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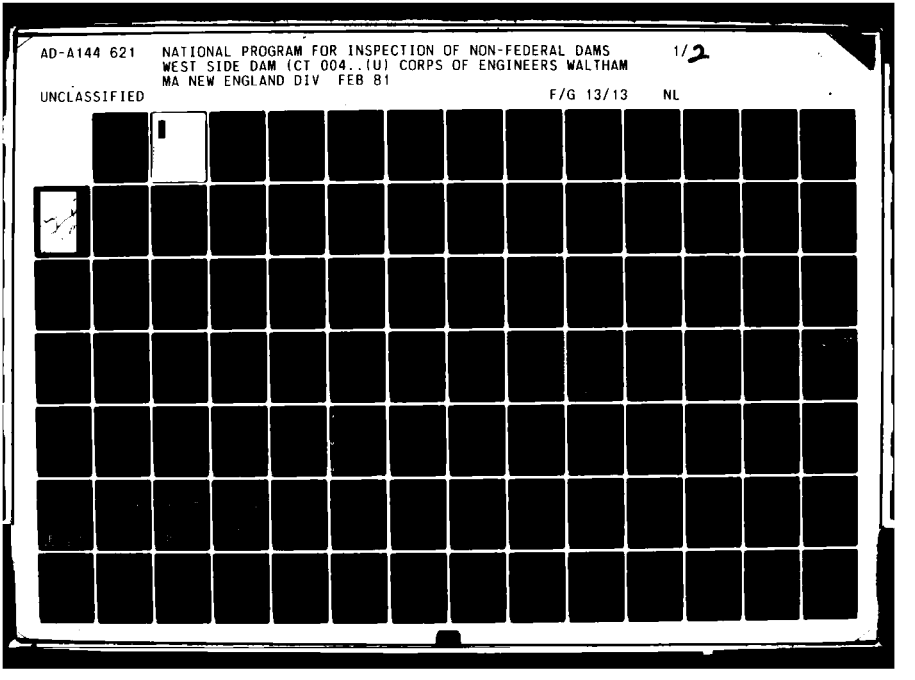

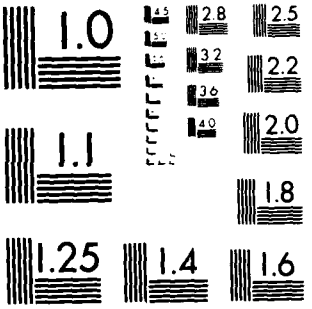

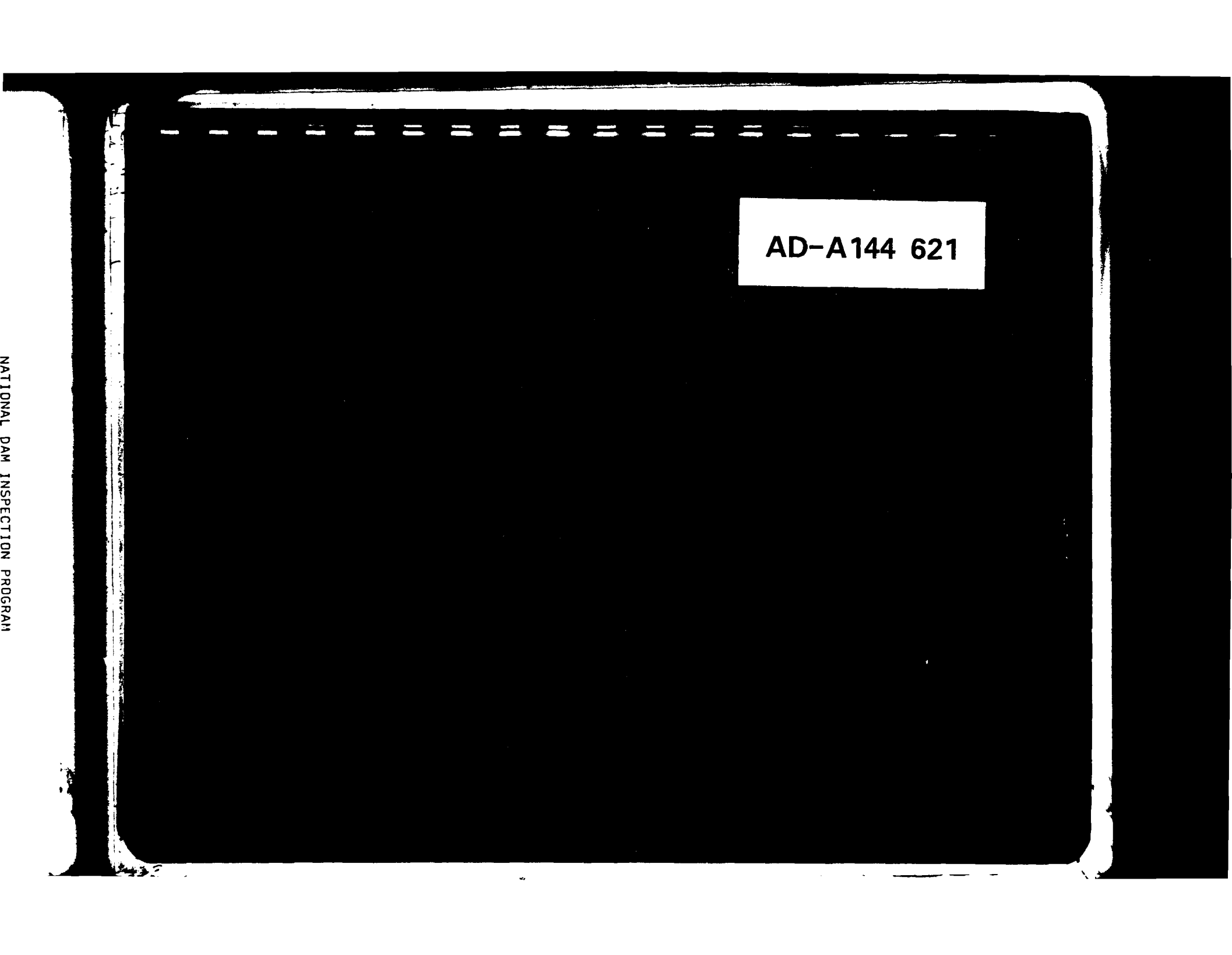

NATIONAL DAM INSPECTION PROGRAM

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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

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Housatonic River Basin
Norfolk, Connecticut

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

The West Side Dam is a single purpose flood control dam. The dam consists of a compacted earth embankment on a pervious foundation with a maximum height of 20 feet, a top width of 14 feet, and a crest length of 730 feet. Based on visual inspection, the dam is judged to be in good condition. The dam is classified as "Intermediate" in size with a "High" hazard potential. A test flood equal to the PMF was selected.

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DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION CORPS OF ENGINEERS

424 TRAPELO ROAD

WALTHAM, MASSACHUSETTS 02254

NEDED

JUL 01 1981

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the West Side Dam (CT-00484) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is vitally important.

Copies of this report have been forwarded to the Department of Environmental Protection. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Protection for your cooperation in this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

Incl
As stated

WEST SIDE DAM
CT 00484

HOUSATONIC RIVER BASIN
NORFOLK, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

IDENTIFICATION NO: CT 00484

NAME OF DAM: West Side Dam

TOWN: Norfolk

COUNTY AND STATE: Litchfield County, Connecticut

STREAM: Spaulding Brook

DATE OF INSPECTION: November 17, 1980

BRIEF ASSESSMENT

The West Side Dam is a single purpose flood control dam. The dam consists of a compacted earth embankment on a pervious foundation with a maximum height of 20 feet, a top width of 14 feet, and a crest length of 730 feet. The principal spillway is of the drop inlet type and discharges through a 36-inch concrete pipe through the center of the dam to an energy dissipator. A grass-covered 120 foot emergency spillway is excavated into the right abutment. Filter drains under the downstream embankment discharge through the side walls of the energy dissipator. The impoundment has a maximum storage capacity of 1,780 Acre-Feet.

Based on the visual inspection, the dam is judged to be in good condition. Features that could affect the future integrity of the dam are the seepage and erosion of the right abutment and the emergency spillway.

The dam is classified as "Intermediate" in size with a "High" hazard potential. A test flood equal to the Probable Maximum Flood (PMF) was selected in accordance with the Corps of Engineers'

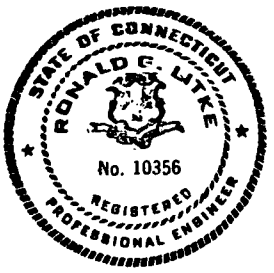
Recommended Guidelines for Safety Inspection of Dams to evaluate the spillway capacity. The Test Flood inflow of 7,000 cubic feet per second (cfs) was routed through the impoundment and a peak outflow of 2,800 cfs was calculated. The spillway capacity of 3,000 cfs is equal to 106 percent of the routed Test Flood outflow and results in a freeboard of 0.1 feet.

It is recommended that a qualified, registered engineer be retained to investigate the seepage and erosion of the right abutment and emergency spillway. The dam should be inspected by a qualified, registered engineer during each period of flood impoundment to assure that it functions as designed. In addition, the Soil Conservation Service's Operations and Maintenance Handbook should be provided to the dam's operator, records of water levels should be kept, and a downstream warning system should be developed.

The owner should implement these recommendations as described herein and in greater detail in Section 7 of the Report within two years after receipt the this Phase I Inspection Report.

Ronald G. Litke, P.E.
Project Engineer

Roald Haestad
President



This Phase I Inspection Report on West Side Dam (CT-00484) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, MEMBER
Geotechmical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

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 be 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 spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does <u>not</u> 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 of the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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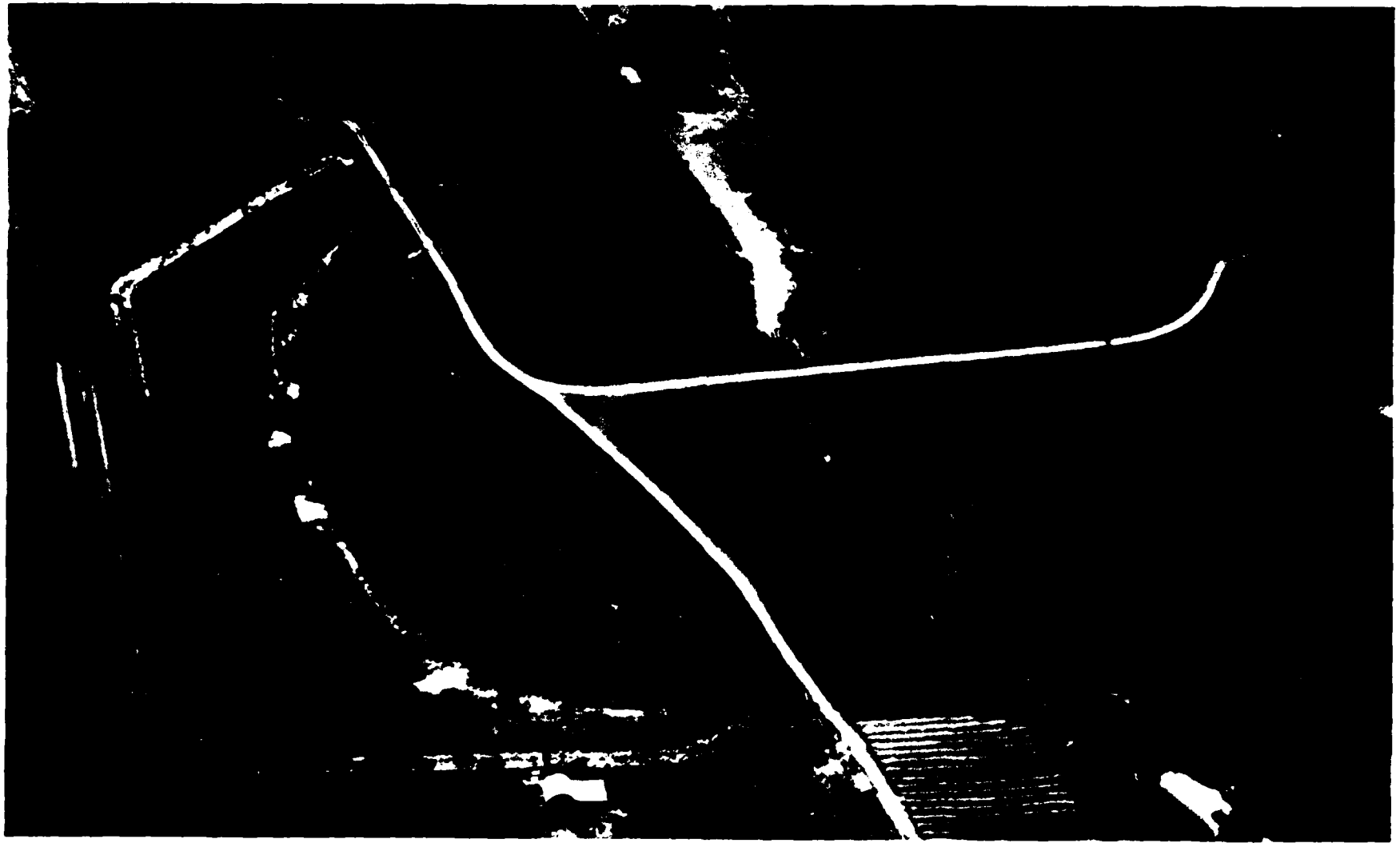
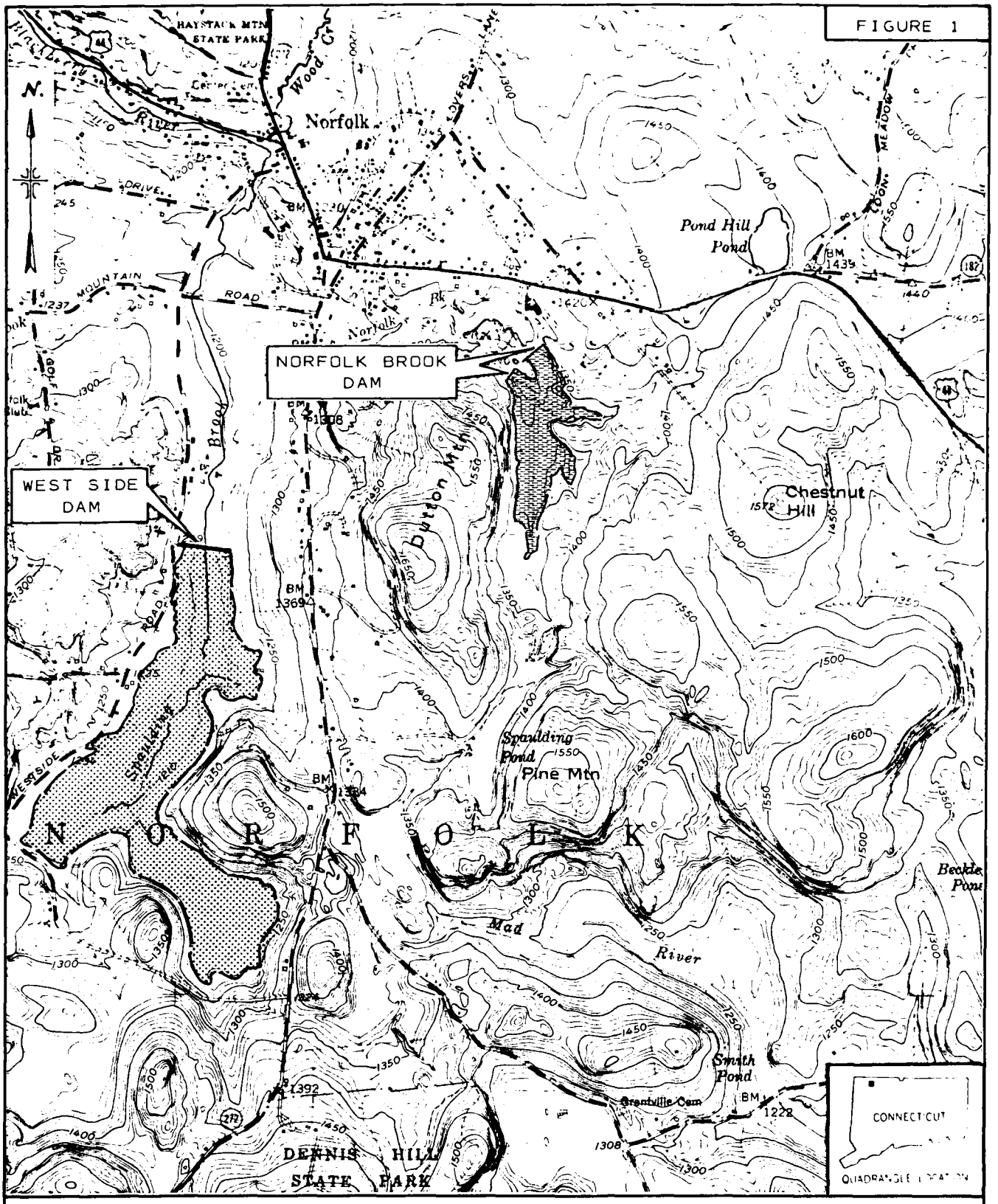


OVERVIEW PHOTO

U.S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WEST SIDE DAM - CT 00484
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		SPAULDING BROOK NORFOLK, CONNECTICUT 13 NOVEMBER 19



LOCATION PLAN

WEST SIDE DAM
NORFOLK, CONNECTICUT

ROALD HAESTAD, INC. SCALE: 1" = 2000' NORFOLK QUADRANGLE 1969

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

WEST SIDE DAM

PROJECT INFORMATION
SECTION 1

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 Inspection 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. Roald Haestad, 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 were issued to Roald Haestad, Inc. under a letter of October 28, 1980, from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-0005 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

The purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring correction in a timely manner by non-federal interest.
2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dams.
3. To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

The West Side Dam, also known as Blackberry River Watershed Floodwater Retarding Dam No. 5, is located on Spaulding Brook approximately 6,000 feet upstream of the confluence with the Blackberry River, one mile south of Norfolk and 1,500 feet west of Connecticut Route 272 in the Town of Norfolk, Connecticut. The dam site is located but not shown on the Norfolk U.S.G.S. Quadrangle Map having coordinates of latitude N41° 58.6' and longitude W73° 12.4'.

b. Description of Dam and Appurtenances

The West Side Dam is a flood control dam which remains empty except during periods of heavy runoff.

The dam consists of a compacted earth embankment 730 feet long on a pervious foundation with a maximum height of 20 feet, a top width of 14 feet, and an upstream slope which varies from 4.5 horizontal to 1 vertical at the principal spillway to 10 horizontal to 1 vertical on both sides of the principal spillway. The downstream slope varies from 2.8 horizontal to 1 vertical at the energy dissipator to 22 horizontal to 1 vertical on the right side and 12 horizontal to 1 vertical on the left side of the energy dissipator. Excess excavated material was disposed of on the slopes, causing the variation. Filter drains were constructed along the downstream toe and outlet through the sidewalls of the energy dissipator. The embankment is protected with a good growth of sod except for a gravel farm road across the crest of the dam.

The principal spillway consists of a reinforced concrete drop inlet with a weir length of 17 feet and a flashboard slot at the upstream end for draining the sediment pool. A galvanized steel

trash rack prevents debris from clogging the outlet conduit.

The outlet conduit is a 36-inch prestressed concrete steel cylinder pipe through the center of the dam and has three reinforced concrete anti-seep collars. The plans show the outlet pipe to be supported by a concrete cradle for its full length. The principal spillway discharges through a reinforced concrete energy dissipator at the downstream toe. The energy dissipator is of the impact box type.

A 120 foot emergency spillway has been excavated into the right abutment. The emergency spillway is grass-covered and has a 30 foot level control section. The approach channel has a one percent slope up to the control section; the discharge channel has a 2.9 percent slope and changes farther downstream to one percent. (See Appendix B, page B-3.)

The crest of the dam is 15.5 feet above the weir of the principal spillway and 4.7 feet above the emergency spillway.

c. Size Classification - "Intermediate"

According to the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, a dam is classified as "Intermediate" in size if the height is between 40 feet and 100 feet or the dam impounds between 1,000 Acre-Feet and 50,000 Acre-Feet. The West Side Dam has a maximum height of 20 feet and a maximum storage capacity of 1,780 Acre-Feet. Therefore, the dam is classified as "Intermediate" in size based on storage capacity.

d. Hazard Classification - "High"

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the hazard classification for the dam is

"High". A dam failure analysis indicates that a breach of the West Side Dam could result in the loss of more than a few lives and extensive downstream property damage.

The dam breach would release up to 28,000 cfs into Spaulding Brook. The flood waters would travel 1,200 feet downstream where a number of structures at a religious institution including a multi-family residence, a dining hall and farm buildings would be flooded up to a depth of 10 feet. The flood waters would continue downstream overtopping a small dam by 9 feet and flooding several residential homes from 2 feet to 10 feet deep.

The maximum project discharge capacity prior to dam breach would cause flooding to a depth of approximately 2 feet at the structures directly downstream of the dam, and would overtop the small downstream dam by 2 feet.

e. Ownership

The State of Connecticut
Department of Environmental Protection
Water and Related Resources
State Office Building
Hartford, Connecticut 06115

Benjamin Warner, Director of Water Resources
(203) 566-7220

f. Operator

Anthony Cantele
P.O. Box 161
Pleasant Valley, Connecticut 06063
(203) 379-0771

g. Purpose of Dam

The dam is a single purpose structure designed to provide flood protection to the Blackberry River flood plain.

h. Design and Construction History

The dam was designed in 1967 by the Soil Conservation Service, U.S. Department of Agriculture, for the State of Connecticut. The dam was designed to contain a storm of the magnitude of Hurricane "Diane" (1955) without emergency spillway flow. The dam was constructed in 1970 by Della Construction Company of Enfield, Connecticut, under the supervision of the Soil Conservation Service. In 1972 repairs were made to the emergency spillway. The high water table caused extensive seepage in the cut requiring the installation of additional drains and repairs to eroded areas.

i. Normal Operational Procedures

The site is reportedly visited by Department of Environmental Protection personnel during periods of heavy runoff. Any problems noted would be reported to the DEP Office in Hartford. No measurements have been taken or records kept of past impoundment depths. The impoundment has never been substantially filled.

1.3 Pertinent Data

a. Drainage Area

The drainage area consists of 2.9 square miles of wooded "mountainous" terrain. The watershed contains one significant pond and large swampy areas.

b. Discharge at Damsite

The principal spillway is of the drop inlet type with a conduit through the dam. An emergency spillway of the grassed earth type is cut in the right abutment.

1.	Outlet Works (conduits) Size:	36-inch
	Invert Elevation:	1201.9
	Discharge Capacity:	150 cfs$^{\pm}$ (at top of dam)
2.	Maximum Known Flood at Damsite:	Unknown
3.	Ungated Spillway Capacity * at Top of Dam:	3,000 cfs
	Elevation:	1222.0
4.	Ungated Spillway Capacity * at Test Flood Elevation:	2,820 cfs
	Elevation:	1221.9
5.	Gated Spillway Capacity at Normal Pool Elevation:	N/A
	Elevation:	
6.	Gated Spillway Capacity at Test Flood Elevation:	N/A
	Elevation:	
7.	Total Spillway Capacity* at Test Flood Elevation:	2,820 cfs
	Elevation:	1221.9
8.	Total Project Discharge * at Top of Dam:	3,000 cfs
	Elevation:	1222.0
9.	Total Project Discharge * at Test Flood Elevation:	2,820 cfs
	Elevation:	1221.9

*Includes Emergency Spillway

c. Elevation - Feet Above Mean Sea Level (NGVD)

1.	Streambed at Toe of Dam:	1201.9
2.	Bottom of Cutoff:	N/A
3.	Maximum Tailwater:	1205.5
4.	Normal Pool:	1206.5
5.	Full Flood Control Pool:	1217.33 Emergency Spillway
6.	Spillway Crest:	1206.5 Principal Spillway
7.	Design Surcharge - Original Design:	1220.03
8.	Top of Dam:	1222.0
9.	Test Flood Surcharge:	1221.9

d. Reservoir - Length in Feet

1.	Normal Pool:	900'
2.	Flood Control Pool:	5,400' Emergency Spillway
3.	Spillway Crest Pool:	1,000' Principal Spillway
4.	Top of Dam:	5,600'
5.	Test Flood Pool:	5,600'

e. Storage - Acre-feet

1.	Normal Pool:	6 Acre-Feet
2.	Flood Control Pool:	1351.6 Acre-Feet Emergency Spillway
3.	Spillway Crest Pool:	10 Acre-Feet Principal Spillway
4.	Top of Dam:	1,780 Acre-Feet
5.	Test Flood Pool:	1,760 Acre-Feet

f. Reservoir Surface - Acres

1.	Normal Pool:	9.9 Acres
2.	Flood-Control Pool:	188.1 Acres Emergency Spillway
3.	Spillway Crest:	12.5 Acres Principal Spillway
4.	Test Flood Pool:	201.2 Acres
5.	Top of Dam:	202.8 Acres

g. Dam

1.	Type:	Compacted Earthfill Embankment
2.	Length:	730'
3.	Height:	20'
4.	Top Width:	14'
5.	Side Slopes:	Upstream - Vary from 4.5 - 10 horizontal to 1 vertical Downstream - Vary from 2.8 - 22 horizontal to 1 vertical
6.	Zoning:	Homogeneous embankment with organic material on downstream slope and disposal material placed on both slopes
7.	Impervious Core:	N/A
8.	Cutoff:	Eliminated during construction as depth of foundation excavation exceeded designed cut-off trench.
9.	Grout Curtain:	N/A
10.	Other:	

h. Diversion and Regulating Tunnel - N/A

	EMERGENCY	PRINCIPAL
i. Spillway:	Grass-covered earth spillway excavated in right abutment	Drop inlet type

i. Spillway (cont'd)	EMERGENCY	PRINCIPAL
2. Length of Weir:	120' at 30' level control section	17'
3. Crest Elevation with Flashboards:	N/A	N/A
without Flashboards:	1217.3	1206.5
4. Gates:	N/A	N/A
5. Upstream Channel:	Grass-covered 120' wide, earth excavation, negative slope	N/A
6. Downstream Channel:	Grass-covered earth excavation, 120' wide, 2.9% slope to 1.0% slope	Excavated channel in existing ground
7. General:		

j. Regulating Outlets

1. Invert:	1202.9
2. Size:	6.0' wide by 3.25' high
3. Description:	Stop log slot in the concrete riser
4. Control Mechanism:	Flashboards - Top Elev. 1206.2
5. Other:	Flashboards were in place at the time of inspection

ENGINEERING DATA
SECTION 2

2.1 Design Data

Available information reviewed included the design report, As-Built Plans and correspondence. The design report and plans were prepared by the Soil Conservation Service (SCS), U.S. Department of Agriculture. The design report was found to be incomplete in that outflow hydrographs for the design storms were missing and emergency spillway capacity computations were incomplete. Also, emergency spillway discharge capacities given in different sections of the report are conflicting. Apparently changes were made in the emergency spillway design and not documented. Correspondence mentions an error in the freeboard hydrograph which was corrected but no documentation was found. The design report did contain a geology report including test borings; a soil report; hydraulic/hydrologic computations; and structural computations for the intake structure, conduit and energy dissipator.

2.2 Construction Data

As-Built Plans were available and reviewed. Construction records, including change orders, soil test results and photographs are stored at the Federal Archives and Records Center in Waltham, Massachusetts, but were not available for review. The two most significant changes from the original design noted were the elimination of the cut-off trench and the alteration of the spillway approach channel.

The cut-off trench was eliminated as the foundation excavation was as deep in many places as the proposed cut-off trench. The dam was designed with an upstream slope of 3.5 horizontal to 1 vertical

and a downstream slope of 2.5 horizontal to 1 vertical. However, as excess material was available during construction the slopes were flattened to 10 horizontal to 1 vertical upstream and up to 22 horizontal to 1 vertical downstream.

The spillway approach channel was changed from a level section to a negative slope with two swales up to the control section.

In 1972, two years after completion of the dam, repairs were made to the emergency spillway. The high water table caused extensive seepage in the cut requiring the installation of additional drains. As-Built Plans were available for this work.

2.3 Operational Data

The site is visited during periods of heavy runoff but no depth readings are made or records kept.

2.4 Evaluation of Data

a. Availability

Existing data was available at the Soil Conservation Service, U.S. Department of Agriculture, Storrs, Connecticut; at the Federal Archives and Records Center in Waltham, Massachusetts; and at the State of Connecticut Department of Environmental Protection, Hartford, Connecticut.

b. Adequacy

The information which was available, along with the visual inspection and the hydraulic and hydrologic calculations made for this report, were adequate to assess the condition of the dam. It should be noted, however, that the impoundment has never been filled and the reaction of the structure to full loading conditions is not known.

c. Validity

The field inspection indicated that the dam was constructed substantially as shown on the As-Built Plans.

VISUAL INSPECTION

SECTION 3

3.1 Findings

a. General

The visual inspection of the dam was conducted on November 17, 1980. At the time of inspection the water level was about 0.5 feet below the crest of the drop inlet weir and was being controlled by flashboards at the upstream end of the drop inlet. The general condition of the dam at the time of inspection was good.

The dam consists of a compacted earth embankment with a drop inlet principal spillway located near the center of the dam discharging through a 36-inch pipe to an energy dissipator at the downstream toe. An emergency spillway is excavated into the right abutment and is grass-covered.

b. Dam

The upstream and downstream slopes of the dam are grass-covered, Photos 1 and 2. The grass cover is in good condition and has been kept mowed except near the energy dissipator where the slope is steeper. The slopes are even with no indication of movement or sloughing. The crest of the dam has a gravel surface and is used as a farm road. A slight depression, 0.2 feet deep, was noted in the crest near the principal spillway. A concrete footpath goes from the inlet structure to the crest of the dam, Photo 5.

The dam was built in a swamp and has wet areas both upstream and downstream of the dam. As the impoundment was empty, no seepage and wet or spongy areas were observed on the downstream slope. Approximately 1 gpm amount of clear seepage was observed discharging

from the left toe rain, Photo 3. Some rust staining was visible at the right toe drain, Photo 4, but there was no flow at the time of inspection.

c. Appurtenant Structures

The appurtenant structures consist of the principal spillway and outlet works and the emergency spillway. The inlet structure is a reinforced concrete drop inlet with a galvanized steel trash rack, Photo 5, all in good condition. Flashboards at the upstream end allow for draining the sediment basin. Sediment was visible almost to the top of the boards at the time of inspection, Photo 6. The inlet structure discharges through a 36-inch prestressed concrete steel cylinder pipe, which was not observed, to a reinforced concrete energy dissipator of the impact box type, Photo 7. The concrete was in good condition. There was quite a bit of stone riprap in the energy dissipator. The riprap around the energy dissipator has settled or may have been tossed into the dissipator by vandals. The toe drains discharge through the walls of the energy dissipator. The openings of the energy dissipator did not have any protective bar screens or fence.

The emergency spillway consists of a 120 foot section excavated into the right abutment, Photos 8, 9 and 10. The spillway has a sod surface for erosion protection. The hillside into which the spillway was excavated is very wet due to seepage. There are several drains in the spillway and abutment and also areas of stone fill, Photos 9, 10 and 11, evidence of repair work from past erosion or sloughing. Even with the drains the area is very wet, with ponding occurring in the spillway, Photo 10. Three electric cattle fences were observed within the emergency spillway.

d. Reservoir Area

No indications of instability were observed along the edges of the reservoir in the vicinity of the dam, although there was evidence of past instability in the form of erosion or sloughing in the right abutment above the emergency spillway. The impoundment area is a large flat swamp, Photo 12.

e. Downstream Channel

The downstream channel was excavated as part of the dam construction project. The channel is clear of debris and no obstructions to flow were observed, Photo 13.

3.2 Evaluation

On the basis of the visual inspection, the dam is judged to be in good condition. The following conditions could affect the future integrity of the dam:

1. Continued seepage and erosion in the area of the emergency spillway could cause additional erosion during high flows which could partially obstruct the emergency spillway.

2. It should be emphasized that the impoundment has never been substantially filled. Therefore, no observations have been made as to seepage through the dam, or its behavior under full hydrostatic loading conditions.

OPERATIONAL AND MAINTENANCE PROCEDURES
SECTION 4

4.1 Operational Procedures

a. General

The West Side Dam is a single purpose flood control dam which remains empty except for periods of heavy runoff. Except for flashboards to allow for draining the sediment pool, the dam has no operating facilities. Both the drop inlet on the principal spillway and the emergency spillway operate without human assistance. The dam is inspected annually by representatives of the Department of Environmental Protection and the Soil Conservation Service. (See Appendix B, page B-46.)

b. Description of Any Warning System in Effect

There is no formal warning system in effect. The dam is monitored during heavy runoff. Any problems noted would be reported to the Department of Environmental Protection in Hartford.

4.2 Maintenance Procedures

a. General

The grass is mowed and the brush is cut at least once a year. (The slope above the energy dissipator had not been mowed for some time prior to the inspection.) The trash rack on the principal spillway is cleaned as required. The gravel roadway along the crest of the dam has a few small depressions which would collect surface runoff.

An Operations and Maintenance agreement was made between the State of Connecticut and the Soil Conservation Service at the time of construction. An Operation and Maintenance Handbook prepared

by the Soil Conservation Service and the Department of Environmental Protection for Connecticut watersheds is available from the Soil Conservation Service. The Handbook lists operating procedures and maintenance items to be performed.

b. Operating Facilities

At the time of inspection sediment had accumulated to the top of the flashboards. It was reported that sediment had not been removed since the construction of the dam.

4.3 Evaluation

Present operations and maintenance procedures are adequate but could be improved. The slope above the energy dissipator should be mowed with the rest of the embankment, and the gravel road should be regraded to maintain a level crest.

Copies of the Operation and Maintenance Handbook should be provided to the Operators for their implementation. The annual inspections by representatives of the Soil Conservation Service and the Department of Environmental Protection should continue. A formal warning system should be prepared for the dam and put into effect.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES
SECTION 5

5.1 General

The outlet works at the West Side Dam consist of a principal spillway of the drop inlet type discharging through the center of the dam into an energy dissipator downstream, and an emergency spillway excavated into the right abutment. The principal spillway consists of a single stage, reinforced concrete riser, 36-inch diameter prestressed concrete steel cylinder pipe through the dam, and a reinforced concrete energy dissipator at the outlet end of the pipe. The inlet riser is a 6' x 6' box with provisions for flashboards at the upstream end. Flashboards were in place at the time of inspection; water level was over the flashboards and about 0.5 feet below the drop inlet weir. The drop inlet is protected with a galvanized steel trash rack. The drop inlet connects to a 36-inch prestressed concrete steel cylinder pipe outlet conduit which passes through the dam.

The emergency spillway is a broad-crested earth channel excavated into the right abutment with a grassed surface. The channel is 120 feet on the bottom with side slopes of 3 horizontal to 1 vertical. There were three electric cattle fences across the spillway at the time of inspection.

The capacity of the prinicpal spillway is about 140 cfs at design high water Elev. 1220.03. The emergency spillway has a capacity of 1,040 cfs at the design high water and 2,850 cfs at the top of the dam, Elev. 1222.0. Total spillway capacity at the top of the dam is 3,000 cfs.

The dam has a watershed of 2.9 square miles of essentially undeveloped wooded terrain. The watershed has very steep slopes, one significant pond and three large swamps. Elevations range from 1,700 feet at the southwest end to 1,200 feet at the dam.

5.2 Design Data

The dam was designed by the Soil Conservation Service, U.S. Department of Agriculture, for the State of Connecticut. The design report and correspondence was available and reviewed.

The dam was designed to contain a Hurricane Diane-type storm (1955), 8.51 inches of rainfall in 14 hours, without discharging over the emergency spillway. The impoundment would store 884 Acre-Feet, or 5.64 inches of runoff, at emergency spillway level, El. 1217.33.

At design high water, El. 1220.03, the dam would store 1,355 Acre-Feet, or 8.64 inches of runoff from a storm producing 15.42 inches of rainfall in 6 hours.

The As-Built Plans show the inlet channel for the emergency spillway sloping up to the control section instead of being level as originally designed. This should increase spillway capacity and velocities although no revised computations were found.

5.3 Experience Data

No experience data was available. The site is visited during periods of heavy runoff but no depth readings are taken or records kept.

5.4 Test Flood Analysis

Based on the dam failure analysis, the dam is classified as "High" hazard potential. The dam is classified as "Intermediate" in size based on a maximum storage capacity of 1,750 Acre-Feet. According to the Recommended Guidelines for Safety Inspection of Dams, by the Corps of Engineers, the Test Flood should be the Probable Maximum Flood (PMF). The Test Flood inflow was calculated for the 2.9 square mile watershed using 2,400 cubic feet per second per square mile (csm) from the Corps of Engineers' guide curves for "mountainous" terrain. Initial water level was assumed to be at the level of the prinicpal spillway.

The peak inflow, calculated to be about 7,000 cfs, results in a routed outflow of 2,800 cfs. The flood routing through the reservoir was done in accordance with the Corps of Engineers' "Estimating Effect of Surcharge Storage on Maximum Probable Discharges". The spillway capacity was calculated to be about 3,000 cfs or 106 percent of the Test Flood routed outflow.

5.5 Dam Failure Analysis

A dam failure analysis was made using the Corps of Engineers' "Rule of Thumb" Procedure. Failure was assumed when the water level reached the top of the dam, producing a maximum head of 20 feet.

The spillway discharge prior to dam breach was significant when compared to the dam breach flows; therefore, it was taken into consideration in the flood routings. The spillway discharge was first routed through each reach, assuming steady state conditions. The storage volume thus obtained was subtracted from the storage required

the dam breach flood routing in order to derive the usable storage within the reach.

The calculated dam breach, 20 feet high by 240 feet wide, would release up to 28,000 cfs into Spaulding Brook. The flood waters would travel 1,200 feet downstream where a number of structures at a religious institution including a multi-family residence, a dining hall and farm buildings would be flooded up to a depth of 10 feet. The flood waters would continue downstream, overtopping a small dam by 9 feet, and flood several residential homes from 2 feet to 10 feet deep. The flood waters would join the Blackberry River and flow at an average depth of 9.5 feet. The low lying homes along the river banks would be flooded up to a depth of 2 feet. See Figure 4, page D-24.

The maximum project discharge capacity of 3,000 cfs prior to dam breach would cause flooding to a depth of approximately 2 feet at the dining hall directly downstream of the dam, and would overtop the small downstream dam by 2 feet. The Blackberry River would be able to contain the flow with minor overtopping of the river banks.

The dam is classified as "High" hazard potential. A dam failure could result in the loss of more than a few lives and extensive downstream property damage should the dam fail.

EVALUATION OF STRUCTURAL STABILITY
SECTION 6

6.1 Visual Observations

The visual inspection did not disclose any indications of immediate structural instability. The emergency spillway area, including the right abutment slope, is very wet with much seepage coming from the hillside. Evidence of past repairs to eroded areas caused by this seepage was observed. No sloughing of the embankment was observed.

6.2 Design and Construction Data

A design report and As-Built Plans were available for review at the Soil Conservation Service, U.S. Department of Agriculture, Storrs, Connecticut. The Soil Report recommended a 2:1 downstream slope with a factor of safety of 1.86, and an upstream slope of 3-1/2:1 with a factor of safety of 1.03, because of the rapid drawdown at this site. (See Appendix B, pages B-41 through B-44.) Field surveys show the maximum slopes to be 2.8 horizontal to 1 vertical downstream, and 4.5 horizontal to 1 vertical upstream.

6.3 Post-Construction Changes

In 1972, two years after completion of the dam, repairs were made to the emergency spillway. Drains were installed in the spillway and along the right abutment to relieve a seepage problem. Several washouts were also filled. As several of the drainage trenches are in the spillway and parallel to the flow, they may encourage erosion. Although no additional erosion was noted, the abutment and spillway were very wet with water ponded in the spillway.

6.4 Seismic Stability

The dam is located in Seismic Zone 1 and in accordance with the recommended Phase I inspection guidelines does not warrant seismic stability analysis.

ASSESSMENT, RECOMMENDATIONS, & REMEDIAL MEASURES
SECTION 7

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection and a review of the available data, the dam is judged to be in good condition. The future integrity of the dam could be affected by continued seepage and erosion of the right abutment and emergency spillway.

An evaluation of the hydraulic and hydrologic features of the dam determined that the spillways are capable of passing 106 percent of the Test Flood (PMF).

b. Adequacy of Information

The information available is adequate for a Phase I Investigation.

c. Urgency

The recommendations presented in Sections 7.2 and 7.3 should be carried out within two years of receipt of this Report by the owner.

7.2 Recommendations

The following recommendations should be carried out under the direction of a qualified, registered engineer:

1. The seepage and erosion of the right abutment and emergency spillway should be investigated and repairs or improvements made as required.
2. As the behavior of the dam under full hydrostatic loading is not known, the dam should be inspected by a qualified, registered engineer during each period of significant flood impoundment. Especial care should be taken in inspecting

the dam whenever the previous maximum impoundment depth is exceeded.

7.3 Remedial Measures

a. Operations and Maintenance Procedures

1. Inspection of the dam during periods of heavy runoff should be continued. In addition, depth readings should be taken and records kept. Especial care should be taken in inspecting the dam whenever the previous maximum impoundment depth is exceeded.
2. Rocks should be removed from the energy dissipator.
3. Periodic regrading of the gravel road should be done to maintain a level crest.
4. The program of annual technical inspections by qualified, registered engineers should be continued.
5. A downstream warning system should be developed and put into effect in case of an emergency at the dam.
6. The Soil Conservation Service Operations and Maintenance Handbook should be provided to the operators of the dam.

7.4 Alternatives

There are no practical alternatives to the above recommendations.

APPENDIX A

VISUAL CHECK LIST WITH COMMENTS

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT: West Side Dam

DATE: 11/17/80 TIME: 2:00 p.m. WEATHER: Sunny 35°

W.S. ELEVATION: 1206.0 U.S. N/A DN.S

	PARTY	DISCIPLINE
1.	Roald Haestad, P.E. - Roald Haestad, Inc.	Civil/Geotechnical
2.	Donald L. Smith, P.E. - Roald Haestad, Inc.	Civil/Hydrologic
3.	Ronald G. Litke, P.E. - Roald Haestad, Inc.	Civil/Structural
4.		
5.		
6.		

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam Embankment	RH,DLS,RGL	Good condition
2.	Outlet Works - Intake Channel & Structure	RH,DLS,RGL	Sediment to top of flashboards
3.	Outlet Works - Transition & Conduit	RH,DLS,RGL	36" P.C.C.P.
4.	Outlet Works - Outlet Structure & Channel	RH,DLS,RGL	Rocks in dissipator
5.	Outlet Works - Emer. Spill., Appr. & Disc. Channel	RH,DLS,RGL	Very wet; natural seepage
6.			
7.			
8.			
9.			
10.			
11.			
12.			

PERIODIC INSPECTION CHECK LIST

PROJECT: West Side Dam DATE: 11/17/80

PROJECT FEATURE: Dam Embankment NAME: RH

DISCIPLINE: Civil Engineers NAME: DLS,RGL

AREA ELEVATION	CONDITIONS
DAM EMBANKMENT	
CREST ELEVATION	1,222
CURRENT POOL ELEVATION	1,206.0 (0.5' below Principal Spillway)
MAXIMUM IMPOUNDMENT TO DATE	Unknown
SURFACE CRACKS	None observed
PAVEMENT CONDITION	Gravel road - good condition
MOVEMENT OR SETTLEMENT OF CREST	Crest appears to have settled at conduit
LATERAL MOVEMENT	None observed
VERTICAL ALIGNMENT	Good with the exception of dip at conduit
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 observed
VEGETATION ON SLOPES	Grass cover mowed except at steep areas at outlet works
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	Evidence of past sloughing of right abutment slope of emergency spillway
ROCK SLOPE PROTECTION - RIPRAP FAILURES	No riprap slope protection
UNUSUAL MOVEMENT OR CRACKING AT OR NEAR TOES	None observed
UNUSUAL EMBANKMENT OR DOWNSTREAM SEEPAGE	No seepage; impoundment empty at the time of inspection
PIPING OR BOILS	N/A
FOUNDATION DRAINAGE FEATURES	CMP toe drains discharge at energy dissipator for outlet works
TOE DRAINS	Left toe drain discharging; right toe drain dry with orange stains
INSTRUMENTATION SYSTEM	None known

PERIODIC INSPECTION CHECK LIST

PROJECT: West Side Dam DATE: 11/17/80

PROJECT FEATURE: Outlet Works - Intake Channel and Intake Structure NAME: RH

DISCIPLINE: Civil Engineers NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
A. APPROACH CHANNEL:	Consists of an excavated channel through an existing swamp
SLOPE CONDITIONS	N/A
BOTTOM CONDITIONS	Sediment
ROCK SLIDES OR FALLS	
LOG BOOM	N/A
DEBRIS	
CONDITION OF CONCRETE LINING	N/A
DRAINS OR WEEP HOLES	N/A
B. INTAKE STRUCTURE:	Galvanized steel trash rack
CONDITION OF CONCRETE	Good
STOP LOGS AND SLOTS	Good condition; sediment accumulated to top of stop logs

PERIODIC INSPECTION CHECK LIST

PROJECT: West Side Dam DATE: 11/17/80

PROJECT FEATURE: Outlet Works - Transition & Conduit NAME: RH

DISCIPLINE: Civil Engineers NAME: RGL, DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - TRANSITION AND CONDUIT	
GENERAL CONDITION OF CONCRETE	Conduit is 36" prestressed concrete steel cylinder pipe
RUST OR STAINING ON CONCRETE	Pipe could not be observed
SPALLING	
EROSION OR CAVITATION	
CRACKING	
ALIGNMENT OF MONOLITHS	
ALIGNMENT OF JOINTS	
NUMBERING OF MONOLITHS	

PERIODIC INSPECTION CHECK LIST

PROJECT: West Side Dam DATE: 11/17/80

PROJECT FEATURE: Outlet Works - Outlet Structure & Channel NAME: RH

DISCIPLINE: Civil Engineers NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND CHANNEL	
GENERAL CONDITION OF CONCRETE	Good
RUST OR STAINING	At right toe drain
SPALLING	None
EROSION OR CAVITATION	None
VISIBLE REINFORCING	None
ANY SEEPAGE OR EFFLORESCENCE	Seepage from left toe drain (clear)
CONDITION AT JOINTS	Good
DRAIN HOLES	Left and right toe drains
CHANNEL	Excavated; clear of debris
LOOSE ROCK OR TREES OVERHANGING CHANNEL	None
CONDITION OF DISCHARGE CHANNEL	Good

PERIODIC INSPECTION CHECK LIST

PROJECT: West Side Dam DATE: 11/17/80

PROJECT FEATURE: Emergency Spillway NAME: RH

DISCIPLINE: Civil Engineers NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - EMERGENCY SPILLWAY, APPROACH AND DISCHARGE CHANNELS	
A. APPROACH CHANNEL:	Excavated; grass-covered; cattle fence
GENERAL CONDITION	Fair; wet with evidence of past erosion
LOOSE ROCK OVERHANGING CHANNEL	None
TREES OVERHANGING CHANNEL	None
FLOOR OF APPROACH CHANNEL	Wet; crushed stone drains present
B. EMERGENCY SPILLWAY	30 foot wide level control section; excavated at right abutment
GENERAL CONDITION	Fair; ponding and evidence of past erosion
SURFACE	Grass covered
OTHER	N/A
ANY SEEPAGE	Ponding in spillway; Natural seepage from right abutment
DRAIN HOLES	Seepage drains in channel floor
C. DISCHARGE CHANNEL:	Grass-covered; excavated in right abutment
GENERAL CONDITION	Fair; evidence of repairs to past erosion
LOOSE ROCK OVERHANGING CHANNEL	None
TREES OVERHANGING CHANNEL	None
FLOOR OF CHANNEL	Wet with stone drains in floor
OTHER OBSTRUCTIONS	Cattle fences across spillway

APPENDIX B

ENGINEERING DATA

LIST OF REFERENCES

Reference Nos. 1 through 3 are located at the State of Connecticut Department of Environmental Protection, Water and Related Resources Section, State Office Building, Hartford, Connecticut. Reference Nos. 4 through 7 are located at the Soil Conservation Service, U.S. Department of Agriculture, Mansfield Professional Park, Route 44-A, Storrs, Connecticut. Reference Nos. 7 and 8 are located at the Federal Archives and Records Center, Waltham, Massachusetts.

1. As-Built Plans, Blackberry River Watershed Project, Floodwater Retarding Dam No. 5, Norfolk, Connecticut, by the Soil Conservation Service of the U.S. Department of Agriculture, 1971.

2. Correspondence file on Blackberry River Watershed Project, Floodwater Retarding Dam No. 5, Norfolk, Connecticut.

3. "Reservoir Operation Data" and "Pertinent Data" by Anderson-Nichols Associates, February 1967.

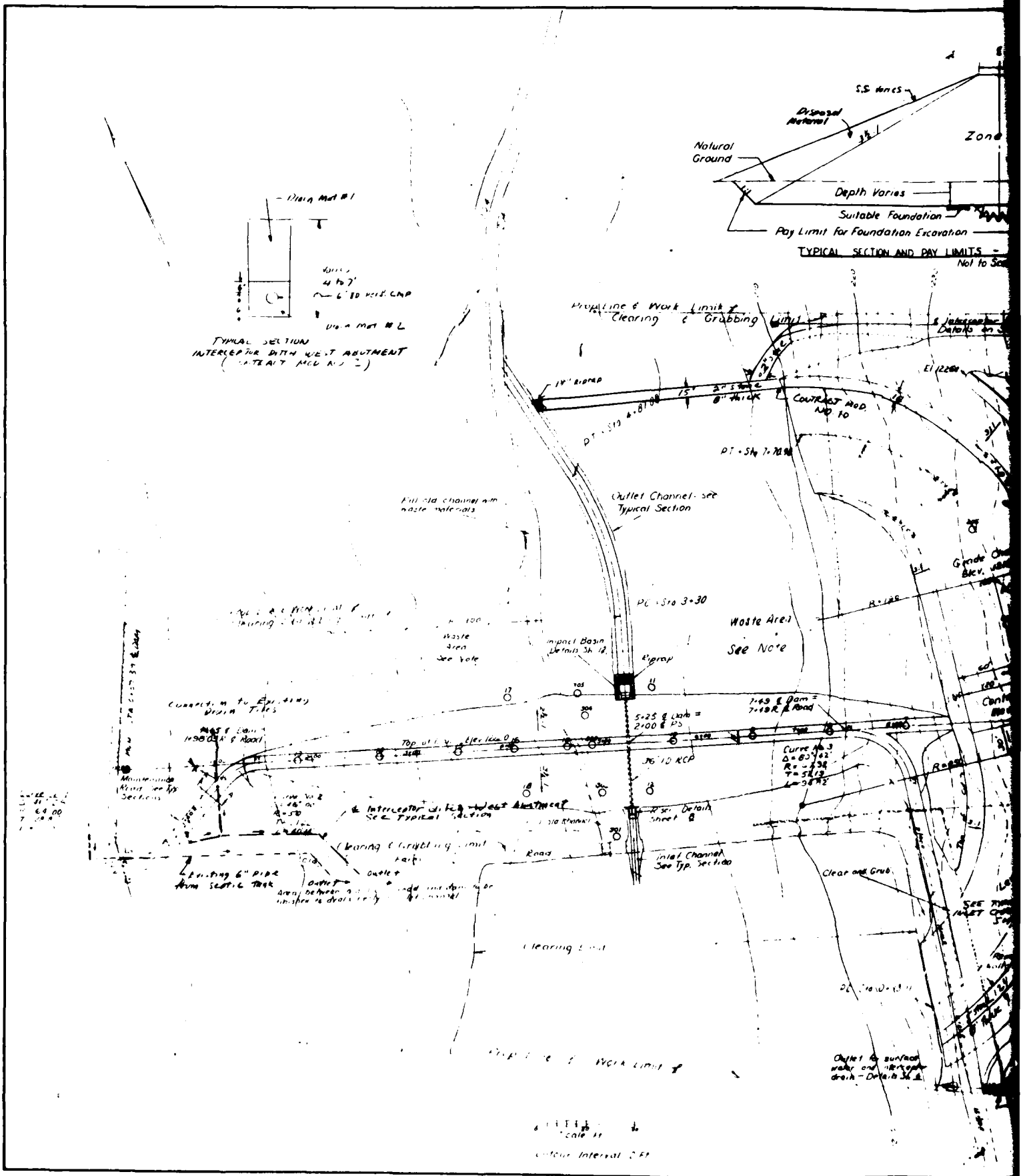
4. Design Report, Blackberry River Watershed, Site No. 5, Norfolk, Connecticut.

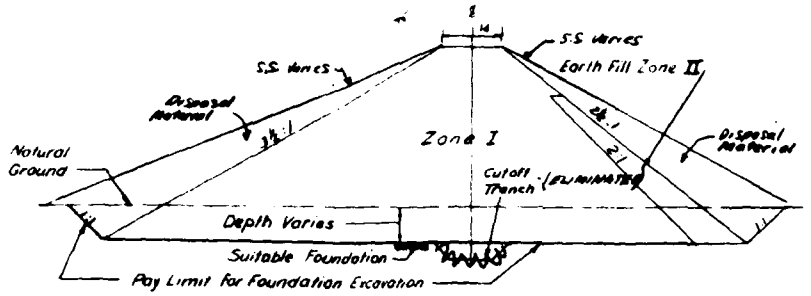
5. Plans for Blackberry River Watershed Project, Floodwater Retarding Dam No. 5, Norfolk, Connecticut 1967.

6. Plans for repairs to the emergency spillway at Blackberry River Watershed Project, Floodwater Retarding Dam No. 5, Norfolk, Connecticut 1972.

7. Construction progress photographs.

8. Soil Test Results, Change Orders and miscellaneous data.


S.S. Fence
Disposal Material
Natural Ground
Depth Varies
Suitable Foundation
Pay Limit for Foundation Excavation
TYPICAL SECTION AND PAY LIMITS
Drain Mat #1
TYPICAL SECTION
INTERCEPTOR DITCH WEST ABUTMENT
Drain Mat #2
Clearing & Grubbing Limit
14" RIPRAP
8" Thick
CONTRACT MOD. NO 10
Outlet Channel - see Typical Section
Fill old channel with waste materials
Waste Area
See Note
Impact Basin Details Sh. 12
Riprap
Connection to Existing Drain Tiles
Existing 6" PIPE from SEPTIC TANK
Intercepter ditch WEST ABUTMENT
See Typical Section
Initial Channel See Typ. Section
Clear and Grub
Clearing Limit
Work Limit
Outlet to surface water and interceptor drain - Details Sh. 8



TYPICAL SECTION AND PAY LIMITS - EMBANKMENT
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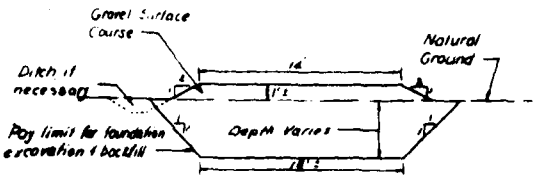

SECTION A-A
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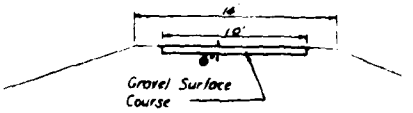
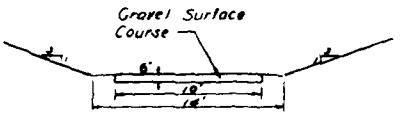


FILL SECTION



CUT SECTION

TYPICAL SECTIONS AND PAY LIMITS MAINTENANCE ROAD
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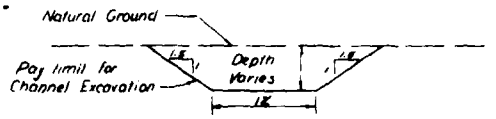
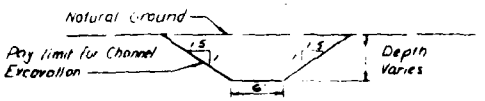
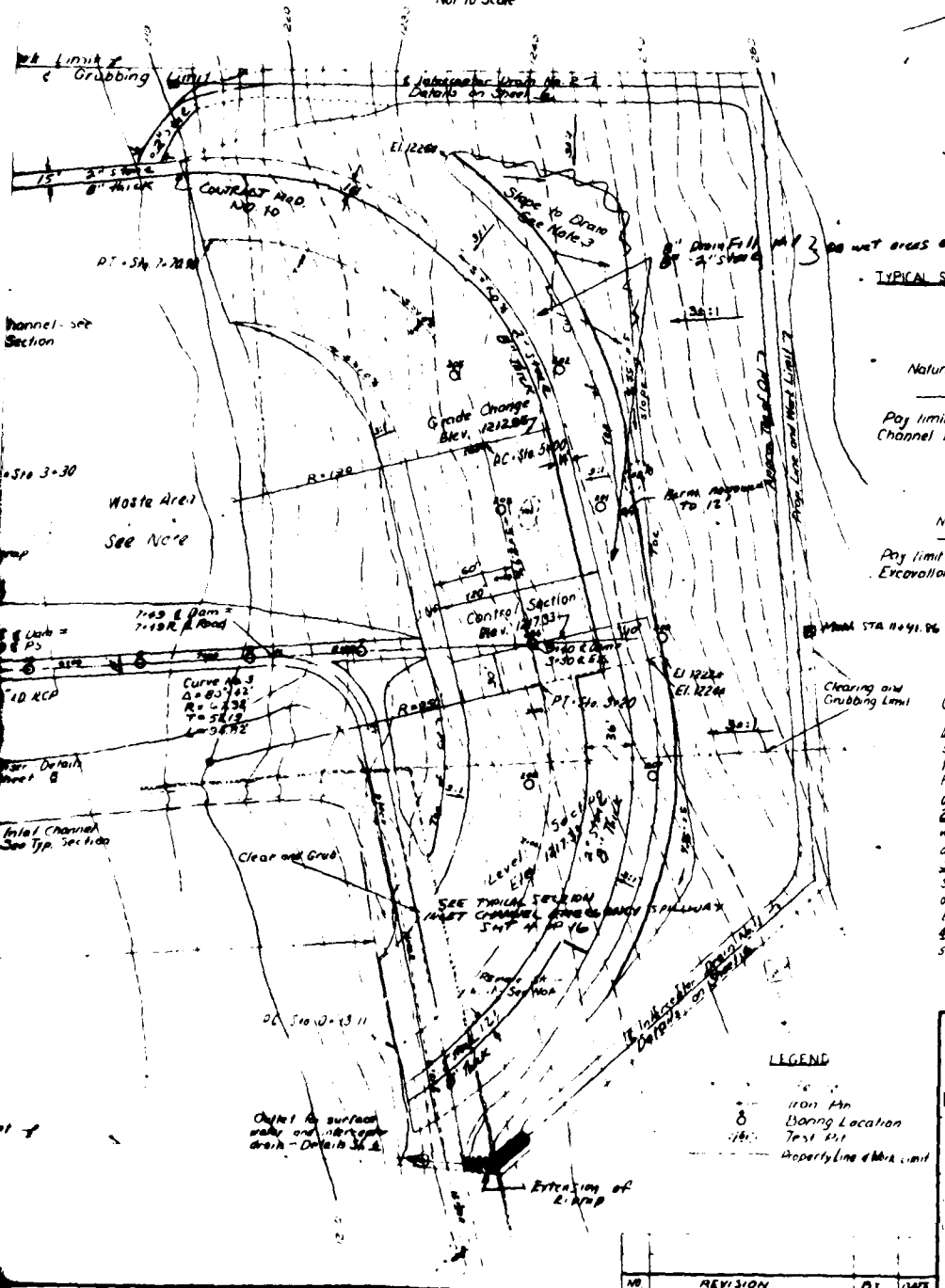


OUTLET



INLET

TYPICAL SECTIONS AND PAY LIMITS-CHANNELS
Not to Scale



CONSTRUCTION DETAILS

1. Suitable organic material from the foundation excavation shall be stockpiled in the designated waste areas. Material from these stockpiles shall be placed on the downstream face of the dam as Earth Fill Zone II as shown, and all surplus material disposed of as specified.
2. The stone wall in the vicinity of the Emergency Spillway shall be removed and suitable rock salvaged for use as riprap.
3. The slope of the borrow area and the terrace shall be cut to the approximate lines and grades shown or, depending on field conditions as directed by the Engineer.
4. All fences within the work and borrow areas shall be removed.

AS-BUILT
8/13/71

LEGEND

- Iron Pin
- Boring Location
- Test Pit
- Property line & Work Limit

NO.	REVISION	BY	DATE

BLACKBERRY RIVER WATERSHED PROJECT
FLOODWATER RETARDING DAM NO 5
LITCHFIELD COUNTY, CONNECTICUT

PLAN OF STRUCTURAL WORKS & FILL PLACEMENT

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	W.T. Ferguson	6-66
Drawn	W.T. Ferguson	6-66
Traced	W.T. Ferguson	6-66
Checked	F.W. Wysong	7-67

Approved by: [signature]

Sheet No. 3 of 16

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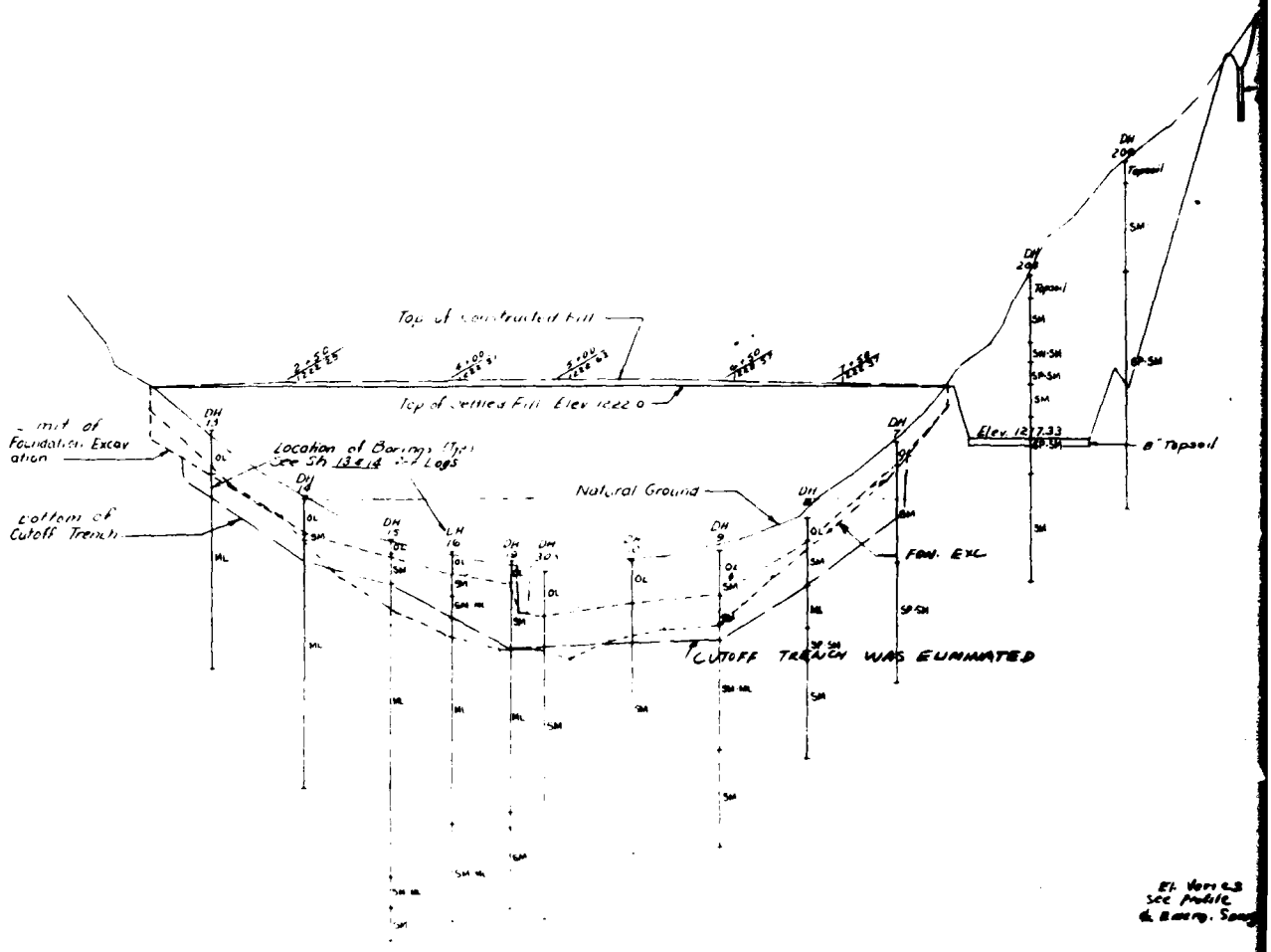
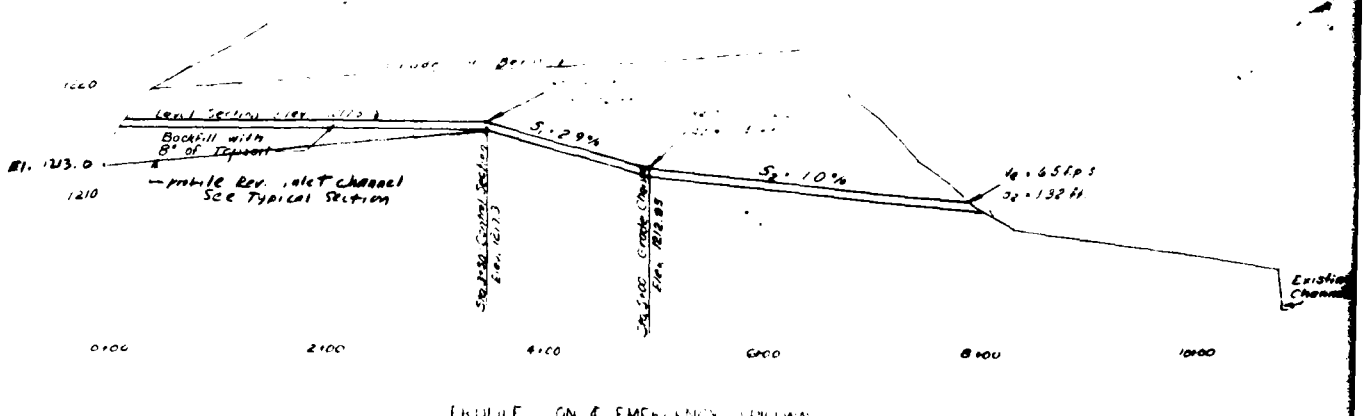
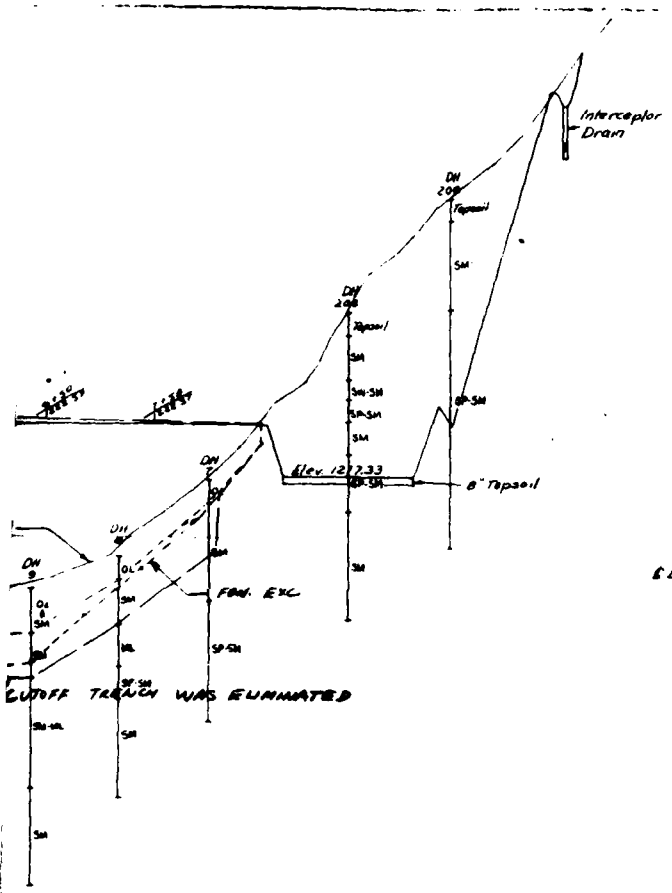
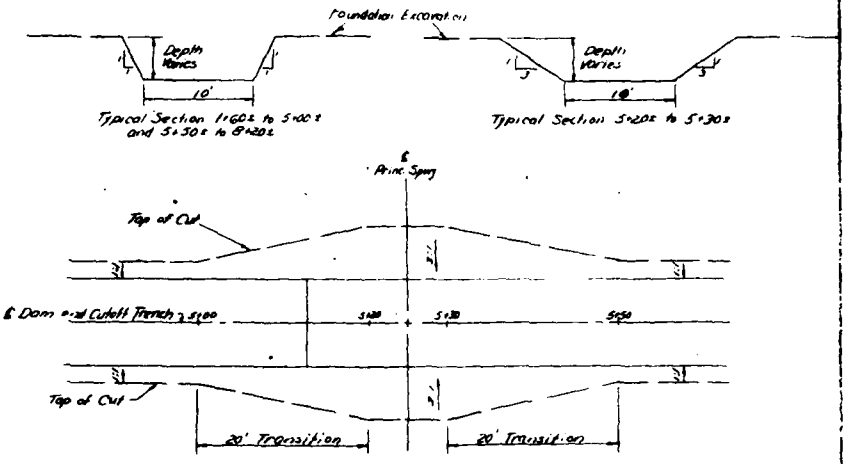




PROFILE ON ℄ EMERGENCY SPILLWAY





CUTOFF TRENCH - TYPICAL SECTIONS (PAY LIMITS)
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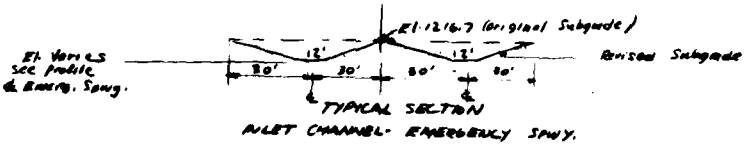
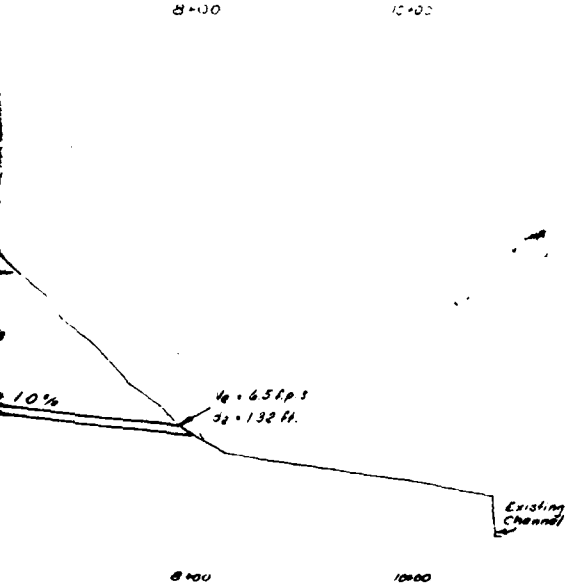
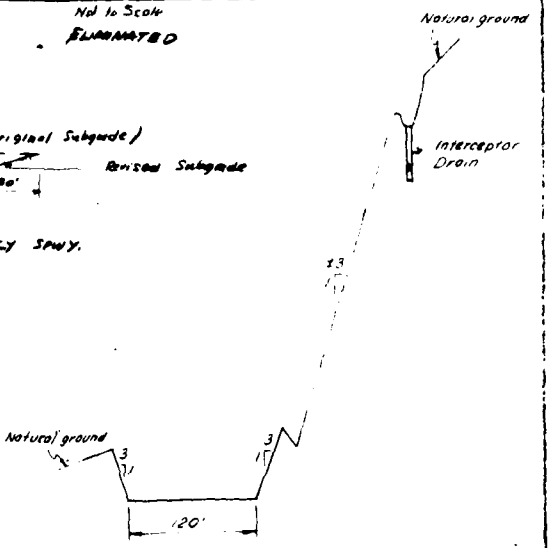
ELIMINATED







TYP. SECT OF EMERG. SPWY

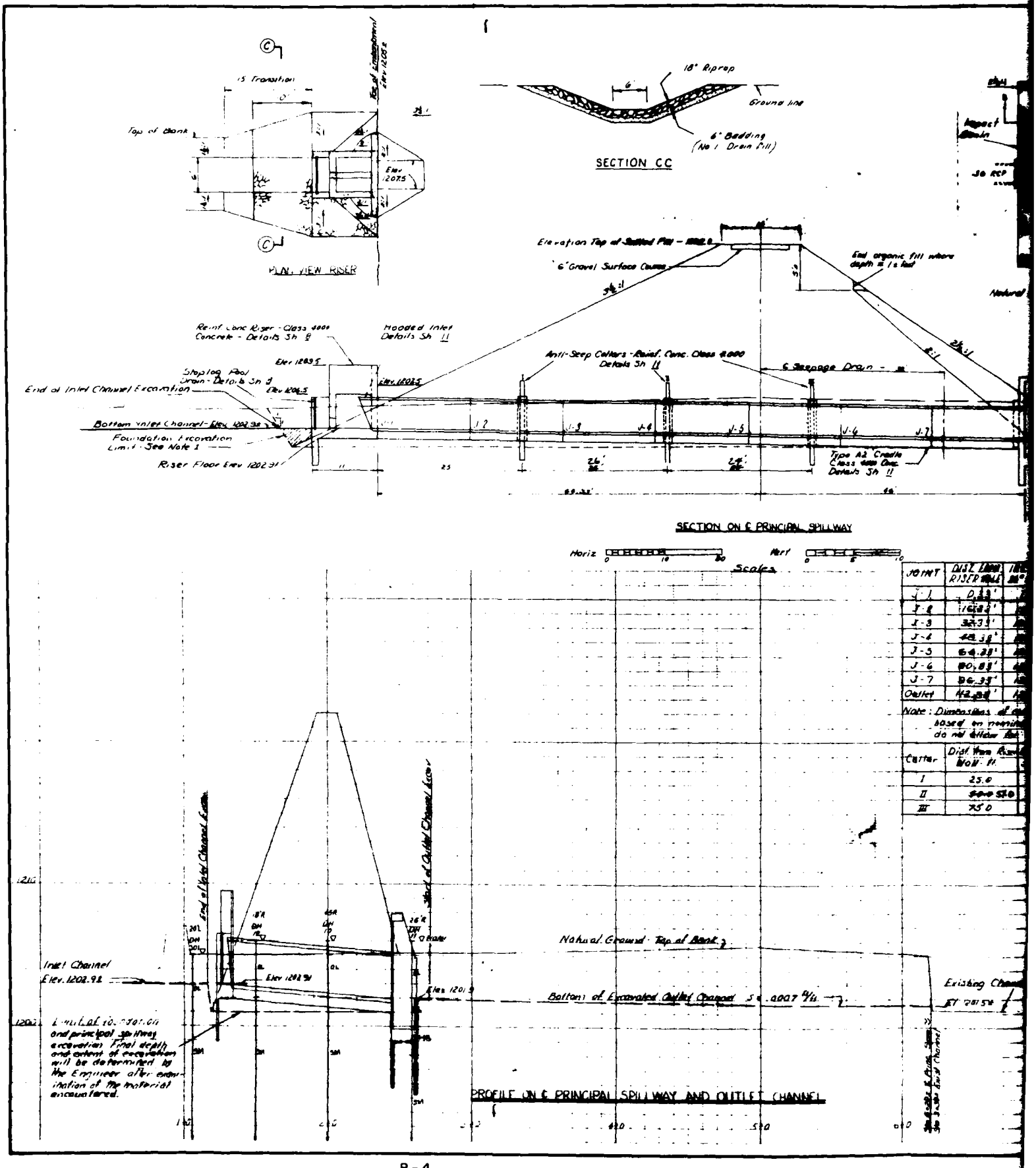
AS-BUILT
8/13/71

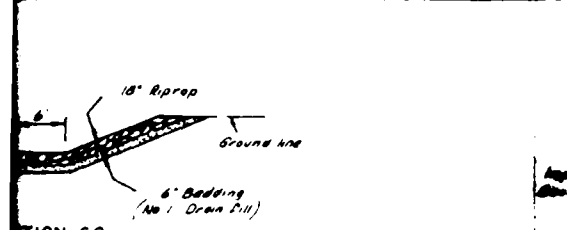
BLACKBERRY RIVER WATERSHED PROJECT
FLOODWATER RETARDING DAM NO. 5
LITCHFIELD COUNTY, CONNECTICUT

CUTOFF TRENCH & EMERG. SPWY. DETAILS

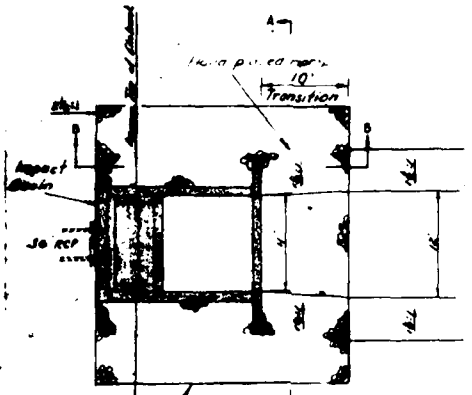
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

W T Ferguson	7-66		
W T Ferguson	7-66		
F M Wysong	7-67	4 / 16	CN - 411 - P

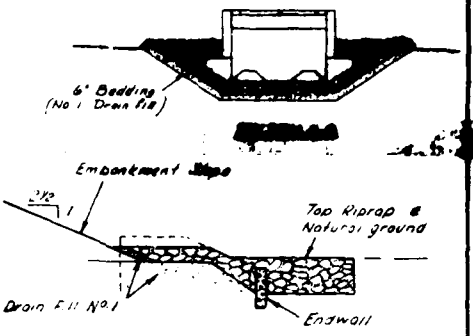

15 Transition
Top of Bank
Elev 1207.5
PLAN VIEW RISER
18" Riprap
6" Bedding (No 1 Drain Fill)
Ground line
SECTION CC
Elevation Top of Settled Fill – 1212.6
6" Gravel Surface Course
End organic fill where depth ≥ 1.5 feet
Natural
Reinf Conc Riser - Class 4000 Concrete - Details Sh 8
Hooded Inlet Details Sh 11
Elev 1203.5
Stepping Pool Drain - Details Sh 9
Elev 1206.5
End of Inlet Channel Excavation
Anti-Seep Collars - Reinf. Conc. Class 4000 Details Sh 11
6 Seepage Drain -
Bottom Inlet Channel - Elev 1202.38
Foundation Excavation Limit - See Note 1
Riser Floor Elev 1202.31
J-1
J-2
J-3
J-4
J-5
J-6
J-7
Type A2 Cradle Class 4000 Conc. Details Sh 11
SECTION ON ℄ PRINCIPAL SPILLWAY
Horiz
Vert
Scales
JOINT
Outlet
Cutter
I
II
III
25.0
Inlet Channel
Elev. 1202.92
Elev 1202.31
Elev 1201.9
Natural Ground Top of Bank
Bottom of Excavated Outlet Channel
Existing Ch
End of Inlet Channel Excav
Start of Outlet Channel Excav
Limits of foundation and principal spillway excavation. Final depth and extent of excavation will be determined by the Engineer after examination of the material encountered.
PROFILE ON ℄ PRINCIPAL SPILLWAY AND OUTLET CHANNEL



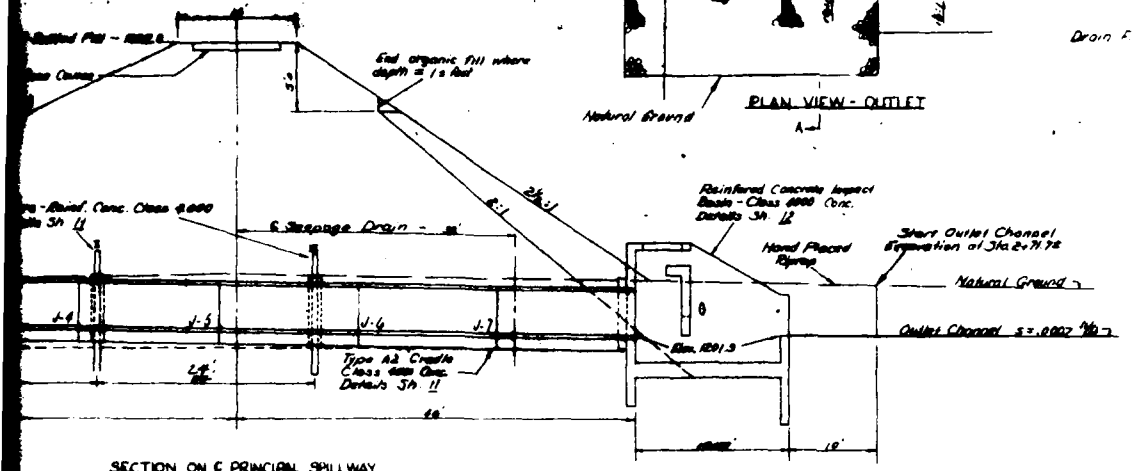
TION CC



PLAN VIEW - OUTLET



SECTION BB



SECTION ON ℄ PRINCIPAL SPILLWAY

1 After the foundation excavation has been approved by the Engineer, fill consisting of the most impervious material available at the site shall be placed and compacted as specified. The fill shall be placed to an elevation slightly higher than the bottom of the riser and the cradle before excavating for seepage drain and anti-seep collars.

2 Organic material from the foundation excavation shall be stockpiled and later placed on the downstream face of the embankment to the lines and grades shown. All surplus excavated materials shall be used to fill the old channel, fill depressions between the compacted fill and natural ground, or spread in the designated waste areas.

Scales

JOINT	DIST. FROM RISER WALL	INV. ELEV. AT 36" I.D. PIPE
J-1	0.33'	1202.04
J-2	16.33'	1202.95
J-3	32.33'	1202.86
J-4	48.33'	1202.81
J-5	64.33'	1202.83
J-6	80.33'	1202.89
J-7	96.33'	1202.99
Outlet	112.33'	1201.90

Note: Dimensions of concrete pipe are based on nominal length and do not allow for overlap.

Cutter	Dist. From Riser Wall - Ft.	Inv. Elev. of 36" Pipe
I	25.0	1202.87
II	50.0	1202.80
III	75.0	1202.63

CONSTRUCTION DETAILS

1-a 36" I.D. Reinforced Concrete Water Pipe
7-16' Sections (One section to have plain end)
1 Hooded inlet wall piece for 12" wall

b Pressure Head = 17 Ft.

c Load = 15,188 lbs/lin ft based on O.D. of 3.52 Ft.
Min 3-edge bearing strength for .001 in crack = 3,500 lbs/lin ft. for Pre-stressed pipe AWWA C-301
Min 3-edge bearing strength for .01-in. crack = 1,650 lbs/lin ft. for non-prestressed pipe AWWA C-300

2 Hand placed riprap - to be reasonably well graded from a max size of 18" to a min. size of 6".

AS-BUILT

Existing Channel
EL 1201.58

SPILLWAY AND OUTLET CHANNEL

BLACKBERRY RIVER WATERSHED PROJECT
FLOODWATER RETARDING DAM NO 5
LITCHFIELD COUNTY, CONNECTICUT

PRINCIPAL SPILLWAY

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	Date	Approved by
W.T. Ferguson	11 66	Title
Drawn W.T. Ferguson	11 66	Title
Traced		
Checked F.M. Wysocki	7 67	Sheet No. 7 of 18

Drawing No. CN - 411 - P

SCS-803 (3-66)

UNITED STATES GOVERNMENT

Memorandum

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
February 27, 1967

TO : Harold M. Kautz, Head, E&WP Unit, SCS,
Upper Darby, Pennsylvania 19082

FROM : Whitney T. Ferguson, Jr., Acting State
Conservation Engineer, SCS, Storrs, Conn. 06268

SUBJECT : ENG - Design, 13-5, Blackberry River Watershed, Site No. 5

By telephone on February 24, Francis Wysong requested information for the hydrology section of the design report for the subject site.

The principal spillway hydrograph was adapted from the material in the watershed work plan files in order to use the family hydrograph method which the consultant for the state agency is familiar with. The point rainfall of 8.51 inches and storm duration of 14 hours of the 1955 Hurricane "Diane" were used. The higher peak did not appreciably affect the proportioning of the structure.

From past experience, we found that the consultant checked our watershed areas rather closely, and we have made a practice of retracing it for final design. In this case, the more precise definition of the watershed on the 1:24,000 quad. sheet (WPP used 1:31,680) gave a slightly reduced area. We take advantage of all we can get as the somewhat restrictive State Water Resources Commission design criteria went into effect after approval of the work plan.

The freeboard hydrograph computations were unintentionally omitted from the original submission and are enclosed herein.

If there are further questions, please let us know.

Attachment

February 16, 1967

To: G. E. Oman

From: C. E. Smith

Re: Preliminary Design - Comments--Site 5, Blackberry River Watershed, Connecticut

The work plan for this particular watershed was completed in 1959. There was very little engineering data included. The H&H portion of this design is also insufficient. The following items were "gleaned" from the computational data:

1. The emergency spillway crest was set by routing a principal spillway hydrograph using a "B" distribution, 8.51 inches of rainfall, a 14-hour storm duration for moisture condition III. The reason for using this hydrograph has not been stated. However, the work plan refers to the August 1955 storm. ASK FOR ADDITIONAL AMOUNT FOR 1955 STORM THIS WOULD BE WHAT THE WORK PLAN INTENDED BE USED.

2. The emergency spillway hydrograph was based on a 6-hour, "B" distribution hydrograph using 15.42 inches of rainfall. The reason for this hydrograph has not been stated. However, the work plan refers to 1.5 times the 6-hour point rainfall. $6^{hr}_{PMP} = 10.3 \times 1.5 = 15.42''$

3. The freeboard hydrograph computation is missing.

4. It is also noted that the drainage area has been changed from 3.03 square miles in the work plan to 2.94 square miles in the final design. No reason was given.

Since there is so little information in the work plan to refer to and information is lacking the final design, it is difficult to give any firm recommendations, ~~except to state that~~ since Connecticut obviously revised the design from the work plan, it would have been better if they used the Washington minimum criteria. They at least should explain the basis for the design.

WHY WOULD IT HAVE BEEN BETTER?

ASK THAT THE ABOVE INFORMATION BE INCLUDED IN THE DESIGN FOLDER. — BY PHONE NOW OR IN OUR TRANSMITTAL LETTER

FRF 2/23/67

cc: H. M. Kautz
C. E. Smith
F. D. Theurer

Phoned 2-24-67 requesting the above information.
Mat'l rec'd 2-28-67

SCS-319 A (3-61)

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

HYDROGRAPH COMPUTATION
PRINC. SPILLWAY (cstr)

WATERSHED OR PROJECT Blackberry River STATE Conn.

STRUCTURE SITE OR SUBAREA Site #5

DR. AREA 2.94 SQ. MI. T_c 7.2 HR. RUNOFF CONDITION NO. III

RUNOFF CURVE NO. 85 . STORM DISTRIB. CURVE II . HYDROGRAPH FAMILY NO. 1

STORM DURATION 14 HR. RAINFALL: POINT 8.51 IN. AREAL ____ IN.

Q 6.71 IN. COMPUTED T_p 5.04 HR. T_o 12.6 HR.

$(T_o + T_p)$: COMPUTED 2.5 ; USED 3 . REVISED T_p 4.2

$q_p = \frac{484\ A}{REV.\ T_p}$ = 339 CFS. Qq_p = 2275 CFS.

t(COLUMN) = (t/T_p) REV. T_p. q(COLUMN) = $(q_c/q_p)\ Qq_p$.

LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS
1	0	0	21	29.40	5	41		
2	1.47	11	22	30.87	2	42		
3	2.94	61	23	32.34	0	43		
4	4.41	230	24			44		
5	5.88	687	25			45		
6	7.35	1280	26	Check:		46		
7	8.82	1478	27	$Q = \frac{\Delta t \cdot \Sigma q}{645\ A}$		47		
8	10.29	1310	28			48		
9	11.76	1045	29	$\Delta t = 1.47$		49		
10	13.23	851	30	$\Sigma q = 8789$		50		
11	14.70	660	31	$645 A = 1896.3$		51		
12	16.17	458	32			52		
13	17.64	289	33	$Q = 6.81$" OK		53		
14	19.11	177	34			54		
15	20.58	107	35			55		
16	22.05	64	36			56		
17	23.52	36	37			57		
18	24.99	20	38			58		
19	26.46	11	39			59		
20	29.93	7	40			60		

GPO 1961 : 0P—591668

SCS-319 A (3-61)

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

12/1-

HYDROGRAPH COMPUTATION
EMERG. SPILLWAY

WATERSHED OR PROJECT Blackberry River STATE Conn

STRUCTURE SITE OR SUBAREA Site #5

DR. AREA 2.94 SQ. MI. T_c 7.2 HR. RUNOFF CONDITION NO. III

RUNOFF CURVE NO. 85 . STORM DISTRIB. CURVE B . HYDROGRAPH FAMILY NO. 1

STORM DURATION 6 HR. RAINFALL: POINT 15.42 IN. AREAL — IN.

Q 13.5 IN. COMPUTED T_p 5.04 HR. T_o 5.69 HR.

$(T_o + T_p)$: COMPUTED 1.13 ; USED 1 . REVISED T_p 5.69

$q_p = \frac{484\ A}{REV.\ T_p}$ = 250 CFS. Qq_p = 3380 CFS.

t(COLUMN) = (t/T_p) REV. T_p. q(COLUMN) = $(q_c/q_p)\ Qq_p$.

LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS
1	0	0	21	31.81	3	41		
2	1.59	98	22	33.40	0	42		
3	3.18	507	23			43		
4	4.77	1596	24			44		
5	6.36	2695	25			45		
6	7.95	3045	26	Check: —		46		
7	9.54	2620	27	$Q = \frac{\Delta t \cdot \Sigma q}{645\ A}$		47		
8	11.13	1920	28			48		
9	12.72	1314	29	$\Delta t = 1.5932$		49		
10	14.32	872	30	$\Sigma q = 16395$		50		
11	15.91	585	31	$645\ A = 1896.3$		51		
12	17.50	389	32			52		
13	19.09	264	33	$Q = 13.77$ "OK		53		
14	20.68	176	34			54		
15	22.27	122	35			55		
16	23.86	81	36			56		
17	25.45	54	37			57		
18	27.04	30	38			58		
19	28.63	17	39			59		
20	30.22	7	40			60		

GPO 1961 : 09—001065

SCS-319 A (3-61)

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

HYDROGRAPH COMPUTATION
Freeboard

WATERSHED OR PROJECT Blackberry River STATE Conn

STRUCTURE SITE OR SUBAREA Site #5

DR. AREA 2.94 SQ. MI. T_c 7.2 HR. RUNOFF CONDITION NO. II

RUNOFF CURVE NO. 67 . STORM DISTRIB. CURVE B . HYDROGRAPH FAMILY NO. 2

STORM DURATION _____ HR. RAINFALL: POINT 24 IN. AREAL — IN.

Q 18.97 IN. COMPUTED T_p 5.04 HR. _____ T_o 5.45 HR.

$(T_o + T_p)$: COMPUTED 1.08 ; USED 1 . REVISED T_p 5.45

$q_p = \frac{484\ A}{REV.\ T_p}$ = 261 CFS. Qq_p = 4951 CFS.

t(COLUMN) = (t/T_p) REV. T_p. q(COLUMN) = $(q_c/q_p)\ Qq_p$.

LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS
1	0	0	21	30.52	5	41		
2	1.53	129	22	32.05	0	42		
3	3.05	842	23			43		
4	4.58	2376	24			44		
5	6.10	3971	25	Check		45		
6	7.63	4382	26	$Q = \frac{\Delta t \cdot \Sigma q}{645\ A}$		46		
7	9.16	3812	27			47		
8	10.68	2723	28	Δt = 1.526		48		
9	12.21	1881	29	Σq = 23,848		49		
10	13.73	1272	30	645 A = 1896.3		50		
11	15.26	822	31	Q = 19.2" ok		51		
12	16.79	559	32			52		
13	18.31	386	33			53		
14	19.84	257	34			54		
15	21.36	168	35			55		
16	22.89	114	36			56		
17	24.42	74	37			57		
18	25.94	45	38			58		
19	27.47	20	39			59		
20	28.99	10	40			60		

GPO 1961 O-601668

State Conn.		Project Blackberry River W/S Site #5		
By FMW	Date 1-67	Checked By	Date	Job No.
Subject DURATION OF FLOW THROUGH EM. SP.				Sheet 11 of 12

t_e - TIME EMERGENCY SPILLWAY BEGINS TO FLOW _____ 8.45 HRS.

t_w - TIME EMERGENCY SPILLWAY FLOW IS MAXIMUM ___ 13.10 HRS.

V_{se} - STORAGE AT t_e _____ 874 AC. FT.

V_{sw} - STORAGE AT t_w _____ 1355 AC. FT.

Q_o - MAXIMUM DISCHARGE AT t_w _____ 1175 CFS

Q_p - PIPE DISCHARGE AT t_w _____ 140 CFS

$Q_e = Q_o - Q_p$ _____ 1035 CFS

Q_I - PEAK INFLOW _____ 3045 CFS

V_I - TOTAL INFLOW VOLUME _____ 2117 AC. FT.

$t_w (Q_I/V_I)\ 1/12.1 =$ 1.557

$V_{iw}/V_I =$ _____ 0.765

V_{iw} - INFLOW VOLUME AT t_w _____ 1620 AC. FT.

$t_1 = t_w - t_e$ _____ 4.65 HRS.

$$t_2 = \left[\frac{(V_I - V_{iw}) + (V_{sw} - V_{se})}{Q_p + 0.3\,(Q_e)}\right] 12.1$$

$$t_2 = \left[\frac{(2117 - 1620) + (1355 - 874)}{140 + (0.3 \times 1035)}\right] 12.1$$

$t_2 =$ 26.24 HRS.

$t = t_1 + t_2$ _____ 30.89 HRS.

SEMI-FINAL

CN - 60
JAN. 1959

GEOLOGY REPORT

BLACKBERRY RIVER WATERSHED
LITCHFIELD COUNTY, CONNECTICUT
WEST SIDE BROOK - SITE NO. 5

REPORT NO. CN-409-G

Concurred by:

Whitney T. Ferguson, Jr.
Acting State Conservation Engineer
Storrs, Connecticut

Prepared by:

William M. Brown, Geologist
SCS, Storrs, Connecticut
November 1960

I. Introduction

A. General

State: Connecticut County: Litchfield

Watershed: Blackberry River Location: Norfolk, Conn.

Site: West Side Brook - Site No. 5

Investigated by: William M. Brown, Geologist Date: 8/60

Equipment: Acker Drills (2); 1 John Deere Dozer

Site Data:

Drainage area: 3.03 sq. miles 1939.2 acres

Type Structure: Compacted Earth Purpose: Flood Prevention

Height of fill: 22 feet Length of Embankment: 790 feet

Volume of fill: 18,415 cubic yards

Location Emergency Spillway: Right Bank

Storage Allocation

	Depth at Dam (feet)	Surface Area (acres)	Volume (ac. ft.)
Sediment			
Floodwater:			

REFERENCE:

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DRAWING NO.
SHEET ___ OF ___
DATE

B. Surface Geology and Physiography

Site No. 5 is located in the western crystallines of Connecticut in the Berkshire and Housatonic Highland physiographic province. The site is set in a region of moderate relief. The left and right abutments have slopes of 5% and 6% respectively. The width of the floodplain at the proposed centerline of the dam is approximately 250 feet.

The underlying bedrock although not observed at the site is the gneiss complex of the Highlands. The complex is generally considered to be Pre-Cambrian in age and contains all gradations of micaceous schists to quartz biotite gneisses.

Surface conditions on the left abutment are generally wet and soggy underfoot. Surface seepage and spring activity is common to this abutment at and on the upstream and downstream sides of the centerline of the dam. This abutment consists of fine grained sands and silts of lacustrine origin contemporaneous with glacial deposition. Some spring activity is also common to the right abutment. The materials present are likewise of glacial origin consisting of sands and gravels. No large boulders were found at the site.

No sediment or erosion problem is present or is anticipated at the site since ground cover consists of woodland and swamp area. Channel and streambank conditions are stable.

Groundwater level in a good portion of the valley bottom is 1 to 2 feet above the existing organic ground surface.

II Subsurface Geology

A. Centerline of the Dam

Eighteen holes were drilled to investigate and evaluate foundation conditions beneath the proposed fill zone of the dam. Of these, 10 were along the centerline, two were on the upstream and downstream side of the centerline on either side of West Side Brook, and four were along the axis of the principal spillway.

A two to four foot highly organic topsoil or muck mantle was found in holes along the valley bottom. On the right side of the valley (East) all holes from the principal spillway east penetrated silty sands and gravels whose estimated relative density was medium as determined by the blow count per foot on the split spoon sampler. This density was maintained to a depth of about 20 feet at which point the material became dense. The materials

encountered on the right side of West Side Brook have been tentatively classified as SM's, SP-SM, and SM with ML fraction. These materials were characteristic of both the right abutment and right valley bottom. A greater in place density was noted in hole 6; the highest hole on the right abutment. The deepest penetration of any holes on the right side was in hole 302 which went to a depth of 32 feet. Because of the near surface or surface groundwater conditions, no acquifer could be identified on the right valley bottom or abutment.

The left abutment as previously described, is characterized by wet, soggy, spring and seep conditions. A four or five foot muck and/or highly organic mantle is common to most of this abutment. Underlying this zone is found a low plasticity silt. This silt or very fine grained sand exhibits rapid dilatancy, and a slight dry strength. This zone has been tentatively identified as an ML pending laboratory analysis. The ML is also slightly micaceous. A general thickening of the ML was detected towards the left abutment from the brook. In hole 19, the ML unit was 17 feet in thickness. Progressing up-slope the ML attained a thickness of 40 feet in hole 14A. The total thickness of ML in hole 13 is unknown.

A total of 5 Shelby tube samples were taken for shipment to the laboratory for analysis. Three samples were taken from hole 15A at intervals of 5.0 to 7.0 feet, 15.0 to 17.0 feet, and 25.0 to 27.0 feet. Two additional samples were taken in hole 14A at intervals of 10.0 to 12.0 feet and 20.0 to 22.0 feet.

In hole 14A, firm foundation materials were encountered at 40 feet. This material consisted of poorly graded, silty sand with some decomposed rock fragments.

B. Centerline of Outlet Structure

The proposed location of the principal conduit is on the right side of West Side Brook. The materials penetrated have all been tentatively identified as SM's with some ML fraction. Some gneissic fragments and quartzitic pebbles were also encountered.

As previously mentioned all holes east of and including the holes along the principal spillway penetrated silty gravelly sands. Five holes were drilled along the axis of

the proposed outlet structure. All of the holes collared below water-level in about 1 to 2 feet of water and penetrated muck and/or decayed vegetation to depths of from 4 to 6 feet. Generally the materials had a loose in place relative density up to a depth of from 10 to 12 feet as determined by the blow count on the split spoon sampler. Beyond this depth the materials became increasingly dense.

C. Emergency Spillway

The emergency spillway is tentatively planned for the right abutment. Eight holes were drilled to evaluate the subsurface conditions. All holes went to a depth 5 to 10 feet below the anticipated excavation grade. No bedrock was encountered in any of the holes drilled. The materials as tentatively classified consist primarily of SP's, and SM's. Beyond a 15 to 20 feet depth the materials became very dense as indicated by the blow count. Very dense SP's and SM's will constitute the type materials which will be found at the base of the excavation.

Water at shallow depth was encountered in nearly all of the holes from near surface (S-201; at 2.0 feet) to depths of 8 feet (S-205 and S-206).

D. Borrow Areas

No formal investigation was undertaken to determine a borrow source area(s). If the existing centerline of the dam is maintained, subsequent investigations will be made. From drilling the emergency spillway, conditions would seem to indicate that materials from this excavation and those along the whole right abutment would be adequate and usable as borrow.

E. Relief Well and Foundation Drain Explorations

No specific investigation was made to determine foundation conditions for the above purposes. It is felt that sufficient information was gathered during the centerline investigations of the dam and principal spillway to adequately evaluate the foundation conditions.

SEMI-FINAL

GEOLOGY REPORT

CN - 60
JAN. 1959

BLACKBERRY RIVER WATERSHED
WEST SIDE BROOK - SITE NO. 5
Norfolk, Connecticut

Interpretations and Conclusions
"For in Service Use Only"

1. The right abutment consists primarily of silty-gravelly sands having been tentatively classified SP's and SM's. Surface seepage is common to this abutment and drainage will have to be provided during and after construction.

2. The left abutment is very wet with spring activity and seepage common to the whole abutment. A 4 to 5 foot black, almost muck-like, mantle overlies a very fine grained, somewhat micaceous sand or coarse grained silt. The silt has a low plasticity, rapid dilatancy, and a low dry strength. It has tentatively been classified as an ML. The ML has a thickness of 40 feet as seen in hole 14A and extends to an undetermined depth in hole 13. Presumably the ML is of comparable thickness or less as compared to 14A. Pending laboratory tests the ML may have a sufficient density to allow construction to proceed. Estimates on the basis of field investigations however are that failure due to settlement or shearing may be expected along the centerline of the proposed structure.

3. The left valley bottom is about at the local groundwater table. Approximately 2-3 feet of muck overlies a very loose silty sand which is about 6 feet in thickness. Underlying this sand is the ML bearing the same characteristics of the ML described previously. The ML is only 17 feet thick in hole 19 assuming a lenticular shape. The ML pinches out radically towards hole 303 and thickens noticeably towards holes 14 and 15.

4. The right valley bottom consists of silty sands whose estimated in place densities range from loose to dense. No area of failure is anticipated in this portion of the valley bottom once the organic mantle is removed.

5. In placing the principal conduit, backfilling from a depth of almost 10 feet may be required before placing the cradle. The silty sands underlying the organic mantle are fairly loose and may be susceptible to displacement under a vertical load.

REFERENCE:	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	DRAWING NO. SHEET ___ OF ___ DATE ___

B-15

6. A filter blanket will probably be required on both abutments to the crest elevation of the emergency spillway to relieve seepage and groundwater conditions common to both abutments.

7. No rock excavation is anticipated in the emergency spillway section. Water should be anticipated in the construction and post-construction phases. An uphill vertical cutoff and/or drain will probably be required to intercept water to prevent seepage and sluffing on the side-slopes of the spillway.

Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location West Side Brook - Norfolk Owner _____ State Conn.

Watershed Housatonic River Sub-watershed _____ Site No. 5

Logged by W. H. Brown Date May 19 60 Project: WP1 ___ WP2 X FP ___ Pub. 46 ___

Drilling Equipment 2 Acker Drills Location of Holes Centerline

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Rec. † %
7	1217	0.0	2.0		Topsoil, silty sand, poorly graded, some organic material.	OL						
		2.0	4.0	28	Sand, fine grained, medium dense, poorly graded, fines +12%, some muscavite.	SM						
		4.0	6.0	38	Same as above, more dense, some fragmental rock.	SM						
		6.0	8.0	24	Same as above.	SM						
		8.0	10.0	47	Same as above.	SM						
		10.0	12.0	29	Sand, fine grained, poorly graded, medium dense, pebbles throughout.	SP-SM						
		15.0	17.0	36	Same as above, some decomposed rock	SM						
		20.0	22.0	42	Sand, fine to medium grained, rounded quartz pieces.	SP						
8	1210	0.0	2.0		Topsoil and overburden							
		2.0	4.0	19	Sand, fine to medium grained, coarse fraction of pebbles and rock fragments. Free Water.	SM						
		4.0	6.0	32	Same as above with more coarse material.	SM						

* Disturbed-undisturbed-rock core † Percent sample recovery.

1 copy to S and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

Form SCS-339
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location: West Side Brook - Norfolk Owner: State: Conn.
Watershed: Blackberry River Sub-watershed: Site No. 5
Logged by: W. M. Brown Date: May 1960 Project: WP1 ___ WP2 X FP ___ Pub: 46
Drilling Equipment: 2 Auger Drills Location of Holes: Centerline

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. %
8	1210	6.0	8.0	11	Very fine grained sand or coarse silt, no coarse fraction, medium to stiff.	ML						
		8.0	10.0		Same as above.	SP-						
		10.0	12.0	23	Sand, fine to medium grained, some coarse fraction	SM						
		15.0	17.0	22	Sand, fine grained, poor grading, much less coarse fraction, some pebbles.	SM						
		20.0	22.0	32	Same as above but denser	SM						
9	1207	0.0	2.0		Topsoil & overburden, organic	OL						
		2.0	4.0	8	Highly organic cover & decayed vegetation underlain by very fine poorly graded sand. Water.	OL & SM						
		4.0	6.0	8	Sand, poorly graded, gray, some coarse sand & gravel fraction, loose.	SM						
		6.0	8.0	19	Sand, fine grained, poorly graded, brown, some coarse sand & pebbles.	SM						
		8.0	10.0	11	Sand, fine grained, poorly graded, some gravel mixed, very silty with low plasticity.	SM- ML						

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* Disturbed-undisturbed-rock core † Percent sample recovery

1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist

Sheet 1 of ___ Sheets

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location [illegible] Owner [illegible] State [illegible]

Watershed [illegible] Sub-watershed [illegible] Hole No. [illegible]

Logged by [illegible] Date May 19 60 Project: WP1 [illegible] WP2 [illegible] FP [illegible]

Drilling Equipment [illegible] Location of Holes [illegible]

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	[illegible]	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Type	From Ft.	To Ft.	Rec. %
9	[illegible]	10.0	12.0	19	Same as above without coarse fraction	SM-ML						
		15.0	17.0	13	Same as above with quartz pebbles							
		20.0	22.0	49	Sand, fine grained, poorly graded; fragmental	SM						
					quartz rock and pebbles.							
		25.0	27.0	79	Same as above except very dense.							
10	[illegible]	0.0	1.0		Peat and decayed vegetation. Free Water	[illegible]						
		1.0	6.0	28	Sand, well graded, gravelly, highly oxidized.	SW						
		6.0	8.0	11	Sand, fine grained, poorly graded, some coarse	SM						
					well graded sands, some gravel sizes.							
		8.0	10.0	23	Sand, poorly graded, fine to medium grained,	SP						
					more oxidation, coarser than above.							
		10.0	12.0	40	Sand, well graded, fine to coarse grained,	SW-						
					gravels up to 3/4".	SM						
		15.0	17.0	11	Sand, fine grained, poorly graded, rotted mica	SM						
					schist; quartzitic fragments, from gravels or							
					cobbles.							

Disturbed, undisturbed, rock core. Percent sample recovery.
1 copy to [illegible] and WP Unit. 1 copy Soil Mechanics Laboratory with samples.
Disposition as directed by State Conservationist.

Sheet [illegible] of [illegible] Sheets

Form SCS-526
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location: Hook Side Patch - Norfolk Owner: State: Conn.
Watershed: Blackberry River Sub-watershed: Site No. 5
Logged by: M. M. Brown Date: May 19 60 Project: WP1 WP2 X FP Pub. 46
Drilling Equipment: 2 Acker Drills Location of Holes: Centerline

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	RPT	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type	Samples From Ft.	Samples To Ft.	Rec. %
10	1206	20.0	22.0	50	Sand, well graded, fine grained sand from lenses,	SW						
					pebbles, very dense	SW						
		25.0	27.0	90	Sand, silty, very dense, decomposed mica schist	SM						
					fragments and pebbles.							
11	1206	0.0	4.0		Peat and decayed vegetation. Free Water	Pt						
		4.0	6.0	9	Sand-very fine grain and/or coarse grained silt,	ML						
					some coarser sand with gravel sizes,							
		6.0	8.0	16	Sand, very fine grained, some coarse sands,	SM						
					abundant pebble sizes and angular quartzitic	ML						
					fragments.							
		8.0	10.0	32	Sand, very fine grained, some pebbles.	SM						
		10.0	12.0	11	Same as above, some decomposed schist and	SM						
					quartzitic fragments.							
		12.0	14.0	18	Same as above with more coarse well graded sands.	SW						

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* Disturbed-Undisturbed-Split core; † Percent sample recovery.
1 copy to C and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location: West Side Brook - Marshall — Owner: _____ — State: Maine
Watershed: Blueberry River — Sub-watershed: _____ — Site No. 5
Logged by: W. M. Brown — Date: May 19 60 — Project: WP1 ☒ WP2 ☐ FP ☐ — Pub. 46
Drilling Equipment: 2 Acker Trills — Location of Holes: Centerline

Hole No.	Station and Surface Elev.	Hole Depth From (Ft.)	Hole Depth To (Ft.)	BPF	Description of Materials	Unified Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type	Samples From (Ft.)	Samples To (Ft.)	Samples Rec. %
11	1206	14.0	16.0	21	Same as above.	SM						
		20.0	22.0	26	Same as above	SM						
		25.0	27.0	71	Same as above without schist fragments or pebbles, very dense.	SM						
12	1206	0.0	4.0		Peat and decayed vegetation, Free Water	OL						
		4.0	6.0	17	Sand, fine grained, some pebbles and angular rock inclusions.	SM						
		6.0	8.0	12	Sand, fine to medium grained, poorly graded, pebbles and rock fragments.	SM						
		8.0	10.0	27	Same as above.	SM						
		10.0	12.0	23	Same as above.	SM						
		12.0	14.0	25	Same as above.	SM						
		14.0	16.0	24	Same as above with 5% fraction of SM	ML SM						
		20.0	22.0	29	Same as above	ML SM						
		25.0	27.0	39	Same as above	SM						

Sheet ___ of ___ Sheets

* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

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Form SCS-539
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location: West Side Brook - Norfolk | Owner: | State: Conn.
Watershed: Blackberry River | Sub-watershed: | Site No.
Logged by: W. M. Brown | Date: May 19 60 | Project: WP1 | WP2 X | FP | Pub. 46
Drilling Equipment: 2 Auger Drills | Location of Holes: Centerline

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	RPT	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. %
13	1218	0.0	4.0		High organic silt with decayed vegetation. Free	OL						
					Water.							
		4.0	6.0	4	Sand, very fine grained and/or coarse silt, some	ML						
					organic traces, some muscovite flakes, no coarse							
					fraction.							
		6.0	8.0	4	Same as above without organic traces	ML						
		10.0	12.0	5	Same as above, loose	ML						
		15.0	17.0	6	Same as above	ML						
		20.0	22.0	6	Same as above	ML						
14	1212	0.0	3.5		Muck, Free Water	OL						
		3.5	4.0		Coarse sand with gravel, silty	SM						
		4.0	6.0	4	Very fine grained sand or coarse silt, some flakes	ML						
					of muscovite, some pebbles, traces of organic							
					matter.							
		6.0	8.0	3	Same as above without pebbles or organic traces.	ML						
		8.0	10.0	5	Same as above	ML						
		15.0	17.0	4	Same as above	ML						
		20.0	22.0	6	Same as above	ML						

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* D-Undisturbed undisturbed rock core. † Percent sample recovery.
1 copy to X and WP Unit; 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet 1 of 1 Sheets

Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location West Side Brook - Norfolk Owner _____ State Conn.

Watershed Blackberry River Sub-watershed _____ Site No. 5

Logged by W. M. Brown Date May 1960 Project: WP1 ___ WP2 X FP ___ Pub. 46 ___

Drilling Equipment 2 Acker Drills Location of Holes Centerline

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. % †
14	1212	25.0	27.0	5	Same as above.	ML						
14A	1212	0.0	2.0		Peat and decayed vegetation	OL						
		2.0	44.0		For Shelby Tube Samples			4	US	10.0	12.0	
		44.0	46.0	30	Sand, fine to medium grained, poorly graded, some angular rock fragments.	SM		5	US	20.0	22.0	
		49.0	51.0		Same as above, very dense.							
15	1208	0.0	1.5		Muck-Free Water at 2.0 feet	OL						
		1.5	4.0		Coarse sand w/gravel, silty & W/organic traces.	SM						
		4.0	6.0	4	Very fine grained sand and/or coarse silty, traces of muscovite, no coarse fraction.	ML						
		10.0	12.0	5	Same as above	ML						
		15.0	17.0	6	Same as above	ML						
		20.0	22.0	5	Same as above	ML						
		25.0	27.0	6	Same as above	ML						
		30.0	31.0	8	Same as above	ML						
		31.0	32.0	16	Coarse sand with pebbles w/very high % silt,	SM-						
					increase density	ML						

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* Disturbed-undisturbed-rock core. † Percent sample recovery.

1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples
Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location West Side Brook - Norfolk Owner State Conn.

Watershed Blackberry River Sub-watershed Site No. 5

Logged by N. M. Brown Date May 1960 Project: WP1 WP2 X FP Pub. 46

Drilling Equipment 2 Acker Drills Location of Holes Centerline

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. % †
15	1208	35.0	37.0	42	Sand, fine grained, poorly graded, decomposed schist fragments, dense							
15A	1208	0.0	35.0		For Shelby Tube Samples			1	US	5.0	7.0	
		35.0	37.0	77	Sand, fine to medium grained, very silty, some fragmental rock	SM		2	US	15.0	17.0	
								3	US	25.0	27.0	
		40.0	42.0	123	Split spoon sampler at refusal - Sample from open-end sampler Same as above but very dense.	SM						
16	1207	0.0	1.0		Muck - Free Water	OL						
		1.0	2.0		Very fine grained with abundant organic material associated.	OL & SM						
		2.0	4.0	3	Sand, fine to medium grained, micaceous, poorly graded, some pebbles.	SM						
		4.0	6.0	4	Same as above	SM-ML						
		6.0	8.0	5	Very fine grained sand and/or coarse silt, some muscovite.	ML						
		8.0	10.0	6	Same as above	ML						

* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples
Other copies as directed by State Conservationist.

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Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location West Side Brook - Norfolk Owner _____ State Conn.

Watershed Blackberry River Sub-watershed _____ Site No. 5

Logged by W. M. Brown Date May 1960 Project: WP1 ___ WP2 X FP ___ Pub. 46

Drilling Equipment 2 Acker Drills Location of Holes Centerline

Hole No.	Station and Surface Elev	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. † %
16	1207	15.0	17.0	8	Same as above	ML						
		20.0	22.0	9	Same as above	ML						
		25.0	27.0	10	Sand, very fine grained, poorly graded, some fragmental rock.	SM-ML						
		30.0	32.0	11	Same as above	SM-ML						
17	1206	0.0	0.7		Muck - Free Water	OL						
		0.7	2.0		Fine silty sand with gravel	SM						
		2.0	4.0	13	Sand, fine to medium grained, poorly graded, brown, micaceous, no coarse fraction.	SM						
		4.0	6.0	11	Same as above with increase in coarse material, some fragmental rock.	SM						
		6.0	8.0	15	Sand, gray, better grading, some coarse sand, and fragmental rock.	SM						
		8.0	10.0	12	Silt, gray	ML						
		15.0	17.0	6	Same as above	ML						
		20.0	22.0	9	Sand, fine to medium grained, some coarse sand, fragmental rock, pebbles.	SM-ML						

* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

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Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location West Side Brook - Norfolk Owner _____ State Conn.

Watershed Blackberry River Sub-watershed _____ Site No. 5

Logged by M. M. Brown Date May 1960 Project: WP1 ____ WP2 X FP ____ Pub. 46 ____

Drilling Equipment 2 Acker Drills Location of Holes Centerline

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	RPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. % †
17	1206	25.0	27.0	21	Same as above with less coarse fraction	SM-ML						
18	1206	0.0	1.0		Muck - Free WATER	OL						
		1.0	2.0		Fine to medium sand, poorly graded, some organic material, gravel	SM						
		2.0	4.0	3	Same as above	SM						
		4.0	6.0	4	Same as above, more oxidation, no organic traces	SM						
		6.0	8.0	6	Sand, fine to medium grained, pebbles and rock fragments.	SM						
		8.0	10.0	6	Sand, very fine grained and/or coarse grained silt, gray.	ML						
		15.0	17.0	8	Same as above.	ML						
		20.0	22.0	9	Same as above, becomes coarser at 23.0 feet.	ML						
		25.0	27.0	14	Sand, silty, fragmental rock, poorly graded,	ML						
					Note: Driller log indicates a lithology at 26.7 feet where a fine grained sand was entered.							

* Disturbed-undisturbed rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples
Other copies as directed by State Conservationist.

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Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner _____ State Conn.

Watershed Blackberry River Sub-watershed _____ Site No. 5

Logged by W. M. Brown Date May 19 60 Project: WP1 ___ WP2 X FP ___ Pub. 46 ___

Drilling Equipment Acker Drills Location of Holes Centerline - Left Abutment

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	RPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. † %
S-19	1206	0.0	2.0		Black organic muck	OL						
		2.0	4.0	3	Sand - fine to medium grained, brown-gray,	OL-						
					micaceous, trace or organic material	SM						
		4.0	6.0	3	Same as above.	OL-SM						
		6.0	8.0	4	Same as above.	SM						
		8.0	10.0	5	Silt	ML						
		10.0	12.0	7	Silt	ML						
		15.0	17.0	9	Silt	ML						
		20.0	22.0	10	Silt	ML						
		25.0	27.0	11	Sand, fine to medium grained, gray. Angular	SM						
					fragmental rock. Some pebble sizes.							
		30.0	32.0	13	Same as above, but less coarse.	SM						

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* Disturbed-undisturbed-rock core † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner State Conn.

Watershed Blackberry River Sub watershed Site No. 5

Logged by W. M. Brown Date May 19 60 Project: WP1 WP2 X FP Pub 46

Drilling Equipment Acker Drills Location of Holes Centerline - Left Abutment

Hole No	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.		Description of Materials	Unif. Soil Class Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. † %
S-20	1207	0.0	5.0		Muck, water, decayed vegetation	OL						
		5.0	7.0	2	Sand - poorly graded silty, fine to medium grained, organic trace	OL & SM						
		10.0	12.0	12	Very fine sand, or coarse silt. Some pebbles	ML						
		15.0	17.0	13	Same as above with no pebbles.	ML						
		20.0	22.0	15	Same as above.	ML						
		25.0	27.0	15	Same as above with fragments at 26.5' and sand.	ML						
		30.0	32.0	15	Sand - fine to medium grained, silty, poorly graded, some mica and fragmental rock.	SM						
		35.0	37.0	17	Sand - fine to medium grained, poorly graded.	SM						

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* Disturbed-undisturbed-rock core † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples
Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

Form SCS-533
Rev. Dec 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner State Connecticut

Watershed Blackberry River Sub-watershed Site No. 5

Logged by W. M. Brown Date May 1960 Project: WP1 WP2 X FP Pub 46

Drilling Equipment Acker Drills Location of Holes Emergency Spillway - Right Side

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class Symb.	Type Bit Used	Samples No	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec † %
S-201	1240.5	0.0	2.0		Water at 2.0'.	SM						
		2.0	4.0	13	Sand-silty, fine grained, poor grading. Muscovite. Some rock fragments (less than 5%)	SM						
		4.0	6.0	18	Same as above with flakes of mica. Some ML of SM.	SM						
		6.0	8.0	32	Sand-well graded, fine to coarse grained, Muscovite flakes.	SW						
		8.0	10.0	13	Same as above.	SW						
		10.0	12.0	15	Same as above.	SW						
		15.0	17.0	36	Sand-fine to medium grained, poorly graded, Muscovite. Pebble inclusions.	SP						
		20.0	22.0	87	Sand-silty, fine grained. Pebble inclusions.	SM-ML						
		26.0	28.0	89	Same as above with more fragmental rock	SM-ML						
		28.0	28.5	O.E.*	Same as above.	SM-ML						
S-202	1239.6	0.0	2.0		Topsoil	SM						
		2.0	4.0	29	Sand-fine grained, poorly graded. Muscovite. Angular pebbles 2-5%. Fairly dense for this depth.	SP-SM						

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* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples
Other copies as directed by State Conservationist.
* Open End

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Rev. Dec. 58

LOG OF TEST HOLES

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner State Connecticut

Watershed Blackberry River Sub-watershed Site No 5

Logged by W. H. Brown Date May 19 60 Project: WP1 WP2 X FP Pub. 46

Drilling Equipment Acker Drills Location of Holes Emergency Spillway - Right Side

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class Symb	Type Bit Used	Samples No	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec % †
		4.0	6.0	26	Sand - same as above with more rounded fragmental quartz rock and pebbles. Water at 5.0'.	SP-SM						
		6.0	8.0	6	Sand-fine grained with some coarse fraction. Percentage of pebbles and silt is higher.	SM						
		8.0	10.0	64	Sand-very dense, fine grained, angular pebbles, some oxidized decomposed rock.	SM						
		15.0	17.0	54	Sand-fine to medium grained with some very coarse grained sand, predominantly poorly graded.	SP-SM						
		20.0	22.0	68	Sand-fine grained, dense, angular pebble inclusions Poorly graded. Trace of Muscovite.	SP-SM						
		25.0	27.0	89	Sand, well graded, grains angular. Some fine grained compact lenses. Muscovite.	SW-SM						
		30.0	32.0	97	Sand-fine grained, dense. Abundant fragmental pebbles and other rock inclusions. Much decomposed rock.	SP						
S-203	1232.8	0.0	2.0		Topsoil	SM						
		2.0	4.0	39	Sand-silty, pebbles and fragmental rock. Mica. Water at 4.0'.	SM						

* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

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Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner State Connecticut

Watershed Blackberry River Sub-watershed Site No. 5

Logged by H. M. Brown Date May 19 60 Project: WP1 WP2 X FP Pub. 46

Drilling Equipment Acker Drills Location of Holes Emergency Spillway - Right Side

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. † %
		4.0	6.0	14	Same as above.	SM						
		6.0	8.0	38	Sand - fine grained, dense, poorly graded, pebbles and rock fragments.	SM						
		8.0	10.0	38	Same as above.	SM						
		10.0	12.0	15	Same as above but less fines	SP-SM						
		15.0	17.0	34	Same as above but with some decomposed mica schist.	SP-SM						
		20.0	22.0	57	Same as above but with pebbles and more fines	SM						
		25.0	27.0	76	Same as above.	SP						
S-204	1232.4	0.0	2.0		Topsoil	SM						
		2.0	4.0	39	Sand - well oxidized, fine grained, poorly graded. Muscovite and subround quartz rock to 3/4".	SM						
		4.0	6.0	62	Same as above but with larger quartz fragments. Some biotite.	SM						
		6.0	8.0	44	Sand, well graded(with some lenses of the above), oxidized. Some fragmental mica schist & decomposed rock.	SW-SM						
		8.0	10.0	25	Sand-poorly graded with some coarse fraction. Decomposed rock, pebbles and mica.	SP-SM						

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* Disturbed-undisturbed-rock core. †, Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

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LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner State Connecticut

Watershed Blackberry River Sub-watershed Site No. 5

Logged by W. M. Brown Date May 19 60 Project: WP1 ___ WP2 X ___ FP ___ Pub. 46 ___

Drilling Equipment Acker Drills Location of Holes Emergency Spillway - Right Side

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec %
		10.0	12.0	38	Sand, fine grained, silty, dense. Pebbles in matrix. Some decomposed fragmental rock.	SM						
		15.0	17.0	36	Sand - fine to medium grained, much higher percentage of coarse material; predominately poorly graded.	SP-SM						
		20.0	22.0	61	Sand-fine grained, dense. Angular pebbles are abundant throughout.	SM						
		26.0	28.0	71	Sand same as above. Very dense. Decomposed mica schist. Sample from O.E.	SM						
S-205	1231.5	0.0	2.0		Topsoil	SM						
		2.0	4.0	53	Sand, silty, fine grained, poorly graded, dense. Pebble inclusions - 20%.	SM						
		4.0	6.0	47	Same as above with somewhat better grading. More Muscovite and fragmental, angular, quartz rock.	SM						
		6.0	8.0	11	Water bearing sand, fine grained, poorly graded, pebbles and silt.	SM						
		8.0	10.0	24	Sand, fine grained, poorly graded, fragmental pebbles.	SM						

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* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner State Connecticut

Watershed Blackberry River Sub-watershed Site No. 5

Logged by W. M. Brown Date May 19 60 Project: WP1 WP2 X FP Pub. 46

Drilling Equipment Acker Drills Location of Holes Emergency Spillway - Right Side

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.		Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. † %
		10.0	12.0	35	Same as above with decomposed schist.	SM						
		15.0	17.0	40	Same as above less schist.	SM						
S-206	1242.9	0.0	2.0		Topsoil	SM						
		2.0	4.0	37	Sand, silty, fine to medium grained, poorly graded. Mica. Fragmental rock 15-20%.	SM						
		4.0	6.0	34	Same as above	SM						
		6.0	8.0	6	Same as above but no coarse fraction. Water Bearing. Micaceous.	SM						
		8.0	10.0	4	Same as above. Coarse fraction at 10.0'.	SM						
		10.0	12.0	37	Sand - fine to medium grained, poorly graded. Very micaceous. Abundant gravel sizes up to 3/4".	SP-SM						
		15.0	17.0	64	Sand - fine to medium grained, very dense, pebbles and fragmental rock in matrix.	SP-SM						
		20.0	22.0	65	Same as above but with less fines.	SP-SM						
		25.0	27.0	63	Same as above with biotite mica schist	SP-SM						
		30.0	32.0	76	O.E. * Same as above	SP-SM						

* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.
* Open End

Sheet ___ of ___ Sheets

Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location: Norfolk — Owner: — State: Connecticut

Watershed: Blackberry River — Sub-watershed: — Site No.: 5

Logged by: W. M. Brown — Date: May 19 60 — Project: WP1 — WP2 X — FP — Pub. 46

Drilling Equipment: Acker Drills — Location of Holes: Emergency Spillway - Right Side

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. † %
5-207	1238	0.0	2.0		Topsoil	SM						
		2.0	4.0	14	Sand, fine grained, silty, decomposed schist fragments with abundant mica. Quartz fragments and pebbles. Water at 3.0'.	SM						
		4.0	6.0	15	Sand, fine grained, poorly graded, Mica. Some rounded quartz fragments and decomposed pebbles.	SM						
		6.0	8.0	16	Sand, fine grained, silty, some quartz pebble inclusions, poorly graded.	SM						
		8.0	10.0	19	Sand, fine to medium grained, pebbles, some decomposed schist.	SP-SM						
		10.0	12.0	19	Same as above, less decomposed material	SP-SM						
		12.0	14.0	19	Same as above.	SP-SM						
		14.0	16.0	26	Same as above but with less fines. Muscovite.	SP						
		20.0	22.0	43	Same as above.	SP						
		25.0	27.0	69	Sand, fine grained, poorly graded, fragmental pebbles and rock.	SM						
		30.0	32.0	88	Same as above but more dense.	SM						

* Disturbed-undisturbed-rock core. † Percent sample recovery.
4 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

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Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner State Connecticut

Watershed Blackberry River Sub-watershed Site No. 5

Logged by W. M. Brown Date May 19 60 Project: WP1 WP2 X FP Pub. 46

Drilling Equipment Acker Drills Location of Holes Emergency Spillway - Right Side

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type	Samples From Ft.	Samples To Ft.	Samples Rec. %
S-208	1228	0.0	2.0		Topsoil	SM						
		2.0	4.0	15	Sand, fine to medium grained, poorly graded. Traces of mica. Some decomposed rock, pebble size inclusions.	SP-SM						
		4.0	6.0	14	Same as above, but with more fines	SM						
		6.0	8.0	13	Same as above with rounded 3/4" quartz pieces.	SM						
		8.0	10.0	17	Same as above.	SM						
		10.0	12.0	18	Same as above with high percent of more plastic fines.	SM-ML						
		12.0	14.0	56	Sand, fine to medium grained, poorly graded, decomposed rock.	SP-SM						
		14.0	16.0	97	Same as above. Sand- fine grained.	SP-SM						
		20.0	22.0	95	Same as above.	SP-SM						
		25.0	27.0	119	Same as above.	SP-SM						
		30.0	32.0	152	Same as above, with some coarse sand. Sample from O.E.*	SP-SM						

* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.
* Open End

Sheet ___ of ___ Sheets

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Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner State Connecticut

Watershed Blackberry River Sub-watershed Site No. 5

Logged by W. M. Brown Date May 1960 Project: WP1 WP2 X FP Pub. 46

Drilling Equipment Acker Drills Location of Holes Housatonic Spillway - Right Side

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. † %
S-301	1205	0.0	4.0		Muck, water, decayed vegetation	OL						
		4.0	6.0	26	Sand, fine to medium grained, grains angular, poorly graded, silt, some organic traces and odors.	OL&SM						
		6.0	8.0	11	No sample.							
		8.0	10.0	13	Sand, fine grained, silty, some angular quartz fraction. Some rock fragments.	SM						
		15.0	17.0	34	Same as above without coarse fraction.	SM						
		20.0	22.0	34	Same as above with some pebble inclusions.	SM						
		25.0	27.0	40	Same as above with some rock fragments.	SM						
S-302	1205	0.0	4.0		Water, muck, vegetation.	OL						
		4.0	6.0	5	Sand, micaceous, poorly graded, silty, fine to medium grained, some organic material and color.	OL&SM						
		6.0	8.0	11	Sand, fine grained, very silty, poorly graded. Mica, some fragmental inclusions and decomposed gneiss.	SM						
		8.0	10.0	12	Same as above.	SM						
		10.0	12.0	13	Same as above.	SM						

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* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner _____ State Connecticut

Watershed Blackberry River Sub-watershed _____ Site No. 5

Logged by W. N. Brown Date May 1960 Project: WP1 ____ WP2 X FP ____ Pub. 46

Drilling Equipment Acker Drills Location of Holes Principal Spillway

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. † %
		12.0	14.0	15	Sand - coarser, fine-medium grained, poorly graded, micaceous, some angular quartz grains.	SM						
		14.0	16.0	23	Sand-silty, finer grained, poor grading, pebble fraction.	SM						
		16.0	18.0	38	Same as above.	SM						
		21.0	23.0	29	Same as above with quartzitic fragments.	SM						
		26.0	28.0	44	Sand-fine to medium grained, angular, poorly graded.	SM						
		31.0	33.0	46	Same as above but finer grained.	SM						
S-303	1205	0.0	4.0		Water, muck, vegetation.	OL						
		5.0	7.0	32	Sand, very fine grained, very silty, some coarse sand 5-10%.	SM						
		7.0	9.0	17	Same as above with some 1/2" gravel sizes - 5%, Pebbles.	SM						
		9.0	11.0	26	Same as above.	SM						
		11.0	13.0	16	Same as above.	SM						
		13.0	15.0	22	Sand-fine grained, high percent of silt, poorly graded.	SM						

B-37

* Disturbed-undisturbed rock core † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner State Connecticut

Watershed Blackberry River Sub-watershed Site No. 5

Logged by W. M. Brown Date May 19 60 Project: WP1 WP2 X FP Pub. 46

Drilling Equipment Acker Drills Location of Holes Principal Spillway

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	BPF	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. † %
S-303	1205	20.0	22.0	32	Same as above.	SM						
		25.0	27.0	43	Sand-better grading, fine to medium grained, more coarse fraction, some gravels.	SM						
		30.0	32.0	49	Same as above but with less coarser fraction and sand is fine grained.	SM						
S-304	1205	0.0	4.0		Water, muck, vegetation.	OL						
		4.0	6.0	14	Sand-silty, poorly graded, fine to medium grained. Muscovite - Unit continues to 6' or 7'.	SM						
		6.0	8.0	20	Sand, very fine grained, silty, some rounded gravels.	SM						
		8.0	10.0	13	Same as above.	SM						
		10.0	12.0	32	Same as above.	SM						
		12.0	14.0	33	Sand, silty, coarser fraction and almost well graded.	SM						
		16.0	18.0	50	Same as above with some 1/1 angular quartz fragments.	SM						
		21.0	23.0	49	Sand, very fine grained, dense, very silty, quartzitic inclusions.	SM						

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* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet 1 of Sheets

Form SCS-533
Rev. Dec. 58

LOG OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Location Norfolk Owner State Connecticut

Watershed Blackberry River Sub-watershed Site No. 5

Logged by W. M. Brown Date May 19 60 Project: WP1 WP2 X FP Pub. 46

Drilling Equipment Acker Drills Location of Holes Principal Spillway

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.		Description of Materials	Unif. Soil Class Symb.	Type Bit Used	Samples No.	Samples Type	Samples From Ft.	Samples To Ft.	Samples Rec. % †
		26.0	28.0	92	Same as above but very dense.	SM						
S-305	1205	0.0	5.0		Muck and Water	OL						
		5.0	7.0	9	Sand, fine to medium grained, micaceous, poor grading, no significant coarse fraction.	SP-SM						
		7.0	9.0	10	Sand - same as above - pebble size inclusions, in matrix.	SP-SM						
		9.0	11.0	22	Sand - same as above except coarser, more fines and better grading.	SM						
		11.0	13.0	27	Same as above minus the coarse fraction, some subround quartz fragments.	SM						
		13.0	15.0	29	Same as above.	SM						
		20.0	22.0	28	Same as above.	SM						
		25.0	27.0	62	Same as above but much denser. Fragmental schist and gneiss.	SM						

* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

H. W. Kenty

T. R. Wire, State Conservation Engineer, SCS, Storrs, Connecticut

April 24, 1962

Roy S. Decker, Head, Soil Mechanics Laboratory, SCS, Lincoln, Nebraska

Engineering Data - Design

Connecticut WF-2, Blackberry River, Site No. 5

ATTACHMENTS

1. Form SCS 354, Soil Mechanics Laboratory Data, 1 sheet.
2. Form SCS 355, Triaxial Shear Test Data, 2 sheets.
3. Form SCS 352, Compaction and Penetration Resistance Report, 1 sheet.
4. Form SCS 353, Filter Material, 1 sheet.
5. Form SCS 357, Summary - Slope Stability Analysis, 1 sheet.
6. Geological Plans and Profiles.

DISCUSSION

W.B.

FOUNDATION:

A. Classification: Foundation materials consist of lacustrine sands and silts ranging from SP-SM to fine grained non-plastic silts classed as ML.

The lacustrine sediments on the left abutment and the flood plain are mantled with up to 4 feet of highly organic material classed in the field as OL.

The fine grained silts underlie the left abutment and approximately the left half of the flood plain. The right side of the flood plain and the right abutment consist primarily of sandy material in the SM and SP range.

B. Density: Standard penetration resistance tests indicate that the sandy material is dense to very dense with most tests in the range of 20 blows/foot or higher. The general range of blow count in the ML material was 4 to 6 blows/foot.

Under the fill height planned, the sandy material can be considered as non-yielding.

Core samples submitted from the non-plastic ML zone had densities in the range of 1.6 to 1.7 gm/cc. The gradation and plasticity of the core samples submitted differ somewhat from the average lacustrine sediments at Site 9 on this watershed as reported by Moran Proctor Mueser and Rutledge. Core samples from Site No. 9 submitted to this

Laboratory contained some silty strata that were very comparable to the materials on this site. The density of the silty stratum in the core samples from Site 9 is in the same range as the ML at this site. The more plastic varves or stratum had densities in the range of 1.35 gm/cc.

C. Shear Strength: Consolidated, undrained shear tests were made on the cores submitted and were reported in the preliminary report. The consolidated shear strength of the non-plastic silt is high. Our estimate of the consolidated strength for this stratum is $\phi = 41.5°$ and $c = 300$ p.s.f. The basis for this estimate is shown on the attached Forms SCS 355. The failure envelope was obtained on a sample from Site No. 9, which was very similar to the samples from this site.

The consolidated strength is more than adequate for the height of fill planned. The amount of consolidation that will occur during construction is very questionable, however. It is, therefore, suggested that the unconsolidated strength be used as a basis for design.

Unconsolidated shear strength of $\phi = 0$, $c = 1000$ p.s.f. was suggested by the consulting firm for the lacustrine sediments at Blackberry River, Site No. 9. Numerous unconfined compression tests were made in the Laboratory recently on lacustrine sediments from Massachusetts that had gradation and density very similar to the core samples from this site. The average shear strength from these tests was $\phi = 0$, $c = 1000$ p.s.f.

Based on present information and the tests referred to above, we suggest design values of $\phi = 0$, $c = 1000$ p.s.f. for the non-plastic silts at this site also.

D. Consolidation: Three consolidation tests were made on the core samples. The data obtained was included in the preliminary report.

As a basis for estimating consolidation, the percent consolidation curve of the Laboratory samples were used. The average of the three tests was used; and since no correction for preconsolidation or rebound was made, the estimate should represent a maximum. Estimated consolidation potential of the non-plastic silts is 1% under the fill height planned.

Based on this estimate, the total consolidation potential of the ML stratum will be less than 0.3 foot.

With the low consolidation potential indicated, differential settlement should not endanger the embankment.

EMBANKMENT:

A. Classification: One borrow sample was submitted to the Laboratory and sieve analysis was made on three samples in the field. The materials range from medium grained SM to SM-SP.

3 -- T. R. Wire -- 4/24/62
Rey S. Decker
Subj: Connecticut WP-2, Blackberry River, Site No. 5

B. Compacted Density: Standard Proctor compaction tests made in the field showed compacted densities of 123.2 to 125.6 p.c.f. A Standard compaction test was made on the Laboratory sample and the density obtained was 121.5 p.c.f. The lower density on the Laboratory sample can be attributed to the finer gradation.

C. Shear Strength: Shear strength of the sandy material at this site is expected to be similar to Samples 62W2603 and 2604 from Site No. 15 on this watershed. The shear strength of 62W2603 and 2604 was $\phi = 30°$, $c = 0$.

SLOPE STABILITY:

The stability of the downstream slope was checked with a Modified Swedish Circle Method of Analysis. Unconsolidated strength of $\phi = 0$, $c = 1000$ p.s.f. was used for the foundation. A drain was considered at $c/b = 0.6$. With these conditions a factor of 1.86 was obtained for a 2:1 downstream slope.

Failure in the upstream slope under rapid drawdown would occur as shallow surface slides in non-cohesive soils. For this reason, the infinite slope analysis was used to check stability of the upstream slope. A factor of safety of 1.03 was obtained for a 3 1/2:1 slope, considering horizontal flow lines.

RECOMMENDATIONS

A. Site Preparation: The shear strength of the OL surface soil is expected to be very low and the consolidation potential will probably be high. We suggest that this material be removed.

B. Cutoff Trench: A shallow cutoff trench is recommended. The trench should be backfilled with the least pervious material available. The backfill should be compacted to a minimum of 95% of Standard Proctor.

C. Principal Spillway: Foundation conditions at the proposed location appear to be quite uniform. The surface 3 or 4 feet is organic muck. The muck is underlain by sandy material classed primarily as SM.

After removal of the muck as discussed under site preparation, we recommend that the conduit trench be excavated to elevation 1193. Below this depth, the blow count exceeds 11 blows/foot and very little, if any, consolidation would be expected under the low fill planned.

D. Drain: A foundation drain is recommended. A pipe and filter drain should be adequate. The drain should be located at about $c/b = 0.6$ and extend up the abutments to normal pool level.

Some stratification is evident in the foundation. It appears, however, that a drain trench about 6 feet to 8 feet deep will be adequate.

4 -- T. R. Wire -- 4/24/62
Rey S. Decker
Subj: Connecticut WP-2, Blackberry River, Site No. 5

The suggested filter gradation is shown on the attached Form SCS 353. Due to the presence of some silts, it may be well to stay on the fine side of these limits.

E. Settlement: An allowance of 3 percent of the embankment height is suggested for residual consolidation in the fill and foundation.

F. Selection of Material: The emergency spillway excavation will provide most of the embankment material. The material ranges from a fine grained SM to SM-SP. We recommend selective placement during construction to use the finer material like Sample 62W2937 in the center section with the coarser sands placed in the shell sections. All materials should be placed at a minimum of 95% of Standard Proctor density.

G. Slopes: The following slopes are recommended:

Upstream: 3 1/2:1.

Downstream: 2:1 with a drain at c/b = 0.6.

H. Emergency Spillway: The ground water level is extremely high an an interceptor drain or some other measure will probably be required for protection of the cut slope.

Prepared by:

Lorn P. Dunnigan

Reviewed and Approved by:

Roland B. Phillips

Attachments

cc: T. R. Wire (1)
H. M. Kautz, Upper Darby, Pennsylvania ✓
M. Paul Tedrow, Storrs, Connecticut
W. M. Brown, Storrs, Connecticut

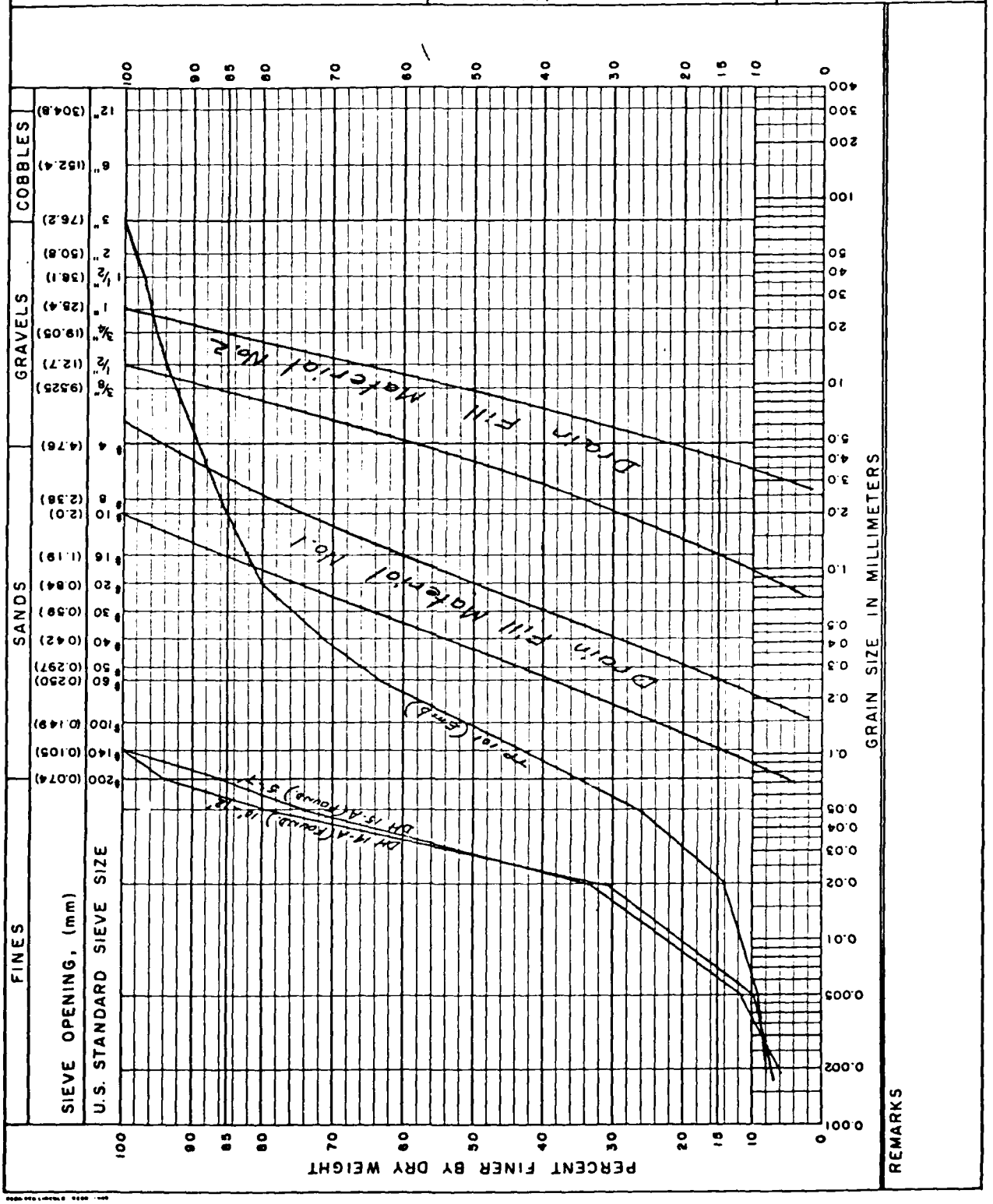
Form SCS 130a
5-65

1/10

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

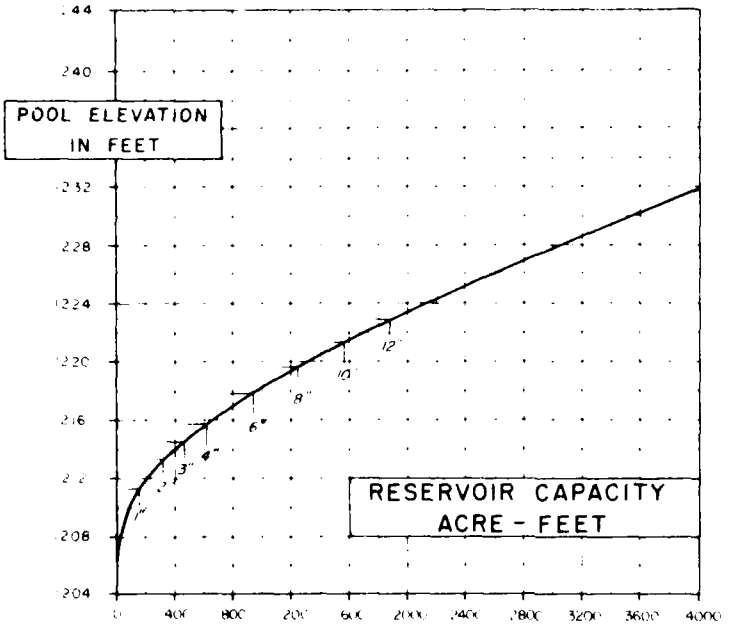
PROJECT and STATE: Blackberry River - Site #5 Connecticut CN411

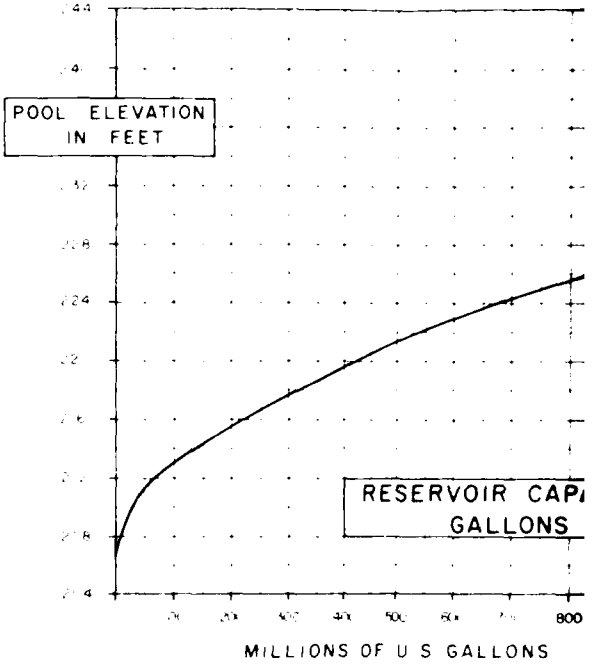
DESIGNED AT | BY: W. T. F. | DATE: 12-5-66

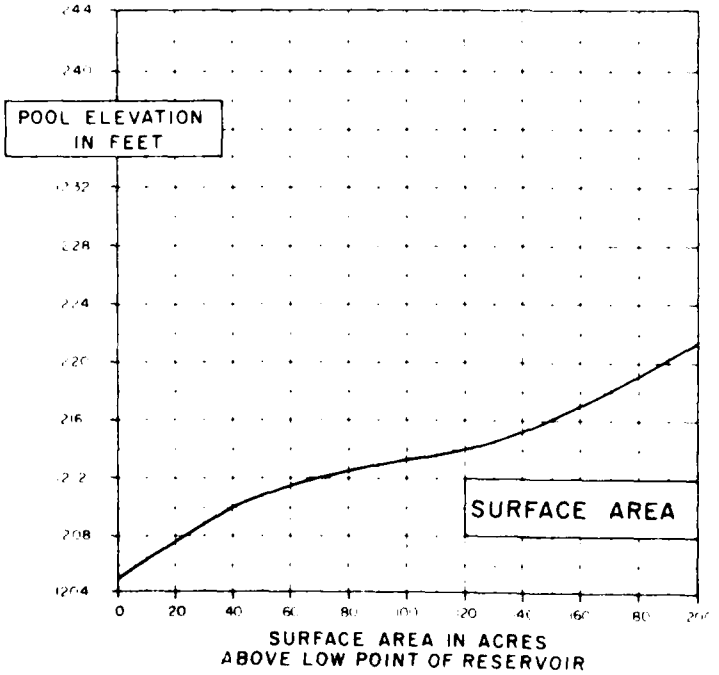


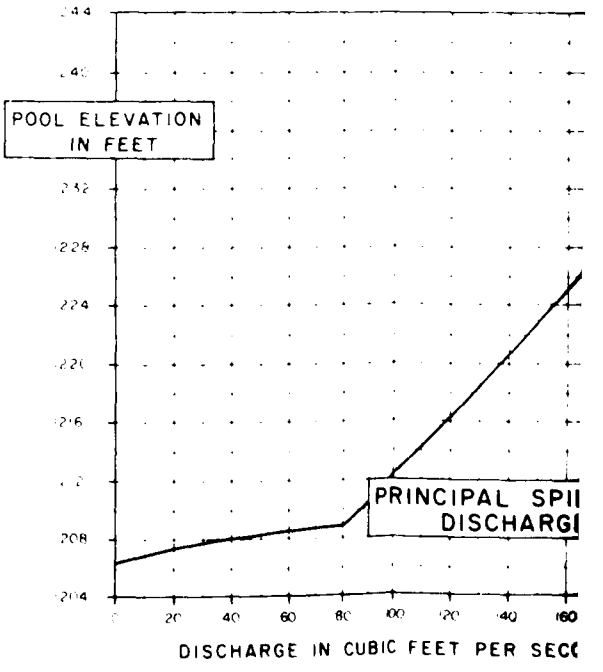
RESERVOIR OPERA

SITE NO. 5 - WEST SIDE RESERVOIR - BL



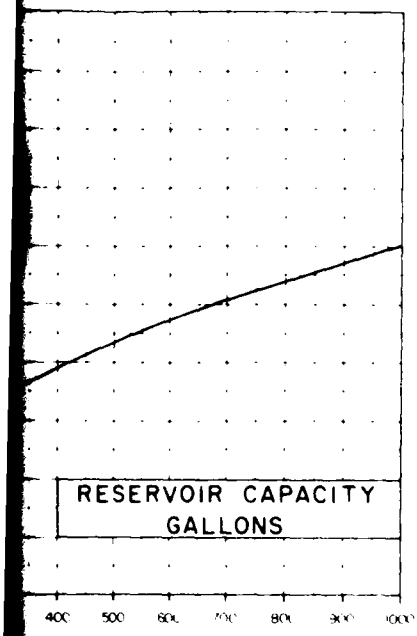




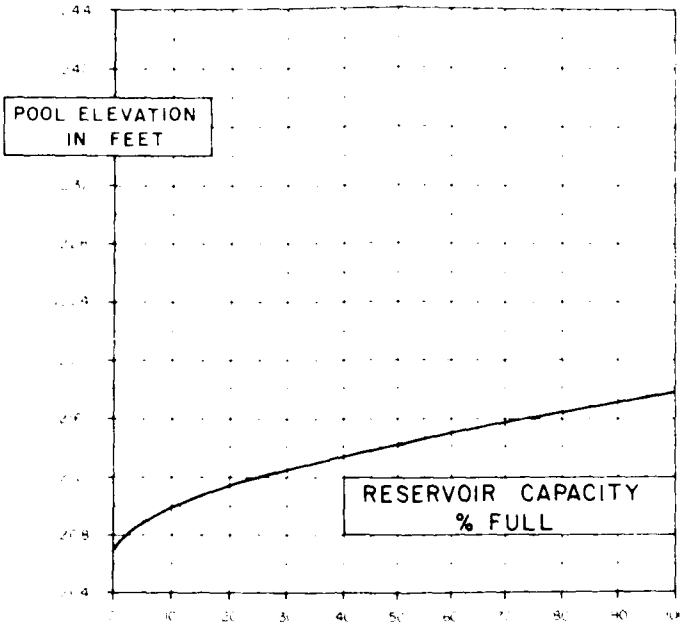


R OPERATION DATA

ESERVOIR - BLACKBERRY RIVER WATERSHED



ONS OF U S GALLONS



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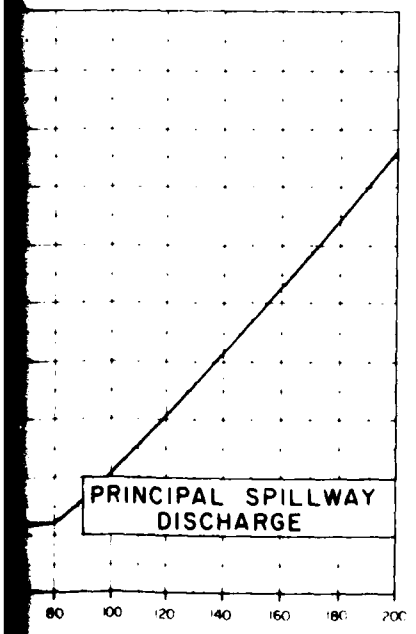

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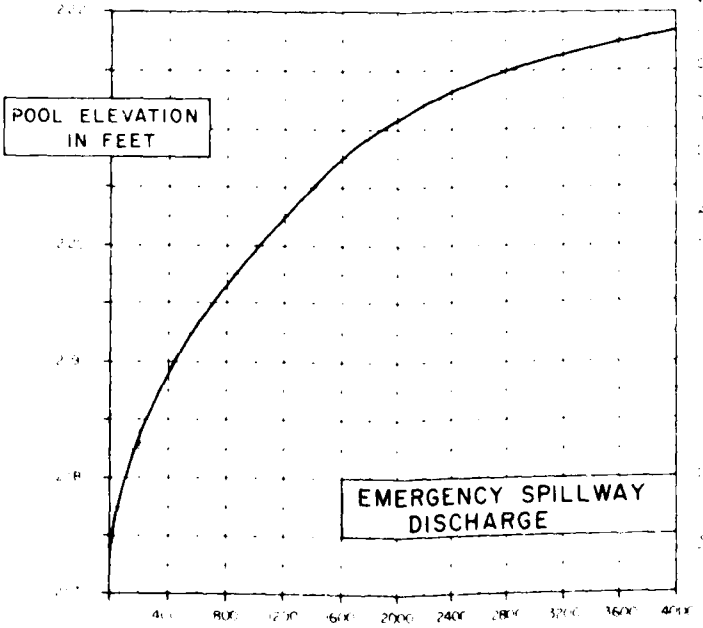


DISCHARGE IN CUBIC FEET PER SECOND

DAM

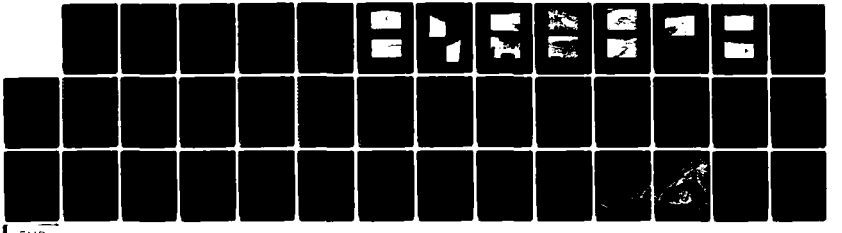
STATUS
UNDER DESIGN

Anderson Nichols Associates February

AD-A144 621 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
WEST SIDE DAM (CT 004..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV FEB 81

2/2

UNCLASSIFIED F/G 13/13 NL



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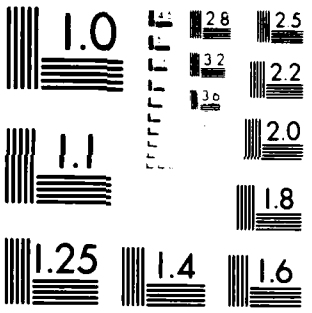
DATE FILMED
9-84
DTIC



WATER RESOURCES UNIT - D.E.P.

OPERATION AND MAINTENANCE INSPECTION REPORT

PROJECT: Norfolk - Childs Reservoir Site 5 DATE: August 13, 1979

INSPECTION PARTY: A. Cross, Soil Conservation Service; and A. Roberts, V. Galgowski, Department of Environmental Protection

ITEM	CONDITION S or U*	MAINTENANCE OR REPAIRS REQUIRED	DATE COMPLETED
I. Embankments			
A. Vegetation	S		
B. Rip rap	S		
C. Drains	S		
II. Principal Spillway			
A. Trash rack	S		
B. Gates	N/A		
C. Stilling basin	S		
D. Conduit	S		
III. Emergency Spillway			
A. Vegetation	S		
B. Obstructions	S		
IV. Outlet Channels			
A. Slope protection	S		
B. Debris	S		
V. Reservoir Area			
A. Debris	S		
B. Stop logs	N/A		
VI. Miscellaneous			
A. Access road	S		
B. Fences	S		

Remarks: Site in acceptable condition.

Inspected by: Victor F. Galgowski Title Supt. of Dam Maintenance

* S = Satisfactory
U = Unsatisfactory
NA = Not applicable

APPENDIX C

PHOTOGRAPHS

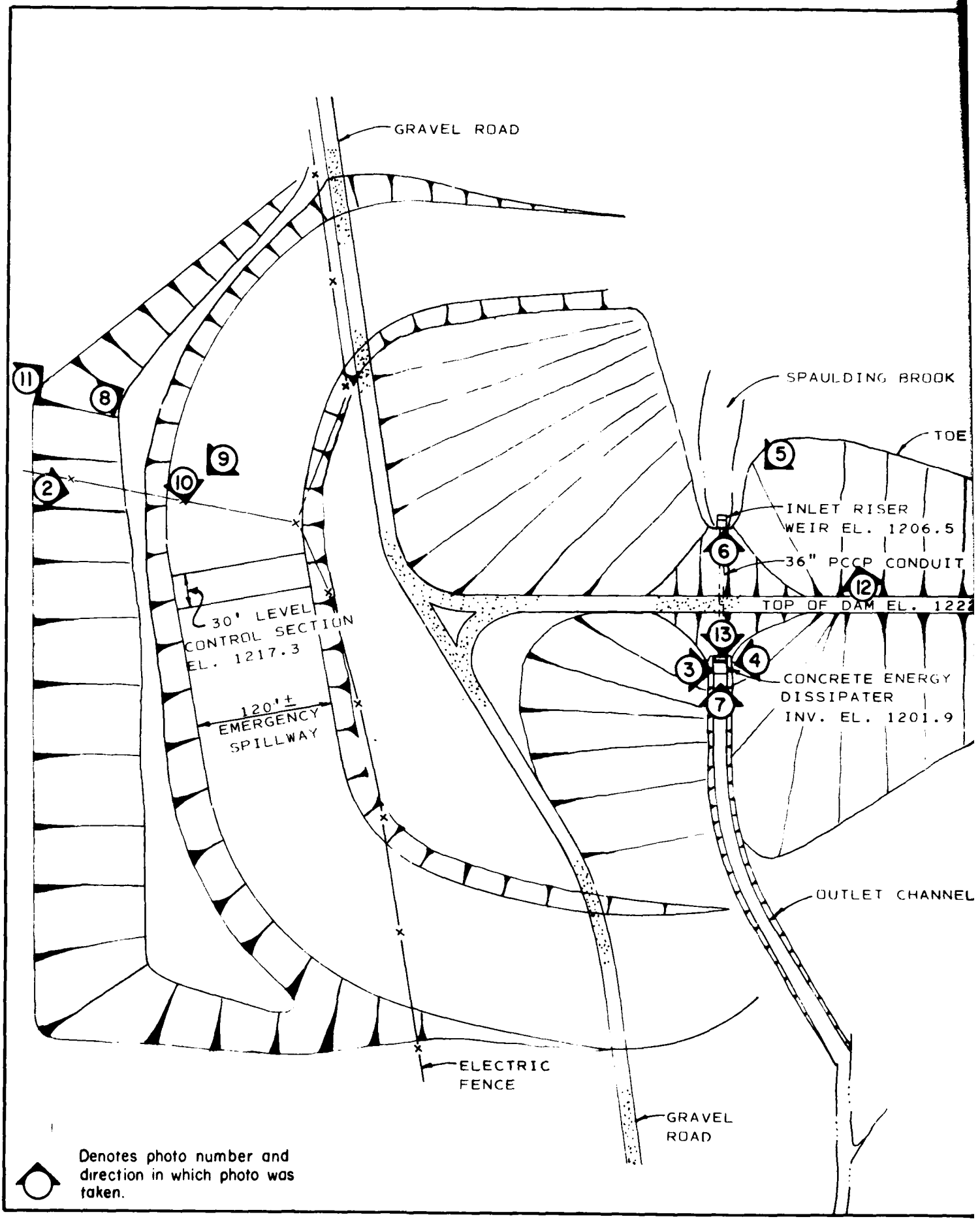
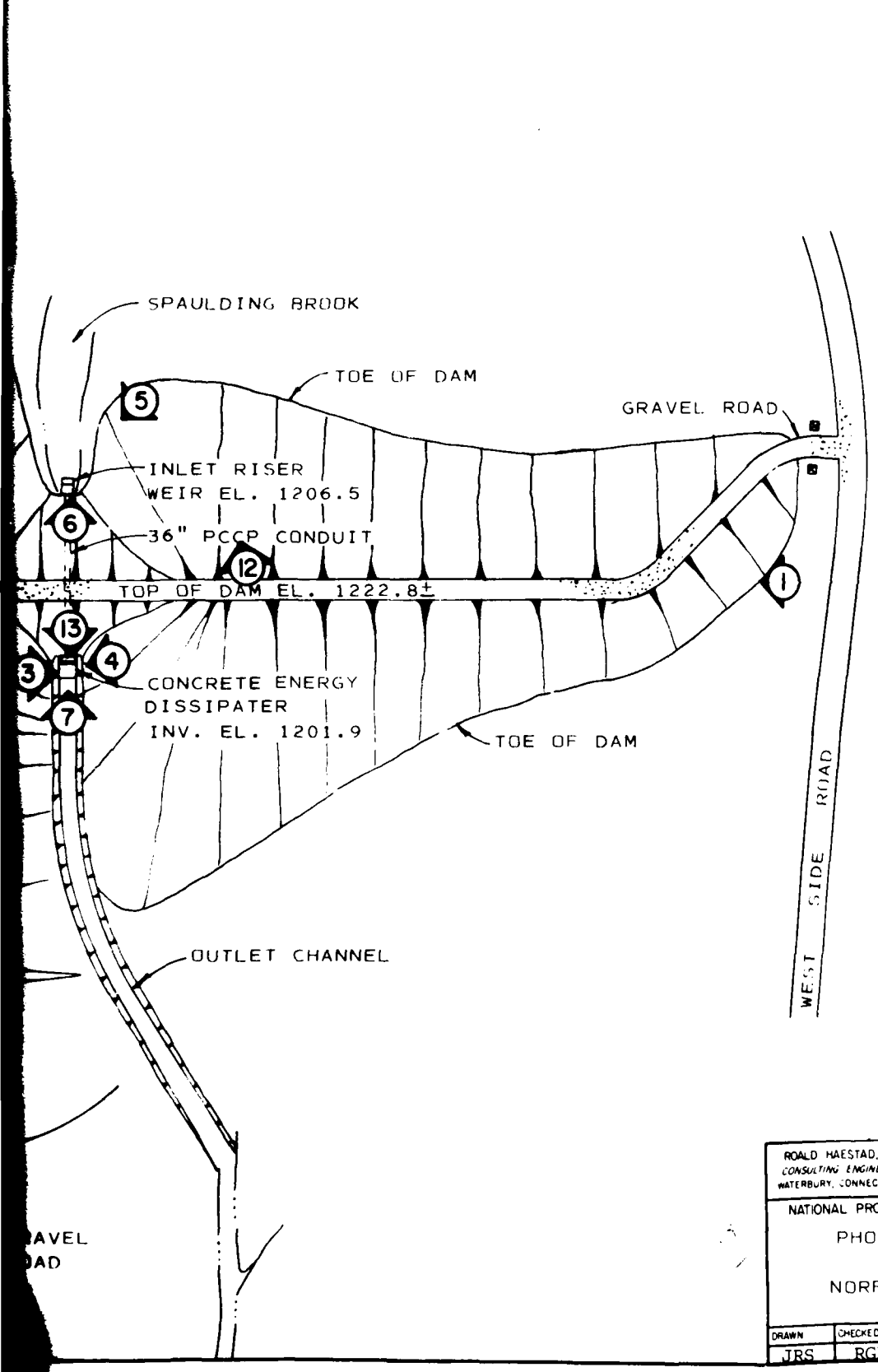

GRAVEL ROAD
SPAULDING BROOK
TOE
INLET RISER
WEIR EL. 1206.5
36" PCCP CONDUIT
TOP OF DAM EL. 122
30' LEVEL
CONTROL SECTION
EL. 1217.3
120'±
EMERGENCY
SPILLWAY
CONCRETE ENERGY
DISSIPATER
INV. EL. 1201.9
OUTLET CHANNEL
ELECTRIC
FENCE
GRAVEL
ROAD
Denotes photo number and direction in which photo was taken.

FIGURE 2



ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

PHOTO LOCATION PLAN
WEST SIDE DAM
NORFOLK, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALES 1" = 100'
JRS	RGL	RH	DATE 2/81 PAGE C-1

PHOTO NO. 1

DAM FROM LEFT ABUTMENT. EMERGENCY SPILLWAY AT FAR END. WHITE AREAS ARE EROSION AREAS REPAIRED WITH WHITE STONE.

PHOTO NO. 2

DAM AND EMERGENCY SPILLWAY FROM RIGHT ABUTMENT. NOTE CATTLE FENCE AND PONDING IN THE SPILLWAY.

U.S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WEST SIDE DAM BLACKBERRY RIVER NORFOLK, CONNECTICUT CT 00484 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

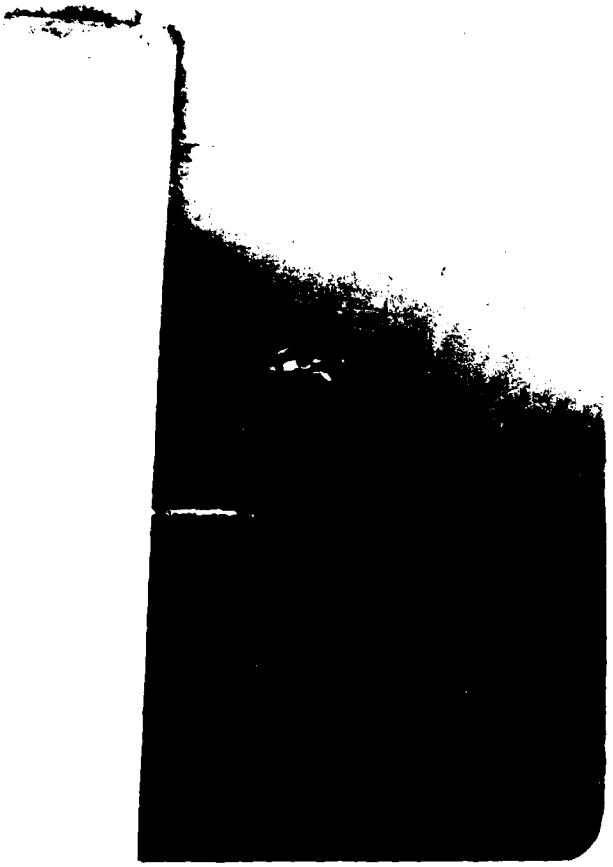


PHOTO NO. 3

LEFT TOE DRAIN DISCHARGING AT ENERGY DISSIPATOR. FLOW WAS ABOUT 1 GPM AND WAS CLEAR.

PHOTO NO. 4

RIGHT TOE DRAIN AT ENERGY DISSIPATOR. NOTE RUST STAINING, EVIDENCE OF PAST DISCHARGES.

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WEST SIDE DAM BLACKBERRY RIVER NORFOLK, CONNECTICUT CT 00484 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

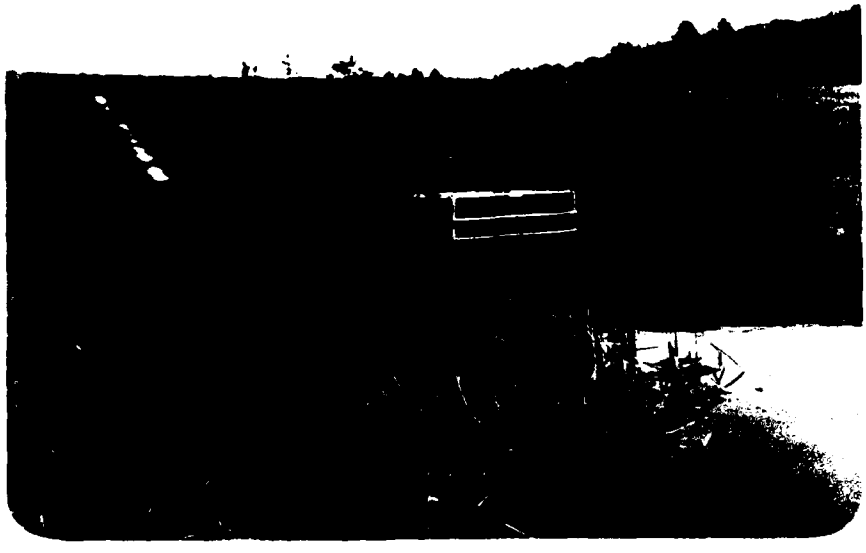


PHOTO NO. 5

REINFORCED CONCRETE DROP INLET WITH GALVANIZED STEEL TRASH RACK. NOTE CONCRETE WALK ON EMBANKMENT.

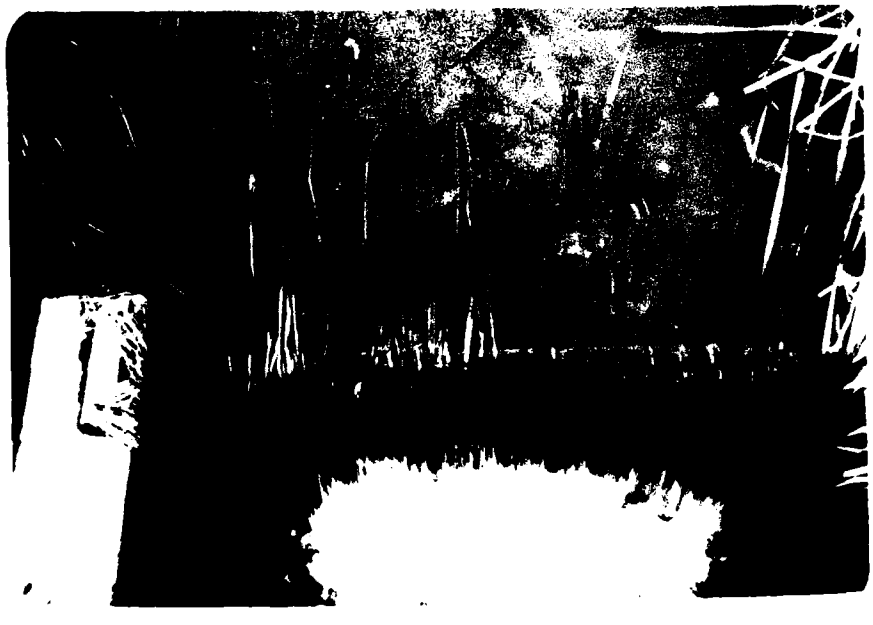


PHOTO NO. 6

FLASHBOARDS AT UPSTREAM END OF DROP INLET. NOTE SEDIMENT LEVEL ALMOST TO TOP OF FLASHBOARD.

US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WEST SIDE DAM BLACKBERRY RIVER NORFOLK, CONNECTICUT CT 00484 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

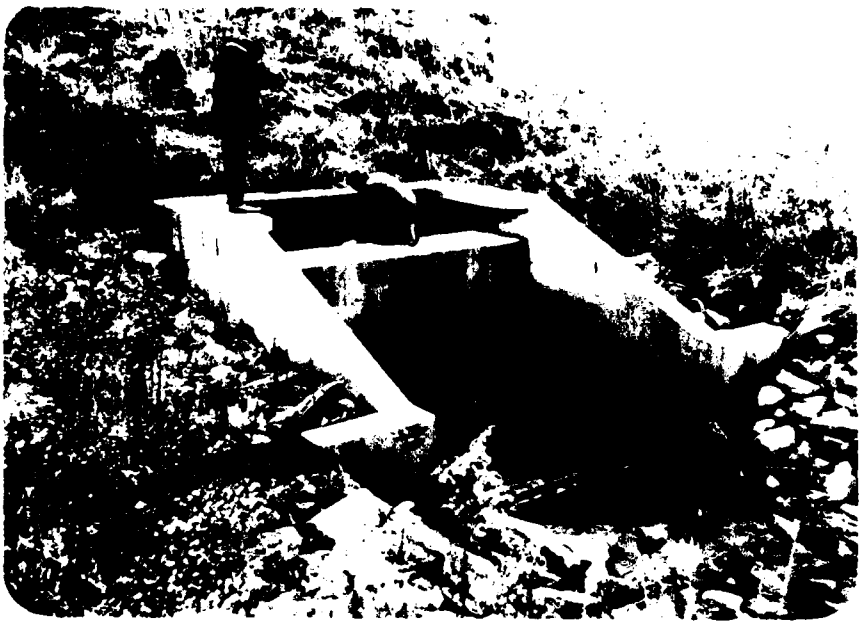


PHOTO NO. 7

ENERGY DISSIPATOR. NOTE TOE DRAIN DISCHARGE,
ROCKS IN THE DISSIPATOR AND UNMOWED GRASS ON EMBANKMENT.

PHOTO NO. 8

SPILLWAY APPROACH CHANNEL FOR EMERGENCY SPILLWAY.
NOTE STONE REPAIRS TO SEEPAGE AREAS.

US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WEST SIDE DAM BLACKBERRY RIVER NORFOLK, CONNECTICUT CT 00484 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 9

AREA UPSTREAM OF EMERGENCY SPILLWAY CONTROL SECTION.
NOTE STONE FILL, STANDING WATER AND CATTLE FENCE.

PHOTO NO. 10

EMERGENCY SPILLWAY DISCHARGE CHANNEL.
NOTE PONDING AND STONE REPAIRS TO ERODED AREAS.

U.S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WEST SIDE DAM BLACKBERRY RIVER NORFOLK, CONNECTICUT CT 00484 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 11

STONE DRAIN ALONG TOP OF EMERGENCY SPILLWAY CHANNEL.

U.S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WEST SIDE DAM BLACKBERRY RIVER NORFOLK, CONNECTICUT CT 00484 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 12

IMPOUNDMENT AREA UPSTREAM OF EMBANKMEI
NOTE EXCAVATED CHANNEL IN CENTER.

PHOTO NO. 13

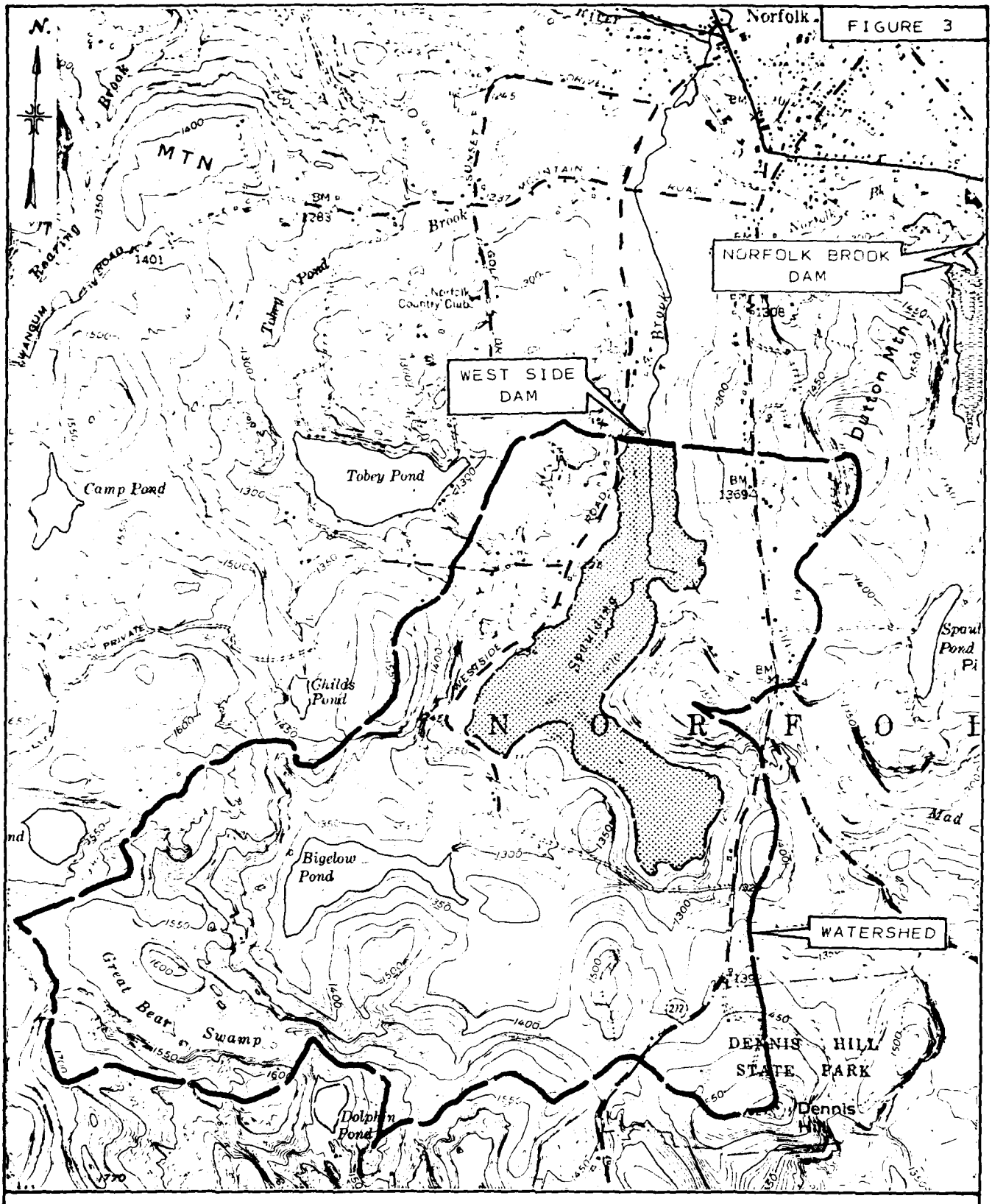
DISCHARGE CHANNEL. FLOW FROM EMERGENCY
SPILLWAY WOULD ENTER FROM RIGHT.

U.S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WEST SIDE DAM BLACKBERRY RIVER NORFOLK, CONNECTICUT CT 00484 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

FIGURE 3



WATERSHED MAP

WEST SIDE DAM
NORFOLK, CONNECTICUT

ROALD HAESTAD, INC. SCALE: 1" = 2000' NORFOLK QUADRANGLE 1969

Emergency Spillway Discharge Data Modified for n=.035

Ref. TR 2 Supp A - Dwg ES-124 Sh.1 - Crest El = 1212.33 b = 120

q_c cfs/ft	d_c ft	V_c fps	$z d_c$	$w = c + z d_c$	$Q_c = q_c w$	H_p	W.S. Elev	Est. T.W. Elev. (Interp)	Pipe h ft	Pipe Q
1	.32	3.2	.96	120.96	121	.7	1218.03	1205.11	12.92	130
3	.65	4.6	1.95	121.95	366	1.49	1210.82	1205.19	13.63	134
5	.92	5.4	2.76	122.76	614	2.02	1219.35	1205.25	14.10	136
10	1.46	6.8	4.38	124.38	1244	2.97	1220.30	1205.35	14.95	139
15	1.92	7.8	5.76	125.76	1885	3.68	1221.01	1205.45±	15.56	142
20	2.35	8.6	7.05	127.05	3540 (2541)	4.39 (4.50)	1221.72	1205.55±	16.17	145
25	2.70	9.3	8.10	128.10	3200	4.99	1222.32	1205.65±		150±
30	3.05	9.9	9.15	129.15	3875	5.50	1222.83	1205.75±		150±
35	3.38	10.3	10.14	130.14	4555	5.94	1223.27	1205.85±		150±

Q_{max} = 1175 cfs @ Elev. 1220.03 — Soil Type

Q_{pipe} = 138 cfs — Permissib

1037 cfs = $Q_{max\ spillway}$

$q = \frac{Q}{b} = \frac{1037}{120} = 8.64$ cfs/foot

In Exit C

V_c = 6.5 fps — V_c =

d_c = 1.32 — d_c

Exit channel slope to be S_c for $\frac{1}{4}q$

$\frac{q}{4}$ = 2.16 cfs/ft

S_c = 0.022 ft/ft (Figure E-3)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

(Modified for n=.035 - L=300') C.R. #5 1/22 9/12

Crest El = 1217.33 b = 120' L = 300' Z = 3 CN-411-H

W.S. Elev	Est. T.W. Elev. (Interp)	Pipe h ft	Pipe Q	Comb. Q	Q=730' OVER DAM CREST Q					
1218.03	1205.11	12.92	130	251						
1218.82	1205.19	13.63	134	500						
1219.35	1205.25	14.10	136	750						
1220.30	1205.35	14.95	139	1383						
1221.01	1205.45±	15.56	142	2027						
1221.72	1205.55±	16.17	145	~~2685~~ ~~3685~~						
1222.32	1205.65±		150±	3695	344					
1222.83	1205.75±		150±	5460	1435					
1223.27	1205.85±		150±	7420	2716					

Soil Type = Walpole & Sudbury - between soil groups #2 & #3

Permissible vel. = 7 fps x 1.25 for Class "C" structure = 8.75 fps

In Exit Channel:

V_e = 7.1 fps < 8.75 fps allow.

d_e = 1.2'±

GPO: 1957 O - 431849

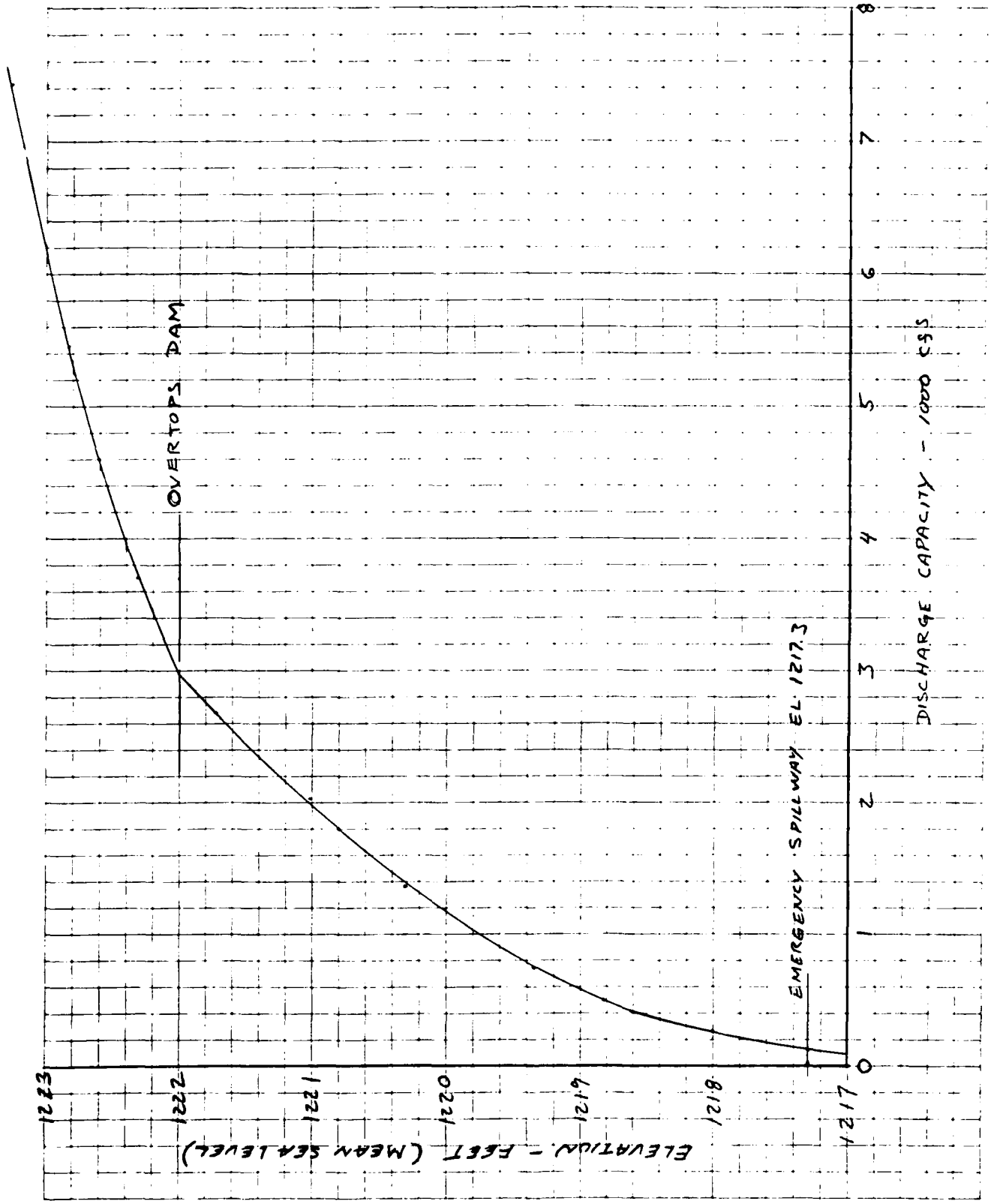
DLS 1/2/13

BY DLS DATE 1/5/81 **ROALD HAESTAD, INC.** SHEET NO 2 OF 22

CONSULTING ENGINEERS

CKD BY SAL DATE 1/13/81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 48-035

SUBJECT WEST SIDE DAM (NO. 5) SPILLWAY CAPACITY



CONN BLACKBERRY RIVER W.S.

WTF 9-15-61 D T BALLOU 9/62 SITE 5

Stage Storage Computations 1 12

ELEV.	Area Acres	Σ Adj Areas	Ave. Area	Contour Interval	Vol. Ac-Ft	Σ Vol. Ac-Ft	Avail. Storage
1205	0.4						
		8.9	4.55	1	4.6		At 1206.5, Avail. Stor. = 0
1206	8.5					4.6	
		25.0	12.5	1	12.5		
1207	16.5					17.1	7.1
		41.1	20.55	1	20.6		
1208	24.6					37.7	27.7
		57.2	28.6	1	28.6		
1209	32.6					66.3	56.3
		73.3	36.65	1	36.7		
1210	40.7					103.0	93.0
		177.9	88.95	5	444.8		
1215	137.2					547.8	537.8
		325.3	162.75	5	813.8		
1220	188.1					1361.6	1351.6
		410.7	205.35	5	1026.8		
1225	222.6					2388.4	2378.4

Required Storage for Sediment = 8.3 Ac-Ft

Elev. to give 8.3 Ac-Ft = 1206.3 ±

Use Elev. 1206.5 to start routing.

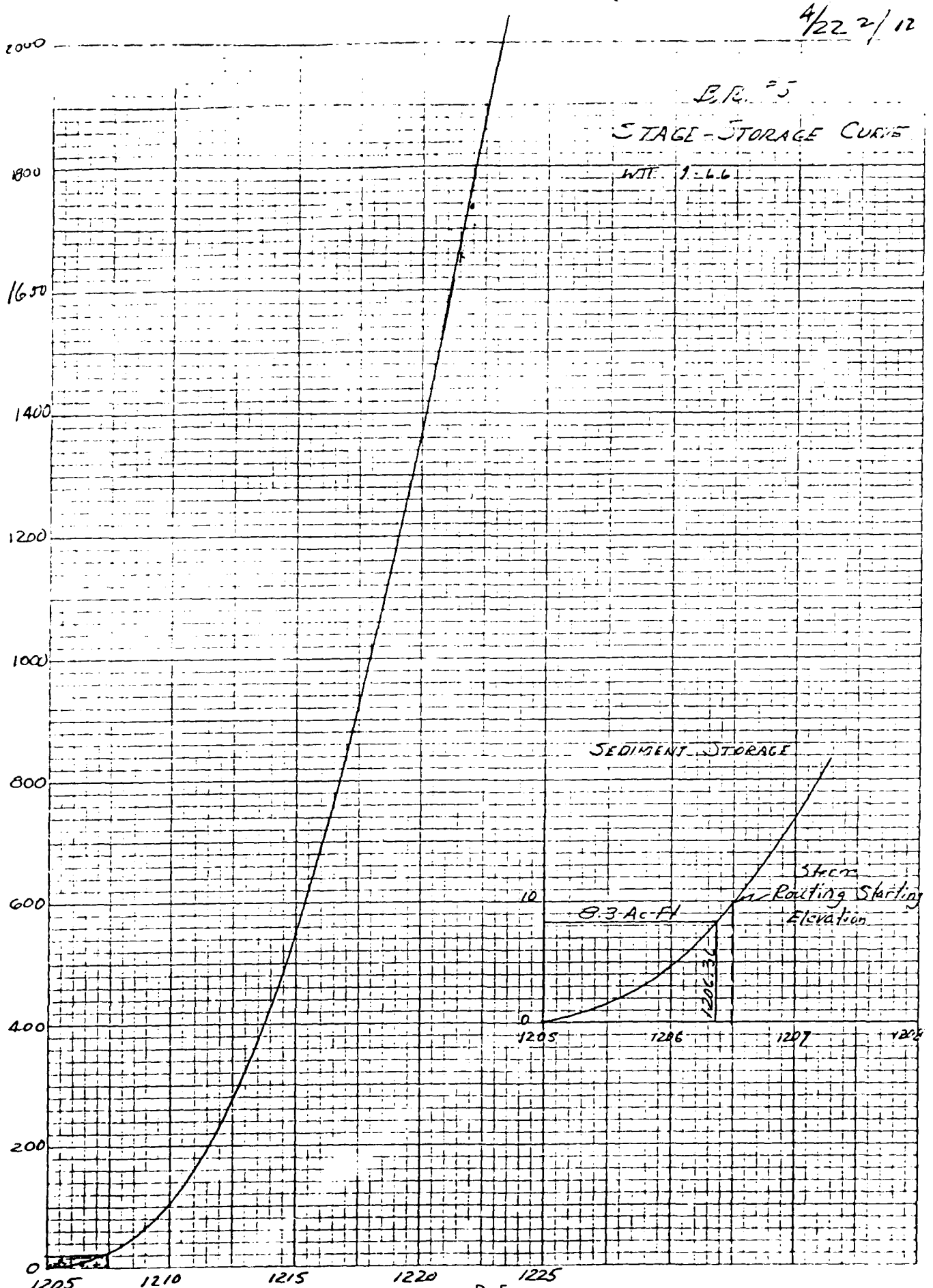
DLS 1/2/81

4/22 2/12

E.R. #5

STAGE - STORAGE CURVE

WITH 1:6.6



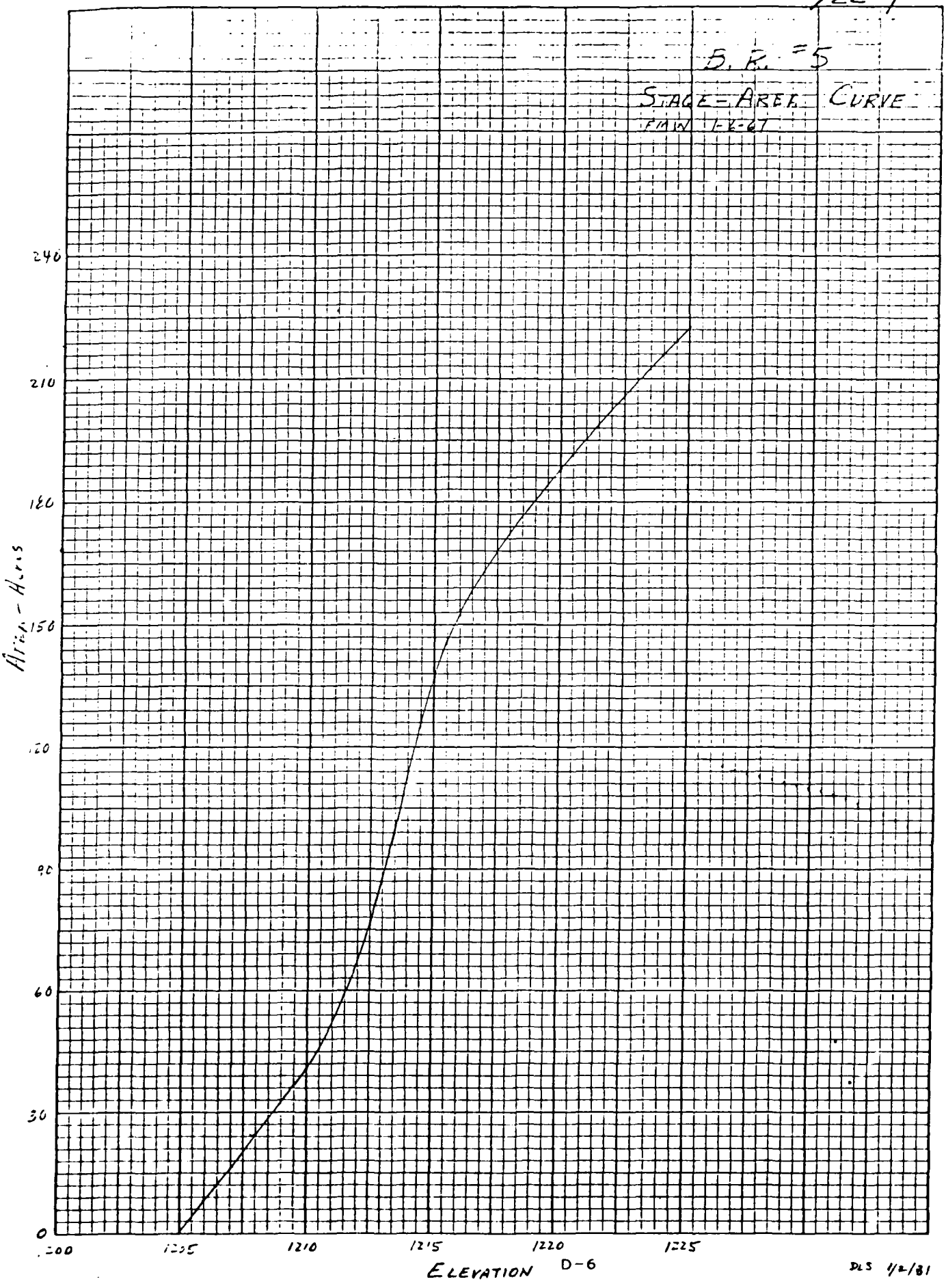
DLS 1/2/81

6/22 3/14

B. R. = 5

STAGE - AREA CURVE

FAW 1-K-67



D-6

DLS 1/2/81

SUBJECT WEST SIDE DAM - NO.5 TEST FLOOD ANALYSIS - PMF

TEST FLOOD = PMF

DRAINAGE AREA = 2.9 sq. mi.

FROM CORPS OF ENGINEERS CHART FOR "MOUNTAINOUS" TERRAIN

MPF = 2400 csm

PMF = 2400 x 2.9 = 6960 cfs

Q_{P1} = 6960 cfs

H_1 = 5.9' above emergency spillway (EL 1223.2)

$STOR_1$ = 1820 Ac-Ft. FROM STAGE-STORAGE CURVE

= 11.8" runoff from 2.9 sq. mi.

$$Q_{P2} = Q_{P1}\left(1 - \frac{STOR_1}{19}\right) = 6960\left(1 - \frac{11.8}{19}\right) = 2637 \text{ cfs}$$

H_2 = 4.4' (EL 1221.7) $STOR_2$ = 1700 Ac-Ft.

$$STOR_{AVE} = \frac{STOR_1 + STOR_2}{2} = \frac{1820+1700}{2} = 1760 \text{ Ac-Ft.} = 11.4"$$

$$Q_{P3} = 6960\left(1 - \frac{11.4}{19}\right) = 2784 \text{ cfs}$$

H_3 = 4.5' (EL 1221.8) $STOR_3$ = 1740 Ac-Ft.

$$STOR_{AVE} = \frac{1760+1740}{2} = 1750 \text{ Ac-Ft.} = 11.3"$$

$$Q_{P4} = 6960\left(1 - \frac{11.3}{19}\right) = 2820 \text{ cfs}, \; H_4 = 4.6' \text{ (El 1221.9)}$$

SPILLWAY CAPACITY = 3000 cfs (El 1222)

TEST FLOOD = $\frac{3000}{2820} \times 100$ = 106% of PMF

BY DLS DATE 1/7/81 **ROALD HAESTAD, INC.** SHEET NO 7 OF 22
CONSULTING ENGINEERS
CKD BY SAL DATE 1/13/81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 419-033
SUBJECT WEST SIDE DAM - NO.5 DAM BREACH ANALYSIS

STORAGE AT TOP OF DAM = 1780 AC-FT.

Q_{p1} = Peak Failure Outflow = $8/27\, W_b \sqrt{g}\, y_o^{3/2}$

W_b = Breach Width = 40% of dam length at mid-height

Dam length at mid-height = 240 ft.

$W_b = 0.40\,(465) = 186$ ft.

y_o = Total height from river bed to pool level at time of failure

y_o = 20 feet

$$Q_{p1} = 8/27\,(186)\sqrt{32.2}\,(20)^{3/2}$$

$$= 27{,}971 \text{ cfs} \qquad \underline{\text{SAY } 28{,}000 \text{ cfs}}$$

BY SAL DATE 1/15/81 ROALD HAESTAD, INC. SHEET NO 8 OF 22

CKD BY DLS DATE 1/16/81 CONSULTING ENGINEERS JOB NO. 049 035

SUBJECT WEST SIDE DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 1

TOTAL SECTION

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
1.0	45	.23	0.50	0.0013	0.56	13
2.0	90	90	1.00	0.0013	0.89	80
3.0	135	203	1.50	0.0013	1.17	237
4.0	180	360	2.00	0.0013	1.42	510
5.0	225	562	2.50	0.0013	1.64	925
6.0	270	810	3.00	0.0013	1.86	1503
7.0	315	1103	3.50	0.0013	2.06	2268
8.0	360	1440	4.00	0.0013	2.25	3238
9.0	405	1823	4.50	0.0013	2.43	4433
10.0	450	2250	4.99	0.0013	2.61	5871
11.0	483	2716	5.62	0.0013	2.82	7670
12.0	516	3215	6.24	0.0013	3.03	9726
13.0	548	3746	6.83	0.0013	3.22	12047
14.0	581	4310	7.42	0.0013	3.40	14643
15.0	613	4906	8.00	0.0013	3.57	17524
16.0	646	5535	8.57	0.0013	3.74	20698
17.0	678	6196	9.13	0.0013	3.90	24176
18.0	711	6890	9.69	0.0013	4.06	27966
19.0	744	7616	10.24	0.0013	4.21	32077
20.0	776	8375	10.79	0.0013	4.36	36520

MANNING COEFFICIENT=N=0.0600
STORAGE AT TIME OF FAILURE=S= 1780 AC. FT.
LENGTH OF REACH=L= 3800 FT

INFLOW INTO REACH=QP1= 28000 CFS
DEPTH OF FLOW=H1= 18.0 FT.
CROSS SECTIONAL AREA=A1= 6896 SQ.FT.
STORAGE IN REACH=V1= 483.2 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 20399 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 15.9 FT.
TRIAL CROSS SECTIONAL ^REA=A(TRIAL)= 5476 SQ.FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 359.3 AC. FT.

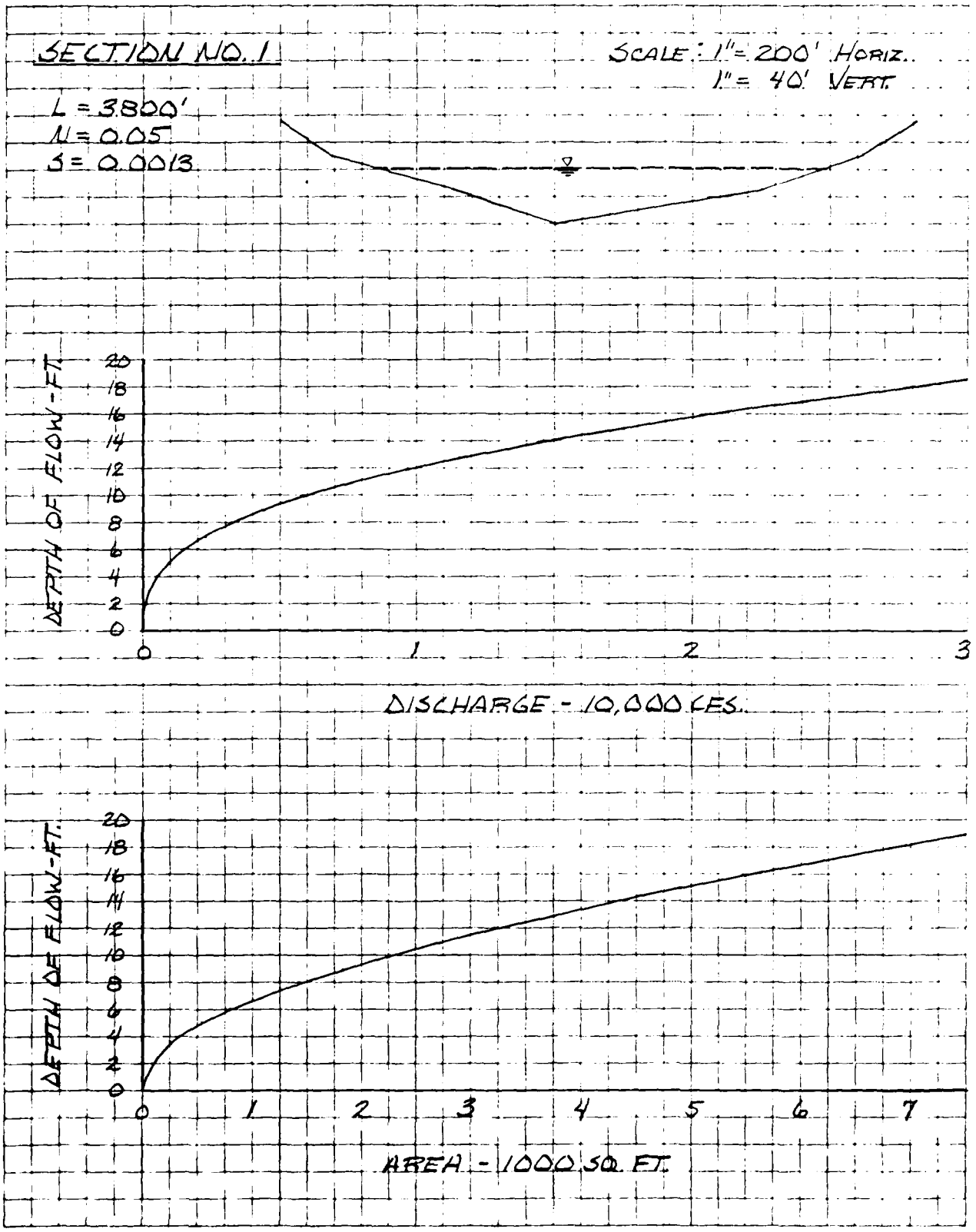
REACH OUTFLOW=QP2= 21374 CFS
DEPTH OF FLOW=H2= 16.2 FT.

BY LBG DATE 1-15-81 **ROALD HAESTAD, INC.** SHEET NO 9 OF 22

CONSULTING ENGINEERS

CKD BY SAL DATE 1-15-81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-035

SUBJECT WEST SIDE DAM - FLOOD ROUTING



SECTION NUMBER 2

SPAULDING B. POND
(STORAGE CAPACITY WITHIN REACH)

HEIGHT (FEET)	SURFACE AREA (ACRES)	STORAGE VOLUME (ACRE-FEET)
1.0	5.58	3.4
2.0	9.86	11.2
3.0	14.14	23.2
4.0	18.42	39.4
5.0	22.70	60.0
6.0	26.65	84.7
7.0	30.60	113.3
8.0	34.55	145.9
9.0	38.50	182.4
10.0	42.45	222.9
11.0	46.40	267.3
12.0	50.35	315.7
13.0	54.30	368.0
14.0	58.25	424.3
15.0	62.20,	484.5

STORAGE CAPACITY CALCULATED FROM SURFACE AREAS AT KNOWN ELEVATIONS.

SUBJECT WEST SIDE DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 2

SPAULDING B. POND

HEIGHT ABOVE SPILLWAY LEVEL (FEET)	SPILLWAY DISCHARGE CAPACITY (CFS)
1.0	195
2.0	552
3.0	1113
4.0	1964
5.0	3118
6.0	4509
7.0	6121
8.0	7925
9.0	9922
10.0	12092
11.0	14443
12.0	16957
13.0	19646
14.0	22493
15.0	25485

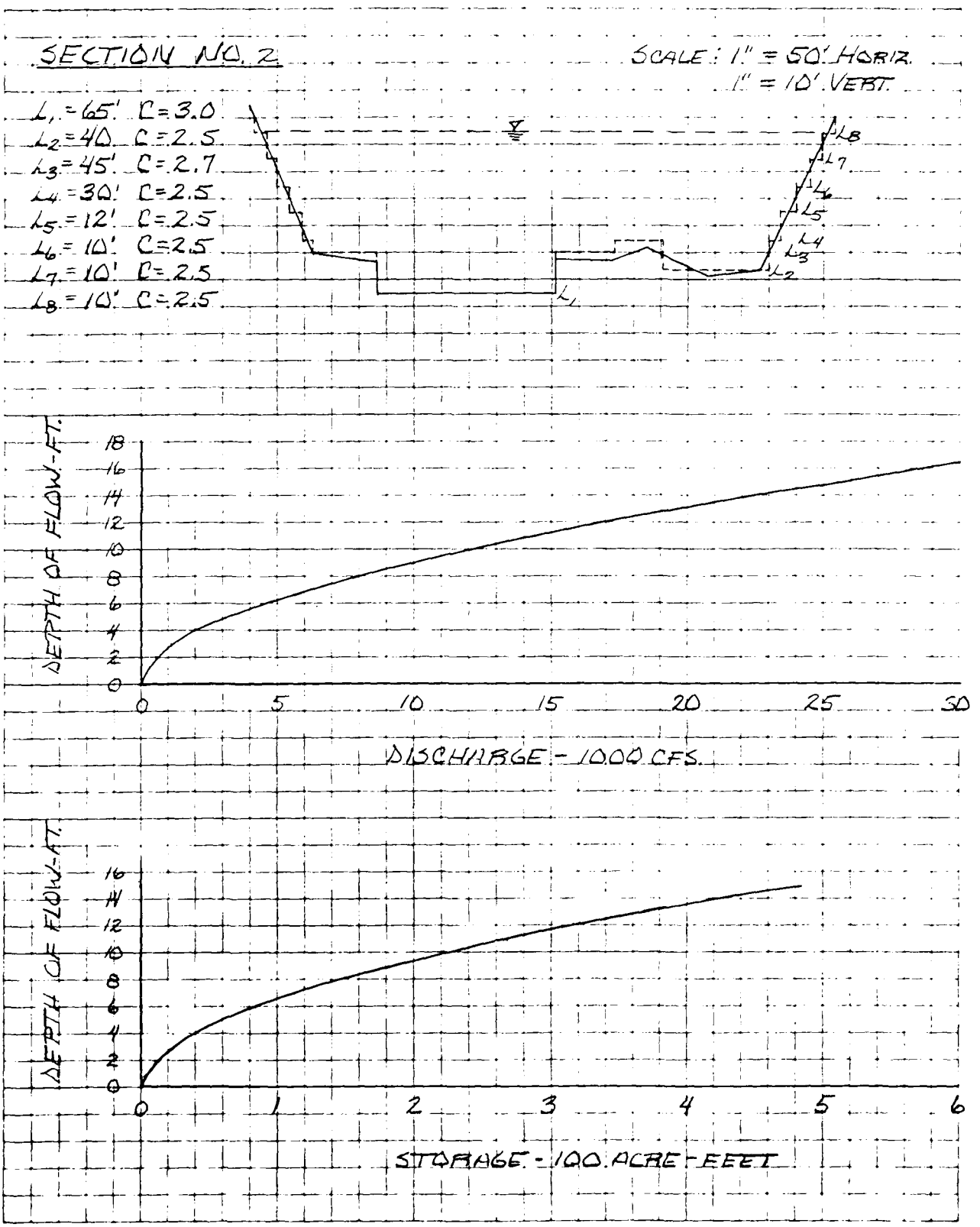
STORAGE AT TIME OF FAILURE=S= 1780 AC. FT.
LENGTH OF REACH=L= 1800 FT

INFLOW INTO REACH=QP1= 21374 CFS
HEIGHT ABOVE SPILLWAY LEVEL=H1= 13.6 FT.
STORAGE IN REACH=V1= 344.3 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 17240 CFS
TRIAL HEIGHT ABOVE SPILLWAY LEVEL=H(TRIAL)= 12.1 FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 263.3 AC. FT.

REACH OUTFLOW=QP2= 17726 CFS
HEIGHT ABOVE SPILLWAY LEVEL=H2= 12.3 FT.

SUBJECT WEST SIDE DAM - FLOOD ROUTING



BY SAL DATE 1/15/81 ROALD HAESTAD, INC. SHEET NO 13 OF 22

CKD BY DLS DATE 1/16/81 CONSULTING ENGINEERS JOB NO. 049 035

SUBJECT WEST SIDE DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 3A

MAIN CHANNEL

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
1.0	26	.13	0.50	0.0375	4.52	59
2.0	34	43	1.26	0.0375	8.40	358
3.0	41	79	1.92	0.0375	11.10	883
4.0	49	124	2.51	0.0375	13.30	1645
5.0	57	175	3.08	0.0375	15.22	2664
6.0	63	233	3.70	0.0375	17.22	4012
7.0	69	297	4.30	0.0375	19.03	5653
8.0	75	367	4.89	0.0375	20.72	7604
9.0	81	443	5.46	0.0375	22.30	9879
10.0	87	525	6.02	0.0375	23.80	12494
11.0	92	613	6.63	0.0375	25.39	15554
12.0	97	705	7.23	0.0375	26.91	18971
13.0	97	800	8.21	0.0375	29.28	23421
14.0	97	895	9.18	0.0375	31.55	28237
15.0	97	990	10.16	0.0375	33.74	33408
16.0	97	1085	11.13	0.0375	35.87	38920
17.0	97	1180	12.11	0.0375	37.93	44764
18.0	97	1275	13.08	0.0375	39.94	50930
19.0	97	1370	14.06	0.0375	41.90	57411
20.0	97	1465	15.03	0.0375	43.82	64199

MANNING COEFFICIENT=N=0.0400

BY SAL DATE 1/15/81 ROALD HAESTAD, INC. SHEET NO 14 OF 22

CKD BY DLS DATE 1/16/81 CONSULTING ENGINEERS JOB NO. 049 035

SUBJECT WEST SIDE DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 3B

LEFT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
13.0	30	15	0.50	0.0375	2.27	34
14.0	39	49	1.28	0.0375	4.23	208
15.0	47	92	1.95	0.0375	5.61	517
16.0	56	144	2.57	0.0375	6.75	969
17.0	65	204	3.15	0.0375	7.74	1575
18.0	73	272	3.72	0.0375	8.64	2350
19.0	82	349	4.27	0.0375	9.47	3307
20.0	90	435	4.81	0.0375	10.25	4459

MANNING COEFFICIENT=N=0.0800

SECTION NUMBER 3C

RIGHT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
6.0	37	19	0.50	0.0375	1.81	34
7.0	74	74	1.00	0.0375	2.88	213
8.0	111	167	1.50	0.0375	3.77	628
9.0	148	296	2.00	0.0375	4.57	1352
10.0	185	463	2.50	0.0375	5.30	2451
11.0	188	649	3.46	0.0375	6.58	4267
12.0	190	838	4.40	0.0375	7.72	6469
13.0	193	1029	5.33	0.0375	8.78	9029
14.0	196	1223	6.24	0.0375	9.76	11927
15.0	199	1419	7.15	0.0375	10.68	15147
16.0	201	1618	8.04	0.0375	11.55	18678
17.0	204	1819	8.92	0.0375	12.38	22509
18.0	207	2023	9.79	0.0375	13.17	26633
19.0	209	2229	10.65	0.0375	13.93	31043
20.0	212	2438	11.50	0.0375	14.66	35733

MANNING COEFFICIENT=N=0.1000

SUBJECT WEST SIDE DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 3

TOTAL SECTION

	A R E A (SQ.FT.)				D I S C H A R G E (CFS)			
H	A	B	C	TOTAL	A	B	C	TOTAL
1.0	13	0	0	13	59	0	0	59
2.0	43	0	0	43	358	0	0	358
3.0	79	0	0	79	883	0	0	883
4.0	124	0	0	124	1645	0	0	1645
5.0	175	0	0	175	2664	0	0	2664
6.0	233	0	19	252	4012	0	34	4045
7.0	297	0	74	371	5653	0	213	5866
8.0	367	0	167	534	7604	0	628	8232
9.0	443	0	296	739	9879	0	1352	11231
10.0	525	0	463	988	12494	0	2451	14945
11.0	613	0	649	1261	15554	0	4267	19821
12.0	705	0	838	1543	18971	0	6469	25440
13.0	800	15	1029	1844	23421	34	9029	32484
14.0	895	49	1223	2167	28237	208	11927	40373
15.0	990	92	1419	2501	33408	517	15147	49072
16.0	1085	144	1618	2846	38920	969	18678	58566
17.0	1180	204	1819	3202	44764	1575	22509	68848
18.0	1275	272	2023	3570	50930	2350	26633	79914
19.0	1370	349	2229	3948	57411	3307	31043	91761
20.0	1465	435	2438	4338	64199	4459	35733	104391

STORAGE AT TIME OF FAILURE=S= 1780 AC. FT.
LENGTH OF REACH=L= 4000 FT

INFLOW INTO REACH=QP1= 17726 CFS
DEPTH OF FLOW=H1= 10.6 FT.
CROSS SECTIONAL AREA=A1= 1144 SQ.FT.
STORAGE IN REACH=V1= 87.2 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 16857 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 10.4 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 1095 SQ.FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 82.8 AC. FT.

REACH OUTFLOW=QP2= 16880 CFS
DEPTH OF FLOW=H2= 10.4 FT.

BY ABG DATE 1-12-81 **ROALD HAESTAD, INC.** SHEET NO 17 OF 22

CONSULTING ENGINEERS

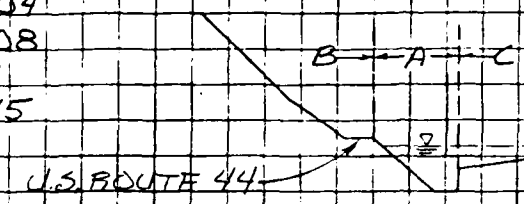
CKD BY SAL DATE 1-15-81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-035

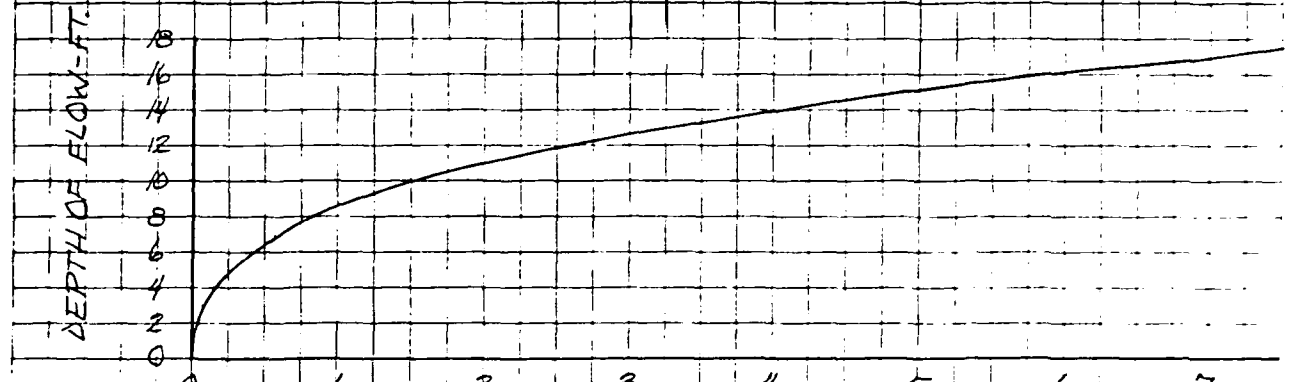
SUBJECT WEST SIDE DAM - FLOOD ROUTING

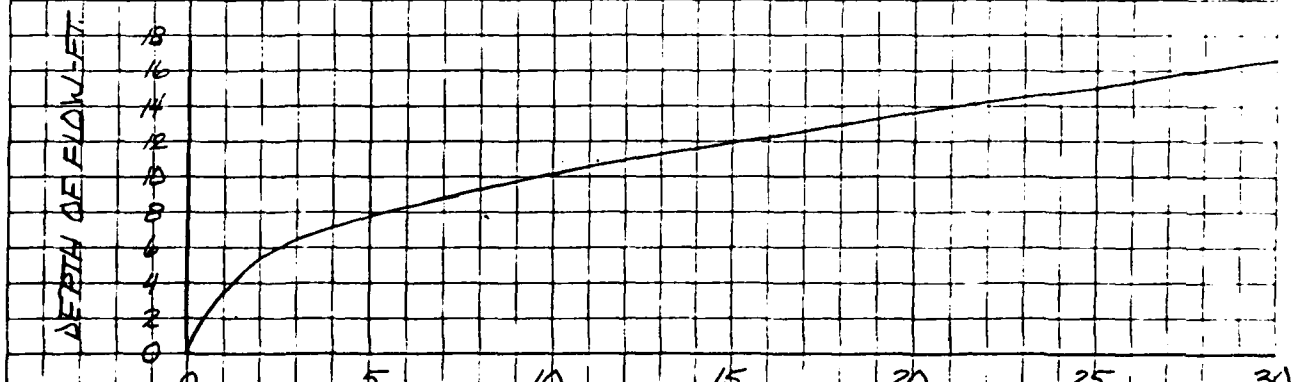
SECTION NO 3

SCALE: 1" = 200' HORIZ.
1" = 40' VERT.

L = 4000'
N(A) = 0.04
(B) = 0.08
(C) = 0.1
S = 0.0375







SUBJECT WEST SIDE DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 4A

MAIN CHANNEL

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
1.0	22	.11	0.50	0.0250	4.22	46
2.0	34	39	1.14	0.0250	7.32	284
3.0	46	78	1.70	0.0250	9.56	749
4.0	48	125	2.59	0.0250	12.67	1577
5.0	48	172	3.57	0.0250	15.68	2690
6.0	48	219	4.55	0.0250	18.43	4028
7.0	48	266	5.53	0.0250	20.99	5573
8.0	48	313	6.51	0.0250	23.40	7312
9.0	48	360	7.49	0.0250	25.69	9236
10.0	48	407	8.47	0.0250	27.88	11335
11.0	48	454	9.44	0.0250	29.99	13602
12.0	48	501	10.42	0.0250	32.03	16032
13.0	48	548	11.40	0.0250	34.01	18619
14.0	48	595	12.38	0.0250	35.93	21359
15.0	48	642	13.36	0.0250	37.80	24247
16.0	48	689	14.34	0.0250	39.62	27280
17.0	48	736	15.32	0.0250	41.40	30454
18.0	48	783	16.30	0.0250	43.15	33767
19.0	48	830	17.27	0.0250	44.86	37214
20.0	48	877	18.25	0.0250	46.54	40795

MANNING COEFFICIENT=N=0.0350

SECTION NUMBER 4B

LEFT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
4.0	33	16	0.50	0.0250	2.11	35
5.0	66	66	1.00	0.0250	3.36	221
6.0	99	148	1.50	0.0250	4.40	650
7.0	131	263	2.00	0.0250	5.33	1400
8.0	164	411	2.50	0.0250	6.18	2539
9.0	197	591	3.00	0.0250	6.98	4128
10.0	230	805	3.50	0.0250	7.74	6227
11.0	248	1044	4.20	0.0250	8.74	9127
12.0	267	1302	4.88	0.0250	9.65	12567
13.0	285	1578	5.53	0.0250	10.50	16561
14.0	315	1878	5.96	0.0250	11.03	20708
15.0	334	2202	6.59	0.0250	11.79	25968
16.0	354	2546	7.20	0.0250	12.52	31862
17.0	373	2909	7.80	0.0250	13.20	38409
18.0	392	3291	8.40	0.0250	13.87	45628
19.0	411	3692	8.98	0.0250	14.50	53539
20.0	430	4113	9.56	0.0250	15.12	62161

MANNING COEFFICIENT=N=0.0700

BY SAL DATE 1/15/81 ROALD HAESTAD, INC. SHEET NO 20 OF 22

CKD BY JLS DATE 1/16/81 CONSULTING ENGINEERS JOB NO. 049 035

SUBJECT WEST SIDE DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 4C

RIGHT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
5.0	8	4	0.50	0.0250	1.47	6
6.0	15	15	0.99	0.0250	2.34	35
7.0	23	34	1.49	0.0250	3.06	103
8.0	30	60	1.98	0.0250	3.71	222
9.0	38	94	2.48	0.0250	4.30	403
10.0	45	135	2.97	0.0250	4.86	656
11.0	48	181	3.75	0.0250	5.67	1029
12.0	51	231	4.50	0.0250	6.40	1476
13.0	54	282	5.21	0.0250	7.06	1995
14.0	57	337	5.90	0.0250	7.67	2586
15.0	60	394	6.57	0.0250	8.24	3251
16.0	63	455	7.22	0.0250	8.78	3989
17.0	66	517	7.85	0.0250	9.28	4803
18.0	69	583	8.47	0.0250	9.77	5693
19.0	72	651	9.08	0.0250	10.23	6662
20.0	75	723	9.68	0.0250	10.67	7709

MANNING COEFFICIENT=N=0.1000

SUBJECT WEST SIDE DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 4

TOTAL SECTION

	AREA (SQ.FT.)				DISCHARGE (CFS)			
H	A	B	C	TOTAL	A	B	C	TOTAL
1.0	11	0	0	11	46	0	0	46
2.0	39	0	0	39	284	0	0	284
3.0	78	0	0	78	749	0	0	749
4.0	125	16	0	141	1577	35	0	1612
5.0	172	66	4	241	2690	221	6	2916
6.0	219	148	15	381	4028	650	35	4713
7.0	266	263	34	562	5573	1400	103	7076
8.0	313	411	60	783	7312	2539	222	10073
9.0	360	591	94	1045	9236	4128	403	13767
10.0	407	805	135	1347	11335	6227	656	18218
11.0	454	1044	181	1679	13602	9127	1029	23759
12.0	501	1302	231	2033	16032	12567	1476	30075
13.0	548	1578	282	2407	18619	16561	1995	37175
14.0	595	1878	337	2809	21359	20708	2586	44653
15.0	642	2202	394	3238	24247	25968	3251	53466
16.0	689	2546	455	3689	27280	31862	3989	63132
17.0	736	2909	517	4162	30454	38409	4803	73667
18.0	783	3291	583	4656	33767	45628	5693	85088
19.0	830	3692	651	5173	37214	53539	6662	97415
20.0	877	4113	723	5712	40795	62161	7709	110664

STORAGE AT TIME OF FAILURE=S= 1780 AC. FT.
LENGTH OF REACH=L= 4000 FT

INFLOW INTO REACH=QP1= 16880 CFS
DEPTH OF FLOW=H1= 9.7 FT.
CROSS SECTIONAL AREA=A1= 1256 SQ.FT.
STORAGE IN REACH=V1= 92.6 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 16002 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 9.5 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 1196 SQ.FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 87.1 AC. FT.

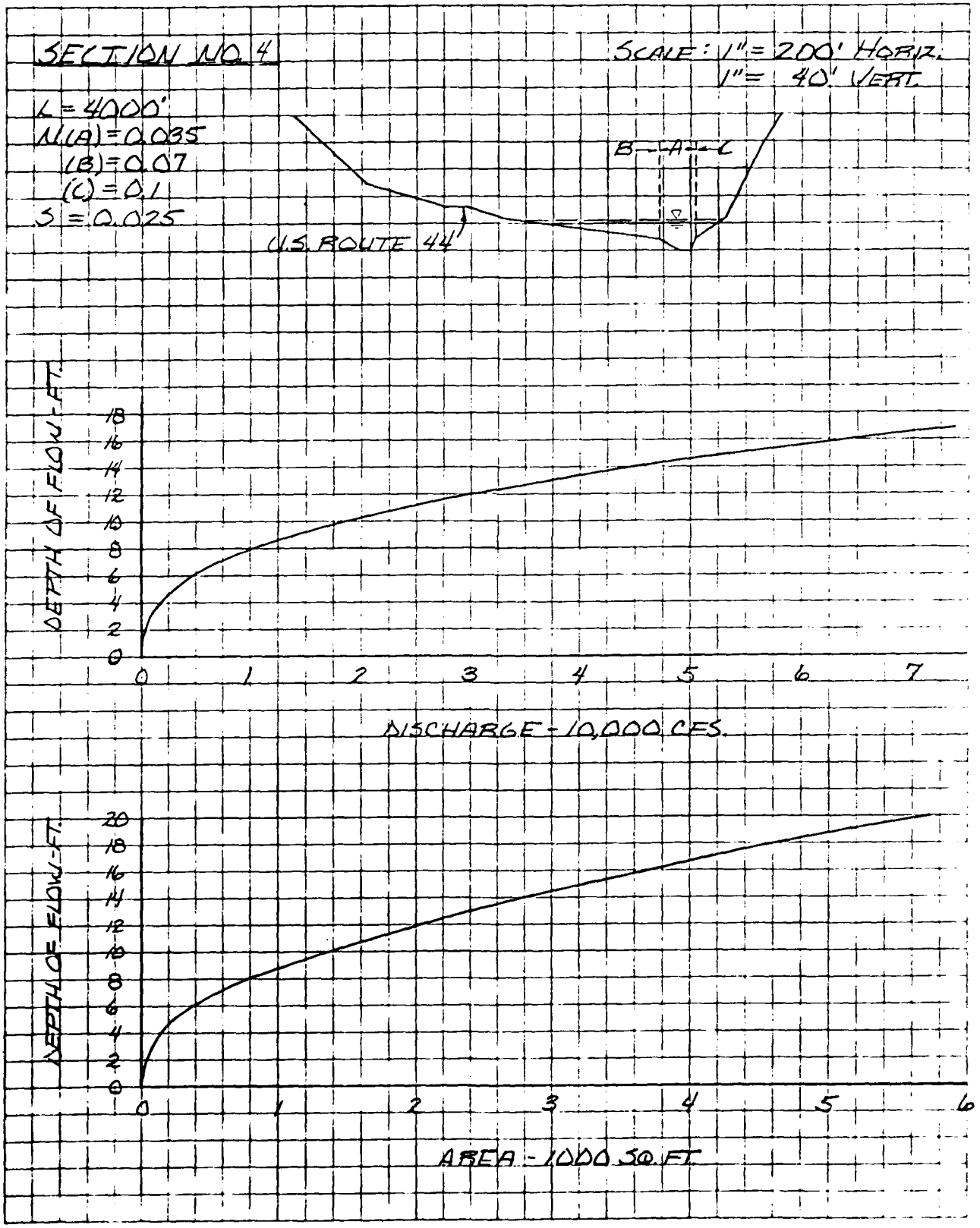
REACH OUTFLOW=QP2= 16028 CFS
DEPTH OF FLOW=H2= 9.5 FT.

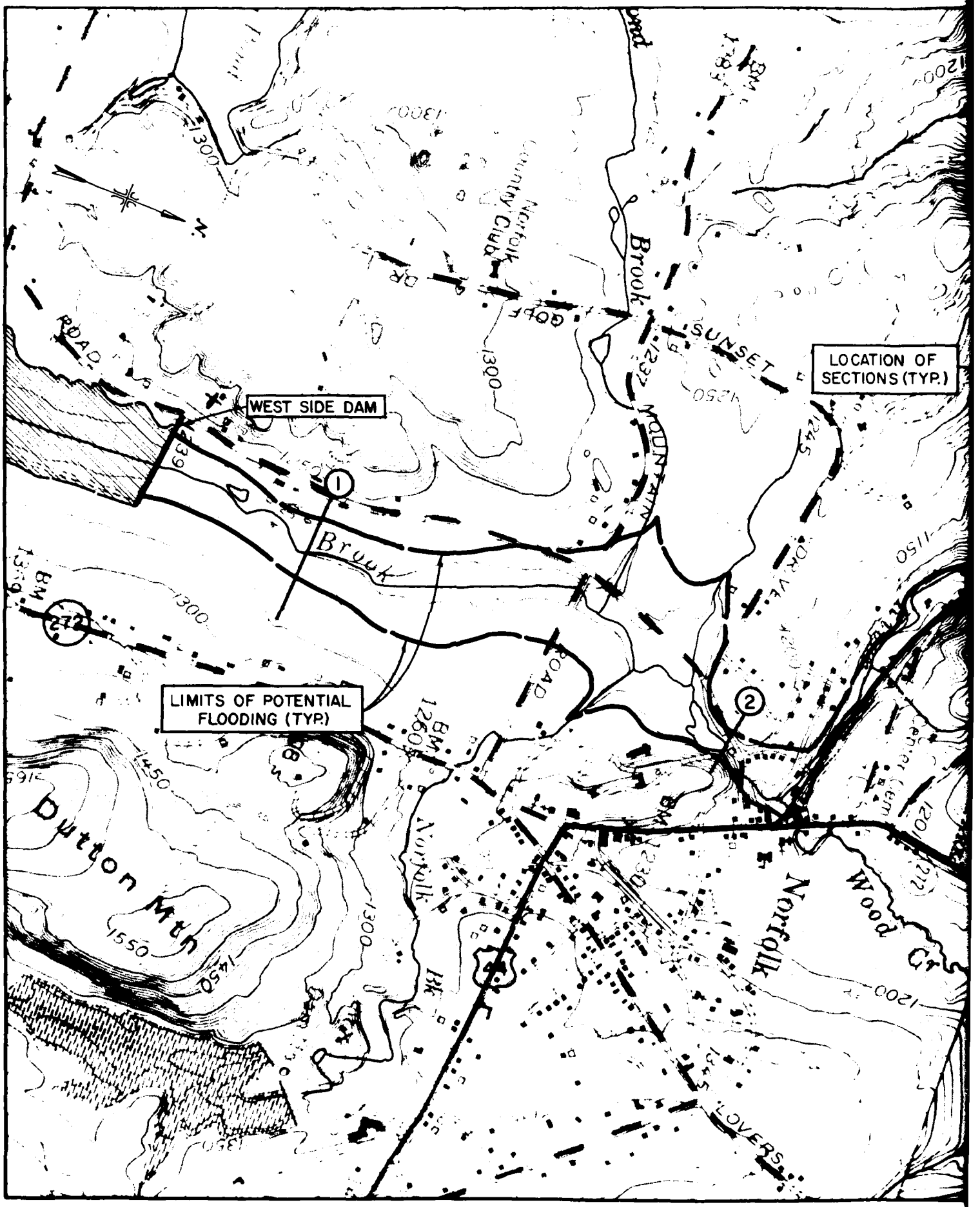
BY LEG DATE 1-12-81 **ROALD HAESTAD, INC.** SHEET NO 22 OF 22

CONSULTING ENGINEERS

CKD BY SAL DATE 1-15-81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49.035

SUBJECT WEST SIDE DAM - FLOOD ROUTING




WEST SIDE DAM
LOCATION OF SECTIONS (TYP.)
LIMITS OF POTENTIAL FLOODING (TYP.)
Brook
Brook
SUNSET
ROAD
Norfolk
Norfolk
Wood Cr
Button Mtn
1
2
272

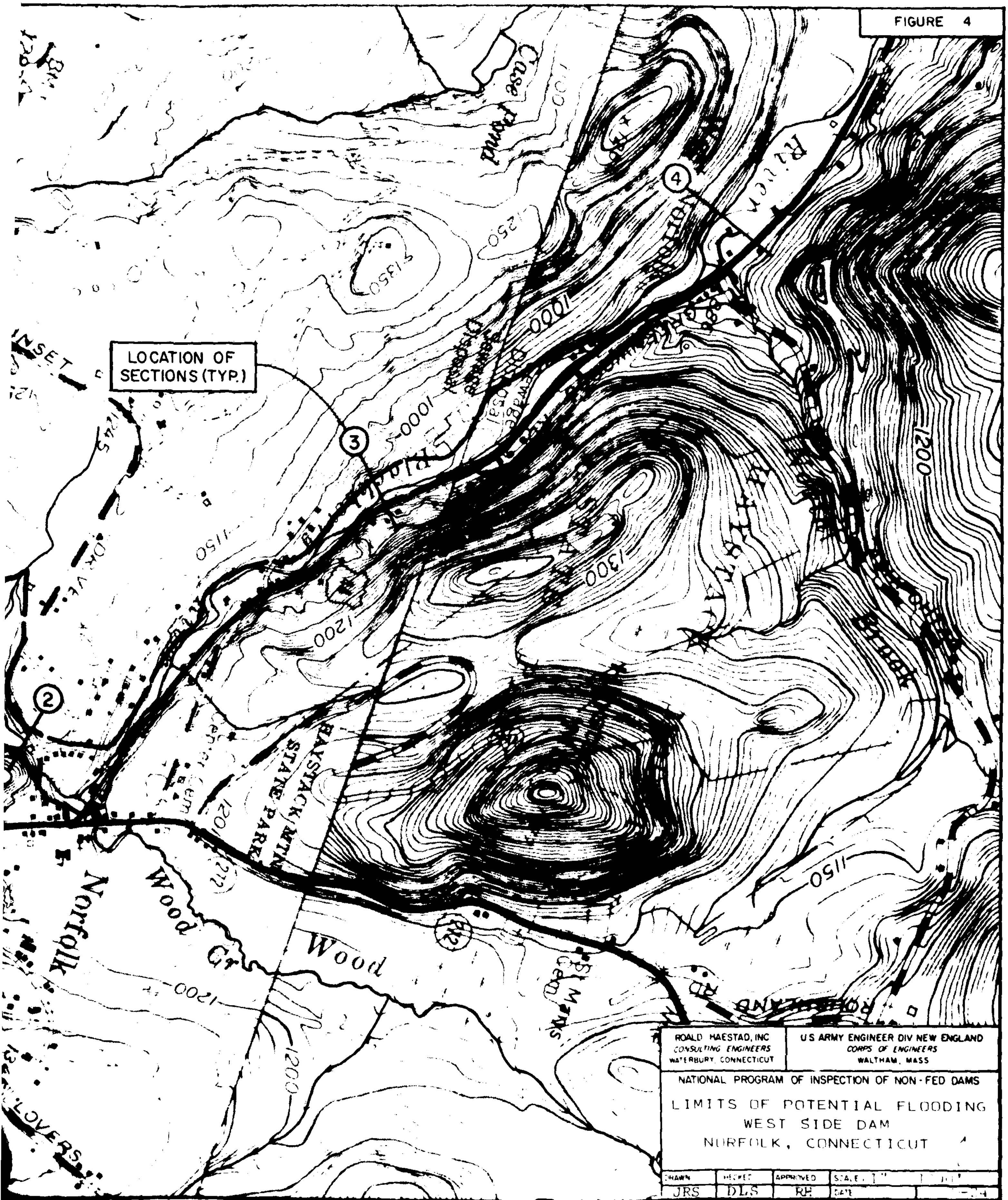


FIGURE 4
LOCATION OF
SECTIONS (TYP.)
Case Pond
Norfolk
Wood Cr
Wood
BAYSTACK MTN
STATE PARK
Blackberry
River
1000
1150
1200
1250
1300
1350
2
3
4
ROALD HAESTAD, INC
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT
U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
LIMITS OF POTENTIAL FLOODING
WEST SIDE DAM
NORFOLK, CONNECTICUT
DRAWN
CHECKED
APPROVED
SCALE
DATE
JRS
DLS
RH

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME