the right upstream toe above the normal pool level, and rock spoil was placed at the left upstream toe. No seepage was observed beyond the dam toe or discharging from embankment drain outlets through the impact basin sidewalls. No water was impounded in the reservoir, however. A ten foot wide berm, 540 feet long with a one percent slope, intercepts surface runoff from the downstream face of the dam and conducts it to a rock gutter along the toe. While no erosion was noted at the intersection of the berm and the downstream slope, the potential for erosion exists, particularly before the vegetation becomes well established. It is recommended that this area be inspected frequently for gullying.

c. Appurtenant Structures.

1. Principal Spillway. As shown on the plates, the riser is located at the upstream toe of the embankment. The exposed portions of the riser were inspected and evaluated to be in good condition with no signs of concrete deterioration, spalling or other structural deficiency or defects, Photograph

4. An angle in the low stage trash rack is slightly bent. The impact basin at the downstream toe was inspected and found to be in good condition, Photograph 5, with no cracking or spalling of the concrete or erosion adjacent to the structure. The embankment drains outlet through the walls of the impact basin and were dry. The downstream channel was also inspected and found to be in good condition, with no significant erosion or deterioration.

2. Emergency Spillway. The emergency spillway at the left abutment was inspected and found to be in good condition, Photographs 6 and 7. The emergency spillway was recently seeded and mulched. A tributary to Newtown Creek enters the emergency spillway upstream of the control section, Photograph 8. The stream was dry at the time of the inspection.

d. Reservoir. At the time of the inspection, no water was impounded behind the embankment. The pond drain was open, permitting base flow to pass through the principal spillway. The reservoir slope in the vicinity of the right end of the dam has recently been seeded and mulched. No debris or sediment was noted in the vicinity of the riser.

e. Downstream Conditions. Newtown Creek downstream of the dam is about 14 feet wide with steep banks about 4 feet high. The left channel bank and flood plain is wooded with underbrush. The right channel bank is brush covered. A private road parallels the stream on the right bank. About 1000 feet downstream of the dam, Newtown Creek flows under State Route 532 (Dolington Road) through a 26 foot by 8.5 foot opening. About 2500 feet further downstream Newtown Creek enters the Borough of Newtown. In the next 0.6 mile are many homes and businesses subject to damage in the event of failure of Newtown Dam. About 2.8 miles downstream of the dam, Newtown Creek enters Nashaminy Creek. A "High" hazard classification is justified for this dam.

3.2 Evaluation.

Inspection of the dam and appurtenant facilities disclosed no evidence of apparent past or present movement that would indicate existing instability of the dam, principal spillway or emergency spillway. The exposed portions of the riser and impact basin were inspected, and the principal spillway is judged to be in good condition. The emergency spillway is also considered to be in good condition. The embankment is considered to be in good condition, although the vegetative cover is not firmly established. The overall condition of the dam is considered to be good.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures.

Operational procedures are discussed in some detail in Section 1.2. Operation of the dam does not require a dam tender. Under normal conditions the pond drain is closed and flow discharges over the riser weirs and through the 30 inch conduit at the base of the embankment. Additional excess water is then stored and discharged over the crest of the emergency spillway. There have been no large storms since the embankment was completed, and water has never flowed over the emergency spillway. Written operation and maintenance procedures used by the Neshaminy Water Resources Authority are contained in "State of Pennsylvania Watersheds and Resource Conservation and Development Operation and Maintenance Handbook for Projects Installed with Assistance from the Soil Conservation Service", and specific procedures for each site are contained in the "Operations Manual" prepared by William G. Major Associates, Inc., June 1977.

4.2 Maintenance of the Dam.

The dam is maintained by Bucks County personnel who periodically check the embankment, mow the grass and remove woody vegetation. As owner of the dam, Neshaminy Water Resources Authority monitors the maintenance performed and assists if possible.

4.3 Maintenance of Operating Facilities.

Maintenance of these facilities includes cleaning debris from the trash racks, lubricating the gate hoist and checking the structural integrity of the principal spillway system.

4.4 Warning Systems In Effect.

A draft warning procedure, dated January 1980, has been prepared by the local Civil Defense office. The draft was submitted to both the Neshaminy Water Resources Authority and the Pennsylvania Emergency Management Agency in Harrisburg for review. The warning procedures have been approved by the Neshaminy Water Resources Authority.

4.5 Evaluation.

It is judged that the current operating procedure, which does not require a dam tender, is a realistic means of operating the relatively simple control facilities at Newtown Dam.

The "Operations Manual" prepared by William G. Major Associates, Inc., summarizes the control features and the responsible agency for operation and maintenance of each project constructed by 1977 within the Neshaminy Watershed. Although the operational philosophy for a single-purpose flood control structure is contained in the manual, a "fact sheet" pertaining to Newtown Dam is required. It is important that individuals responsible for the maintenance and operation of Newtown Dam are aware of the written procedures to insure that all items are carefully inspected and maintained on a periodic basis.

SECTION 5
HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features.

a. Design Data. The complete folder of design calculations was reviewed, and portions of this folder are presented in Appendix D.

The watershed is about 2.7 miles long and averages about 1.2 miles wide, having a total area of approximately 3.0 square miles. Elevations range from 380 in the upper reaches of the watershed to about 213, the normal pool elevation. The watershed is predominantly open/farmland, with less than 15 percent residential development. Residential development can be expected to progress rapidly within the watershed, however.

In accordance with criteria established by Federal (OCE) Guidelines, the recommended spillway design flood for this "Intermediate" size dam and "High" hazard classification is the Probable Maximum Flood (PMF). The Soil Conservation Service designed this dam as a Class C structure, which requires that the spillway systems be designed to pass the PMF.

b. Experience Data. There are no records of reservoir levels kept for this dam. Rainfall is measured and records are kept at the Neshaminy Water Resources Authority's office in Cross Keys, Doylestown, Pennsylvania. There are no estimates or records of previous high water levels.

c. Visual Observations. On the date of the inspection, there were no conditions observed that would indicate a reduced spillway capacity during an extreme event. Observations regarding the condition of the downstream channel, spillways and reservoir are located in Appendix A and are discussed in greater detail in Section 3.

d. Overtopping Potential. The dam was designed to pass the PMF without overtopping. The PMF inflow hydrograph and flood routing were done according to procedures in the SCS National Engineering Handbook. The flood routing was originally done by a graphical procedure. Subsequently, the flood routing was checked by the SCS computer program, TR-20, the results of which are included in Appendix D. The peak PMF inflow value computed by TR-20 is 14,853 cfs, and the combined principal and emergency spillway capacities of the reservoir at the top of the dam are 10,967 cfs. The TR-20 computer routing indicates a maximum reservoir level of 239.6 feet, the design top of dam. As the spillway systems for this dam pass

the PMF without overtopping the embankment, they are considered to be "Adequate".

e. Downstream Conditions. Immediately downstream of the dam is a farm. The barn, which is shown on Plate 3, Appendix E, and the farm house would be damaged in the event of a dam failure. About 1,000 feet downstream of the dam Newtown Creek flows under State Route 532, through a 26 foot by 8.5 foot bridge opening. Immediately downstream of the bridge are two houses, and 2,400 feet downstream of the dam Newtown Creek enters the Borough of Newtown, where there are many more homes and businesses subject to flooding and damage in the event of failure of the dam. Therefore, a "High" hazard classification is justified for this structure.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. Visual observations detected no evidence of existing or pending embankment instability. Upstream and downstream slopes appear stable, with no surficial slides or significant erosion. Both the upstream and downstream slopes were seeded with mixtures containing Crownvetch, which will require another year to become well established. There are no exterior signs or other evidence to indicate that the internal drainage systems were not operating properly. It is noted, however, that during this inspection the reservoir was empty, the embankment was not retaining a head of water, and the performance of the internal drainage system could not be evaluated.

Exposed portions of the principal spillway were inspected and judged to be in good condition.

b. Design and Construction Data. Design documentation is very complete as a several hundred page design folder prepared by the Soil Conservation Service (SCS) was available and reviewed for this investigation. Data included in these files are a foundation report containing permeability test results, shear strength test results and a stability analysis, structural calculations for the principal spillway and a complete set of hydrologic/hydraulic calculations. Portions of the Hydrology/Hydraulics section are presented in Appendix D. Principal features of this structure are presented in the drawings located in Appendix E.

A stability analysis of the embankment was performed by SCS using the ICES-LEASE computer program. Soil strength parameters were based on two consolidated-undrained triaxial compression test series conducted on compacted Zone 1 material and one series on compacted Zone 2 material. The foundation materials were assumed to have sufficient strength to prevent potential failure arcs from passing through the foundation. The shear strength parameters adopted for design were reviewed and judged to be conservative, based on the test results. Stability analyses using the Swedish circle method resulted in the following minimum factors of safety:

Slope	Condition	Minimum Factor of Safety
Upstream	Rapid Drawdown	1.57
Downstream	Steady Seepage	1.86

The recommended allowable factors of safety for these conditions, in accordance with Corps of Engineers EM 1110-2-1902, are 1.2 and 1.5, respectively. Therefore, it is concluded that the stability of the embankment is adequate.

c. Operating Records. There are no operational records for this structure.

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

e. Seismic Stability. The 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. As the stability analysis resulted in a minimum factor of safety of 1.57 during rapid drawdown, the most critical loading condition, it can be assumed that seismic stability requirements are satisfied.

SECTION 7
ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Evaluation. Visual inspection and review of design and construction documentation indicate that the dam and appurtenant structures of Newtown Dam are in good condition.

In accordance with criteria established by Federal (OCE) Guidelines, the recommended spillway design flood for this intermediate size dam and "High" hazard classification is the Probable Maximum Flood (PMF). The Soil Conservation Service designed this dam as a Class C structure, which requires that the spillway systems be designed to pass the PMF.

The hydrologic and hydraulic computations presented in Appendix D indicate that the spillway structures are capable of discharging the PMF without overtopping the embankment. Therefore, the structure is considered to have an "Adequate" spillway system.

b. Adequacy of Information. The information available for this investigation was adequate to evaluate the structural and hydraulic aspects of the dam.

c. Urgency. It is recommended that the suggestions presented in Section 7.2 be implemented as specified.

7.2 Remedial Measures.

a. Facilities. It is recommended that, during the period required for establishment of Crownvetch, the embankment, particularly the downstream berm, be periodically checked for erosion damage.

b. Operation and Maintenance Procedures. Neshaminy Water Resources Authority has an "Operations Manual" specifying agencies responsible for operation and maintenance of Neshaminy Watershed projects completed by 1977. The manual requires updating to include Newtown Dam. The Operations Manual refers to a "Development, Operation and Maintenance Manual" prepared by SCS for a maintenance inspection checklist, which should be used to insure that all items are periodically inspected and maintained in the best possible condition. It is recommended that these procedures provide for a period of observation during and following impoundment of significant quantities of water behind the embankment.

These observations should include monitoring discharge from the embankment drainage system and looking for sources of uncontrolled seepage.

A warning procedure has been developed and approved by the Neshaminy Water Resources Authority. This procedure indicates that the structure should be monitored on a 24 hour basis when the severity of a forecasted storm is predicted to be near, at or above the design capacity of the structure. The procedure also includes emergency telephone numbers and areas downstream of the dam which should be notified in the event a hazardous condition develops.

APPENDIX

A

CHECK LIST
VISUAL INSPECTION
PHASE I

Name Dam *Newtown Dam* County *Bucks* State *Pennsylvania* National ID # *PA 01064*

Type of Dam *Earth* Hazard Category *High*

Date(s) Inspection *7/1/1980* Weather *Sunny* Temperature *80's*

Pool Elevation at Time of Inspection *Dry* M.S.L. Tailwater at Time of Inspection *N/A* M.S.L.

Inspection Personnel:

Mary F. Beck (Hydrologist)
Raymond Lambert (Geologist)
Arthur Dvinoff (Geotechnical/ Civil)
(7/14/1980)
Vincent McKeever (Hydrologist)

Mary F. Beck Recorder

Remarks:

Mr. William Taylor, of Neshaminy Water Resources Authority was on site and provided assistance to the inspection team.

Sheet 1 of 11

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*	

Sheet 2 of 11

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*	

Sheet 3 of 11

EMBANKMENT

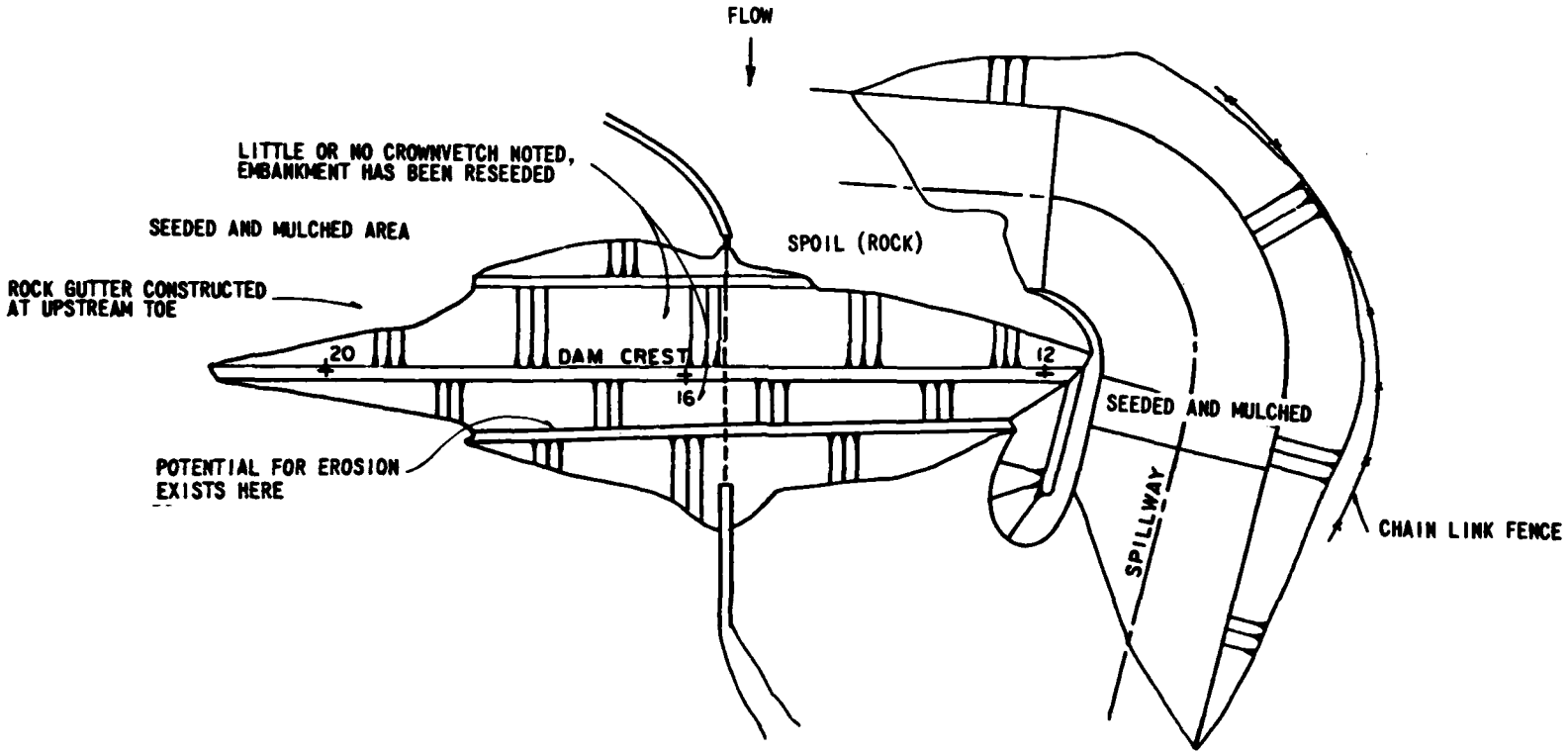
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	*None observed.*	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	*None observed.*	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	*Crest is protected by gravel. No significant erosion was observed.*	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	*Vertical alignment is shown on Sheet 5B of 11. Horizontal alignment is good.*	
RIPRAP FAILURES	*Riprap is in good condition.*	

Sheet 4 of 11

EMBANKMENT

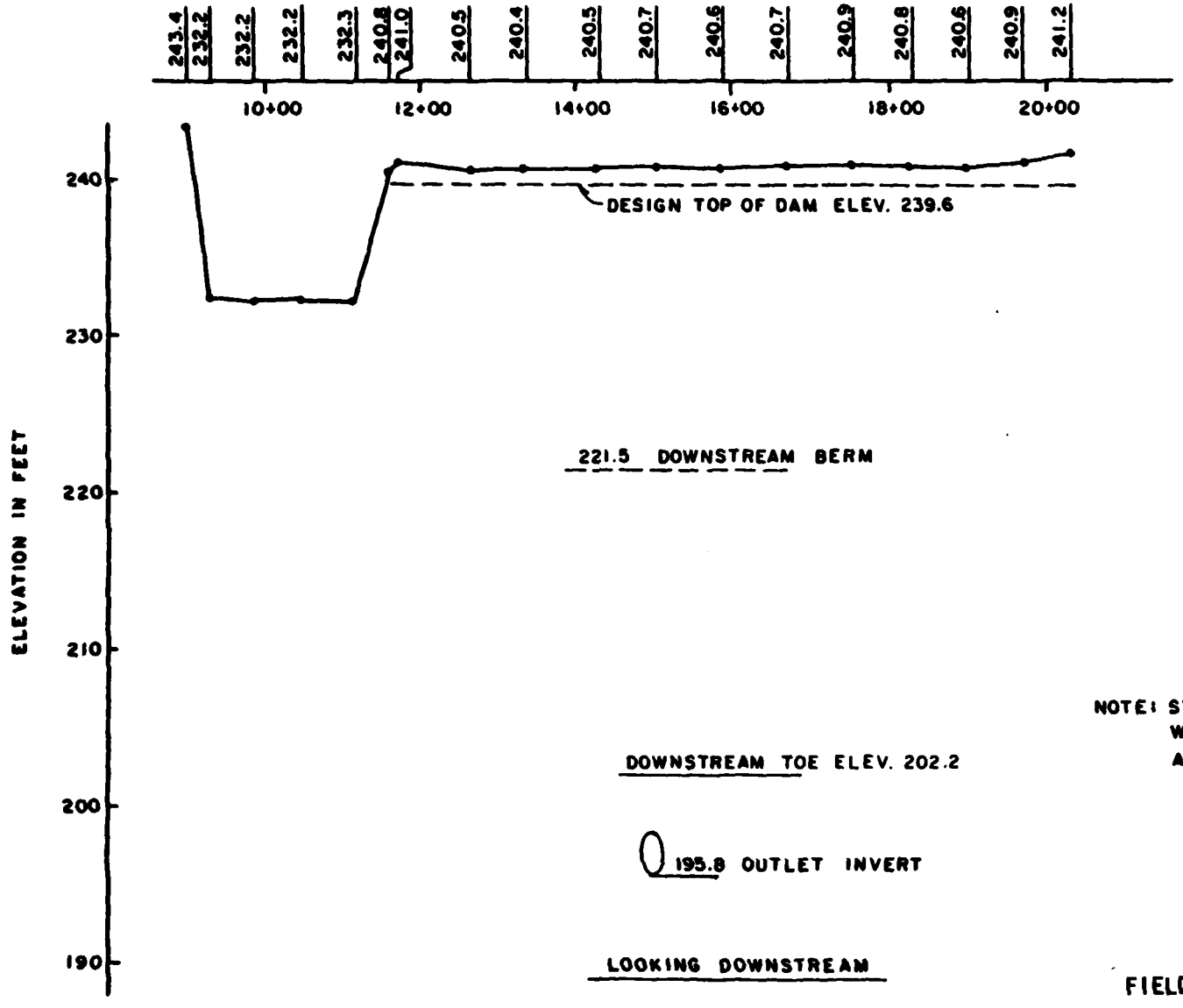
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATION	*Upstream and downstream faces were dormant seeded and mulched in Fall, 1979 and reseeded in Spring, 1980, thus almost no Crownvetch is evident.*	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	*All junctions are in good condition.*	
ANY NOTICEABLE SEEPAGE	*None observed, reservoir dry at time of inspection.*	
STAFF GAGE AND RECORDER	*None*	
DRAINS	*Embankment drains outletting through impact basin walls were dry.*	

Sheet 5 of 11



FIELD OBSERVATION PLAN
SCS PA 621

SHEET 5A OF 11



NOTE: STATIONS CORRESPOND WITH PLATE 3 OF APPENDIX E

FIELD OBSERVATION PROFILE
SCS PA 621

SHEET 5B OF 11

PRINCIPAL SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	*Conduit through embankment not inspected.*	
INTAKE STRUCTURE	*Exposed surfaces show no signs of cracking, spalling or other concrete defects.*	
OUTLET STRUCTURE	*Exposed surfaces show no signs of cracking, spalling or other concrete defects.*	
OUTLET CHANNEL	*Good condition.*	
EMERGENCY GATE	*Sluice gate open, gate was not exercised.*	

Sheet 6 of 11

EMERGENCY SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	*None, the downstream edge of a 50 foot level section is the control section.*	
APPROACH CHANNEL	*Good condition. A tributary to Newtown Creek enters the approach channel below the control section via a channel excavated in bedrock.*	
DISCHARGE CHANNEL	*Good condition.*	
BRIDGE AND PIERS	*None.*	

Sheet 7 of 11

GATED SPILLWAY

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*	

Sheet 8 of 11

INSTRUMENTATION

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

Sheet 9 of 11

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	*Reservoir slopes are flat to moderate. The sluice gate has not been closed and the reservoir is empty.*	
SEDIMENTATION	*No sediment was noted in the reservoir area.*	

Sheet 10 of 11

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	*The downstream channel is in good condition, averages 14 feet wide with 4 foot high banks on 3H:1V slopes. The banks are wooded with heavy underbrush. The left floodplain is also wooded and a farm driveway and farm is on the right floodplain.*	
SLOPES	*The valley gradient is about 0.007.*	
APPROXIMATE NO. OF HOMES AND POPULATION	*Immediately downstream of the dam is a farm, the barn is shown on Plate 3, Appendix E. About 1,200 feet downstream of the dam is one home subject to damage in the event of a dam failure. About 1,200 feet further downstream, Newtown Creek flows through the Borough of Newtown where there are many homes and businesses subject to damage in the event of a dam failure.*	

Sheet 11 of 11

APPENDIX

B

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM *Newtown Dam*

ID # *PA 01064*

ITEM	REMARKS
AS-BUILT DRAWINGS	*"As-built" drawings were provided for this investigation and will be on file with DER, SCS and the Owner.*
REGIONAL VICINITY MAP	*Plate 1, Appendix E.*
CONSTRUCTION HISTORY	*See Section 1.2 of text.*
TYPICAL SECTIONS OF DAM	*See Appendix E.*
OUTLETS - PLAN	*Appendix E*
DETAILS	
CONSTRAINTS	
DISCHARGE RATINGS	*Appendix D*
RAINFALL/RESERVOIR RECORDS	*Rainfall is measured by Neshaminy Water Resources Authority at their office in Cross Keys, Doylestown, Pennsylvania.*

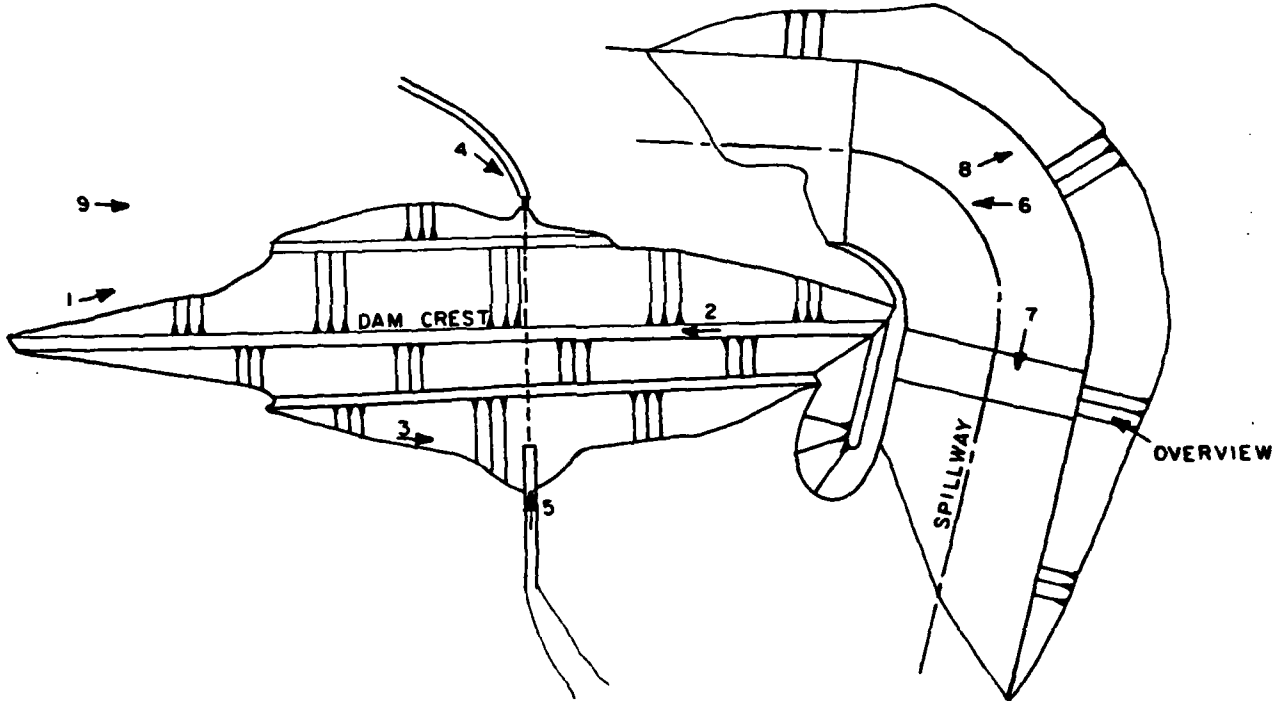
ITEM	REMARKS
DESIGN REPORTS	*Design folder on file with DER and SCS.*
GEOLOGY REPORTS	*Included in design folder, see also Appendix F.*
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	*See discussion in Sections 5 and 6 of text.*
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	*Complete records in SCS files.*
POST-CONSTRUCTION SURVEYS OF DAM	*A final crest profile survey was performed for "as-built" drawings.*
BORROW SOURCES	*Data located on SCS drawings.*

ITEM	REMARKS
MONITORING SYSTEMS	*None*
MODIFICATIONS	*No post-construction modifications.*
HIGH POOL RECORDS	*None*
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	*None*
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	*None*
MAINTENANCE OPERATION RECORDS	*Neshaminy Water Resources Authority maintain these files.*

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	*See Appendix E for details.*
OPERATING EQUIPMENT PLANS & DETAILS	*See Appendix E for details.*
MISCELLANEOUS	*The following information is located in DER files.* 1. *"Report Upon the Application of the Neshaminy Water Resources Authority" submitted by the State of Pennsylvania, September 28, 1977.* 2. *Permit issued by the State of Pennsylvania, October 3, 1977.* 3. *35 sheet set of design drawings prepared by SCS, 1976-1977.* 4. *Erosion and Sediment Control Plan prepared by SCS, August 1977.* 5. *Progress Reports by Frederick Schuetz, Project Engineer, SCS.* *Also available from SCS were complete construction records.*

APPENDIX

C



DOWNSTREAM

PHOTOGRAPH LOCATION PLAN
SCS PA 621

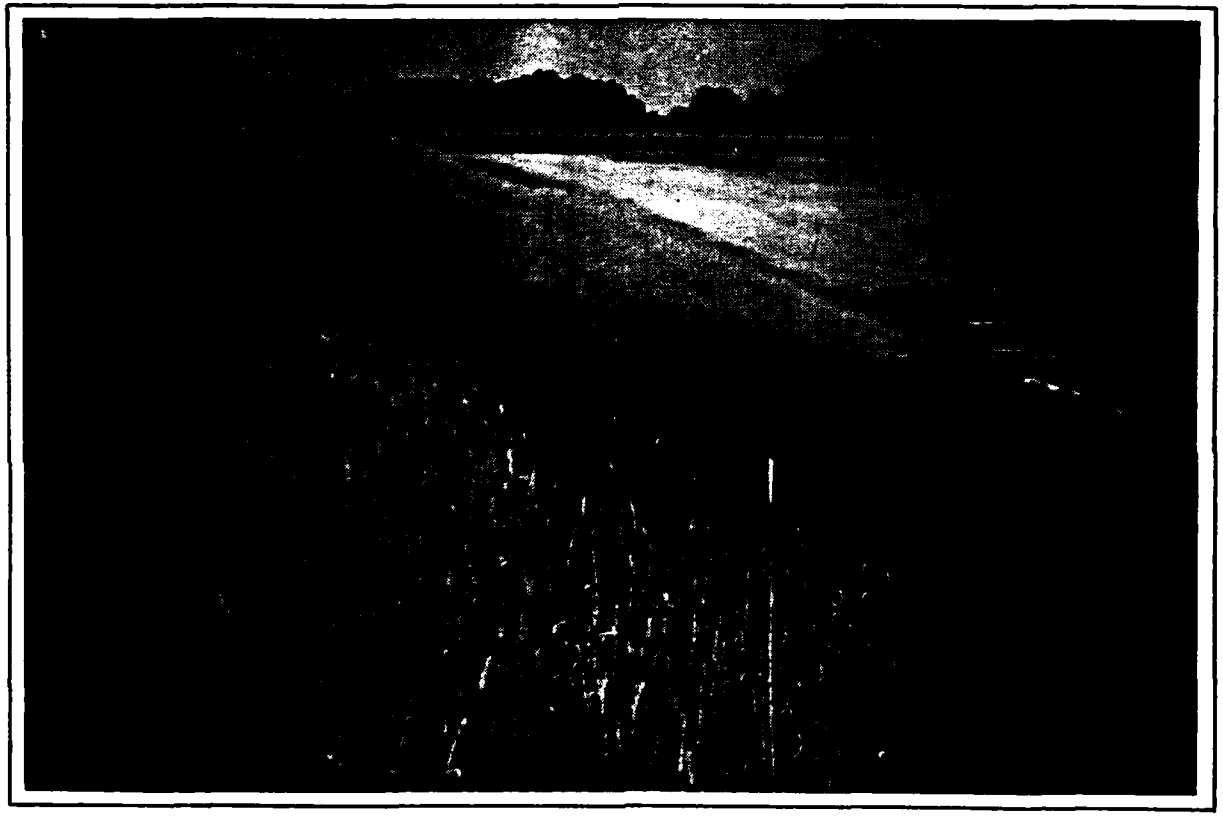
PLATE C-1

UPSTREAM FACE WITH ROCK GUTTER
AT UPSTREAM TOE.

PHOTOGRAPH NO. 1

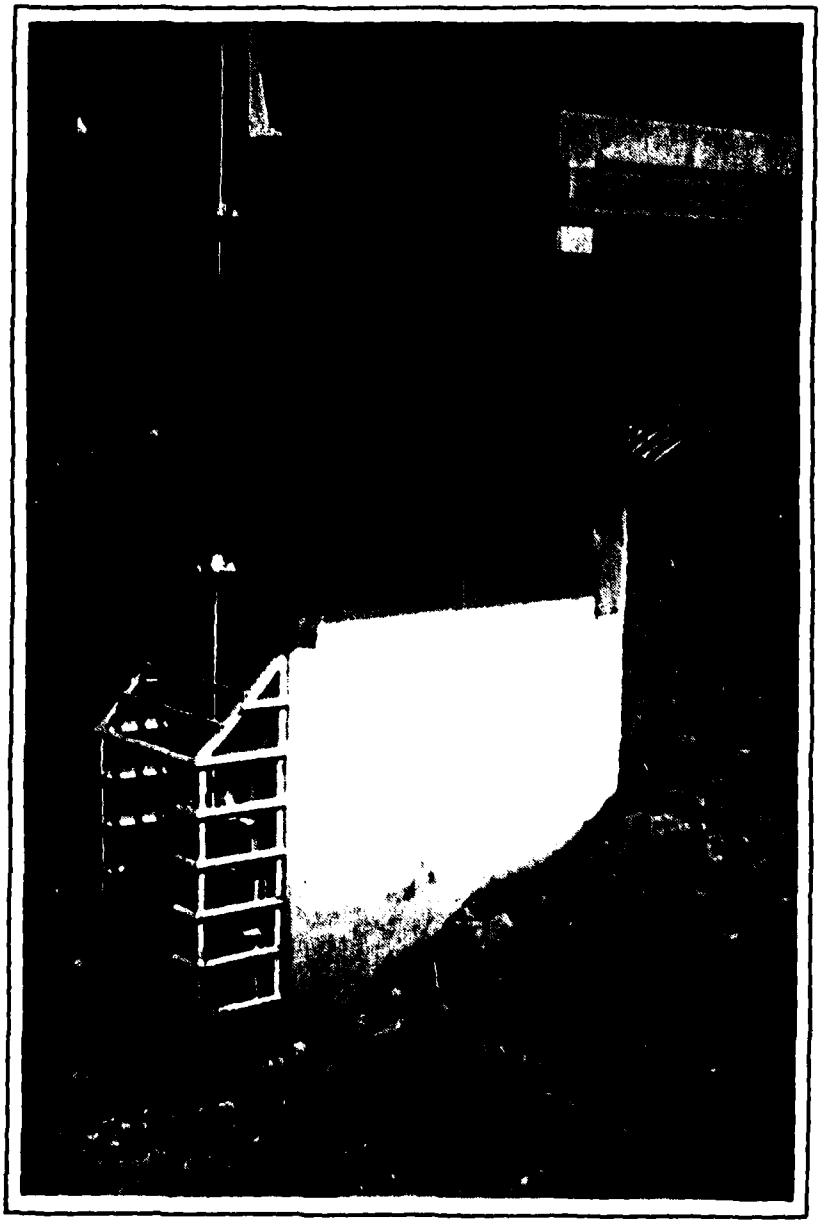
GRAVEL ROAD PROTECTS EMBANKMENT CREST.

PHOTOGRAPH NO. 2



DOWNSTREAM FACE WITH ROCK GUTTER
AT TOE.

PHOTOGRAPH NO. 3



PRINCIPAL SPILLWAY RISER AT UPSTREAM TOE.

PHOTOGRAPH NO. 4

IMPACT BASIN AT DOWNSTREAM TOE.

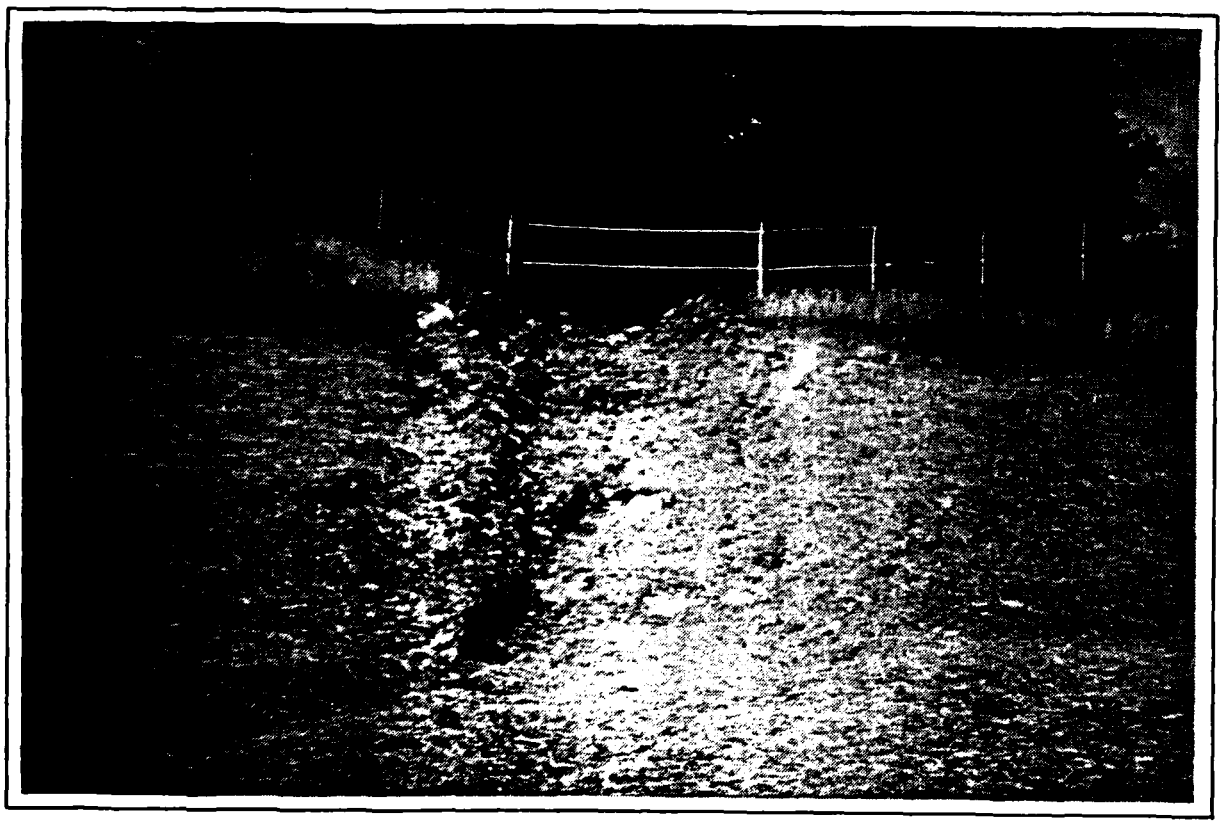
PHOTOGRAPH NO. 5

EMERGENCY SPILLWAY LOOKING UPSTREAM

PHOTOGRAPH NO. 6

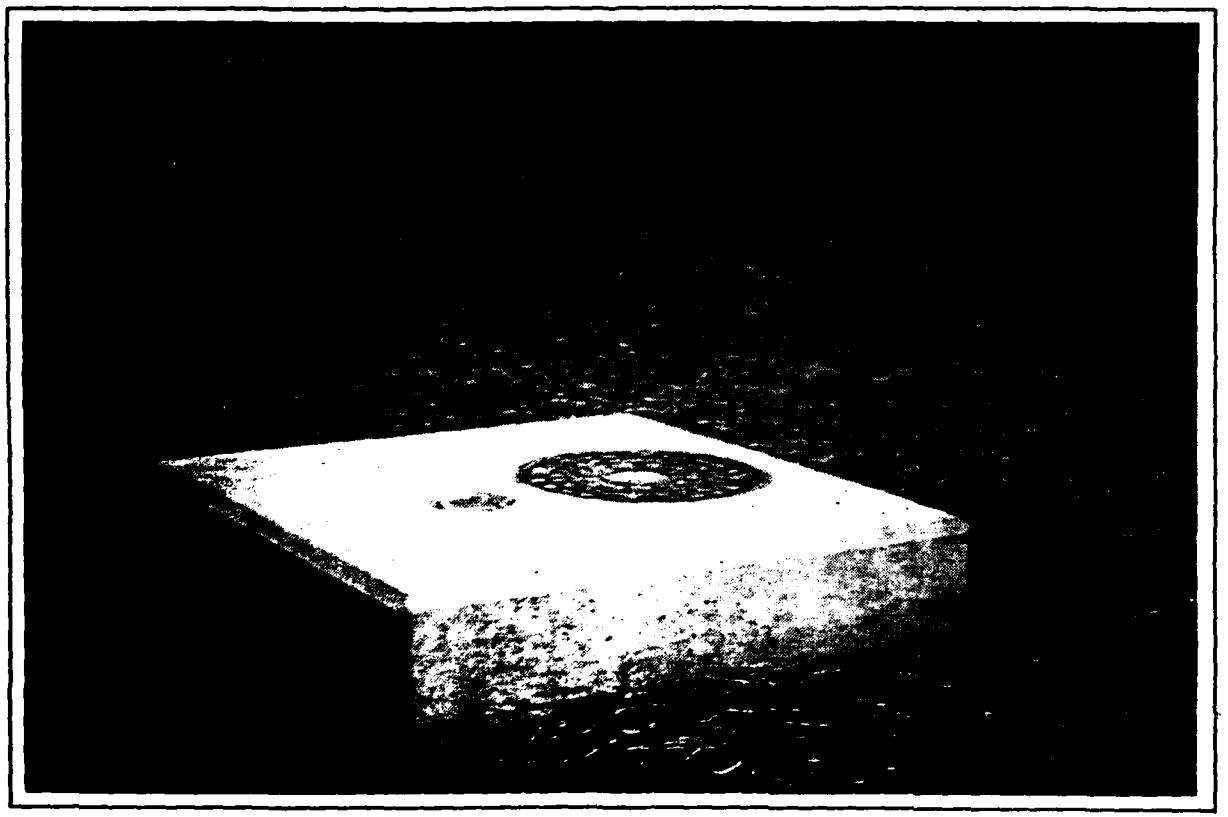
EMERGENCY SPILLWAY LOOKING DOWNSTREAM

PHOTOGRAPH NO. 7



INTERMITTENT STREAM ENTERS EMERGENCY
SPILLWAY UPSTREAM OF CONTROL SECTION.

PHOTOGRAPH NO. 8



SANITARY SEWER MANHOLE. SEWER IS UNDER EMBANKMENT.

PHOTOGRAPH NO. 9

TYPICAL DEVELOPMENT ADJACENT TO
NEWTOWN CREEK IN NEWTOWN, PENNSYLVANIA.

PHOTOGRAPH NO. 10

APPENDIX

D

NEWTOWN DAM
(SCS PA 621)

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: *Predominantly open farm land with little residential development.*

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): *213.0 feet (56 Acre-Feet).*

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): *239.6 feet (1420 Acre-Feet).*

ELEVATION MAXIMUM DESIGN POOL: *239.6 feet.*

ELEVATION TOP DAM: *239.6 feet, design*

EMERGENCY SPILLWAY

a. Elevation *231.9 feet.*

b. Type *grass lined trapezodial channel.*

c. Width *185 feet.*

d. Length *About 650 feet.*

e. Location Spillover *Left abutment.*

f. Number and Type of Gates *None.*

PRINCIPAL SPILLWAY

a. Type *Deep inlet riser, 30 inch conduit and impact basin.*

b. Location *Dam station 15+00, at maximum section.*

c. Entrance inverts *213 feet.*

d. Exit inverts *196.0 feet.*

e. Emergency draindown facilities *Pond drain at base of riser, 199 feet.*

HYDROMETEOROLOGICAL GAGES:

a. Type *None within watershed.*

b. Location *N/A*

c. Records *N/A*

MAXIMUM NON-DAMAGING DISCHARGE: *Not determined.*

HYDROLOGIC AND HYDRAULIC
BASE DATA

DRAINAGE AREA:(1) *3.04 square miles.*

PROBABLE MAXIMUM PRECIPITATION (PMP)
USED IN DESIGN:(1) *25.5 inches.*

HYDROGRAPH PARAMETERS:(1)

Runoff Curve Number *81*

Time of Concentration *1.84 hour*

SPILLWAY CAPACITY AT MAXIMUM
WATER LEVEL:(1) *10,967 cfs*

(1) From SCS Design Folder

Newtown Dam
(SCS PA 621)
Hydrology/Hydraulics

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

1. The hazard potential is rated as "High" as there would be loss of life if the dam failed.

2. The size classification is "Intermediate" based 1420 Acre-Feet total storage capacity and 44 feet height.

3. The spillway design flood, based on size and hazard classification, is the Probable Maximum Flood (PMF).

Hydrologic/Hydraulic Analysis

The complete H & H design folder was available for review. The PMF inflow hydrograph was determined according to procedures in the SCS National Engineering Handbook, Section 4 (NEH-4). The routing was done according to procedures in NEH-5 (1968, was not available for review) and, later, checked by SCS computer program, TR-20. The computer routing indicates a higher maximum water elevation than the original flood routing. As land rights were obtained before the computer routing, it was decided to increase the emergency spillway width to stay within the acquired land rights.

Orignial design parameters were checked against current information and/or criteria. The drainage area of 3.04 square miles is verified by current USGS maps.

Calculations for the PMF inflow hydrograph were based on a 6-hour rainfall of 25.5 inches and a Runoff Curve Number of 81. Rainfall criteria established for this investigation by the Corps of Engineers indicate a 26.6 inch rainfall (Ref.-Hydrometerological Report No. 33) and the use of Hop Brook factor, a point rainfall reduction factor. For a watershed of this size, the point rainfall

is reduced by 20%, to 21.2 inches. Thus, the design rainfall is conservative compared to Corps of Engineers criteria. The Runoff Curve Number 81 (CN 81) is based on the hydroglogic soil group classification and expected future land use within the watershed. The future land use was based on projections of the Bucks and Montgomery Planning Commission to year 2010. Projected land use includes open, 3.5%; wooded, 9.5%; and residential and commercial 87.0%. The estimated current developed areas are less than 10% from the 1973 USGS map. The estimated future conditions are judged adequate.

The elevation-storage data was checked and found adequate. The emergency spillway discharge was checked according to current SCS criteria, TR-39. The maximum emergency spillway discharge was estimated as 10,852 cfs (see sheet 5), about the same as emergency spillway discharge used in the SCS computer routing.

The spillway is rated as "Adequate" as the spillways will pass the PMF without overtopping the embankment.

BY MEB DATE 7/2/80 SUBJECT Newtown Dam SHEET 5 OF 8

CHKD. BY REM DATE 7/24/80 Hydrology / Hydraulics JOB No.

Emergency Spillway Capacity ref. SCS TR-39

bottom width = 30 ft.
level section = 50 ft.
total length to downstream edge of level section 455 ft
approach channel slope = 0.02

assume Q = 10,852 cfs estimated emergency spillway capacity

$q = Q/b = 10,852/185 = 58.6$ cfs/ft.

depth at upstream edge of level section = 5.9 ft.

ES-158, sheet 1 of 10

depth at entrance to approach channel ~15.6 ft

ES-158, sh. 3 of 10

velocity head at entrance to approach channel ~ 0.12 ft.

ES-159, sh. 1 of 2

total head at entrance to approach channel
elev. + water depth + velocity head
224.0 + 15.6 + 0.12 = 239.7 ~239.6 top of dam

the above calculations are adequate as they are within the accuracy of the charts.

Penna | Project: Tommy Creek | SHEET 6 OF 8

By H.L.W. | Date 9-27-74 | Checked By | Date | Job No PA-621

Subject WORK PLAN - DESIGN COMPARISON (DAMS) | Sheet 3 of ✓

ITEM	UNIT	WORK PLAN	DESIGN	COMMENTS
DRAINAGE AREA	SQ. MI.	3.04	3.04	
STORAGE CAPACITY				
SEDIMENT (INC. AERATED)	AC. FT.	69	69	
BENEFICIAL	AC. FT.			
RETARDING	AC. FT.	594	678.7	
TOTAL	AC. FT.	663	747.7	
BETWEEN HIGH & LOW S.	AC. FT.			
SURFACE AREA				
NORMAL POOL	ACRE	10	11	
RETARDING POOL	ACRE			
DESIGN HIGH WATER	ACRE	67	82	
VOLUME OF FILL	CU. YD.	63,100		
TOP OF DAM ELEV.	FEET	239.3	239.6	
MAX. HEIGHT OF DAM	FEET	43.3	43.6	
EMERGENCY SPILLWAY				
CREST ELEVATION	FEET	231.0	231.9	
BOTTOM WIDTH	FEET	150	185.0	
TYPE	—	sod	sod	
PERCENT CHANCE OF USE	—	1	1	
AVE. CURVE NO. COND. II	—	81	81	
EM. SP. HYDROGRAPH				
STORM RAINFALL	IN.	10.5"	10.5"	
STORM RUNOFF	IN.	8.12	8.12	
VELOCITY OF FLOW - V	FPS	8.3	7.58	
PEAK DISCHARGE RATE	CFS	2020	2091	
MAX. WATER SURFACE EL.	FEET	234.2	234.7	
FREEBOARD HYDROGRAPH				
STORM RAINFALL	IN.	26	25.5"	
STORM RUNOFF	IN.	23.39	22.88	
VELOCITY OF FLOW - V_e	FPS	14.2	14.79	
PEAK DISCHARGE RATE	CFS	10,275	10967	
MAX. WATER SURFACE EL.	FEET	239.3	239.6	
PRINCIPAL SPILLWAY				
RISER SIZE	FT.	—	2.5' x 7.5'	
MAX. LOW STAGE FLOW	CFS	—	—	
ORIFICE SIZE	FT.	—	—	
MAX. HIGH STAGE FLOW	CFS	436	917	
PIPE SIZE	DIA.		30	
CAPACITY EQUIVALENTS				
TOTAL SEDIMENT VOL.	IN.	0.42	0.42	
RETARDING STORAGE	IN.	3.66	4.186	
EM. SPILLWAY STORAGE TO TOP OF DAM	IN.	4.42	4.12	
CLASS OF STRUCTURE	—	C	C	
CONSTRUCTION COSTS				
	—			
	—			

NP-CC-1

REF - SCS DESIGN FOLDER

COMPUTATION SHEET
SCS-ENG-522 REV. 3-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Penna | PROJECT Neshaminy Creek
BY L.W | DATE 8/27/74 | CHECKED BY | DATE | JOB NO. PA-621
SUBJECT Time of Concentration (copied From planning data) SHEET 6 OF

	Length	Slope	Vel	t sec	
		Woods			
Overland Flow	2800'	2.1%	1.0	2800	
Gully	7000'	0.009	3.4	2060	
Channel	8000'	0.01	4.5	1790	r = 2
				6640 sec	
				1.84 hours	

$\frac{\Delta \text{ Elev}}{\text{sum } L} = \frac{120}{17800}$

Soil Cover Complex (copied from planning data)

Future Conditions

Cover	Hydro Soil Class	CN.	% Land	% x CN		
Grass	B	83	1.5	124		
Woodland	B	70.1	9.5	666		
Public	B	79	2.0	158		
Commercial	B	89	1.0	89		
Res. dom. 20-40,000	B	81.7	36.0	2941		
Res. dom. > 40,000	B	81.7	50.	4085	II	III
			100.	8063	use 81	94

REF - SCS DESIGN FOLDER

FREEBOARD ROUTING BOTTOM WIDTH= 185.0 ENTRANCE LENGTH= 400.0

TIME	INFLOW	AVE INFLOW	OUTFLOW	STORAGE	ELEVATION	V/L (ES & ONLY)	V/E
0.25	0.07	0.03	0.05	55.60	213.00		
0.50	10.47	4.27	7.03	55.63	213.19		
0.75	52.46	31.47	21.04	55.99	213.57		
1.00	154.43	103.44	29.27	57.61	213.71		
1.25	363.39	258.91	49.94	62.14	214.09		
1.50	758.57	560.98	80.75	72.38	214.94		
1.75	1336.96	1048.77	85.27	92.31	216.12		
2.00	2231.03	1784.00	89.87	127.36	218.06		
2.25	3623.22	2927.12	95.13	185.92	220.48		
2.50	5917.98	4770.60	100.95	282.46	223.33		
2.75	9041.57	7479.77	107.65	434.83	226.75		
3.00	11979.93	10510.75	119.13	649.69	230.77		
3.25	14076.13	13028.03	1452.13	902.65	234.12	5.11	6.49
3.50	14853.05	14464.59	5027.13	1134.56	236.68	9.39	10.85
3.75	14160.24	14506.64	8327.58	1296.31	238.41	11.13	13.27
4.00	12874.64	13517.43	10224.58	1383.96	239.29	11.87	14.39
4.25	11494.43	12184.53	10967.45	1416.76	239.61	12.15	14.77
4.50	10198.98	10846.70	10921.68	1414.74	239.59	12.13	14.76
8.50	562.92	668.54	1786.37	926.65	234.42	6.58	7.09
12.50	0.00	0.00	199.59	759.54	232.27	NON CRITICAL FLOW	

VOLUME CHECK AT HP= 0.38. COMPUTED HP= 7.71 AT ELEV. 239.61 (STORAGE IS 1416.7 AC.FT.= 8.73 IN.)
TIME= 4.25 HOURS CRITICAL VELOCITY= 12.15 CRITICAL DEPTH= 4.59 CRITICAL SLOPE= 1.60.

PEAK INFLOW	=	14853.	CFS
TOTAL VOL. THRU EMER SPILLWAY	=	2953.	AC-FT.
ASCENDING VOL. THRU EMER SPILLWAY	=	731.	AC-FT.
PEAK OUTFLOW	=	10967.	CFS
ATTACK	=	15.966	AC-FT PER FT. WIDTH

DURATION OF FLOW= 11.50

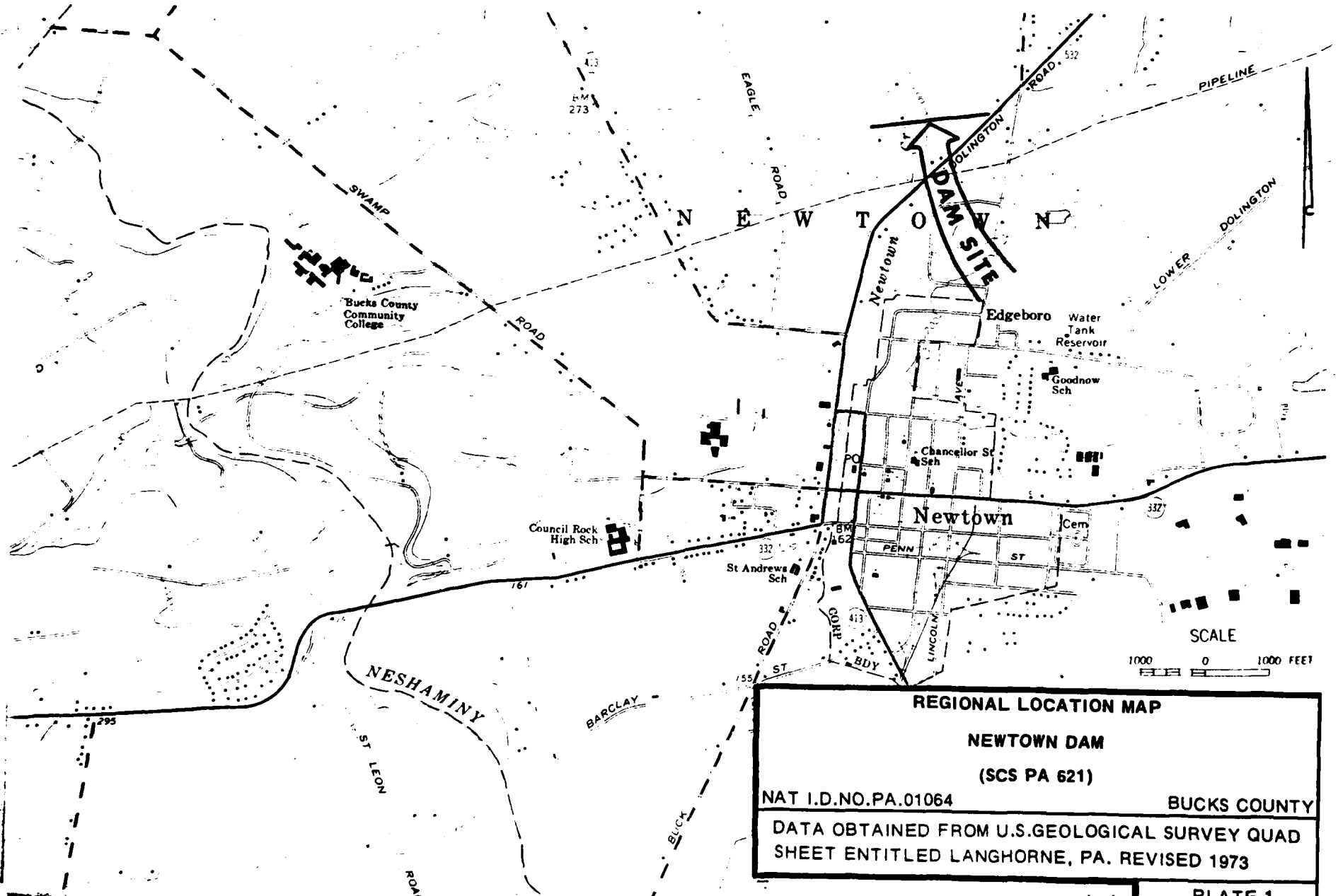
EXIT CHANNEL VELOCITY = 14.79

REF - SCS DESIGN FOLDER

SHEET 8 OF 9

APPENDIX

E



REGIONAL LOCATION MAP

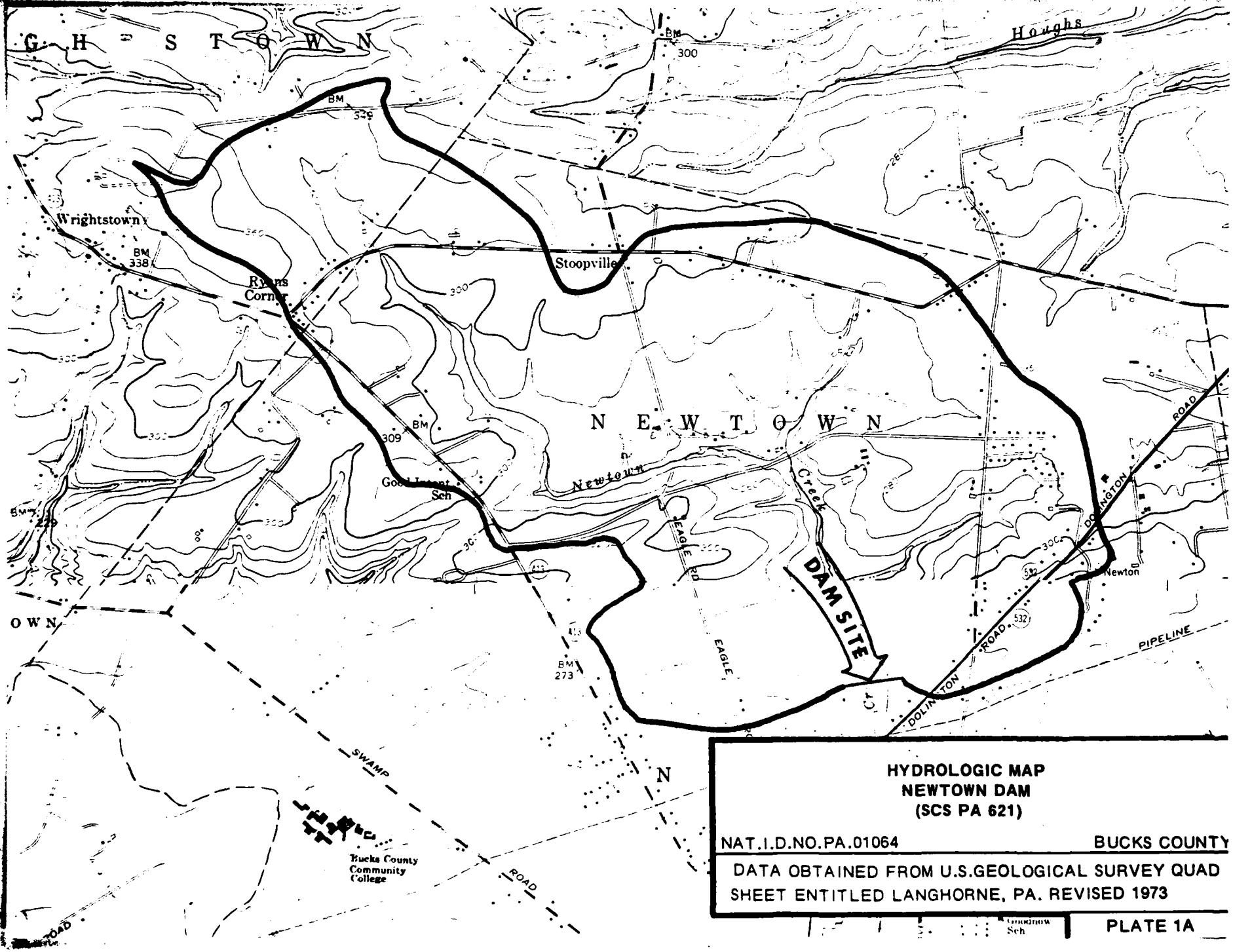
NEWTOWN DAM

(SCS PA 621)

NAT I.D.NO.PA.01064 BUCKS COUNTY

DATA OBTAINED FROM U.S.GEOLOGICAL SURVEY QUAD SHEET ENTITLED LANGHORNE, PA. REVISED 1973

PLATE 1



HYDROLOGIC MAP
NEWTOWN DAM
(SCS PA 621)

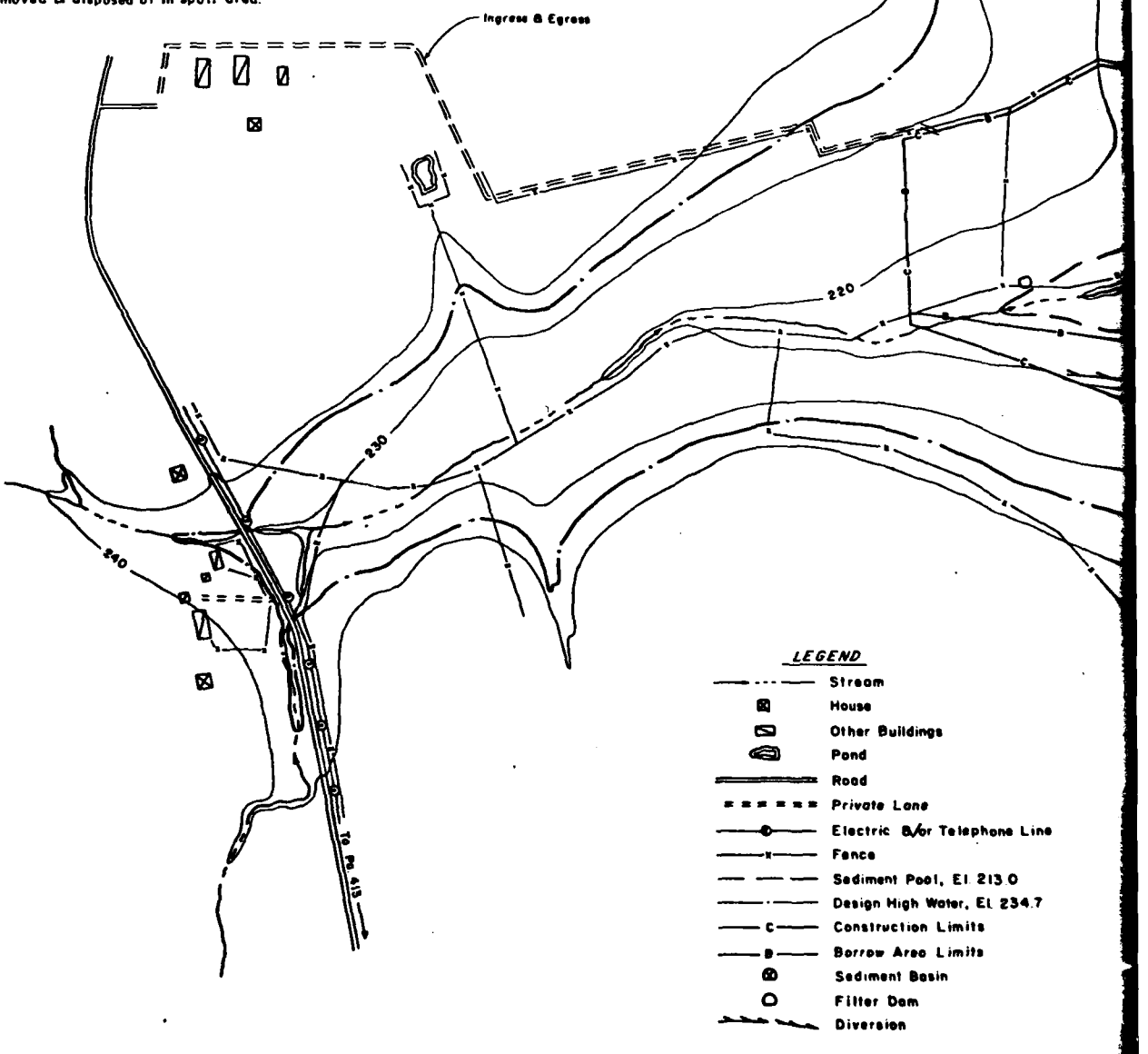
NAT.I.D.NO.PA.01064 BUCKS COUNTY

DATA OBTAINED FROM U.S.GEOLOGICAL SURVEY QUAD SHEET ENTITLED LANGHORNE, PA. REVISED 1973

PLATE 1A

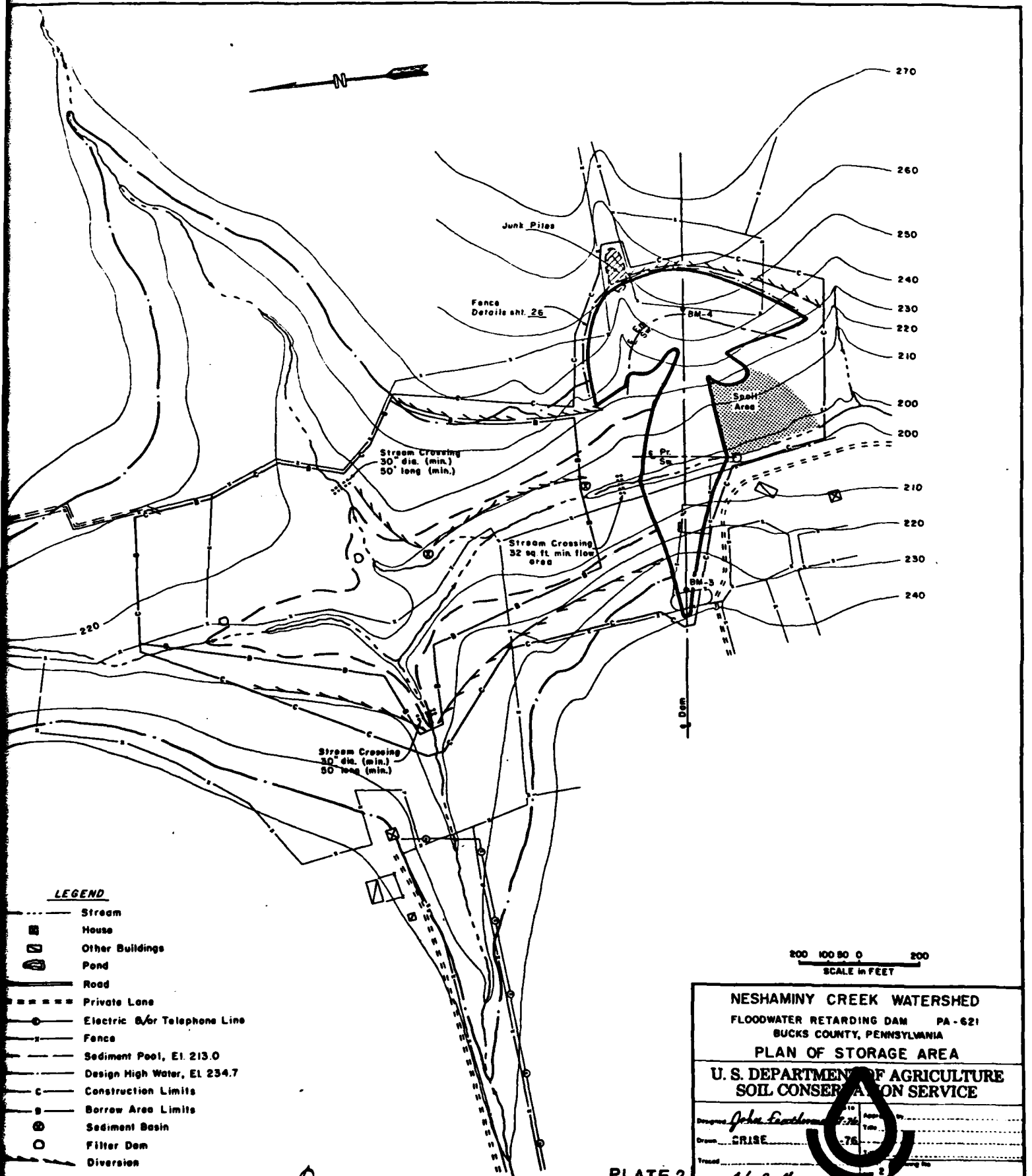
CONSTRUCTION NOTES

1. For Em. Sw section see sht. 6, for profile see sht. 24.
2. ℄ Dam = ℄ Cutoff Trench
3. Junk Piles within construction limits shall be disposed of in spoil area.
4. Filter Dams, Stream Crossings and Sediment Basins will be located as directed by the Engineer. (details sht. 5)
5. Diversions, final line and grade will be determined by the Engineer. (details sht. 5)
6. Borrow Area sideslopes shall be no steeper than 3:1.
7. Spoil Area shall be cleared prior to use and spoil shall be graded for drainage.
8. Clearing & Grubbing required in structure area, borrow area and upstream of dam below elev. 213.0 will be as directed by the Engineer.
9. For ℄ Dam Layout see sht. 3.
10. Ingress & Egress, Final line and grade will be determined by the Engineer.
11. All fences & buildings within construction limits shall be removed & disposed of in spoil area.



LEGEND

- Stream
- House
- Other Buildings
- Pond
- Road
- Private Lane
- Electric &/or Telephone Line
- Fence
- Sediment Pool, El 213.0
- Design High Water, El 234.7
- Construction Limits
- Borrow Area Limits
- Sediment Basin
- Filter Dam
- Diversion



NESHAMINY CREEK WATERSHED

FLOODWATER RETARDING DAM PA-621

BUCKS COUNTY, PENNSYLVANIA

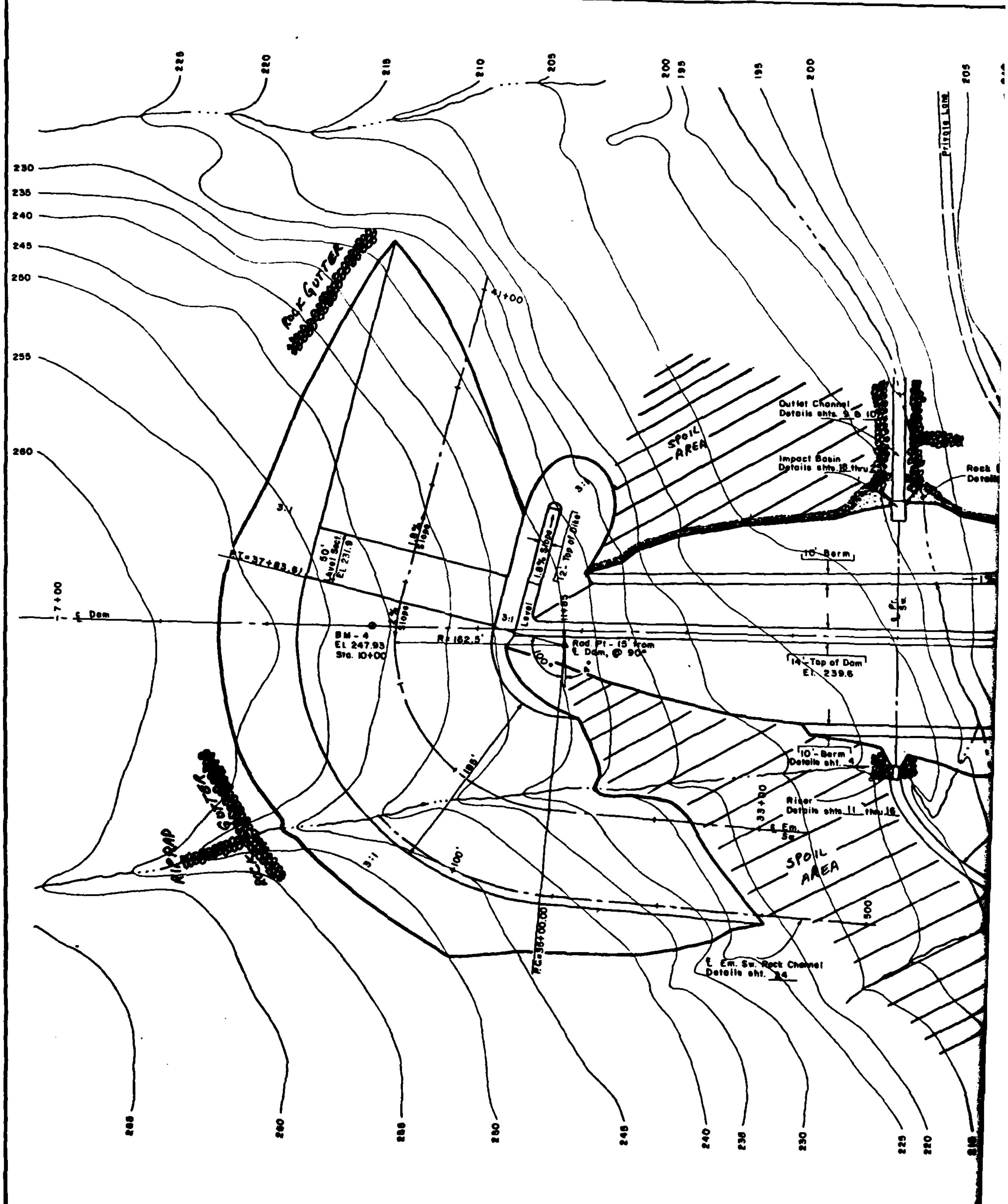
PLAN OF STORAGE AREA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed John Faulkner 7-76
Drawn CRISE 7-76
Traced
Checked John Faulkner 8-76

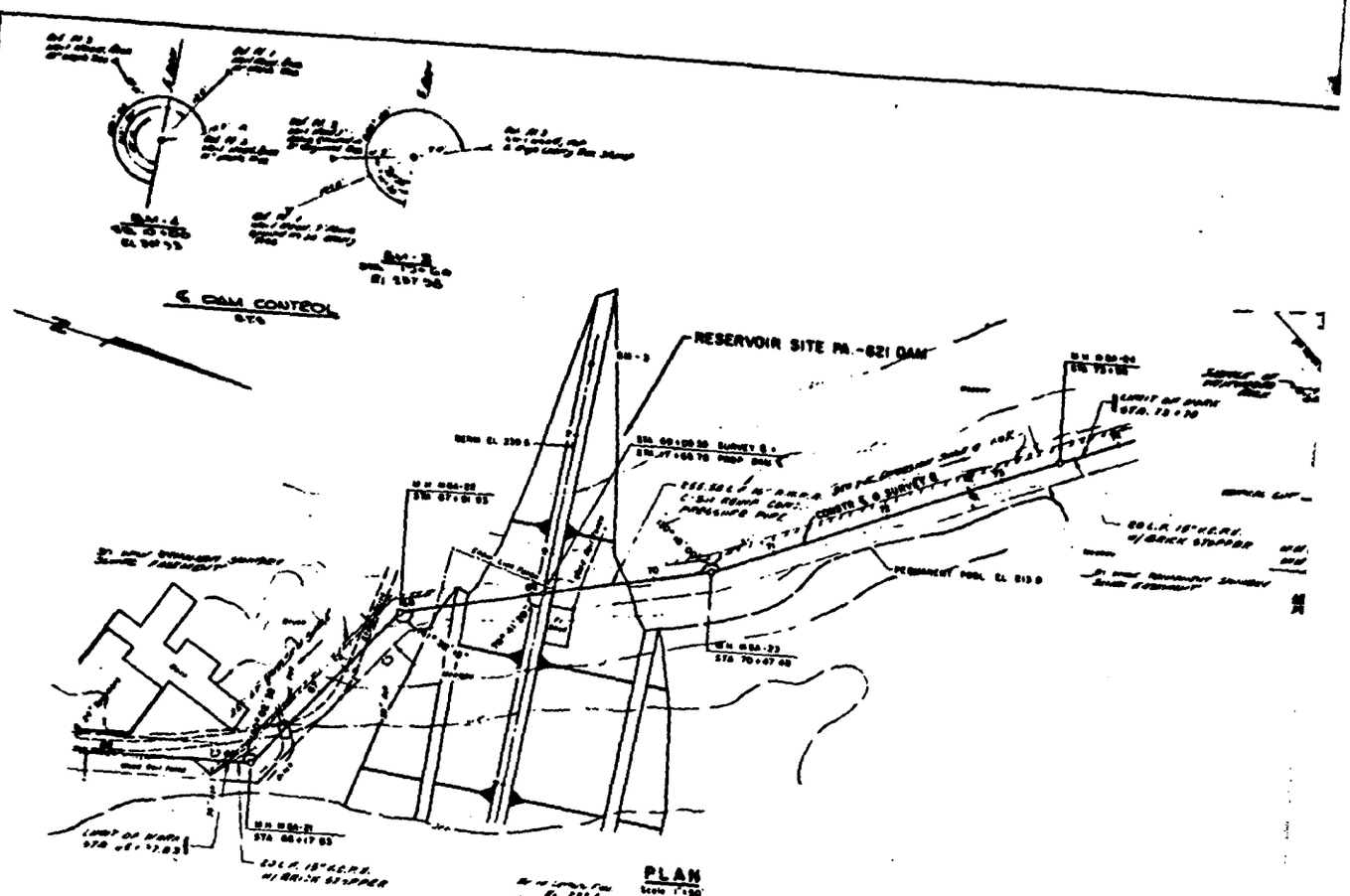
PLATE 2

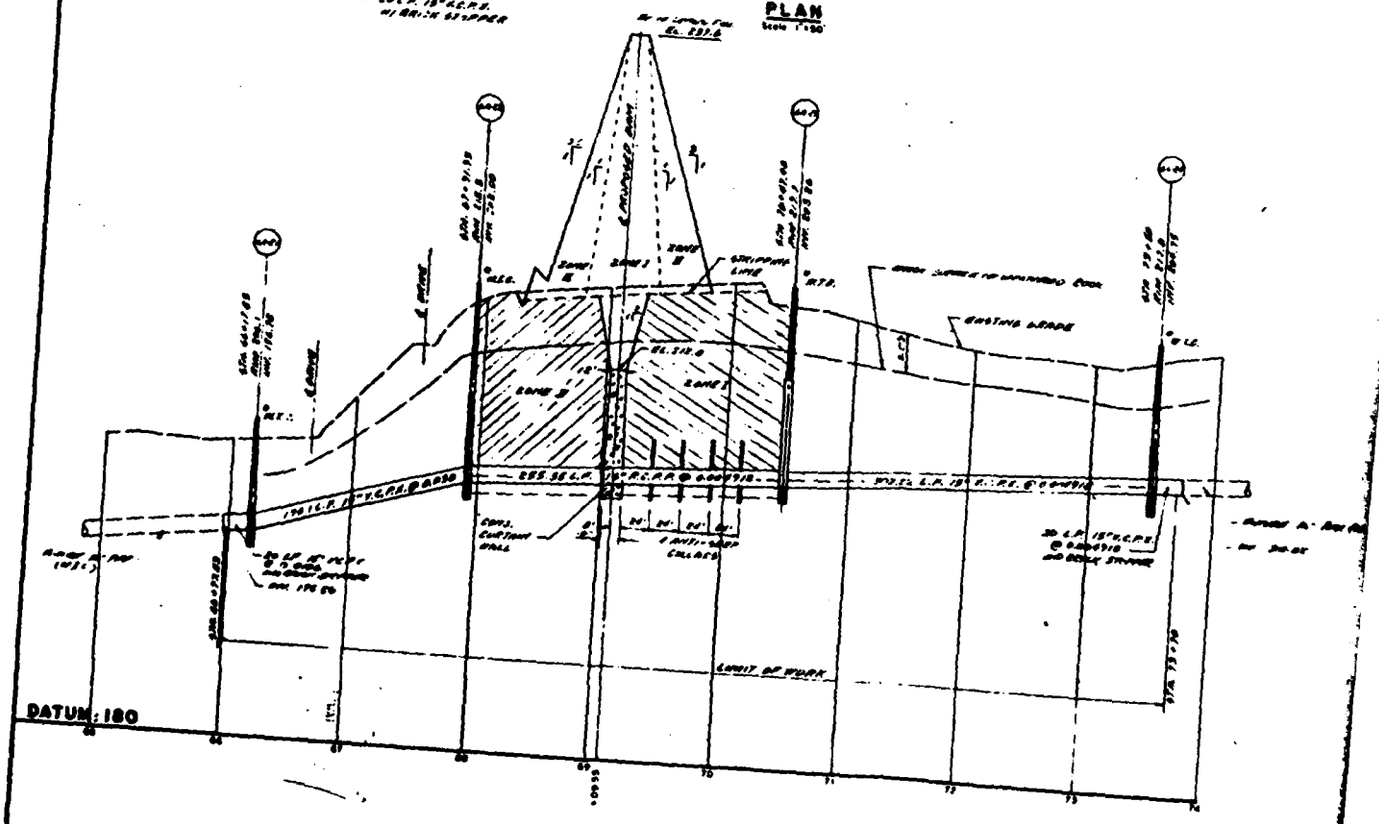
PA-621-P



Rock Gutter
Rip Rap
Rock Gutter
Spoil Area
Spoil Area
Outlet Channel Details shts. 9 & 10
Impact Basin Details shts. 18 thru 2
10' Berm
10' Berm Details sht. 4
14' Top of Dam El. 239.6
Riser Details shts. 11 thru 16
℄ Em. Sw. Rock Channel Details sht. 24
BM - 4 El. 247.93 Sta. 10+00
R= 162.5'
Rod Pt - 15' from ℄ Dam, @ 90°
PT=37+83.81
50' Level Sect. El. 231.8
1.8% Slope
1.8% Slope
12' Top of Dike
℄ Dam
Private Land
3:1

Ref. Pt. 3
Nail head, base
12" maple tree.
Ref. Pt. 1
Nail head, 7' above
ground in 24"
cherry tree
Ref. Pt. 2
Nail head, 1' above
ground in 3"
dogwood tree.
Ref. Pt. 2
Nail head, base
11" maple tree
Ref. Pt. 1
Nail head, base
10" maple tree
Ref. Pt. 3
Nail head, top
4" high cherry
tree stump
BM - 4
Sta. 10+00
El. 247.93
BM - 3
Sta. 19+60
El. 237.98
℄ Dam
N
℄ DAM LAYOUT
NOT TO SCALE
Private Lane
Barn
Outlet Channel
Details shts. 9 & 10
Impact Basin
Details shts. 12 thru 14
Rock Fill
Details shts. 7 & 8
10' Berm
1% Slope
El. 220
El. 219
Rock Gutter
Details shts. 7 & 8
2.5:1
3:1
Pr. 3%
14' Top of Dam
El. 239.6
Shed
BM - 3
El. 237.98
Sta. 19+60
ROCK GUTTER
El. 213
10' Berm
Details sht. 4
Riser
Details shts. 11 thru 16
Inlet Channel
Details shts. 9 & 10
6 Em. 3%
SPOIL AREA
6 Em. Sp. Rock Channel
Details sht. 14
23+00
33+00
NOTE: HANDWRITTEN ADDITIONS
TAKEN FROM AS BUILT DRAWINGS
EMERGENCY SPILLWAY
CURVE DATA
I = 100°
R = 162.5'
E = 90.30'
M = 58.04'
C = 248.95'
L = 283.61'
T = 193.67'
P.C. = 35+00.00
P.T. = 37+83.61
60 30 15 0 60
SCALE in FEET
NESHAMINY CREEK WATERSHED
FLOODWATER RETARDING DAM PA-621
BUCKS COUNTY, PENNSYLVANIA
PLAN OF STRUCTURAL WORKS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Designed John Gentleman 76
Drawn GRISE 75
Traced
Checked John Gentleman 8 76
PLATE 3
PA-621-P


RESERVOIR SITE PA.-621 DAM
PLAN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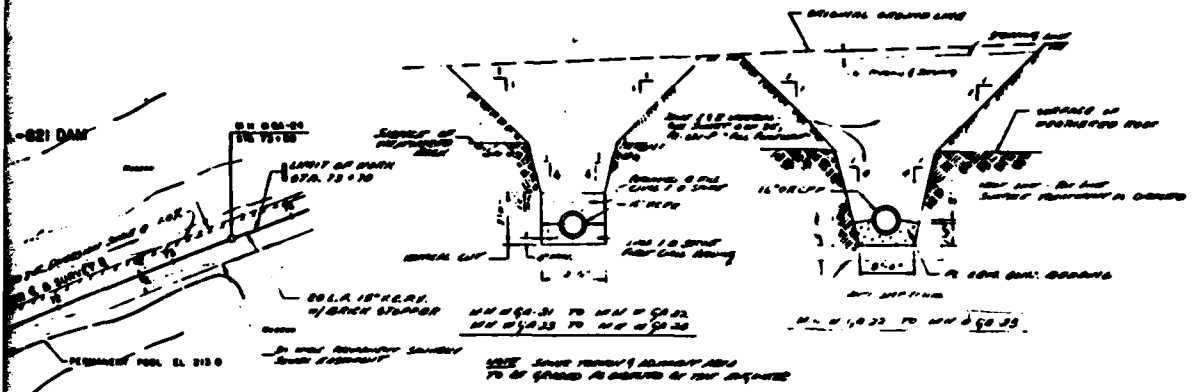
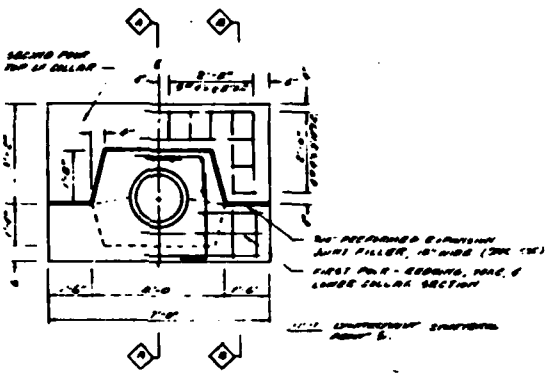
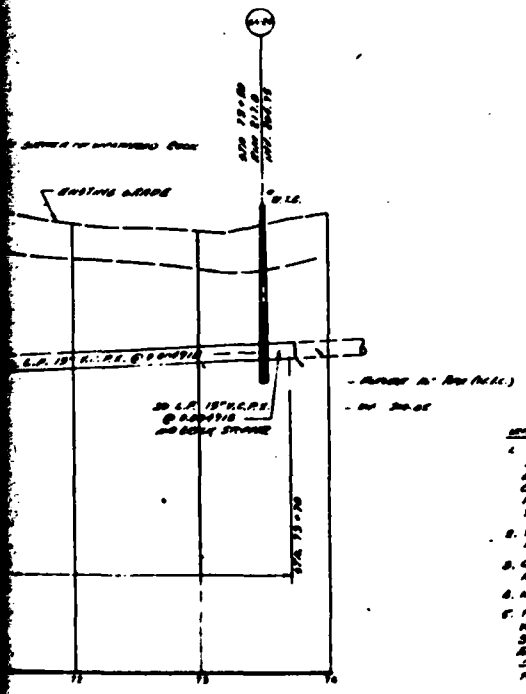
PROFILE

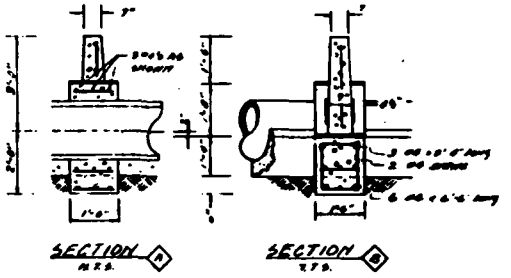
TYPICAL TRENCH DETAILS



ANTI-SEEP COLLAR DETAILS







SECTION

SECTION

NOTES

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]

NOTES

1. [illegible]
2. [illegible]

NEWTOWN CREEK TRUNK
NEWTOWN TOWNSHIP, BUCKS COUNTY PA.
F.P.A. Corporation
2307 Piedmont Avenue
Huntingdon Valley, Pa. 19006

SANITARY SEWER DETAILS - PA-621 DAM

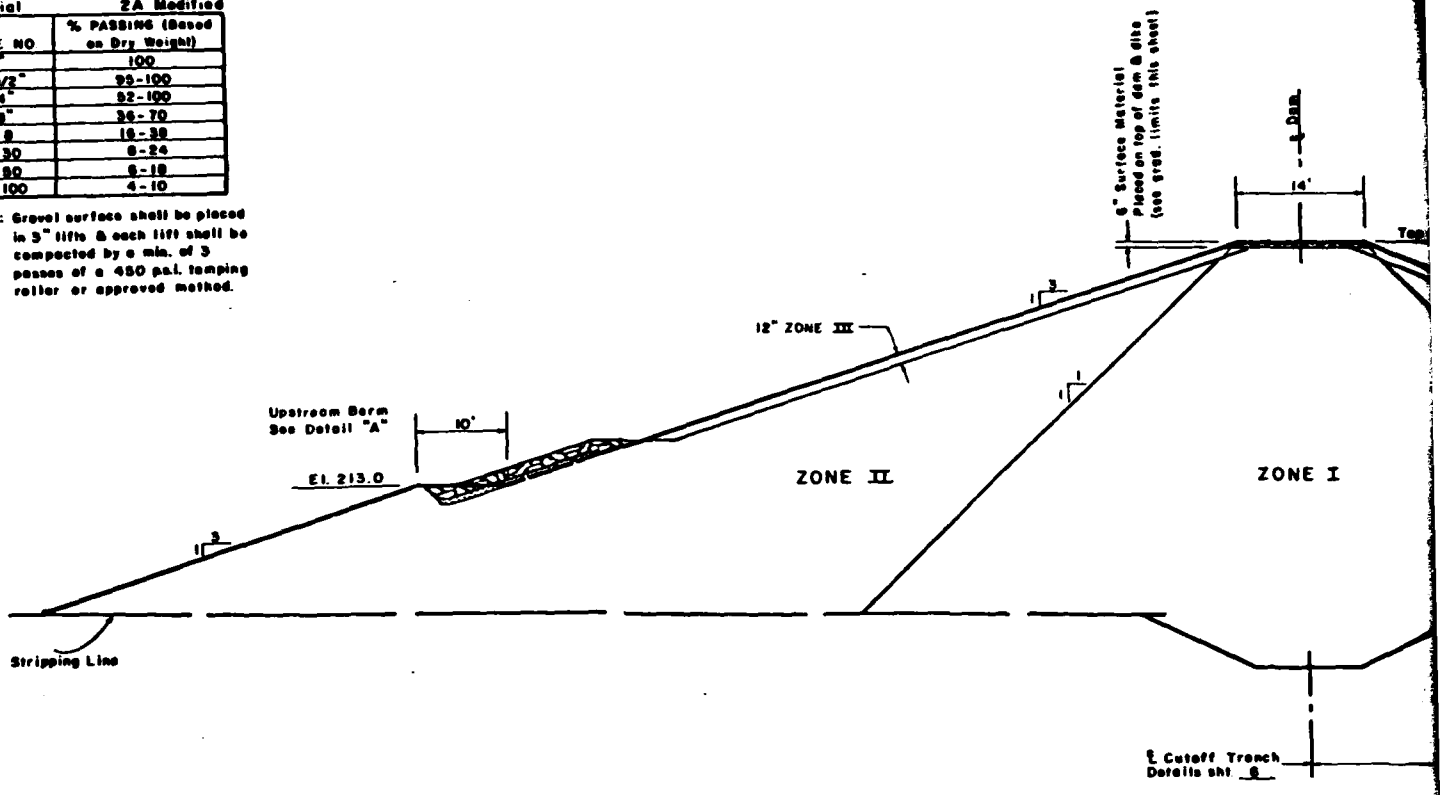
BOUCHER and JAMES, INC.
Engineers and Surveyors
Riverside, Pa. Doylestown, Pa.

PLATE 4

GRADATION LIMITS

Surface Material	PennDOT 2A Modified
SEIVE NO	% PASSING (Based on Dry Weight)
2"	100
1-1/2"	95-100
3/4"	82-100
3/8"	36-70
no. 8	19-38
no. 30	8-24
no. 80	5-18
no. 100	4-10

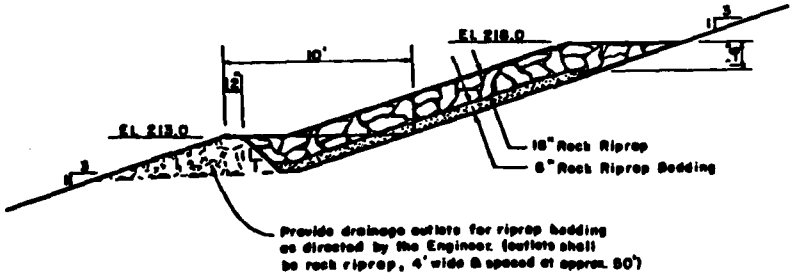
NOTE: Gravel surface shall be placed in 3" lifts & each lift shall be compacted by a min. of 3 passes of a 450 p.s.i. tamping roller or approved method.



TYPICAL SECTION OF DA

10 5 2 0 10

SCALE in FEET



DETAIL "A"

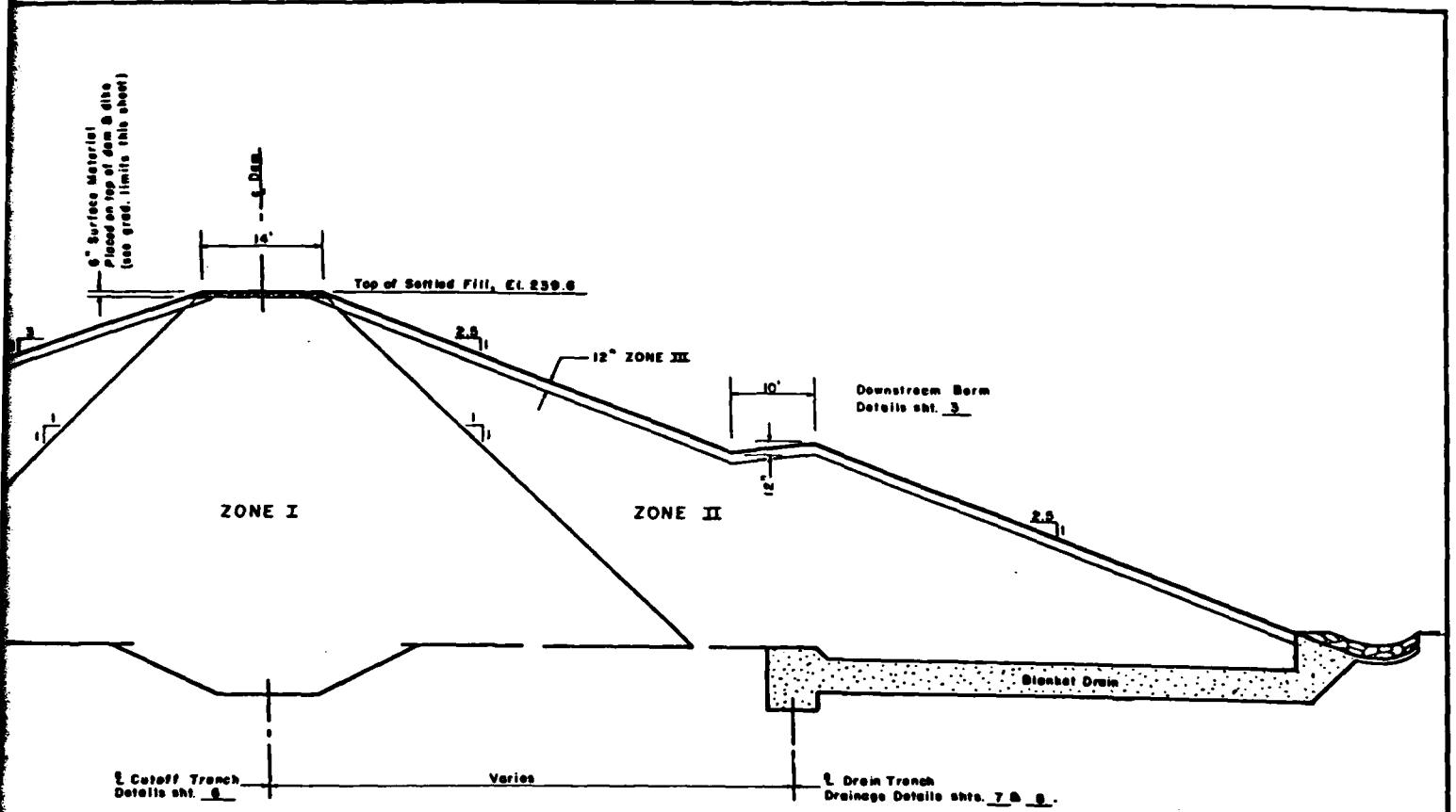
SELECTIVE PLACEMENT	MATERIAL	MAX. % ROCK SIZE
ZONE I	Material as represented by: TP-117 ML 1.0' to 5.0'; TP-129 ML 1.0' to 2.5'; TP-141 SM 3.5' to 5.2'; TP-211 ML 0.5' to 2.0'	6"
ZONE II	Material as represented by: TP-129 SM 2.5' to 4.0'	12"
ZONE III	Topsoil or ML	—

1) Maximum permissible

2) Water content of fill Variation from optim by the Engineer

3) For typical compact

4) For hand compacted shall not exceed 3"



TYPICAL SECTION OF DAM

10 5 2 0 10

SCALE in FEET

SELECTIVE PLACEMENT	MATERIAL	MAX. [4] ROCK SIZE	[1] [4] MAX. LIFT	REQ'D. [2] WATER CONTENT	COMPACTION [3] CLASS	COMPACTION [3] DEFINITION
ZONE I	Material as represented by: TP-117 ML 1.0' to 8.0' TP-129 ML 1.0' to 2.5' TP-141 SM 3.5' to 5.2' TP-211 ML 0.5' to 2.0'	6"	9"	Optimum to +4%	A	95% Standard density by ASTM D-698, Method A.
ZONE II	Material as represented by: TP-129 SM 2.5' to 4.0'	12"	18"	-2% to +2% of optimum Minus 3/4" matl. ASTM D-698 Method D	C	Minimum 6 passes with a 450 psi tamping roller per lift.
ZONE III	Topsoil or ML	—	12"	As designated by the Engineer.	C	Minimum 1 pass with a 450 psi tamping roller or approved method.

1. Maximum permissible lift thickness before compaction.
2. Water content of fill matrix at time of compaction. Variation from water content shown may be approved by the Engineer.
3. For typical compaction curves see sht. 38.
4. For hand compacted backfill, the maximum rock size shall not exceed 3" & lift thickness shall not exceed 4".

CONSTRUCTION NOTES

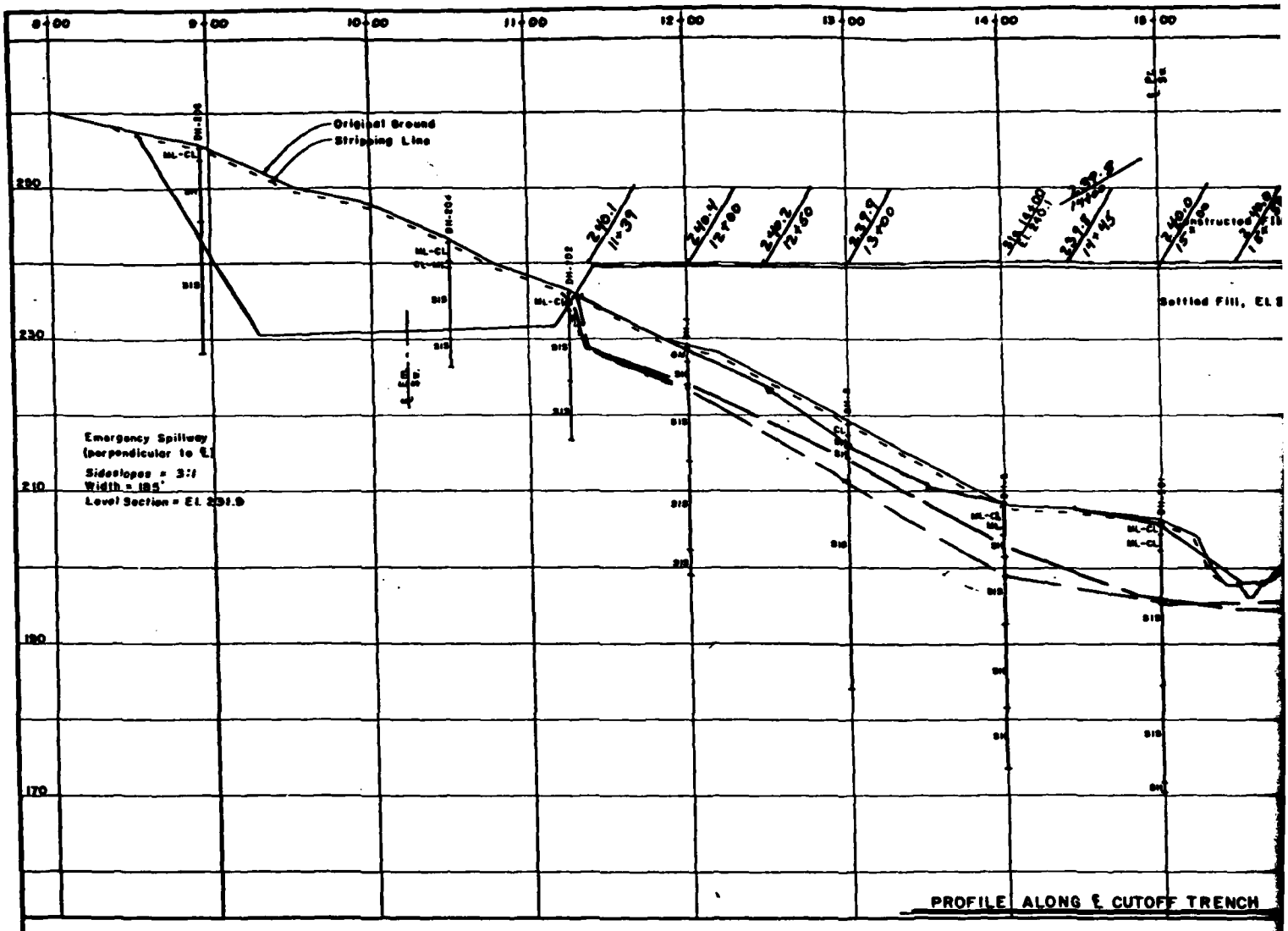
1. Constructed Slopes are:
   3:1 = 2.96:1
   2.5:1 = 2.47:1
2. For constructed fill elevations see sht. 6.

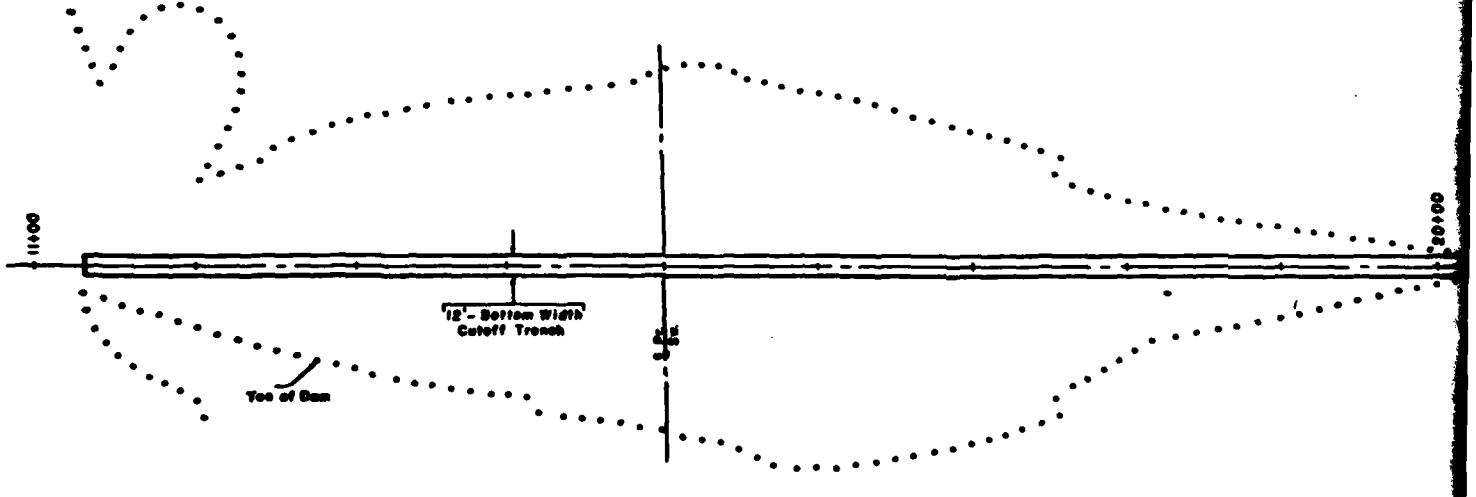
NESHAMINY CREEK WATERSHED
FLOODWATER RETARDING DAM PA-621
BUCKS COUNTY, PENNSYLVANIA
FILL PLACEMENT

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed John Leatherman 1-76 Approved
Drawn CRISE 1-76 Title
Traced Date
Checked John Leatherman 2-76 Sheet No. PA-621-P

PLATE 5

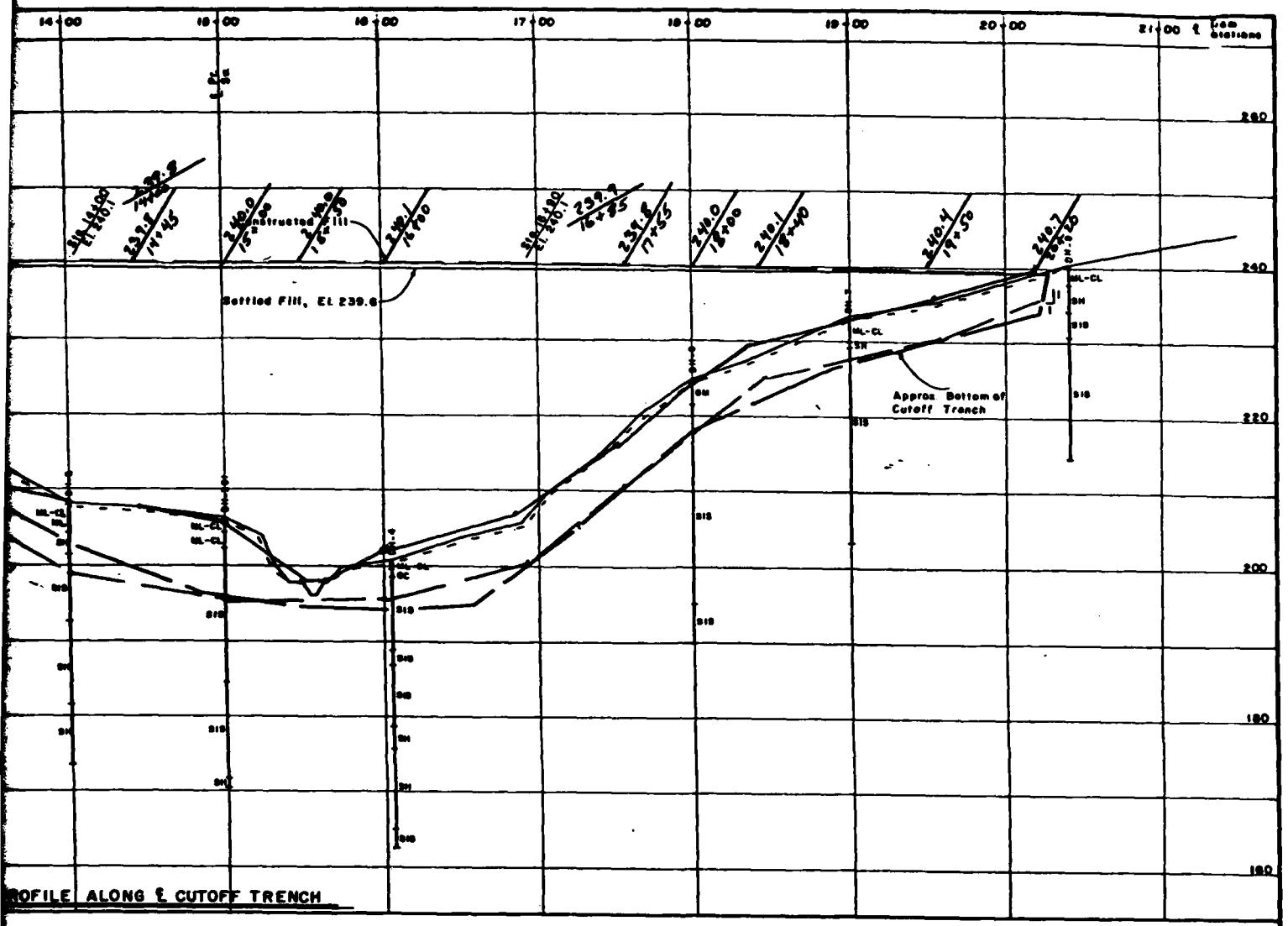




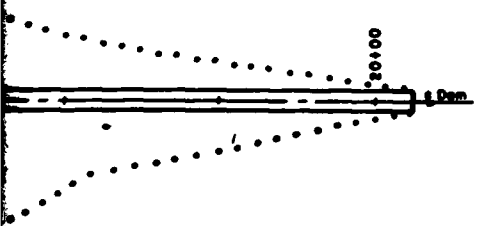
PLAN VIEW

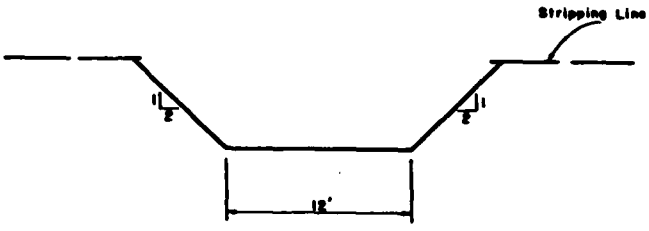
60 30 15 0 60

SCALE in FEET



PROFILE ALONG ℄ CUTOFF TRENCH





TYPICAL SECTION

CONSTRUCTION NOTES

1. ℄ Dam ⊥ ℄ Cutoff Trench
2. For logs of test holes see shts. 29 thru 34

NOTE: HANDWRITTEN ADDITIONS TAKEN FROM AS BUILT DRAWINGS

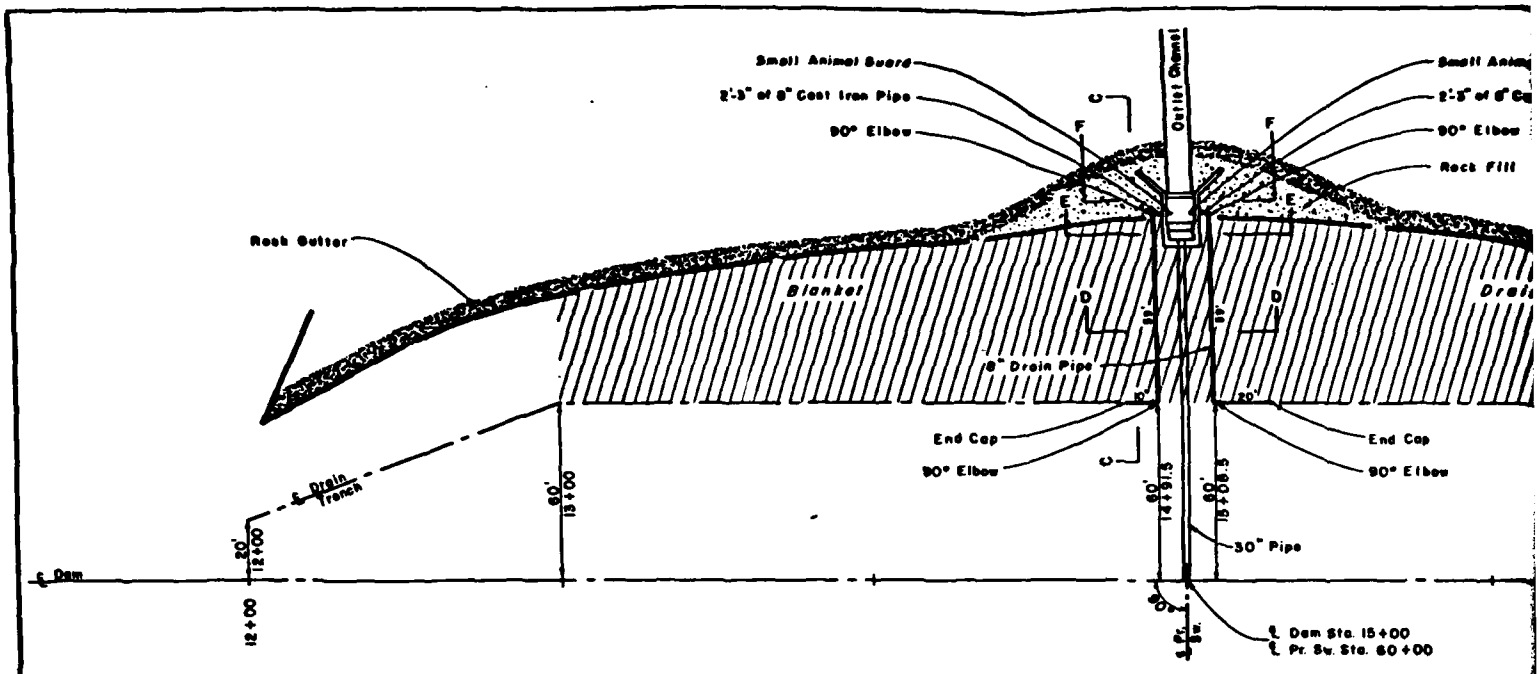
NESHAMINY CREEK WATERSHED
FLOODWATER RETARDING DAM PA-621
BUCKS COUNTY, PENNSYLVANIA
CUTOFF TRENCH

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed John Easthouse -76
Drawn CRISE -76
Traced
Checked John Easthouse

PLATE 6

PA-621-P



PLAN VIEW

30 15 0 30

SCALE in FEET

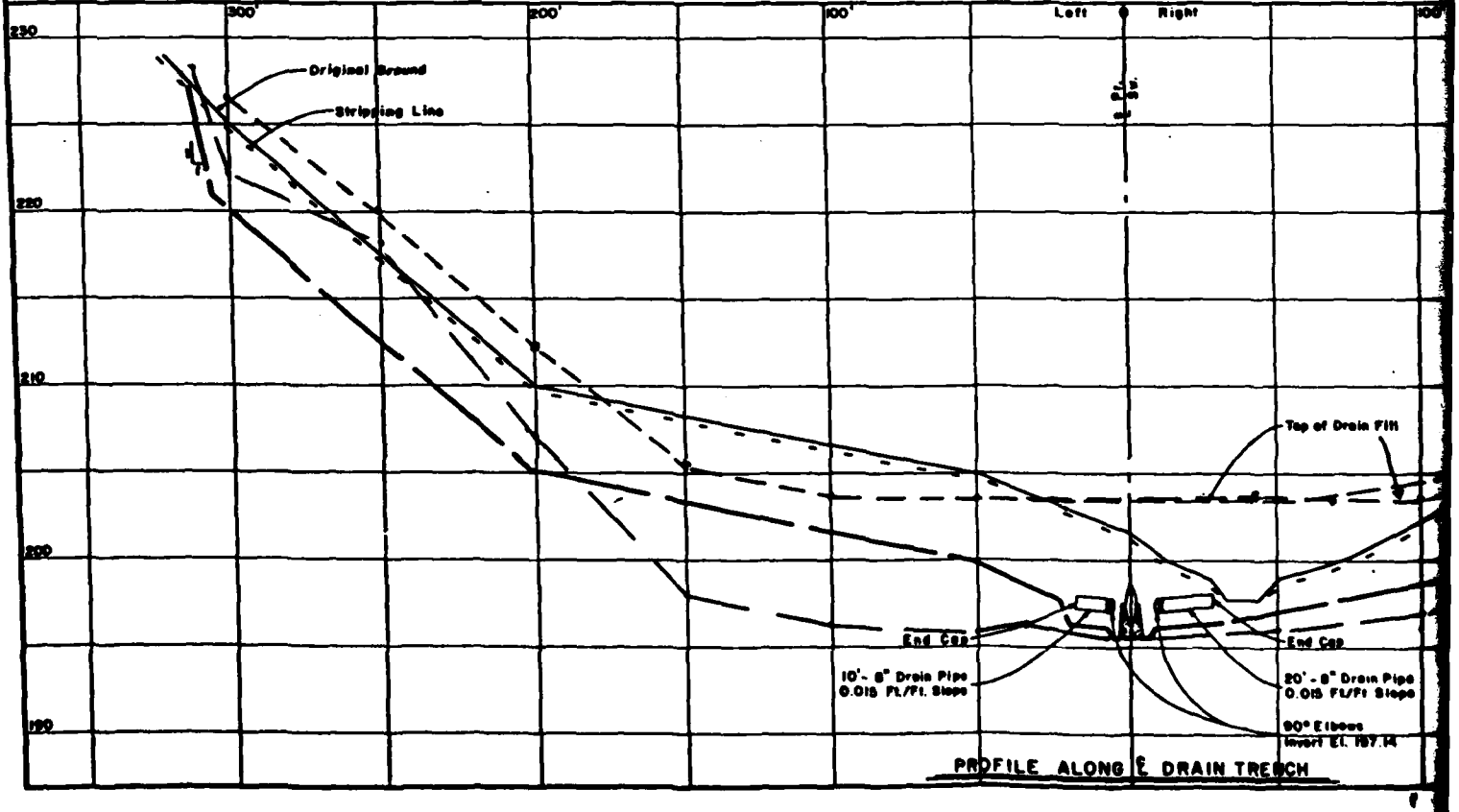
GRADATION LIMITS

FINE DRAIN FILL (PennDOT Type A)

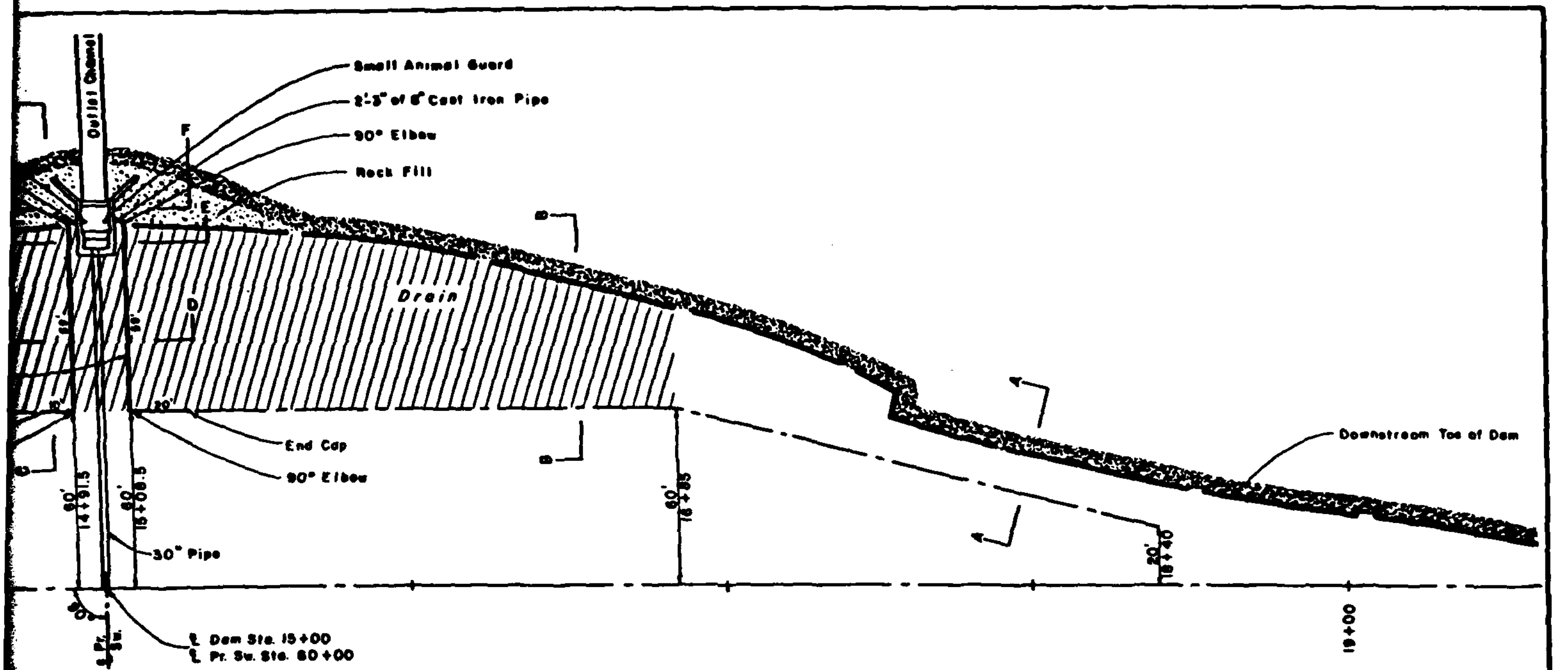
SEIVE NO.	% PASSING (Based on Dry Weight)
3/8"	100
no. 4	90 - 100
no. 8	70 - 100
no. 16	50 - 85
no. 30	30 - 65
no. 50	8 - 30
no. 100	0 - 10
no 200	< 3

COARSE DRAIN FILL (PennDOT no. 2 B)

SEIVE NO.	% PASSING (Based on Dry Weight)
1- 1/2"	100
1"	90 - 100
1/2"	25 - 60
no. 4	0 - 10
no. 8	0 - 5
no. 200	< 3



PROFILE ALONG ℄ DRAIN TRENCH



PLAN VIEW

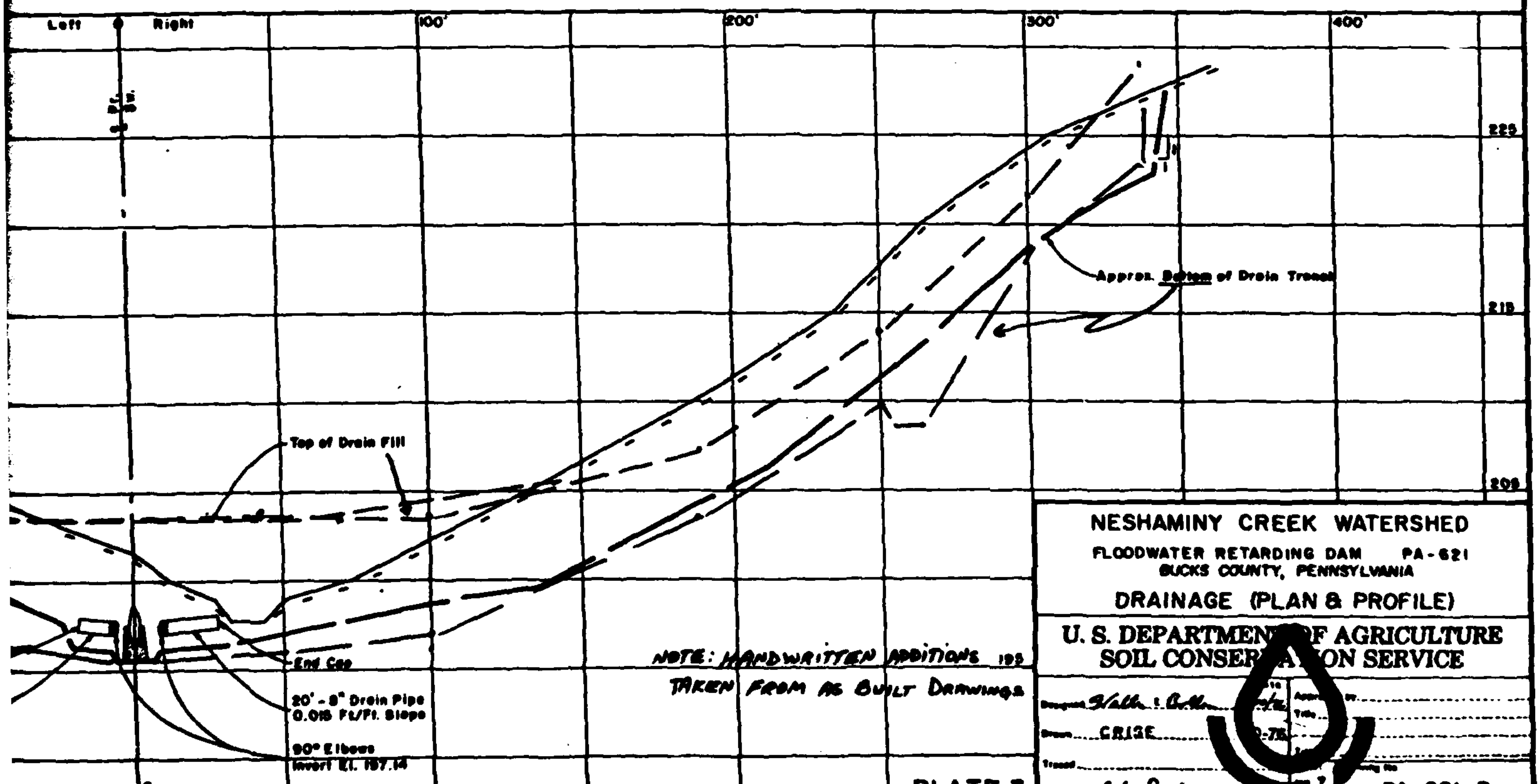
0 15 30 — SCALE IN FEET

QUANTITY SUMMARY

148'-0"	8" Drain Pipe
4'-6"	8" Cast Iron Pipe
4	90° Elbows
2	End Caps
2	Small Animal Guards (sht. 24)

CONSTRUCTION NOTES

1. 8" Drain Pipe shall be PVC, Class 200, with Standard Dimension Ratio = 13.5
2. 8" Cast Iron Pipe. Spec. 201
3. Rock Bedding & Rock Riprap Bedding shall meet gradation limits for coarse drain fill.
4. Rock Fill - place and grade as directed by the Engineer.



PROFILE ALONG ℄ DRAIN TRENCH

NOTE: HANDWRITTEN ADDITIONS 199
TAKEN FROM AS BUILT DRAWINGS

NESHAMINY CREEK WATERSHED

FLOODWATER RETARDING DAM PA-621

BUCKS COUNTY, PENNSYLVANIA

DRAINAGE (PLAN & PROFILE)

U. S. DEPARTMENT OF AGRICULTURE

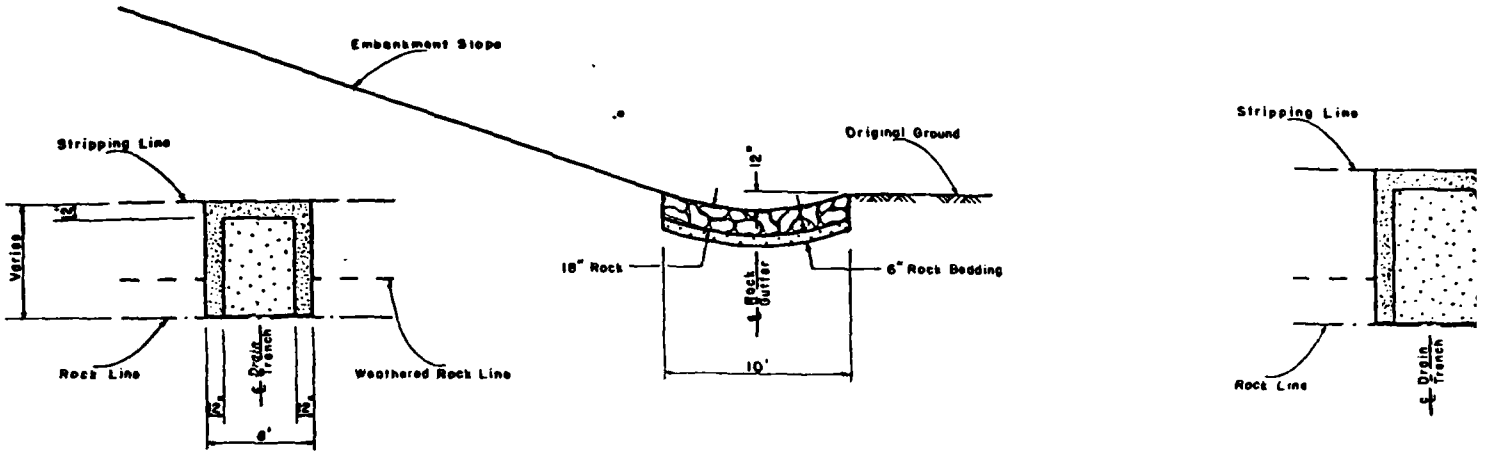
SOIL CONSERVATION SERVICE

Designed: Walter ... Drawn: CRISE Traced: Checked: John ...

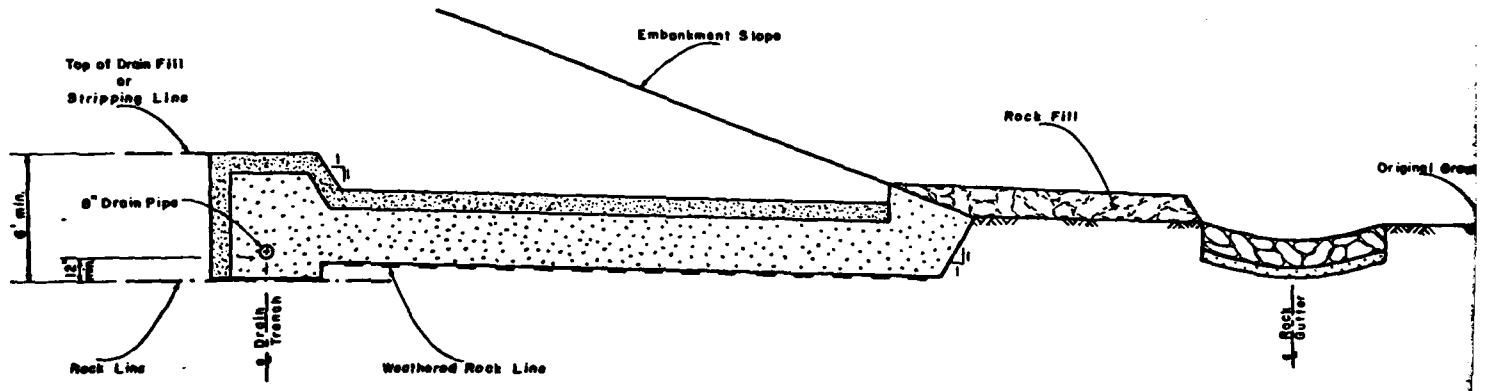
PLATE 7

PA-621-P

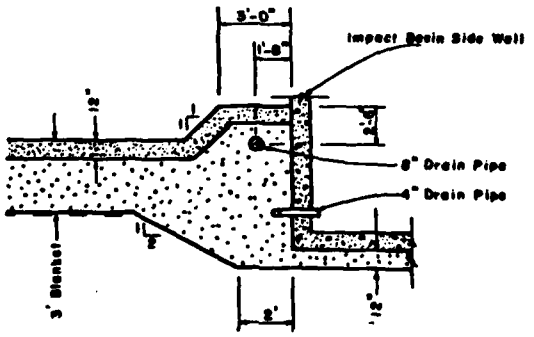
12



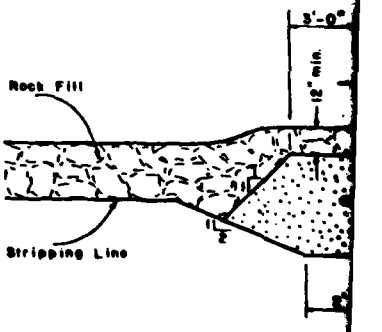
SECTION A-A



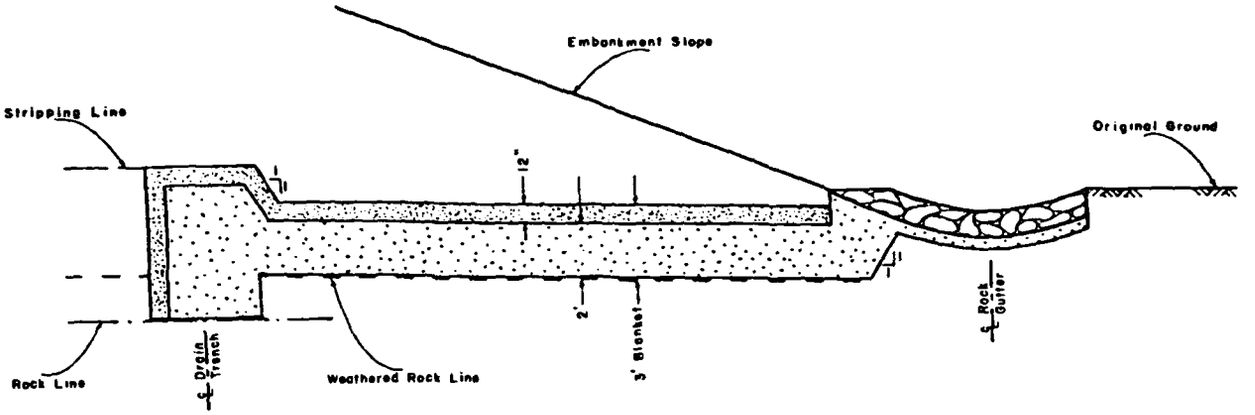
SECTION C-C



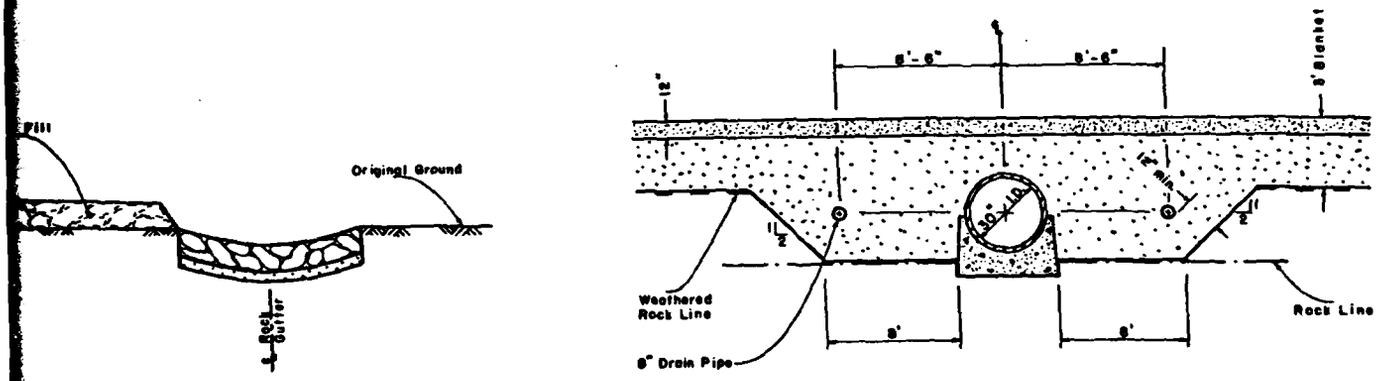
SECTION E-E



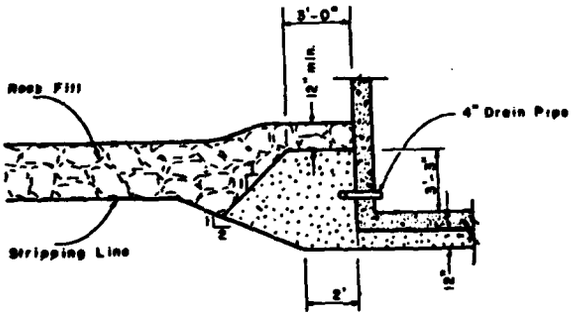
SECTION F-F



SECTION B-B



SECTION D-D



SECTION F-F

Fine Drain Fill

Coarse Drain Fill

NESHAMINY CREEK WATERSHED
FLOODWATER RETARDING DAM PA-621
BUCKS COUNTY, PENNSYLVANIA

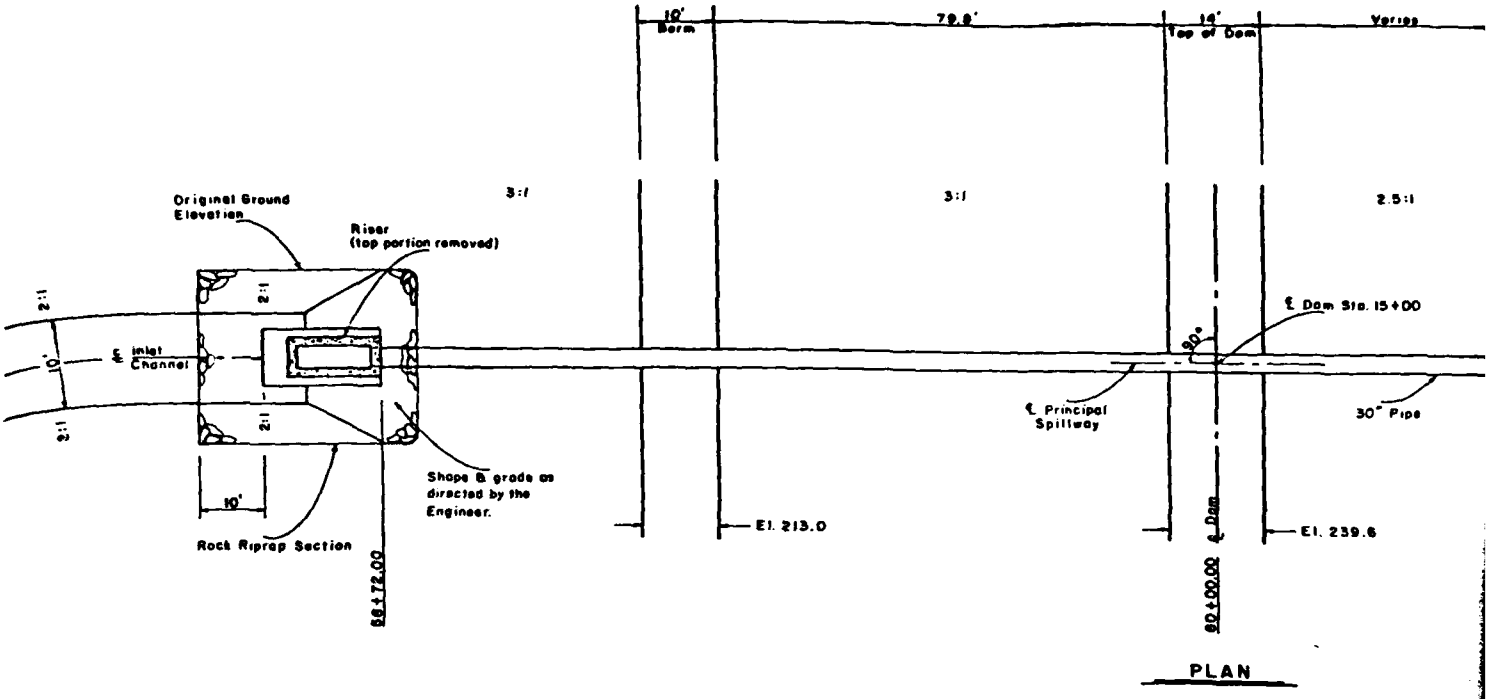
DRAINAGE (SECTIONS)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed Walter L. Butler
Drawn CRISE
Traced
Checked John Eastburn

PLATE 8

PA-621-P



PLAN

30" I.D. PIPE JOINT DATA				COLLAR DATA FOR 30" I.D. PIPE		
JOINT	JOINT GAP	DIST. FROM RISER WALL	INVERT EL.	COLLAR	DIST. FROM RISER WALL	INVERT EL.

30" I.D. Reinforced Concrete Pressure Pipe Steel Cylinder Type, Spec. 541 (AWWA C-301)

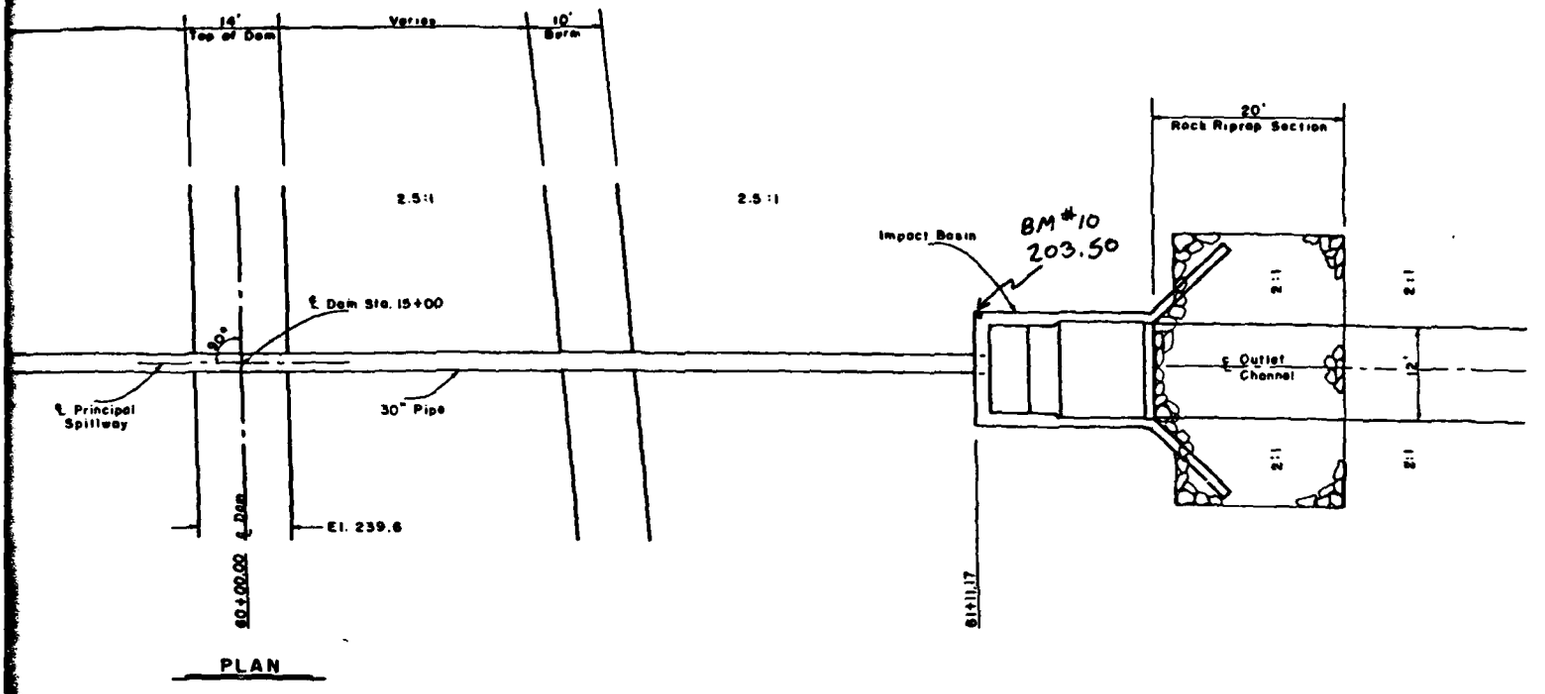
240' - Straight Sections

1 - Spigot Wall Fitting (10°) sht. 17

240' - Total

CONSTRUCTION NOTES

1. Outlet end of pipe to be finished so that no metal
2. Pipe layout data to be furnished by the Enginee
3. Inlet channel and outlet channel - final line and shall be determined by the Engineer.
4. Rock riprap bedding shall meet gradation limits coarse drain fill. (sht. 7)



PLAN

30" I.D. Reinforced Concrete Pressure Pipe
Steel Cylinder Type, Spec. 541 (AWWA C-301)

240' - Straight Sections
1 - Spigot Wall Fitting (10°) sht. 17
240' - Total

CONSTRUCTION NOTES

1. Outlet end of pipe to be finished so that no metal is exposed.
2. Pipe layout data to be furnished by the Engineer.
3. Inlet channel and outlet channel - final line and grade shall be determined by the Engineer.
4. Rock riprap bedding shall meet gradation limits for coarse drain fill. (sht. 7)

NOTE: HANDWRITTEN ADDITIONS TAKEN FROM AS BUILT DRAWINGS

NOT TO SCALE

NESHAMINY CREEK WATERSHED
FLOODWATER RETARDING DAM PA-621
BUCKS COUNTY, PENNSYLVANIA

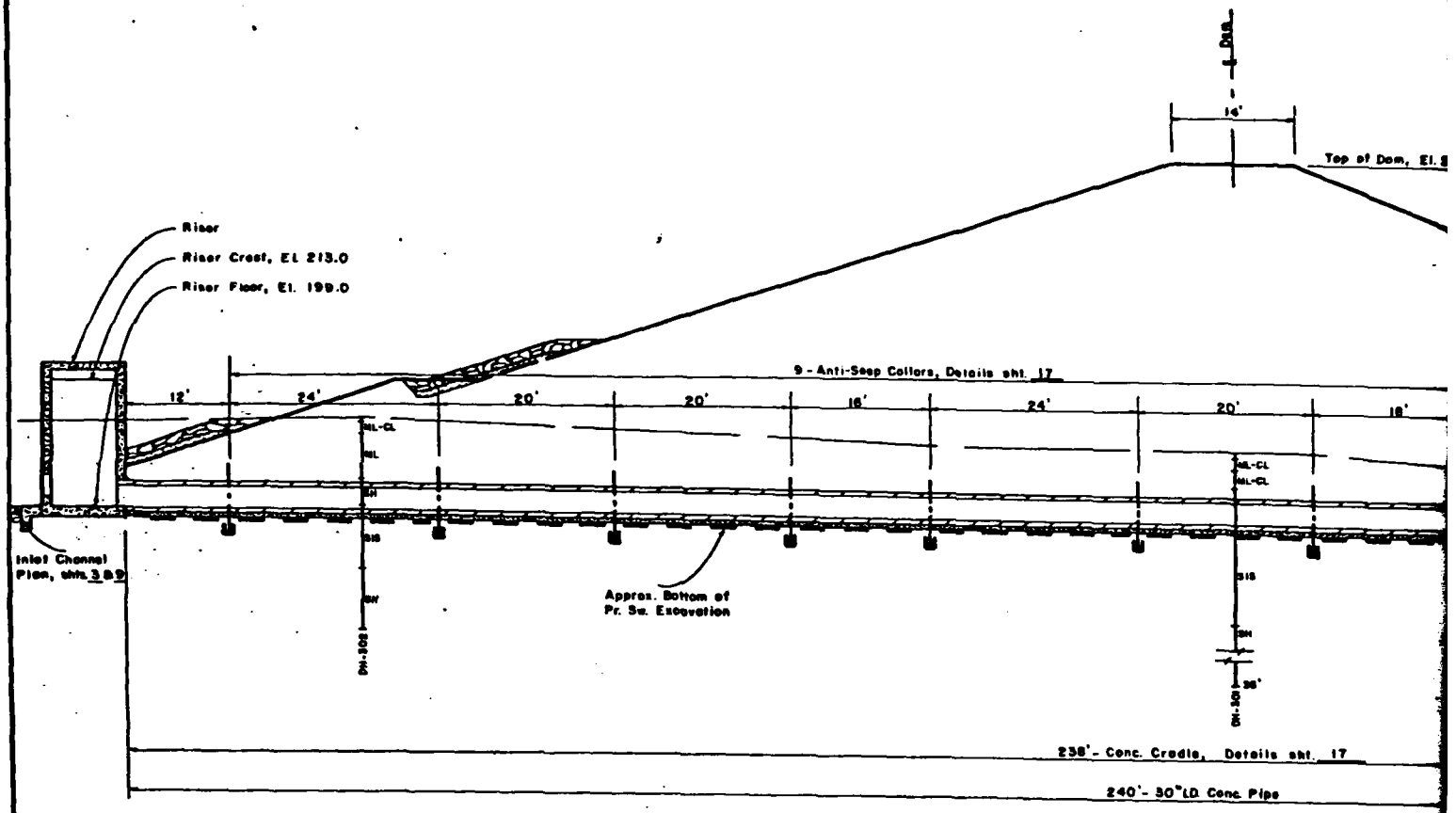
PRINCIPAL SPILLWAY (PLAN)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed John Eastburn 7/6 Approved
Drawn CRISE 7-78 Title
Traced
Checked John Eastburn Sheet No.

PA-621-P

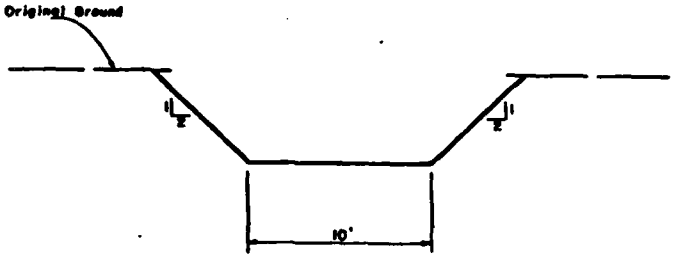
PLATE 9



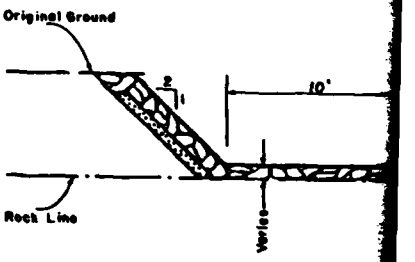
PROFILE ALONG ℄

10 5 2 0 10

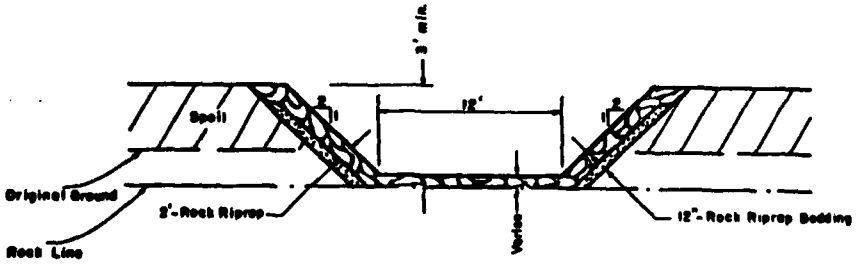
SCALE in FEET



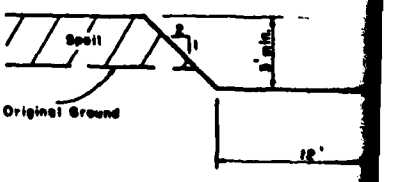
INLET CHANNEL



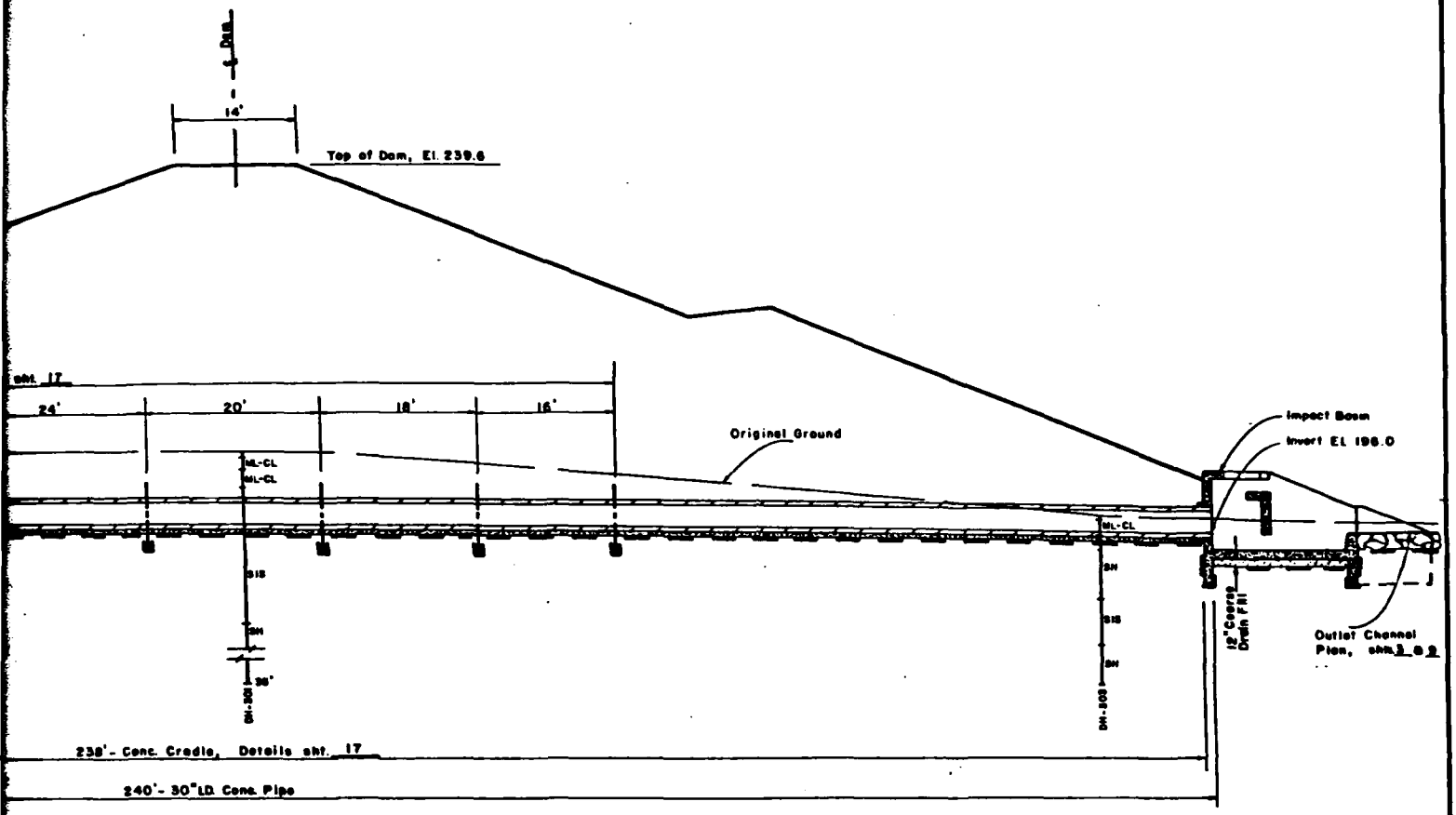
INLET CHANN
Rock Riprap Sect



OUTLET CHANNEL
20' - Rock Riprap Section



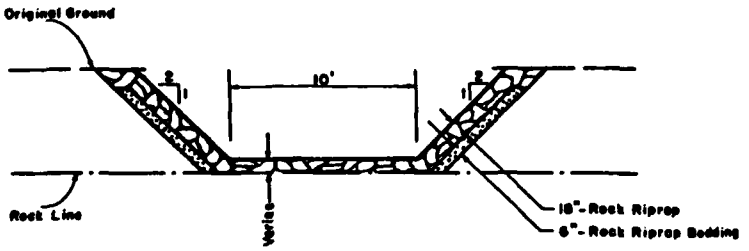
OUTLET CHA



PROFILE ALONG ℄

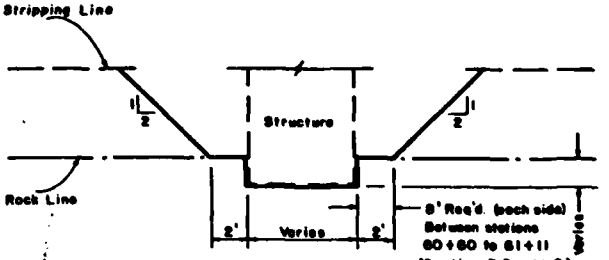
10 5 2 0 10

SCALE in FEET

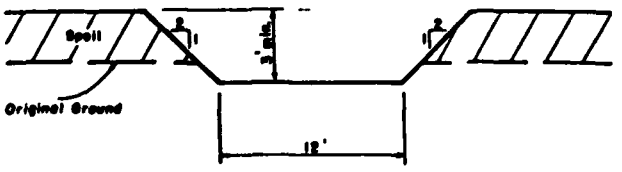


INLET CHANNEL

Rock Riprap Section



PRINCIPAL SPILLWAY



OUTLET CHANNEL

NESHAMINY CREEK WATERSHED

FLOODWATER RETARDING DAM PA-621

BUCKS COUNTY, PENNSYLVANIA

PRINCIPAL SPILLWAY (PROFILE)

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

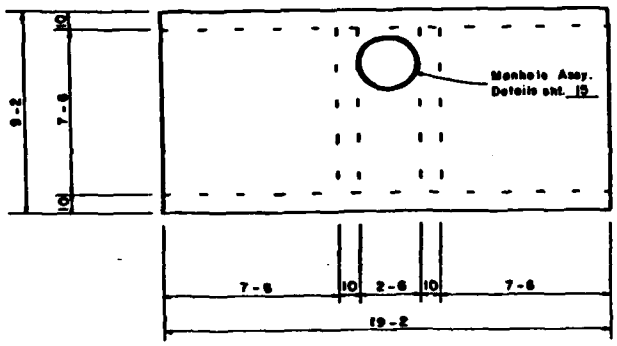
Designed John Smith 7-76 Approved by

Drawn CRISE 7-76 Title

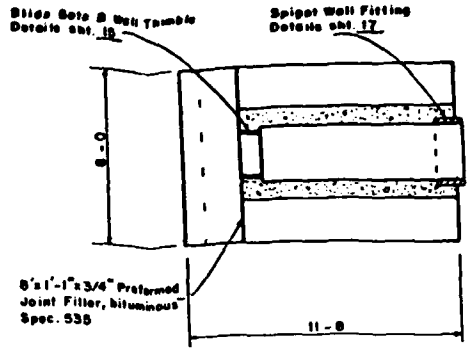
Traced

Checked John Smith Date PA-621-P

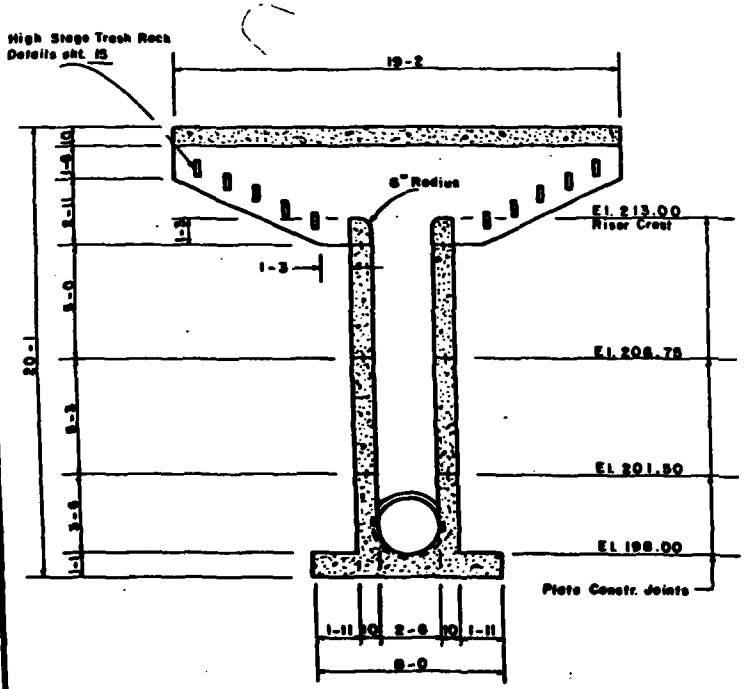
PLATE 10



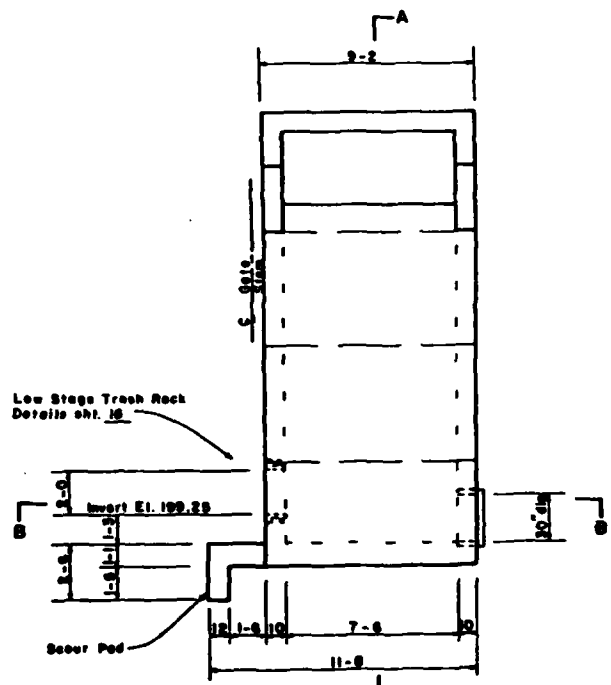
PLAN - TOP



SECTION B-B



SECTION A-A



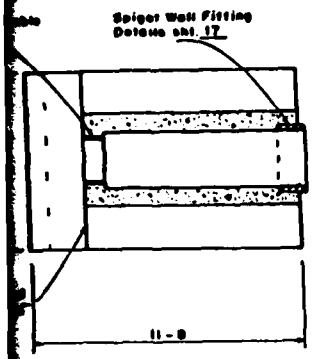
SIDE ELEVATION

QUANTITIES

STEEL:

#5 Bar	3,008.75 Lin. Ft.	3,138.1 Lbs.
#6 Bar	344.5 Lin. Ft.	517.4 Lbs.
#7 Bar	306.0 Lin. Ft.	625.5 Lbs.
	Total	4,281.0 Lbs.

TOTAL CONCRETE — 84.3 Cu. Yds



SECTION B-B

1/4"x6" structural steel plate, to conform to Spec. 881
Continuous thru constr. joint.
Splices shall be either:
1. Butt welded
2. Lapped 3" and bolted
3. Lapped 3" and fillet welded

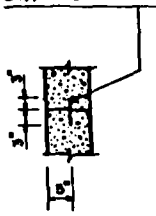
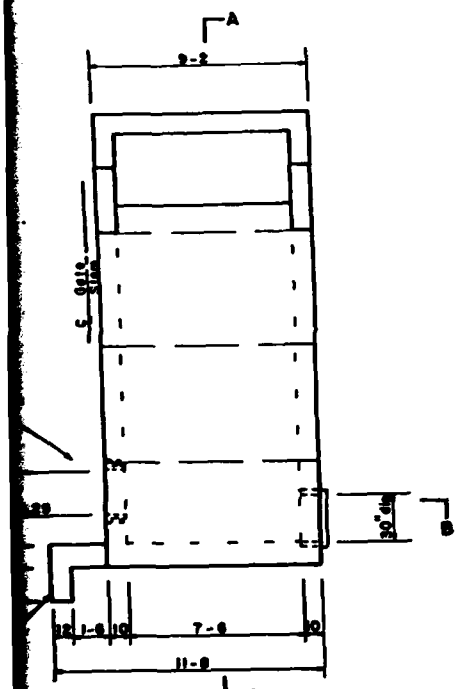
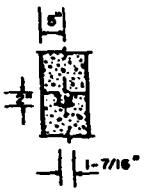


PLATE
CONSTR. JOINT



SIDE ELEVATION

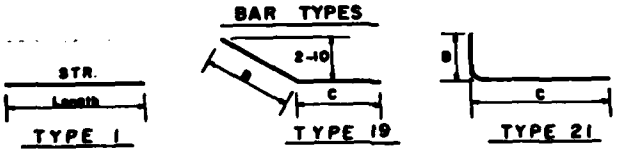


CONSTR. JOINT

STEEL SCHEDULE

Mark	Size	Quantity	Length	Type	B	C	Total Length
B1	6	10	7-6	1			75-0
B2	5	9	8-9	1			78-9
B3	7	34	9-0	21	3-1	5-11	306-0
B4	5	8	8-9	1			70-0
B5	5	9	7-6	1			67-6
B6	5	2	3-0	1			6-0
B7	5	5	6-9	21	1-0	5-9	33-9
B8	6	3	6-9	21	1-0	5-9	20-3
B9	5	14	6-9	21	1-0	5-9	94-6
B10	6	10	8-3	1			82-6
B11	5	4	3-3	1			13-0
B12	6	3	2-3	1			6-9
B13	5	3	2-3	1			6-9
B14	5	10	5-9	21	0-6	5-3	57-6
B15	5	18	8-0	21	2-9	5-3	144-0
B16	5	10	7-6	1			75-0
B17	5	9	4-0	21	2-0	2-0	36-0
B18	5	9	3-0	21	1-6	1-6	27-0
B19	6	7	4-0	1			28-0
R1	5	6	12-0	1			72-0
R2	6	16	8-3	1			132-0
R3	5	10	3-3	1			32-6
R4	5	6	12-0	1			72-0
R5	5	40	8-0	21	2-9	5-3	320-0
R6	5	10	8-3	1			82-6
R7	5	10	3-3	1			26-0
R8	5	28	8-0	21	2-9	5-3	224-0
R9	5	14	11-0	1			154-0
R10	5	14	11-3	1			157-6
T1	5	4	7-0	1			28-0
T2	5	4	12-6	1			50-0
T3	5	4	18-0	1			72-0
T4	5	4	18-9	1			75-0
T5	5	8	8-6	19	6-9	1-9	68-0
T6	5	8	2-6	1			20-0
T7	5	8	3-0	1			24-0
T8	5	8	3-9	1			30-0
T9	5	8	4-3	1			34-0
T10	5	8	4-9	1			38-0
T11	5	16	5-0	1			80-0
T12	5	6	8-9	1			52-6
T13	5	32	8-9	1			280-0
T14	5	4	5-0	1			20-0
T15	5	12	18-9	1			225-0
T16	5	8	7-9	1			62-0

BAR TYPES



CONSTRUCTION NOTES

1. Bar dimensions are out to out of bar.
2. Radius of bends equals 3 bar diameters for sizes equal to or less than #7.
3. The 2" and 3" dimensions from face of concrete to steel are clear distances.
4. Portland Cement type I-A or I with an air-entraining admixture shall be used.
5. All exposed edges of concrete to have a 1" chamfer unless otherwise noted.

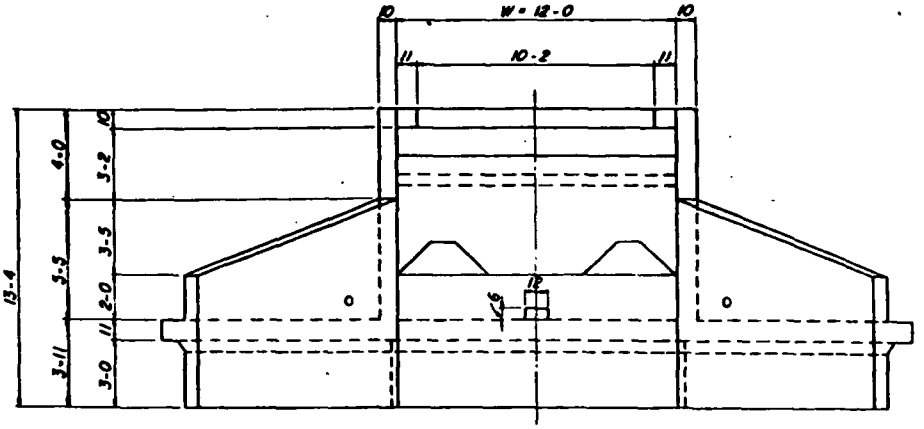
0 1 2 3 4 5
SCALE in FEET

NESHAMINY CREEK WATERSHED
FLOODWATER RETARDING DAM PA-621
BUCKS COUNTY, PENNSYLVANIA
RISER STRUCTURAL DETAILS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

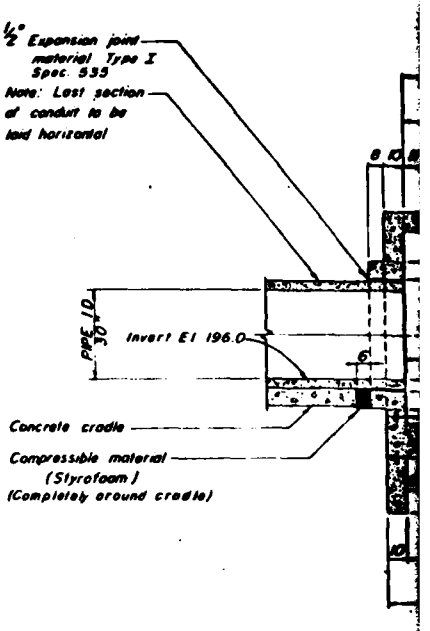
Designed CRISE 1-77
Traced
Checked

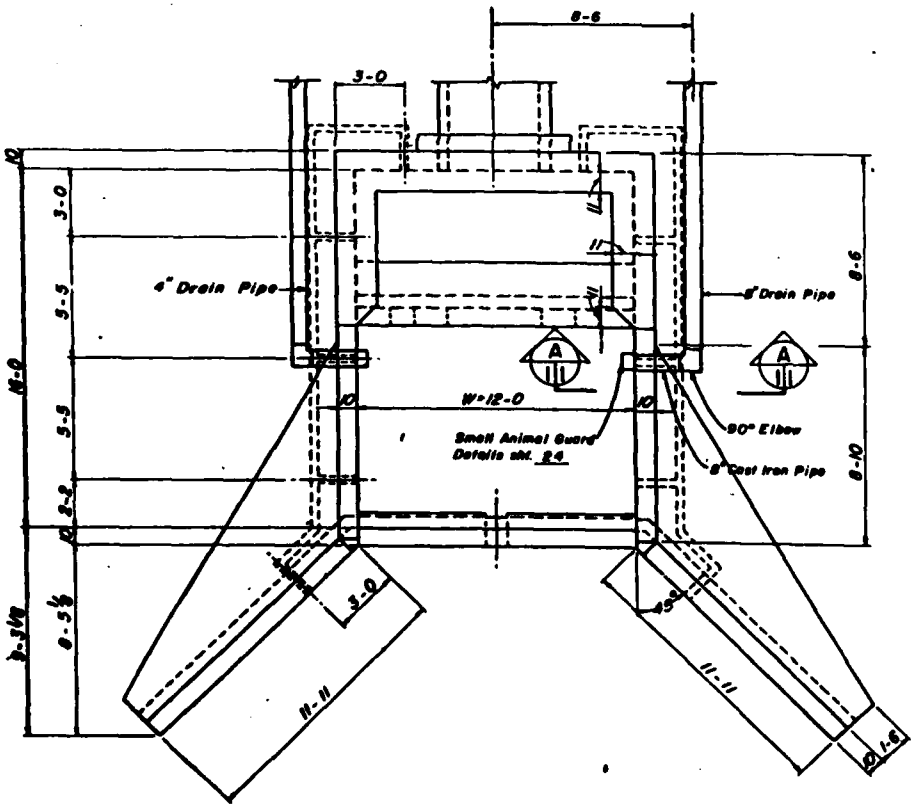
PLATE 11

PA-621-P

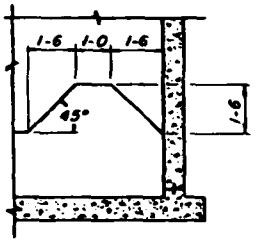


DOWNSTREAM ELEVATION





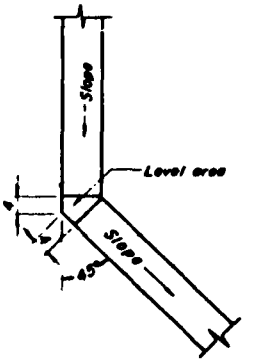
PLAN



SECTION (A)

NOT TO SCALE

SECTION



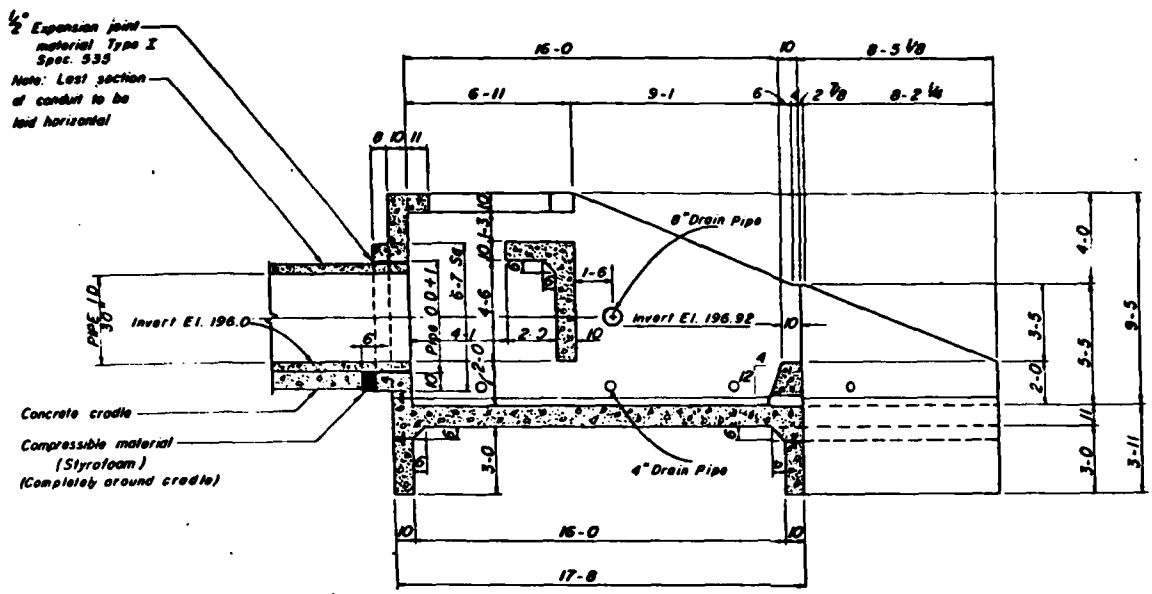
PLAN - JUNCTION SIDEWALL AND WINGWALL
NOT TO SCALE

CUTOFF WALL

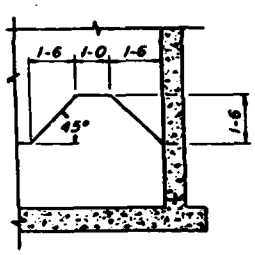
STANDARD IMPACT BASIN		
DESIGN CONSTANTS	f'_c = 4000 psi	f_c = 1600 psi
	n = 8	f_s = 20,000 psi
STANDARD DRAWING NO	ES-4120	
DATE 1-70	SHEET 1 OF 5	

CARL ROHDE
Consulting Engineer
694 Ridgeway Rd Lake Oswego, Ore

1 0 5 10
SCALE IN FEET
EXCEPT AS NOTED

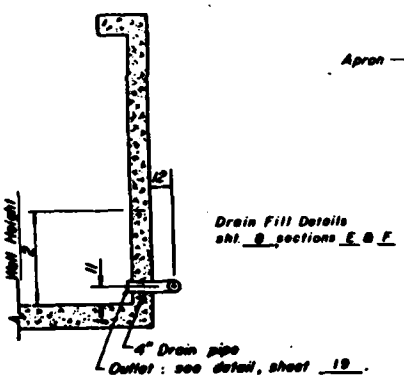


SECTION ON CENTERLINE



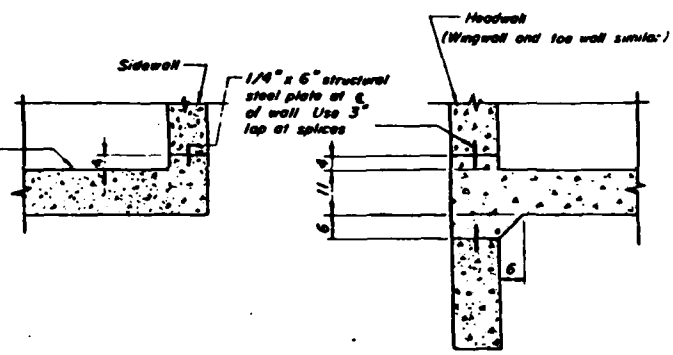
SECTION (A)

NOT TO SCALE



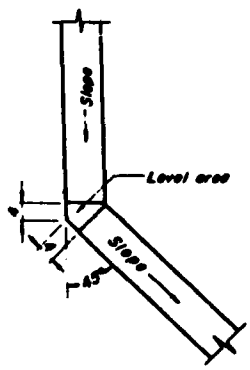
SECTION THROUGH DRAIN & FILTER

NOT TO SCALE



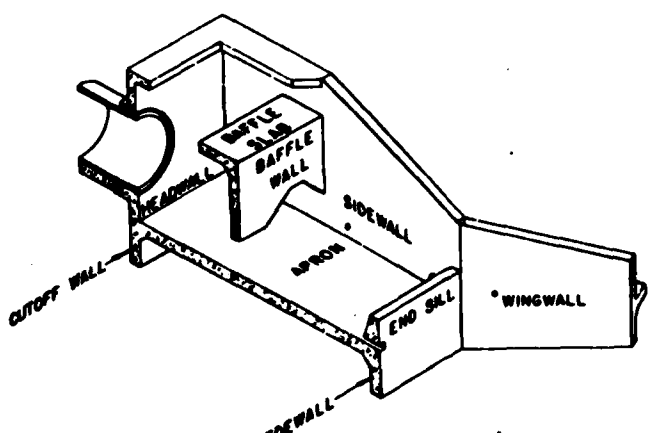
CONSTRUCTION JOINT DETAILS

NOT TO SCALE



PLAN - JUNCTION SIDEWALL AND WINGWALL

NOT TO SCALE



ISOMETRIC VIEW

For Construction Notes see sht. 11.

QUANTITIES

Formwork (Contact area)	1650	Sq Ft
Reinforced Concrete	37.2	Cu Yds
Reinforcing Steel	5561	lbs
Drainage		
4" Drain Pipe shall be PVC, Class 200, with Standard Dimension Ratio = 13.5		
Drain Pipe, 4"	69	Lin Ft
Animal Screens (sht. 19)	10	
Tees for std. dbl. tee branch w/plug	6	
Elbows 90°	6	
Elbows 45°	2	
Joints		
1/4" x 6" Structural steel plate	720	lbs

NESHAMINY CREEK WATERSHED
FLOODWATER RETARDING DAM PA-621
BUCKS COUNTY, PENNSYLVANIA

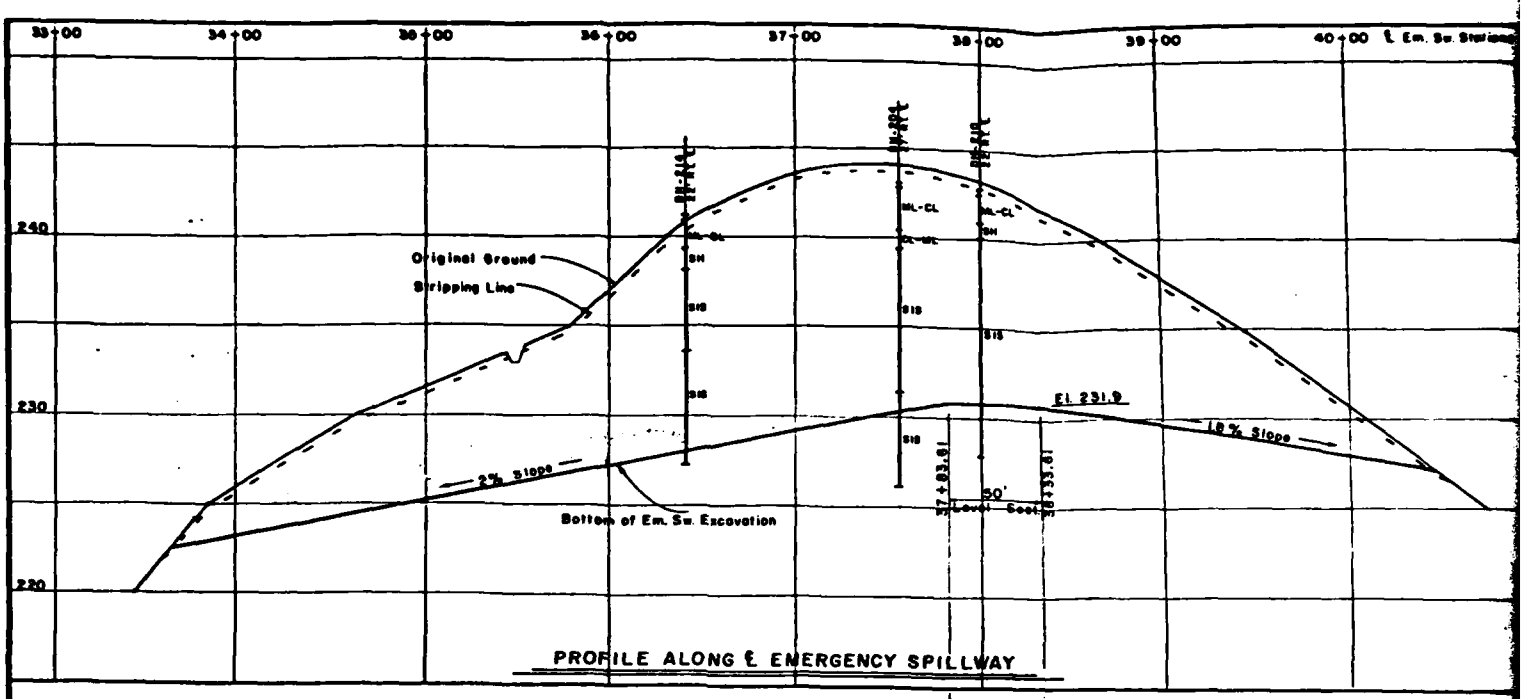
IMPACT BASIN

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

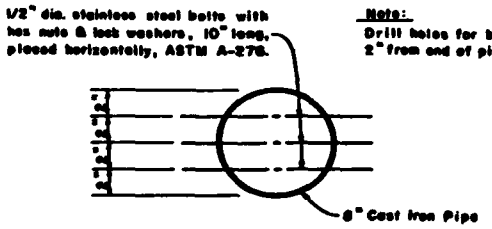
Designed	Date	Approved by	
Drawn		Title	
Traced		Title	
Checked		Sheet No. 10 of 35	PA-621-P

5 10
IN FEET
AS NOTED

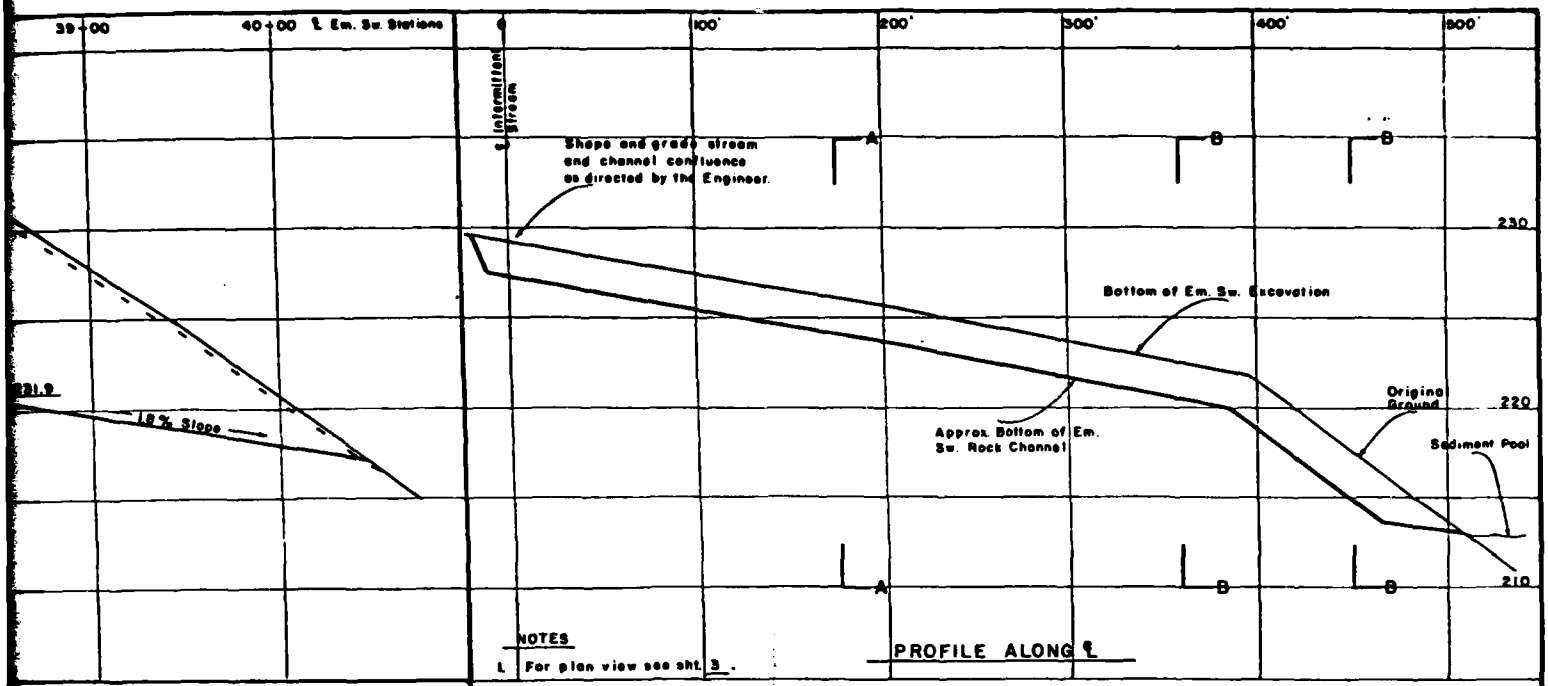
PLATE 12



PROFILE ALONG ℄ EMERGENCY SPILLWAY



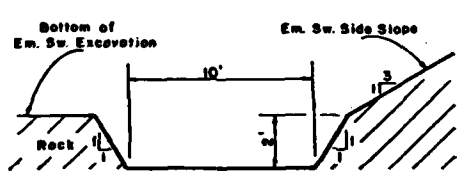
SMALL ANIMAL GUARD
R - REQUIRED



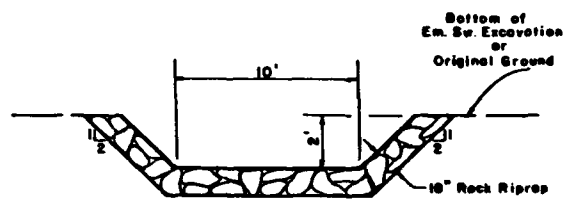
PROFILE ALONG ℄

NOTES

1. For plan view see sht. 3.
2. Transition between Sections A-A & B-B shall be as directed by the Engineer.



SECTION A-A



SECTION B-B

EMERGENCY SPILLWAY ROCK CHANNEL

NESHAMINY CREEK WATERSHED

FLOODWATER RETARDING DAM PA-621
BUCKS COUNTY, PENNSYLVANIA

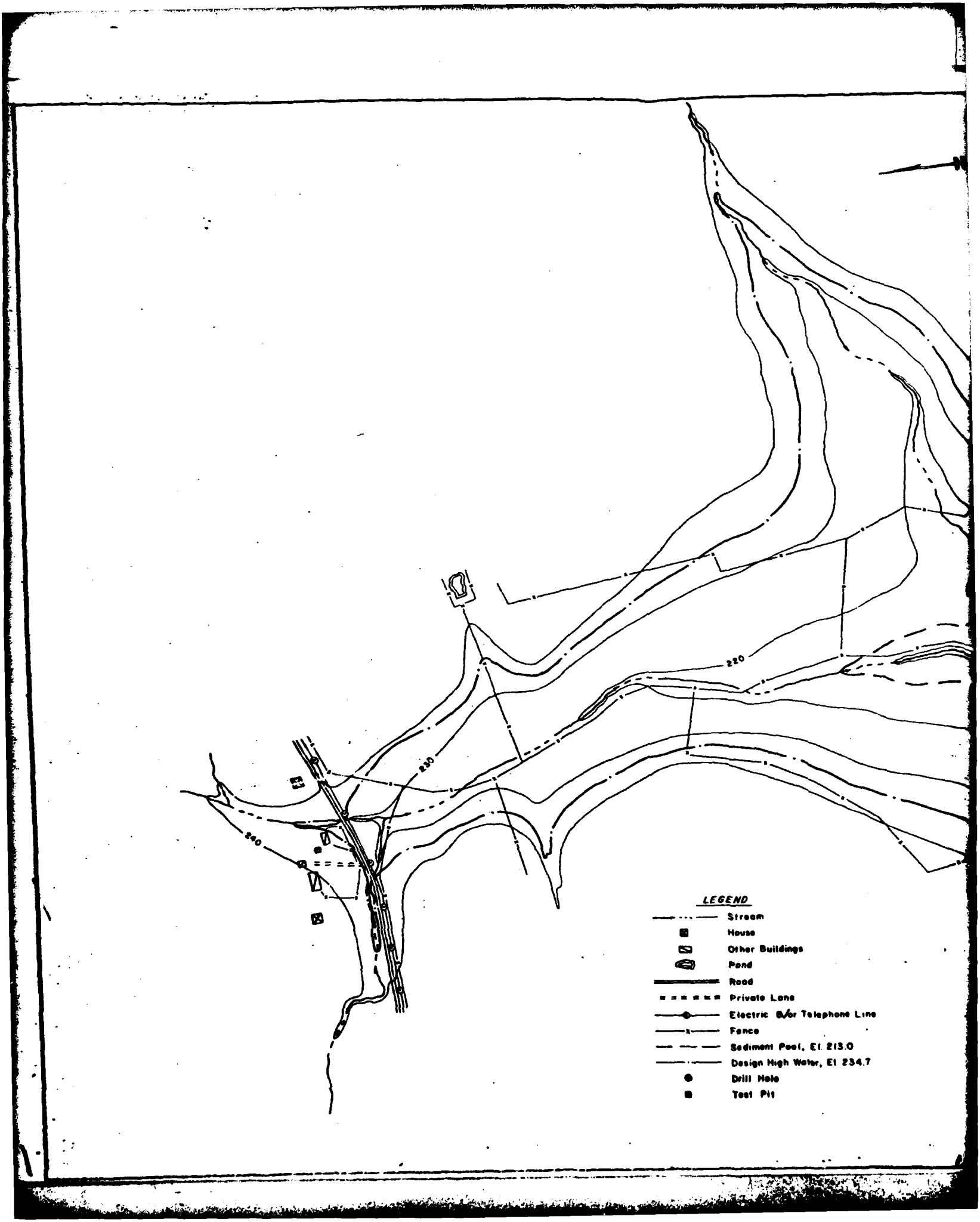
MISCELLANEOUS

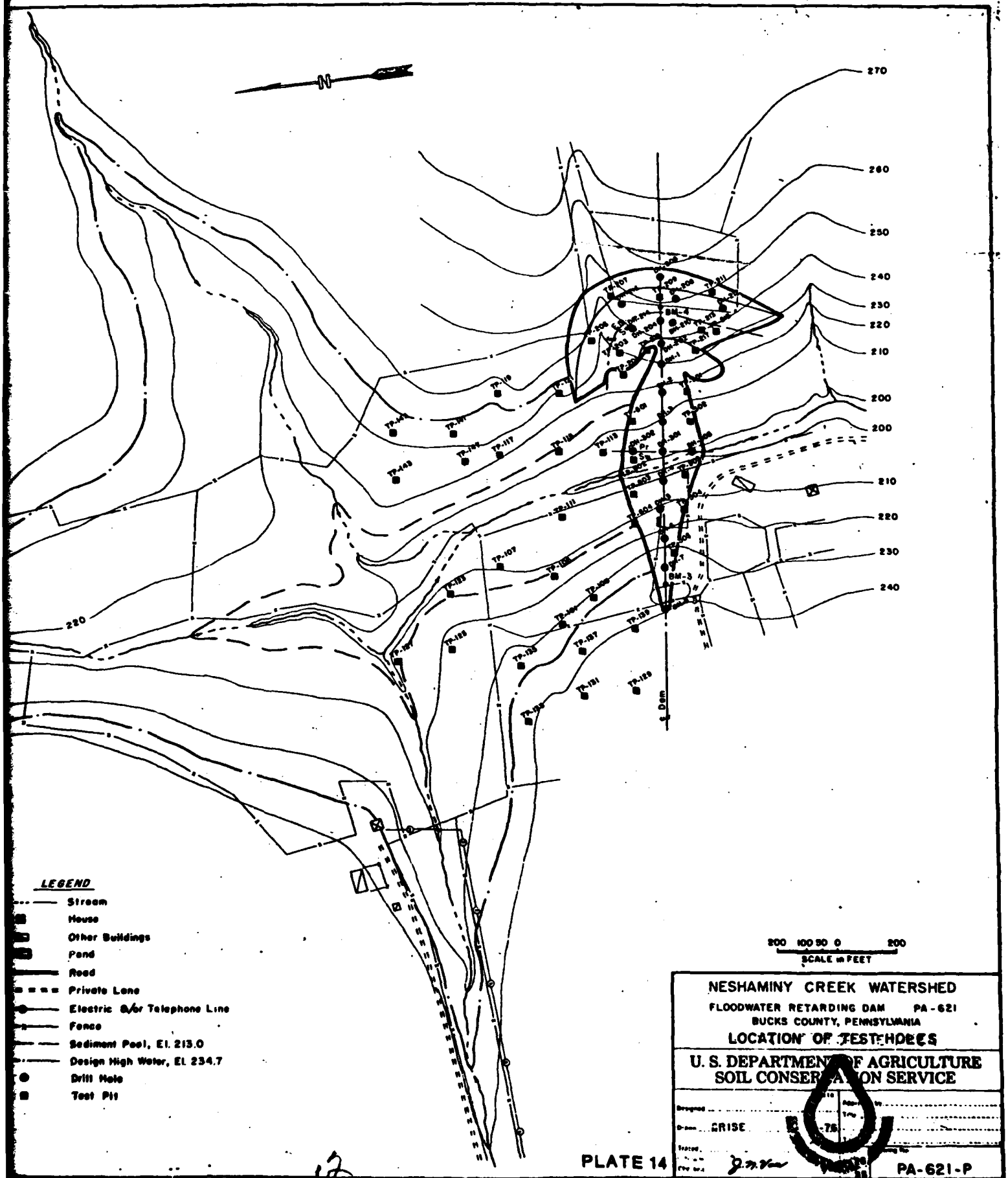
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed John Eastburn 7-78
Drawn CRISE 7-78
Traced
Checked John Eastburn 7-78
Approved
Title
Sheet No.
Drawing No. PA-621-P

PLATE 13

2


220
230
240
LEGEND
Stream
House
Other Buildings
Pond
Road
Private Lane
Electric &/or Telephone Line
Fence
Sediment Pool, El. 213.0
Design High Water, El. 234.7
Drill Hole
Test Pit



NESHAMINY CREEK WATERSHED

FLOODWATER RETARDING DAM PA-621

BUCKS COUNTY, PENNSYLVANIA

LOCATION OF TESTHOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed
Drawn GRISE 75
Traced
Title
Approved by
Title
Date
Drawing No.

PLATE 14

PA-621-P

BH-1, ELEV. 229.1, 32+00, CENTERLINE
LOGGED BY: JOE VAN 4-6-71
DRILLING EQUIPMENT: SKID RIG

HOLE FROM	HOLE TO	DESCRIPTION OF MATERIALS	UNIF. SOIL CLASS. SYMB.	STANDARD PENETRATION BLOWS PER 6"	TYPE BIT USED	NO.	TYPE	SAMPLES FROM FT.	TO FT.	% REC.
0.0	0.4	TOPSOIL		1-5-17	SPT	1	JAR	0.0	1.5	80
0.4	2.3	GRAVEL, SILTY, RED, WEA. SHALE	GM	27-50 .3	"	2	"	1.5	2.3	50
2.3	5.4	SHALE, SANDY, HARDNESS-3, RED			TRI			2.3	5.3	
5.4	15.0	SILTSTONE, SHALY, RED, HARDNESS-3 TO 4, VERTICAL & ANGULAR FRACTURES TO 12.7', CL SEAMS AT 11.5 & 11.7'		50/.1	SPT	3	JAR	5.3	5.4	30
					TRI			5.4	6.0	
15.0	26.7	SILTSTONE, SHALY, RED & GRY MOTTLED, MED. TO THICK BEDDED, DENSE, CROSSBEDDED, WEA. JOINT AT 16.8' & 19.6' WITH STAINS, HEAVY FRACTURING FROM 19.6-22.3', GRY, THIN BEDDED FROM 22.3-22.7', FROM 22.7-26.7' GRY & BANDED WITH SOME RED SHALE, RQD-57 PERCENT			DIA		NXM	6.0	9.5	100
					"		"	9.5	12.5	85
					"		"	12.5	15.0	100
					"		"	15.0	19.0	75
26.7	30.0	SILTSTONE, SHALY, THICK BEDDED, DENSE, HARDNESS-4 WITH LT. GRY INSTRUSIONS, (ARGILLITE), RQD-64 PERCENT			"		"	19.0	22.7	72
					"		"	22.7	26.5	92
30.0		BOTTOM OF HOLE - WL (4-8-71) 5.4'			"		"	26.5	30.0	100

BH-2, ELEV. 219.3, 33+00, CENTERLINE
LOGGED BY: JOE VAN 4-5-71
DRILLING EQUIPMENT: SKID RIG

HOLE FROM	HOLE TO	DESCRIPTION OF MATERIALS	UNIF. SOIL CLASS. SYMB.	STANDARD PENETRATION BLOWS PER 6"	TYPE BIT USED	NO.	TYPE	SAMPLES FROM FT.	TO FT.	% REC.
0.0	0.5	TOPSOIL		1-2-7	SPT	1	JAR	0.0	1.5	70
0.5	2.0	CLAY, SILTY, 10 PERCENT SAND, TRACE OF GRAVELS, LOW PLASTIC, RED	CL	17-20-33	"	2	"	1.5	3.0	70
2.0	3.8	SHALE, RED, WEA., SOFT, DRY, FORMS CL WHEN MOIST + WATER STOOD IN HOLE		29-50/.3	"	3	"	3.0	3.8	80
3.8	5.0	SHALE BOULDER + DRILLED THROUGH, VERY SANDY			TRI			3.8	5.0	
5.0	35.0	SILTSTONE, SHALY, HARDNESS-3, MEDIUM TO THICK BEDDED, RED W/GRY MOTTLING TO 10.2', VERTICAL FRACTURES FROM 6.7 TO 9.0', VERY BROKEN AT 16.5', 18.0' AND 18.6', CALCITE IN ANGULAR FRACTURE AT 22.0', GRY W/ RED FROM 30.1-35.0', SOME BANDING, RQD-66 PERCENT		56	SPT	4	"	5.0	5.5	90
					TRI			5.5	6.0	
					DIA		NXM	6.0	6.7	100
					"		"	6.7	12.0	100
					"		"	12.0	18.1	100
					"		"	18.1	25.0	100
					"		"	25.0	29.0	100
35.0		BOTTOM OF HOLE - WL (4-8-71) 6.4'			"		"	29.0	35.0	100

BH-3, ELEV. 208.6, 34+00, CENTERLINE
LOGGED BY - JOE VAN 4-2-71
DRILLING EQUIPMENT: SKID RIG

HOLE FROM	HOLE TO	DESCRIPTION OF MATERIALS	UNIF. SOIL CLASS. SYMB.	STANDARD PENETRATION BLOWS PER 6"	TYPE BIT USED	NO.	TYPE	SAMPLES FROM FT.	TO FT.	% REC.
0.0	0.5	TOPSOIL		1-1-3	SPT	1	JAR	0.0	1.5	80
0.5	2.5	SILT, CLAYEY, 10 PERCENT FINE SAND, SLIGHT PLASTIC, VERY MOIST, RED-BRN	ML-CL	6-7-12	"	2	"	1.5	3.0	90
				16-14-21	"	3	"	4.0	5.5	80
2.5	3.0	SILT, DRY, WEA. SHALE	ML	14-16-17	"	4	"	5.5	7.0	70
3.0	4.0	BOULDER - DRILLED THROUGH FLAT BOULDER		50/.4	"	5	"	7.0	7.4	50
4.0	7.0	SHALE, WEA., RED, SOFT, W/ SHALE (15 PERCENT), FRAGS., DRY, WHEN WET IS LOW PLASTIC CL, 20-30 PERCENT SHALE FRAGS. FROM 6.0'- 7.2'			TRI			7.4	8.0	
					DIA		NXM	8.0	10.6	80
7.0	15.5	SILTSTONE WITH LAMINATED SHALE; RED & GRY, HARDNESS-3, THIN TO MEDIUM BEDDED, WEA. SANDSTONE, THIN BEDDED FROM 8.5' TO 9.0', VERY WEA. SHALE FROM 11.7' TO 11.9' BROKEN, VERT. FRAC. 12.9'-13.2', WATER ERODED VERT. JOINT FROM 13.5' TO 15.5', MED. BEDDED 13.5'-15.5', SOME CROSS BEDDED, RQD-55 PERCENT.			"		"	10.6	12.1	100
					"		"	12.1	13.2	100
					"		"	13.2	15.5	95
					"		"	15.5	19.0	100
					"		"	19.0	27.6	100
15.5	26.7	SHALE, SILTY, RED, MED. TO THICK BEDDED, SOLID, DENSE, WITH SHALY SILTSTONE STREAKS, HARDNESS-3 TO 4, 3" TO 9" PIECES, WATER ERODED JOINTS AT 21.1' & 21.3', SHALY SILTSTONE 21.0' TO 23.5', GRY, W/RED CROSSBEDDING FROM 23.9' TO 26.0', VERY BROKEN FROM 25.3' TO 25.8', RQD-46 PERCENT.			"		"	27.6	32.5	100
					"		"	32.5	35.0	100
26.7	35.0	SHALE, GRY W/SILTSTONE STREAKS, THIN TO MEDIUM BEDDED, HARDNESS-3 TO 4, SOME FRACTURING W/ CALCITE (THIN), VERY BROKEN AT 32.5', (ARGILLITE), RED SILTY SHALE FROM 34.5' TO 35.0', RQD-56 PERCENT.								
35.0		BOTTOM OF HOLE - WL (4-9-71) 3.6'								

BH-4, ELEV. - 201.0, 36+06, CENTERLINE
LOGGED BY - JOE VAN 4-1-71
DRILLING EQUIPMENT - SKID RIG

HOLE FROM	HOLE TO	DESCRIPTION OF MATERIALS	UNIF. SOIL CLASS. SYMB.	STANDARD PENETRATION BLOWS PER 6"	TYPE BIT USED	NO.	TYPE	SAMPLES FROM FT.	TO FT.	% REC.
0.0	0.5	TOPSOIL		2-3-7	SPT	1	JAR	0.0	1.5	75
0.5	1.3	SILT, CLAYEY, 10 PERCENT FINE SAND, SLIGHTLY PLASTIC, GRY-BRN	ML-CL	17-50/.3	SPT	2	"	1.5	2.3	80
1.3	2.3	GRAVEL, CLAYEY, RED-BRN SHALE GRAVELS W/35 PERCENT PLASTIC FINES - REFUSAL AT 2.3', FINE SANDSTONE			TRI			2.3	2.8	
					DIA		NXM	2.8	3.6	100
2.3	2.8	SILTSTONE, RED, HARDNESS-3, COBBLE	GC		"		"	3.6	9.0	100
2.8	12.0	SILTSTONE, SHALY, CROSS BEDDED, THIN TO MEDIUM BEDDED, WATER-ERODED BEDDING PLANES, HARDNESS-3, 5.8'-6.2', THIN BEDDED, WATER ZONE, HARDNESS-2, ONE-FOURTH INCH CLAY SEAM AT 7.8', SOFT WATER ERODED SEAM AT 6.5', ONE INCH VERTICAL FRACTURE AT 8.9', SOFT WATER ERODED ZONE FROM 8.6'-8.9', GRAY FROM 7.7', FROM 10.3' TO 12.0' SILTSTONE IS THIN BEDDED WITH SHALE STREAKS, RED TO GRAY, RQD-37 PERCENT.			"		"	9.0	14.0	100
					"		"	14.0	19.5	100
					"		"	19.5	29.5	100
					"		"	29.5	36.5	100
12.0	14.0	SILTSTONE, SHALY, SOLID, HARDNESS-3, 1" GRY SHALE STREAK AT 13.5', GRY W/RED, WATER ERODED BEDDING PLANE AT 12.8', RQD-55 PERCENT.								
14.0	22.3	SILTSTONE, SHALY, RED, DENSE, HARDNESS-3, 2" VERT. FRACTURED AT 17.0', WATER ERODED SEAM AT 14.8', VERT. FRACTURED AT 19.8' (1" W/ CALCITE IN FRAC.) VERY SOLID CORE, SOME HAIRLINE VERT. FRAC., RQD-65 PERCENT.								

CONTINUED

BH-4 CONT'D

HOLE FROM	HOLE TO	DESCR
22.3	25.2	SHALE THIN
25.2	34.0	SHALE THIN
34.0	36.5	SILTS
36.5		BOTTO

BH-5, ELEV. 210.7
LOGGED BY: JOE VAN
DRILLING EQUIPMENT:

HOLE FROM	HOLE TO	DESCR
0.0	1.5	TOPSO
1.5	2.5	SILT, 3.0',
2.5	21.8	SILTS SEVER AT 13 FROM TOP OF SHALY
21.8	39.0	SILTS BROKE FROM GRY W
39.0	40.0	SHALE
40.0		BOTTO

BH-8, ELEV. 240.7'
LOGGED BY: JOE VAN
DRILLING EQUIPMENT:

HOLE FROM	HOLE TO	DESCR
0.0	0.2	TOPSO
0.2	2.6	SILT,
2.6	6.0	SHALE
6.0	9.3	SILTST ANGUL SLIGHT
9.3	25.0	SILTST VERTIC OR ST 23.2',
25.0		BOTTO

BH-301, ELEV. 205.4
LOGGED BY: JOE VAN
DRILLING EQUIPMENT:

HOLE FROM	HOLE TO	DESCR
0.0	0.5	TOPSO
0.5	2.0	SILT, 1.5'-
2.0	4.0	SILT, W/ SHA
4.0	21.4	SILTS 14.0' SOME 21.9' RQD-3 VERT. SILTY
21.4	34.1	SHALE RED & IS GRY BROKE BROKE 29.8' GRY S ONE S
34.1	35.0	SHALE RED,
35.0		BOTTO

NOTE - ALL SOIL AND

DH-4 CONT'D.

HOLE FROM	DEPTH TO	DESCRIPTION OF MATERIALS
22.3	25.2	SHALE, SLATY, ARGILLITE, HARDNESS-3-4, GRY W/RED, 1° VERT. FRAC. AT 22.3', THIN BEDDED, VERY SANDY AT 27' & 28', RED SHALE TO 25.2' THIN TO MEDIUM BEDDED, LIMY AT 23.5', RQD-52 PERCENT.
25.2	34.0	SHALE, SILTY, DARK GRY TO BROWN TO GRY (ARGILLITE), HARDNESS-3 TO 4, SOME THIN CALCITE PARTINGS, VERT. FRAC. FROM 26.5'-26.8', THIN BEDDED, BANDED WITH SILTSTONE STREAKS, VERT. FRAC. AT 30.3' AND 31.0' TO 31.3', SOFT AND BROKEN 31.8' TO 32.7', RQD-52 PERCENT.
34.0	36.5	SILTSTONE, RED, SHALY, DENSE, HARDNESS 3 TO 4, SOFT WEATHERED, SHALY ZONE AT 34.3', RQD-62 PERCENT
36.5		BOTTOM OF HOLE. WL (4-6-71) 2.5'

SAMPLES

FROM FT.	TO FT.	% REC.
0.0	1.5	80
1.5	2.3	50
2.3	5.3	
5.3	5.4	30
5.4	6.0	
6.0	9.5	100
9.5	12.5	85
12.5	15.0	100
15.0	19.0	75
19.0	22.7	72
22.7	26.5	92
26.5	30.0	100

DH-5, ELEV. 210.7, 17+00, 9' U.S.
LOGGED BY: JOE VAN 4-5-71
DRILLING EQUIPMENT: SKID RIG

HOLE FROM	DEPTH TO	DESCRIPTION OF MATERIALS	UNIF. SOIL CLASS. SYMB.	STANDARD PENETRATION BLOWS PER 6"	TYPE BIT USED	NO.	TYPE
0.0	1.5	TOPSOIL WITH GRAVEL & COBBLES		2-3-4	SPT	1	JAR
1.5	2.5	SILT, CLAYEY, SLIGHT PLASTIC, TRACE MOISTURE, WEA. SHALE, CASING AT 3.0', 10 PERCENT SAND	ML-CL	13-19-50	SPT	2	"
					DIA		NXM
2.5	21.8	SILTSTONE, SHALY, RED OR SILTY SHALE, HARDNESS-3, MEDIUM BEDDED, SEVERAL VERT. & ANGULAR FRAC. FROM 5.0' TO 16.0', WORM HOLE POROSITY AT 13.0', WATER ERODED JOINT AT 13.4' AND 17.8' WITH STAIN, GRY DENSE FROM 13.0' TO 15.3', AFTER 14.7' CORE PULLED SMALL ARTESIAN FLOW OVER TOP OF CASING, WATER ERODED JOINTS AT 20.1'-20.5', RED TO 2.8', VERY SHALY AT 21.0', RQD-43 PERCENT.			"		"
21.8	39.0	SILTSTONE, GRY W/RED SHALY BANDING & CROSS-BEDDING, THIN BEDDED & BROKEN FROM 24.8' TO 25.5', ANGULAR FRACTURING WITH CALCITE LININGS FROM 28.5' TO 31.0' & 32.6' TO 33.4', RED FROM 29.7' TO 33.6', HARDNESS-3 TO 4, RED & GRY SHALY SILTSTONE FROM 33.6' TO 37.0' (ARGILLITE) GRY W/RED 37.0' TO 39.0', RQD-53 PERCENT.			"		"
39.0	40.0	SHALE, HARDNESS-2, MED. BEDDED, GRY, DENSE.					
40.0		BOTTOM OF HOLE, WL (4-9-70) 6.2'					

SAMPLES FROM FT.	TO FT.	% REC.
0.0	1.5	70
1.5	3.0	70
3.0	3.8	80
3.8	5.0	
5.0	5.5	90
5.5	6.0	
6.0	6.7	100
6.7	12.0	100
12.0	18.1	100
18.1	25.0	100
25.0	29.0	100
29.0	35.0	100

SAMPLES FROM FT.	TO FT.	% REC.
0.0	1.5	70
1.5	2.5	80
2.5	5.0	95
5.0	7.0	100
7.0	9.0	98
9.0	13.5	100
13.5	15.5	100
15.5	20.5	100
20.5	23.5	100
23.5	25.5	100
25.5	27.4	100
27.4	34.5	100
34.5	40.0	100

DH-8, ELEV. 240.7', 20+40, CENTERLINE
LOGGED BY: JOE VAN 4-7-71
DRILLING EQUIPMENT: SKID RIG

HOLE FROM	DEPTH TO	DESCRIPTION OF MATERIALS	UNIF. SOIL CLASS. SYMB.	STANDARD PENETRATION BLOWS PER 6"	TYPE BIT USED	NO.	TYPE
0.0	0.2	TOPSOIL		1-1-1	SPT	1	JAR
0.2	2.6	SILT, CLAYEY, SLIGHT PLASTIC, RED, WET, 10 PERCENT SAND	ML-CL	2-9-30	"	2	"
2.6	6.0	SHALE, SANDY, WEA., RED, HARDNESS-2			TRI		
6.0	9.3	SILTSTONE, SHALY, WEA., HARDNESS-2, MED. BEDDED, BROKEN AT 8.0', ANGULAR FRAC. AT 7.4', SOME VUGGY POROSITY, CL SEAM AT 8.3', SOME SLIGHT STAIN FROM 8.0'-9.0', GRY TO BROWN, SOME RED, RQD-18 PERCENT		56/.5'	SPT	3	JAR
					TRI		
					DIA		NXM
9.3	25.0	SILTSTONE, HARDNESS-3 TO 4 (ARGILLITE), MEDIUM TO THICK BEDDED, DENSE, VERTICAL FRAC. 11.1' TO 12.3', RED, SOME GRY MOTTLED, POSSIBLE SLIGHT OIL STAIN IN JOINTS AT 13.2', VERT. FRAC. 18.2'-22.8' ANGULAR JOINT AT 23.2', RED W/GRAY, DENSE, SOLID, FROM 21.5'-25', RQD-52 PERCENT.			"		"
25.0		BOTTOM OF HOLE - WL (4-9-71) 2.4'					

SAMPLES FROM FT.	TO FT.	% REC.
0.0	1.5	80
1.5	3.0	90
4.0	5.5	80
5.5	7.0	70
7.0	7.4	50
7.4	8.0	
8.0	10.6	80
10.6	12.1	100
12.1	13.2	100
13.2	15.5	95
15.5	19.0	100
19.0	27.9	100
27.9	32.5	100
32.5	35.0	100

SAMPLES FROM FT.	TO FT.	% REC.
0.0	1.5	70
1.5	3.0	90
3.0	4.5	70
4.5	8.0	60
8.0	9.3	95
9.3	10.5	55
10.5	12.5	90
12.5	14.0	100
14.0	20.0	100
20.0	23.5	100
23.5	26.5	80
26.5	30.0	100
30.0	35.0	95

DH-301, ELEV. 205.4, 15+00, CENTERLINE
LOGGED BY: JOE VAN 4-8-71
DRILLING EQUIPMENT: SKID RIG

HOLE FROM	DEPTH TO	DESCRIPTION OF MATERIALS	UNIF. SOIL CLASS. SYMB.	STANDARD PENETRATION BLOWS PER 6"	TYPE BIT USED	NO.	TYPE
0.0	0.5	TOPSOIL		1-1-1	SPT	1	JAR
0.5	2.0	SILT, CLAYEY, 15 PERCENT FINE SAND, MOIST, BROWN, SOME GRAVEL 1.5'-2.0', ALLUVIUM, SLIGHT PLASTIC	ML-CL	1-3-4	"	2	"
				7-13-37	"	3	"
2.0	4.0	SILT, SLIGHT PLASTIC, 15 PERCENT SAND, TRACE MOISTURE, WEA. SHALE, W/SHALE GRAVELS FROM 3.0' TO 4.0', TAN, YELLOW, GRY, RESIDUAL	ML-CL				
4.0	21.4	SILTSTONE, SHALY, BOULDER TO 4.7', CROSS-BEDDED, RED TO 8.0', TO 14.0' GRY BANDED, HARDNESS-3, THIN BEDDED, BROKEN 13.3'-13.7', SOME POSSIBLE SLIGHT OIL STAINING JOINT FROM 8.0'-9.0, FROM 14'-21.8', HARDNESS-3 TO 4, THICK BEDDED, GRY & RED MOTTLED, RQD-37 PERCENT, SOME STAINING FROM 15.2'-15.9' WITH ERODED JOINTS, VERT. FRAC. 14.5'-15.5', 16.5'-18.8' RED SHALE, HARDNESS-2 W/ SILTY STREAKS.			DIA		NXM
21.4	34.1	SHALE, SILTY, MED. BEDDED, RED TO 22.4', FROM 22.4'-23.4', GRY W/ RED & CROSS BEDDING (ARGILLITE), HARDNESS-3 FROM 24.8'-34.1', SHALE IS GRY, THN TO MED. BEDDED, CALCAREOUS, HARDNESS-3, HARDNESS-4, BROKEN LIMY SHALE FROM 28.0'-28.8' W/VERT. FRAC. THIN BEDDED & BROKEN LIMY SHALE 29.2'-29.9', WITH CL SEAM IN ANGULAR FRAC. AT 29.8' THIN BEDDED AND SANDY, SLIGHT CALCAREOUS, HARDNESS-2 PLUS, GRY SHALE FROM 31.5'-33.5', THIN BEDDED, WITH CALCITE PARTINGS, ONE SOLID PIECE 33.5'-34.0', RQD-43 PERCENT.			"		"
34.1	35.0	SHALE, SILTY, THIN BEDDED, HARDNESS-2, WEA. WITH CALCITE PARTINGS, RED, RQD-32 PERCENT.					
35.0		BOTTOM OF HOLE. WL (4-12-71) 7.5'					

NOTE - ALL SOIL AND ROCK CLASSIFICATIONS WERE DETERMINED BY VISUAL-MANUAL METHOD.

NESHAMINY CREEK WATERSHED
FLOODWATER RETARDING DAM PA-621
BUCKS COUNTY, PENNSYLVANIA
LOGS OF TEST HOLES
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed Date Approved by
Drawn Title
Traced Title
Checked 9/70 Sheet No. 29 of 29 Drawing No. PA-621-P

PLATE 15

AD-A091 486 WOODWARD-CLYDE CONSULTANTS PLYMOUTH MEETING PA F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. NEWTOWN DAM (NDS I.D. NUMBER P--ETC(U)
AUG 80 M F BUCK, J H FREDERICK DACW31-80-C-0018
UNCLASSIFIED NL

END
DATE FILMED
1 83
DTIC

LEGEND

TEST HOLE NUMBERING SYSTEM

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

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

GW	Well graded gravels; gravel-sand mixtures
GP	Poorly graded gravels
GM	Silty gravels; gravel-sand-silt mixtures
GC	Clayey gravels; gravel-sand-clay mixtures
SW	Well graded sands; sand-gravel mixtures
SP	Poorly graded sands
SM	Silty sands; sand-silt mixtures
SC	Clayey sands; sand-clay mixtures
ML	Silts; silty, very fine sands; sandy or clayey silts
CL	Clays of low to medium plasticity; silty, sandy or gravelly 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

BEDROCK SYMBOLS

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

SAMPLES

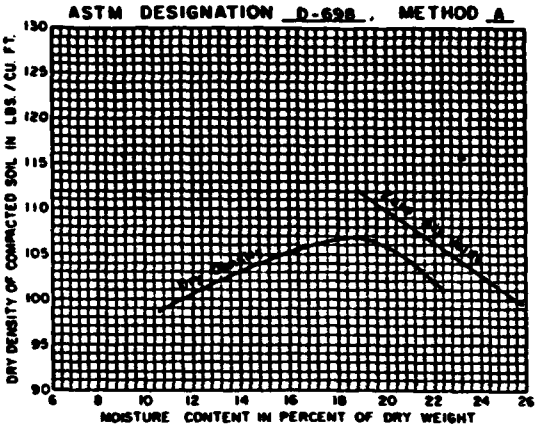
DS	Disturbed
US	Undisturbed

NOTE:
All soil and rock classifications were determined by visual examination, except where otherwise noted.

COMPACTION CURVE

LABORATORY SAMPLE NO. 72W2084

ASTM DESIGNATION D-698, METHOD A



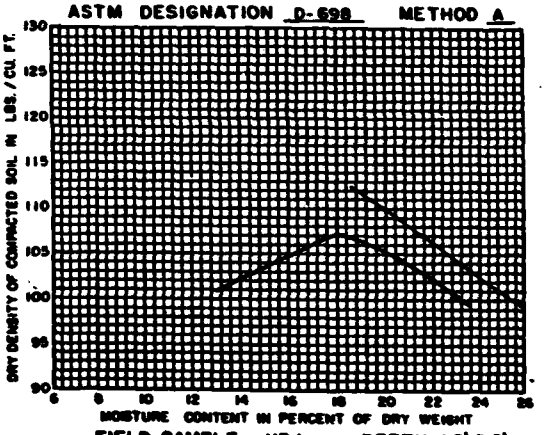
FIELD SAMPLE 211.1 DEPTH 0.5'-2.0'

LABORATORY CLASSIFICATION ML

COMPACTION CURVE

LABORATORY SAMPLE NO. 72W2086

ASTM DESIGNATION D-698 METHOD A



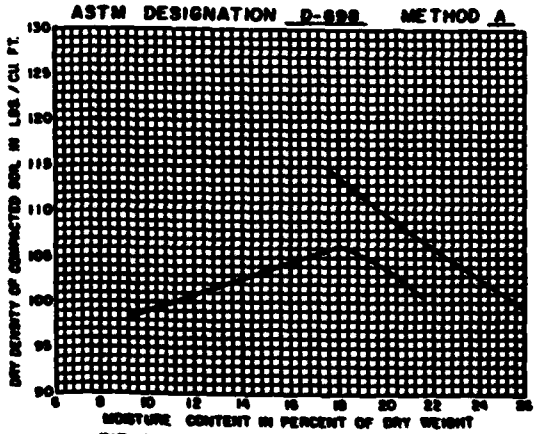
FIELD SAMPLE 117.1 DEPTH 1.0'-5.0'

LABORATORY CLASSIFICATION ML

COMPACTION CURVE

LABORATORY SAMPLE NO. 72W2087

ASTM DESIGNATION D-698 METHOD A



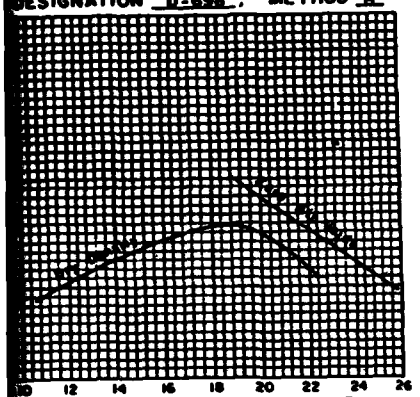
FIELD SAMPLE 141.1 DEPTH 3.5'-5.5'

LABORATORY CLASSIFICATION ML

COMPACTION CURVE

RATORY SAMPLE NO. 72W2084

DESIGNATION D-698, METHOD A



URE CONTENT IN PERCENT OF DRY WEIGHT

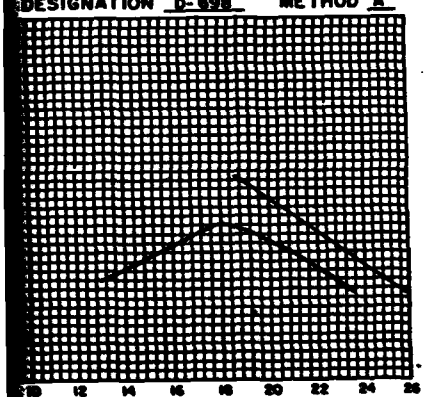
D SAMPLE 211.1 DEPTH 0.5'-2.0'

RATORY CLASSIFICATION ML

COMPACTION CURVE

LABORATORY SAMPLE NO. 72W2086

ASTM DESIGNATION D-698 METHOD A



URE CONTENT IN PERCENT OF DRY WEIGHT

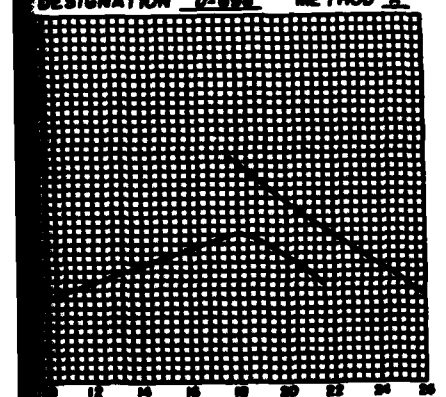
D SAMPLE 117.1 DEPTH 1.0'-3.0'

RATORY CLASSIFICATION ML

COMPACTION CURVE

RATORY SAMPLE NO. 72W2087

DESIGNATION D-698 METHOD A



URE CONTENT IN PERCENT OF DRY WEIGHT

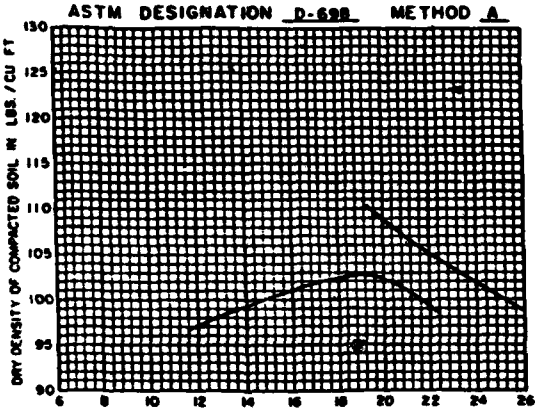
D SAMPLE 141.1 DEPTH 3.5'-5.5'

RATORY CLASSIFICATION GM

COMPACTION CURVE

LABORATORY SAMPLE NO. 72W2088

ASTM DESIGNATION D-698 METHOD A



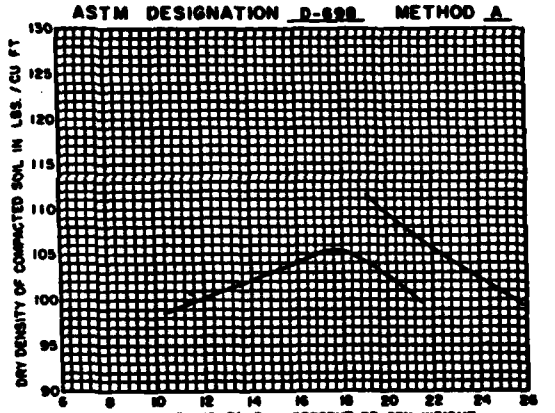
FIELD SAMPLE 129.1 DEPTH 1.0'-2.5'

LABORATORY CLASSIFICATION ML

COMPACTION CURVE

LABORATORY SAMPLE NO. 72W2089

ASTM DESIGNATION D-698 METHOD A



FIELD SAMPLE 129.2 DEPTH 2.5'-4.0'

LABORATORY CLASSIFICATION GM

NESHAMINY CREEK WATERSHED

FLOODWATER RETARDING DAM PA-621
BUCKS COUNTY, PENNSYLVANIA

COMPACTION DATA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed		Date	Approved by
Drawn	GRISE	9-76	Title
Traced			Title
Checked			Sheet No.
Revised		9-76	PA-621-P

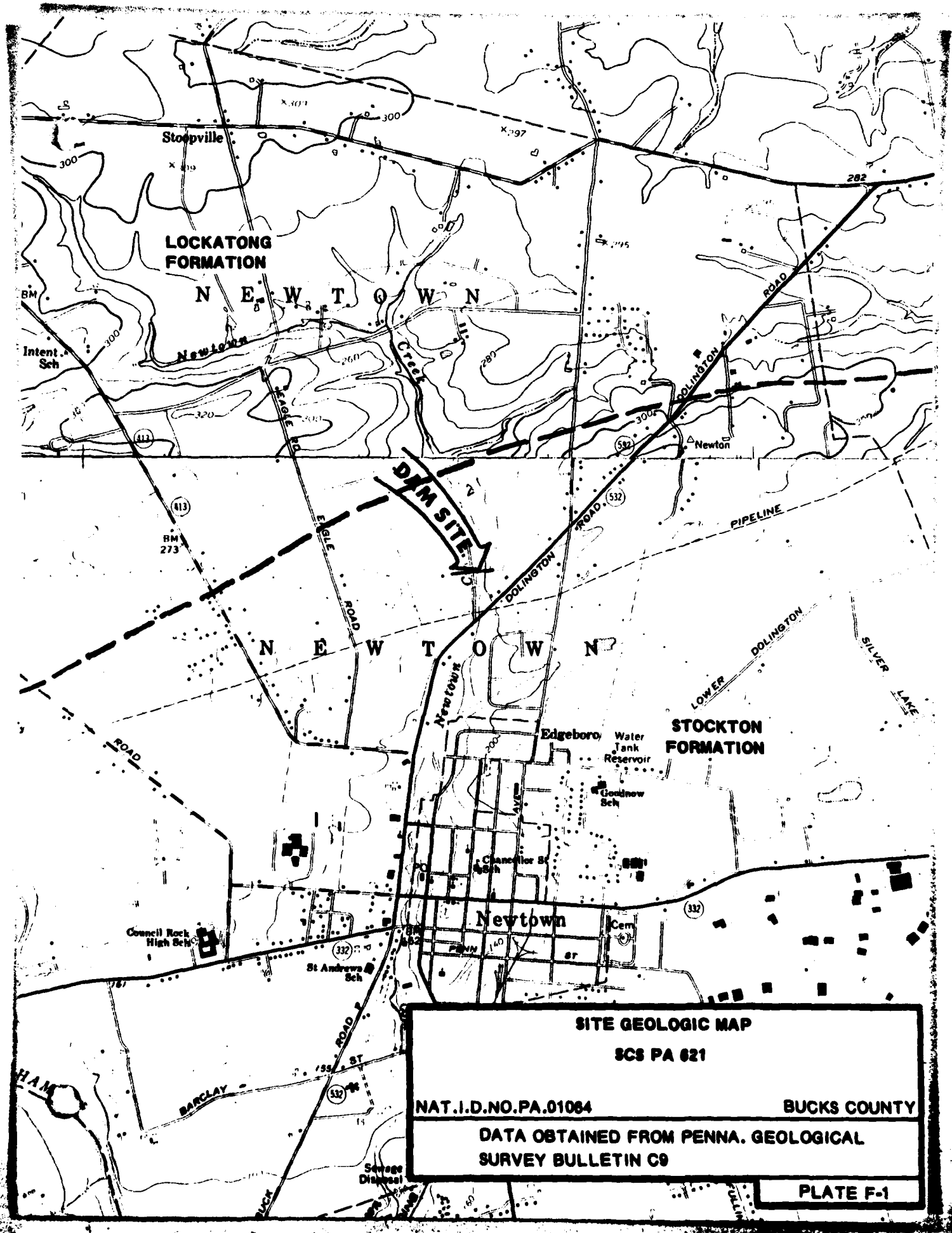
PLATE 16

APPENDIX

F

SITE GEOLOGY
NEWTOWN DAM
(SCS PA 621 DAM)

SCS PA 621 Dam is located in the Triassic Lowland Section of the Piedmont Physiographic Province. As shown in Plate F-1, the site is underlain by the Stockton Formation of Triassic age. Information contained in the state files describes the bedrock as silty shale and shaly and sandy siltstone that strikes east-west and dips 10 to 20 degrees to the north. This is consistent with the observed N70°E strike and 11 degree north dip (upstream) of bedrock exposed on the left side of the emergency spillway. High angle rock jointing strikes near east-west (parallel to dam centerline) and north-south (perpendicular to dam centerline). A potential for seepage under the dam exists due to the jointed and blocky character of the bedrock.



SITE GEOLOGIC MAP

SCS PA 621

NAT.I.D.NO.PA.01064 **BUCKS COUNTY**

DATA OBTAINED FROM PENNA. GEOLOGICAL SURVEY BULLETIN C9

PLATE F-1