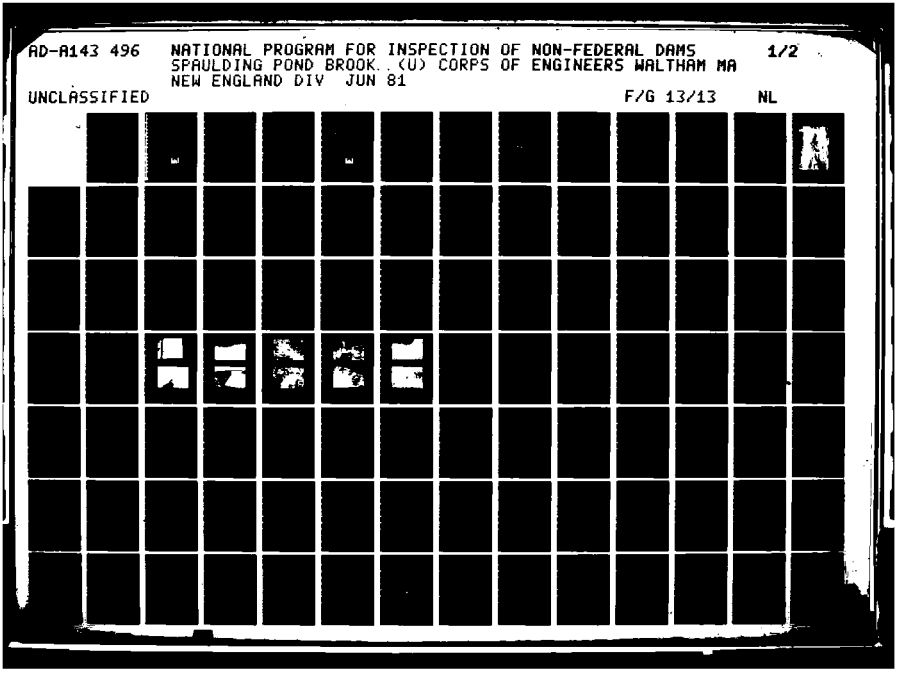
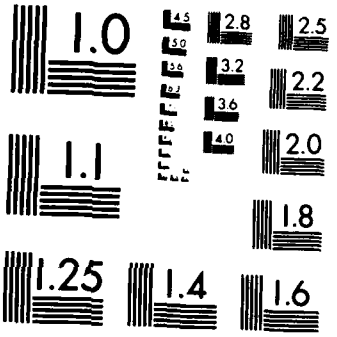
AD-A143 496 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 1/2
SPAULDING POND BROOK.. (U) CORPS OF ENGINEERS WALTHAM MA
NEW ENGLAND DIV JUN 81
UNCLASSIFIED F/G 13/13 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

SHETUCKET RIVER BASIN

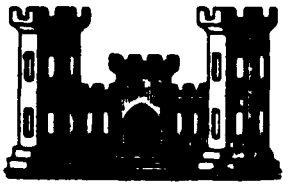
NORWICH, CONNECTICUT

AD-A143 496

SPAULDING POND BROOK
SITE NO. 2

DIKE CT 01712
DAM CT 00203

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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

JUNE 1981

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00203 ; CT01712	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Spaulding Pond Brook, Site No. 2 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE June 1981 13. NUMBER OF PAGES 70
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

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

18. SUPPLEMENTARY NOTES

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

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

DAMS, INSPECTION, DAM SAFETY,

Shetucket River Basin
Norwich, Conn.
Spaulding Pond Brook

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

Dam No. 2 along Spaulding Pond Brook is an earth embankment structure. It is 12 ft. wide at the crest, 200 ft. long and 16 ft. high. Both the upstream and downstream slopes are about 3H:1V. As a result of the visual inspection, hydrologic and gydraulic computations and the review of the design plans and specifications, the dam is considered to be in GOOD condition. The dam is classified as SMALL in size and has a HIGH hazard potential structure in accordance with the Corps of Engineers.

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

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

AUG 1 1980

NEDED

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 Spaulding Pond Brook Site No. 2 Dam & Dike (CT-00203 and CT-01712) 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, and to the owner, the City of Norwich, CT. 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,

William E. Hodgson

Incl
as stated

WILLIAM E. HODGSON, JR.
Colonel, Corps of Engineers
Acting Commander and Acting Division Engineer

SHETUCKET RIVER BASIN

NORWICH, CONNECTICUT

SPAULDING POND BROOK

SITE NO. 2

DIKE CT 01712

DAM CT 00203

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

JUNE 1981

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

	DAM	DIKE
Identification No.:	CT 00203	CT 01712
Name of Dam:	Spaulding Pond Brook Site No.2 - Dam	Spaulding Pond Brook Site No.2 - Dike
Town:	Norwich	Norwich
County and State:	New London, Connecticut	New London, Connecticut
Stream:	Spaulding Pond Brook	Spaulding Pond Brook
Owner:	City of Norwich	City of Norwich
Date of Inspection:	8 April 1981	8 April 1981

BRIEF ASSESSMENT

Dam No.2 along Spaulding Pond Brook is an earth embankment structure. It is 12 feet wide at the crest, 200 feet long and 16 feet high. Both the upstream and downstream slopes are about 3H:1V. There is partial riprap protection on the upstream slope. The principal spillway consists of a reinforced concrete drop inlet structure with trash racks and a 30 inch diameter reinforced concrete pipe. There is a grassed emergency spillway 100 feet wide in the left abutment. A dike approximately 900 feet long surrounds the reservoir on the easterly side. The maximum height of this earth embankment dike is 15 feet. The dam is located downstream from Spaulding Pond Dam No.1 on the Spaulding Pond Brook. The maximum storage capacity of this facility is 63 acre feet at the level of the top of the dam, and its drainage area is approximately 0.45 square miles. The dam is a single purpose flood prevention dam which is intermittently used in the winter months for ice skating. It was constructed in 1968 by the City of Norwich with the assistance of the Soil Conservation Service.

As a result of the visual inspection, hydrologic and hydraulic computations and the review of the design plans and specifications, the dam is considered to be in GOOD condition. To assure the long term performance of this structure a few items of concern require attention. Most of these are maintenance items and include the restoration of the surface along the

crest of the dam, removing brush and debris from the culvert under the road and from the outlet channel, and cleaning debris from a drain outlet at the base of the dike.

The dam is classified as SMALL in size and as a HIGH hazard potential structure in accordance with the recommended guidelines established by the Corps of Engineers.

The test flood for these conditions ranges from half the Probable Maximum Flood to the Probable Maximum Flood (½ PMF to PMF). The test flood chosen for this dam, based on its size, is half the Probable Maximum Flood (½ PMF). This test flood has an inflow and outflow discharge equal to 400 cfs and will not overtop the dam. The emergency spillway together with the principal spillway is capable of handling 700% of the test flood outflow. It is recommended that the owner perform the remedial measures mentioned above and listed under Section 7 of this report.

The above recommendations should be instituted within two years of the owner's receipt of this report.

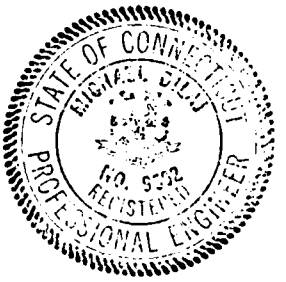
LENARD & DILAJ ENGINEERING, INC.

By: John F. Lenard

John F. Lenard, P.E., President

Michael Dilaj

Michael Dilaj, P.E., Vice President
Project Manager



Dike-CT-01712

This Phase I Inspection Report on Spaulding Pond Brook Site No.2 Dam -CT-00203 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 investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation. However, the investigation is intended to identify any need for such studies.

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

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

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

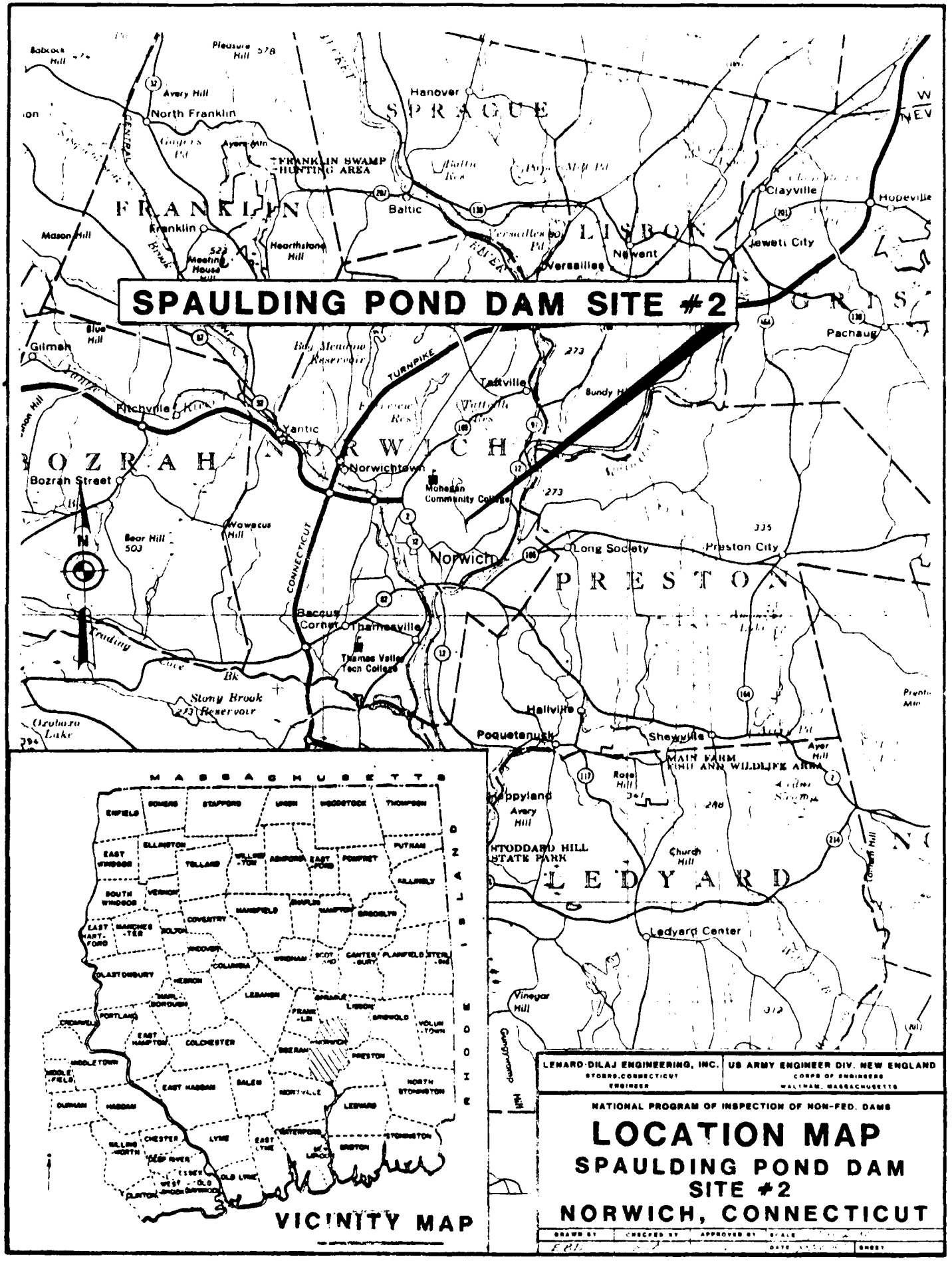
The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project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

TABLE OF CONTENTS

APPENDICES

OVERVIEW PHOTO

	US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM MASSACHUSETTS LENARD OILAJ ENGINEERING, INC. STORRS CONNECTICUT ENGINEER	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	SPAULDING POND DAM #2 NORWICH, CONNECTICUT CT 00203 MAY 1981	


SPAULDING POND DAM SITE #2
FRANKLIN
SPRAGUE
LISBON
PRESTON
LEDYARD
NORWICH
BOZRAH
Hanover
North Franklin
Baltic
Franklin
Versailles
Jewett City
Clayville
Hopeville
Pachaug
Gilman
Yantic
Taftville
Norwichtown
Bozrah Street
Norwich
Long Society
Preston City
Baccus Corner
Thamesville
Hallville
Poquetanuck
Shewville
Ledyard Center
Gales Ferry
Stony Brook Reservoir
Bear Hill
Wawecus Hill
Hearthstone Hill
Mason Hill
Avery Hill
Pleasure Hill
Church Hill
Vineyar Hill
Rote Hill
Avery Hill
Bay Meadow Reservoir
Mohegan Community College
Thames Valley Tech College
FRANKLIN SWAMP HUNTING AREA
STODDARD HILL STATE PARK
MAIN FARM KIHLL ANN WILDLIFE AREA
CONNECTICUT
TURNPIKE
MASSACHUSETTS
VICINITY MAP
LENARD-DILAJ ENGINEERING, INC.
US ARMY ENGINEER DIV. NEW ENGLAND
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
LOCATION MAP
SPAULDING POND DAM
SITE #2
NORWICH, CONNECTICUT

PHASE I INSPECTION REPORT

SECTION I - PROJECT INFORMATION

1.1 General:

a. Authority: Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam 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. Lenard & Dilaj Engineering, Inc. has been retained by the New England Division to inspect and report on selected dams in the States of Connecticut and Rhode Island. Authorization and notice to proceed were issued to Lenard & Dilaj Engineering, Inc. under a letter of 6 November, 1980 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0014 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection Program: 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.

c. Scope of Inspection Program: The scope of this Phase I inspection report includes:

1. Gathering, reviewing and presenting all available data as can be obtained from the owners, previous owners, the state and other associated parties.

2. A field inspection of the facility detailing the visual condition of the dam, embankments and appurtenant structures.

3. Computations concerning the hydraulics and hydrology of the facility and its relationship to the calculated flood through the existing spillway.

4. An assessment of the condition of the facility and corrective measures required.

It should be noted that this report does not pass judgment on the safety or stability of the dam other than on a visual basis. The inspection is to identify those features of the dam which need corrective action and/or further study.

1.2 Description of the Project:

a. Location: The project is located on Spaulding Pond Brook (a tributary to the Shetucket River) in the City of Norwich, County of New London, and State of Connecticut. The dam is located approximately 200 feet north of Mohegan Park Road, 7,000 feet upstream of the Shetucket River, and is shown on the Norwich, Connecticut USGS quadrangle map, having coordinates 41° 32' 22" (north latitude) and 72° 04' 06" (west longitude).

b. Description of Dam and Appurtenances: Spaulding Pond Brook Dam No. 2 is an earth embankment dam 200 feet long and 16 feet high, with an average crest width of 12 feet. Both the upstream and downstream embankments have a slope of about 3H:1V. There is partial riprap protection on the upstream slope to a height of 6 to 7 feet. The riprap consists of large stones up to 4 and 5 feet in diameter. On the downstream slope, riprap protection in only provided near the outlet pipe. The small impoundment behind the dam is approximately 2 acres in size and 3 feet deep (see Photo 3).

Its principal spillway consists of a drop inlet structure located on the upstream slope of the dam. There is a low level outlet at the invert of the 30 inch pipe passing through the dam, controlled by a gate valve, and there are two additional inlets at higher elevations. A low level orifice, 12"x 20" in size, maintains normal water level at elevation 159.0 feet, while a high level intake on both sides of the structure with a total length of 15 feet will pass flood flows at an elevation of 166.3 feet. Any flows in addition to those that the 30 inch pipe could handle would pass over the 100 foot wide emergency spillway on the left side of the dam (see Site Plan and plates in Appendix B). Further left of the dam is a dike, about 900 feet long, with a maximum height of 15 feet and side slopes of 3H:1V. A nature

trail passing between the dam and dike divides the available storage into two separate areas. To maintain some equalization of water levels and flows, an arch culvert, 50" x 31" in size, passes beneath the road between these two reservoir areas.

c. Size Classification: SMALL - With the pool level at the top of the dam, the impoundment capacity is 63 acre feet. The dam's height above the spillway pipe is 16 feet. On the basis of storage, it is therefore classified as a SMALL structure in accordance with the recommended guidelines of the Corps of Engineers, which state that a small dam is one whose storage is greater than or equal to 50 and less than 1,000 acre feet and whose height is greater than or equal to 25 and less than 40 feet.

d. Hazard Classification: HIGH - The dam and dike are classified as having a HIGH hazard potential because they are located in an area where the failure discharge from either the dam or dike could cause the possible loss of more than a few lives and appreciable damage to property. The breach of the dam could cause damage to homes located 2,500 feet downstream from the dam. At this point no flooding is anticipated within the homes prior to failure, while post failure depths would be 2 to 3 feet above the sill elevations of most houses in the area. The breach of the dike would cause damage at homes located about 600 feet downstream. At this point no flow is anticipated prior to failure, while post failure depths would be about 2 feet above the sill elevation of the houses in the area.

e. Ownership: Spaulding Pond Brook Dam No.2 is owned by the City of Norwich.

f. Operator: Operation of this facility is under the supervision of the Department of Public Works, Walter J. Wadja, Jr., Director, City Hall, City of Norwich, Norwich, Connecticut, telephone 887-5413. Routine work at the dam is supervised by the Superintendent of Parks and Cemeteries.

g. Purpose of Dam: Dam No. 2 along Spaulding Pond Brook is a flood water retarding dam. During the winter it is used for ice skating.

h. Design and Construction History: Spaulding Pond Brook Dam No.2 was designed by the United States Department of Agriculture, Soil Conservation Service, Project No. CN-425-P, in 1966. It was built under the Watershed Protection and Flood Prevention Act by the City

of Norwich, State of Connecticut and New London County Soil and Water Conservation District with the assistance of the Soil Conservation Service of the United States Department of Agriculture in 1968.

i. Normal Operating Procedures: Water level is normally maintained at the elevation of the low level orifice on the principal spillway drop inlet structure. Because it is a single purpose flood prevention dam, water is kept at a relatively low level in the pond by the low level inlet. Flood waters would enter the inlet structure at the high level crest of the riser. Since its construction, however, no flow has reached this level.

1.3 Pertinent Data:

a. Drainage Area: Dam No.2 along Spaulding Pond Brook and its drainage area are located in New London County in southeastern Connecticut. The basin is irregular in shape and the entire watershed in only 0.45 square miles in size. Of this, 0.24 square miles are controlled by Dam No.1 at Spaulding Pond. The remaining area of 0.21 square miles contributes directly to Dam No.2. The topography is characterized by hilly terrain with elevations ranging from a high of 390 feet at the northern most point of the watershed to a low of 159 feet at the low level orifice of the inlet structure at the dam. Basin slopes are generally moderate with few steep areas. The storage available at Dam No.1 has a significant impact on the flow anticipated at the project area, as evident from the calculations attached in Appendix D of this report.

b. Discharge at Damsite: Discharge at the dam is through the low level gated outlet, the low level orifice, the main riser crest, and over the emergency spillway. There are no other outlets along the dike. Most data shown below is taken from SCS design data and some has been calculated or interpolated therefrom.

1.	Outlet works	
	Size:	30" RCP low level outlet
	Invert Elev.:	156.0 feet
	Discharge capacity:	80 cfs (at test flood level)
2.	Maximum known flood at dam site:	Elevation of 164.3± attained on January 26,1978. Approximate discharge through dam - 18 cfs
3.	Ungated spillway capacity at top of dam:	2,850 cfs at Elev. 172.3

4.	Ungated spillway capacity at test flood elevation:	400 cfs at Elev. 169.0
5.	Gated spillway capacity at normal pool elevation:	N/A
6.	Gated spillway capacity at test flood elevation:	N/A
7.	Total spillway capacity at test flood level:	400 cfs at Elev. 169.0
8.	Total project discharge at top of dam:	2,850 cfs at Elev. 172.3
9.	Total project discharge at test flood elevation:	400 cfs at Elev. 169.0

c. Elevations (Feet above National Geodetic Vertical Datum):

1.	Streambed at toe of dam: Toe of Dike:	156.3 157.2
2.	Bottom of cutoff:	156 (Dam) 152 (Dike)
3.	Maximum tailwater:	N/A
4.	Normal pool:	159.0
5.	Full flood control pool:	168.1
6.	Spillway crest:	166.3 (Principal) 168.1 (Emergency)
7.	Design surcharge (Original Design):	170.3
8.	Top of dam:	172.3
9.	Test flood surcharge:	169.0

d. Reservoir Length (in Feet):

1.	Normal pool:	300
2.	Flood control pool:	700
3.	Spillway crest pool:	450 (Principal) 700 (Emergency)
4.	Top of dam:	1,000
5.	Test flood pool:	750

e. Storage (Acre Feet):

1.	Normal pool:	4
2.	Flood control pool:	33
3.	Spillway crest pool:	25 (Principal) 33 (Emergency)
4.	Top of dam:	63
5.	Test flood pool:	40

f. Reservoir Surface Area (Acres):

1.	Normal pool:	2.5
2.	Flood control pool:	5.5
3.	Spillway crest:	4.5 (Principal) 5.5 (Emergency)
4.	Test flood pool:	5
5.	Top of dam:	8.5

g. Dam and Dike:

		Dam	Dike
1.	Type:	Earth embankment	Earth embankment
2.	Length:	200 feet	900 feet
3.	Height:	16 feet	15 feet
4.	Top width:	12 feet	12 feet
5.	Side slopes:	3H:1V	3H:1V
6.	Zoning:	Core-Impervious Outer fill-Pervious	Core-Impervious Outer fill-Pervious
7.	Impervious Core:	Silty sands from borrow material	Silty sands from borrow material
8.	Cutoff:	To bedrock or limits of excavation	To bedrock or limits of excavation
9.	Grout curtain:	None	None
10.	Other:	Toe drains - two outlets	Toe drains - three outlets

h. Diversion and Regulating Tunnel: None

i. Spillway (Principal):

	Low Level	High Level
1. Type:	12"x20" orifice in concrete wall	Concrete drop inlet
2. Length of weir:	1.7 feet	15 feet
3. Crest elevation:	159.0 feet	166.3 feet
4. Gates:	None	None
5. Upstream channel:	N/A	N/A
6. Downstream channel:	30" RCP to discharge point	30" RCP to discharge point
7. General:	N/A	N/A

Spillway (Emergency):

1. Type:	Grass channel
2. Length of crest:	100 feet
3. Crest elevation:	168.1 feet
4. Gates:	None
5. Upstream channel:	Grass slope
6. Downstream channel:	Grass slope
7. General:	Berm between dam and spillway to channel flow away from toe of dam.

j. Regulating Outlets:

1. Invert:	156.0 feet
2. Size:	12 inch diameter opening in concrete chamber
3. Description:	Opening in wall of riser on upstream side.
4. Control mechanism:	Hand wheel sluice gate lift
5. Other:	None

SECTION 2

ENGINEERING DATA

2.1 Design: Spaulding Pond Brook Dam No.2 was designed in 1966 by the United States Department of Agriculture, Soil Conservation Service, Engineering and Watershed Planning Unit, Upper Darby, Pennsylvania. The design report, design calculations, subsurface data, construction plans and specifications are available at the Soil Conservation Service office in Storrs, Connecticut. Selected calculations, plans and other data are reproduced in the Appendix of this report.

2.2 Construction: The entire facility was constructed in 1968. Construction supervision reports are available at the Soil Conservation Service.

2.3 Operation: Spaulding Pond Brook Dam No.2 was constructed for flood water retarding purposes. Other than routine maintenance, there is no operation involved. The facility is maintained by the City of Norwich Department of Public Works. Mowing and all other maintenance is accomplished by the City of Norwich Public Works Department.

2.4 Evaluation:

a. Availability: The facility is open to the public at all hours. Consequently, it was made available for visual inspection. All design plans and calculations were made available for this review, and the more significant parts are reproduced in this report.

b. Adequacy: The detailed design information was found to be very adequate for making this review. The design report and the plans were found to be precise and thorough.

c. Validity: The plans made available were stamped "As Built" by the Soil Conservation Service. A field survey conducted at the site during the inspection confirmed that these plans were valid.

SECTION 3

VISUAL INSPECTION

3.1 Findings:

a. General: An inspection of Spaulding Pond Brook Dam No.2 was performed on April 8, 1981 by Lenard & Dilaj Engineering, Inc. with the assistance of Geotechnical Engineers, Inc. The weather was clear and the temperature was about 60°F. At the time of inspection, the water level in the pond was 159.4 feet, about 0.4 feet above the orifice invert elevation.

On the basis of the visual inspection, the dam was judged to be in good condition.

b. Dam: The dam is an earth embankment with 3H:1V upstream and downstream slopes. The crest width is about 12 feet. There is an emergency spillway that was excavated at the left abutment and a combination drop inlet spillway and gated low-level inlet structure near the center of the dam. The facility was constructed in 1968 by the City of Norwich with the assistance of the Soil Conservation Service, U.S. Department of Agriculture.

1. Crest: The crest of the dam is grass covered, but has been deteriorated by a foot and vehicle path. Runoff water has further accelerated this erosion process, as shown on Photo 2. The surface along the crest of the dam does not have a crown and thus water does not run off.

2. Upstream Slope: The upstream slope is protected with riprap up to an elevation of 11 feet below the crest. Above this elevation, the slope is covered with long grasses. The riprap is in good condition, and above the riprap level there are no signs of erosion or sloughing.

3. Downstream Slope: The downstream slope is covered with long grasses. There is no indication of seepage, erosion or sloughing because the water level in the pond is normally low. The design drawings show a longitudinal foundation drain under about the midpoint of the downstream slope. Two 8-inch corrugated metal pipes constitute the outlets for the drain and are located at both sides

of the drop inlet spillway outlet pipe. The left drain pipe is discharging about 6 gallons per hour, while the right drain discharges about 12 gallons per hour. The discharge of the left drain pipe is rust colored (Photo 7) while the discharge of the right drain pipe is clear. No seepage was observed at the downstream toe or further downstream of the dam.

c. Appurtenant Structures: The appurtenant structures of this dam are the combination drop inlet spillway and gated low-level inlet structure, the emergency spillway and the dike.

1. Drop Inlet Spillway: The concrete structure and the trash racks are in good condition (Photo 4). There is a gate controlling a low-level inlet on the upstream face of the concrete structure (Photo 4). At the time of inspection, the gate was partially open. The outlet pipe discharges into a riprap-lined channel (Photo 7). There is some brush growing in the channel which may present some obstruction to the flow.

2. Emergency Spillway: The emergency spillway is a 100 foot wide earth channel in the left abutment. The slopes and bottom of the channel are grass covered with no signs of erosion. A footpath crosses the channel with insignificant erosion. The emergency spillway can be seen on the left side of Photo 3.

3. Dike: The dike is an earth embankment with 3H:1V slopes. The drawings show that the dike has a longitudinal foundation drain under about the midpoint of the downstream slope. At the time of inspection, there was no water stored immediately upstream of the dike except for some standing water at about Sta 14+50. The dike crest and slopes are grass covered with no significant erosion, except for ruts left by vehicles along the crest (Photo 9). The foundation drain has three outlets (numbered 3, 4, and 5 in the design drawings). Two of the three outlets, 3 and 5, do not contain a pipe, but consist of a trench filled with granular material covered by riprap at their exit at the toe of the dike. At the time of inspection, these two outlets were not discharging. The third outlet, at Sta 14+50, consists of an 8 inch corrugated metal pipe that was discharging a small flow, as evidenced by the wet area at the end of the pipe. The pipe was buried under stones and debris (Photo 10).

Seepage was observed at the toe of the dike in the vicinity of the drain pipe probably as the result of the blockage of the pipe.

d. Reservoir Area: The reservoir is crossed by a road consisting of earth fill with a corrugated metal pipe culvert beneath it, which has been partially silted up (Photos 5 and 6). The road earth fill also supports a natural gas pipeline.

e. Downstream Channel: The downstream channel for the outlet pipe is riprap protected and has some brush growth. The emergency spillway discharges into the outlet channel about 200 feet downstream of the dam. The downstream channel then crosses under Mohegan Park Road through a 24 inch diameter culvert (Photo 8).

3.2 Evaluation: On the basis of the visual inspection, the dam and its appurtenant structures are judged to be in good condition. Items requiring maintenance consist of:

a. brush removal in the outlet channel,

b. removal of debris from the No.4 drain outlet of the dike (Sta 14+50),

c. repair of erosion along the crest of the dam and dike,

d. cleaning of the culvert under the road (and gas line) crossing through the reservoir. This is necessary to maintain a flow to equalize water levels within the reservoir behind the dam and the dike.

e. The reservoir was not storing flood waters at the time of inspection; thus, no determination of seepage problems could be made. An attempt should be made to inspect the downstream slopes of the dam and dike during periods of high water levels in the reservoir.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedure:

a. General: The City of Norwich Public Works Department operates the dam and appurtenant facilities. The primary purpose of this facility is to provide for flood protection. For this reason water is always kept at a low elevation. The second orifice of the principal spillway, three feet above the bottom of the reservoir, is always open. Consequently, water levels are always maintained at this elevation, unless large flood flows result in a temporary rise in the pond level. During the winter months the pond is used for ice skating by local residents. There are no operational procedures in effect at the dam. According to reports, the emergency spillway has never been used.

b. Description of Any Warning System in Effect: Emergency action and/or warning is coordinated by the City of Norwich Department of Public Works. No formal emergency or contingency plan is in effect. In a letter dated August 30, 1968, the Soil Conservation Service did, however, suggest that "the park roads be closed when there is continuing intensive rainfall following rainfall of 3 to 4 inches within two hours, or when the flood pool is 1.2 feet below the top of the inlet riser (site 2) and still rising."

4.2 Maintenance Procedures:

a. General: Routine maintenance is carried out and is supervised by the Superintendent of Parks and Cemeteries. The grassed areas are periodically mowed.

b. Operating Facilities: The only operating facility is the principal spillway. The construction of the inlet structure reduces the necessity for frequent maintenance. There does not seem to be any need for maintenance on the operating facilities other than intermittent repair as the need arises and occasional discharge of accumulated sediments in the pond.

4.3 Evaluation: Maintenance of the dam and appurtenant facilities needs to be improved. A formal program of operation and maintenance procedures should be implemented, including documentation to provide complete records for future reference; a formal downstream warning system should be developed and implemented; and a program of biennial technical inspections by a qualified registered engineer should be instituted.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General: Spaulding Pond Brook Dam No.2 is an earth embankment dam. It is 200 feet long, 12 feet wide at the crest, and 16 feet high above streambed. Its principal spillway consists of a drop inlet structure located on the upstream slope of the dam. There is a low level outlet at the invert of the 30 inch pipe passing through the dam, controlled by a gate valve, and there are two additional inlets at higher elevations. A low level orifice maintains normal water level at elevation 159.0 feet, while a high level intake on both sides of the structure will pass flood flows at an elevation of 166.3 feet. Any flows in addition to those that the 30 inch pipe could handle would pass over the 100 foot wide emergency spillway on the left side of the dam. Further left of the dam is a dike about 900 feet long with a maximum height of 15 feet. A wood road passing between the dam and dike divides the available storage into two separate areas. To maintain some equalization of water levels and flows, an arch culvert passes beneath the road between these two reservoir areas.

The channel immediately downstream of the dam is a riprap lined excavation. Prior to crossing the road through a 24 inch pipe culvert, it is a natural streambed. After passing beneath the road, the brook flow passes through a small wetland area and is then channeled through a long series of pipes through the residential and downtown areas of Norwich, before discharging into the Shetucket River near its intersection with the Thames River.

The total watershed covers an area of 0.45 square miles. The upper area of 0.24 square miles is controlled by Spaulding Pond Brook Dam No.1. The portion contributing directly to Spaulding Pond Brook Dam No.2 consists of 0.21 square miles. It should be noted that a portion of the lower watershed area has been added on by the construction of a diversion ditch by the SCS located just to the left of the dike. This is not apparent from USGS quadrangle maps.

At the riser crest elevation of 166.3 feet, available storage at the site is approximately 25 acre feet. This increases to 40 acre feet at the test flood level and 63 acre feet at the top of the dam.

5.2 Design Data: Sufficient design data was found to be available from records of the Soil Conservation Service. Design

calculations, plans, inspection reports, and as-built drawings are on file both at the State and SCS offices.

A summary of the available design data includes the following:

Drainage Area:	132 acres
Time of Concentration:	0.5 hours
Emergency Spillway	
- Frequency of use:	Once in 100 years
- Duration of flow through spillway:	8.8 hours
- Maximum velocity at control section:	6.9 ft./sec.
Earth Fill	
- Height:	16 feet
- Volume:	18,500 C.Y.

Flood Frequency or Determining Factor	Elev. (Ft.)	Storage (Ac.Ft.)	Inflow (cfs)	Outflow (cfs)
50 yr.	159.0	0.9	-	20.9
100 yr.-6 hr. AMC II	166.3	24.0	205	84
100 yr. -6 hr. AMC III	167.6	30.2	367	75
16.5 in. rainfall AMC III	170.3	47.6	1,312	1,094
Design high water plus 2 ft.	172.3	54.2	1,928	1,760

5.3 Experience Data: While no day to day records are maintained for the facility, it is known that since its construction, no flow has passed over the principal spillway crest or through the emergency spillway. The highest water level, attained on January 26, 1978, is marked on the side of the riser (Photo No.4) at elevation 164.3 feet, 2 feet below the crest elevation of the inlet structure and 4 feet below the crest of the emergency spillway.

5.4 Test Flood Analysis: Based on the "Recommended Guidelines for Safety Inspection of Dams," Spaulding Pond Brook Dam No.2 is classified as SMALL in size and as having a HIGH hazard potential. The test flood for these conditions ranges from half the Probable Maximum Flood to the Probable Maximum Flood (½ PMF to PMF). Based on the size of the dam and its storage capacity, the ½ PMF was chosen as the test flood.

Using the HEC-1 Flood Hydrograph Computer Program developed by the Army Corps of Engineers for dam safety investigations, the inflow and outflow for the test flood were both found to be 400 cfs (900 CSM). As a basis for comparison, the PMF resulted in an inflow and outflow of 1,350 cfs (3,000 CSM). The outflow capacity of the dam with water level at the top of its crest is 2,850 cfs, which is equivalent to 700% of the routed test flood outflow. The freeboard distance remaining between the high water level of the test flood and the top of the dam would be about 3.3 feet. Because the dam at Site No.2 is the second in a series of flood control structures along Spaulding Pond Brook, the flood was also routed through Dam Site No.1 to take advantage of available storage at that site.

5.5 Dam Failure Analysis: A dam failure analysis was performed using the "Rule of Thumb" method for estimating downstream dam failure hydrographs, as developed by the Corps of Engineers. Peak outflow before failure of the dam would be 400 cfs, producing a depth of flow of about 0.5 feet at the initial impact area (an apartment complex) 1,000 feet downstream of the dam and a depth of 2.0 feet at a housing area 2,500 feet downstream. The calculated dam failure discharge, based on an assumed breach width of 50 feet, is 5,200 cfs, which will produce a depth of flow of 2.1 feet and 4.9 feet at the same downstream points. Pool elevation at the time of the breach was assumed to be at the level of the ½ PMF. This means an increase in the depth of flow of 1.6 feet and 3 feet, due to the failure of the dam. At the second point downstream of the dam (25+00), the increase of 3 feet in water level will mean a rise of 2 to 3 feet above the sill elevation of homes in that area. The analysis covered a distance of 4,500 feet downstream of the dam, as shown by the calculations in Appendix D. Through its entire length, this flow would pass through densely populated residential and commercial areas of Norwich. The breach of the dam could cause significant downstream damage with the possible loss of more than a few lives.

For the dike, there would be only a negligible flow preceding the failure. The calculated dike failure discharge of 9,770 cfs, based on an assumed breach width of 100 feet, would produce a depth of flow of 2.3 feet at a housing development about 600 feet downstream of the dike. This means an increase in flow from a negligible depth before failure to a depth of 2.3 feet after failure of the dike. This increase in water depth can cause houses in this development to be flooded with about 2 feet of water above the sill elevation, and thereby cause the possible loss of more than a few lives. As shown on the map of the Potential Flood Area of the dam and dike failures, the impact area of the dike initially differs from that of the dam. About 2,000 feet downstream, however, the two impact areas converge.

Based on the failure analyses of both the dam and dike, these structures are classified as having a HIGH hazard potential.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations: The visual inspection did not reveal any indications of structural instability.

6.2 Design and Construction Data: The design and construction data consists of exploration data, design notes, plans and as-built drawings prepared by the U.S. Soil Conservation Service. For a formal stability analysis additional data would be required.

6.3 Post Construction Changes: There are no known or observed post construction changes.

6.4 Seismic Stability: Spaulding Pond Brook Dam No.2 is located in Seismic Zone 1 and, in accordance with the Phase I inspection guidelines,does not warrant seismic stability analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment:

a. Condition: The visual inspection indicated that the dam and its appurtenant structures were in good condition. There are some items requiring maintenance:

1. Brush removal in the outlet channel.

2. Removal of debris from No.4 drain outlet of the dike (Sta 14+ 50).

3. Repair of erosion at the crest of the dam and dike.

4. Cleaning of the culvert under the road crossing through the reservoir.

b. Adequacy of Information: The assessment of the condition of the dam is based on a review of existing drawings and the visual inspection.

c. Urgency: The remedial measures described below should be implemented by the owner within one year of receipt of this report.

7.2 Recommendations: The following recommendations should be implemented under the direction of a qualified registered professional engineer.

a. The downstream slopes of the dam and dike should be inspected during periods of high water levels in the reservoir.

7.3 Remedial Measures:

a. Operating and Maintenance Procedures:

1. Remove brush from outlet channel.

2. Remove debris from No.4 drain outlet of the dike.

3. Repair erosion at crest of dam and dike.

4. Clean culvert under road crossing the reservoir.

5. Institute a program of biennial technical inspections by a qualified registered professional engineer.

6. Develop a formal warning system for downstream inhabitants to be used in case of emergencies.

7. Monitor the project during and immediately after periods of intense rainfall and check for possible seepage. Keep a record of flood pool levels for future reference purposes.

7.4 Alternatives: There are no practical alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT *SPAULDING POND DAM #2*

DATE *April 8, 1981*

TIME *9 am - 12 noon*

WEATHER *Clear, 60's*

W.S. ELEV. _____ U.S. _____ DN.S.

PARTY:

1. *John Lenard - L.D.E.I.*
2. *Michael Dilaj - L.D.E.I.*
3. *Michael Romanowski - L.D.E.I.*
4. *Mark Vasington - L.D.E.I.*
5. *Gonzalo Castro - G.E.I.*
6. *Karl Acimovic - L.D.E.I.*
7. _____
8. _____
9. _____
10. _____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	*Geotechnical*	*Gonzalo Castro*	
2.	*Structural, Civil*	*John Lenard*	
3.	*Hydraulics, Hydrology*	*Karl Acimovic, Michael Dilaj*	
4.	*Survey, Civil*	*Michael Romanowski*	
5.	*Survey*	*Mark Vasington*	
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT *SPAULDING POND DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	*172.3 ft.*
Current Pool Elevation	*159.4 ft. (9 feet below top of inlet structure)*
Maximum Impoundment to Date	*To elevation 164.3 ft.*
Surface Cracks	*None observed.*
Pavement Condition	*Not applicable.*
Movement or Settlement of Crest	*None observed. Ruts due to vehicle and foot traffic.*
Lateral Movement	*None observed*
Vertical Alignment	*Too irregular to judge.*
Horizontal Alignment	*Too irregular to judge.*
Condition at Abutment and at Concrete Structures	*Good.*
Indications of Movement of Structural Items on Slopes	*None.*
Trespassing on Slopes	*Several footpaths, no significant erosion.*
Sloughing or Erosion of Slopes or Abutments	*None.*
Rock Slope Protection - Riprap Failures	*Large riprap below el. 161.5. Good condition.*
Unusual Movement or Cracking at or Near Toe	*None observed.*
Unusual Embankment or Downstream Seepage	*None observed.*
Piping or Boils	*None observed.*
Foundation Drainage Features	*Drainage trench. Two 8 inch outlet pipes discharging ~0.1 and 0.2 gpm.*
Toe Drains	*None known.*
Instrumentation System	*None known.*
Vegetation	*Grass, long. No trees or brush.*

PERIODIC INSPECTION CHECKLIST

PROJECT *SPAULDING POND DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	
Crest Elevation	*172.3 ft.*
Current Pool Elevation	*None*
Maximum Impoundment to Date	*To elevation 164.3 ft.*
Surface Cracks	*None observed.*
Pavement Condition	*Not applicable*
Movement or Settlement of Crest	*None observed. Ruts due to traffic.*
Lateral Movement	*None observed.*
Vertical Alignment	*Too irregular to judge.*
Horizontal Alignment	*Too irregular to judge.*
Condition at Abutment and at Concrete Structures	*Good.*
Indications of Movement of Structural Items on Slopes	*Not applicable.*
Trespassing on Slopes	*Several footpaths. No significant erosion.*
Sloughing or Erosion of Slopes or Abutments	*None observed.*
Rock Slope Protection - Riprap Failures	*No slope protection.*
Unusual Movement or Cracking at or Near Toes	*None observed.*
Unusual Embankment or Downstream Seepage	*Some apparent seepage at maximum section left of drainage outlet #4. Small head due to ponding of water upstream in low area. Generally dike is above water level.*
Piping or Boils	*None observed.*
Foundation Drainage Features	*Drainage trench three outlets. No discharge except drain #4.*
Toe Drains	*None known.*
Instrumentation System	*None known.*
Vegetation	*Grass, long. No bushes.*

PERIODIC INSPECTION CHECKLIST

PROJECT *SPAULDING POND DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	*No approach channel.*
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	
Condition of Concrete	*Good.*
Stop Logs and Slots	*Good.*

PERIODIC INSPECTION CHECKLIST

PROJECT *SPAULDING POND DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	*Good.*
Condition of Joints	*Good.*
Spalling	*None observed.*
Visible Reinforcing	*None observed.*
Rusting or Staining of Concrete	*None observed.*
Any Seepage or Efflorescence	*None observed.*
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	*None observed.*
Cracks	*None observed.*
Rusting or Corrosion of Steel	*None observed.*
b. Mechanical and Electrical	*Not applicable.*
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECKLIST

PROJECT *SPAULDING POND DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	*Good.*
Rust or Staining on Concrete	*None observed.*
Spalling	*None observed.*
Erosion or Cavitation	*None observed.*
Cracking	*None observed.*
Alignment of Monoliths	*Not applicable.*
Alignment of Joints	*Not applicable.*
Numbering of Monoliths	*Not applicable.*

PERIODIC INSPECTION CHECKLIST

PROJECT *SPAULDING POND DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	*None*
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	
Channel	*Good condition. Large riprap.*
Loose Rock or Trees Overhanging Channel	*Not applicable.*
Condition of Discharge Channel	*Good. Some growth of brush.*

PERIODIC INSPECTION CHECKLIST

PROJECT *SPAULDING POND DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	*No approach channel.*
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	*Open earth channel, grassy surface.*
General Condition of Concrete	*Not applicable.*
Rust or Staining	*Not applicable.*
Spalling	*Not applicable.*
Any Visible Reinforcing	*Not applicable.*
Any Seepage or Efflorescence	*Not applicable.*
Drain Holes	*Not applicable.*
c. Discharge Channel	
General Condition	*Good, grass-covered.*
Loose Rock Overhanging Channel	*None.*
Trees Overhanging Channel	*None.*
Floor of Channel	*Grass.*
Other Obstructions	*None observed.*
Other Comments	

PERIODIC INSPECTION CHECKLIST

PROJECT *SPAULDING POND DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	*There is no service bridge.*
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Underside of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

APPENDIX B

ENGINEERING DATA

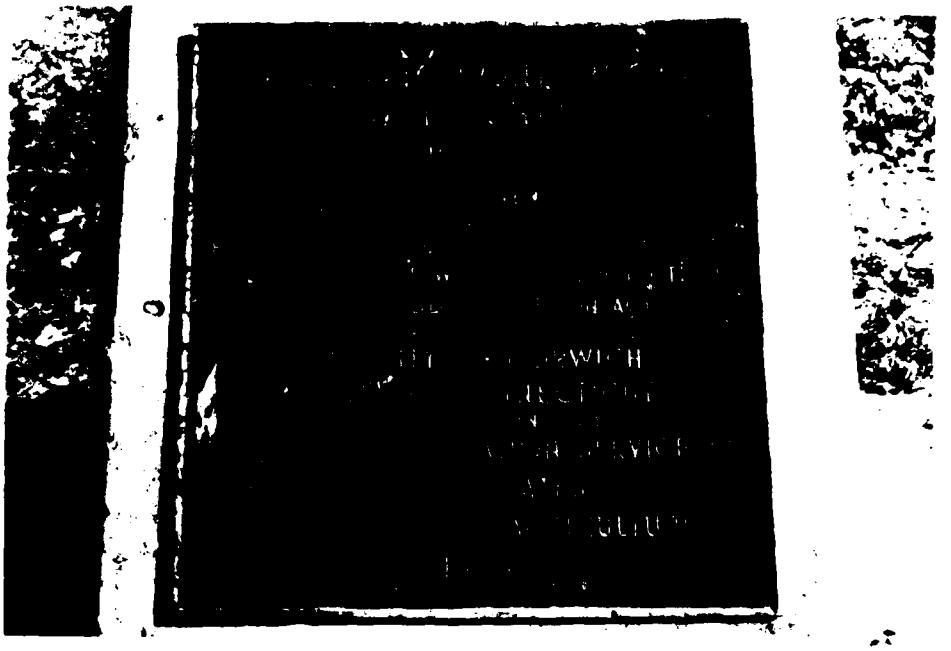


Photo 1. Bronze plate at dam with project information.

Photo 2. Footpath and vehicle rut running along crest of dam. Note runoff erosion developing along path.

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	SPAULDING POND DAM #2 NORWICH, CONNECTICUT CT 00203 MAY 1981 C-2
LENARD·DILAJ ENGINEERING, INC. STORRS, CONNECTICUT ENGINEER		

Photo 3. View of dam from across reservoir on upstream side. Note emergency spillway depression on left side of photo.

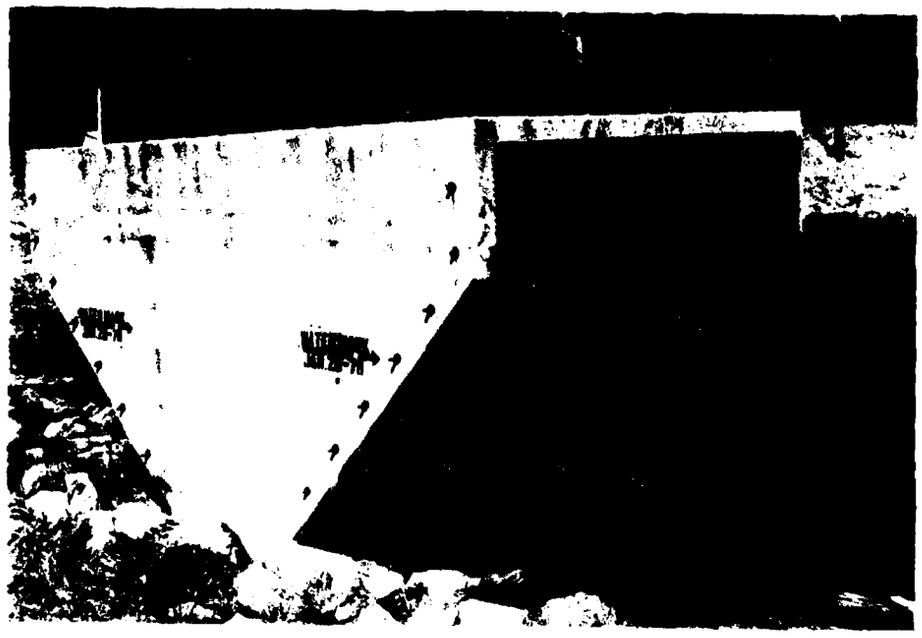


Photo 4. Drop inlet primary spillway structure. Note grate for pipe inlet on upstream side.

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS LENARD·DILAJ ENGINEERING, INC. STORRS,CONNECTICUT ENGINEER	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	SPAULDING POND DAM #2 NORWICH, CONNECTICUT CT 00203 MAY 1981 C-3

Photo 5. Inlet side of culvert at the road between the dam and dike storage areas. Note small bush growing at invert and missing asphalt coating in the culvert.

Photo 6. Discharge side of same culvert. Note siltation and vegetation in flow path.

Photo 7. Outlet pipe of primary spillway at dam. Note foundation drains on both sides of outlet pipe and rust colored discharge from the left foundation drain.

Photo 8. Twenty-four inch corrugated metal culvert crossing the road below the dam.

Photo 9. View of dike from left abutment.

Photo 10. Silted drain outlet No.4 near center of dike.

APPENDIX D

HYDROLOGIC AND HYDRAULIC

COMPUTATIONS

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO 1 OF 1
CALCULATED BY K. A. DATE 4/29/81
CHECKED BY _____ DATE _____
SCALE _____

DETERMINATION OF SPILLWAY TEST FLOOD*

A. SIZE CLASSIFICATION

Based on either storage or height

			THIS DAM:
(Small)	Storage	50-999 Ac.-Ft.	54 AC.-FT.
	Height	25-39 Ft.	16 FT.
Intermediate	Storage	1,000-50,000 Ac.Ft.	
	Height	40-100 Ft.	
Large	Storage	More than 50,000 Ac.-Ft.	
	Height	Greater than 100 Ft.	

B. HAZARD POTENTIAL CLASSIFICATION

Category	Loss of Life	Economic Loss
Low	None expected	Minimal
Significant	Few	Appreciable
(High)	(More than few)	(Excessive)

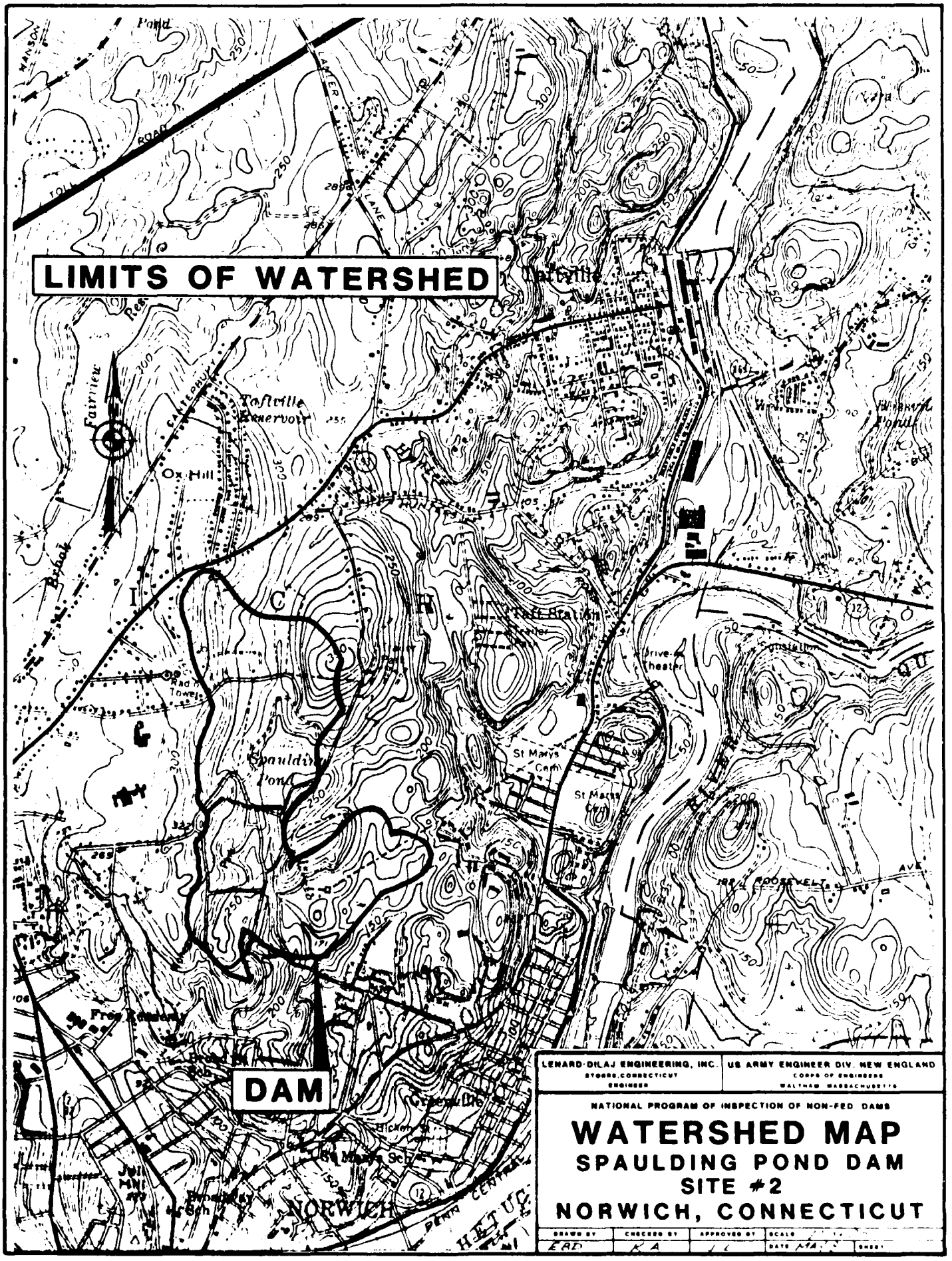
Hazard Classification HIGH

C. HYDROLOGIC EVALUATION GUIDELINES

Hazard	Size	Spillway Test Flood
Low	Small	50 to 100-Year Frequency
	Intermediate	100-Year Frequency to ½ PMF
	Large	½ PMF to PMF
Significant	Small	100-Year Frequency to ½ PMF
	Intermediate	½ PMF to PMF
	Large	PMF
(High)	(Small)	(½ PMF to PMF)
	Intermediate	PMF
	Large	PMF

Spillway Test Flood 1/2 PMF

* Based upon "Recommended Guidelines for Safety Inspection of Dams" Department of the Army, Office of the Chief of Engineers, November 1976.



LENARD-DILAJ ENGINEERING, INC.	US ARMY ENGINEER DIV. NEW ENGLAND
STORRS, CONNECTICUT ENGINEER	CORPS OF ENGINEERS WALTHAM MASSACHUSETTS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

WATERSHED MAP
SPAULDING POND DAM
SITE #2
NORWICH, CONNECTICUT

DRAWN BY	CHECKED BY	APPROVED BY	SCALE	SHEET
ERD	KA		DATE APR.	

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
RUNOFF HYDROGRAPH AT	3
COMBINE 2 HYDROGRAPHS AT	4
ROUTE HYDROGRAPH TO	5
END OF NETWORK	

SPAULDING POND BROOK WATERSHED DAM NO.2

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79

RUN DATED 05/07/81.
TIME 0 12.35.10.

SPAULDING POND BROOK WATERSHED DAM NO. 2 NORWICH,CONNECTICUT
80-27-12
MAY 1981 DESIGN STORM --- **1/2 PMF**

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
150	0	30	0	0	0	0	0	4	0

JOPER	NWT	LROPT	IRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 6 LRTIO= 1

RTIOS= .10 .20 .30 .50 .80 1.00

SUB-AREA RUNOFF COMPUTATION

CALCULATION OF INFLOW HYDROGRAPH TO SPAULDING POND DAM NO.1

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

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.26	0.00	.26	0.00	0.000	0	0	0

PRECIP DATA

SPFE	RMS	R6	R12	R24	R48	R72	R96
0.00	25.20	100.00	111.00	120.00	127.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.20	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 1.36 CP= .63 NTA= 0

RECESSION DATA

STRTQ= 1.80 QRCSN= .05 RTIOR= 1.00

UNIT HYDROGRAPH 15 END-OF-PERIOD ORDINATES, LAG= 1.37 HOURS, CP= .62 VOL= 1.00

14. 48. 73. 66. 45. 30. 20. 13. 9. 6.
4. 3. 2. 1. 1.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q

(2)

SUM 25.60 20.02 5.59 8858.
(650.)(508.)(142.)(250.83)

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

HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH SPAULDING POND DAM NO.1

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	2	0	1	0	0

ROUTING DATA

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

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-241.	-1

STAGE	241.00	242.00	244.80	245.00	246.00	247.00	248.00
FLOW	0.00	10.00	15.00	25.00	80.00	250.00	780.00
SURFACE AREA=	13.	16.					
CAPACITY=	0.	72.					
ELEVATION=	241.	246.					

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
241.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
250.5	2.6	1.5	1000.

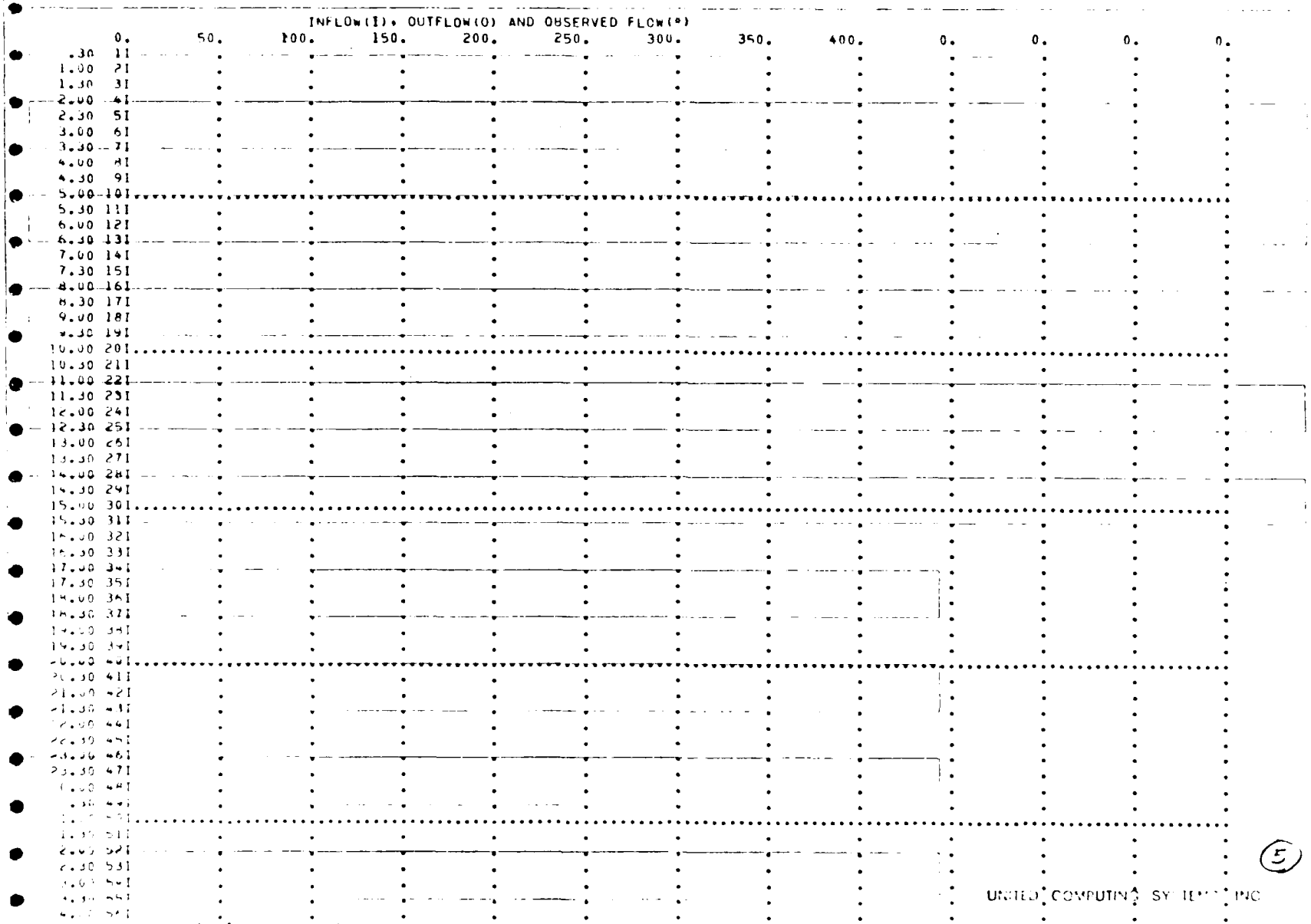
(3)

PEAK OUTFLOW IS 223. AT TIME 43.00 HOURS

SPAULDING POND DAM NO.1

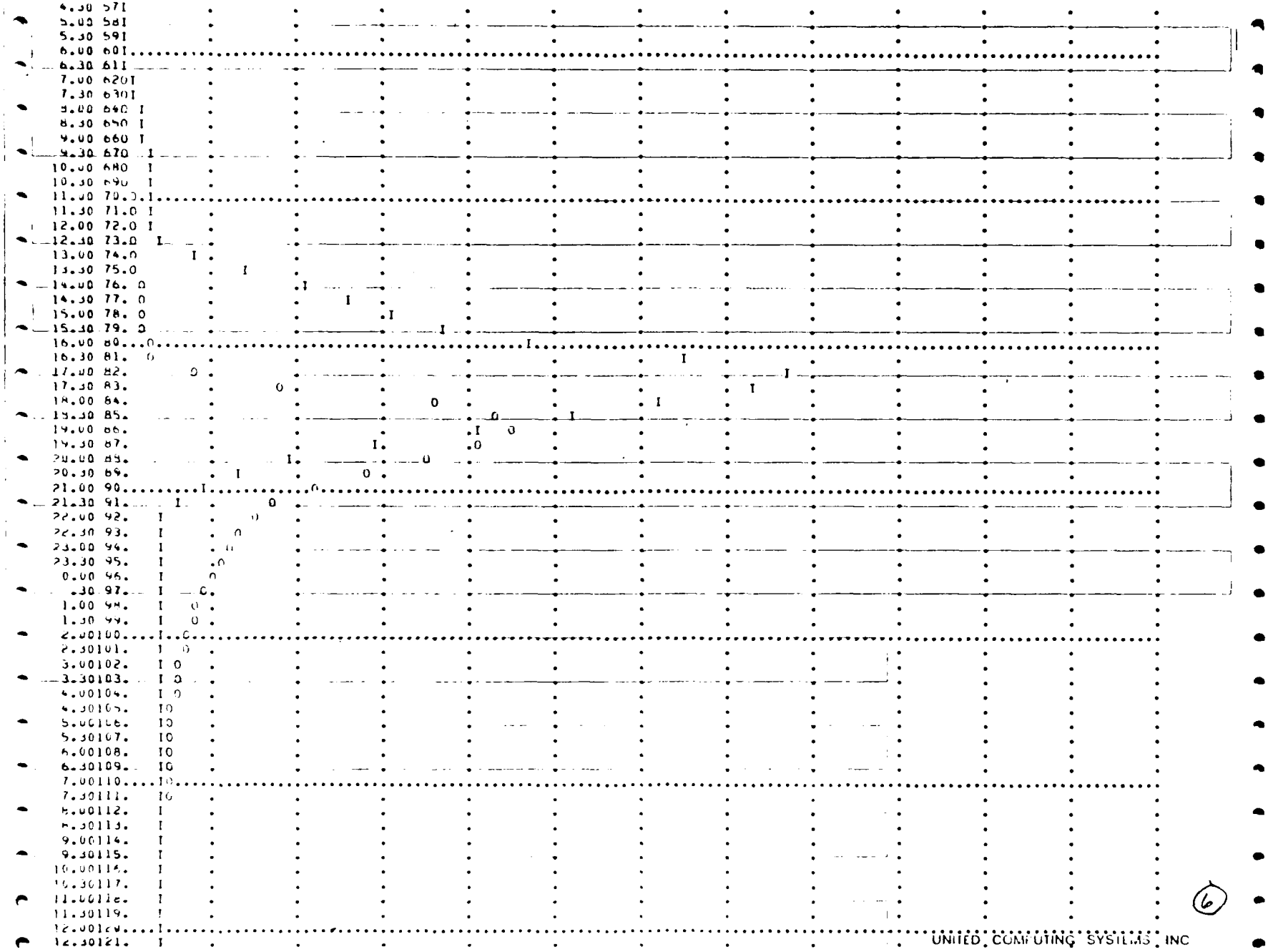
INFLOW/OUTFLOW HYDROGRAPH

STATION 2



(5)

UNITED COMPUTING SYSTEMS, INC


UNITED COMPUTING SYSTEMS INC

SUB-AREA RUNOFF COMPUTATION

CALCULATION OF INFLOW HYDROGRAPH TO SPAULDING POND DAM NO.2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	0	0	0	1	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TWSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.21	4.06	.21	0.00	4.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.80	25.20	100.00	111.00	120.00	127.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.80	1.00	0.00	0.00	1.00	1.00	.20	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 1.14 CP= .63 NTA= 0

RECESSION DATA

STRTQ= -1.80 QRCSN= -.05 RTIOR= 1.00

UNIT HYDROGRAPH 12 END-OF-PERIOD ORDINATES, LAG= 1.14 HOURS, CP= .63 VOL= 1.00

17. 54. 70. 52. 31. 19. 11. 7. 4. 2.
1. 1.

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	25.60	20.02	5.59	7412.
										(650.)	(508.)	(142.)	(209.88)

COMBINE HYDROGRAPHS

COMBINE HYDROGRAPHS 2 AND 3 INFLOW TO SPAULDING POND NO.2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	2	0	0	1	0	1	0	0

HYDROGRAPH ROUTING

COMBINED INFLOW ROUTED THROUGH SPAULDING POND DAM NO.2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	1	0	0	2	0	1	0	0

ROUTING DATA

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

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-159.	-1

STAGE	159.00	160.00	162.00	164.00	166.00	168.70	170.70	171.70
FLOW	0.00	5.70	12.70	17.00	20.40	282.00	1344.00	2228.00
CAPACITY=		4.	8.	15.	23.	33.	45.	60.	80.	103.
ELEVATION=	160.	162.	164.	166.	168.	170.	172.	174.	176.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
159.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
172.3	2.8	1.5	780.

PEAK OUTFLOW IS 417. AT TIME 42.50 HOURS

SPAULDING POND DAM NO. 2

INFLOW/OUTFLOW HYDROGRAPH

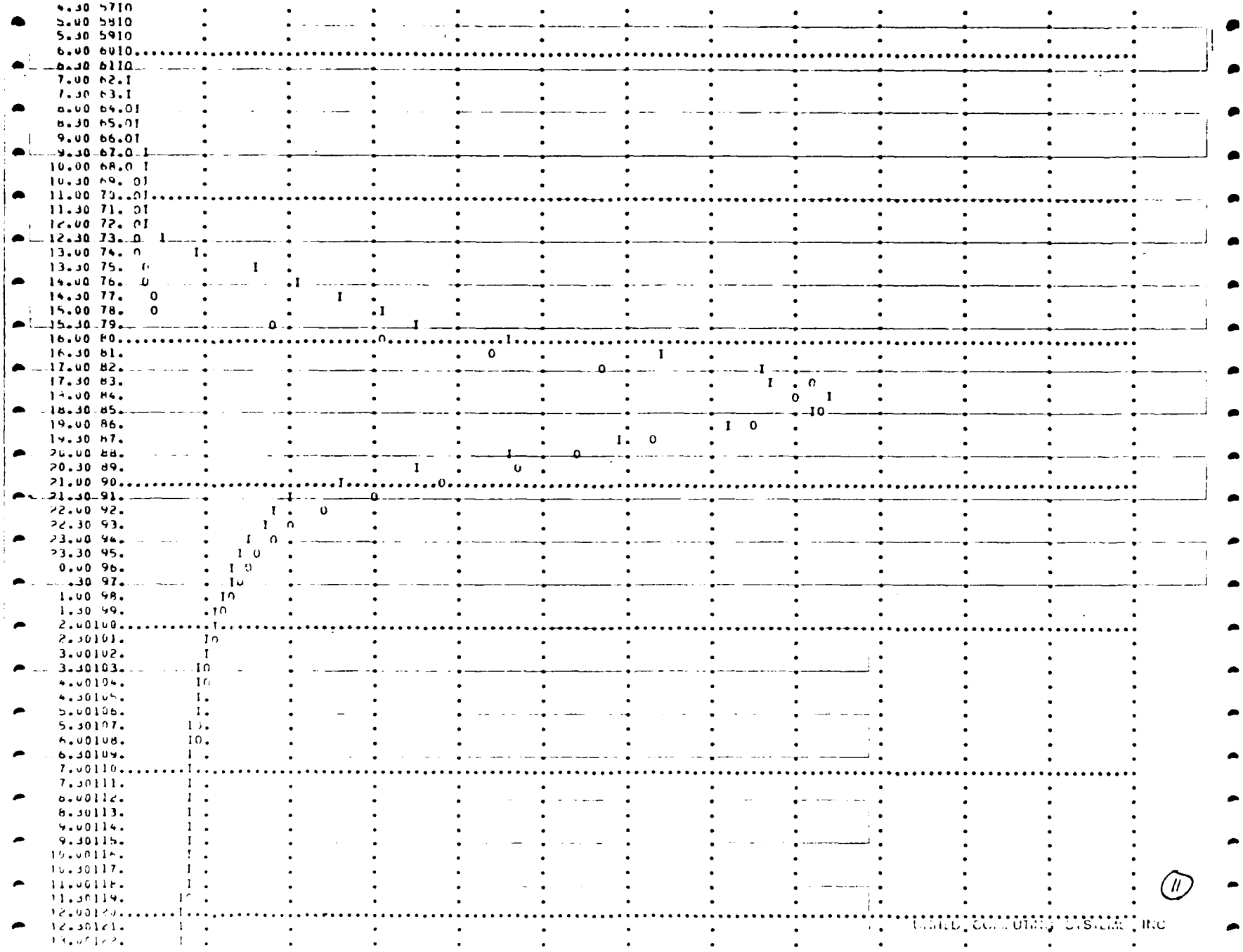
STATION 5

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

	0.	50.	100.	150.	200.	250.	300.	350.	400.	450.	0.	0.	0.
[illegible]	110												
1.00	210												
1.30	310												
[illegible]	410												
2.30	510												
3.00	610												
3.30	710												
4.00	810												
4.30	910												
5.00	1010												
5.30	1110												
6.00	1210												
6.30	310												
7.00	1410												
7.30	1510												
8.00	1610												
8.30	1710												
9.00	1810												
9.30	1910												
10.00	2010												
10.30	2110												
11.00	2210												
11.30	2310												
12.00	2410												
12.30	2510												
13.00	2610												
13.30	2710												
14.00	2810												
14.30	2910												
15.00	3010												
15.30	3110												
16.00	3210												
16.30	3310												
17.00	3410												
17.30	3510												
18.00	3610												
18.30	3710												
19.00	3810												
19.30	3910												
20.00	4010												
20.30	4110												
21.00	4210												
21.30	4310												
22.00	4410												
22.30	4510												
23.00	4610												
23.30	4710												
0.00	4810												
.30	4910												
1.00	5010												
1.30	5110												
2.00	5210												
2.30	5310												
3.00	5410												
3.30	5510												
4.00	5610												

(10)

[illegible] INC



(11)

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

				RATIOS APPLIED TO FLOWS					
OPERATION	STATION	AREA	PLAN	RATIO 1 .10	RATIO 2 .20	RATIO 3 .30	RATIO 4 .50	RATIO 5 .80	RATIO 6 1.00
HYDROGRAPH AT	1	.26 (.67)	1	77. (2.18)	154. (4.35)	231. (6.53)	384. (10.88)	615. (17.41)	769. (21.76)
ROUTED TO	2	.26 (.67)	1	11. (.31)	14. (.40)	57. (1.62)	223. (6.30)	541. (15.32)	720. (20.38)
HYDROGRAPH AT	3	.21 (.54)	1	68. (1.92)	136. (3.85)	204. (5.77)	340. (9.62)	543. (15.39)	679. (19.23)
2 COMBINED	4	.47 (1.22)	1	77. (2.17)	147. (4.17)	217. (6.13)	419. (11.86)	1005. (28.47)	1309. (37.08)
ROUTED TO	5	.47 (1.22)	1	19. (.55)	108. (3.06)	183. (5.18)	417. (11.80)	965. (27.34)	1326. (37.56)

SPAULDING POND DAM NO. 1

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	241.00	241.00	250.50
STORAGE	0.	0.	151.
OUTFLOW	0.	0.	2105.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	242.63	0.00	22.	11.	0.00	44.50	0.00
.20	244.35	0.00	47.	14.	0.00	45.50	0.00
.30	245.59	0.00	66.	27.	0.00	44.00	0.00
.50	246.54	0.00	86.	223.	0.00	43.00	0.00
.80	247.55	0.00	98.	541.	0.00	42.00	0.00
1.00	247.89	0.00	104.	720.	0.00	41.50	0.00

SPAULDING POND DAM NO. 2

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

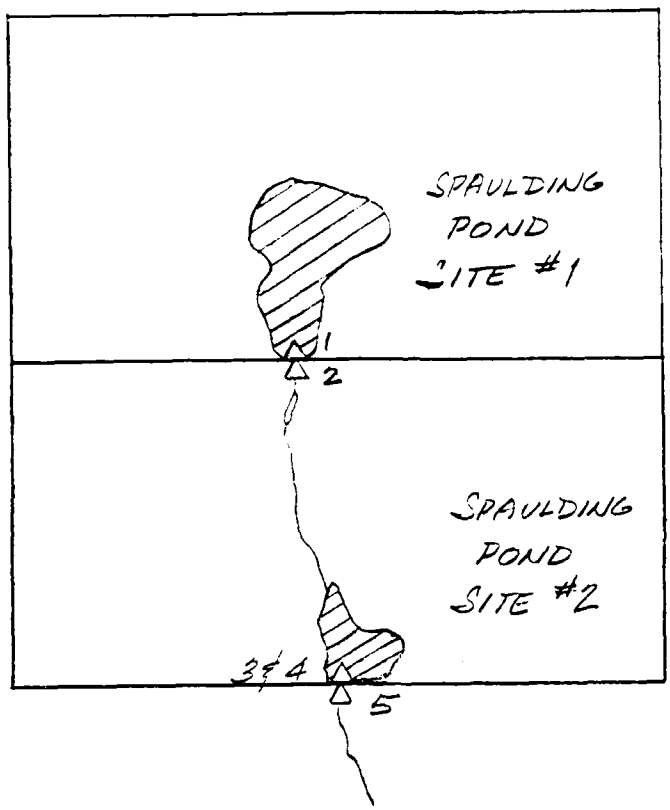
	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	159.00	159.00	172.30
STORAGE	0.	0.	63.
OUTFLOW	0.	0.	2758.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	165.37	0.00	20.	19.	0.00	44.50	0.00
.20	166.90	0.00	27.	108.	0.00	42.00	0.00
.30	167.68	0.00	31.	183.	0.00	41.50	0.00
.50	168.95	0.00	39.	417.	0.00	42.50	0.00
.80	169.99	0.00	45.	965.	0.00	42.00	0.00
1.00	170.67	0.00	50.	1370.	0.00	41.50	0.00

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND SIM #2
SHEET NO 1 OF
CALCULATED BY K.A. DATE 4/28/81
CHECKED BY M.R. DATE 5/7/81
SCALE

SCHEMATIC



1 - SITE #1 INFLOW
2 - SITE #1 ROUTED OUTFLOW
3 - SITE #2 INFLOW
4 - COMBINE HYDROGRAPHS 2 AND 3
5 - SITE #2 ROUTED OUTFLOW

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO 2 OF
CALCULATED BY K.A. DATE 4/28/81
CHECKED BY M.R DATE 5/7/81
SCALE

WATERSHED AREA – SPAULDING POND DAM #2

SITE NO. 1 (NORWICH, CONN. QUAD.)

106 grads } 106 grads ⇒ 155 ac. 0.24 S.M.
106 "

SITE NO. 2 (NORWICH, CONN. QUAD.)

107 grads
105 "
106 " } 106 grads ⇒ 155 ac. (0.24 S.M.)

Use SCS ⇒ 132 ac. 0.21 S.M.

TOTAL WATERSHED 0.45 S.M.

WATERSHED AREA – SPAULDING POND DAM #1

FROM SCS 7½' MAP I REPORT 0.26 S.M.

PRECIPITATION

SCS NEAREST EVENT
FROM TABLE NO 40

PMP 6 HR. 25.2 INCHES

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPALDING POND DAM #2
SHEET NO 3 OF
CALCULATED BY K.A. DATE 5/6/81
CHECKED BY M.R DATE 5/7/81
SCALE

LAG TIME (SNYDER'S)

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

SPALDING POND DAM #1:

$C_t = 2.0$
$L = 4500' = 0.85$ MI.
$L_{CA} = 1800' = 0.34$ MI.

$$t_p = 2.0[(0.85)(0.34)]^{0.3}$$

$t_p = 1.36$ HRS.

SPALDING POND DAM #2:

$C_t = 2.0$
$L = 2800' = 0.53$ MI.
$L_{CA} = 1550' = 0.29$ MI.

$$t_p = 2.0[(0.53)(0.29)]^{0.3}$$

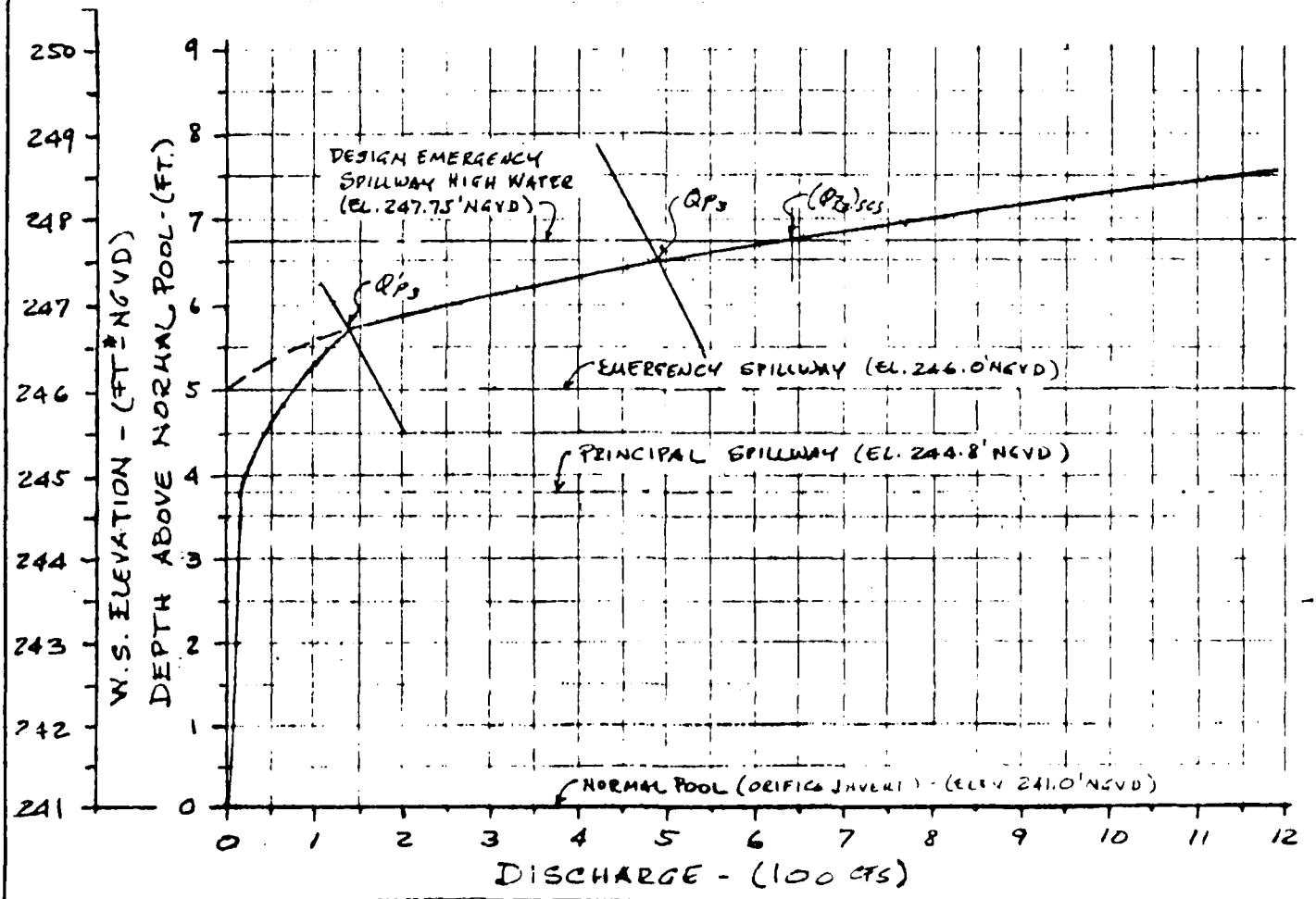
$t_p = 1.14$ HRS.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #1
SHEET NO 4 OF
CALCULATED BY K.A. DATE 5/6/91
CHECKED BY MR. DATE 5/7/91
SCALE

OUTFLOW RATING CURVE – SPAULDING POND DAM #1

FROM SCS & PHASE I REPORT (BY CAMM ENG.)

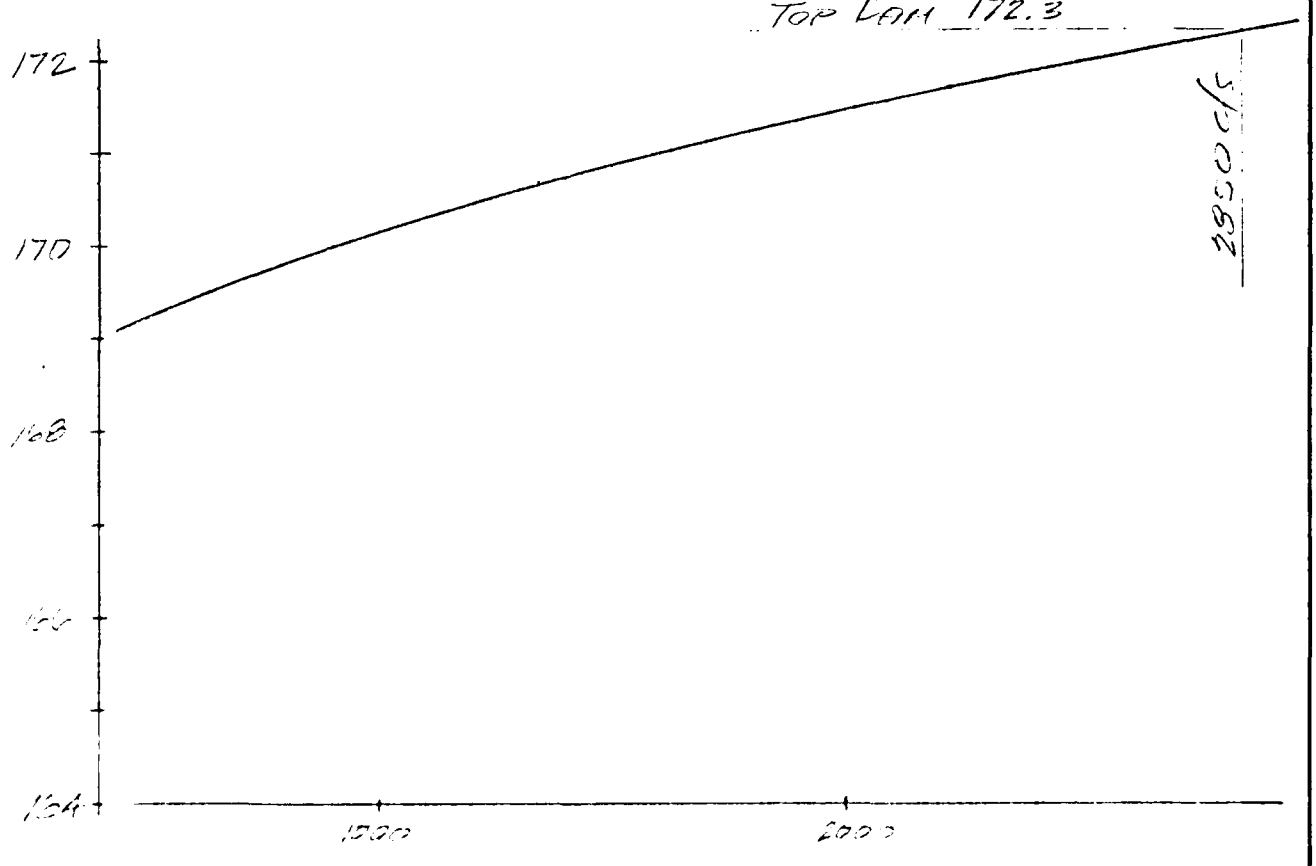


LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB Spaulding Pond Dam #2
SHEET NO 5 OF
CALCULATED BY K.A. DATE 5/6/81
CHECKED BY MR DATE 5/7/81
SCALE

Outflow Rating Curve – Spaulding Pond Dam #2

Elev. (Ft.)	Q-Principal Spillway	Q-Emergency Spillway	Q-Total (CFS)
159	0	0	0
160	5.7	0	5.7
162	12.7	0	12.7
164	17.0	0	17.0
166	20.4	0	20.4
168.7	79.1	205	282
170.7	85.1	1259	1344
171.7	88.0	2140	2228



LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO. 6 OF
CALCULATED BY K.A. DATE 5/6/81
CHECKED BY M.R. DATE 5/7/81
SCALE

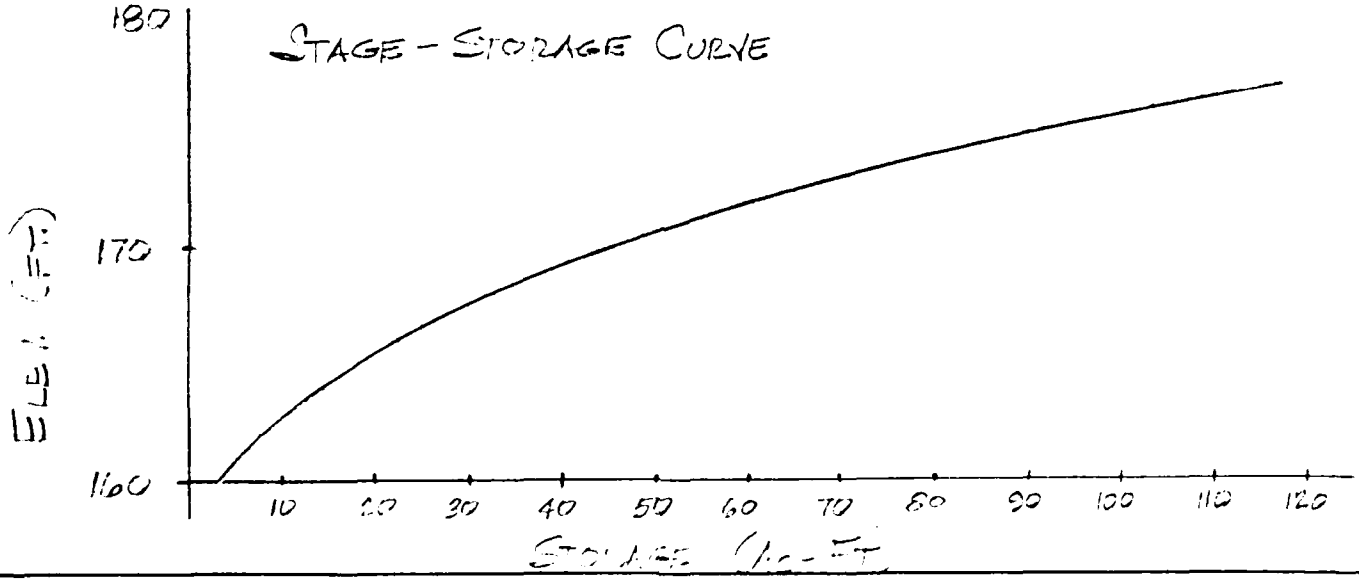
WATER SURFACE AREAS & STORAGE

SPAULDING POND DAM #1: (FROM PRINCE I REPORT)

NORMAL POOL ELEV. 241.0' — 13 AC.
FLOOD POOL ELEV. 246.0' — 10 AC.
(LINEAR VARIATION WITHIN EXPECTED SURCHARGE)

SPAULDING POND DAM #2: (FROM SCS – SEE APPENDIX B)

ELEV.	W. OF WOOD RD.	E. OF WOOD ROAD	TOTAL (AC. FT.)
160	3.75	0	3.75
162	7.91	0	7.91
164	12.58	2.00	14.58
166	17.78	4.92	22.70
168	24.02	8.68	32.70
170	31.81	13.56	45.37
172	41.56	18.92	60.48
174	54.22	25.36	79.58
176	70.43	32.90	103.3[illegible]



LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND UNIT #2
SHEET NO DF-1 OF 15
CALCULATED BY K.A. DATE 4/28/81
CHECKED BY MR DATE 5/7/81
SCALE

DAM FAILURE ANALYSIS

DAM LENGTH = 200'

DAM LENGTH AT 1/2 HEIGHT = 120'

PEAK FAILURE OUTFLOW:

$$Q_{P_1} = \frac{8}{27} W_b \sqrt{g} \, y_o^{3/2}$$

$W_b = 0.4 \times 120' = 48'$

$g = 32.2 \text{ FT/S}^2$

$y_o = 16.0'$

$Q_{P_1} = \frac{8}{27} (48)(32.2^{1/2})(16.0^{3/2})$

$Q_{P_1} = 5165 \text{ CFS}$

STORAGE

AT TOP DAM
FROM 200

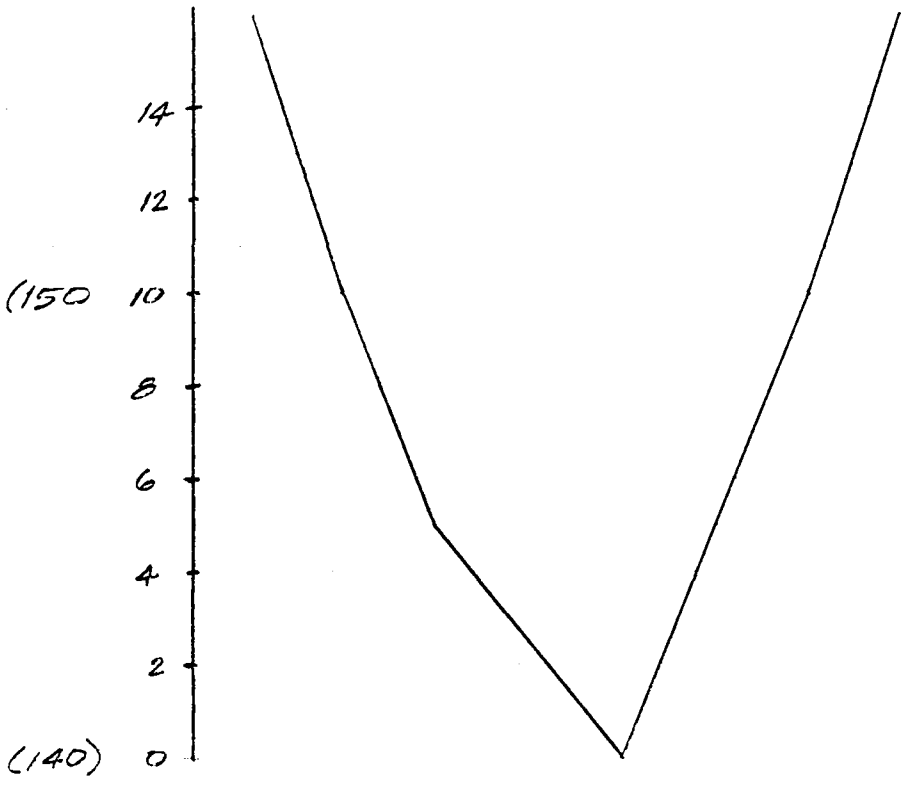
$S = 54.2 \text{ AC.FT.}$

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPILLWAY POND DAM #2
SHEET NO DF-2 OF 18
CALCULATED BY K.A. DATE 4/28/81
CHECKED BY M.R. DATE 5/7/81
SCALE HORIZ. 1" = 100', VERT. 1" = 4'

SECTION #1

STATION 3+00



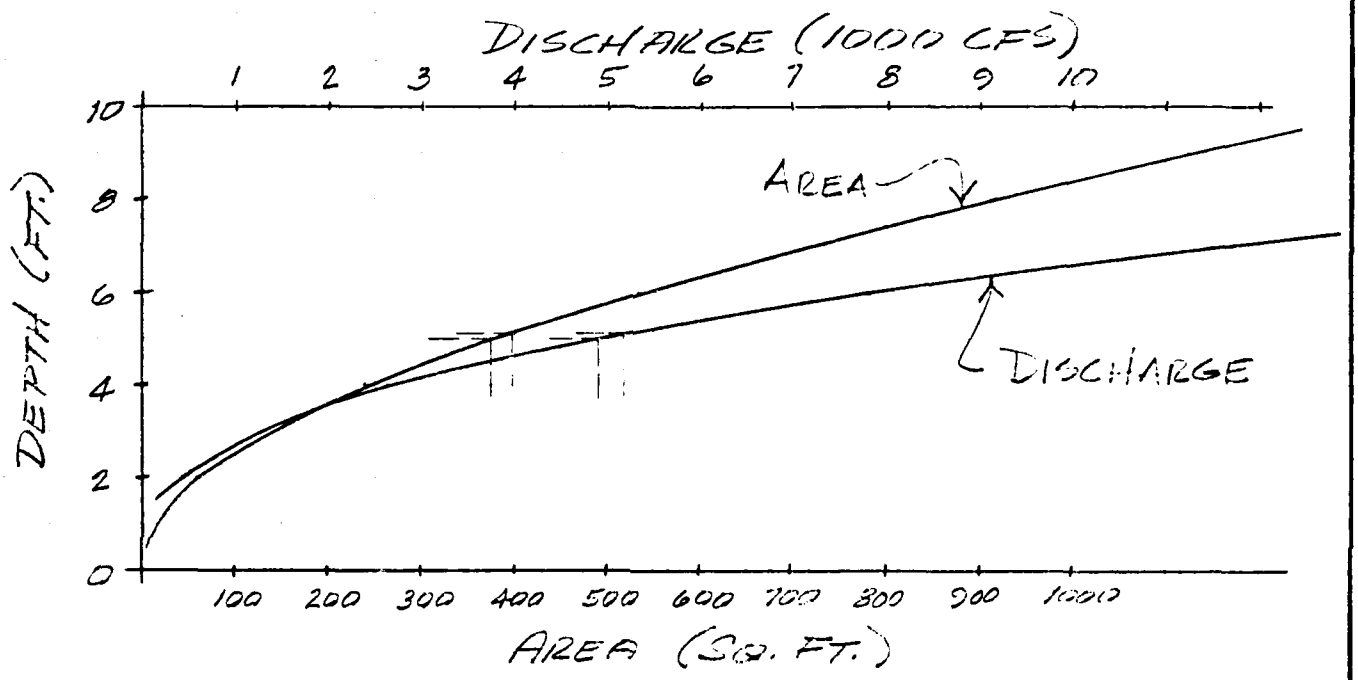
H	A	WP	R	n	V	Q (cfs)
2	60	61	1.0	.05	6.9	414
4	240	120	2.0	.05	10.9	2,616
6	535	170	3.1	.05	14.6	7,811
8	915	210	4.4	.05	18.4	16,836
10	1375	250	5.5	.05	21.4	29,425
12	1907	282	6.8	.05	24.7	47,102
14	2505	316	7.9	.05	27.2	68,136

$\frac{L}{S} = \frac{300 \text{ ft}}{.005 \text{ ft/ft}}$

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-3 OF 15
CALCULATED BY K.A. DATE 4/28/91
CHECKED BY M.R. DATE 5/7/91
SCALE

SECTION #1 (CONT.)



$Q_{P1} = 5165$ cfs
$H = 5.1$ ft.
$A = 396$ sq. ft.
$V_1 = 4.7$ ac. ft.

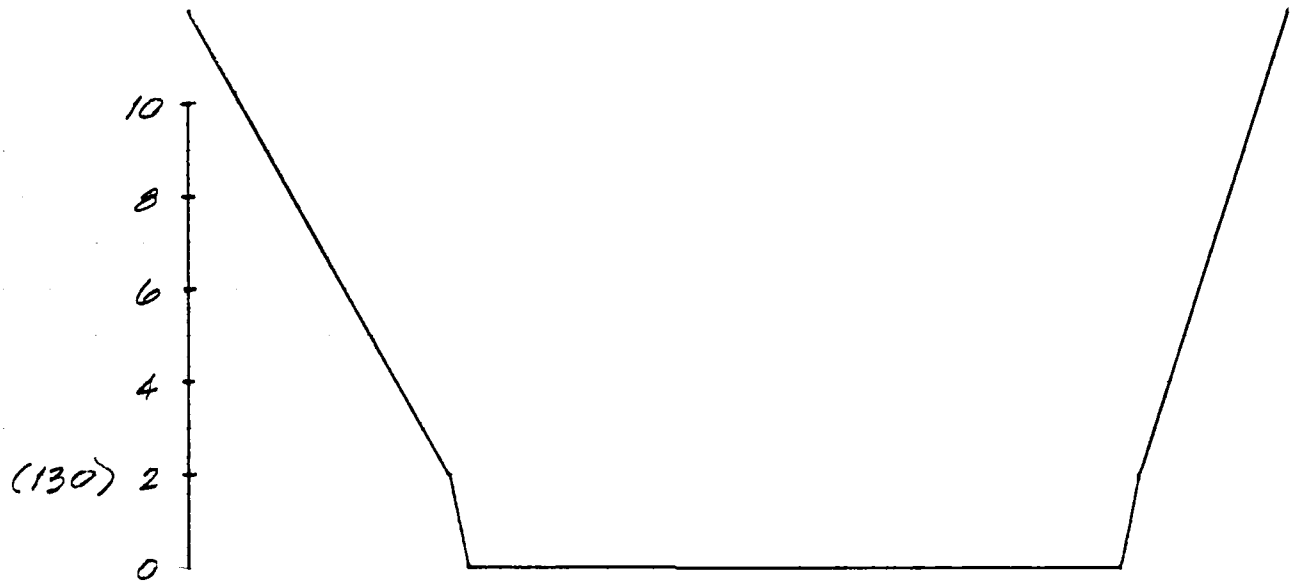
(TRIAL) $Q_{P2} = 4908$ cfs
$H = 5.0$ ft.
$A = 375$ sq. ft.
$V_2 = 2.6$ ac. ft.

$Q_{P2} = 4912$ cfs
$H = 5.0$ ft.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-4 OF 15
CALCULATED BY K.A. DATE 4/29/81
CHECKED BY M.R DATE 5/7/81
SCALE HOR. 1"=100', VER. 1"=4'

SECTION #2 — STATION 10+00



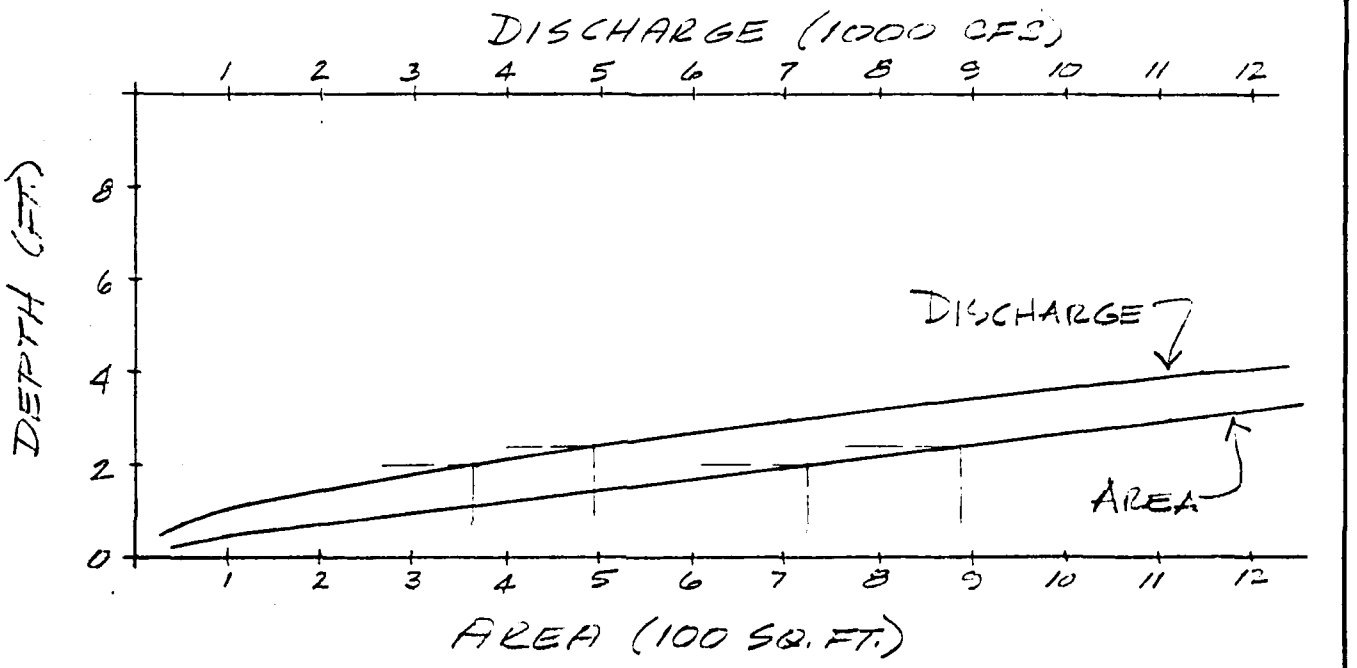
H	A	W/P	R	n	V	Q (CFS)
2	720	370	2.0	.06	5.1	3,672
4	1506	416	3.6	.06	7.6	11,445
6	2382	460	5.2	.06	9.7	23,105
8	3342	500	6.7	.06	11.5	38,433
3	1101	392	2.8	.06	6.4	7,046

L = 700'
S = .017

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-5 OF 16
CALCULATED BY K.A. DATE 4/29/81
CHECKED BY MR DATE 5/7/81
SCALE

SECTION #2 (CONT.)



$Q_{P2} = 4912$ cfs

$H = 2.4$ ft.

$A = 885$ sq. ft.

$V_1 = 14.2$ ac. ft.

(TRIAL) $Q_{P3} = 3625$ cfs

$H = 2.0$ ft.

$A = 725$ sq. ft.

$V_2 = 11.7$ ac. ft.

$Q_{P3} = 3738$ cfs

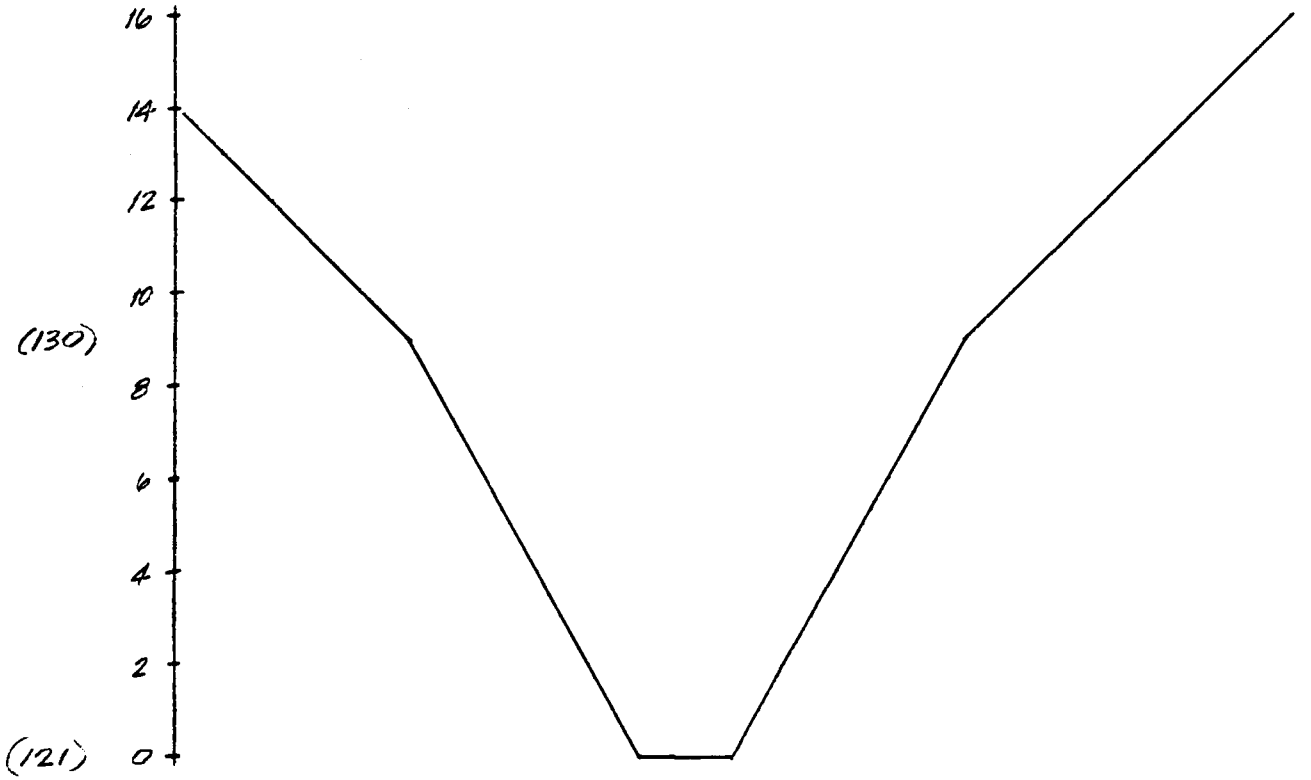
$H = 2.1$ feet

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-6 OF 18
CALCULATED BY K.A. DATE 4/29/81
CHECKED BY M.R DATE 5/7/81
SCALE HOR. 1" = 100', VER. 1" = 4'

SECTION #3

STATION 25+00



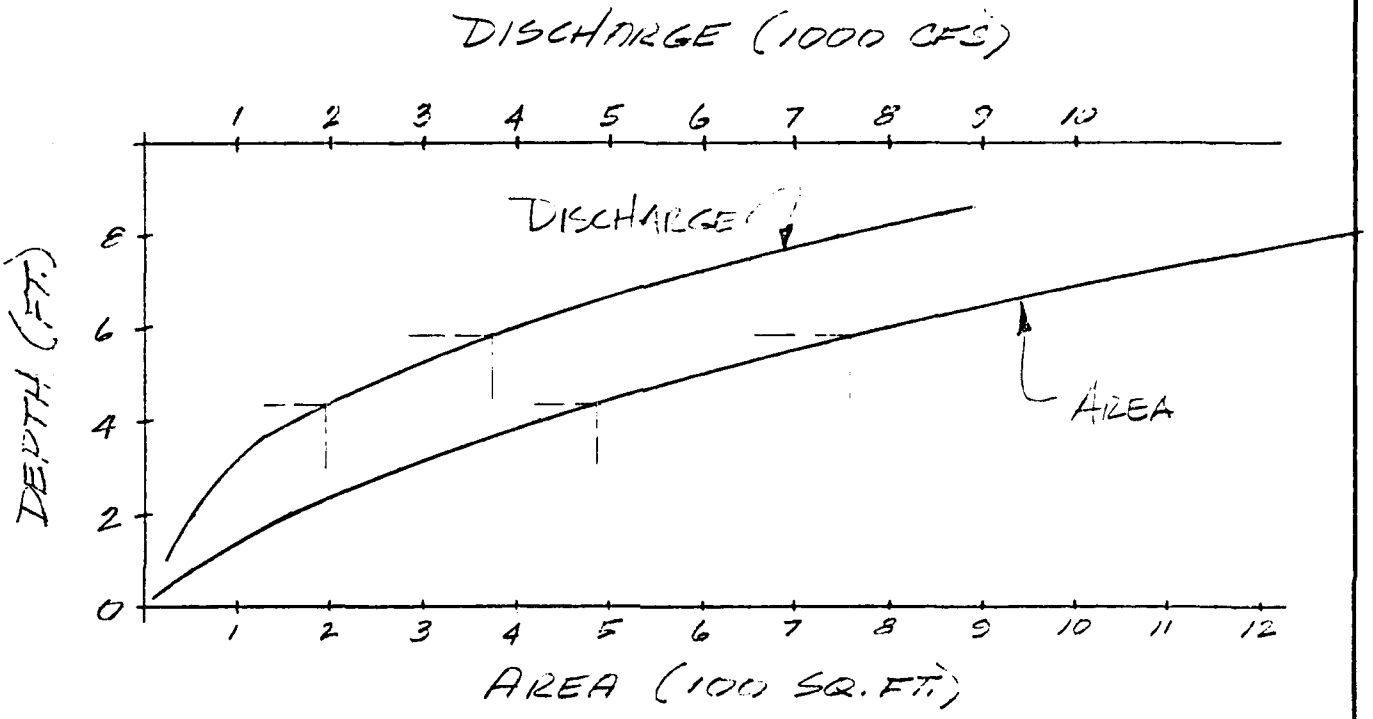
H	A	WP	R	n	V	Q (cfs)
2	156	106	1.5	.04	3.3	515
4	422	160	2.6	.05	3.8	1604
6	798	216	3.7	.05	4.9	3910
8	1284	270	4.8	.05	5.3	7447

L = 1500 ft.
S = .00457

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-7 OF 18
CALCULATED BY K.A. DATE 4/29/81
CHECKED BY M.R DATE 5/7/81
SCALE

SECTION #3 (CONT.)



$Q_{P3} = 3728$ cfs

$H = 5.8$ ft.

$A = 760$ sq ft.

$Y_1 = 26.2$ ac. ft.

(TRIAL) $Q_{P4} = 1921$ cfs

$H = 4.3$ ft.

$A = 485$ sq ft.

$Y_2 = 16.7$ ac. ft.

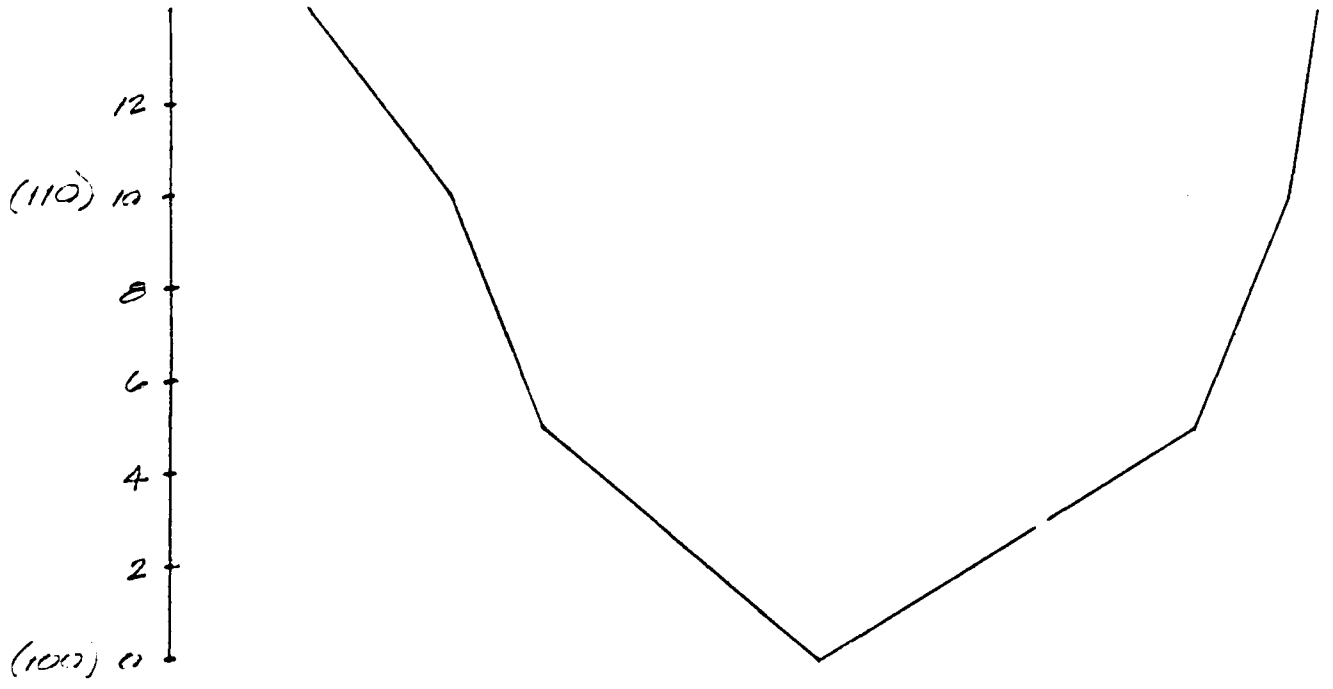
$Q_{P4} = 2150$ cfs

$H = 4.9$ ft.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-E OF 15
CALCULATED BY K.A. DATE 4/29/81
CHECKED BY M.R. DATE 5/7/81
SCALE HOR. 1"=100', VER. 1"=4'

SECTION #4 — STATION 95+00



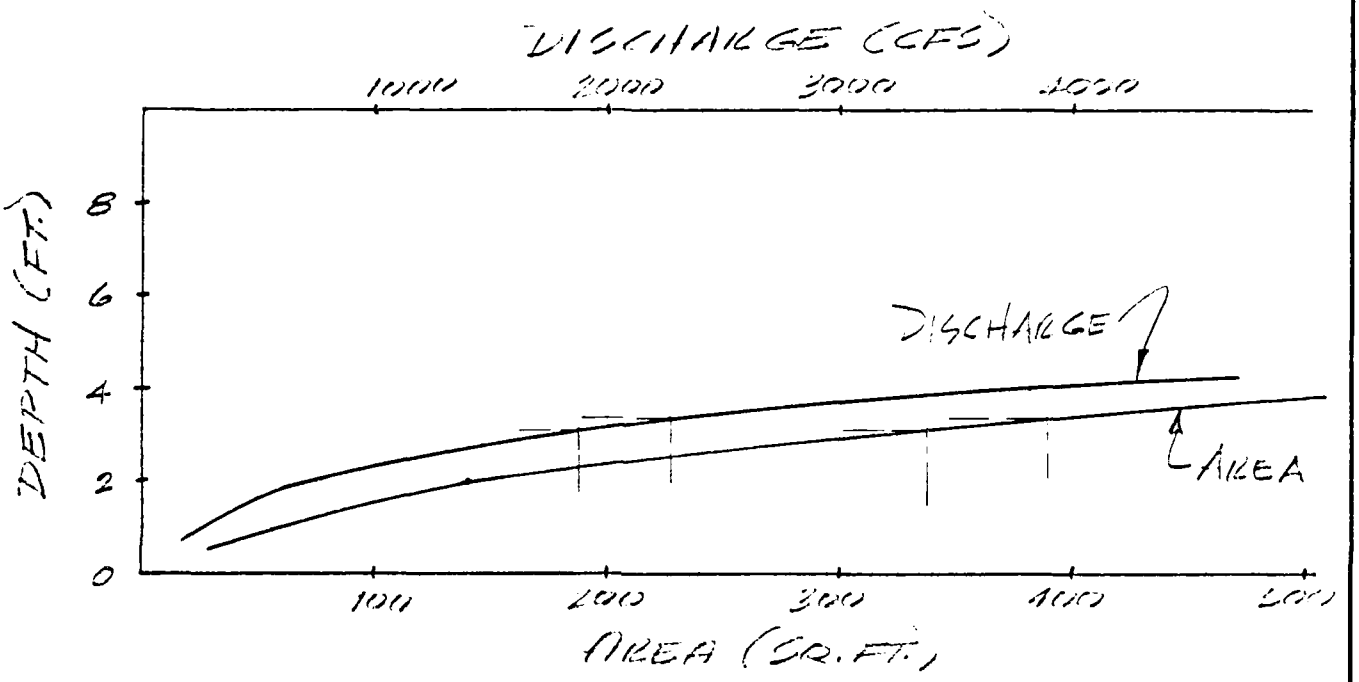
H	A	WP	R	n	√	Q (cfs)
2	140	140	1.0	.04	5.4	756
4	560	280	2.0	.05	6.8	3,508
6	1225	370	3.3	.05	9.6	11,856
8	2015	410	4.9	.05	12.4	24,956
3	315	210	1.5	.05	5.6	1,764

L = 1000 ±
S = 0.021 ± .005

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-9 OF 18
CALCULATED BY K.A. DATE 4/30/81
CHECKED BY M.R DATE 5/7/81
SCALE

SECTION #4 (CONT.)



$Q_{P4} = 2250$ cfs
$H = 3.4$ ft.
$A = 390$ sq. ft.
$V_1 = 9.0$ ac. ft.

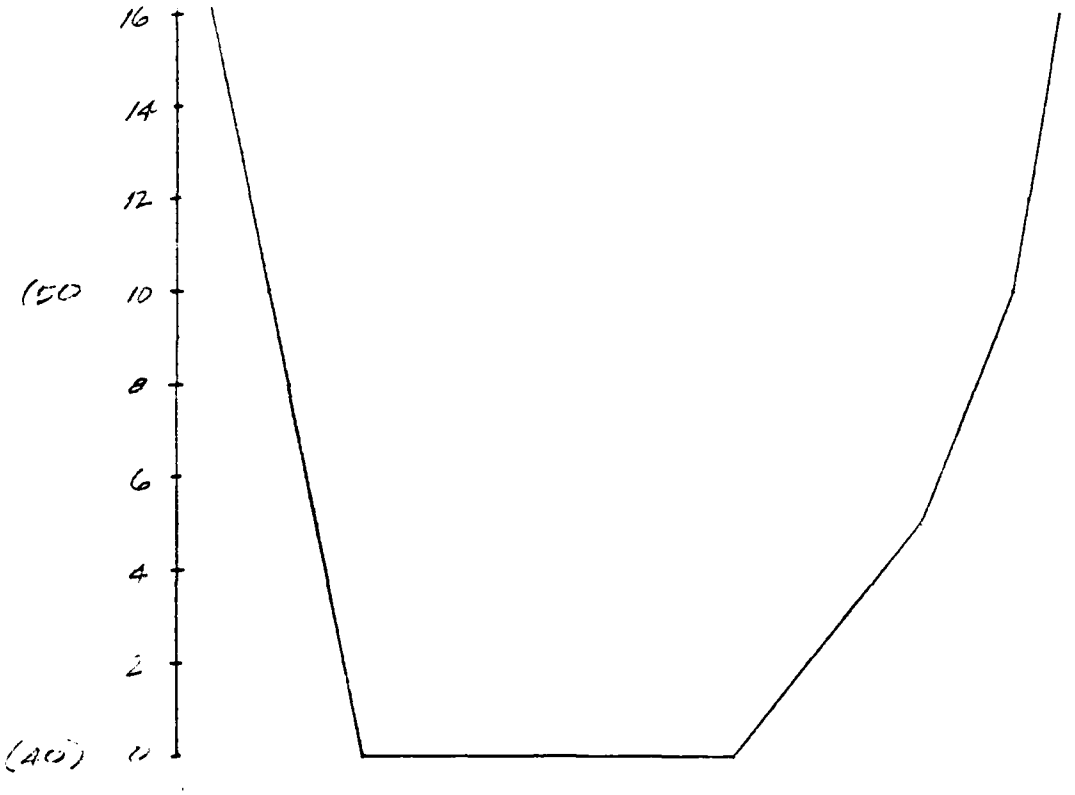
(TRIAL) $Q_{P5} = 1884$ cfs
$H = 3.1$ ft.
$A = 338$ sq. ft.
$V_2 = 7.8$ ac. ft.

$Q_{P5} = 1910$ cfs
$H = 3.2$ ft.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-10 OF 18
CALCULATED BY K.A. DATE 4/29/81
CHECKED BY MK DATE 5/8/81
SCALE

SECTION #5 — STATION 45+00



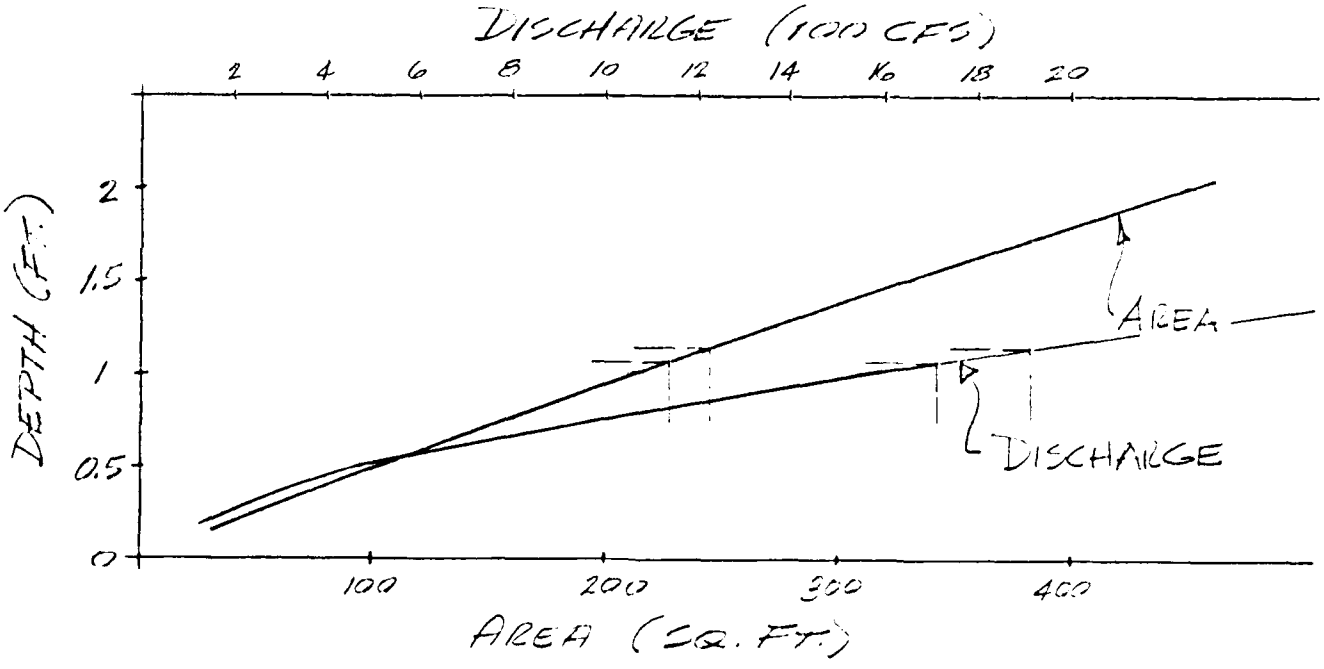
H	A	WP	R	n	V	Q (cfs)
2	450	250	1.8	.05	10.8	4860
3	713	276	2.6	.05	13.6	9829
4	1001	300	3.3	.05	16.1	16,116
1	212	224	1.0	.05	7.3	1548
0.5	103	212	0.5	.05	4.6	474

L = 1000 ft.
S = 0.016 ft./ft.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND LAM #2
SHEET NO DF-11 OF 19
CALCULATED BY K.A. DATE 4/29/91
CHECKED BY MR DATE 5/8/91
SCALE

SECTION #1 (CONT.)



$Q_{P5} = 1910$ cfs
$H = 1.1$ ft.
$A = 245$ sq. ft.
$V_1 = 5.6$ ac. ft.

(TRIAL) $Q_{P6} = 1713$ cfs
$H = 1.1$ ft.
$A = 230$ sq. ft.
$V_2 = 5.3$ ac. ft.

$Q_{P6} = 1718$ cfs
$H = 1.1$ ft.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-12 OF 15
CALCULATED BY K.A. DATE 5/12/81
CHECKED BY [illegible] DATE 5/12/81
SCALE

DIKE FAILURE ANALYSIS

DIKE LENGTH = 900'

PEAK FAILURE OUTFLOW:

$$Q_{P1} = \frac{8}{27} W_b \sqrt{g}\, Y_o^{3/2}$$

$W_b = 100'$

$g = 32.2\ FT/SEC^2$

$Y_o = 15'$

$$Q_{P1} = \frac{8}{27}(100)(32.2^{1/2})(15^{3/2})$$

$$Q_{P1} = 9770\ CFS$$

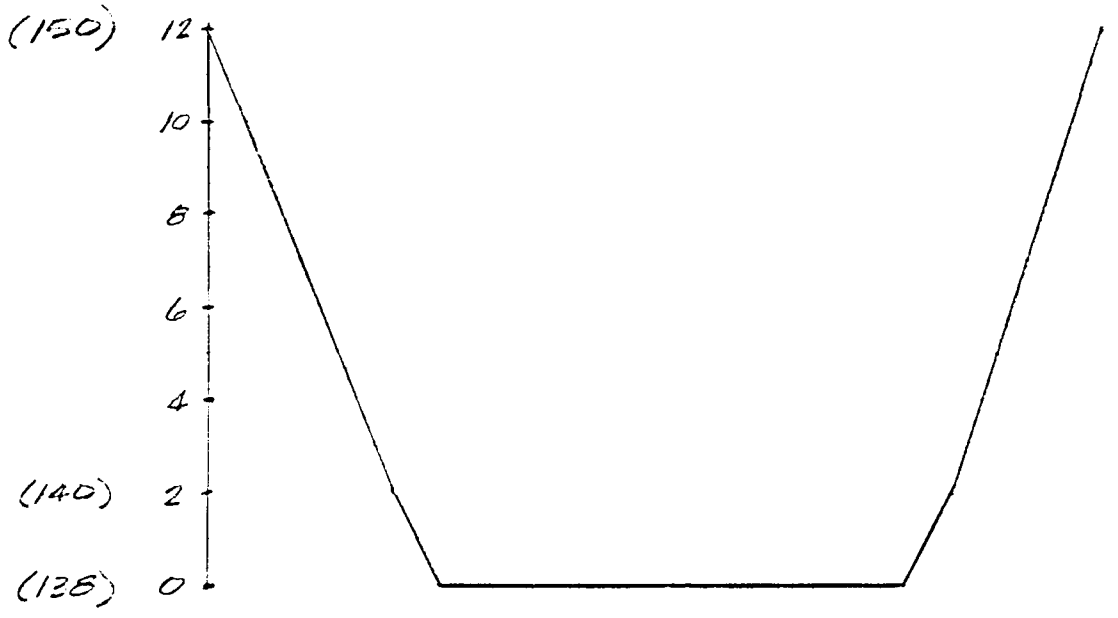
STORAGE

$S = 20$ AC. FT.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-13 OF 18
CALCULATED BY K.A. DATE 5/12/81
CHECKED BY [illegible] DATE 5/[illegible]/81
SCALE HORIZ. 1"=100', VERT. 1"=4'

SECTION #1 — STATION 6+00



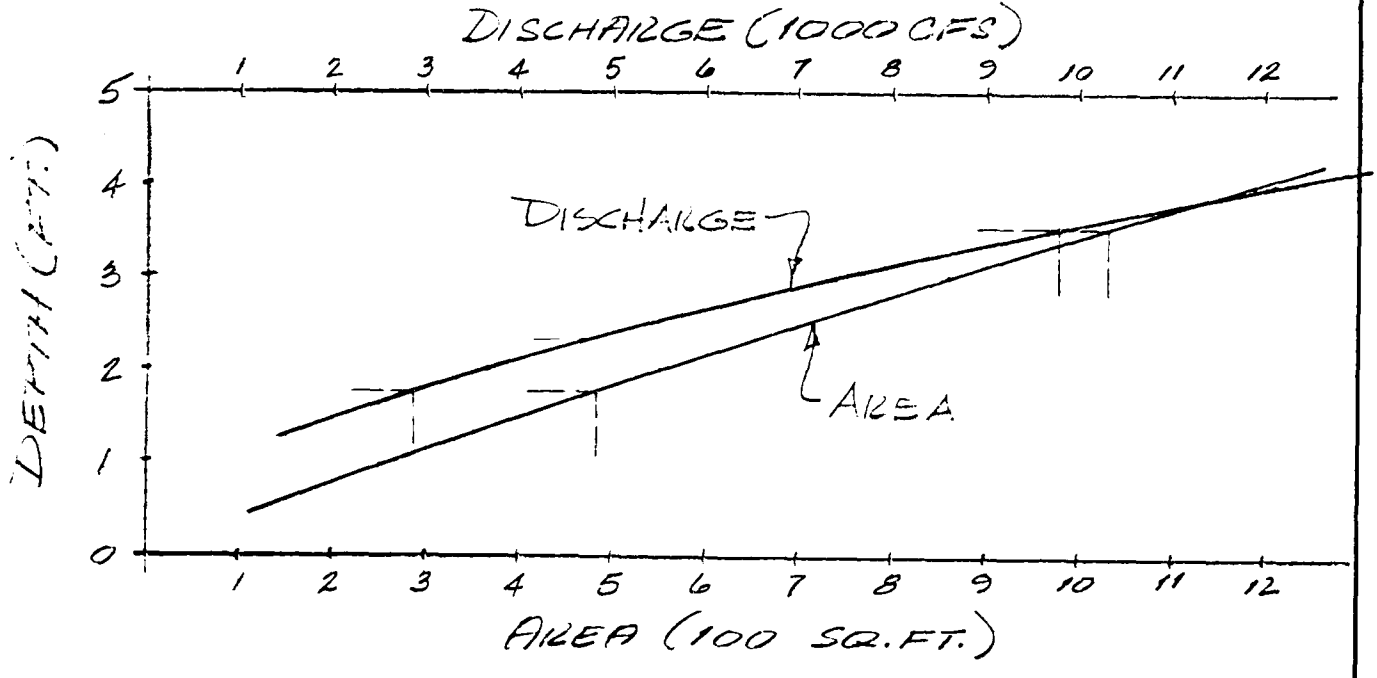
H	A	WP	R	n	V	Q (cfs)
2	550	300	1.8	.06	6.6	3630
4	1186	336	3.5	.06	10.2	12,097
6	1892	370	5.1	.06	13.1	24,785
8	2670	408	6.5	.06	15.4	41,113
3	859	316	2.7	.06	8.6	7387

[illegible] C.F.
[illegible] K / C.F.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-14 OF 18
CALCULATED BY K.A. DATE 5/12/81
CHECKED BY [illegible] DATE [illegible]
SCALE [illegible]

SECTION #1 (CONT.)



Q_{P1} = 9710 cfs

H = 3.5 ft.

A = 1030 sq. ft.

V_1 = 14.2 ac. ft.

(TRIAL) Q_{P2} = 2840 cfs

H = 1.8 ft.

A = 480 sq. ft.

V_2 = 6.6 ac. ft.

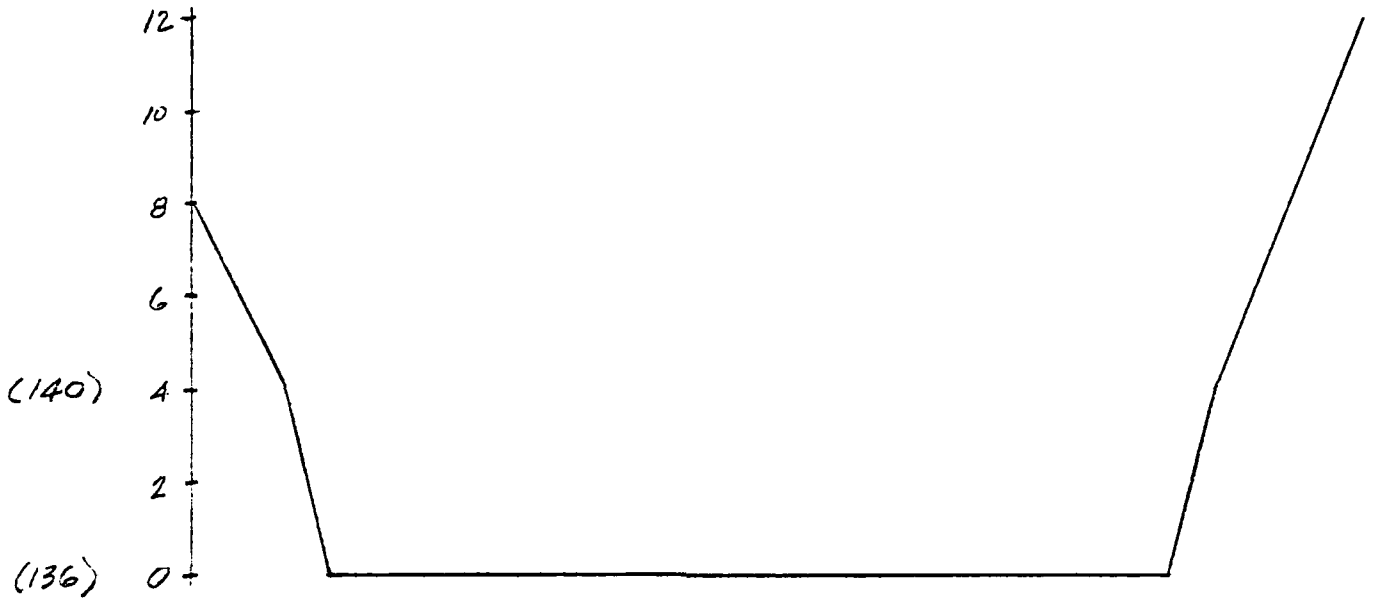
Q_{P2} = 4690 cfs

H = 2.3 ft.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-15 OF 18
CALCULATED BY K. A. DATE 5/12/81
CHECKED BY MK. DATE 5/13/81
SCALE HORIZ. 1" = 100', VERT. 1" = 4'

SECTION #2 — STATION 9+00



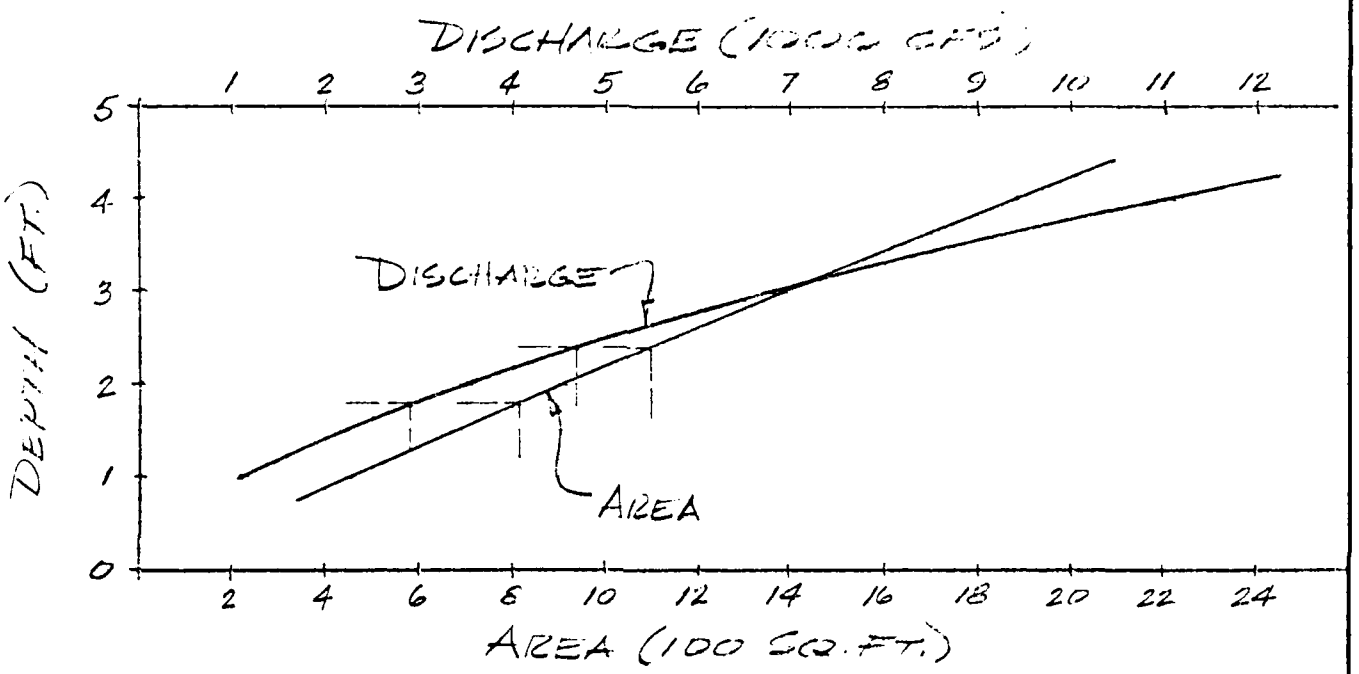
H	A	WP	R	n	V	Q (cfs)
1	455	460	1.0	.05	2.4	1,092
2	914	464	2.0	.05	3.9	3,565
3	1359	486	2.9	.05	4.9	6,806
4	1882	500	3.8	.05	5.9	11,104

L = 300 ft.
S = .0067 ft./ft.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-16 OF 18
CALCULATED BY K. A. DATE 5/12/81
CHECKED BY M.R. DATE 5/13/81
SCALE

SECTION #2 (CONT.)



$Q_{P2} = 4690$ cfs

$H = 2.4$ ft.

$A = 1100$ sq. ft.

$V_1 = 7.6$ ac. ft.

(TRIAL) $Q_{P3} = 2908$ cfs

$H = 1.8$ ft.

$A = 815$ sq. ft.

$V_2 = 5.6$ ac. ft.

$Q_{P3} = 3142$ cfs

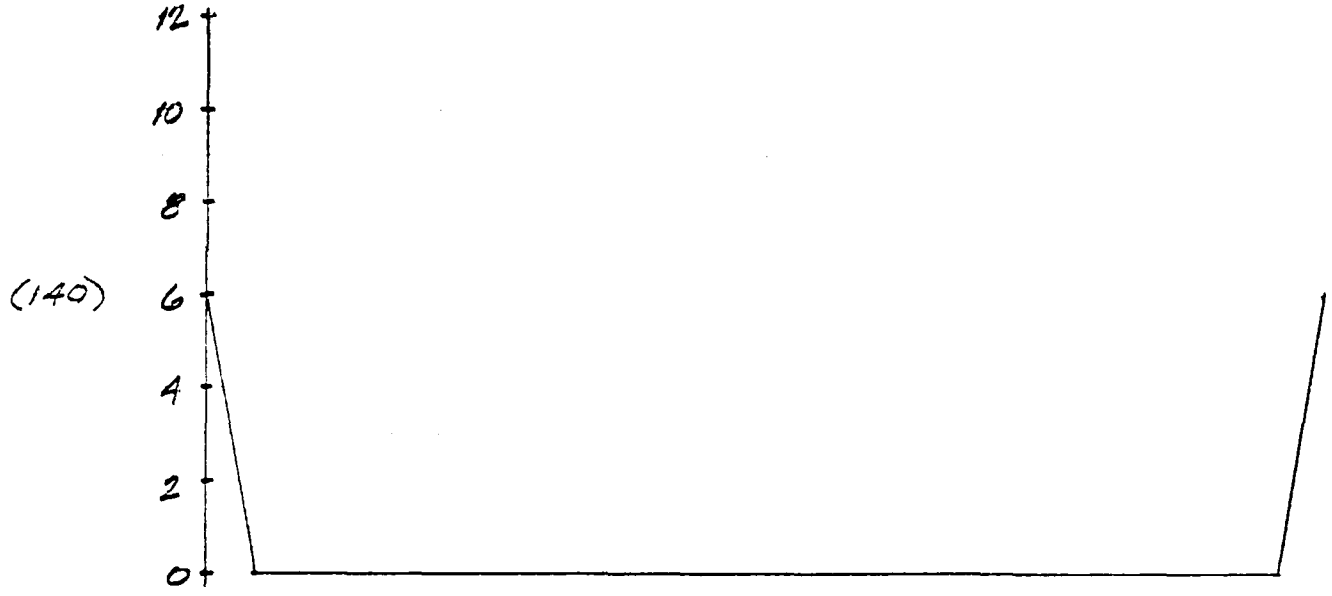
$H = 1.9$ ft.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND DAM #2
SHEET NO DF-17 OF 18
CALCULATED BY K.A. DATE 5/12/81
CHECKED BY [illegible] DATE [illegible]
SCALE HORIZ. 1"=100', VERT. 1"=4'

SECTION #3

STATION 12+00



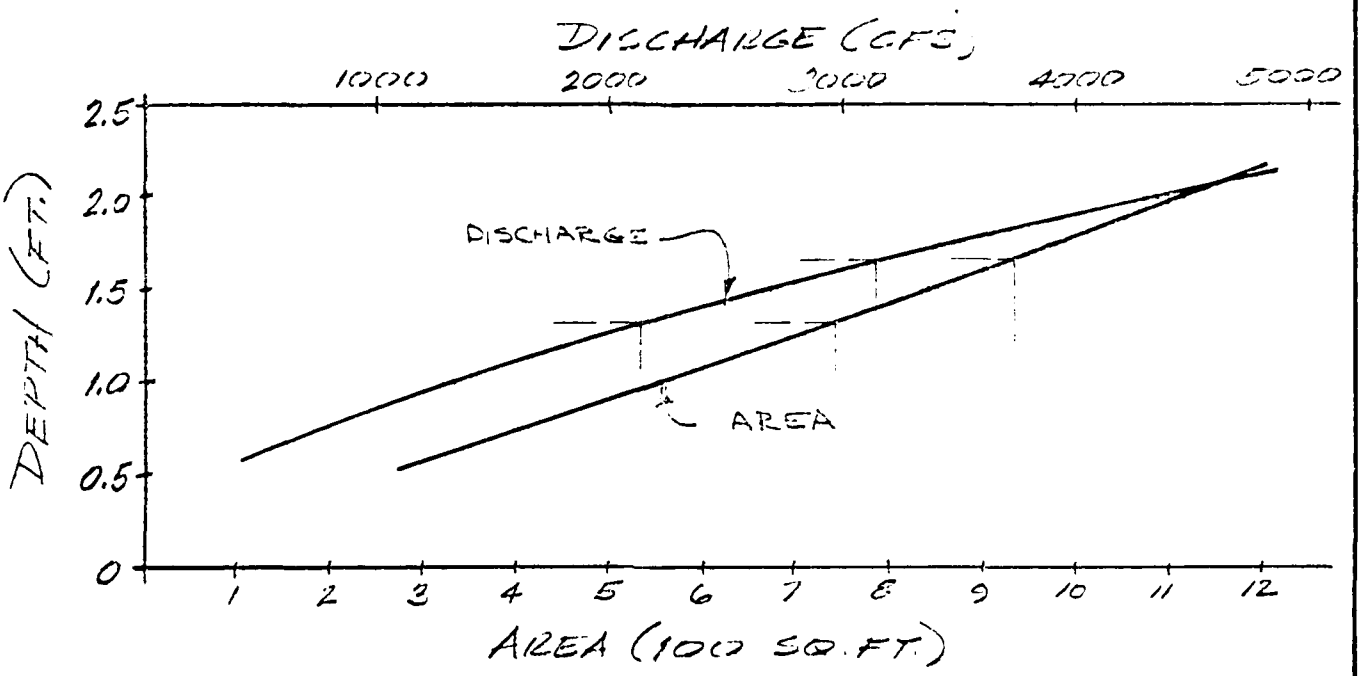
H	A	WP	R	n	V	Q (cfs)
1	554	555	1.0	.05	2.4	1330
2	1116	566	2.0	.05	3.9	4352
3	1686	571	2.9	.05	4.9	8261
4	2264	572	3.9	.05	6.0	13584
1.5	840	562	1.5	.05	3.2	2688

L = 500 ft.
S = .0067 ft./ft.

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB SPAULDING POND UNIT #2
SHEET NO DF-18 OF 18
CALCULATED BY K.A. DATE 5/12/91
CHECKED BY [illegible] DATE [illegible]
SCALE

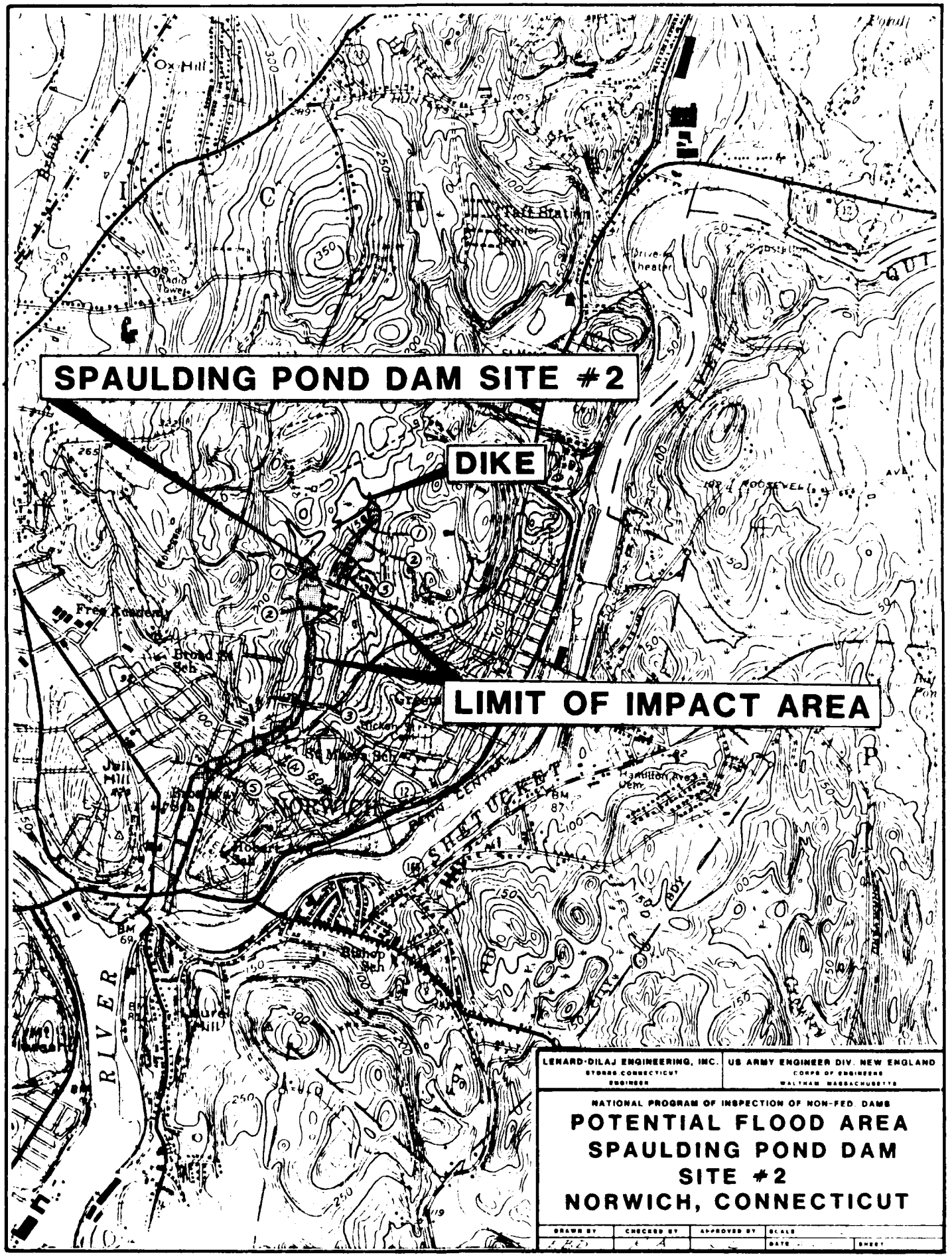
SECTION #2 (CONT.)



$Q_{P3} = 3142$ cfs
$H = 1.7$ ft.
$A = 930$ sq. ft.
$V_1 = 6.4$ ac. ft.

(TRIAL) $Q_{P4} = 2136$ cfs
$H = 1.3$ ft.
$A = 740$ sq. ft.
$V_2 = 5.1$ ac. ft.

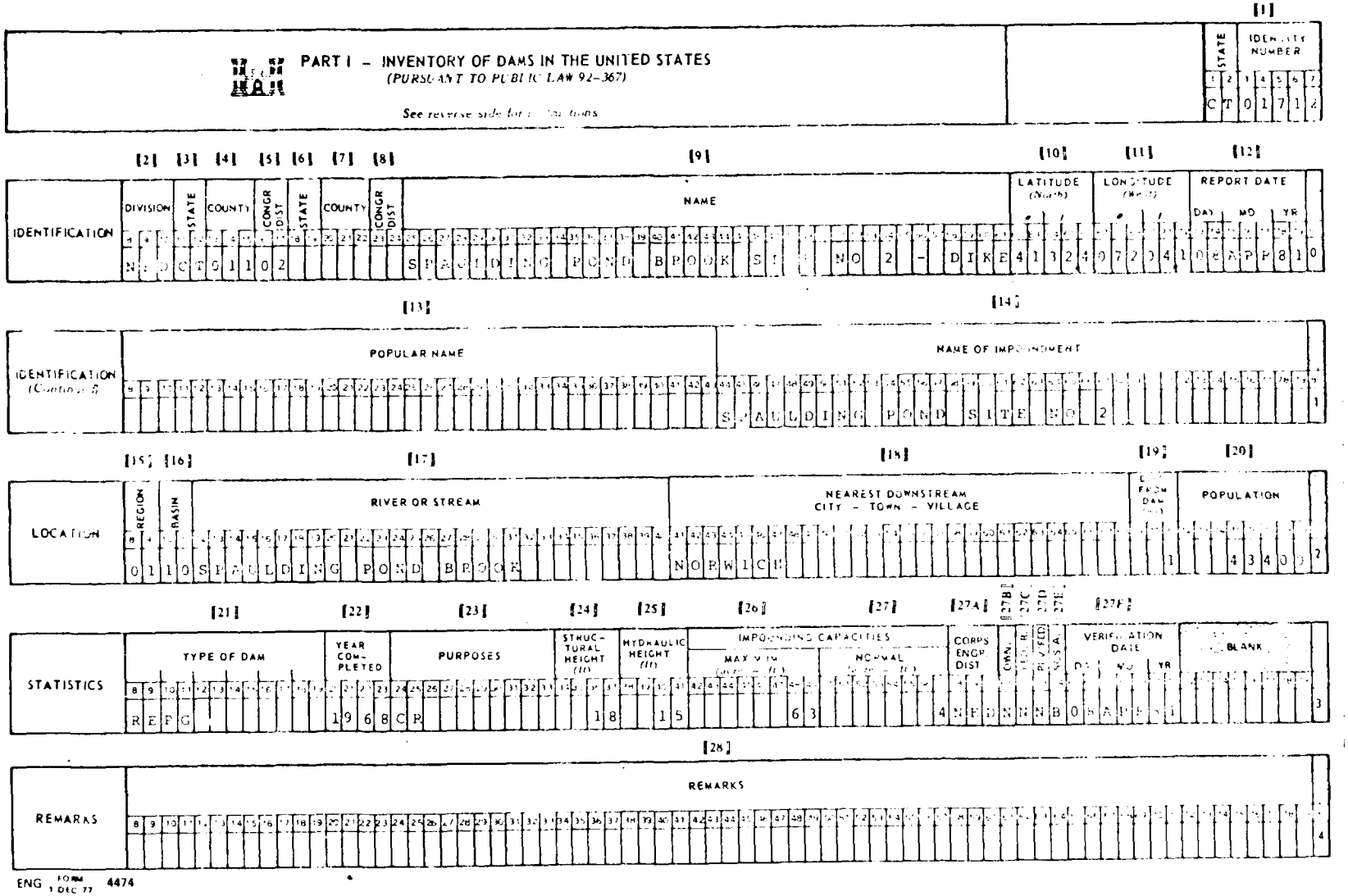
$Q_{P4} = 2240$ cfs
$H = 1.3$ ft.


SPAULDING POND DAM SITE #2
DIKE
LIMIT OF IMPACT AREA
Ox Hill
Taft Station
Radio Towers
Broad Sch
Free Academy
Jail Hill
Bishop Sch
RIVER
SHETUCKET
NORWICH
BM 87
BM 69
LENARD-DILAJ ENGINEERING, INC.
STORRS CONNECTICUT
ENGINEER
US ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM MASSACHUSETTS
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
POTENTIAL FLOOD AREA
SPAULDING POND DAM
SITE #2
NORWICH, CONNECTICUT
DRAWN BY
CHECKED BY
APPROVED BY
SCALE
DATE
SHEET

APPENDIX E

INFORMATION AS CONTAINED IN THE

NATIONAL INVENTORY OF DAMS


PART I – INVENTORY OF DAMS IN THE UNITED STATES
(PURSUANT TO PUBLIC LAW 92-367)
See reverse side for instructions
[1]
STATE
IDENTIFICATION NUMBER
CT 01702
[2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12]
IDENTIFICATION
DIVISION
STATE
COUNTY
CONGR DIST
STATE
COUNTY
CONGR DIST
NAME
LATITUDE (North)
LONGITUDE (West)
REPORT DATE
DAY MO YR
NO 2 - DIKE
41 32 40 73 41 0 APR 81
[13] [14]
IDENTIFICATION (Continued)
POPULAR NAME
NAME OF IMPOUNDMENT
SALUDING POND SITE NO 2
[15] [16] [17] [18] [19] [20]
LOCATION
REGION
BASIN
RIVER OR STREAM
NEAREST DOWNSTREAM CITY – TOWN – VILLAGE
DIST FROM DAM (miles)
POPULATION
01 10 SALUDING POND BROOK
NORWICH
1 4340
[21] [22] [23] [24] [25] [26] [27] [27A] [27B] [27C] [27D] [27E] [27F]
STATISTICS
TYPE OF DAM
YEAR COMPLETED
PURPOSES
STRUCTURAL HEIGHT (ft)
HYDRAULIC HEIGHT (ft)
IMPOUNDING CAPACITIES
MAX W.S. ELEV (ft)
NORMAL W.S. ELEV (ft)
MAX STORAGE (ac-ft)
NORMAL STORAGE (ac-ft)
CORPS ENGR DIST
COMM
PRIVATELY OWNED
VERIFICATION DATE
DAY MO YR
BLANK
REFG 1968 CP 18 15 63 40 NED N N N B 0 APR 81 3
[28]
REMARKS
REMARKS
4
ENG FORM 1 DEC 77 4474

PART II – INVENTORY OF DAMS IN THE UNITED STATES

(PURSUANT TO PUBLIC LAW 92-367)

See reverse side for instructions

FORM APPROVED
OMB NO. 49-R0421

REQUIREMENTS CONTROL SYMBOL
DAEN-CWE-17

[1] STATE: CT — IDENTITY NUMBER: 01712

	[29]	[30]	[31]	[32]	[33]	[34]	[35]	[36]	[37]	[38]	[39]	[40]	[41]	[42]	[43]	[44]	[45]	
STATISTICS	D. SHAPE	CREST LENGTH (ft)	SPILLWAY TYPE	SPILLWAY WIDTH (ft)	SPILLWAY MAXIMUM DISCHARGE (cfs)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NO	NAVIGATION LOCKS LENGTH (ft)	NAVIGATION LOCKS WIDTH (ft)	NAVIGATION LOCKS LENGTH (ft)	NAVIGATION LOCKS WIDTH (ft)	NAVIGATION LOCKS LENGTH (ft)	NAVIGATION LOCKS WIDTH (ft)	NAVIGATION LOCKS LENGTH (ft)	NAVIGATION LOCKS WIDTH (ft)	BLANK
		900				1100												5

	[46] OWNER	[47] ENGINEERING BY	[48] CONSTRUCTION BY
MISC DATA	NORWICH CITY OF	SCS	

	[49] REGULATORY AGENCY: DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
MISC DATA (Continued)	CONN DEP	CONN DEP	CONN DEP	CONN DEP

	[53] INSPECTION BY	[54] INSPECTION DATE DAY	MO	YR	[55] AUTHORITY FOR INSPECTION
MISC DATA (Continued)	LENARD & DILAIA ENGINEERING, INC.	05	08	81	PL 92-367

	[56] REMARKS
REMARKS	

ENG FORM 1 DEC 77 4474A

PART III - INVENTORY OF DAMS IN THE UNITED STATES
SUPPLEMENTARY DATA

(1)

STATE	IDENTITY NUMBER
CT	01712

	(A-1)	(A-2)	(A-3)	(A-4)	(A-5)	
LOCATION	TOWN	NED PERMIT NO	STATE NUMBER	FERC NO	USGS SHEET	A
	NORWICH				NORWICH, CT.	

	(B-1)	(B-2)	(B-3)	(B-4)	(B-5)	(B-6)	(B-7)	(B-8)	(B-9)	(B-10)	(B-11)	(B-12)	
DRAINAGE CHARACTERISTICS	DRAINAGE AREA SQ MI	FLOW DATA MIN CFS	FLOW DATA AVE CFS	FLOW DATA MAX CFS	CREST ELEV MSL	ABUT ELEV MSL	USABLE STORAGE ACRE FEET	RESERVOIR AREA ACRES	FLASH BOARD HT FEET	OUTLET CONDUITS NO	OUTLET CONDUITS SIZE	INVERT ELEV MSL	B
	1				172		60	3	0	0			

	(C-1)	(C-2)	(C-3)	(C-4)	(C-5)	(C-6)	(C-7)	
POWER DATA	GENERATION UNITS INSTALLED NO CAP KW	GENERATION UNITS PLANNED NO CAP KW	AVERAGE ANNUAL GENERATION KWH	LAST GEN YEAR	RETIRED YEAR	FORMER USE	CAPACITY FACTOR	C

	D
B-2 NO SPILLWAY OR OUTLET WORKS DIFFERENT FROM NORMAL	

	E

NED FORM 1 JAN 1980 (TEST)

PART I – INVENTORY OF DAMS IN THE UNITED STATES

(PURSUANT TO PUBLIC LAW 92-367)

See reverse side for instructions

[1] STATE: CT | IDENTITY NUMBER: 00203

IDENTIFICATION

[2] DIVISION | [3] STATE | [4] COUNTY | [5] CONGR DIST | [6] STATE | [7] COUNTY | [8] CONGR DIST | [9] NAME | [10] LATITUDE (N-S-th) | [11] LONGITUDE (W-st) | [12] REPORT DATE (DAY, MO, YR)

01 | 09 | 011 | 02 | | | | SPAULDING POND SITE NO 2 | 41 32 | 072 04 | 08 APR 10

IDENTIFICATION (Continued)

[13] POPULAR NAME | [14] NAME OF IMPOUNDMENT

SPAULDING POND SITE NO 2 | 1

LOCATION

[15] HYDROLOGIC REGION | [16] BASIN | [17] RIVER OR STREAM | [18] NEAREST DOWNSTREAM CITY – TOWN – VILLAGE | [19] DIST FROM DAM (mi) | [20] POPULATION

01 | | SPAULDING POND BROOK | NORWICH | 1 | 4340 | 2

STATISTICS

[21] TYPE OF DAM | [22] YEAR COMPLETED | [23] PURPOSES | [24] STRUCTURAL HEIGHT (ft) | [25] HYDRAULIC HEIGHT (ft) | [26] IMPOUNDING CAPACITIES: MAXIMUM (ac-ft) | NORMAL (ac-ft) | [27] DAMS ENGR DIST | [27A] OWN | [27B] REG | [27C] PRV FED | [27D] SCS | [27E] VERIFICATION DATE (DA, MO, YR) | [27F] BLANK

REP | 1968 | CR | 19 | 16 | 63 | | NE | 0 | N | N | N | B | | | 3

REMARKS

[28] REMARKS

4

ENG FORM 1 DEC 77 4474

PART II – INVENTORY OF DAMS IN THE UNITED STATES

(PURSUANT TO PUBLIC LAW 92-367)

See reverse side for instructions

FORM APPROVED
OMB NO. 49-R0421
REQUIREMENTS CONTROL SYMBOL
DAEN-CWE-17

[1]

STATE	IDENTITY NUMBER					
1 2	3	4	5	6	7	
C T	0	0	2	0	3	

[29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45]

STATISTICS

D S NAZ	CREST LENGTH (ft)	SPILLWAY TYPE	SPILLWAY WIDTH (ft)	SPILLWAY MAXIMUM DISCHARGE (cfs)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NO	LOCKS LENGTH (ft)	LOCKS WIDTH (ft)	LOCKS LENGTH (ft)	LOCKS WIDTH (ft)	LOCKS LENGTH (ft)	LOCKS WIDTH (ft)	LOCKS LENGTH (ft)	LOCKS WIDTH (ft)	BLANK
1	2000	U	115	28500	7500												5

[46] [47] [48]

MISC DATA

OWNER	ENGINEERING BY	CONSTRUCTION BY
NORWICH, CITY OF	SCS	6

[49] [50] [51] [52]

MISC DATA *(Continued)*

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
CONN DEP	CONN DEP	CONN DEP	CONN DEP 7

[53] [54] [55]

MISC DATA *(Continued)*

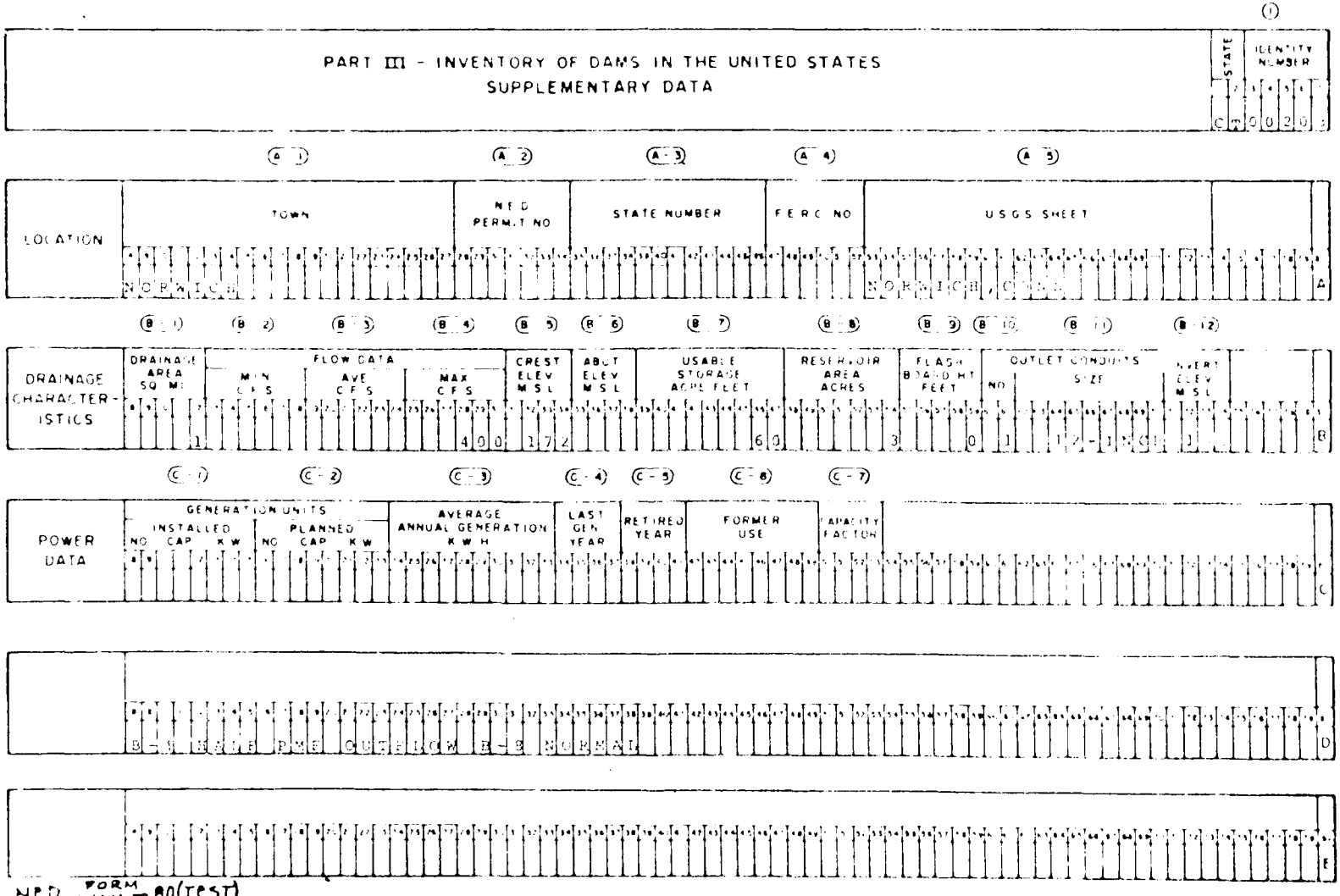
INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
LENAPD & DILAJ ENGINEERING, INC.	08	APR	81	PL 92-367 8

[56]

REMARKS

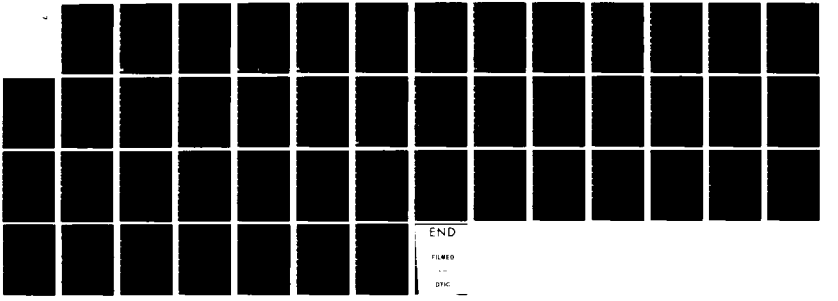
REMARKS
32-15FT WIDE PRIMARY SPILLWAY & 100FT WIDE EMERGENCY SPILLWAY 9

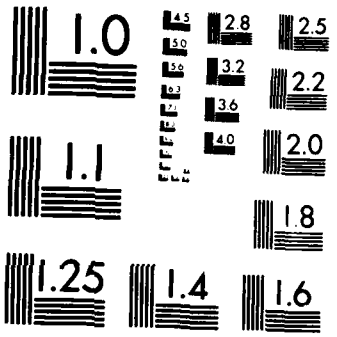
ENG FORM 1 DEC 77 4474A


PART III - INVENTORY OF DAMS IN THE UNITED STATES
SUPPLEMENTARY DATA
STATE
IDENTITY NUMBER
LOCATION
TOWN
NED PERMIT NO
STATE NUMBER
FERC NO
USGS SHEET
DRAINAGE CHARACTERISTICS
DRAINAGE AREA SQ MI
FLOW DATA
MIN CFS
AVE CFS
MAX CFS
CREST ELEV MSL
ABUT ELEV MSL
USABLE STORAGE ACRE FEET
RESERVOIR AREA ACRES
FLASH BOARD HT FEET
OUTLET CONDUITS
NO
SIZE
INVERT ELEV MSL
POWER DATA
GENERATION UNITS
INSTALLED
NO
CAP
KW
PLANNED
NO
CAP
KW
AVERAGE ANNUAL GENERATION KWH
LAST GEN YEAR
RETIRED YEAR
FORMER USE
CAPACITY FACTOR
B-9 REMEDIAL MEASURE
B-10 NUMBER
NED FORM 1 JAN 79 80(TEST)

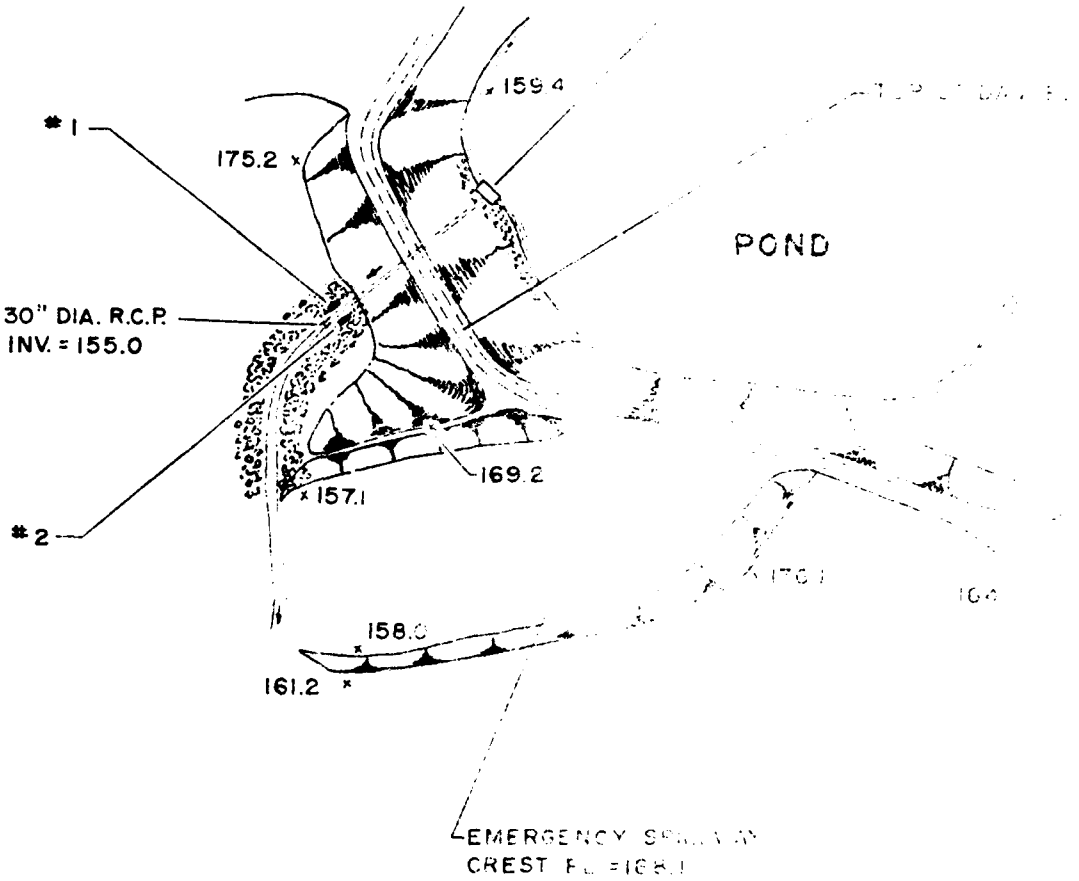
AD-A143 496 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 2/2
SPAULDING POND BROOK.. (U) CORPS OF ENGINEERS WALTHAM MA
NEW ENGLAND DIV JUN 81

UNCLASSIFIED F/G 13/13 NL

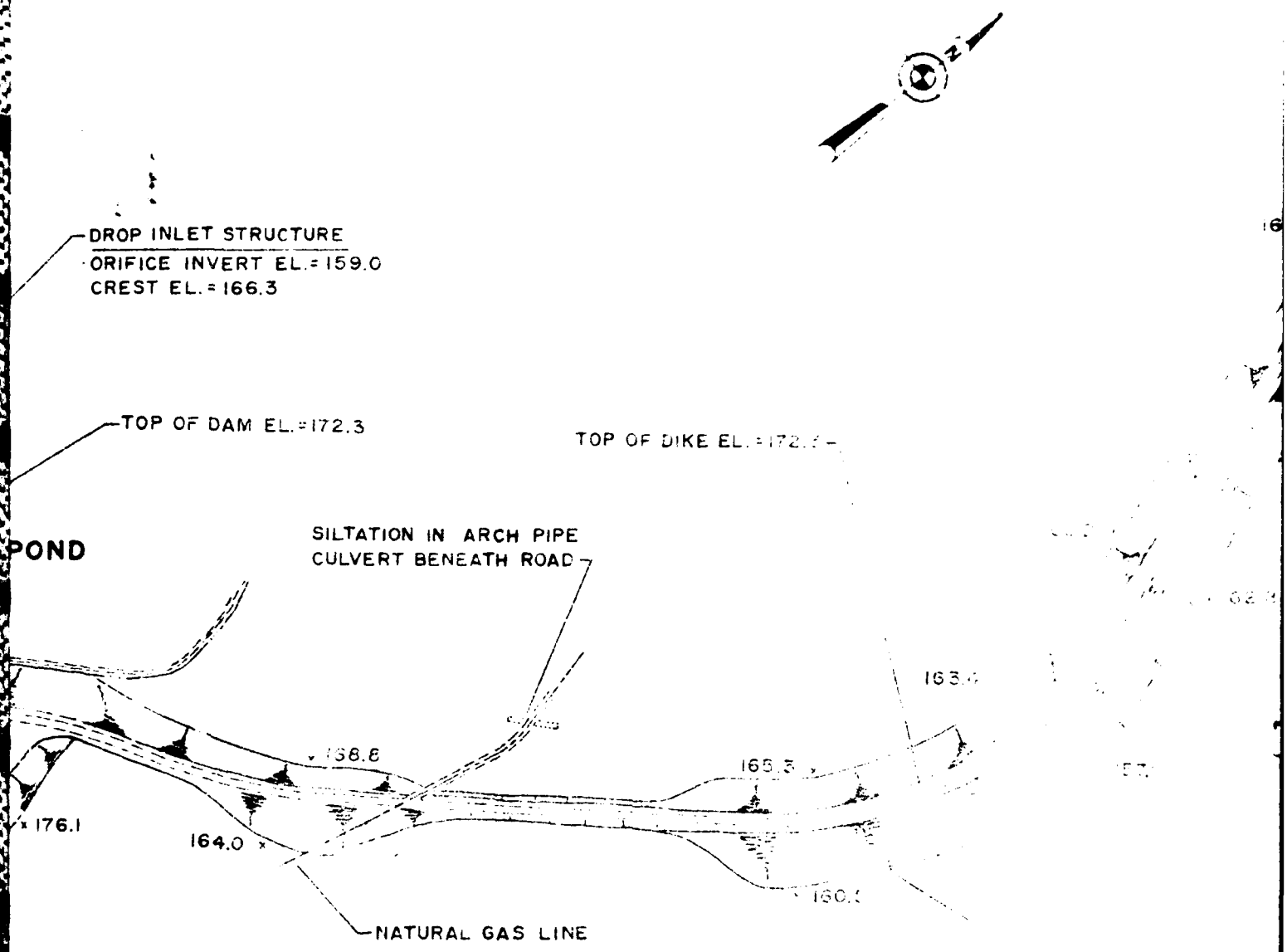




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A


#1
175.2
159.4
POND
30" DIA. R.C.P.
INV. = 155.0
#2
157.1
169.2
158.0
161.2
EMERGENCY SPILLWAY
CREST EL. =168.1

(1)



LEGEND

RIP RAP

EDGE OF ROAD

EDGE OF [illegible]

EDGE [illegible]

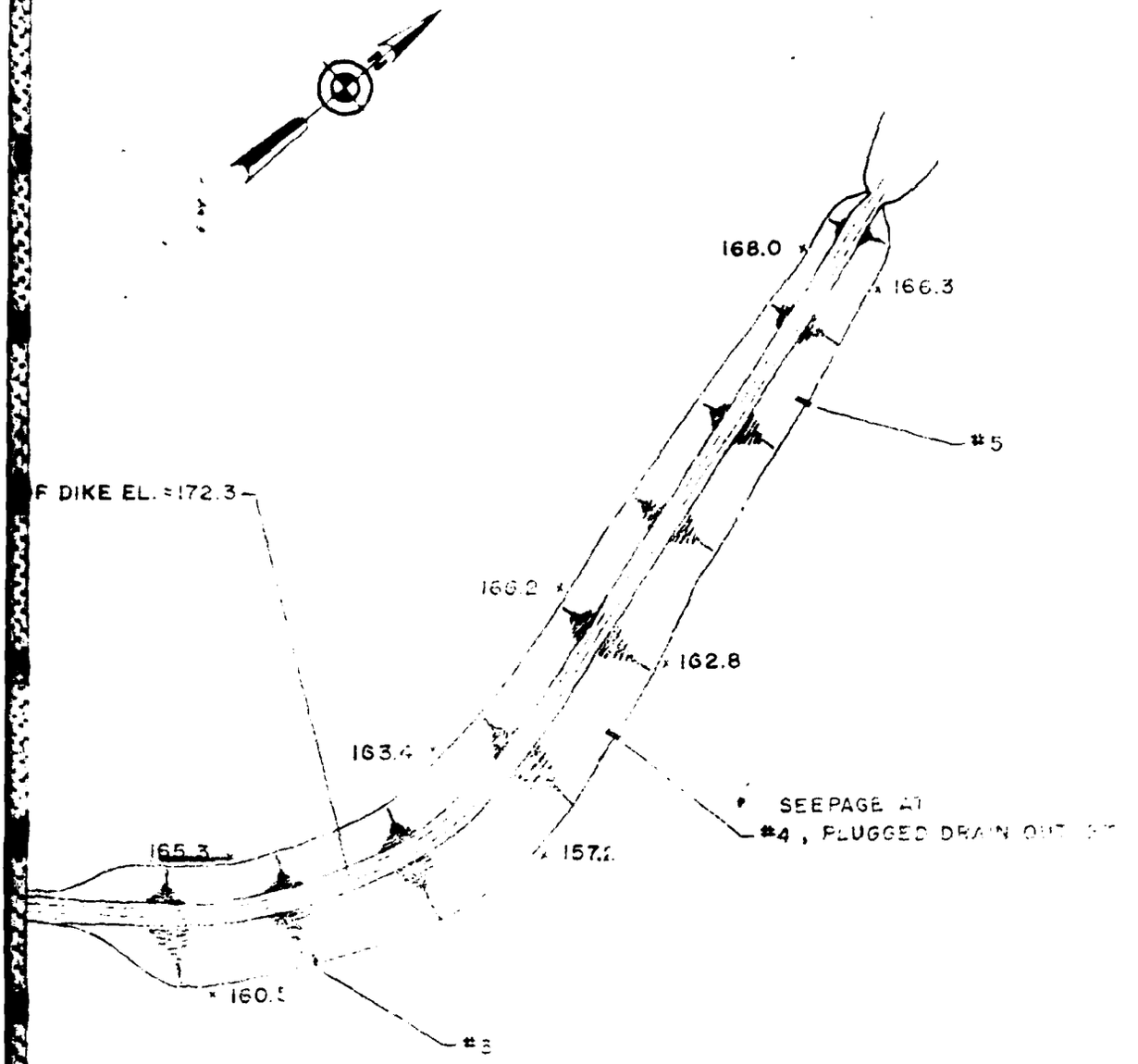
#4 TOE DRAIN OUTLET

100 200

FEET

(2)

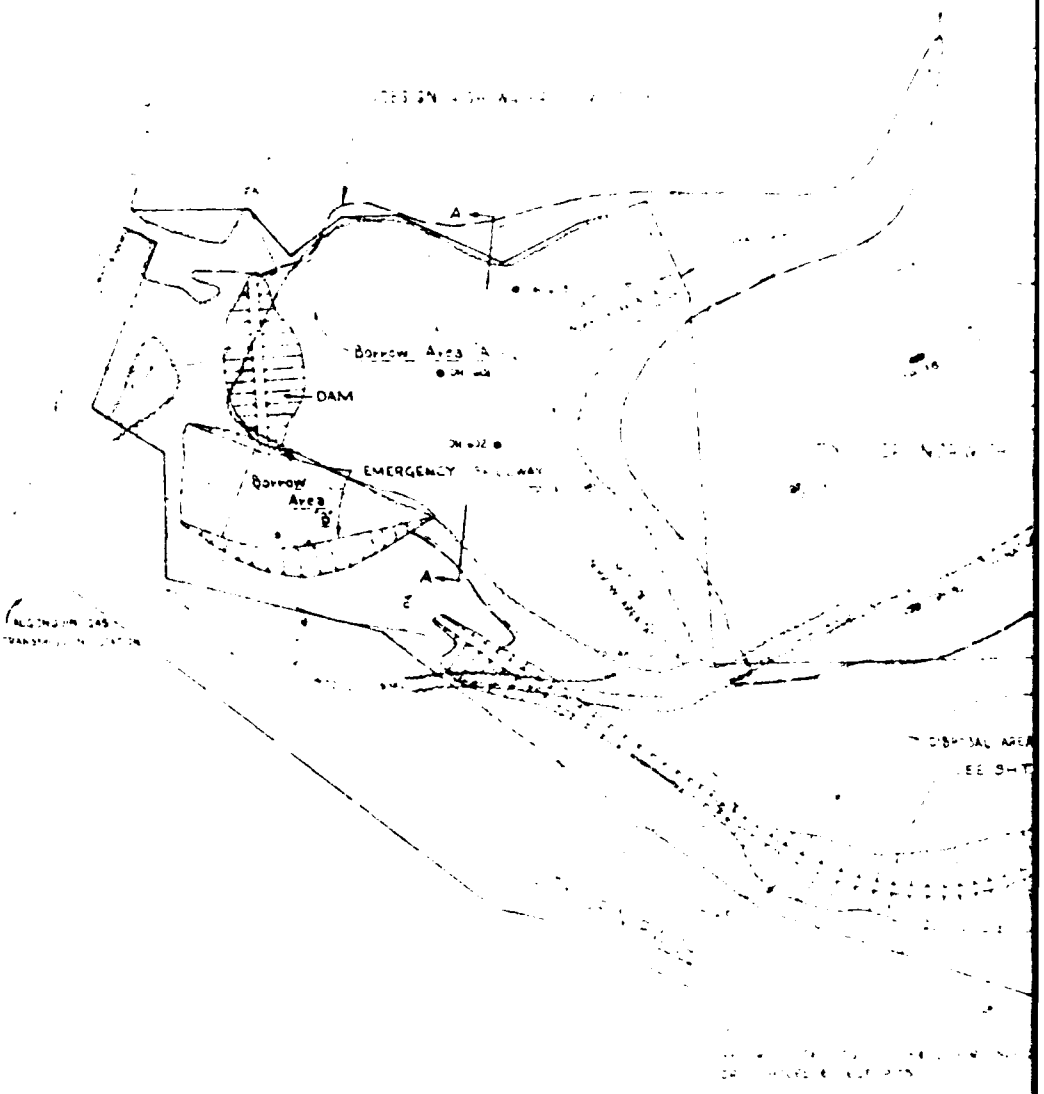
(3)

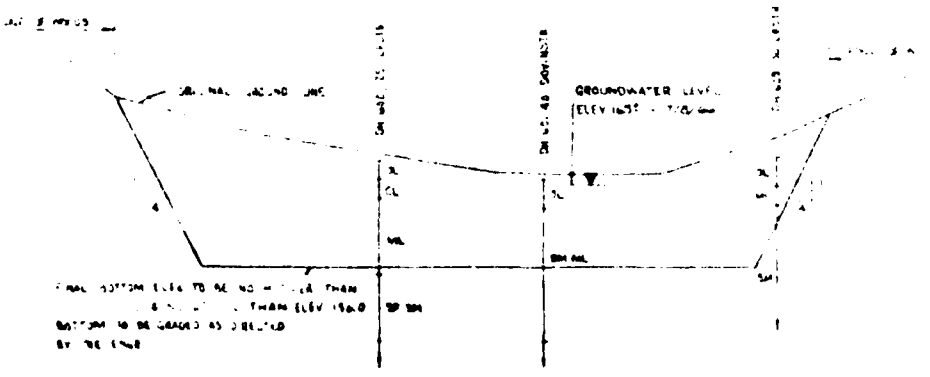


EGEND

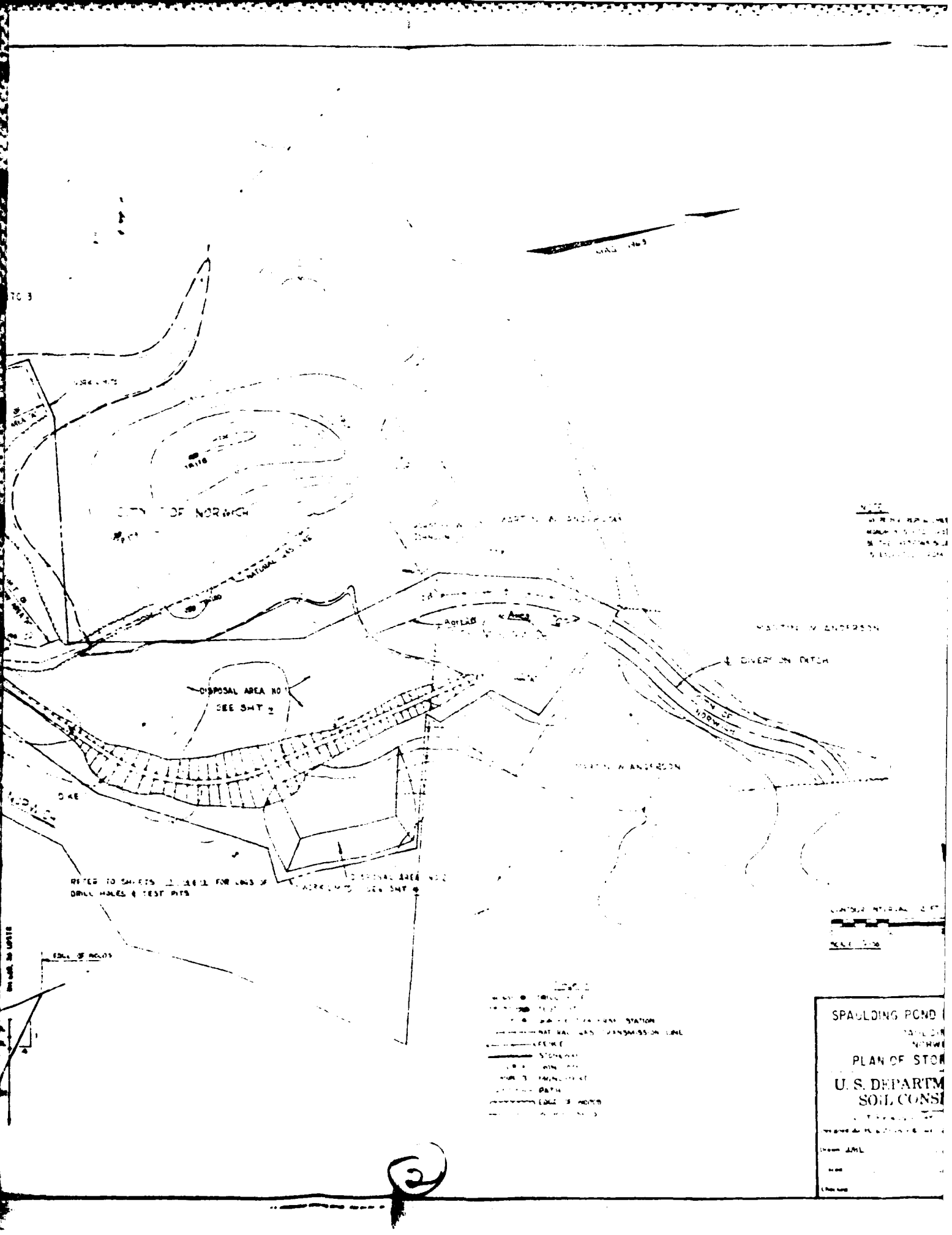
RIP RAP
EDGE OF ROAD
EDGE OF BROOK
EDGE OF POND
TOE DRAIN OUTLETS

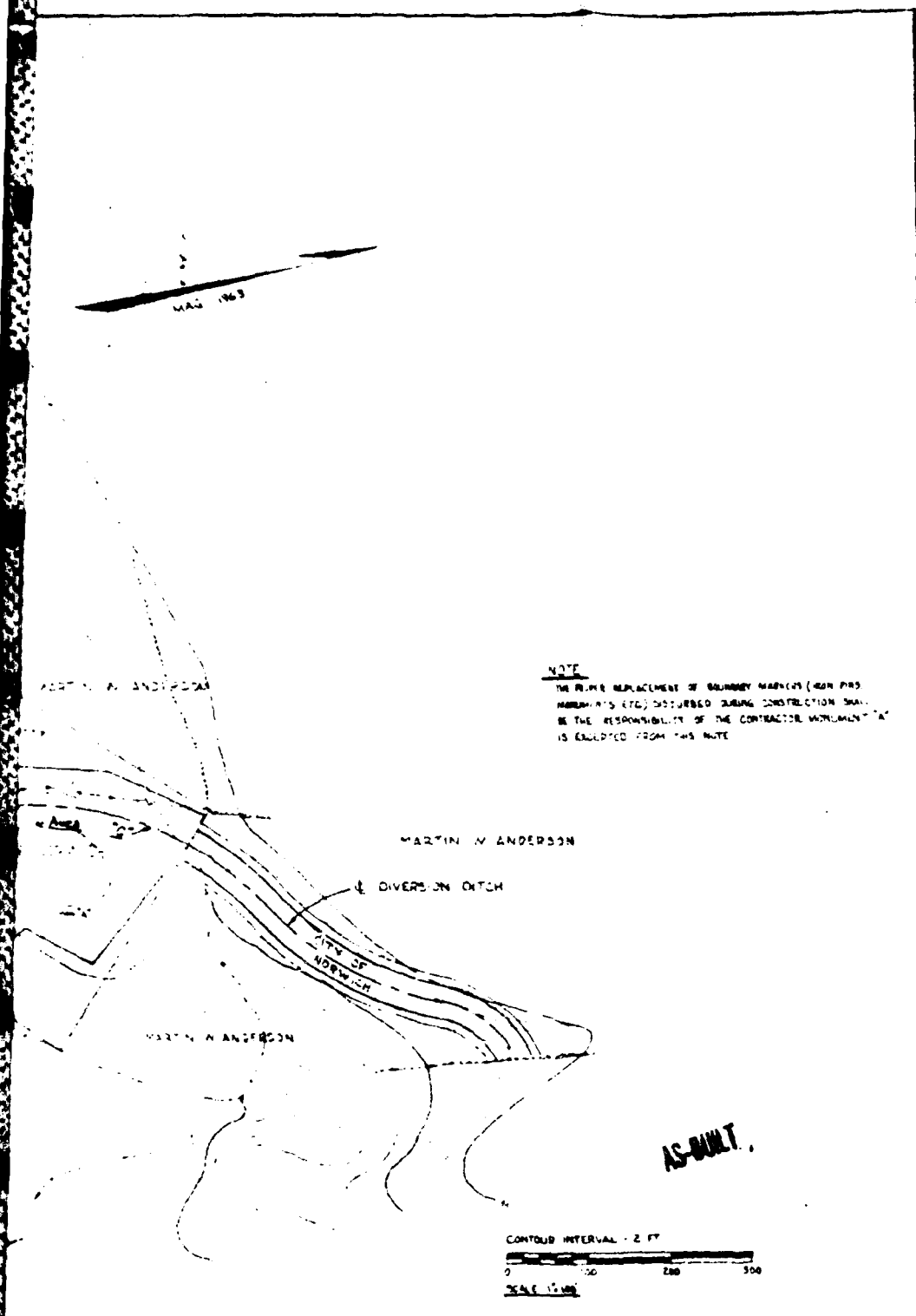
SITE
SPAULD
DAM
NORWICH





(1) SECTION A-A - TYPICAL BORROW AREA 'A'


DISPOSAL AREA NO
SEE SHT 2
DIVERSION DITCH
SPAULDING POND
PLAN OF STOR
U. S. DEPARTM
SOIL CONS



SPAULDING POND BROOK WATERSHED PROJECT

SPAULDING POND SITE NO. 2
NORWICH, CONNECTICUT

PLAN OF STORAGE & BORROW AREAS

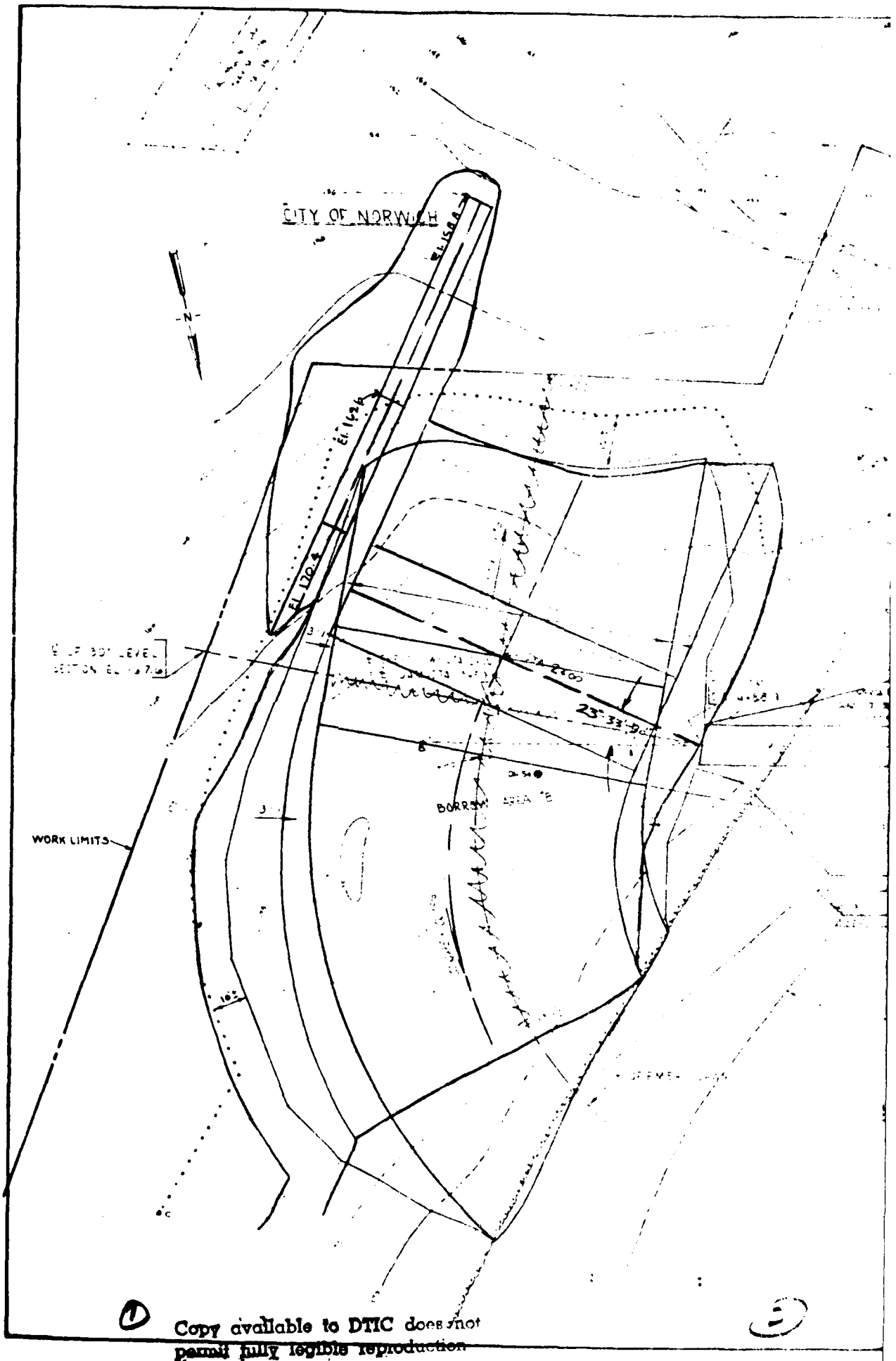
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

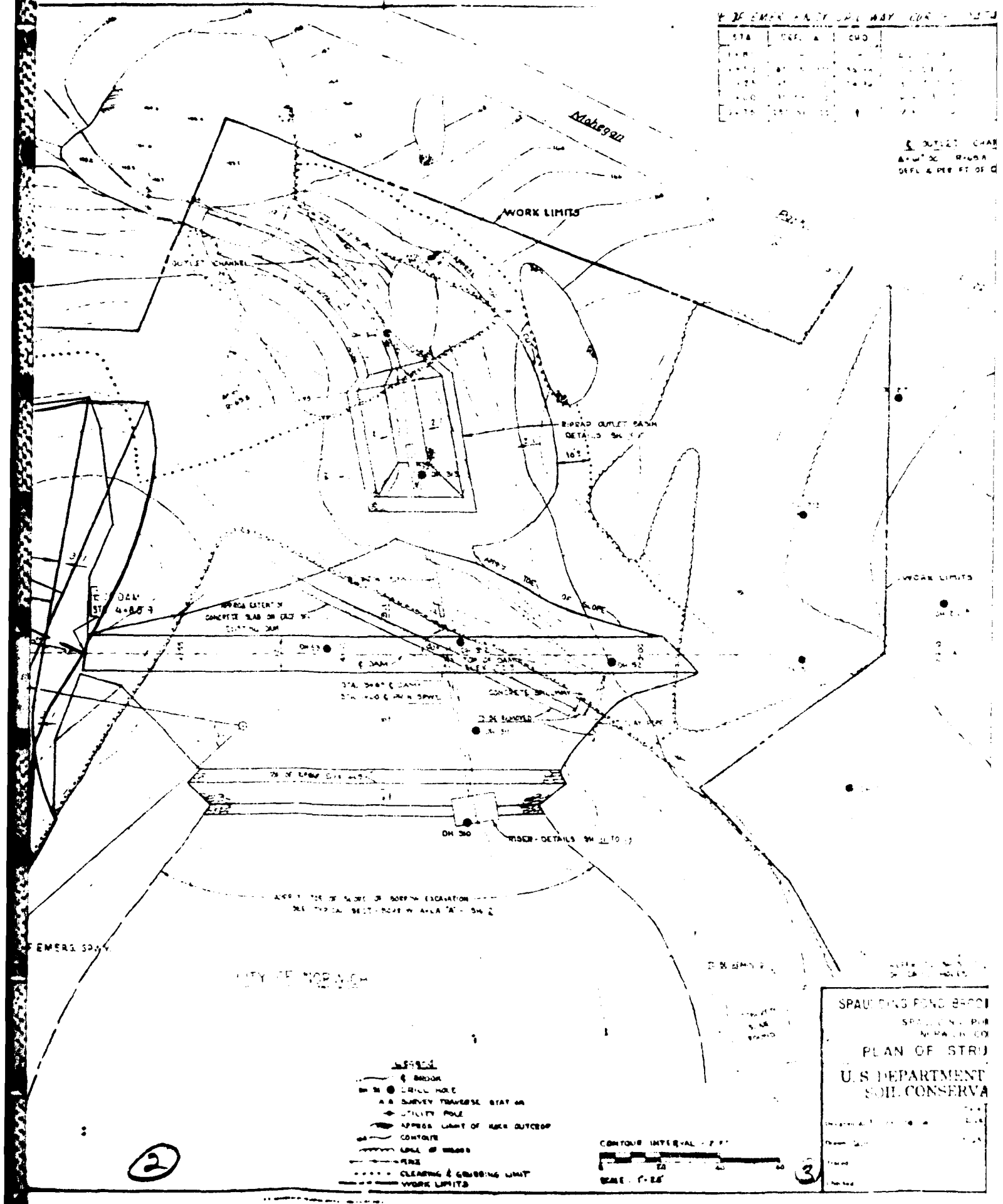
Sheet No. 2 of 19

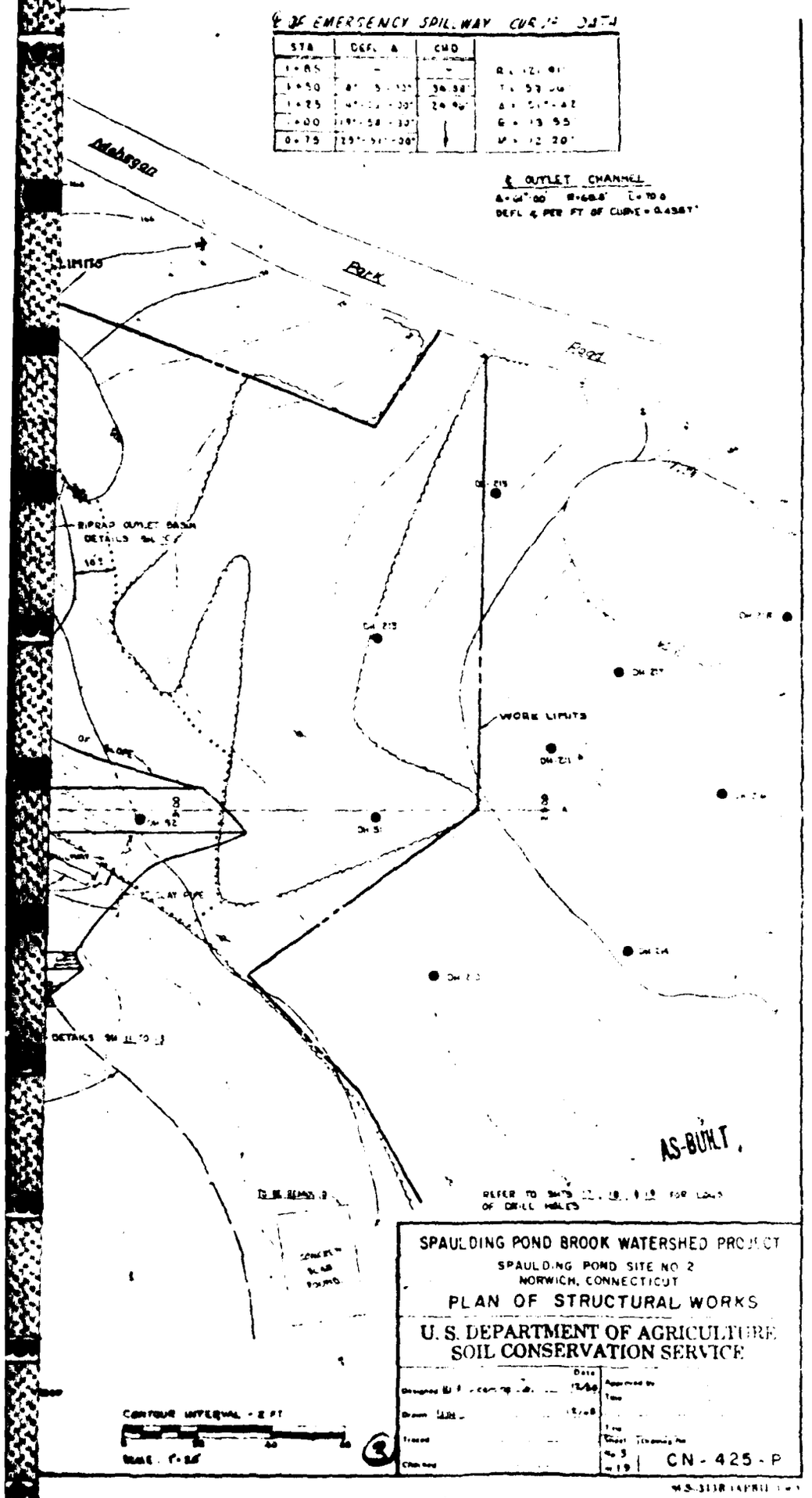
CN - 425 - P

3

SCS-313B (APR. 1. 1963)




Mohegan
WORK LIMITS
OUTLET CHANNEL
RIPRAP OUTLET BASIN
DETAILS SH
16'
WORK LIMITS
TOP OF SLOPE
DH 5
DH 6
DH 7
DH 8
DH 9
DH 10
RISER - DETAILS SH
CONCRETE SPILLWAY
EMERG SPWY
CITY OF NORWICH
SYMBOLS
CENTER LINE OF DAM
DRILL HOLE
SURVEY TRAVERSE STATION
UTILITY POLE
CONTOUR
FENCE
CLEARING & GRUBBING LIMIT
WORK LIMITS
CONTOUR INTERVAL
SCALE
PLAN OF STRU
U.S DEPARTMENT
SOIL CONSERVA
2
3



SPAULDING POND BROOK WATERSHED PROJECT

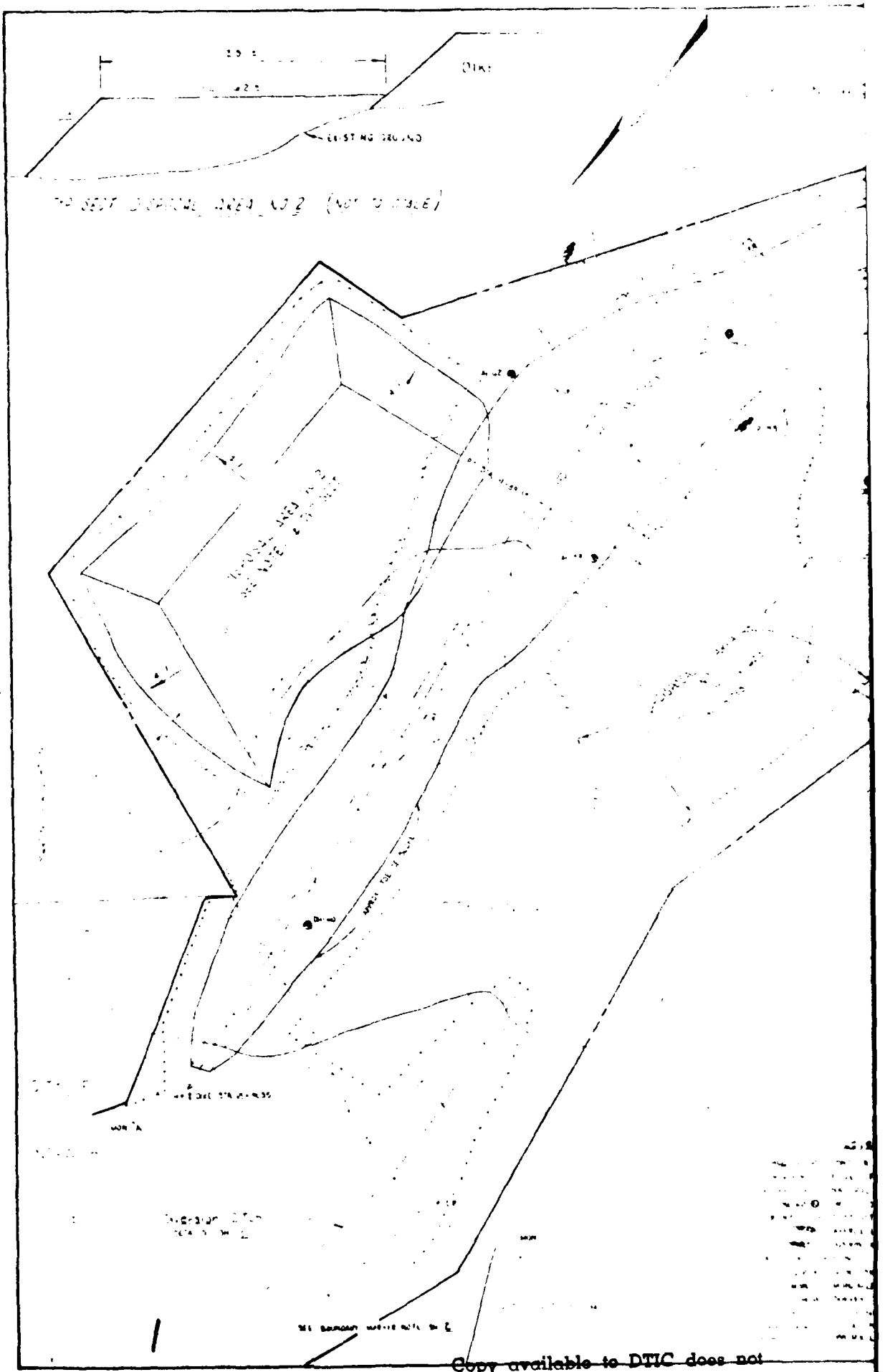
SPAULDING POND SITE NO 2
NORWICH, CONNECTICUT

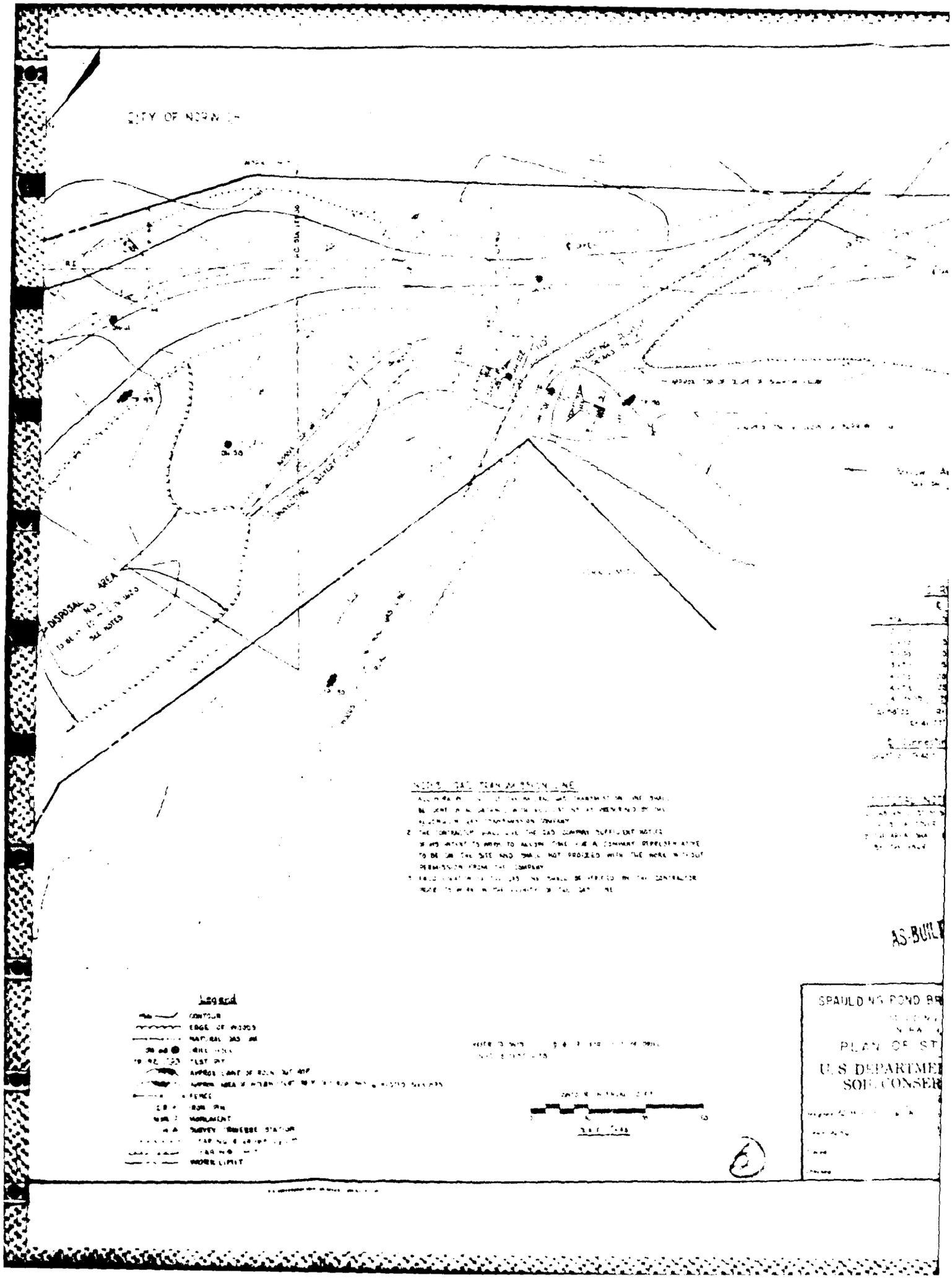
PLAN OF STRUCTURAL WORKS

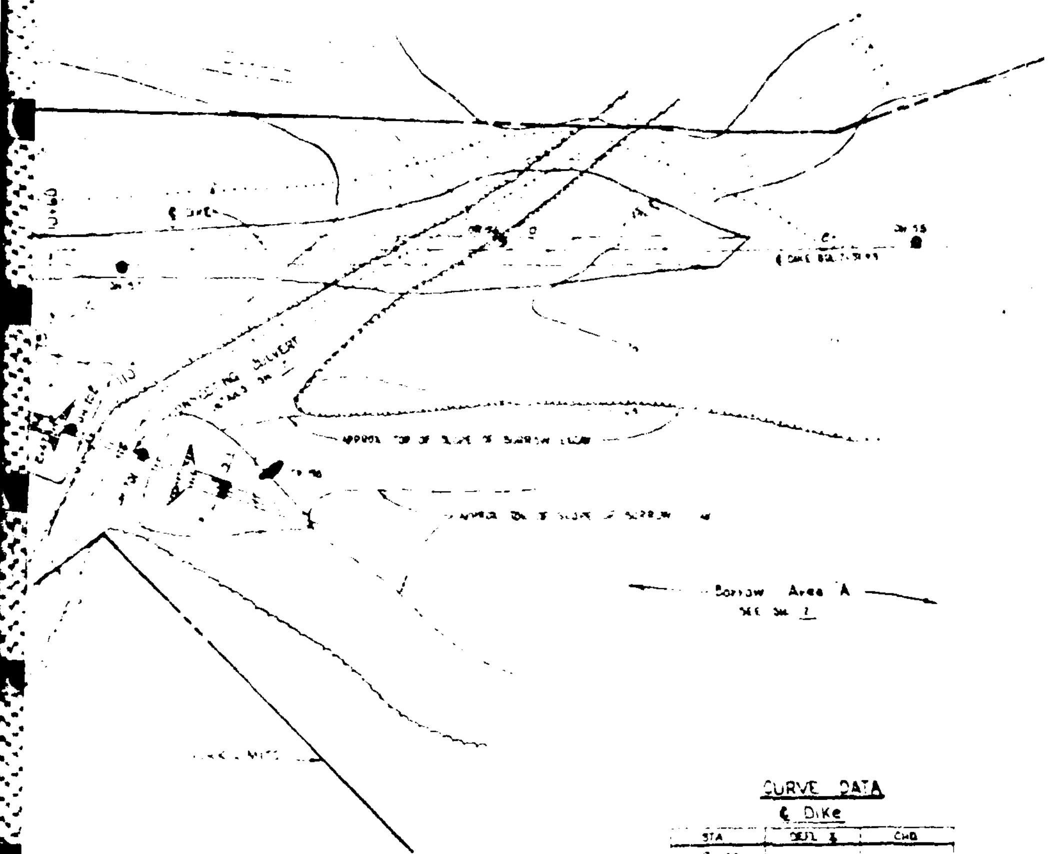
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Date

CN - 425 - P




CITY OF NORWICH
DISPOSAL AREA
SEE NOTES
Legend
CONTOUR
EDGE OF WOODS
FENCE
MARSHLAND
AS-BUILT
PLAN OF ST
U.S. DEPARTMEN
SOIL CONSER



CURVE DATA

℄ Dike

STA	DEFL ∠	CHD
2+00	—	49.94
[illegible]+50	5°02'24"	
[illegible]+00	10-04-48	
3+50	15-07-12	
4+00	20-09-36	
4+50	25-12-00	39.92
4+89.39	29-10-00	

Δ = 58°20' R = 284.20' T = 158.62'

E = 41.27' M = 86.03

℄ Connecting Culvert Ditch

[illegible] T = 40.0 R = [illegible] L = 72.0'

DISPOSAL NOTES

1. UNBURNED STUMPS & LOGS SHALL HAVE A MINIMUM OF 3' OF COVER
2. THE AREA SHALL BE GRADED TO DRAIN AS DIRECTED BY THE ENGR.

AS-BUILT

SCALE

SPAULDING POND BROOK WATERSHED PROJECT

SPAULDING POND SITE NO. 2

NORWICH, CONNECTICUT

PLAN OF STRUCTURAL WORKS

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Designed [illegible] Date [illegible]

Drawn [illegible]

Traced

Checked

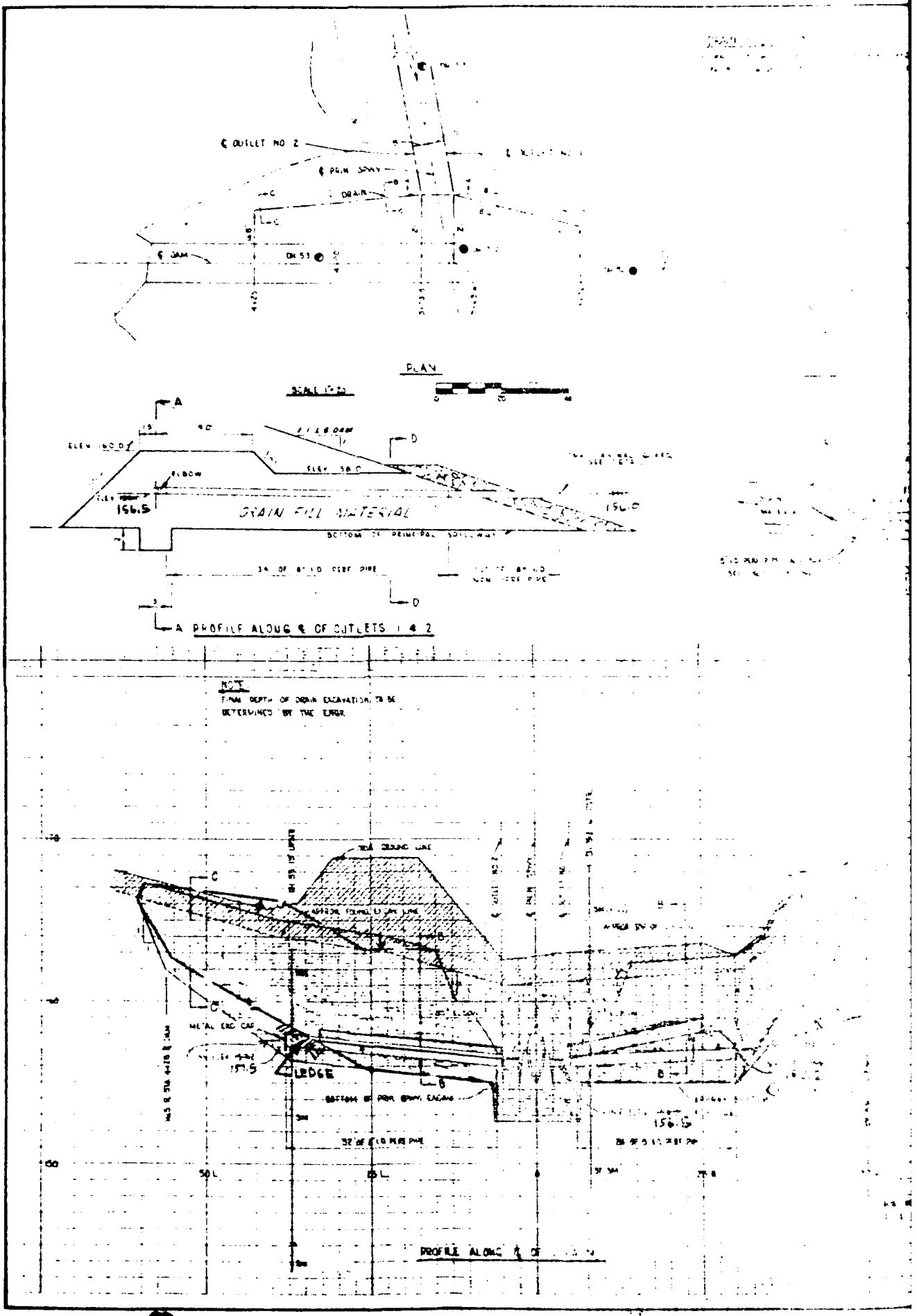
Approved by

Title

Sheet No. 4 of 19

Drawing No. CN - 425 - P

SCS-313B (APRIL 1963)


℄ OUTLET NO 2
℄ DRAIN
℄ DAM
PLAN
A
D
ELBOW
156.5
DRAIN FILL MATERIAL
A PROFILE ALONG ℄ OF OUTLETS 1 & 2
NOTE
FINAL DEPTH OF DRAIN EXCAVATION TO BE
DETERMINED BY THE ENGR.
C
B
METAL END CAP
LEDGE
PROFILE ALONG ℄ OF

DRAIN PIPE NOTES

OUTLET NO. 1

SECTION A-A

AS-BUILT

8"	100 %
	76-100
	58-66
	42-70
	22-61
	13-32
	8-27
	0-7
	0-5

3/8" Dia Bolts
Hex Nut And Washers

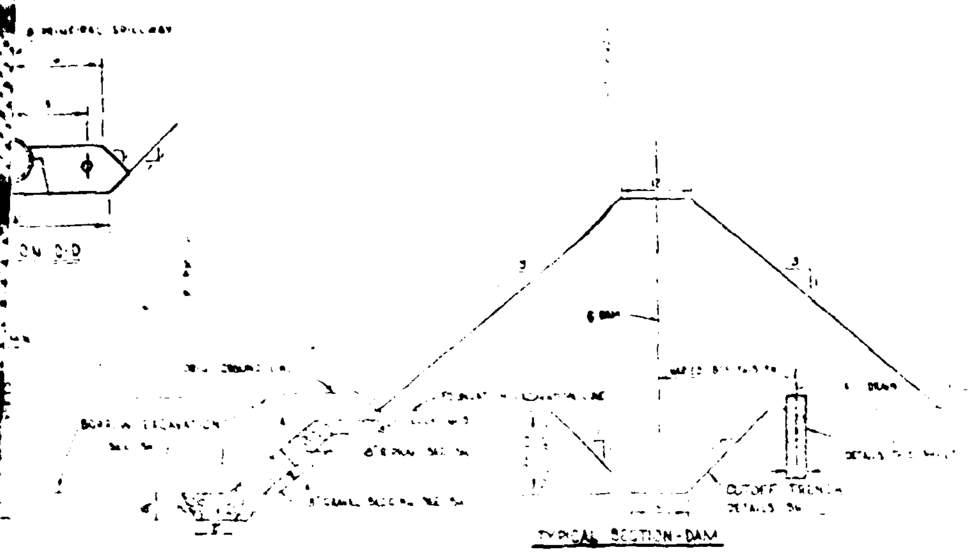
8" Dia Pipe

SMALL ANIMAL GUARD DETAILS

SPAULD

U.S. DE
SO

(27)



TYPICAL SECTION - DAM

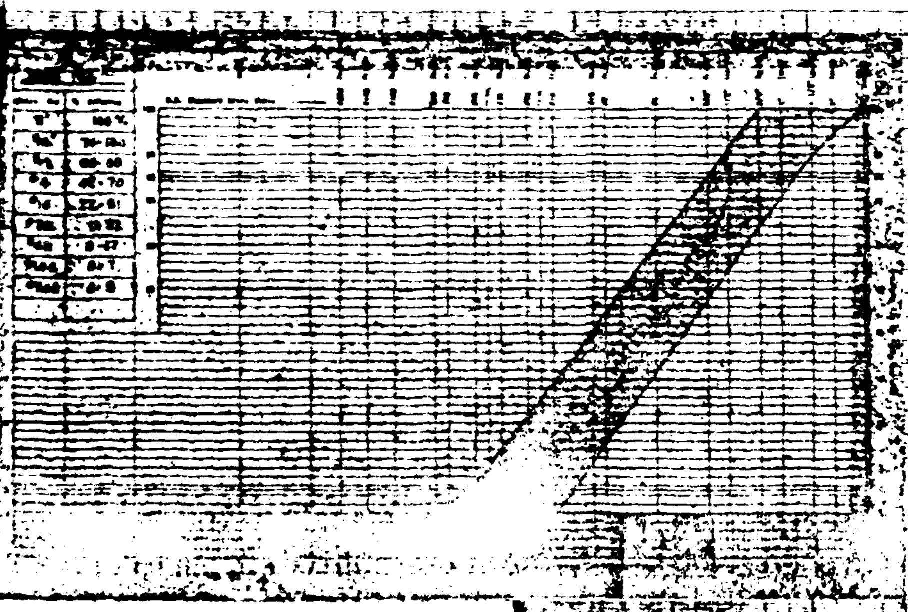
NOT TO SCALE

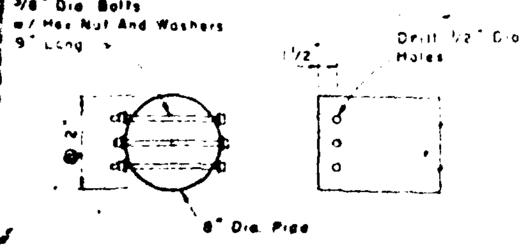
THE DAM AND DIKE EMBANKMENTS SHALL CONSIST OF EARTH FILL CLASS A COMPACTION CONSISTING MAINLY OF SILTY SANDS (SM, SM-ML) AND INORGANIC SILTS (ML) [illegible] REPRESENTED BY THE FOLLOWING LOGS

FROM 1.2 TO 13.5 ... 6.9 ... 16.5 ... 6.8 ... 16.0 (ML) ... 5.6 ... 17.5 ... 0.5 ... 16.7 ... 1.3 ... 8.5 (SM) ... 1.3 ... 6.7 (SM)

COARSER MATERIALS CONSISTING MAINLY OF POORLY GRADED SANDS [illegible] REPRESENTED BY THE FOLLOWING LOGS SHALL BE PLACED IN THE OUTER PORTION OF THE FILL AS DIRECTED BY THE ENGR.

FROM 10 TO 13.5





SMALL ANIMAL GUARD DETAILS

AS-BUILT

SPAULDING POND BROOK WATERSHED PROJECT

SPAULDING POND SITE NO. 2

NORWICH, CONNECTICUT

DRAINAGE DETAILS - DAM

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Designed | Date | Approved by | Title

Drawn

Traced | Title

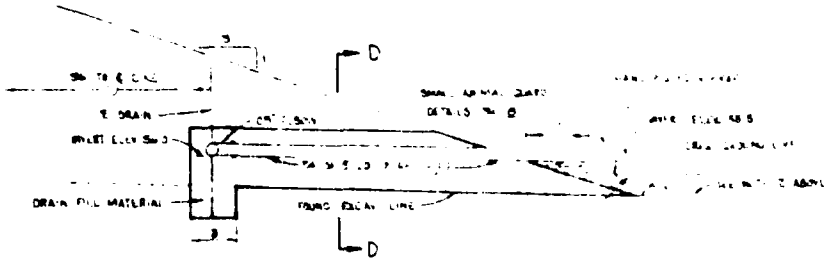
Checked

Sheet No. 8 | Drawing No. CN-425-P

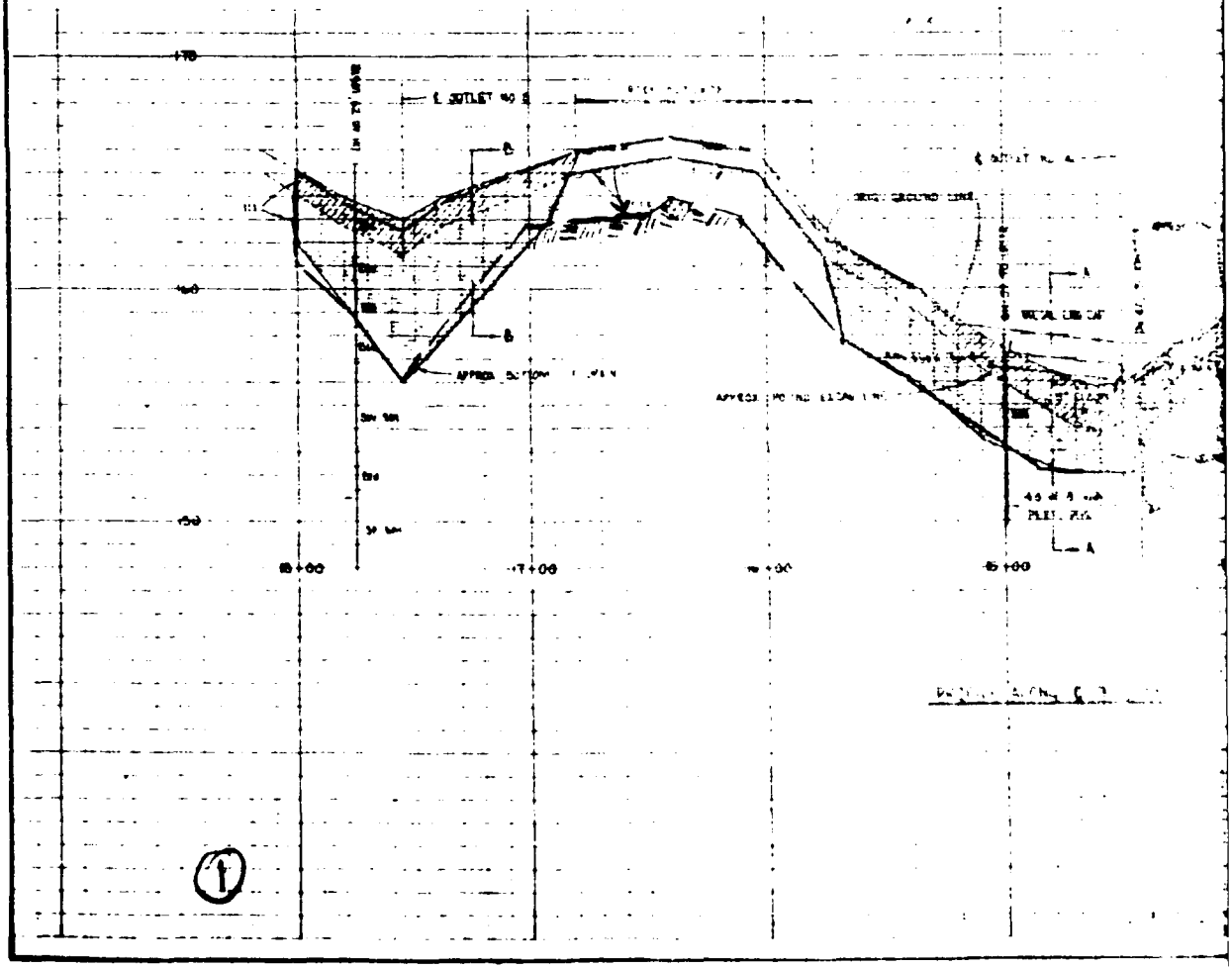
(3)

GENERAL NOTES

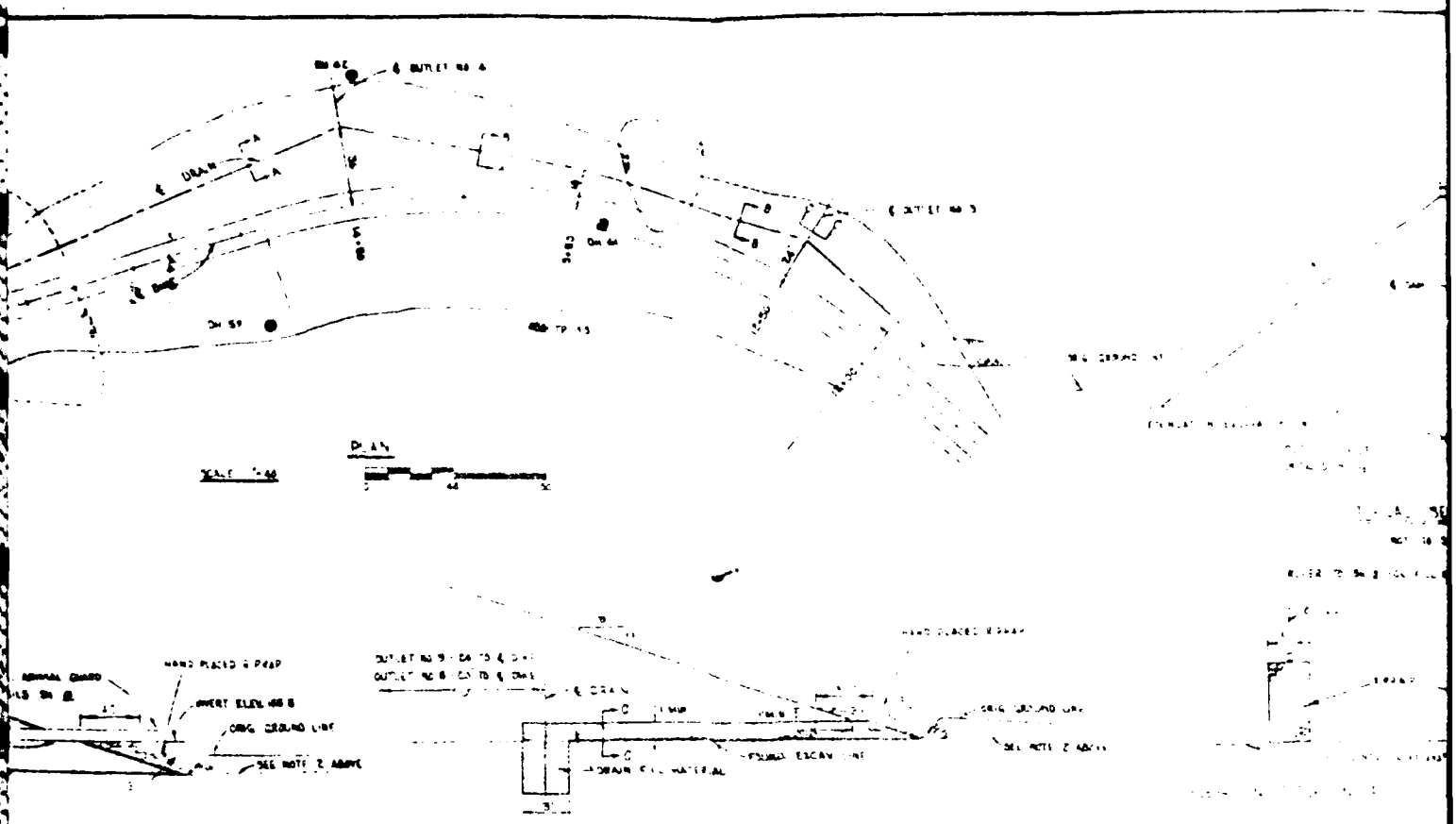
1. THE ENGINEER WILL DETERMINE THE FINAL DEPTH OF DRAIN EXCAVATION
2. THE ORIG GROUND AT ENDS OF OUTLETS SHALL BE GRADED TO PROVIDE SUITABLE DRAINAGE AWAY FROM TOE OF DAM AS DIRECTED BY THE ENGR
3. FOR DESCRIPTION OF CORE HOLES AND TEST PITS REFER TO SHTS 17, 18 & 19
4. REFER TO SH 8 FOR DRAIN PIPE NOTES AND DRAIN FILL MATERIAL GRADATION LIMITS



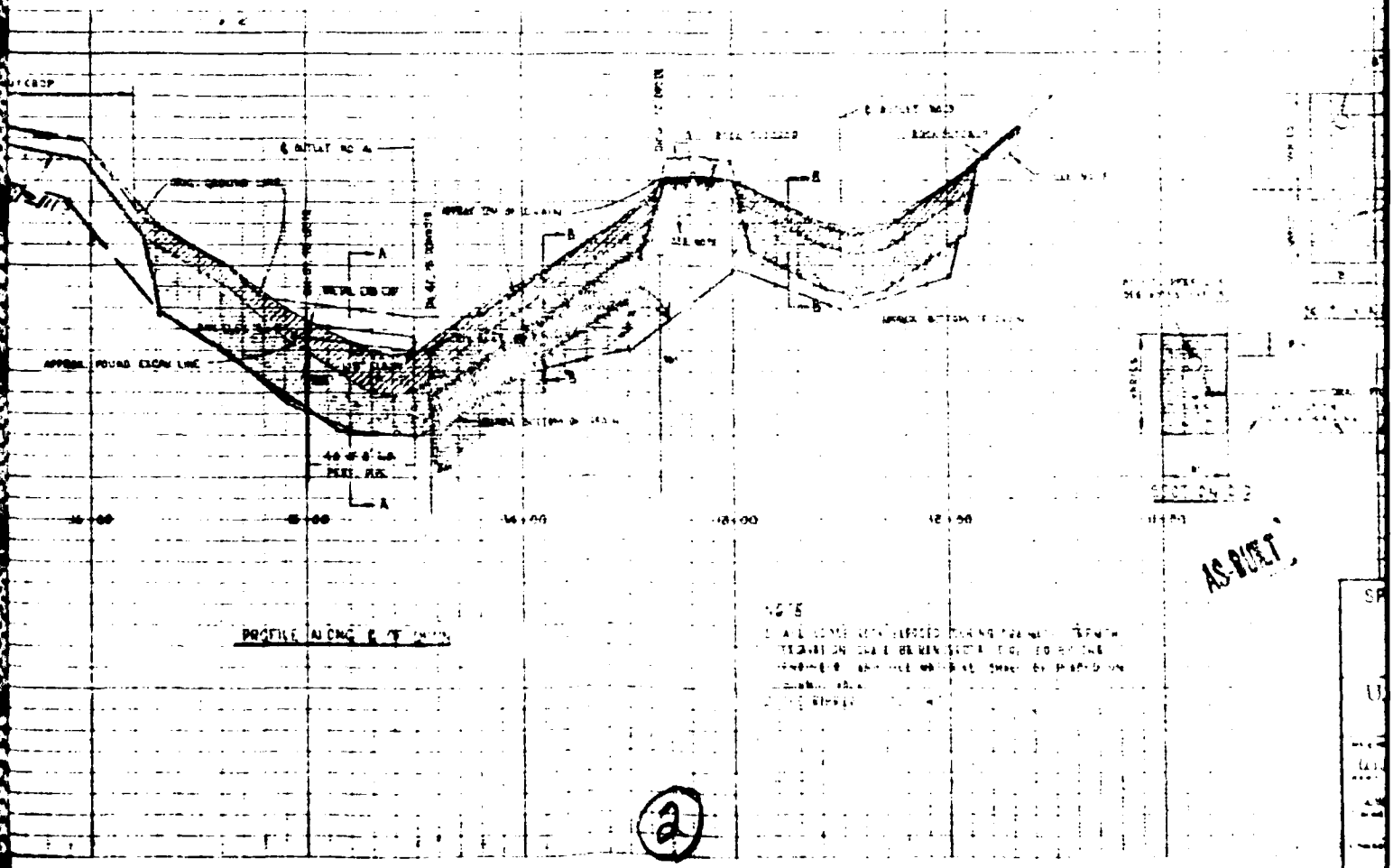
PROFILE ALONG ℄ OF OUTLET NO 4



(1)



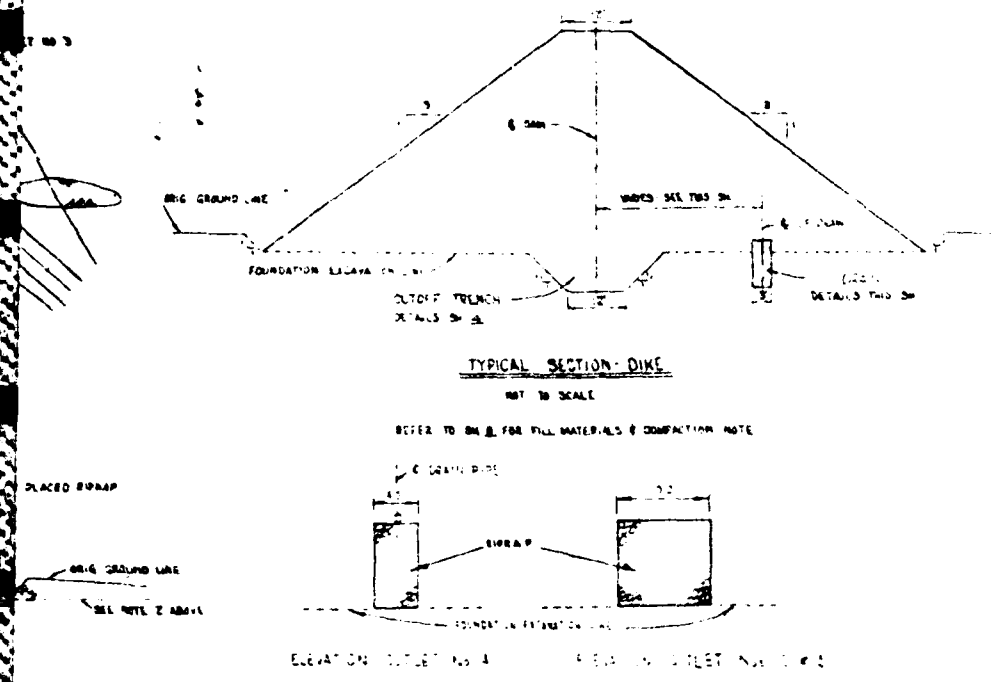
TYPICAL SECTION ALONG ℄ OF OUTLET NOS. 3 & 4

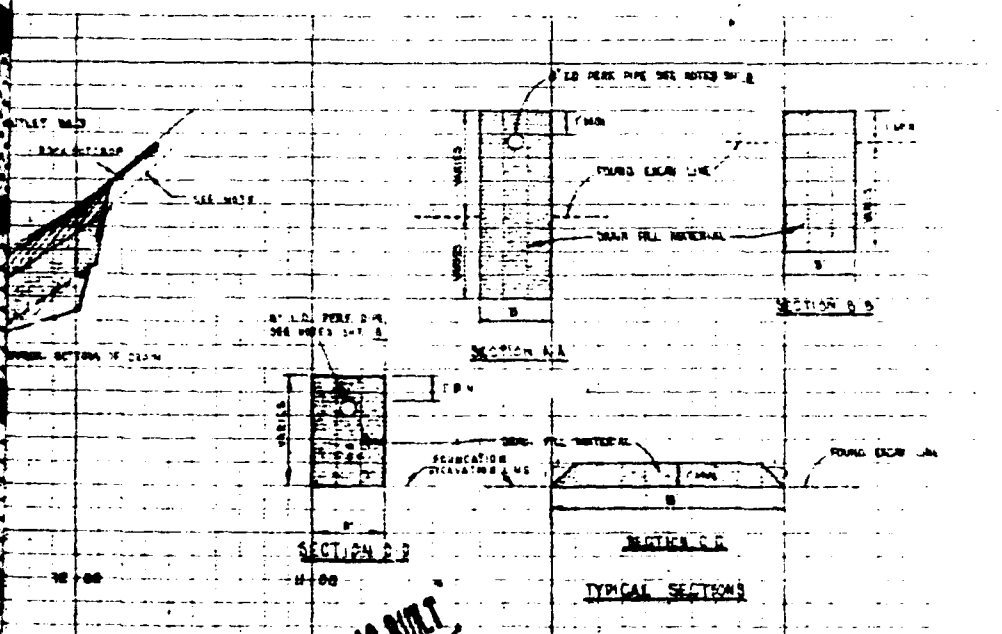


PROFILE ALONG ℄ OF OUTLET NO. 4

NOTE

(2)





SPAULDING POND BROOK WATERSHED PROJECT

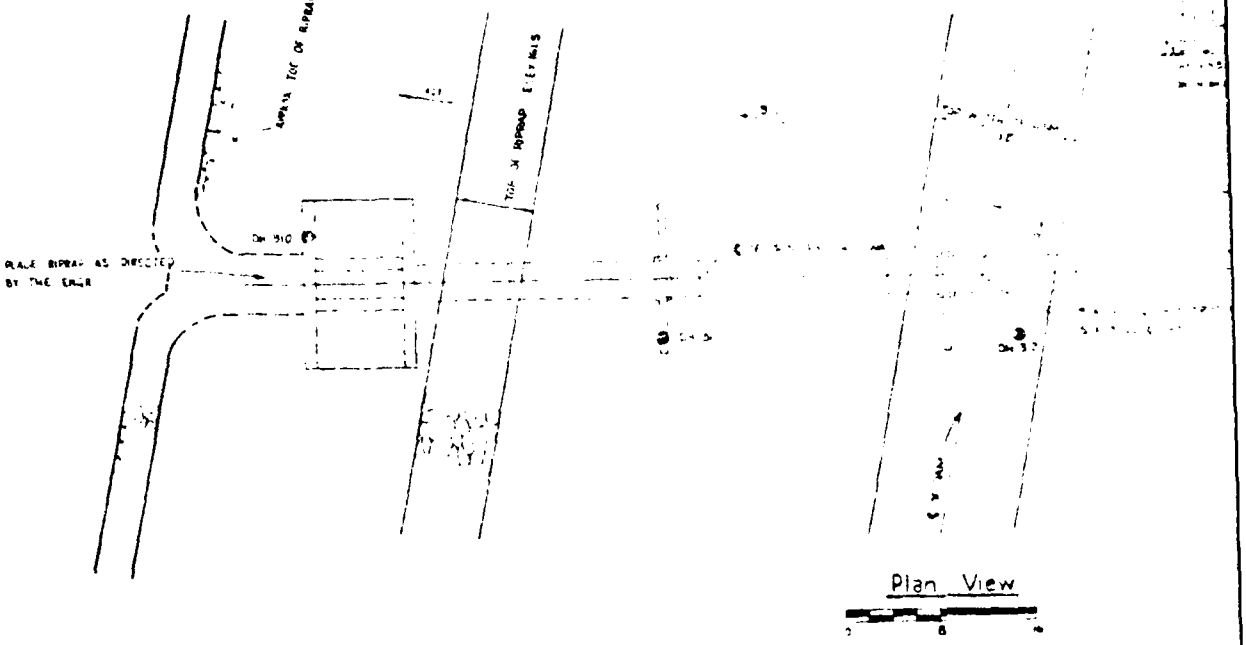
SPAULDING POND SITE NO 2
NORWICH, CONNECTICUT

DRAINAGE DETAILS - DIKE

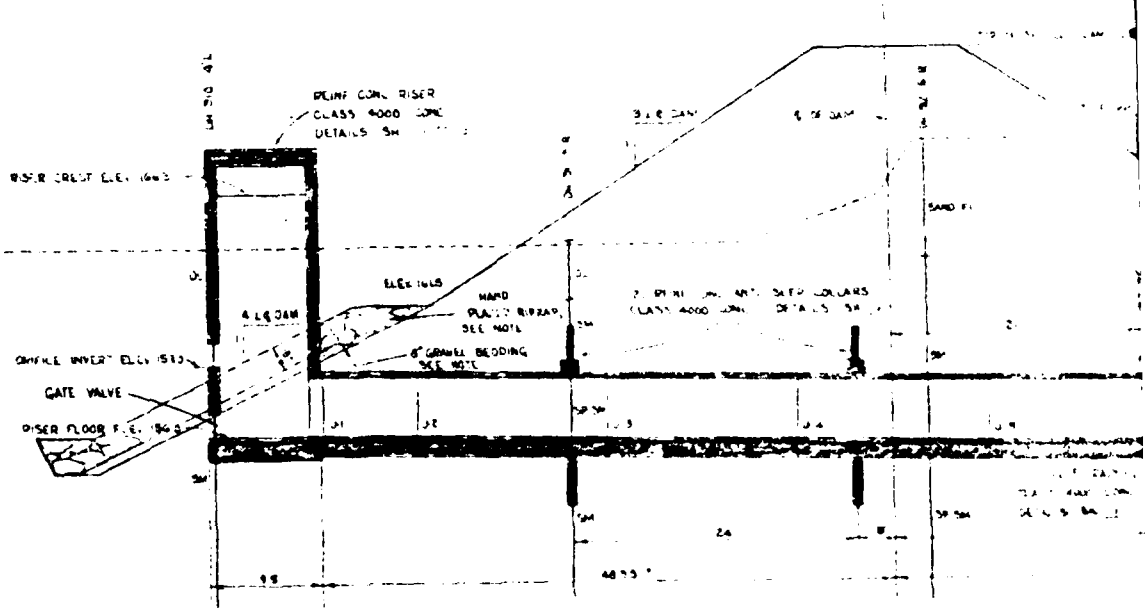
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed W.H. Lanning Jr. Date 12/65
Drawn
Traced
Checked
Approved by Title Title
Sheet No. 9 of 19 Drawing No. CN - 425 - P

(3)



Plan View



Profile Along ℄ of Principal Spillway

PRINCIPAL SPILLWAY CONDUIT NOTES

30" I.D. RCMP CONC WATER PIPE
(1) 8.0' SECTION
(7) 16.0' SECTIONS
(1) WALL FITTING FOR 19" WALL
TOTAL = 120.1'
PRESSURE HEAD = 14'
LOAD = 10,700 LBS. PER L.F. BASED ON 0.0 X 2.96
MIN. 3-EDGE BEARING STRENGTH FOR 0.01" CRACK=
2,640 LBS PER L.F. FOR PRESTRESSED PIPE AWWA C301
MIN 3-EDGE BEARING STRENGTH FOR 0.01" CRACK=
9,510 LBS PER L.F. FOR NON PRESTRESSED PIPE AWWA C300

(1)

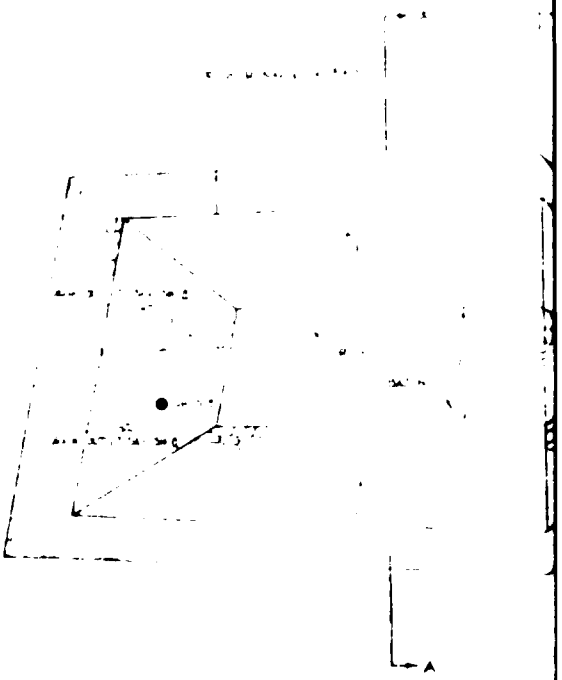
COLLAR	DIST FROM OUTLET END	INV ELEV OF 36" I.D. PIPE
I	21.33	199.92
II	49.33	198.76

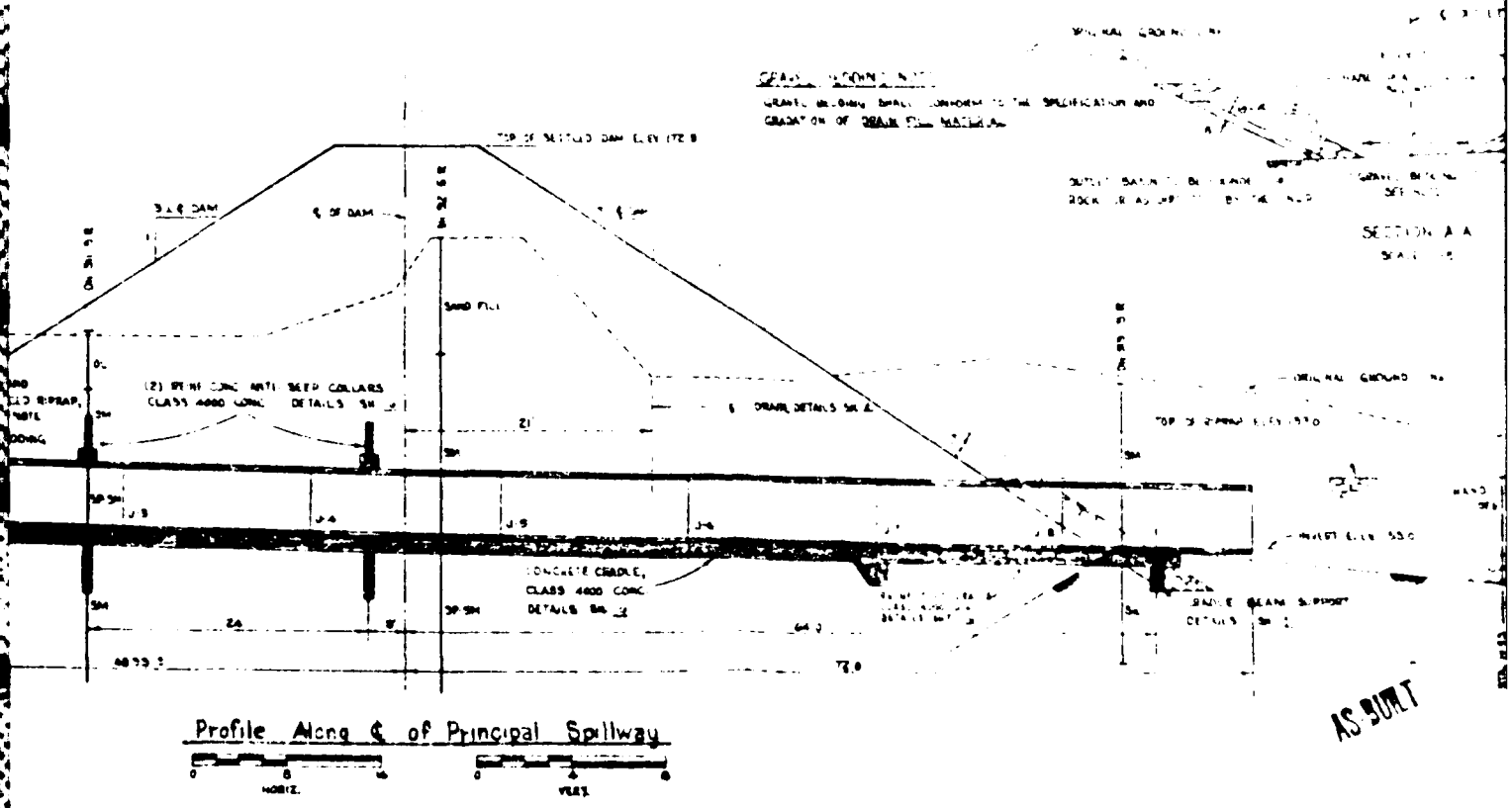
JOINT	DIST FROM OUTLET END	INVERT ELEV (FT. MSL)	SLOPE
OUTLET	0	198.34	
J-8	16.0	199.16	
J-7	32.0	199.98	
J-6	48.0	200.80	
J-5	64.0	201.62	
J-4	80.0	202.44	
J-3	96.0	203.26	
J-2	112.0	204.08	
J-1	128.0	204.90	

NOTE

DIMENSIONS IN (THUS) FOR CIRCULAR ARE BASED ON NOMINAL SIZE AND DO NOT INCLUDE CREEP

Plan View



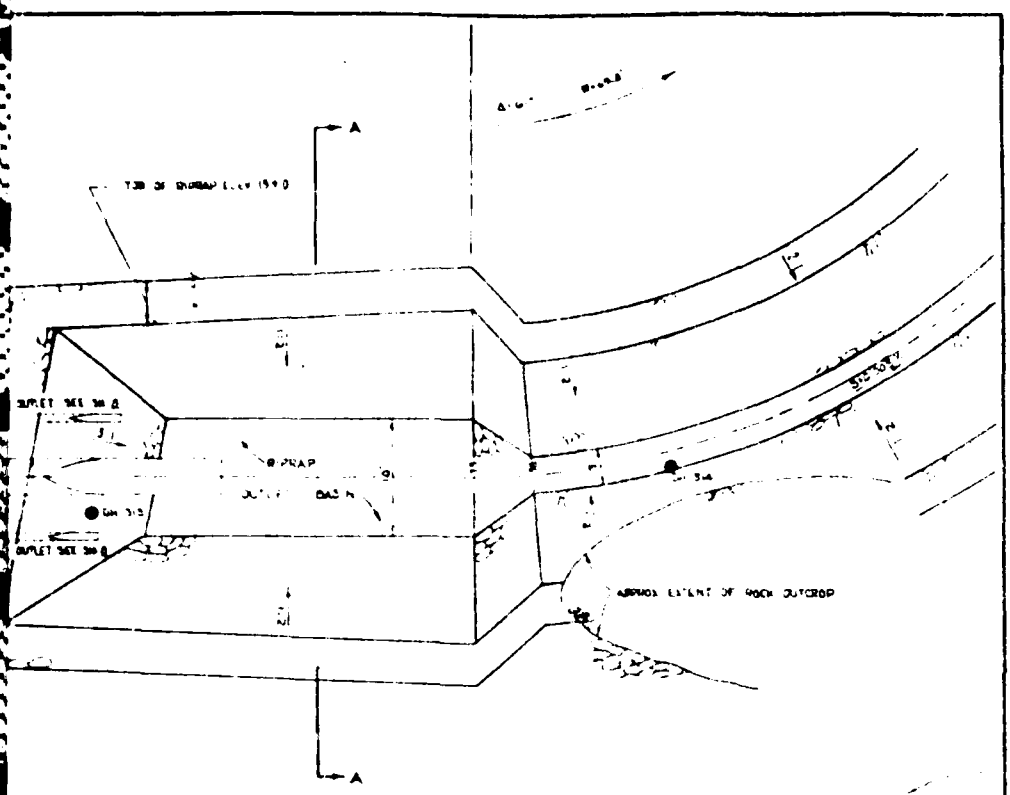


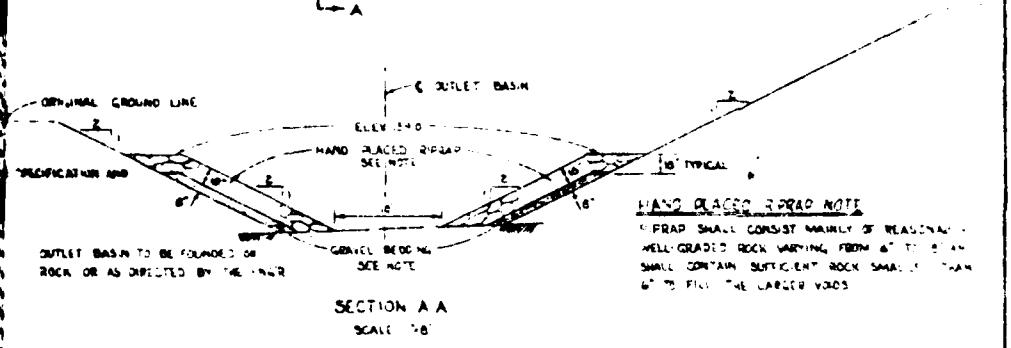
Profile Along ℄ of Principal Spillway

HORIZ. 0 8 16

VERT. 0 4 8

(2)

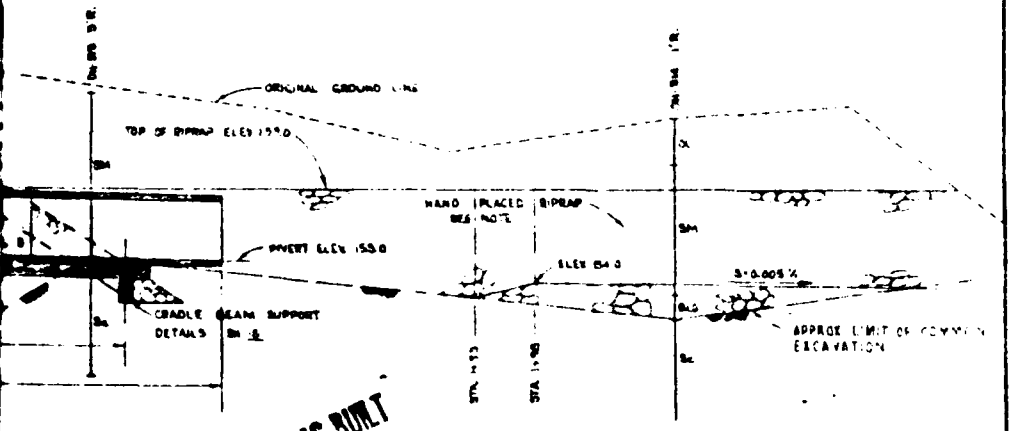




SECTION A A
SCALE 1"=8'

HAND PLACED RIPRAP NOTE

RIPRAP SHALL CONSIST MAINLY OF REASONABLY WELL GRADED ROCK VARYING FROM 6" TO 8' AND SHALL CONTAIN SUFFICIENT ROCK SMALLER THAN 6" TO FILL THE LARGER VOIDS



AS-BUILT

SPAULDING POND BROOK WATERSHED PROJECT
SPAULDING POND SITE NO 2
NORWICH, CONNECTICUT
PRINCIPAL SPILLWAY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed W.R. Date 12/65
Drawn Traced
Checked
Approved by
Title
Type
Sheet no 10 of 19
Drawing no CN-425-P

REFER TO SHTS 13, 18, & 19 FOR LOGS OF DRILL HOLES

SCS-ENG-38 (APRIL 1965)

(3)

STATE OF CONNECTICUT

WATER RESOURCES COMMISSION

STATE OFFICE BUILDING · HARTFORD 15, CONNECTICUT

January 16, 1967

CONSTRUCTION PERMIT FOR DAM

r

City of Norwich
Norwich, Connecticut

TOWN: **Norwich**
RIVER: **Shetucket River**
TRIBUTARY: **unnamed**

Attention: Mr. Harold M. Walz, Director
Public Works

Your application for a permit to (xxxxxx) (construct) a dam on **an unnamed tributary to Shetucket River, known as Spaulding Pond, Site #2** in the Town of **Norwich** in accordance with plans prepared by **the Soil Conservation Service** dated **December 1965** has been reviewed.

The construction, in accordance with those plans, is APPROVED under the conditions which follow.

I. The Commission shall be notified as follows:
   - **A) When construction is started**
   - **B) When foundation is excavated**
   - **C) When dam is complete and before water is impounded**
   - **D) When project is complete and ready for final inspection**

II. This permit with the plans and specifications must be kept at the site of the work and made available to the Commission at any time during the construction.

III. If any changes are contemplated or required, the Commission must be notified and supplementary approval obtained.

IV. If the construction authorized by this permit is not started within **2 years** of the date of this permit and completed within **4 years** of the same date, this permit must be renewed.

V. Additional requirements -

Your attention is directed to Section 25-112 of the 1958 Revision of the General Statutes which states in part regarding this Construction Permit: "A copy of the permit shall be sent to the town clerk." The enclosed carbon copy of this permit is the copy intended for the town clerk and it is your obligation to duly file this copy.

Your attention is further directed to Section 25-115 of the 1958 Revision of the General Statutes - "Liability of Owner or Operator. Nothing in this chapter and no order, approval or advice of the Commission or a member thereof, shall relieve any owner or operator of such a structure from his legal duties, obligations and liabilities resulting from such ownership or operation. No action for damages sustained through the partial or total failure of any structure or its maintenance shall be brought or maintained against the state, a member of the Commission or the Commission, or its employees or agents, by reason of supervision of such structure exercised by the Commission under this chapter."

The Commission cannot convey or waive any property right in any lands of the State, nor is this permit to be construed as giving any property rights in real estate or material or any exclusive privileges, nor does it authorize any injury to private property or the invasion of private rights or any infringement of federal, state or local laws or regulations.

Your attention is also directed to Section 26-134 of the 1958 Revision of the General Statutes - "Obstructing Streams. No person shall, unless authorized by the director, prevent the passing of fish in any stream or through the outlet or inlet of any pond or stream by means of any rack, screen, weir or other obstruction or fail, within ten days after service upon him of a copy of an order issued by the director, to remove such obstruction." The address of the State Board of Fisheries and Game is State Office Building, Hartford, Connecticut.

Very truly yours,

WATER RESOURCES COMMISSION

By: William S. Wise
William S. Wise, Director

WSW:hmy

cc: Fish & Game

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Lansfield Professional Park
Storrs, Connecticut 06268

August 30, 1968

Mr. Harold M. Walz
Director of Public Works
City of Norwich
Norwich, Connecticut 06360

Dear Mr. Walz:

In accordance with the recommendation made by Mr. Macchi the following information will provide you with a guide as to when it would be advisable to close the Park roads to eliminate possible accidents due to emergency spillway discharges.

The principal spillway (pipe conduit) hydrograph is based on 5 inches of rainfall and associated runoff of about 4 inches or for a rainfall of about 5 inches under normal conditions the emergency spillway may not operate.

The required capacity of the emergency spillway is based on a rainfall of over 16 inches and 15 inches of runoff.

Under this condition the emergency spillway would begin to discharge about 2.5 hours after the start of the design storm. When the pool is 0.6 feet below the crest of the emergency spillway or 1.2 feet below the top of the inlet riser, there would be 27-acre-feet of temporary storage which could result from 2.5 inches of runoff or about 3.5 inches of rainfall.

Time and intensity are factors which are not apparent in the two conditions above.

It is suggested that the Park roads be closed when there is continuing intensive rainfall following rainfall of 3 to 4 inches within two hours, or when the flood pool is 1.2 feet below the top of the inlet riser (Slide 2) and still rising.

Sincerely yours,

T. R. Wire
State Conservation Engineer

cc:
Mr. A. J. Macchi ✓

STATE OF CONNECTICUT

WATER RESOURCES COMMISSION

STATE OFFICE BUILDING · HARTFORD 15, CONNECTICUT

September 17, 1968

CERTIFICATE OF APPROVAL

City of Norwich
Norwich,
Connecticut

TOWN: Norwich
RIVER: Shetucket River
TRIBUTARY: Unnamed
CODE NO.: T 14.7 SU.2 U1.3

Attention: Mr. Harold M. Walz, Dir.
Public Works

Dear Mr. Walz:

NAME AND LOCATION OF STRUCTURE: Spaulding Pond Dam Site #2 approximately 200 feet north of Mohegan Park Road and approximately 800 feet west of Curtis Street in the Town of Norwich

DESCRIPTION OF STRUCTURE AND WORK PERFORMED: Construction of an earth dam approximately 180 feet in length and 9 feet in height and an earth dike approximately 1120 feet in length and 19 feet in height in accordance with plans prepared by the U. S. Department of Agriculture, Soil Conservation Service dated:

CONSTRUCTION PERMIT ISSUED UNDER DATE OF: January 16, 1967

This certifies that the work and construction included in the plans submitted, for the structure described above, has been completed to the satisfaction of this Commission and that this structure is hereby approved in accordance with Section 25-114 of the 1958 Revision of the General Statutes.

The owner is required by law to record this Certificate in the land records of the town or towns in which the structure is located.

WATER RESOURCES COMMISSION

BY: J. J. Curry, Director

This floodwater retarding dam is located on Spaulding Pond Brook, immediately outside the northerly limit of the City of Norwich. Sheet 4 of this report, together with the Norwich 7.5 minute quadrangle published by the U.S. Geological Survey, may be used to locate the structure more accurately.

A summary of pertinent design information is given on sheet 2 of this report.

Criteria and procedures used in this design are given in the following Soil Conservation Service publications:

National Engineering Memorandum No. 27, Limiting Criteria for the Design of Earth Dams
National Engineering Memorandum No. 42, Reinforced Concrete Pipe Drop Inlet Barrels
National Engineering Memorandum No. 50, Drop Inlet Spillway Standards
National Engineering Handbook No. 4A, Hydrology
National Engineering Handbook No. 5, Hydraulics
National Engineering Handbook No. 8, Geology
Engineering Division Technical Release No. 2, Earth Spillways
Engineering Division Technical Release No. 5, Structural Design of Underground Conduits
Engineering Division Technical Release No. 10, Storage-Floodwater Retarding Structures
Engineering Division Technical Release No. 12, Procedure for Computing Sediment Requirements for Retarding Reservoirs
Weather Bureau Technical Paper No. 40
Weather Bureau Technical Paper No. 29

This structure is one of two flood retention structures designed to reduce flood damages in the flood plain of this watershed. It will retard the runoff from a 100-year frequency storm without discharge occurring in the emergency spillway.

The results of hydrologic and hydraulic computations are given on sheet 3 of this report.

This structure consists of a compacted earth fill with a cutoff extending into the foundation. A drainage system is located under the downstream portion of the fill to collect and safely discharge any seepage that may develop through the embankment and foundation with the impoundment of floodwaters.

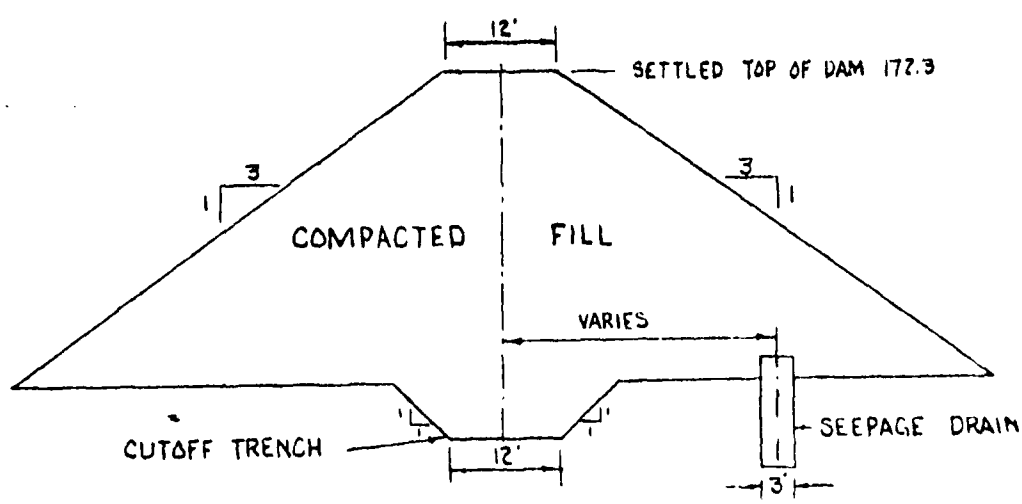
The principal spillway is a drop inlet structure consisting of a two-stage reinforced concrete riser, 30-inch diameter conduit of reinforced concrete water pipe, and a riprap outlet basin to dissipate energy at the outlet end of the conduit.

The emergency spillway is designed as an earth cut in the left abutment.

U S DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

DESIGN REPORT SUMMARY

I.	**Watershed data**		
	A. Structure class	c	
	B. Drainage area	132	Ac.
	C. Time of concentration - T_c	0.5	Hrs.
	D. Hydrologic curve number - C_n		
	1. Moisture condition II	75	
	2. Moisture condition III	91	
II.	**Principal spillway**		
	A. Conduit		
	1. Size (I.D.)	30	In.
	2. Length	118.1	Ft.
	B. Riser		
	1. Size	2.5 x 7.5	Ft.
	2. Height	10.3	Ft.
	C. Weir length	15	Ft.
	D. Orifice size	12 x 20	In.
	E. Pond drain size	12	In.
	F. Type of energy dissipator	riprap basin	
III.	**Emergency spillway**		
	A. Width	100	Ft.
	B. Side slopes	3:1	
	C. Length of level section	100	Ft.
	D. Exit slope	0.021	Ft/Ft.
	E. Maximum velocity at control section (D.H.W.)	6.9	Ft/Sec.
	F. Duration of flow (D.H.W.) through emergency spillway	8.8	Hrs.
	G. Frequency of use	once in 100-years	
IV.	**Earth fill**		
	A. Height	16	Ft.
	B. Volume	18,500	C.Y.
	C. Compaction	Class A	



Typical Cross Section

ENGINEERING & WATERSHED PLANNING UNIT, UPPER DARBY, PA

U S DEPARTMENT OF AGRICULTURE – SOIL CONSERVATION SERVICE

Element of Structure	Determining Factor	Elevation	Surface Area Acres	Storage		Inflow		Peak Outflow c.f.s.
				Acre-Feet	Inches*	Volume Inches*	Peak Rate c.f.s.	
Invert of orifice	50-year sediment accumulation	159.0	1.8	0.9	-	-	-	20.9
Crest of riser	100-year frequency 1/ storm, 6 hr. duration moisture condition II	166.3	4.6	24.0	2.18	2.52	205	84
Crest of emergency spillway	100-year frequency 2/ storm, 6 hr. duration, moisture condition III	167.6	5.4	30.2	2.74	4.08	367	75
Design high water	16.5 in. rainfall, 2/ moisture condition III	170.3	7.1	47.6	4.33	15.38	1312	1094
Top of dam 3/	Design high water 2/ elevation plus 2 ft.	172.3	8.8	54.2 4/	4.93 4/	21.89 4/	1928 4/	1760 4/

* Volume expressed in inches of runoff from controlled watershed area of 132 acres.

1/ Work Plan evaluation storm

2/ State of Connecticut, Water Resources Commission, criteria

3/ Maximum elevation as determined by (a) routing 1.0 x value from ES-1020 sh. 5, moisture condition III (SCS freeboard hydrograph, National Engineering Memorandum SCS-27)
(b) Design high water elevation plus 2 feet

4/ Value obtained from SCS freeboard hydrograph routing
Time required to empty flood storage is 1.45 days.

ENGINEERING & WATERSHED PLANNING UNIT, UPPER DARBY, PA

STATE Connecticut | PROJECT Spaulding Pond Brook, Site #2

BY WHL | DATE | CHECKED BY | DATE | JOB NO CN 425-H

SUBJECT NARRATIVE | SHEET 1 OF

A. General

In view of the scarcity of borrow material at Site No. 1 where, as a final resort, borrow was taken from the pool, it was decided to utilize the available borrow in the pool at Site No. 2 and account for the resulting flood storage in the routings. This additional storage allowed the top of dam to be lowered 5.5' below the work plan estimate, resulting in a considerable decrease of compacted fill. The borrow removal also saved the cost of excavating a ditch from the woods road to the riser to allow drainage of the pool area east of the woods road. The increased storage permitted the emergency spillway to be lowered approximately 4' below the work plan estimate which then allowed the spillway to be moved from the right abutment to the left abutment. Not only did this save the cost of excavating approximately 600 c.y. of rock, but appears to present a much more useable source of borrow material. The flood storage obtained by the removal of borrow will be verified after excavation.

The Principal Spillway elevations were established by three main factors:

1. an elevation low enough to allow the use of as much storage east of the woods road as feasible.
2. the presence of rock near the outlet end of the pipe and in the outlet channel.
3. an elevation at the inlet end to which the pool borrow area (Borrow Area "A") could be drained during excavation.

The orifice was located at elevation 159.0 with the proposed limit of borrow excavation at elevation 158.5 to insure the provision of sufficient sediment storage.

The flood routing were based upon the runoff from the entire watershed (0.207 sq.mi.) initially neglecting the fact that the pool area was divided by a saddle. To the inflow hydrographs were added the respective outflows from Site No. 1, with the exception of the high stage hydrograph. Here, lacking a high stage routing for Site No. 1, the principal spillway outflow hydrograph (AMCIII) was added to the high stage inflow hydrograph (AMCII) yielding slightly conservative results. The outflow from Site No. 1 was lagged 1/2 hour to account for the travel time plus retardance due to both localized pockets of valley storage and a restriction created by a small road culvert.

During the initial stages of design, consideration was given to a second principal spillway through the dike east of the woods road which would serve to drain the small pool area. This would have been required to discharge approximately 12.8 AF through the dike and out of the watershed. As an alternative to this, it was decided to place a connecting culvert under the woods road (under the gas transmission line). The capacity of the culvert was then checked using both the

principal spillway storm and the emergency spillway design storm to insure that it did not retard flow from the main pool to the small pool. During the principal spillway storm, flow through the culvert was mainly out of the main pool, but at T=3.9" hrs. (w.s. elevation slightly below the emergency spillway crest) the flow reversed, thus precluding the possible existence of a higher stage in the main pool.

During the emergency spillway design storm flow through the culvert is again mainly directed out of the main pool. At T=2.1 hr. the water surfaces equalize only to have the water surface elevation in the main pool again rise above that east of the woods road. At T=2.4" hr. flow across the woods road occurs (from west to east) equalizing the water surfaces before the Design High Water Elevation is attained, thus not affecting the routine.

B. Connecting Culvert Flow Computations

These computations consist of determining, for each of the two pool areas, the amount of inflow during a given time interval and the resulting water surface elevations. The amount of inflow was determined from the area between the inflow and outflow hydrographs for the given time interval. The resulting water surface elevations were then used to determine the amount of flow through the connecting culvert during the time interval from the head-discharge curve. The Q_{av} curve was determined by assuming that the flow varied from a maximum value at the beginning of the time interval to zero at the end of the interval (water surf. elevs. equal @ end of interval). This was found not to be the case, but rather that the flow was greater than zero at the end of the interval, thus resulting with a larger value of average flow. This was corrected by determining, at the end of each time interval, the increase in Q from the resulting water surface elevations at the end of that interval.

The water surface profiles through the culvert were used to obtain the amount of flow and the resulting gradient between the water surface elevations at each end of the culvert before full-pipe flow occurred.

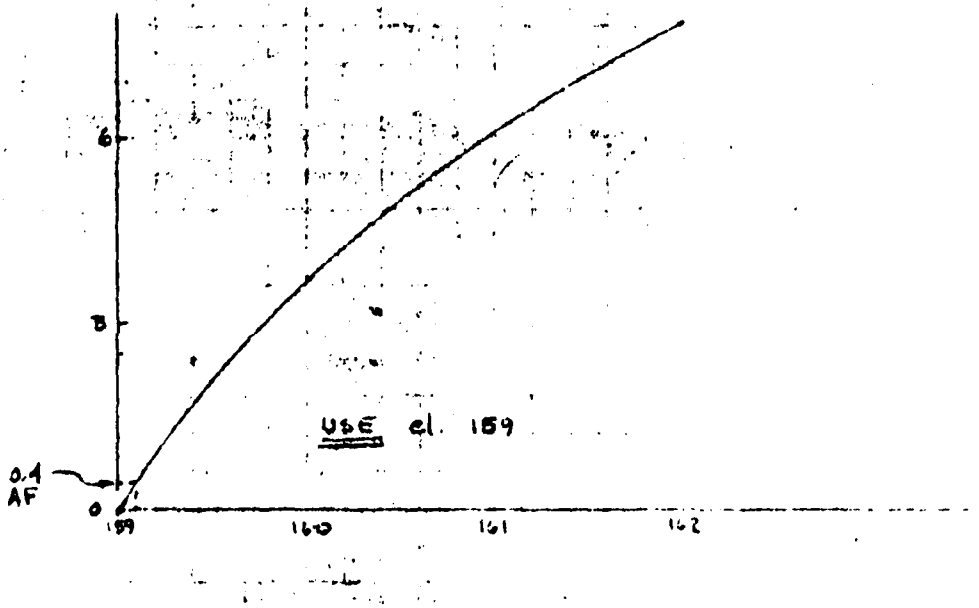
COMPUTATION SHEET
SCS-523 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
		Spaulding Road Project Site #2		
BY	DATE 10/25/65	CHECKED BY WTF	DATE 12-7-65	JOB NO. CN-425-H
SUBJECT Surface Storage - W. Side of Wood Road				SHEET 5 OF 5D

Including storage due to borrow removal

Elev.	Area Ac.	Avg. Area Ac.	Contour Int. Ft	Volume Ac.-Ft	Accum Stor. Ac Ft	Avail Stor. Ac Ft
159	1.8		2'		0	0
				3.75		
160	1.95				3.75	3.75
				4.16		
161	2.21				7.91	7.91
				4.70		
162	2.46				12.61	12.61
				5.20		
163	2.74				17.81	17.81
				6.24		
164	3.50				24.05	24.05
				7.79		
166	4.29				31.84	31.84
				9.75		
167	5.46				41.59	41.59
				12.66		
169	7.20				54.22	54.22
				16.21		
171	9.01				70.43	70.43



COMPUTATION SHEET
SCS-523 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
Conn.		Spaulding Pond Comm. Site 2		
BY	DATE	CHECKED BY	DATE	JOB NO.
WTF	11/64	WHL	2/3/65	CN-425-1
SUBJECT				SHEET 6 OF 50
Stage - Storage Data				

Stage - Storage Data East of Wood Road

Elev.	Area - Ac.	Av. Area - Ac.	Contour Int	Vol. Ac-Ft	Accum Stor	Adj Stor
157.5	0					0
		0.06	0.5'	0.03		
158	0.11				0.03 AF	0
		0.27	2'	0.54		
160	0.42				0.57	0
		0.60	2'	1.20		
162	0.77				1.77	0
		1.00	2'	2.00		
164	1.24				3.77	2.00 AF
		1.46	2'	2.92		
166	1.67				6.69	4.92
		1.88	2'	3.76		
168	2.08				10.45	8.68
		2.34	2'	4.68		
170	2.60				15.13	13.36
		2.78	2'	5.56		
172	2.96				20.69	18.92
		3.22	2'	6.14		
174	3.48				27.13	25.36
		3.77	2'	7.54		
176	4.06				34.67	32.90

Storage below elev. 162 unavailable for flood storage.

COMPUTATION SHEET
SCS-523 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
Conn.				
BY	DATE	CHECKED BY	DATE	JOB NO
WHL	10/25/65	D.S.	12/7/65	

SUBJECT Compound Stage Storage Data SHEET OF

Pool area east of woods rd filled with spoil to elev 162

Elev	Avail Stor E. of rd	Avail Stor W of rd	Avail Stor Total
159	0	0 AF	0 AF
160	0	3.75	3.75
162	0	7.91	7.91
164	2.0 A.F.	12.58	14.68
166	4.92	17.78	22.70
168	8.68	24.02	32.70
170	13.36	31.81	45.17
172	18.92	41.56	60.48
174	25.36	54.22	79.58
176	32.90	70.43	103.33

COMPUTATION SHEET
SCS-523 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

GPO 1958 O—479667

STATE		PROJECT		
Conn.		Spaulding Pond Brook, Site 2		
BY	DATE	CHECKED BY	DATE	JOB NO.
WHL	2/4/65	WTF	3/6/65	CN- 425-H

SUBJECT Principal Spillway Discharge Data — SHEET 8 OF 50

Two-Stage ; Riser - Floor Elev. 156.0

Outlet Invert Elev. = 155.0

Elev of ℄ of Outlet = 156.25

Low Stage - Orifice 1'-8" wide by 1'-0" high @ elev. 159.0

Assume discharge coeff. = 0.6

$Q = CA\sqrt{2gh} = 0.6\,(1.67')(8.02)\sqrt{H} = \underline{8.02\sqrt{H}}$

High Stage - Weir (30" I.D. conduit)

weir length = (7.5' (3)) 2 = 15'

$Q_w = CLH^{3/2}$ where $C = 3.1$

$\therefore Q_w = 3.1\,(15)(H^{3/2}) = \underline{46.5\,H^{3/2}}$

Pipe Flow

$n = 0.012$ (Manning) $A_p = 4.91$ sq ft $L_p = 140' \pm$ $K_p = 0.00786$

$K_p L_p = 140(0.00786) = 1.10$

$K = \left(\frac{1}{K_o + K_e + K_p L_p}\right)^{1/2} = \left(\frac{1}{3.10}\right)^{1/2} = \sqrt{0.322} = 0.568$

K_o = entrance loss = 1.0

K_e = exit loss = 1.0

$Q_p = KA_p\sqrt{2gH} = 0.568(4.91)(8.02)H_p^{1/2} = \underline{22.4\,H_p^{1/2}}$

COMPUTATION SHEET
SCS-523 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

GPO 1956 O-670867

STATE		PROJECT		
Conn		Spaulding Pond Brook, Site 2		
BY	DATE	CHECKED BY	DATE	JOB NO.
WHL	10/22/65	D.S.	12/7/65	JN-ACE-11
SUBJECT				SHEET 9 OF 50
Stage - Discharge Data				

outlet inv. elev. 155.0 ℄ outlet elev. 156.25

orifice crest elev. 159.0 ℄ orifice elev. 159.5

Elev.	Orifice Flow (159.5)		Weir Flow (166.8)			Pipe Flow (156.25)		Resultant Flow
	h_o	$Q_o = 8.02\sqrt{h_o}$	h_w	$h_w^{3/2}$	$Q_w = 46.5\, H_w^{3/2}$	h_p	$Q_p = 77.4\, h_p^{1/2}$	cfs
159	0	0						0
160	0.5	5.7						5.7
161	1.5	9.8						9.8
162	2.5	12.7						12.7
163	3.5	15.0						15.0
164	4.5	17.0						17.0
165	5.5	18.8						18.8
166	6.5	20.4						20.4
166.3	6.8	20.9	0	0	0			20.9
166.6	7.1	21.3	0.3	0.164	7.6			28.9
166.9	7.4	21.8	0.6	0.465	21.6			43.4
167.2	7.7	22.2	0.9	0.854	39.7	10.95	74.1	61.9
167.5	8.0	22.7	1.2	1.315	61.1	11.25	75.1	75.1
167.6						11.35	75.4	75.4
168						11.75	76.7	76.7
170.3						14.05	84	

COMPUTATION SHEET
SCS-523 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

GPO 1958 O 470067

STATE		PROJECT		
Conn.		Spaulding Pond Brook Site 2		
BY	DATE	CHECKED BY	DATE	JOB NO.
WHL	10/26/05	ATF		CN-405-4

SUBJECT Emergency Spillway Hydraulics — SHEET 20 OF 50

Inlet length = 160'± S_i = 0 % b = 100' z = 3:1

Control sect elev. = 167.6'

q	d_c	$z d_c$	$b + z d_c$	$Q = q(b + z d_c)$	H_p	W.S. Elev.
2	0.5'	1.5	101.5	203.0	1.1'	168.70
5	0.92	2.76	102.76	514	1.88	169.48
7	1.15	3.45	103.45	724	2.28	169.88
10	1.46	4.38	104.38	1044	2.76	170.36
12	1.65	4.95	104.95	1259	3.10	170.70
15	1.91	5.73	105.73	1586	3.49	171.09
17	2.09	6.27	106.27	1807	3.8	171.40
20	2.33	6.99	106.99	2140	4.11	171.71

W.S. Elev.	H_{pipe}	$H_{pipe}^{1/2}$	$Q_p = 22.4 H_p^{1/2}$	Q_{em}	Total Q cfs
168.70	12.45	3.53	79.1	203	282
169.48	13.23	3.64	81.5	514	596
169.88	13.63	3.69	82.6	724	807
170.36	14.11	3.75	84.0	1044	1128
170.70	14.45	3.80	85.1	1259	1344
171.09	14.84	3.85	86.2	1586	1672
171.40	15.15	3.88	86.9	1807	1894
171.71	15.46	3.93	88.0	2140	2228

from emer. spwy. design hydrograph:

design high water - elev. 170.3

total discharge - 1094 cfs

@ elev. 170.3, $Q_p = (170.3 - 156.\ldots)^{1/2}(\ldots) = 84$ cfs

$Q_{em} = 1094 - 84 = 1010$ cfs

$Q_{em}/_b = 10.1 \frac{cfs}{ft}$ S_e [illegible] V = 7.55 [illegible]

$H_p = 2.8'$ (from plot of H_p vs [illegible])

$d_c = 1.47'$ [illegible] $V_c = 6.9$ [illegible]

$A = \frac{Q}{V} = \frac{1010}{7.55} = 133.8^{\square'} = (b+3d)d$ [illegible]

$(100 + 3d)(d) = 133.8$

$3d^2 + 100d - 133.8 = 0$

$d^2 + 33.3d - 44.6 = 0$ $d = \frac{-33.3 \pm (33.3^2 + 4 \times 44.6)^{1/2}}{2}$

$= \frac{2.6}{2} = 1.3' = d_{exit}$

Soil type: Hollis (shallow silty soil)
refer - TSC ENG. MEMO UD-3

Allowable velocity =
for seed mixtures #2 thru 7, 0-5% grade

erosion resistant soil - V=7 fps
easily erodible " - V=5 "
use V=6 fps

for once in 100 yrs.

$V_{ALLOW} = 6(1.25) = 7.5'/sec$ say OK

GEOLOGY REPORT

STORAGE ALLOCATION

	Depth at Dam (feet)	Surface Area (acres)	Volume (ac. ft.)
Sediment:	1.4	1.0	0.4
Floodwater:	14.0	8.3	45.0

B. Surface Geology and Physiography

Site No. 2 at Spaulding Pond Brook is located in the Eastern Metamorphic Highlands of Connecticut. The area of the site is of gentle topographic expression set in a region of moderate to steep relief. The structure consists of a main dam approximately 285 feet long and an adjoining dike approximately 1200 feet long. The centerline of the dam crosses a pond impounded by a small concrete and granular fill dam. The right and left abutments (looking downstream) have slopes of approximately 9 percent each.

The bedrock as exposed and/or encountered in drilling is the Putnam Gneiss of probable Precambrian age. This formation is composed of four different mappable phases; the predominant one in the watershed being the Sillimanite-pinite schist. Rocks of this phase are gray to brown and medium to coarse-grained. Principal mineral constituents are quartz, biotite, feldspars, and iron minerals. Surficial deposits are of glacial origin consisting almost primarily of a thin layer of till which generally reflects the bedrock topography and is referred to as ground moraine. Within the till highly varied soil types may be found ranging from stream-deposited sands and gravels to compact clayey tills.

No structural features were observed at the site. Strike of the bedrock is not consistent in the watershed because of the distortion of the rock; however the dip as observed in most cases is very steep but again varying considerably in direction. Present channel conditions are stable and no erosion problem is anticipated since the outlet of the channel is on bedrock.

GEOLOGY REPORT

II. Subsurface Geology

A. Centerline of Dam

Thirteen holes were drilled either on or near the centerlines of the proposed dam and dike. All holes were sampled with a split-spoon sampler using standard penetration resistance and all bedrock was diamond cored to a minimum penetration of 5.0 feet. All holes drilled encountered bedrock with the exception of #54 which went to a depth of 21.0 feet where the blow count on the sampling spoon was in excess of 250 blows per feet.

The material encountered in all holes with the exception of those in or on the periphery of the existing pond (holes 53 and 54) is essentially the same; that being very fine to fine grained poorly graded sand with varying amounts of non-plastic fines. Generally the blow count indicates that the sand has a dense to very dense relative density beyond a depth of 5.0 feet. Characteristic with the morainal type cover, very little stratification is present in those areas drilled and that which may occur is very local and not extensive. In hole 53 which was drilled in the existing pond from a barge, about 2.5 feet of highly plastic silt was penetrated immediately underlain by a very dense, very fine grained sand. Fragmental rock up to 1" size was present throughout the section and was estimated 5 to 10 percent by volume. In hole 54, a very fine grained sand with associated low plasticity fines was drilled. This zone (visually identified) was encountered at 8.0 feet and extended to 13.5 feet.

The bedrock profile on the basis of exposure and drill hole information is highly irregular and does not assume any reliable lateral continuity. The bedrock varies considerably in texture, type and mineral constituents. The bedrock which is primarily the schist phase of the Putnam Gneiss formation, ranges from a very fine grained biotitic, feldspathic schist to a highly quartzitic schist where the rock texture is almost massive. Bedding planes in the core range from horizontal to almost vertical again attesting to the lack of uniformity in the attitude of the bedrock throughout the site. Fracturing is common in most of the bedrock drilled

with the greatest percentage of fracturing being horizontal. Oxidation was noted along fracture faces in holes 51 and 52. The bedrock cored in the remaining holes was in generally good condition and unweathered.

Groundwater levels are within 5 to 7 feet of ground surface elevations in most of the holes drilled. No groundwater levels could be detected in holes 56 and 57. No groundwater measurement was made in hole No. 55.

Surface boulders were common throughout the site and the presence of boulders in several of the holes necessitated drilling with a diamond bit.

B. Centerline of Outlet Structure

Five holes were drilled along an axis paralleling the centerline of the proposed conduit. Holes 310 and 311 were drilled in the existing pond from a barge. Hole 312 was located on and drilled through the existing structure. Holes 313 and 314 were located on natural ground surface. It should be noted that all hole depths in nos. 310 and 311 have been measured from the raft deck which is 2.0 feet above pond level. In hole 310, 3.5 feet of low-volume weight material was visually classified as a low plasticity organic silt (OL). This was underlain by fine to medium grained silty sand which attained a very dense relative density by 15.5 feet or 11.5 feet from pond bottom. Bedrock was encountered at 35.0 feet.

In hole 311, almost 3.0 feet of low plasticity organic silt extended from existing pond, or to about a depth of 7.0 feet from the raft deck. From 9.0 to 13.5 feet a layer of fine to medium grained, poorly graded, well oxidized sand was entered. The fines were non-plastic and estimated from 5 to 12 percent. A very dense relative density was not attained until about 25.5 feet. Bedrock was not encountered until 29.5 feet at which depth 5.0 feet of schist was cored.

Hole 312 was located on and drilled through 5.0 feet of granular sand and gravel fill of the existing embankment. This was underlain by a very dense silty sand which graded

GEOLOGY REPORT

into a very dense and very fine grained sand at 13.5 feet. This material continued to the point of refusal on the sampling spoon at 31.0 feet where rock core drilling commenced. At a depth of 14.0 feet the driller made a notation on his log of an artesian condition, however no measurement of head was made. Since this condition was not observed in the field at the time it is uncertain whether or not the notation on the log represented a true artesian flow.

In hole 313, no split spoon samples could be obtained for the first 7 feet because of a dense boulder concentration. Because of its proximity to adjoining holes, the material is probably the same, that being a fine grained silty sand visually classified as SM. Bedrock was hit at 7.0 feet and was diamond cored for 5.0 feet making a total hole depth of 12.0 feet. The bedrock was in good condition being generally unweathered.

Hole 314 penetrated a dark brown organic silty sand for the first 2.0 feet and has tentatively been classified as OL. From 2.0 to 9.0 feet the material was a very fine to fine grained silty sand with decomposed schist fragments from about 4.0 feet. Refusal was met at 9.0 feet and diamond drilling was performed from 9.0 to 12.0 feet. The bedrock (schist phase of the Putnam Gneiss) was fine grained, with near vertical bedding planes. The rock was well fractured to 11.0 feet with oxidation following the bedding planes of the schist. Generally the rock was well fractured throughout most of the section cored.

C. Emergency Spillway

Eight holes were drilled in the proposed emergency spillway area to evaluate subsurface materials and to delineate the underlying bedrock. All holes drilled penetrated bedrock. The most conspicuous factor was the irregularity of the bedrock surface. Depth to bedrock ranged from 1.0 foot in hole #218 where surface outcropping was common to 22.0 feet and 25.0 feet in holes 214 and 216 respectively. The bedrock drilled in holes 214 and 216 was composed of soft decomposed biotitic schist. Core recovery from both these holes was poor with the best recovery being obtained in hole 216 in the last 5 feet run from 38 to 43 feet. Core recovery in this interval was 78 percent.

GEOLOGY REPORT

The materials comprising the substratum are primarily a very fine to fine grained sand being poorly graded with non-plastic fines estimated from 15 to 20%. Fragmental rock is estimated at 20-30%. A general thickening towards the north or towards the entrance channel is apparent in the substratum and conversely the depth to bedrock becomes shallow approaching the exit channel toward holes 213 and 215.

Bedrock excavation should be anticipated in portions of the emergency spillway to meet design grades. The probable area of anticipated rock excavation is indicated by the following drill holes where bedrock was encountered above design grade: Nos. 211, 217 and 218. The emergency spillway when completed at grade will be on both bedrock and fairly well consolidated silty sands with fragmental rock, cobbles, and boulders. The outer portions of the exit channel should present no problem with regard to stability since most of it should be on bedrock.

D. Borrow Areas

The primary source of borrow (designated Borrow "A") is approximately 700 feet north of the proposed dam. It has the configuration of a conical-shaped hill with three gently sloping sides of approximately 9% with the steepest side towards the west or pool side having a slope of about 20%. One backhoe pit (#178) was dug on the crest of the hill to a depth of 8.1 feet. The material encountered as visually identified is a very fine to fine grained sand with non-plastic fines estimated about 12 to 15%. The material has been tentatively classified as an SM in the Unified Soil Classification System. A sample of the material from #178 was sent to the Soil Mechanics Laboratory for analysis to determine the suitability of the material for fill. In addition to pit #178, pits 179, 180, 190 and 191 were dug on the southern fringe of the proposed main borrow area. Pit 179 went to a depth of 9.1 feet. The material has been tentatively classified as SP-SM. Pit 180 was dug on the east flank of the borrow area near a natural gas line. Bedrock outcropping is common throughout this area and pit 180 was probably bottomed on bedrock at 2.7 feet. Pits 180 and 191 were dug on the southern periphery of the borrow area. The pits are approximately within the normal pool level and the material tentatively identified as SM.

GEOLOGY REPORT

In pit 191 water was encountered at three (3) feet and was present throughout the whole section of hole beyond 3.0 feet.

Within the existing pond, holes 601, 602 and 603 were drilled from a barge to evaluate materials as a possible borrow alternate. A maximum depth of 37.3 feet was attained in hole 601 before refusal was obtained on the split spoon sampler. The material in the three holes were essentially the same being fine grained silty (non-plastic) sand.. Apart from being well saturated a mantle of low plastic organic silts are present from existing pond bottom to about 8 feet as seen in hole 601. This area has been referenced Borrow Area "B".

Borrow Area "C" in the emergency spillway area represents that material which may be salvaged during common excavation in setting the design spillway grade.

REFERENCE:	U.S.DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	DRAWING NO. CN 425-G SHEET 7 OF DATE 7/6/-

COMPUTATION SHEET
SCS-523 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

rev. 9-21-66

GPO 1958 O-619663

STATE		PROJECT		
Conn.		Spaulding Pond Brook, Site 2		
BY	DATE	CHECKED BY	DATE	JOB NO.
WHL	2/8/66			CN-425-Q
SUBJECT				SHEET 1 OF 43
Quantity Summary				

Compacted Fill, Class A

Dam embankment	+	2,500 C.Y.
" cutoff trench	+	640
Principal Spillway backfill (= excav. - drain fill)	+	340
	−	98 (drain fill)
Dam - Drain Fill above fdn. line	−	9
Dike embankment	+	15,048
" cutoff trench		814
Dike - Drain Fill above fdn. line	−	88
Connecting Culvert backfill (- excav.)	+	193
Net =		19,340 C.Y.

Drain Fill

Dam - drain	170 C.Y.
Dike - drain	241
Outlet Basin & Channel	36
Under riprap - face of dam	44
Total =	491 C.Y.

Riprap - Hand placed

Outlet Basin & Channel	152 C.Y.
Connecting Culvert	31
Face of dam	169
End of Outlets	5
Total =	357 C.Y.

COMPUTATION SHEET
SCS-523 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

GPO 1958 O-470867

STATE		PROJECT		
Conn.		Spaulding Pond Brook Site 2		
BY	DATE	CHECKED BY	DATE	JOB NO.
WHL	2/8/66			CN-425-2
SUBJECT				SHEET 2 OF 12
Quantity Summary - cont'd.				

Excavation Common

Dam Foundation	996 C.Y.
" Cutoff	640
Principal Spillway	546
Dam Seepage Drain	61
Outlet Basin & Channel	950
Dike Foundation	2,972
" Cutoff	814
" Seepage Drain	132
Connecting Culvert Ditch	857
Error	193
Total	6,165 C.Y.

Excavation Rock

Prin. Spwy. & Outlet Channel	34 C.Y.
Dam Boulder estimate	30
Dike "	60
Diversion " "	20
	144
	SAY 150 C.Y.

COMPUTATION SHEET
SCS-523 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

GPO 1958 O-470867

STATE		PROJECT		
BY	DATE	CHECKED BY	DATE	JOB NO.
SUBJECT				SHEET 3 OF 43

Quantity Summary - cont'd.

Clearing and Grubbing

Dam & emergency spwy. area -

Dike areas

Diversion (incl. borrow & waste)

Clearing, Class A

Diversion Area No. 1

" " No. 2

APPENDIX C

PHOTOGRAPHS