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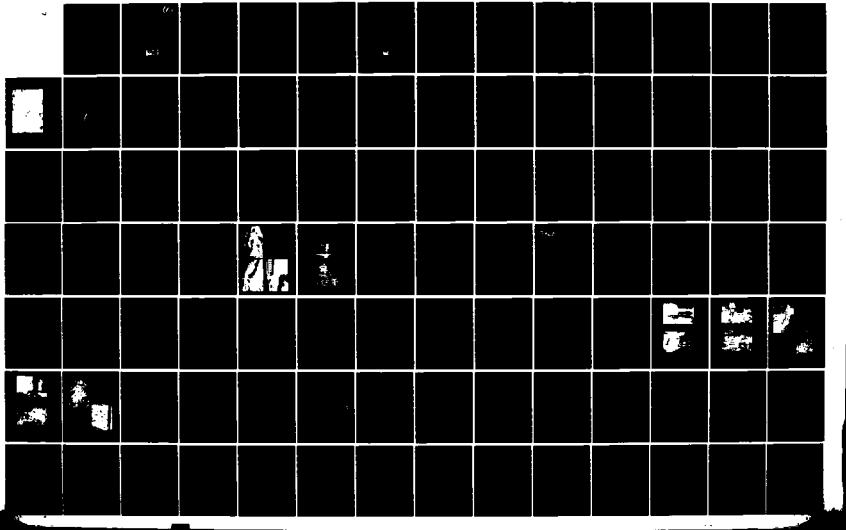
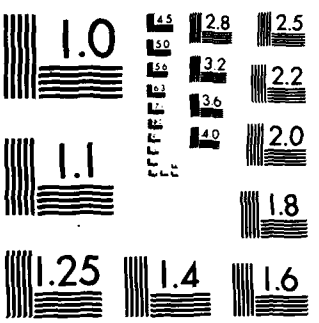
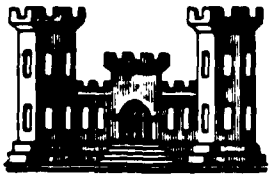




LOWER CONN RIVER BASIN
CLINTON, CONNECTICUT

INDIAN LAKE DAM
CT 00189

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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

MARCH 1981

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00189	2. GOVT ACCESSION NO. AD-A143432	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Indian Lake Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT. 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE March 1981 13. NUMBER OF PAGES 55
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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 Conn River Basin
Clinton, Conn.
Indian Lake Dam

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

Indian Lake Dam is a stone wall, earth embankment structure, 8 to 15 feet wide at the crest, approx. 125 feet long, and with a maximum height of approx. 12 ft. above the stream bed. As a result of the visual inspection, hydrologic and hydraulic computations, and the review of limited available data regarding this facility, the dam is considered to be in POOR condition. The dam is classified as SMALL in size and as having a HIGH hazard potential.

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

REPLY TO
ATTENTION OF:

NEDED

JUL 17 1981

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

Dear Governor O'Neill:

Inclosed is a copy of the Indian Lake Dam (CT-00189) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis.

The visual inspection of Indian Lake Dam indicated serious problems exist with the left section of the dam that could affect the dams stability. In addition to the structural problems the preliminary hydrologic analysis indicated that the spillway capacity would likely be exceeded by floods greater than four percent of the Probable Maximum Flood (PMF). Our screening criteria specifies that a dam classified as high hazard with a spillway capacity insufficient to discharge fifty percent of the PMF be judged as having a seriously inadequate spillway. Because of the concern with the dams stability and a serious inadequacy of the spillway, the dam has been assessed as unsafe until corrective measures are completed.

It is recommended that within six months from the date of this letter the owner of the dam engage the services of a qualified registered engineer to do the following:

1. analyze the stability of the dam and recommend repairs
2. perform a detail hydrologic-hydraulic investigation to assess further the potential of overtopping the dam and a need for and the means to increase project discharge capacity.

Based upon the engineers recommendations, appropriate remedial mitigating measures should be designed and completed within 18 months of the date of this notification. In the interim, a detailed emergency operation and warning system should be promptly developed and during periods of unusual heavy percipitation, round-the-clock surveillence be provided.

NEDED
Honorable William A. O'Neill

I approve the report and support the findings and recommendations described in Section 7, with qualifications as noted above. I request that you keep me informed of the actions taken to implement these recommendations since this follow-up is an important part of the program.

Copies of this report have been forwarded to the Department of Environmental Protection and to the owner, Rollar Homes, Inc., Clinton, 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,

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

LOWER CONN RIVER BASIN

CLINTON, CONNECTICUT

INDIAN LAKE DAM
CT 00189

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

MARCH 1981

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

Identification No.:	CT 00189
Name of Dam:	Indian Lake Dam
Town:	Clinton
County and State:	Middlesex County, Connecticut
Stream:	Indian River
Date of Inspection:	12 November 1980

BRIEF ASSESSMENT

Indian Lake Dam is a stone wall, earth embankment structure, 8 to 15 feet wide at the crest, approximately 125 feet long, and with a maximum height of approximately 12 feet above the stream bed. The spillway is part of the dam itself and is approximately 35 feet long. The crest of the spillway consists of uneven stone and the approach area is silted. The outlet works is a 20" diameter steel pipe, with a gate structure on the upstream side. It is not operational and the stem and rails have been removed. The maximum storage capacity of the reservoir is approximately 49 acre feet at the top of the dam and the drainage area is approximately 6.75 square miles.

The dam was probably constructed during the late 1800's for the purpose of producing ice. Presently, the dam is used only intermittently for recreational purposes and primarily serves an aesthetic value.

During the severe storm in January 1979, the dam was overtopped and severely damaged. Subsequently, some of the damage has been repaired.

As a result of the visual inspection, hydrologic and hydraulic computations, and the review of limited available data regarding this facility, the dam is considered to be in POOR condition.The deterioration of the downstream stone masonry wall endangers its stability and represents an apparent hazard to the numerous residences immediately

downstream from the dam. The left side of the dam, in particular, is in very poor condition, and the downstream wall of the spillway has large voids where stones have been dislodged in the past.

The dam is classified as SMALL in size and as having a HIGH hazard potential, in accordance with the recommended guidelines established by the Corps of Engineers. The test flood for this dam is half the Probable Maximum Flood (½ PMF), which has an inflow and outflow of 4,370 cfs that will overtop the dam by 4.9 feet. The outflow capacity of the spillway with water level at the top of the dam is 340 cfs, which represents 8% of the test flood outflow.

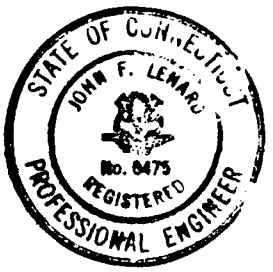
It is recommended that the Owner retain the services of a registered professional engineer to perform a detailed hydrologic-hydraulic investigation to assess further the potential of overtopping the dam and the need for and the means to increase the project discharge capacity.

The above recommendations and remedial measures which are discussed in Section 7 should be instituted within six months of the Owner's receipt of this report.

LENARD & DILAJ ENGINEERING, INC.

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

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



This Phase I Inspection Report on Indian Lake Dam (CT-00189) 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.

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

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

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering 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.

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TAKEN 11 DEC. 1980

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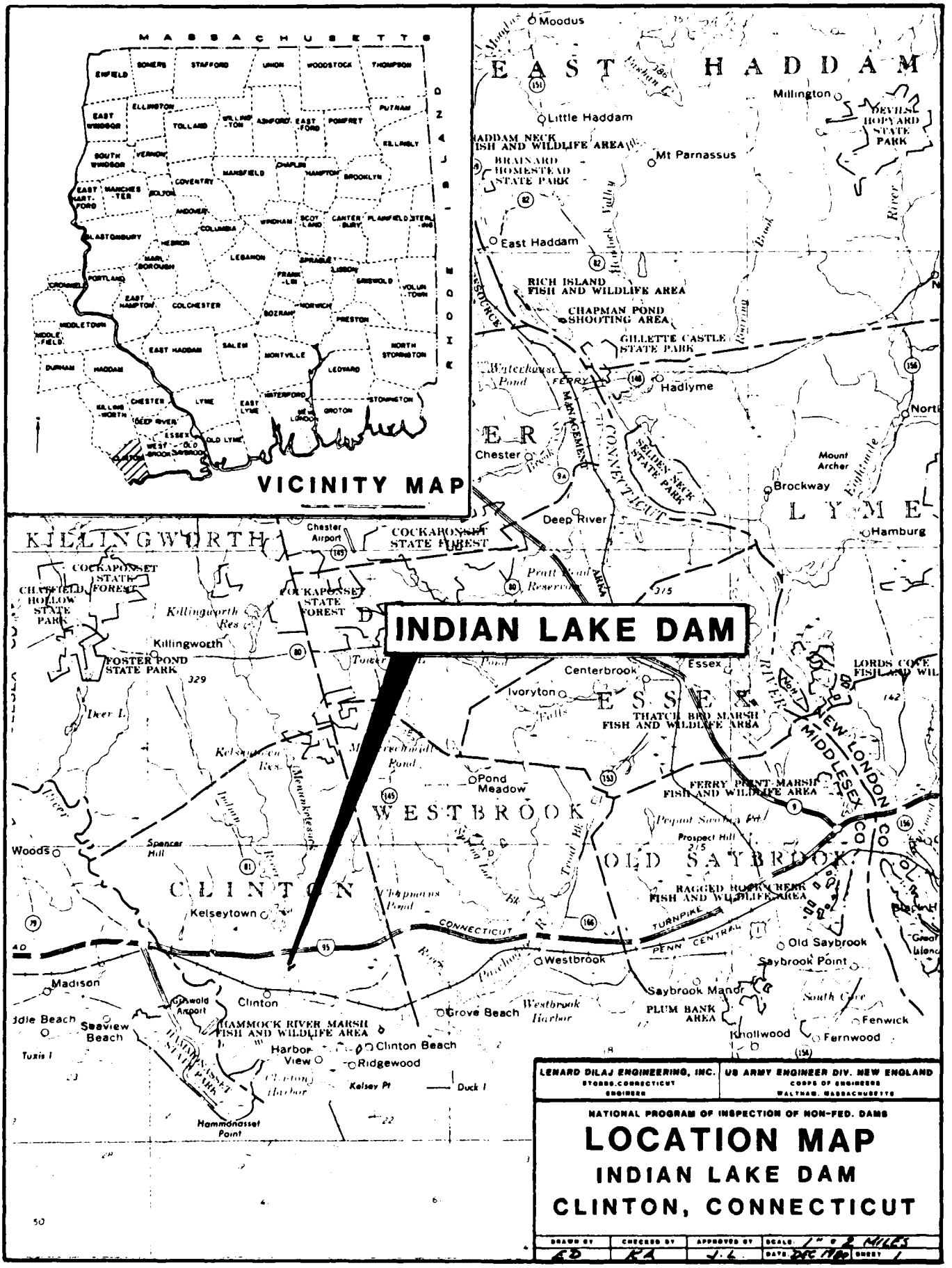
MASSACHUSETTS
RHODE ISLAND
VICINITY MAP
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Millington
Little Haddam
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Killingworth
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Knollwood
Fernwood
CONNECTICUT TURNPIKE
PENN CENTRAL
LENARD DILAJ ENGINEERING, INC.
US ARMY ENGINEER DIV. NEW ENGLAND
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
LOCATION MAP
INDIAN LAKE DAM
CLINTON, CONNECTICUT
DRAWN BY
CHECKED BY
APPROVED BY
SCALE: 1" = 2 MILES
DATE: DEC 1978
SHEET 1

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 Project:

a. Location: The project is located on the Indian River, in the Town of Clinton, County of Middlesex, and State of Connecticut. The dam is located just south of Interstate Route 95 and is shown on the Clinton, Connecticut USGS guadrangle map, having coordinates 41° 17' 12" (north latitude) and 72° 31' 34" (west longitude).

b. Description of Dam and Appurtenances: The project consists of a dam and spillway approximately 125 feet long, of which the spillway is 35 feet in length. It is an earth-filled embankment dam, with a dry masonry stonewall face on the downstream side.

On the right side of the spillway, the dam is approximately 60 feet long and 10 feet wide at the crest. The downstream side is a vertical dry masonry stonewall, while the upstream side is earth embankment gently sloped towards the reservoir. There is no slope protection on the upstream side of the dam. A 14 foot long, 20" diameter cast iron pipe passes through this portion of the dam. The gate on the upstream side is in position but is inoperable since the rails and the stem have either been broken or deliberately removed. The spillway is 35 feet long and 10 feet high. It is of dry masonry construction.

The portion of the dam on the left side of the spillway is approximately 30 feet long and 7 feet wide at the crest. The embankment consists of dry masonry walls both on the upstream and downstream sides, with earth fill in between. The dam was capped in 1979

with a loose concrete pour after the dam was overtopped.

There is no operational procedure for this facility. When the reservoir stage is high, it discharges over the spillway weir into the river downstream and ultimately into Long Island Sound. The dam was overtopped in 1979 and extensive erosion occurred in the locations previously mentioned. During this flooding the dam was sand-bagged to prevent further erosion of the dam.

c. Size Classification: With the pool level at the top of the dam, the impoundment capacity of the lake is 49 acre feet. The height of the facility above the stream bed is 12 feet. The dam is therefore classified as a SMALL structure, in accordance with the recommended guidelines of the Corps of Engineers.

d. Hazard Classification: The dam is classified as having a HIGH hazard potential, since the failure discharge can cause damage to several trailers located approximately 1000 feet downstream and could result in the loss of more than a few lives. The estimated increase in water depths due to the failure of the dam would range from 9 feet in the vicinity of the trailers to 2 feet at a point approximately 1,700 feet downstream.

e. Ownership: Owner - George Rollar, President, Rollar Homes, Inc., 133 West Main Street, Clinton, Connecticut 06143, telephone (203) 669-5725.

f. Operator: The owner is the operator for this facility.

g. Purpose of Project: Presently aesthetic, it was originally constructed as an ice pond.

h. Design and Construction History: Nothing is known about the original construction of the dam. Judging from the fact that the original purpose was to produce ice, indications are that it was probably constructed at the end of the nineteenth century.

i. Normal Operational Procedures: There is no operational procedure for this dam. The owner is called only during emergency conditions and, during the last such emergency, sandbags were placed on the dam during the flooding.

1.3 Pertinent Data:

a. Drainage Area: Indian Lake and its drainage area are located in Middlesex County, in the south central portion of the state. It is an area of general rolling terrain with elevations ranging from a high of 430 feet at the northernmost portion of the watershed to a low of 11 feet at Indian Lake. The drainage area begins in the town of Killingworth and extends in a general southeasterly direction (along its long axis) to the town of Clinton at a point about 1.5 miles north of Long Island Sound. It is basically rectangular in shape with a length of 6 miles and an average width of 1.5 miles. The total drainage area for Indian Lake is 6.75 square miles. About 7% of the watershed area consists of wetlands capable of storing some of the runoff generated by the design storm. Basin slopes vary greatly but could be generally described as moderate.

b. Discharge at Dam Site: Discharges are for the spillway only since the sluice gate is inoperable. No records of spillway or outlet works discharges are available. Listed below are calculated discharge data for the spillway.

1.	Outlet works:	
	Size:	20 inch diameter cast iron pipe
	Invert Elev:	4.0 feet
	Discharge capacity:	40 cfs (presently inoperable)
2.	Maximum known flood at dam site:	Discharge unknown
3.	Ungated spillway capacity at top of dam:	340 cfs at Elev.13.0
4.	Ungated spillway capacity at test flood elevation:	2,000 cfs at Elev. 17.9
5.	Outlet works capacity at normal pool elevation:	Inoperable
6.	Outlet works capacity at test flood elevation:	Inoperable
7.	Total discharge capacity at test flood elevation:	2,000 cfs at Elev.17.9

8.	Total project discharge at top of dam:	340 cfs at Elev. 13.0
9.	Total project discharge at test flood elevation:	4,370 cfs at Elev. 17.9

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

1.	Streambed at toe of dam:	2.0
2.	Bottom of cutoff:	Unknown
3.	Maximum tail water:	Unknown
4.	Normal pool:	10.7
5.	Full flood control pool:	N/A
6.	Spillway crest:	10.7
7.	Design surcharge (original design):	Unknown
8.	Top of dam:	13.0
9.	Test flood surcharge:	17.9

d. Reservoir (Length in Feet):

1.	Normal pool:	1,300
2.	Flood control pool:	N/A
3.	Spillway crest pool:	1,300
4.	Top of dam:	1,400
5.	Test flood pool:	1,600

e. Storage (acre-feet):

1.	Normal pool:	21
2.	Flood control pool:	N/A
3.	Spillway crest pool:	21
4.	Top of dam:	49
5.	Test flood pool:	127

f. Reservoir Surface (acres):

1.	Normal pool:	11
2.	Flood control pool:	N/A
3.	Spillway crest:	11
4.	Test flood pool:	19
5.	Top of dam:	14

g. Dam:

1.	Type:	Earth embankment and vertical downstream dry masonry walls
2.	Length:	125 feet
3.	Height:	12 feet
4.	Top width:	7-10 feet
5.	Side slopes:	2.5H:1V upstream Vertical downstream
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:	Stone masonry; broad crest
2.	Length of weir:	37 feet
3.	Crest elevation (without flashboards):	10.7 feet
4.	Gates:	None

5.	U/S channel:	Natural bed
6.	D/S channel:	Natural bed

j. Regulating Outlets:

1.	Invert:	4.0 feet
2.	Size:	20 inch diameter
3.	Description:	Cast iron pipe
4.	Control mechanism:	Inoperable wooden gate
5.	Other:	Approximate discharge capacity of pipe is 40cfs

SECTION 2

ENGINEERING DATA

2.1 Design: No data on the design of the dam or appurtenances has been recovered and probably none exists.

2.2 Construction: Nothing is known about the construction of the dam. Judging from the fact that the original purpose was to produce ice, indications are that it was probably constructed at the end of the nineteenth century.

2.3 Operation: The only operating facility at this site was a 20" diameter cast iron conduit sluiceway. A wooden gate is in place closing the opening of the pipe, but the stem has been removed, thus preventing operation of this facility. All guards for the sluiceway are deteriorating and the gate is presently leaking approximately 15 gallons per minute. There are no other operational facilities.

2.4 Evaluation:

a. Availability: There are no computations or design drawings available and there are no operating procedures in effect. The basis for the information presented in this report is principally the visual observations of the inspection team.

b. Adequacy: The limited amount of detailed engineering data available was inadequate to perform an in-depth assessment of the dam. Therefore, the final assessment of this dam is based primarily on visual inspection, the performance history, and hydraulic and hydrologic computations of spillway capacity.

c. Validity: All data presented in this report is based on visual inspection and the above quoted computations.

SECTION 3

VISUAL INSPECTION

3.1 Findings:

a. General: An inspection of Indian Lake Dam was performed on November 12, 1980 by Lenard & Dilaj Engineering, Inc., with the assistance of Geotechnical Engineers, Inc. The weather was clear and windy with temperatures in the 30°F range. Water level in the lake at the time of inspection was at an elevation about 1 inch above the lowest point of the spillway crest.

b. Dam: The dam has a downstream dry stone masonry wall, an upstream embankment on the right side, and an upstream stone wall on the left side. There is considerable siltation against the dam and the spillway, and therefore, the original configuration of the upstream slope and wall of the dam are unknown. There is a spillway at the center and an outlet to the right of the spillway which is presently not operational.

The section of the dam left of the spillway was repaired in 1979 after having been overtopped in January of the same year. The exposed upstream wall appears in good condition. The downstream wall of the left part of the dam was also repaired in the upper portion, but the lower part of the wall is in an advanced state of deterioration with bulging and movement of stone blocks (see Photo 2).

The right section of the dam has an upstream slope with no riprap of other type of slope protection. Large (1 foot diameter) trees are growing on the slope. An upstream stone wall immediately to the right of the spillway corresponds to an inlet and gate structure which is no longer operational. The downstream wall of the right part of the dam is in good condition. It has a section where the joints were partially filled with mortar (Photo 10). Adjacent to the outlet pipe, there is a tree growing in the wall (Photo 6). There are also trees growing immediately downstream of the wall.

There are two seepage areas along the toe of the left abutment about 15 feet and 20 feet downstream of the dam (Photos 8 and 9, respectively). The seeps were rust-colored and did not appear to contain visible amounts of soil particles. Seepage flow at each area was estimated at approximately 0.5 gallons per minute.

c. Appurtenant Structures: The spillway is at the central section of the dam.The crest is very irregular (Photos 2 and 3) and apparently some stones have been washed away. Visual inspection indicates that a number of stones have fallen out over the years. The downstream face of the spillway is very irregular with some indication of bulging (Photo 5). A large void, about 3 feet wide, can be seen near the base of the spillway wall in Photo 7. A tree growing out of the wall (Photo 3) has caused some displacement on the stone blocks. Water is seeping out along most of the downstream spillway wall. It is a dry rubble masonry wall, and with water constantly passing through the spillway, it is difficult to ascertain the number of stones missing or the rate of the seepage. The right training wall (Photo 4) has large voids which have resulted in a washing out of soil through the wall. This is evidenced by a general depression behind the wall, which is about a half foot lower than the surrounding area (See location on Site Plan).

The outlet works are not operational. Remains of the gate mechanism can be observed under water. The 20-inch diameter outlet pipe was inspected from the downstream end using a flashlight and a reflector. At a point about 12 feet inside the pipe from the downstream end, there was a small pile of rust colored material, which apparently is the result of local seepage of water and soil materials from an opening in the pipe. Leakage through the closed gate, augmented to a minor extent by seepage, resulted in a flow at the downstream end of about 15 gpm.

d. Reservoir Area: There were no signs of instability along the lake edge in the vicinity of the dam. Along the left edge of the lake there is a stone masonry retaining wall near the dam, apparently the remains of installations for ice production. At the left abutment, there is a wide area with an elevation about equal to the lowest elevations of the crest of the dam (See Site Plan). Indian Lake is traversed at its approximate midpoint by Interstate Route 95. This is a multiple lane highway with double box culverts to handle the flow through the lake. The culverts are each approximately 10'x 10' in size.

e. Downstream Channel: The downstream channel for the spillway is the natural streambed, whose banks are covered with trees.

3.2 Evaluation: On the basis of the visual inspection, the dam is judged to be in poor condition because of the following:

a. The deteriorated condition of the downstream wall of the spillway and left section of the dam indicate a reduction in stability.

b. The void at the base of the spillway results in decreased stability of the downstream wall.

c. The growth of trees on the dam and out of the downstream wall will accelerate deterioration of the walls.

d. The outlet pipe through the right abutment of the dam is presently inoperable since the removal of the gate mechanism on the upstream side of the dam.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures:

a. General: The owner does not reside at the dam and there are no procedures for any kind of operation. There is no one present at the site to attend to any routine or emergency functions. The owner maintains an office in Clinton, Connecticut, and all activities must be requested through this office.

b. Description of Any Warning System in Effect: There is no warning system in effect at this facility.

4.2 Maintenance Procedures:

a. General: With the exception of restoring damage by flood flows, there is absolutely no maintenance at this dam, as evidenced, in particular, by the growth of trees and vegetation on the dam itself. Indications are that the dam and appurtenant facilities were not maintained over the past decade. Damage caused by the 1979 flood was repaired to some degree.

b. Operating Facilities: The sluiceway is not operational. It is in a state of disrepair and is inoperable due to the lack of a stem and mechanism to move the gate. There are numerous fallen trees and other debris blocking the discharge channel.

4.3 Evaluation: The maintenance of the dam and appurtenant facilities is non-existent. The extensive growth of trees on the dam is deteriorating the masonry wall along the face of the embankment. There is no means of lowering the water behind the dam because the sluiceway cannot be operated. If the dam is to be preserved, a regular inspection and maintenance program must be developed, implemented and followed on a routine basis.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General: Indian Lake Dam is an earth embankment dam with a vertical stone masonry face on the downstream side. The dam is approximately 125 feet long and 12 feet high. Its spillway has a length of 37 feet and the crest is 2.3 feet below the top of the dam. For purposes of hydraulic calculations the spillway weir was considered to be broad crested. A 20-inch discharge pipe passes through the dam, but is controlled by a gate which is presently inoperable. Contributions of the discharge pipe to the outflow capacity were, therefore, not considered.

The downstream channel is approximately 40 feet wide at the base of the dam and converges to an average width of about 20 feet further downstream. The channel is in fairly poor condition with heavy growths of underbrush and trees on its immediate banks.

The watershed encompasses an area of 6.75 square miles. Its upper reaches are basically undeveloped while the lower portion has some dense residential areas.

At spillway elevation, Indian Lake has a storage capacity of approximately 21 acre-feet; this increases to 49 acre-feet at the top of the dam. The lake is traversed by Interstate Route 95 which has two 10'x 10' culverts passing through the lake. Although the hydraulic capacity of these culverts is not adequate to pass the test flood (which means that Route 95 would probably be flooded during the occurrence of the ½ PMF), its effect on the flows at Indian Lake Dam were not considered for the enclosed calculations.

5.2 Design Data: No design data was found to be available for this dam.

5.3 Experience Data: Although no records were available from the owner, two sources of information were found for two specific flood events. For the storm occurring during January of 1979, the State of Connecticut had records available to show the limits of flooding at the dam. Pictures (copies of which may be found in Appendix B) indicate that the left bank was saturated and sandbags had been placed along the upstream side.

A study done by the Corps of Engineers in July of 1976, entitled "Connecticut Coastline Study, Effects of Coastal Storms", indicates that for the 1938 hurricane, Indian

Lake and its dam were subjected to coastal flooding. This means that the dam was subjected to flooding from both directions and the spillway was totally submerged.

5.4 Test Flood Analysis: Based on the "Recommended Guidelines for Safety Inspection of Dams", the dam is classified as SMALL in size with 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). Because of the size of the dam, 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, inflow and outflow for the test flood were found to be 4370 cfs at the dam site. The spillway capacity of 340 cfs represents 8% of this test flood outflow. The test flood would overtop the dam by 4.9 feet.

In development of the inflow hydrograph to Indian Lake, it was assumed that Upper Millpond Dam and the culvert at I-95 had no effect on the peak inflow. Although there is some storage available, the effect would be negligible for the test flood. Consequently, at these two structures this simplified version of the inflow hydrograph gives a more conservative view of the effects at Indian Lake Dam.

5.5 Dam Failure Analysis: A dam failure analysis was performed using the "Rule of Thumb" method for estimating downstream dam failure hydrographs established by the Corps of Engineers. Failure was assumed to occur when the water level in the lake was at the level of the top of the dam.

The calculated dam failure discharge is 2,500 cfs and will produce an increase in the depth of flow of approximately 9 feet at a point 750 feet downstream of the dam. The failure analysis covered a distance of approximately 1,700 feet downstream, as shown by the calculations in Appendix D. The increase in the depth of flow at that point was calculated to be approximately 2 feet for the dam failure. The spillway discharge just prior to the dam's failure would be 340 cfs, producing a depth of flow of about 2 feet at each of the 2 points mentioned above.

The dam breach would cause appreciable damage to the bridge and trailers located 700 to 1000 feet downstream of the dam and might result in the loss of more than a few lives. Several trailers in particular would be flooded due to these flows, which would raise the water levels to a depth of at least 2 feet above the floor levels of the trailers.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations: The visual inspection indicated that the downstream wall of the spillway and left section of the dam has deteriorated, with apparent bulging and general distortion of the stone blocks. There is also a cavity about 3 feet wide at the base of the spillway wall. On the basis of these observations, the future stability of the wall is questionable, particularly under large discharge flows.

6.2 Design and Construction Data: There was no available design and construction data.

6.3 Post Construction Changes: There have been no known post construction changes except for the repairs of the left section of the dam after having been overtopped and eroded in the January 1979 storm. The repairs consisted mostly of setting stones with mortar in the upper 2 feet of the upstream and downstream walls with no apparent improvements of the overall wall stability.

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: On the basis of the visual inspection, the dam is judged to be in poor condition. The deterioration of the stone masonry downstream wall endangers its stability.

b. Adequacy of Information: The assessment of the condition of this dam is based primarily on the visual inspection, past performance history and sound engineering judgment.

c. Urgency: The recommendations and remedial measures relating to the downstream wall of the dam, as described below, should be implemented by the Owner within 6 months after receipt of this Phase I report. All other recommendations and remedial measures should be implemented within one year after receipt of the report.

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

a. Analyze the stability of the dam in general and the downstream wall in particular. Also investigate the source and significance of downstream seepage and seepage into the outlet pipe.

b. Conduct a detailed hydraulic investigation to assess the need for and means to increase the discharge capacity of the spillway and outlet works.

c. It should be noted that repairs consisting primarily of filling the voids and joints of the downstream masonry wall with mortar can be detrimental to the stability of the dam, resulting in a rise of the phreatic surface within the dam, and consequently an increased load against the wall. Any such future repairs should not be implemented without the advice and supervision of a qualified professional engineer.

d. Trees should be removed from the upstream slope, downstream slope, and from an area within 20 feet of the downstream wall of the dam. Stumps and root systems should be removed from the areas indicated and the holes filled with appropriate fill, under the supervision of an engineer.

7.3 Remedial Measures:

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

b. Remove trees and saplings from slopes including the roots. Resulting voids should be backfilled with suitable compacted material.

c. Develop an "Emergency Action Plan" that will include an effective preplanned downstream warning system, locations of emergency equipment, materials and manpower, authorities to contact and potential areas that require evacuation.

d. Institute a program of annual technical inspection by a qualified registered engineer.

7.4 Alternatives: As an alternative to the above recommendations and remedial measures, the Owner should consider removing the dam under the supervision of a registered professional engineer.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT *INDIAN LAKE DAM* DATE *NOVEMBER 12, 1980*

TIME *10 am*

WEATHER *Clear, windy*

W.S. ELEV. *Spillway Crest* U.S. ____ DN.S.

PARTY:

1. *John F. Lenard, L.D.E.I.*
2. *Michael Dilaj, L.D.E.I.*
3. *Karl Acimovic, L.D.E.I.*
4. *Gonzalo Castro, G.E.I.*
5. ____
6. ____
7. ____
8. ____
9. ____
10. ____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT *INDIAN LAKE DAM* DATE *NOVEMBER 12, 1980*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
DAM	
Crest Elevation	
Current Pool Elevation	
Maximum Impoundment to Date	*Overtopped in January 1979.*
Surface Cracks	*None observed.*
Pavement Condition	*Not applicable*
Movement or Settlement of Crest	*Too irregular to judge*
Lateral Movement	*Too irregular to judge*
Vertical Alignment	*Too irregular to judge*
Horizontal Alignment	*Some bulging of downstream face, especially left of abutment*
Condition at Abutment	*Erosion at left abutment, particularly downstream of dam.*
Indications of Movement of Structural Items on Slopes	*Not applicable*
Trespassing on Slopes	*Some trespassing on upstream slope right of spillway.*
Sloughing or Erosion of Slopes or Abutments	*None except as noted above*
Rock Slope Protection - Riprap Failures	*No rock slope protection observed.*
Unusual Movement or Cracking at or Near Toe	*None observed*
Embankment or Downstream Seepage	*Two seepage areas at left abutment downstream of dam.*
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	*Trees growing out of upstream slope and downstream walls, up to 1' trunk diameter*

PERIODIC INSPECTION CHECKLIST

PROJECT *INDIAN LAKE DAM* DATE *NOVEMBER 12, 1980*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	*There is no dike at this location.*
Crest Elevation	
Current Pool Elevation	
Maximum Impoundment to Date	
Surface Cracks	
Pavement Condition	
Movement or Settlement of Crest	
Lateral Movement	
Vertical Alignment	
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	
Indications of Movement of Structural Items on Slopes	
Trespassing on Slopes	
Sloughing or Erosion of Slopes or Abutments	
Rock Slope Protection - Riprap Failures	
Unusual Movement or Cracking at or Near Toes	
Unusual Embankment or Downstream Seepage	
Piping or Boils	
Foundation Drainage Features	
Toe Drains	
Instrumentation System	
Vegetation	

PERIODIC INSPECTION CHECKLIST

PROJECT *INDIAN LAKE DAM* DATE *NOVEMBER 12, 1980*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	*None observed.*
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	*Sluice gate under water, not operable.*
Condition of Concrete	
Stop Logs and Slots	*Sluice gate closed, but leaking ∿15 gmp.*

PERIODIC INSPECTION CHECKLIST

PROJECT *INDIAN LAKE DAM* DATE *NOVEMBER 12, 1980*

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 *INDIAN LAKE DAM* DATE *NOVEMBER 12, 1980*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	
Conduit	*Cast iron 20" I.D. pipe, apparently in good condition. Inspected from downstream end. An apparent seep into pipe about 1/3 from upstream end. Closed gate had deteriorated guide post; also deteriorated stem. Vertical planking gate.* *Gate leaking at about 15 gpm.*

PERIODIC INSPECTION CHECKLIST

PROJECT *INDIAN LAKE DAM* DATE *NOVEMBER 12, 1980*

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	*No outlet structure. Outlet channel is part of original stream channel.*
General Condition of Concrete	*Not applicable.*
Rust or Staining	*Not applicable.*
Spalling	*Not applicable.*
Erosion or Cavitation	*Not applicable.*
Visible Reinforcing	*Not applicable.*
Any Seepage or Efflorescence	*Not applicable.*
Condition at Joints	*Not applicable.*
Drain holes	*Not applicable.*
Channel	*Silted, some trees fallen over channel, vegetation growth.*
Loose Rock or Trees Overhanging Channel	*Numerous trees along channel banks.*
Condition of Discharge Channel	*Obstructions, as noted; poor condition.*

PERIODIC INSPECTION CHECKLIST

PROJECT *INDIAN LAKE DAM* DATE *NOVEMBER 12, 1980*

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	
General Condition	*Poor, dry stone masonry, large voids on training walls and one at base of downstream face of spillway.*
Rust or Staining	*Not applicable*
Spalling	*Not applicable*
Any Visible Reinforcing	*Not applicable*
Any Seepage or Efflorescence	*Considerable seepage out of downstream face.*
Drain Holes	*Not applicable.*
c. Discharge Channel	*Natural stream bed.*
General Condition	*Fair*
Loose Rock Overhanging Channel	*None*
Trees Overhanging Channel	*Many trees along channel edge.*
Floor of Channel	*Gravelly, fallen trees and rock*
Other Obstructions	*Possibly wood plank bridge 300 feet downstream of dam.*
Other Comments	

PERIODIC INSPECTION CHECKLIST

PROJECT *INDIAN LAKE DAM* DATE *NOVEMBER 12, 1980*

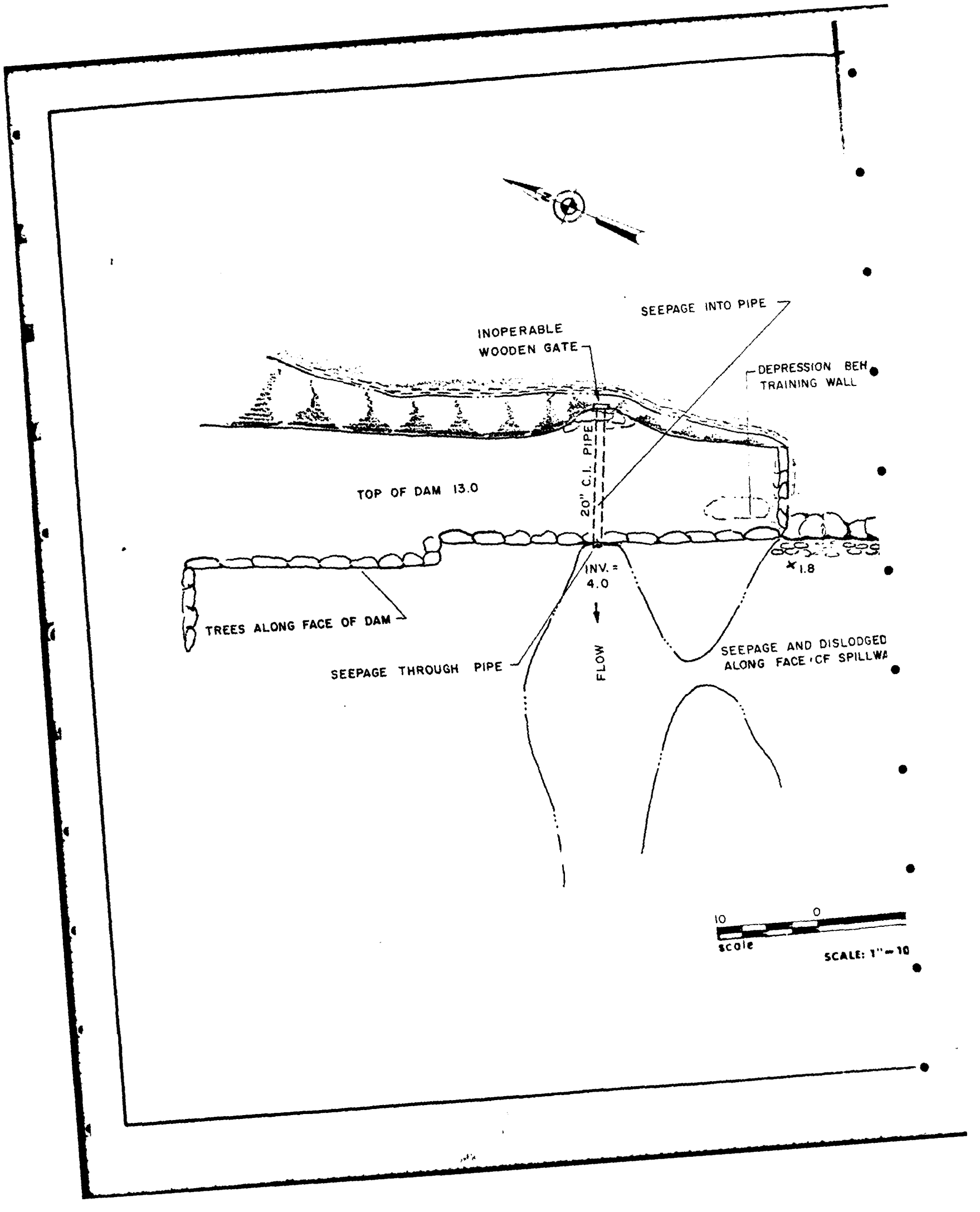
PROJECT FEATURE _____ NAME _____

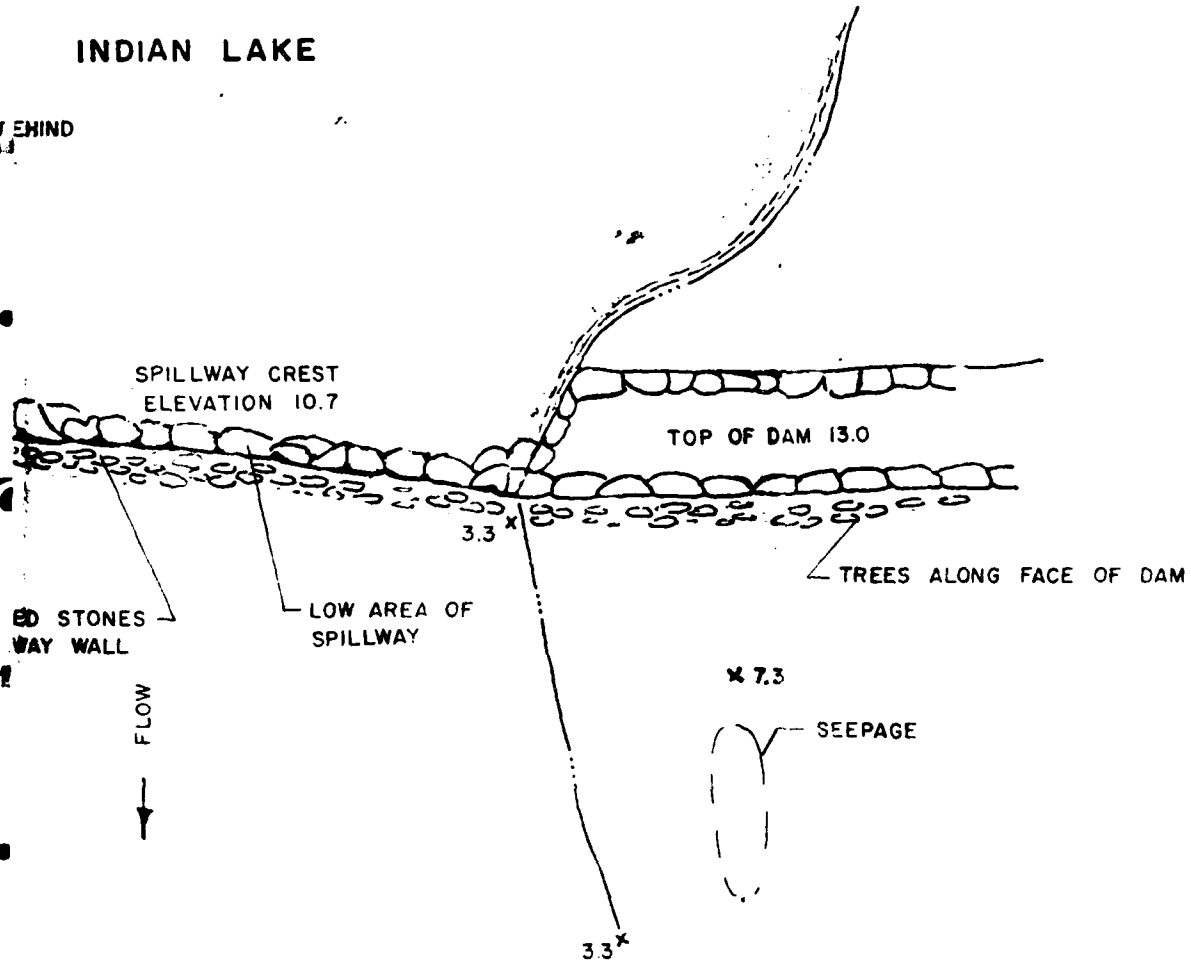
DISCIPLINE _____ NAME _____

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


SEEPAGE INTO PIPE
INOPERABLE
WOODEN GATE
DEPRESSION BEN
TRAINING WALL
20" C.I. PIPE
TOP OF DAM 13.0
INV. =
4.0
1.8
TREES ALONG FACE OF DAM
SEEPAGE THROUGH PIPE
FLOW
SEEPAGE AND DISLODGED
ALONG FACE OF SPILLWA
10
0
scale
SCALE: 1" = 10



10 20
feet

10'

EDWARD 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

SITE PLAN

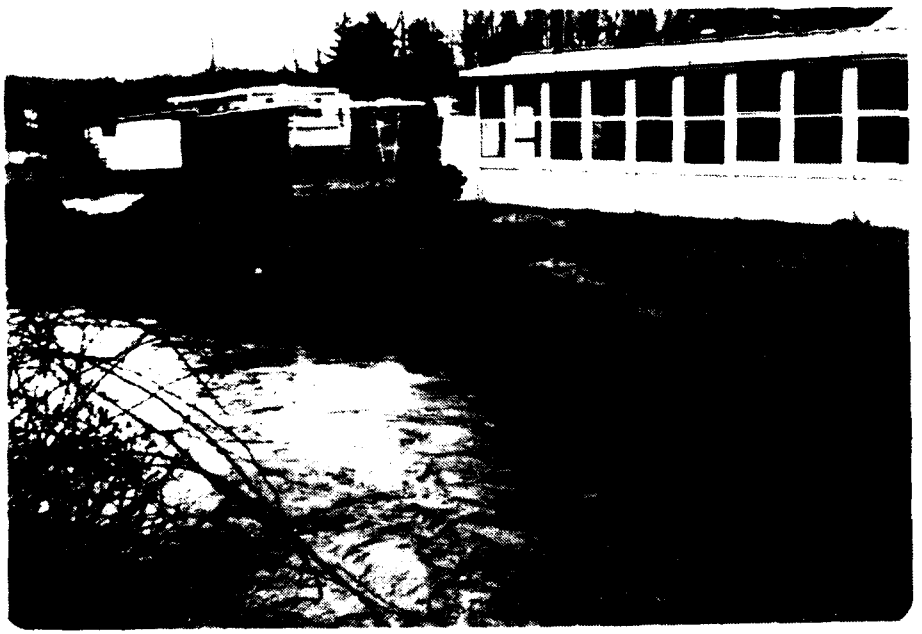
INDIAN LAKE DAM

CLINTON, CONNECTICUT

DRAWN BY	CHECKED BY	APPROVED BY	DATE

LEFT EMBANKMENT SHOWING LOCATION OF SANDBAGS WHERE DAM WAS OVERTOPPED.

LEFT EMBANKMENT SHOWING DOWNSTREAM WALL. NOTE DISLODGED STONES, DUE TO OVERTOPPING. SANDBAGS ON UPSTREAM SIDE CAN BE SEEN AT TOP RIGHT OF PICTURE.



CHANNEL DOWNSTREAM FROM DAM AT THE FIRST TRAILER. NOTE EROSION AND SLOUGHING OF EMBANKMENT.

INDIAN LAKE DAM

PICTURES TAKEN DURING THE JANUARY 22, 1979 STORM

THE NEW HAVEN REGISTER, FRIDAY, JANUARY 26, 1979

Dead End

Mill Pond Dam reportely was stable Thursday, but that didn't stop water from flooding this nearby dirt road off Old Mill Road in Clinton. Civil Preparedness Director Gerald Vece said many local roads were having a difficult time recuperating from the relentless rain. (Staff photo by Nancy Combs).

BUCK & BUCK
ENGINEERS
98 WADSWORTH STREET, HARTFORD, CONNECTICUT 06106

JAMES A. THOMPSON
ROBINSON W. BUCK
LAWRENCE P. BUCK

HENRY WOLCOTT BUCK
1931-1965
ROBINSON D. BUCK
1935-1950

COMM. 5713-139

January 23, 1979

Mr. Victor F. Galgowski,
Department of Environmental Protection,
State Office Building, Capitol Avenue,
Hartford, Connecticut 06115

Reference: Indian River Dam, Clinton

Dear Vic:

At your request I inspected the subject dam on Sunday, the 21st and again on Monday, January 22nd. On Sunday, flow over the dam was at bank full stage and there was evidence that the southerly abutment had been overtopped prior to my arrival. The rubble stone masonry on the downstream face of the southerly abutment had collapsed and efforts had been made to divert flow from the collapsed area, by use of sand bags.

A very short distance downstream from this dam is a timber road bridge and a trailer park. The trailer nearest the dam is a permanently installed unit, immediately adjacent to the river. At the time of peak flow, and high tide, the water surface of the river was approximately 24 inches below the floor level of the trailer. It is my opinion, that should the subject dam fail, it would severely damage this trailer, and could also damage other trailers which are further downstream, and at lower elevations.

On Monday I met Mr. Gerald J. Vece, the Clinton Director of Civil Preparedness, and advised him of the dangerous situation at the dam. He told me that he had been informed that stones had also been dislodged from the face of the spillway. I don't doubt this, but, I cannot confirm it because of the heavy flow over the spillway.

I advised Mr. Vece that there was probably no danger as long as the water level upstream from the dam was below the bank level and dropping, however, I also advised that he should monitor the situation and warn people of the danger should the water levels start to rise toward their previous highs.

In my opinion this dam is unsafe and poses a danger to life and property immediately downstream. Considering the state of collapse of the southerly abutment, the dam should either be repaired on an emergency basis or breached.

Sincerely yours,
BUCK & BUCK

James A. Thompson

JAT:fb

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING HARTFORD, CONNECTICUT 06115

2 February 1979

Mr. George Rollar
133 West Main Street
Clinton, CT 06413

Re: Indian Lake Dam
Clinton

Dear Mr. Rollar:

According to records maintained in this office, you are the owner of the subject dam.

Under Section 25-110 of the 1975 Revision of the General Statutes, a copy of which is enclosed, the Department of Environmental Protection has jurisdiction over all dams "---which by breaking away or otherwise might endanger life or property". The Indian Lake Dam could cause damage in the event of failure and is, therefore, under the jurisdiction of this department.

During the heavy rainstorm of January 21 and again on January 22, the dam was inspected by an engineering consultant retained by our department. The results of his inspection indicate the dam cannot be considered a safe structure in its present condition.

Since Section 25-111 of the General Statutes states in part: "If, after any inspection described herein, the Commissioner finds any such structure to be in an unsafe condition, he shall order the person, firm or corporation owning or having control therof to place it in a safe condition or to remove it, and shall fix the time within which such order shall be carried out", the following order is mandated.

FINDINGS

Based on an engineer's report covering the inspection of the Indian Lake Dam, the Department of Environmental Protection finds the structure to be in an unsafe condition. It also finds that certain repairs or alterations are necessary to place the structure in a safe category.

The repairs or alterations to be made should include, but are not necessarily limited to the following items:

1. Repair southerly stone masonry abutment.
2. Replace any stones dislodged from the spillway section.
3. Assure adequate spillway capacity and freeboard.

Mr. George Rollar
133 West Main Street
Clinton, CT 06413

ORDER

In accordance with Section 25-111 of the 1975 Revision of the General Statutes, you are hereby ordered to make the repairs or alterations necessary to place the Indian Lake Dam in a safe category or to remove the structure.

Any repairs or alterations to the structure or its removal shall be carried out in accordance with engineering plans and specifications prepared by an engineer registered in the State of Connecticut and submitted to this department for approval and for the issuance of a permit prior to any construction or demolition work in accordance with Section 25-112 of the 1975 Revision of the General Statutes.

The Commissioner shall be notified in writing within three weeks of receipt of this order as to what steps you plan to take to repair or remove the structure. Engineering plans should be submitted for the repair or removal of this dam by August 1, 1979 and repair or removal accomplished by February 1, 1980. Until necessary repairs are completed, an emergency plan should be prepared to prevent or minimize the possible failure of the dam. You should develop a warning system with local authorities for alerting downstream residents in case of emergency.

Sincerely yours,

Stanley J. Pac
Commissioner

SJP:VFG:ljk

cc: Daniel A. Vece, Jr.
First Selectman, Clinton

Enclosure

SENT CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Water Resources Unit
Telephone no. 566-7245

203/669 5725

Rollar Homes, Inc.

133 West Main Street
CLINTON, CONNECTICUT 06413

February 9, 1979

State of Connecticut
Department of Environmental Protection
State Office Building
Hartford, Connecticut 06115
Attention: Stanley J. Pac

Dear Mr. Pac:

Re: your letter dated February 2, 1979 on the Indian Lake Dam.

On February 9, 1979 Daniel Vece, First Selectman of the Town of Clinton and I physically inspected the Indian Lake Dam.

I plan to make the necessary repairs as outlined in your letter when the weather permits.

As I will be out of the State for a period of time, I will contact your office upon my return to the area.

If you have any further questions on this matter, please contact my office.

Sincerely,

GEORGE ROLLAR

GR/bs

cc: Daniel Vece, Jr.
First Selectman, Clinton

COPY

COPY

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING HARTFORD, CONNECTICUT 06115

25 February 1980

Mr. Dean E. Phillips
276 Main Street
Portland, CT

Re: Indian Lake (Mill Pond)
Clinton

Dear Mr. Phillips:

We have reviewed your recently submitted report on the subject dam owned by Mr. George Rollar.

It appears the report adequately addresses the first two items listed in the Order of February 2, 1979; specifically, repairs to the stone masonry sections of the dam. However, we are still concerned about the adequacy of the spillway and cannot agree that a hydrologic analysis is unwarranted at this time.

Your report indicates a contributing drainage area of approximately 2300 acres. The "Gazeteer of Drainage Areas" published by U.S.G.S. indicates it to be about seven square miles or 4480 acres. The analysis also suggests present spillway capacity is about 300 c.f.s. In our opinion, discharges resulting from a storm of a 100 year frequency would be considerably in excess of 300 c.f.s.

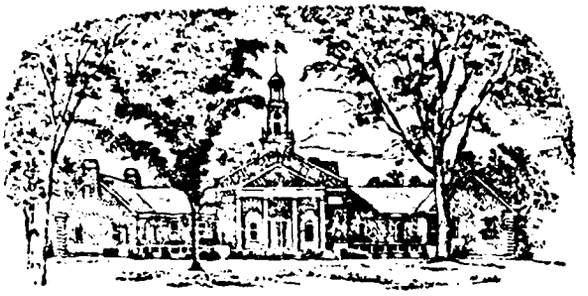
In view of the potential hazard posed by this dam to downstream property and the fact that it did overtop in January, 1979, further study of the adequacy of the spillway is warranted.

Very truly yours,

Victor F. Galgowski
Supt. of Dam Maintenance
Water Resources Unit
Telephone no. 566-7245

VFG:ljk

cc: George Rollar



TOWN OF CLINTON, CONNECTICUT 06413

October 17, 1979

Department of Environmental Protection
Erosion and Control Unit
State Office Building
Hartford, Connecticut 06115

Gentlemen:

This office has received an inquiry on the dam located on Old Mill Road in Clinton as to its condition.

I believe your office may have inspected this area. I would appreciate any information you could give me as to any action taken by your office.

Thank you for your consideration.

Respectfully yours,

Charles H. Pitt
ZONING & WETLANDS ENFORCEMENT OFFICER
TOWN OF CLINTON

CHP/ac

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING HARTFORD, CONNECTICUT 06115

October 25, 1979

Mr. George Rollar
Rollar Homes, Inc.
133 West Main Street
Clinton, CT 06413

Re: Indian Lake Dam
Clinton, Connecticut

Dear Mr. Rollar:

On February 2, 1979, Commissioner Stanley J. Pac issued an Order for repairs to the subject dam which is under your ownership. The Order stipulated engineering plans for the proposed work be submitted by August 1, 1979. Upon review and approval of the plans, a Construction Permit would be issued. Subsequently, by means of a letter dated February 9, 1979, you indicated your intentions to comply.

Since we have received no further communications, please consider this letter a reminder of the conditions outlined in the Order, especially the completion of necessary repairs by February 1, 1980.

Very truly yours,

Victor F. Galgowski
Supt. of Dam Maintenance
Water Resources Unit
566-7245

VFG/dr

203/669-5725

Rollar Homes, Inc.

133 West Main Street
CLINTON, CONNECTICUT 06413

November 6, 1979

Mr. Victor F. Galgowski
State of Connecticut
Dept. of Environmental Protection
Water Resources Unit
State Office Building
Hartford, CT 06115

Re: Indian Lake Dam
Clinton, Conn.

Dear Mr. Galgowski:

The repairs that were ordered on the dam have been completed. If an engineer from the state wishes to inspect the repairs please contact me so that we may set up an appointment.

Thank you.

Sincerely,

Darlene Rollar

DARLENE ROLLAR

DR:mr

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING HARTFORD, CONNECTICUT 06115

November 14, 1979

Mr. George Rollar
Rollar Homes, Inc.
133 West Main Street
Clinton, CT 06413

Re: Indian Lake Dam
Clinton, Connecticut

Dear Mr. Rollar:

Thank you for your prompt reply to our recent inquiry concerning needed alterations to your dam. I am pleased to learn that certain repairs have been made to the structure.

However, the Order issued by the Commissioner of the Department of Environmental Protection, on February 2, 1979, specifically stated that any repairs or alterations to the dam must be carried out in accordance with engineering plans and specifications prepared by a registered engineer and submitted for our approval prior to any construction.

The procedure you followed is not in conformity with the Order or with state statutes pertaining to supervision of dams. Therefore, you must now retain a registered engineer to prepare engineering drawings and specifications for the work as completed and make them available to this office. In addition, the engineer must certify the dam, in its present condition, can be classified as a safe structure.

Very truly yours,

Victor F. Galgowski

Victor F. Galgowski
Supt. of Dam Maintenance
Water Resources Unit
566-7244

VFG/dr

cc: Daniel A. Vece, Jr.
First Selectman
Town Hall
54 East Main Street
Clinton, CT 06413

ENGINEERS REPORT

CONCERNING

STABILITY OF

THE INDIAN RIVER DAM

CLINTON, CONNECTICUT

GEORGE ROLLAR

OWNER

dean e. phillips
consulting engineer
portland, connecticut

CONTENTS

1. Purpose

The purpose of this report is to investigate the safety of the Indian River Dam and to determine if necessary repairs have been made subsequent to the damage that occurred on the 21st and 22nd of January, 1979.

2. Location

The dam is located on the southern portion of the Indian River in Clinton, Connecticut. It lies about 600 feet east of the center line of Connecticut Route 81 and 700 feet south of U.S. I-95.

3. Drawings

The following drawings accompany this report as appendices and are deemed to be a part thereof:

Exhibit A LOCATION PLAN - INDIAN RIVER DAM

Exhibit B DRAINAGE AREA TRIBUTARY TO INDIAN RIVER DAM

Exhibit C TOPOGRAPHIC SURVEY - INDIAN RIVER DAM

4. Description

The Indian River Dam is a dry rubble masonary dam with a probable earth core. It is about 75 feet long and 7 to 9 feet wide at the top. The face of the dam is nearly vertical and, at the center line of the stream bed, rises 7 feet to the top of the spillway. The original purpose of the dam was the formation of an ice pond upstream. No known plans for the construction of the dam are in existance and the dam is relatively old. The pond formed by the dam has considerable asthetic and recreational value and also serves as a detention basin, stabilizing flow conditions downstream to some extent.

5. Cause for concern

On the 21st and 22nd of January, 1979 the area underwent

a rainfall approximating the duration and intensity of a 100 year storm. The southerly abutment of the dam was overtopped and some of the dry rubble masonry was washed away, both from the abutment and the spillway of the dam. At the request of Connecticut State Department of Environmental Protection, James A. Thomson of Buck and Buck Engineers, 98 Wadsworth Street, Hartford, CT. 06106 inspected the dam when the flow was near its highest level. In his report to the State, Mr. Thomson stated, considering the state of colapse of the southerly abutment that, "in my opinion the dam is a threat to life and property immediately downstream." He also stated that "the dam should be either repaired on an emergency basis or breached."

The dam has subsequently been repaired. However, the adequacy of the repairs and safety of the dam must be assured.

6. Investigation

a. Structure

Pursuant to a letter dated October 25, 1979 from Mr. Victor Galgowski of the State Department of Environmental Protection to Mr. George Rollar, this office was contacted to examine the dam and report its findings to the State.

Subsequent to the storms of January, 1979, but prior to examination by this office, reconstruction of the easterly abutment had been done. Consequently, a detailed structural analysis is now not feasible. However, a surfacial examination indicates that the work was satisfactorily done with the missing stones being returned and mortared in place above the existing dry rubble construction. The damaged area of the spillway is now almost totally of mortared stone.

A topographic survey conducted on 12/10/79 indicates that there is now a minimum freeboard of 2 feet at the spillway with the top being equal to or higher than that of the northerly abutment.

b. Hydrology

A detailed hydrological analysis of the Indian River drainage basin does not appear to be warranted at this time because of the expensive cost of such an analysis. The drainage basin consists of approximately 2300 acres with many holding areas of various sizes and to analyze them would be extremely time consuming.

Although damaged to some extent, this dam did successfully handle the heavy January, 1979 flows. The rainfall during that period approached the intensity and duration of a 100 year storm. The flow created thereby was further aggrivated by snow melt and ground frost which limited absorption by the soil.

7. Conclusion

Based upon our observations, surveys and analyses, it is our opinion that this dam will adequately handle the flow of a 100 year storm both structurally and hydraulically. The repairs which have been made appear to be successfull and the dam does not now present a threat to life or property downstream.

Respectfully submitted,

Dean E. Phillips, P.E.

Interdepartment Message

STO-201 REV. 7 78 STATE OF CONNECTICUT
(Stock No. 6938-051-01)

	NAME	TITLE	DATE
To	Victor F. Galgowski	Supt. of Dam Maintenance	21 February 1980
	AGENCY	ADDRESS	
	Water Resources Unit		
	NAME	TITLE	TELEPHONE
From	Charles J. Pelletier	Consultant	
	AGENCY	ADDRESS	
	Environmental Protection		

SUBJECT

Indian Lake Dam, Clinton

I have reviewed the report submitted in response to your order of February 2, 1979 and subsequent correspondence.

In summary you have required repair of damage to masonry which resulted from high flows in January 1979 and assurance of adequate spillway capacity & freeboard.

The report specifically omits hydrologic and hydraulic analyses. Approximate analysis suggest that the spillway capacity is about 300 c.f.s. without freeboard and that the 100 year flood flow is considerably in excess of 300 c.f.s. The report states that the drainage area is approximately 2300 acres. The Gazetteer of Drainage Areas shows a drainage area of about 6 square miles or 3840 acres.

We conclude that the report does not adequately address your requirement of acceptable spillway capacity and freeboard.

C J Pelletier
Water Resources Unit

CJP:ljk

COPY

COPY

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING HARTFORD, CONNECTICUT 06115

4 September 1980

Mr. George Rollar
133 West Main Street
Clinton, CT 06413

Re: Indian Lake Dam
Clinton

Dear Mr. Rollar:

Following heavy rainstorms in January of 1979 the subject dam was declared unsafe by a consultant to the Department of Environmental Protection. As mandated by state statutes, Commissioner Stanley J. Pac issued an Order to you to repair or remove the dam. Subsequently, you completed certain repairs without prior approval by our department. Since this procedure was not in accordance with the statutes pertaining to dams, you were requested to retain a registered engineer to prepare details of the work performed and to certify the dam as being safe.

This past February Dean Philips did submit on your behalf an engineering report of his findings following an investigation of the dam. Upon review of the report, he was notified a question of spillway adequacy still remained and a hydrologic and hydraulic analysis was required.

The purpose of this letter is to inform you we have not received this additional material. Therefore, the conditions of the Order have not been fully completed.

May we please have your cooperation.

Very truly yours,

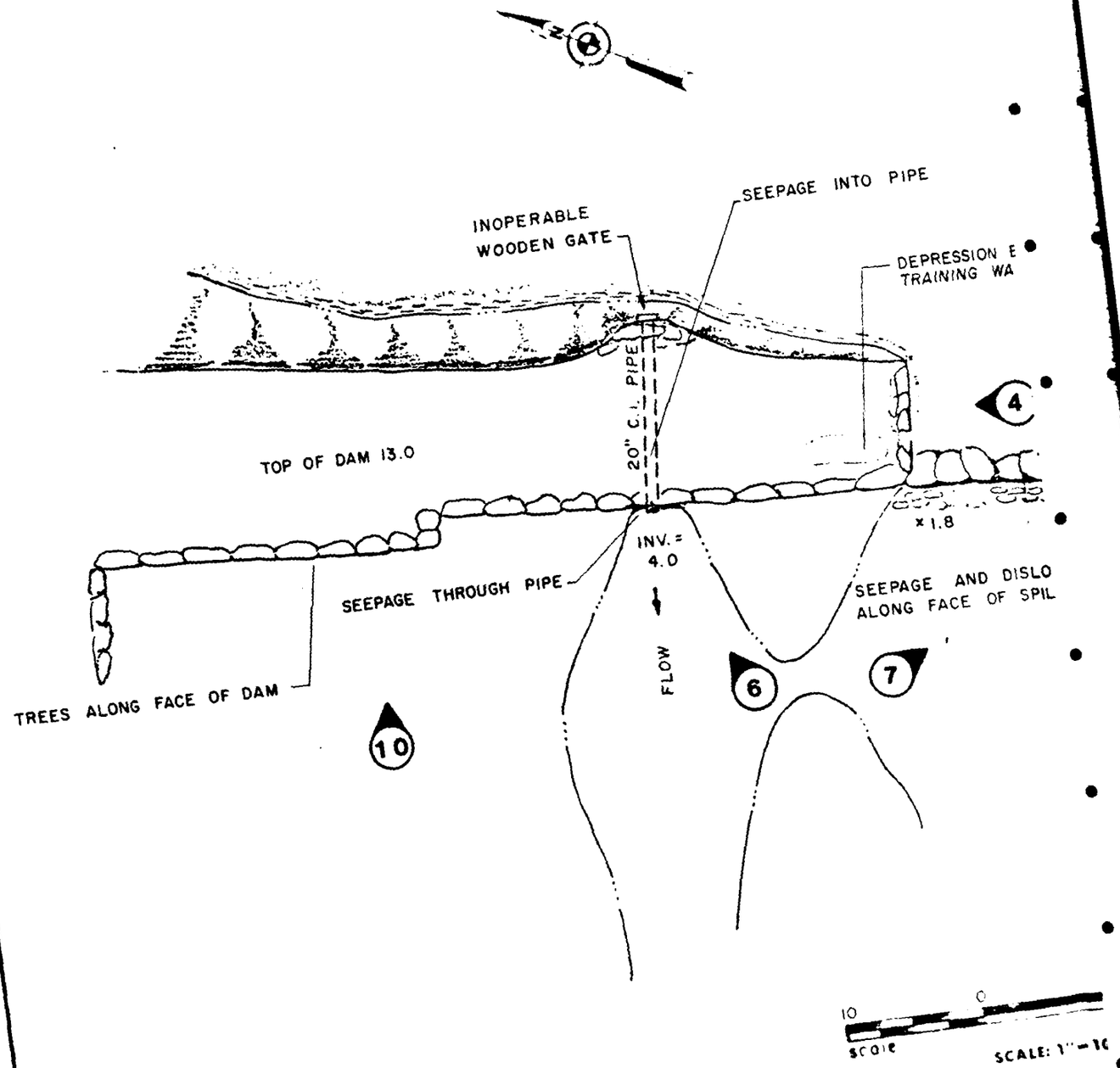
Victor F. Galgowski
Supt. of Dam Maintenance
Water Resources Unit
Telephone no. 566-7245

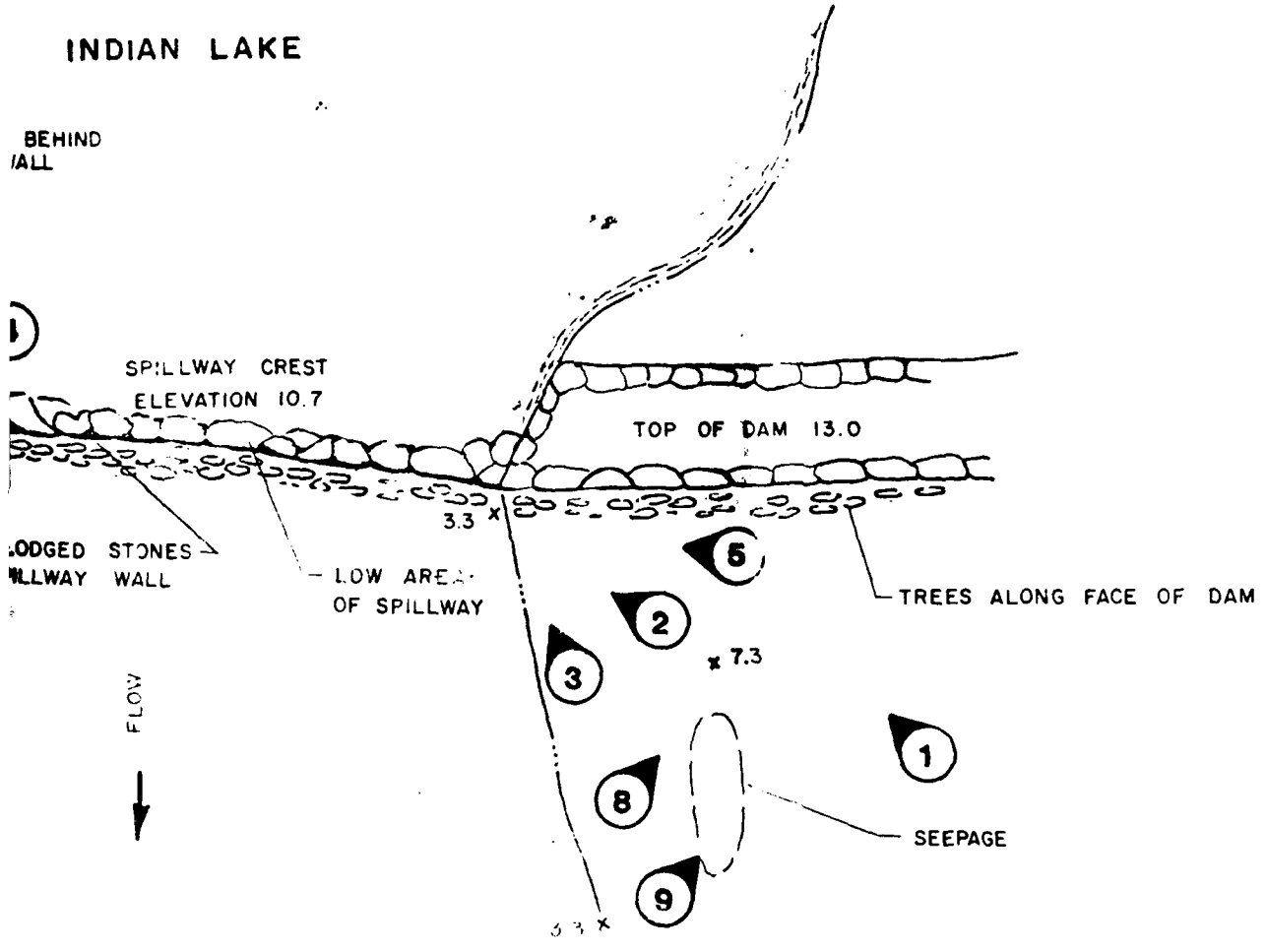
VFG:ljk

cc: Dean Philips
Dan Vece, First Selectman

APPENDIX C

PHOTOGRAPHS


INOPERABLE
WOODEN GATE
SEEPAGE INTO PIPE
DEPRESSION E
TRAINING WA
20" C.I. PIPE
4
TOP OF DAM 13.0
INV. =
4.0
x 1.8
SEEPAGE THROUGH PIPE
SEEPAGE AND DISLO
ALONG FACE OF SPIL
FLOW
6
7
TREES ALONG FACE OF DAM
10
10
0
SCALE: 1" = 1



10 20
feet

10'

LENARD DILAJ ENGINEERING, INC
STAFFORD CONNECTICUT
ENGINEER

US ARMY ENGINEER DIV NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM MASSACHUSETTS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

PHOTO INDEX

INDIAN LAKE DAM

CLINTON, CONNECTICUT

DRAWN BY	CHECKED BY	APPROVED BY	DATE

Photo 1 - Overview of left abutment showing repairs made in 1979 after the dam was overtopped. View of pond and I-95 culvert at inlet to the pond.

Photo 2 - Downstream side of left abutment. Note erosion damage and movement of stones on wall and embankment.

Photo 3 - Close-up of downstream wall at left end of spillway. Note tree growing out of spillway wall and upward displacement of stones. Horizontal direction indicated with level rod.

Photo 4 - Right training wall of spillway. Note large voids and tree growing at upstream end. (Extreme right of photo.)

Photo 5

Downstream side of spillway, showing same tree as on photo 4. Note irregular crest of spillway and siltation on upstream side of spillway.

Photo 6

Downstream wall and outlet pipe. Note tree growing on wall next to outlet pipe and seepage passing through sluice gate.

Photo 7 - Close-up of void at base of spillway wall.

Photo 8 - Seepage area at toe of left abutment about 15 ft. downstream of dam.

Photo 9

Seepage area at toe of left abutment about 20 ft. downstream of dam.

Photo 10

Downstream wall at right abutment. Note mortared joints.

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	INDIAN LAKE DAM CT C0189 CLINTON, CONNECTICUT JAN 1981 C-6

APPENDIX D

HYDROLOGIC AND HYDRAULIC

COMPUTATIONS

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

JOB Contract No. DAC... ...014
SHEET NO ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____
SCALE None

INDIAN LAKE DAM

DETERMINATION OF SPILLWAY TEST FLOOD*

A. SIZE CLASSIFICATION

Based on either storage or height

			THIS DAM:
(Small)	Storage	50-999 Ac.-Ft.	49 Ac.-Ft.
	Height	25-39 Ft.	12 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

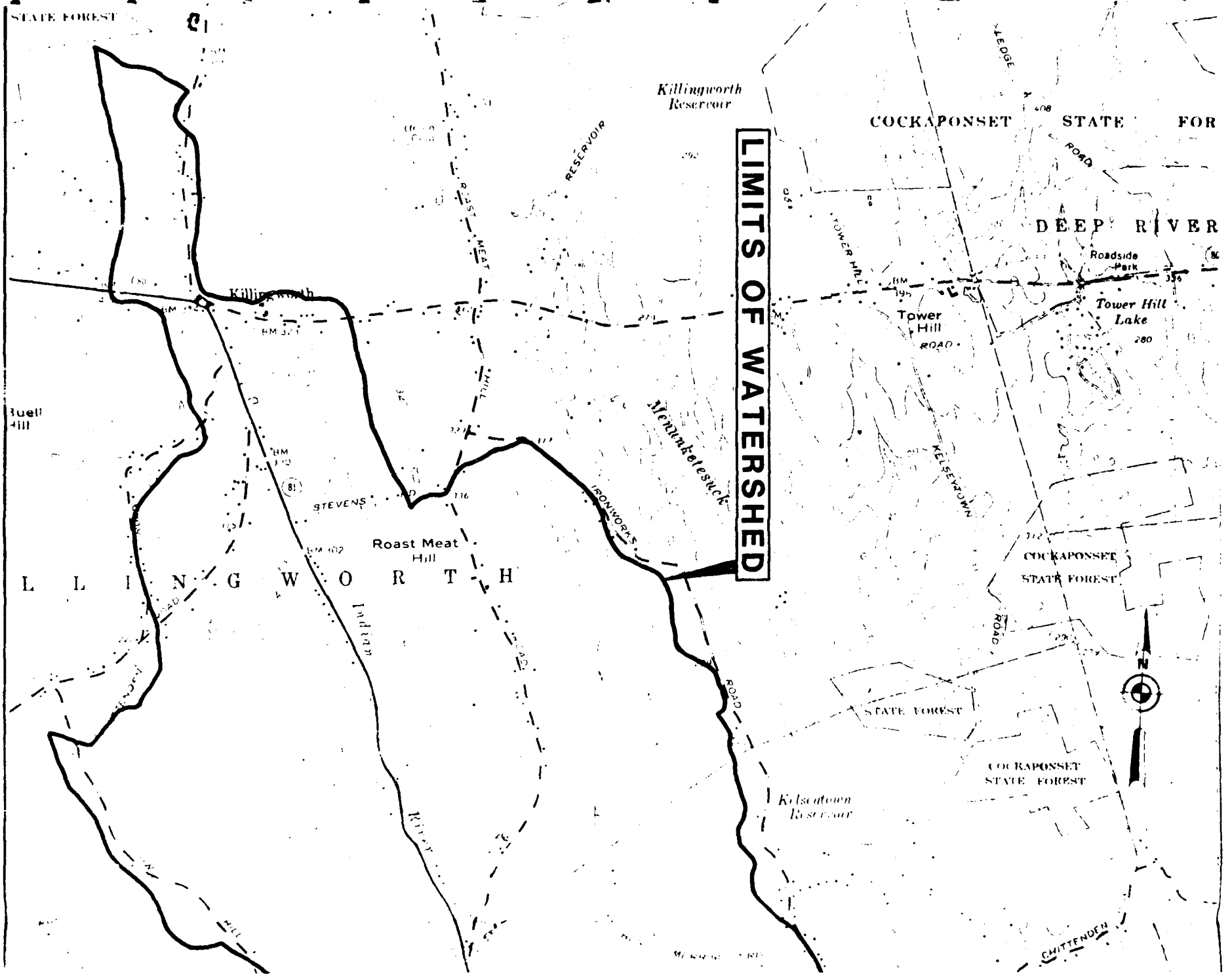
Hazard Classification HIGH

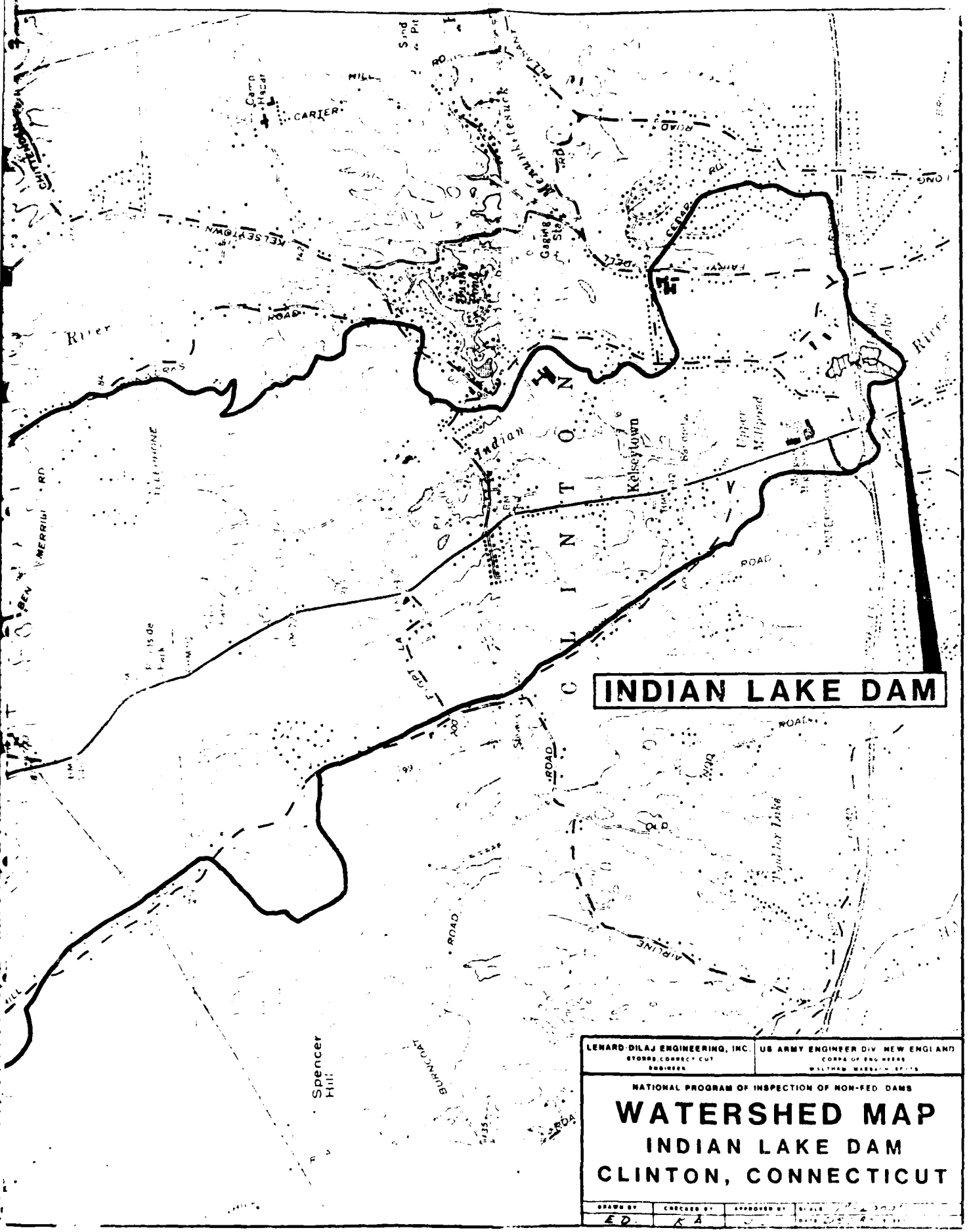
C. HYDROLOGIC EVALUATION GUIDELINES

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 ½ PMF

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


LIMITS OF WATERSHED
Killingworth Reservoir
COCKAPONSET STATE FOR
DEEP RIVER
Roadside Park
Tower Hill Lake
Tower Hill Road
Killingworth
Buell Hill
Roast Meat Hill
Menunketesuck
Kelseytown Road
Ironworks Road
Stevens Road
Indian River
Kelsentown Reservoir
COCKAPONSET STATE FOREST
STATE FOREST
COCKAPONSET STATE FOREST
Chittenden Hill
N



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

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

WATERSHED MAP

INDIAN LAKE DAM

CLINTON, CONNECTICUT

DRAWN BY	CHECKED BY	APPROVED BY	SCALE
E.D.	K.A.		

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

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

WATERSHED ANALYSIS

INDIAN LAKE DAM

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

RUN DATE= 12/08/80.
TIME= 16.02.32.

INDIAN LAKE DAM CLINTON CONNECTICUT
80-27-2
NOVEMBER 1980--DESIGN STORM--

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	TRACE
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 INDIAN LAKE DAM

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	6.75	0.00	6.75	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	25.50	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
3	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.20	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 5.54 CP= .63 NTA= 0

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

UNIT HYDROGRAPH 42 END-OF-PERIOD ORDINATES, LAG= 5.56 HOURS, CP= .63 VOL= 1.00

13.	50.	101.	160.	225.	293.	361.	419.	462.	491.
504.	501.	473.	431.	391.	355.	322.	292.	265.	241.
218.	198.	180.	163.	148.	134.	122.	111.	100.	91.
83.	75.	68.	62.	56.	51.	46.	42.	38.	35.
31.	28.	26.	23.	21.	19.	18.	16.	14.	13.
12.	11.	10.	9.	8.	7.	7.	6.	5.	5.
4.	4.								

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 25.91 20.29 5.62 185760.
(658.)(515.)(143.)(5260.14)

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

HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH INDIAN LAKE 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	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-11.	-1

STAGE	10.70	11.00	12.00	13.00	15.00	17.00
FLOW	0.00	15.20	145.30	342.00	884.20	1626.50
SURFACE AREA=	0.	11.	13.	15.	17.	19.	20.
CAPACITY=	0.	21.	36.	63.	95.	130.	169.
ELEVATION=	5.	11.	12.	14.	16.	18.	20.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
10.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
13.0	2.6	1.5	88.

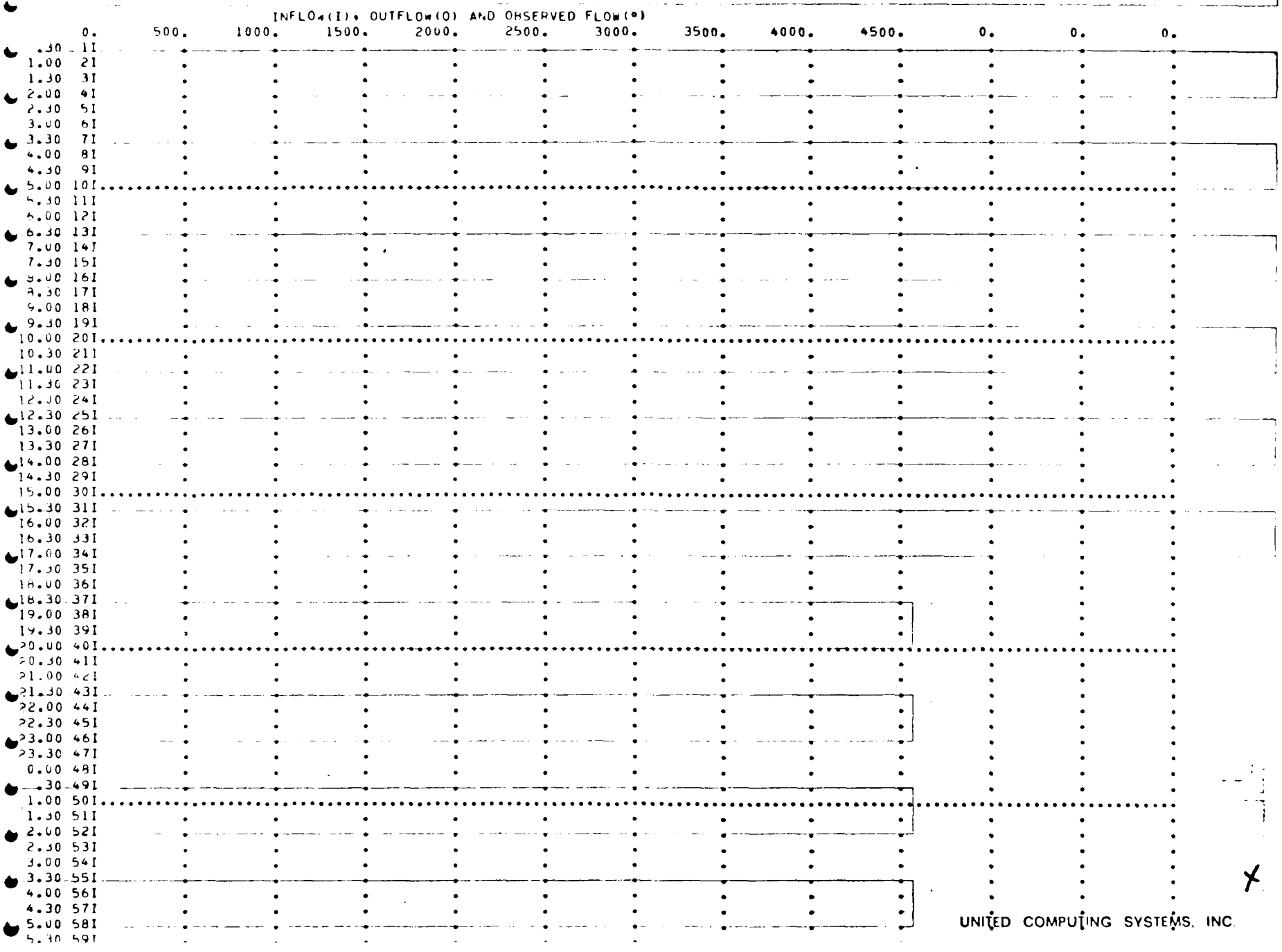
QVN

PEAK OUTFLOW IS 4368. AT TIME 45.00 HOURS

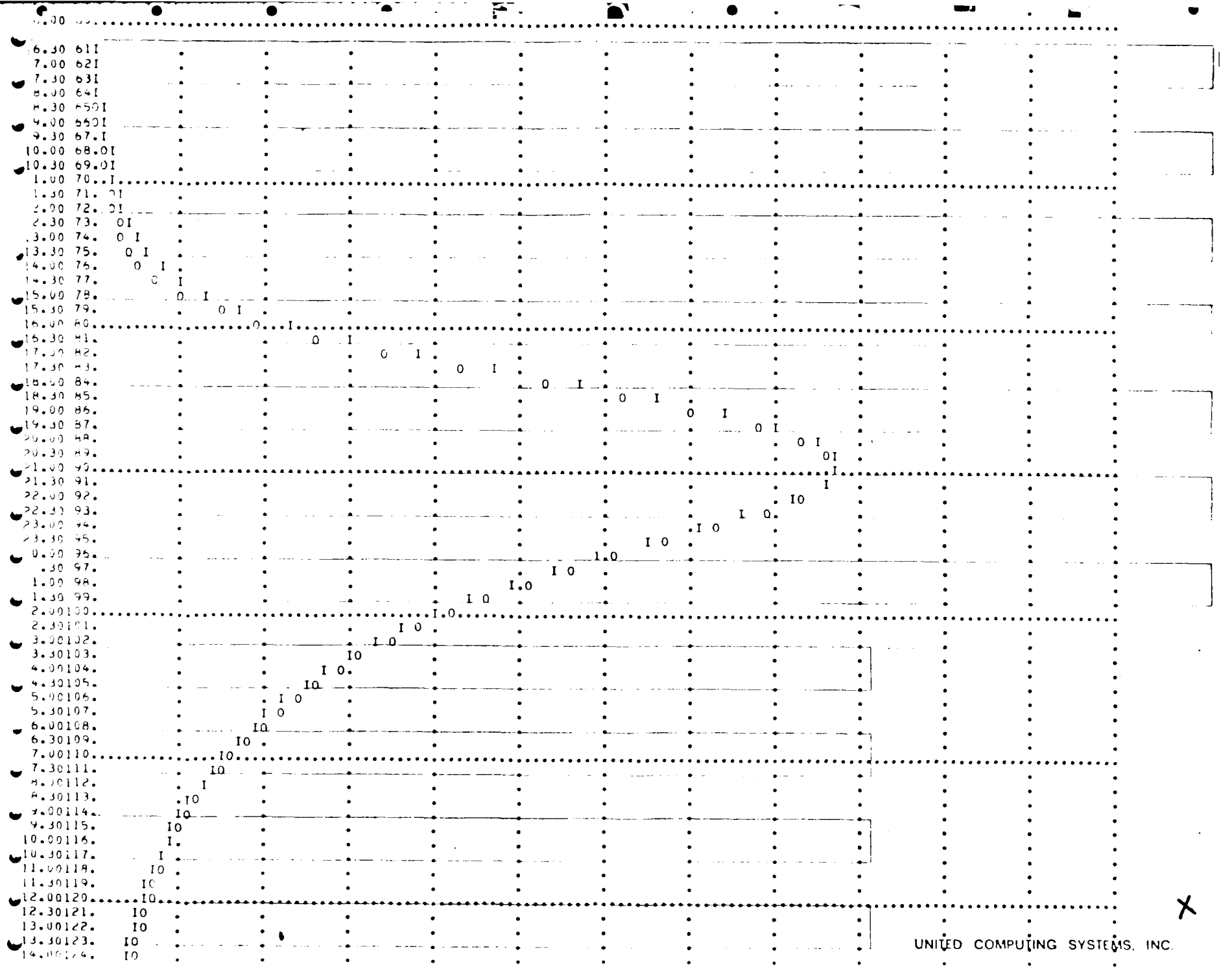
INFLOW/OUTFLOW HYDROGRAPH

STATION 2

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



UNITED COMPUTING SYSTEMS, INC.


UNITED COMPUTING SYSTEMS, INC.

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 .20	RATIO 3 .30	RATIO 4 .50	RATIO 5 .80	RATIO 6 1.00
HYDROGRAPH AT	1	6.75	1	874.	1748.	2623.	4371.	6994.	8742.
		(17.48)		(24.75)	(49.51)	(74.26)	(123.77)	(198.04)	(247.55)
ROUTED TO	2	6.75	1	871.	1746.	2620.	4368.	6989.	8737.
		(17.48)		(24.67)	(49.45)	(74.20)	(123.69)	(197.92)	(247.40)

INDIAN LAKE DAM — SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

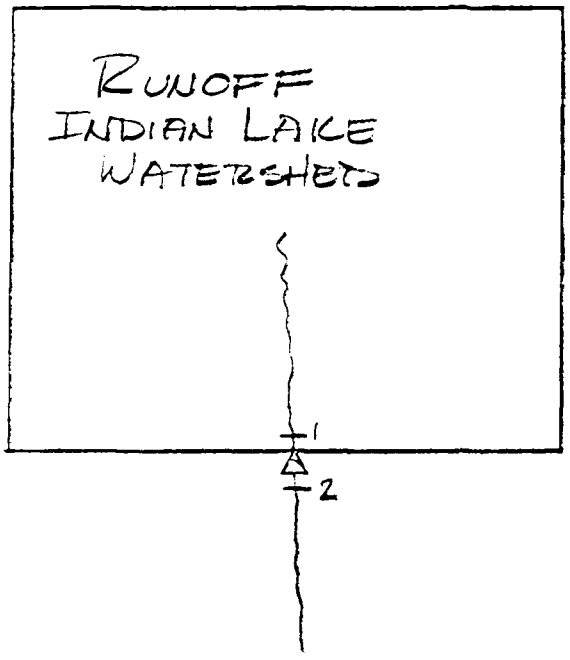
	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	10.70	10.70	13.00
STORAGE	21.	21.	49.
OUTFLOW	0.	0.	342.

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	14.05	1.05	64.	871.	9.50	45.00	0.00
.20	15.26	2.26	83.	1746.	14.50	45.00	0.00
.30	16.21	3.21	98.	2620.	18.00	45.00	0.00
.50	17.88	4.88	127.	4368.	21.50	45.00	0.00
.80	20.07	7.07	170.	6989.	38.00	45.00	0.00
1.00	21.41	8.41	198.	8737.	38.50	45.00	0.00

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

JOB INDIAN LAKE DAM
SHEET NO 1 OF 13
CALCULATED BY K. A. DATE 11/18/80
CHECKED BY J. L DATE 12/30/1980
SCALE

SCHEMATIC



1- INDIAN LAKE INFLOW
2- " " " ROUTED THROUGH DAM

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

JOB INDIAN LAKE DAM
SHEET NO 2 OF 13
CALCULATED BY K. A. DATE 11/18/80
CHECKED BY J. L. DATE 12/30/1980
SCALE

WATERSHED AREA

CLINTON QUAD:

11,904
8953
2951 grads ⟹ 6.74 S.M.

7231
4271
2960 grads ⟹ 6.76 S.M.

6.75 S.M.

LAKE SURFACE AREAS

LAKE: 4 grads ⟹ 5.85 AC.

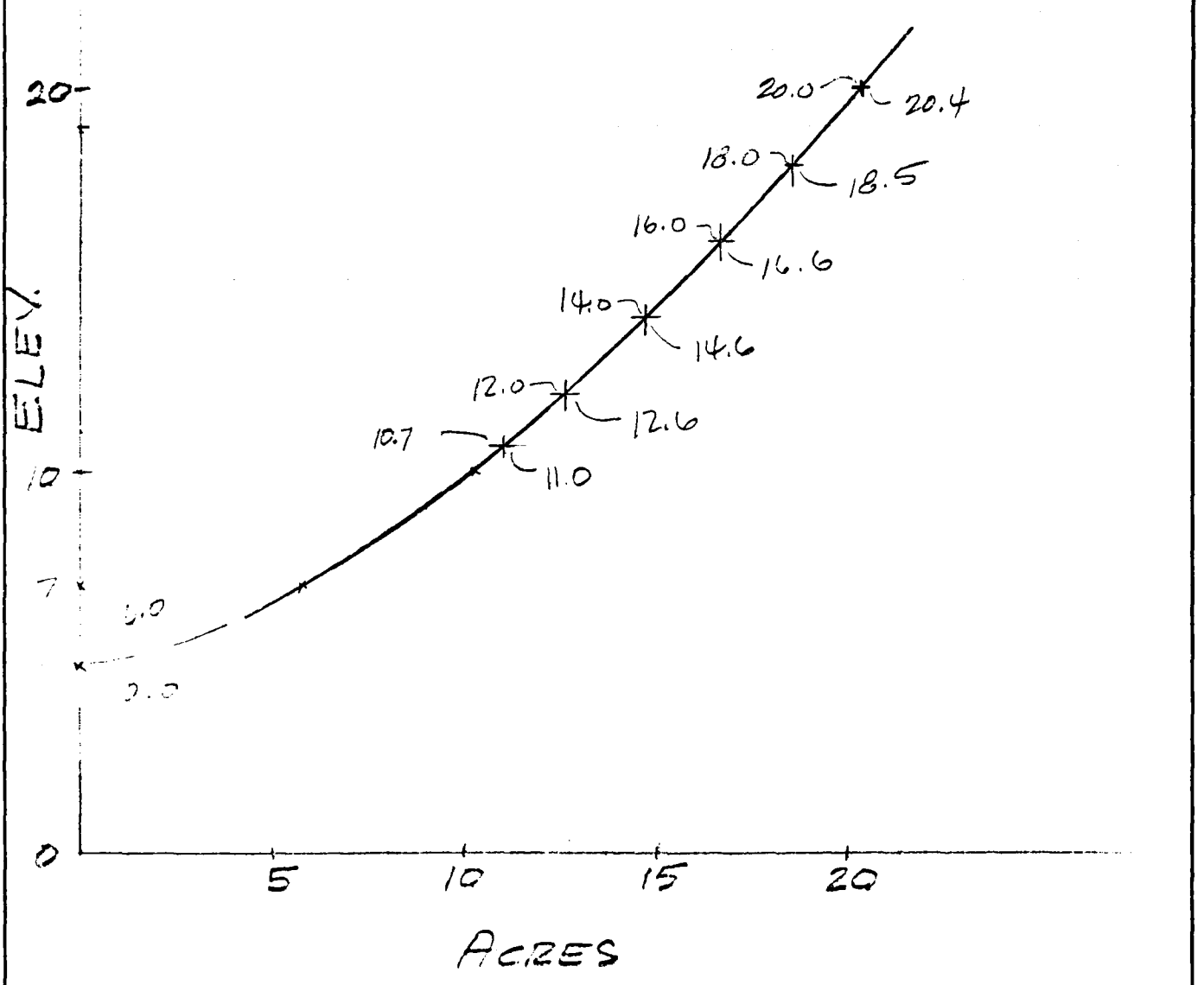
10' CONTOUR: 7 grads ⟹ 10.2 AC.

20' CONTOUR: 14 grads ⟹ 20.4 AC.

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

JOB INDIAN LAKE DAM
SHEET NO 3 OF 13
CALCULATED BY KA DATE 11/18/80
CHECKED BY JL DATE 12/30/1980
SCALE

SURFACE AREAS (CONT.)



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

JOB INDIAN LAKE DAM
SHEET NO 4 OF 13
CALCULATED BY K. A. DATE 11/18/80
CHECKED BY J.F.L DATE 12/30/1980
SCALE

PRECIPITATION

U.S. Weather Bureau
Tech. Paper No. 40

PMF - 6 Hours
10 Sq. Mi.

25.5 INCHES

LAG TIME (SNYDER'S)

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

$C_t = 2.0$

$L = 40,350'/5280' = 7.64$ Mi.

$L_{CA} = 29,600'/5230' = 3.00$ Mi.

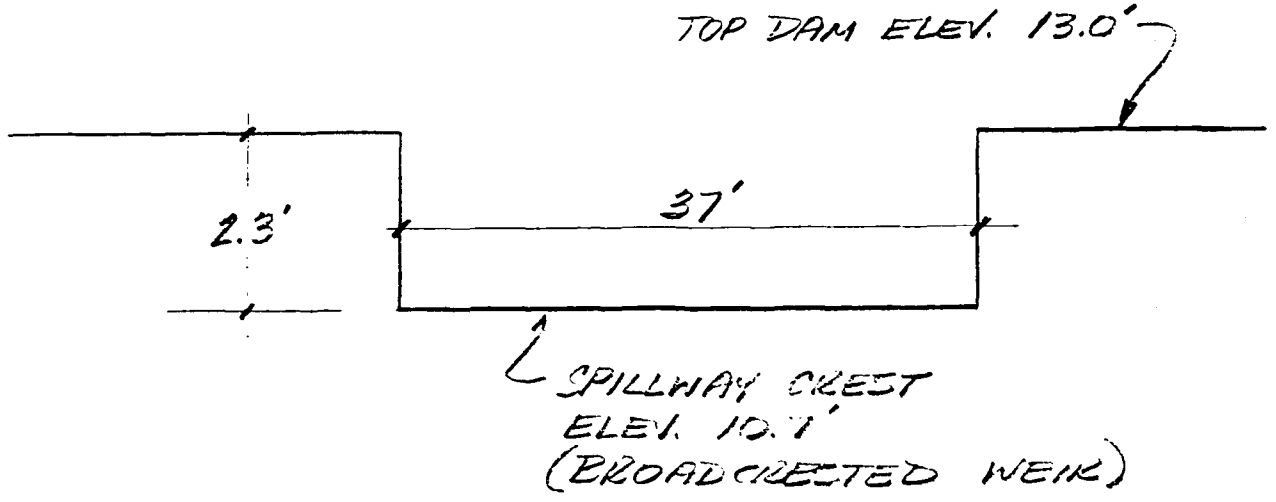
$$t_p = 2.0\left[(7.64)(3.90)\right]^{0.3}$$

$t_p = 5.54$ Hrs.

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

JOB INDIAN LAKE DAM
SHEET NO 5 OF 13
CALCULATED BY K.A. DATE 11/13/80
CHECKED BY JFL DATE 12/30/1980
SCALE

SPILLWAY



DISCHARGE: $Q = CLH^{1.5}$

ELEV.	C	L	H	Q (CFS)
10.7	2.5	37'	0	0
11.0	2.5	↕	0.3	15.2
12.0	2.65		1.3	145.3
12.0	2.65		2.3	342.0
15.0	2.68		4.3	884.2
17.0	2.79		6.3	1626.5
21.4	2.6	37'	10.7	3626.1

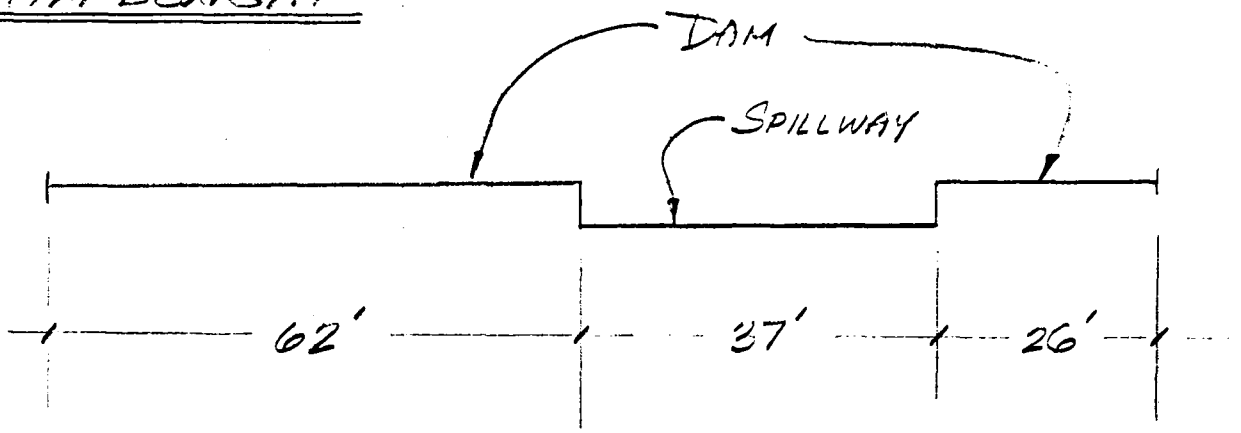
TEST FLOOD LEVEL - ½ PMF

17.9	28	37	7.2	2001.5

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

JOB INDIAN LAKE DAM
SHEET NO 6 OF 13
CALCULATED BY K. A. DATE 11/18/80
CHECKED BY _____ DATE _____
SCALE _____

DAM LENGTH



DAM LENGTH = TOTAL LENGTH - SPILLWAY WIDTH

DAM LENGTH = 62' + 26' = L

L = 88'

DISCHARGE COEFFICIENT OVER DAM

C = 2.55

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

JOB INDIAN LAKE DAM
SHEET NO 7 OF 13
CALCULATED BY K.A. DATE 12/23/80
CHECKED BY JFL DATE 12/30/80
SCALE

DAM FAILURE ANALYSIS

STORAGE (AT TOP OF DAM): $S = 49$ AC.-FT.

PEAK FAILURE OUTFLOW:

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

WHERE, $W_b = 0.4 \times 90 = 36$ ft.
$g = 32.2$ ft./s^2
$y_o = 12$ ft.

$$Q_{P_1} = \frac{8}{27}(36)\sqrt{32.2}\,(12)^{3/2}$$

$$Q_{P_1} = 2516 \text{ CFS}$$

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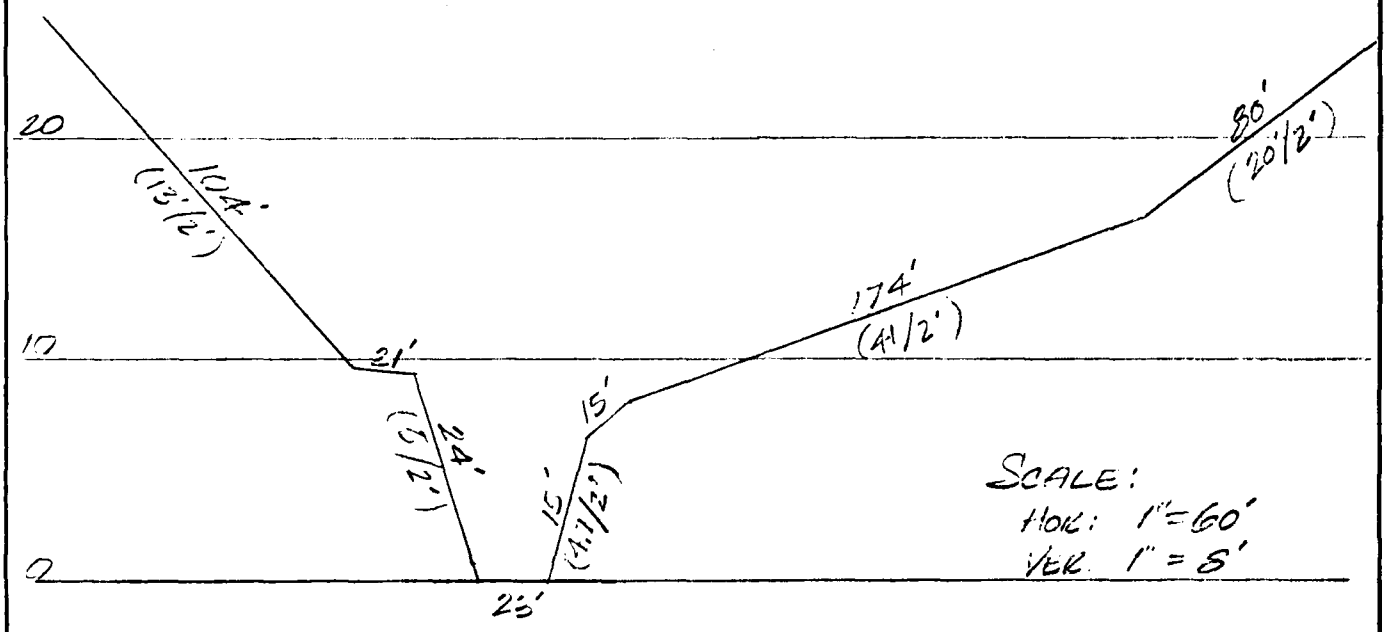
JOB INDIAN LAKE DAM
SHEET NO 5 OF 13
CALCULATED BY K. A. DATE 12/23/80
CHECKED BY JL DATE 12/30/80
SCALE

SECTION 1



H	A	WP	R	V	Q (CFS)
2	56	33	1.70	1.52	86
4	131	42	3.12	2.30	301
6	223	52	4.29	2.84	633
8	328	73	4.63	2.99	1011
10	523	138	3.79	2.61	1365
12	853	192	4.44	2.91	2482
14	1293	246	5.26	3.26	4215
16	1843	300	6.14	3.61	6653
18	2485	338	7.35	4.07	10114
20	3195	372	8.59	4.51	14410
22	3960	405	9.80	4.92	19530
24	4800	438	10.98	5.31	25540

$n = .050$
$S = .0019$
$L = 750'$

$$V = \frac{1.49 R^{2/3} S^{1/2}}{n} \qquad Q = VA$$

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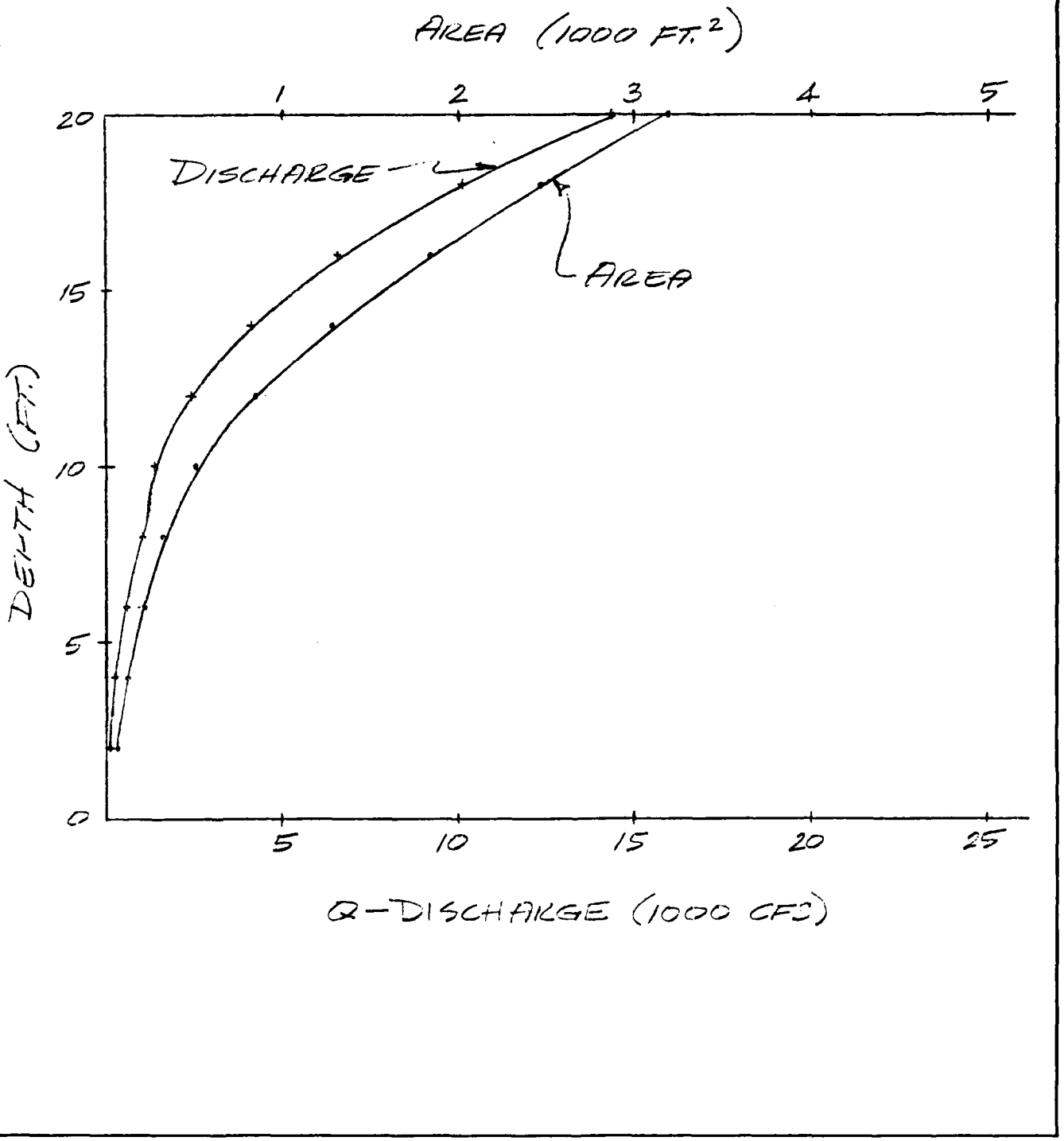
JOB INDIAN LAKE DAM
SHEET NO 9 OF 13
CALCULATED BY K. A. DATE 12/23/80
CHECKED BY JFL DATE 12/30/80
SCALE

SECTION 1



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JOB INDIAN LAKE DAM
SHEET NO 10 OF 13
CALCULATED BY K. A. DATE 12/23/80
CHECKED BY JL DATE 12/30/80
SCALE

SECTION 1 - ROUTING

$n = 0.050$

$S = 49$ AC.-FT.

$L = 750$ FT.

$Q_{P1} = 2516$ CFS

$H_1 = 12.1$ FT.

$A_1 = 680$ SQ.-FT.

$V_1 = 15.2$ AC.-FT.

$Q_{P2}(TRIAL) = 2516\ (1 - 15.2/49) = 1736$ CFS

$H\ (TRIAL) = 10.8$ FT.

$A\ (TRIAL) = 650$ SQ-FT.

$V_1\ (TRIAL) = 11.2$

$Q_{P2} = 2516\ (1 - \frac{11.2 + 15.2}{2}/49) = 1838$ CFS

$\therefore Q_{P2}$ = REACH OUTFLOW = 1838 CFS

H = DEPTH OF FLOW = 11.0 FT.

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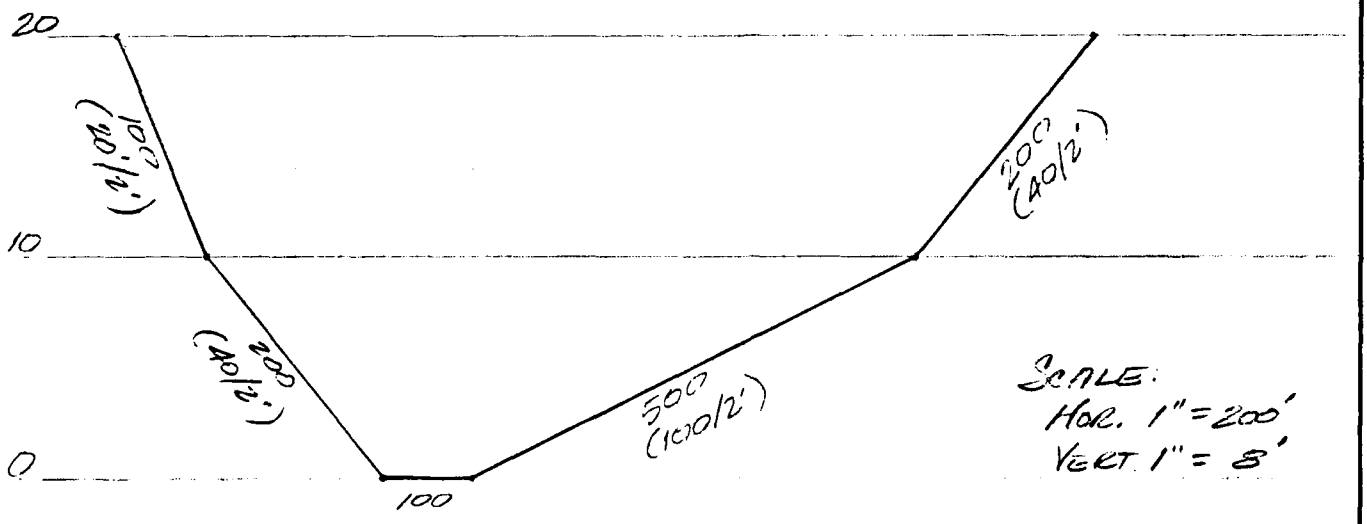
JOB INDIAN LAKE DAM
SHEET NO 11 OF 13
CALCULATED BY K. A. DATE 12/23/80
CHECKED BY JL DATE 12/30/80
SCALE

SECTION 2



H	A	WP	R	V	Q (CFS)
2	340	240	1.42	0.62	212
4	960	380	2.53	0.92	881
6	1860	520	3.58	1.12	2152
8	2990	660	4.53	1.35	4047
10	4440	800	5.55	1.55	6882
12	6100	860	7.09	1.83	11,133
14	7680	920	8.57	2.07	16,320

n = .040
S = .000176
L = 950'

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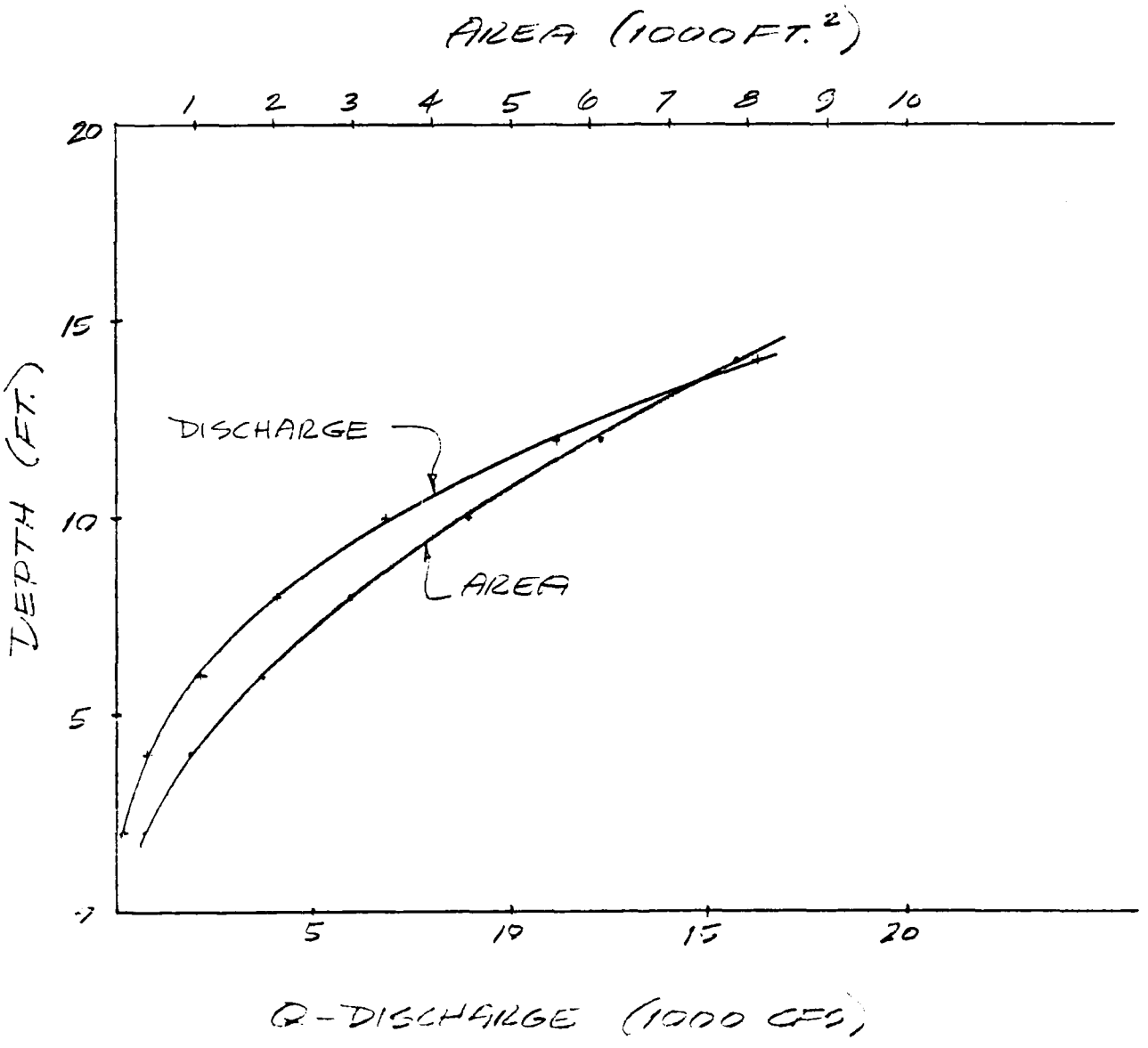
JOB INDIAN LAKE DAM
SHEET NO 12 OF 13
CALCULATED BY K. A. DATE 12/23/80
CHECKED BY JL DATE 12/30/80
SCALE

SECTION 2



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JOB INDIAN LAKE DAM
SHEET NO 13 OF 13
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SCALE

SECTION 2

$n = .040$

$S = 49$ Ac.-Ft.

$L = 950$ FT.

$Q_{P_2} = 1838$ CFS

$H_1 = 5.7$ FT.

$A_1 = 1700$ SQ.-FT.

$V_2 = 37$ Ac.-Ft

$Q_{P_3}(\text{TRIAL}) = 1838(1 - 37/49) = 450$ CFS

$H(\text{TRIAL}) = 2.0$ FT.

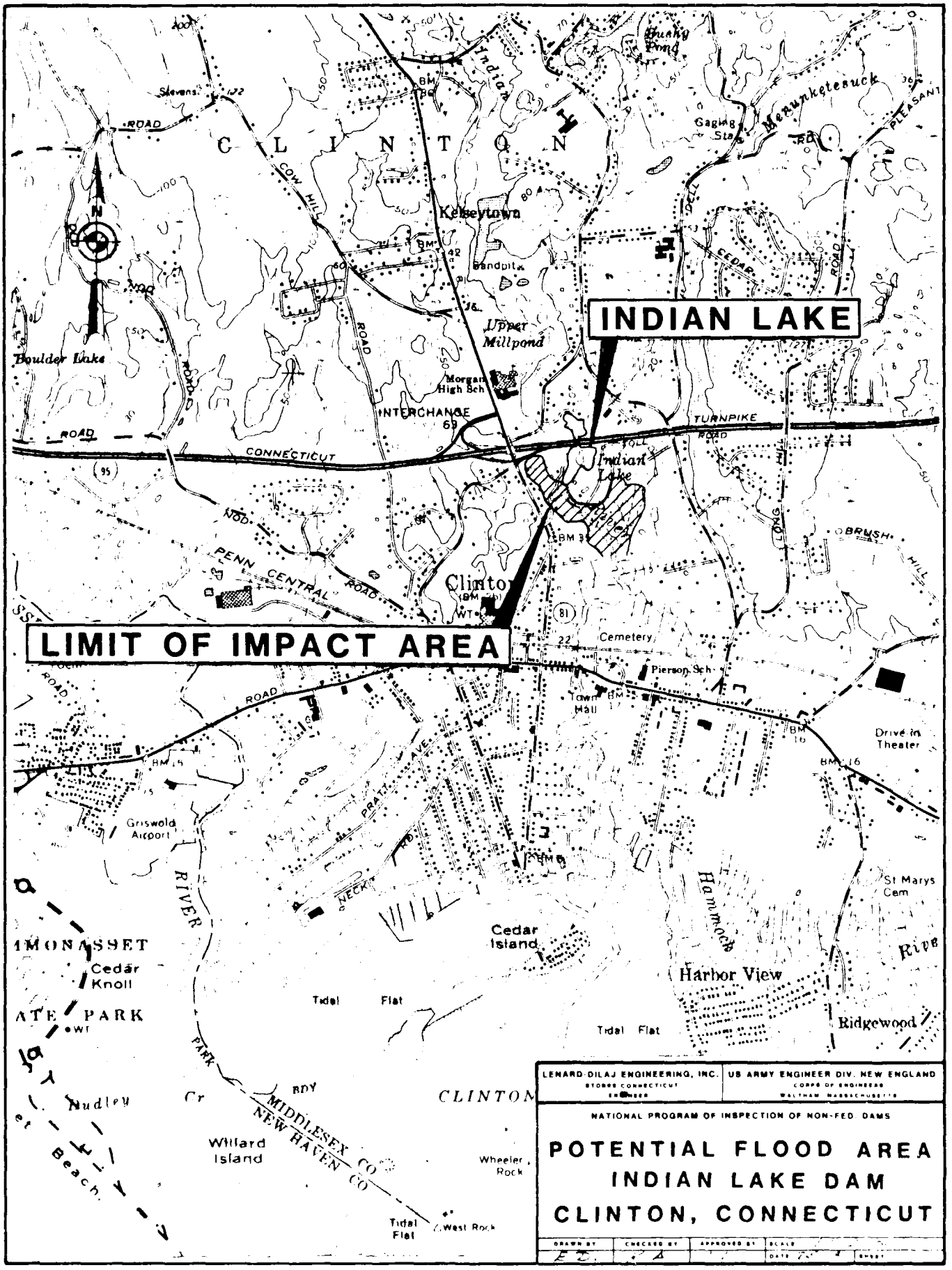
$A(\text{TRIAL}) = 650$ SQ.-FT.

$V_2(\text{TRIAL}) = 14.2$

$Q_{P_3} = 1838\left(1 - \frac{14.2 + 37}{2}/49\right) = 840$ CFS

$\therefore Q_{P_3}$ = REACH OUTFLOW = 840 CFS

H = DEPTH OF FLOW = 2.8 FT.



LENARD-DILAJ ENGINEERING, INC.
STORRS CONNECTICUT

US ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM MASSACHUSETTS

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

POTENTIAL FLOOD AREA
INDIAN LAKE DAM
CLINTON, CONNECTICUT

DRAWN BY	CHECKED BY	APPROVED BY	SCALE
F.C.	A.		DATE 7-8 SHEET

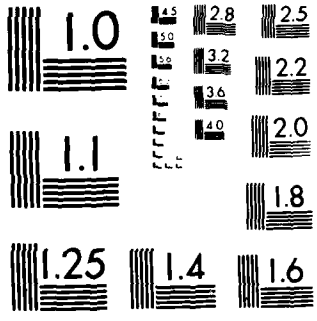
APPENDIX E

INFORMATION AS CONTAINED IN THE

NATIONAL INVENTORY OF DAMS

AD-A143 432 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS INDIAN LAKE DAM (CT 0..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV MAR 81 2/2

UNCLASSIFIED F/G 13/13 NL



APPENDIX E

INFORMATION AS CONTAINED IN THE

NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	NUMBER	DIVISION	STATE	COUNTY	CONG DIST	STATE	COUNTY	CONGR DIST	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY | MO | YR
CT	[illegible]	[illegible]	CT	007	03				INDIAN LAKE DAM	4117.2	7231.6	12NOV80

POPULAR NAME	NAME OF IMPOUNDMENT
	INDIAN LAKE

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI)	POPULATION
01	CA	INDIAN RIVER	CLINTON	1	11200

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT)	HYDRAULIC HEIGHT (FT)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
EART	1900	R	12	12	49	21	NED	N	N	N	N	

REMARKS
21=VERTICAL MASONRY DOWNSTREAM 22=ESTIMATE 23=BASICALLY AESTHETIC

NID HAS	SPILLWAY TYPE	SPILLWAY WIDTH (FT)	MAXIMUM DISCHARGE (FT)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PLANNED (MW)	NAVIGATION LOCKS NO	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)
[illegible]	[illegible]	37	342	1250											

OWNER	ENGINEERING BY	CONSTRUCTION BY
[illegible]	UNKNOWN	UNKNOWN

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	CT DEP	CT DEP

INSPECTION BY	INSPECTION DATE DAY | MO | YR	AUTHORITY FOR INSPECTION
LENARD & DILAJ ENGINEERING INC	12NOV80	PL 92-367

REMARKS