Phase I Inspection Report
Nanticoke Creek Watershed Project Site 8
Susquehanna River Basin, Broome County, New York
Inventory No. N.Y. 573

George Koch, P.E.

New York State Department of Environmental Conservation/50 Wolf Road
Albany, New York 12233

Department of the Army
26 Federal Plaza/ New York District, CoF£
New York, New York 10007

Approved for public release; Distribution unlimited.

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.
Nanticoke Creek Watershed Protection Project Dam Site No. 8 was found to have no conditions which would render the dam unsafe. Minor maintenance actions were recommended.
NANTICOKE CREEK WATERSHED PROJECT
VTC 9
BROOME COUNTY, NEW YORK
VOLUME IV N.Y. 819

PHASE 1 INSPECTION REPORT
NATIONAL RIVER SAFETY PROGRAM

Nanticoke Creek Watershed Project Site Number 8
(Inventory Number NY-573), Susquehanna River Basin, Broome County, New York,
Phase 1 Inspection Report.

George Koch

DAGW51-79-C-0001

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

CONTRACT NO. DAGW51-79-C-0001

274
TABLE OF CONTENTS

- ASSESSMENT
  - OVERVIEW PHOTOGRAPH

1 PROJECT INFORMATION
  1.1 GENERAL
  1.2 DESCRIPTION OF PROJECT
  1.3 PERTINENT DATA

2 ENGINEERING DATA
  2.1 DESIGN
  2.2 CONSTRUCTION RECORDS
  2.3 OPERATION RECORD
  2.4 EVALUATION OF DATA

3 VISUAL INSPECTION
  3.1 FINDINGS
  3.2 EVALUATION OF OBSERVATIONS

4 OPERATION AND MAINTENANCE PROCEDURES
  4.1 PROCEDURE
  4.2 MAINTENANCE OF DAM
  4.3 WARNING SYSTEM IN EFFECT
  4.4 EVALUATION
5  HYDROLOGIC/HYDRAULIC

5.1  DRAINAGE AREA CHARACTERISTICS

5.2  ANALYSIS CRITERIA

5.3  SPILLWAY CAPACITY

5.4  RESERVOIR CAPACITY

5.5  FLOODS OF RECORD

5.6  OVERTOPPING POTENTIAL

5.7  EVALUATION

6  STRUCTURAL STABILITY

6.1  EVALUATION OF STRUCTURAL STABILITY

7  ASSESSMENT/RECOMMENDATIONS

7.1  ASSESSMENT

7.2  RECOMMENDED MEASURES

APPENDIX

A.  PHOTOGRAPHS

B.  ENGINEERING DATA CHECKLIST

C.  VISUAL INSPECTION CHECKLIST

D.  HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS

E.  STABILITY ANALYSES

F.  REFERENCES

G.  DRAWINGS
PHASE 1 REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Nanticoke Creek Watershed Protection Project Dam Site No. 8
I.D. No. NY-573 (#85D-3645)

State Located: New York
County Located: Broome
Watershed: Susquehanna River Basin
Stream: Unnamed tributary of Nanticoke Creek
Date of Inspection: November 8, 1978

ASSESSMENT

The Nanticoke Creek Watershed Protection Project Dam Site No. 8 is a floodwater retarding structure. Examination of available documents and a visual inspection of the dam did not reveal conditions which are considered to be unsafe.

The total discharge capability of the spillways is adequate for the Probable Maximum Flood (PMF).

To assure the continued satisfactory performance of this structure, a schedule of periodic maintenance should be established. Included in this schedule should be items such as mowing the grass on the embankment slopes and periodic operation and lubrication of the slide gate mechanism.

George Koch
Chief, Dam Safety Section
New York State Department of Environmental Conservation
NY License No. 45937

Approved By:

Col. Clark H. Benn
New York District Engineer

Date: 17 April 1979
NANTICOKE CREEK SITE No. 8 OVERVIEW
NORTHERN END OF UPSTREAM FACE AND EMERGENCY SPILLWAY

OVERVIEW
SOUTHERN END OF UPSTREAM FACE
PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NANTICOKE CREEK WATERSHED PROTECTION PROJECT
DAM SITE No. 8
I.D. No. NY 573
(#85D-3645)
SUSQUEHANNA RIVER BASIN
BROOME COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority
The Phase 1 Inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection
This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF PROJECT

a. Description of the Dam and Appurtenant Structures
The Nanticoke Creek Watershed Protection Project Dam No. 8 consists of an earth dam with a principle spillway pipe passing through the embankment and an emergency spillway on the northern end of the dam.

The dam consists of a compacted earth embankment which is 41 feet high, has a crest length of 460 feet and a crest width of 16 feet. The upstream slope is 1 vertical on 3 horizontal and the downstream slope is 1 vertical on 2 horizontal. The crest and exposed slopes are grass covered. An earth cutoff trench of varying depth and width keys the embankment into the foundation soils.

The principle spillway consists of a two stage reinforced concrete drop inlet structure, a 24 inch diameter reinforced concrete water pipe with anti-seepage collars, and a plunge pool to dissipate energy at the outlet end of the conduit. A reservoir drain consisting of a 12 inch cast iron pipe extends from the upstream toe of the embankment to the base of the principle spillway riser. A vertical slide gate mechanism mounted along the inside of the riser controls the flow through the reservoir drain. The emergency spillway is a grass lined channel, 180 feet wide, located in an earth cut on the northern end of the dam.

An internal drainage system consisting of a gravel and sand filter with perforated 8 inch diameter bituminous coated, corrugated metal collector pipes is located at the base of the embankment near the downstream toe. Seepage is collected and conducted through this drain and outletted into the plunge pool.
b. Location
Dam No. 8 of the Nanticoke Creek Project is located on an unnamed tributary of the Nanticoke Creek, approximately 7.5 miles north of the Village of Maine. The site is off Howland Hill Road in the Town of Nanticoke, New York.

c. Size Classification
This dam is 41 feet high and is classified as an "intermediate" size dam (between 40 and 100 feet high).

d. Hazard Classification
The dam is classified in the "high" hazard category because of the presence of several homes downstream of the dam.

e. Ownership
This dam is owned by the County of Broome, New York.

f. Purpose of Dam
This dam is a floodwater retarding structure.

g. Design and Construction History
This dam was designed by the U.S. Department of Agriculture, Soil Conservation Service (SCS). Construction of the dam was completed in 1970. The SCS Office for Broome County, located at the Broome County Airport, has a design folder containing hydrologic, hydraulic, and structural design information, and the as-built plans and documents. Since the only modification made during construction was a minor one resulting from the rock surface under the spillway being deeper than anticipated, the plans included in Appendix F are essentially the same as the as-built drawings.

h. Normal Operating Procedures
Normal flows are discharged through the principle spillway. This structure has sufficient capacity to discharge a 100 year flood without flow occurring in the emergency spillway. For storms greater than the 100 year flood, flow will discharge through the emergency spillway.

1.3 PERTINENT DATA

a. Drainage Area (acres) 1382

b. Discharge at Dam (cfs)
   - Principle Spillway W.S. at top of dam 70
   - Principle Spillway at Emergency Spillway Crest 66
     Elevation
   - Reservoir Drain at Principle Spillway Crest El. 18
   - Maximum Known Flood 61
   - Emergency spillway W.S. at top of dam 8280


c. Elevation (USGS datum)
   - Top of Dam 1258.2
   - Emergency Spillway Crest (Auxiliary Spillway) 1252.5
   - Principle Spillway Crest (Service Spillway) 1239.5
   - Invert of Reservoir Drain Inlet 1218.0
d. Reservoir (acres)
   Surface area at Top of Dam 46.2
   Surface area at Crest of Emergency Spillway 33.0
   Surface area at Crest of Principle Spillway 13.8

e. Storage Capacity (acre-feet)
   Top of Dam 608
   Emergency Spillway Crest 380
   Principle Spillway Crest 88.6

f. Dam
   Embankment Type: Compacted earth fill with
                   an earth keyed cutoff trench
   Embankment length (ft.) 460
   Slopes
     Upstream
     Downstream
   1 vertical on 3 horizontal
     1 vertical on 2.5 horizontal
   Crest elevation (USGS datum) 1258.2
   Crest Width (ft) 16

g. Spillway
   Principle Spillway (Service)
   Type: Uncontrolled, reinforced concrete, two stage
          drop inlet (2 x 6 ft.) rising 24.5
          feet; 24 inch diameter reinforced concrete
          pressure conduit 248 feet long;
          riprapped plunge pool.
          Length (ft.): Weir 12

   Emergency Spillway (Auxiliary)
   Type: Grass-lined channel having trapezoidal
          cross-section
   Bottom Width (ft.) 180
   Side Slopes (V : H) 1 on 3
   Length of level section (in profile)(ft.) 50
   Exit Slope (ft/ft) 0.29

h. Low Level Outlet
   Reservoir Drain:
   Type: 12 inch diameter cast iron pipe with
          a reinforced concrete inlet.

   Control: Mechanically operated vertical slide
gate mounted along the inside of the
principle spillway riser.
SECTION 2: ENGINEERING DATA

2.1 DESIGN

a. Geology
The Nanticoke Creek Watershed Project Dam No. 8 is located in the "Glaciated Allegheny Plateau" physiographic province of New York State. Bedrock underlying the site is mapped as Cashqua Shale of the Upper Devonian Age. This rock was formed approximately 400 million years ago.

Glacial ice was instrumental in smoothing the topography of the area. The present surficial deposits have resulted primarily from glaciations during the Cenozoic Era, the last of which was the Wisconsin glaciation, approximately 11,000 years ago. Glacial deposits such as outwash plains and eskers are major features of the landscape in parts of this region.

b. Subsurface Investigations
A subsurface investigation program was conducted by the Soil Conservation Service in 1966. This program consisted of 23 test pits and 13 drill holes. The maximum depth of the explorations was 34 feet. Applicable subsurface information is included in Appendix G.

In general, the surficial soils at the project site consist of a thin layer of topsoil underlain by glacial till on both abutments and by assorted alluvium and reworked till in the floodplain. A gravelly material with moderate to rapid permeability was encountered from 8 to 12 feet in Test Pit No. 1 on the northern abutment. This material was found only in this one test pit. Shale bedrock underlies these soil deposits.

c. Embankment and Appurtenant Structures
The dam was designed by the Soil Conservation Service who prepared a design report. Seventeen drawings, several of which have been included in Appendix G, were prepared for the construction of the dam.

Hydraulically, the dam was designed to retard the floodwaters resulting from a 100 year frequency storm, without a discharge occurring in the emergency spillway.

2.2 CONSTRUCTION RECORDS
Complete as-built contract plans and documents are available from the SCS Office in Broome County. No major construction changes were made on this job. The as-built plans were included in the appendix of this report.

2.3 OPERATION RECORD
Since the dam is an ungated, floodwater retarding structure, no operating records are maintained regarding water levels. However, during periods of heavy rainfall, SCS personnel do monitor reservoir levels.

2.4 EVALUATION OF DATA
The data presented in this report has been compiled from information obtained from the Soil Conservation Service as well as the New York State Department of Environmental Conservation files. It appears to be adequate and reliable for the purpose of the Phase 1 Inspection.
SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General
Visual inspection of Dam Site No. 8 was conducted on November 8, 1978. The weather was clear and the temperature was around 50°F. The water surface was several inches above the invert of the low stage inlet on the riser. There was a small flow from the principle spillway pipe spilling into the plunge pool.

b. Embankment
The earth embankment showed no signs of distress. The vertical and horizontal alignment of the crest appears to be as it was constructed, with no visible surface cracks appearing on the crest or embankment slopes. There were no areas of serious sloughing or subsidence noted. Some minor sloughing was observed on the upstream slope in the range of fluctuation of the water surface level.

Inspection of the downstream face did not reveal any signs of seepage. There was a slight discharge from the 8 inch collection pipe of the internal drainage system on the southern side of the principle spillway pipe. The collection pipe to the north of the principle spillway was dry.

No undesirable vegetative growth or animal penetrations into the slopes were observed. However, on the date of the inspection, the grass on the upstream and downstream slope had not been mowed.

c. Principle Spillway
The principle spillway consists of the vertical drop inlet structure, a reinforced concrete pressure pipe through the embankment, a plunge pool and an outlet channel. All of these components were in satisfactory condition. The only minor deficiency noted concerned the plunge pool. The downstream toe of the dam, the bottom of the stream channel and the stream banks were lined with riprap, but there was no riprap in the center of the stream to check the velocity of water coming through the spillway pipe.

d. Emergency Spillway
A grass lined emergency spillway in an earth cut section is located beyond the northern end of the embankment. The spillway had been mowed and appeared to be in satisfactory condition.

e. Drain
The reservoir drain conduit and slide gate may be used to lower the reservoir when the pool level is below the principle spillway crest. The slide gate is located within a pipe sleeve which extends to the top of the riser.
f. Downstream Channel
The outlet channel beyond the end of the plunge pool was heavily overgrown with weeds and brush. However, no severe side-slope erosion or debris obstructions were in evidence.

g. Reservoir
There were no signs of soil instability in the reservoir area.

3.2 EVALUATION OF OBSERVATIONS
Visual observations did not reveal any problems which would adversely affect the safety of the dam.
SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES
The normal water surface elevation is approximately at the low stage inlet elevation. Downstream flows are limited by the capacity of the 24 inch diameter reinforced concrete pipe. The reservoir provides 374 acre feet of storage between the normal water level and the crest of the emergency spillway.

4.2 MAINTENANCE OF DAM
The dam is maintained by the owner and is in satisfactory condition. Normal maintenance consists of mowing the crest of the embankment and the bottom of the emergency spillway channel.

4.3 WARNING SYSTEM IN EFFECT
No apparent warning system is present.

4.4 EVALUATION
The dam and appurtenant structures are satisfactorily maintained.
SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS
Delineation of the watershed draining into the reservoir pool area was made using the USGS 7.5 minute quadrangle for Lisle, N.Y. The watershed consists of woodlands and lightly forested area situated in a rural section. Relief ranges from moderate to steep with the steeper slopes occurring on the western side of the watershed. The slopes on the western side range from 15 to 20%, and on the eastern side they range from 5 to 10%. The rectangularly shaped drainage area is about 1382 acres.

5.2 ANALYSIS CRITERIA
The analysis of the spillway capacity of the dam was performed using the Corps of Engineer's HEC-1 computer program, incorporating the "Snyder Synthetic Unit Hydrograph" method and the "Modified Puls" flood routing procedure. The spillway design flood selected for analysis was the PMF in accordance with recommended guidelines of the U.S. Army Corps of Engineers.

5.3 SPILLWAY CAPACITY
The principal and emergency spillways are uncontrolled structures. The principal spillway operates under weir or orifice flow conditions depending upon the floodwater inflow to the reservoir pool. During orifice flow operation, pressure flow develops in the 24 inch conduit. The emergency spillway was analyzed as a broad-crested weir having a discharge coefficient (C) of 3.087.

The spillways have sufficient capacity for discharging the peak outflow from the PMF. Due to the limited storage capacity, there will be little attenuation of the storm flows. For this storm, the peak inflow and the peak outflow are both 3640 cfs. When the spillways are discharging the peak outflow, the water surface will be 2.4 feet below the top of the dam.

5.4 RESERVOIR CAPACITY
Normal flood control storage capacity of the reservoir between the principal and emergency spillways is 291 acre-feet which is equivalent to a runoff depth of 2.5 inches over the drainage area. Surcharge storage capacity to the maximum high water elevation is an additional 228 acre-feet; equivalent to a runoff depth over the drainage area of 2.0 inches. Total storage capacity of the dam is 608 acre-feet; equivalent to 5.3 inches of direct runoff.

5.5 FLOODS OF RECORD
The maximum known flood occurred during Hurricane Eloise during September, 1975. The pool level at this time was reported to be about 7 feet above the principal spillway crest. The calculated discharge for this flood is as follows:

<table>
<thead>
<tr>
<th>Elevation (ft.)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1246.4</td>
<td>61</td>
</tr>
</tbody>
</table>

-8-
5.6 **OVERTOPPING POTENTIAL**
Analysis indicates the total discharge capability is sufficient to prevent overtopping from the PMF.

5.7 **EVALUATION**
This dam has sufficient capability to impound and adequately discharge floodwaters expected to result from the PMF.
SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations
No signs of major distress of the dam were observed during the inspection.

b. Design and Construction Data
Design data was obtained from the Soil Conservation Service Office in Binghamton. Stability analyses were performed by SCS using a modification of the Swedish Circle Method. Various conditions were analyzed during the design process. The conditions applicable to the dam as it was constructed are as follows:

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>UPSTREAM SLOPE</th>
<th>DOWNSTREAM SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Drawdown</td>
<td>1.69</td>
<td></td>
</tr>
<tr>
<td>Long Term Steady State</td>
<td></td>
<td>1.60</td>
</tr>
<tr>
<td>Seepage from Emergency Spillway Crest</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The calculated factors of safety for this dam are in excess of the minimum factors in the Corps of Engineers recommended guidelines. The dam is therefore considered to have an adequate factor of safety for stability.

A summary of the analyses and sections showing the failure arcs are included in Appendix E.

Based on discussions with SCS representatives, the dam was built essentially according to the plans. The only significant difference was that the rock surface was somewhat deeper than expected.

c. Post Construction Changes
The SCS representatives were not aware of any changes which have been made on the dam.

d. Seismic Stability
This dam is located in Seismic Zone No. 1. Therefore, a seismic stability analysis is not warranted.
SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety
The Phase I Inspection of the Nanticoke Creek Dam No. 3 did not reveal
conditions which constitute a hazard to human life or
property. The earth embankment is considered to be stable, structurally,
and capable of safely retarding floodwaters resulting from the PMF.

The design of this dam includes an internal drainage system to control
the phreatic surface and to provide a safe outlet for foundation seepage.

b. Adequacy of Information
Information concerning the design and performance of this dam is con-
sidered adequate for the purposes required for Phase I Inspection Reports.

c. Need for Additional Investigations
No additional investigations are necessary at this time.

7.2 RECOMMENDED MEASURES
The following tasks should be undertaken by maintenance forces:

a. Periodic operation and lubrication of the mechanically
operated slide gate mechanism to insure the ease of
operation of the reservoir drain conduit.

b. A schedule for periodic maintenance should be established
which would include items such as mowing the grass on the
embankment slopes.
VIEW LOOKING EAST ALONG DAM CREST

EMERGENCY SPILLWAY LOOKING DOWNSTREAM
RISER - PRINCIPAL SPILLWAY INLET

PRINCIPAL SPILLWAY OUTLET PIPE
AND PLUNGE POOL (LOOKING UPSTREAM)
PRINCIPAL SPILLWAY OUTLET PIPE
AND PLUNGE POOL (LOOKING DOWNSTREAM)

OUTLET OF INTERNAL DRAINAGE
SYSTEM COLLECTION PIPE
APPENDIX B

ENGINEERING DATA CHECKLIST
<table>
<thead>
<tr>
<th>Item</th>
<th>Plans</th>
<th>Details</th>
<th>Typical Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dam</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Spillway(s)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Outlet(s)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Design Reports</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Design Computations</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Discharge Rating Curves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dam Stability</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seepage Studies</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsurface and Materials Investigations</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Item</td>
<td>Remarks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction History</td>
<td>ONLY INFORMATION AVAILABLE OBTAINED THROUGH DISCUSSIONS WITH PROJECT INSPECTOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surveys, Modifications, Post-Construction Engineering Studies and Reports</td>
<td>NONE REPORTED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accidents or Failure of Dam Description, Reports</td>
<td>NONE REPORTED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation and Maintenance Records Operation Manual</td>
<td>NONE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX C

VISUAL INSPECTION CHECKLIST
1) Basic Data
   a. General
      Name-of Dam: NANTICOKE CREEK Site 8
      I.D. #: N.Y. 573 (#850-3645)
      Location: Town NANTICOKE County Broome
      Stream Name: UNNAMED
      Tributary of: NANTICOKE CREEK
      Longitude (W), Latitude (N): W076° 4.8' N42° 16.5'
      Hazard Category: C
      Date(s) of Inspection: 11/8/78
      Weather Conditions: Sunny 45° 50°
      b. Inspection Personnel: R. WARRENDER, W. LYNICK
      c. Persons Contacted: H. HIRTH, SCS SYRACUSE
                               G. PAGE & D. KOLESAR, SCS Broome Co.
      d. History:
         Date Constructed: 1970
         Owner: Broome County
         Designer: SCS
         Constructed by: C.O. MURRAY

2) Technical Data
   Type of Dam: EARTH
   Drainage Area: 1382 Acres
   Height: 41 ft.  Length: 460 ft.
   Upstream Slope: 1 on 3  Downstream Slope: 1 on 2.5
2) Technical Data (Cont'd)

External Drains: on Downstream Face @ Downstream Toe Riprap

Internal Components:

- Impervious Core
- Drains 8" CMP Drain Pipe in Sand & Gravel Drain
- Cutoff Type Compacted Earth Fill
- Grout Curtain
2) Evaluation

**Earth Fill with Good Vegetative Cover**

a. Crest
   1. Vertical Alignment **Okay**
   2. Horizontal Alignment **Okay**
   3. Surface Cracks **None**
   4. Miscellaneous **Crest was only part of embankment which had been mowed.**

b. Slopes
   1. Undesirable Growth or Debris, Animal Burrows **Slopes had not been mowed**
   2. Sloughing, Subsidence or Depressions **Minor sloughing on upstream slope at water surface elevation (within range of fluctuation)**
   3. Slope Protection **Unmowed Grass and Crownvetch**
   4. Surface Cracks or Movement at Toe **None**
   5. Seepage **None**
   6. Condition Around Outlet Structure **Satisfactory**
c. Abutments

(1) Erosion at Embankment and Abutment Contact **NONE**

(2) Seepage along Contact of Embankment and Abutment **NONE**

(3) Seepage at toe or along downstream face **NONE**

d. Downstream Area - below embankment

(1) Subsidence, Depressions, etc. **NONE**

(2) Seepage, unusual growth **NONE**

(3) Evidence of surface movement beyond embankment toe **No Evidence**

(4) Miscellaneous

---

e. Drainage System

| 2-8” Diameter Bit Coated CMP in Sand & Gravel Drain Fill |
(1) Condition of relief wells, drains, etc.

________________________

________________________

________________________

________________________

(2) Discharge from Drainage System  **Very Slow (Less Than 3 Gallons/Hour)**
4) Implementation

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Documentation/Surveys</td>
</tr>
<tr>
<td>(2)</td>
<td>Observation Wells</td>
</tr>
<tr>
<td>(3)</td>
<td>Weirs</td>
</tr>
<tr>
<td>(4)</td>
<td>Piezometers</td>
</tr>
<tr>
<td>(5)</td>
<td>Other</td>
</tr>
</tbody>
</table>

5) Reservoir

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Slopes</td>
<td>Trees and Grass up to edge of Reservoir</td>
</tr>
<tr>
<td>b. Sedimentation</td>
<td>None</td>
</tr>
</tbody>
</table>
c) Spillway (including tail race channel)

a. General Riser, Outlet Pipe & Plunge Pool IN SATISFACTORY CONDITION

b. Principle Spillway 24.5' HIGH RECTANGULAR RC DROP INLET;
24" Dia. RC PRESSURE PIPE; RIPRAP LINED PLUNGE POOL AT OUTLET

[c] Emergency or Auxiliary Spillway GRASS LINED TRAPEZOIDAL OPEN CHANNEL IN EARTH CUT

d. Condition of Tail Race channel RIPRAP ON SIDES OF CHANNEL
FORMED PLUNGE POOL – NO RIPRAP ACROSS CENTER OF CHANNEL TO CHECK VELOCITY OF FLOW EXITING FROM SPILLWAY PIPE.

e. Stability of Channel side/slopes NO SPECIAL TREATMENT
BEYOND ENDS OF PLUNGE POOL; BRUSH & WEEDS GROWING ON CHANNEL BANKS.
c. Condition (debris, etc.) **Trees and Brush Lining Stream Banks**

b. Slopes **1 on 1 - Not Riprapped, although some stone present.**

c. Approximate number of homes **Village of Maine plus 3 homes near the point where the stream passes under the county highway**

8) Miscellaneous
9) Structural

a. Concrete Surfaces  **Satisfactory**

b. Structural Cracking  **None**

c. Movement - Horizontal & Vertical Alignment (Settlement)  **None**

d. Junctions with Abutments or Embankments  **N/A**

e. Drains - Foundation, Joint, Face  **N/A**

f. Water passages, conduits, sluices  **Satisfactory**

g. Seepage or Leakage  **None**
n. Joints - Construction, etc.

i. Foundation

j. Abutments

k. Control Gates  RESERVOIRRAIN HAS SLIDE GATE

l. Approach & Outlet Channels

m. Energy Dissipators (plunge pool, etc.) PIPE EXTENSION Satisfactory

n. Intake Structures

o. Stability

p. Miscellaneous
APPENDIX D

HYDROLOGIC/HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS
### AREA-CAPACITY DATA:

<table>
<thead>
<tr>
<th></th>
<th>Elevation (ft.)</th>
<th>Surface Area (acres)</th>
<th>Storage Capacity (acre-ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Top of Dam</td>
<td>1258.2</td>
<td>46.2</td>
<td>608</td>
</tr>
<tr>
<td>2) Design High Water (Max. Design Pool)</td>
<td>1255.2</td>
<td>39.0</td>
<td>476</td>
</tr>
<tr>
<td>3) Auxiliary Spillway Crest</td>
<td>1262.5</td>
<td>33.0</td>
<td>380</td>
</tr>
<tr>
<td>4) Pool Level with Flashboards</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Service Spillway Crest</td>
<td>1239.5</td>
<td>13.8</td>
<td>88.6</td>
</tr>
</tbody>
</table>

### DISCHARGES

<table>
<thead>
<tr>
<th></th>
<th>Volume (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Average Daily</td>
<td>N/A</td>
</tr>
<tr>
<td>2) Spillway @ Maximum High Water</td>
<td>70.1</td>
</tr>
<tr>
<td>3) Spillway @ Design High Water</td>
<td>57.8</td>
</tr>
<tr>
<td>4) Spillway @ Auxiliary Spillway Crest Elevation</td>
<td>65.6</td>
</tr>
<tr>
<td>5) Low Level Outlet</td>
<td>18.7</td>
</tr>
<tr>
<td>6) Total (of all facilities) @ Maximum High Water</td>
<td>8350.2</td>
</tr>
<tr>
<td>7) Maximum Known Flood</td>
<td>ELEV. = 1246.4</td>
</tr>
</tbody>
</table>
**Type:** Level Grassy Earth  

**Width:** 16 ft  
**Length:** 460 ft  

**Spillway Location:** N/A  

**SPILLWAY:**  

<table>
<thead>
<tr>
<th>Principal</th>
<th>Emergency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation</td>
<td>1239.5</td>
</tr>
<tr>
<td>Type</td>
<td>RC Drop Inlet w/ Trash Rack</td>
</tr>
<tr>
<td>Width</td>
<td>2ft x 6ft</td>
</tr>
<tr>
<td>Type of Control</td>
<td>Uncontrolled</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Type</td>
<td>N/A</td>
</tr>
<tr>
<td>(Flashboards; gate)</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Number</td>
<td>N/A</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Size/Length</td>
<td>N/A</td>
</tr>
<tr>
<td>Invert Material</td>
<td>Mowed Grass</td>
</tr>
<tr>
<td>Anticipated Length of operating service</td>
<td>&lt; 1 Per 100 Yrs</td>
</tr>
</tbody>
</table>

24" Dia RC Conduit - 248' Length  

<table>
<thead>
<tr>
<th>Sharp Crested</th>
<th>Height Between Spillway Crest &amp; Approach Channel Invert (Weir Flow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{L}{b} = 1.0 )</td>
<td>( N/A )</td>
</tr>
<tr>
<td><strong>Weir Length = 12'</strong></td>
<td>Broad Crested</td>
</tr>
</tbody>
</table>
RESERVOIR DRAIN

Type: Gate √ Sluice ___ Conduit √ Penstock ___
Shape: Gate-Flat Circular Conduit-Round Cast/Iron
Size: _______________________________

Elevations: Entrance invert 1215.5
Exit invert 1210.5
Tailrace Channel: Elevation 1208.5

HYDROMETEROLOGICAL CASES:
Type: NONE
Location: _______________________________
Records: Date — ____________________________
         Max. Reading — ____________________________

FLOOD WATER CONTROL SYSTEM:
Warning System: NONE
Method of Controlled Releases (mechanisms):

NONE EXCEPT FOR MANUALLY OPERATED RESERVOIR DRAIN SLIDE GATE
LAND USE:

- **1382 ACRES**
- **2.16 SQ.MI.**

**RUNOFF CHARACTERISTICS:**

- **Land Use - Type:** LIGHT FOREST & WOODLANDS
- **Terrain - Relief:** MODERATE TO STEEP
- **Surface - Soil:** GLACIAL TILL

**Runoff Potential** (existing or planned extensive alterations to existing (surface or subsurface conditions))

NONE

Potential Sedimentation problem areas (natural or man-made; present or future)

NONE

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

NONE

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

- **Location:** NONE
- **Elevation:**
- **Reservoir:**
  - **Length @ Maximum Pool:** N/A (Miles)
  - **Length of Shoreline (@ Spillway Crest):** N/A (Miles)
D.A. = Drainage area in square miles
L = River mileage from the given station to the upstream limit of the drainage area
LCA = River mileage from the station to the center of gravity of the drainage area
PMP = Probable Maximum Precipitation in inches
\( t_p \) = Lag time from mid-point of unit rainfall duration, \( t_r \), to peak of unit hydrograph, in hours.
\( t_r \) = Unit rainfall duration, equal to \( \frac{t_p}{550} \), in hours.
\( C_t \) = Coefficient depending upon unit and drainage basin characteristics
\( t_e \) = Unit rainfall duration shorter than standard unit;
\( t_r \), adopted in specific study, in hours.
\( t_{pr} \) = Lag time from mid-point of unit rainfall duration, \( t_e \), to peak of unit hydrograph, in hours.

D.A. = 2.16 square miles, L = 3.33 miles, LCA = 1.32 miles
PMP = 20.5 inches, \( C_t = 2.0 \)
\( C_r = 0.425 \) from average 640 \( C_r = 400 \)

\[ t_p = C_t (L \cdot LCA) \cdot 0.5 = \frac{2.0 \cdot (3.33) \cdot (1.32) \cdot 0.5}{3.12} = 3.12 \text{ hours} \]
\[ t_e = \frac{t_p}{550} = \frac{3.12}{550} = 0.57 \text{ hours} \] (Use 1 hr. hydrograph)

\[ t_{pr} = t_p + 0.25 (t_e - t_r) = (3.12) + 0.25(1 - 0.57) = 3.23 \text{ hrs.} \]

From HMC 33 - Figure 2, Depth - Area - Duration
\( C_r = 20.5'' \)

6 hour % 111 = 22.55, 12 hour % 113 = 27.26
24 hour % 123 = 26.01, 48 hour % 14% = 29.11
**PROJECT GRID**

**SUBJECT: HYDROLOGY & HYDRAULIC COMPUTATIONS**

<table>
<thead>
<tr>
<th>PRINCIPAL SPILLWAY CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WATER SURFACE AT AUXILIARY SPILLWAY CREST</strong></td>
</tr>
<tr>
<td>[ q = A \sqrt{\frac{2}{{K_a + K_b + K_c L}}} = 3.14 \sqrt{\frac{2(32.2)(147)}{1+0.5+4.5+(0.045)(298)}} = 65.64 \text{ cfs} }</td>
</tr>
</tbody>
</table>

| **WATER SURFACE AT DESIGN HIGH WATER** |
| \[ q = 3.14 \sqrt{\frac{2}{{1+0.5+4.5+(0.045)(298)}}} = 67.77 \text{ cfs} } |

| **WATER SURFACE AT TOP OF DAM** |
| \[ q = 3.14 \sqrt{\frac{2}{{1+0.5+4.5+(0.045)(298)}}} = 70.06 \text{ cfs} } |

| **EMERGENCY SPILLWAY CAPACITY** |
| **WATER SURFACE AT TOP OF DAM** |
| \[ q = c L H^{3/2} = (3.087)(197.1)(5.7)^{3/2} = 8280.1 \text{ cfs} } |
| \[ L = 180 + (2.85)(3)(2) = 197.1 \text{ ft} } |

| **RESERVOIR DRAIN CAPACITY** |
| **WATER SURFACE AT PRINCIPAL SPILLWAY CREST** |
| \[ q = 0.78 \sqrt{\frac{2}{{1+0.5+0.0417(30)}}} = 18.68 \text{ cfs} } |
### PROJECT GRID

**JOB NAME:** SITE 3  
**SHEET NO.:** 2  
**CHECKED BY:**  
**DATE:**  

**SUBJECT:** HYDRAULIC COMPUTATIONS  
**COMPUTED BY:** RLW  
**DATE:** 2/2/79

<table>
<thead>
<tr>
<th>DEPTH OF FLOW IN EMERGENCY SHELTER DURING PMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Q = cLh_{2/3} \Rightarrow h^2 = \frac{Q}{cL} = 3577 )</td>
</tr>
<tr>
<td>( h = \frac{Q}{cL} = 3577 )</td>
</tr>
<tr>
<td>( Q = 3577 )</td>
</tr>
<tr>
<td>( L = 180 + (1.25)(0.2) = 189 )</td>
</tr>
</tbody>
</table>
**HAUTICHE CREEK WATERSHED PROJECT SITE NO 8**

**PHF WITH RATIOS**

**DATE**

<table>
<thead>
<tr>
<th>HW</th>
<th>NHR</th>
<th>MIN</th>
<th>IDAY</th>
<th>IHR</th>
<th>IMIN</th>
<th>METRC</th>
<th>IPTL</th>
<th>IPRT</th>
<th>NSTAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**JOPER**

NWT

5

0

**MULTI-PLAN ANALYSES TO BE PERFORMED**

RTUS= 0.50 1.00

**PLAN= 1. NRTI= 2. LRTIO= 1**

**SUB-AREA RUNOFF COMPUTATION**

<table>
<thead>
<tr>
<th>ISTAR</th>
<th>ICOMP</th>
<th>IECOL</th>
<th>ITAPE</th>
<th>JPRT</th>
<th>INAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**HYDROGRAPH DATA**

<table>
<thead>
<tr>
<th>IHYG</th>
<th>IHG</th>
<th>TARKA</th>
<th>TAPD</th>
<th>TRSCA</th>
<th>TRSCD</th>
<th>RATIO</th>
<th>ISNOW</th>
<th>ISAME</th>
<th>LOCAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2.16</td>
<td>0.</td>
<td>2.16</td>
<td>0.</td>
<td>0.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**PRECIP DATA**

<table>
<thead>
<tr>
<th>SPFE</th>
<th>PHS</th>
<th>R6</th>
<th>R12</th>
<th>R24</th>
<th>R48</th>
<th>R72</th>
<th>R96</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.</td>
<td>20.50</td>
<td>111.00</td>
<td>122.00</td>
<td>133.00</td>
<td>142.00</td>
<td>0.</td>
<td>0.</td>
</tr>
</tbody>
</table>

**TSU'C COMPUTED BY THE PROGRAM IS 0.738**

**LOSS DATA**

<table>
<thead>
<tr>
<th>STRK</th>
<th>DLTKR</th>
<th>RTIGL</th>
<th>ERALN</th>
<th>STRKS</th>
<th>RTIGK</th>
<th>STRNL</th>
<th>CNSTL</th>
<th>ALSMX</th>
<th>RTIMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.</td>
<td>0.</td>
<td>1.00</td>
<td>0.</td>
<td>0.</td>
<td>1.00</td>
<td>0.00</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**UNIT HYDROGRAPH DATA**

<table>
<thead>
<tr>
<th>TP</th>
<th>CP</th>
<th>NTI</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.00</td>
<td>0.63</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**REFERENCES DATA**

<table>
<thead>
<tr>
<th>STG</th>
<th>QRSN</th>
<th>RTIGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.00</td>
<td>4.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SHYDER CP AND TP ARE TC= 3.71 AND R= 2.44 INTERVALS**

**UNIT HYDROGRAPH 19 END-OF-PERIOD ORDINATES, LAG= 2.98 HOURS, CP= 0.63, VOL= 1.00**

<table>
<thead>
<tr>
<th>47.</th>
<th>103.</th>
<th>269.</th>
<th>283.</th>
<th>215.</th>
<th>142.</th>
<th>93.</th>
<th>62.</th>
<th>41.</th>
<th>27.</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.</td>
<td>12.</td>
<td>8.</td>
<td>5.</td>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**END-OF-PERIOD FLOW**

<table>
<thead>
<tr>
<th>TIME</th>
<th>RAIN</th>
<th>EXCS</th>
<th>COMPO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.01</td>
<td>0</td>
<td>4.</td>
</tr>
<tr>
<td>2</td>
<td>0.01</td>
<td>4</td>
<td>4.</td>
</tr>
<tr>
<td>3</td>
<td>0.01</td>
<td>0</td>
<td>4.</td>
</tr>
<tr>
<td>Station</td>
<td>PEAK</td>
<td>6-HOUR</td>
<td>24-HOUR</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>CFS</td>
<td>3,640</td>
<td>2,845</td>
<td>1,024</td>
</tr>
<tr>
<td>INCHES</td>
<td>12.25</td>
<td>17.64</td>
<td>17.92</td>
</tr>
<tr>
<td>AC-FT</td>
<td>1,411.</td>
<td>2,032</td>
<td>2,055</td>
</tr>
</tbody>
</table>

**SUM** 21.52 17.84 25.082.

**HYDROGRAPH AT STA**

<table>
<thead>
<tr>
<th>Station</th>
<th>PEAK</th>
<th>6-HOUR</th>
<th>24-HOUR</th>
<th>72-HOUR</th>
<th>TOTAL VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFS</td>
<td>1,820</td>
<td>1,422</td>
<td>912</td>
<td>173</td>
<td>12,342.0</td>
</tr>
<tr>
<td>INCHES</td>
<td>6.13</td>
<td>8.82</td>
<td>8.96</td>
<td>9.00</td>
<td></td>
</tr>
<tr>
<td>AC-FT</td>
<td>706.</td>
<td>1,016</td>
<td>1,032</td>
<td>1,037</td>
<td></td>
</tr>
</tbody>
</table>

**HYDROGRAPH AT STA**

<table>
<thead>
<tr>
<th>Station</th>
<th>PEAK</th>
<th>6-HOUR</th>
<th>24-HOUR</th>
<th>72-HOUR</th>
<th>TOTAL VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFS</td>
<td>3,640</td>
<td>2,845</td>
<td>1,024</td>
<td>347</td>
<td>25,084.0</td>
</tr>
<tr>
<td>INCHES</td>
<td>12.25</td>
<td>17.64</td>
<td>17.92</td>
<td>18.00</td>
<td></td>
</tr>
<tr>
<td>AC-FT</td>
<td>1,411.</td>
<td>2,032</td>
<td>2,055</td>
<td>2,074</td>
<td></td>
</tr>
<tr>
<td>CFS</td>
<td>6-HOUR</td>
<td>24-HOUR</td>
<td>72-HOUR</td>
<td>TOTAL VOLUME</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>3645.</td>
<td>2975.</td>
<td>904.</td>
<td>325.</td>
<td>23442.</td>
<td></td>
</tr>
</tbody>
</table>
# Peak Flow Summary for Multiple Plan-Ratio Economic Computations

<table>
<thead>
<tr>
<th>Station</th>
<th>Plan</th>
<th>0.50</th>
<th>1.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1220</td>
<td>3640</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1940</td>
<td>3645</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
APPENDIX E

STABILITY ANALYSES
C. **Slope Stability Analysis:** The analysis is limited to the embankment assuming that soft foundation soils are removed to elevation 1211 and replaced with embankment soils. The method of analysis is a modification of the Swedish circle.

A 3:1 upstream slope with 10 ft berm is adequate assuming drawdown to the base.

In the steady seepage case with the phreatic line from the emergency spillway crest to the downstream slope, the factor of safety is 1.5 for a 2 1/2:1 slope and 10 ft wide berm. The factor of safety is 1.6 with a drain at c/b = 0.6 and no berm.

Shear values from sample 66W1301, Site 13, resulted in higher factors of safety than those from sample 67W735.

**CONCLUSIONS AND RECOMMENDATIONS**

A. **Preparation:** Remove deleterious and soft material from the foundation.

B. **Cutoff and Drainage:** Interrupt disturbed surface soils on the abutments with a partial cutoff. Cut off the permeable alluvial gravels labeled "B" on Form SCS-35B to till or bedrock. A 30 ft bottom width is suggested through the narrow floodplain to keep the hydraulic gradient near 1.0.

A trench drain is recommended to pick up seepage that bypasses the cutoff into alluvial gravels downstream. Extend the drain up both abutments to permanent pool level taking it to bedrock in the right abutment. A transverse drain (or lateral) can be placed against the sandy silt should this material (labeled "G") be continuous downstream. Drain filter elements can be designed in the field.

**EMBANKMENT**

A. **Placement of Material:** Soils represented by samples tested can be placed anywhere in the embankment.

Standard density of the minus 3/4 inch fraction of samples 67W735 and 67W736 is about 124pcf, correcting density of the minus No. 4 fraction for 15% rock. This agrees well with similar samples from Site No. 13 which had minus 3/4 inch standard densities of 123 and 123.5 pcf. It is concluded that compaction control for this site can be based on 95% of standard density using either the minus No. 4 or the minus 3/4 inch fraction.
<table>
<thead>
<tr>
<th>SOURCE AND USE OF MATERIALS</th>
<th>CLASSIFICATION</th>
<th>ADOPTED DESIGN DATA</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Emer Spuy Embankment</td>
<td>Cl.</td>
<td>124.0</td>
<td>135.0</td>
</tr>
<tr>
<td>2 Site #19 Embankment</td>
<td>Cl.</td>
<td>123.0</td>
<td>135.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRIAL NO.</th>
<th>SLOPE</th>
<th>CONDITIONS</th>
<th>F_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Up 3:1</td>
<td>Full drawdown -10' heel @ elev. 1250 - Arc cut from opp. side, then Emb. (17^0-550) only.</td>
<td>1.69</td>
</tr>
<tr>
<td>2</td>
<td>Up 24:1</td>
<td>Nadir -N. heel - Arc cut from opp. side, then Emb. (17^0-550) only.</td>
<td>1.39</td>
</tr>
<tr>
<td>3A</td>
<td>Up 23:1</td>
<td>Same as #2 but 12' heel @ elev. 1230.</td>
<td>1.51</td>
</tr>
<tr>
<td>3B</td>
<td>Up 24:1</td>
<td>Same as #2 but Emb. (22^0-450) only.</td>
<td>1.72</td>
</tr>
<tr>
<td>3C</td>
<td>Up 24:1</td>
<td>Same as #2 but Emb. (29.5^0-375) only.</td>
<td>1.61</td>
</tr>
<tr>
<td>3D</td>
<td>Up 23:1</td>
<td>Same as #2 except drain 94% = 0%</td>
<td>1.62</td>
</tr>
<tr>
<td>4</td>
<td>Up 23:1</td>
<td>Nadir -10' heel @ elev. 1230 - Arc cut from opp. side, then Emb. (17^0-550) only.</td>
<td>1.54</td>
</tr>
<tr>
<td>4A</td>
<td>Up 23:1</td>
<td>Nadir -10' heel @ elev. 1230 - Arc cut from opp. side, then Emb. (17^0-550) only.</td>
<td>1.60</td>
</tr>
</tbody>
</table>
APPENDIX F

LIST OF REFERENCES
APPENDIX F

REFERENCES


APPENDIX C

DRAWINGS
CUTOFF TRENCH CONSTRUCTION NOTES
1. Final depth of trench to be determined at time of construction by the engineer.
2. Excavate to LAM and form splay where trench bottoms on splay. All rock exposed in the bottom of trench shall be thoroughly cleaned of loose material prior to backfilling operation.
SECTION OF DAM AT STA. 4-77 (TYPICAL FROM APPROX. STA. 2-58 TO 10-77)
(NOT TO SCALE)
### Earth Fill Requirements

<table>
<thead>
<tr>
<th>Material</th>
<th>Max. Rock Size</th>
<th>Lift Size Then Compacted</th>
<th>Minimum Water Content</th>
<th>Compaction</th>
<th>Class</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bally gravel, labelled material, &quot;F&quot; on sheet 15 and represented by</td>
<td>6&quot;</td>
<td>4&quot;</td>
<td>6&quot;</td>
<td>S</td>
<td>A</td>
<td>5% max. density by ASTM D1557 Method A</td>
</tr>
</tbody>
</table>

1/ The placement table indicates estimated use of material.

2/ The maximum rock size placed in backfill, compacted by means of hand tamping or manually operated power tampers or plate vibrators, shall be 6".

3/ The maximum rock size of 6" compacted in the backfill can be ranked to the portion of the dam labelled "over size rock section" as shown on this sheet. Over size material (6" to 12") in this section shall be graded so that the larger rock are placed toward the downstream slope.

4/ The foundation surface through the base area of the dam shall be scarified to a depth of 6" and compacted prior to placement of fill material.

5/ Excavated material, represented by TP.00 from 6" to 90", at foundation trench shall be compacted and used as backfill adjacent to the drain fill material. Minimum covering of this material to topsoil that is suitable for use and not used on the specified area of the emergency spillway shall be incorporated within the slopes of the earth fill as directed by the engineer.

### Construction Details

- The principal spillway excavation section
- Principal spillway excavation section 0-50
- Principal spillway excavation section 0-20

### Revisions

- NANTICOKE CREEK WATERSHED PROJECT
- SITE: FLOODWATER RETAINING DAM
- BROOME COUNTY, NEW YORK
- FILL PLACEMENT & PRIN SPILLWAY EXCAVATION
- U.S. DEPARTMENT OF AGRICULTURE
- SOIL CONSERVATION SERVICE

<table>
<thead>
<tr>
<th>Date</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/67</td>
<td>LC BERTON</td>
<td>1/67</td>
</tr>
<tr>
<td>1/67</td>
<td>D ANGELD</td>
<td>1/67</td>
</tr>
<tr>
<td>2/67</td>
<td>B J G</td>
<td>NY-2054-4</td>
</tr>
</tbody>
</table>
AS BUILT 9/25/70

DRAINAGE SYSTEM NOTES

1. All drain pipes shall conform to specification 110 and shall be 8" dia., shape 1; Class 1 (annular corrugations) or Class II (helical corrugations), Type A (fully bituminous coated pipe).

2. Use a minimum of 8" of drain fill around pipes.

3. The profiles at the bottom of all excavations as shown are only approx. The required finished grades will be established in the field at the time of construction by the engineer.

4. Drain fill at area of down stream slope of dam to be covered with 8" riprap.

![Diagram showing drainage system and profile along profile of outlet drain.]

Drain Size Distribution Graph for Drain Fill

<table>
<thead>
<tr>
<th>Size (inches)</th>
<th>Quantity (ft³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>200</td>
</tr>
<tr>
<td>6</td>
<td>150</td>
</tr>
<tr>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>10</td>
<td>75</td>
</tr>
<tr>
<td>12</td>
<td>50</td>
</tr>
<tr>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
</tr>
</tbody>
</table>

NANTICOKE CREEK WATERSHED PROJECT
SITE 1 - FLOODWATER RETAINING DAM
BROOKE COUNTY, NEW YORK
DRAINAGE SYSTEM

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

[Signatures and dates of personnel involved in the project.]
As directed by engineer, steel in shaded area will be cut, bent, or moved as required to accommodate repositioning. See detail for exact location of piling. See sheet 55.

SECTION A-A

OUTSIDE FACE  INSIDE FACE

UPSTREAM ELEVATION

OUTSIDE FACE  INSIDE FACE

FOOTING PLAN

STEEL 3' FROM BOTTOM OF FOOTING

STEEL 2' FROM TOP OF FOOTING

DOWNSTREAM ELEVATION

SCALE IN FEET
AS BUILT

PLATE CONSTRUCTION

JOINT

STEEL E FROM TOP OF FOOT TO #10 RSR ELEVATION

SIDEWALL ELEVATION

SIDEWALL ELEVATION

NANTICOKE CREEK WATERSHED PROJECT
SITE 6
FLOODWATER RETENTION DAM
BROOME COUNTY, NEW YORK

RSER STRUCTURAL DETAILS
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
REINFORCED CONCRETE ANTI-SEEP COLLAR

CONCRETE BEDDING
(WITH REINFORCED CONC BEDDING SUPPORT)

REINFORCED CONCRETE WATER PIPE JOINT
BAR TYPE

AS BUILT

<table>
<thead>
<tr>
<th>ANTI-SEEP COLLAR STEEL SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>A-2</td>
</tr>
<tr>
<td>A-3</td>
</tr>
<tr>
<td>A-4</td>
</tr>
<tr>
<td>B-1</td>
</tr>
</tbody>
</table>

BEDDING SUPPORT STEEL SCHEDULE

<table>
<thead>
<tr>
<th>Mark</th>
<th>Sum</th>
<th>Length</th>
<th>Type</th>
<th>Quan.</th>
<th>Unit</th>
<th>Total Quan.</th>
<th>Total Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>5</td>
<td>0-3</td>
<td>1</td>
<td>4</td>
<td>10</td>
<td>10-0</td>
<td></td>
</tr>
<tr>
<td>B-2</td>
<td>5</td>
<td>0-6</td>
<td>1</td>
<td>10</td>
<td>25</td>
<td>25-0</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL QUANTITIES-COLLARS, BEDDING & BEDDING SUPPORT

STEEL

Additional No. 6 Bars Used Where Rock Lay
Is Less Than Design

CONCRETE SLP 5 = 195 A.S.

Non-Enhanced

Reinforced

CONSTRUCTION DETAILS SHEET B

SPIGOT RING WALL FITTING

NANTICOKE CREEK WATERSHED PROJECT
SITE B
FLOODWATER RETAINING DAM
GOSHEN COUNTY, NEW YORK
CONDUIT DETAILS
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GEORGE RESERVOIR

Gravel, silty - approximately 30 percent fines, 20 percent sands and 50 percent gravel - small and medium-sized pebbles, no stone more than 6" in size; generallypermable - glacial till - very dense. (a)

Gravel, silty - approximately 25 percent fines, 25 percent sands and 50 percent gravel - almost equal in size; generally permeable - recent alluvium and round gravel - generally soft and/or loose. (a) & (b)

Sand - grading toward a siltsilt - moderately dense and hard; appears as a smooth surface with depth - average water level per 3' of 25 cfs with 20 psig. (a) & (b)

B. D. o. F. (Entr. 1203.6)

Note: This material is essentially the same as the predominant till or gravel shown herein, except that it has a considerable concentration of cobbles and boulders. Possible some sort of intact feature. (a) & (b)

Note: See profile on sheet 2.

END OF SHEET
<table>
<thead>
<tr>
<th>Material</th>
<th>Depth (ft)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.0</td>
<td>Tested.</td>
</tr>
<tr>
<td>A</td>
<td>1.0</td>
<td>Material B</td>
</tr>
<tr>
<td>B</td>
<td>2.0</td>
<td>Depth in hole (ft)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
<td>Sampled</td>
</tr>
</tbody>
</table>