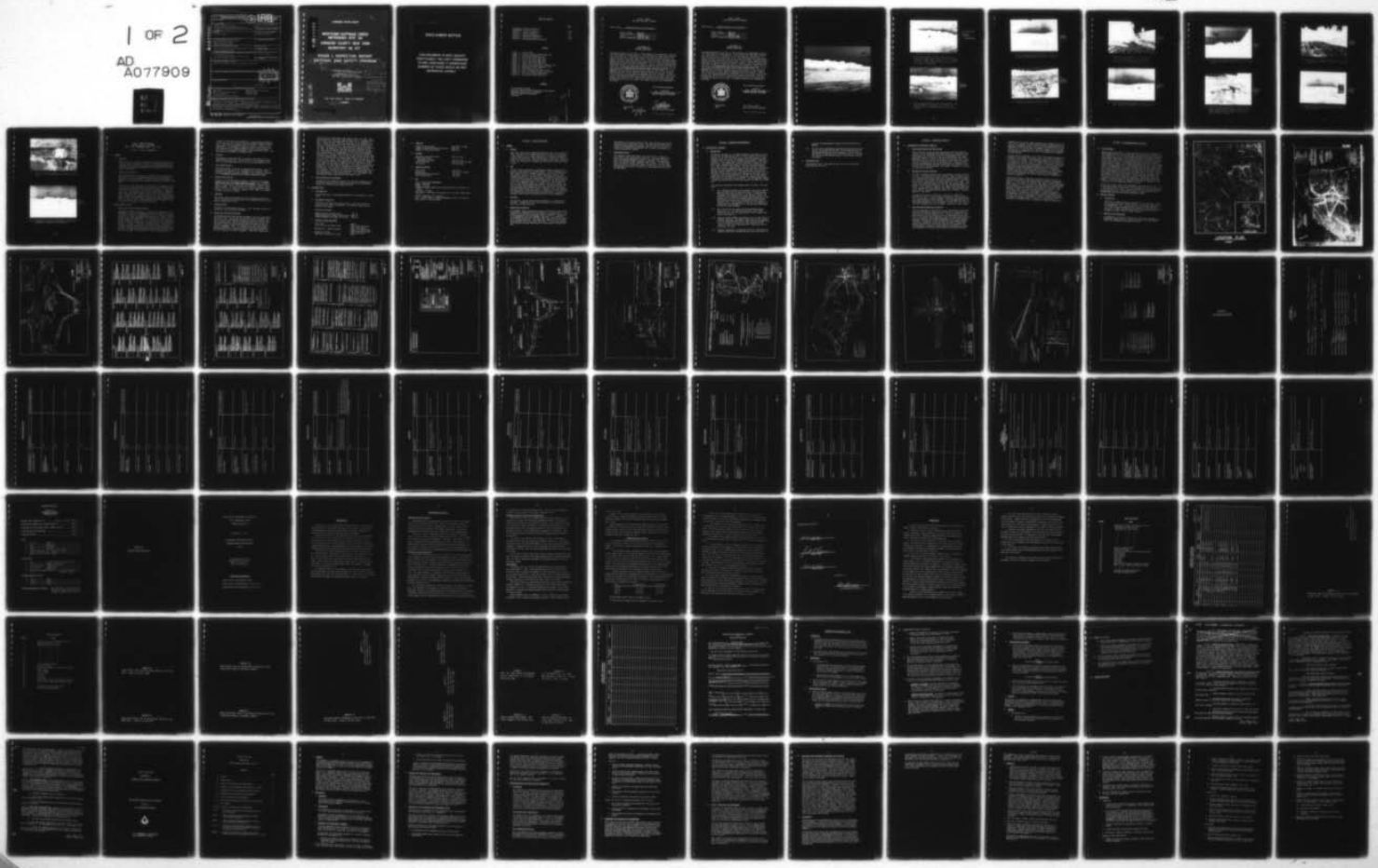
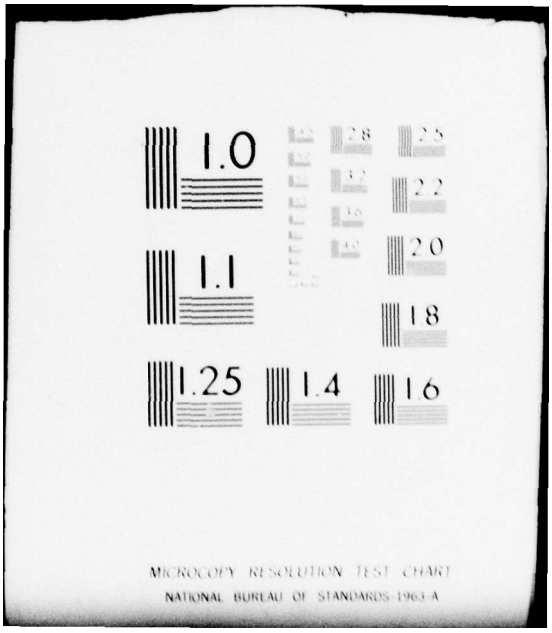
AD-A077 909 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. NEWTOWN-HOFFMAN CREEK WATERSHED SI--ETC(U)
JUL 78 J B STETSON DACW51-78-C-0035
UNCLASSIFIED NL

1 OF 2
AD A077909




1.0
1.1
1.25
1.4
1.6
2.0
2.2
2.5
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle)	5. TYPE OF REPORT & PERIOD COVERED
Phase I Inspection Report Newtown-Hoffman Creek Watershed Site 3A Chemung River Basin, Chemung County, New York Inventory No. N.Y. 617	Phase I Inspection Report National Dam Safety Program
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) John B. Stetson	8. CONTRACT OR GRANT NUMBER(s) DACW-51-78-C-0035
9. PERFORMING ORGANIZATION NAME AND ADDRESS Dale Engineering Company, Inc Bankers Trust Building Utica, New York 13501	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS New York State Department of Environmental Conservation/ 50 Wolf Road Albany, New York 12233	12. REPORT DATE 28 July 1978 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) Department of the Army 26 Federal Plaza/ New York District, CofE New York, New York 10007	15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; Distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

DDC RECEIVED DEC 12 1979 A

18. SUPPLEMENTARY NOTES

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DDC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability
Newtown-Hoffman Site 3A Dam
Chemung County
Newtown Creek

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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.
Newtown-Hoffman Creek Watershed Site 3A was still under construction at time of this report. Dam has not held an impoundment. Further evaluation at the time of filling was recommended.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

AD A077909
DDC FILE COPY

AD A077909

CHEMUNG RIVER BASIN

NEWTOWN-HOFFMAN CREEK WATERSHED SITE 3A

CHEMUNG COUNTY NEW YORK

INVENTORY № 617

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM.

Newtown-Hoffman Creek Watershed Site 3A, Inventory Number 617, Chemung River Basin, Chemung County, New York. Phase I Inspection Report.

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED

CONTRACT NO. DACW 51-78-C-0035

DDC FILE COPY

DDC
RECEIVED
DEC 12 1979
A

NEW YORK DISTRICT CORPS OF ENGINEERS

JULY 1978

John B. Stetson

393 970

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DDC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

TABLE OF CONTENTS

FIGURES

APPENDIX

Accession For
NTIS GRA&I
DDC TAB
Unannounced
Justification
By
Distribution/
Availability Codes
Dist | Avail and/or special
A 23

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam Newtown-Hoffman Site 3a Dam NY617

State Located New York
County Located Chemung
Stream Newtown Creek
Date of Inspection June 14, 1978

ASSESSMENT OF GENERAL CONDITIONS

The Newton-Hoffman Site 3a Dam is a multi-purpose earth embankment structure with flood control storage capacity. The structure has been under construction since 1974 and is currently in the final stages of construction. To date the reservoir has never been filled. The dam designer and construction agency, the Soil Conservation Service, has made some major structural modifications and repair work during construction. At this stage, nothing has been determined to render the dam to be unsafe. However, since the reservoir has never been filled, the inspection report has not covered all the criteria according to the Recommended Guidelines for Safety Inspection of Dams. It is anticipated the structure will be filled in the spring of 1979. It is recommended that the dam be inspected upon filling and again in the spring of 1980 and that this report should be amended with those findings. A hydrologic evaluation was performed and determined that the structure will be able to pass the Probable Maximum Flood without overtopping the dam. Stability computations and field soils information obtained during construction were reviewed and found to be in order. No remedial measures are recommended at this time.

STATE OF NEW YORK
DALE ENGINEERING COMPANY, INCORPORATED
LICENSED PROFESSIONAL ENGINEER
NO. 076

Dale Engineering Company

John B. Stetson, President

Approved By:
Date: 28 July 78

Col. Clark H. Benn
New York District Engineer

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam Newtown-Hoffman Site 3a Dam NY617

State Located New York
County Located Chemung
Stream Newtown Creek
Date of Inspection June 14, 1978

ASSESSMENT OF GENERAL CONDITIONS

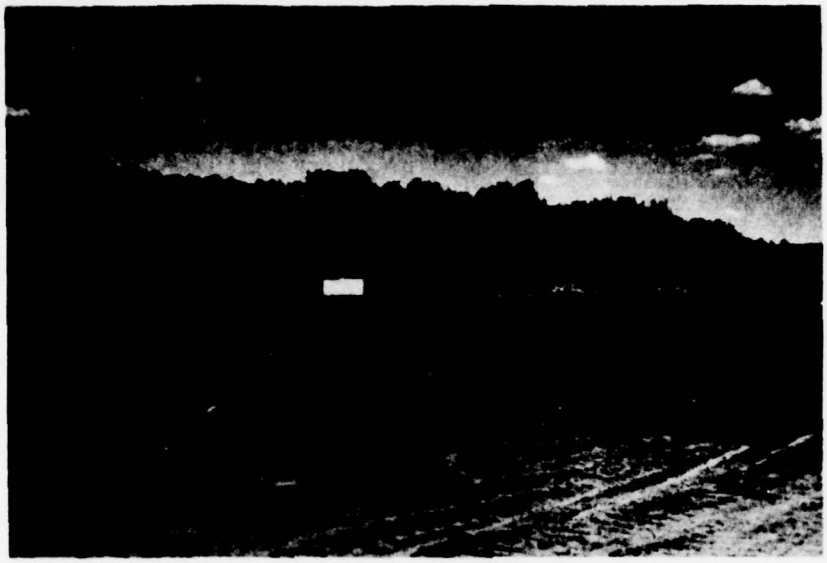
The Newton-Hoffman Site 3a Dam is a multi-purpose earth embankment structure with flood control storage capacity. The structure has been under construction since 1974 and is currently in the final stages of construction. To date the reservoir has never been filled. The dam designer and construction agency, the Soil Conservation Service, has made some major structural modifications and repair work during construction. At this stage, nothing has been determined to render the dam to be unsafe. However, since the reservoir has never been filled, the inspection report has not covered all the criteria according to the Recommended Guidelines for Safety Inspection of Dams. It is anticipated the structure will be filled in the spring of 1979. It is recommended that the dam be inspected upon filling and again in the spring of 1980 and that this report should be amended with those findings. A hydrologic evaluation was performed and determined that the structure will be able to pass the Probable Maximum Flood without overtopping the dam. Stability computations and field soils information obtained during construction were reviewed and found to be in order. No remedial measures are recommended at this time.

Dale Engineering Company

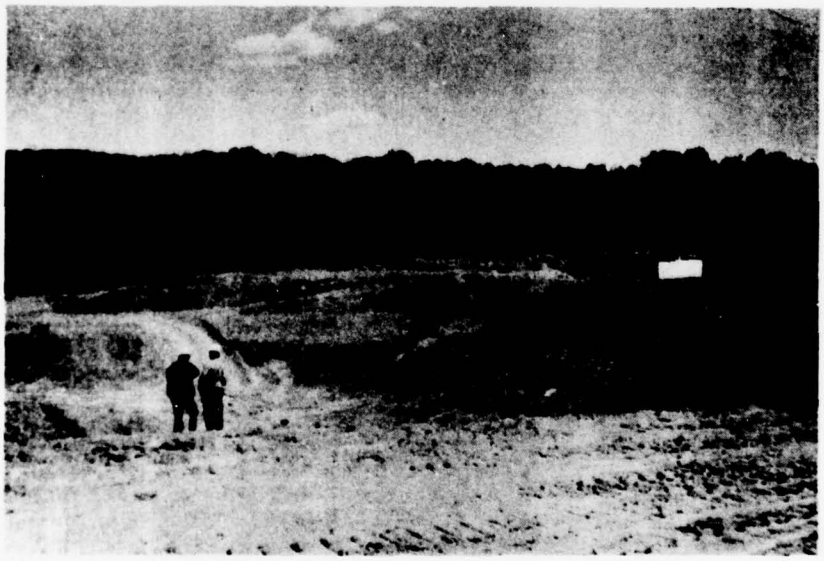
John B. Stetson, President

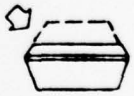
Approved By:
Date:

Col. Clark H. Benn
New York District Engineer

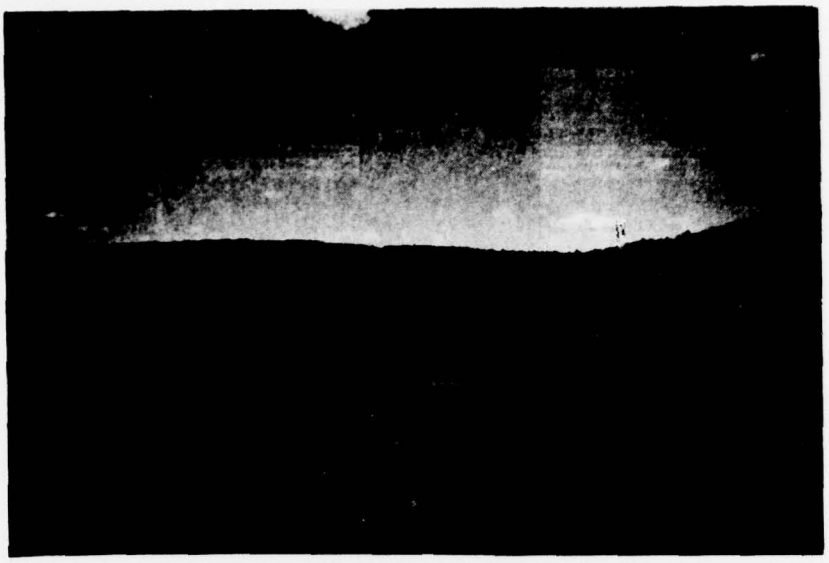


1. View across front of dam. Notice center portion of dam cut to install new principal spillway intake and discharge pipe. Normal pool over flow intake elevation is at top of concrete structure.





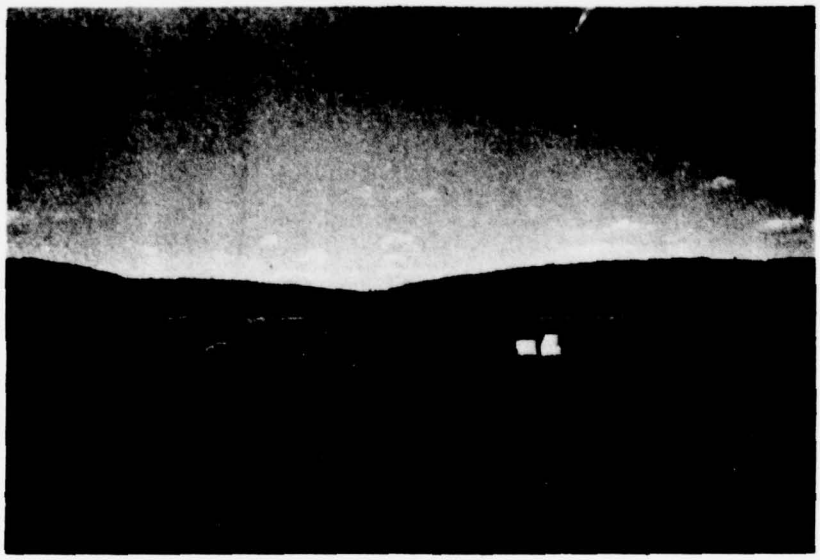
2. View looking down into dry impoundment area in the front of the dam. At time of inspection multi-purpose dam had never been filled.



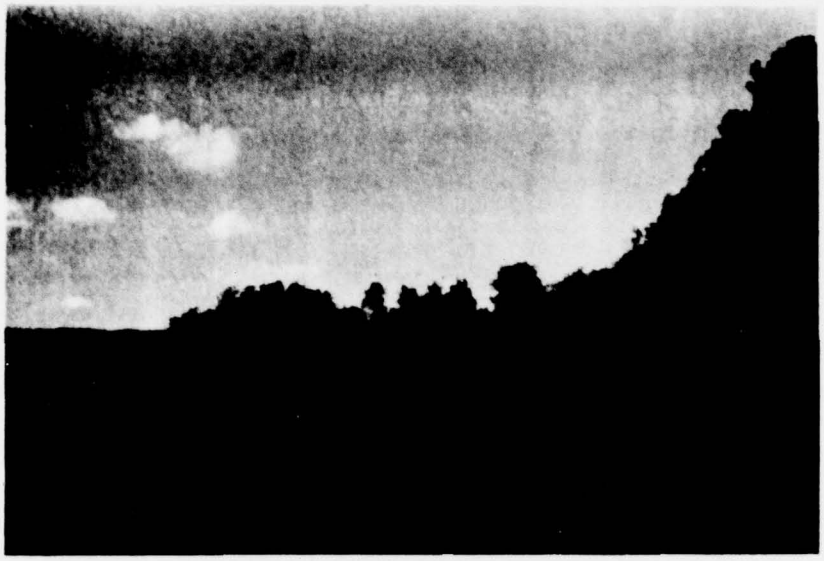
3. View looking upstream from dam. Pond area contains approximately 6 inches of water.

4. Detail of riprap on face of dam.

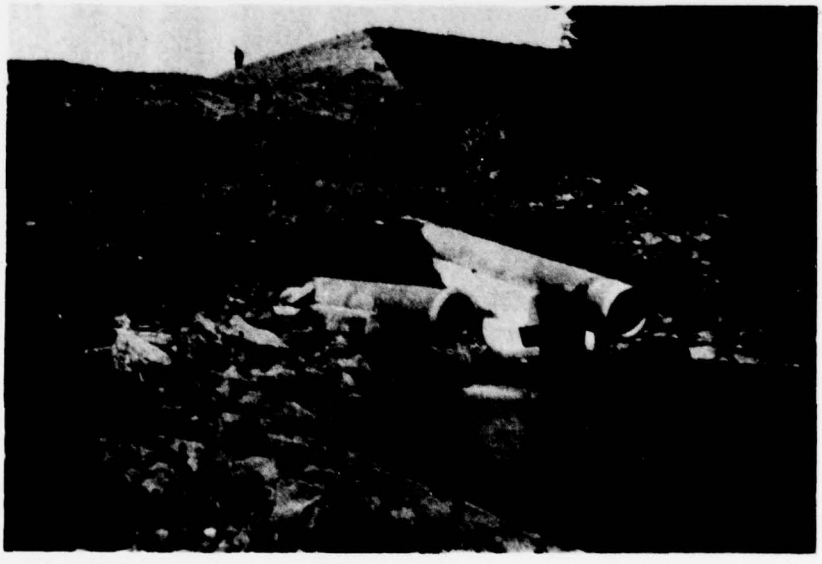
5. Downstream embankment at west abutment. Stone-filled trench at west abutment carries surface drainage and treated effluent from sewage treatment facility.



6. View upstream from middle of grassed spillway. Spillway founded in west abutment.

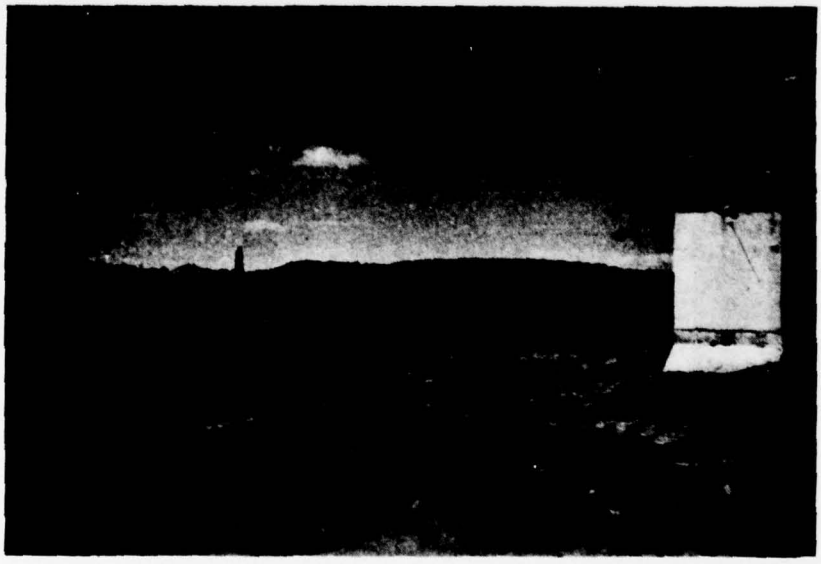


7. View of spillway control section looking north.

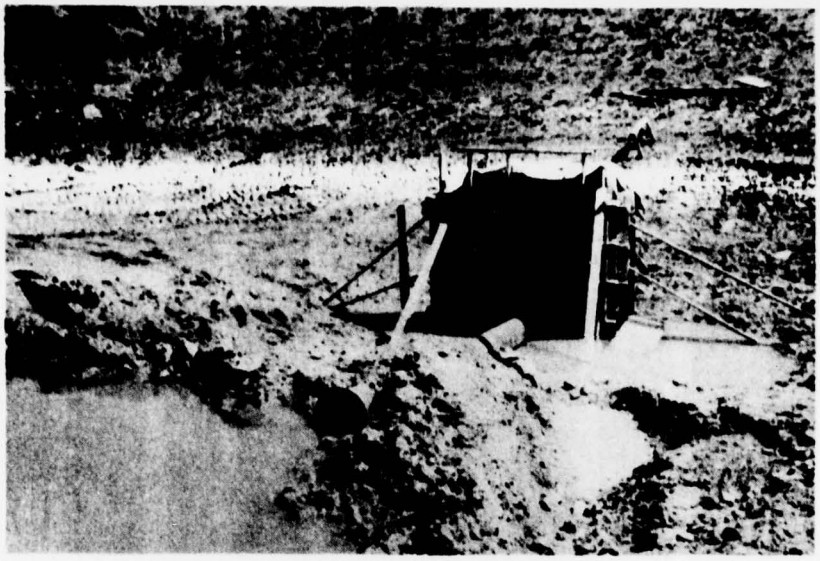


8. Detail of discharge pipes; left pipe drawdown, right pipe principal spillway for multi-purpose pool. Notice small drain pipe on left of pipes.

9. South view of compacted earth in cut section over in-place seepage collars and principal spillway pipe.



10. North view, same area as 9, with intake tower in photo.



11. Detail of new drawdown gate under construction.

12. Overview of upstream embankment with new drawdown structure in foreground.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM - NEWTOWN-HOFFMAN ID# - NY617

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and The New York State Department of Environmental Conservation.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the structural and hydraulic condition of the Newtown-Hoffman Dam and appurtenant structures, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the State of New York.

This Phase I inspection report does not relieve an Owner or Operator of a dam of the legal duties, obligations or liabilities associated with the ownership or operation of the dam. In addition, due to the limited scope of services for these Phase I investigations, the investigators had to rely upon the data furnished to them. Therefore, this investigation is limited to visual inspection, review of data prepared by others, and simplified hydrologic, hydraulic and structural stability evaluations where appropriate. The investigators do not assume responsibility for defects or deficiencies in the dam or in the data provided.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Newtown-Hoffman Creek Dam is a rolled earth embankment. The embankment is made up of homogenous fill material with a core cut-off trench of selective homogenous earth fill. The dam is approximately 53 feet high and approximately 800 feet in length. The upstream slope of the embankment is 3-1/2 horizontal to 1 vertical and the downstream slope is 3 to 1. The dam is a multi-purpose facility providing a recreational pool and serving as a flood control facility. The dam is located in a rural setting. The principal spillway was under construction at the time of the inspection. A failure of the concrete at the base of the originally constructed principal spillway structure necessitated the reconstruction of the principal spillway in a new location. This construction was in

progress at the time of the inspection. The principal spillway is a riser and pipe type structure which discharges through a 30 inch pipe. The original discharge pipe now serves as a drain for the impoundment. An emergency spillway is located to the west of the dam structure and is located completely within original ground. The width of the emergency spillway is approximately 200 feet. The dam spillway discharges into Newtown Creek.

b. Location

The Newtown-Hoffman Creek Dam is located in the Town of Erin in Chemung County, New York. The dam is built across Newtown Creek and is located approximatley 2-1/2 miles from the Hamlet of Erin.

c. Size Classification

The maximum height of the dam is approximatley 53 feet. The conservation storage capacity is estimated to be 1,369 acre feet. Therefore, the dam is in the intermediate size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

The dam is in the high hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams since it contributes to the control of runoff from its headwaters location with a number of other similar structures which makeup a regional flood control system. The Hamlet of Erin is located downstream approximately 2-1/2 miles. Potential damage is also evident to a number of homes on Laurel Hill Road.

e. Ownership

The dam has been constructed by the Soil Conservation Service of the U.S. Department of Agriculture for the Chemung County Soil and Water Conservation District.

f. Purpose of Dam

The dam is a multi-purpose facility. It will be used for both recreational and flood control purposes.

g. Design and Construction History

The Newtown-Hoffman Creek Dam was designed by the Soil Conservation Service in 1971. Invitations for bids were issued in March, 1974 and Construction Contract was awarded to Simone Construction Company of Long Island. Notice to Proceed was given in June of 1974. The cutoff trench was over-excavated from that shown on the construction drawings. Earth fill operations on the cutoff trench began in September, 1974. As excavation operations progressed, it was determined that an impervious blanket upstream from the dam would be necessary to control seepage. In May 1975, forming and

placing of the reinforcement steel began on the riser slab. Concrete placement on the riser began in May of 1975. Concrete placement in the riser continued until the final pour in December of 1975. In May of 1976, cracks were observed in the transition wall and at the downstream wall of the riser section of the principal spillway. By August of 1976, these cracks had opened to maximum of 1/2 inch. An Engineering investigation report conducted by the U.S. Department of Agriculture Soil Conservation Service indicates that the placement of the embankment of the dam during September and October of 1975 was done with the fill at moisture content consistently above optimum. The fill was brought up more quickly than the riser concrete and an isolated lower area was left at the riser to be filled in later. The investigation report concludes that the failure of the concrete riser was due to a combination of excessive earth loads and the lack of adequate vertical reinforcing in the riser section at the base of the riser. This report is included in Appendix B. In 1977, the Soil Conservation Service designed a new spillway and riser section to replace the old damaged spillway riser section. Construction of this new riser and spillway section was underway at the time of the inspection. The photographs indicate the progress in this reconstruction. Until the present time, the Newtown-Hoffman Creek Dam has never been filled.

h. Normal Operational Procedures

See Appendix B on Inspection Reports for Operations Agreement and Guidelines between the Soil Conservation Service and the Chemung County Soil and Water Conservation District.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of the Newtown-Hoffman Site 3A watershed is 1,709 acres.

b. Discharge at Dam Site

The dam is not operational and was still in the later stages of construction at time of inspection. No historical date is available for this report.

Computed Discharges:

Ungated service spillway (max.)	136 cfs
Ungated emergency spillway, design storm	2392 cfs
Ungated emergency spillway, top of dam	7155 cfs

c. Elevation (feet above MSL)

Top of dam	1494.5	
Top of service spillway intake	1484.5	Drop Inlet Weir
	1487.5	Riser Crest
Maximum pool - design discharge	1490.4	(1/2 PMF by SCS)
	1491.4	(1/2 PMF by Dale)
Emergency Spillway	1488.8	(100 year)
Steam bed at centerline of dam	1441.5	

d. Reservoir

Length of maximum pool	4130 feet (1/2 PMF)
Length of recreation/conservation pool	3980 feet
Length of flood control pool	4080 feet

e. Storage

Recreation/conservation pool	1369 acre feet
Flood control pool (emergency spillway)	455 acre feet
Design Surcharge	639 acre feet (1/2 PMF)
Top of Dam	1191 acre feet

f. Reservoir Surface

Top of dam	145 acres
Maximum pool	128 acres (1/2 PMF)
Recreation/conservation pool	100 acres
Flood control pool	122 acres

g. Dam

Type - Rolled earth embankment.
Length - 800 feet.
Height - 53 feet.
Freeboard between normal pool elevation and top of the dam - 10 feet.
Top width - 18 feet.
Side Slopes - Upstream 3.5 horizontal to 1 vertical, downstream 3 to 1.
Zoning - Homogenous fill material.
Core - Cutoff trench of selected homogenous earth fill material.
Grout curtain - None recorded.

SECTION 2 - VISUAL INSPECTION

2.1 SUMMARY

a. General

The visual inspection of Newtown-Hoffman Dam took place on June 14, 1978. The dam is still under construction by the U.S. Department of Agriculture's Soil Conservation Service following two modifications in the structure. These changes were required due largely to conditions found in the field and in design as described in Section 1.2.g. As of the date of inspection, the reservoir has never been filled.

b. Dam

The dam visually conforms to the drawings except as noted on the as-built plans which are provided herein. The dam embankment is in good condition with an adequate vegetative cover crop for protection against erosion. At the time of inspection a 20-foot cut through the center of the dam existed to accommodate the new principal spillway conduit and intake tower as part of the modification to the dam. The exposed cut section showed the dam section material to be homogenious glacial till type soils. The steeper portion of east abutment appears to require some gravel material for local run-off drainage-way stabilization. Another area where the SCS team member who accompanied the inspection effort indicated drain-way stabilization for run-off is needed at the east abutment drainage cutoff trench which drains a sizable area east of the dam. The upstream face riprap requires some maintenance, a condition related to the current construction activity on the embankment.

c. Spillway

The spillway, located above the west abutment, is a grassed type spillway. Inspection of this area indicates the spillway cover crop to be in good condition.

d. Appurtenant Structures

The drawdown intake structure was under construction at the time of inspection, a photograph of the structure is included herein. The new principal spillway intake was recently completed. Restoration of the embankment cut and drawdown intake was still incomplete. The drawdown and principal spillway pipes were inspected and found to be in good condition. The plunge pool, however, was not apparently modified during the repair work and it is questioned whether the discharge pipe may reach across the designated discharge pool area.

The reservoir area has not been filled. The contractor has cleared the entire multi-purpose pool area. The 1700-acre drainage area is largely forested above the reservoir and the cover crop is not indicative of sedimentation problems, nor is there any evidence of a severe sedimentation problem.

f. Downstream Channel

The immediate downstream channel does not show any evidence of erosion due to the construction of the dam. The area immediately below the grassed emergency spillway is a wooded area and would have a considerably higher roughness coefficient. The downstream area also seems to have a relatively flat gradient. A rare flood event such as the 1/2 PMF may create a flood pool in the area below the dam and cause erosion to portions of the downstream toe of the dam embankment.

SECTION 3 - HYDROLOGY AND HYDRAULICS

3.1 EVALUATION OF FEATURES

a. Design Data

The dam was designed for 1/2 Probably Maximum Flood (PMF) as criteria for the spillway design flood. The Soil Conservation Service, designer of the dam, provided a copy of the design manual to the insection team for review. The computations provided in Appendix C prepared for this report were prepared independently of SCS's computations. The computations indicate that the spillway will pass the 1/2 PMF (assessed equivalent to the SPF) with approximately 2-1/2 feet of flow in the spillway. The multi-purpose reservoir has a flood control storage pool of 455 acre feet with a vegetative grassed spillway reportedly designed to discharge initially at a 100 year return interval event. The dam was also evaluated for a PMF event and was found to pass that event with less than a foot of freeboard. Peak flow discharges for the PMF and SPF were approximately 5200 cfs and 2500 cfs. The reservoir storage capacity was evaluated using the Modified Puls Method. The PMF peak was reduced insignificantly while the 1/2 PMF was reduced from 3000 cfs to 2500 cfs.

The following assumptions and procedures were utilized in the analysis:

(i) Unit hydrograph parameters both Snyder's and Clark's methods were evaluated with available hydrologic information data. USGS quad sheets were primarily utilized to determine the parameters for computations for both methods. Results obtained from the different approaches were weighed and it was determined to use the Clark method computations obtained from the North Atlantic Division Water Resource Study of February, 1972. The computed TC value of 1.79 compares favorable with the designers TC of 1.43 which was determined by the SCS overland method.

(ii) PMF rainfall data was obatined from Hydrometeorlogical Report No. 51. Six, twelve, twenty-four, forty-eight, seventy-two hour for ten square miles rainfall values were used in the analysis.

(iii) Computer program UHCOMP, developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center was used to compute the unit hydrograph and runoff. Base flow was assumed to be 2 cfs per square mile while loss rates were set at 1.0 inches for initial abstraction and 0.1 inches per hour for continuous loss rate.

(iv) Computer program HEC-1, developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center was used solely for

routing flood hydrographs through dam using Modified Puls Method.

(v) The principal and emergency spillway were assumed both operational to pass PMF and 1/2 PMF. The drawdown pipe would not be operational for flood discharging. At the start of the PMF and 1/2 PMF events the reservoir would be at normal pool elevation with 455 acre feet of flood control storage available.

b. Experience Data

No experience data is available for ths site since the dam has never been put into use.

SECTION 4 - STRUCTURAL STABILITY

4.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations And Data Review

The construction of the dam and appurtenances have not been completed. The dam embankment had essentially been completed but the requirement for a redesign of the spillway/drawdown riser has necessitated removal of parts of the dam, approximately the center embankment section to permit construction of the new riser. Similarly, new construction for the drawdown intake below the upstream toe was on-going at the time of the inspection. Generally, the existing dam embankment and appurtenant structures conform to the as-built plans. No misalignment, settlement, sloughing, or erosion of concern was observed.

b. Geology and Seismic Stability

The site is mapped as glacial drift surrounding a valley of alluvial fill. Site subsurface records indicate a depth of about 20 feet of sandy-gravally alluvium overlying silty-sandy lacustrine deposits. Glacial drift varies from poorly sorted stoney till to sorted glaciofluvial sandy gravels and glaciolacustrine silty sands. Records of the subsurface work indicate that the various types of deposits are relatively continuous. No rock outcroppings were observed. Drill records to about 50 ft. depth did not encounter bedrock. The New York State Geologic Map (1971) indicates this area to be underlain by Upper Devonian shales and siltstones. Depth to bedrock is not known.

No known faults exist in the area. The site is located in a Seismic Risk Zone 1. Only two minor earthquakes have occurred in this region, about 10 miles southwest of the site according to New York State Geological Survey records. One earthquake occurred in 1888 (Modified Mercalli II) and another in 1973 (M.M. II). No significant earthquake activity of greater intensity is anticipated.

c. Data Review and Stability Evaluation

The U.S. Department of Agriculture - Soil Conservation Service has performed an extensive geologic investigation in preparation for planning this reservoir-dam facility. The major portion of earth work required for this project was to be undertaken with on-site soils. The design study conducted by the Soil Conservation Service has been thorough, and included embankment stability and seepage analysis. The results of the SCS stability and seepage analysis (included in Appendix D) were reviewed for general content and method (numerical work and details relating to laboratory data interpretation, checking of established and assigned soil properties necessary for design, and its design calculations were not

checked), and it is felt items considered and procedures for evaluation are in general accordance with commonly accepted methods of reservoir embankment design. Similarly, field construction of the embankment structure was under the general supervision of SCS personnel, and it is felt that the indicated procedures for placement and checking of embankment soils are in accordance with commonly accepted methods.

The construction completed at the time of the inspection generally conforms to the design and as-built plans, portions of which are included in this report. The embankment slopes of 3 horizontal to 1-1/2 vertical upstream, and 3 to 1 downstream are felt to be proper/adequate for the soil types utilized. A foundation cutoff constructed of the site's more impermeable soils and provisions for handling through-the-embankment seepage have been provided as suggested by good design/construction practice. An impervious blanket installed in the impounding area adjacent to the upstream toe of slope has been provided as a result of a water budget evaluation (blanket was not necessitated because of seepage and stability concerns).

Concerning structural stability, unresolved issues as of the inspection date relate to the needed proper placement of embankment material in the area of the new spillway riser to achieve the final shape, and to the effect of reservoir impoundment on the embankment where completed. Soil placement performed under the supervision of SCS personnel would be expected to be properly installed. Some seepage is expected to occur through the dam structure. It is anticipated that a period of many months is necessay before a steady state of seepage will be reached. Periodic inspections of the embankment and its downstream area should be performed during and after the reservoir impoundment to detect possible occurrences of unexpected seepage because of erratics in the natural soil foundation or abutment areas, or because of improper construction.

SECTION 5 - ASSESSMENT/REMEDIAL MEASURES

5.1 DAM ASSESSMENT

On the basis of the Phase I visual examination, the earth embankment of the Newtown-Hoffman Site 3a Dam appears to be adequate for normal reservoir operation. The facility has been designed using modern standards and adequate supervision of the construction practices appear to have taken place. Reevaluation of the existing soils at the dam site prompted the installation of an impervious blanket at the base of the upstream face of the dam. This impervious blanket was installed for water budget purposes rather than for dam seepage and stability. Upon completion of the embankment fill, fractures were noted in the concrete riser which form the principal spillway. Analyses indicate that the cause of this failure was due to excessive soil pressures combined with insufficient reinforcement of the principal spillway riser. In order to repair the damage, the existing principal spillway riser was abandoned and a new principal spillway constructed. The new spillway was under construction at the time of the dam inspection. Observations during the progress of the work indicate that the remedial work should prove successful. The dam designer is requested to review the adequacy of the plunge pool and the downstream channel capacity.

At the time of this report, the impoundment has never been filled. This situation precludes the detection of any seepage defects that may exist in the dam structure. Due to the fact that there has not been any water in the reservoir, this report cannot assess all requirements of the Recommended Guidelines for Safety Inspection of Dams.

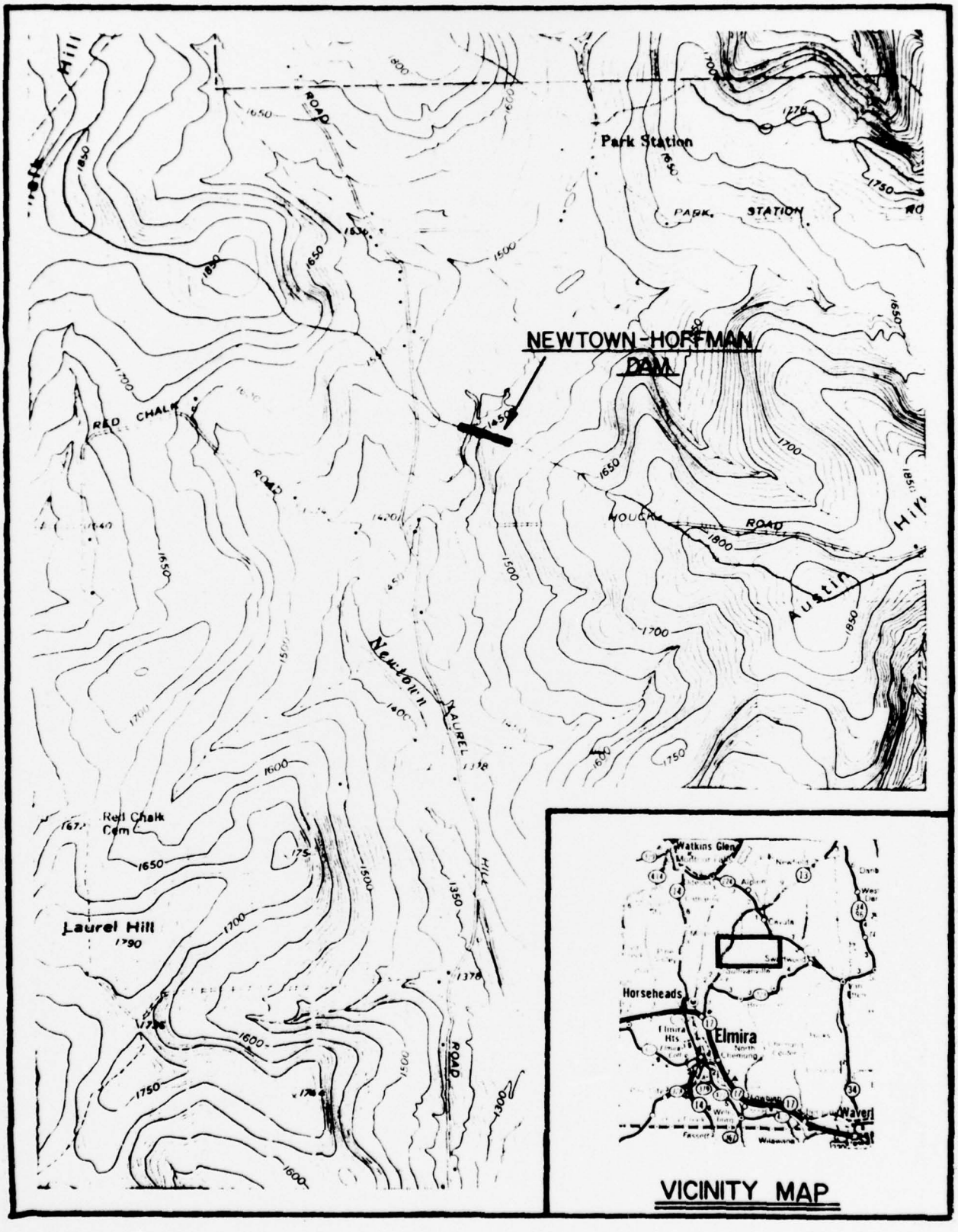
5.2 REMEDIAL MEASURES

a. Alternatives

There are no remedial measures required for this structure. Since the dam has never been filled with water, no remedial measures can be recommended at this time nor have any defects been detected. This report should be amended with an inspection while being filled and also to inspect the dam approximately one year after the impoundment has been filled to normal capacity.

b. Operation and Maintenance

See Appendix B on Inspection Reports for Operations Agreement and Guidelines between the Soil Conservation Service and the Chemung County Soil and Water Conservation District.



LOCATION PLAN

FIGURE 1

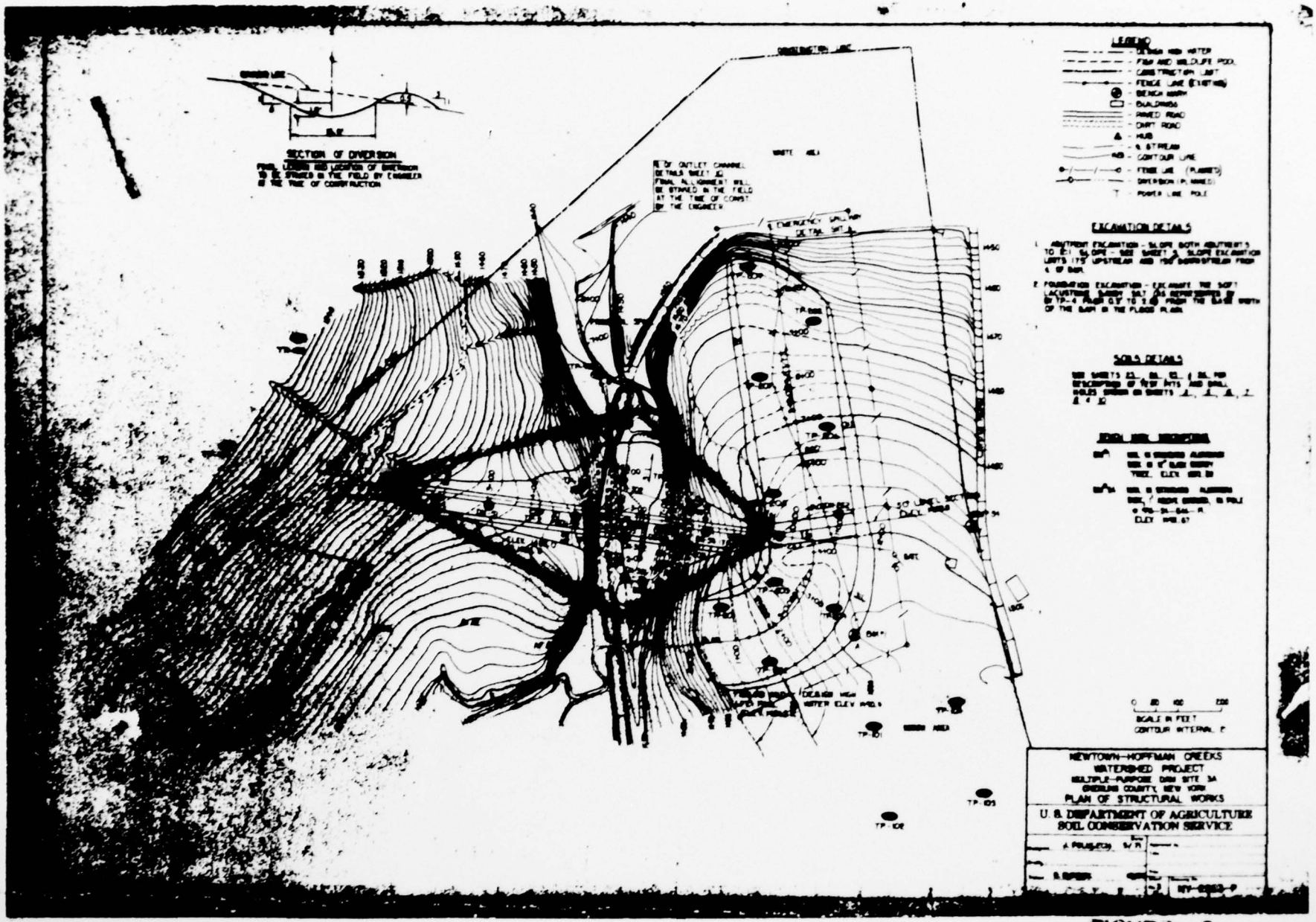

LEGEND
EXCAVATION DETAILS
SOILS DETAILS
NEWTOWN-HOFFMAN CREEKS
WATERSHED PROJECT
MULTIPLE-PURPOSE DAM SITE 3A
CHEMUNG COUNTY, NEW YORK
PLAN OF STRUCTURAL WORKS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FIGURE 2

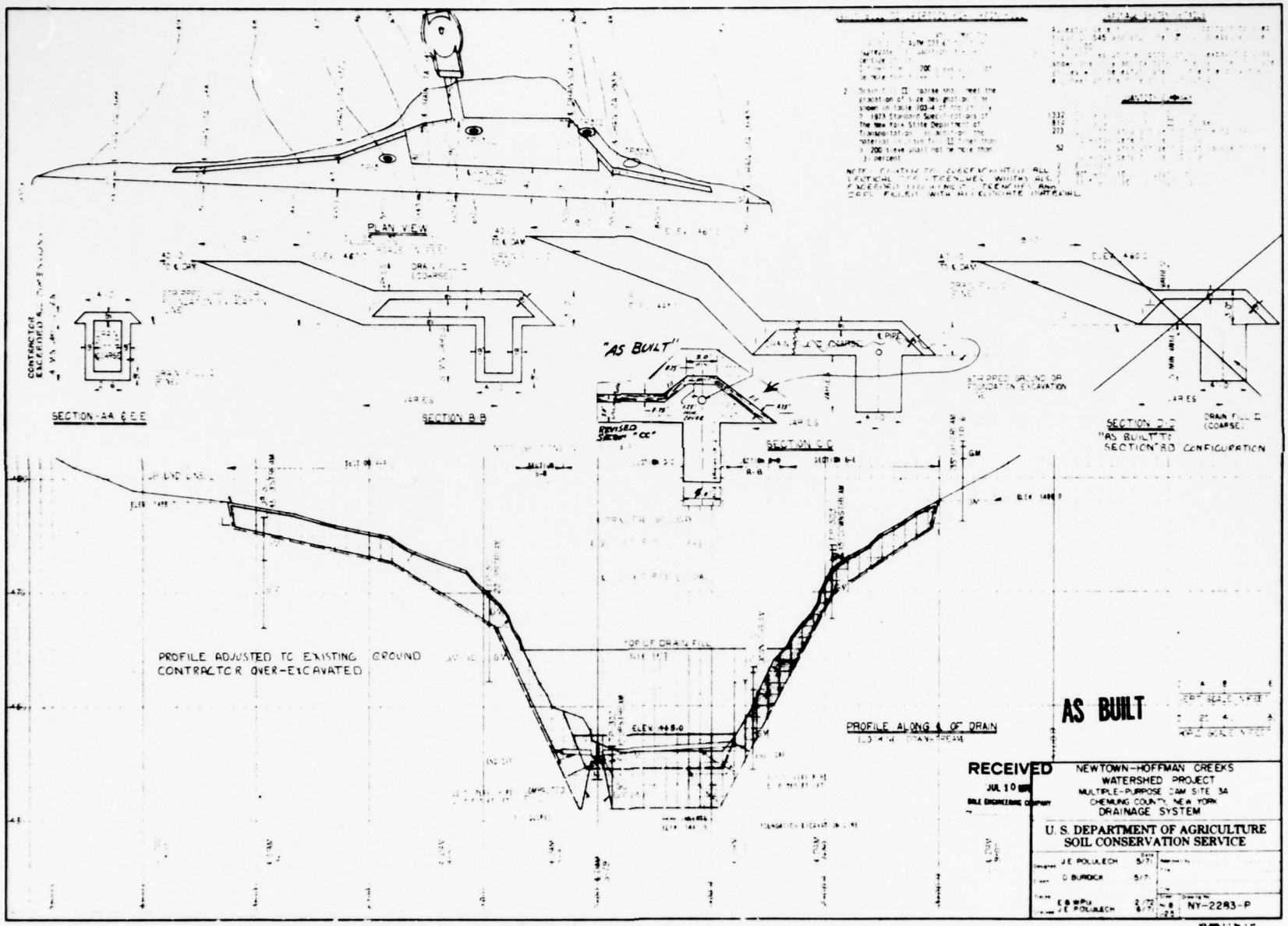
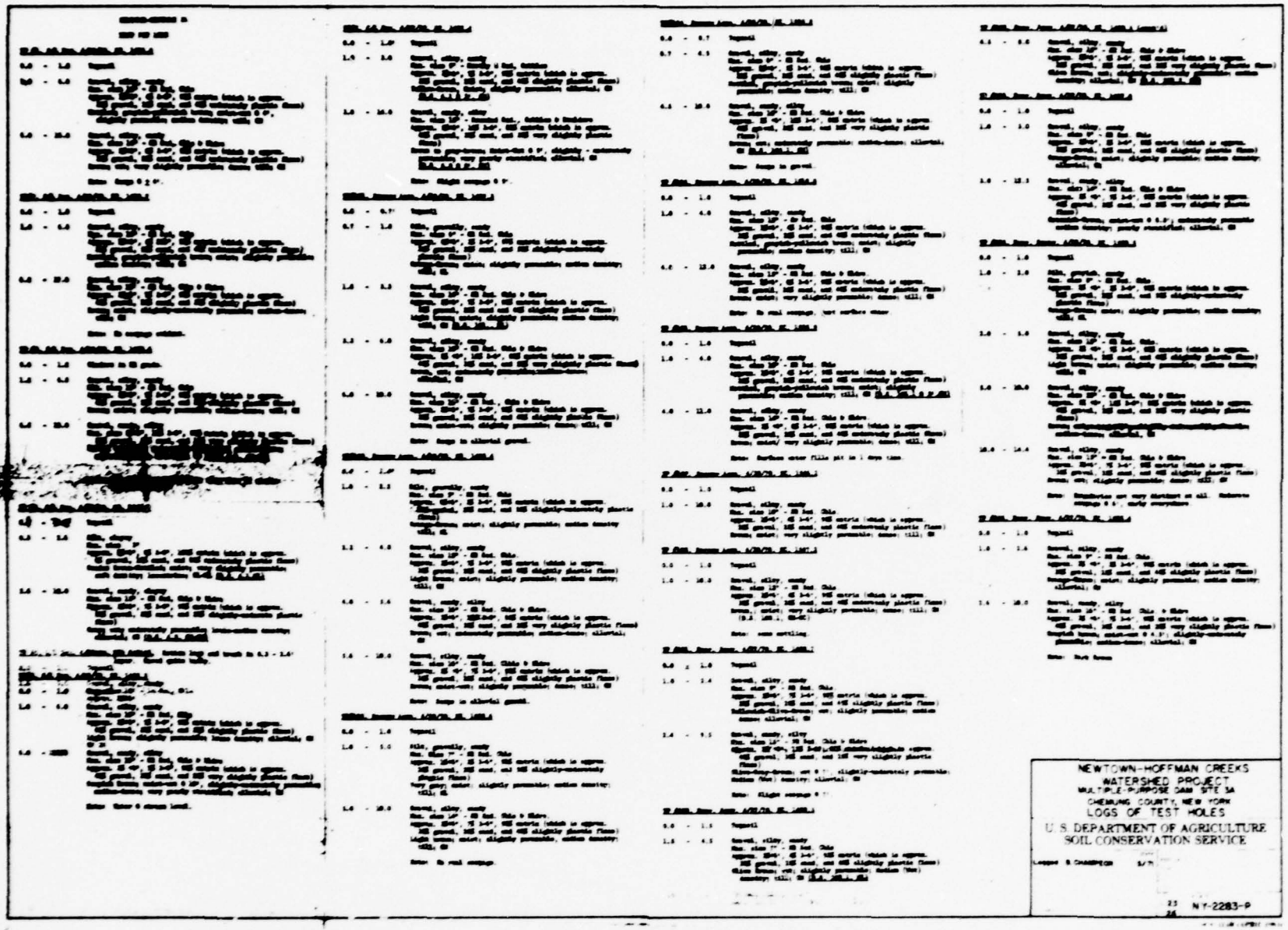

PLAN VIEW
SECTION A-A & E-E
SECTION B-B
"AS BUILT"
SECTION C-C
SECTION D-D
"AS BUILT" CROSS SECTION CONFIGURATION
PROFILE ADJUSTED TO EXISTING GROUND
CONTRACTOR OVER-EXCAVATED
PROFILE ALONG ℄ OF DRAIN
AS BUILT
RECEIVED
JUL 10
NEWTOWN-HOFFMAN CREEKS
WATERSHED PROJECT
MULTIPLE-PURPOSE DAM SITE 3A
CHEMUNG COUNTY, NEW YORK
DRAINAGE SYSTEM
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
J.E. POLULECH
D. BURDICK
NY-2283-P

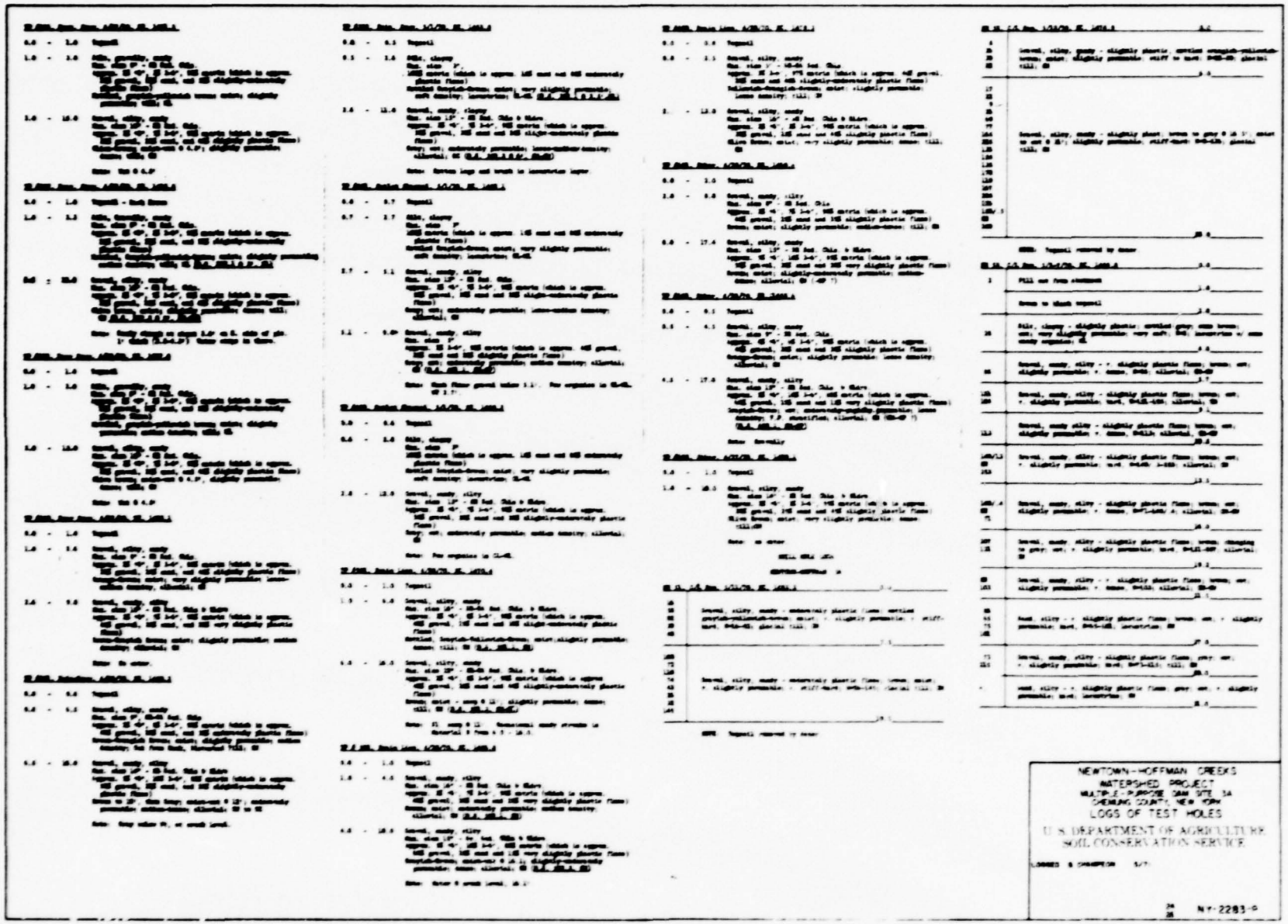
FIGURE 3



NEWTOWN-HOFFMAN CREEKS
WATERSHED PROJECT
MULTIPLE-PURPOSE DAM SITE 3A
CHEMUNG COUNTY, NEW YORK
LOGS OF TEST HOLES
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NY-2283-P

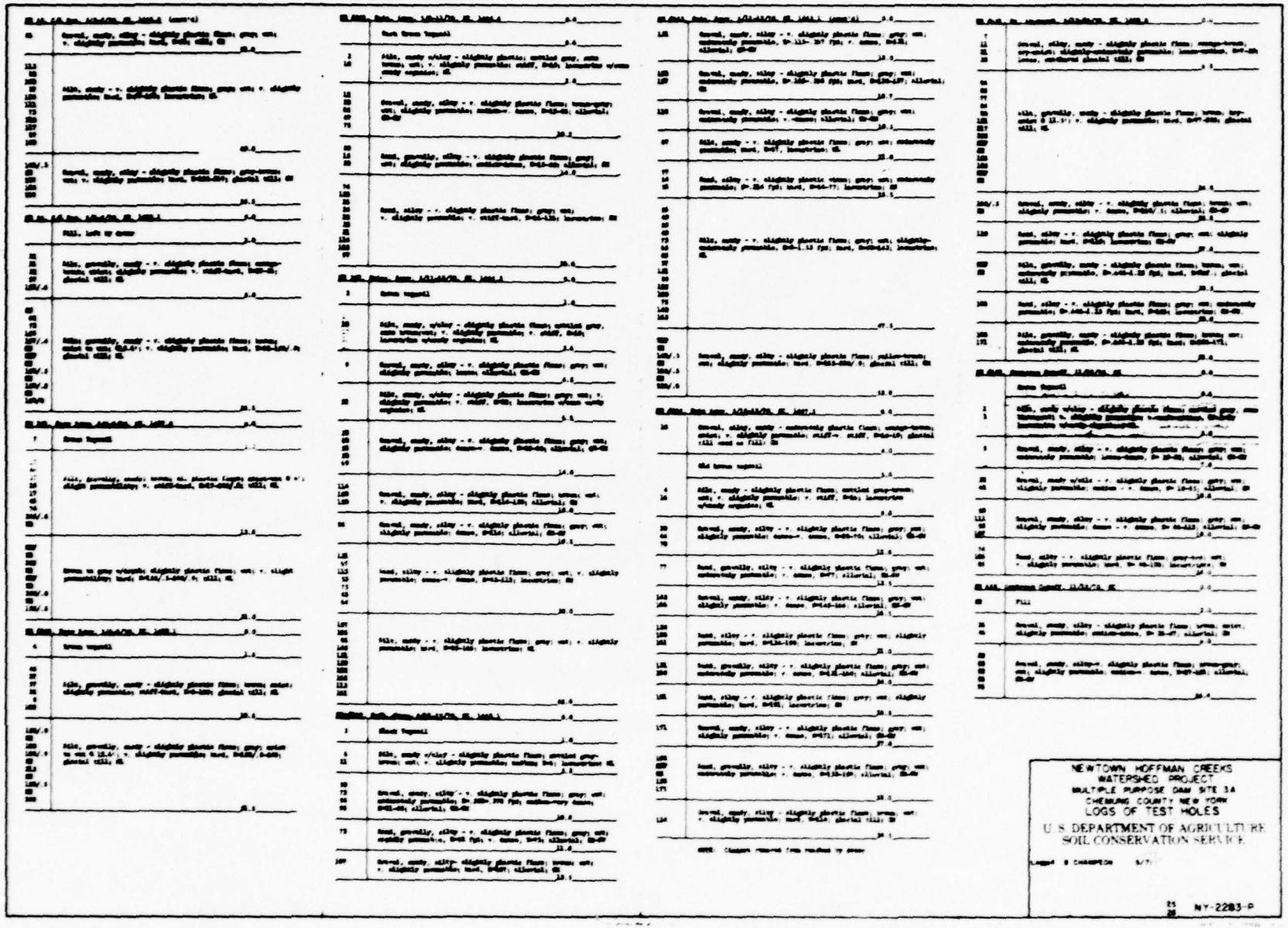
FIGURE 4



NEWTOWN-HOFFMAN CREEKS
WATERSHED PROJECT
MULTIPLE-PURPOSE DAM SITE 3A
CHEMUNG COUNTY, NEW YORK
LOGS OF TEST HOLES
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NY-2283-6

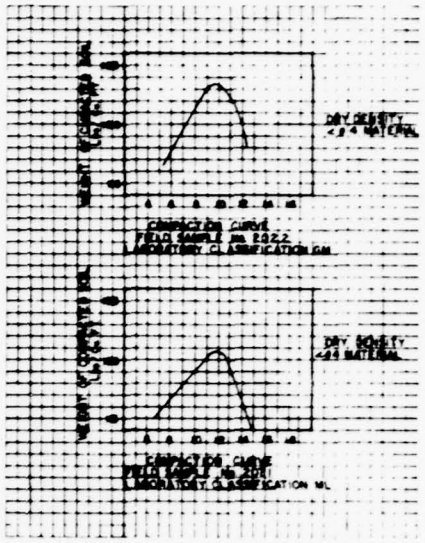
FIGURE 5



NEWTOWN HOFFMAN CREEKS
WATERSHED PROJECT
MULTIPLE PURPOSE DAM SITE 3A
CHEMUNG COUNTY NEW YORK
LOGS OF TEST HOLES
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NY-2283-P

FIGURE 6



NEWTOWN-HOFFMAN CREEKS
WATERSHED PROJECT
MULTIPLE-PURPOSE DAM SITE 3A
CHEMUNG COUNTY, NEW YORK
LOGS OF TEST HOLES
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NY-2283-P

FIGURE 7

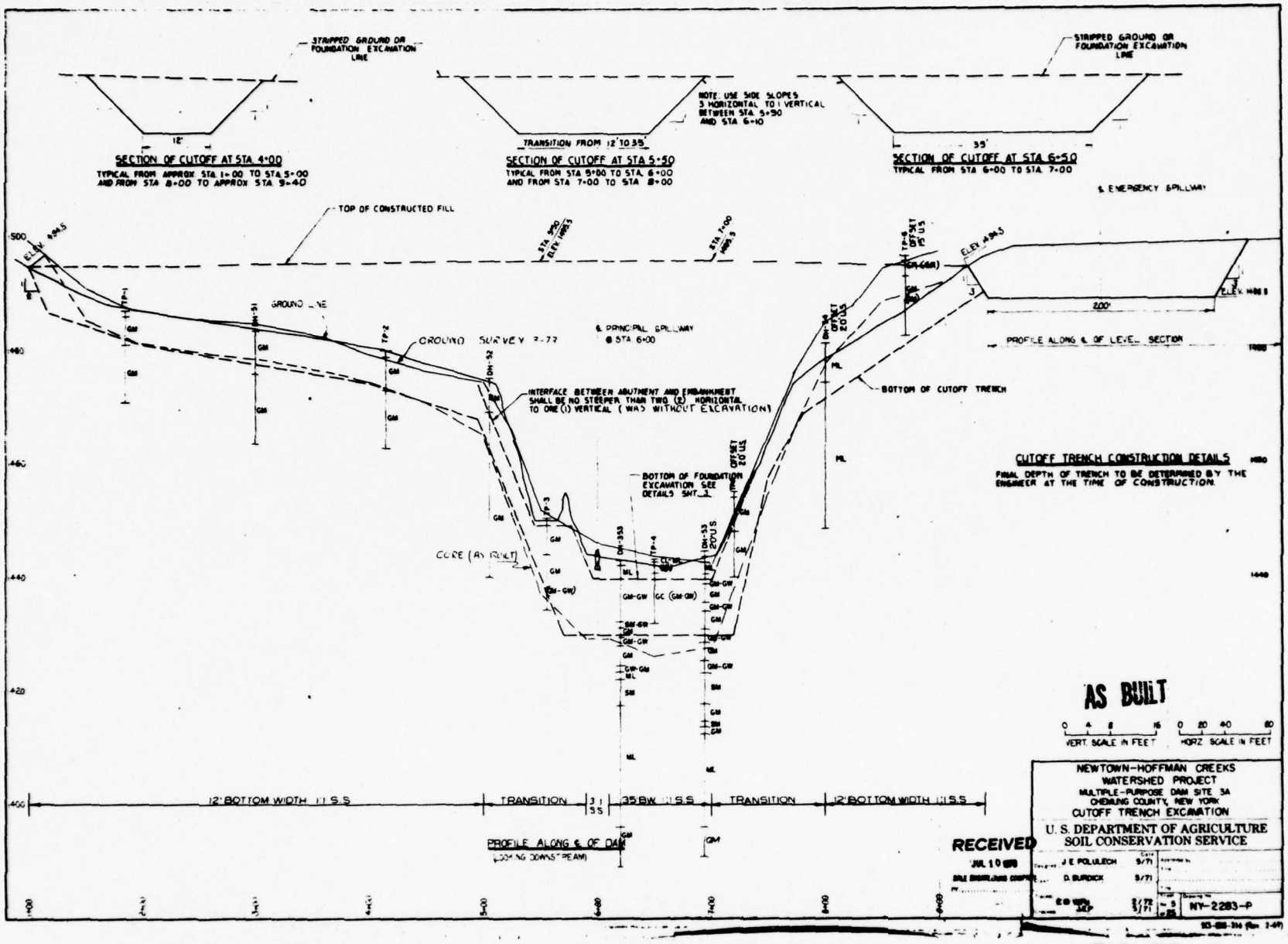

STRIPPED GROUND OR FOUNDATION EXCAVATION LINE
12'
SECTION OF CUTOFF AT STA 4+00
TYPICAL FROM APPROX STA 1+00 TO STA 5+00 AND FROM STA 8+00 TO APPROX STA 9+40
TRANSITION FROM 12' TO 35'
NOTE: USE SIDE SLOPES 3 HORIZONTAL TO 1 VERTICAL BETWEEN STA 5+50 AND STA 6+10
SECTION OF CUTOFF AT STA 5+50
TYPICAL FROM STA 5+00 TO STA 6+00 AND FROM STA 7+00 TO STA 8+00
35'
SECTION OF CUTOFF AT STA 6+50
TYPICAL FROM STA 6+00 TO STA 7+00
℄ EMERGENCY SPILLWAY
TOP OF CONSTRUCTED FILL
ELEV. 494.5
GROUND LINE
GROUND SURVEY 3-77
℄ PRINCIPAL SPILLWAY @ STA 6+00
INTERFACE BETWEEN ABUTMENT AND EMBANKMENT SHALL BE NO STEEPER THAN TWO (2) HORIZONTAL TO ONE (1) VERTICAL (WAS WITHOUT EXCAVATION)
BOTTOM OF FOUNDATION EXCAVATION SEE DETAILS SHT 3
CORE (AS BUILT)
BOTTOM OF CUTOFF TRENCH
PROFILE ALONG ℄ OF LEVEL SECTION
200'
CUTOFF TRENCH CONSTRUCTION DETAILS
FINAL DEPTH OF TRENCH TO BE DETERMINED BY THE ENGINEER AT THE TIME OF CONSTRUCTION.
AS BUILT
VERT. SCALE IN FEET
HORZ SCALE IN FEET
12' BOTTOM WIDTH U.S.S.
TRANSITION
3:1 SS
35 BW U.S.S.
TRANSITION
12' BOTTOM WIDTH U.S.S.
PROFILE ALONG ℄ OF DAM (LOOKING DOWNSTREAM)
RECEIVED
JUL 10
NEWTOWN-HOFFMAN CREEKS WATERSHED PROJECT
MULTIPLE-PURPOSE DAM SITE 3A
CHEMUNG COUNTY, NEW YORK
CUTOFF TRENCH EXCAVATION
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
J. E. POLULECH 9/71
D. BURDICK 9/71
NY-2283-P

FIGURE 8

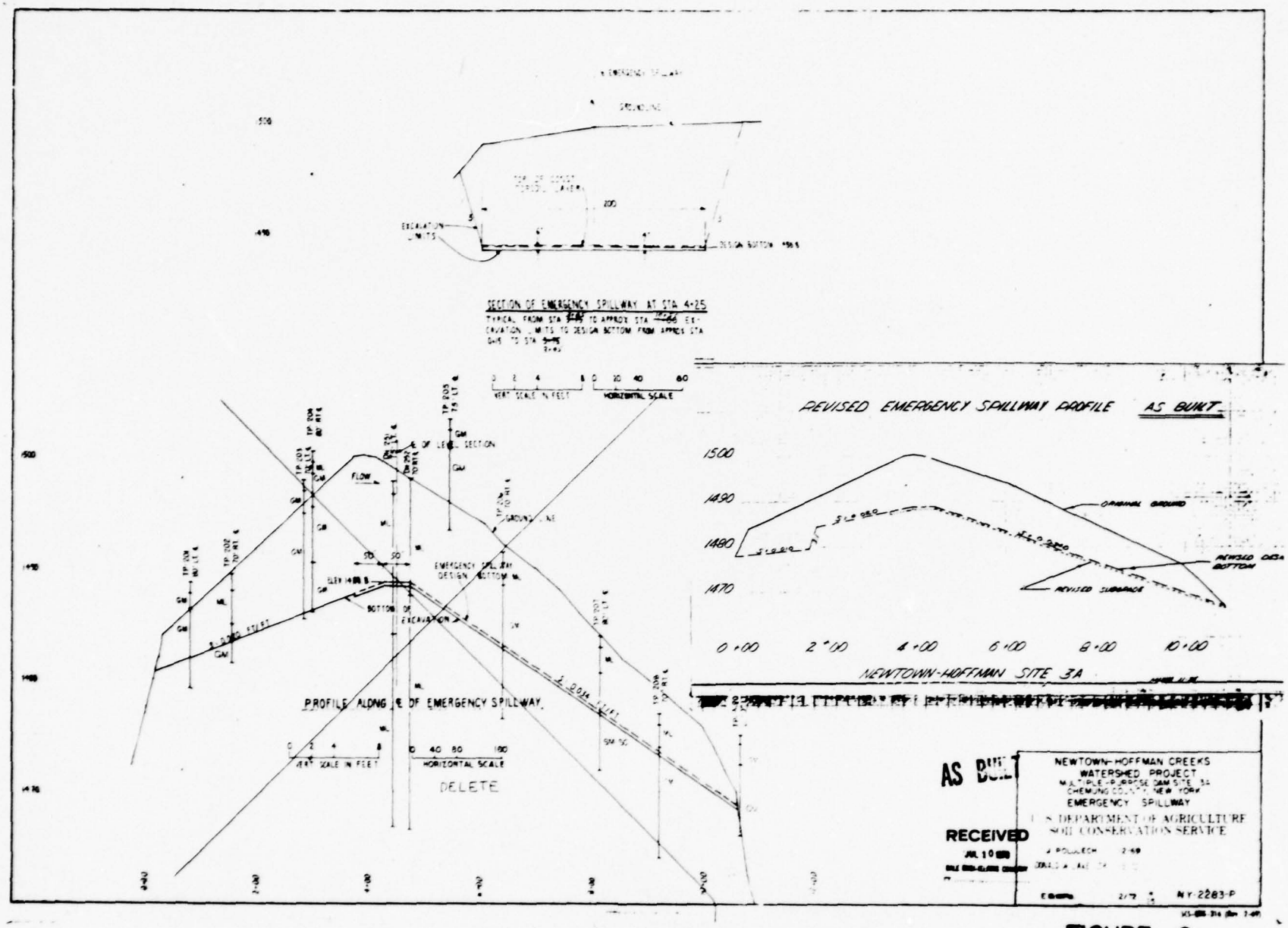

SECTION OF EMERGENCY SPILLWAY AT STA 4+25
PROFILE ALONG ℄ OF EMERGENCY SPILLWAY
REVISED EMERGENCY SPILLWAY PROFILE AS BUILT
ORIGINAL GROUND
REVISED SUBGRADE
0+00
2+00
4+00
6+00
8+00
10+00
NEWTOWN-HOFFMAN SITE 3A
DELETE
AS BUILT
RECEIVED
NEWTOWN-HOFFMAN CREEKS WATERSHED PROJECT
MULTIPLE PURPOSE DAM SITE 3A
CHEMUNG COUNTY, NEW YORK
EMERGENCY SPILLWAY
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NY-2283-P

FIGURE 9

NEWTOWN-HOFFMAN CREEKS WATERSHED PROJECT

MULTIPLE PURPOSE DAM - SITE 3A

REPAIR

DRAINAGE AREA	1 709 Acres
FLOOD STORAGE (TO EMERGENCY SPILLWAY CREST)	455 Ac. Ft.
WATER SURFACE AREA (SEDIMENT POOL)	100 Acres
HEIGHT OF DAM	53 Feet
VOLUME OF FILL	104,400 Cu. Yds.

BUILT UNDER THE WATERSHED PROTECTION AND FLOOD PREVENTION ACT

BY

CHEMUNG COUNTY SOIL AND WATER CONSERVATION DISTRICT

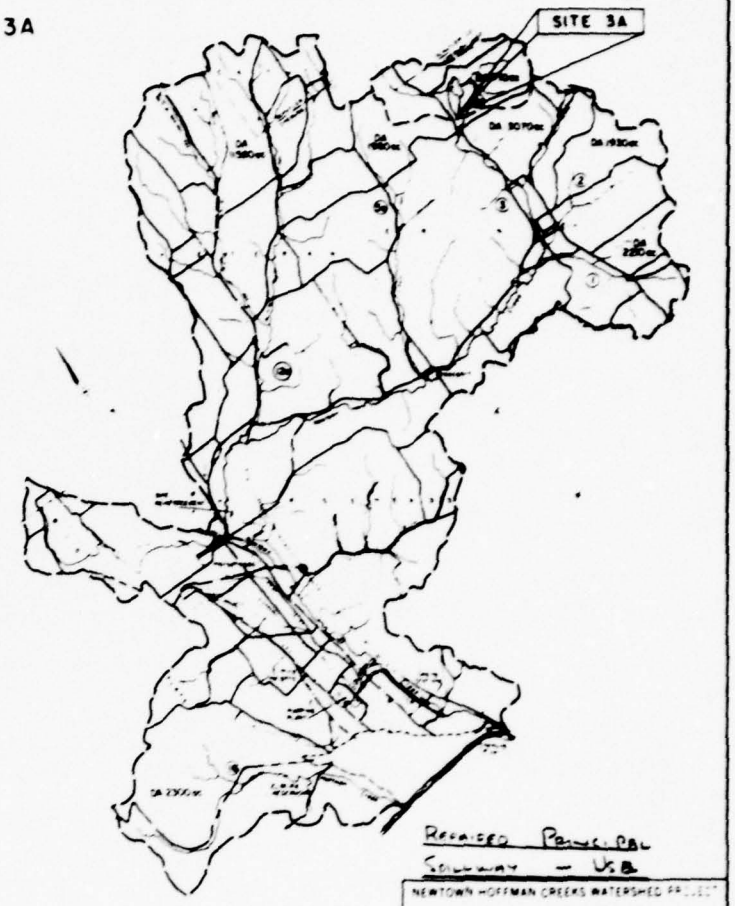
WITH THE ASSISTANCE OF

SOIL CONSERVATION SERVICE

OF THE

U.S. DEPARTMENT OF AGRICULTURE

INDEX



NEWTOWN-HOFFMAN CREEKS WATERSHED PROJECT
MULTIPLE PURPOSE DAM SITE 3A
CHEMUNG COUNTY, NEW YORK
COVER SHEET
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NY 270-4-P

FIGURE 10

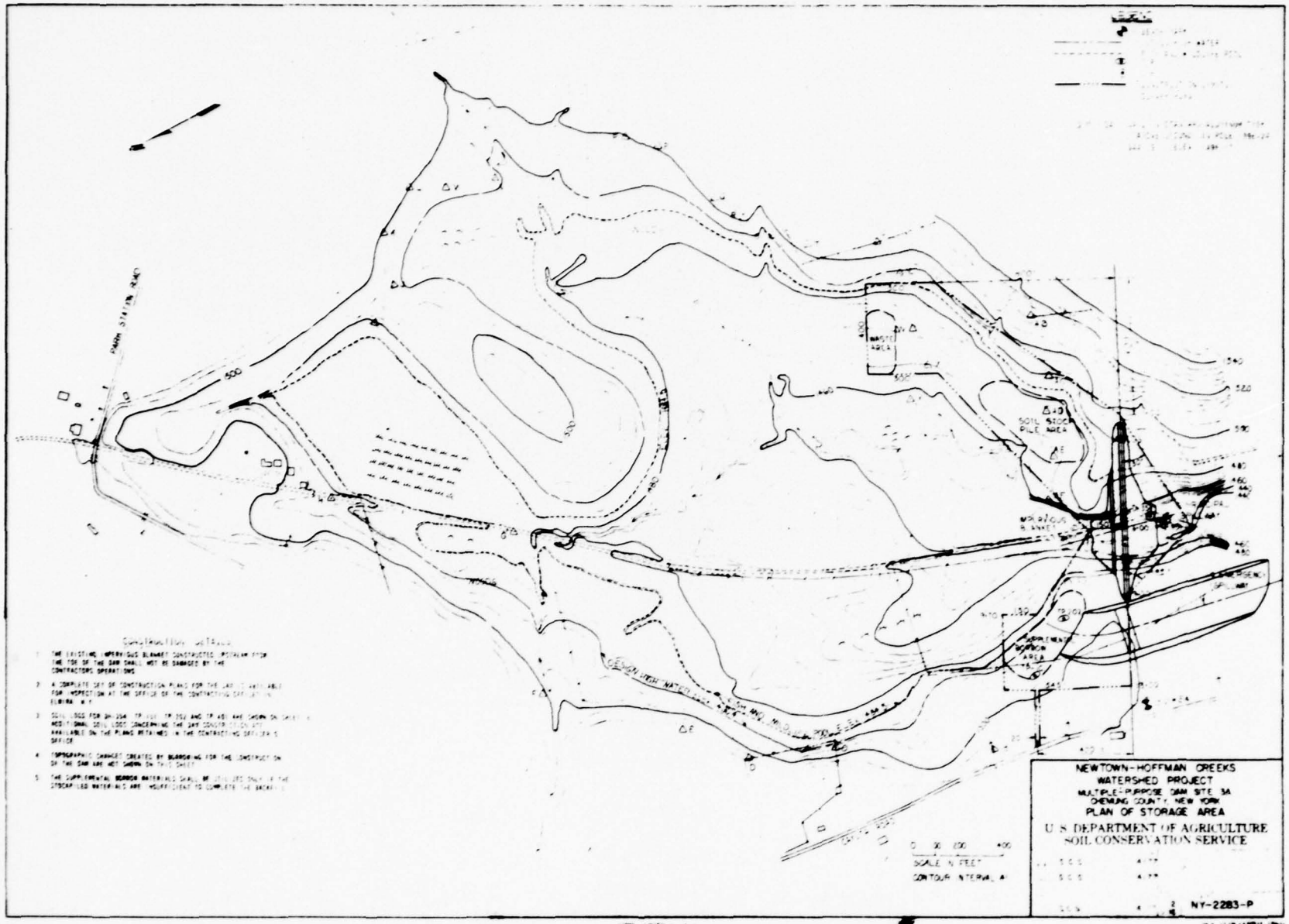

NEWTOWN-HOFFMAN CREEKS
WATERSHED PROJECT
MULTIPLE-PURPOSE DAM SITE 3A
CHEMUNG COUNTY, NEW YORK
PLAN OF STORAGE AREA
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NY-2283-P
SCALE IN FEET
CONTOUR INTERVAL

FIGURE 11

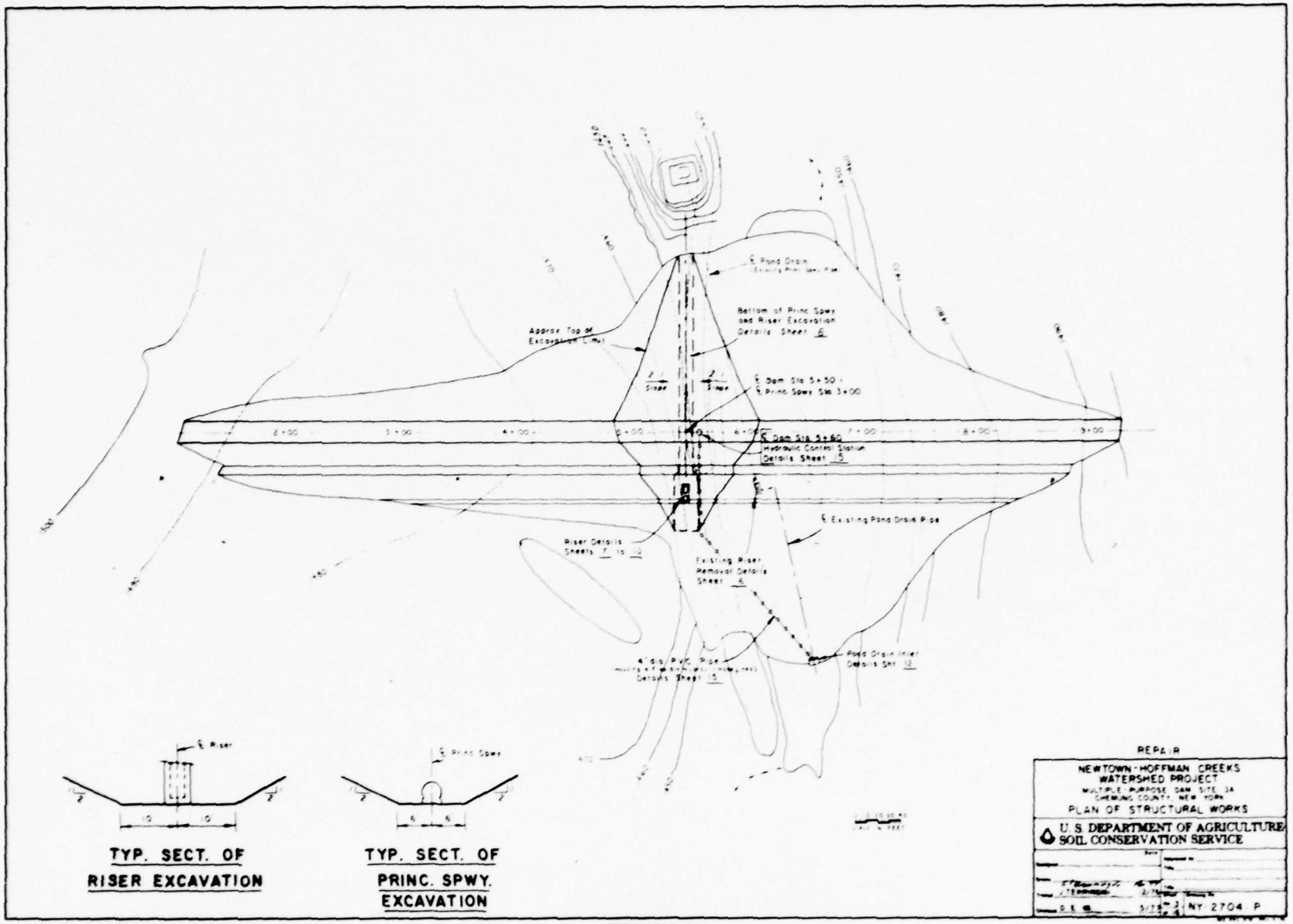

℄ Pond Drain
Bottom of Princ Spwy and Riser Excavation Details Sheet 6
Approx Top of Excavation Limit
℄ Dam Sta 5+50 ↑
℄ Princ Spwy Sta 3+00
℄ Dam Sta 5+50
Hydraulic Control Station Details Sheet 5
℄ Existing Pond Drain Pipe
Riser Details Sheets 7 to 10
Existing Riser Removal Details Sheet 6
Pond Drain Inlet Details Sht 10
Details Sheet 13
℄ Riser
℄ Princ Spwy
TYP. SECT. OF RISER EXCAVATION
TYP. SECT. OF PRINC. SPWY. EXCAVATION
REPAIR
NEWTOWN-HOFFMAN CREEKS WATERSHED PROJECT
MULTIPLE PURPOSE DAM SITE 3A
CHEMUNG COUNTY, NEW YORK
PLAN OF STRUCTURAL WORKS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NY-2704-P

FIGURE 12

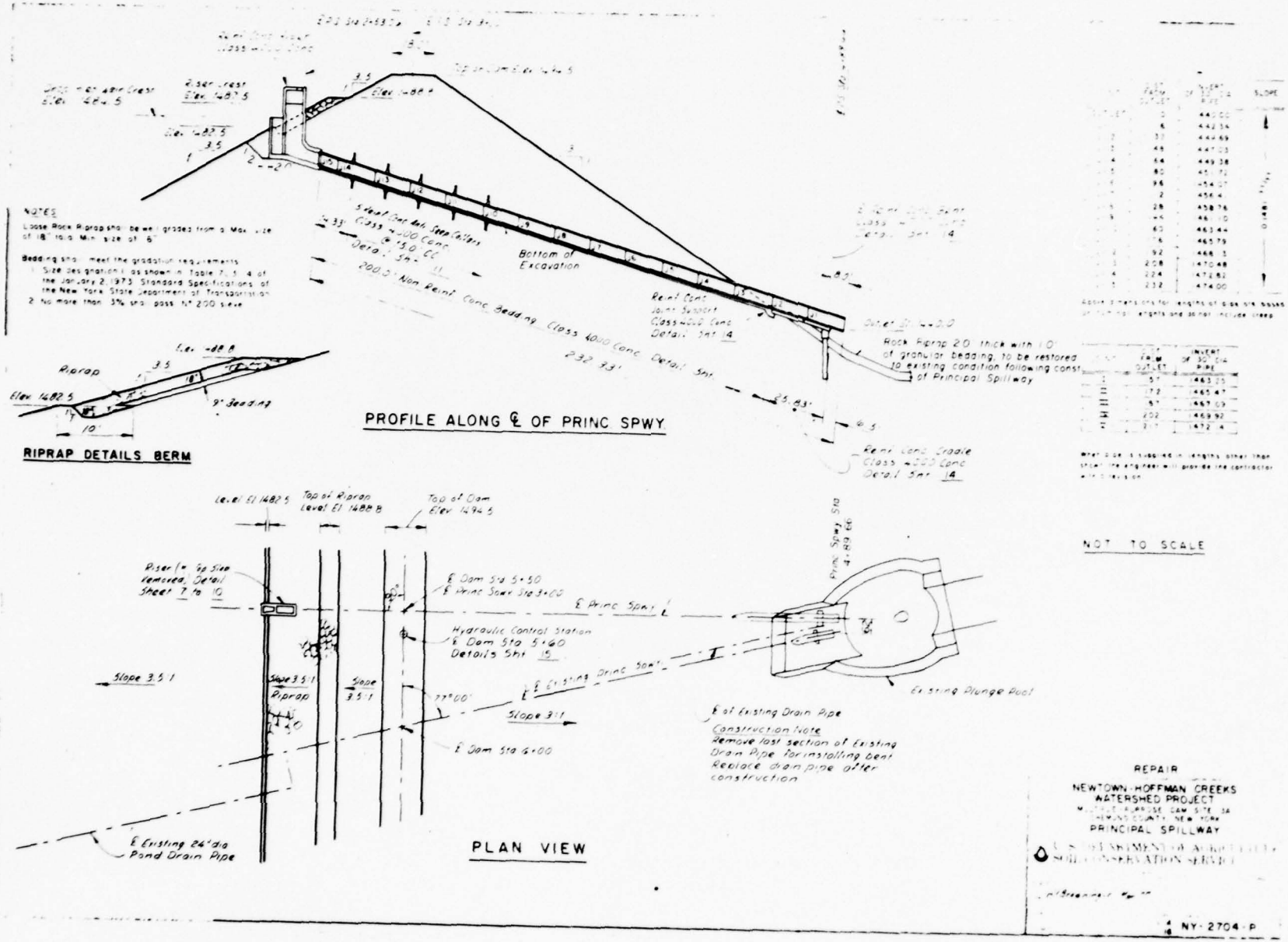
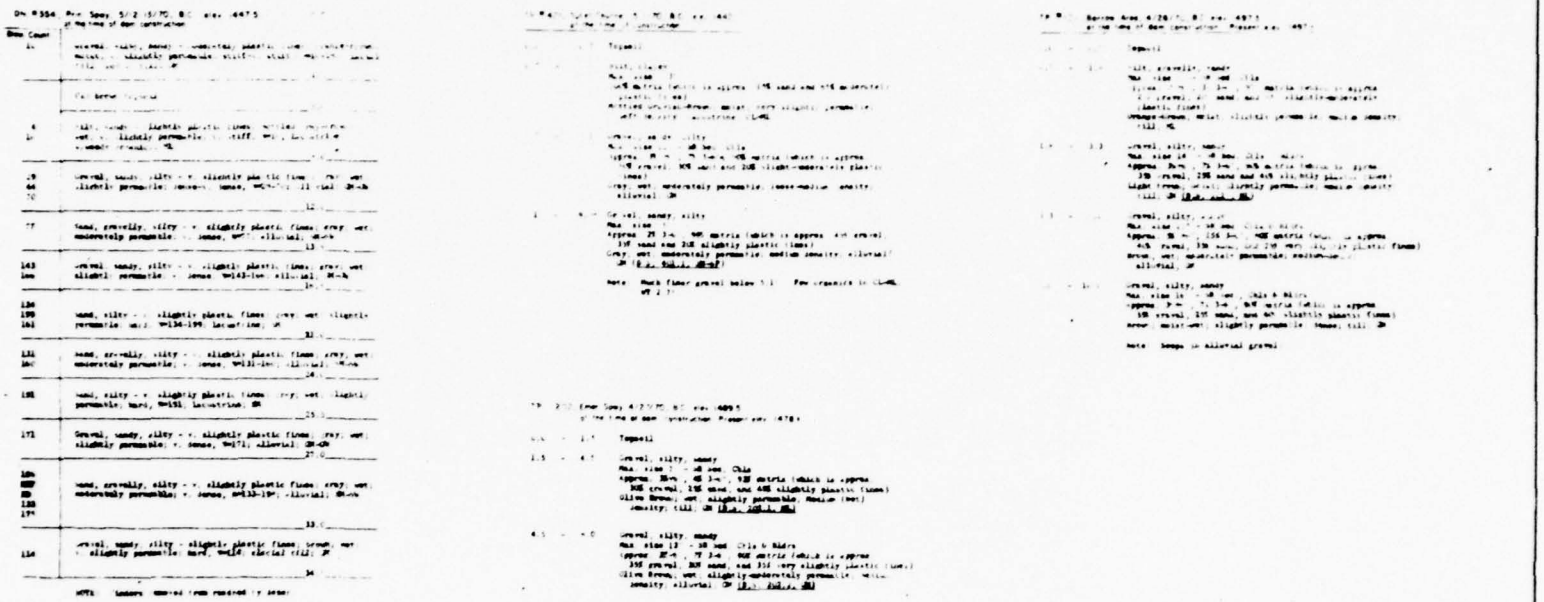

RIPRAP DETAILS BERM
PROFILE ALONG ℄ OF PRINC SPWY
PLAN VIEW
NOT TO SCALE
REPAIR
NEWTOWN-HOFFMAN CREEKS
WATERSHED PROJECT
PRINCIPAL SPILLWAY
NY-2704-P

FIGURE 13



NEWTOWN - HOFFMAN CREEKS
WATERSHED PROJECT
MULTIPLE - PURPOSE DAM SITE 3A
CHEMUNG COUNTY, NEW YORK
LOGS OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NY-2283-P

FIGURE 14

APPENDIX A

FIELD INSPECTION REPORT

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam Newtown-Hoffman County Chemung State New York ID # _____

Type of Dam Earthen Hazard Category 1

Date(s) Inspection June 14, 1978 Weather Partly Cloudy Temperature 65°

Pool Elevation at Time of Inspection None M.S.L. Tailwater at Time of Inspection N/A

Reservoir never filled.

Inspection Personnel:

Neal Dunlevy - Dale Engineering Company
F. W. Byszewski - Dale Engineering Company
Dave McCarthy - Dale Engineering Company
Herman Muskatt - Dale Engineering Company

Lloyd Thomas Soil Conservation Service
Harry Hirsh Soil Conservation Service
Don Lake Soil Conservation Service
Dana Chapman Soil Conservation Service
Howard Hall Soil Conservation Service

Neal F. Dunlevy Recorder

CONCRETE/MASONRY DAMS

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

CONCRETE/MASONRY DAMS

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

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.	Abutment runoff diverted to front of dam.
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Smooth, straight alignment.	
RIPRAP FAILURES	None observed.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	None.	
APPROACH CHANNEL	Grassed approach. Full crop cover over spillway.	
DISCHARGE CHANNEL	Grassed spillway gradient increase at downstream and terminates into woods near existing stream channel.	Downstream gradient appears flat; question whether rare spillway dischargi event would cause submerged tailwater di charge for principal spillway donduit an or erode downstream embankment faces whi is not riprapped.
BRIDGE AND PIERS	None.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No movement or erosion observed. Minor concentration of cobbles and rocks at junction.	Vegetated spillway.
ANY NOTICEABLE SEEPAGE	Not filled.	
STAFF GAGE AND RECORDER	None observed.	
DRAINS	Not being used.	

GATED SPILLWAY

(PRINCIPAL SPILLWAY)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Newly constructed; not in use.	
APPROACH CHANNEL	Dam face.	
DISCHARGE CHANNEL	Conduit with free fall discharge into small stilling basin.	
BRIDGE AND PIERS	None	
GATES AND OPERATION EQUIPMENT	Hydraulically controlled; not in operation.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed.	
INTAKE STRUCTURE	Drawdown spillway; Conduit structure under construction. Principal sprillway, not operational.	
OUTLET STRUCTURE	Pipe discharge. Free fall into still-ing basin.	
OUTLET CHANNEL	Small stilling basin constructed in natural stream channel.	
EMERGENCY GATE	Principal and emergency hydraulically operated.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	No noticeable obstruction.	
SLOPES	Downstream thalweg relatively flat.	
APPROXIMATE NO. OF HOMES AND POPULATION	None observed in immediate area. A number of very small settlements further downstream.	

INSTRUMENTATION

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

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	No significant slopes.	
SEDIMENTATION	Drainage area greatly forested. Reservoir never filled.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

NAME OF DAM Newtown-Hoffman

ID # _____

ITEM	REMARKS
AS-BUILT DRAWINGS	Available from S.C.S. Selected plans included in this report.
REGIONAL VICINITY MAP	See plans.
CONSTRUCTION HISTORY	Records available for S.C.S.
TYPICAL SECTIONS OF DAM	See plans.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See plans. See Computations.
RAINFALL/RESERVOIR RECORDS	Available data with S.C.S.

ITEM	REMARKS
DESIGN REPORTS	Available from S.C.S.
GEOLOGY REPORTS	Available from S.C.S.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Available from S.C.S.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Available from S.C.S.
POST-CONSTRUCTION SURVEYS OF DAM	Available from S.C.S.
BORROW SOURCES	Available from S.C.S.

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	See comments in this report.
HIGH POOL RECORDS	Reservoir never filled.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	See appendices, this report.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	See appendices, this report.
MAINTENANCE OPERATION RECORDS	Not applicable.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	Available from S.C.S. Selected plans shown in this report.
OPERATING EQUIPMENT PLANS & DETAILS	See plans, this report. Additional data available from S.C.S.

NEWTOWN-HOFFMAN DAM

CHECK LIST
HYDROLOGIC & HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1700 acres, largely wooded.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1484.5

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1488.8

ELEVATION MAXIMUM DESIGN POOL: 1490.4

ELEVATION TOP DAM: 1494.5

CREST:

a. Elevation 1488.8
b. Type Vegetative
c. Width 200 feet
d. Length See plans, this report.
e. Location Spillover Over west abutment
f. Number and Type of Gates None

OUTLET WORKS:

a. Type 30-inch reinforced concrete pipe.
b. Location Center of embankment
c. Entrance Inverts 1442.0 feet
d. Exit Inverts 1440.0 feet
e. Emergency Draindown Facilities Yes, manual control hydraulic system.

HYDROMETEOROLOGICAL GATES:

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

MAXIMUM NON-DAMAGING DISCHARGE: Not determined. A number of small settlements downstream. None observed in immediate area of dam site.

APPENDIX B

PREVIOUS INSPECTION REPORTS

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

SYRACUSE, NEW YORK

September 15, 1976

ENGINEERING INVESTIGATION REPORT

NEWTOWN–HOFFMAN CREEK WATERSHED

SITE 3A

By authority of letter
dated June 28, 1976, from
Robert L. Hilliard
State Conservationist

Investigating Committee

Joseph Zurlo, Civil Engineer, NETSC

Gerald Bowie, Planning Engineer, Syracuse, NY

Donald Wallin, Design Engineer, Syracuse, NY

INTRODUCTION

On June 29, 1976, a committee was selected by State Conservationist Robert Hilliard to investigate cracking in the principal spillway riser on Newtown-Hoffman Creek Watershed, Site 3A. Committee members are Joseph Zurlo, Gerald Bowie, and Donald Wallin, Chairman.

Cracks have occurred in the transition elbow and in the downstream wall of the riser. The committee has reviewed construction drawings, job diaries, the design folder, and all construction records. Several site viewings were held and the problem has been discussed in depth with construction personnel, representatives of the cement supplier, Portland Cement Association, and various Soil Conservation Service specialists.

The first cracks were discovered on May 29, 1976. These cracks were located between elevation 1451 and elevation 1465 (Exhibits 3-7 and 23). The thickness of the cracks were hairline to 0.05 inches. On July 26, 1976, additional cracks were discovered within the transition elbow. These cracks are significantly larger, with a maximum opening of 3/16 inches. By August 18, 1976, these cracks had opened to a maximum of 1/2 inches (Exhibits 8-13).

The committee wishes to thank members of the Breesport Construction Unit - Ed Blackmer, Dan Maxim, and Gary Page - for their valuable assistance in measuring, plotting and answering questions. Several other Soil Conservation Service personnel also supplied valuable input to the report.

BACKGROUND AND HISTORY

Description of the Project

Newtown-Hoffman Creeks Watershed is located in Schuyler and Chemung Counties in south-central New York. Works of improvement included in the work plan are seven dams, a pumping plant, a debris basin, diking, grade stabilization structures, and channel improvement. At present, construction has taken place on two of the dams and the pumping plant.

Site 3A is a class c structure located on a tributary to Newtown Creek in the most northern reaches of the watershed. The site is planned for extensive recreational development. The dam is approximately 53 feet high, containing about 105,000 cubic yards of fill. The structure is located approximately seven miles upstream from Breesport, New York, and will control a drainage area of 1709 acres. A detailed description of the project is available in the Newtown-Hoffman Creeks Watershed Work Plan.

Geology and Soil Engineering

The surficial geology of the site is mapped as till and colluvium with small amounts of water laid drift and alluvium intermixed. Site investigation revealed the left abutment to be primarily GM to GC-GM glacial till. The flood plain consists of about one foot of topsoil overlying 2-4 feet of dense lacustrine silts. Dirty alluvial gravels (GM-GW-GP) up to 18 feet thick lie immediately below the lacustrine silts. Below the gravels, lacustrine silts are again encountered to an approximate thickness of 50 feet. The right abutment is a mixture of dirty alluvial gravels (GM and silty glacial tills ML to SC-SM). Bedrock was not encountered during the investigation. Standard penetration tests indicate a dense, high strength foundation at the site. No significant foundation settlement was anticipated from the embankment load.

Soil testing was conducted at Lincoln, Nebraska, Soil Mechanics Laboratory. The embankment was designed as a homogeneous fill with internal embankment drainage and foundation drainage. An impervious blanket extending a minimum of 400 feet upstream from the toe to the dam will be installed to reduce seepage losses. Complete details and results of soil mechanics testing

are available in the project design folder. Logs of all soil borings are included in the appendix of this report (Exhibits 20-22).

Structural Design - Principal Spillway Riser

The riser has 2.5' x 7.5' inside dimensions and an open top. It is located in a sloping berm within the embankment (Exhibit 16), and has a height from the invert to the crest of 45.5 feet. A low stage drop inlet and a transition elbow were added to a standard ES-3030-4035E riser. This modification was made by removing the lower 3'-6" of the standard and replacing it with a 9 foot section which included the transition. Steel in the standard portion of the riser was not changed from that shown on the standard.

The lower 9 feet, however, was designed for wall to footing and horizontal steel using the concepts in Technical Release 30. The design of vertical steel for embankment moment in this section apparently was not performed. Although the riser is 45.5 feet high, the lowest section designed for vertical steel to resist embankment moment was 34.5 feet below riser crest.

At the time of design, June 1971, several telephone conversations were held with design personnel in the NETSC, Engineering and Watershed Planning Unit. An item of particular discussion was designing vertical steel for embankment moment.

Construction

Invitations for bids on Site 3A, Newtown-Hoffman Creeks Watershed were issued March 7, 1974. The construction contract for the dam was awarded to Simone Construction Company of Long Island, New York. Notice to proceed was given June 7, 1974, and on June 18, 1974, construction operations began. Operations during the first construction season consisted of clearing, dewatering, excavation and a small amount of earthfill.

The cutoff trench was overexcavated from that shown on the construction drawings (Exhibit 28). Earthfill operations in the cutoff trench began on September 9, 1974. As excavation operations progressed, it was determined that an impervious blanket upstream from the dam would be necessary to control seepage.

Winter shutdown began on November 12, 1974, although the contractor continued to work on minor items during the winter. Work resumed in full

on April 18, 1975.

On May 15, 1975, forming and placing of reinforcing steel began on the riser slab. Concrete placement on the riser began on May 29, 1975. Concrete placement in the riser continued until the final pour on December 2, 1975.

Winter shutdown for the second season began November 11, 1975, with the contractor continuing to work on some items through the winter. Work resumed in full on May 3, 1976. Work during the summer of 1976 consisted of rock riprap, site cleanup and seeding. Final inspection for the construction took place on June 15, 1976.

OBSERVATIONS AND FINDINGS

1. The design folder shows that the available endwall steel in the riser 34.5 below the crest is less than that required for embankment moment. This concept is shown on pages 3-7, table 3-2, of Technical Release 30.

In the design folder, structural section, sheet 26, the required area of endwall steel, 29.5' below the surface of the fill (32' below crest) is 8.5 square inches and the available area of steel is 6.0 square inches. At 32.0' below the surface of fill (34.5' below crest), the required area of steel is 10.6 square inches and the available area of steel is 6.6 square inches. This discrepancy was discussed with personnel of the NETSC design section and was apparently determined to be within allowable limits, considering the conservatism of the approach in Technical Release 30.

Further examination by the committee using Technical Release 30 methods plus an additional surcharge due to riser location in a sloping portion of the fill indicates the reinforcing is inadequate from approximately elevation 1465 to the bottom of the riser (a distance of approximately 24'). The analysis is summarized as follows:

Elev.	A_s (Required)	A_s (Available)
1464 [1]	3.7 $in.^2$	3.4 $in.^2$
1453 [2]	12.0 $in.^2$	6.6 $in.^2$
1445.5	21.7 $in.^2$	11.9 $in.^2$

[1] Approximate upper limit of horizontal cracks.

[2] Two feet above lowest part of "standard" riser used on job.

2. There are no supporting design computations for sizing the reinforcement for the embankment moment at a location 32 feet and greater below the surface of the fill. Apparently temperature and shrinkage steel is all that is present to resist this moment.

3. The standard riser selected for adapting to this situation was a ES-3030-4035, meaning the riser would have no fill within 5 feet of the crest. The design folder indicates this to be initially true and apparently later changes after the design was completed or as the design progressed altered the fill level to within 2 feet of the crest.

4. Floodwaters from Hurricane Eloise caused overtopping of the fill at approximately elevation 1454 at about 1.5' to 2.0' deep, on September 26, 1975.

5. It was October 4, 1975, following the high water of September 26, before the contractor had cleaned up the site and was able to begin fill placement again. He was concerned about additional winter damage, and therefore attempted to place as much fill as possible before winter shutdown. The fill went in not only rapidly but at a moisture content consistently above optimum. The fill was brought up more quickly than the riser concrete and an isolated lower area was left at the riser to be filled in later. From October 4, 1975 to early November (approximately 30 days) the elevation of the fill rose approximately 40 feet.

6. One pour of concrete did not meet specified concrete strength (average elev. 1447). The effects of 3700 psi concrete were reviewed at that time and the material was kept in place.

7. The job diary indicates construction personnel had many problems with the contractor concerning concrete placement, such as correct placement, dirty construction joints, bent bars, dirty bars, and tying of bars. Follow-up discussion with construction personnel indicates that such deficiencies were corrected prior to placement of concrete.

8. Two of six B-16 bars (vertical bars in the zone of cracking) were cut off approximately 22 inches short at a change in wall thickness. The bars would have projected out of the wall if not cut or bent.

Respectfully submitted:

Joseph Zurlo
JOSEPH ZURLO

Gerald R. Bowie
GERALD BOWIE

Donald E. Wallin
DONALD WALLIN

Concurred By:

D. W. Shanklin
DONALD W. SHANKLIN
State Conservation Engineer

CONCLUSIONS

1. Actual lateral earth loads on the principal spillway riser are highly variable and difficult to predict.

2. Technical Release 30 uses a difference in equivalent fluid pressure upstream to downstream equal to 50 pounds per cubic foot to compute earth loads. Although somewhat arbitrary, this would appear to be a realistic value for most design situations.

3. The riser was not located in a horizontal berm as assumed in design. The effects of the differential soil level (upstream to downstream) must, therefore, be accounted for in determining the loading. The committee estimates this additional loading to be 300 pounds per square foot on the downstream riser wall.

4. The riser is grossly lacking in vertical steel to resist embankment moment, especially in the lower 9 foot section.

5. The methods of determining the required area of endwall and lower sidewall steel in Technical Release-30 are approximate and considered conservative; however, the degree of conservatism is vague. When the required reinforcing exceeds temperature and shrinkage requirements using these methods, the committee sees two approaches. The first approach is to provide all of the required steel in these areas rather than only the T&S steel as shown in table 3-2, page 3-7 of Technical Release 30. If the riser was designed using the concepts of Technical Release 30 with the appropriate soil depth and the entire amount of required steel provided, it is quite probable significant cracking would not have occurred. The second approach would be to use an appropriate, more exacting solution to the problem of designing a non-prestressed reinforced concrete box structure subject to bending moments.

Based on these observations the committee feels that a review of the higher "standard" riser drawings should be made with the intent of insuring adequate steel for the largest soil load possible.

6. It appears possible that the fact the earthfill was placed rapidly and wet in the late fall of 1975 could have increased the loading on the riser. Comments related to bulging of the fill have been found in the job diary. However, no additional, substantive data relative to this subject could be found by the committee. Nevertheless, this is an area of concern and should be studied for its effect on future structures.

7. Nearness of hauling equipment to the riser may have put large surchages on the wall, particularly at the time when the fill was placed wet and was quite plastic. At one point in the job diary, the hauling equipment was close enough to hit the concrete forms.

8. The cracking problem does not appear to be related to the performance of the contractor who constructed the riser or to the quality of the concrete.

9. The size of the cracks and spacing of the cracks in the transition elbow indicate that the reinforcing steel may have yielded or lost bond with the concrete.

The committee recommends that qualified specialists be consulted to determine a course of action for repairs to the structure.

LIST OF EXHIBITS

NUMBER	TITLE
1	Photograph of water overtopping the fill
2	Photograph showing wet fill
3	Photographs of riser cracks
4	" " " "
5	" " " "
6	" " " "
7	" " " "
8	" " " "
9	" " " "
10	" " " "
11	" " " "
12	" " " "
13	" " " "
14	Concrete summary table
15	Plan view of dam
16	Profile on centerline of principal spillway
17	Riser details
18	Riser details
19	Riser details
20	Soil logs
21	Soil logs
22	soil logs
23	Plot of riser cracks on downstream endwall
24	Plot of riser cracks in transition elbow
25	" " " " " " "
26	" " " " " " "
27	Horizontal sections through riser
28	Principal spillway profile

Concrete Summary

EXHIBIT 14

ncrete our No.	Location / Date		Elevation	Slump	Air %	7 Day Strength	28 Day Strength	Date Forms Removed	Remarks
1	Riser	5/29/75	to 1442	4½"	5.5%	3890	4700 4880 4790		
2	"	6/19/75	to 1445 ±	3¼"	3.7%	3520	4100 3120 4120		SHORT OF CONSTR. JOINT
2A	"	7/29/75	to 1448.0	2½"	6.5%		3540 3840 3730		EPOXY BONDED TO POUR 2
3	"	8/20/75	to 1451.0	3½"	4%		5160 5180 5240		
4	"	8/29/75	to 1456.0	4"	5.5%	3040	4270 4440 4300		
	"	8/29/75	" "	5"	4.5%				
5	"	9/10/75	to 1461.0	4½"	5.4%	3400			
6	"	9/22/75	to 1466.0	3½"	5.2%	3310	4210 4210 4120		
7	"	10/1/75	to 1471.0	3½"	4.2%	4030	4950 4950 4810		
8	"	10/13/75	to 1475.5	2¾"	4.6%	4010	4630 4550 4830		
9	"	11/4/75	to 1481.0	4¼"	5.4%	4170	4010 4810 4440		
	"	11/4/75	"	3½"	4.5%				
10	"	11/18/75	to 1486.0	3½"	3.6%	4120	4580 4990 5010		
	"	11/19/75	" "	4"	5.9%				
11	"	12/2/75	Final pour	4½"	5.8%	3360	4160 5010 4810		

EXHIBIT 12

Close-up view of cracking on West wall at the base of the riser. Flow is to the left.

EXHIBIT 13

Close-up view of cracking on East wall at the base of the riser. Flow is to the right.

LIST OF EXHIBITS

NUMBER	TITLE
1	Photograph of water overtopping the fill
2	Photograph showing wet fill
3	Photographs of riser cracks
4	" " " "
5	" " " "
6	" " " "
7	" " " "
8	" " " "
9	" " " "
10	" " " "
11	" " " "
12	" " " "
13	" " " "
14	Concrete summary table
15	Plan view of dam
16	Profile on centerline of principal spillway
17	Riser details
18	Riser details
19	Riser details
20	Soil logs
21	Soil logs
22	soil logs
23	Plot of riser cracks on downstream endwall
24	Plot of riser cracks in transition elbow
25	" " " " " " "
26	" " " " " " "
27	Horizontal section through riser
28	Principal spillway profile

EXHIBIT 8

View inside riser at the bottom looking at the East wall. Flow is to the right.

EXHIBIT 9

View inside the riser at the bottom looking at the West wall. Flow is to the left.

EXHIBIT 10

View inside riser at the bottom looking up at the transition elbow at the East sidewall.

EXHIBIT 11

View inside the riser at the bottom looking up at the transition elbow at the West sidewall.

EXHIBIT 12

Close-up view of cracking on West wall at the base of the riser. Flow is to the left.

EXHIBIT 13

Close-up view of cracking on East wall at the base of the riser. Flow is to the right.

EXHIBIT 5

View of downstream endwall of riser, approximately elevation 1456 to 1461

EXHIBIT 6

View of downstream endwall of riser, approximately elevation 1463 to 1458

EXHIBIT 7

View of East sidewall of riser approximately elevation 1462

EXHIBIT 1

Sept. 26, 1975, Water overtopping partial completed fill at approx. elevation 1454.

EXHIBIT 2

Fill placement Oct. 14, 1975. Note wetness of the fill. Truck to left of riser is stuck.

EXHIBIT 3

View of downstream endwall and riser sidewall from inside riser

EXHIBIT 4

View of downstream endwall of riser–approximately elev. 1461 at the top of picture.

Concrete Summary

Concrete Pour No.	Location	Elevation	Slump	Air %	7 Day Strength	28 Day Strength	Date Forms Removed	Remarks

SAC File Copy

OPERATION AND MAINTENANCE AGREEMENT
FOR
STRUCTURAL MEASURES

THIS AGREEMENT made on June 26, 1972 is between the Soil Conservation Service, United States Department of Agriculture, hereinafter referred to as the Service, and the following organization(s), hereinafter referred to as the Sponsor:

New York State Department of Environmental Conservation

The Sponsor and the Service agree to carry out the plan on the attached 4 pages for the operation and maintenance of structural measures in the Newtown-Hoffman Creeks

Watershed Project, State of New York. The measures covered by this agreement are identified as:

Multipurpose Structure Site 3A

Name of Sponsor New York State Department of Environmental Conservation

By A G Hall Title Director Land Use Planning

~~This action was authorized at an official meeting of the Sponsor named immediately above on _____ at _____~~

~~Attest _____ Title _____~~

Name of Sponsor _____

By _____ Title _____

This action was authorized at an official meeting of the Sponsor named immediately above on _____ at _____

Attest _____ Title _____

Soil Conservation Service, United States Department of Agriculture

By H. C. Eddison Title State Conservationist

OPERATION AND MAINTENANCE PLAN

I OPERATIONS

A. The sponsor will be responsible for and will operate or have operated without cost to the Service the structural measures in compliance with any applicable Federal, State and local laws, and in a manner that will assure that the structural measures will serve the purpose for which installed as set forth in the Work Plan.

B. The Service will, upon request of the Sponsor and to the extent that its resources permit, provide consultative assistance in the operation of the structural measures.

II MAINTENANCE

A. The Sponsor will:

1. Be responsible for and promptly perform or have performed without cost to the Service except as provided in Paragraph III, Establishment Period, all maintenance of the structural measures determined by either the Sponsor or the Service to be needed.

2. Obtain prior Service approval of all plans, designs and specifications for maintenance work involving major repair.

B. The Service will, upon request of the Sponsor and to the extent that its resources will permit, provide consultative assistance in the preparation of plans, designs and specifications for needed repair of the structural measures.

III ESTABLISHMENT PERIOD

A. During an Establishment Period, as herein defined, the Service will bear such part of the cost of any needed major repairs to the structural measures, including associated vegetative work, as is proportionate to the original construction costs borne by the Service in the construction of the structural measures except that the Service will not bear any of the cost for:

1. Repairs to channels or portions thereof which do not have permanent linings such as concrete, riprap, or grouted rock.

III ESTABLISHMENT PERIOD (continued)

2. Repairs determined by the Service to have been occasioned by improper operation or maintenance, or both.

3. Repairs applicable to municipal or industrial water supply or to any other purpose for which construction costs are not authorized to be paid for in whole or in part with funds appropriated to the Service.

4. Repairs that are mutually determined by the Sponsor and the Service as being items of normal maintenance rather than major repair and are not therefore in keeping with the spirit and intent of the Establishment Period provisions.

B. The Establishment Period for structural measures (exclusive of any associated vegetative work) is a period of three years ending at midnight on the third anniversary of the date on which the structural measure is accepted.

C. The Establishment Period for vegetative work associated with a structural measure is a period from date of acceptance of the initial vegetative work to midnight of the date on which the Service writes the Sponsor advising that an adequate vegetative cover has been obtained. However, this period shall not exceed two growing seasons or the end of the Establishment Period for the associated structural measure whichever is greater in time.

D. As used in the two preceding paragraphs, and elsewhere in this Plan, the following words have the meanings described below:

ACCEPTED, ACCEPTANCE: The date structural or vegetative measures are accepted from the contractor when a contract is involved, or the date structural or vegetative measures are completed to the satisfaction of the Service when force accounts operations are involved.

ADEQUATE VEGETATIVE COVER: A minimum of seventy percent (70%) cover of the desirable species, with no active rilling that cannot be controlled by the vegetation.

E. Major repair may involve such things as (1) repairing separated joints, cracks or breaks in the principal spillway, (2) correcting seepage, (3) replacing significant backfill around structures resulting from major erosion damage, (4) major revegetation due to failure to obtain an adequate vegetative cover, and (5) restoring areas with significant erosion caused by unusual flow (volume, recurrence or extended period of time) in emergency spillways.

F. No action with respect to needed repairs during the Establishment Period will be taken by the Sponsor or the Service which would lessen or adversely affect any legal liability of any contractor or his surety for payment of the cost of the repairs.

IV INSPECTIONS AND REPORTS

A. During the Establishment Period the Sponsor and the Service will jointly inspect the structural measures at least annually and after unusually severe floods or the occurrence of any other unusual condition that might adversely affect the structural measures. It is desirable the annual inspections be performed during the month shown below. Any supplemental inspections then determined necessary will be scheduled and agreed to at that time.

MAY
(Month)

B. After the Establishment Period the structural measures will be inspected annually by the Sponsor, preferably during the month shown below, and after unusually severe floods or the occurrence of any other unusual condition that might adversely affect the structural measures.

MAY
(Month)

C. After the Establishment Period the Service may inspect the structural measures at any reasonable time.

D. A written report will be made of each inspection. The report of joint inspections will be prepared by the Sponsor with the assistance of the Service. A copy of each report will be provided by the party preparing the report to the other party within ten days of the date on which the inspection was made.

V RECORDS

The Sponsor will maintain in a centralized location a record of all inspections performed both individually and jointly by the Sponsor and the Service, and of all significant actions taken by the Sponsor with respect to operation and maintenance. The Service may inspect these records at any reasonable time.

VI GENERAL

A. The Sponsor will:

1. Prohibit the installation of any structures or facilities that will interfere with the operation or maintenance of the structural measures.

VI GENERAL (continued)

2. Obtain prior Service approval of the plans and specifications for any alteration or improvement to the structural measures.

3. Obtain prior Service approval of any agreement to be entered into with other parties for the operation or maintenance of all or any part of the structural measures, and provide the Service with a copy of the agreement after it has been signed by the Sponsor and the other party.

B. Service personnel will be provided the right of free access to the structural measures at any reasonable time for the purpose of carrying out the terms of this Plan.

C. The responsibilities of the Sponsor under this Plan are effective simultaneously with the acceptance of the works of improvement in whole or in part.

VII SPECIAL PROVISIONS

115.0413 - Land Rights on Federal Land - To minimize delay in obtaining land rights on federal land, the federal agency responsible for the land must be kept informed of progress in project installation. The state conservationist is to inform the responsible official of the federal land administering agency by September 30 each year the approximate dates on which land rights will be requested for installing approved watershed project structures on the federal land.

115.042 - Operation and Maintenance - Maintenance includes performance of work and the application of measures to prevent deterioration as well as repairing damages after they occur. This includes both the routine and recurring needs such as repainting exposed surfaces or fertilizing vegetation and the more complex, costly, and skilled work required to make needed repairs, or to replace concrete, steel, or earthen portions of structure measures. Skilled labor, heavy equipment, materials, and costly specialized machinery may be required. The cost can usually be minimized by performing maintenance when it is first needed. The need may occur at any time and usually can be expected to be in proportion to the severity of storms. The repair of damages to completed structural measures and to established vegetative measures caused by deterioration, flash floods, abnormal rainfall events, or vandalism is maintenance regardless of whether it occurs immediately after or several years after a work of improvement is completed or established.

115.0421 - Authorized Assistance for Operation and Maintenance - SCS assistance for operation and maintenance should be consistent with the knowledge, capability, interest, experience, and attitude of the local organization with these responsibilities. Assistance is authorized for such items as:

a. Providing frank and timely information to sponsors on estimated costs in time, effort, and money that they can be expected to bear for operation and maintenance.

b. Helping sponsors schedule and program their operation and maintenance resources.

c. Helping sponsors establish entrance and user fees, where applicable.

d. Helping sponsors make maintenance inspections. (Usually limited to the first 3 years for each structure.)

e. Advising sponsors on operation and maintenance controls and techniques.

f. Furnishing information from as-built plans when needed.

g. Making engineering surveys and designs for maintenance when needed (as SCS facilities are available).

h. Taking actions to inform, train, and encourage sponsors to perform operation and maintenance promptly as needed.

SCS may not perform or bear the cost of maintenance work.

115.0422 - Maintenance Access Roads - Occasionally it may be desirable to provide a route to get maintenance equipment to otherwise inaccessible channel reaches that are being improved. In most places, existing state, county, and farm roads or trails, open traversable areas, or construction access roads provide adequate access for the kind of equipment required during the time of year maintenance is expected to be performed. PL-566 cost sharing for constructing maintenance access roads is to be limited to the length necessary to reach sections of planned but unconstructed channel improvement that is otherwise inaccessible. The quality of maintenance access roads is to be the minimum needed to move the kind of equipment required during the season of year maintenance is to be performed.

Maintenance access roads and crossings are to be designed to serve multiple purposes whenever possible. For example, culverts or fords for maintenance access roads may serve as:

a. Controlled inlets for side drainage.

b. Water-level controls for laterals or swamp areas when required for wildlife-habitat enhancement.

c. Other authorized project purposes.

The land rights for constructing and maintaining access roads must be provided without PL-566 cost sharing. Provisions must be made for the sponsors to maintain the roads.

115.0423 - Operation and Maintenance Inspection and Followup - SCS policy for operation and maintenance inspections and followup is as follows:

a. Where a watershed project is within one work unit, SCS responsibility for O&M inspections and followup is assigned to the district conservationist. Certain conditions may dictate the need for a specialist to participate in the inspections.

b. Where a project involves two or more work units, SCS responsibility for O&M inspections and followup is to be assigned by the state conservationist.

c. Where two or more states are concerned, responsibility for O&M inspections and followup is to be determined jointly by the state conservationists.

d. The SCS employee responsible for O&M inspections and followup and the sponsors are to make a joint inspection annually, after unusually severe floods, and after any other unusual conditions that might

adversely affect the structural measure. These joint annual inspections are to continue for 3 years following installation of each structure. The sponsors are responsible for continuing the inspections after the third year. They are to prepare a report and send a copy to the SCS employee responsible for O&M inspections and followup. In situations where the sponsors have shown lack of ability to carry out inspections properly or where conditions indicate need for continued SCS assistance, SCS may continue to provide inspection assistance after the third year. This should be only for special situations as determined by the state conservationist.

e. The SCS employee responsible for O&M inspections and followup is to review thoroughly the sponsors' O&M reports of inspections and maintenance. Evidence that inspections or needed maintenance are not being performed properly and promptly are to be reported immediately to the state conservationist, who must then take appropriate action on the reported deficiencies.

115.05 - ESTABLISHMENT PERIOD - An "establishment period" is prescribed to allow time for latent defects and design deficiencies to become apparent. The establishment period for structural works of improvement shall extend 3 years from the date the structural works of improvement are accepted from the contractor as being completed. The establishment period for vegetative work associated with a structural measure is to terminate when any of the following conditions are met:

a. Adequate vegetative cover is obtained.

b. Two growing seasons have elapsed after the initial installation of vegetative work.

c. The establishment period for the associated structural measure has terminated.

115.06 - REPAIR AND ADDITIONAL WORK - During the establishment period for vegetative measures, the state conservationist may approve PL-566 cost sharing for any additional work required to obtain an adequate vegetative cover. Approval of the administrator is required for PL-566 cost sharing for other repair or additional work on completed structural works of improvement. Requests for approval will be considered if:

a. The need is determined during the establishment period.

b. The need results from latent conditions unknown to both SCS and the sponsors or from misjudgments, deficiencies, or mistakes by SCS.

c. PL-566 cost sharing requested for the repair or additional work does not exceed the ratio authorized for the original construction of the specific work involved.

WPH - August 1967
(Revised - March 1969)

STATE OF NEW YORK

WATERSHEDS

OPERATION AND MAINTENANCE HANDBOOK

FOR PROJECTS INSTALLED WITH ASSISTANCE

from the

SOIL CONSERVATION SERVICE

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE OF NEW YORK

WATERSHEDS

OPERATION AND MAINTENANCE HANDBOOK

CONTENTS

I. General

This handbook is intended to acquaint sponsors with the essentials of operating and maintaining their watershed projects.[1] The information and suggestions will help each sponsor understand and appreciate the job more fully so that it can be carried out in a timely and efficient manner.

The life of a watershed project can be divided into three broad phases, i.e., planning, installation, and operation and maintenance. Real effort and quality workmanship are essential in all three phases if the project is to provide the watershed community with the desired benefits. Sponsors may request and get considerable professional assistance for planning and installing their projects. In fact, trained Soil Conservation Service (SCS) technicians actually perform many of the various and complicated tasks in the first two phases. The operation and maintenance phase is equally critical and requires effort and expenditures throughout the useful life of the project. Sponsors are required to operate and maintain projects without financial assistance from SCS.

II. Definitions

A. Operation

The administration, management, and performance of non-maintenance actions needed to keep completed works of improvement functioning as planned.

B. Maintenance

Work required to keep works of improvement in, or restore them to, their original physical and functional condition.

Maintenance includes performance of work and application of measures to prevent deterioration as well as restoring, rebuilding, replacing, and putting together parts that have been torn, broken, or deteriorated.

C. Operation and Maintenance Agreement

A binding agreement between watershed sponsors and SCS that records the action each is to take in the operation and maintenance of the works of improvement described in the agreement.

The operation and maintenance agreement is a record of mutually satisfactory arrangements for:

1. Periodic and special inspections to determine how works of improvement are functioning and what operation and maintenance are needed.

1/ This handbook is also applicable to structural works of improvement installed under other Service assisted programs, such as RC&D.

2. Report of findings and record of how, when, and by whom the needed work is to be done.

3. Record and report of the cost and the date work was done.

A plan of operation and maintenance detailing the major routine needs is included in the operation and maintenance agreement. A separate plan is included for each measure or group of measures for which the routine operation and maintenance needs are expected to be different.

II. Reasons for Operation and Maintenance

Watershed projects move into the construction stage only after it is determined that the resulting benefits will equal or exceed the cost. The categories of cost include administration, land rights, installation, operation, and maintenance. Thus, watershed structures are designed and installed with the knowledge that operation and maintenance will be required.

The cost of operation and maintenance can be expected to increase if action is delayed. For example, delaying action to control woody plant growth in some channels for a single year can more than double the cost of spraying or cutting the plants. In addition, woody plants restrict waterflow and prevent the channel from effectively performing its planned project function. It is usually a small job to repair erosion rills when they first develop on earthen fills or in spillways. If erosion is allowed to continue, the corrective measures become more costly; in extreme cases, inattention to these maintenance needs can cause the structure to fail.

IV. Beginning of the Operation and Maintenance Phase

Each portion of watershed works of improvement enters the operation and maintenance phase when it is completed.

Structures installed by contract are considered completed when they are accepted from the contractors. Structures installed by local organization force accounts are considered completed when SCS agrees and notifies the local organization that the installation has been completed in accordance with the approved plans.

Vegetative measures are considered completed as soon as either of the following conditions are met:

A. SCS determines that an adequate cover has been obtained

B. Two growing seasons have elapsed after the initial vegetative installation.

The earthen embankment, spillway, and other structural portions of a dam may enter the operation and maintenance phase before planned vegetative cover is obtained on the earthen portions. Sponsors are responsible for maintaining the structural portions as soon as the work is accepted from the construction contractors. However, sponsors are not expected to bear the entire cost of repairing damages caused by lack of planned vegetative cover if damages occur before vegetative measures are completed.

Provisions to this effect are to be included in operation and maintenance agreements covering structures on which vegetative cover is an integral feature.

SCS will notify sponsors when, in accordance with these criteria, the vegetative measures are complete.

V. Responsibilities for Operation and Maintenance

A. Contractor

The contractor is responsible for providing an installation that fully conforms to the contract drawings and specifications. Usually the contractor's responsibility for the work terminates when work has been completed and accepted by the contracting officer. But under certain circumstances the contractor's liability may be extended. For example, the factory warranty on items, such as electric motors, may extend for a specified number of months or years. If this is so or if a failure results from the use of material or workmanship of less quality than specified in the contract, the contractor's responsibility may extend beyond the date on which work has been accepted by the contracting officer.

B. Sponsoring Local Organization

The sponsors are fully responsible for financing and performing operation and maintenance needs on works of improvement without SCS cost-sharing assistance. If there is a malfunction or failure of any works of improvement, the sponsors should notify SCS immediately. The sponsors should avoid any action that would relieve the contractors or contractor suppliers of liability.

C. Soil Conservation Service

SCS is to determine the cause and measures needed to correct any malfunction or failure of watershed works of improvement. If design or construction for which SCS was responsible is at fault, SCS will provide funds if available for the federal

share of reconstruction costs. A separate agreement detailing work to be done and cost-sharing arrangements must be signed by SCS and the sponsors before the work is started.

SCS will:

1. Plan and design structural measures to function satisfactorily with reasonable maintenance for their estimated life.

2. Provide sponsors with complete, frank, and timely information on the expected cost of operation and maintenance in time, effort, and money.

3. Include in the work plan a complete description and discussion of anticipated major, as well as uncommon, items of operation and maintenance needs for each type of structure.

4. Counsel with sponsors on entrance and user fees where applicable.

5. Help sponsors make maintenance inspections for the first 3 years.

6. Furnish information from as-built plans when needed.

Within the limits of available resources, SCS will also:

7. Help sponsors schedule and program their operations and maintenance resources.

8. Advise sponsors on operation and maintenance controls and techniques.

9. Make engineering surveys and designs for maintenance when needed.

VI. Organizing for Operation and Maintenance

One of the first and major problems that sponsors need to resolve is arranging for funds to pay for operation and maintenance work. Experience has shown that fees collected for concessions and use of public recreation developments seldom cover the total cost of operating the development and leave no funds for maintenance. Plans for individual landowners to maintain structures on their own land are usually unsatisfactory because of changing interests, ownerships, and costs. Expected freewill donations to cover maintenance costs usually fail to materialize when needed.

Tax assessments provide an equitable and continuing means of funding operation and maintenance activities.

Although the watershed work plan includes an estimate of funds for the designed life of the project, actual costs can be expected to vary from year to year. For example, weather conditions could require higher-than-normal expenditure for operation and maintenance the very year a structure is completed.

Thus, sponsors will need enough funds to begin maintenance as soon as work is completed, and arrangements should be made to accumulate a reserve of funds to pay for greater-than-normal annual maintenance costs as they occur. Funds set aside for this purpose must meet the requirements of the laws of New York State.

The manner of getting maintenance performed should be carefully considered and a method selected that will best fit the resources, desires, and capabilities of the sponsors. If sponsors have the equipment and work forces and are normally engaged in similar work, they may wish to use their own forces. Some sponsors have been very successful in arranging for local or state public works or highway departments to do the work. Such arrangements should be approved in advance by the Service or included in the operations and maintenance agreement. In all cases, it is strongly recommended that sponsors appoint maintenance managers and delegate authority to arrange for force-account work or to contract for the work. The important thing is to get timely performance of quality maintenance work.

VII. Plan of Operation and Maintenance

Operation and maintenance needs for dams, channels, or other works of improvement depend on variable factors such as topography, geology, size, purpose served, and use. Some items of maintenance may be critically important for one or more structures but may be less important for other similar structures in the project. Identifying operation and maintenance needs, structure by structure, will be useful to sponsors in planning and scheduling an effective operation and maintenance program.

SCS will help sponsors of each project prepare a plan of operation and maintenance tailored to fit each of the planned works of improvement having different operation and maintenance needs. The plan of operation and maintenance should be as detailed as necessary to identify all items of maintenance that are likely to be needed and specify the means to be used to accomplish them. It should be prepared before installation of the works of improvement is started.

Some examples of operation and maintenance actions that may be required on watershed works of improvement are listed in the appendix. Sponsors may find this list helpful in developing individual plans of operations.

VIII. Operation and Maintenance Inspection and Followup

The timing for some recurring operation and maintenance needs can usually be predicted with reasonable accuracy. For example, the operation and maintenance of public recreation facilities may require continuous attention during certain seasons. The vegetation on some earthen embankments may be expected to need an annual application of fertilizer and perhaps mowing periodically during certain seasons. The plan of operation and maintenance includes provisions to take care of these types of recurring needs. However, other operation and maintenance needs can be determined only by careful onsite observation. Thus, it will be necessary for sponsors to arrange for periodic inspection of project structures.

SCS will help sponsors inspect each structural measure to determine operation and maintenance needs for a period of 3 years after the structure is completed. Inasmuch as untreated minor maintenance needs can grow rapidly into major and costly maintenance problems, it is highly recommended that inspections be made 1 month after the structure is completed, every 3 months thereafter for 1 year, and annually thereafter. In addition, each structure should be inspected after unusually heavy runoff-producing storms. The findings, showing the needs and the date maintenance is to be performed, are to be recorded and made available to SCS. SCS also requests that sponsors send a copy of their accomplishment records that show the date of completed work and the cost to sponsors. This information will help SCS keep maintenance cost estimates current, thereby enabling SCS to provide better help to other sponsors. Many sponsors have found that simple forms help in recording and reporting inspection and follow-up activities. See Appendix A for examples of such forms. SCS will help sponsors develop forms that meet the needs of both the sponsors and SCS and insure that local and state requirements are observed.

IX. Environment

Watershed projects are designed to improve the total environment of the community. Actions are taken during project installations to minimize adverse effects on the environment. Completed projects should be living evidence of the consideration and concern sponsors have for the future well-being of the entire watershed community.

How successful this effort will be depends directly on the manner in which the project is operated and maintained. Methods and procedures of operation and maintenance activities can be developed that maintain and add to the beauty of the area, eliminate health hazards, control erosion and other pollutants, avoid contamination from use of unproven pesticides and herbicides, improve the economy, and insure the safe use and enjoyment of all facilities for their planned life.

A conservation plan should be prepared for all land within the land rights boundary for each structure. It should be started when the land rights are obtained and recorded. This plan is in addition to the O&M Plan for the structure and does not supplant it.

The conservation plan should reflect decisions on land uses and conservation treatments that will permit optimum community benefits without hinderance to the normal operation and maintenance of the structure.

APPENDIX

The following is a list of operation and maintenance items that may be needed. Other items needed should be included. As appropriate, pictures or sketches with descriptive captions may be inserted to help illustrate these items.

A. Operation

1. Operate gates and other features to regulate the retention or release of water for irrigation, drainage, flood control, or other use in accordance with the watershed work plan. Gates and valves should be operated periodically to ensure working order at time needed. Frequency of checking should be determined and scheduled by inspection group. Operation must comply with permits granted under state or local laws as they apply to the storage, release, depletion, and use of water.

2. Regulate storage and volumes in multiple-purpose reservoirs, if so designed, to provide for maximum flood storage if watershed and snow pack conditions dictate.

3. Maintain elevation of the water surface in erosion control structures insofar as natural conditions permit to prevent headcuts and erosion in the upstream channel.

4. Develop, promulgate, and enforce reasonable and necessary regulations for occupancy and use of each public recreation and fish and wildlife development in order to protect the public's health, welfare, safety, and enjoyment. These include regulations for use of recreation areas and facilities within design limits and for purposes intended. Misuse, including overuse, of an area leads to rapid deterioration, diminished esthetic value, and general depreciation of the environment, usually accompanied by unsafe and unsanitary conditions.

5. Confine travel by motor vehicles to designated roads and parking areas to prevent erosion, damage to vegetation, impairment of recreation values, and adverse effect on fish and wildlife resources.

6. Keep the speed of traffic within acceptable and safe limits.

7. Keep each recreation facility clean and sanitary.

8. Sweep, mop, wash, disinfect, decontaminate, deodorize, or service in other ways toilets and restrooms as often and intensively as necessary to maintain acceptable standards of cleanliness. Service septic tanks as needed to keep them functioning properly, to reduce objectionable odors, and to exclude insects and rodents.

   Pesticides are regulated by New York State and may be used as approved by the Commissioner of the Department of Environmental Conservation.

9. Prevent, insofar as practicable, contamination or pollution of all water for human consumption and/or recreation use. Test water regularly and treat all water as necessary to protect public health. If the water is unsafe, immediately post against using it. Take all reasonable steps to prevent use of unsafe water until corrective measures are taken. Consider applicable state and local laws, ordinances, and codes as minimum requirements for safeguarding public health and safety.

10. Dispose of garbage and other refuse as often as necessary to avoid threat to public health and safety and detraction from public use and enjoyment. Keep containers tightly covered. Do not allow containers to overflow and treat them to minimize obnoxious odors. Empty containers often enough to prevent breeding of flies and other disease-bearing insects and rodents.

11. Eliminate from recreation areas all safety hazards such as dangerous trees, toxic plants, broken steps, protruding nails or bolts, glass, and cans.

12. Provide lifeguards at swimming areas as required by state and local laws and regulations.

B. Maintenance

1. Vegetation

a. Reseed, resod, and fertilize areas of poor stand or areas destroyed by erosion. If necessary, restore eroded areas before reseeding.

b. Cut or spray with approved herbicide and remove undesirable vegetation. Observe local ordinances regarding spraying and burning. Only herbicides currently approved by the Commissioner of the New York State Department of Environmental Conservation may be used. Current "Cornell Recommends for Field Crops" can be used as a guide for selection of herbicides and approved methods of application.

c. Fertilize vegetation as required to maintain a vigorous stand.

d. Control grazing to insure proper vegetative cover.

e. Mow grass at regular intervals to maintain optimum cover.

2. Channels--lined and unlined

a. Remove silt bars and properly dispose of them outside the channel perimeter.

b. Remove and properly dispose of debris. Give special attention to removal and proper disposal of debris and repair of erosion damage at structures.

c. Replace, reinforce, or extend riprap where needed.

d. Keep access roads for maintenance and maintenance travelways in usable condition.

e. Maintain dikes and spoil to divert water to protected inlets and prevent overbank flow.

f. Fill contraction cracks in lined channels with appropriate material.

g. Renovate channel banks damaged by storm flow.

h. Rehabilitate damaged pipe inlets from fields or side channels. Replace eroded soil adjacent to structures.

3. Earth dams

a. Replace soil removed by rodents.

b. Inspect drainage systems and relief wells annually for proper functioning and clean out or replace as necessary.

c. Maintain riprap or other wave-protection measures and replace as needed.

d. Remove and/or stabilize slide material as soon as practical. It may be necessary to construct a berm or flatten the slope.

e. Restore to proper elevation dikes that have settled.

f. Replace eroded material and revegetate eroded areas in emergency spillways.

4. Structures

a. Stabilize the plunge pool with appropriate maintenance measures at the outlet of principal spillways having propped outlets.

b. Keep stilling basin free of debris-rock.

c. Restore eroded earth materials or damaged riprap around energy dissipaters and reseed the area if appropriate.

d. Restore concrete that has deteriorated.

e. Maintain in proper working order gates and valves, trash racks, and metal works. Immediately remove ice and debris that may hamper their function. Restore protective coatings if necessary.

f. Maintain in proper working order pumping plants including housing, trash racks, gates, electrical or mechanical controls and equipment, and power units.

g. Maintain fences in good condition until there is mutual agreement that they are no longer needed to protect structural works of improvement.

h. Maintain in proper working order fish and wildlife features such as fish ladders, traps, screens, water level control gates, etc.

i. Repaint, as needed, all surfaces requiring protection by paint.

j. Maintain in good condition and proper working order recreation facilities such as bathhouses, toilets, docks, beaches, etc.

k. Remove weak diving boards, hidden rocks, or other obstructions in swimming waters. At all swimming areas:

   (1) Conspicuously post general safety rules.

   (2) Establish depth markers.

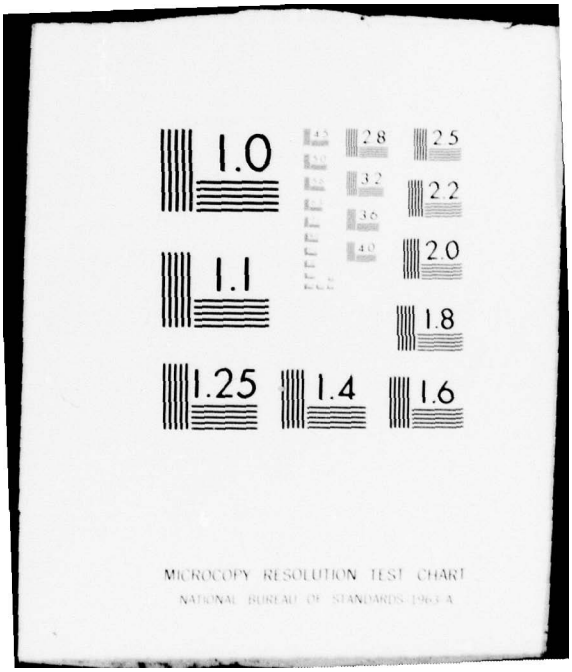
   (3) Provide, if practical, lifesaving and first-aid equipment.

l. Repair and repaint or replace signs and plaques to keep them sightly and functional.

AD-A077 909 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. NEWTOWN-HOFFMAN CREEK WATERSHED SI--ETC(U)
JUL 78 J B STETSON DACW51-78-C-0035
UNCLASSIFIED NL

2 OF 2
AD A077909

END
DATE FILMED
1-80
DDC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

C. Public Safety at Structural Works of Improvement

Many structures in SCS-assisted projects by their essential nature, are more or less hazardous to the public. Project features designed for recreation or fish and wildlife enhancement invite the public, and children especially are attracted to structures that provide an opportunity to play in water. Structures such as open-top spillway risers, steep-walled channels and chutes, plunge pools, and stilling basins are especially hazardous and require special attention to safety measures.

All structures built in SCS-assisted projects are to be designed to avoid hazardous conditions where possible and are to be provided with safety fences, guard rails, or other safeguards to protect the public from unavoidable project-created hazards. Work plans are to provide for these measures. Much can be done in basic planning and design to avoid hazardous conditions and to provide protection against hazards without extra cost.

SCS policy regarding cost classification of watershed work is set forth in the Watershed Protection Handbook.

Local sponsors should provide any additional safety measures deemed necessary as a result of observations during periodic inspections and general operation and maintenance.

Some specific hazards are outlined below, with recommended safety measures to be considered.

Drop-Inlet Spillway Risers

Danger of falling off or into riser.

a. Locate riser in reservoir rather than in embankment where practical, if climatic (ice) conditions permit, to make access more difficult.

b. Use standard covered-top riser where possible.

c. Use low-level inlet on riser, where practical, to keep normal pool level below top of riser and prevent access to top by boat or swimming.

d. Do not use permanently installed ladder on inside or outside of riser.

e. Use trash rack that cannot be entered easily.

f. Paint DANGER - STAY OFF signs on faces of riser.

Catwalks to Spillway Risers

Danger of falling from catwalk or riser.

a. Use catwalk only where needed for access to valve or gate controls that must be operated frequently or to trash racks for removal of trash. (In some cases, hydraulically operated valves or gates may be practical, with controls at a convenient location on embankment or abutment.)

b. Install guard rails on catwalks and riser.

c. Install protective chain link fence and gate with lock across entrance to catwalk.

d. Post warning signs.

SAF and Other Deep Stilling Basins; Drop Structures

Danger of falling from high walls.

a. Prevent access by protective chain link fence.

b. Install guard rails on top of walls.

c. Provide escape route from pool.

d. Post warning signs.

Plunge Pools

Danger of drowning in pool.

a. Provide flat enough slope to climb out on at least one side.

b. Prevent access by protective chain link fence.

c. Post warning signs.

Steep-Walled and Vertical-Walled Channels and Chutes

Danger of falling from walls.

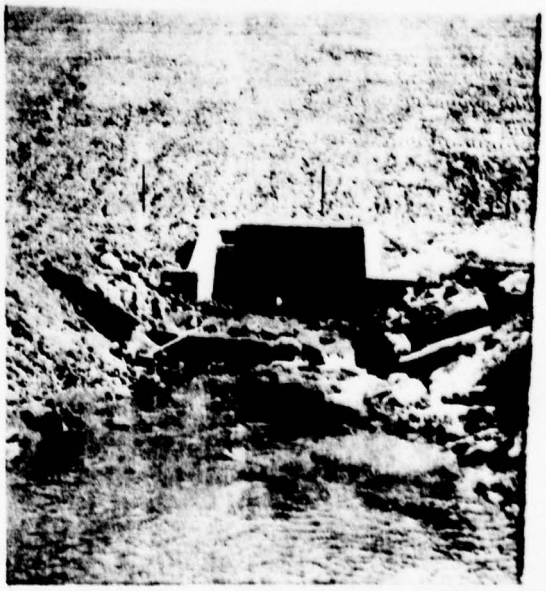
a. Install protective chain link fence or guard rails on top of walls.

b. Provide escape routes from channel bottom.

EXHIBIT 1

Right: Channel into reservoir may be steep and require riprap. Intense storms can move riprap which must be replaced and anchored.

Left: Critical area reseeding will be helped by applying mulch and installing net to hold mulch in place.



Right: Impact basin and channel below dam need to be checked frequently. Sediment and other debris must be removed promptly for them to function properly.

Left: Small slips can occur after cover established. Repair promptly, seed or bring in new sod. Drainage may be required to remove seepage water.

Right: Large slips or gullies caused by surface water may need heavy equipment for repair. Diverting surface water will speed recovery.

Left: Floating trash can block riser and emergency spillways. Remove immediately. Unexpected storm can severely damage structure.

Steep Rock Cuts (Emergency Spillways, etc.)

Danger of falling.

a. Install protective chain link fence or guard rail at top of cut.

b. Post warning signs.

Steep Cut-and-Fill Slopes (Dams, Levees, Channels, Terraces, etc.)

Danger of overturning mowers, tractors, and other equipment.

a. Advise farmers, maintenance personnel, etc., against operating equipment on steep slopes.

b. Recommend use of proper safety devices on equipment (protective frames, crush-resistant cabs, and seat belts).

c. Call attention to hazards in maintenance plans and agreements.

d. Specify maintenance procedures in maintenance plans and agreements that clearly exclude operation of equipment on steep slopes.

EXHIBIT 2

OPERATION AND MAINTENANCE AGREEMENT
FOR
STRUCTURAL MEASURES

THIS AGREEMENT made on _____ is between the Soil Conservation Service, United States Department of Agriculture, hereinafter referred to as the Service, and the following organization(s), hereinafter referred to as the Sponsor:

The Sponsor and the Service agree to carry out the plan on the attached _____ pages for the operation and maintenance of structural measures in the

Watershed Project, State of _____. The measures covered by this agreement are identified as:

Name of Sponsor _____

By _____ Title _____

This action was authorized at an official meeting of the Sponsor named immediately above on _____ at _____

Attest _____ Title _____

Name of Sponsor _____

By _____ Title _____

This action was authorized at an official meeting of the Sponsor named immediately above on _____ at _____

Attest _____ Title _____

Soil Conservation Service, United States Department of Agriculture

By _____ Title _____

OPERATION AND MAINTENANCE PLAN

I OPERATIONS

A. The sponsor will be responsible for and will operate or have operated without cost to the Service the structural measures in compliance with any applicable Federal, State and local laws, and in a manner that will assure that the structural measures will serve the purpose for which installed as set forth in the Work Plan.

B. The Service will, upon request of the Sponsor and to the extent that its resources permit, provide consultative assistance in the operation of the structural measures.

II MAINTENANCE

A. The Sponsor will:

1. Be responsible for and promptly perform or have performed without cost to the Service except as provided in Paragraph III, Establishment Period, all maintenance of the structural measures determined by either the Sponsor or the Service to be needed.

2. Obtain prior Service approval of all plans, designs and specifications for maintenance work involving major repair.

B. The Service will, upon request of the Sponsor and to the extent that its resources will permit, provide consultative assistance in the preparation of plans, designs and specifications for needed repair of the structural measures.

III ESTABLISHMENT PERIOD

A. During an Establishment Period, as herein defined, the Service will bear such part of the cost of any needed major repairs to the structural measures, including associated vegetative work, as is proportionate to the original construction costs borne by the Service in the construction of the structural measures except that the Service will not bear any of the cost for:

1. Repairs to channels or portions thereof which do not have permanent linings such as concrete, riprap, or grouted rock.

III ESTABLISHMENT PERIOD (continued)

2. Repairs determined by the Service to have been occasioned by improper operation or maintenance, or both.

3. Repairs applicable to municipal or industrial water supply or to any other purpose for which construction costs are not authorized to be paid for in whole or in part with funds appropriated to the Service.

4. Repairs that are mutually determined by the Sponsor and the Service as being items of normal maintenance rather than major repair and are not therefore in keeping with the spirit and intent of the Establishment Period provisions.

B. The Establishment Period for structural measures (exclusive of any associated vegetative work) is a period of three years ending at midnight on the third anniversary of the date on which the structural measure is accepted.

C. The Establishment Period for vegetative work associated with a structural measure is a period from date of acceptance of the initial vegetative work to midnight of the date on which the Service writes the Sponsor advising that an adequate vegetative cover has been obtained. However, this period shall not exceed two growing seasons or the end of the Establishment Period for the associated structural measure whichever is greater in time.

D. As used in the two preceding paragraphs, and elsewhere in this Plan, the following words have the meanings described below:

ACCEPTED, ACCEPTANCE: The date structural or vegetative measures are accepted from the contractor when a contract is involved, or the date structural or vegetative measures are completed to the satisfaction of the Service when force accounts operations are involved.

ADEQUATE VEGETATIVE COVER: A minimum of seventy percent (70%) cover of the desirable species, with no active rilling that cannot be controlled by the vegetation.

E. Major repair may involve such things as (1) repairing separated joints, cracks or breaks in the principal spillway, (2) correcting seepage, (3) replacing significant backfill around structures resulting from major erosion damage, (4) major revegetation due to failure to obtain an adequate vegetative cover, and (5) restoring areas with significant erosion caused by unusual flow (volume, recurrence or extended period of time) in emergency spillways.

F. No action with respect to needed repairs during the Establishment Period will be taken by the Sponsor or the Service which would lessen or adversely affect any legal liability of any contractor or his surety for payment of the cost of the repairs.

IV INSPECTIONS AND REPORTS

A. During the Establishment Period the Sponsor and the Service will jointly inspect the structural measures at least annually and after unusually severe floods or the occurrence of any other unusual condition that might adversely affect the structural measures. It is desirable the annual inspections be performed during the month shown below. Any supplemental inspections then determined necessary will be scheduled and agreed to at that time.

_____
(Month)

B. After the Establishment Period the structural measures will be inspected annually by the Sponsor, preferably during the month shown below, and after unusually severe floods or the occurrence of any other unusual condition that might adversely affect the structural measures.

_____
(Month)

C. After the Establishment Period the Service may inspect the structural measures at any reasonable time.

D. A written report will be made of each inspection. The report of joint inspections will be prepared by the Sponsor with the assistance of the Service. A copy of each report will be provided by the party preparing the report to the other party within ten days of the date on which the inspection was made.

V RECORDS

The Sponsor will maintain in a centralized location a record of all inspections performed both individually and jointly by the Sponsor and the Service, and of all significant actions taken by the Sponsor with respect to operation and maintenance. The Service may inspect these records at any reasonable time.

VI GENERAL

A. The Sponsor will:

1. Prohibit the installation of any structures or facilities that will interfere with the operation or maintenance of the structural measures.

VI GENERAL (continued)

2. Obtain prior Service approval of the plans and specifications for any alteration or improvement to the structural measures.

3. Obtain prior Service approval of any agreement to be entered into with other parties for the operation or maintenance of all or any part of the structural measures, and provide the Service with a copy of the agreement after it has been signed by the Sponsor and the other party.

B. Service personnel will be provided the right of free access to the structural measures at any reasonable time for the purpose of carrying out the terms of this Plan.

C. The responsibilities of the Sponsor under this Plan are effective simultaneously with the acceptance of the works of improvement in whole or in part.

VII SPECIAL PROVISIONS

CHECK LIST

The items to be checked at time of inspection may include, but not be limited to, the following:

1. Vegetation
   a. Need ;for mowing
   b. Need for reseeding
   c. Need for fertilizing
   d. Evidence of overgrazing

2. Fences
   a. Loose or damaged posts
   b. Loose or broken wires
   c. Accumulated debris in fence
   d. Condition of gates and gaps

3. Principal Spillway
   a. Obstructions in spillway
   b. Condition of outlet and riser
      (1) Signs of seepage
      (2) Separation of joints
      (3) Cracks or breaks
      (4) Differential settlement
   c. Gate operational check
   d. Sediment check for bars and unusual accumulations

4. Emergency Spillway
   a. Erosion
   b. Sedimentation
   c. Weeds, logs, or other obstructions, reducing channel capacity
   d. Conformity with original design (slips or slides)

5. Embankment
   a. Settlement or cracking
   b. Erosion
   c. Leakage
   d. Rodent, wildlife or livestock damage

6. Reservoir Area
   a. Undesirable vegetative growth
   b. Cut or fallen trees
   c. Slash and other debris

7. Outlet Channel
   a. Sedimentation
   b. Bank cutting
   c. Condition of riprap or other works of improvement
      (1) Undermining
      (2) Damage or deterioration
      (3) Adjacent channel scouring
   d. Adjacent property damage

8. Safety hazards

(For further details, refer to Appendix A of O&M Handbook)

EXHIBIT 3

NY-AS-17
4-28-71
(File Code AS-12-5)

U. S. Department of Agriculture
Soil Conservation Service

OPERATION AND MAINTENANCE INSPECTION REPORT FOR STRUCTURES

Watershed_____ Inspection: ☐ Special ☐ Annual Date:_____

Site No. _____

Name of Sponsoring Local Organization(s) having Operation and Maintenance Responsibility: _____

Structure operation satisfactory:_____ Unsatisfactory:_____

Item	Condition: Satisfactory	Condition: Unsatisfactory	Describe maintenance and needed repairs	Estimated Costs	Agreed date repairs to be compld.
1 Vegetation					
Principal 2 Spillway					
3 Fences					
Emergency 4 Spillway					
5 Embankment					
Reservoir 6 Area					
Outlet 7 Channel					
8 Other					

Remarks: _____

_____ _____

SCS Representative Sponsoring Local Organization Rep.

Distribution: Orig. - Sponsor with O&M responsibility
3 - SCS District Conservationist (1 forwarded to State Office, 1 forwarded to Area Conservationist)
1 - Each of other sponsors of watershed project
1 - N. Y. Department of Environmental Conservation

Report due - 10 days after inspection

(Check list on reverse side)

CHECK LIST

The items to be checked at the time of inspection should include, but not be limited to, the following:

1. Access Roads and Parking Lots
   a. Surface needs repiar
   b. Ditches and culverts need cleaning
   c. Berms need maintenance
   d. Need adequate signs

2. Boating and Fishing Area
   a. Ramps, docks, piers and mooring areas need maintenance
   b. Garbage cans are clean
   c. Comfort stations clean, free of odor and insects
   d. Need for mowing or reseeding

3. Picnic and Camping Areas
   a. Tables, fireplaces, and shelters need repair
   b. Garbage cans are clean
   c. Comfort stations clean, free of odor and insects
   d. Need for mowing or reseeding

4. Fish and Wildlife Facilities
   a. Water control gates work properly
   b. Water levels maintained at desired elevation
   c. Cold water provided as planned
   d. Duck blinds & other facilities in good condition

5. Swimming Areas
   a. First aid and life saving equipment available
   b. Deep water posted and roped off
   c. Lifeguards on duty
   d. Safety rules posted

6. Fences
   a. Posts are straight and firm
   b. Wires are not broken or loose
   c. Gates operate freely
   d. Debris is removed

7. Electrical System
   a. Free of low hanging wires
   b. Free of defective switches or fixtures
   c. Broken and burned-out light bulbs replaced

8. Trails and Walkways
   a. Properly surfaced and protected from erosion
   b. Free of hazards and obstructions

9. Other
   a. Recreation areas free of dangerous trees, toxic plants, broken glass, tin cans, broken steps and protruding nails
   b. All buildings in good state of repair
   c. Sanitary facilities and water supply system clean and in good operating condition, and Health Dept. regulations being complied with
   d. Vehicular traffic confined to authorized areas
   e. Speed limits and park regulations posted

(For further details, refer to Appendix A of O&M Handbook)

EXHIBIT 4

NY-AS-18
4-28-71
(File Code AS-12-5)

U. S. Department of Agriculture
Soil Conservation Service

OPERATION AND MAINTENANCE INSPECTION REPORT FOR BASIC FACILITIES IN A PUBLIC RECREATIONAL DEVELOPMENT

Watershed_____ Inspection: ☐ Special ☐ Annual Date_____

Site No._____

Sponsoring Local Organization(s) having maintenance responsibility:

_____

Structure operation satisfactory: Unsatisfactory: _____

Item	Condition: Satisfactory	Condition: Unsatisfactory	Describe maintenance and needed repairs	Estimated Costs	Agreed date repairs to be compl.
1 Access roads & park. lots					
2 Boating and fish. areas					
3 Picnic areas					
4 Fish & wild-life facil.					
5 Swimming Areas					
6 Fences					
7 Electrical System					
8 Trails and Walkways					
9 Other					

Remarks: _____

_____

_____

_____

SCS Representative

Sponsoring Local Organization Rep.

Distribution: Orig. - Sponsor with O&M Responsibility
3 - SCS District Conservationist (1 forwarded to State Office, 1 forwarded to Area Conservationist)
1 - Each of other sponsors of watershed project
1 - N.Y. Department of Environmental Conservation
(Check list on Reverse Side)

Report due - 10 days after inspection

NY-AS-19
4-28-71
(Case File AS-12-5)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

REPORT OF COMPLETION OF NEEDED MAINTENANCE

Watershed_____ Site No. _____ Date_____

The Operation and Maintenance Inspection Report dated_____ showed a need for certain maintenance and repair jobs. Those jobs have now been completed and their costs, including services performed, are as follows:

Item Number	Maintenance Performed	Costs	Date Completed

Remarks: _____

_____

_____

_____ _____
SCS Representative Sponsoring Local Organization Rep.

Distribution: Orig. - Sponsor with O&M Responsibility
3 - SCS District Conservationist (1 forwarded to State Office, 1 forwarded to Area Conservationist)
1 - Each of other sponsors of watershed project
1 - N.Y. Department of Environmental Conservation

Report due - 10 days after completion of maintenance

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

DALE

DESIGN BRIEF

DESIGNED BY N.D. DATE June 26, 1978
CHECKED BY PAGE C-1 OF
PROJECT NO. 2210 SHORT TITLE N.Y. Dam Inspection
DESIGN SUBJECT Newtown Hoffman Creek Dam Site 5a REF. DWGS.

Estimation of Tc

Bureau of Public Roads

$$T_c = \left(\frac{11.9\ L^3}{H}\right)^{.385}$$

$T_c = \left(\frac{11.9\ (1.65)}{\ }\right) = 0.\ $ HRS

SET UP FOR CLARKS METHOD

L = WATERSHED LENGTH (Mi)

H = DIFF IN ELEV.

SCS CURVE NUMBER METHOD

$$L = \frac{l^{0.8}\ (S+1)^{0.7}}{1900\ Y^{0.5}} =$$

l =
Y = %

$S = \frac{1000}{CN} - 10 =$ (CN=)

L =

$T_c = L/0.6 =$

$$T_c + R = 10\ a \left(\frac{DA}{S}\right)^{.25}$$

North Atlantic Division
Regional Relationships
Dated 1968-1969)

4.17

a = 1.05
DA = 2.61
S =

R =
Tc =

DALE

DESIGN BRIEF

DESIGNED BY N. B. DATE June 26, 1974

CHECKED BY PAGE C-2 OF

PROJECT NO. 2210 SHORT TITLE N.Y. Dam Inspection

DESIGN SUBJECT Newtown Hutchinson Creek Site 3a REF. DWGS.

Estimation of Snyder Parameters

$$q_p = \frac{640\, C_p}{t_p} \quad \text{or} \quad 640\, C_p = q_p\, t_p$$

q_p = peak discharge/mi^2

t_p = lag

S = Slope

L Length of drainage area

L_{ca} length to center of drainage area

t_R duration of effective rainfall

T_R adopted duration

$$C_t = 0.6/\sqrt{S}$$

$$t_p = C_t (L L_{ca})^{0.3}$$

$$t_r = t_p / 5.5$$

$$t_{pr} = t_p + 0.25 (t_R - t_r)$$

C_t = 1.2 for mountain
= 0.72 for foothills
= 0.35 for valley

per Chow 14-23

Final Snyder Parameters

T_{pr} =

C_p =

DALE

DESIGN BRIEF

DESIGNED BY N. D. DATE July 7, 1978

CHECKED BY PAGE C-3 OF

PROJECT NO. 2210 SHORT TITLE

DESIGN SUBJECT Newtown - Hoffman Creek Site 5a REF. DWGS.

SUMMARY OF ESTIMATES OF CLARK AND SNYDER PARAMETERS

EPR - T_c = 0.645 hours

SCS (Upland Method by SCS) T_c = 1.42 hours

SCS (CN Method) T_c 2.38 hours

North Atlantic Div

St. L. of 1972 T_c 1.79 hours

Use North Atlantic Div. Results for T_c and R estimate

T_c = 1.79 hours

R = 2.38 hours

Clarke

Only set for Snyder

T_{pv} = 1.20

C_p = 0.6

Snyder

Use Clarke values. Snyder values only rough estimate

DALE

DESIGN BRIEF

DESIGNED BY M. D DATE July 7, 1978

CHECKED BY PAGE C-7 OF

PROJECT NO. 2210 SHORT TITLE N.Y. Dist. Empire

DESIGN SUBJECT Canton - [illegible] REF. DWGS.

D-A-D Relationship *

Since Drainage Area [illegible] Area
10 sq. mi use values for 10 sq. mi

Duration	Depth	% of Total
6 HR	25.0	113
12 HR	28.1	126
24 HR	30.2	136
48 HR	33.5	151
72 HR	35.0	158

Point Index Rainfall **

22.2 inches

Base Flow

Estimate 2 Cubic feet per sec per sq. mi

Base Flow = 2 X 2.67 = 5.34 CFS say 5 c/s

Loss Rates

Initial Loss 1.0 in
Constant Loss 0.1 in/hr

* From Hydrometeorological Report No. 51
** Index rainfall - estimate for 24 hour duration for area of 200 sq. mi.

DALE

DESIGN BRIEF

DESIGNED BY M.D DATE July 12, 1978

CHECKED BY PAGE C-5 OF

PROJECT NO. 2210 SHORT TITLE N.Y Dam Inspections

DESIGN SUBJECT Newtown-Hoffman Dam Site 3a REF. DWGS.

UHCOMP Computer Run Results

(Refer to Routing Table Spacing)

Run No.	Description	Peak	Page
1	PMF	5500	6-7
2	SPF	2950	8-10

```
SELECT 1-  (1=T...  2=UNIT H, 3=RAIN, 4=RUNOFF, 5=PNT, 6=STOP)      1
ENTER TIME INTERVAL(MIN)=    5.
```

```
SELECT 1-2 (1=TIME INT, 2=UNIT H, 3=RAIN, 4=RUNOFF, 5=PNT, 6=STOP)      2
ENTER DRAINAGE AREA (SQMI) =        2.07
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER )                             2
ENTER NUMBER OF TIME-AREA ORDINATES (0=NONE)=                           0
ENTER CLARKS TC AND R (HRS) =          1.79        2.38
```

TP	CP	TC	R
1.79	0.450	1.79	2.38

```
SELECT 1-3 (1=TIME INT, 2=UNIT H, 3=RAIN, 4=RUNOFF, 5=PNT, 6=STOP)      3
ENTER RAIN IMMEDIATELY PREVIOUS =          0.00
SELECT 1-3 ( 1=RAIN, 2=SFS, 3=PMS )                                     3
ENTER PMS INDEX RAINFALL (IN) = 22.20
ENTER R6,R12,R24,R48,R72,R96 =     113.00  126.00  136.00  151.00  158.00
ENTER TRSPC AND TRSDA (SQMI) =                0.00        2.07
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS)                            1
ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) =       1.00        0.10
```

```
SELECT 1-6 (1=TIME INT, 2=UNIT H, 3=RAIN, 4=RUNOFF, 5=PNT, 6=STOP)      4
ENTER A TITLE PLEASE -   NEWTOWN-HOFFMAN PMF
ENTER STRTQ, QRCSN, AND RTIOR =          5.00      5.00      1.00
```

HR	MIN	RAIN	LOSS	EXCESS	UNIT HG	RECSN	FLOW
1	0	0.01	0.01	0.00	175.	5.	5.
2	0	0.01	0.01	0.00	414.	5.	5.
3	0	0.01	0.01	0.00	394.	5.	5.
4	0	0.01	0.01	0.00	253.	5.	5.
5	0	0.01	0.01	0.00	168.	5.	5.
6	0	0.01	0.01	0.00	110.	5.	5.
7	0	0.04	0.04	0.00	72.	5.	5.
8	0	0.04	0.04	0.00	47.	5.	5.
9	0	0.04	0.04	0.00	31.	5.	5.
10	0	0.04	0.04	0.00	20.	5.	5.
11	0	0.04	0.04	0.00	13.	5.	5.
12	0	0.04	0.04	0.00	9.	5.	5.
13	0	0.21	0.21	0.00	6.	5.	5.
14	0	0.25	0.25	0.00	4.	5.	5.
15	0	0.31	0.26	0.05		5.	14.
16	0	0.79	0.10	0.69		5.	146.
17	0	0.29	0.10	0.19		5.	343.
18	0	0.23	0.10	0.13		5.	391.
19	0	0.02	0.02	0.00		5.	320.
20	0	0.02	0.02	0.00		5.	227.
21	0	0.02	0.02	0.00		5.	150.
22	0	0.02	0.02	0.00		5.	100.
23	0	0.02	0.02	0.00		5.	67.
24	0	0.02	0.02	0.00		5.	46.
25	0	0.11	0.10	0.01		5.	34.
26	0	0.11	0.10	0.01		5.	29.
27	0	0.11	0.10	0.01		5.	27.
28	0	0.11	0.10	0.01		5.	25.

29	0	0.11	0.10	0.01	5.	24.
30	0	0.11	0.10	0.01	5.	22.
31	0	0.36	0.10	0.26	5.	65.
32	0	0.36	0.10	0.26	5.	169.
33	0	0.36	0.10	0.26	5.	267.
34	0	0.36	0.10	0.26	5.	352.
35	0	0.36	0.10	0.26	5.	374.
36	0	0.36	0.10	0.26	5.	402.
37	0	1.87	0.10	1.77	5.	684.
38	0	2.25	0.10	2.15	5.	1387.
39	0	2.81	0.10	2.71	5.	2245.
40	0	7.12	0.10	7.02	5.	3775.
41	0	2.62	0.10	2.52	5.	5347.
42	0	2.06	0.10	1.96	5.	5403.
43	0	0.17	0.10	0.07	5.	4482.
44	0	0.17	0.10	0.07	5.	3207.
45	0	0.17	0.10	0.07	5.	2140.
46	0	0.17	0.10	0.07	5.	1443.
47	0	0.17	0.10	0.07	5.	986.
48	0	0.17	0.10	0.07	5.	691.
49	0	0.01	0.01	0.00	5.	485.
50	0	0.01	0.01	0.00	5.	330.
51	0	0.01	0.01	0.00	5.	215.
52	0	0.01	0.01	0.00	5.	139.
53	0	0.01	0.01	0.00	5.	87.
54	0	0.01	0.01	0.00	5.	41.
55	0	0.02	0.02	0.00	5.	22.
56	0	0.02	0.02	0.00	5.	11.
57	0	0.02	0.02	0.00	5.	9.
58	0	0.02	0.02	0.01	5.	7.
59	0	0.02	0.02	0.00	5.	6.
60	0	0.02	0.02	0.00	5.	6.
61	0	0.10	0.10	0.00	5.	5.
62	0	0.12	0.10	0.02	5.	9.
63	0	0.14	0.10	0.04	5.	20.
64	0	0.37	0.10	0.27	5.	77.
65	0	0.14	0.10	0.04	5.	145.
66	0	0.11	0.10	0.01	5.	143.
67	0	0.01	0.01	0.00	5.	103.
68	0	0.01	0.01	0.00	5.	71.
69	0	0.01	0.01	0.00	5.	48.
70	0	0.01	0.01	0.00	5.	33.
71	0	0.01	0.01	0.00	5.	23.
72	0	0.01	0.01	0.00	5.	17.
73	0				5.	13.
74	0				5.	10.
75	0				5.	8.
76	0				5.	7.
77	0				5.	6.
78	0				5.	5.
79	0				5.	5.
80	0				5.	5.
81	0				5.	5.
82	0				5.	5.
83	0				5.	5.
84	0				5.	5.
85	0				5.	5.
TOTAL		28.29	4.08	21.01	1722.	425. 37634.

```
SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      1
ENTER TIME INTERVAL(MIN)=    60.

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      2
ENTER DRAINAGE AREA (SQMI) =        2.67
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER )        2
ENTER NUMBER OF TIME-AREA ORDINATES (0=NONE)=      0
ENTER CLARKS TC AND R (HRS) =          1.79        2.38

      TP        CP        TC        R

    1.79     0.430      1.79      2.38

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      3
ENTER RATIO IMPERVIOUS =          0.00
SELECT 1-3 ( 1=RAIN, 2=SPS, 3=PMS )        2
ENTER SPS INDEX RAINFALL (IN) = 11.10
ENTER TRSPC AND TRSDA (SQMI) =              1.00        2.67
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS)        1
ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) =       1.00        0.10

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      4
ENTER A TITLE PLEASE -   NEWTON HOFMA SPF
ENTER STRTQ,QRCSN,AND RTIOR =          5.00        5.00      1.00

 HR MTN   RAIN   LOSS  EXCESS  UNIT HG    RECSN      FLOW
  1    0   0.00   0.00   0.00      175.       5.         5.
  2    0   0.00   0.00   0.00      414.       5.         5.
  3    0   0.00   0.00   0.00      394.       5.         5.
  4    0   0.00   0.00   0.00      258.       5.         5.
  5    0   0.00   0.00   0.00      168.       5.         5.
  6    0   0.00   0.00   0.00      110.       5.         5.
  7    0   0.01   0.01   0.00       72.       5.         5.
  8    0   0.01   0.01   0.00       47.       5.         5.
  9    0   0.01   0.01   0.00       31.       5.         5.
 10    0   0.01   0.01   0.00       20.       5.         5.
 11    0   0.01   0.01   0.00       13.       5.         5.
 12    0   0.01   0.01   0.00        9.       5.         5.
 13    0   0.03   0.03   0.00        6.       5.         5.
 14    0   0.04   0.04   0.00        4.       5.         5.
 15    0   0.04   0.04   0.00                 5.         5.
 16    0   0.11   0.11   0.00                 5.         5.
 17    0   0.04   0.04   0.00                 5.         5.
 18    0   0.03   0.03   0.00                 5.         5.
 19    0   0.00   0.00   0.00                 5.         5.
 20    0   0.00   0.00   0.00                 5.         5.
 21    0   0.00   0.00   0.00                 5.         5.
 22    0   0.00   0.00   0.00                 5.         5.
 23    0   0.00   0.00   0.00                 5.         5.
 24    0   0.00   0.00   0.00                 5.         5.
 25    0   0.01   0.01   0.00                 5.         5.
 26    0   0.01   0.01   0.00                 5.         5.
 27    0   0.01   0.01   0.00                 5.         5.
 28    0   0.01   0.01   0.00                 5.         5.
 29    0   0.01   0.01   0.00                 5.         5.
 30    0   0.01   0.01   0.00                 5.         5.
```

31	0	0.04	0.04	0.00	5.	5.
32	0	0.04	0.04	0.00	5.	5.
33	0	0.04	0.04	0.00	5.	5.
34	0	0.04	0.04	0.00	5.	5.
35	0	0.04	0.04	0.00	5.	5.
36	0	0.04	0.04	0.00	5.	5.
37	0	0.13	0.13	0.00	5.	5.
38	0	0.16	0.16	0.00	5.	5.
39	0	0.19	0.13	0.06	5.	16.
40	0	0.49	0.10	0.39	5.	98.
41	0	0.18	0.10	0.08	5.	204.
42	0	0.14	0.10	0.04	5.	214.
43	0	0.02	0.02	0.00	5.	164.
44	0	0.02	0.02	0.00	5.	114.
45	0	0.02	0.02	0.00	5.	76.
46	0	0.02	0.02	0.00	5.	51.
47	0	0.02	0.02	0.00	5.	35.
48	0	0.02	0.02	0.00	5.	25.
49	0	0.10	0.10	0.00	5.	18.
50	0	0.10	0.10	0.00	5.	14.
51	0	0.10	0.10	0.00	5.	11.
52	0	0.10	0.10	0.00	5.	9.
53	0	0.10	0.10	0.00	5.	7.
54	0	0.10	0.10	0.00	5.	6.
55	0	0.28	0.10	0.18	5.	37.
56	0	0.28	0.10	0.18	5.	111.
57	0	0.28	0.10	0.18	5.	182.
58	0	0.28	0.10	0.18	5.	226.
59	0	0.28	0.10	0.18	5.	259.
60	0	0.28	0.10	0.18	5.	278.
61	0	0.99	0.10	0.89	5.	416.
62	0	1.19	0.10	1.09	5.	753.
63	0	1.49	0.10	1.39	5.	1174.
64	0	3.78	0.10	3.68	5.	1964.
65	0	1.39	0.10	1.29	5.	2785.
66	0	1.09	0.10	0.99	5.	2837.
67	0	0.17	0.10	0.07	5.	2324.
68	0	0.17	0.10	0.07	5.	1676.
69	0	0.17	0.10	0.07	5.	1139.
70	0	0.17	0.10	0.07	5.	769.
71	0	0.17	0.10	0.07	5.	560.
72	0	0.17	0.10	0.07	5.	410.
73	0	0.00	0.00	0.00	5.	300.
74	0	0.00	0.00	0.00	5.	208.
75	0	0.00	0.00	0.00	5.	136.
76	0	0.00	0.00	0.00	5.	89.
77	0	0.00	0.00	0.00	5.	57.
78	0	0.00	0.00	0.00	5.	30.
79	0	0.01	0.01	0.00	5.	18.
80	0	0.01	0.01	0.00	5.	11.

81	0	0.01	0.01	0.00		5.	9.
82	0	0.01	0.01	0.00		5.	7.
83	0	0.01	0.01	0.00		5.	6.
84	0	0.01	0.01	0.00		5.	6.
85	0	0.05	0.05	0.00		5.	5.
86	0	0.06	0.06	0.00		5.	5.
87	0	0.08	0.08	0.00		5.	5.
88	0	0.19	0.10	0.09		5.	21.
89	0	0.07	0.07	0.00		5.	42.
90	0	0.06	0.06	0.00		5.	40.
91	0	0.01	0.01	0.00		5.	28.
92	0	0.01	0.01	0.00		5.	20.
93	0	0.01	0.01	0.00		5.	15.
94	0	0.01	0.01	0.00		5.	11.
95	0	0.01	0.01	0.00		5.	9.
96	0	0.01	0.01	0.00		5.	8.
97	0					5.	7.
98	0					5.	6.
99	0					5.	6.
100	0					5.	6.
101	0					5.	5.
102	0					5.	5.
103	0					5.	5.
104	0					5.	5.
105	0					5.	5.
106	0					5.	5.
107	0					5.	5.
108	0					5.	5.
109	0					5.	5.
TOTAL		15.52	4.43	11.49	1722.	545.	20329.

NEWTOWN-HOFFMAN (PRINC SPILLWAY)

DIAMETER OF PIPE (FT) 2.50
START ELEV OF PIPE (FT) 1442.50
ROUGH COEFFICIENT 0.0150
HEIGHT-HEAD (FT) 60.00
PIPE LENGTH (FT) 250.00

KT,KG,KENT,KEXT 4.15 3.05 0.10 1.00

C 0.491

ELEV	HEIGHT	G2gH	(2gH)**1/2	Q/C	Q
1443	0.50	32.20	5.67	27.85	13.68
1444	1.50	96.60	9.83	48.25	23.69
1445	2.50	161.00	12.69	62.28	30.59
1446	3.50	225.40	15.01	73.70	36.19
1447	4.50	289.80	17.02	83.56	41.04
1448	5.50	354.20	18.82	92.38	45.37
1449	6.50	418.60	20.46	100.43	49.32
1450	7.50	483.00	21.98	107.88	52.98
1451	8.50	547.40	23.40	114.85	56.40
1452	9.50	611.80	24.73	121.42	59.63
1453	10.50	676.20	26.00	127.65	62.69
1454	11.50	740.60	27.21	133.59	65.61
1455	12.50	805.00	28.37	139.27	68.40
1456	13.50	869.40	29.49	144.74	71.08
1457	14.50	933.80	30.56	150.00	73.67
1458	15.50	998.20	31.59	155.09	76.17
1459	16.50	1062.60	32.60	160.01	78.58
1460	17.50	1127.00	33.57	164.79	80.93
1461	18.50	1191.40	34.52	169.43	83.21
1462	19.50	1255.80	35.44	173.95	85.43
1463	20.50	1320.20	36.33	178.36	87.59
1464	21.50	1384.60	37.21	182.66	89.70
1465	22.50	1449.00	38.07	186.85	91.77
1466	23.50	1513.40	38.90	190.96	93.78
1467	24.50	1577.80	39.72	194.98	95.76
1468	25.50	1642.20	40.52	198.92	97.69
1469	26.50	1706.60	41.31	202.78	99.59
1470	27.50	1771.00	42.08	206.58	101.45
1471	28.50	1835.40	42.84	210.30	103.28
1472	29.50	1899.80	43.59	213.96	105.08
1473	30.50	1964.20	44.32	217.55	106.84
1474	31.50	2028.60	45.04	221.09	108.58
1475	32.50	2093.00	45.75	224.57	110.29
1476	33.50	2157.40	46.45	228.00	111.97
1477	34.50	2221.80	47.14	231.38	113.63
1478	35.50	2286.20	47.81	234.71	115.27
1479	36.50	2350.60	48.48	237.99	116.88
1480	37.50	2415.00	49.14	241.23	118.47
1481	38.50	2479.40	49.79	244.42	120.04
1482	39.50	2543.80	50.44	247.58	121.59
1483	40.50	2608.20	51.07	250.69	123.12
1484	41.50	2672.60	51.70	253.77	124.63
1485	42.50	2737.00	52.32	256.81	126.12
1486	43.50	2801.40	52.93	259.81	127.60
1487	44.50	2865.80	53.53	262.78	129.05

1488	45.50	2930.20	54.13	265.72	130.50
1489	46.50	2994.60	54.72	268.62	131.92
1490	47.50	3059.00	55.31	271.49	133.33
1491	48.50	3123.40	55.89	274.34	134.73
1492	49.50	3187.80	56.46	277.15	136.11
1493	50.50	3252.20	57.03	279.94	137.48
1494	51.50	3316.60	57.59	282.69	138.83
1495	52.50	3381.00	58.15	285.43	140.18
1496	53.50	3445.40	58.70	288.13	141.50
1497	54.50	3509.80	59.24	290.81	142.82
1498	55.50	3574.20	59.78	293.47	144.12
1499	56.50	3638.60	60.32	296.10	145.42
1500	57.50	3703.00	60.85	298.71	146.70
1501	58.50	3767.40	61.38	301.29	147.97
1502	59.50	3831.80	61.90	303.86	149.23

NEWTOWN HOFFMAN
WEIR FLOW PROGRAM

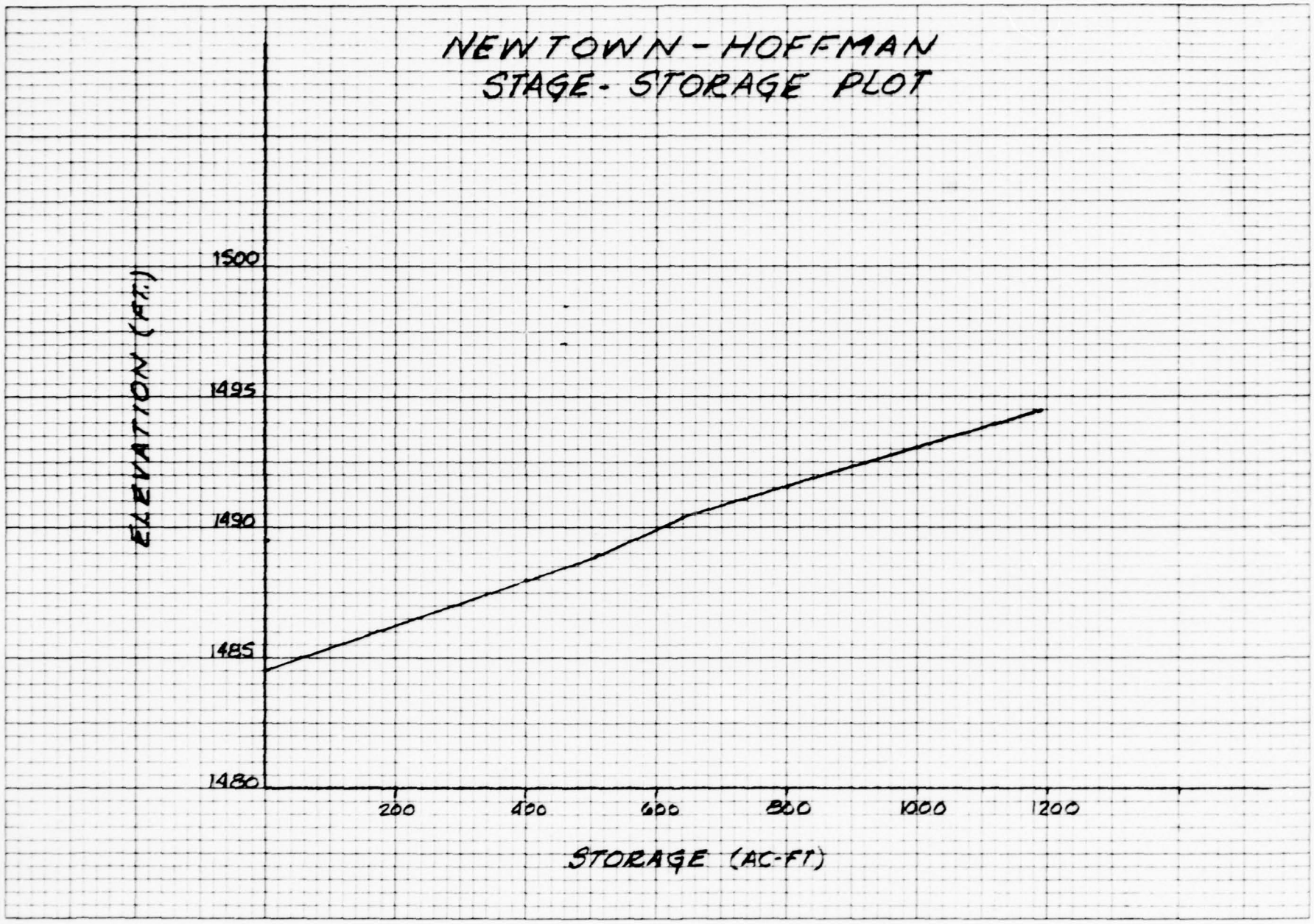
GIVE C&L 3.20 200.00
GIVE ELEVATION TO START FLOW AND HEIGHT 1489 20

ELEV	1490 FT	DISCHARGE	640. CFS
ELEV	1491 FT	DISCHARGE	1810. CFS
ELEV	1492 FT	DISCHARGE	3326. CFS
ELEV	1493 FT	DISCHARGE	5120. CFS
ELEV	1494 FT	DISCHARGE	7155. CFS
ELEV	1495 FT	DISCHARGE	9406. CFS
ELEV	1496 FT	DISCHARGE	11853. CFS
ELEV	1497 FT	DISCHARGE	14482. CFS
ELEV	1498 FT	DISCHARGE	17280. CFS
ELEV	1499 FT	DISCHARGE	20239. CFS
ELEV	1500 FT	DISCHARGE	23349. CFS
ELEV	1501 FT	DISCHARGE	26604. CFS
ELEV	1502 FT	DISCHARGE	29998. CFS
ELEV	1503 FT	DISCHARGE	33525. CFS
ELEV	1504 FT	DISCHARGE	37181. CFS
ELEV	1505 FT	DISCHARGE	40960. CFS
ELEV	1506 FT	DISCHARGE	44859. CFS
ELEV	1507 FT	DISCHARGE	48875. CFS
ELEV	1508 FT	DISCHARGE	53004. CFS
ELEV	1509 FT	DISCHARGE	57243. CFS

NEWTOWN-HOFFMAN
WEIR FLOW PROGRAM

GIVE C&L 2.64 600.00
GIVE ELEVATION TO START FLOW AND HEIGHT 1494 15

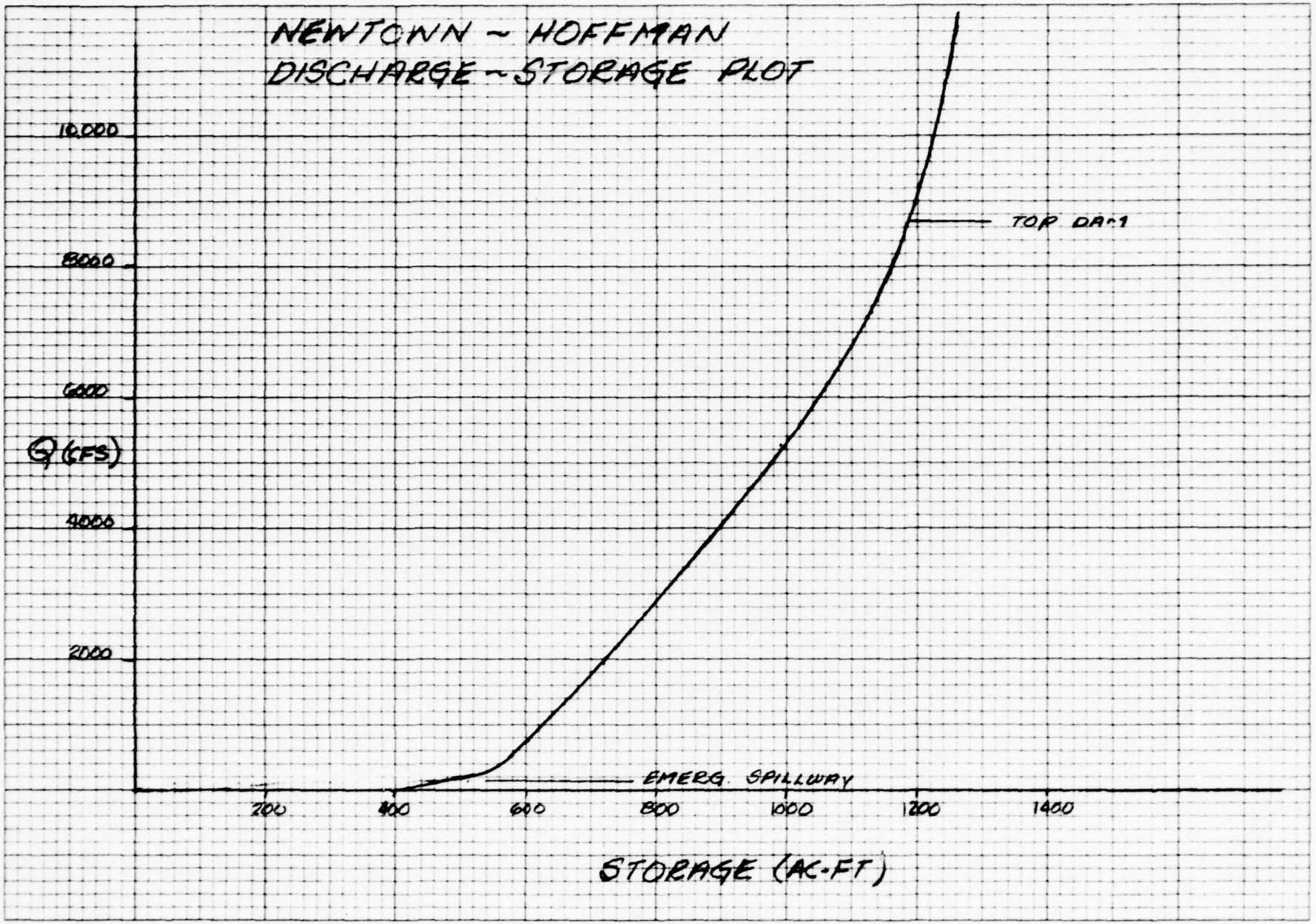
ELEV	1495 FT	DISCHARGE	2112. CFS
ELEV	1496 FT	DISCHARGE	5974. CFS
ELEV	1497 FT	DISCHARGE	10974. CFS
ELEV	1498 FT	DISCHARGE	16896. CFS
ELEV	1499 FT	DISCHARGE	23613. CFS
ELEV	1500 FT	DISCHARGE	31040. CFS
ELEV	1501 FT	DISCHARGE	39115. CFS
ELEV	1502 FT	DISCHARGE	47789. CFS
ELEV	1503 FT	DISCHARGE	57024. CFS
ELEV	1504 FT	DISCHARGE	66787. CFS
ELEV	1505 FT	DISCHARGE	77052. CFS
ELEV	1506 FT	DISCHARGE	87794. CFS
ELEV	1507 FT	DISCHARGE	98994. CFS
ELEV	1508 FT	DISCHARGE	110633. CFS
ELEV	1509 FT	DISCHARGE	122696. CFS


NEWTOWN - HOFFMAN
STAGE - STORAGE PLOT
ELEVATION (FT.)
1500
1495
1490
1485
1480
200
400
600
800
1000
1200
STORAGE (AC-FT)

FROM CREST OF PRINCIPAL SPILLWAY

NAME	ELEV.	H	Q PRINC. SPWY.	Q EMERG. SPWY	Q DAM	Q TOT.
NEWTOWN HOFFMAN	1484.5		—	—	—	—
	1485		126	—	—	126
	1486		128	—	—	128
	1487		129	—	—	129
	1488		131	—	—	131
	1489		132	—	—	132
	1490		133	640	—	773
	1491		135	1810		1945
	1492		136	3326		3462
	1493		138	5120		5258
	1494		139	7155		7294
	1495		140	9406	2112	11658
	1496		142		5974	15522
	1497		143		10974	20523
	1498		144		16896	26446
	1499		145		23613	33164
	1500		147		31040	40593

NO. 340-10 DIETZGEN GRAPH PAPER
DIETZGEN CORPORATION



```
**********
EC-1 VERSION DATED JAN 1973
PDATED AUG 74
HANGE NO. 01
**********
```

NEWTOWN HOFFMAN SITE 3A DAM
RESERVOIR ROUTING OF PMF OVER STRUCTURE
INCLUDES EMERGENCY SPILLAY AND FLOOD POOL STORAGE

JOB SPECIFICATION

NQ	NMR	MNIN	IDAY	IHR	MIN	METRC	IPLT	IPRT	MSTAN
26	1	0	0	0	0	0	0	0	0

JOPER	NWT
3	0

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	0	0	0	0	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	2.67	0.0	0.0	0.0	0.0	0	0	0

INPUT HYDROGRAPH

22.	65.	169.	267.	332.	3784.	4702.	684.	1387.	2245.
3775.	5347.	5463.	4482.	3207.	2140.	1443.	988.	691.	485.
330.	215.	139.	87.	41.	22.				

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5463.	4087.	1770.	1635.	42512.
INCHES		14.24	24.66	24.69	24.69
AC-FT		2027.	3512.	3515.	3515.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	1	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE	400.	500.	550.	720.	900.	1000.	1160.	1220.	0.	0.
OUTFLOW	0.	200.	300.	2000.	4000.	6000.	8000.	10000.	0.	0.

TIME	EOP STOR	AVG IN	EOP OUT
1	411.	22.	22.
2	413.	44.	25.
3	420.	117.	39.
4	433.	218.	67.
5	451.	300.	102.
6	509.	2050.	686.
7	794.	4243.	2824.
8	787.	2693.	2742.
9	689.	1636.	1691.
10	696.	1816.	1764.
11	768.	3010.	2530.
12	883.	4561.	3008.
13	950.	5405.	5169.
14	950.	4973.	4991.
15	897.	3845.	3968.
16	824.	2674.	3153.
17	747.	1792.	2296.
18	684.	1216.	1643.
19	637.	840.	1173.
20	603.	588.	831.
21	578.	408.	583.
22	560.	273.	402.
23	546.	177.	292.
24	532.	113.	265.
25	517.	64.	234.
26	502.	32.	203.
SUM			41506.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5169.	3937.	1727.	1596.	41506.
INCHES		13.72	24.07	24.10	24.10
AC-FT		1953.	3420.	3432.	3432.

********** ********** ********** ********** **********

RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	5463.	4087.	1770.	1635.	2.67
ROUTED TO	0	5169.	3937.	1727.	1596.	2.67

****
EC-1 VERSION DATED JAN 1973
PDATED AUG 74
RUNNGE NO. 01
****

NEWTOWN-HOFFMAN SITE 3A DAM
RESERVOIR ROUTING OF SPF OVER STRUCTURE
INCLUDES EMERGENCY SPILLWAY AND FLOOD POOL STORAGE

JOB SPECIFICATION

NQ	NMR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
28	1	0	0	0	0	0	0	0	0

JOPER	NWT
3	0

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	0	0	0	0	0	0

HYDROGRAPH DATA

INYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	2.67	0.0	0.0	0.0	0.0	0	0	0

INPUT HYDROGRAPH

6.	37.	111.	182.	228.	259.	278.	416.	753.	1174.
1964.	2785.	2835.	2324.	1676.	1139.	789.	560.	410.	300.
208.	136.	89.	57.	3000.	18.	11.	9.		

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3000.	2126.	985.	777.	21754.
INCHES		7.41	12.61	12.63	12.63
AC-FT		1055.	1795.	1799.	1799.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	1	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE	400.	500.	550.	720.	900.	1060.	1160.	1220.	0.	0.
OUTFLOW	0.	200.	300.	2000.	4000.	6000.	8000.	10000.	0.	0.

TIME	EOP STOR	AVG IN	EOP OUT
1	403.	6.	6.
2	404.	22.	8.
3	409.	74.	18.
4	419.	147.	38.
5	432.	205.	63.
6	445.	244.	91.
7	459.	269.	118.
8	476.	347.	153.
9	509.	505.	219.
10	562.	964.	425.
11	629.	1569.	1094.
12	704.	2375.	1843.
13	760.	2810.	2440.
14	767.	2500.	2528.
15	738.	2000.	2196.
16	692.	1408.	1721.
17	648.	964.	1278.
18	613.	675.	925.
19	587.	485.	668.
20	568.	355.	485.
21	555.	254.	350.
22	543.	172.	286.
23	530.	113.	259.
24	515.	73.	231.
25	599.	1529.	794.
26	641.	1509.	1212.
27	571.	15.	512.
28	539.	10.	279.
SUM			20239.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2528.	2001.	840.	723.	20239.
INCHES		6.97	11.71	11.75	11.75
AC-FT		993.	1668.	1674.	1674.

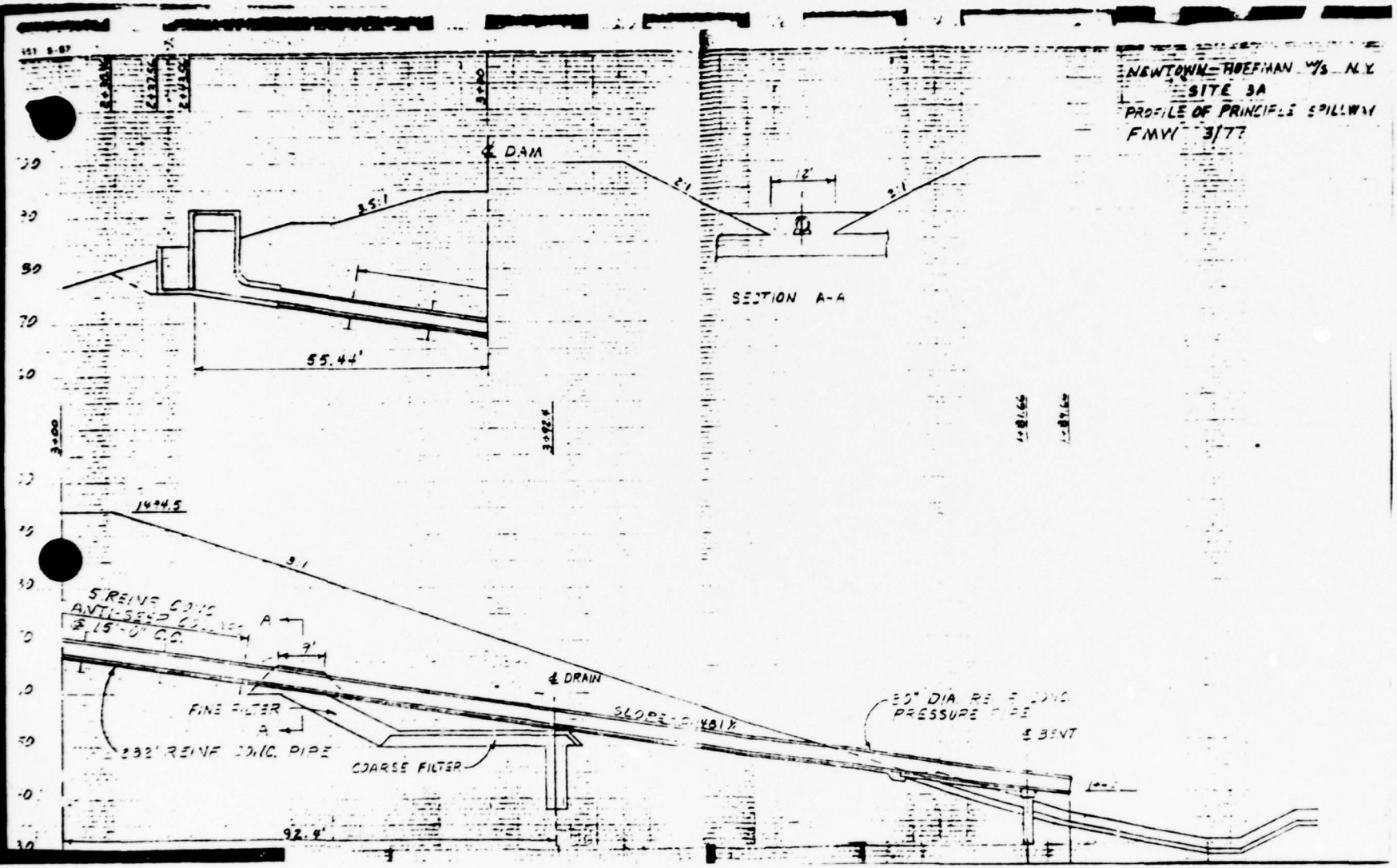
********** ********** ********** ********** **********

RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	3000.	2126.	985.	777.	2.67
ROUTED TO	0	2528.	2001.	840.	723.	2.67

APPENDIX D

STRUCTURAL STABILITY COMPUTATIONS


NEWTOWN-HOEFFMAN W/S N.Y.
SITE 3A
PROFILE OF PRINCIPLE SPILLWAY
FMW 3/77
℄ DAM
2:1
3.5:1
55.44'
SECTION A-A
12'
1444.5
3:1
5' REINF CONC ANTI-SEEP COLLAR @ 15'-0" C.C.
A
7'
℄ DRAIN
FINE FILTER
232' REINF CONC. PIPE
COARSE FILTER
SLOPE = 48.1%
60" DIA REINF CONC PRESSURE PIPE
℄ BENT
92.9'

NEWTOWN HOFFMAN SITE 3A
NY-2283

EMBANKMENT AND FOUNDATION DESIGN- TABLE OF CONTENTS

SAMPLE	DEPTH	USCS	D_{50} mm	PI	LL	% .005 mm	PIPING *	CRACKING *	REMARKS
106-1	3'	GM	.3	—	—	—	—	—	SYR. LAB LINCOLN LAB ACSOLTS
108-1	2'-10'	CL	.05	9	29	25	6	5	
501-1	1'-6'	GM	1.0	—	—	—	—	—	SYR.
501-2	6'-11'	SM-SC	.07	5	23	11	4	5	SYR.
102-1	1'-10'	GM-GC	.25	6	30	9	5	3	SYR.
104-1	4.5'-10'	GM	2.2	NP	<16	6	6	5	SYR
102-2	4.5-8'	GM	3.3	NP	21	6	6	3	SYR
102-2	4.5-8'	GM	2.0	2	20		4	3	LINCOLN LAB
102-1	2'-3'	CL	.01	7	17				LINCOLN LAB
102-1	12'-13'	CL	.01	3	24				SYR
102-1	15'-15'	CL	.05	NP	22	11			SYR.
102-1	30'	CL	.007	NP	20	6			SYR.
102-2	8'	SM-SC	.09	6	23	9	5		SYR.

* BASED ON QUALITATIVE OBSERVATIONS

State New York — Project Newtown - Hoffman Site 3A

By J.B.P. Date 4/11 Checked by

Subject CLASSIFICATION OF [illegible]

SAMPLE	DEPTH	USCS	D_{50} MM	PI	LL	% -.005 MM	PIPING*	CRACKING*	REMARKS
3.1	6.5'-16'	GM-GW	6.5	N.P.	<26	<6	5	3	Syr. Lab
4.2	2.6'-12'	GM-GW	9.0	N.P.	<23	4	5	3	Syr.
302.2	6'	GM-GW	14.	N.P.	<25	<4	6	3	Syr.
502.2	4'-8'	GM	5.0	3	22	6	5	3	Syr.
402.1	4.5'-17'	GM-SP	5.4	NP	17	<3	6	3	Syr.
401.1	5'-9'	SM-SP	2.6	NP	<18	<7	5	3	Syr.
6.1	3'	GM	3.7	NP	<21	5	5	3	Syr.
6.2	8'	GM	3.4	NP	<18	<12	5	3	Syr.
7.1	1'-4'	GM	3.0	NP	32	12	5	3	Syr.
TOTAL (1-3)	Composed of class of embankment material.								Syr.
4.1	1'-2.1'	ML	.031	NP	<43	27	6	5	
8.1	2.5'	ML	.032	6	37	29	6	5	

* DEGREE OF RESISTANCE (1 GREATEST TO 6 LEAST)

SLOPE STABILITY

INPUT DATA SHEET

Pg 2-1

SHEET 1 OF 1

TRIAL ADP FORM 2
UPPER DARBY, PA. 2/68

IDENTIFICATION - LOCATION

TOWN HOFFMAN SITE 3A NEW YORK BY JCP FEB 16 1971

PHI = 21 DEGREES C = 575 LBS/SQ FT CK SCY FEB 16 1971

TOTAL LINE	COORDINATES FIRST POINT X1	Y1	SECOND POINT X2	Y2	DENSITY BELOW LINE	SHEAR PARAMETERS ABOVE LINE PHI	C	BELOW LINE PHI	C
1	-9.0	0.	9.0	0.	136.	0	0	21.	575.
2	9.0	0.	145.	-54.5	136.	0	0	21.	575.
3	145.	-54.5	5000.	-54.5	-138.	0.	0.	30.	0.
4	145.	-54.5	98.	-54.5	-138.	21.	575.	30.	0.
5	98.	-54.5	68.	-34.5	-138.	21.	575.	21.	575.
6	68.	-34.5	-4.	-10.0	-138.	21.	575.	21.	575.
7	-4.	-10.0	-26.0	-10.0	-138.	21.	575.	21.	575.
8	-26.0	-10.0	-26.1	-5.7	-138.	21.	575.	21.	575.
9	-26.1	-5.7	-9.	0.	136	0.	0.	21.	575.
10	-26.1	-5.7	-37.5	-9.5	-138.	0.	0.	21.	575.
	-37.5	-9.5	-47.5	-10.0	-138.	0.	0.	21.	575.
	-47.5	-10.0	-181.0	-54.5	-138.	0.	0.	21.	575.
	-181.0	-54.5	-5000.	-54.5	-138.	0.	0.	30.	0.
	-181.0	-54.5	98.	-54.5	-138.	21.	575.	30.	0.

IDENTIFICATION

DOWNSTREAM SLOPE 2:1 WITH 10FT. BERM AT 1484.5

ΔX	TOP Y	ΔY	NO Y ARCS	RAD INC	MIN TANG	MAX TANG
20.	130.	-20.	4.	4.	12.	14.

IDENTIFICATION

DOWNSTREAM SLOPE = 2.5:1 NO BERMS DRAIN AT C/b = 0.6

ΔX	TOP Y	ΔY	NO Y ARCS	RAD INC	MIN TANG	MAX TANG
20.	90.	-20.	4.	4.	2.	4.

NEWTOWN HOFFMAN SITE)A NEW YORK
PHI=21DEGREES C=575 LBS/SQ FT

BY JEP FEB 16,1971
CK SCY FEB 16,1971

Point Dat. Ck.
J.E.P
2-3-71

EMBANKMENT AND FOUNDATION INPUT DATA

	FIRST POINT X	FIRST POINT Y	SECOND POINT X	SECOND POINT Y	DENSITY IN LBS/CU.FT.	SHEAR PARAMETERS ABOVE LINE PHI	ABOVE LINE C	BELOW LINE PHI	BELOW LINE C
LINE 1	-9.0	0.0	9.0	0.0	136.0	0.0	0.	21.0	575.
LINE 2	9.0	0.0	145.0	-54.5	136.0	0.0	0.	21.0	575.
LINE 3	145.0	-54.5	5000.0	-54.5	-138.0	0.0	0.	30.0	0.
LINE 4	145.0	-54.5	98.0	-54.5	-138.0	21.0	575.	30.0	0.
LINE 5	98.0	-54.5	68.0	-34.5	-138.0	21.0	575.	21.0	575.
LINE 6	68.0	-34.5	-4.0	-10.0	-138.0	21.0	575.	21.0	575.
LINE 7	-4.0	-10.0	-26.0	-10.0	-138.0	21.0	575.	21.0	575.
LINE 8	-26.0	-10.0	-26.1	-5.7	-138.0	21.0	575.	21.0	575.
LINE 9	-26.1	-5.7	-9.0	0.0	136.0	0.0	0.	21.0	575.
LINE 10	-26.1	-5.7	-37.5	-9.5	-138.0	0.0	0.	21.0	575.
LINE 11	-37.5	-9.5	-47.5	-10.0	-138.0	0.0	0.	21.0	575.
LINE 12	-47.5	-10.0	-181.0	-54.5	-138.0	0.0	0.	21.0	575.
LINE 13	-181.0	-54.5	-5000.0	-54.5	-138.0	0.0	0.	30.0	0.
LINE 14	-181.0	-54.5	98.0	-54.5	-138.0	21.0	575.	30.0	0.

NEWTOWN HOFFMAN SITE 3A NEW YORK
PHI=21DEGREES C=575 LBS/SQ FT

BY JEP FEB 16,1971
CK SCY FEB 16,1971

UPSTREAM SLOPE 3 1 WITH 10FT. BERM AT 1484.5

ARC INPUT DATA

HORIZONTAL DISTANCE FROM CENTERLINE OF DAM TO LEFT MOST ARC CENTER = -160.0 FT.

HORIZONTAL DISTANCE BETWEEN ARC CENTERS = 20.0 FT.

NUMBER OF HORIZONTAL DISTANCES = 5

VERTICAL DISTANCE FROM TOP OF DAM TO UPPER MOST ARC CENTER = 130.0 FT.

VERTICAL DISTANCE BETWEEN ARC CENTERS = -20.0 FT.

NUMBER OF VERTICAL DISTANCES = 4

DISTANCE BETWEEN ARC RADIUS = 4 FT.

LINE NUMBER TANGENT TO MINIMUM ARC = 12

LINE NUMBER TANGENT TO MAXIMUM ARC = 14

MINIMUM SAFETY FACTOR AND ASSOCIATED RADIUS FOR SELECTED ARC CENTERS

VERTICAL	HORIZONTAL DISTANCE -160.0		-140.0		-120.0		-100.0		-80.0							
DISTANCE	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS
130.0	184	1.989	184	1.799	184	1.671	184	1.772	184	2.093						
110.0	164	2.112	184	1.776	164	1.689	164	1.711	164	1.989						
90.0	144	2.231	144	1.795	144	1.724	144	1.685	144	1.882						
70.0	124	2.372	124	1.860	124	1.715	124	1.692	124	1.810						

NOTE: SEE NEXT PAGE FOR CONTINUATION OF UPSTREAM SLOPE CHECK

NEWTOWN HOFFMAN SITE 3A NEW YORK
PHI=21DEGREES C=575 LBS/SQ FT

BY JEP FEB 16,1971
CK SCY FEB 16,1971

Pg 2-4
Point out CK. & CP
3-3-71

UPSTREAM SLOPE 3 1 WITH LOFT. BERM AT 1484.5

ARC INPUT DATA

HORIZONTAL DISTANCE FROM CENTERLINE OF DAM TO LEFT MOST ARC CENTER = -160.0 FT.

HORIZONTAL DISTANCE BETWEEN ARC CENTERS = 20.0 FT.

NUMBER OF HORIZONTAL DISTANCES = 5

VERTICAL DISTANCE FROM TOP OF DAM TO UPPER MOST ARC CENTER = 170.0 FT.

VERTICAL DISTANCE BETWEEN ARC CENTERS = -20.0 FT.

NUMBER OF VERTICAL DISTANCES = 2

DISTANCE BETWEEN ARC RADIUS = 4 FT.

LINE NUMBER TANGENT TO MINIMUM ARC = 12

LINE NUMBER TANGENT TO MAXIMUM ARC = 14

MINIMUM SAFETY FACTOR AND ASSOCIATED RADIUS FOR SELECTED ARC CENTERS

VERTICAL	HORIZONTAL DISTANCE -160.0		-140.0		-120.0		-100.0		-80.0							
DISTANCE	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS
170.0	224	1.922	224	1.713	224	1.712	224	1.907	224	2.321						
150.0	204	1.951	204	1.725	204	1.675	204	1.824	204	2.201						

NEWTOWN HOFFMAN SITE 3A NEW YORK — BY JEP FEB 16,1971
PHI=21DEGREES C=575 LBS/SQ FT — CK SCY FEB 16,1971

DOWNSTREAM SLOPE=2.5 1 NO BERMS DRAIN AT C/B=0.6

4/15/71

ARC INPUT DATA

HORIZONTAL DISTANCE FROM CENTERLINE OF DAM TO LEFT MOST ARC CENTER = 60.0 FT.

HORIZONTAL DISTANCE BETWEEN ARC CENTERS = 20.0 FT.

NUMBER OF HORIZONTAL DISTANCES = 4

VERTICAL DISTANCE FROM TOP OF DAM TO UPPER MOST ARC CENTER = 90.0 FT.

VERTICAL DISTANCE BETWEEN ARC CENTERS = -20.0 FT.

NUMBER OF VERTICAL DISTANCES = 4

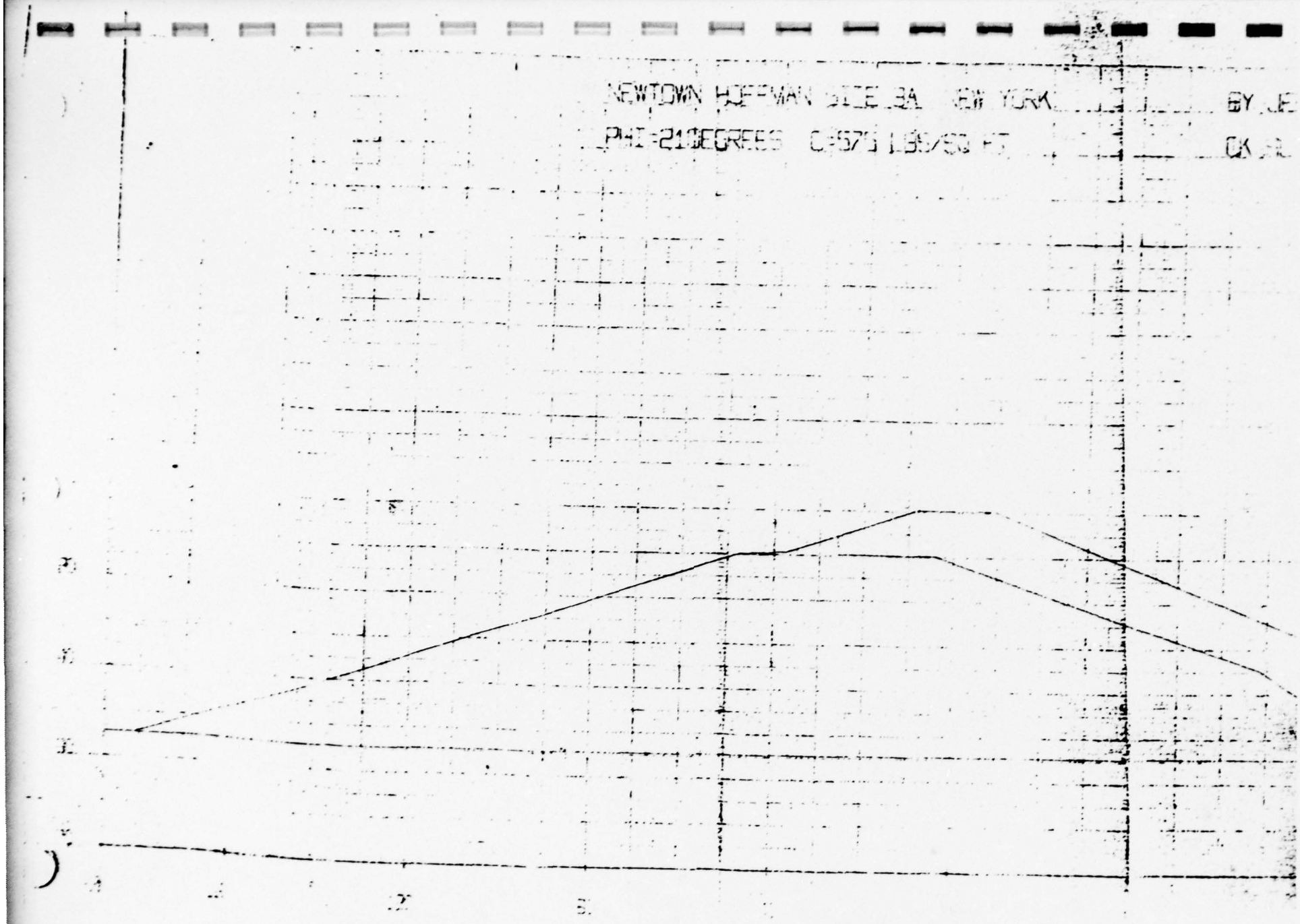
DISTANCE BETWEEN ARC RADIUS = 4 FT.

LINE NUMBER TANGENT TO MINIMUM ARC = 2

LINE NUMBER TANGENT TO MAXIMUM ARC = 4

MINIMUM SAFETY FACTOR AND ASSOCIATED RADIUS FOR SELECTED ARC CENTERS

VERTICAL	HORIZONTAL DISTANCE 60.0		80.0		100.0		120.0									
DISTANCE	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS	RAD	FS
90.0	144	2.095	144	1.756	144	1.675	144	1.909								
70.0	124	1.980	124	1.687	124	1.703	124	2.035								
50.0	104	1.872	104	1.657	104	1.785	104	2.183								
30.0	84	1.790	84	1.704	84	1.915	84	2.372								


NEWTOWN HUFFMAN DICE BA NEW YORK
BY JE
PHI=21DEGREES C=57.1 LBS/SQ FT
CK RL

STATE NEW YORK

BY WAR

CUTOFF TRENCH FILL

MINIMUM REQUIRED [illegible] CUTOFF TRENCH
CHECK WITH FOLLOWING [illegible] USE MAXIMUM VALUE

1) $W = h_1 - d$ 2) $W = \frac{h_2}{2}$ 3) $W = 12$

WHERE: W = BOTTOM WIDTH OF CUTOFF
d = DEPTH OF BOTTOM OF CUTOFF BELOW BASE OF FILL
h_1 = RESERVOIR HEAD MEASURED TO NORMAL POOL ELEVATION 1434.6
h_2 = RESERVOIR HEAD MEASURED TO EMERGENCY SPILLWAY CREST 1438.8

(FROM STRIPPED GROUND OR FOUND. EXCAV. LINE)

STA. 4+00	d = 54',	h_1 = [illegible],	h_2 = 73	W = 12'
STA. 5+00	d = 40',	h_1 = [illegible],	h_2 = 57.3'	W = 12'
5+50	d = 39'	h_1 = [illegible]	h_2 = 52.5'	W = 27'
STA. 5+80	d = 22.8',	h_1 = [illegible],	h_2 = 36.3'	W = 33'
6+00	d = [illegible]	h_1 = [illegible]	h_2 = [illegible]	W = 35'
6+40	d = 10.0	h_1 = [illegible]	h_2 = 21'	W = 35'
7+00	d = [illegible]	h_1 = [illegible]	h_2 = [illegible]	W = 36'
7+50	[illegible]	[illegible]	[illegible]	12'
7+50	d = 5.0'	h_1 = 22.1'	[illegible]	W = 21.3'

USE FOLLOWING

MATERIALS TESTING REPORT

U.S. DEPARTMENT of AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL CLASSIFICATION

PROJECT and STATE: Mayhew Hoffman Site 3H

FIELD SAMPLE NO.: —

TYPE OF SAMPLE: —

SAMPLE LOCATION:

DEPTH: —

GEOLOGIC ORIGIN:

TESTED AT:

DATE: 5/11/11

SYMBOL:

DESCRIPTION: Materials Borderine Drain

LABORATORY NO.:

GRAIN SIZE DISTRIBUTION

D_1 | D_5 | D_{10} | D_{30} | D_{60} | D_{95} | D_{MAX} | C_u | C_c

FINES | SANDS | GRAVELS | COBBLES

SIEVE OPENING, (mm)

US STANDARD SIEVE SIZE

PERCENT FINER BY DRY WEIGHT

GRAIN SIZE IN MILLIMETERS

207.1 'E'
207.2 'E'
501.2 'D'
502.1 'C'
401.1 'B'
502.2 'B'
302.2 'B'

SPECIFIC GRAVITY (G_s)		ATTERBERG LIMITS						SOLUBLE SALTS	SHRINKAGE LIMIT	UNDISTURBED CONDITION	
		NATURAL MOISTURE		AIR DRY		OVEN DRY				MOISTURE	DRY UNIT WEIGHT
(+) #4	(-) #4	LL	PI	LL	PI	LL	PI	%	%	%	G/cc pcf

REMARKS: Embankment Mat'ls. Rep. by 'E' Mat. 207.1, 207.2, 202.1 (Not Shown) and 'C' Mat. 202.2 (Not Shown)

Foundation Mat'ls. 501.2 'D', 502.1 'C', 401.1 'B', 502.2 & 302.2

9-64

LABORATORY No.

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	SOIL CLASSIFICATION

PROJECT and STATE: NEWTOWN - HOFFMAN SITE 3A

SAMPLE LOCATION:

FIELD SAMPLE NO.:

DEPTH:

GEOLOGIC ORIGIN:

TYPE OF SAMPLE:

TESTED AT:

APPROVED BY: JEP CK WHR 5-11-71

DATE: 5/7/71

SYMBOL:

DESCRIPTION: REGRADED MATERIALS BORROW DRAIN

GRAIN SIZE DISTRIBUTION

COBBLES | GRAVELS | SANDS | FINES

SIEVE OPENING, (mm)

U.S. STANDARD SIEVE SIZE

GRAIN SIZE IN MILLIMETERS

UNDISTURBED CONDITION: MOISTURE %; DRY UNIT WEIGHT g/cc pcf

SOLUBLE SALTS %

SHRINKAGE LIMIT %

ATTERBERG LIMITS: NATURAL MOISTURE LL PI; AIR DRY LL PI; OVEN DRY LL PI

SPECIFIC GRAVITY (G_s) (+) #4

REMARKS

SCS-ENG-523 Rev. 8-69 SOIL CONSERVATION SERVICE

☆GPO 1969-O-357-545

STATE	PROJECT		
NEW YORK	NEWTOWN HOFFMAN SITE 3A		
BY J.E.P. DATE 5/7/71	CHECKED BY JAR DATE 5-11-71	JOB NO. NY-2283-D	
SUBJECT FINE DRAIN FILL CALCULATIONS		SHEET OF 2 of 3	

I. PIPING CONTROL

ASSUME BASE WITH HIGH PIPING POTENTIAL

a. $D_{3_F} \geq .074$ m.m. OR #200 SIEVE ✓

b. $D_{15_F} \leq 4\ D_{85}$ ~~302.2~~ 207.1 ✓

D_{85} 207.1 MAT 'E' = 2.0 m.m. ✓

$D_{15_F} \leq 4\ (2.0) \leq 8.0$ m.m. ✓

c. $D_{50_F} \leq 25\ D_{50}$ 207.1 ✓

D_{50} 207.1 MAT 'E' = .03 m.m. ✓

$D_{50_F} \leq 25(.03) \leq .75$ m.m. ✓

d. $D_{100_F} \leq 3''$

e. $C_u = \frac{D_{60}}{D_{10}} \leq 20$

ASTM C 33 FINE CONC AGG.

$D_{60} = 1.4$ m.m.

$D_{10} = .15$ m.m.

$C_u = \frac{1.4}{0.15} = 9.3 \leq 20$ O.K. ✓

II. PERMEABILITY REQUIREMENTS

ASSUME BASE MODERATELY TO HIGHLY PERMEABLE

a. $D_{3_F} \geq 0.074$ m.m. OR #200 SIEVE ✓

b. $D_{15_F} \geq 5\ D_{15}$ 502.1 ✓

$D_{15_F} \geq .025$ m.m. ✓

D_{15} 502.1 MAT 'C' = .005 m.m.

USE $D_{15_{MIN.}} = 0.1$ m.m.

STATE New York | PROJECT Newtown - Hoffman Site 3A

BY J. E. P. | DATE 5/11/71 | CHECKED BY WAR | DATE 5-11-71 | JOB NO. NY-2265-D

SUBJECT Coarse Drain Fill Calculations | SHEET 4-4 OF 4

I. Piping Control Requirements

Assume Base with High Piping Potential

a. $D_{3_F} \geq .074$ m.m. or #200 Sieve ✓

b. $D_{15_F} \leq 4\, D_{85_{401.1}}$ ✓ $\qquad D_{85_{401.1}} = 10.0$ m.m. ✓

$D_{15_F} \leq 4(10.0) \leq 40.0$ m.m. ✓

c. $D_{50_F} \leq 25\, D_{50_{401.1}}$ ✓ $\qquad D_{50_{401.1}} = 2.2$ m.m. ✓

$D_{50_F} \leq 25\ (2.2$ m.m.$) \leq 55.0$ m.m. ✓

d. $D_{100_F} \leq 3''$

$D_{60} = 9.0$ m.m. ✓ } NYSDOT #1

e. $C_{u_F} \leq 20$ $\qquad D_{10} = 4.5$ m.m. ✓ }

$C_{u_F} = \frac{D_{60}}{D_{10}} = \frac{9.0}{4.5} = 2.0 \leq 20.0$ O.K.

f. $D_{85_F} \geq$ Dia. Perf. Pipe $\geq \frac{5}{16}''$

$D_{85_F} \geq 7.9$ m.m. ✓

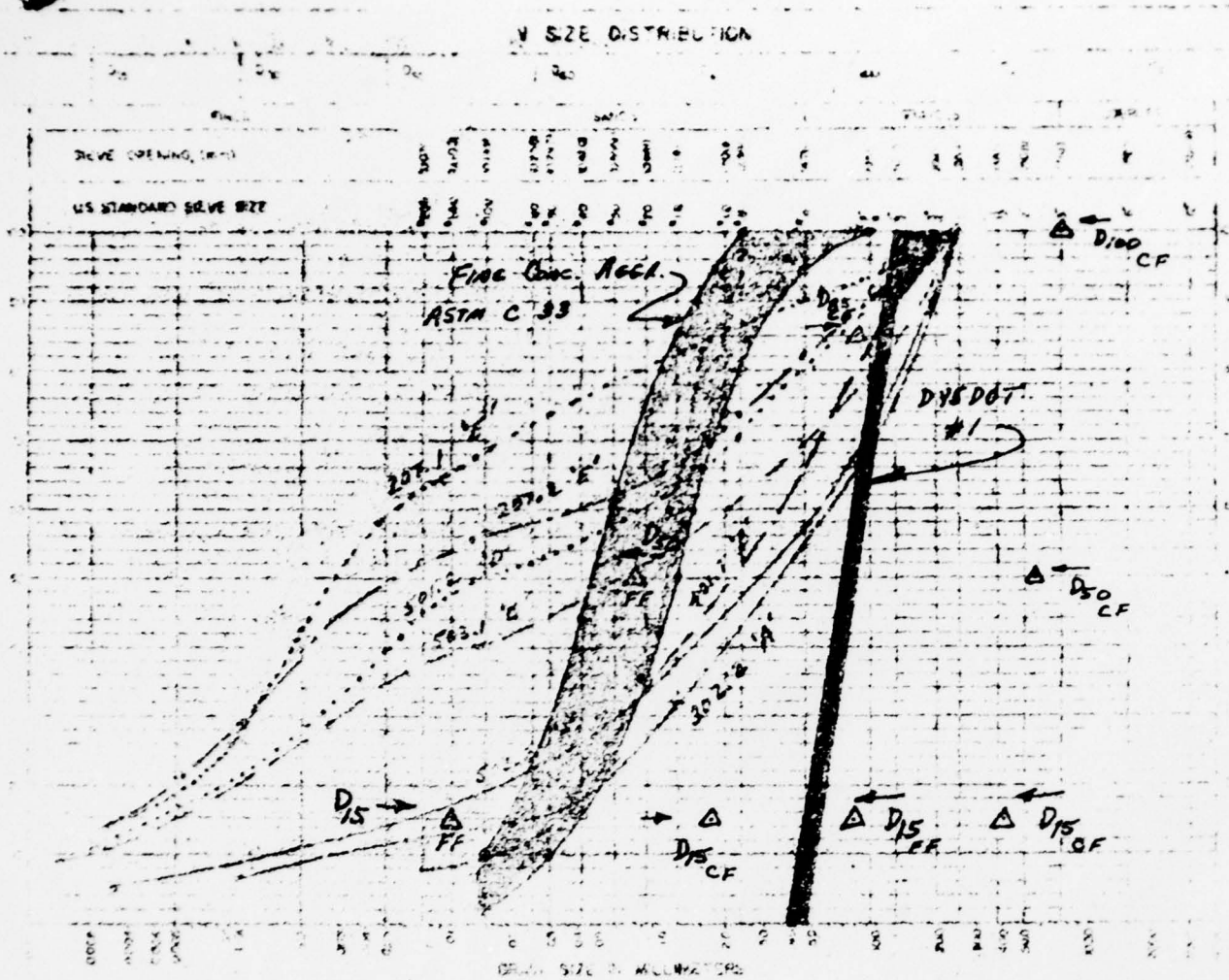
Permeability Requirements

Assume Base Moderately to Highly Permeable

a. $D_{3_F} \geq 0.074$ m.m. or #200 Sieve

b. $D_{15_F} \geq 5\, D_{15_{401.1}}$ $\qquad D_{15_{401.1}} = .34$ m.m. ✓

$D_{15_F} \geq 5(.34) \geq 1.70$ m.m.



SIZE DISTRIBUTION

SPECIFIC GRAVITY (G_s)	ATTERBERG LIMITS						SOLUBLE SALTS	SHRINKAGE LIMIT	UNDISTURBED CONDITION	
	NATURAL MOISTURE		AIR DRY		OVEN DRY				MOISTURE	DRY DENSITY
%	LL	PI	LL	PI	LL	PI	%	%	%	pcf

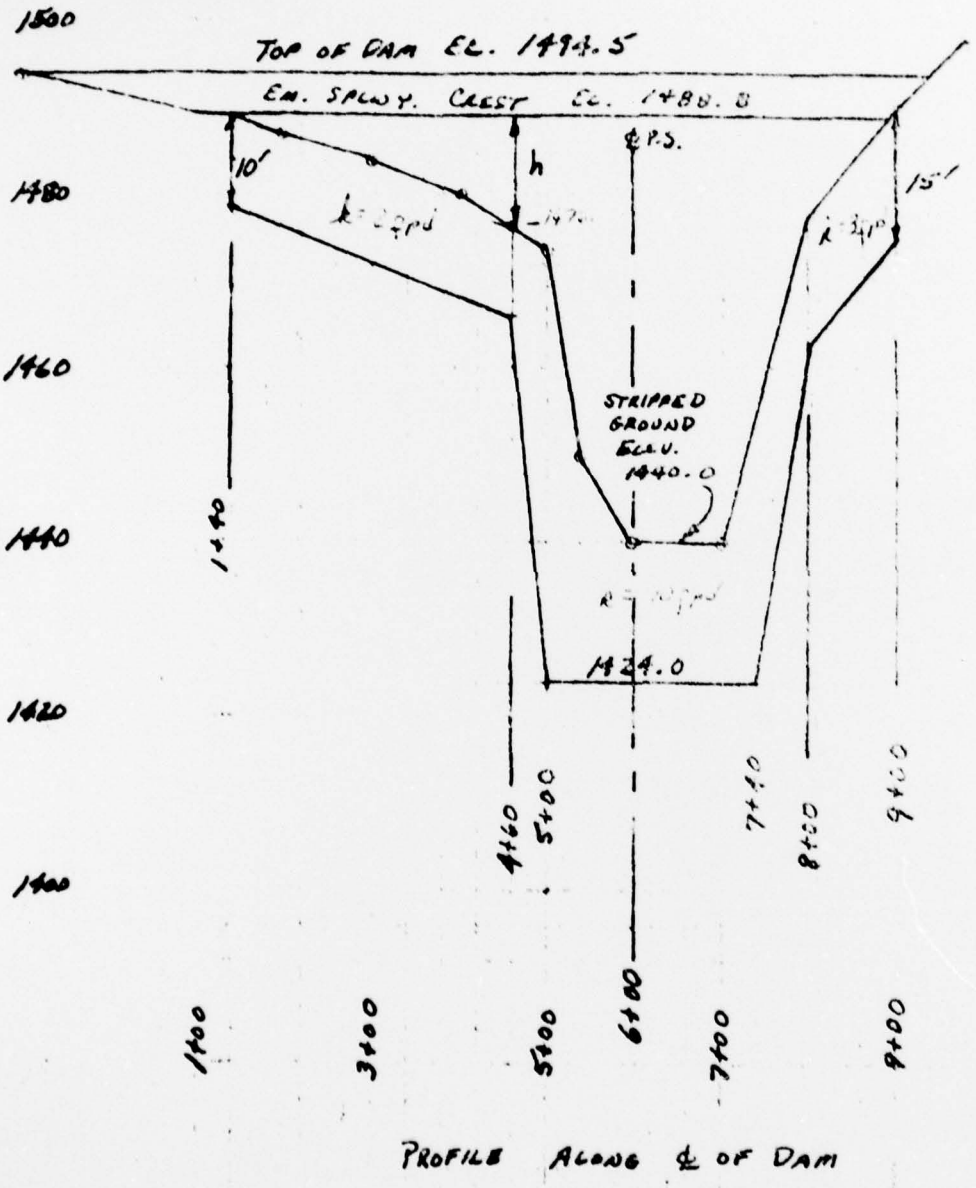
COARSE FILTER D.K. ADJACENT TO 'A' & 'B' MATLS.
USE FINE FILTER ADJACENT TO C, D, & E MATLS.

STATE New York | PROJECT Newtown Harbarn Site 3A

BY J.E.P. | DATE 5/10/71 | CHECKED BY [illegible] | DATE [illegible] | JOB NO. NY-[illegible]

SUBJECT Seepage Analysis | SHEET [illegible] OF [illegible]

Seepage Thru Foundation



Profile Along ℄ of Dam

SCS-ENG-523 Rev. 8-69 SOIL CONSERVATION SERVICE

STATE New York | PROJECT Newtown Hoffman Site 3A

BY J.C.P. | DATE 5/10/71 | CHECKED BY [illegible] | DATE 5/14/71 | JOB NO NY-0203-0

SUBJECT Seepage Analysis (Cont.) | SHEET 8 OF 8 5-2

Seepage Thru Foundation

Stations	K fpd	h (Avg.) Ft.	L Ft. Seepage Path Length	A Sq Ft	Q C.F.D. $k\frac{h}{L}A$
1+40 To 4+60	1.0	$\frac{13+0}{2}=6.5$	$\left(\frac{0+18}{2}\right)5.5$ +18 = 87	(10)(320) = 3200	(1.0)(.077)(3200) = 775
4+60 To 6+00	10.0	$\frac{13+19}{2}=31$	$\left(\frac{18+25}{2}\right)5.5$ +18 = 181	(10)(380) = 3800	(10)(.171)(380) = 6498
TOTAL FROM LEFT SIDE = 6991 C.F.D.					
6+00 To 8+00	10.0	$\frac{19+11}{2}=30.0$	$\left(\frac{18+18}{2}\right)5.5$ +18 = 185	(10)(320) = 3200	(10)(.162)(320) = 6415
8+00 To 9+00	3.0	$\frac{11+0}{2}=5.5$	$\left(\frac{18+0}{2}\right)5.5$ +18 = 78	(5)(100) = 1500	(3.0)(.071)(1500) = 320
TOTAL FROM RIGHT SIDE = 6735 C.F.D.					

Outlet Drain Along Princ. Spwy.

Assume K = 40,000 fpd NYS DOT #1

i = .01354 Ft/Ft

Assume $Q/2$ is discharged thru drain at each end & $Q/2$ is discharged thru the pipe.

Q = 6991 C.F.D. (Left Side provides greater Q)

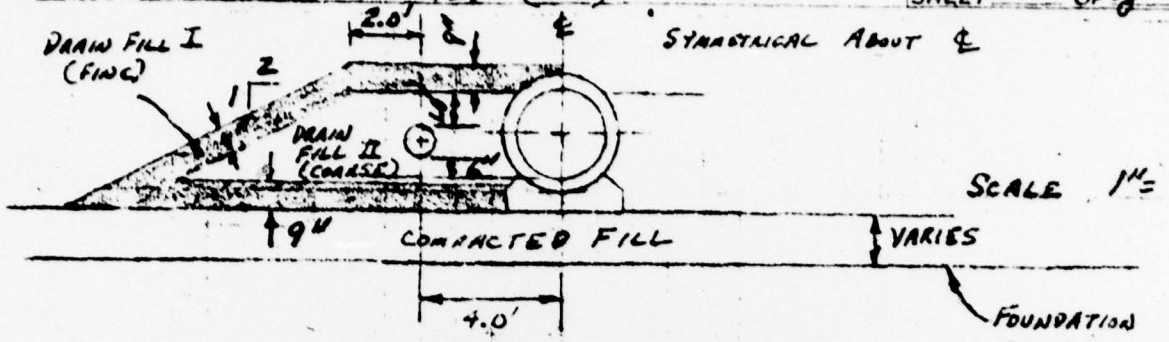
$\therefore Q_{DRAIN} = \frac{6991}{2} = 3496$ C.F.D.

Area'd. = $\frac{Q_D}{K\,i} = \frac{3496}{(40{,}000)(.0135)} = \frac{3496}{542} = 6.45 = 6.5$ Ft²

STATE New York | PROJECT Newtown Hoffman Site 3A

BY EP | DATE 5/14/71 | CHECKED BY [illegible] | DATE 5/14/71 | JOB NO NY-2283-D

SUBJECT Seepage Analysis (Cont.) | SHEET 5-3 OF [illegible]



Symmetrical About ℄

Scale 1" = 5'

Use The Following Layout Along P. Slwy.

$A_{\text{Drain Fill II (Coarse)}} \approx \frac{1}{2}(2.5)(5.0) + 4.5(2.5) = 6.25 + 11.25 = 17.5$ □'

17.5 Sq Ft. > 6.45 Req'd. O.K.

Since seepage from left side is less than from the right side, the area provided will be more than adequate and will provide symmetry.

$Q_{Pipe} = \frac{6991}{2} = 3496$ ~~2952~~ C.F.D. $= \frac{0.0405}{0.0342}$ cfs

Assume: 10" dia Pipe

$n = 0.012$

$S = 0.01354$ Ft/Ft

$d/D = 0.5$ (Half Full Flow)

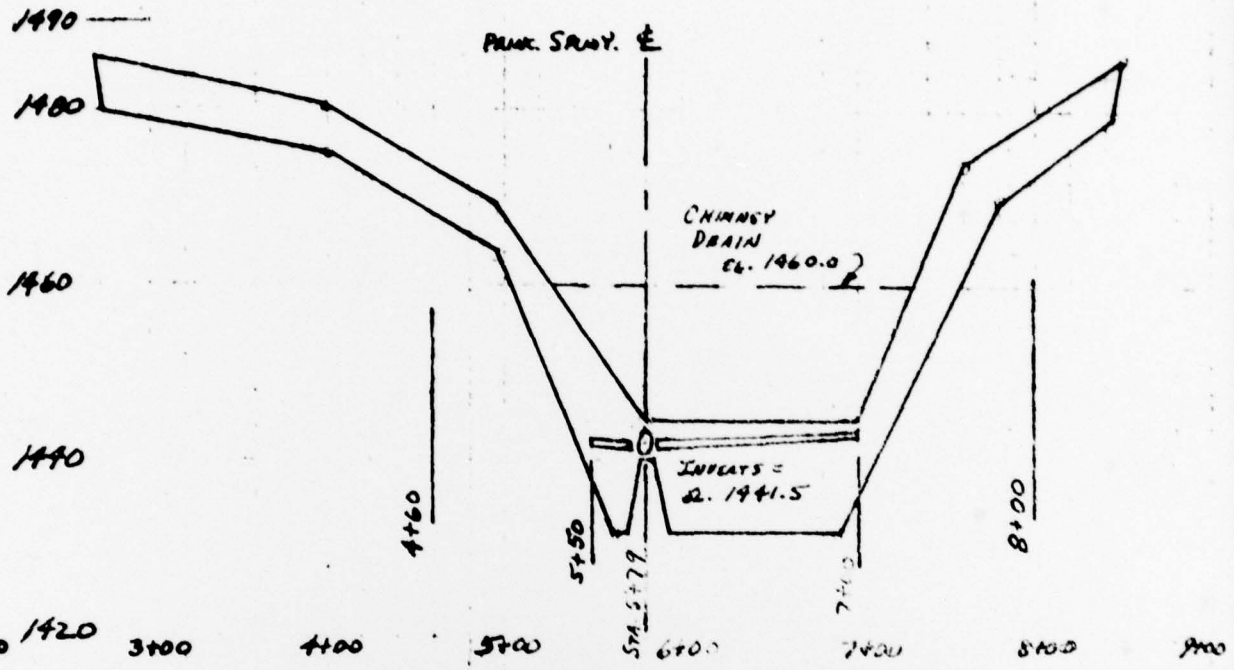
From ES-97 Sht. 3 of 7 $\frac{nQ}{D^{8/3} S^{1/2}} = .2317 \quad .608 \quad .1163$

Solve for $Q = \frac{.2319\ D^{8/3} S^{1/2}}{n} = \frac{(.2317)(.83)^{8/3}\sqrt{.01354}}{.012}$

$Q = \frac{.0164}{.012} = 1.37$ cfs > .0342 cfs

∴ Use 10" As. Ccd. Pipe Throughout

STATE New York		PROJECT Newtown Hoffman Site 3A		
BY J.C.P.	DATE 5/17/71	CHECKED BY	DATE	JOB NO. NY-2283-D
SUBJECT Lateral Drain System				SHEET ... OF 5-4



PROFILE OF DRAINAGE SYSTEM
(STATIONS TAKEN FROM ℄ DAM)

ASSUME THE OUTLET DRAIN PIPES (10") ARE FILLED WITH WATER, & THE GRADIENT IS THE SLOPE OF THE DRAIN MATERIAL. THEN THE WATER ELEV. IN THE DRAIN MATERIAL AT THE INTERSECTION OF THE OUTLET DRAIN ALONG THE P. S. AND LATERAL DRAINS = 1442.3. START WITH THIS ELEVATION AND A GRADIENT EQUAL TO THE SLOPE OF THE DRAIN PIPE. ∴ THE ELEV. @ STA. 5+50 WILL BE ≈ 1442.6 AND AT STA. 7+00 ELEV. ≈ 1443.8

FOR COMPUTATIONS OF DRAIN CAPACITY, THE ACTUAL GRADIENT OF THE WATER SURFACE WILL BE USED.

THE SLOPE OF THE DRAIN PIPE WILL BE THE GRADIENT.

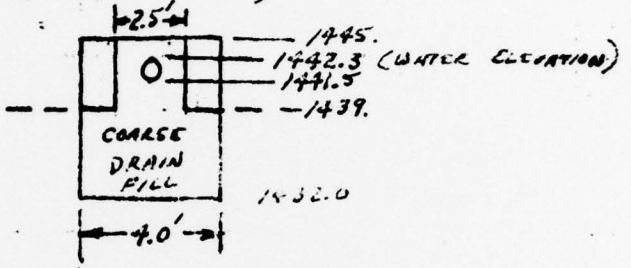
Left Side @ Sta. 5+79

$Q = 6991$ c.f.d.

$Q_{DRAW\ FILL} = \frac{6991}{2} = 3496$ c.f.d. $\qquad i$ = Slope Pipe = .01 FT/FT

$A_{REQ'D} = \frac{Q_{DR}}{K\,i} = \frac{3496}{(40{,}000)(.010\ FT/FT)} = 8.74\ \square'$

$A_{PROVIDED}$ @ 5+79



$A = (2.5')(3.3') + (4.0')(7.0')$

$A = 8.25\ \square' + 28.0\ \square'$

$A = 36.25\ \square' > 8.74\ \square'$ O.K.

Left Side @ Sta. 5+50

$Q \approx 6500$ cfd (Assumed)

$Q_{DRAW} = 6500$ cfd (No Pipe)

$A_{REQ'D.} = \frac{Q_{DR}}{K\,i} = \frac{6500}{(40{,}000)(.44)}$ $\qquad i = \frac{20'}{45'} = .44\ FT/FT$ (Slope of Drain Fill)

$A_{REQ'D} = \frac{6500}{17{,}600} = 0.4\ \square'$

Area of Coarse Drain Fill Available @ 5+50 >>> $0.4\ \square'$ ∴ O.K.

Left Side @ Sta. 4+60

$Q = 493$ cfd $\qquad i = \frac{10'}{100'} = 0.1\ FT/FT$

$Q_{DRAW} = 493$ cfd (No Pipe)

$A_{REQ'D} = \frac{Q_{DR}}{K\,i} = \frac{493}{(40{,}000)(.1)} = 0.1\ \square'$

Area of Coarse Drain Fill Available @ 4+60 >>> $0.1\ \square'$ O.K.

STATE New York | PROJECT [illegible]

BY J. E. P. | DATE 5/19/71 | CHECKED BY | DATE | JOB NO.

SUBJECT LATERAL DRAIN SYSTEM (CON'T.) | SHEET | OF

LEFT SIDE (CONTINUED)

ENTRANCE AREA BETWEEN STA's. 4+60 AND 5+79

$Q \approx 6498$ cfd

$$A_{REQ'D} = \frac{Q}{K_{FOUND.} \frac{i.cr.}{F.S.}} = \frac{Q}{10\,fpd\,(0.5)}$$

$$A_{REQ'D} = \frac{Q}{5.0\,fpd} = \frac{6498}{5.0} = 1{,}300\,\square'$$

$$A_{PROVIDED} = 2\left[119\left(\frac{6.0+12.0}{2}\right)\right] + (4.0)(119)$$

$$= 2(119)(9.0) + 476$$

$$= 2142 + 476$$

$$= 2618\,\square' > 1300\,\square' \quad O.K.$$

SCS-ENG-022 NOV. 8-69 SOIL CONSERVATION SERVICE

STATE New York | PROJECT Newtown Northam Creek U.S. Site # 5A
BY J.E.P. | DATE 5/20/71 | CHECKED BY | DATE | JOB NO. NY-[illegible]-D
SUBJECT LATERAL DRAIN SYSTEM (CONT.) SHEET [illegible] OF 7 0

RIGHT SIDE @ STA. 5+79

AREA ADEQUATE SINCE Q = 6735 cfd IS LESS THAN
.. LEFT SIDE Q = 6991 cfd

RIGHT SIDE @ STA. 7+00

$Q = 320 + \frac{6415}{2} = 320 + 3208 = 3528$ c.f.d.

$Q_{DRAIN} = 3528$ c.f.d. (No Pipe)

$i = \frac{20'}{65'} = .31$

$A_{REQ'D} = \frac{Q_{DRAIN}}{Ki} = \frac{3528}{(\cancel{40,000})(.31)} = .28\ \square'$
$12{,}400$

AREA OF COARSE DRAIN FILL AVAILABLE @ 7+00 >>> $.28\ \square'$ ∴ O.K.

RIGHT SIDE @ STA. 8+00

Q = 320 cfd
Q_{DRAIN} = 320 cfd (No Pipe)

$i = \frac{20'}{135'} = .15$ FT/FT

$A_{REQ'D} = \frac{Q_{DR}}{Ki} = \frac{(320)}{(\cancel{40,000})(.15)} = .05\ \square'$
$6{,}000$

AREA OF COARSE DRAIN FILL AVAILABLE @ 8+00 >>> $.05\ \square'$ ∴ O.K.

ENTRANCE AREA BETWEEN STA's. 8+00 AND 5+79 (RIGHT SIDE)

Q = 6415 cfd

$A_{REQ'D.} = \frac{Q}{K_{POWER}\ 2\ CU/F.S.} = \frac{6415}{10{,}000\ (0.5)} = 1283\ \square'$

$A_{PROVIDED} = 2\left[221\left(\frac{9.0}{\cancel{6.0+12.0}}\right)\right] + \cancel{4.0(221)} = 3978 + 884$
884

$A_{PROVIDED} = 4862\ \square'$ >> $1283\ \square'$ ∴ O.K.

APPENDIX E

REFERENCES

APPENDIX

REFERENCES

1. Department of the Army, Office of the Chief of Engineers. National Program of Investigation of Dams; Appendix D: Recommended Guidelines for Safety Inspection of Dams, 1976

2. The University of the State of New York - The State Education Department - State Museum and Science Service - Geological Survey: Geological Map of New York (1961)

3. Linsley and Franzini: Water Resources Engineering, Second Edition, McGraw-Hill (1972)

4. Sherard, Woodward, Gizienski, Clevenger: Earth and Earth - Rock Dams, John Wiley and Sons, Inc., 1963

5. Ven Te Chow: Handbook of Applied Hydrology, McGraw-Hill, 1964

6. Louis C. Schreiner and John T. Riedel: Hydrometeorological Report No. 51, U.S. Department of Commerce, National Oceanic and Atmospheric Administration National Weather Service, Office of Hydrology; Silver Springs, Maryland, September 1976

7. The Hydrologic Engineering Center: Computer Program 723-X6-L2010, HEC-1 Flood Hydrograph Package, User's Manual, Corps of Engineers, U.S. Army, 609 Second Street, Davis, California 95616, January 1973

8. The Hydrologic Engineering Center, Art Pabst: Computer Program UHCOMP, Unpublished, Corps of Engineers, U.S. Army, 609 Second Street, Davis, California 95616

9. North Atlantic Regional Water Resources Study Coordinating Committee: Appendix C, Climate, Meteorology and Hydrology, February 1972

10. Soil Conservation Service (Engineering Division): Urban Hydrology for Small Watersheds, Technical Release No. 55, U.S. Department of Agriculture, January 1975

11. Resource Analysis, Upper Hudson & Mohawk River Basins, Hydrologic Flood Routing Models, October 1976

12. Soil Conservation Service, Technical Release No. 56, A Guide for Design and Layout of Vegetative Wave Protection for Earth Dam Embankments, December 12, 1974, U.S. Department of Agriculture

13. Soil Conservation Service: Earth Dams and Reservoirs: Technical Release No. 60, June 1976, U.S. Department of Agriculture

14. H.W. King, E.F. Brater: Handbook of Hydraulics, McGraw-Hill, 5th Edition, 1963