LEVEL II

SUSQUEHANNA RIVER BASIN

UNNAMED TRIBUTARY OF ROARING RUN, BRADFORD COUNTY

PENNSYLVANIA

AD A108964

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STEINHAUER DAM

NDI No. PA 00947

PennDER No. 8-64

Dam Owner: Eugene R. Ciccotti

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

DACW31-81-C-0011

prepared for

DEPARTMENT OF THE ARMY

Baltimore District, Corps of Engineers

Baltimore, Maryland 21203

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prepared by

MICHAEL BAKER, JR., INC.

Consulting Engineers

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June 1981

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PREFACE

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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. 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.

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM
Steinhauer Dam, Bradford County, Pennsylvania
NDI No. PA 00947, PennDER No. 8-64
Unnamed Tributary of Roaring Run
Inspected 31 October 1980

ASSESSMENT OF GENERAL CONDITIONS

Steinhauer Dam is owned by Eugene R. Ciccotti and is classified as a "Significant" hazard - "Small" size dam. The dam was found to be in fair overall condition at the time of inspection.

Hydraulic/hydrologic evaluations, performed in accordance with procedures established by the Baltimore District, Corps of Engineers, for Phase I Inspection Reports, revealed that the spillway capacity is less than the peak inflow to the impoundment during the 100-year flood. A spillway design flood (SDF) in the range of the 100-year flood to the 1/2 Probable Maximum Flood (1/2 PMF) is required for Steinhauer Dam. Because the dam is on the low end of the "Small" size category in terms of storage capacity and height, the 100-year flood was chosen as the SDF. The spillway will not pass the SDF without overtopping the dam. The spillway is therefore considered "Inadequate."

It is recommended that the owner immediately develop remedial measures to ensure that the dam is not overtopped by the 100-year flood.

Several items of remedial work should be immediately initiated by the owner. These include:

1) Fill the low area near the right end of the dam and reseed with grass.

2) Develop remedial measures to ensure that the dam is not overtopped by the 100-year flood.

3) Cut the brush and trees on the downstream slope.

4) Cut the weeds and high grass in the emergency spillway.

In addition, the following operational measures are recommended to be undertaken by the owner:

1) Develop a detailed emergency operation and warning system.

2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.

3) When warning of a storm of major proportions is given by the National Weather Service, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. An emergency drawdown plan should be developed in case an emergency drawdown of the pond should become necessary. These should be included in a formal maintenance and operations manual for the dam.

Submitted by:

MICHAEL BAKER, JR., INC.

John A. Dziubek, P.E.
Engineering Manager-Geotechnical

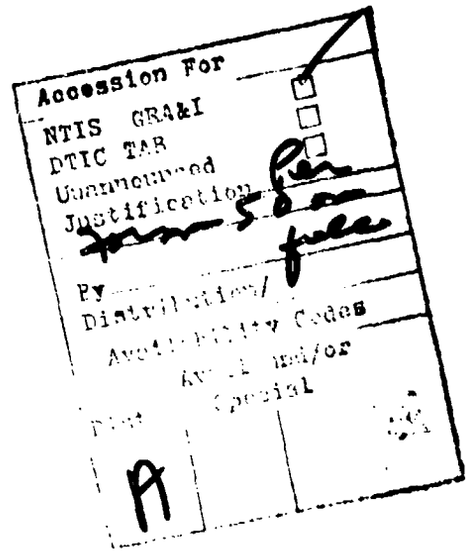
Date: 26 June 1981

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
Commander and District Engineer

Date: 2 July 81



STEINHAUER DAM

Overall View of Dam from Left Abutment

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
STEINHAUER DAM
NDI No. PA 00947, PennDER No. 8-64

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 of Inspection - 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. Description of Dam and Appurtenances - Steinhauer Dam is an earthfill embankment with a height of 12 feet and a crest length of approximately 444 feet. The dam has a crest width of 10 feet, an upstream slope of 2.8H:1V (Horizontal to Vertical) and a downstream slope of 3.4H:1V. The dam crest has a minimum elevation of 1699.5 feet Mean Sea Level (ft. M.S.L.). According to the design plans, a cut-off trench runs the length of the embankment and extends into impervious material.

The principal spillway riser consists of a 24-inch diameter corrugated metal pipe (CMP) with a trash rack. The crest of the riser is at elevation 1697.0 ft. M.S.L. The riser pipe is connected to a 15-inch diameter CMP outlet conduit which extends through the embankment. This conduit discharges into a plunge pool at the toe of the dam. According to design plans, there are two anti-seep collars located on this conduit.

According to the design plans, there is a 10-inch diameter pipe extending from the base of the intake riser at the upstream toe of the dam to the reservoir bottom. The last pipe section is made of vitrified clay and is plugged with concrete. The reservoir can be dewatered by breaking this section of pipe. The water will discharge to the intake riser and out the conduit for the principal spillway.

The emergency spillway is a grass-lined trapezoidal channel located at the left abutment. This channel has a bottom width of 20 feet perpendicular to flow and a crest elevation of 1698.1 ft. M.S.L. The spillway is irregular in shape and is overgrown with brush and weeds. The channel side slopes are typically 4H:1V. Two roads (jeep trails) cross the spillway, one at the crest and one downstream from the dam through the discharge channel.

b. Location - Steinhauer Dam is located on an unnamed tributary of Roaring Run in South Creek Township, Bradford County, Pennsylvania. It is about 3 miles northwest of Gillett, Pennsylvania. The coordinates of the dam are N 41° 59.6' and W 76° 49.6'. The dam and reservoir are shown on the USGS 7.5 minute topographic quadrangle, Gillett, Pennsylvania.

c. Size Classification - The height of the dam is 12 feet. The reservoir volume to the top of the dam at elevation 1699.5 ft. M.S.L. is 82 acre-feet. Therefore, the dam is in the "Small" size category.

d. Hazard Classification - Three houses, a trailer and two garages are located between 0.75 mile and 1.25 miles downstream from the dam. These structures range from less than 5 feet above the streambed to approximately 10 feet above the streambed. A 6-foot diameter culvert conveys the channel beneath a road located 1.2 miles downstream from the dam. Beneath another road, located 1.3 miles downstream from the dam, is a 4-foot high by 12-foot wide concrete culvert. There would be economic damage to these structures and roads if the dam were to fail; however, no loss of life is believed likely to occur. Therefore, Steinhauer Dam is considered to be in the "Significant" hazard category.

e. Ownership - The dam and reservoir are owned by Mr. Eugene R. Ciccotti, 2333 Kapiolani 1508, Honolulu, Hawaii 96826.

f. Purpose of the Dam - The reservoir is used for recreational purposes.

g. Design and Construction History - The dam was designed by the Soil Conservation Service, United States Department of Agriculture, in 1968. The contractor is unknown. The dam was built in either 1968 or 1969. Minor modifications made to the dam are discussed in Section 2.2.

h. Normal Operating Procedures - The reservoir is normally maintained at or near the riser crest elevation (Elevation 1697.0 ft. M.S.L.). The dam is visited once a year by the owner.

1.3 PERTINENT DATA

a. Drainage Area (square miles) - 0.2

b. Discharge at Dam Site (c.f.s.) -

Maximum Flood	Unknown
Spillway Capacity at Maximum Pool (El. 1699.5 ft. M.S.L.) -	173

c. Elevation* (feet above Mean Sea Level [ft. M.S.L.]) -

Design Top of Dam -	1700.5
Minimum Top of Dam -	1699.5
Maximum Design Pool -	Unknown
Principal Spillway (Riser) Crest -	1697.0
Streambed at Toe of Dam -	1687.1
Maximum Tailwater of Record -	Unknown

d. Reservoir (feet) -

Length of Maximum Pool (El. 1699.5 ft. M.S.L.) -	1300
Length of Normal Pool (El. 1697.0 ft. M.S.L.) -	1100

e. Storage (acre-feet) -

Top of Dam (El. 1699.5 ft. M.S.L.) -	82
Normal Pool (El. 1697.0 ft. M.S.L.) -	58

f. Reservoir Surface (acres) -

Top of Dam (El. 1699.5 ft. M.S.L.) -	10.56
Normal Pool (El. 1697.0 ft. M.S.L.) -	8.96

*All elevations are referenced to the riser crest, El. 1697.0 ft. M.S.L., as estimated from the USGS 7.5 minute topographic quadrangle, Gillett, Pennsylvania.

g. Dam -

Type - Homogeneous earthfill	
Total Length Including Spillway (feet) -	444
Height (feet) - Design -	13.4
Field -	12.4
Top Width (feet) -	10
Side Slopes - Upstream - Design -	3H:1V
Field -	2.8H:1V
Downstream - Design -	2H:1V
Field -	3.4H:1V
Zoning -	None
Impervious Core -	None
Cut-off - According to design plans, a cut-off trench runs the length of the embankment and extends into impervious material.	
Drains -	None

h. Diversion and Regulating Tunnels - None

i. Principal Spillway -

Type - 24-inch CMP riser connected to a 15-inch CMP outlet conduit	
Location - 80 feet right of emergency spillway	
Crest Elevation (ft. M.S.L.) -	1697.0
Gates -	None
Downstream Channel - Water discharges into a plunge pool on the left downstream abutment of the dam and drains into the original streambed channel.	

j. Emergency Spillway -

Type - Grass-lined trapezoidal channel	
Location - Left abutment	
Channel Bottom Width (feet) -	20
Side Slopes -	4H:1V
Crest Elevation (ft. M.S.L.) -	1698.1
Gates -	None
Downstream Channel - Trapezoidal channel discharges into flat area below dam toward original streambed channel.	

k. Outlet Works - According to design plans, a 10-inch diameter clay pipe extends into the pond from the riser at the upstream toe of the dam. The pipe can be broken to dewater the reservoir.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Information reviewed for the preparation of this report consisted of the Soil Conservation Service's design plans and a summary of the design calculations for the dam which were obtained from the owner of the dam. The original owner of the dam did not obtain a permit from PennDER for construction of the dam.

2.2 CONSTRUCTION

The exact construction date of the dam is unknown, but it was probably built in the summer of 1968.

The original owners performed some construction modifications to the dam. These included:

1) Widening the dam at the township road at the right abutment

2) Adding riprap to the upstream face of the dam

3) Filling in low spots on the top of the dam

4) Filling a slide at the water's edge with riprap.

This work was done in the period from 1970 to 1979. No drawings or reports of this work are available.

No "as-built" plans were available for review. During the field investigation, some discrepancies between the design plans and the actual construction were observed. These included:

1) The downstream slope was constructed on a 3.4H:1V slope rather than 2H:1V.

2) The anti-vortex device was not installed on the intake riser.

3) A riprap-lined plunge pool was not installed.

2.3 OPERATION

No formal records are available for operation of the dam and reservoir. The spillway is uncontrolled and the reservoir does not fluctuate much from the spillway crest level. The dam is visited once a year by the owner.

2.4 EVALUATION

a. Availability - The information reviewed was obtained from the owner.

b. Adequacy - The information available combined with the visual inspection measurements and observations is adequate for a Phase I Inspection of this dam.

c. Validity - The drawings available from the Soil Conservation Service are not listed as "as-built". A comparison of the design drawings with the visual inspection observations and measurements shows several discrepancies. These included:

1) The downstream slope was constructed on a 3.4H:1V slope rather than 2H:1V.

2) The anti-vortex device was not installed on the intake riser.

3) A riprap-lined plunge pool was not installed.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General - The dam was found to be in fair overall condition at the time of inspection on 31 October 1980. No unusual weather conditions were experienced during the inspection. Noteworthy deficiencies observed during the visual inspection are described briefly in the following paragraphs. The complete visual inspection checklist, field sketch, top of dam profile, and typical cross-section are given in Appendix A.

b. Dam - The downstream slope is covered with a thick growth of small trees and brush, partially obstructing the visual inspection. There is a low area near the right end of the dam.

c. Appurtenant Structures - The principal spillway (outlet works) has formed a natural plunge pool at the discharge end of the pipe. The emergency spillway is overgrown with weeds and high grass.

d. Reservoir Area - The reservoir slopes are moderate with no signs of instability. No problems were observed in the reservoir area.

e. Downstream Channel - The downstream channel is steeply sloped. The channel is lined with rock and vegetation. Three houses, a trailer, two garages, and a township road are located between 0.75 mile to 1.25 miles downstream from the dam. They may suffer economic damage if the dam should fail.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no formal procedures for lowering the reservoir or evacuating the downstream area in case of an impending failure of the dam. It is recommended that formal emergency procedures be adopted, prominently displayed and furnished to all operating personnel.

4.2 MAINTENANCE OF DAM

There are no formal records of maintenance or formal procedures for evaluating the necessity of maintenance for the structure. It is recommended that formal inspection procedures be developed.

4.3 MAINTENANCE OF OPERATING FACILITIES

There are no operating facilities installed on the dam. An emergency drawdown plan should be developed in case an emergency drawdown of the pond should become necessary.

4.4 DESCRIPTION OF ANY WARNING SYSTEM

There are no warning procedures in the event of a dam failure. An emergency warning system should be developed.

4.5 EVALUATION OF OPERATING ADEQUACY

A formal maintenance and operations manual should be prepared for the dam.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data - No hydraulic or hydrologic design calculations are available for Steinhauer Dam. A summary sheet concerning the design values used for the dam indicated that the dam was designed to safely pass the 50-year flood. The maximum design discharge was 276 c.f.s.

b. Experience Data - There is no information available on the maximum reservoir level or discharge.

c. Visual Observations - The emergency spillway is overgrown with weeds and brush but the spillway capacity should not be significantly affected during times of high flow. No other problems were observed which would indicate that the dam and appurtenant structures could not perform satisfactorily during a flood event.

d. Overtopping Potential - Steinhauer Dam is a "Small" size - "Significant" hazard dam requiring evaluation for a spillway design flood (SDF) in the range of the 100-year flood to the 1/2 Probable Maximum Flood (1/2 PMF). Since the dam and reservoir are in the lower end of the "Small" size category in terms of storage capacity and height, the 100-year flood was selected as the SDF.

Using material from "The Hydrologic Study - Tropical Storm Agnes" prepared by the Special Studies Branch, Planning Division, North Atlantic Division, Corps of Engineers, in New York City, December 1975, the peak inflow to the impoundment for the 100-year flood was calculated to be 545 c.f.s. The peak inflow to the impoundment for the 100-year flood was also calculated to be 170 c.f.s. using material from "Water Resources Bulletin, Bulletin No. 13, Floods in Pennsylvania," prepared by the Department of Environmental Resources, Commonwealth of Pennsylvania. Averaging these two methods produced a peak inflow of 357 c.f.s. which was used in this analysis.

The spillway capacity at the minimum top of the dam is 173 c.f.s. which is approximately 48.5 percent of the peak inflow to the impoundment.

e. Spillway Adequacy - As outlined in the above analysis, the inflow to the impoundment during the 100-year flood is greater than spillway capacity; therefore, the spillway is considered "Inadequate."

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations - There were no structural inadequacies observed during the visual inspection. The downstream slope was covered with a thick growth of small trees and brush which partially obstructed the visual inspection. This vegetation should be cut and the downstream slope carefully examined during the next inspection.

b. Design and Construction Data - Design calculations were not available for review. Because of the low height of the dam, the moderate slopes and total width of the embankment, and because no signs of distress or steady state seepage were observed; no further stability analysis is deemed necessary for this Phase I Inspection Report.

c. Operating Records - Nothing in the operational information indicates concern relative to the structural stability of the dam.

d. Post-Construction Changes - No changes adversely affecting the structural stability of the dam have been performed.

e. Seismic Stability - The dam is located in Seismic Zone 1 of the "Seismic Zone Map of the Contiguous United States," Figure 1, page D-30, "Recommended Guidelines for Safety Inspection of Dams." This is a zone of minor seismic activity, and therefore, further consideration of the seismic stability is not warranted.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety - Steinhauer Dam was found to be in fair overall condition at the time of inspection. Steinhauer Dam is a "Significant" hazard - "Small" size dam requiring a spillway capacity in the range of the 100-year flood to the 1/2 PMF. Because Steinhauer Dam is on the low end of the "Small" size category in terms of height and storage capacity, the 100-year flood was chosen as the SDF. As presented in Section 5, the spillway capacity is less than the peak inflow to the impoundment during the 100-year flood. Therefore, the spillway is considered "Inadequate."

b. Adequacy of Information - The information available and the observations made during the visual inspection are considered sufficient for a Phase I Inspection Report.

c. Urgency - The owner should immediately initiate the remedial measures discussed in paragraph 7.2.

d. Necessity for Additional Data/Evaluation - The hydraulic/hydrologic analysis performed in connection with this Phase I Inspection Report has indicated the need for additional spillway capacity.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection revealed certain items of remedial work which should be performed by the owner without delay. These include:

1) Fill the low area near the right end of the dam and reseed with grass.

2) Develop remedial measures to ensure that the dam will not be overtopped by the 100-year flood.

3) Cut the brush and trees on the downstream slope.

4) Cut the weeds and high grass in the emergency spillway.

In addition, the following operational measures are recommended to be undertaken by the owner:

1) Develop a detailed emergency operation and warning system.

2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.

3) When warning of a storm of major proportions is given by the National Weather Service, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. An emergency drawdown plan should be developed in case an emergency drawdown of the pond should become necessary. These should be included in a formal maintenance and operations manual for the dam.

APPENDIX A

VISUAL INSPECTION CHECK LIST, FIELD SKETCH, TOP OF DAM PROFILE, AND TYPICAL CROSS-SECTION

Check List
Visual Inspection
Phase 1

Name of Dam Steinhauer Dam County Bradford State Pennsylvania Coordinates Lat. N41° 59.6'
Long. W76° 49.6'

NDI # PA 00947
PennDER # 8-64

Date of Inspection 31 October 1980 Weather Sunny Temperature 45° F.

Pool Elevation at Time of Inspection 1696.37 ft. M.S.L.* Tailwater at Time of Inspection 1687.06 ft. M.S.L.

*All elevations referenced to assumed riser crest elevation 1697.00 ft. M.S.L. from USGS 7.5 minute topographic quadrangle, Gillett, Pennsylvania.

Inspection Personnel:

Michael Baker, Jr., Inc.:

James G. Ulinski
Wayne D. Lasch
Jeffrey S. Maze

Owner's Representatives:

James G. Ulinski Recorder

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: STEINHAUER DAM

NDI # PA 00947

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
LEAKAGE		
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS		
DRAINS		
WATER PASSAGES		
FOUNDATION		

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: STEINHAUER DAM

NDI # PA 00947

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

EMBANKMENT

Name of Dam STEINHAUER DAM

NDI # PA 00947

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	None observed. Previous owner reported some minor sloughing on upstream slope which was repaired with riprap.	

EMBANKMENT

Name of Dam STEINHAUER DAM

NDI # PA 00947

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	A low area exists near the right end of the dam.	Fill the low area and reseed with grass.
RIPRAP FAILURES	None observed	

EMBANKMENT

Name of Dam STEINHAUER DAM

NDI # PA 00947

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No problems observed.	
ANY NOTICEABLE SEEPAGE	None observed	
STAFF GAGE AND RECORDER	None	
DRAINS	None	
VEGETATION	The downstream slope is covered with thick brush and small trees. This growth was so thick that the visual inspection of the embankment was difficult.	Cut the trees and brush.

PRINCIPAL SPILLWAY

Name of Dam: STEINHAUER DAM

NDI # PA 00947

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN PRINCIPAL SPILLWAY	No problems observed.	
INTAKE STRUCTURE	No problems observed.	
OUTLET STRUCTURE	The principal spillway has formed a plunge pool at the discharge point. The plunge pool appears stable at this time.	
OUTLET CHANNEL	The discharge travels down the left downstream abutment to the original streambed. No problems observed.	
EMERGENCY GATE	None	

EMERGENCY SPILLWAY

Name of Dam: STEINHAUER DAM

NDI # PA 00947

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONTROL SECTION	No problems observed.	
APPROACH CHANNEL	No problems observed.	
DISCHARGE CHANNEL	No problems observed.	
BRIDGE AND PIERS	None	
VEGETATION	The emergency spillway is overgrown with weeds and high grass.	The vegetation should be cut to a reasonable height.

GATED SPILLWAY - Not Applicable

Name of Dam: STEINHAUER DAM

NDI # PA 00947

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

INSTRUMENTATION

Name of Dam: STEINHAUER DAM

NDI # PA 00947

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

RESERVOIR

Name of Dam: STEINHAUER DAM

NDI # PA 00947

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir slopes are moderate (5°-15°) and no problems were observed.	
SEDIMENTATION	Cattails were observed at the upper end of the reservoir. However, sedimentation does not appear to be a problem.	

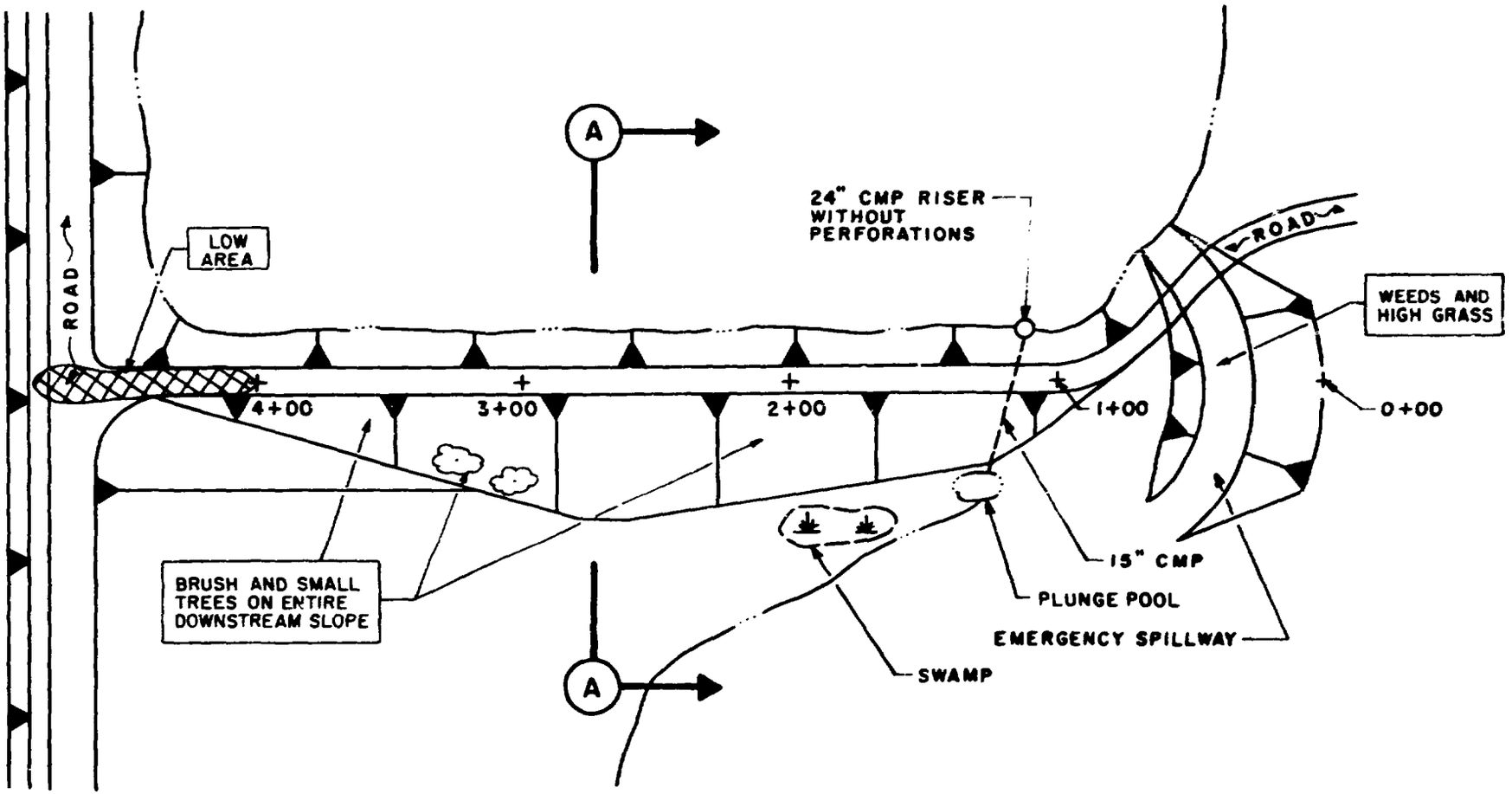
DOWNSTREAM CHANNEL

Name of Dam: STEINHAUER DAM

NDI # PA 00947

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel is forested with no major debris.	
SLOPES	The downstream channel averages 5% to Roaring Run, located 1.35 miles downstream.	
APPROXIMATE NO. OF HOMES AND POPULATION	Three houses, a trailer and two garages are located between 0.75 mi. and 1.25 mi. downstream from the dam. A 6 ft. diameter culvert conveys the channel beneath a road located 1.2 mi. downstream from the dam. Beneath another road, located 1.3 mi. downstream from the dam, is a 4 ft. high by 12 ft. wide concrete culvert.	

CROSS SECTION TAKEN AT STA. 2 + 75



FIELD SKETCH

STEINHAUER DAM

NDI NO. PA 00947

PennDER NO. 8-64

SCHEMATIC - NOT TO SCALE

A-13

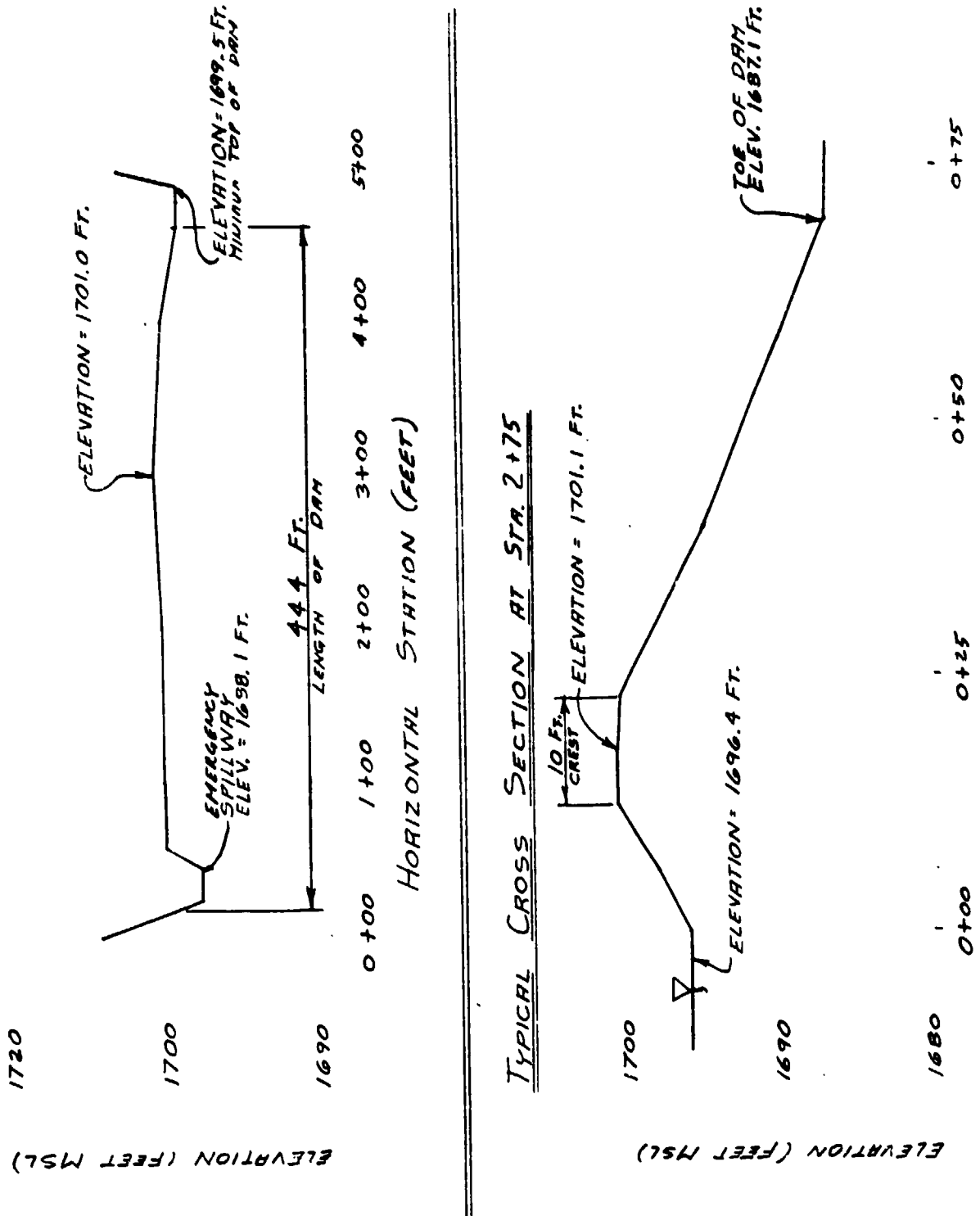
MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

STEINHAUER DAM

TOP OF DAM PROFILE
TYPICAL CROSS-SECTION

DATE OF INSPECTION: 31 October 1980



APPENDIX B

ENGINEERING DATA CHECK LIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

Name of Dam: STEINHAUER DAM
NDI # PA 00947

ITEM	REMARKS
PLAN OF DAM	See Plate 5 of this report.
REGIONAL VICINITY MAP	A USGS 7.5 minute topographic quadrangle, Gillett, Pennsylvania was used to prepare the vicinity map which is enclosed in this report as the Location Plan (Plate 1).
CONSTRUCTION HISTORY	The dam was designed by the Soil Conservation Service, United States Department of Agriculture in 1968. The contractor is unknown. The dam was built in 1968 or 1969.
TYPICAL SECTIONS OF DAM	See Plate 3 of this report. However, the downstream slope of the dam is 3.4H:1V, not the designed 2H:1V.
HYDROLOGIC/HYDRAULIC DATA	No information available
OUTLETS - PLAN and - DETAILS	See Plate 4 of this report. The trash rack and anti-vortex device were not observed during the inspection.
- CONSTRAINTS	None
- DISCHARGE RATINGS	No information available
RAINFALL/RESERVOIR RECORDS	No records are kept.

Name of Dam: STEINHAUER DAM

NDI # PA 00947

ITEM	REMARKS
DESIGN REPORTS	None available
GEOLOGY REPORTS	No geology reports are available for the dam. See Appendix F for the Regional Geology.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Hydrologic and hydraulic design computations were made by the Soil Conservation Service, Bradford County, Pennsylvania. No stability or seepage studies were available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	No information available
POST-CONSTRUCTION SURVEYS OF DAM	None performed
BORROW SOURCES	No information available

Name of Dam: STEINHAUER DAM

NDI # PA 00947

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	The original owners performed some modifications to the dam between 1970 and 1979. These included: widening the dam at the township road at the right abutment, adding riprap to the upstream face of the dam, filling in low spots on the top of the dam and filling a slide at the water's edge with riprap. No records, drawings or reports are available on this work.
HIGH POOL RECORDS	No records are kept
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None reported
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported in the available information.
MAINTENANCE OPERATION RECORDS	No maintenance records are kept.

Name of Dam: STEINHAUER DAM

NDI # PA 00947

ITEM	REMARKS
SPILLWAY PLAN, SECTIONS, and DETAILS	See Plate 3 of this report.
OPERATING EQUIPMENT PLANS & DETAILS	There is no operating equipment on the dam.

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 0.2 sq. mi., moderate to steep slopes, grass covered, some wooded areas

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1697.0 ft. M.S.L. (58 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1699.5 ft. M.S.L. (82 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1699.5 ft. M.S.L. (minimum top of dam elevation)

EMERGENCY SPILLWAY: Trapezoidal earth channel

a. Crest Elevation 1698.1 ft. M.S.L.
b. Type Trapezoidal channel
c. Channel Bottom Width 20 ft.
d. Location Spillover Left abutment
e. Number and Type of Gates None

PRINCIPAL SPILLWAY:

a. Type 24" CMP riser connected to a 15" CMP outlet pipe
b. Location 80 ft. right of emergency spillway
c. Riser Crest Elevation 1697.0 ft.
d. Exit Inverts 1690.6 ft.
e. Emergency Drawdown Facilities 10" dia. clay pipe extending into reservoir from base of riser

HYDROMETEOROLOGICAL GAGES: None

a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE Unknown

APPENDIX C

PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS

DETAILED PHOTOGRAPH DESCRIPTIONS

Overall View - Overall View of Dam from Left Abutment

Photograph Location Plan

Photo 1 - View Along Crest of Dam from Right Abutment

Photo 2 - View Along Crest of Dam from Left End of Embankment

Photo 3 - View of Upstream Slope of Dam from Right Abutment

Photo 4 - View of Downstream Slope of Dam from Left Abutment

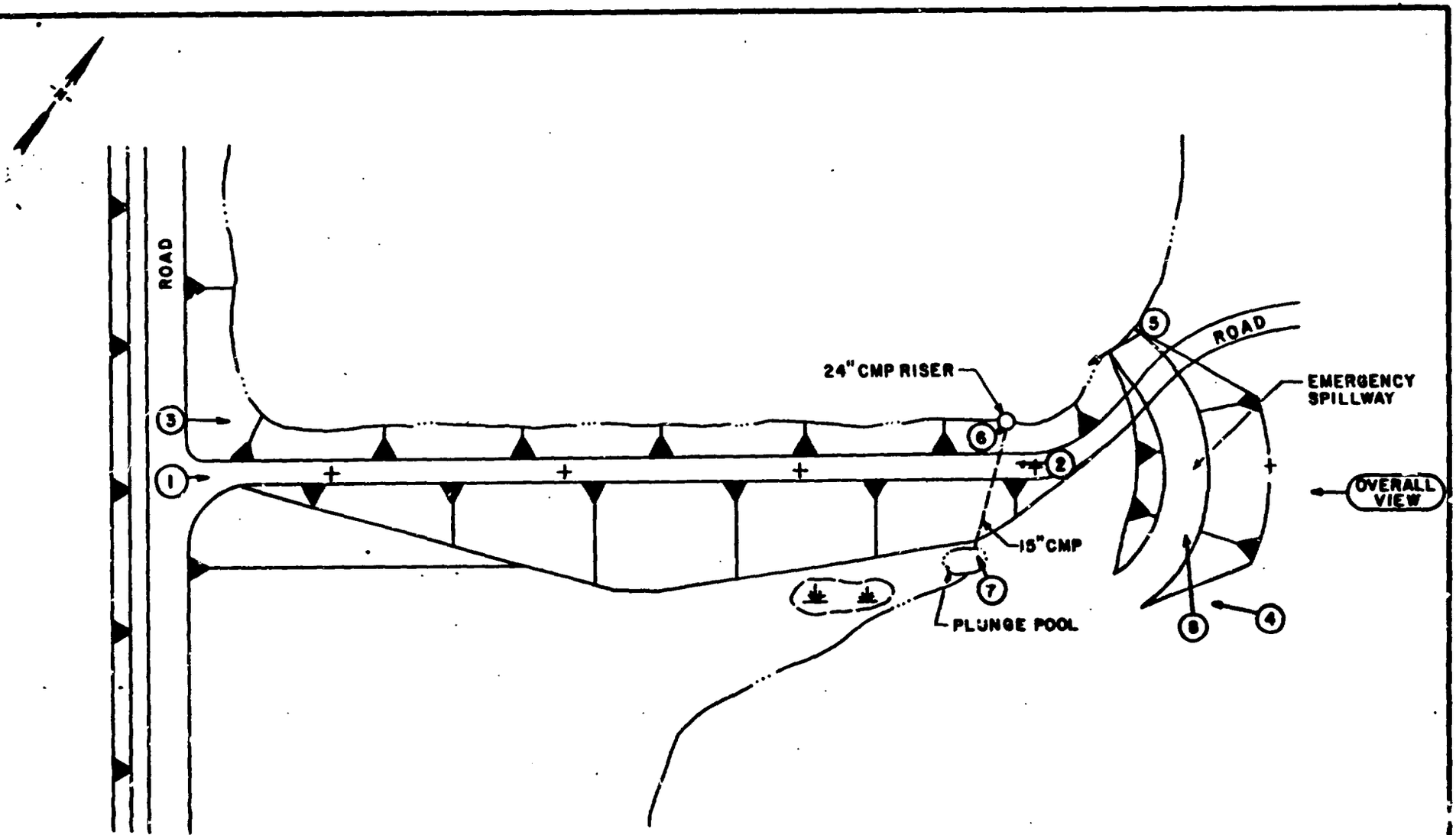
Photo 5 - View of Principal Spillway Riser Crest

Photo 6 - Close-up View of Principal Spillway Riser Crest

Photo 7 - View of Discharge End of Principal Spillway

Photo 8 - View of Emergency Spillway Channel (Looking Upstream)

Note: Photographs were taken on 31 October 1980.



PHOTOGRAPH LOCATION PLAN

STEINHAUER DAM

NDI NO. PA00947

PennDER NO. 8-64

Photographs Taken 31 October 1980

STEINHAUER DAM

PHOTO 1. View Along Crest of Dam from Right Abutment

PHOTO 2. View Along Crest of Dam from Left End of Embankment

PHOTO 3. View of Upstream Slope of Dam from Right Abutment

PHOTO 4. View of Downstream Slope of Dam from Left Abutment

PHOTO 5. View of Principal Spillway Riser Crest

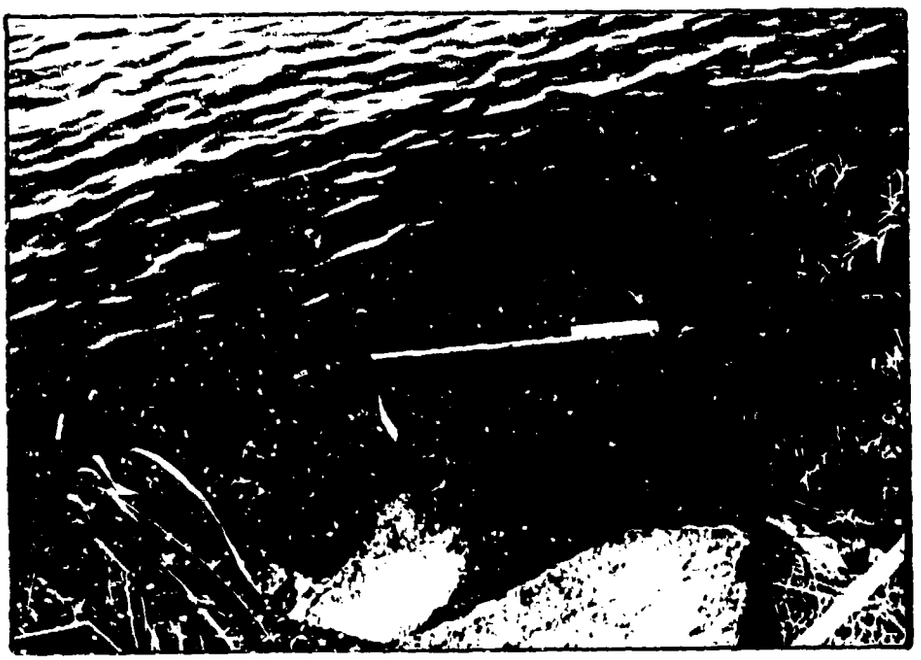


PHOTO 6. Close-up View of Principal Spillway Riser Crest

PHOTO 7. View of Discharge End of Principal Spillway

PHOTO 8. View of Emergency Spillway Channel (Looking Upstream)

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject STEINHAUER DAM S.O. No. _____
APPENDIX D - HYDROLOGIC AND Sheet No. _____ of _____
HYDRAULIC COMPUTATIONS Drawing No. _____
Computed by _____ Checked by _____ Date _____

SUBJECT	PAGE
PREFACE	i
HYDROLOGY AND HYDRAULIC DATA BASE	1
HYDRAULIC DATA	2
DRAINAGE AREA AND CENTROID MAP	3
TOP OF DAM PROFILE AND CROSS SECTION	4
SPILLWAY RATING CURVE	5
OUTLET PIPE RATING	7
SPILLWAY AND PIPE RATING SUMMARY	11
100-YEAR DISCHARGE CALCULATION	12

PREFACE

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

The conclusions presented pertain to present conditions, and the effect of future development on the hydrology has not been considered.

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: STEINHAUER DAM

100-YEAR RAINFALL = 5.6 INCHES/24 HOURS(1)

STATION	1	2	3	4	5
Station Description	STEINHAUER DAM				
Drainage Area (square miles)	0.2				
Cumulative Drainage Area (square miles)	0.2				
Adjustment of PMF for Drainage Area (%)(1)					
6 Hours					
12 Hours					
24 Hours					
48 Hours					
72 Hours					
Spillway Data					
Crest Length (ft)	SPILLWAY DISCHARGE				
Freeboard (ft)	RATING CURVE DEVELOPED				
Discharge Coefficient	ON SHEETS 5-11				
Exponent					

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Subject STEINHAUER DAM — S.O. No.
HYDRAULIC DATA — Sheet No. 2 of 13
Drawing No.
Computed by GWT — Checked by WDC — Date 12-12-80

STORAGE CALCULATIONS

AREA VS. ELEVATION (MEASURED FROM QUADS)

ELEVATION (FT.)	SURFACE AREA (ACRES)
1697.0	8.96
1700.0	10.88
1720.0	23.04

NORMAL POOL STORAGE

STORAGE VOLUME = $V_{NP} = \frac{h}{3}(A_1 + A_2 + \sqrt{A_1 A_2})$

h = ESTIMATED AVERAGE DEPTH = 7.6 FT.
A_1 = SURFACE AREA OF NORMAL POOL = 8.96 Ac.
A_2 = SURFACE AREA OF RESERVOIR BOTTOM = 6.34 Ac.
(ESTIMATED FROM AVERAGE DEPTH AND RESERVOIR SIDE SLOPES.)

NORMAL POOL STORAGE = $V_{NP} = \frac{7.6}{3}(8.96 + 6.34 + \sqrt{(8.96)6.34})$

$V_{NP} = 57.85$ Ac.-Ft.

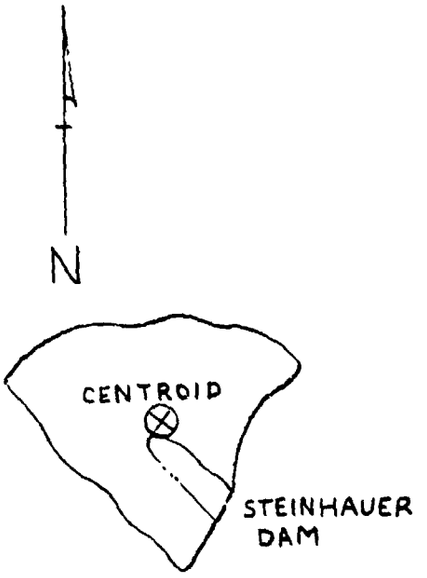
TOP OF DAM STORAGE

82 AC.-FT. (FROM HEC-1 ANALYSIS)

SNYDER'S UNIT HYDROGRAPH PARAMETERS

$L = 0.595$ Mi., $L_{CA} = 0.252$ Mi.
WATERSHED IS IN ZONE 16A (USE VALUES FOR ZONE 16)
$C_T = 0.80$, $C_P = 0.49$
$T_P = C_T (L \times L_{CA})^{0.3} = 0.80(0.595 \times 0.252)^{0.3} = 0.45$

DRAINAGE AREA = 0.195 Sq. Mi.



QUAD:
GILLETT

STEINHAUER DAM

DRAINAGE AREA AND CENTROID MAP

0 2000 4000 6000

SCALE: 1" = 2000'

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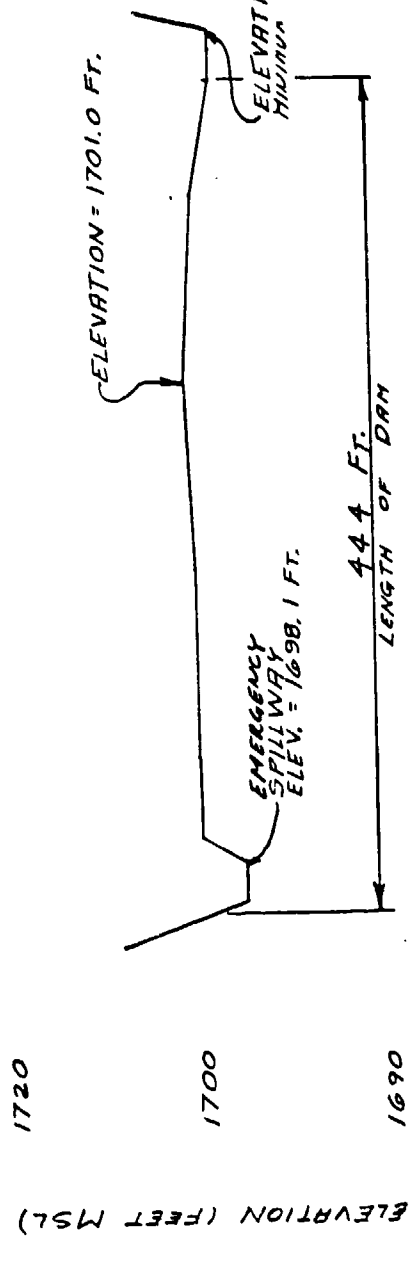
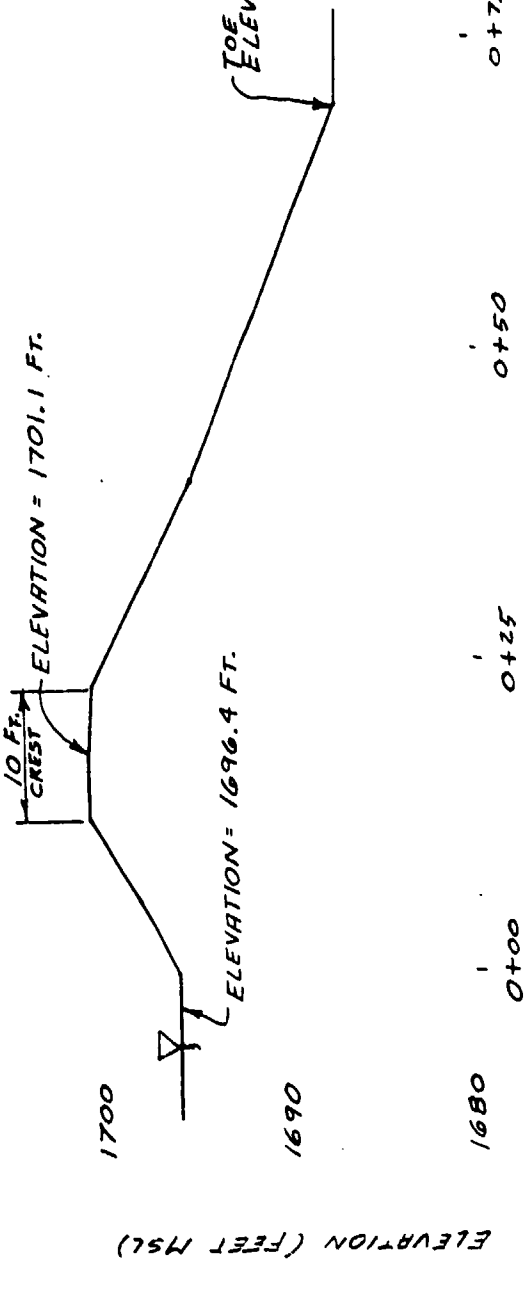
Subject STEINHAUER DAM — S.O. No. 13937-00-ACA-16
TOP OF DAM PROFILE — Sheet No. 4 of 13
TYPICAL CROSS SECTION — Drawing No.
Computed by GWT — Checked by WDL — Date 11-18-80

TOP OF DAM PROFILE (LOOKING DOWNSTREAM)

LENGTH OF DAM = 444 FEET



TYPICAL CROSS SECTION AT STA. 2+75



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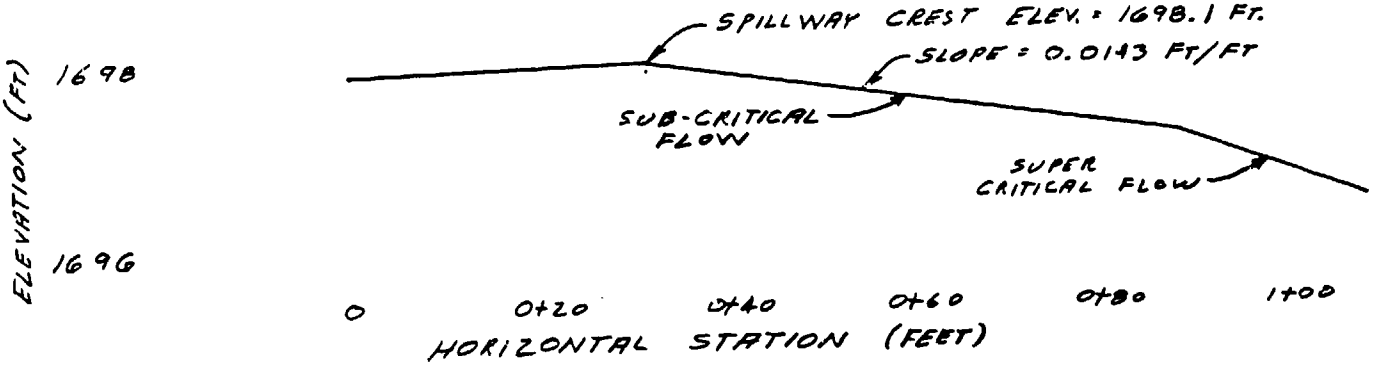
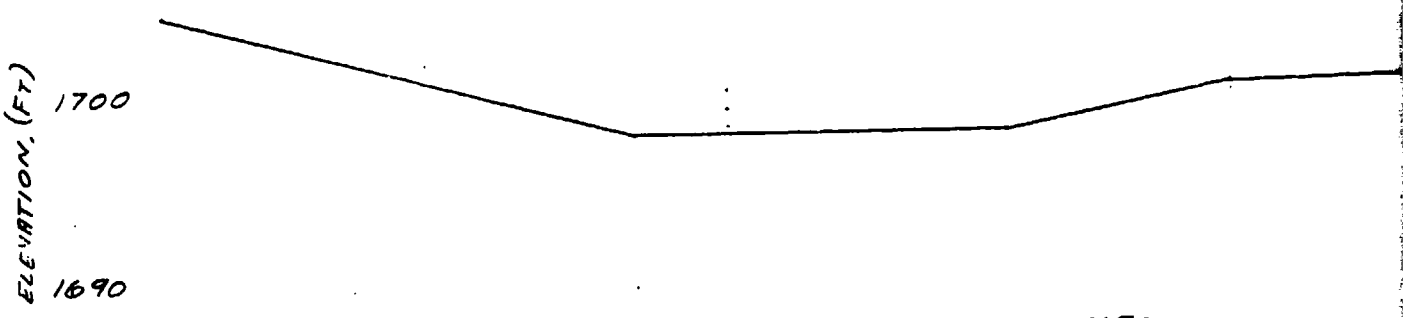
Subject STEINHAUER DAM — S.O. No. ____
EMERGENCY SPILLWAY RATING — Sheet No. 5 of 13
Drawing No. ____
Computed by GWT — Checked by WDL — Date 12-8-80

SPILLWAY PROFILE



TYPICAL SPILLWAY CROSS SECTION (LOOKING DOWNSTREAM)



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Subject STEINHAUER DAM S.O. No.
EMERGENCY SPILLWAY RATING Sheet No. 6 of 13
Drawing No.
Computed by GWT Checked by WDL Date 12-8-80

THE RATING TABLE WAS DEVELOPED USING THE MANNING EQUATION FOR CHANNEL FLOW, USING CONTROL SECTION WHERE FLOW IS SUB-CRITICAL DOWNSTREAM FROM CREST.

$V = \frac{1.486}{n}(R)^{2/3}(S)^{1/2}$

$= 3.949\ R^{2/3}$

$n = 0.045$ p. 7-22 BRATER & KING

$S = \frac{1698.1 - 1697.6}{35}$

$= 0.0143$ FT/FT.

R = HYDRAULIC RADIUS = AREA OF SECTION / WETTED PERIMETER

$Q = AV$

ELEVATION, (FT)	DEPTH, (FT)	AREA, (FT^2)	WETTED PERIMETER, (FT)	V, (FPS)	Q, (CFS)
1697.0	0	0	0	0	0
1697.5	0	0	0	0	0
1698.1	0	0	0	0	0
1698.5	.4	8.87	23.75	2.05	18.18
1699.0	.9	21.94	28.50	3.32	72.84
1699.5	1.4	37.10	32.00	4.36	161.76
1700.0	1.9	54.15	37.50	5.05	273.46
1700.5	2.4	73.80	40.50	5.89	434.68
1701.0	2.9	92.07	44.00	6.46	594.77

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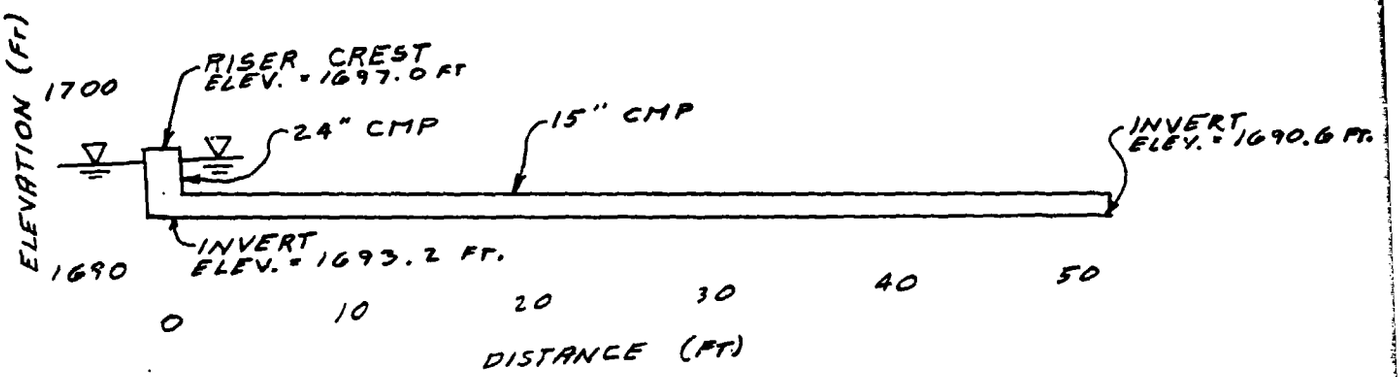
Subject STEINHAUER DAM — S.O. No.
OUTLET PIPE RATING — Sheet No. 7 of 13
Drawing No.
Computed by GWT — Checked by WNL — Date 12-4-80



PIPE = 15" CMP
LENGTH = 52 FEET
TOP OF RISER = ELEV. 1697 FEET
RISER TOP = 24" PIPE
INLET FOR 15" DIA. PIPE = ELEV. 1693.2 FEET
OUTLET FOR 15" DIA. PIPE = ELEV. 1690.6 FEET

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Subject STEINHAUER DAM — S.O. No.
OUTLET PIPE RATING — Sheet No. 8 of 13
Drawing No.
Computed by GWT — Checked by WDL — Date 12-4-80

WEIR FLOW - 24" DIA. INLET TOWER

$Q = CLH^{3/2}$

$L = C = 2\pi R$ $\quad R = 1$ FT.
$= 6.28$ FT.
H VARIES FROM 0 TO 4 FT.
C = 3.8 Pg. 5-41 KING + BRATER

$Q = 23.9\ H^{3/2}$

ELEVATION, (FT)	C	L, (FT)	H, (FT)	Q, (CFS)
1697.0	3.8	6.28	0	0
1697.5	3.8	6.28	0.5	8.45
1698.0	3.8	6.28	1.0	23.90
1698.5	3.8	6.28	1.5	43.91
1699.0	3.8	6.28	2.0	67.60
1699.5	3.8	6.28	2.5	94.47
1700.0	3.8	6.28	3.0	124.19
1700.5	3.8	6.28	3.5	156.49
1701.0	3.8	6.28	4.0	191.20

ORIFICE FLOW - 24" DIA. INLET TOWER

$Q = CA(2gH)^{0.5}$

$= 15.119\ (H)^{0.5}$

$A = \pi R^2$ $\quad R = 1$ FT
$= 3.14$ SQ. FT.
$g = 32.2$ FT./SEC.
C = 0.6 Pg. 4-31 KING + BRATER
H VARIES FROM 0 TO 4 FT.

ELEVATION, (FT)	C	A, (FT^2)	H, (FT)	Q, (CFS)
1697.0	0.6	3.14	0	0
1697.5	0.6	3.14	0.5	10.69
1698.0	0.6	3.14	1.0	15.12
1698.5	0.6	3.14	1.5	18.52
1699.0	0.6	3.14	2.0	21.38
1699.5	0.6	3.14	2.5	23.91
1700.0	0.6	3.14	3.0	26.19
1700.5	0.6	3.14	3.5	28.28
1701.0	0.6	3.14	4.0	30.24

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Subject STEINHAUER DAM — S.O. No.
OUTLET PIPE RATING — Sheet No. 9 of 13
Drawing No.
Computed by GWT — Checked by WDL — Date 12-4-80

ORIFICE FLOW - 15" DIA. OUTLET PIPE

$Q = CA(2gH)^{0.5}$
$= 0.6(1.227)(64.4H)^{0.5}$
$= 5.91(H)^{0.5}$

$A = \pi R^2$ $R = 0.625$ FT.
$= 1.227$ FT^2
$g = 32$ FT/SEC^2
$C = 0.6$ Pg. 4-31 & 4-32 KING & BRATER
H VARIES FROM 3.2 TO 7.2 FT. AND IS MEASURED FROM THE CENTER OF THE PIPE ELEV. 1693.8 FT.

ELEVATION (FT)	H (FT)	Q (CFS)
1697.0	0	0
1697.5	3.7	11.37
1698.0	4.2	12.11
1698.5	4.7	12.81
1699.0	5.2	13.48
1699.5	5.7	14.11
1700.0	6.2	14.72
1700.5	6.7	15.30
1701.0	7.2	15.86

PIPE FLOW - 15" DIA. OUTLET PIPE

$Q = \frac{A(2gH)^{1/2}}{[1 + K_e + K_d + K_c(L)]^{1/2}}$
$= \frac{1.227(64.4H)^{1/2}}{[1 + .78 + 0 + .0792(52)]^{1/2}}$
$= 4.05H^{1/2}$

$A = 1.227$ FT^2
$g = 32.2$ FT/SEC^2
$L = 52$ FT
K_e (K_o) = 0.78 Pg 5.5-6 SCS NEH 5
K_d (K_g) = 0 Pg 5.5-10 SCS NEH 5
K_c (K_f) = 0.0792 Pg 5.5-4 SCS NEH 5
$n = 0.024$
H VARIES FROM 5.7 FT TO 9.2 FT AND IS MEASURED FROM THE TOP OF PIPE ELEV. AT THE OUTLET - ELEV. 1691.8 FT.

ELEVATION, (FT)	H, (FT)	Q (CFS)
1697.0	0	0
1697.5	5.7	9.67
1698.0	6.2	10.08
1698.5	6.7	10.48
1699.0	7.2	10.87
1699.5	7.7	11.24
1700.0	8.2	11.60
1700.5	8.7	11.95
1701.0	9.2	12.28

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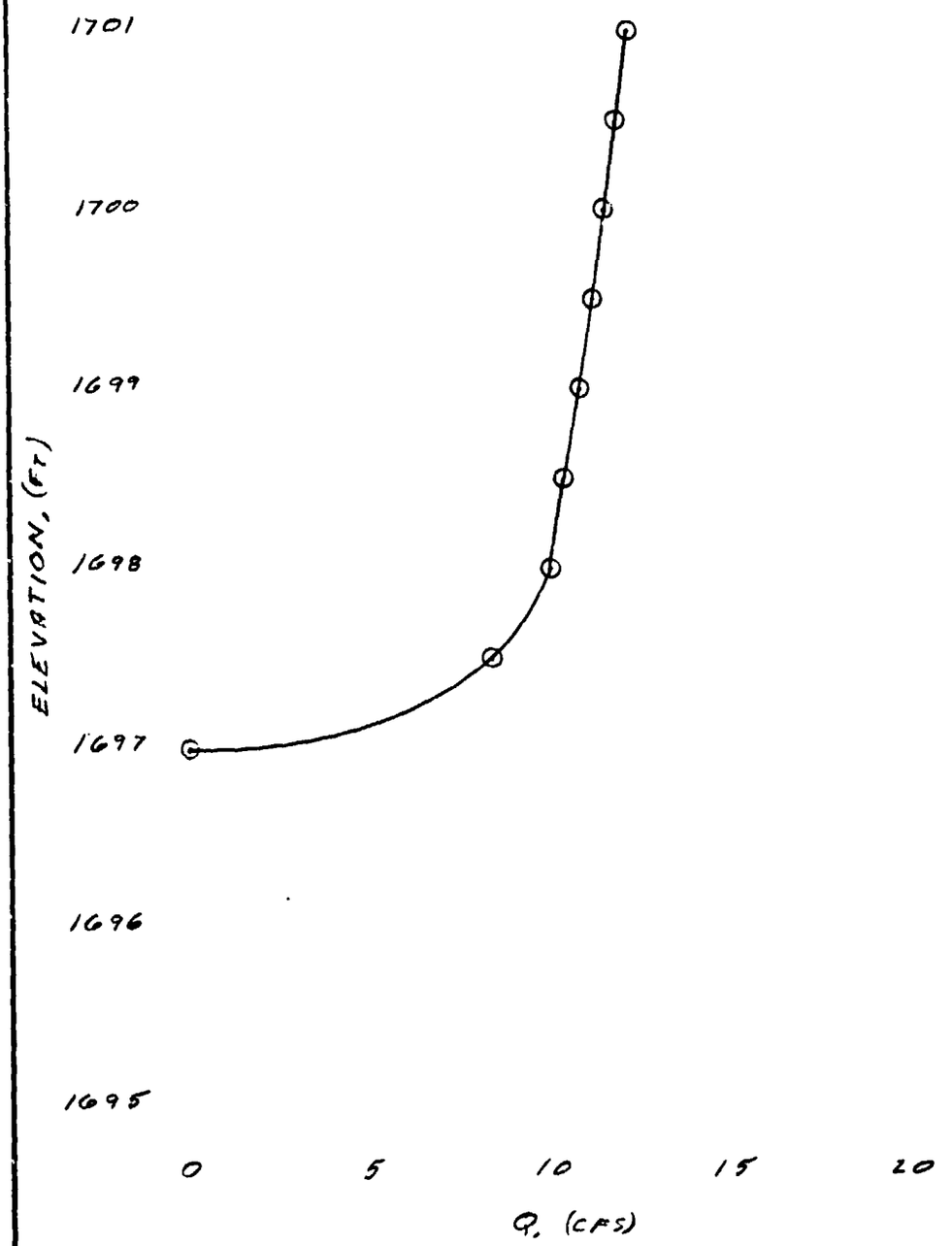
Subject STEINHAUER DAM S.O. No.
OUTLET PIPE RATING CURVE Sheet No. 10 of 13
Drawing No.
Computed by GWT Checked by WDL Date 12-8-80



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Subject STEINHAUER DAM S.O. No.
SPILLWAY AND PIPE RATING Sheet No. 11 of 13
SUMMARY Drawing No.
Computed by GWT Checked by WDL Date 12-8-80

ELEVATION (FT)	OUTLET PIPE Q (CFS)	SPILLWAY Q (CFS)	TOTAL Q (CFS)
1697.0	0	0	0
1697.5	8.4	0	8.4
1698.0	9.7	0	9.7
1698.5	10.5	18.2	28.7
1699.0	10.9	72.8	83.7
1699.5	11.2	161.8	173.0
1700.0	11.6	273.5	285.1
1700.5	11.9	434.7	446.6
1701.0	12.3	594.8	607.1

SPILLWAY CAPACITY AT THE MINIMUM TOP OF THE DAM (ELEV. 1699.5 FT.) IS 173 C.F.S.

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Box 280
Beaver, Pa. 15009

Subject STEINHAUER DAM — S.O. No.
100-YEAR DISCHARGE — Sheet No. 12 of 13
CALCULATION — Drawing No.
Computed by GWT — Checked by WDV — Date 12-8-90

THE INFLOW TO THE IMPOUNDMENT FOR THE 100-YEAR FLOOD WAS CALCULATED USING MATERIAL FROM "THE HYDROLOGIC STUDY - TROPICAL STORM AGNES" PREPARED BY THE SPECIAL STUDIES BRANCH, PLANNING DIVISION, NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS, IN NEW YORK CITY.

① COMPUTE THE MEAN LOGARITHM.

$\log(q_m) = C_m + 0.75 \log A$

$\log(q_m)$ = MEAN LOGARITHM OF ANNUAL FLOOD PEAKS
A = DRAINAGE AREA, Sq. Mi. = 0.195 Sq. Mi.
C_m = MAP COEFFICIENT FOR MEAN LOG OF ANNUAL PEAKS FROM FIG. 21 = 2.21

$\log(q_m) = 2.21 + 0.75(\log 0.195)$
$= 1.677$

② COMPUTE STANDARD DEVIATION

$S = C_s - 0.05(\log A)$

S = STANDARD DEVIATION OF THE LOGARITHMS OF THE ANNUAL PEAKS.
C_s = MAP COEFFICIENT FOR STANDARD DEVIATION FROM FIG. 22 = 0.382
A = DRAINAGE AREA, Sq. Mi, = 0.195 Sq. Mi.

$S = 0.382 - 0.05(\log 0.195)$
$= 0.4175$

③ SELECT SKEW COEFFICIENT FROM FIG. 23 = 0.28

④ $\log(q_{100}) = \log(q_m) + K(P,g)\,S$

$K(P,g)$ = STANDARD DEVIATE FOR A GIVEN EXCEEDENCE FREQUENCY PERCENTAGE (P) AND SKEW COEFFICIENT (g) FROM EXHIBIT 39 OF BEARD'S "STATISTICAL METHODS IN HYDROLOGY" = 2.536

$\log(q_{100}) = 1.677 + 2.536(0.4175)$
$= 2.7358$

$q_{100} = 544.2$ CFS

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Subject STEINHAUER DAM S.O. No.
100-YEAR DISCHARGE CALCULATION Sheet No. 13 of 13
Drawing No.
Computed by GWT Checked by WDV Date 6/19/81

THE INFLOW TO THE IMPOUNDMENT FOR THE 100-YEAR FLOOD WAS CALCULATED USING MATERIAL FROM "WATER RESOURCES BULLETIN, BULLETIN NO. 13, FLOODS IN PENNSYLVANIA", PREPARED BY THE DEPARTMENT OF ENVIRONMENTAL RESOURCES, COMMONWEALTH OF PENNSYLVANIA.

DRAINAGE BASIN FROM PLATE 1 – MODEL 2

REGRESSION EQUATION FROM TABLE 2

$Q_T = CA^X$

T = 100 YEARS
C = 564
A = DRAINAGE AREA, 0.20 Sq. Mi.
X = 0.744

$Q_{100} = 564 (0.20)^{.744}$

$Q_{100} = 170.3$ C.F.S.

AVERAGING THE INFLOW FROM THIS METHOD AND THE PREVIOUS METHOD GIVES AN INFLOW OF 357.2 C.F.S. TO THE IMPOUNDMENT.

APPENDIX E

PLATES

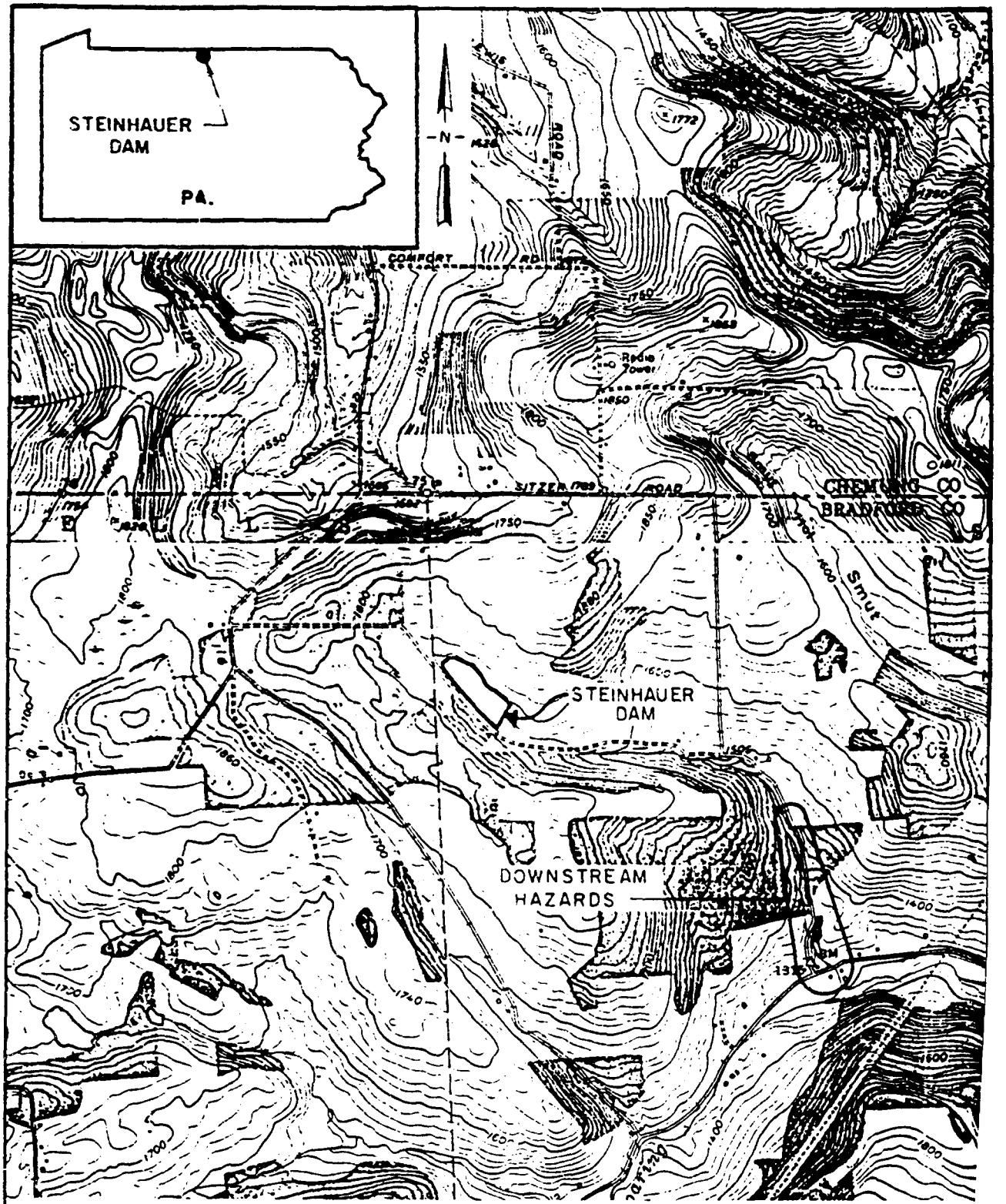
CONTENTS

Plate 1 - Location Plan

Plate 2 - Watershed Map

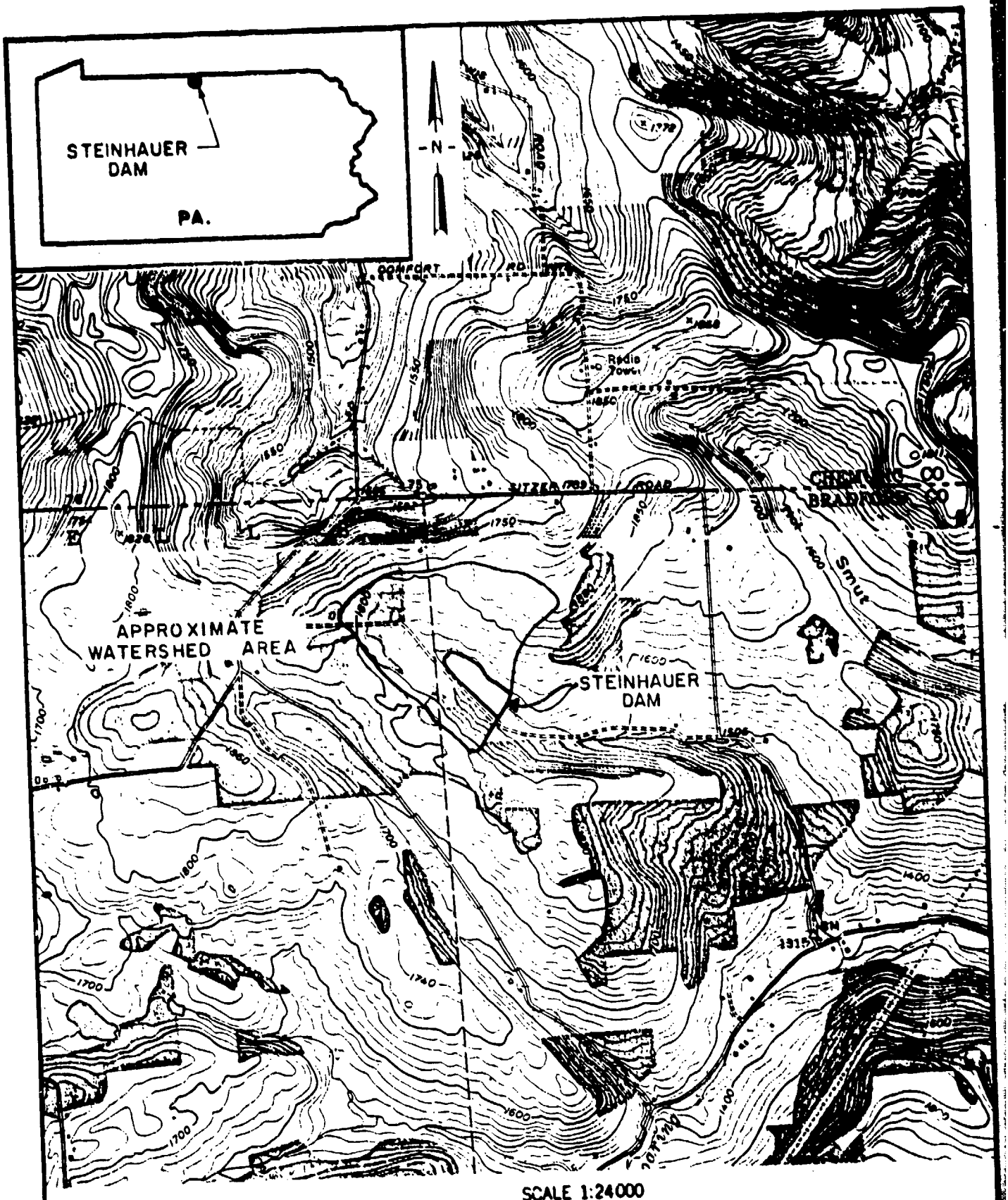
Plate 3 - Profile and Cross Section of Dam, Profile of Emergency Spillway (1968)

Plate 4 - Details of Principal Spillway (1968)



REFERENCES!
1. U.S.G.S. 7.5' ELMIRA, N.Y.-PA. QUADRANGLE. 1953
2. U.S.G.S. 7.5' GILLETT, PA. QUADRANGLE. PHOTOREVISED 1969

PLATE 1 LOCATION PLAN
STEINHAUER DAM



REFERENCES:
1. U.S.G.S. 7.5' ELMIRA, N.Y.-PA. QUADRANGLE. 1953
2. U.S.G.S. 7.5 GILLETT, PA. QUADRANGLE. PHOTOREVISED 1969

PLATE 2 WATERSHED MAP

STEINHAUER DAM

PROFILE.

TOP OF SETTLED DAM ~~633~~ 633.5'

~~632.5~~ 632.5'

NORMAL POOL 620

558

551

540

EL 61.0'

FLOOD-WATER

EL. 610'

BRUSH SLOPES 4:1

15' MIN.

NOT TO SCALE

RIPRAP FACE OF UPSTREAM (3:1) SLOPE BETWEEN ELEVATIONS - 61.0' AND 59.0'

A POSSIBLE SOURCE OF STONE WOULD BE THAT OVER 6" IN SIZE REMOVED FROM FILL.

25 # STONE OR LARGER RECOMMENDED

FLOW

FEB 31-68

STAINED

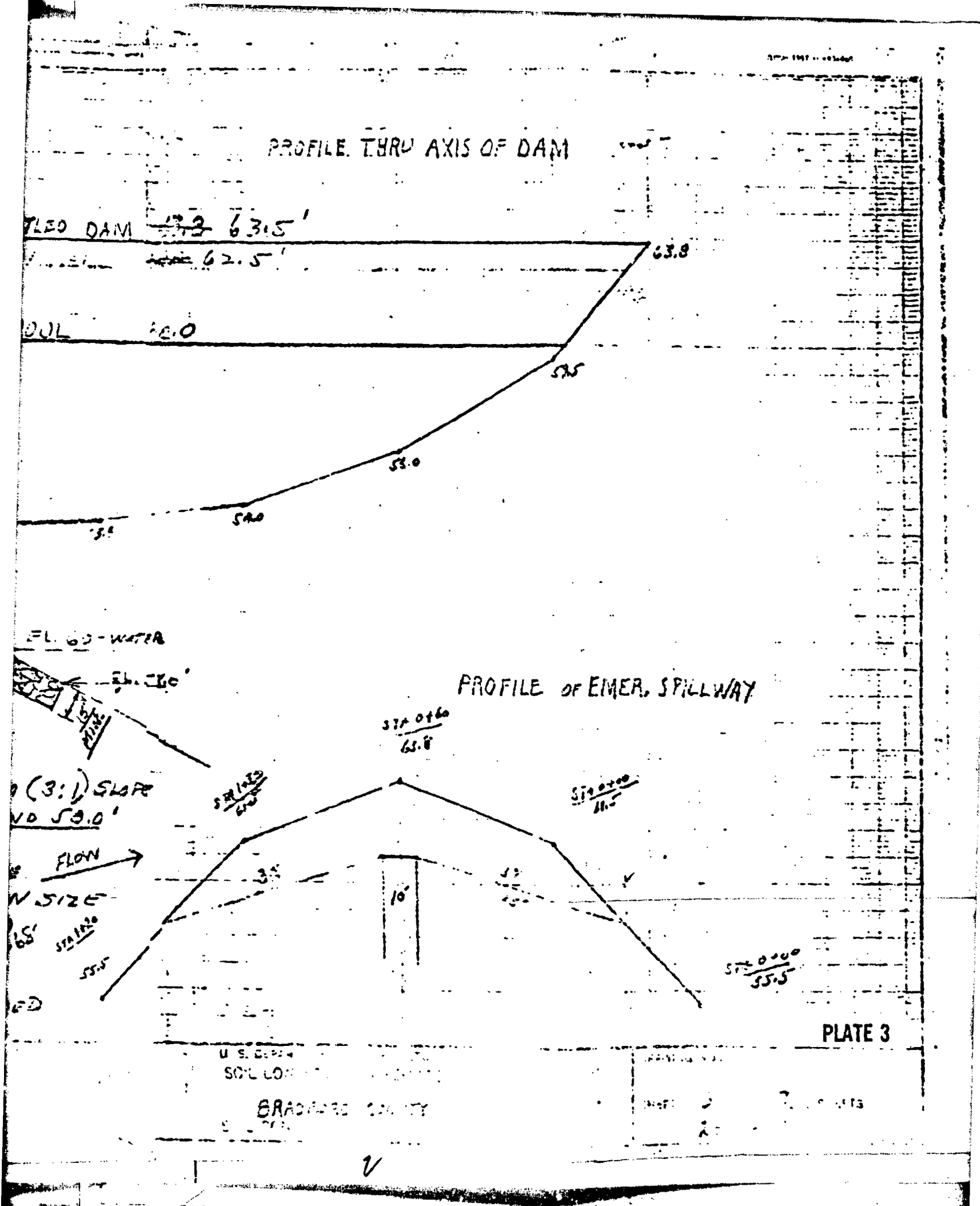
555

SEEDED

U. S. DEPT.

SOIL CO

ERADIC


PROFILE THRU AXIS OF DAM
63.8
53.0
PROFILE OF EMER. SPILLWAY
FLOW
10'
PLATE 3

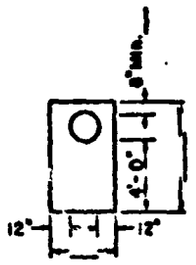
APD-704

REFER TO:
ESNE 6, FOR STRUCTURAL QUANTITIES
ESNE 7, SHEET 3 OF 3 FOR HYDRAULICS

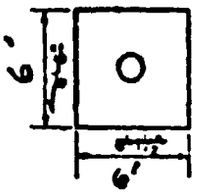
DROP INLET PIPE SPIL

VOLUME OF CONCRETE	
ITEM	Quantity in Cu. Yds.
RISER JUNCTION BOX	
BENT	
OTHER	
TOTAL	

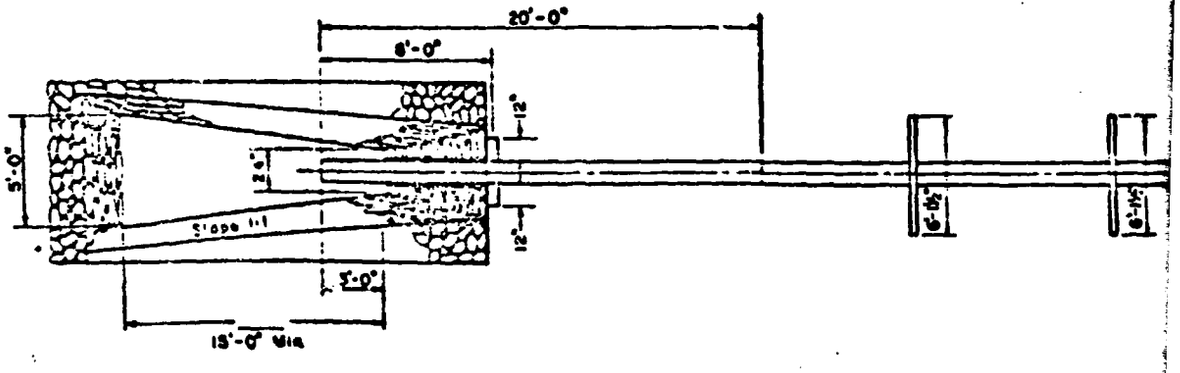
CONCRETE BENT



ANTI-SEEP COLLAR



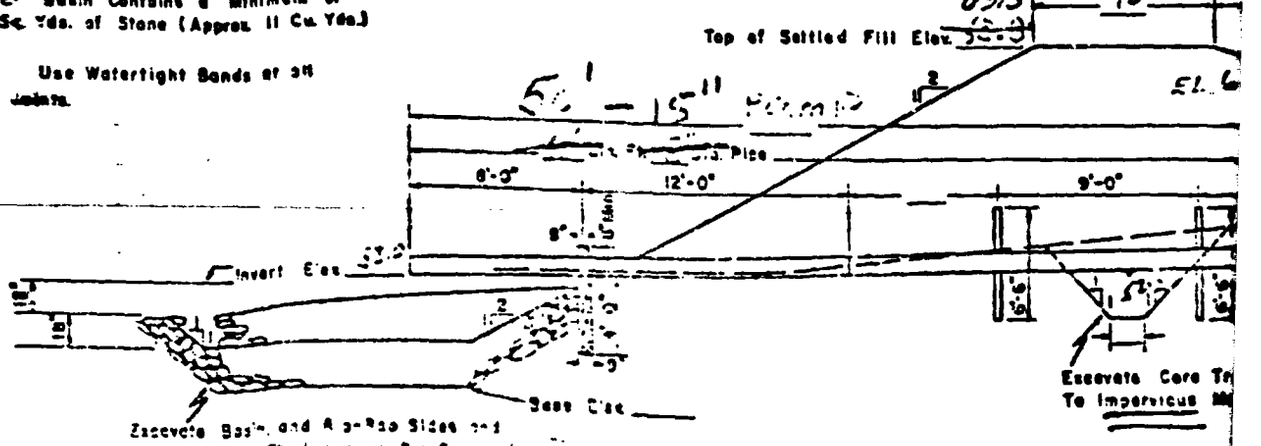
See Detail on Right.



PIPE SPILLWAY FACE [illegible]
[illegible]
SEE SHEET [illegible]

NOTE: Basin Contains a Minimum of 22 Cu. Yds. of Stone (Approx. 11 Cu. Yds.)

Use Watertight Bands at all Pipe Joints.



SECTION ON CENTERLINE

Prepared By:
ENGINEERING & [illegible]
PLANNING UNIT
DESIGN SECTION
UPPER DARBY, PA.

Technical Approval Recommended
SCS Form
WATERSHED
DATE

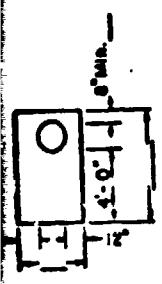
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ASSISTING
[illegible] SOIL C

END-57 12-8-55

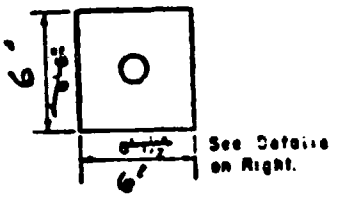
DROP INLET PIPE SPILLWAY

RISER	CONCRETE, VITRIFIED CLAY, [illegible] WROUGHT IRON, OR STEEL [illegible]
BARREL	BITUMINOUS COATED CORRUGATED METAL PIPE

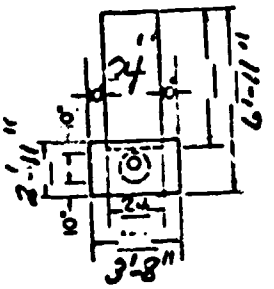
CRETE BENT



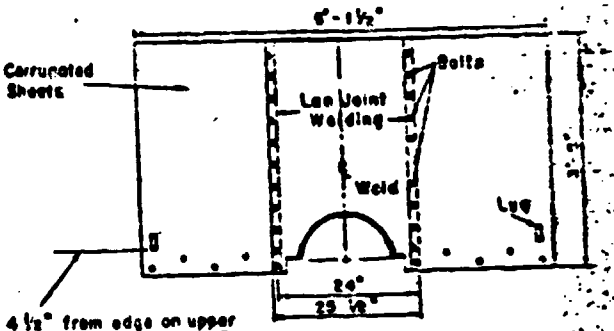
ANTI-SEEP COLLAR

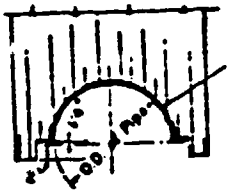


PIPE RISER

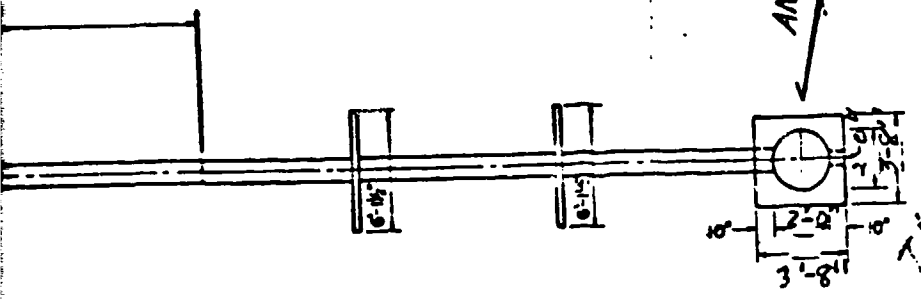


COLLAR DETAILS





ANTI SEEP



NOTES

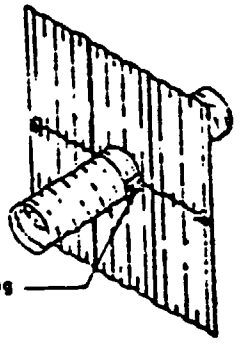
Holes match punched in shop to permit field bolting.

Galvanized bolts to be furnished with Diaphragm.

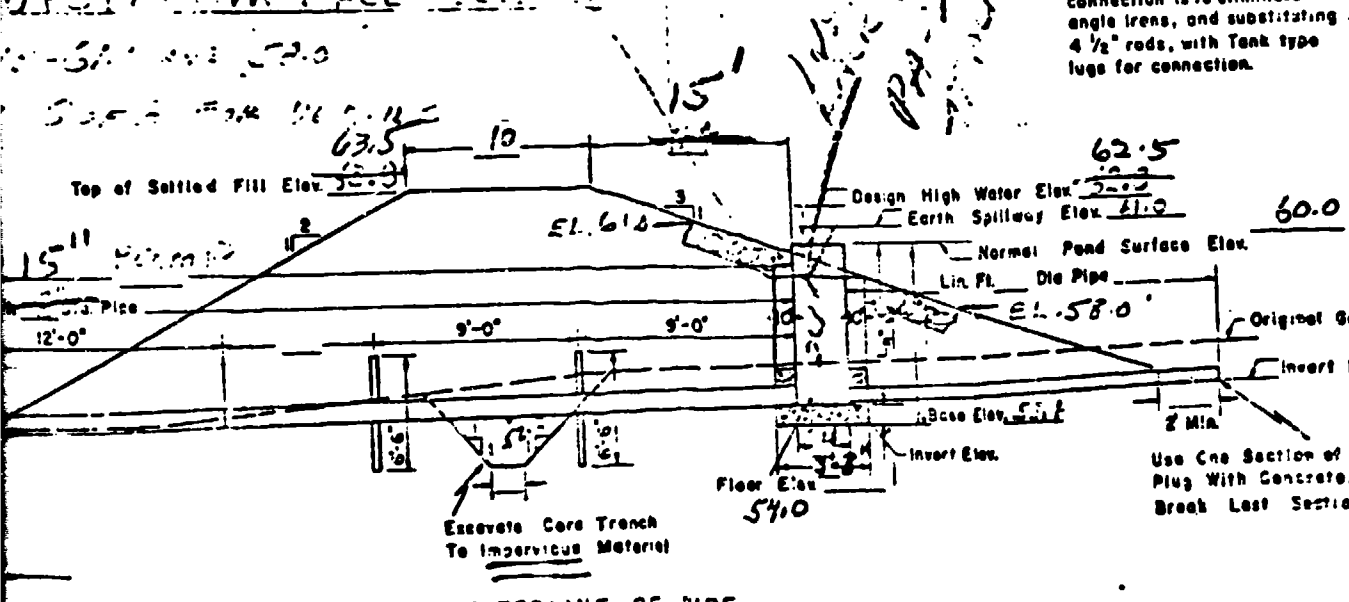
Lap between two sections to receive extra bituminous coating at time of assembly.

Diaphragm to be fully bituminous coated.

COLLAR DETAILS



An alternate method of connection is to eliminate angle irons, and substituting 4 ½" rods, with Tank type lugs for connection.



SECTION ON CENTERLINE OF PIPE

PLATE 4

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ASSISTING

[illegible] SOIL CONSERVATION DISTRICT

COOPERATOR [illegible]

COMPILED BY [illegible]

APPENDIX F

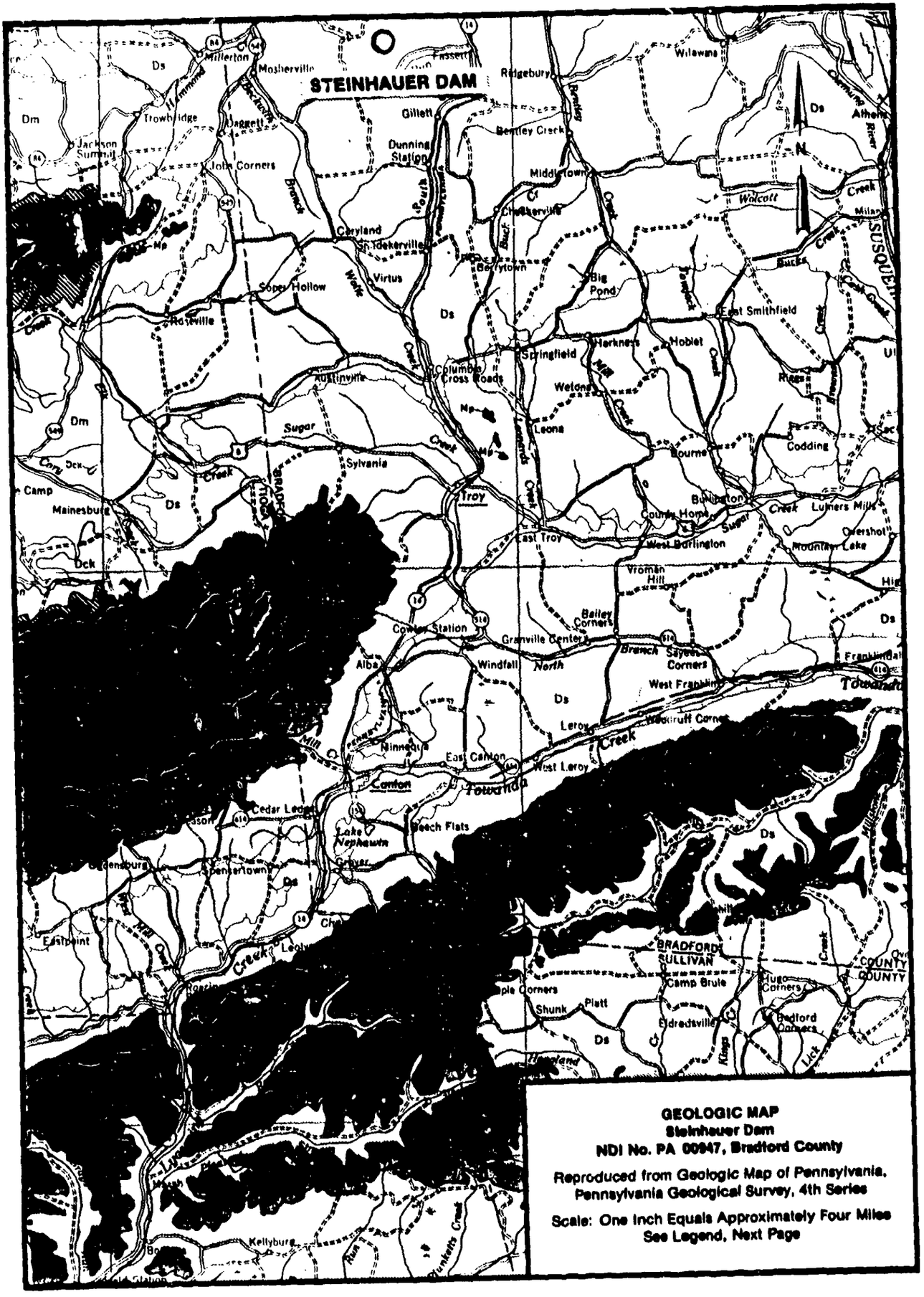
REGIONAL GEOLOGY

Steinhauer Dam
NDI No. PA 00947, PennDER No. 8-64

REGIONAL GEOLOGY

Steinhauer Dam is located in the Glaciated Low Plateaus section of the Applachian Plateaus physiographic province. Drainage is to the north via South Creek and the average relief in the area is 500 feet. The area has been glaciated at least 3 times and is currently overlain with Wisconsin stage glacial deposits. Surface soils in the vicinity of the dam consist primarily of stoney, silt loams. No test boring data were available for review; thus, the thickness of this overburden is difficult to ascertain.

Geologic references indicate that bedrock in the vicinity of the dam consists primarily of members of the Chemung Formation in the Susquehanna Group. The Chemung is composed of prodelta, fossiliferous, gray to olive green sandstones and shales of Upper Devonian age. The dam is situated at the bottom of the Pine Creek Anticline; thus, artesian conditions are probable beneath the dam site. Strata dip, if any, would be very slight and to the southwest.



GEOLOGIC MAP
Steinhauer Dam
NDI No. PA 00947, Bradford County

Reproduced from Geologic Map of Pennsylvania, Pennsylvania Geological Survey, 4th Series

Scale: One Inch Equals Approximately Four Miles
See Legend, Next Page

GEOLOGY MAP LEGEND

DEVONIAN

UPPER

WESTERN PENNSYLVANIA

Oswayo Formation
Greenish gray to gray shales, siltstones and sandstones becoming increasingly shaly westward; considered equivalent to type Oswayo. Riceville Formation Dr in Erie and Crawford Counties; probably not distinguishable north of Corry.

Dcr

Cattaraugus Formation
Red, gray and brown shale and sandstone with the proportion of red decreasing westward; includes Venango sands of drillers and Salamanca sandstone and conglomerate; some limestone in Crawford and Erie counties.

Dcn

Conneaut Group
Alternating gray, brown, greenish and purplish shales and siltstones; includes "pink rock" of drillers and "Chemung" and "Girard" Formations of northwestern Pennsylvania.

Dca

Canadaway Formation
Alternating brown shales and sandstones; includes "Portage" Formation of northwestern Pennsylvania.

CENTRAL AND EASTERN PENNSYLVANIA

Dos

Oswayo Formation
Brownish and greenish gray, fine and medium grained sandstones with some shales and scattered calcareous lenses; includes red shales which become more numerous eastward. Relation to type Oswayo not proved.

Dck

Catskill Formation
Chiefly red to brownish shales and sandstones; includes gray and greenish sandstone tongues named Elk Mountain, Honesdale, Shohola, and Delaware River in the east.

Dm

Marine beds
Gray to olive brown shales, graywackes, and sandstones; contains "Chemung" beds and "Portage" beds including Burket, Brallier, Harrell, and Trimmers Rock; Tully Limestone at base.

Ds

Susquehanna Group
Barbed line is "Chemung-Catskill" contact of Second Pennsylvania Survey County reports; barbs on "Chemung" side of line.

MIDDLE AND LOWER

Dh

Hamilton Group

Mahantango Formation
Brown to olive shale with interbedded sandstones which are dominant in places (Montebello); highly fossiliferous in upper part; contains "Centerfield coral bed" in eastern Pennsylvania.

Marcellus Formation
Black, fissile, carbonaceous shale with thick, brown sandstone (Turkey Ridge) in parts of central Pennsylvania.

Onondaga Formation
Greenish blue, thin bedded shale and dark blue to black, medium bedded limestone with shale predominant in most places; includes Selinsgrove Limestone and Needmore Shale in central Pennsylvania and Buttermilk Falls Limestone and Keyser Shale in easternmost Pennsylvania; in Lehigh Gap area includes Palmerton Sandstone and Bowmanstown Chert.

Dms

Oriskany Formation
White to brown, fine to coarse grained, partly calcareous, locally conglomeratic, fossiliferous sandstone (Ridgeley) at the top; dark gray, cherty limestone with some interbedded shales and sandstones below (Shriver).

Helderberg Formation
Dark gray, calcareous, thin bedded shale (Mandata) at the top, equivalent to Port Ewen Shale and Becraft Limestone in the east; dark gray, cherty, thin bedded, fossiliferous limestone (New Scotland) with some local sandstones in the middle; and, at the base dark gray, medium to thick bedded, crystalline limestone (Coeymans), sandy and shaly in places with some chert nodules.