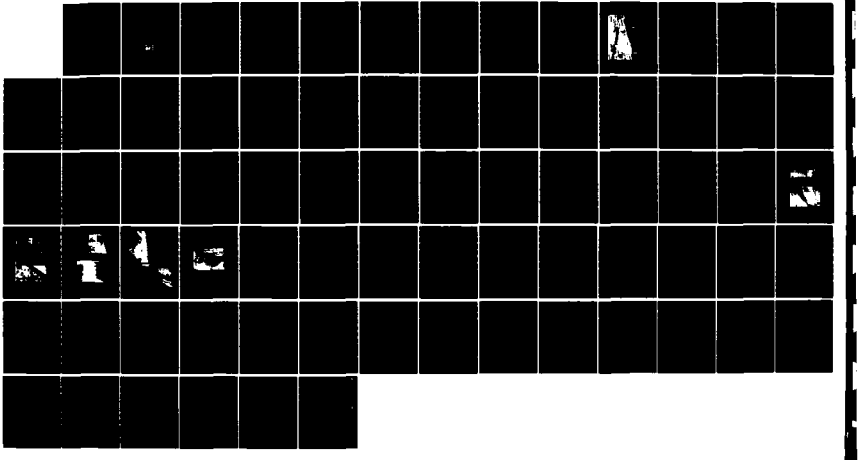
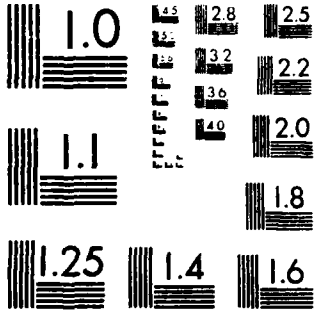
AD-A143 732 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 1/1
TRADING COVE POND DAM..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV JUN 81

UNCLASSIFIED F/G 13/13 NL

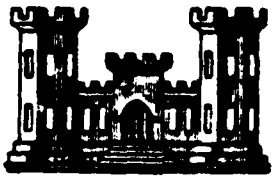




LOWER THAMES RIVER BASIN
NORWICH, CONNECTICUT

TRADING COVE POND DAM
CT 00237

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 00237	2. GOVT ACCESSION NO. AD A143732	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Trading Cove Pond Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE June 1981 13. NUMBER OF PAGES 50
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,

Lower Thames River Basin
Norwich, Conn.

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

Trading Cove Dam is an earth embankment dam with vertical masonry walls along the upstream crest. The dam is 230 feet long and 29 feet high as measured above the stream bed. As a result of the visual inspection and hydrologic and hydraulic computations, the dam is considered to be in FAIR condition. The dam is classified as SMALL in size and as having a LOW hazard potential, in accordance with the recommended guidelines established by the Corps of Engineers. The storage capacity at the top of the dam is 500 acre feet.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Name of Dam:	Trading Cove Pond Dam
Identification No.:	CT 00237
Town:	Norwich and Montville
County and State:	New London, Connecticut
Stream:	Trading Cove
Owner:	Daniel Griffin & State of Connecticut
Date of Inspection:	8 April 1981

BRIEF ASSESSMENT

Trading Cove Dam is an earth embankment dam with vertical masonry walls along the upstream crest. State Route 32 runs along this crest, which is 54 feet wide. The dam is 230 feet long and 29 feet high as measured above the stream bed. Along the upstream side of the crest there is a masonry wall on both sides of the spillway, varying in both length and height. From the base of these walls the earth embankment slopes down to the water line established by the crest elevation of the spillway. The spillway, which is located near the approximate center of the dam, discharges its flow directly into a culvert which passes through the dam. The distance from the spillway crest to the entrance of the culvert is about 3 feet. The culvert consists of a concrete box and masonry structure which is 16 feet wide and 15.5 feet high.

The outlet works, located near the left abutment of the dam, consists of a square concrete opening from which the grate has been removed. There is no controlling gate mechanism for this outlet and its discharge point on the downstream slope of the dam has been blocked by riprap. Some water still passes through this opening and is then discharged into a tail race channel. The end of the channel has been blocked but a small opening in the tail race wall provides an outlet to the streambed near the downstream toe of the dam.

The dam presently serves no purpose other than to provide a means of crossing Trading Cove Brook with State Route 32

which passes over the crest of the dam. Very little is known about the history of the dam, other than the fact than a downstream mill, which was demolished in 1976, probably used the dam for the generation of mechanical power. It is apparent from the concrete construction within the culvert that when Route 32 was widened to support about four lanes of traffic, the dam was expanded by additions on both the upstream and downstream sides.

As a result of the visual inspection and hydrologic and hydraulic computations, the dam is considered to be in FAIR condition. To assure the long term performance of this structure, a few items of concern require attention. The erosion of the downstream slope near the spillway walls must be repaired, tree and brush growth on both slopes must be cleared, the upstream wall should be regrouted and a trash rack and gate mechanism should be installed at the outlet structure.

The dam is classified as SMALL in size and as having a LOW hazard potential, in accordance with the recommended guidelines established by the Corps of Engineers. The storage capacity at the top of the dam is 500 acre feet.

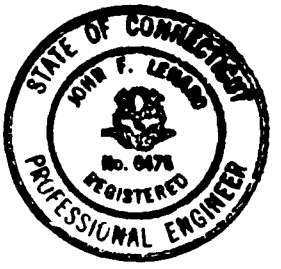
The test flood for this dam is the 100-year flood, which for purposes of calculation has been approximated by 25% of the Probable Maximum Flood. This test flood has a peak inflow of 4,800 cfs and an outflow discharge of 4,500 cfs. The maximum outflow capacity of the spillway before overtopping occurs is 2,300 cfs, which represents approximately 51 percent of the test flood outflow.

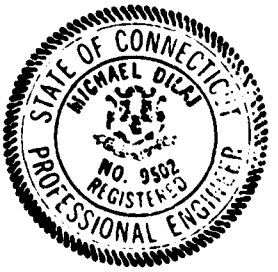
It should be noted that during the final review process the hazard classification for Trading Cove Pond Dam was changed from high to low. For this reason, the report is basically complete.

LENARD & DILAJ ENGINEERING, INC.

By: John F Lenard
John F. Lenard, P.E., President

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





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.

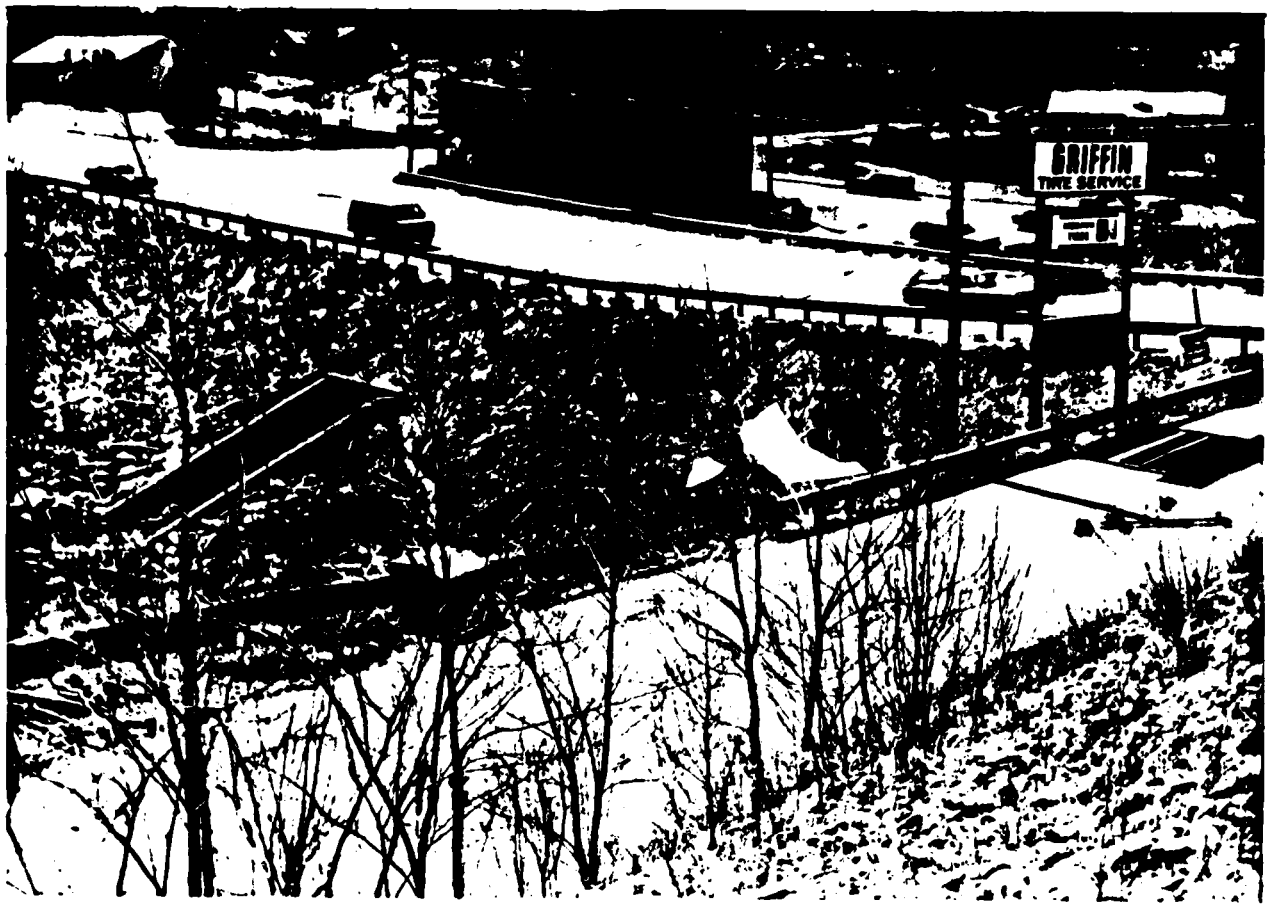
It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the 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

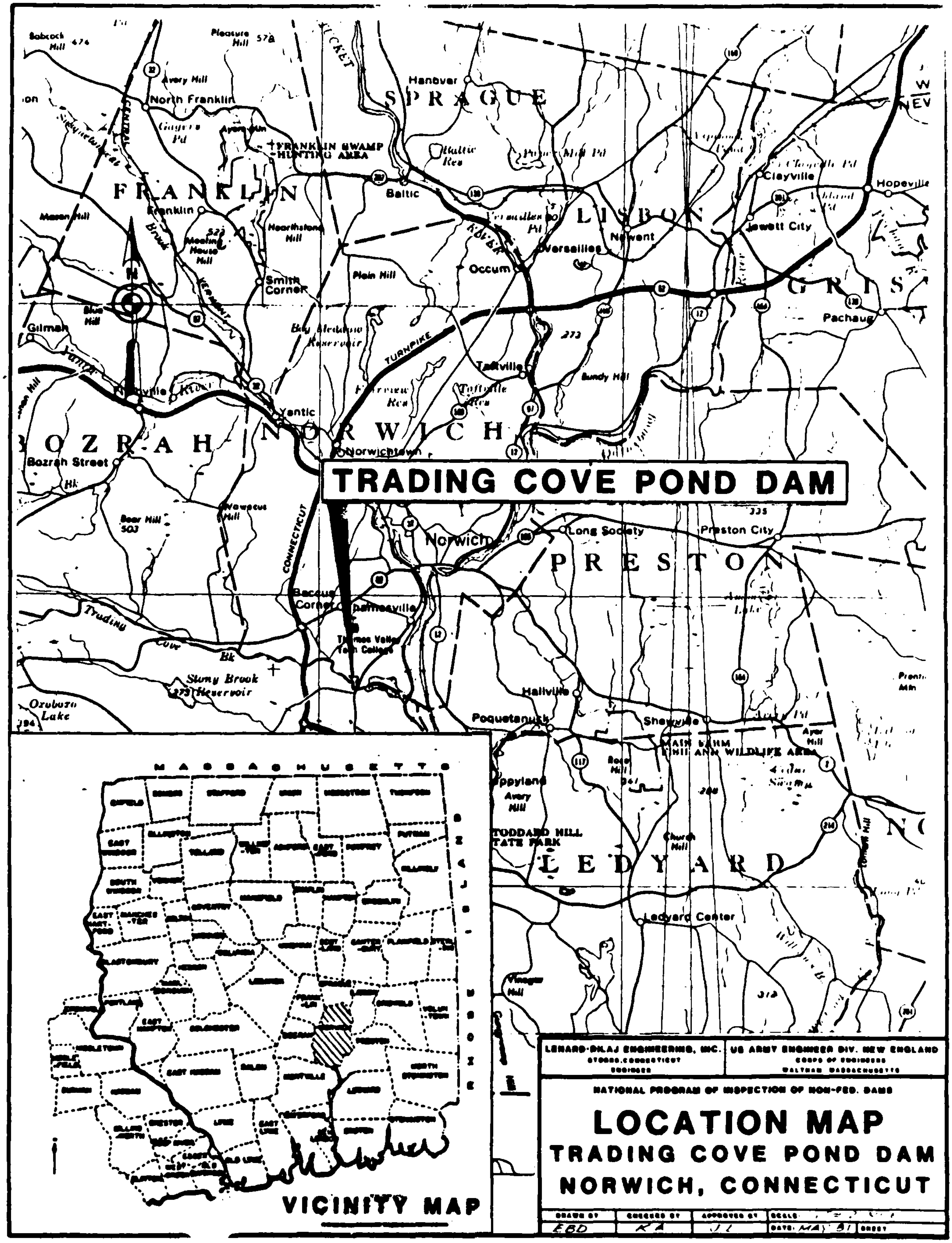
APPENDICES



OVERVIEW PHOTO

TAKEN 8 APRIL 1981

	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	TRADING COVE DAM NORWICH, CONNECTICUT CT 00237 MAY 1981	


TRADING COVE POND DAM
FRANKLIN
SPRAGUE
LISBON
BOZRAH
NORWICH
PRESTON
LEDYARD
North Franklin
Franklin
Hanover
Baltic
Clayville
Hopeville
Jewett City
Newent
Versailles
Occum
Smith Corner
Taftville
Yantic
Norwichtown
Norwich
Bozrah Street
Long Society
Preston City
Pachaug
Bacous Corner
Thamesville
Hallville
Poquetanuck
Shewville
Ledyard Center
Avery Hill
Pleasure Hill
Blue Hill
Gilman
Bundy Hill
Bear Hill
Wawecus Hill
Plain Hill
Hearthstone Hill
Meeting House Hill
Church Hill
Vinegar Hill
Trading Cove Bk
Stony Brook Reservoir
Oxoboxo Lake
Bog Meadow Reservoir
TURNPIKE
CONNECTICUT
FRANKLIN SWAMP HUNTING AREA
STODDARD HILL STATE PARK
MASSACHUSETTS
VICINITY MAP
LENARD-DILAJ ENGINEERING, INC.
US ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
LOCATION MAP
TRADING COVE POND DAM
NORWICH, CONNECTICUT
DRAWN BY
CHECKED BY
APPROVED BY
SCALE
DATE
SHEET
EBD
KA

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 furthur study.

1.2 Description of the Project:

a. Location: The project is located on Trading Cove Brook, a tributary to the Thames River which is approximately 5,000 feet downstream of the dam. Route 32 passes over the crest of the dam, and the town line for Norwich and Montville passes through the center of both Trading Cove Pond and the dam (perpendicular to Route 32). Both towns are located in New London County. The facility is shown on the Uncasville USGS quadrangle map, having coordinates 41° 29' 41" (north latitude) and 72° 06' 01" (west longitude).

b. Description of Dam and Appurtenances: The dam at Trading Cove Pond is an earth embankment dam, approximately 230 feet long and 29 feet high, with an average crest width of 54 feet. From observations of the site, it is suspected that there is an existing masonry dam within the outer earth embankment structure. State Route 32 runs along the crest of the dam, which is paved along its entire width. Along the upstream side of the dam there are portions of masonry wall, some of which have been gunited along the left side of the spillway. The remaining part of the upstream side of the dam is earth fill with a very irregular surface, ranging from 1.5H:1V to 2H:1V in slope. The downstream slope of the dam is an earth embankment with a slope of 2H:1V. It has the spillway discharge channel exiting at its center.

The spillway is located at the center of the dam along the upstream side and is an ashlar masonry structure with a flashboard permanently attached. The discharge channel from the spillway crosses beneath the dam in the form of a box culvert 16 feet wide and 15.5 feet high. The culvert is constructed of reinforced concrete and stone masonry. The masonry portion is located in

the approximate center of the culvert and may coincide with what was thought to be the original masonry dam. The spillway is 29 feet long and about 10 feet high. The flashboard is 6 inches in height. The spillway channel on the downstream side of the dam is the natural streambed. Tail water in the spillway channel is controlled by the level of Trading Cove, which is adjacent to the Thames River. The Thames River and Trading Cove are subject to tidal fluctuations.

An intake structure is located near the left abutment of the dam. From the entrance, the channel appeared to be a concrete box culvert. Because it was partially blocked no inspection could be made of its interior from the upstream or downstream sides. The downstream exit of the untake structure channel is blocked by large riprap piled up against its face. At the exit of this channel, there is a tail race which runs towards the location of the former mill building. The race is now permanently blocked off at its furthest downstream point. Along the left downstream toe of the dam, there is a discharge pipe from the tail race channel to the main stream.

c. Size Classification: SMALL - With the pool level at the top of the dam, the impoundment capacity is 500 acre feet. The dam's height above the streambed is 29 feet. In accordance with the guidelines of the Corps of Engineers, which state that a dam less than 39 feet in height and with a storage of 50 to 999 acre feet is small, the dam is classified as being SMALL.

d. Hazard Classification: LOW - The dam is classified as having a LOW hazard potential because no loss of life and minimal economic loss are expected. A tire sales outlet is located downstream of the dam, but discharge from the failure of the spillway is not expected to reach the sill elevation of the building even when failed in conjunction with high tide in the Thames River estuary. Because of its width, the dam was not considered as a likely possibility for failure. Only the spillway portion was therefore subjected to a failure analysis, with water level at the spillway crest elevation.

e. Ownership: Ownership and responsibility for the upkeep of the dam were difficult to determine. From available records it appear that the State of Connecticut owns between the highway lines of Route 32, which runs along the crest of the dam, while Daniel Griffin owns portions of the dam beyond those lines. The deed for the Griffin property indicates that water rights and control of the

outlet structures are under the ownership of Daniel Griffin of Griffin Tire Service, Inc., 812 West Thames Street, Norwich, Connecticut, 06360, telephone no. (203 889-2315).

f. Operator: The roadway along the crest of the dam and the appurtenant drainage is maintained by the Department of Transportation, State of Connecticut. The dam embankments and appurtenant facilities not on State property are presently not operated and there are no operational procedures in effect.

g. Purpose of Dam: The dam was originally constructed for mechanical power generation. The mill located downstream from the facility was demolished in 1976. At the present time there is no use for the water in Trading Cove Pond, and the dam serves no purpose other than to provide a means of crossing Trading Cove Brook with State Route 32.

h. Design and Construction History: Nothing is known about the original construction of the dam. The State of Connecticut Department of Transportation, however, later improved this dam and built State Route 32 along the crest. Inspection of the spillway channel crossing the dam indicates that the center one-third portion of the dam was probably the original structure. Both on the upstream and downstream slopes, indications are that the dam was extended for the purpose of widening Route 32. The original mill was demolished in 1976 when the Griffin Tire Service, Inc. purchased the site.

i. Normal Operating Procedures: There is no operational procedure at this facility.

1.3 Pertinent Data:

a. Drainage Area: Trading Cove Pond and its drainage area are located in New London County in the southeastern portion of the State of Connecticut. The basin is somewhat rectangular in shape with a longitudinal east-west axis of approximately 6 miles and a width of 3 miles. The total drainage area is 13.3 square miles in size. The topography is characterized by hilly terrain, with elevations ranging from a high of 519 feet in the northwesterly portion of the watershed to a low of 14 feet at the elevation of the spillway at Trading Cove Pond Dam. Basin slopes are generally moderate. The character of the area is generally rural with some densely populated areas near the urban area of Norwich in the northeasterly portion of the watershed. No signigicant

wetlands or other storage areas exist in the watershed to retard the peak of the surface runoff. A map of the watershed area is attached in Appendix D of this report.

b. Discharge at Dam Site: No records of spillway or outlet works discharges are available for this site. Listed below are calculated discharge data for the spillway.The outlet works, because it is blocked, was not considered in the calculations:

1.	Outlet works:	Inoperative (Dimensions unknown)
2.	Maximum known flood at dam site:	Discharge unknown.
3.	Ungated spillway capacity at top of dam:	2,300 cfs at Elev.32.1
4.	Ungated spillway capacity at test flood elevation:	2,500 cfs at Elev.34.4
5.	Gated spillway capacity at normal pool elevation:	N/A
6.	Gated spillway capacity at test flood elevation:	N/A
7.	Total spillway capacity at test flood elevation:	2,500 cfs at Elev.34.4
8.	Total project discharge at top of dam:	2,300 cfs at Elev.32.1
9.	Total project discharge at test flood elevation:	4,500 cfs at Elev.34.4

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

1.	Streambed at toe of dam:	3.1
2.	Bottom of cutoff:	Unknown
3.	Maximum tail water:	Unknown
4.	Normal pool:	13.8
5.	Full flood control pool:	N/A
6.	Spillway crest:	13.8
7.	Design surcharge (original design):	Unknown

8.	Top of dam:	32.1
9.	Test flood surcharge:	34.4

d. Reservoir (length in feet):

1.	Normal pool:	900
2.	Flood control pool:	N/A
3.	Spillway crest pool:	900
4.	Top of dam:	6,400
5.	Test flood pool:	7,000

e. Storage (acre feet):

1.	Normal pool:	20
2.	Flood control pool:	N/A
3.	Spillway crest pool:	20
4.	Top of dam:	500
5.	Test flood pool:	600

f. Reservoir Surface (acres):

1.	Normal pool:	4
2.	Flood control pool:	N/A
3.	Spillway crest:	4
4.	Test flood pool:	62
5.	Top of dam:	52

g. Dam:

1.	Type:	Earth embankment with some upstream vertical masonry walls
2.	Length:	230 feet
3.	Height:	29 feet
4.	Top width:	54 feet

5.	Side slopes:	Downstream 3H:1V Upstream - Irregular, 1½-2H:1V with vertical masonry walls
6.	Zoning:	Unknown
7.	Impervious core:	Unknown
8.	Cutoff:	Unknown
9.	Grout curtain:	Unknown

h. Diversion and Regulating Tunnel: N/A

i. Spillway:

1.	Type:	Masonry with flashboard Ogee type weir
2.	Length of weir:	22 feet
3.	Crest elevation (with permanent flashboard):	13.8 feet
4.	Gates:	None
5.	U/S channel:	Natural bed
6.	D/S channel:	Natural bed

j. Regulating Outlets: Culvert through dam; exact characteristics and dimensions could not be determined.

SECTION 2

ENGINEERING DATA

2.1 Design: There is very little known about the design of the dam. It was constructed for mechanical power generation for a downstream mill, probably during the middle of the nineteenth century. The mill structure was demolished in 1978. Plans for the original construction were not available. During the reconstruction of Route 32 the dam was improved and an addition was made on both the upstream and downstream sides. The original part of the dam can be seen in the existing culvert, where it covers approximately the center third. (Refer to Photo 6).

2.2 Construction: Nothing is known about the construction of the original dam. Indications are that it was constructed during the middle of the nineteenth century, but no more definite information is available. Later additions were made for the improvement of Route 32 which runs along the crest of the old dam. Recently, further improvements were made to alleviate drainage problems.

2.3 Operation: The dam was originally constructed for mechanical power generation. Presently, it serves to pass State Route 32 over Trading Cove Brook. Since the demolition of the mill building, the tail race of the dam was reconnected to the original stream channel. There are no operational procedures in effect at the site and no records of past operations were found to be available.

2.4 Evaluation:

a. Availability: The facility is available for visual inspection since it serves as a roadbed for a state highway. All accessible operating parts of the facility were inspected. No plans or other design information were found to be available.

b. Adequacy: The limited amount of data available was inadequate to perform an in-depth assessment of the dam and appurtenant facilities. Therefore, the final assessment of this dam must be based primarily on visual inspection and hydraulic and hydrologic computations of spillway and outlet capacity

c. Validity: Due to the lack of available data, the conclusions found in this report are based on visual inspection and hydraulic and hydrologic computations.

SECTION 3

VISUAL INSPECTION

3.1 Findings:

a. General: An inspection of Trading Cove Dam was performed on April 8, 1981 by Lenard & Dilaj Engineering, Inc. with the assistance of Geotechnical Engineers, Inc. The weather was sunny and the temperature was about 65°. At the time of inspection, the water level in the pond was about 6 inches above the top of the flashboards of the spillway.

As a result of the visual inspection, the Trading Cove Dam and its appurtenances were found to be in fair condition.

b. Dam: The dam is an earth embankment dam with a 54 foot wide crest. Route 32 runs along the crest of the dam. The upstream section consists of an ashlar masonry wall, partially gunited, with the lower part being an earth slope. The downstream section is a 2H:1V earth slope.

1. Crest: The entire crest of the dam is paved and constitutes Route 32. The downstream side of the crest is lower because there is a curve in the road with a super-elevation on the upstream end. No cracks of significance were observed on the pavement.

2. Upstream Slope: The upstream slope of the dam consists of an ashlar masonry wall near the crest and an earth embankment on the lower part of the slope (see Photo 1). Part of the wall on the left side of the spillway has been gunited. Some of the gunited areas near the spillway have begun to show signs of spalling, as seen in Photo 1. To the right of the spillway there are areas which have mortar missing from between the stone blocks. Earth fill has been placed against the lower part of this wall, but the fill has a very irregular surface and an extensive growth of small trees. The retaining wall just to the left of the spillway has also been gunited and has had PVC drain pipes installed about 2 to 3 feet into it.

3. Downstream Slope: The downstream side of the dam has a slope of about 2H:1V. It is basically a

grass slope with some brush and small trees (up to a trunk diameter of 3 inches) growing on it (Photo 3). There are some footpaths along the slope which have resulted in erosion, particularly near the wing walls of the outlet channel to the spillway, as seen in Photos 3 and 4. The erosion here is as deep as 2 feet along the right side of the structure. No seepage or sloughing of the embankment was observed along any of the downstream areas. The lower part of the slope is protected against tail water erosion by riprap which extends about 10 feet up the slope in the vicinity of the wing walls of the outlet structure.

c. Appurtenant Structures: The appurtenant structures for this dam are the spillway located near the center of the dam and an outlet structure with a tail race channel near the left abutment.

1. Spillway: The spillway consists of an ashlar masonry structure with flashboards (Photo 2) and training walls on both sides (Photo 1). The spillway discharge channel passes through the dam. The upstream and downstream sections of the channel are a concrete box structure, while the central section has ashlar masonry walls and a concrete slab roof (Photo 6). There are drain holes in the downstream section of the channel and both the concrete and ashlar masonry appear in good condition. There was no flow observed coming out of the drain holes along the masonry or concrete walls. Minor efflorescence and evidence of seepage were observed on the masonry walls.

2. Outlet Structure and Tail Race Channel: The intake is located near the left abutment. The concrete is in good condition (Photo 5), but there is no gate, and the trash rack has been removed and lies at the bottom of the entrance channel. The conduit through the dam is, at its upstream end,a concrete box (Photo 5). The conduit then turns to the left at a right angle. The nature of the channel from this point could not be observed or otherwise determined. At the downstream side of the dam, the conduit could not be observed, because it was covered with stones. The water flows up through the stones (photo 7), and then continues into a tail race channel. The tail race channel has a natural earth embankment on its left side and a concrete wall on its right. The right side of

this wall has an earth embankment placed against it as shown on Photos 7 and 8. About 20 feet downstream of the conduit outlet, there is a pipe with the gate removed that conveys the flow to the downstream spillway channel (Photos 7 and 8). The concrete wall of the tail race channel is cracked and shows displacements across the cracks of up to about one inch (Photo 8). The earth embankment behind the wall is overgrown with brush and has an irregular surface (Photo 8).

d. Reservoir Area: There is considerable siltation in the reservoir reaching the spillway crest. There is a building and a parking area at the reservoir edge immediately upstream of the right section of the dam. If the water level were to reach the crest of the dam, the parking lot and building would be flooded with a few feet of water.

e. Downstream Channel: The downstream channel is the natural streambed. There is a tail water controlled by the level of the Thames River, but there are no significant obstructions to the flow.

3.2 Evaluation: On the basis of the visual inspection, the dam and its appurtenant structures are judged to be in fair condition. This assessment is based on the erosion on the downstream slope, on the tree and brush growth on both embankment slopes, on the missing grout and spalling of the upstream walls, and on the inoperative condition and blockage of the outlet structure near the left abutment.

The present configuration of the dam appears to be the result of substantial widening and raising of an earlier dam.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures:

a. General: The State of Connecticut owns the land and appurtenant structures of the dam between the highway lines of Route 32 which runs along the crest of the dam. Daniel Griffin owns the remaining portions of the dam and appurtenances beyond the highway lines. According to the deed, Griffin also has water rights in the pond and has control of the outlet structures on the dam controlling flow toward the original mill location. The State of Connecticut Department of Transportation has made improvements to the road and drainage facilities. However, there are no operational procedures in effect for the spillway or the outlet works by either the State or Daniel Griffin. Water level is maintained by a permanently set 6" high flashboard bolted to the spillway crest.

b. Description of Any Warning System in Effect: There is no emergency or contingency plan in effect at this facility.

4.2 Maintenance Procedures:

a. General: Maintenance of the spillway is provided by the Department of Transportation of the State of Connecticut. Further upstream or further downstream from where the state highway passes there is no maintenance provided.

b. Operating Facilities: The outlet works trash rack has been removed from its groove and is blocking the flow. There is no maintenance provided here.

4.3 Evaluation: Maintenance of the dam and appurtenant facilities appears to be limited to that required for the proper drainage along the state highway. Embankments should be maintained free of brush and trees so that inspections can be performed.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General: Trading Cove Dam is an earth embankment dam with some vertical masonry walls along the upstream side. It is about 230 feet long, 54 feet wide at the crest, and 29 feet high above the streambed. The spillway is located near the center of the dam, and about 3 feet away from the vertical wall which forms the entrance to the culvert which passes through the dam. The spillway most closely resembles an ogee type of weir, as shown by the sketches in the attached calculations of Appendix D. As water level continues to rise above the level of the spillway, the discharge was calculated as orifice flow, due to the presence of the culvert in close proximity to the crest. The additional discharge capacity which could be obtained from the outlet works near the left abutment was not considered because the outlet side of the structure appeared to be permanently blocked by stones placed in front of the opening. Any flow passing through the stones during a storm was considered to be insignificant. Also the nature of the passage through the dam could not be determined and its hydraulics not calculated.

The downstream channel of the dam first forms a small ponded area and then flows in a shallow stream down to Trading Cove, a tidal backwater of the Thames River. The distance from the dam to Trading Cove is approximately 800 feet.

The watershed covers an area of 13.3 square miles, all of which contributes directly to Trading Cove Pond. No other significant dams or impoundments are located within the watershed, and no substantial wetland areas exist which might add to the storage of storm water flows to decrease the peak outflows.

At spillway elevation, Trading Cove Pond has a storage capacity of approximately 20 acre feet. This increases to 500 acre feet at the top of the dam and to 600 acre feet at the test flood level.

5.2 Design Data: No design data was found to be available for Trading Cove Dam.

5.3 Experience Data: No records on past experience were found to be available for this site.

5.4 Test Flood Analysis: Based on the "Recommended Guidelines for Safety Inspection of Dams" the Trading Cove Dam is classified as SMALL in size and as having a LOW hazard potential. The test flood for these conditions ranges from the 50-year flood to the 100-year flood. Based on the size of the dam and the storage capacity, the 100-year flood 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 found to be 4,800 cfs (360 csm) and 4,500 cfs, respectively. As a basis of comparison, the PMF resulted in an inflow of 19,200 cfs and an outflow of 18,900 cfs. The outflow capacity of Trading Cove Dam at the level of the top of the dam is 2,300 cfs, which represents 51% of the test flood outflow. The maximum overtopping associated with this outflow is 2 feet. The assumed pool elevation at the beginning of the test flood routing is 13.8 feet, the spillway elevation.

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. Failure was assumed to occur when the water level in the pond was at the level of the crest of the spillway. Because of the crest width, the dam was not considered as a likely possibility for failure. Only the spillway portion was therefore subjected to a failure analysis.

Because the outlet works is partially blocked, an insignificant discharge was assumed prior to the failure of the dam. On the downstream side, however, the failure discharge was calculated in conjunction with high tide elevation in the Trading Cove portion of the Thames River tidal estuary. The calculated dam failure discharge, based on an assumed breach width of 22 feet (the width of the spillway), is 1,350 cfs. This will produce a depth of flow of approximately 4 feet in the vicinity of the tire outlet downstream of the dam. This level is not expected to reach the sill elevation of the building even when failure occurs in conjunction with high tide. Beyond the tire outlet there are no structures before the flow reaches Trading Cove. The analysis therefore covered a distance of 600 feet as shown by the calculations in Appendix D.

The breach of the spillway at Trading Cove Pond Dam is not expected to cause any loss of life and only minimal damage and economic loss to the tire outlet on the downstream side. Because flood depths are not expected to reach the sill elevation of the building, the dam is classified as having a LOW hazard potential.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations: The visual inspection did not disclose any evidence of structural instability.

6.2 Design and Construction Data: There was no design and construction data available to permit a formal evaluation of the stability of the dam.

6.3 Post Construction Changes: The construction of Route 32 apparently widened and raised an existing dam. In its present configuration, the crest is about 54 feet wide and the dam is a maximum of about 29 feet high.

6.4 Seismic Stability: The dam 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 are in fair condition. There are some items requiring maintenance to prevent deterioration of the dam:

1. Erosion of the downstream slope adjacent to the wing walls of the outlet structure for the spillway discharge channel.

2. Tree and brush growth on the upstream and downstream slopes.

3. Regrouting of the upstream wall.

4. The outlet structure, whose trash rack is not in place and whose discharge channel is blocked.

b. Adequacy of Information: There was no design or construction data available, and thus the assessment of the condition of the dam is based on the visual inspection and engineering judgment.

7.3 Remedial Measures:

a. Operating and Maintenance Procedures:

1. Repair the erosion adjacent to the wingwalls of the culvert on the downstream slope of the dam with crushed stone.

2. Remove small trees and brush growing on the slopes and within 20 feet of the toe, and develop protection against erosion with grass or riprap.

3. Regrout the upstream ashlar masonry wall and repair the gunited section.

4. Reinstall the trash rack removed from the outlet works and clean the general area around it.

5. Establish a program of annual technical inspections by a registered professional engineer.

6. Implement and intensify a program of diligent and periodic maintenance including, but not limited to, mowing brush on slopes, backfilling animal burrows with suitable well tamped material, and cleaning debris from spillway and slopes.

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

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT *TRADING COVE DAM*

DATE *April 8, 1981*

TIME *12:30-2:30 pm*

WEATHER *Sunny, 65°*

W.S. ELEV. *6 inches* U.S. ____ DN.S.
above flashboards

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 - L.D.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 *TRADING COVE DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	*32.1*
Current Pool Elevation	*13.8, 6 inches above flashboards*
Maximum Impoundment to Date	*Unknown.*
Surface Cracks	*None observed.*
Pavement Condition	*Good.*
Movement or Settlement of Crest	*None observed.*
Lateral Movement	*None observed.*
Vertical Alignment	*Downstream side of crest is lower than upstream side because of superelevation of road.*
Horizontal Alignment	*Too irregular to judge.*
Condition at Abutment and at Concrete Structures	*Erosion gullies on downstream slope along spillway walls.*
Indications of Movement of Structural Items on Slopes	*Not applicable.*
Trespassing on Slopes	*Footpaths, some erosion.*
Sloughing or Erosion of Slopes or Abutments	*None observed.*
Rock Slope Protection - Riprap Failures	*No protection of upstream slope. Riprap at spillway outlet and at toe of downstream slope.*
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	*None known or observed.*
Toe Drains	*None known or observed.*
Instrumentation System	*None known or observed.*
Vegetation	*Numerous trees and brush on upstream slope. A few trees up to 3 inches on downstream slope.*

PERIODIC INSPECTION CHECKLIST

PROJECT *TRADING COVE DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	*Tailrace channel (to dam). Side wall is an earth dike with an upstream concrete wall.*
Crest Elevation	*Practically no water in channel.*
Current Pool Elevation	
Maximum Impoundment to Date	*Cracks on upstream concrete wall.*
Surface Cracks	*Not applicable.*
Pavement Condition	*None observed.*
Movement or Settlement of Crest	*Noted ~1 inch across cracks in concrete.*
Lateral Movement	*Good.*
Vertical Alignment	*Cracked. As built alignment is curved.*
Horizontal Alignment	*Not applicable.*
Condition at Abutment and at Concrete Structures	*Not applicable.*
Indications of Movement of Structural Items on Slopes	*Footpaths.*
Trespassing on Slopes	*None observed.*
Sloughing or Erosion of Slopes or Abutments	*Riprap recently installed at pipe outlet (downstream side of dike).*
Rock Slope Protection - Riprap Failures	*None observed.*
Unusual Movement or Cracking at or Near Toes	*None observed.*
Unusual Embankment or Downstream Seepage	*None observed.*
Piping or Boils	*None known.*
Foundation Drainage Features	*None known.*
Toe Drains	*None known.*
Instrumentation System	*Grass, few small trees.*
Vegetation	

PERIODIC INSPECTION CHECKLIST

PROJECT *TRADING COVE 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	*Reinforced concrete, ~5 ft. by 5 ft.*
Condition of Concrete	*Good.*
Stop Logs and Slots	*Trash rack out of place, in stream. Gate mechanism and gate missing.*

PERIODIC INSPECTION CHECKLIST

PROJECT *TRADING COVE DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	*There is no control tower.*
a. Concrete and Structural	
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
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 *TRADING COVE DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	*Not observable.*
General Condition of Concrete	
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECKLIST

PROJECT *TRADING COVE DAM* DATE *April 8, 1981*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	*Outlet channel is tailrace (to dam). See comments under dike embankment. Outlet is covered with stones. Pipe is not observable. Water surfacing through stones.*
General Condition of Concrete	
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	
Channel	
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	

PERIODIC INSPECTION CHECKLIST

PROJECT *TRADING COVE POND* 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	*Small training wall at right side only.*
General Condition of Concrete	*Ashlar masonry with gunite cover on left side and pointed joints on right side. Gunite in good condition; ∿30% to 40% of mortar is missing.*
Rust or Staining	*None observed.*
Spalling	*None observed.*
Any Visible Reinforcing	*None observed.*
Any Seepage or Efflorescence	*None observed.*
Drain Holes	*PVC pipes on left side, ∿2 to 3 feet deep.*
c. Discharge Channel	*Under dam, the natural stream channel.*
General Condition	*Good.*
Loose Rock Overhanging Channel	*None.*
Trees Overhanging Channel	*None.*
Floor of Channel	*Gravel.*
Other Obstructions	*None.*
Other Comments	

PERIODIC INSPECTION CHECKLIST

PROJECT *TRADING COVE 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

APPENDIX C

PHOTOGRAPHS

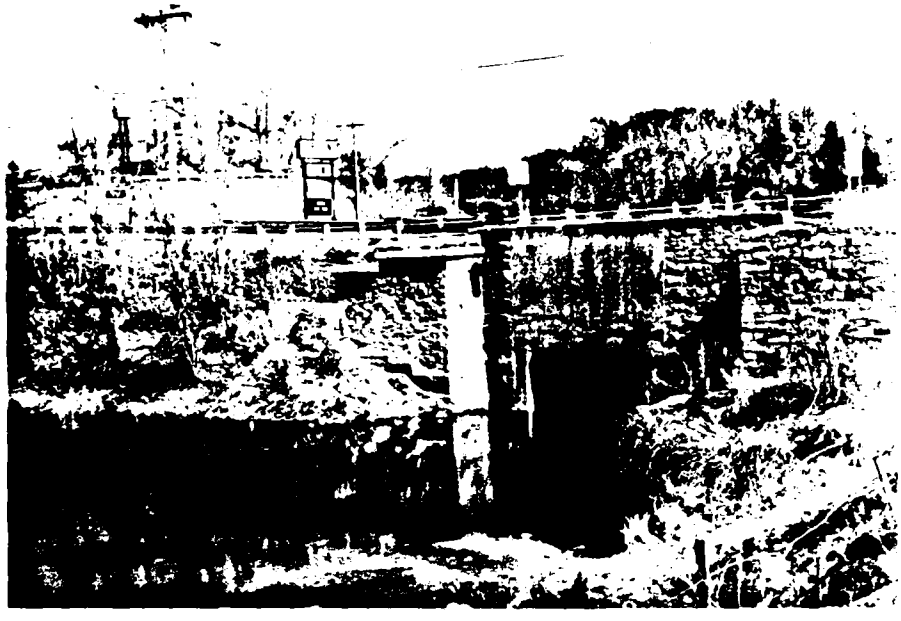


Photo 1. Upstream view of the dam from parking lot at edge of pond. Note cement bag retaining wall at left end of culvert embankment.

Photo 2. Spillway weir and flashboard at inlet of culvert.

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	TRADING COVE DAM NORWICH, CONNECTICUT CT 00237 MAY 1981 C-2
LENARD J. AJ ENGINEERING, INC. [illegible], CONNECTICUT ENGINEER		

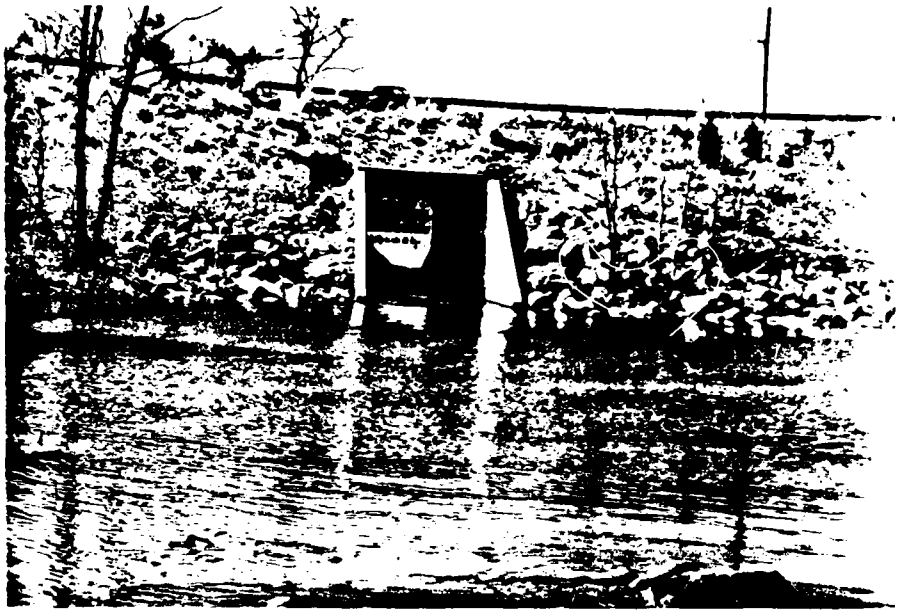


Photo 3. View of downstream slope of dam and spillway weir on upstream side (as viewed through the culvert). Note erosion along both wing walls of culvert outlet.

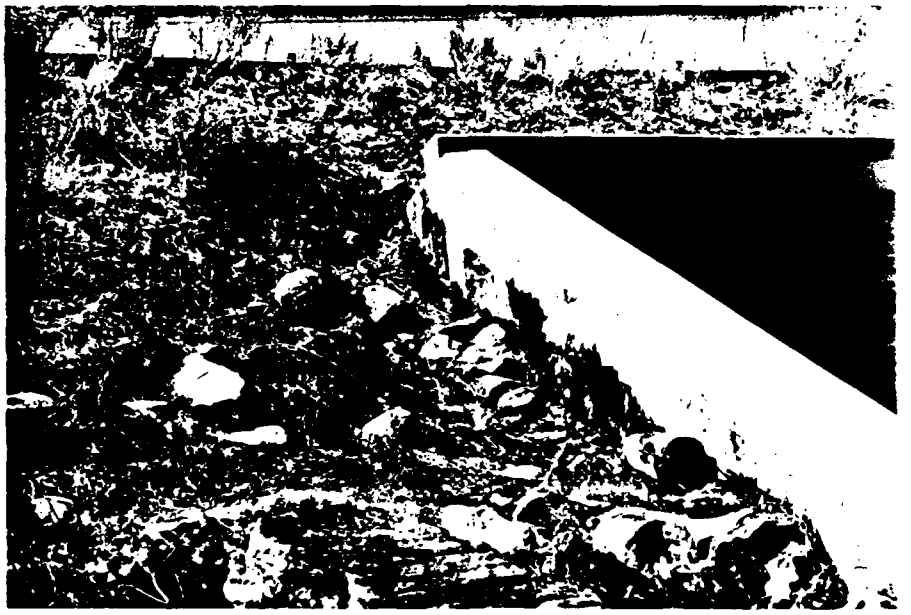


Photo 4. Closeup of erosion along the right wing wall of the culvert outlet.

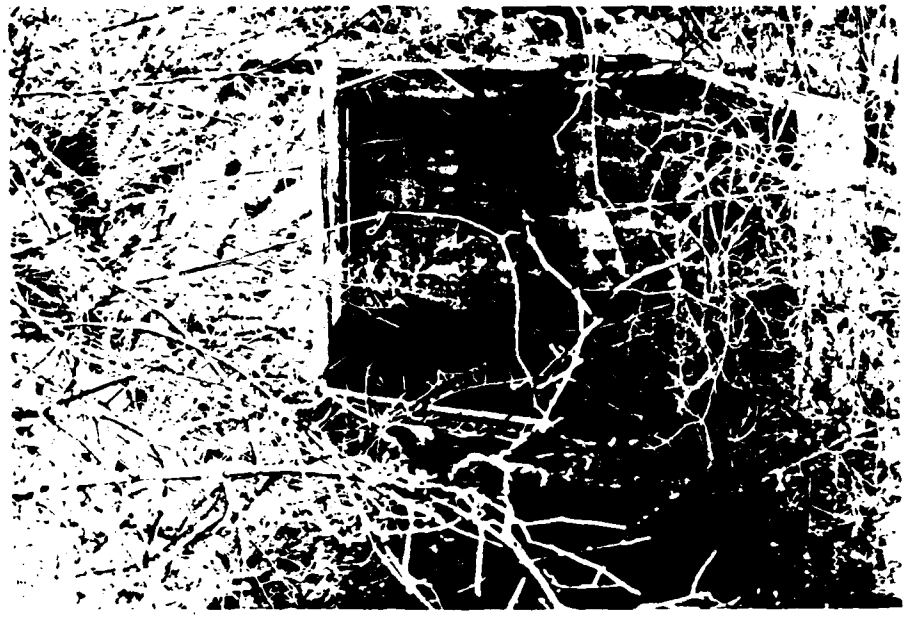


Photo 5. Intake structure near left abutment of dam. Note trash rack tilted towards the pond.

Photo 6. Spillway channel (culvert) through dam as seen from downstream end. Note stone masonry center portion of spillway channel, which probably indicates the size of the original dam.

Photo 7.

Tailrace channel for conduit passing through dam. Outlet is buried beneath the stones in the foreground. Note gate slot for discharge pipe from channel into main stream at right of photo on retaining wall.

Photo 8.

Downstream side of discharge pipe from tailrace channel. Note spalling of concrete wall.

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	TRADING COVE DAM NORWICH, CONNECTICUT CT 00237 MAY 1981 C-5

Photo 9. Downstream view of Griffin Tire Co. from toe of dam.

APPENDIX D

HYDROLOGIC AND HYDRAULIC

COMPUTATIONS

LENARD & DILAJ ENGINEERING, INC.
1065 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB TRADING COVE DAM
SHEET NO. 1 OF 1
CALCULATED BY K. A. DATE 7-6-81
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.	492 Ac.Ft.
	Height	25-39 Ft.	29 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 LOW

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 100-YEAR

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

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT 1
ROUTE HYDROGRAPH TO 2
END OF NETWORK

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

RUN DATED 08/30/91.
TIME 10.12.21.

TRADING COVE DAM MONTVILLE - NORWICH CONNECTICUT
80-27-11
MAY 1981 DESIGN STORM ---

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
150	0	30	0	0	0	0	0	4	0

JOPER	MUT	LROPT	ITRACE
5	0	0	0

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

RTIOS=	.10	.25	.30	.50	.80	1.00

****

SUB-AREA RUNOFF COMPUTATION

CALCULATION OF INFLOW HYDROGRAPH TO TRADING COVE POND

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	13.36	0.00	13.36	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	25.80	100.00	111.00	120.00	127.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .810

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= 5.04 CP= .63 NTA= 0

RECESSION DATA
STRTQ= -1.00 QRCSN= -.05 RTIOR= 1.00

UNIT HYDROGRAPH 56 END-OF-PERIOD ORDINATES, LAG= 5.05 HOURS, CP= .63 VOL= 1.00

33.	124.	251.	398.	556.	721.	870.	985.	1061.	1098.
1090.	1070.	918.	825.	741.	665.	598.	537.	482.	433.
389.	350.	314.	282.	253.	228.	205.	184.	165.	148.
133.	120.	107.	97.	87.	78.	70.	63.	56.	51.
46.	41.	37.	33.	30.	27.	24.	22.	19.	17.
15.	14.	13.	11.	10.	9.				

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	26.54	20.86	5.68	383715.
										(674.)	(530.)	(144.)	(10865.60)

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

HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH TRADING COVE DAM

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	-14.	-1

STAGE	14.00	15.00	17.00	19.00	20.00	22.00	24.00	26.00	30.00	32.10
	35.00	40.00								
FLOW	0.00	101.00	479.00	991.00	1155.00	1415.00	1634.00	1827.00	2162.00	2319.00
	2519.00	2831.00								
SURFACE AREA=	4.	11.	18.	25.	36.	45.	52.	56.	70.	85.
	105.									
CAPACITY=	0.	23.	66.	130.	252.	373.	470.	524.	712.	867.
	1057.									
ELEVATION=	14.	17.	20.	23.	27.	30.	32.	33.	36.	38.
	40.									

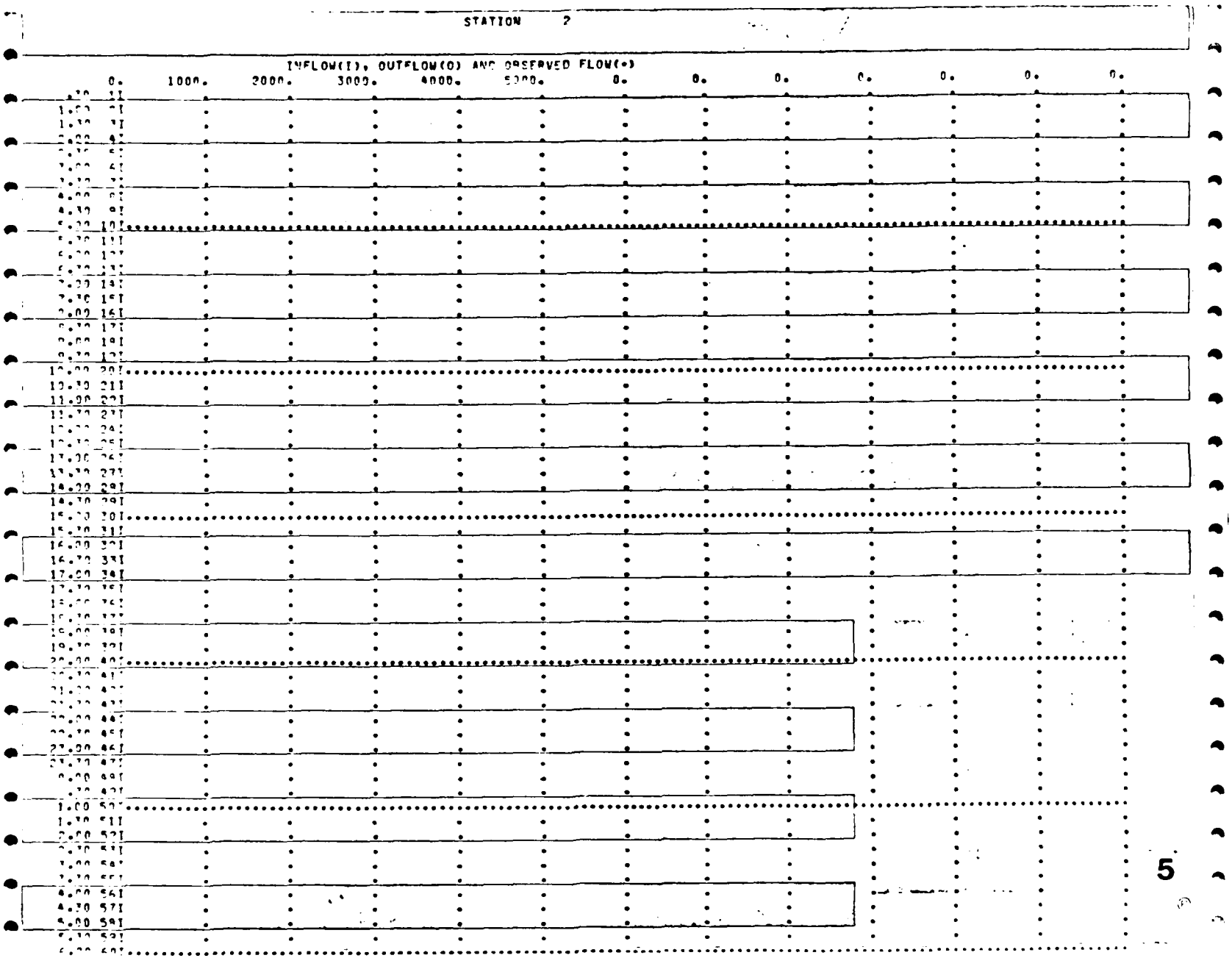
CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
13.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0

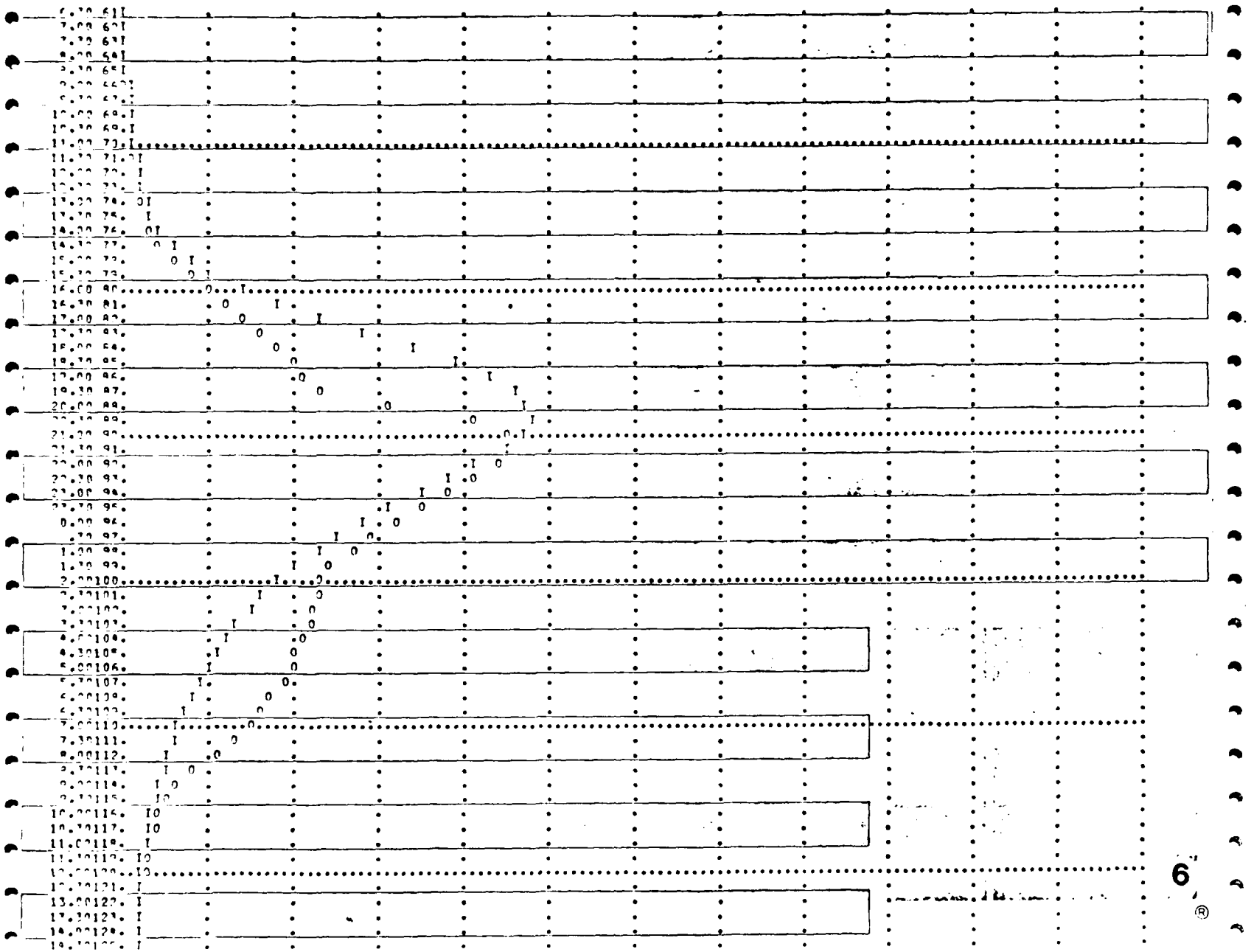
DAM DATA

TOPEL	COOD	EXPD	DAMWID
32.1	2.6	1.5	230.

CVN

PEAK OUTFLOW IS 4549. AT TIME 45.50 HOURS


STATION 2
INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
0. 1000. 2000. 3000. 4000. 5000. 0. 0. 0. 0. 0. 0. 0.



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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS					
				RATIO 1 .10	RATIO 2 .25	RATIO 3 .30	RATIO 4 .50	RATIO 5 .80	RATIO 6 1.00
HYDROGRAPH AT	1	13.36 (34.60)	1	1916. (54.26)(	4790. 135.65)(	5748. 162.78)(	9581. 271.29)(	15329. 434.07)(	19161. 542.59)(
ROUTED TO	2	13.36 (34.60)	1	1652. (46.78)(	4549. 128.82)(	5614. 158.96)(	9462. 267.98)(	15131. 428.46)(	18899. 535.04)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

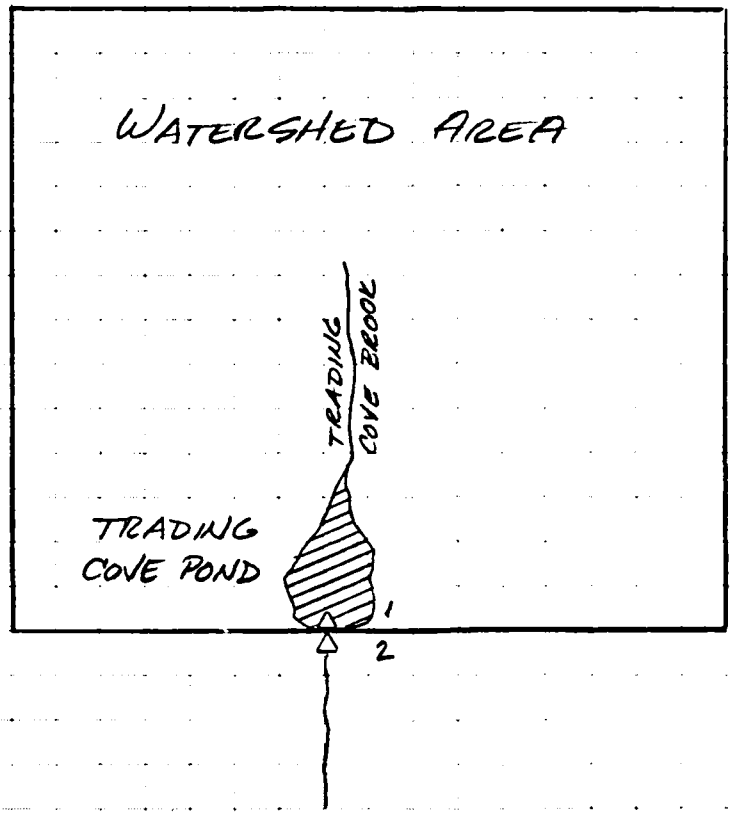
	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	17.80	17.80	32.10
STORAGE	0.	0.	475.
OUTFLOW	0.	0.	2319.

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	24.19	0.00	162.	1652.	0.00	46.00	0.00
.25	30.39	2.29	606.	4549.	6.00	45.50	0.00
.30	35.09	2.99	651.	5614.	8.00	45.00	0.00
.50	37.16	5.06	709.	9462.	11.50	45.00	0.00
.80	39.62	7.52	1017.	15131.	14.50	45.00	0.00
1.00	41.05	8.95	1172.	19895.	16.00	45.00	0.00

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

JOB TRADING COVE DAM
SHEET NO. 1 OF 8
CALCULATED BY K.A. DATE 5/1/81
CHECKED BY MR DATE 5/6/81
SCALE

SCHEMATIC



1- INFLOW TO TRADING COVE POND

2- OUTFLOW ROUTED THROUGH TRADING COVE DAM

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

JOB TRADING COVE DAM
SHEET NO 2 OF 8
CALCULATED BY K.A. DATE 5/1/01
CHECKED BY MR. DATE 5/6/01
SCALE

WATERSHED AREA

NORWICH QUAD:

1714 grads
1719 "
} 1717 grads ⇒ 2509 Ac. — 3.92 S.M.

UNCASVILLE QUAD:

325 grads
322 "
324 "
} 324 grads ⇒ 473 Ac. — 0.74 S.M.

MONTVILLE QUAD:

137 grads
137 "
} 137 grads ⇒ 200 Ac. — 0.31 S.M.

FITCHVILLE QUAD:

3664 grads
3653 "
3652 "
3663 "
} 3658 grads ⇒ 5345 Ac. — 8.35 S.M.

TOTAL WATERSHED — 13.32 S.M.

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

JOB TRADING COVE DAM

SHEET NO 3 OF 8

CALCULATED BY K.A. DATE 5/1/81

CHECKED BY M.R. DATE 5/6/81

SCALE

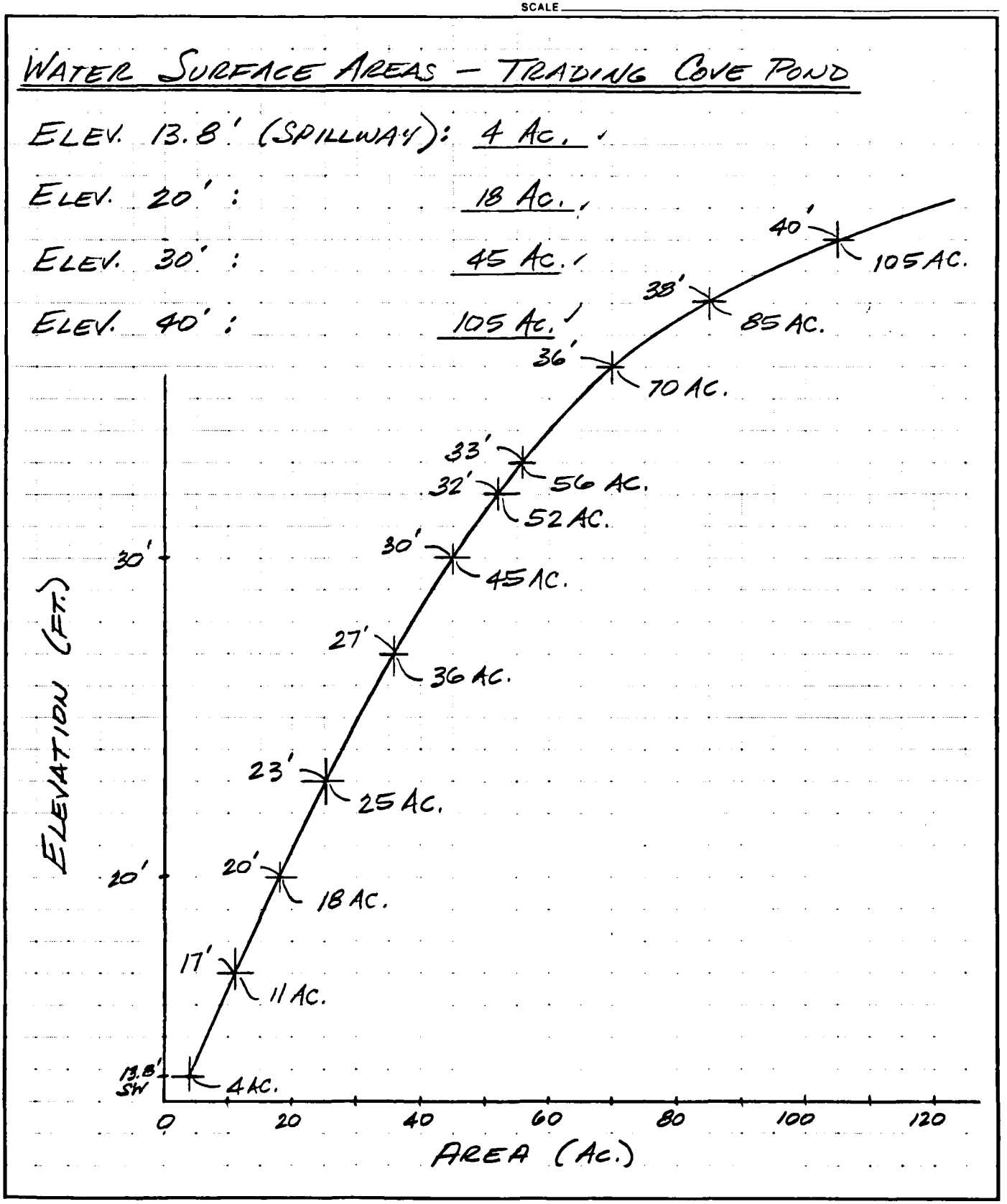
WATER SURFACE AREAS – TRADING COVE POND

ELEV. 13.8' (SPILLWAY): 4 Ac. ✓

ELEV. 20': 18 Ac. ✓

ELEV. 30': 45 Ac. ✓

ELEV. 40': 105 Ac. ✓



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

JOB TRADING COVE DAM
SHEET NO 4 OF 8
CALCULATED BY K.A. DATE 5/1/81
CHECKED BY M.R. DATE 5/6/81
SCALE

PRECIPITATION

U.S. WEATHER BUREAU
TECH. PAPER NO. 40

PMF 6-HOUR 25.8 INCHES

LAG TIME (SNYDER'S)

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

$C_t = 2.0$
$L = 37,500' = 7.10$ MI.
$L_{CA} = 16,150' = 3.06$ MI.

$$t_p = 2.0\left[(7.10)(3.06)\right]^{0.3}$$

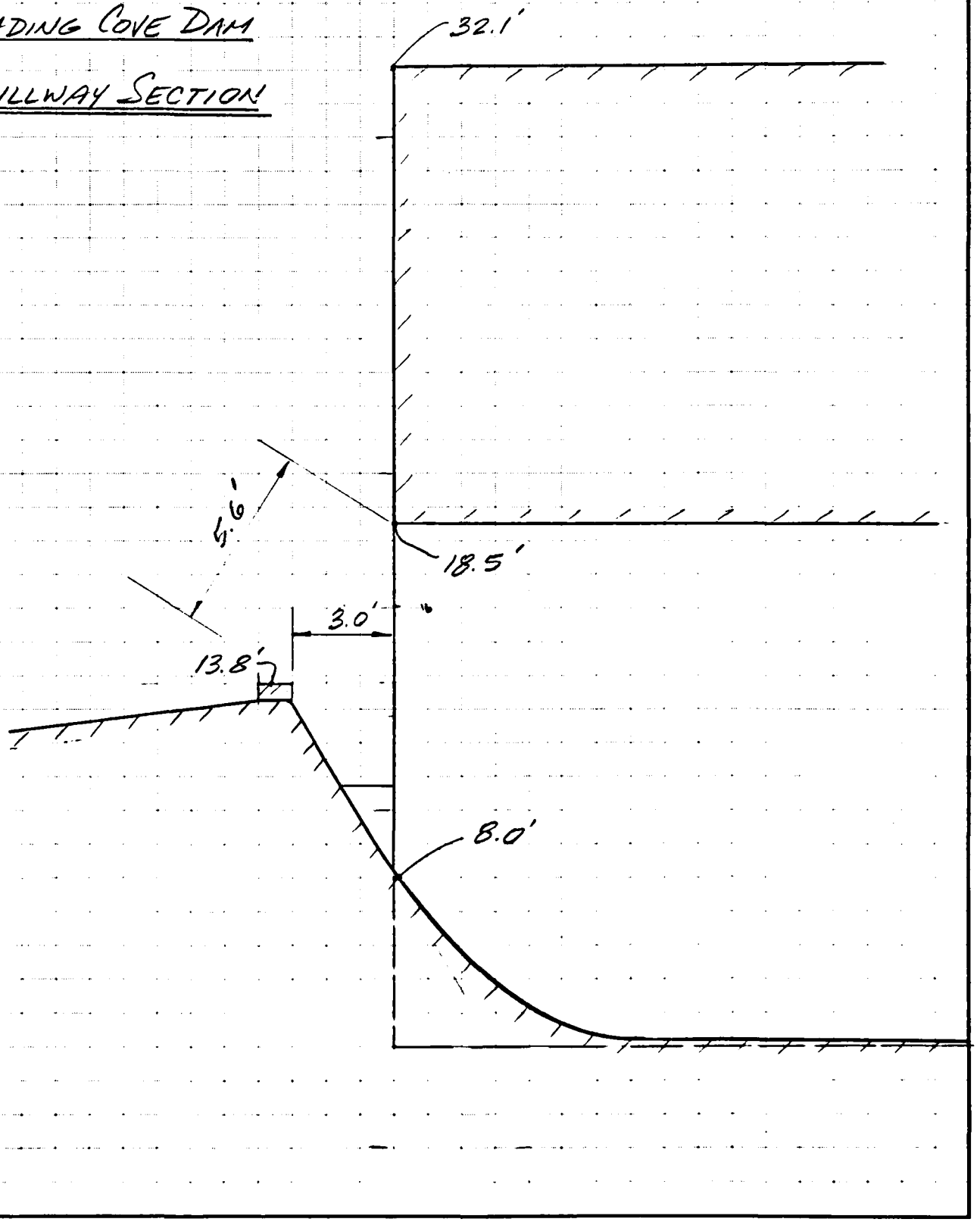
$t_p = 5.04$ HRS.

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

JOB TRADING COVE DAM
SHEET NO 5 OF 8
CALCULATED BY K.A. DATE 5/1/81
CHECKED BY MR DATE 5/6/81
SCALE 1"=4'

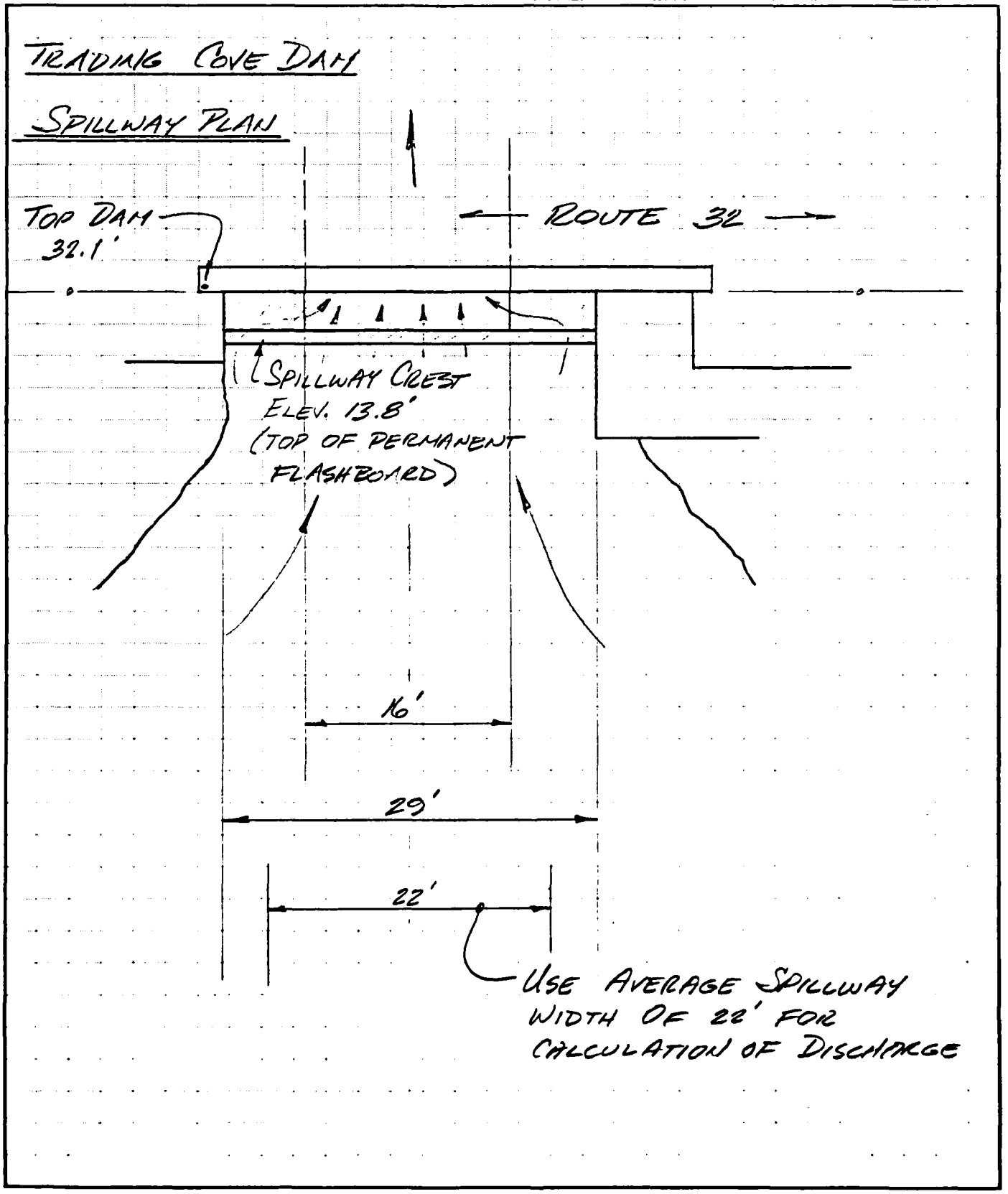
TRADING COVE DAM

SPILLWAY SECTION



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

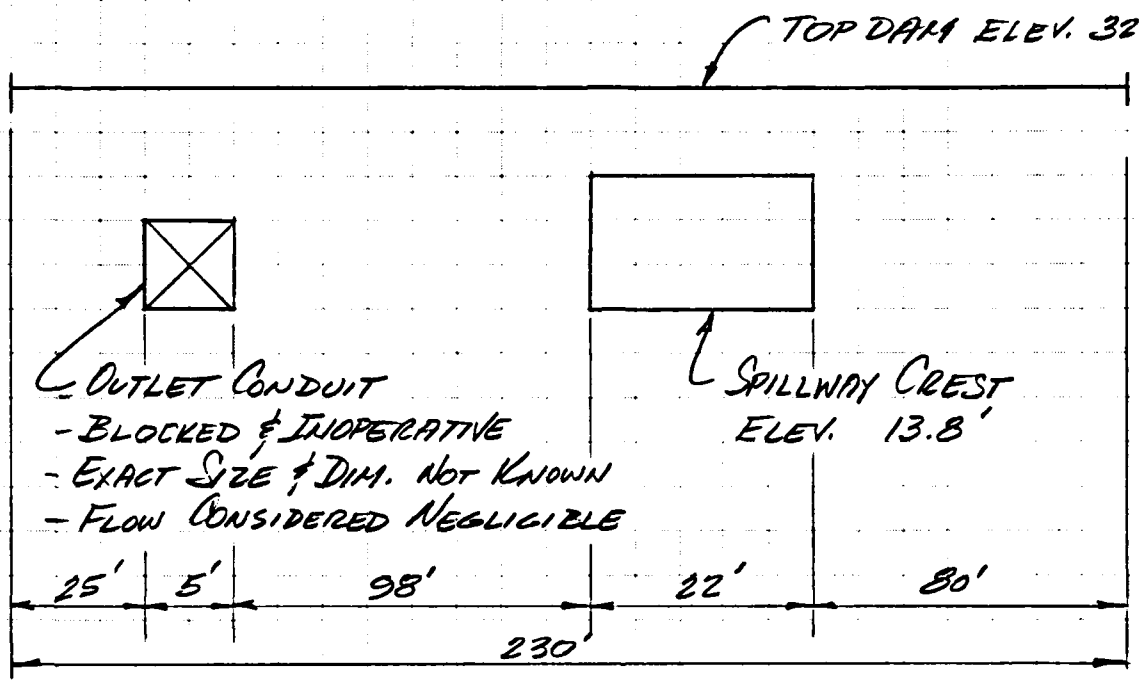
JOB TRADING COVE DAM
SHEET NO. 6 OF 8
CALCULATED BY K.A. DATE 5/4/81
CHECKED BY MR DATE 5/7/81
SCALE



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

JOB TRADING COVE DAM
SHEET NO 7 OF 8
CALCULATED BY K.A. DATE 5/4/81
CHECKED BY M.R. DATE 5/7/81
SCALE

TRADING COVE DAM



DAM LENGTH

L = TOTAL LENGTH (INCL. SPILLWAY)

L = 230'

DISCHARGE COEFFICIENT OVER DAM

C = 2.6

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

JOB TRADING COVE DAM
SHEET NO 8 OF 8
CALCULATED BY K.A. DATE 5/4/81
CHECKED BY M.R DATE 5/7/81
SCALE

SPILLWAY DISCHARGE

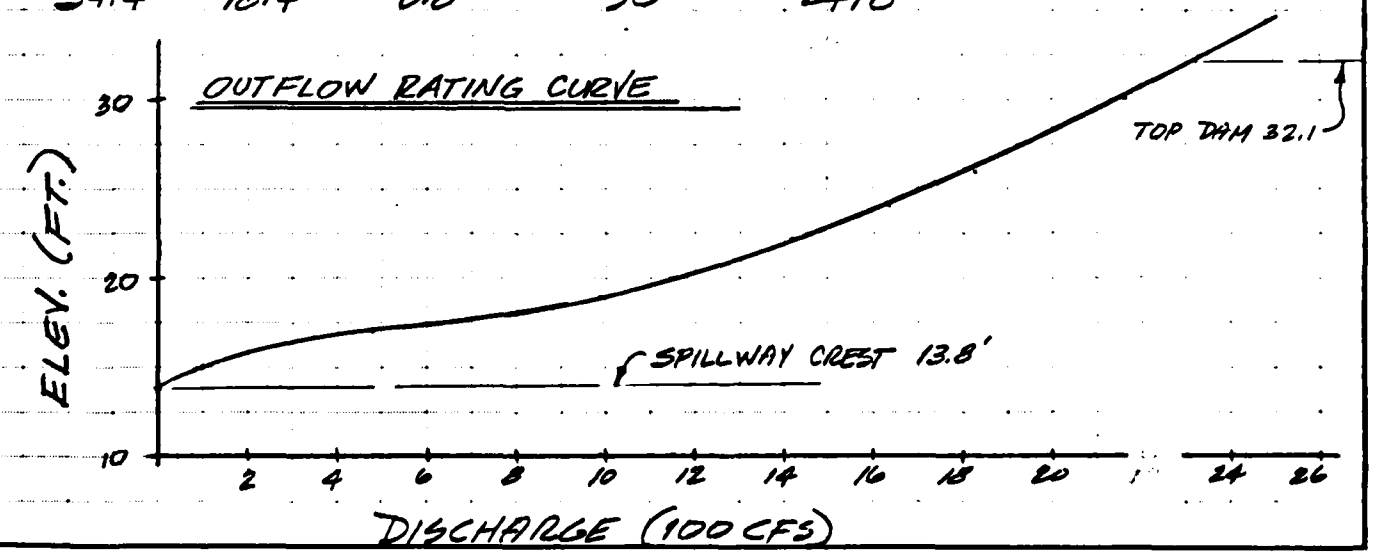
SPILLWAY FLOW $Q = CLH^{1.5}$ ①

ORIFICE FLOW $Q = CA\sqrt{2gH}$ ②

ELEV.	H	C	L/A	Q	
13.8	0	3.2	22'	0	1
15.0	1.2	3.5	22	101	1
17.0	3.2	3.8	22	479	1
19.0	5.2	3.8	22	991	1
20.0	4.0	0.8	90 □'	1156	2
22.0	6.0	0.8	90	1415	2
24.0	8.0	0.8	90	1634	2
26.0	10.0	0.8	90	1827	2
30.0	14.0	0.8	90	2162	2
32.1	16.1	0.8	90	2318	2
35.0	19.0	0.8	90	2519	2
40.0	24.0	0.8	90	2831	2

TEST FLOOD LEVEL (100-YEAR)

34.4	18.4	0.8	90	2478	2



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

JOB TRADING COVE DAM
SHEET NO DF-1 OF 3
CALCULATED BY K. A. DATE 6/20/81
CHECKED BY _____ DATE _____
SCALE _____

DAM FAILURE ANALYSIS

DAM LENGTH = 230'

SPILLWAY LENGTH = 22' (AT OPENING OF CULVERT)

FOR FAILURE ANALYSIS:
FAIL SPILLWAY SECTION ONLY, AT SPILLWAY CREST ELEVATION AND IN CONJUNCTION WITH HIGH TIDE. *

PEAK FAILURE OUTFLOW:

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

$W_b = 22$ ft.

$g = 32.2$ ft/s^2

$y_o = 11$ ft.

$$Q_{P1} = \frac{8}{27}(22)(\sqrt{32.2})(11^{3/2})$$

$$Q_{P1} = 1350 \text{ cfs}$$

STORAGE:

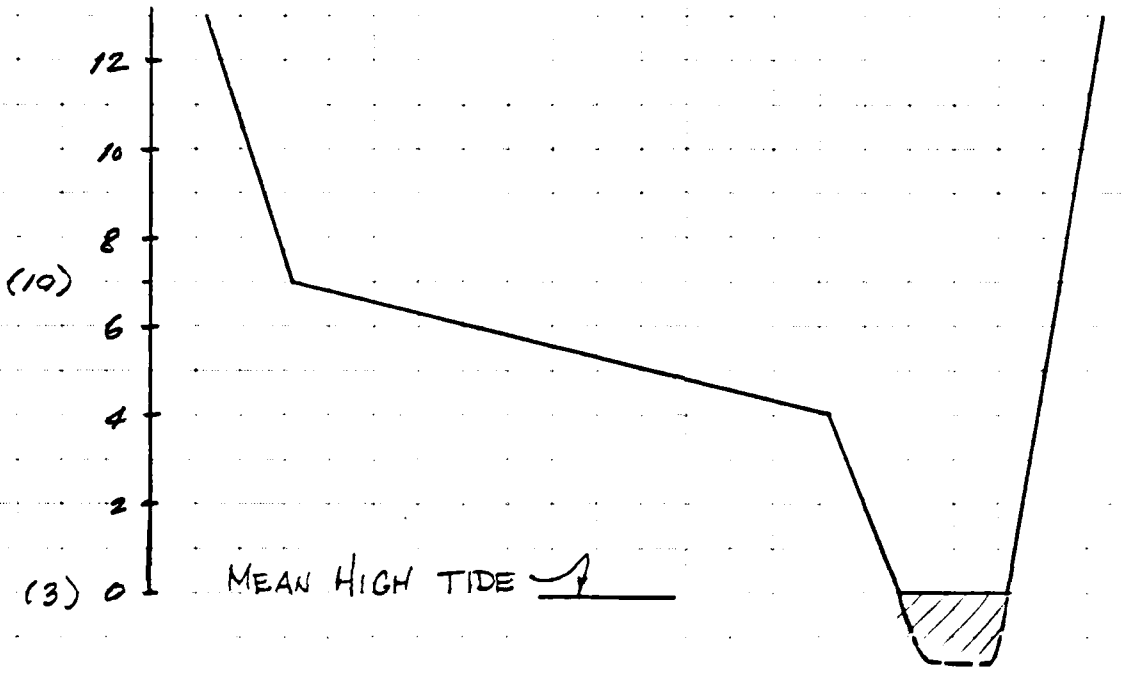
AT TOP OF SPILLWAY: $S = 20$ Ac. Ft. (APPROX.)

* NOTE: IF SPILLWAY IS BREACHED AT THE SPILLWAY CREST ELEVATION, THERE WOULD BE NO PRE-FAILURE FLOW IN THE STREAM. THE SPILLWAY PROVIDES THE ONLY SIGNIFICANT FLOW.

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

JOB TRADING COVE DAM
SHEET NO DF-2 OF 3
CALCULATED BY K.A. DATE 5/4/81
CHECKED BY MR DATE 5/7/81
SCALE HORIZ. 1"=50', VERT. 1"=4'

SECTION #1 — STATION 6+00



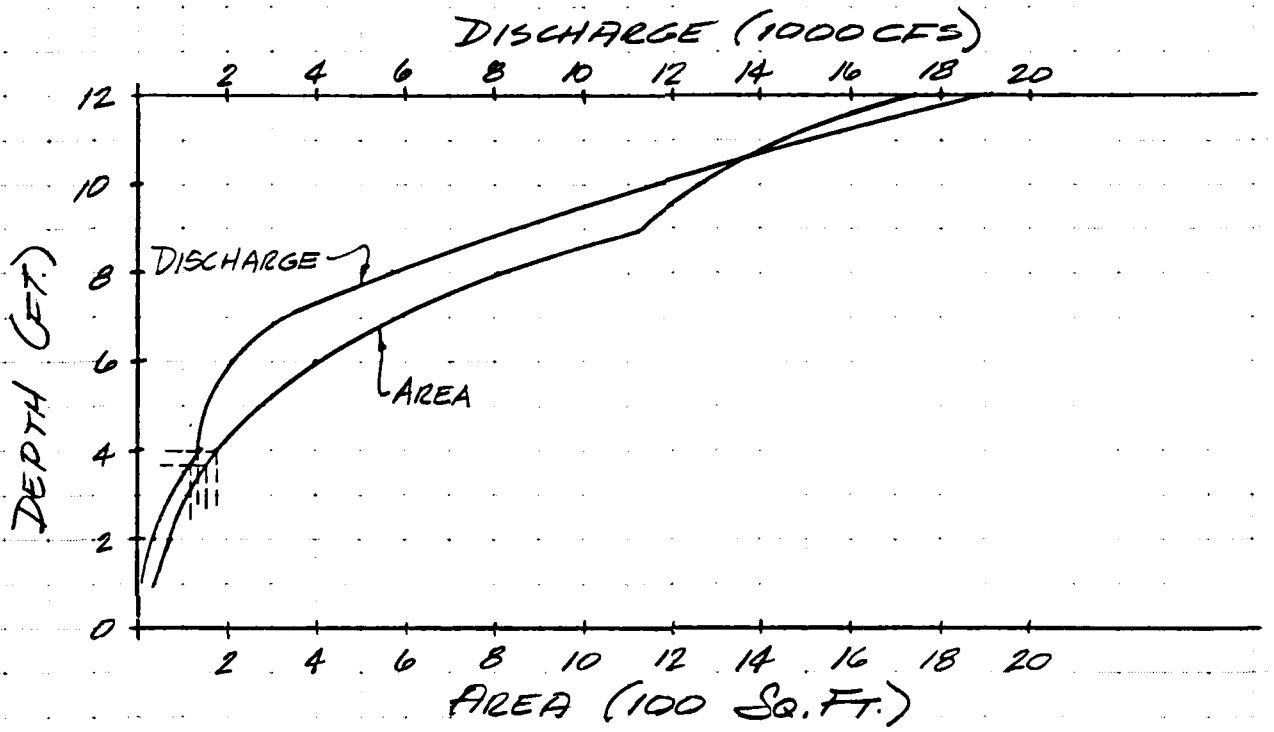
H	A	WP	R	n	V	Q (cfs)
2	74	44	1.7	.04	5.3	392
4	176	58	3.0	.04	7.7	1355
6	400	166	2.4	.05	5.3	2120
8	807	220	3.7	.05	7.1	5730
10	1261	234	5.4	.05	9.2	11,601
12	1741	246	7.1	.05	11.0	19,151

$L = 600$ ft.
$S = .01$ ft./ft.

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

JOB TRADING COVE DAM
SHEET NO DF-3 OF 3
CALCULATED BY K. A. DATE 5/4/81
CHECKED BY MR DATE 5/7/81
SCALE

SECTION #1 (CONT.)



Q_{P1} = 1350 cfs (TRIAL) Q_{P2} = 1181 cfs

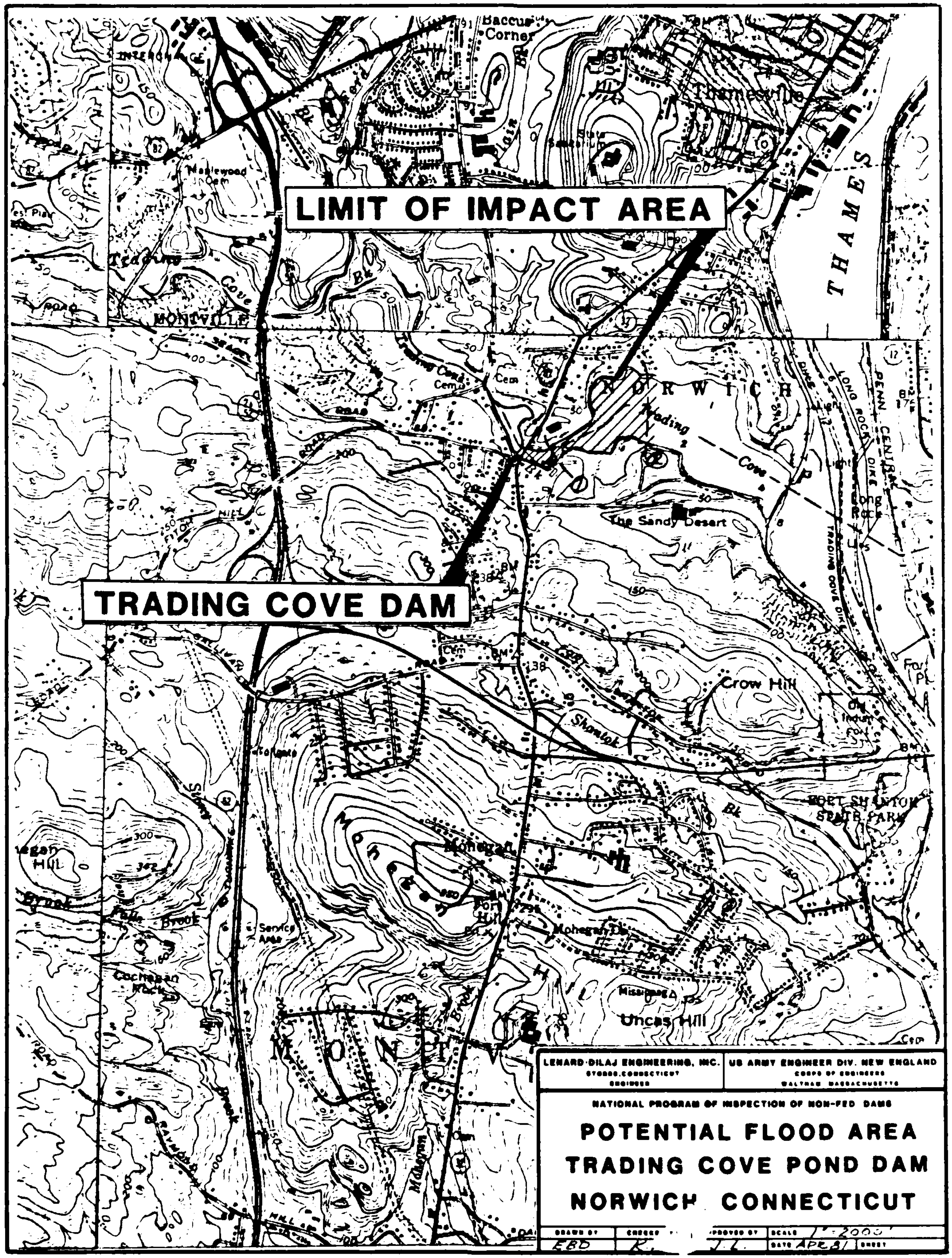
H = 4.0 ft. H = 3.7 ft.

A = 180 sq. ft. A = 160 sq. ft.

V_1 = 2.5 ac. ft. V_2 = 2.2 ac. ft.

Q_{P2} = 1191 cfs

H = 3.7 ft.


LIMIT OF IMPACT AREA
TRADING COVE DAM
THAMES
NORWICH
Trading Cove
The Sandy Desert
Crow Hill
Uncas Hill
MONTVILLE
LENARD-DILAJ ENGINEERING, INC.
US ARMY ENGINEER DIV. NEW ENGLAND
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
POTENTIAL FLOOD AREA
TRADING COVE POND DAM
NORWICH CONNECTICUT

APPENDIX E

INFORMATION AS CONTAINED IN THE

NATIONAL INVENTORY OF DAMS

[1]

PART I – INVENTORY OF DAMS IN THE UNITED STATES
(PURSUANT TO PUBLIC LAW 92-367)

See reverse side for instructions.

STATE	IDENTITY NUMBER
CT	00237

IDENTIFICATION

[2] DIVISION	[3] STATE	[4] COUNTY	[5] CONGR DIST	[6] STATE	[7] COUNTY	[8] CONGR DIST	[9] NAME	[10] LATITUDE (North)	[11] LONGITUDE (West)	[12] REPORT DATE
NED	CT	011	02				TRADING COVE POND DAM	41 29 7	072 06 0	08 APR 81

IDENTIFICATION *(Continued)*

[13] POPULAR NAME	[14] NAME OF IMPOUNDMENT
	TRADING COVE POND

LOCATION

[15] REGION	[16] BASIN	[17] RIVER OR STREAM	[18] NEAREST DOWNSTREAM CITY – TOWN – VILLAGE	[19] DIST FROM DAM (mi)	[20] POPULATION
01	10	TRADING COVE BROOK	NORWICH-MONTVILLE	1	6020 0

STATISTICS

[21] TYPE OF DAM	[22] YEAR COMPLETED	[23] PURPOSES	[24] STRUCTURAL HEIGHT (ft)	[25] HYDRAULIC HEIGHT (ft)	[26] IMPOUNDING CAPACITIES MAXIMUM (acre-ft)	[27] IMPOUNDING CAPACITIES NORMAL (acre-ft)	[27A] CORPS ENGR. DIST.	[27B] OWN.	[27C] FED. R.	[27D] PRIV/FED	[27E] SCS A.	[27F] VERIFICATION DATE	[BLANK]
REPGRA	1900R		31	29	500	20	NED	N	N	N	N	08 APR 81	3

REMARKS

[28] REMARKS	
21- INNER MASONRY DAM COVERED BY EARTH EMBANKMENT 22- ESTIMATE	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 3 7

STATISTICS

[29] D S HAZ	[30] CREST LENGTH (ft)	[31] SPILLWAY TYPE	[32] SPILLWAY WIDTH (ft)	[33] SPILLWAY MAXIMUM DISCHARGE (cfs)	[34] VOLUME OF DAM (CY)	[35] POWER CAPACITY INSTALLED (MW)	[36] POWER CAPACITY PROPOSED (MW)	[37] NO.	[38] NAVIGATION LOCKS LENGTH (ft)	[39] NAVIGATION LOCKS WIDTH (ft)	[40] NAVIGATION LOCKS LENGTH (ft)	[41] NAVIGATION LOCKS WIDTH (ft)	[42] NAVIGATION LOCKS LENGTH (ft)	[43] NAVIGATION LOCKS WIDTH (ft)	[44] NAVIGATION LOCKS LENGTH (ft)	[45] NAVIGATION LOCKS WIDTH (ft)	BLANK
3	2300	U	22	23000	28400												5

MISC DATA

[46] OWNER	[47] ENGINEERING BY	[48] CONSTRUCTION BY
STATE OF CONN. & GRIFFIN		6

MISC. DATA *(Continued)*

[49] REGULATORY AGENCY DESIGN	[50] CONSTRUCTION	[51] OPERATION	[52] MAINTENANCE
CONN DEP	CONN DEP	CONN DEP	CONN DEP 7

MISC. DATA *(Continued)*

[53] INSPECTION BY	[54] INSPECTION DATE DAY MO YR	[55] AUTHORITY FOR INSPECTION
LENARD & DILAJ ENGINEERING, INC.	08APR81	PL92-367 8

REMARKS

[56] REMARKS
33-MAX. DISCHARGE IS ORIFICE FLOW 46-DANIEL GRIFFIN PART OWNER 9

ENG FORM 1 DEC 77 4474A

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

(1)

STATE	IDENTITY NUMBER
CT	00237

LOCATION

(A-1) TOWN	(A-2) NED PERMIT NO	(A-3) STATE NUMBER	(A-4) FERC NO	(A-5) USGS SHEET	
NORWICH-MONTVILLE				UNCASVILLE	A

DRAINAGE CHARACTERISTICS

(B-1) DRAINAGE AREA SQ MI	(B-2) FLOW DATA MIN CFS	(B-3) FLOW DATA AVE CFS	(B-4) FLOW DATA MAX CFS	(B-5) CREST ELEV MSL	(B-6) ABUT ELEV MSL	(B-7) USABLE STORAGE ACRE FEET	(B-8) RESERVOIR AREA ACRES	(B-9) FLASH BOARD HT FEET	(B-10) OUTLET CONDUITS NO	(B-11) OUTLET CONDUITS SIZE	(B-12) INVERT ELEV MSL	
13			4500	32		500		4	1	1		B

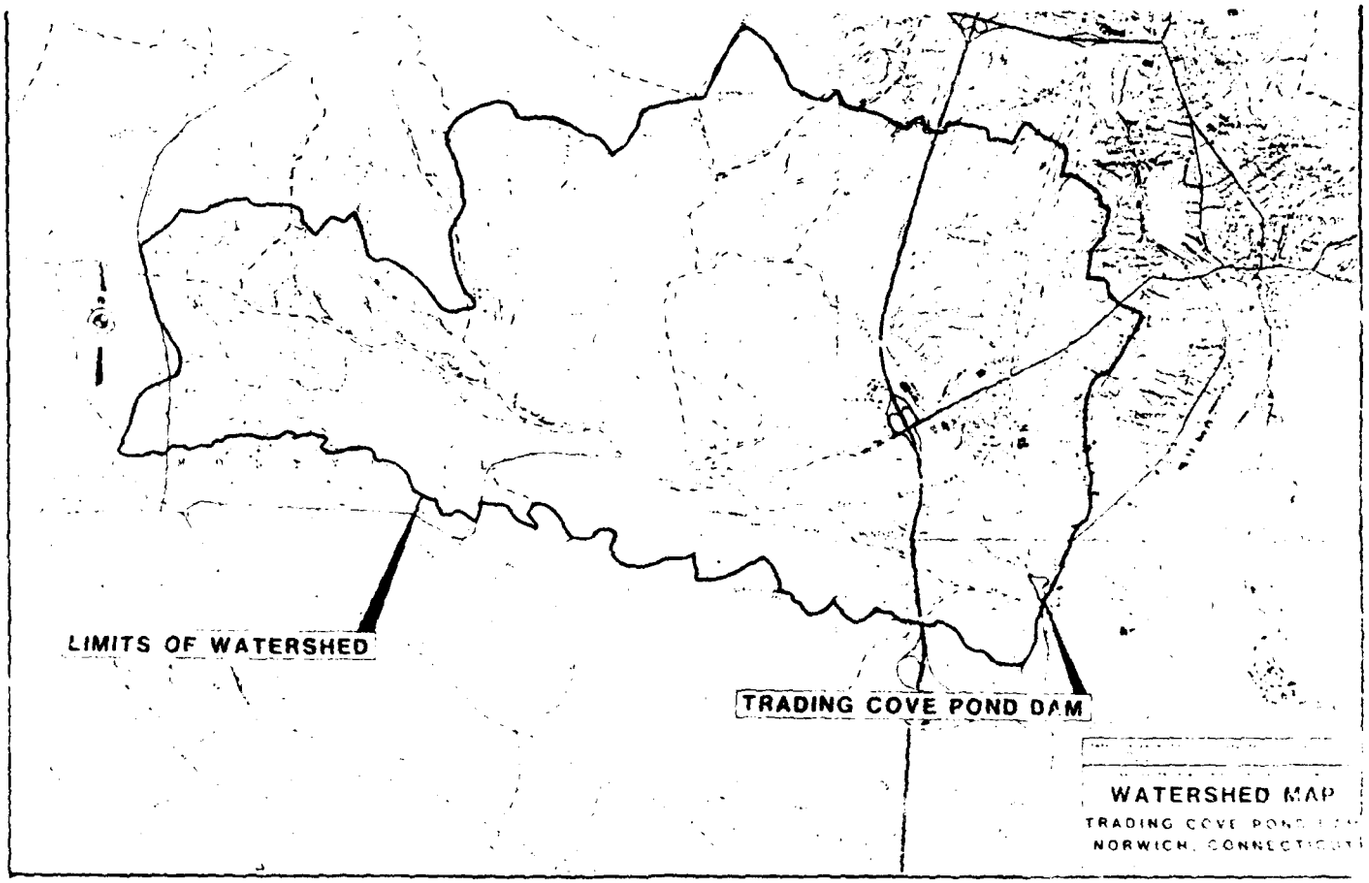
POWER DATA

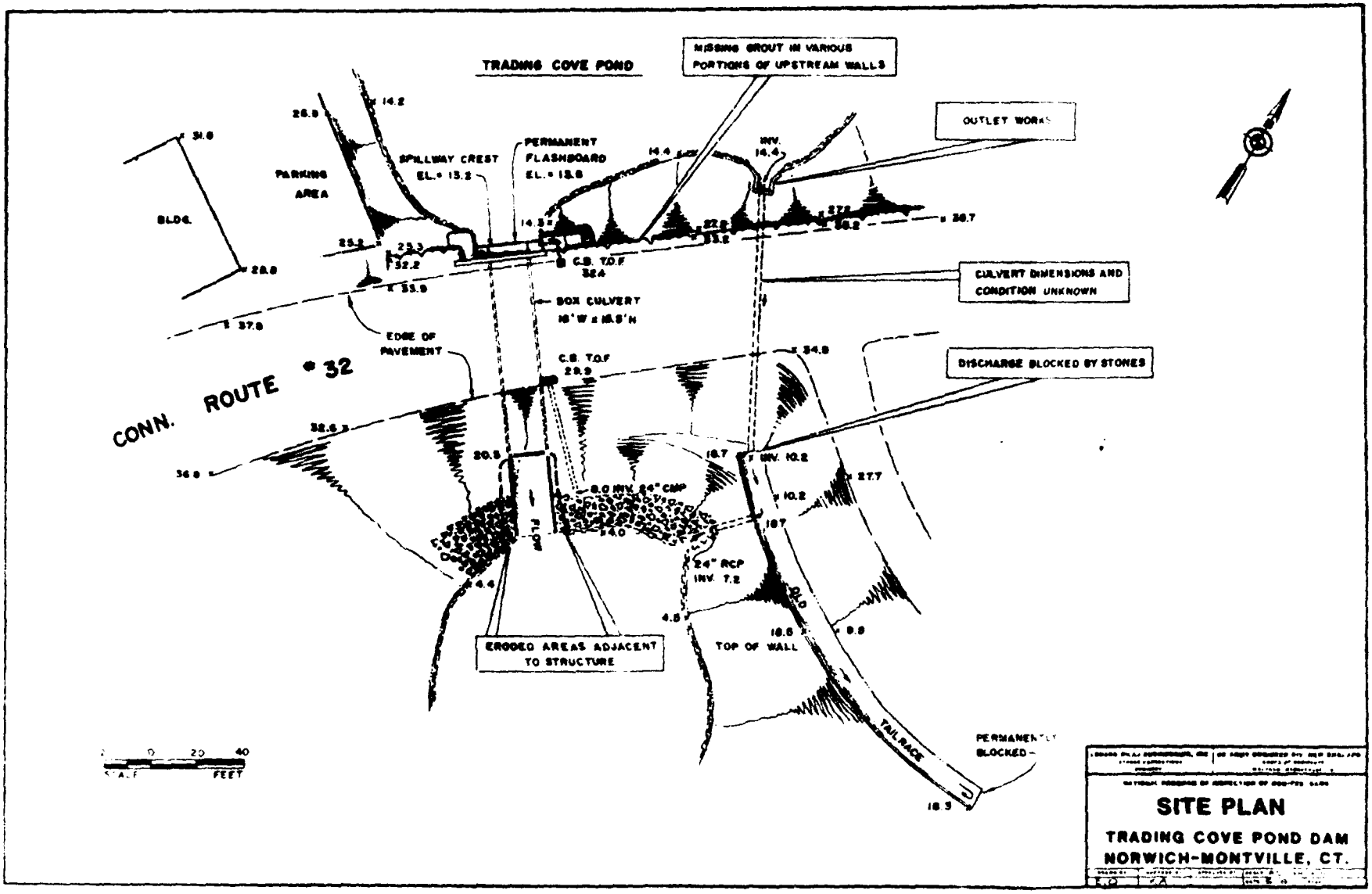
(C-1) GENERATION UNITS INSTALLED NO	INSTALLED CAP KW	PLANNED NO	PLANNED CAP KW	(C-2) AVERAGE ANNUAL GENERATION KWH	(C-3) LAST GEN YEAR	(C-4) RETIRED YEAR	(C-5) FORMER USE	(C-6) CAPACITY FACTOR	
									C

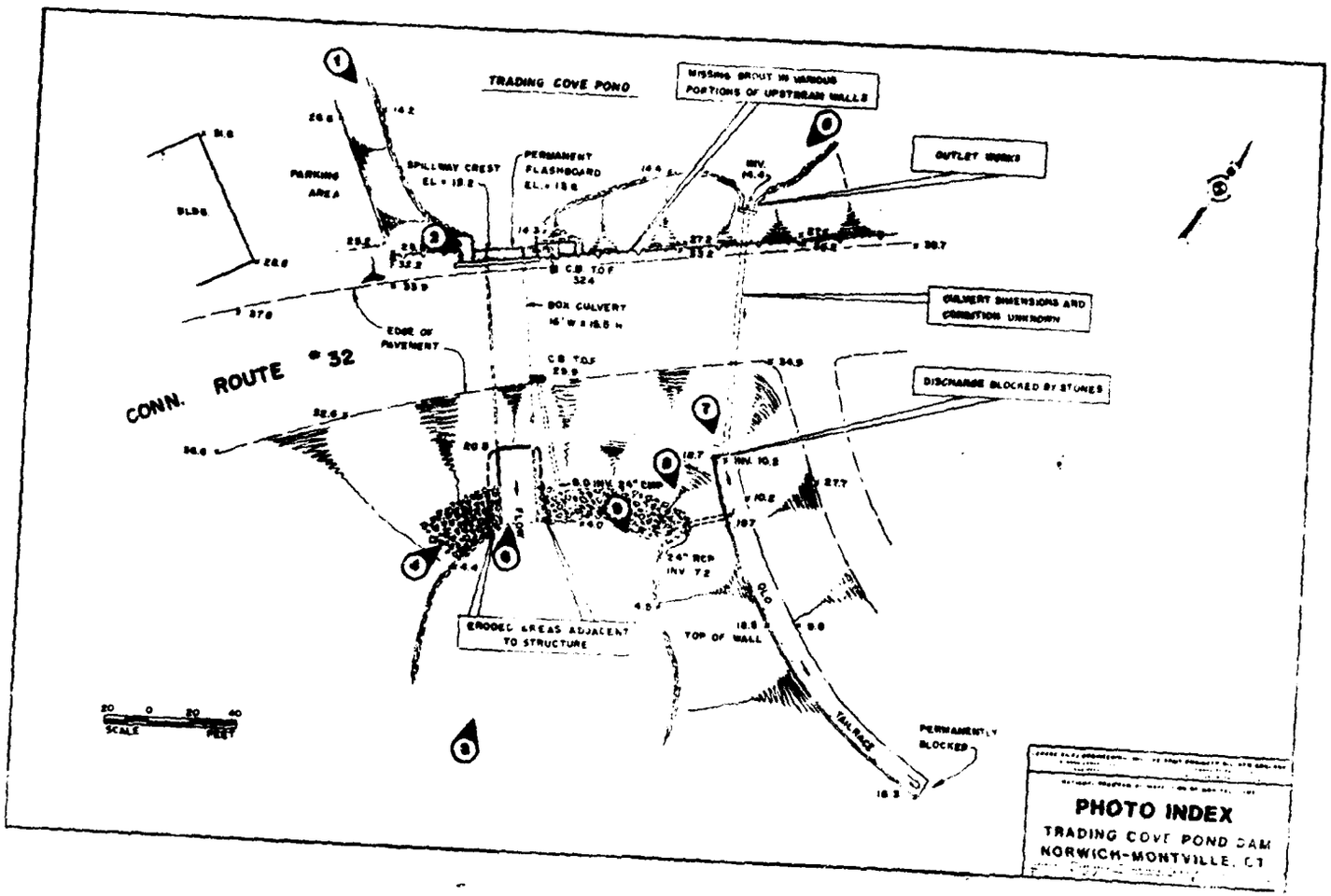
B-4 100-YEAR OUTFLOW B-11 CONDUIT BLOCKED, SIZE NOT DETERMINED D

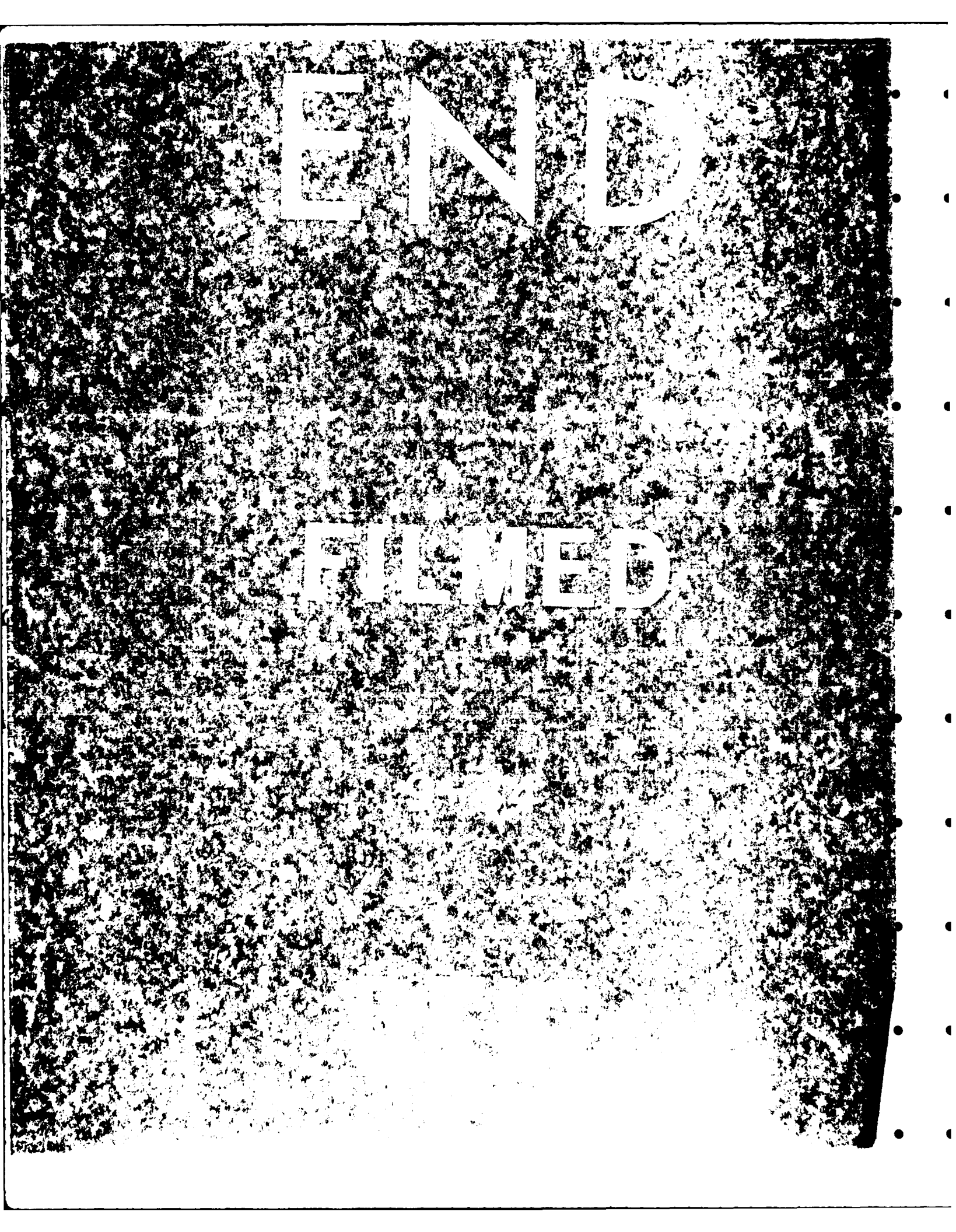
E

NED 1 FORM JAN 1980 (TEST)


LIMITS OF WATERSHED
TRADING COVE POND DAM
WATERSHED MAP
TRADING COVE POND
NORWICH, CONNECTICUT


TRADING COVE POND
MISSING GROUT IN VARIOUS PORTIONS OF UPSTREAM WALLS
OUTLET WORKS
PERMANENT FLASHBOARD EL. = 13.8
SPILLWAY CREST EL. = 13.2
PARKING AREA
BLDG.
INV. 14.4
CULVERT DIMENSIONS AND CONDITION UNKNOWN
BOX CULVERT
EDGE OF PAVEMENT
CONN. ROUTE 32
DISCHARGE BLOCKED BY STONES
C.B. T.O.F 29.9
C.B. T.O.F 32.4
8.0 INV. 24" CMP
24" RCP INV. 7.2
INV. 10.2
ERODED AREAS ADJACENT TO STRUCTURE
TOP OF WALL
TAILRACE
PERMANENTLY BLOCKED
0 20 40
SCALE FEET
SITE PLAN
TRADING COVE POND DAM
NORWICH-MONTVILLE, CT.


TRADING COVE POND
MISSING GROUT IN VARIOUS PORTIONS OF UPSTREAM WALLS
OUTLET WORKS
PARKING AREA
BLDG
SPILLWAY CREST EL. = 19.2
PERMANENT FLASHBOARD EL. = 19.6
INV. 14.4
C.B. TOP 32.4
BOX CULVERT 16' W x 16.5' H
CULVERT DIMENSIONS AND CONDITION UNKNOWN
EDGE OF PAVEMENT
CONN. ROUTE # 32
C.B. TOP 29.9
DISCHARGE BLOCKED BY STONES
FLOW
24" RCP INV. 7.2
ERODED AREAS ADJACENT TO STRUCTURE
TOP OF WALL
TAILRACE
PERMANENTLY BLOCKED
SCALE FEET
PHOTO INDEX
TRADING COVE POND DAM
NORWICH-MONTVILLE, CT


END
FILMED