HOUSATONIC RIVER BASIN
WOLCOTT, CONNECTICUT

CORNELIS DAM

CT 00293

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

The original hardcopy version of this report
contains color photographs and/or drawings.
For additional information on this report
please email

U.S. Army Corps of Engineers
New England District
Email: Library@nae02.usace.army.mil

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

MARCH, 1981

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER CT 00293	2. GOVT ACCESSION NO. ADA044080	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Cornelis Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE March 1981
		13. NUMBER OF PAGES 65
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

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

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

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

DAMS, INSPECTION, DAM SAFETY,

Housatonic River Basin
Wolcott, Connecticut

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

The Cornelis Dam is an earth embankment with concrete and masonry spillways. It is approximately 330 ft. long, 15.3 ft. high and has an average top width of 15 ft. Based on visual inspection and past operational performance, the dam is judged to be in FAIR condition. The dam is classified as SMALL in size and a HIGH hazard potential structure in accordance with the Recommended Guidelines for Safety Inspection of Dams, established by the Corps of Engineers.

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

407-440

HOUSATONIC RIVER BASIN

WOLCOTT, CONNECTICUT

CORNELIS DAM

CT 00293

PHASE 1 INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

Indentification No.:	CT 00293
Name of Dam:	Cornelis Dam
Town:	Wolcott
Country and State:	New Haven, Connecticut
Stream:	Mad River
Date of Inspection:	November 14, 1980

BRIEF ASSESSMENT

The Cornelis Dam is an earth embankment with concrete and masonry spillways. It is approximately 330 feet long, 15.3 feet high and has an average top width of 15 feet. The Cornelis Dam was probably constructed in 1917 with subsequent improvements in 1945. The dam is presently owned by the Scovill Manufacturing Company and is operated by the Century Brass Products, Inc. The pond is presently utilized for swimming.

Based on visual inspection and past operational performance, the dam is judged to be in FAIR condition. Seepage and vegetation was noted on the downstream face of the west spillway and trees and brush are growing on the earth embankments.

The dam is classified as SMALL in size and a HIGH hazard potential structure in accordance with the Recommended Guidelines for Safety Inspection of Dams, established by the Corps of Engineers. The impoundment storage at the top of the dam is 50 ac.-ft. and the maximum height of the dam is 15.3 feet. Failure of the dam would result in the loss of more than a few lives and damage to several houses. The depth of inundation at these 6 homes would be 0 feet before and 1 to 3 feet after dam failure.

The test flood for this dam is 1/2 the Probable Maximum Flood (PMF). The test flood has an inflow equal to 6040 cfs and an outflow discharge equal to 6040 cfs with a stillwater elevation of 508.1 which will overtop the dam by 1.9 feet.

The maximum outflow capacity of the spillways with the water surface at the top of dam is 2520 cfs, which is 42 percent of the test flood outflow.

It is recommended that the following items be studied further by a qualified registered engineer: The condition of the upstream face, the inability of the spillways to pass the test flood without overtopping the dam, the removal of the trees on the embankments, the impact on the integrity of the dam of the seepage through the joints of the west spillway and abutment.

The following remedial measures should be taken by the owner: The removal of brush from the embankments and west spillway, monitoring of seepage through the west spillway and weepholes, repairing of depressions and eroded areas on the embankments, development of a downstream warning plan and an annual inspection program.

Recommendations and remedial measures that should be implemented within one year of receipt of this Phase I Inspection Report are further described in Section 7.

JAMES P. PURCELL ASSOCIATES, INC.

STATE OF CONNECTICUT
SUDHIR A. SHAH
No. 8012
REGISTERED
PROFESSIONAL ENGINEER

Sudhir A. Shah, P.E.
Director of Engineering
Connecticut P.E. No. 8012

PREFACE

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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there by any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

TABLE OF CONTENTS

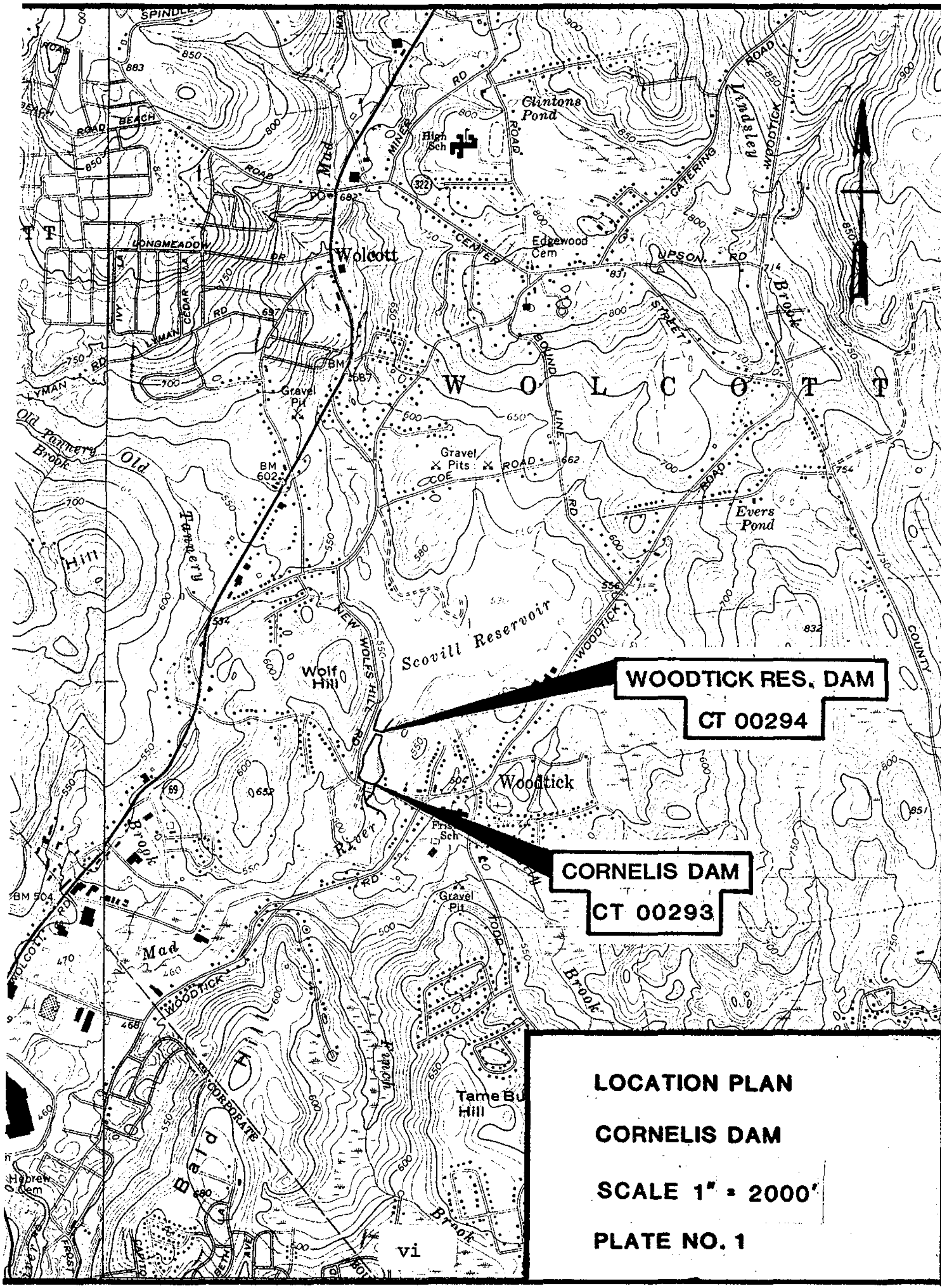
TABLE OF CONTENTS (Cont'd)

TABLE OF CONTENTS (Cont'd)

APPENDICES

OVERVIEW PHOTO - CORNELIS DAM

PHOTO TAKEN DECEMBER 15, 1980



LOCATION PLAN

CORNELIS DAM

SCALE 1" = 2000'

PLATE NO. 1

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

NAME OF DAM: CORNELIS DAM

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority:

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program of dam inspections throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. James P. Purcell Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to James P. Purcell Associates, Inc., under a letter from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0009 has been assigned by the Corps of Engineers for this work.

b. Purpose:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.

2. Encourage and prepare the States to initiate quickly, effective dam safety programs for non-federal interests.

3. To update, verify and complete the National Inventory of Dams.

1.2 Description of Project:

a. Location:

The Cornelis Dam is located in the Town of Wolcott approximately 3 miles northeast of Waterbury, Connecticut (See Plate No. 1). The dam impounds water from the Mad River and is located approximately 6000 feet upstream of the confluence with Old Tannery Brook (also the Wolcott corporate limits).

The Woodtick Reservoir Dam (CT 294) is located 800 feet upstream of the Cornelis Dam. Cornelis Pond is situated in a north/south direction, with the dam at the south end. The dam is at latitude 41°-34'-43.1" and longitude 72°-59'-04.5".

The Cornelis Dam is also known as the Lower Scovill Reservoir Dam.

All elevations used in this report are based on the National Geodetic Vertical Datum (NGVD).

b. Description of Dam and Appurtenances:

The dam consists of two short earth embankments heavily vegetated with brush and trees on the ends of a concrete stone masonry spillway section. The embankments are approximately 6 feet high, have a top width of 15 feet and side slopes of 2H:1V. The dam is approximately 330 feet long with a 132 foot long spillway section at the eastern end. There are two spillways separated by an 8 foot wide concrete central abutment. The western spillway is a 57 foot long stone masonry structure, curved in plan, 9.6 feet high with a concrete cap which is 6 feet wide. The eastern spillway is a 75 foot long concrete weir, straight in plan, and 9.6 feet high.

The outlet works consist of a 30 inch by 30 inch square blowoff through the central abutment. Flow to the outlet is regulated by a sluice gate which is operated by a hand operated gear mechanism located on the top of the central abutment.

c. Size Classification:

The size classification of this dam is SMALL as per the criteria set forth in the Recommended Guidelines for Safety Inspection of Dams by the Corps of Engineers. The impoundment storage at the top of the dam is 50 ac.-ft. (range 50 to 1000 ac.-ft.) and the maximum height of the dam is 15.3 feet (range of 25 to 40 feet). The size classification is based on the storage criteria.

d. Hazard Classification:

The hazard classification of this dam is HIGH as per the criteria set forth in the Recommended Guidelines for Safety Inspection of Dams, by the Corps of Engineers. The dam is located upstream of several houses where failure discharge may cause the loss of more than a few lives. The estimated water depth due to the assumed dam failure may range from 10 feet at the dam to 1 foot, 6000 feet downstream at the confluence with Old Tannery Brook. The depth of inundation at the homes would be 0 feet before and range from 1 to 3 feet after dam failure.

e. Ownership:

Cornelis Dam is presently owned by the Scovill Manufacuturing Company, Scovill Square, Waterbury,Connecticut 06720. (203)757-6061

f. Operator:

The operation of the dam is the responsibility of Century Brass Products, Inc.

The operator of the dam is:

Mr. W.M. Goss, Jr.
Century Brass Products, Inc.
Century Square
Waterbury, CT 06720
Telephone: (203) 574-7700

g. Purpose:

The dam and pond presently are utilized for recreation only, primarily swimming at a beach along the eastern shore.

h. Design and Construction History:

Cornelis Dam was probably built in 1917, with both spillways constructed of stone masonry. In 1945, the eastern concrete spillway was rebuilt including the central and eastern abutment. The blowoff in the central abutment was also added at that time.

i. Normal Operational Procedure:

All water is presently discharged over the spillways. The valve is opened as needed to lower the pond for cleaning of the beach along the eastern shore.

1.3 Pertinent Data:

a. Drainage Area:

The Cornelis Pond drainage basin is generally rectangular in shape with a length of 5 miles and an average width of 1.7 miles resulting in a total drainage area of 8.60 square miles (See drainage basin map in Appendix D). The topography is generally rolling terrain, with elevations ranging from a high of 1100 feet to a low of 502.5 feet at the spillway crest. Stream and basin slopes are moderate, 2 percent and 10 percent, respectively. The reservoir has a normal surface area of 4.5 acres which is 0.08 percent of the watershed. The upstream Woodtick Reservoir has a normal surface area of 128 acres which is 2.3 percent of the watershed. Ninety-nine percent of the watershed drains into the Woodtick Reservoir.

b. **Discharge at Dam Site:**

Listed below are calculated discharge values for the spillway and outlet works (30 inch square blowoff):

1. Outlet Works: A 30 inch square blowoff with an intake at elevation 492.9 and a discharge capacity of 105 cfs at elevation 506.2.

2. There are no specific discharge records available for this dam, however, the Woodtick Reservoir Dam experienced a flow of 1425 cfs during August, 1955, which was subsequently discharged through the Cornelis Dam.

3. Ungated spillway capacity at top of dam: 2520 cfs at elevation 506.2.

4. Ungated spillway capacity at test flood elevation: 4660 cfs at elevation 508.1.

5. Gated spillway capacity at normal pool elevation: N/A

6. Gated spillway capacity at test flood elevation: N/A

7. Total spillway capacity at test flood elevation: 4660 cfs at elevation 508.1.

8. Total project discharge at top of dam: 2625 at elevation 506.2.

9. Total project discharge at test flood level: 6040 cfs at elevation 508.1.

c. **Elevation (Feet above NGVD):**

1.	Stream bed at toe of dam	490.9
2.	Bottom of cutoff	N/A
3.	Maximum tailwater	Unknown
4.	Normal pool	502.5
5.	Full flood control pool	N/A
6.	Spillway crest	502.5
7.	Design surcharge (Original Design)	Unknown
8.	Top of dam	506.2
9.	Test flood level	508.1

d.	**Reservoir (Length in feet)**	
	1. Normal pool	800
	2. Flood Control pool	N/A
	3. Spillway crest pool	800
	4. Top of dam	800
	5. Test flood pool	800
e.	**Storage (acre-feet)**	
	1. Normal pool	31
	2. Flood control pool	N/A
	3. Spillway crest pool	31
	4. Top of dam	50
	5. Test flood pool	61
f.	**Reservoir Surface (acres)**	
	1. Normal pool	4.5
	2. Flood control pool	N/A
	3. Spillway crest	4.5
	4. Test flood pool	6.4
	5. Top of dam	5.7
g.	**Dam**	
	1. Type	Stone masonry, concrete and earth
	2. Length	330 feet
	3. Height	15.3 feet
	4. Top width	15 feet

5.	Side slopes	Upstream - 2H:1V Downstream - 2H:1V
6.	Zoning	Unknown
7.	Impervious core	Unknown
8.	Cutoff	Unknown
9.	Grout curtain	Unknown
10.	Other	----

h. Diversion and Regulating Tunnel N/A

i. Spillway

1.	Type	Broad crested overflow (west) overflow (east)
2.	Length of weir	57.0 feet (west) 75.0 feet (east)
3.	Crest elevation	502.5
4.	Gates	None
5.	U/S Channel	Natural bed
6.	D/S Channel	Overgrown gravel and rock channels. Channels join 200' downstream.
7.	General	----

j. Regulating Outlets

Refer to Paragraph 1.2b - "Description of Dam and Appurtenances" for description of Outlet Works.

1.	Inverts and size	30 inch square blowoff - 492.9 feet
2.	Description	Concrete tunnel

3.	Control Mechanisms	Sluice gate with a hand operated gear mechanism on central abutment
4.	Other	----

SECTION 2

ENGINEERING DATA

2.1 Design:

There are limited available records presenting design information for the construction of the Cornelis Dam. Three 1945 plans, cross sections, and an elevation of the dam, have been included in Appendix B of this report.

2.2 Construction:

There are no available records of the original construction of this dam.

2.3 Operation:

No formal records of operation are kept for this dam.

2.4 Evaluation:

a. Availability:

The information noted above for this facility is available in the files of the Department of Environmental Protection, Water Resources Unit, Dam Safety Engineers, State Office Building, Hartford, Connecticut, and the Century Brass Products, Inc., Waterbury, Connecticut.

b. Adequacy:

The lack of indepth engineering data did not allow a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data alone, but is based primarily on the visual inspection, the dam's past performance, and sound engineering judgment.

c. Validity:

The validity of the limited information available could not be verified.

SECTION 3

VISUAL INSPECTION

3.1 Findings:

a. General:

The visual inspection of the Cornelis Dam was conducted on November 14, 1980 and a copy of the visual inspection check list is contained in Appendix A of this report.

The following procedure was used:

1. Inspection of the upstream area of the reservoir which is impounded by the dam.

2. Visual inspection of the face and top of the dam and spillways for cracks, loose stones, seepage, etc.

3. Inspection of the outlet works and other appurtenances as to their existence, location, and operability.

4. Review of procedures that could be utilized in the event of an emergency situation.

5. A check of the downstream area for seepage, piping, boils or other indications of abnormal conditions. The downstream hazard potential in the event of dam failure was investigated.

6. Photographs of the general area of the dam and of specific items of note were taken and are included in Appendix C of this report.

Before the inspection, the available existing data was studied and reviewed.

b. Dam:

1. Crest: The top of the dam to the west of the spillways is approximately 15 feet wide and extends for approximately 140 feet (Photo C-10). It is heavily vegetated with brush and trees and extends around a corner in a northerly direction. To the east of the spillways, the top of the dam extends approximately 60 feet and is covered with brush.

2. Upstream Face: The upstream face of the western dam is heavily vegetated with trees and brush (Photo C-5). There are two large trees at the upstream end of the eastern abutment (Photo C-6).

3. Downstream Face: The downstream face to the west of the spillways is clear of trees and brush. There are signs of minor erosion at the corner and a hole (2 feet diameter by 18 inches deep) exists at this point near the crest. The eastern embankment is vegetated with brush and there are two small depressions (1 foot diameter by 6 inches deep) near the east abutment. There were no signs of seepage observed on the embankments.

c. **Appurtenant Structures:**

1. Western Spillway: This spillway is constructed of stone masonry and is a 57 foot long by 6 foot wide broad crested weir. (Photos C-3 and C-4.) Mortar is missing from many of the joints and there is clear seepage (approximately 1 to 2 gallons per minute) through the stone joints near the west abutment (Photo C-7). There is also clear seepage at the bottom of the spillway and west abutment. The quantity of this seepage was approximately 1 gallon per minute. Grass and moss is growing from many joints on the spillway and abutment. The west abutment is also stone masonry with many open joints and missing stones (Photo C-3). The weir is capped with concrete which is cracked and spalled. There are two small trees and brush growing between the spillway and the road.

2. Eastern Spillway: This spillway is a 75 foot long concrete weir (Photo C-5 and C-6). The face is cracked and spalled near the central abutment (Photo C-8). The entire spillway was flowing on the day of the inspection. The east abutment is concrete and is generally in good condition. There are two weepholes in the abutment below the spillway which were seeping. The concrete around the weepholes and further downstream to the road is spalled and chipped (Photos C-6 and C-11). There is a tree growing between the spillway and road (Photo C-11).

3. Central Abutment: The concrete central abutment contains three minor cracks (1/16 inch) which extend from one side, across the top, and down the other side. These cracks correspond to the efflorescence noted on both sides (Photos C-4 and C-5). Other than these cracks, the structure is in good condition.

4. Blowoff: A 30 inch square blowoff extends from a sluice gate at the upstream end of the central abutment to an outlet on the east side just below the spillway (Photo C-5). There is a 5 foot by 4 foot wooden cover over an opening in the top of the abutment above the sluice gate. The lift mechanism for the sluice gate is in the center of the abutment (Photos C-5 and C-9). This sluice gate is usually closed with all flow being discharged over the spillways. The gate was last opened a few years ago and is reportedly operational.

d. **Reservoir Area:**

The pond is formed by the flooding of a portion of the Mad River Valley. The sides of the forested valley have gentle slopes bordering the pond. No unusual geologic features were noted that could be expected to adversely affect the dam or its appurtenant structures.

Trespassing on the dam is not permitted.

The Woodtick Reservoir Dam is located approximately 800 feet upstream of the dam and failure of this upstream dam would create a potential hazard at the Cornelis Dam (Photo C-2).

e. **Downstream Channel::**

The two downstream channels are meandering streams which join approximately 200 feet downstream (Photos C-13 and C-14). Nichols Road crosses both channels approximately 30 feet downstream of the spillways. Each opening is 21 feet wide by 7 feet high (Photos C-11 and C-12).

3.2 Evaluation:

Based on the visual inspection, the Cornelis Dam appears to be in fair condition overall, and there were no major areas of distress noted. Specific areas of concern that were noted are:

a. The presence of seepage and grass and moss on the downstream face of the west spillway and abutment.

b. The missing mortar and voids between stones on the downstream face of the west spillway.

c. The missing mortar and stones on the west abutment.

d. The minor cracking of the central abutment.

e. The brush and trees on the embankments.

f. The depressions on the downstream face of the embankments.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures:

a. General:

The pond is presently used solely for recreation and all flow is discharged over the spillways.

b. Description of Any Warning System in effect:

No formal emergency or contingency plan is in effect to reduce or minimize downstream damage in emergency situations.

4.2 Maintenance Procedures:

a. General:

There is no regular maintenance schedule for this dam.

b. Operating Facilities:

No regular maintenance of the gate valve was reported.

4.3 Evaluation:

To insure the safety of the residents downstream, a regular inspection and maintenance program and a formal downstream warning plan should be developed and implemented.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General:

The Cornelis Dam creates an impoundment with a total storage capacity of 31 ac.-ft. at elevation 502.5, the spillway crest elevation. Each foot of depth in the reservoir above the spillway crest can accommodate approxiamtely 4.5 ac.-ft. The west spillway is a 57 foot long by 6 foot wide broad crested uncontrolled weir. The east spillway is a 75 foot long, uncontrolled weir. Ninety-nine percent of the drainage area drains to the upstream Woodtick Reservoir. Stream and basin slopes are moderate, 2 percent and 10 percent, respectively.

5.2 Design Data:

a. No specific design data is available for this watershed or the structures of the Cornelis Dam. In lieu of existing design information, USGS topographic maps (scale 1"=2000') were utilized to develop hydrologic parameters such as drainage area, basin length, time of concentration, and other runoff characteristics. Elevation-storage relations for the reservoir were approximated. Reservoir surface area and surcharge storage were computed using the USGS maps. Some of the pertinent hydraulic design data was obtained and/or confirmed by actual field measurements at the time of the visual inspection.

b. Outflow values (routing procedures) and dam overtopping analyses were computed in accordance with the guidelines developed by the Corps of Engineers. Judgment was used in calculating final values outlined in this report, which are quite approximate and should not be considered a substitute for actual detailed analysis.

5.3 Experience Data:

Historical data for recorded discharges is not available for this dam. However, the maximum discharge to date at the upstream Woodtick Reservoir Dam, experienced during August 1955, was 1425 cfs. This flow was subsequently discharged by the Cornelis Dam.

5.4 Test Flood Analysis:

Recommended guidelines for the Safety Inspection of Dams by the Corps of Engineers were used for the selection of the "Test Flood". This dam is classified as HIGH hazard and SMALL size structure. Guidelines indicate that a range of the 1/2 times the Probable Maximum Flood (PMF) to the PMF be used as the "Test Flood" for these classifications. A test flood of 1/2 PMF was chosen due to the small size of the dam. The watershed of the upstream Woodtick Reservoir Dam has an area of 8.6 square miles.

The watershed of the Cornelis Dam alone is 0.02 square miles. The total watershed area of the Cornelis Dam is 8.6 square miles. Snyder's lag was calculated to be 4.4 hours and a Snyder peaking coefficient of 0.625 was used. The 200 square mile - 24 hour Probable Maximum Precipitation (PMP) is 21.5 inches. The flood hydrograph package, HEC-1 computer program developed by the Corps of Engineers was utilized to develop the inflow hydrograph, route the flood through the reservoir, and for the dam overtopping analysis. A test flood inflow equal to 1/2 PMF was calculated to be 6040 cfs (700 CSM).

This test flood analysis assumes that the outlet works are closed. The inflow hydrograph has been routed through the Woodtick Reservoir, which has been assumed to be full at the beginning of inflow. Hydraulic calculations are included in Appendix D.

The spillway capacity is hydraulically inadequate to pass the test flood (1/2 PMF) and overtopping of the dam will occur. The maximum outflow capacity of the spillways without overtopping the dam is 2520 cfs. This corresponds to approximately 42 percent of the test flood outflow and a storage above the spillway level of 19 ac.-ft. The maximum outflow discharge value for the test flood is 6040 cfs corresponding to a depth of flow over the top of the dam of 1.9 feet and a storage above the spillway level of 30 ac.-ft. A spillway rating curve, an outlet rating curve, and a reservoir stage-capacity curve, are included in Appendix D of this report.

At the spillway elevation of 502.5, the capacity of the 30 inch outlet structure is 30 cfs. It will require approximately 3/4 hour to lower the water level the first foot assuming a water surface area of 4.5 acres, normal inflow conditions, and use of the outlet works to regulate the water level for expected inflows.

5.5 Dam Failure Analysis:

This dam is classified as a HIGH hazard structure. Failure discharge can cause the loss of more than a few lives, damage due to high velocities, impact from debris, and flooding to 6 homes, a building and one road along the downstream channel.

The calculated dam failure discharge is 3650 cfs due to an assumed breach width of 55 feet and a pre-failure pool level equal to the spillway crest. This pre-failure condition was chosen because the increase in flooding due to dam failure with the pool at the top of the dam, from the full spillway discharge flooding, is less than 1.4 feet

Failure will produce a water depth of 10.5 feet immediately downstream of the dam due to the Nichols Road embankment. This roadway may washout due to water and debris impact. The depth of inundation at the 6 houses and 1 building would be 0 feet before and 1 to 3 feet after dam failure.

The failure discharge will effect downstream areas for a distance of 6000 feet from the dam. At this distance, the water surface will be approximately 1 foot above normal observations as it enters a flat swampy area approximately 4000 feet from the dam.

Beyond 6000 feet, the affects of the failure discharge will be reduced by storage in the swampy area. Additional damage is possible in Waterbury until the Mad River enters the Naugatuck River. Water surface elevations due to the failure of the dam are listed on Page D-25. Probable consequences including the prime impact areas are listed on Page D-33.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observation:

The visual inspection revealed no signs of major physical distress in the structure. However, seepage was noted through the joints on the downstream face of the west spillway and abutment. The upstream face of the spillway could not be inspected due to the pond level. The seepage may be occurring or enhanced due to defects in the upstream face of the spillway.

6.2 Design and Construction Data:

There is insufficient design and construction data to permit a formal evaluation of stability.

6.3 Post-Construction Changes:

In 1945, the eastern spillway, central abutment and east abutment were rebuilt and the blowoff was added.

6.4 Seismic Stability:

The dam is in Seismic Zone 1 and hence does not require evaluation for seismic stability according to the Corps of Engineers Recommended Guidelines.

SECTION 7

. ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment:

a. Condition:

Based on the visual inspection, past performance and hydraulic/hydrologic evaluation, the Cornelis Dam and appurtenances are judged to be generally in FAIR condition. Items of concern that should be addressed as a result of this inspection are listed in Section 7.2 and 7.3.

b. Adequacy of Information:

The limited engineering data did not allow for a definitive review. Therefore, the adequacy of the dam is based on visual inspection, past performance history, and engineering judgment.

c. Urgency:

The recommendations and remedial measures described below should be implemented by the owner within one year after receipt of this Phase I Inspection Report.

7.2 Recommendations:

It is recommended that the owner engage a qualified registered engineer to carry out the following actions and that his recommendations be implemented.

a. A detailed hydrologic/hydraulic investigation to determine the need for and means of increasing the discharge capacity of the project.

b. The removal of the trees and their respective root systems on the embankments, below the spillways to the road, and at the upstream end of the east abutment; and the backfilling with suitable compact material.

c. *The upstream face be visually inspected.*

d. The vegetation should be removed from the joints and the joints repointed on the downstream face of the west spillway.

e. The missing stones replaced and the joints repointed at the west abutment.

f. The seepage on the downstream face of the west spillway and abutment should be investigated to determine its potential impact on the integrity of the dam and repairs designed as necessary.

7.3 Remedial Measures:

a. Operational and Maintenance Procedures:

1. Brush should be cleared from the embankments and between the spillways and road.

2. Fill and repair the depressions and eroded areas on the embankments.

3. Monitor the seepage through the weepholes to note any change from the existing conditions.

4. Develop a surveillance and downstream warning plan, including round-the-clock monitoring during heavy precipitation.

5. Institute a program of annual periodic technical inspection including insuring the operability of the outlet works.

7.4 Alternatives:

There are no practical alternatives to the above stated recommendations.

APPENDIX A

INSPECTION CHECK LIST

INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Cornelis Dam

DATE November 14, 1980

TIME 9:00 - 12:00 A.M.

WEATHER Overcast

W.S. ELEV. ________ U.S. ______ DN.S.

PARTY:

1. R. Johnston, JPPA
2. J. Hewes, JPPA
3. J. Walsh, Baystate Environmental Consultants, Inc.
4.
5.
6. J. Abele, Scovill
7. Manufacturing Co.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Hydraulics	R. Johnston	
2.	Structural	J. Hewes	
3.	Geotechnical	J. Walsh	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

INSPECTION CHECK LIST

PROJECT Cornelis Dam DATE November 14, 1980

PROJECT FEATURE ______ NAME ______

DISCIPLINE ______ NAME ______

AREA EVALUATED		CONDITION
DAM EMBANKMENT		
Crest Elevation	506.2	Good
Current Pool Elevation	502.5	Crest of Spillways
Maximum Impoundment to Date		2.55 Feet over Spillways in August, 1955.
Surface Cracks		N/A
Pavement Condition		N/A
Movement or Settlement of Crest		None Observed
Lateral Movement		None Observed
Vertical Alignment		Good
Horizontal Alignment		Good
Condition at Abutment and at Concrete Structures		Good
Indications of Movement of Structural Items on Slopes		None Observed
Trespassing on Slopes		None
Vegetation on Slopes		Yes - Brush and Trees
Sloughing or Erosion of Slopes or Abutments		Several Depressions on Downstream Faces.
Rock Slope Protection - Riprap Failures		N/A
Unusual Movement or Cracking at or near Toes		None Observed
Unusual Embankment or Downstream Seepage		None Observed
Piping or Boils		None Observed
Foundation Drainage Features		Weepholes in Eastern Abutment below Spillways.
Toe Drains		None Observed
Instrumentation System		None Observed

INSPECTION CHECK LIST

PROJECT Cornelis Dam

DATE November 14, 1980

PROJECT FEATURE ____

NAME ____

DISCIPLINE ____

NAME ____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	Central Abutment
a. Concrete and Structural	
General Condition	Good - Loose Timber Cover over wetwell.
Condition of Joints	N/A
Spalling	None Observed
Visible Reinforcing	None Observed
Rusting or Staining of Concrete	Minor due to value stem.
Any Seepage or Efflorescence	Efflorescence at cracks
Joint Alignment	N/A
Unusual Seepage or Leaks in Gate Chamber	None observed - water at pond level
Cracks	Three across top
Rusting or Corrosion of Steel	None Observed
b. Mechanical and Electrical	
Air Vents	None observed
Float Wells	None Observed
Crane Hoist	None Observed
Elevator	None Observed
Hydraulic System	None Observed
Service Gates	
Emergency Gates	Underwater - not visible
Lightning Protection System	None Observed
Emergency Power System	None Observed
Wiring and Lighting System in Gate Chamber	None Observed

INSPECTION CHECK LIST

PROJECT Cornelis Dam

DATE November 14, 1980

PROJECT FEATURE

NAME

DISCIPLINE

NAME

AREA EVALUATED	CONDITION
OUTLET WORKS	30 inch square blowoff in central abutment
a. Approach Channel	Entire lake bed - underwater
b. Intake Structure	Upstream end of central abutment
c. Transition and conduit	A 30 inch sluice gate controls discharge into blowoff. Formed 30 inch square conduit extends through central abutment to a free outlet on the east side below the spillways.
d. Outlet Structure and Outlet Channel.	Conduit outlets to eastern spillway discharge channel.

INSPECTION CHECK LIST

PROJECT Cornelis Dam

DATE November 14, 1980

PROJECT FEATURE

NAME

DISCIPLINE

NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	Eastern Spillway
a. Approach Channel	Pond Bed - Underwater
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	
General Condition of Concrete	Good - Concrete
Rust or Staining	None Observed
Spalling	Yes on Downstream Face
Any Visible Reinforcing	None Observed
Any Seepage or Efflorescence	Spillway Flowing
Drain Holes	None Observed
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None Observed
Trees Overhanging Channel	Yes
Floor of Channel	Rock and Stones
Other Obstructions	Bridge with 7 foot high by 21 foot wide opening approximately 40 feet downstream of spillway.

INSPECTION CHECK LIST

PROJECT Cornelis Dam

DATE November 14, 1980

PROJECT FEATURE

NAME

DISCIPLINE

NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNFLS	Western Spillway
a. Approach Channel	Pond Bed - Underwater
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	
General Condition of Masonry	Fair - Masonry
Rust or Staining	None Observed
Spalling	N/A
Any Visible Reinforcing	None Observed
Any Seepage or Efflorescence	Seepage at west abutment and along toe
Drain Holes	None Observed
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None Observed
Trees Overhanging Channel	Brush
Floor of Channel	Concrete Floor immediately below spillway, stone and gravel beyond.
Other Obstructions	Bridge with 7 foot high by 21 foot wide opening approximately 30 feet downstream of spillway

APPENDIX B

ENGINEERING DATA

APPENDIX B-1

DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS

Location	Items
Mr. Victor J. Galgowski Dam Safety Engineer Water Resources Unit Department of Environmental Protection State of Connecticut State Office Building Hartford, Connecticut 06115	* 1. State Inspection Reports * 2. Plan Showing Dam and Cross-Section * 3. Plan Showing 1945 Modifications 4. Various coorespondence
Century Brass Products, Inc. Century Square Waterbury, Connecticut 06720	* 1. Plan Showing Central Abutment

* Indicates material contained in this Phase I Inspection Report.

APPENDIX B-2

COPIES OF PAST INSPECTION REPORTS

MOZZOCHI ASSOCIATES
CIVIL ENGINEERS

PARTNERS
JOHN LUCHS, JR.
STUART J. BECKERMAN

GLASTONBURY, CONN. 06033
217 HEBRON AVENUE
PHONE 633-9401

PROVIDENCE, R. I. 02903
189 WEYBOSSET STREET
PHONE 421-0420

February 23, 1972

REPLY TO: Glastonbury

William H. O'Brien, III - Civil Engineer
Department of Environmental Protection
Water & Related Resources
State Office Building
Hartford, Connecticut 06115

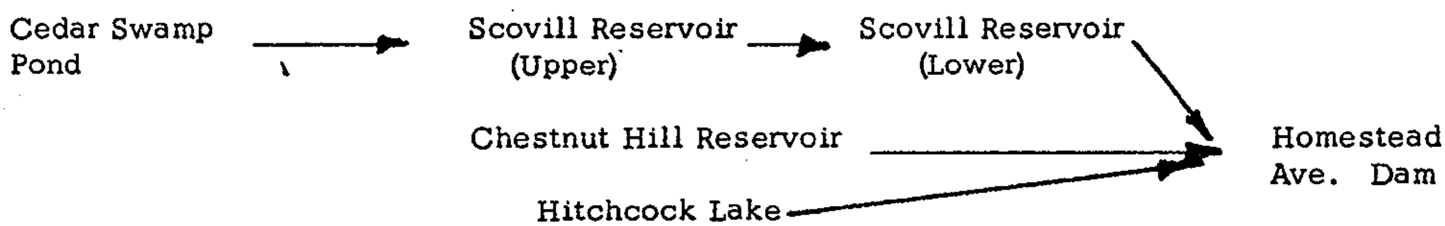
WATER & RELATED RESOURCES
RECEIVED
FEB 2 3 1972
ANSWERED
REFERRED
FILED

Re: Homestead Ave. Dam
(John Errichetti Assoc.)
Waterbury
Our File No. 57-73-94

Dear Mr. O'Brien:

As authorized in your letter of January 27, 1972, we have inspected and evaluated the spillway capacity allowing for the storage of four large reservoirs in the up-stream drainage area.

The total watershed area for this structure is 17.4 ± sq. miles, with four (4) major reservoirs upstream. The storages and releases from these independent structures, will affect the inflow of the subject dam. It was therefore necessary to determine the routed discharges from the upstream reservoirs to evaluate the inflow hydrograph. The flow pattern is as follows:



	Drainage Area		Water Surface Area	
Cedar Swamp Pond	0.9	Sq. Miles	130 ±	Acres
Scovill Reservoir (Upper)	7.4	Sq. Miles	115 ±	Acres
Scovill Reservoir (Lower)	0.0	Sq. Miles	5 ±	Acres
Chestnut Hill Reservoir	1.7	Sq. Miles	65 ±	Acres
Hitchcock Lake	0.3	Sq. Miles	100 ±	Acres
Homestead Ave. Dam	7.1	Sq. Miles	6 ±	Acres
Total	17.4	Sq. Miles		

Flood routing studies for the reservoirs were carried out for design floods of 7.5" and 5.1"/ 6 hr storm and the results tabulated below:

FLOOD ROUTING STUDY

	SPILLWAY		MAX. WATER SURFACE ABOVE CREST		FREEBOARD		MAX. OUTFLOW Q CFS	
Reservoir	width ft.	depth of crest from top	p=7'5"	p=5'1"	p=7'5"	p=5'1"	p=7'5"	p=5'1"
Cedar Swamp Reservoir	13'-0 ±	2'-9"	1'-1"	0'-7"	1'-8"	2'-2"	45	20
Scovill Reservoir (upper)	100' & 39'6"	3'-6"	3'-6"	1'-10"	----	1'-8"	3000	1200
Scovill Reservoir (lower)	57' & 79'	3'-10"	3'-4"	1'-10"	0'-6"	2'-0"	2900	1100
Chestnut Hill Lake	28'	4'-8"	2'-9"	1'-5"	1'-11"	3'-3"	450	160
Hitchcock Lake	26' ±	2' ±	0'-5"	0'-3"	1'-7"	1'-9"	25	10
Homestead Ave. Dam	60' & (40" Sluice gate)	6'-0"	6'-0"	4'-0"	-----	2'-0"	3300	1680

STATE BOARD FOR THE SUPERVISION OF DAMS
INVENTORY DATA

1

NAME OF DAM OR POND Lower Scovill Res. CT-293

CODE NO. N18.0 M6.6

LOCATION OF STRUCTURE:

Town Wolcott

Name of Stream Mad River

U.S.G.S. Quad. Southington Long. 72-59.1 Lat. 41-38.6

OWNER: Scovill Manufacturing Company

Address Waterbury

Telephone

Pond Used For: Recreation DA 8.72 SM

Dimensions of Pond: Width ______ Length ______ Area 10 A ±

Depth of Water below Spillway Level (Downstream) 11"

Total Length of Dam ~~300~~ 560' Length of Spillway ~~(2) 100 ± each~~ 71' - 56'

Height of Abutments above Spillway 4

Type of Spillway Construction Stone and concrete.

Type of Dike Construction Earth.

Downstream Conditions Crosses road 20' below, then through woods.

Summary of File Data

Remarks Board Member

1/56

ROGER C. BROWN
FRANK RAGAINI
JAMES C. BEACH

TELEPHONE 6-7681
P. O. BOX 236

CLARENCE BLAIR ASSOCIATES
INCORPORATED
CONSULTING ENGINEERS
100 CROWN STREET, NEW HAVEN 2, CONN.

WATER SUPPLY AND SEWERAGE
INDUSTRIAL WASTES
INVESTIGATIONS AND REPORTS
VALUATIONS AND RATES
SURVEYS AND MAPS
PROPERTY LINES

October 18, 1944

Re: Cornelis Dam of Scovill Manufacturing Company

Mr. V. B. Clarke, Member
State Board of Supervision of Dams

Dear Mr. Clarke;

At a conference in Waterbury on October 13, attended by representatives of the Scovill Manufacturing Company, the Lane Construction Company and myself, it was decided to proceed at once with the reconstruction of the dam along the lines suggested in my report to them. They are not interested in retaining any of the stone for appearance so all of the new construction will be of concrete throughout.

Mr. Sperry would like to have some sort of flashboards on the spillway, arranged so that they would collapse in times of high flow. He is anxious to get an extra foot of depth in the pond. I told him that it would be necessary to get your permission for such an installation.

For your benefit I am including in this letter that portion of my report that has to do with spillway capacity.

Quote from Report on Cornelis Dam, by Clarence Blair Associates to Scovill Manufacturing Company dated October 9, 1944:

"Sometime between September 7, the date of Mr. V. B. Clarke's letter to you, and our conference with you on September 28, you abandoned the plan of raising the spillway level 2'. We believe that was a wise decision for two reasons; first, a 2' raise would necessitate quite extensive dikes or embankments at the east and west ends of the dam, and secondly, neither of the existing dams is substantial enough to support an additional two feet of height.

It is our opinion that the spillway level should be at the same elevation as the present top of the westerly spillway. The reconstruction work on the easterly dam should be such as to bring its new spillway up to the level of the westerly side.

When Mr. Blair visited the dam in 1938 he found the spillway area inadequate for freshet flows that might be expected. One of the reasons for this was the poor condition of the westerly embankment. The top of that embankment was so low in places that it only afforded a freeboard of 2.2' according to Mr. Blair's figures. By repairing this embankment and bringing it up to a point slightly above the elevation of the westerly abutment wall, the available freeboard of the spillway will become 3.7' which would double the capacity of the spillway, per foot of length.

By doing away with the section of wall which runs easterly from the center abutment for 12', the length of the easterly spillway would be increased to 70'.

This would give a total spillway of 56' + 70' = 126' in length and about 3.7' in depth. According to our formulas this spillway would pass a flow of 340 cubic fe*t per second per square mile. This figure is based on a watershed area of 8.8 square miles. While this capacity is not quite equal to the combined capacity of the two spillways on your Woodtick Dam it is 40% greater than the figure of 240 cubic feet per second per square mile that Mr. Blair recommended to Mrs. Cornelis in 1938."

We would like to have you study this matter of flashboards and report to us your decision because it will affect the design of the details.

I will be glad to meet with you and discuss the matter if you wish.

Very truly yours,

Roger C Brown

RCB:BFS

November 22, 1938

Mrs. Gustave Cornelis
Woodtick
Wolcott, Connecticut

Dear Madam:

I hereby serve this formal notice on you and any other persons having an interest in the dam on Mad River just northerly of Nichols Road in the Town of Wolcott, to place this dam in a safe condition.

I would respectfully refer you to Chapter 171, Sections 3056-3063, inclusive, Connecticut General Statutes 1918 (Title XXX, Chapter 180, Sections 3001-3008, inclusive, Connecticut General Statutes, Revision of 1930). A booklet containing a copy of the Laws and Regulations regarding Inspection of Dams by the Board of Civil Engineers is submitted herewith. Under date of November 11, 1938, I received an application in writing from two corporations who would suffer loss or damage by the breaking away of said dam.

Acting under Section 3058 (General Statutes of 1918) I forthwith visited the dam on November 18, 1938. At that time the reservoir impounded by said dam was full and water was running over the westerly spillway about 2" in depth and also over and through the easterly spillway.

This dam consists of two masonry spillways, each about 56' in length and each spillway slightly curved. The masonry in the southerly face of the spillway is made up of fairly large stone laid up with open joints, and the masonry walls are backed up on the up-stream side with earth fill, sloping gradually into the reservoir. A heavy masonry wall separates the two spillways. Westerly of the westerly spillway, the dam is an earth embankment extending westerly about 150'. From the easterly side of the easterly spillway, a masonry wall extends easterly a comparatively short distance. A wooden flume about 45" in outside diameter extends through this easterly section of the dam to an old abandoned factory southerly of the highway. The height of each spillway is about 10' above the river valley.

The height of the westerly abutment of the westerly spillway is about 3' but the embankment westerly of this point is from 3" to 9" lower than this abutment. Under these conditions, the maximum discharge that could be obtained over the spillways without topping the embankment would be about 2'. A 2' discharge over the two spillways would need a discharge of about 1,055 cubic feet per second for this watershed of 8.8 square miles, or 120 cubic feet per second per square mile. A spillway of this length and depth is not sufficient for this watershed as the records of floods show a maximum discharge of about 240 cubic feet per second per square mile. The dam of the Scovill Manufacturing Company at the northerly end of the Cornelis Pond has a spillway 97' in length and about

4'-8" in depth. A discharge over this dam of 3½' over the spillway is equal to this maximum discharge of 240 cubic feet per second per square mile.

In regard to the condition of your dam, the masonry in the westerly spillway is in good condition and shows very little sign of movement. The easterly spillway, however, is in very poor condition and in my judgment is liable to collapse at any time. Ice and water pressure have acted on this masonry wall so that the easterly portion of this spillway wall projects about 18" south of a vertical line extended upward from the toe of the spillway.

It is therefore necessary for me to advise you that it is imperative to drain your pond at once. Computations of the capacity of this pond indicate that the total amount of water impounded is at least 10 million gallons. A failure of this dam would cause considerable damage to property along Mad River to its discharge into the Naugatuck River. The pond can be lowered by one of two methods: 1. Through the flume. 2. By removing a few spillway stones at a time and gradually lowering the pond as each stone is removed. Any repairs made will probably require the removal of all of the easterly spillway.

The repairs that must be made to put this dam in a safe condition to comply with the Statutes include rebuilding the easterly spillway, adding to the westerly embankment, and providing more depth of spillway in order to take care of maximum discharge.

These recommendations represent the minimum amount of work that can be done to place this dam in a reasonably safe condition. You should take immediate steps to engage a competent engineer registered in Connecticut or an experienced contracting organization with a registered engineer to make these repairs.

I will be pleased to have you advise me of the receipt of this report and order. Plans for repairs are to be submitted for my approval.

It will be necessary for me to check the order to draw the water out of the pond and I request your cooperation so that it will not be necessary to take any further action to comply with this order. [illegible] that I will cooperate in every possible way to expedite [illegible] in a safe condition.

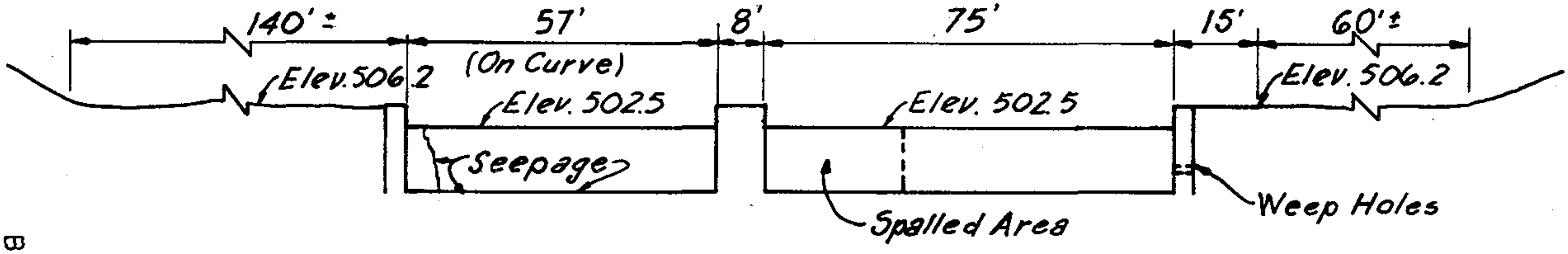
Respectfully submitted,

Member, Board of Civil Engineers
Third Congressional District

(Acting for William C. Smith)
Member, Board of Civil Engineers
[illegible] Congressional District

APPENDIX B-3

RECORD DRAWINGS AND SKETCHES



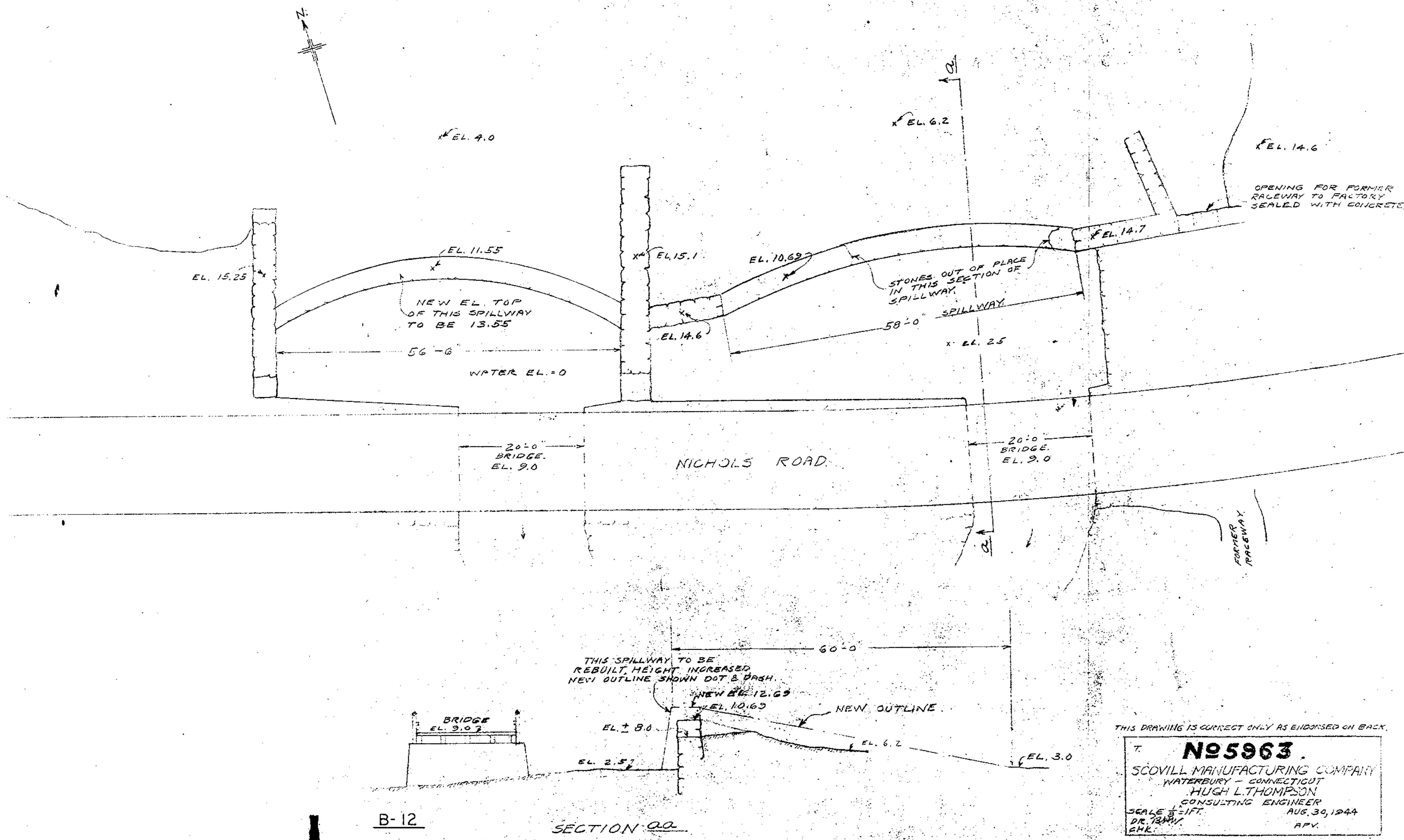
ELEVATION OF DAM - LOOKING UPSTREAM

SCALE 1" = 30'

CORNELIS DAM

JAMES P. PURCELL ASSOCIATES, INC.

ENGINEERS • ARCHITECTS • PLANNERS



B-12

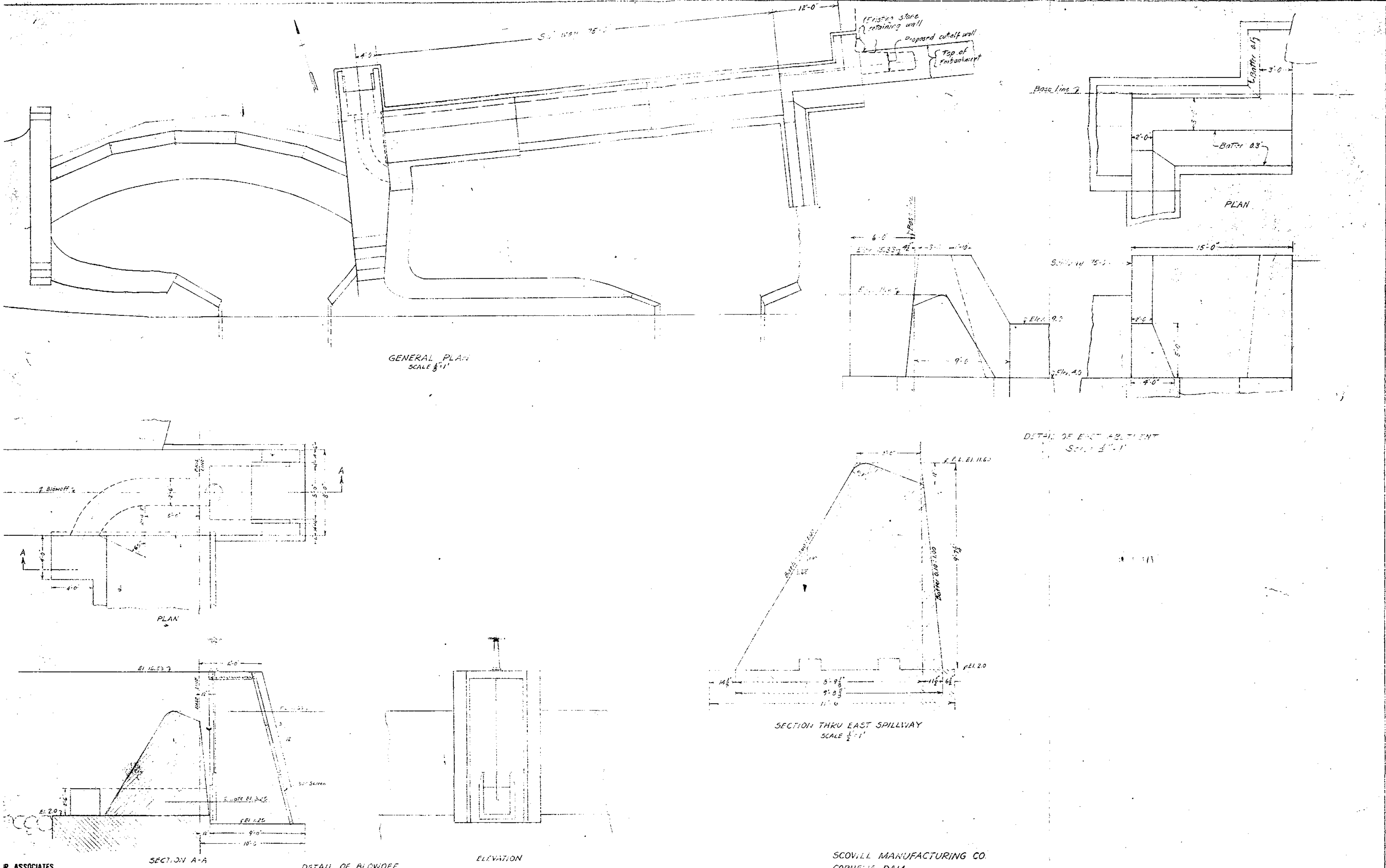
THIS DRAWING IS CORRECT ONLY AS ENDORSED ON BACK.

T.

Nº 5963.

SCOVILL MANUFACTURING COMPANY
WATERBURY – CONNECTICUT
HUGH L. THOMPSON
CONSULTING ENGINEER

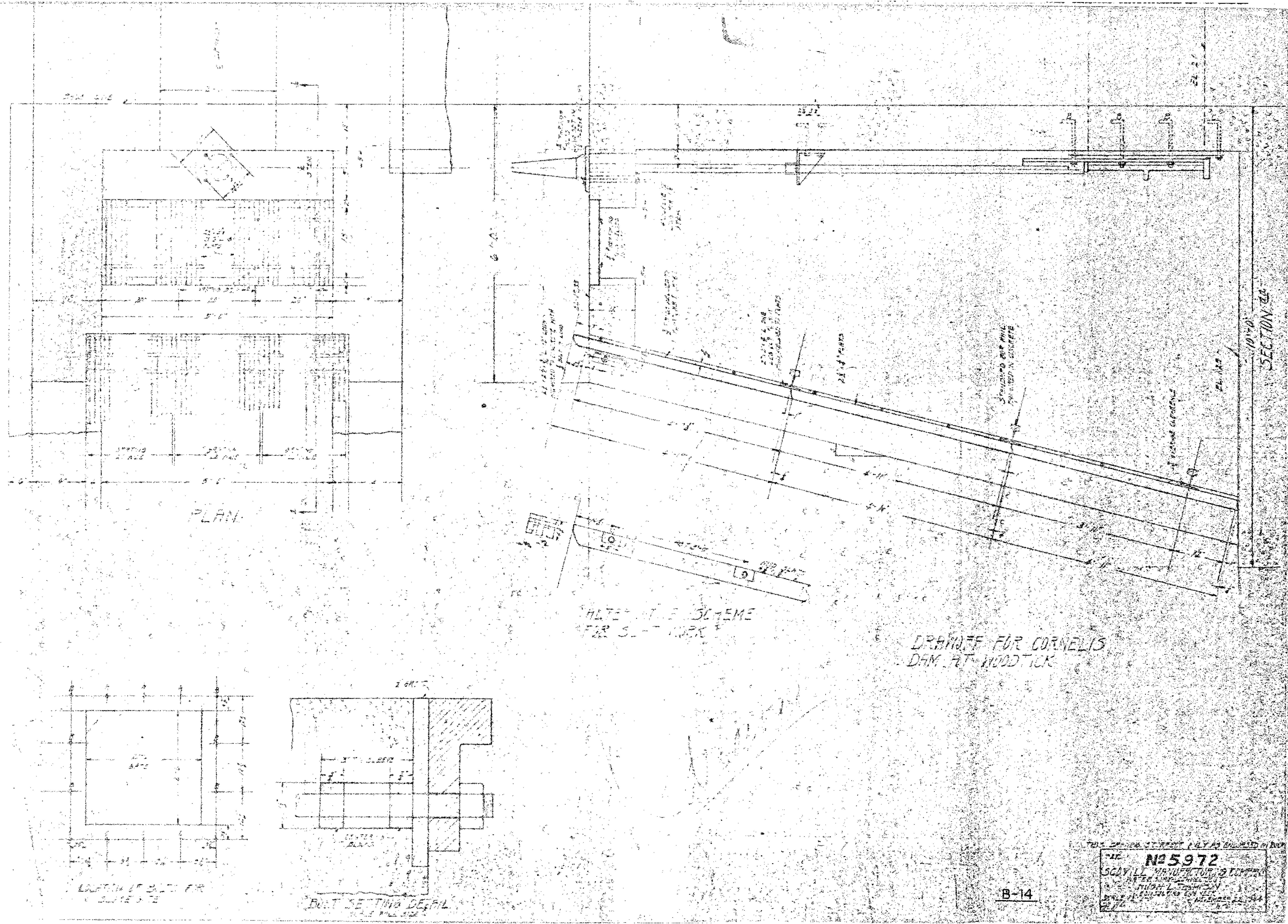
SCALE 1/8" = 1 FT. AUG. 30, 1944
DR. 13MW
CHK. APV.



R ASSOCIATES
ORATED
ENGINEERS
00 Crown Street
CONN.

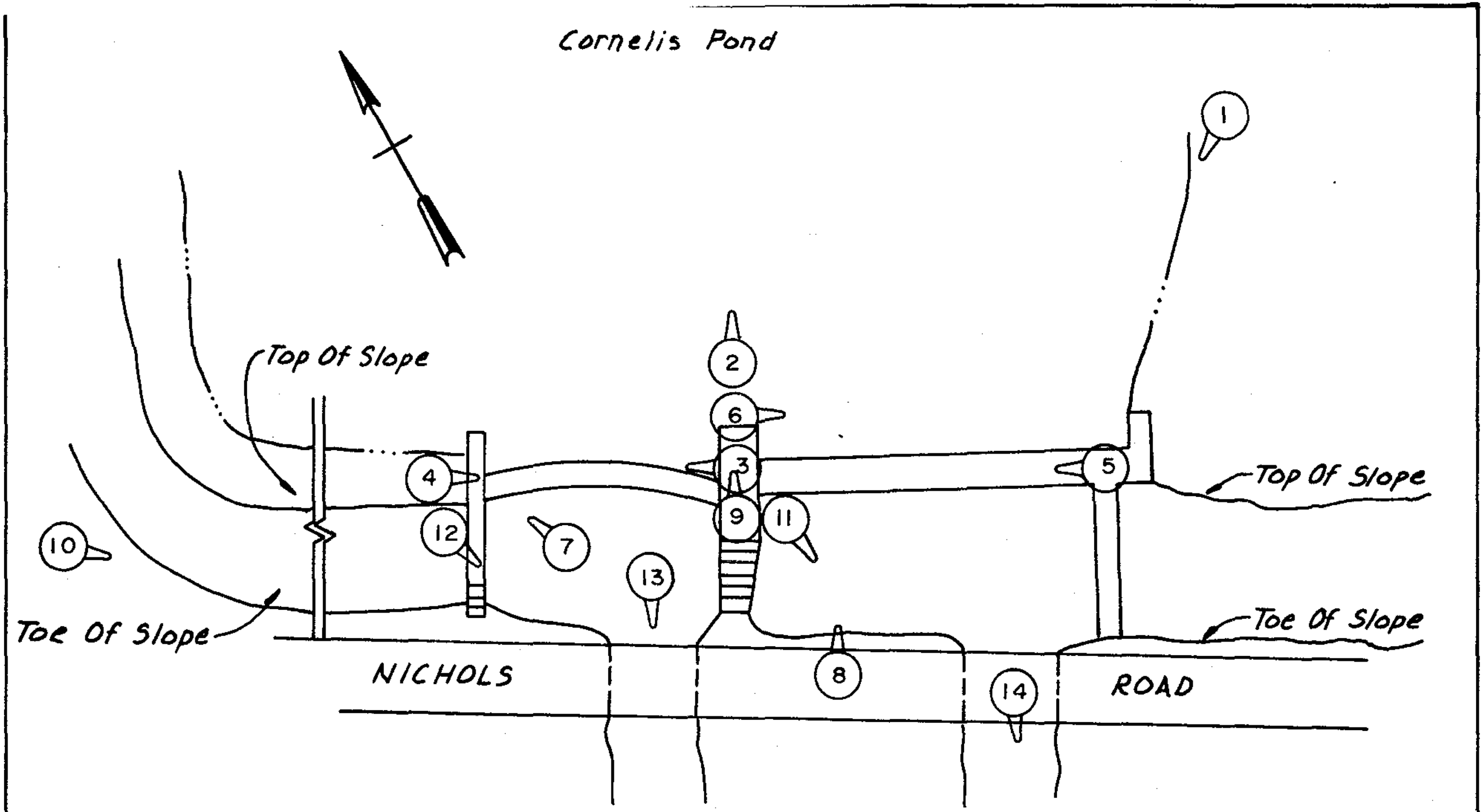
SCOVILL MANUFACTURING CO.
CORNELIS DAM
PRELIMINARY PLAN

B-13


PLAN
SECTION
DRAWOFF FOR CORNELIS
DAM AT WOODTICK
BOLT SETTING DETAIL
Nº 5972
SCOVILL MANUFACTURING COMPANY

APPENDIX C

PHOTOGRAPHS



CORNELIS DAM
PHOTO INDEX

C-1 SPILLWAY - LOOKING SOUTH

C-2 WOODTICK RESERVOIR DAM (CT 294) - LOOKING NORTH

C-3 WEST END OF WEST SPILLWAY - LOOKING FROM CENTER ABUTMENT

C-4 EAST END OF WEST SPILLWAY - LOOKING EAST

C-5 WEST END OF EAST SPILLWAY - LOOKING WEST

C-6 EAST END OF EAST SPILLWAY - LOOKING FROM CENTER ABUTMENT

C-7 SEEPAGE AT WEST END OF WEST SPILLWAY

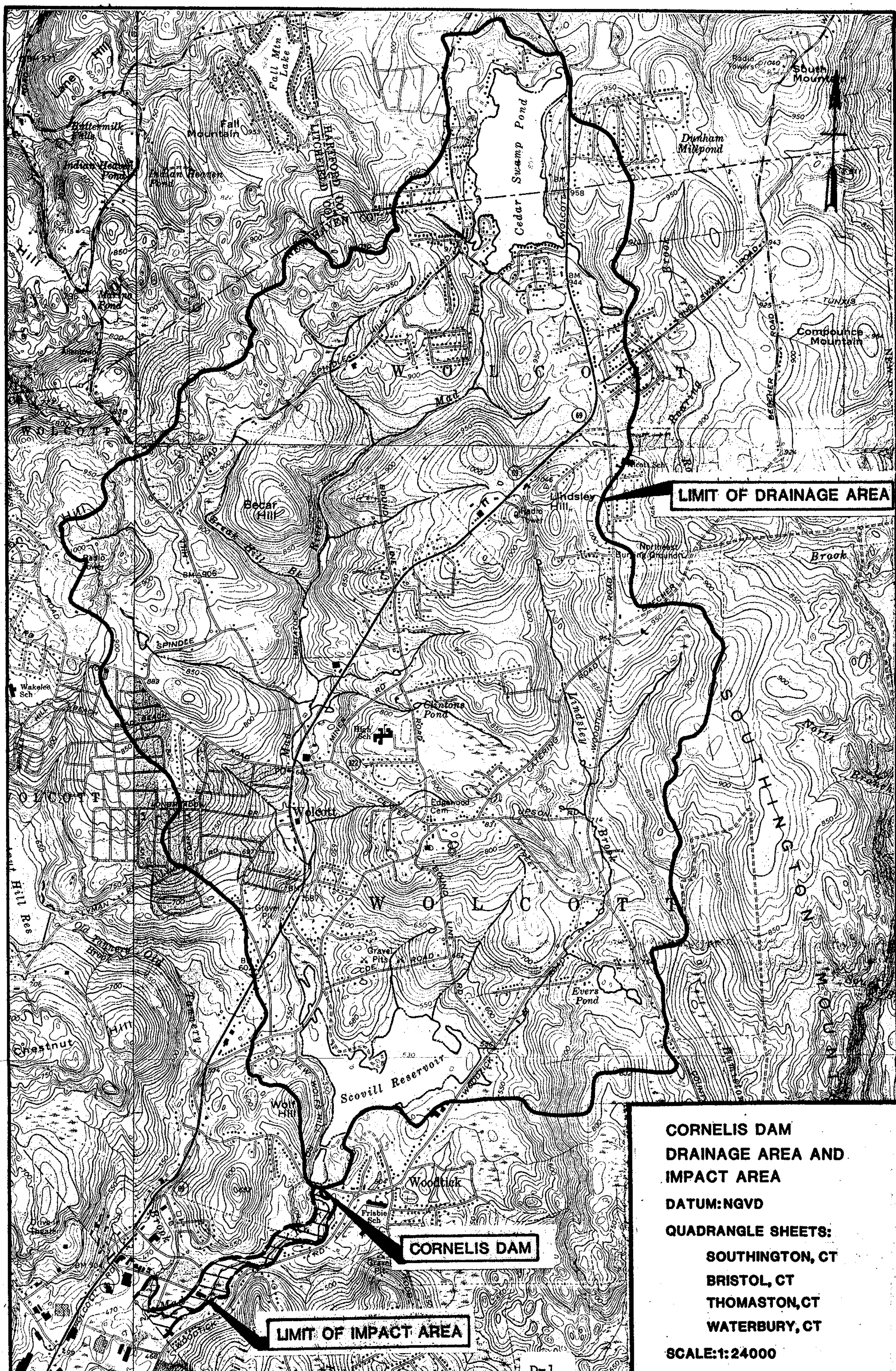
C-8 SPALLING ON DOWNSTREAM FACE OF EAST SPILLWAY

C-9 VALVE STEM FOR OUTLET WORKS

C-10 DOWNSTREAM FACE OF EARTH EMBANKMENT
TO WEST OF SPILLWAYS - LOOKING EAST

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



CORNELIS DAM
DRAINAGE AREA AND
IMPACT AREA
DATUM:NGVD
QUADRANGLE SHEETS:
SOUTHINGTON, CT
BRISTOL, CT
THOMASTON, CT
WATERBURY, CT
SCALE:1:24000
PLATE NO. D-1

HYDROLOGIC AND HYDRAULIC ANALYSIS
SUMMARY SHEET

Dam CORNELIS DAM

Test Flood 1/2 PMF

INFLOW HYDROGRAPH DEVELOPMENT

Drainage Area 8.60 sq. mi.

Probable Maximum Precipitation
24 hour - 200 square mile PMP 21.5 inches

Initial Rainfall Loss 0 Inch
Uniform Rainfall Loss .1 Inch

Snyder's Lag 4.40 hours
Snyder's Peaking Coefficient .625

Test Flood Inflow 6040 CFS

PMF Inflow 12,180 CFS

RESERVOIR ROUTING AND DAM OVERTOPPING

Test Flood Outflow 6040 CFS

Spillway Capacity at Top of Dam 2520 CFS
42 % of Test Flood

Flow Over Spillway at Test Flood 4660 CFS

Spillway Crest Elevation 502.50 Feet
Top of Dam Elevation 506.23 Feet
Test Flood Elevation 508.12 Feet

```
*********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
LAST MODIFICATION  26 FEB 79
*********************************
A1       DAM SAFETY ANALYSIS  -  JOB 80-100/04   ERJ
A2       LOWER SCOVILL RESERVOIR DAM  -  WOLCOTT, CT
A3       12-10-80
B      75       1       0       0       0       0       0       2       0       0
B1      5
J       1       2       1
J1     .5      1.
K               1                                       1
K1       COMPUTATION OF PMF - DEVELOPMENT OF INFLOW HYDROGRAPH
M       1       1     8.6             8.6                                       1
P            21.5     110     124     133     142
T                                                               .1
W     4.4   0.625
X   1.9  0.05     2.0
K       1  UPPER                                        1
K1       ROUTING INFLOW HYDROGRAPH THRU POND - OVERTOPPING ANALYSIS
Y                               1       1
Y1      1                                              -1
$A    128     130     197
$E    525     530     540
$$    525     140     3.8     1.5
$D 529.5     2.65     1.5     140
K       1  LOWER                                        1
K1       ROUTING OUTFLOW HYDROGRAPH THRU LOWER RESERVOIR - OVERTOPPING ANALYSIS
Y                               1       1
Y1      1                                              -1
$A    4.5     5.7     7.0
$E 503.5  506.23      510
$$ 502.5      132    2.65     1.5
$D506.23     2.65     1.5     200
K      99
```

DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

RUN DATE 12/11/80.
TIME 07.52.44.

DAM SAFETY ANALYSIS - JOB 80-100/04 ERJ
LOWER SCOVILL RESERVOIR DAM - WOLCOTT, CT
12-10-80

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
75	1	0	0	0	0	0	2	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 2 LRTIO= 1
RTIOS= .50 1.00

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

SUB-AREA RUNOFF COMPUTATION

COMPUTATION OF PMF - DEVELOPMENT OF INFLOW HYDROGRAPH

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

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	8.60	0.00	8.60	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.50	110.00	124.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	0.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 4.40 CP= .63 NTA= 0

RECESSION DATA
STRTQ= 1.90 QRCSN= .05 RTIOR= 2.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 5.16 AND R= 4.04 INTERVALS

UNIT HYDROGRAPH 25 END-OF-PERIOD ORDINATES, LAG= 4.41 HOURS, CP= .63 VOL= 1.00

74.	266.	511.	703.	781.	701.	551.	430.	335.	262.
204.	159.	124.	97.	75.	59.	46.	36.	28.	22.
17.	[illegible]	[illegible]	[illegible]	[illegible]					

1.01	4.00	4	.01	0.00	.01	1.
1.01	5.00	5	.01	0.00	.01	1.
1.01	6.00	6	.01	0.00	.01	1.
1.01	7.00	7	.03	0.00	.03	1.
1.01	8.00	8	.03	0.00	.03	1.
1.01	9.00	9	.03	0.00	.03	1.
1.01	10.00	10	.03	0.00	.03	1.
1.01	11.00	11	.03	0.00	.03	1.
1.01	12.00	12	.03	0.00	.03	1.
1.01	13.00	13	.13	.03	.10	3.
1.01	14.00	14	.15	.05	.10	12.
1.01	15.00	15	.19	.09	.10	36.
1.01	16.00	16	.49	.39	.10	101.
1.01	17.00	17	.18	.08	.10	216.
1.01	18.00	18	.14	.04	.10	349.
1.01	19.00	19	.01	0.00	.01	451.
1.01	20.00	20	.01	0.00	.01	486.
1.01	21.00	21	.01	0.00	.01	446.
1.01	22.00	22	.01	0.00	.01	366.
1.01	23.00	23	.01	0.00	.01	290.
1.02	0.00	24	.01	0.00	.01	226.
1.02	1.00	25	.10	.00	.10	177.
1.02	2.00	26	.10	.00	.10	139.
1.02	3.00	27	.10	.00	.10	110.
1.02	4.00	28	.10	.00	.10	89.
1.02	5.00	29	.10	.00	.10	73.
1.02	6.00	30	.10	.00	.10	61.
1.02	7.00	31	.40	.30	.10	73.
1.02	8.00	32	.40	.30	.10	145.
1.02	9.00	33	.40	.30	.10	292.
1.02	10.00	34	.40	.30	.10	498.
1.02	11.00	35	.40	.30	.10	728.
1.02	12.00	36	.40	.30	.10	934.
1.02	13.00	37	1.69	1.79	.10	1206.

1.02	17.00	41	2.65	2.55	.10	7161.
1.02	18.00	42	2.08	1.98	.10	9923.
1.02	19.00	43	.15	.05	.10	11962.
1.02	20.00	44	.15	.05	.10	12620.
1.02	21.00	45	.15	.05	.10	11735.
1.02	22.00	46	.15	.05	.10	9921.
1.02	23.00	47	.15	.05	.10	7993.
1.03	0.00	48	.15	.05	.10	6310.
1.03	1.00	49	0.00	0.00	0.00	4984.
1.03	2.00	50	0.00	0.00	0.00	3939.
1.03	3.00	51	0.00	0.00	0.00	3107.
1.03	4.00	52	0.00	0.00	0.00	2441.
1.03	5.00	53	0.00	0.00	0.00	1909.
1.03	6.00	54	0.00	0.00	0.00	1489.
1.03	7.00	55	0.00	0.00	0.00	1161.
1.03	8.00	56	0.00	0.00	0.00	904.
1.03	9.00	57	0.00	0.00	0.00	704.
1.03	10.00	58	0.00	0.00	0.00	547.
1.03	11.00	59	0.00	0.00	0.00	425.
1.03	12.00	60	0.00	0.00	0.00	330.
1.03	13.00	61	0.00	0.00	0.00	256.
1.03	14.00	62	0.00	0.00	0.00	191.
1.03	15.00	63	0.00	0.00	0.00	138.
1.03	16.00	64	0.00	0.00	0.00	94.
1.03	17.00	65	0.00	0.00	0.00	39.
1.03	18.00	66	0.00	0.00	0.00	18.
1.03	19.00	67	0.00	0.00	0.00	4.
1.03	20.00	68	0.00	0.00	0.00	3.
1.03	21.00	69	0.00	0.00	0.00	2.
1.03	22.00	70	0.00	0.00	0.00	1.
1.03	23.00	71	0.00	0.00	0.00	1.
1.04	0.00	72	0.00	0.00	0.00	0.
1.04	1.00	73	0.00	0.00	0.00	0.
1.04	2.00	74	0.00	0.00	0.00	0.
1.04	3.00	75	0.00	0.00	0.00	0.
		SUM	24.42	21.16	3.27	116907.
			(620.)	(537.)	(83.)	(3310.44)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	12620.	10623.	4614.	1624.	116908.
CMS	357.	301.	131.	46.	3310.
INCHES		11.49	19.96	21.08	21.08
MM		291.87	507.03	535.33	535.33
AC-FT		5268.	9151.	9662.	9662.
THOUS CU M		6498.	11288.	11918.	11918.

```
                            INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
       0.     2000.     4000.     6000.     8000.    10000.    12000.    14000.        0.        0.        0.        0.        0.
                                                                                                       PRECIP(L) AND EXCESS(X)
       0.        0.        0.        0.        0.        0.        0.        0.        8.        6.        4.        2.        0.
 1.00  1I         .         .         .         .         .         .         .         .         .         .         .         L
 2.00  2I         .         .         .         .         .         .         .         .         .         .         .         L
 3.00  3I         .         .         .         .         .         .         .         .         .         .         .         L
 4.00  4I         .         .         .         .         .         .         .         .         .         .         .         L
 5.00  5I         .         .         .         .         .         .         .         .         .         .         .         L
 6.00  6I         .         .         .         .         .         .         .         .         .         .         .         L
 7.00  7I         .         .         .         .         .         .         .         .         .         .         .         L
 8.00  8I         .         .         .         .         .         .         .         .         .         .         .         L
 9.00  9I         .         .         .         .         .         .         .         .         .         .         .         L
10.00 10I.......................................................................................................................L
11.00 11I         .         .         .         .         .         .         .         .         .         .         .         L
12.00 12I         .         .         .         .         .         .         .         .         .         .         .         L
13.00 13I         .         .         .         .         .         .         .         .         .         .         .        LX
14.00 14I         .         .         .         .         .         .         .         .         .         .         .        LX
15.00 15I         .         .         .         .         .         .         .         .         .         .         .        LX
16.00 16.I        .         .         .         .         .         .         .         .         .         .         .        LX
17.00 17.I        .         .         .         .         .         .         .         .         .         .         .       LXX
18.00 18. I       .         .         .         .         .         .         .         .         .         .         .        LX
19.00 19. I       .         .         .         .         .         .         .         .         .         .         .        LX
20.00 20..I.....................................................................................................................L
21.00 21. I       .         .         .         .         .         .         .         .         .         .         .         L
22.00 22. I       .         .         .         .         .         .         .         .         .         .         .         L
23.00 23.I        .         .         .         .         .         .         .         .         .         .         .         L
 0.00 24.I        .         .         .         .         .         .         .         .         .         .         .         L
 1.00 25.I        .         .         .         .         .         .         .         .         .         .         .         L
 2.00 26.I        .         .         .         .         .         .         .         .         .         .         .        LX
 3.00 27.I        .         .         .         .         .         .         .         .         .         .         .        LX
 4.00 28I         .         .         .         .         .         .         .         .         .         .         .        LX
 5.00 29I         .         .         .         .         .         .         .         .         .         .         .        LX
 6.00 30I......................................................................................................................LX
 7.00 31I         .         .         .         .         .         .         .         .         .         .         .       LXX
 8.00 32.I        .         .         .         .         .         .         .         .         .         .         .       LXX
 9.00 33.I        .         .         .         .         .         .         .         .         .         .         .       LXX
10.00 34. I       .         .         .         .         .         .         .         .         .         .         .       LXX
11.00 35.   I     .         .         .         .         .         .         .         .         .         .         .       LXX
12.00 36.    I    .         .         .         .         .         .         .         .         .         .         .       LXX
13.00 37.     I   .         .         .         .         .         .         .         .         .         .         .LXXXXXXXXX
14.00 38.        I.         .         .         .         .         .         .         .         .         .        LXXXXXXXXXXX
15.00 39.         .   I     .         .         .         .         .         .         .         .         .     LXXXXXXXXXXXXXX
16.00 40......................I............................................................LXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
17.00 41.         .         .         .     I   .         .         .         .         .         .      LXXXXXXXXXXXXX
18.00 42.         .         .         .         .         I         .         .         .         .         .         LXXXXXXXXXX
19.00 43.         .         .         .         .         .         I         .         .         .         .         .        LX
20.00 44.         .         .         .         .         .         .  I      .         .         .         .         .        LX
21.00 45.         .         .         .         .         .        I.         .         .         .         .         .        LX
22.00 46.         .         .         .         .         I         .         .         .         .         .         .        LX
23.00 47.         .         .         .         I         .         .         .         .         .         .         .        LX
 0.00 48.         .         .         . I       .         .         .         .         .         .         .         .        LX
 1.00 49.         .         .    I    .         .         .         .         .         .         .         .         .        LX
 2.00 50...................I....................................................................................................L
 3.00 51.         .     I   .         .         .         .         .         .         .         .         .         .         L
 4.00 52.         . I       .         .         .         .         .         .         .         .         .         .         L
 5.00 53.         I         .         .         .         .         .         .         .         .         .         .         L
```

```
13.00 61.I    .    .    .    .    .    .    .    .    .    .    .    .    L
14.00 62.I    .    .    .    .    .    .    .    .    .    .    .    .    L
15.00 63.I    .    .    .    .    .    .    .    .    .    .    .    .    L
16.00 64I     .    .    .    .    .    .    .    .    .    .    .    .    L
17.00 65I     .    .    .    .    .    .    .    .    .    .    .    .    L
18.00 66I     .    .    .    .    .    .    .    .    .    .    .    .    L
19.00 67I     .    .    .    .    .    .    .    .    .    .    .    .    L
20.00 68I     .    .    .    .    .    .    .    .    .    .    .    .    L
21.00 69I     .    .    .    .    .    .    .    .    .    .    .    .    L
22.00 70I.........................................................................L
23.00 71I     .    .    .    .    .    .    .    .    .    .    .    .    L
 0.00 72I     .    .    .    .    .    .    .    .    .    .    .    .    L
 1.00 73I     .    .    .    .    .    .    .    .    .    .    .    .    L
 2.00 74I     .    .    .    .    .    .    .    .    .    .    .    .    L
 3.00 75I     .    .    .    .    .    .    .    .    .    .    .    .    L
```

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

1.	1.	1.	1.	1.	1.	1.	1.	1.	0.
0.	0.	1.	6.	18.	50.	108.	174.	225.	243.
223.	183.	145.	113.	88.	69.	55.	44.	36.	30.
37.	73.	146.	249.	364.	467.	603.	879.	1380.	2279.
3580.	4962.	5981.	6310.	5668.	4961.	3996.	3155.	2492.	1969.
1553.	1220.	954.	745.	581.	452.	352.	274.	213.	165.
128.	96.	69.	47.	19.	9.	2.	2.	1.	1.
0.	0.	0.	0.	0.					

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6310.	5312.	2307.	812.	58454.
CMS	179.	150.	65.	23.	1655.
INCHES		5.75	9.98	10.54	10.54
MM		145.93	253.51	267.66	267.66
AC-FT		2634.	4576.	4831.	4831.
THOUS CU M		3249.	5644.	5959.	5959.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

2.	2.	2.	1.	1.	1.	1.	1.	1.	1.
1.	1.	3.	12.	36.	101.	216.	349.	451.	486.
446.	366.	290.	226.	177.	139.	110.	89.	73.	61.
73.	145.	292.	498.	728.	934.	1206.	1757.	2759.	4557.
7161.	9923.	11962.	12620.	11735.	9921.	7993.	6310.	4984.	3939.
3107.	2441.	1909.	1389.	1161.	904.	704.	547.	425.	330.
256.	191.	138.	94.	39.	18.	4.	3.	2.	1.
1.	0.	0.	0.	0.					

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	12620.	10623.	4614.	1624.	116908.
CMS	357.	301.	131.	46.	3310.
INCHES		11.49	19.96	21.08	21.08
MM		291.87	507.03	535.33	535.33
AC-FT		5268.	9151.	9662.	9662.
THOUS CU M		6498.	11288.	11918.	11918.

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

HYDROGRAPH ROUTING

ROUTING INFLOW HYDROGRAPH THRU POND - OVERTOPPING ANALYSIS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
UPPER	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

SURFACE AREA= 128. 138. 147.

DAM DATA

TOPEL	COQD	EXPD	DAMWID
529.5	2.7	1.5	140.

STATION UPPER, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	3.	12.	33.	68.	109.
143.	160.	161.	152.	137.	121.	106.	91.	79.	68.
60.	59.	70.	102.	158.	238.	341.	494.	765.	1277.
2182.	3466.	4809.	5806.	6035.	5539.	4766.	3959.	3221.	2607.
2107.	1702.	1374.	1108.	894.	722.	584.	474.	385.	313.
256.	209.	170.	138.	109.	85.	67.	52.	42.	34.
28.	23.	20.	17.	14.					

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
1.	1.	1.	1.	2.	4.	10.	20.	32.	44.
53.	58.	58.	56.	52.	48.	44.	40.	36.	33.
30.	30.	33.	42.	57.	75.	95.	122.	163.	230.
329.	449.	559.	628.	642.	612.	556.	491.	427.	371.
322.	279.	242.	209.	181.	157.	136.	119.	103.	90.
79.	69.	60.	52.	45.	38.	32.	27.	24.	20.
18.	16.	14.	13.	11.					

STAGE

525.0	525.0	525.0	525.0	525.0	525.0	525.0	525.0	525.0	525.0
525.0	525.0	525.0	525.0	525.0	525.0	525.1	525.2	525.3	525.3
525.4	525.4	525.5	525.4	525.4	525.4	525.3	525.3	525.3	525.3
525.2	525.2	525.3	525.3	525.4	525.6	525.7	526.0	526.3	526.8
527.6	528.5	529.3	529.9	530.0	529.7	529.3	528.8	528.3	527.9
527.5	527.2	526.9	526.6	526.4	526.2	526.1	525.9	525.8	525.7
525.6	525.5	525.5	525.4	525.3	525.3	525.3	525.2	525.2	525.2
525.1	525.1	525.1	525.1	525.1					

PEAK OUTFLOW IS 6035. AT TIME 45.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6035.	5111.	2287.	810.	58321.
CMS	171.	145.	65.	23.	1651.
INCHES		5.53	9.90	10.51	10.51
MM		140.43	251.36	267.06	267.06
AC-FT		2534.	4537.	4820.	4820.
THOUS CU M		3126.	5596.	5945.	5945.

```
                              INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
              0.      1000.     2000.     3000.     4000.     5000.     6000.     7000.       0.        0.        0.        0.        0.
 1.00  1I         .         .         .         .         .         .         .         .         .         .         .         .
 2.00  2I         .         .         .         .         .         .         .         .         .         .         .         .
 3.00  3I         .         .         .         .         .         .         .         .         .         .         .         .
 4.00  4I         .         .         .         .         .         .         .         .         .         .         .         .
 5.00  5I         .         .         .         .         .         .         .         .         .         .         .         .
 6.00  6I         .         .         .         .         .         .         .         .         .         .         .         .
 7.00  7I         .         .         .         .         .         .         .         .         .         .         .         .
 8.00  8I         .         .         .         .         .         .         .         .         .         .         .         .
 9.00  9I         .         .         .         .         .         .         .         .         .         .         .         .
10.00 10I........................................................................................................................
11.00 11I         .         .         .         .         .         .         .         .         .         .         .         .
12.00 12I         .         .         .         .         .         .         .         .         .         .         .         .
13.00 13I         .         .         .         .         .         .         .         .         .         .         .         .
14.00 14I         .         .         .         .         .         .         .         .         .         .         .         .
15.00 15I         .         .         .         .         .         .         .         .         .         .         .         .
16.00 16OI        .         .         .         .         .         .         .         .         .         .         .         .
17.00 17OI        .         .         .         .         .         .         .         .         .         .         .         .
18.00 18O I       .         .         .         .         .         .         .         .         .         .         .         .
19.00 19.OI       .         .         .         .         .         .         .         .         .         .         .         .
20.00 20.OI......................................................................................................................
21.00 21.OI       .         .         .         .         .         .         .         .         .         .         .         .
22.00 22. I       .         .         .         .         .         .         .         .         .         .         .         .
23.00 23.IO       .         .         .         .         .         .         .         .         .         .         .         .
 0.00 24.IO       .         .         .         .         .         .         .         .         .         .         .         .
 1.00 25.I        .         .         .         .         .         .         .         .         .         .         .         .
 2.00 26.I        .         .         .         .         .         .         .         .         .         .         .         .
 3.00 27.I        .         .         .         .         .         .         .         .         .         .         .         .
 4.00 28IO        .         .         .         .         .         .         .         .         .         .         .         .
 5.00 29IO        .         .         .         .         .         .         .         .         .         .         .         .
 6.00 30IO.......................................................................................................................
 7.00 31IO        .         .         .         .         .         .         .         .         .         .         .         .
 8.00 32.I        .         .         .         .         .         .         .         .         .         .         .         .
 9.00 33.I        .         .         .         .         .         .         .         .         .         .         .         .
10.00 34.OI       .         .         .         .         .         .         .         .         .         .         .         .
11.00 35. O I     .         .         .         .         .         .         .         .         .         .         .         .
12.00 36. O  I    .         .         .         .         .         .         .         .         .         .         .         .
13.00 37.  O  I   .         .         .         .         .         .         .         .         .         .         .         .
14.00 38.    O   I.         .         .         .         .         .         .         .         .         .         .         .
15.00 39.       O .   I     .         .         .         .         .         .         .         .         .         .         .
16.00 40.............O.........I.................................................................................................
17.00 41.         .         . O       .     I   .         .         .         .         .         .         .         .         .
18.00 42.         .         .         .    O    .         I         .         .         .         .         .         .         .
19.00 43.         .         .         .         .       O .         I         .         .         .         .         .         .
20.00 44.         .         .         .         .         .       O .  I      .         .         .         .         .         .
21.00 45.         .         .         .         .         .        IO         .         .         .         .         .         .
22.00 46.         .         .         .         .         I    O    .         .         .         .         .         .         .
23.00 47.         .         .         .         I       O .         .         .         .         .         .         .         .
 0.00 48.         .         .         . I       O         .         .         .         .         .         .         .         .
 1.00 49.         .         .    I    . O       .         .         .         .         .         .         .         .         .
 2.00 50....................I.....O..............................................................................................
 3.00 51.         .     I   .O        .         .         .         .         .         .         .         .         .         .
 4.00 52.         . I    O  .         .         .         .         .         .         .         .         .         .         .
 5.00 53.         I   O     .         .         .         .         .         .         .         .         .         .         .
 6.00 54.      I  .O        .         .         .         .         .         .         .         .         .         .         .
 7.00 55.     I  O.         .         .         .         .         .         .         .         .         .         .         .
```

```
15.00 63I0
16.00 64I0
17.00 65I0
18.00 66I0
19.00 67I0
20.00 68I0
21.00 69I
22.00 70I
23.00 71I
 0.00 72I
 1.00 73I
 2.00 74I
 3.00 75I
```

STATION UPPER, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	2.	9.	33.	87.	173.	268.
337.	362.	350.	317.	276.	237.	201.	170.	144.	123.
108.	102.	138.	216.	352.	539.	767.	1105.	1706.	2847.
4527.	7836.	10635.	12176.	12178.	10920.	9127.	7381.	5925.	4823.
3941.	3184.	2560.	2054.	1647.	1322.	1062.	855.	689.	557.
451.	364.	293.	233.	181.	136.	102.	78.	61.	48.
39.	32.	26.	22.	18.					

STORAGE

0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	2.	4.	9.	20.	38.	61.	81.
95.	99.	97.	91.	83.	75.	67.	60.	54.	48.
44.	44.	52.	70.	97.	129.	164.	209.	279.	394.
561.	743.	884.	958.	958.	898.	810.	719.	636.	560.
489.	424.	366.	316.	273.	235.	203.	176.	152.	132.
115.	100.	86.	74.	62.	52.	43.	36.	30.	26.
22.	19.	17.	15.	14.					

STAGE

525.0	525.0	525.0	525.0	525.0	525.0	525.0	525.0	525.0	525.0
525.0	525.0	525.0	525.0	525.0	525.1	525.2	525.3	525.5	525.6
525.7	525.8	525.8	525.7	525.6	525.6	525.5	525.5	525.4	525.4
525.3	525.3	525.4	525.5	525.8	526.0	526.3	526.6	527.2	528.1
529.4	530.7	531.8	532.3	532.3	531.9	531.2	530.6	529.9	529.3
528.8	528.3	527.9	527.5	527.1	526.8	526.6	526.4	526.2	526.0
525.9	525.8	525.7	525.6	525.5	525.4	525.3	525.3	525.2	525.2
525.2	525.2	525.1	525.1	525.1					

PEAK OUTFLOW IS 12178. AT TIME 45.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	12178.	10441.	4588.	1622.	116750.
CMS	345.	296.	130.	46.	3306.
INCHES		11.29	19.85	21.05	21.05
MM		286.85	504.21	534.60	534.60
AC-FT		5177.	9100.	9649.	9649.
THOUS CU M		6386.	11225.	11902.	11902.

```
                            INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
       0.     2000.     4000.     6000.     8000.    10000.    12000.    14000.        0.        0.        0.        0.        0.
 1.00  1I         .         .         .         .         .         .         .         .         .         .         .         .
 2.00  2I         .         .         .         .         .         .         .         .         .         .         .         .
 3.00  3I         .         .         .         .         .         .         .         .         .         .         .         .
 4.00  4I         .         .         .         .         .         .         .         .         .         .         .         .
 5.00  5I         .         .         .         .         .         .         .         .         .         .         .         .
 6.00  6I         .         .         .         .         .         .         .         .         .         .         .         .
 7.00  7I         .         .         .         .         .         .         .         .         .         .         .         .
 8.00  8I         .         .         .         .         .         .         .         .         .         .         .         .
 9.00  9I         .         .         .         .         .         .         .         .         .         .         .         .
10.00 10I........................................................................................................................
11.00 11I         .         .         .         .         .         .         .         .         .         .         .         .
12.00 12I         .         .         .         .         .         .         .         .         .         .         .         .
13.00 13I         .         .         .         .         .         .         .         .         .         .         .         .
14.00 14I         .         .         .         .         .         .         .         .         .         .         .         .
15.00 15I         .         .         .         .         .         .         .         .         .         .         .         .
16.00 160I        .         .         .         .         .         .         .         .         .         .         .         .
17.00 170I        .         .         .         .         .         .         .         .         .         .         .         .
18.00 180 I       .         .         .         .         .         .         .         .         .         .         .         .
19.00 19.0I       .         .         .         .         .         .         .         .         .         .         .         .
20.00 20.0I......................................................................................................................
21.00 21. I       .         .         .         .         .         .         .         .         .         .         .         .
22.00 22. I       .         .         .         .         .         .         .         .         .         .         .         .
23.00 23.IO       .         .         .         .         .         .         .         .         .         .         .         .
 0.00 24.IO       .         .         .         .         .         .         .         .         .         .         .         .
 1.00 25.I        .         .         .         .         .         .         .         .         .         .         .         .
 2.00 26.I        .         .         .         .         .         .         .         .         .         .         .         .
 3.00 27.I        .         .         .         .         .         .         .         .         .         .         .         .
 4.00 28IO        .         .         .         .         .         .         .         .         .         .         .         .
 5.00 29IO        .         .         .         .         .         .         .         .         .         .         .         .
 6.00 30IO.......................................................................................................................
 7.00 31IO        .         .         .         .         .         .         .         .         .         .         .         .
 8.00 32.I        .         .         .         .         .         .         .         .         .         .         .         .
 9.00 33.I        .         .         .         .         .         .         .         .         .         .         .         .
10.00 34.OI       .         .         .         .         .         .         .         .         .         .         .         .
11.00 35. O I     .         .         .         .         .         .         .         .         .         .         .         .
12.00 36.  O I    .         .         .         .         .         .         .         .         .         .         .         .
13.00 37.   O I   .         .         .         .         .         .         .         .         .         .         .         .
14.00 38.     O  I.         .         .         .         .         .         .         .         .         .         .         .
15.00 39.        O.   I     .         .         .         .         .         .         .         .         .         .         .
16.00 40..............O........I.................................................................................................
17.00 41.         .         .   O     .     I   .         .         .         .         .         .         .         .         .
18.00 42.         .         .         .        O.         I         .         .         .         .         .         .         .
19.00 43.         .         .         .         .         .  O      I         .         .         .         .         .         .
20.00 44.         .         .         .         .         .         .O I      .         .         .         .         .         .
21.00 45.         .         .         .         .         .        I.O        .         .         .         .         .         .
22.00 46.         .         .         .         .         I    O    .         .         .         .         .         .         .
23.00 47.         .         .         .         I     O   .         .         .         .         .         .         .         .
 0.00 48.         .         .         . I    O  .         .         .         .         .         .         .         .         .
 1.00 49.         .         .    I    O         .         .         .         .         .         .         .         .         .
 2.00 50...................I...O.................................................................................................
 3.00 51.         .     I   O         .         .         .         .         .         .         .         .         .         .
 4.00 52.         . I   O   .         .         .         .         .         .         .         .         .         .         .
 5.00 53.         I  O      .         .         .         .         .         .         .         .         .         .         .
 6.00 54.      I  O         .         .         .         .         .         .         .         .         .         .         .
 7.00 55.     I O .         .         .
```

```
15.00 63I
16.00 64IO
17.00 65IO
18.00 66IO
19.00 67IO
20.00 68I
21.00 69I
22.00 70I
23.00 71I
 0.00 72I
 1.00 73I
 2.00 74I
 3.00 75I
```

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

HYDROGRAPH ROUTING

ROUTING OUTFLOW HYDROGRAPH THRU LOWER RESERVOIR - OVERTOPPING ANALYSIS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
LOWER	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

SURFACE AREA=	5.	6.	7.
CAPACITY=	0.	19.	43.
ELEVATION=	503.	506.	510.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
502.5	132.0	2.7	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
506.2	2.7	1.5	200.

STATION LOWER, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	2.	8.	26.	60.	102.
138.	159.	162.	154.	139.	124.	108.	94.	81.	70.
62.	59.	67.	95.	148.	227.	328.	475.	734.	1225.
2104.	3402.	4768.	5778.	6046.	5560.	4798.	3987.	3253.	2634.
2145.	1725.	1400.	1125.	912.	735.	597.	483.	394.	320.
262.	215.	175.	142.	114.	89.	70.	55.	44.	36.
29.	24.	21.	18.	15.					

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	2.
2.	3.	3.	3.	2.	2.	2.	2.	2.	2.
1.	1.	2.	2.	3.	3.	4.	6.	8.	11.
17.	22.	27.	30.	30.	29.	27.	24.	22.	20.
17.	14.	12.	11.	9.	8.	7.	6.	5.	4.
4.	3.	3.	3.	2.	2.	2.	1.	1.	1.
1.	1.	1.	1.	1.					

STAGE

502.5	502.5	502.5	502.5	502.5	502.5	502.5	502.5	502.5	502.5
502.5	502.5	502.5	502.5	502.5	502.5	502.6	502.7	502.8	502.9
503.0	503.1	503.1	503.1	503.0	503.0	503.0	502.9	502.9	502.8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6046.	5107.	2287.	810.	58316.
CMS	171.	145.	65.	23.	1651.
INCHES		5.52	9.90	10.51	10.51
MM		140.32	251.37	267.03	267.03
AC-FT		2533.	4537.	4819.	4819.
THOUS CU M		3124.	5596.	5945.	5945.

```
                       INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
          0.     1000.     2000.     3000.     4000.     5000.     6000.     7000.        0.        0.        0.        0.        0.
 1.00   1I         .         .         .         .         .         .         .         .         .         .         .         .
 2.00   2I         .         .         .         .         .         .         .         .         .         .         .         .
 3.00   3I         .         .         .         .         .         .         .         .         .         .         .         .
 4.00   4I         .         .         .         .         .         .         .         .         .         .         .         .
 5.00   5I         .         .         .         .         .         .         .         .         .         .         .         .
 6.00   6I         .         .         .         .         .         .         .         .         .         .         .         .
 7.00   7I         .         .         .         .         .         .         .         .         .         .         .         .
 8.00   8I         .         .         .         .         .         .         .         .         .         .         .         .
 9.00   9I         .         .         .         .         .         .         .         .         .         .         .         .
10.00  10I........................................................................................................................
11.00  11I         .         .         .         .         .         .         .         .         .         .         .         .
12.00  12I         .         .         .         .         .         .         .         .         .         .         .         .
13.00  13I         .         .         .         .         .         .         .         .         .         .         .         .
14.00  14I         .         .         .         .         .         .         .         .         .         .         .         .
15.00  15I         .         .         .         .         .         .         .         .         .         .         .         .
16.00  16I         .         .         .         .         .         .         .         .         .         .         .         .
17.00  17I         .         .         .         .         .         .         .         .         .         .         .         .
18.00  18I         .         .         .         .         .         .         .         .         .         .         .         .
19.00  19.I        .         .         .         .         .         .         .         .         .         .         .         .
20.00  20.I.......................................................................................................................
21.00  21.I        .         .         .         .         .         .         .         .         .         .         .         .
22.00  22. I       .         .         .         .         .         .         .         .         .         .         .         .
23.00  23. I       .         .         .         .         .         .         .         .         .         .         .         .
 0.00  24. I       .         .         .         .         .         .         .         .         .         .         .         .
 1.00  25.I        .         .         .         .         .         .         .         .         .         .         .         .
 2.00  26.I        .         .         .         .         .         .         .         .         .         .         .         .
 3.00  27.I        .         .         .         .         .         .         .         .         .         .         .         .
 4.00  28.I        .         .         .         .         .         .         .         .         .         .         .         .
 5.00  29.I        .         .         .         .         .         .         .         .         .         .         .         .
 6.00  30.I.......................................................................................................................
 7.00  31.I        .         .         .         .         .         .         .         .         .         .         .         .
 8.00  32.I        .         .         .         .         .         .         .         .         .         .         .         .
 9.00  33.I        .         .         .         .         .         .         .         .         .         .         .         .
10.00  34.I        .         .         .         .         .         .         .         .         .         .         .         .
11.00  35.OI       .         .         .         .         .         .         .         .         .         .         .         .
12.00  36. I       .         .         .         .         .         .         .         .         .         .         .         .
13.00  37.   I     .         .         .         .         .         .         .         .         .         .         .         .
14.00  38.     I   .         .         .         .         .         .         .         .         .         .         .         .
15.00  39.       OI.         .         .         .         .         .         .         .         .         .         .         .
16.00  40.............OI.........................................................................................................
17.00  41.         .         .OI       .         .         .         .         .         .         .         .         .         .
18.00  42.         .         .         .   OI    .         .         .         .         .         .         .         .         .
19.00  43.         .         .         .         .       I .         .         .         .         .         .         .         .
20.00  44.         .         .         .         .         .        I.         .         .         .         .         .         .
21.00  45.         .         .         .         .         .         I         .         .         .         .         .         .
22.00  46.         .         .         .         .         .     IO  .         .         .         .         .         .         .
23.00  47.         .         .         .         .       I .         .         .         .         .         .         .         .
 0.00  48.         .         .         .         I         .         .         .         .         .         .         .         .
 1.00  49.         .         .         .  IO     .         .         .         .         .         .         .         .         .
 2.00  50...........................I..............................................................................................
 3.00  51.         .         .I        .         .         .         .         .         .         .         .         .         .
 4.00  52.         .       I .         .         .         .         .         .         .         .         .         .         .
 5.00  53.         .    I    .         .         .         .         .         .         .         .         .         .         .
 6.00  54.         .I        .         .         .         .         .         .         .         .         .         .         .
 7.00  55.        I.         .         .         .         .         .         .         .         .         .         .         .
```

```
15.00 63. I
16.00 64.I
17.00 65.I
18.00 66.I
19.00 67.I
20.00 68.I
21.00 69I
22.00 70I
23.00 71I
 0.00 72I
 1.00 73I
 2.00 74I
 3.00 75I
```

STATION LOWER, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	6.	25.	75.	159.	257.
331.	361.	352.	321.	281.	241.	205.	174.	147.	126.
110.	107.	132.	203.	334.	518.	745.	1071.	1650.	2755.
4758.	7713.	10988.	12135.	12214.	10954.	9195.	7421.	5977.	4847.
3980.	3207.	2596.	2087.	1673.	1345.	1081.	871.	702.	568.
460.	373.	300.	240.	187.	142.	107.	82.	63.	50.
41.	33.	27.	23.	19.					

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	1.	2.	3.	4.
4.	5.	5.	4.	4.	4.	3.	3.	3.	2.
2.	2.	2.	3.	5.	6.	8.	10.	14.	20.
27.	35.	42.	45.	46.	43.	38.	34.	30.	27.
24.	22.	19.	17.	14.	12.	10.	9.	8.	7.
6.	5.	4.	4.	3.	3.	2.	2.	1.	1.
1.	1.	1.	1.	1.					

STAGE

502.5	502.5	502.5	502.5	502.5	502.5	502.5	502.5	502.5	502.5
502.5	502.5	502.5	502.5	502.5	502.6	502.7	502.9	503.1	503.3
503.5	503.5	503.5	503.4	503.4	503.3	503.2	503.1	503.1	503.0
503.0	503.0	503.0	503.2	503.5	503.8	504.2	504.6	505.3	506.4
507.5	508.8	509.8	510.4	510.4	510.0	509.4	508.7	508.1	507.6
507.2	506.7	506.3	505.8	505.3	505.0	504.6	504.3	504.1	503.9
503.7	503.5	503.4	503.3	503.2	503.0	503.0	502.9	502.8	502.8
502.7	502.7	502.7	502.7	502.6					

PEAK OUTFLOW IS 12214. AT TIME 45.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	12214.	10442.	4588.	1621.	116741.
CMS	346.	296.	130.	46.	3306.
INCHES		11.29	19.85	21.05	21.05
MM		286.89	504.19	534.57	534.57
AC-FT		5178.	9100.	9648.	9648.
THOUS CU M		6387.	11225.	11901.	11901.

```
                       INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
        0.     2000.    4000.    6000.    8000.    10000.   12000.   14000.    0.       0.       0.       0.       0.
 1.00   1I
 2.00   2I
 3.00   3I
 4.00   4I
 5.00   5I
 6.00   6I
 7.00   7I
 8.00   8I
 9.00   9I
10.00  10I
11.00  11I
12.00  12I
13.00  13I
14.00  14I
15.00  15I
16.00  16I
17.00  17I
18.00  18I
19.00  19.I
20.00  20.I
21.00  21. I
22.00  22. I
23.00  23. I
 0.00  24. I
 1.00  25.I
 2.00  26.I
 3.00  27.I
 4.00  28.I
 5.00  29.I
 6.00  30.I
 7.00  31.I
 8.00  32.I
 9.00  33.I
10.00  34.I
11.00  35. I
12.00  36.  I
13.00  37.   I
14.00  38.     OI
15.00  39.        OI
16.00  40.            I
17.00  41.                      I
18.00  42.                                   I
19.00  43.                                                 I
20.00  44.                                                        I
21.00  45.                                                        I
22.00  46.                                                   I
23.00  47.                                            I
 0.00  48.                                    I
 1.00  49.                           I
 2.00  50.                  I
 3.00  51.            I
 4.00  52.       I
 5.00  53.   I
 6.00  54.  I
 7.00  55. I
```

```
14.00 62. I
15.00 63. IO
16.00 64. I
17.00 65. I
18.00 66. I
19.00 67. I
20.00 68I
21.00 69I
22.00 70I
23.00 71I
0.00 72I
1.00 73I
2.00 74I
3.00 75I
```

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .50	RATIO 2 1.00
HYDROGRAPH AT	1	8.60	1	6310.	12620.
		(22.27)		(178.68)(	357.36)(
ROUTED TO	UPPER	8.60	1	6035.	12178.
		(22.27)		(170.89)(	344.83)(
ROUTED TO	LOWER	8.60	1	6046.	12214.
		(22.27)		(171.20)(	345.87)(

PLAN 1 ....S........

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	525.00	525.00	529.50
STORAGE	0.	0.	580.
OUTFLOW	0.	0.	5078.

WOODTICK RESERVOIR DAM

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	529.98	.48	642.	6035.	3.00	45.00	0.00
1.00	532.28	2.78	958.	12178.	8.00	45.00	0.00

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	502.50	502.50	506.23
STORAGE	0.	0.	19.
OUTFLOW	0.	0.	2520.

UNIONVILLE RESERVOIR UPPER DAM

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	508.12	1.89	30.	6046.	9.00	45.00	0.00
1.00	510.38	4.15	46.	12214.	14.00	45.00	0.00

CORNELIS DAM

Dam Failure Analysis

1. Failure discharge with pool at spillway (elev. 502.5) = 3650 CFS
2. Depth of water in reservoir at time of failure = 11.6 ft.
3. Maximum depth of flow downstream of dam = 10.5 ft.
4. Water surface elevation just downstream of dam at time of failure = 500.5

The failure discharge of 3650 CFS will enter and flow downstream 6000 feet until the brook enters a large swampy area. Valley storage in this 6000 feet length of brook is significant in reducing the discharge. Also due to roughness characteristics, obstructions and frictional losses, it is very likely that the unsteady dam failure flow will dissipate its wave and kinetic energy and thus convert to steady and uniform flow obeying Manning's formulae 6000 feet downstream. The failure profile will have the following hydraulic characteristics:

DISTANCE FROM THE DAM	WATER SURFACE ELEVATION	DEPTH (ft.)	REMARKS
40	500.5	10.5	Nichols Road
1000	482.7	2.7	
2500	470.0	5.0	
3300	465.4	3.4	
4000	460.6	0.6	Swampy area
6000	456.4	0.4	confluence with old Tannery Brool

NOTES:

"Rule of Thumb" Guidance for Estimating
Downstream Dam Failure Analysis

DATA

Name of Dam CORNELIS DAM

Location WOLCOTT, CONNECTICUT

Drainage Area 8.6 sq. mi., Top of Dam 506.23

Spillway Type broad, Crest of Spillway 502.50

Surface Area @ Crest Elev. 4.5 Acres = 0.007 sq. mi.

Pool Bottom Near Dam = 490.93

Assumed Side Slopes of Embankments = 2:1

Depth of Pool at Dam (Yo) = 11.6 Feet

Mid-Height Elev. 496.72

Length of Dam at Crest = 136 Feet

Length of Dam at Mid-Height = 136 Feet

40% of Dam Length at Mid-Height = W_b = 55 Feet

Step 1

Storage (S) at time of failure 30 Ac-FT

Step 2

Peak Failure Discharge

$$Q_{p1} = 8/27\ W_b \sqrt{g}\ Yo^{3/2}$$

$$= (1.68)\ (W_b)\ (Y_o)^{3/2} = 3650 \text{ cfs}$$

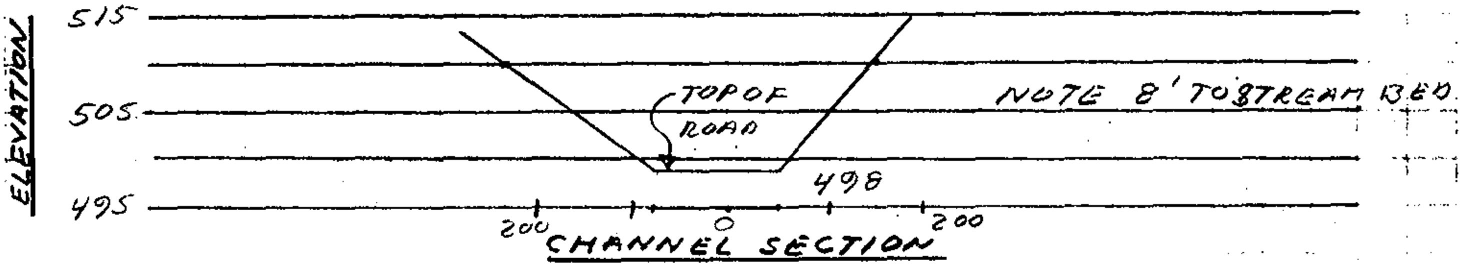
Failure is assumed to coincide with pool elevation at spillway

NOTES: Failure with pool at top of dam would result in flow of 5500 CFS. Full spillway flow would be 2520 CFS. The increase in flooding due to dam failure with pool at top of dam would not be as significant as dam failure with pool at spillway crest.

DAM CORNELIS DAM

SECTION 40' FROM DAM (ROAD) ASSUME OPENINGS BLOCKED WITH DEBRIS

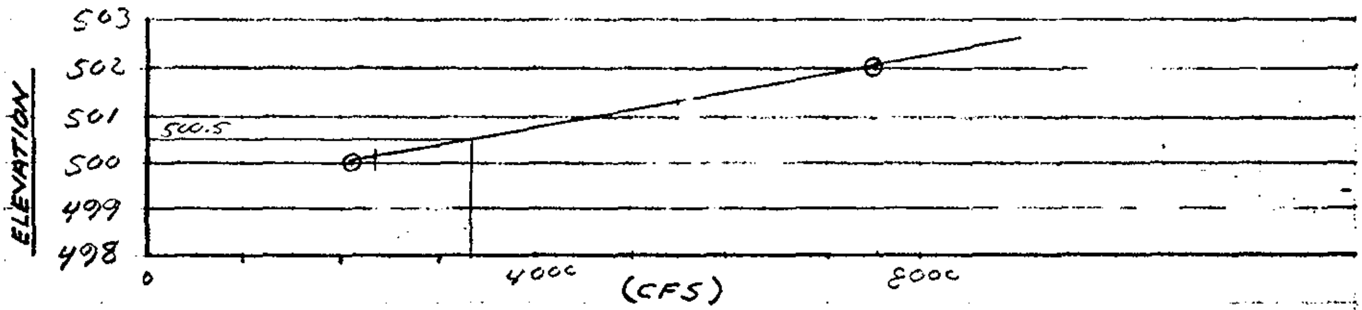
USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ n = .03 SLOPE (S_L) = .01



FULL SPILLWAY Q_S = 0 CFS

Q_{P_1} = 3650 CFS TOTAL STORAGE (S) = 30 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
505	1421	270	5.2	21,000	7
500	296	160	1.9	2215	2
502	672	200	3.4	7487	4



$V_1 = \left(\frac{\ +\ }{2}\right)\left(\frac{\ +\ }{2}\right)\left(\frac{\ }{43560}\right)\left(\frac{1}{2}\right)$ = ______ AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_1/S)$ = ______ CFS V_{AVG} = ______

$V_2 = \left(\frac{\ +\ }{2}\right)(\quad)$ = ______ AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_{AVG}/S)$ = 3650 CFS ELEV = 500.5

DEPTH = 2.5 OVER ROAD

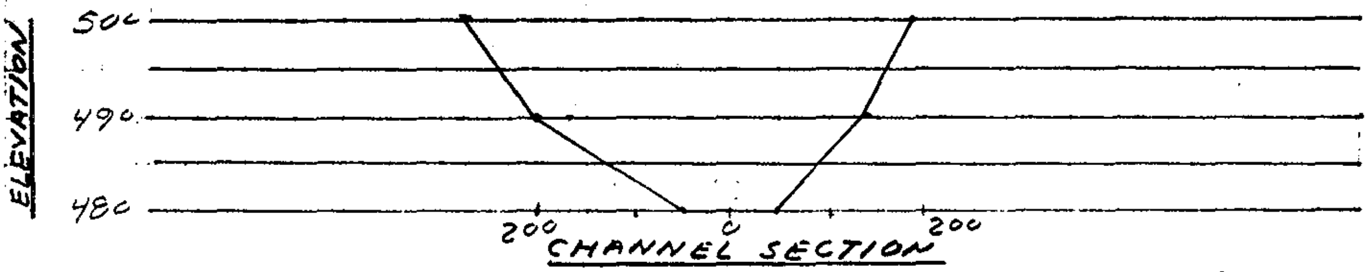
FULL SPILLWAY DEPTH = 0

INCREASE DUE TO DAM FAILURE = 2.5 OVER ROAD

DAM CORNELIS DAM

SECTION 1000' DOWNSTREAM

USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ $n =$ .05 SLOPE (S_L) = .02 '/'

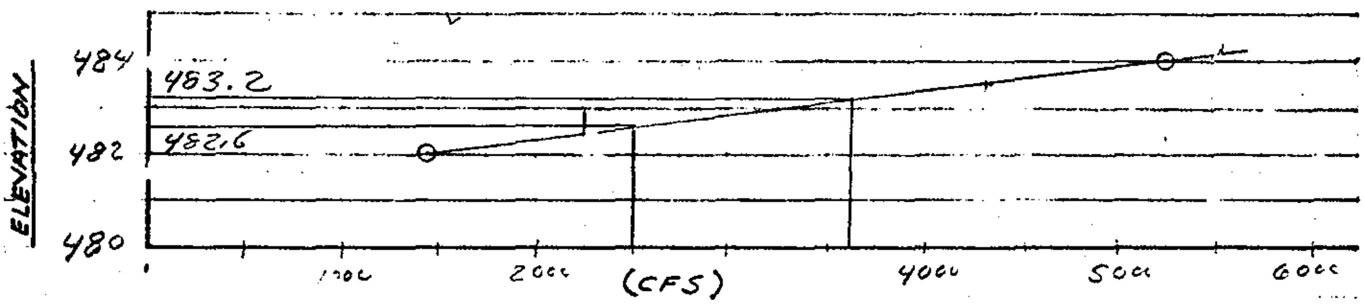


CHANNEL SECTION

FULL SPILLWAY $Q_S =$ 0 CFS

$Q_{P_1} =$ 3650 CFS TOTAL STORAGE (S) = 30 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
485	813	225	3.6	8068	5
482	230	130	1.8	1400	2
484	600	200	3.0	5260	4



$V_1 = \left(\frac{2.5 + 3.2}{2}\right)\left(\frac{180+140}{2} + \frac{180+100}{2}\right)\left(\frac{960}{43560}\right)\left(\frac{1}{2}\right) =$ 9.4 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_1/S) =$ 2500 CFS $V_{AVG} =$ 8.9

$V_2 = \left(\frac{2.5 + 2.6}{2}\right)(3.3) =$ 8.4 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_{AVG}/S) =$ 2600 CFS ELEV = 482.7

DEPTH = 2.7

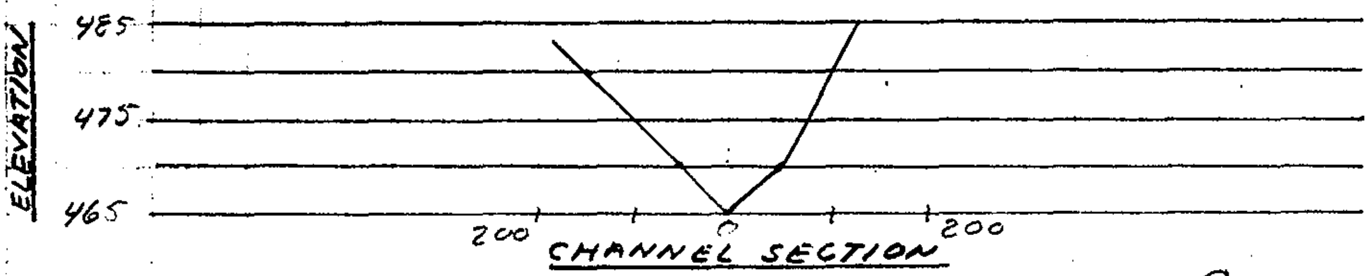
FULL SPILLWAY Q DEPTH = 0

INCREASE DUE TO DAM FAILURE = 2.7

DAM CORNELIS DAM

SECTION 2500' FROM DAM

USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ n = .05 SLOPE (S_L) = .01 '/'

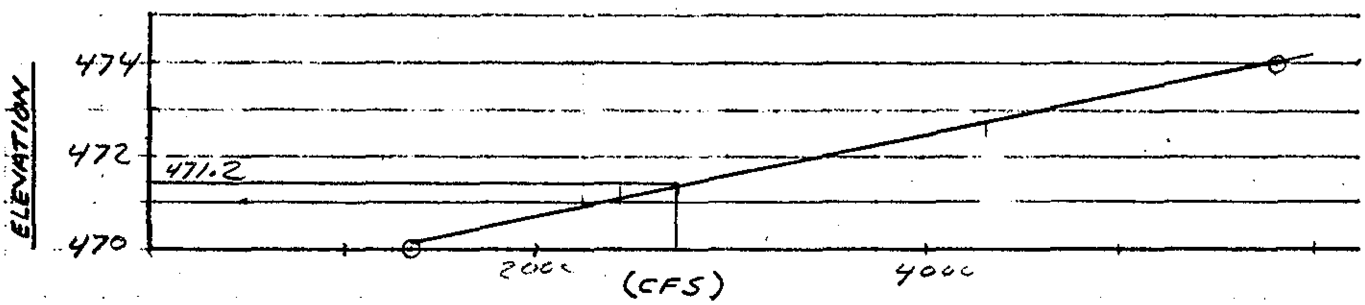


CHANNEL SECTION

FULL SPILLWAY Q_S = 0 CFS

Q_{P_1} = 2600 CFS TOTAL STORAGE (S) = 30 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
475	1000	180	5.6	9300	10
470	250	100	2.5	1372	5
474	720	160	4.5	5800	9



$V_1 = \left(\frac{2.6 + 6.2}{2}\right)\left(\frac{180+100}{2} + \frac{120+0}{2}\right)\left(\frac{1500}{43560}\right)\left(\frac{1}{2}\right) =$ 15.2 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_1/S) =$ 1300 CFS $V_{AVG} =$ 14.2

$V_2 = \left(\frac{2.6 + 5.0}{2}\right)(3.4) =$ 13.1 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_{AVG}/S) =$ 1400 CFS ELEV = 470.0

DEPTH = 5.0

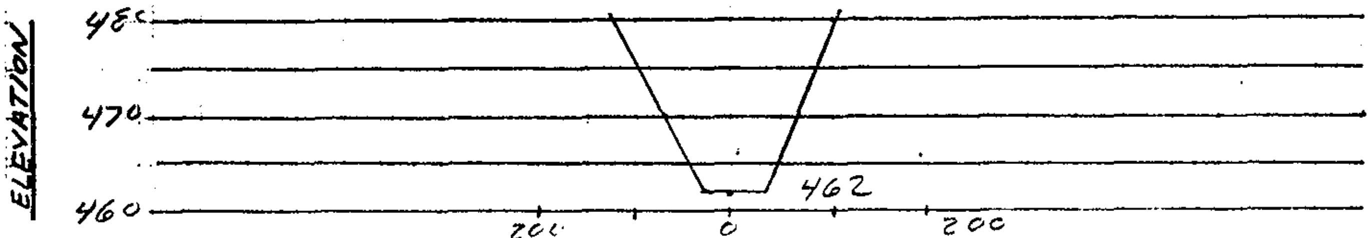
FULL SPILLWAY : DEPTH = 0

INCREASE DUE TO DAM FAILURE = 5.0

DAM CORNELIS DAM

SECTION 3300' FROM DAM

USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ $n =$ .05' SLOPE (S_L) = .003 '/'

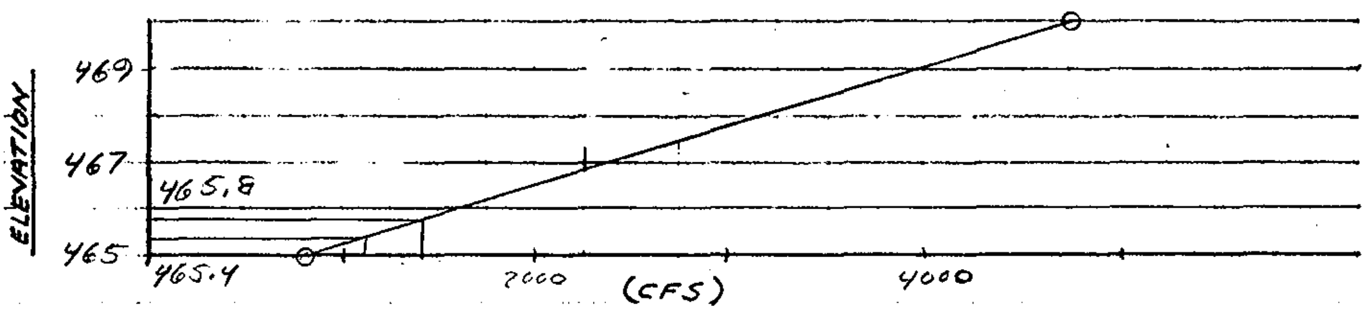


CHANNEL SECTION

FULL SPILLWAY Q_S = 0 CFS

Q_{P_1} = 1400 CFS TOTAL STORAGE (S) = 30 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
470	860	140	6.1	4700	8
465	249	90	2.8	800	3



$V_1 = \left(\frac{5.0 + 3.8}{2}\right)\left(\frac{120+0}{2} + \frac{100+60}{2}\right)\left(\frac{800}{43560}\right)\left(\frac{1}{2}\right) =$ 5.7 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_1/S) =$ 1100 CFS $V_{AVG} =$ 5.6

$V_2 = \left(\frac{5.0 + 3.4}{2}\right)(1.3) =$ 5.5 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_{AVG}/S) =$ 1100 CFS ELEV = 465.4

DEPTH = 3.4

FULL SPILLWAY & DEPTH = 0

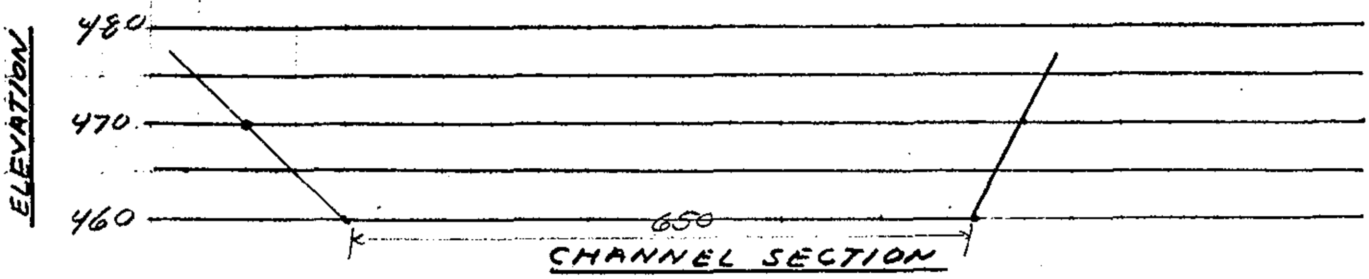
INCREASE DUE TO DAM FAILURE = 3.4

BY ERJ DATE 11/19/80 SUBJECT DAM INSPECTION STUDY SHEET NO. 5 OF 6
CHKD. BY JR DATE 12/5/80 JOB NO. 80-100/04
DAM FAILURE ANALYSIS
PURCELL ASSOCIATES ENGINEERS • ARCHITECTS • PLANNERS

DAM CORNELIS DAM

SECTION 4000' FROM DAM

USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ n = .05 SLOPE (S_L) = .003 '/'

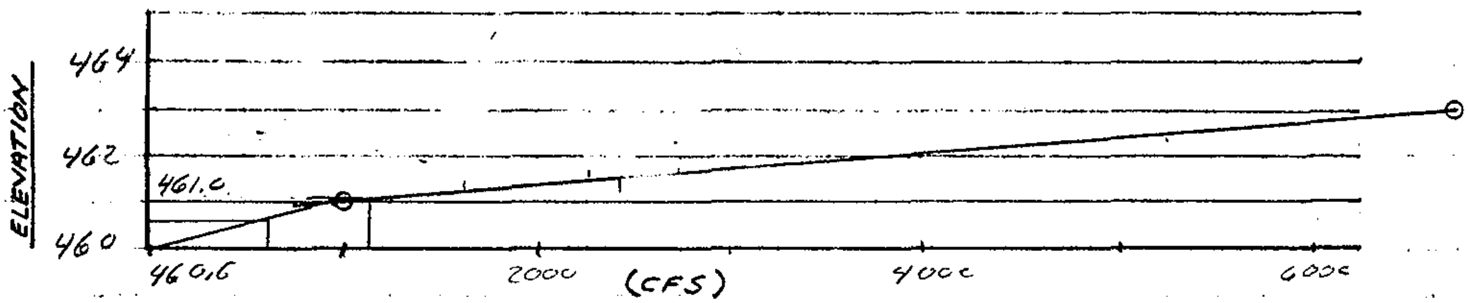


CHANNEL SECTION

FULL SPILLWAY Q_S = 0 CFS

Q_{P_1} = 1100 CFS TOTAL STORAGE (S) = 30 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
465	3450	730	4.7	16000	5
463	2025	700	2.9	6712	3
461	650	650	1.0	1060	1



$V_1 = \left(\frac{3.4 + 1.0}{2}\right)\left(\frac{100+60}{2} + \frac{650+650}{2}\right)\left(\frac{700}{43560}\right)\left(\frac{1}{2}\right)$ = 13.0 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_1/S)$ = 600 CFS V_{AVG} = 12.4

$V_2 = \left(\frac{3.4 + 0.6}{2}\right)(5.9)$ = 11.8 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_{AVG}/S)$ = 650 CFS ELEV = 460.6

DEPTH = 0.6

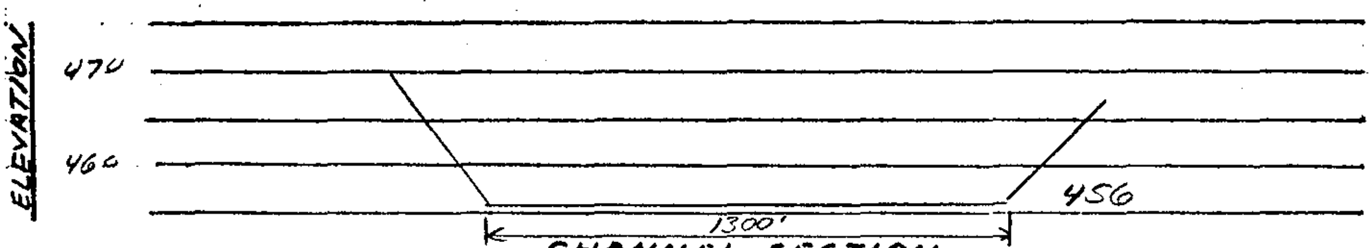
FULL SPILLWAY Q DEPTH = 0

INCREASE DUE TO DAM FAILURE = 0.6

DAM CORNELIS DAM

SECTION 6000 FEET FROM DAM

USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ n = .05 SLOPE (S_L) = .002 '/'

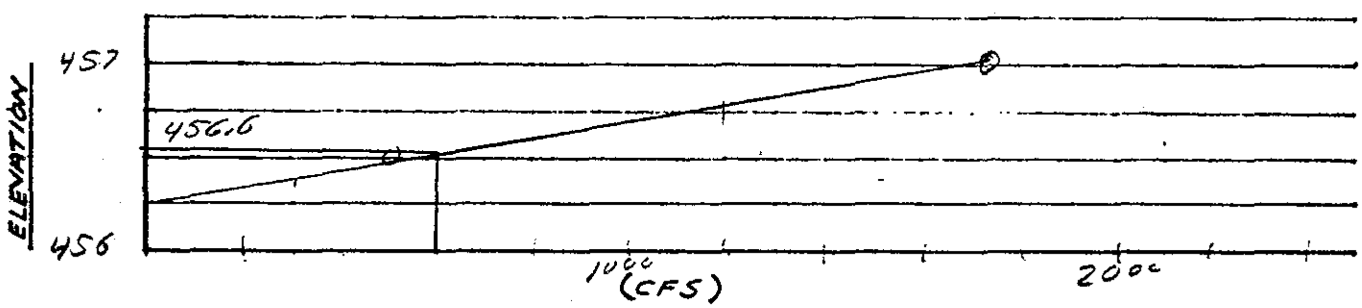


CHANNEL SECTION

FULL SPILLWAY Q_S = 0 CFS

Q_{P_1} = 650 CFS TOTAL STORAGE (S) = 30 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
457	1300	1300	1	1732	1
456.5	650	1300	.5	545	.5



$V_1 = \left(\frac{0.6 + 0.6}{2}\right)\left(\frac{650+650}{2} + \frac{1300+1300}{2}\right)\left(\frac{2000}{43560}\right)\left(\frac{1}{2}\right)$ = 26.8 AC-FT

OVER 1/2 S, BUT USE DUE TO LOW DEPTH OF FLOW

$Q_{P_2} = Q_{P_1}(1 - V_1/S)$ = 100 CFS V_{AVG} = 22.3

$V_2 = \left(\frac{0.6 + 0.2}{2}\right)(44.7)$ = 17.9 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_{AVG}/S)$ = 200 CFS ELEV = 456.4

DEPTH = 0.4

FULL SPILLWAY Q DEPTH = –

INCREASE DUE TO DAM FAILURE = 0.4

CORNELIS DAM

A. Size Classification

Height of dam = 15.3 ft.; hence small

Storage capacity at top of dam (elev. 506.23) = 50 AC-FT.; hence small

Adopted size classification: small

B.i) Hazard Potential

Failure of the dam can cause damage to many homes and buildings between the dam and Old Tannery Brook. Dwellings in Waterbury may also be damaged.

Adopted hazard classification: High

ii) Impact of Failure of Dam with pool at spillway crest

It is estimated from the "rule of thumb" failure hydrograph, that the following adverse impacts are a possibility by the failure of this dam.

a) Loss of homes 6+;
b) Loss of buildings 2+;
c) Loss of highways or roads 2+;
d) Loss of bridges 1+;

The failure profile can affect a distance of 6000 feet from the dam.

C. Hazard Potential Classifications

HAZARD	SIZE	TEST FLOOD RANGE
High	Small	1/2 PMF to PMF

Adopted Test Flood = 1/2 PMF = 700 CSM

= 6040 CFS

D. Overtopping Potential

Drainage Area -- = 8.60 sq. miles

Spillway crest elevation = 502.50

Top of Dam Elevation = 506.23

Maximum spillway discharge

Capacity without overtopping of dam = 2520 CFS
"test flood" inflow discharge = 6040 CFS
"test flood" outflow discharge = 6040 CFS

RATING CURVE DEVELOPMENT

CORNELIS DAM

Spillway

$$Q = CLH^{3/2}$$

$C = 2.65$

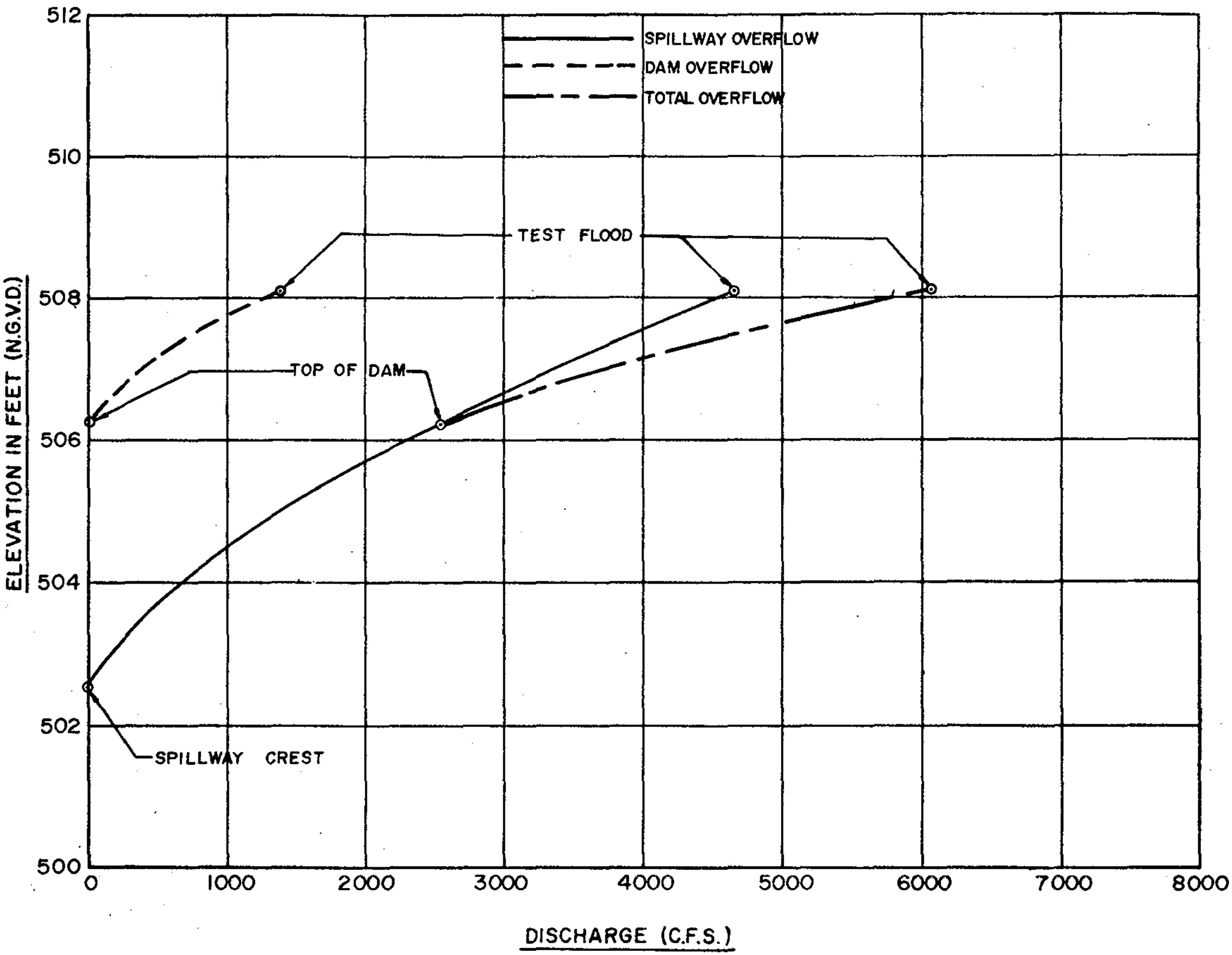
$L = 132$ Feet

30 Inch Blowoff

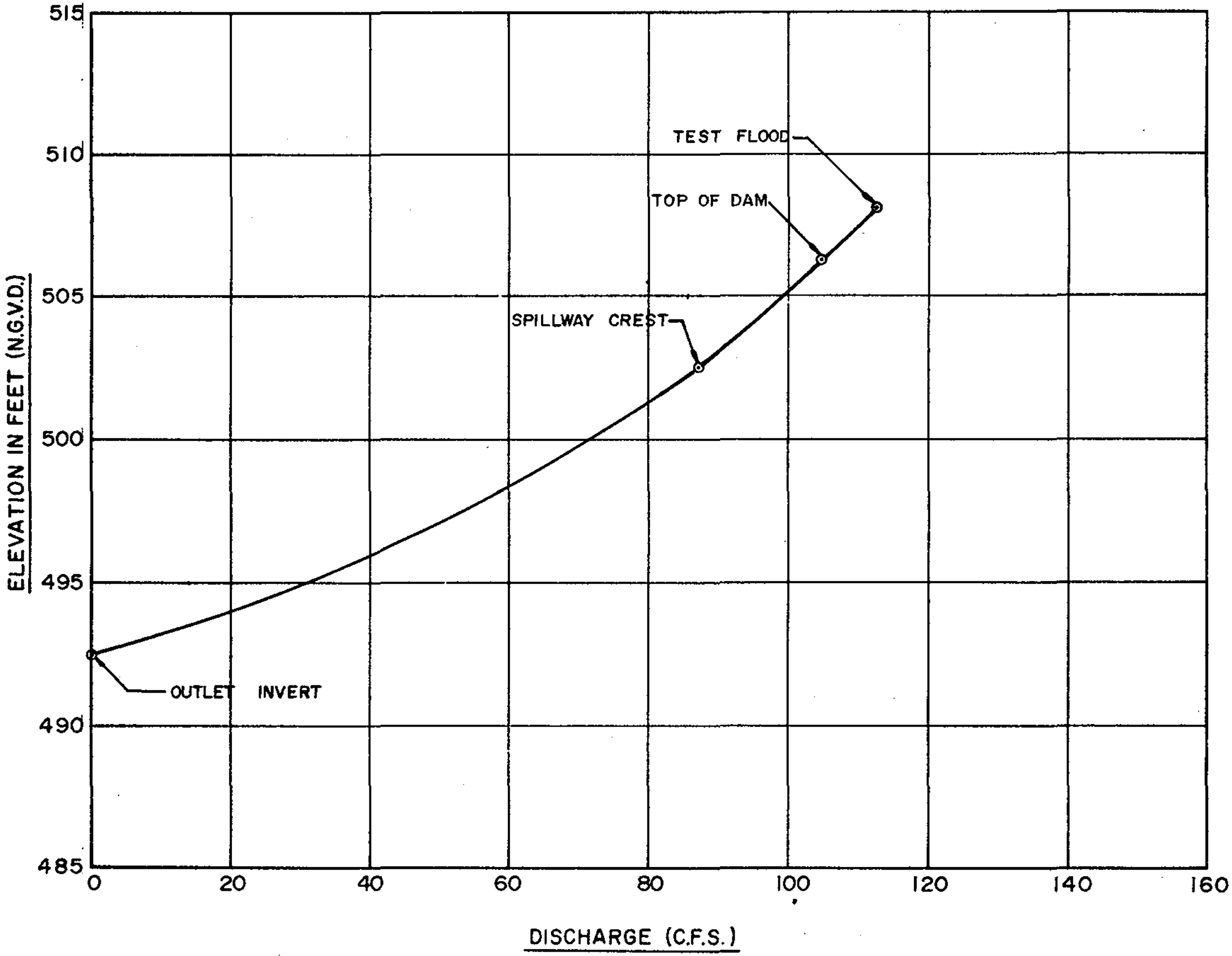
$$Q = (c)(a)(2gh)^{1/2}$$

$C = 0.60$

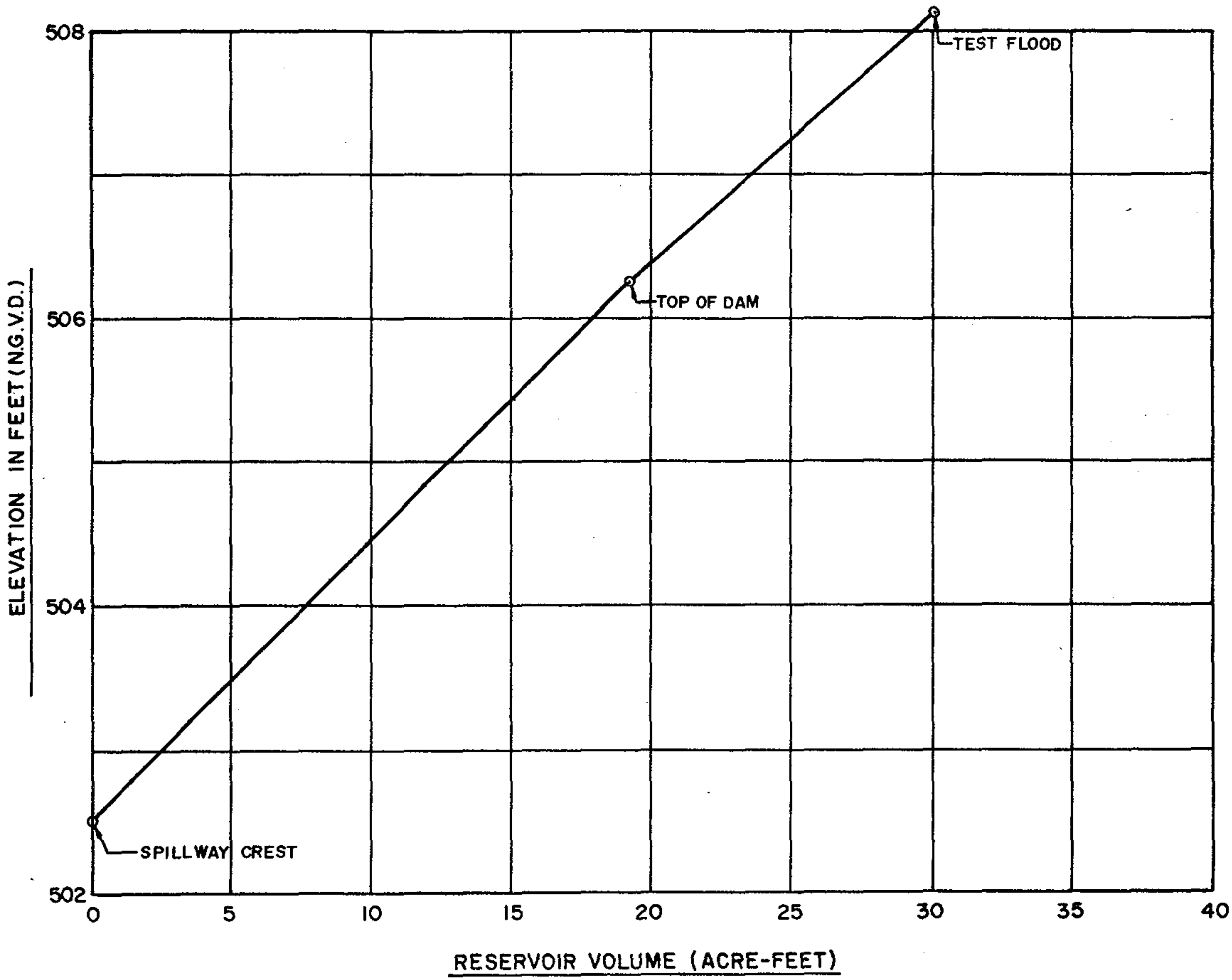
$a = 6.25$ square feet



CORNELIS DAM
SPILLWAY RATING CURVE



CORNELIS DAM
30 INCH SQUARE BLOWOFF
OUTLET WORKS RATING CURVE



CORNELIS DAM

D-37 RESERVOIR STAGE-CAPACITY CURVE

APPENDIX E

INFORMATION AS CONTAINED IN THE

NATIONAL INVENTORY OF DAMS