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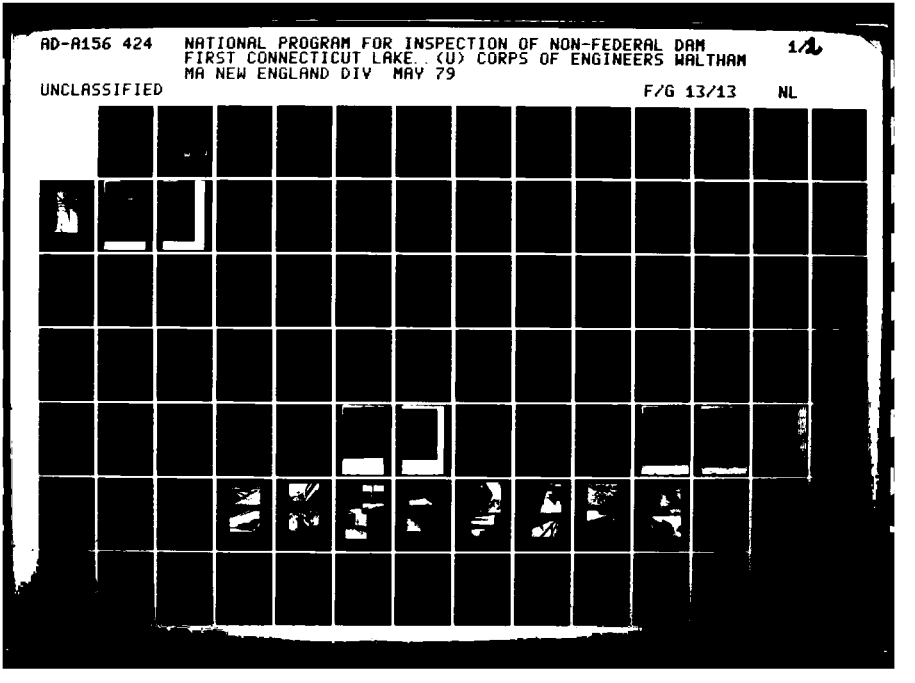

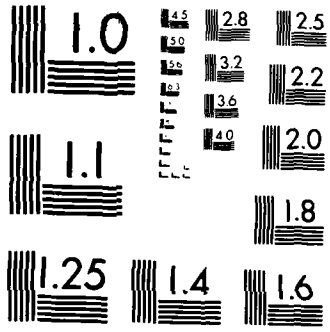

MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS 1963-A

CONNECTICUT RIVER BASIN

PITTSBURG, NEW HAMPSHIRE

FIRST CONNECTICUT LAKE DAM

NH 00186

NHWRB 194.02

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

MAY 1979

UNCLASSIFIED
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AD A156 424

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Connecticut River Basin
Pittsburg, New Hampshire
Connecticut River

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

The dam is a concrete gravity dam with earth embankemtns at each end. The dam is considered to be in good condition although the deteriorated cocncrete requires superficial patch work in many places. It is large in size with a low hazard potential.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED

JUL 26 1979

Honorable Hugh J. Gallen
Governor of the State of New Hampshire
State House
Concord, New Hampshire 03301

Dear Governor Gallen:

I am forwarding to you a copy of the First Connecticut Lake Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Water Resources Board, the cooperating agency for the State of New Hampshire. In addition, a copy of the report has also been furnished the owner, New England Power Company, 9 Court Street, Lebanon, New Hampshire 03766.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Water Resources Board for your cooperation in carrying out this program.

Sincerely yours,

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

FIRST CONNECTICUT LAKE DAM

NH 00186

NHWRB 194.02

CONNECTICUT RIVER BASIN
PITTSBURG, NEW HAMPSHIRE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.:	NH 00186
Name of Dam:	First Connecticut Lake Dam
Town:	Pittsburgh
County & State:	Coos, New Hampshire
Stream:	Connecticut River
Date of Inspection:	June 28, 1978

BRIEF ASSESSMENT

First Connecticut Lake is located in the northern part of the state on the Connecticut River about 8 miles upstream from the town of Pittsburg, New Hampshire. This is a concrete gravity dam with earth embankments at each end. The mass concrete spillway has a total length of 387 feet and contains two sluice gates and a log way near the southern abutment. The maximum height of the dam is 56 feet, and there are mass concrete abutment walls at the junction of the dikes and the spillway. A footbridge above the spillway crest extends the entire length of the spillway and provides access to the manually operated flashboards as well as to the sluice gates and log way. The south dike is about 480 feet long with maximum height of 22 feet. The north dike is about 250 feet long with a maximum height of 15 feet.

Based on visual inspection, available records, and past operational performance, the dam is considered to be in good condition although the deteriorated concrete requires superficial patch work in many places. Seepage was noted at the junction of the southern abutment and dike. An old slide was observed between the southern abutment and retaining wall. The continuance of this classification depends on proper operations and maintenance of the dam.

This dam falls under the category of low hazard potential, and it is large in size. The test flood peak inflow is equal to the probable maximum flood, 103,500 cfs, and the test flood peak outflow is 15,000 cfs. Hydraulic analysis indicates that the maximum surcharge pool elevation will be 1640, approximately 7 feet below the top of the earth dike. The spillway will pass the test flood peak outflow without overtopping the dam, and therefore the spillway capacity is adequate.

The following recommended operation and maintenance measures, as stated in Section 7.3, should be implemented within two years of the receipt of this Phase I report by the owner:

(1) Maintenance program of the owner and the technical annual periodic inspection being performed by the owner's engineering staff should be continued.

(2) Monitoring of the seepage and slide area to determine the cause and then corrective measures should be taken.

(3) Vegetation should be removed except for grass cover that prevents slope erosion.

(4) A program should be prepared and initiated to repair the slope protection as it becomes necessary.

(5) The upstream slope of the dam should be inspected at low water.

(6) Surveillance should be continued and a warning system should be developed for periods of unusually heavy rains and runoff.

(7) All deteriorating concrete surfaces should be repaired.

FAY, SPOFFORD & THORNDIKE, INC.
By

Jurgis Gimbutas, P.E.
Project Engineer

Richard W. Albrecht, P.E.
Vice President

This Phase I Inspection Report on First Connecticut Lake Dam 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 judgment and practice, and is hereby submitted for approval.

Charles G. Tiersch

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

Fred J. Ravens Jr.

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

Saul Cooper

SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

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

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

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

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

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OVERVIEW PHOTOGRAPH

FIRST CONNECTICUT LAKE DAM, LOOKING NORTH ON THE DOWNSTREAM SIDE
Negative No. 10-17

SCALE 1:62500 (ACTUAL)

UNITED STATES
DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY

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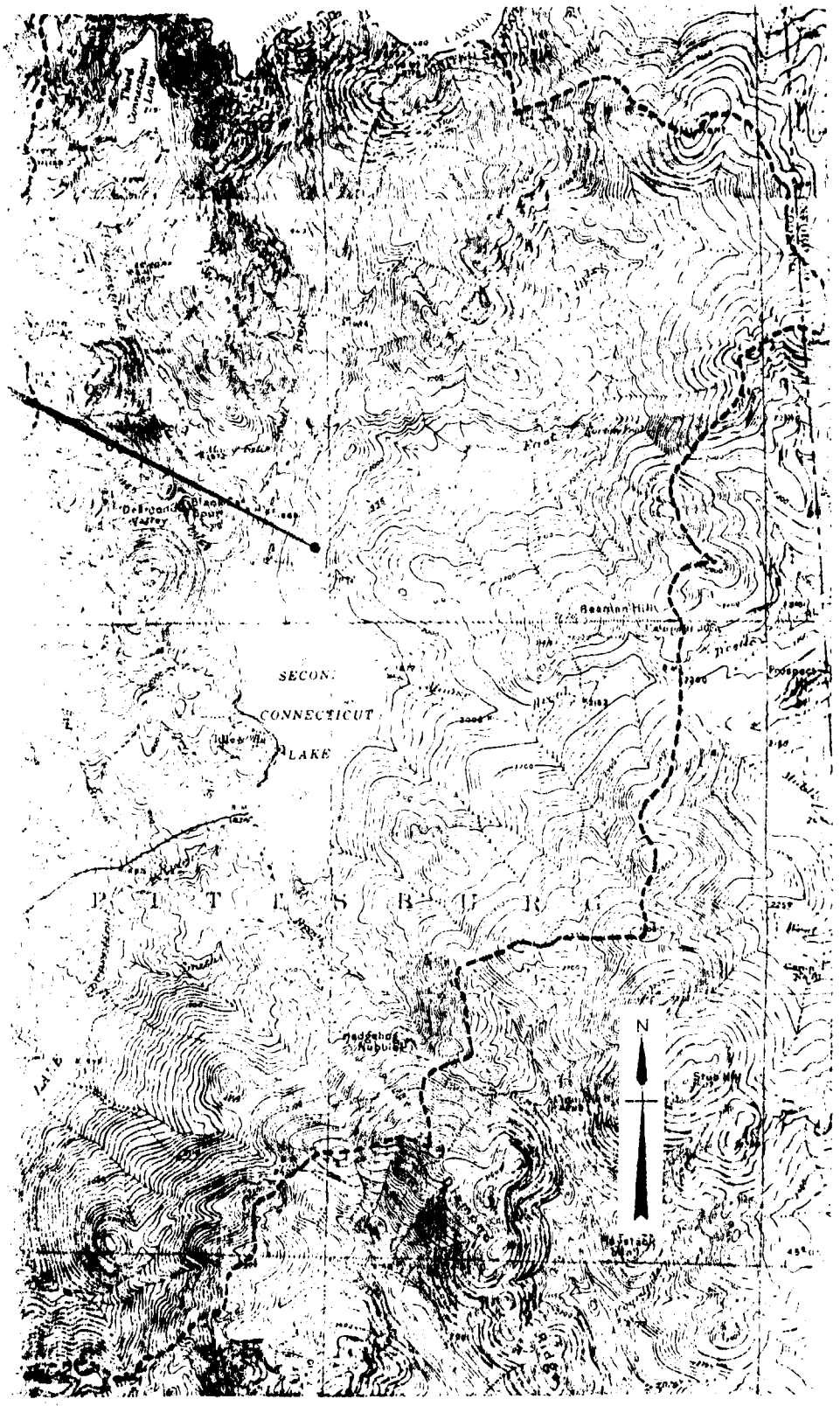

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NEW HAMPSHIRE-VERMONT
INDIAN STREAM QUADRANGLE 1926
NEW HAMPSHIRE-MAINE
SECOND CONNECTICUT LAKE QUADRANGLE 1927

2 of 2

FIRST CONNECTICUT LAKE DAM

SECTION 1 - PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam 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. Fay, Spofford & Thorndike, Inc., have been retained by the New England Division to inspect and report on selected dams in the State of New Hampshire. Authorization and notice to proceed was issued to Fay, Spofford & Thorndike, Inc., under a letter of May 3, 1978, from Mr. Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0308 has been assigned by the Corps of Engineers for this work.

b. Purpose

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

(2) Encourage and prepare the states to initiate quickly effective dam safety programs for non-federal dams.

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

1.2 Description of Project

a. Location

First Connecticut Lake is located in the northern part of the state of New Hampshire. The dam is located on the Connecticut River at the western bay of the lake and about eight miles upstream from Pittsburg, New Hampshire. It is within the borders of this township and is adjacent to U.S. Highway Route 3.

b. Description of Dam

This dam, designed by the New England Power Construction Co., Engineers, Boston, Massachusetts, is a concrete gravity dam with earth dike embankments at each end. The concrete dam is founded on ledge and the embankments on soil. The mass concrete spillway with a total length of 387 feet contains two sluice gates and a log way near the south abutment. The maximum height is 56 feet. There are mass concrete retaining walls where the dikes join the spillway (Photographs No. 6, 7, and 8, Appendix C).

On top of the spillway, there are 4-foot high wooden flashboards having a total length of 358 feet. A large spillway capacity was provided since the spillway section was the most economical type of construction (Photographs No. 1 and 2, Appendix C).

A footbridge with the floor elevation 10 feet above the spillway concrete crest extends the entire length of the spillway and provides access to the manually-operated flashboards as well as to the sluice gates and log way.

Two sluice gates, each 7 feet 8 inches by 9 feet 8 inches, are installed at about the lowest point in the riverbed. Centerlines of the gates are 30 feet below the spillway concrete crest. The gates are operated by an electric motor, which is protected in a wooden gate house. South of the sluice gates, a 10-foot wide log way was provided for the passage of timber logs. The sill of the log way entrance is 14 feet below the spillway concrete crest and is at Elevation 1636.0 msl. The log way is controlled by manually operated stop logs. To guarantee a minimum flow of 8 cfs during the summer, there is a fish pipe near the south gate (Photographs No. 3, 4, and 11, Appendix C).

The dike embankments are of the rolled fill type, constructed on an earth foundation. The top of the embankments is 15 feet wide at Elevation 1647.0. The downstream slope is 1 vertical to 2 horizontal and the upstream 1 vertical to 2.5 horizontal with riprap slope protection. The south dike is about 480 feet long, with a maximum height of 22 feet. The north dike is about 250 feet long, with maximum height of 15 feet (Photographs No. 13 and 14, Appendix C). The total length of both the dikes and the spillway is about 1,120 feet.

c. Size Classification

The storage capacity at the top of the dam is 114,000 acre-feet which is more than 50,000 acre-feet. Therefore, the dam is classified as large in size according to Table 1, Size Classification,

in the "Recommended Guidelines for Safety Inspection of Dams," furnished by the Corps of Engineers.

d. Hazard Classification

There are no permanent structures for human habitations between the First Connecticut Lake Dam and the downstream Francis Lake Dam. It is estimated that in the event of failure of this dam, minimal property damage would probably occur. Therefore, on the basis of Table 2, Hazard Potential Classification, in the "Recommended Guidelines for Safety Inspection of Dams," furnished by the Corps of Engineers, this dam falls in the category of low hazard potential.

e. Ownership

According to available records, the Upper Connecticut River and Lake Improvement Co. of West Stewartstown, New Hampshire, was the owner in the 1930's. Prior to that, the Connecticut River Power Co. of Boston, Massachusetts, and Connecticut Lakes Conservation Co. of Pittsburg, New Hampshire, were the owners.

After 1939, the dam and the water rights were purchased by the New England Power Co. of Westborough, Massachusetts, with a regional office in Lebanon, New Hampshire.

f. Operator

The dam on the First Connecticut Lake is being operated by New England Power Co. Daily operation of the dam is by Mr. Lindsay L. Covill, supervisor, who resides near the dam on Route 3.

The maintenance engineer is Mr. John E. Whitcomb of the New England Power Co., 9 Court Street, Lebanon, New Hampshire, telephone (603) 448-2200.

g. Purpose of Dam

Originally, the prime purpose of this dam was to regulate the flow of water for log driving. Today, the purpose of the First Connecticut Lake, as well as adjacent lakes, is to store water for release downstream during low flows for industrial use and incidental flood control. This also results in recreational benefits.

h. Design and Construction History

Available records indicate that the oldest dam at the outlet of the First Connecticut Lake was built approximately in the year 1880. It was a typical rock filled timber cribbed structure with a

27-foot long spillway and with a height about 17 to 18 feet. In 1915, this dam was removed and replaced by a new timber cribbed dam with earth dikes at both ends. This dam had a sluiceway for logging with a crest elevation of 1637 msl, which is equal to a head of 25 feet. Due to practical aspects, the dam was operated so that the water level would not exceed Elevation 1633.

In March, 1930, the Connecticut Lakes Conservation Co. filed a statement for a proposed new dam to be constructed about 50 feet below the timber crib dam. Drawings and specifications were prepared, and a new dam was built by the New England Power Construction Co. The new dam increased the water level by 7 feet over the level of the old dam. The construction was started in the spring of 1930, and completed in the summer of 1931. During construction, water was controlled by the old crib dam and diverted from the areas where work was progressing by means of sluices or low cofferdams. The compaction of the earth dikes was accomplished by using 3-wheel rollers weighing not less than 10 tons. The entire upstream slope of the dikes was protected with an 18-inch thick layer of riprap.

The mass concrete was specified to be "dense and impervious" with a minimum ultimate strength of 2,000 psi at 28 days. The main reinforcing was specified to have a 5-inch concrete cover. Concrete was tested in the laboratory of Power Construction and Engineering, Inc., and reviewed by the New Hampshire Public Service Commission. Sand and gravel was obtained from the Merrill Pit. Typical test results indicated the concrete strengths exceeding 3,000 psi at 28 days.

During the summer of 1965, the wingwall of the south abutment was repaired to eliminate cracks and the displacement of construction joints. This pinning repair was designed by the New England Power Service Co.

In 1974, an inspection of this dam by engineers from the New Hampshire Water Resources Board revealed concrete erosion at several places. The structure was proclaimed "to be approaching a state of disrepair." In the following year, the owner undertook repairs of the concrete near the gate house and other areas. In 1975/1976, the backfill at the south abutment was removed and replaced by impervious material to eliminate seepage through the dike. The concrete under the gate house and at the fishscreen was repaired. Substantial repairs on the upstream side were done between November, 1977, and March, 1978. These repairs included refacing the concrete from the south abutment for a distance of 100 feet north of the fishscreen. The owner plans to repair the downstream side within the next three years.

i. Normal Operational Procedure

Mr. Lindsay L. Covill, supervisor, residing adjacent to the dam site, provides round-the-clock surveillance for this dam. He is responsible for the daily inspection, routine maintenance and the regulation of flow. The water level, temperature, and rainfall are recorded daily. Flow rates may be varied at the discretion of the supervisor or at the direction of the owner, New England Power Co.

The dam is inspected yearly by the owner's engineering staff and remedial work performed at their recommendations. The New Hampshire Water Resources Board has inspected this dam at irregular intervals.

1.3 Pertinent Data

a. Drainage Area

First Connecticut Lake is a natural lake and storage in the lake was increased by the construction of the dam across the lake outlet. This dam is about 8 miles upstream of Pittsburg, New Hampshire. The drainage area of First Connecticut Lake is 83 square miles. The watershed area is heavily wooded and of mountainous topography.

b. Discharge at Dam Site

(1) Outlet works (conduits): One 8-inch diameter pipe with an invert elevation of 1604.0. The estimated discharge through this conduit at Lake Elevation 1640 is 16 cfs. The estimated discharge through the two sluice openings (each 7 feet wide by 9 feet high) with invert elevation at 1601.5 is 3,720 cfs at Lake Elevation 1640.0.

(2) Maximum known flood at the dam site is unknown.

(3) The ungated spillway capacity at the maximum design pool elevation 1640.0 is 8,900 cfs.

(4) The total spillway capacity at the maximum design pool elevation 1640.0 is 15,394 cfs.

c. Elevation (Feet above MSL)

(1) Top of dam - 1647.0.

(2) Maximum pool design surcharge - 1640.0. This is an assumed value as the drawings indicate that the normal high water elevation is 1640.0.

(3) Top of flashboards - 1640.0.

(4) Spillway crest (top of concrete) - 1636.0.

(5) Stream bed at centerline of dam - 1590 (estimated).

(6) Maximum tail water - 1600 (estimated).

d. Reservoir

(1) Length of maximum pool - 29000 feet (estimated).

(2) Length of recreation pool - 23760 feet (estimated).

(3) Length of flood control pool - 25000 feet (estimated).

e. Storage (Acre-Feet)

The following values (above Elevation 1600.0) have been taken from the capacity curve furnished by New England Power Co.:

(1) Water reservoir at spillway crest elevation - 78,000 acre-feet.

(2) Design surcharge - unknown.

(3) Top of dam - 114,000 acre-feet.

(4) Top of flashboards or normal high water - 91,000 acre-feet.

f. Reservoir Surface (Acres)

The following values have been taken from area-elevation curve furnished by New England Power Co.:

(1) Top of dam - 3,380 acres.

(2) Maximum pool - 3,140 acres.

(3) Flood-control pool - not applicable.

(4) Spillway crest - 2,980 acres.

g. Dam

(1)	Type	Concrete spillway with earth embankments (dikes) at either end.
(2)	Length	1,117 feet.
(3)	Height	Maximum 56 feet.
(4)	Top width of embankment	15 feet.
(5)	Embankment slopes	
	(a) Upstream	1 vertical to 2.5 horizontal.
	(b) Downstream	1 vertical to 2 horizontal.
(6)	Zoning	Dikes are homogenous consisting of selected local material (boulder clay or rock flour).
(7)	Impervious core	None.
(8)	Cutoff	Cut-off trench at the centerline of dike when necessary.
(9)	Grout curtain	None.

h. Spillway

(1)	Type	Ogee shaped weir.
(2)	Length of weir	358 feet (net length).
(3)	Crest elevation	1636 msl.
(4)	Control mechanism	Flashboards, manually operated.
(5)	U/S channel	Lake.

i. Regulating Outlet

(1) Two 7-foot by 9-foot concrete sluice conduits

(a)	Invert	1601.5 msl.
(b)	Control mechansim	Two gates, operated by an electric motor with a gasoline motor and manual backup.

(2) 10-foot wide log way

(a)	Invert	1622.0 msl.
(b)	Control mechanism	Stop logs, manually operated.

(3) 8-inch steel pipe

(a)	Invert	1604.0 msl.
(b)	Control mechanism	Gate valve.

SECTION 2 - ENGINEERING DATA

2.1 Design

Specifications and a geology report dated 1930 was obtained from project records. Drawings indicating plans, elevations and sections of the dam, appurtenant structures and outlet works were obtained from the New England Power Co. Selected drawings are included in Appendix B, following the listing of records and past inspection reports. Discharge rating curve of the spillway and the sluices was also obtained from New England Power Co. These curves are furnished in Appendix D.

2.2 Construction

a. Concrete Properties

The plans specified an ultimate strength of at least 2,000 psi at the end of 28 days. The concrete used developed a strength exceeding 3,000 psi in 28 days. The aggregate was obtained from Merrill Pit. The laboratory report on the concrete indicated the following:

Design mix - 1 cement: 2.2 sand: 3.5 aggregate
Slump - 3 3/4"
Cement Brand - Dragon

b. Construction History

(1) During construction, water was controlled by the old dam and diverted from the area where work was progressing by means of sluices or low cofferdams.

(2) Construction sequence, pertinent construction problems, and alterations are not available from project records.

(3) Modifications and maintenance repairs are available from project records and described in Section 1.2(h).

c. Testing

Concrete testing was performed by the Power Construction and Engineering, Inc., and reviewed by the New Hampshire Service Commission. The cement was tested by E. L. Conwell and Co., Philadelphia, Pennsylvania. Soil samples were sent to the New Hampshire Department Laboratory for analysis. See Appendix B for listing of data related to testing of materials.

2.3 Operation

The water in the lake is checked daily and the level recorded along with temperature and rainfall. There is a U.S.G.S. stream gaging station one-fourth mile downstream of the dam. During floods, the engineers of the New England Power Co. communicate with the Corps of Engineers.

2.4 Evaluation

a. Availability

Pertinent structural, geotechnical, hydrologic, and hydraulic data, which formed the basis of the design of the dam, are available to a limited extent from the project records.

b. Adequacy

Sufficient engineering data are available for a Phase I inspection.

c. Validity

The available engineering data is considered valid on the basis of the results of the visual inspection.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General

The Phase I inspection of First Connecticut Lake was performed on June 28, 1978. A copy of the inspection check list is included in Appendix A.

In general, the soil and rock features are in good condition. Generally, the upstream side of the concrete structures was observed to be in good condition but the downstream side to be in poor condition, see subparagraph c.

b. Dikes

The dikes on either side of the concrete spillway are in good condition. No evidence of vertical or horizontal misalignments was observed nor was there any evidence of piping. The upstream riprap slope protection is generally in fair condition, and there is no indication of sloughing, bulging, or movement of the slope.

Vegetation, consisting of weeds and grass, was noted on both the upstream and downstream slopes.

There is an area between the southern abutment and southern spillway wall where the slope has failed. Seepage, minor in nature, was also observed in this area. This area is protected by the spillway wall and the abutment, both of which are founded on bedrock. It appears that this slope failure occurred years ago and the grass has reestablished. This was also observed by the Water Resource Board in 1976 and it is being monitored by the owner, New England Power Co.

Seepage, minor in nature, was observed at the junction of the southern abutment and dike.

Water was observed seeping from the south abutment. It appears to be leaking from a cold joint at approximately Elevation 1638.

c. Appurtenant Structures

All concrete on the upstream side above the water line was observed to be in good condition except for the north abutment. The

concrete surface of the north abutment was observed to be in poor condition with several badly spalled areas. In general, the concrete surface on the downstream side is in poor condition with numerous badly spalled areas. Joint alignment is generally good and no cavitation was noted. Efflorescence was noted on both the upstream and downstream sides of both abutments and the south retaining wall.

Field observations indicate that the wooden gate house is well maintained and houses the gate operating equipment. This equipment was observed to be in good condition. The concrete piers of the gate house are also in good condition.

The wooden footbridge, the steel piers, and railing located over the spillway are in good condition. The flashboards and the manually operable stop logs were observed to be in good condition.

d. Reservoir Area

First Connecticut Lake is a natural one. Due to the construction of the dam, the storage in the lake is increased. The lake area at the top of the dam is 3,380 acres. The lake is surrounded by forest and mountains.

e. Downstream Channel

The downstream channel and side slopes are in good condition.

3.2 Evaluation

The observed condition of the dam is good. The potential problems observed during the visual inspection are:

a. The poor condition of the concrete surface on the downstream face of the spillway and the north abutment.

b. Seepage at the junction of the southern abutment and dike.

c. The area between the southern abutment and southern spillway wall where the slope has failed.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures

The New England Power Co. has operated the First Connecticut Lake Dam since 1939. The lake level is maintained by the spillway and the log way. The flow is controlled manually by flashboards at the spillway and stop logs at the log way. There is an 8-inch diameter pipe for maintaining minimum discharge. Drawdown is accomplished by the opening of two sluice gates which are operated by electric motors. For more details, see Section 1.2.i.

4.2 Maintenance of Dam

The maintenance of First Connecticut Lake Dam is the responsibility of the New England Power Co. The upstream face of the dam has been repaired in stages during the last three years. There are plans to repair the downstream face during the next few years.

4.3 Maintenance of Operating Facilities

The dam is inspected yearly by the owner's engineering staff and daily by the owner's supervisor, residing near the dam site.

Maintenance of the facilities to operate the gates controlling the flow in the two sluices is good.

4.4 Description of any Warning System in Effect

A flood warning system is non-existent, but the supervisor who resides near the dam keep a close watch during floods. He has both telephone and radio communications with the Lebanon, New Hampshire office.

4.5 Evaluation

The freeboard for the earth embankment during the test flood inflow is satisfactory. The operational and maintenance procedure consisting of daily and yearly inspections should ensure that all problems encountered can be remedied within a reasonable period of time.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

(1) This dam falls under the category of low hazard potential, and it is large in size. Using the "Recommended Guidelines for Safety Inspection of Dams," the recommended spillway test flood peak inflow equals the probable maximum flood. The spillway test flood peak inflow was determined to be approximately 103,500 cfs. The spillway test flood inflow hydrograph is furnished in Appendix D.

(2) The estimated peak outflow is 15,000 cfs, obtained as a result of flood routing. See Appendix D for details.

(3) The reservoir storage capacity versus the elevation curve is furnished in Appendix D.

(4) The estimated composite rating curve for the spillway and all discharging facilities is furnished in Appendix D.

(5) The hydrologic map of the watershed above the dam site, including reservoir area and watercourse, is furnished in Appendix D.

b. Experience Data

There is no evidence of the magnitude of floods and resulting maximum peak inflows in the past.

c. Visual Observations

The valley cross section immediately below the dam is sufficient to convey the peak outflow of 15,000 cfs from the lake. The valley section is rocky and the flow over the spillway is allowed to fall freely onto the downstream channel bed. Noticeable scour of the channel bed was not detected.

d. Overtopping Potential

For conservative analysis, the spillway test flood peak inflow has been taken to be equal to 103,500 cfs that can result from the total drainage area above the First Connecticut Lake Dam. The

maximum surcharge pool elevation in the First Connecticut Lake, when the spillway test flood inflow hydrograph has been routed through the lake, is 1640.0. The available freeboard is 7 feet as the top of the earth dam is at Elevation 1647.0. Therefore, the First Connecticut Lake Dam will not be overtopped when the spillway test flood inflow hydrograph passes through the lake if all the discharge facilities are maintained to function at their optimum capacity.

Currently, a report on the detailed hydrologic studies of this lake is being prepared by Chas. T. Main, Inc., and it is expected that it will be available in the latter part of 1978. Our conclusions pertaining to overtopping should be subject to revision depending on the spillway test flood inflow hydrograph evaluated by Chas. T. Main, Inc.

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

The upstream slope could not be seen due to the fact that it was underwater. The slopes of the embankment do not show any erosion or other weak areas. The visual inspection revealed no evidence of stability problem except possibly for the seepage at the junction of the southern abutment and dike.

b. Design and Construction Data

Design drawings and specifications were obtained from the project records. No design computations were available but the magnitude of the uplift pressure used is available from the project records. The main section of the dam is the mass concrete spillway which is founded on ledge. It was designed with an allowance for uplift on the base varying from two-thirds of the full hydrostatic pressure at the upstream heel to zero pressure at the downstream toe. The resultant was held within the middle third.

c. Operating Records

Except for a few records, which are listed in Appendix B, other operating records are available at the office of the New England Power Co.

d. Post-Construction Changes

Presumably, the last improvements were done in March, 1978.

e. Seismic Stability

The dam is located in Seismic Zone 2 and in accordance with recommended Phase I guidelines does not warrant seismic analyses.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS, & REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

Examination of available documents and visual inspection of the First Connecticut Lake Dam and its appurtenant structures did not reveal any defects which would render the project inadequate from the standpoint of structural stability and the dam is judged to be in good condition.

b. Adequacy of Information

An adequate assessment of the dam consistent with the scope of a Phase I investigation has been made based upon the visual inspection and available information.

c. Urgency

The operational and maintenance measures enumerated in Section 7.3 below should be implemented within two years of receipt of this report by the owner.

d. Need for Additional Investigation

The information available from the visual inspection is adequate to identify the potential problems which are: seepage and the old slide between the southern abutment and spillway retaining wall. These problems require the monitoring by the engineering staff of the owner to determine the cause and then specify remedial measures to rectify the problem.

7.2 Recommendations

No major modification or engineering investigation is recommended at this time.

7.3 Remedial Measures

Although the dam is generally maintained in good condition, it is considered important that the following operating and maintenance procedures be accomplished:

a. The maintenance program of the owner should be continued.

b. All concrete surfaces should be repaired as continued deterioration could develop a serious problem.

(1) Considerable erosion and spalling of the concrete was noticed on the downstream face of the spillway, the north abutment, and the two piers of the gate house.

(2) The wingwall adjacent to the log way is in poor condition especially at the lower elevations. Efflorescence also was observed.

(3) In the two bays where the sluice gates are located, there is considerable erosion and spalling of concrete of the spillway from the crest to the toe.

c. Seepage was observed at the junction of the southern abutment and dike. This area should be monitored to determine the cause and corrective measures should be taken.

d. The monitoring of the area between the southern abutment and spillway retaining wall, which previously failed, should be continued by the New England Power Co. As soon as the cause is determined, corrective measures should be undertaken.

e. Vegetation should be removed from the dam embankment except for grass cover that prevents slope erosion.

f. A program should be prepared and initiated to repair the slope protection as it becomes necessary.

g. Upstream slope of dam should be inspected at low water.

h. Round-the-clock surveillance should be continued during periods of high precipitation.

i. The owner should develop a formal warning system. An operational procedure integrated with the operational procedure of Francis Lake to follow in the event of an emergency should be adopted.

7.4 Alternatives

None recommended.

APPENDIX A

VISUAL INSPECTION CHECK LISTS

APPENDIX A

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT First Connecticut Lake Dam

DATE June 28, 1978

TIME 900 - 1100, 1400 - 1700

WEATHER Drizzle, Sunny in Afternoon

W.S. ELEV. 1638.0 U.S. _____ DN.S.

PARTY:

1.	Jurgis Gimbutas, P.E.	Team Captain - Structural and Concrete
2.	Harvey H. Stoller, P.E.	Soils, Geology, & Foundations
3.	V. Rao Maddineni, P.E.	Hydraulics & Hydrology

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dike Embankment	H. H. Stoller	Good
2.	Log Way	J. Gimbutas	Good
3.	Gate House	J. Gimbutas	Good
4.	Outlet Works - Sluice Conduit and Fish Pipe	J. Gimbutas	Good
5.	Spillway Weir	J. Gimbutas	Poor
6.	Approach and Discharge Channels	V. R. Maddineni H. H. Stoller	Good
7.	Footbridge	J. Gimbutas	Good
8.	Lake and Downstream Channel	V. R. Maddineni	Good

PERIODIC INSPECTION CHECK LIST

PROJECT First Connecticut Lake Dam DATE June 28, 1978

PROJECT FEATURE Dike Embankment

DISCIPLINE Soils & Foundations NAME

PROJECT FEATURE

DISCIPLINE NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	
Crest Elevation	1647.0 msl
Current Pool Elevation	1638.0 msl
Maximum Impoundment to Date	1640.0 msl
Surface Cracks	None observed
Pavement Condition	None
Movement or Settlement of Crest	None observed
Lateral Movement	None observed
Vertical Alignment	No visual vertical misalignment observed
Horizontal Alignment	No visual horizontal misalignment observed
Condition at Abutment and at Concrete Structures	Normal

PERIODIC INSPECTION CHECK LIST

PROJECT First Connecticut Lake Dam DATE June 28, 1978

PROJECT FEATURE Dike Embankment

DISCIPLINE Soils & Foundations NAME [signature]

PROJECT FEATURE _____

DISCIPLINE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
Indications of Movement of Structural Items on Slopes	None observed
Trespassing on Slopes	None apparent
Sloughing or Erosion of Slopes or Abutments	None observed
Rock Slope Protection - Riprap Failures	Fair condition
Unusual Movement or Cracking at or Near Toes	None observed
Unusual Embankment or Downstream Seepage	South abutment (see Section 3)
Piping or Boils	None oberved
Foundation Drainage Features	None observed
Toe Drains	None
Instrumentation System	None

PERIODIC INSPECTION CHECK LIST

PROJECT First Connecticut Lake Dam DATE June 28, 1978

PROJECT FEATURE Log Way

DISCIPLINE Structures & Concrete NAME

PROJECT FEATURE

DISCIPLINE NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - LOG WAY	
a. Intake Structure - Log Way	
Condition of Concrete	Good
Stop Logs and Slots	Very good

PERIODIC INSPECTION CHECK LIST

PROJECT First Connecticut Lake Dam DATE June 28, 1978

PROJECT FEATURE Gate House

DISCIPLINE Structures NAME [illegible]

PROJECT FEATURE _____

DISCIPLINE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - GATE HOUSE	
a. Structural	
General Condition	Good (wood structure)
Leaks in Gate Chamber	South gate, minor in nature
b. Mechanical and Electrical	
Air Vents	None
Float Wells	None
Crane Hoist	Appears to be in good condition
Elevator	None
Hydraulic System	None
Service Gates	Two gates, operated by an electric motor
Emergency Gates	None

PERIODIC INSPECTION CHECK LIST

PROJECT First Connecticut Lake Dam DATE June 28, 1978

PROJECT FEATURE Gate House

DISCIPLINE Structures NAME

PROJECT FEATURE

DISCIPLINE NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
Lightning Protection System	None
Emergency Power System	Gasoline motor and manually operated
Wiring and Lighting System	Operating condition

PERIODIC INSPECTION CHECK LIST

PROJECT First Connecticut Lake Dam DATE June 28, 1978

PROJECT FEATURE Outlet Works

DISCIPLINE Structures & Concrete NAME

PROJECT FEATURE

DISCIPLINE NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SLUICE CONDUIT	
General Condition of Concrete	Good
Erosion or Cavitation	None observed
Outlet Works - Fish Pipe	
Size	8-inch diameter steel pipe
General Condition	Good
Gates	One gate valve, manually operated

PERIODIC INSPECTION CHECK LIST

PROJECT First Connecticut Lake Dam DATE June 28, 1978

PROJECT FEATURE Spillway Weir

DISCIPLINE Structures & Concrete NAME

PROJECT FEATURE Approach Channel

DISCIPLINE Soils & Foundations NAME

DISCIPLINE Hydraulics & Hydrology NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Good
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	None observed
Floor of Approach Channel	Could not be observed
b. Spillway Weir	
General Condition of Concrete	Poor
Rust or Staining	Minor staining
Spalling	Badly spalled areas on the downstream side

PERIODIC INSPECTION CHECK LIST

PROJECT First Connecticut Lake Dam DATE June 28, 1978

PROJECT FEATURE Spillway Weir

DISCIPLINE Structures & Concrete NAME

PROJECT FEATURE Discharge Channel

DISCIPLINE Soils & Foundations NAME

DISCIPLINE Hydraulics & Hydrology NAME

AREA EVALUATED	CONDITION
Any Visible Reinforcing	None observed
Any Seepage or Efflorescence	Efflorescence at abutments
Drain Holes	None observed
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	In places
Floor of Channel	Good condition
Other Obstructions	None

PERIODIC INSPECTION CHECK LIST

PROJECT First Connecticut Lake Dam DATE June 28, 1978

PROJECT FEATURE Footbridge

DISCIPLINE Structures & Concrete NAME

PROJECT FEATURE

DISCIPLINE NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - FOOTBRIDGE	
b. Superstructure	
Bearings	None
Anchor Bolts	Good condition
Bridge Seat	Good condition, grout pad
Longitudinal Members	Good condition
Underside of Deck	Good condition
Secondary Bracing	Good condition
Deck	Sound, creosoted wood planking
Drainage System	Good condition
Railings	Good condition
Expansion Joints	None
Paint	Good condition

PERIODIC INSPECTION CHECK LIST

PROJECT First Connecticut Lake Dam DATE June 28, 1978

PROJECT FEATURE Footbridge

DISCIPLINE Structures & Concrete NAME

PROJECT FEATURE

DISCIPLINE NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
b. Abutment and Piers	
General Condition of Concrete	Poor
Alignment of Abutment	Good
Approach to Bridge	Good

APPENDIX B

EXISTING AVAILABLE INFORMATION

APPENDIX B

1. Listing of Design, Construction and Maintenance Records

In the files of the New Hampshire Water Resources Board in Concord, New Hampshire, there are drawings and seven folders of engineering and maintenance data regarding the First Connecticut Lake Dam in the town of Pittsburg, New Hampshire, dated from 1915 to 1976, and labeled under Town/Dam No. 194.02.

The following is the summary of the seven folders of records.

(1) August 9, 1915 to July 18, 1916. Construction specifications, five drawings (reduced to 11 inches by 24 inches) and correspondence regarding construction of a dam at the outlet of the First Connecticut Lake on the site of an older dam which has been removed.

(2) June 28, to September 12, 1917. Letters and testimony regarding flood and operation of flood gates of the dam last winter.

(3) June, 1922. Pond gage readings 1919 to 1922, February to April; and sketch showing elevations of overflow, compiled by Mr. B. H. Moxon, from data by Mr. H. G. Philbrook.

(4) June 12, to October 13, 1923. Several memorandums and letters regarding the inspections and recommendations for addition of height and other improvements of the dam by: Mr. J. H. Manning of Stone & Webster; Mr. E. W. Philbrook of Upper Connecticut River and Lake Improvement Co.; Mr. S. N. Bigelow of New Hampshire Public Service Commission; I. W. Jones & Co., Engineers, Nielson, New Hampshire.

(5) March 20, 1930. Statement of Connecticut Lakes Conservation Co. of a proposed dam reconstruction, filed with plans and specifications. Filed with the New Hampshire Public Service Commission.

(6) April 26, 1930. Revised general specifications for a new storage dam at First Connecticut Lake, by New England Power Construction Co., Engineers, Boston, Massachusetts (four pages and an 8 1/2-inch by 11-inch map).

(7) May, 1930. Geological Report on the First Connecticut Lake Dam by Mr. Irving B. Crosby, Geologist (eight pages and a map).

(8) 1928-1933. Some fifty large photographs showing the dam before, during, and after construction in 1930.

(9) No date, probably in 1930. Specifications for Rolled Earth Dikes, First Connecticut Lake Storage Dam (seven pages).

(10) May 17, and 18, 1930. Reports on inspection of dam site by Mr. J. W. Golothwart (two pages).

(11) Summer, 1930. Many memorandums and letters regarding construction of new dam, including reports on soil samples by New Hampshire Highway Department Laboratory.

(12) August 10, 1930, and many other dates. Laboratory reports on concrete by Power Construction and Engineering, Inc. Also reports on tests of cement by E. L. Conwell & Co., Philadelphia, Pennsylvania.

(13) July 26, 1932. Approximate discharge rating of 9-foot by 7-foot sluices and an 8-inch diameter fish pipe, and capacity curve.

(14) July 5, 1945. Daily and monthly discharges for 1931-1939, and revised station description with basic hydrological data.

(15) May 4, 1959. Memorandum on the lake levels, addressed to the Governor of New Hampshire, by Mr. W. G. White, Chairman, New Hampshire Water Resources Board (four pages, including tabulation of water levels for 1954 to 1958).

(16) June 28, 1965. A description of repairs made to the upstream portion of the south abutment wingwall by Mr. A. T. Simmonds, Superintendent, North Division, New England Power Co., Littleton, New Hampshire, to Mr. W. G. White, Chairman, New Hampshire Water Resources Board, with a print of Drawing No. 6171.

(17) August 16, 1971. A letter explaining minimum discharges of this and other related lakes by Mr. Francis C. Moore, Water Resources Engineer.

(18) July 7, to November 3, 1976. Several letters and memorandums regarding repair of leakage on the east end of the dam between the New Hampshire Water Resources Board and the New England Power Co.

(19) January 31, 1975. FIA Hazard Boundary Maps, town of Pittsburg, New Hampshire (Coos Co.) by the Department of

Housing and Urban Development (fifteen pages, 11 inches by 17 inches).

In the files of the New England Power Co., Engineering Department, Westborough, Massachusetts, there are records which we have not seen, but we did receive the following hydrological data:

(1) Area capacity curves, dated October 18, 1929.

(2) Spillway discharge rating curve, dated May 18, 1934.

(3) Discharge rating curve of one of two sluices, dated February 11, 1947 (two pages).

(4) Storage tables, dated February 10, 1956 (six pages).

2. Past Inspection Reports

The New Hampshire Water Resources Board has numerous inspection reports from the years prior to reconstruction of the dam in 1930. Only three representative reports from those years are included here and all four available reports from later years.

(1) July 26, 1920. By Mr. E. W. Philbrook of Upper Connecticut River and Lake Improvement Co., West Stewartstown, New Hampshire.

(2) September 14, 1923. By Mr. S. N. Bigelow, Engineer, of New Hampshire Public Service Commission.

(3) June 18, 1927. By Mr. A. C. Newhall of UCRLI Co.

(4) April 28, 1939. By C.S.W. of New Hampshire Water Control Commission.

(5) October 23, 1974. By Mr. F. C. Moore and Mr. D. M. Rapoza, Engineers, New Hampshire Water Resources Board.

(6) November 22, 1974. By Mr. S. C. Burritt, Civil Engineer, New Hampshire Water Resources Board.

(7) April 2, 1976. By Mr. S. C. Burritt, Civil Engineer, New Hampshire Water Resources Board (two pages).

The New England Power Co., Engineering Department, in Westborough, Massachusetts, has more inspection reports for internal use only.

3. Drawings

The New Hampshire Water Resources Board is in possession of the following blueprints of drawings that were made by the New England Power Construction Co., Engineers and Contractors, Boston, Massachusetts, for the Connecticut Lakes Conservation Company. General title of all drawings is: First Connecticut Lake Storage.

*Drawing No. H-4462-0 - Main Dam - Plan & Sections, Dated April 14, 1930.

Drawing No. H-4463-0 - South Bay Dike - Plan & Sections, Dated April 14, 1930.

Drawing No. H-4507 - Plan Showing Lands & Rights Around First Connecticut Lake, Dated April 24, 1930.

Drawing No. H-4540-1 - Main Dam Abutments, Concrete - Plan, Elevations & Sections, Dated May 10, 1930.

Drawing No. H-4552-3 - Main Dam Spillway, Structural, Concrete - Plan, Elevations & Sections, Dated May 13, 1930.

Drawing No. D-6171 - Main Dam, South Abutment, Repairs to Wingwall, Dated May, 1965.

New England Power Co., Engineering Department, at Westborough, Massachusetts, have original tracing of drawings, three of which copies are included with this report.

(1) H-4549 - May 15, 1930, Revised September 19, 1930, Main Dam, General Layout (and Sections).

(2) H-4540 - May 10, 1930, Revised September 18, 1930, Main Dam, Abutments, Concrete, Plan, Elevations, and Sections.

(3) H-4552 - Main Dam Spillway, Structural Concrete, Plan, Elevation, and Sections.

*Also included with this report

C O P Y

W.Stewartstown, N.H.
July 26, 1920

To the Public Service Commission of New Hampshire:

In accordance with instructions in your letter of July 31, 1916, we have inspected the dam at the outlet of First Connecticut Lake in Pittsburg, N.H. and report the following:

1- Gravel wings embankments in good shape having been topped out with one foot of gravel in the year 1919. Both wings almost completely grassed over thereby eliminating the danger of washing.

2- Bulk head, timber crib work and building over the same in good condition.

3- Gates in good operating condition, and reasonably tight.

4- All worn sluice ways replaced in 1919 and in good condition at present.

5- In the spring of 1920 a small leak was discovered under the 20 foot gate between the timber toe piling and the ledge. This leak was stopped by placing 225 bags of sand in front. When the water in the Lake is low enough an inspection will be made at this particular point, and if considered advisable, a mixture of concrete will be put in.

On the whole we consider the dam in very good condition and would at any time be pleased to have an inspection made by the Public Service Commission of New Hampshire, the expense of so doing to be borne by this Company.

UPPER CONNECTICUT RIVER & LAKE IMPROVEMENT CO.

By (Signed) E. W. Philbrook.

Original letter sent downstairs August 3, 1920, with letter to Mr. Timm.

OF

NEW HAMPSHIRE

E-1397

CONCORD September 14, 1923.

Public Service Commission,
Concord, New Hampshire.

Dear Sirs:-

Herewith I submit my report on the inspection of the dam at First Connecticut Lake owned by the Upper Connecticut River & Lake Improvement Company for the proposed raising of three feet.

I gave particular attention to the timber core of the present dam. Three test pits were dug at the following points; one 100 feet south of the gatehouse, one 75 feet north of the gatehouse, and the other at a point 180 feet north of the gatehouse. The pits were dug to about a five-foot depth from the top of the core. In all cases the top was decayed to a maximum depth of a foot and a half, and from there down the core was sound.

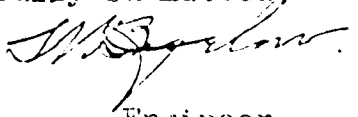
Starting at a point 200 feet north of the north end of the gatehouse and continuing to a point where finished grade hits natural ground, the piling is to be driven to bed rock. The embankment on this stretch has a maximum depth of seven feet. On this stretch something additional will have to be done as one of the company's buildings, as well as the highway, interferes with a two to one slope.

The sod has all been stripped from the downstream face of the dam. Also, sod is removed to a point where the toe of a two to one slope will hit. As yet, the upstream face has not been touched, but this will be stripped to elevation 1220 which will be ten feet, as the new grade for the crest of the dam is elevation 1230. This ten foot area is to be riprapped.

The borrow pit which they are using on the south wing of the dam is good material for fill, having enough clay to bind the coarser material. The pit was one used when the dam was built. For the fill on the north wing they will use another pit which was used at the time the dam was built and is the same material.

At the north end of the gatehouse on the downstream face a crib or a bulkhead is to be built to keep the fill from sliding into the river.

Respectfully submitted,



Engineer.

LWB:HVW

REPORT ON INSPECTION OF FIRST LAKE DAM, PITTSBURG, N.H.

EARTH EMBANKMENTS

The earth embankments at each end of the crib dam have a minimum width of about 9 feet and have thoroughly settled and compacted to a top elevation of at least 1230'.

At the Northerly end of the crib dam, on both the up-stream and down-stream slopes, there is still a little sloughing off of the fill.

The stones used in ripraping the up-stream slope are now well in place.

The 3" Kyanized spruce plank sheeting is in as good condition as when first placed in 1923.

CRIB DAM

The crib work Easterly of a longitudinal section through the 20', 8' and 6' gates contains timber which has deteriorated more or less since the alterations of 1923; Westerly of this section the timber is in a very good state of preservation .

The top of the present crib work shows more or less settling.

The 3" Kyanized spruce plank used for deck planking are in very good condition.

SOUTH BAY DYKE

South Bay Dyke has grassed over to withstand erosion from wave action.

Allen C. Percival

June 18, 1927

NEW HAMPSHIRE WATER CONTROL COMMISSION
DATA ON DAMS IN NEW HAMPSHIRE

LOCATION STATE NO 124.02

Town Pittsburg: County Coos

Stream Connecticut (outlet first)

Basin-Primary Connecticut: Secondary Connecticut Lake

Local Name

Coordinates—Lat. 45° 5' + 2000: Long. 71° 15' + 1000

GENERAL DATA 81.4 PSC

Drainage area: Controlled Sq. Mi.: Uncontrolled Sq. Mi.: Total 30.2 Sq. Mi.

Overall length of dam 300 ft.: Date of Construction

Height: Stream bed to highest elev. 37 ft.: Max. Structure ft

Cost—Dam : Reservoir

DESCRIPTION Timber Crib, (Rock Filled) — Also earth & concrete dam East side at South Bay

Waste Gates

Type

Number : Size ft. high x ft. wid

Elevation Invert : Total Area sq. ft

Hoist

Waste Gates Conduit

Number : Materials

Size 2-6 DIA ft.: Length ft.: Area 120 sq. ft

Embankment

Type Concrete

Height—Max. ft.: Min. ft

Top—Width : Elev. ft

Slopes—Upstream on: Downstream on

Length—Right of Spillway : Left of Spillway

Spillway

Materials of Construction

Length—Total 338' & 10' ft.: Net ft

Height of permanent section—Max. 4' & 18' ft.: Min. ft

Flashboards—Type : Height ft

Elevation—Permanent Crest : Top of Flashboard

Flood Capacity cfs.: cfs/sq. mi.

Abutments

Materials:

Freeboard: Max. ft.: Min. ft

Headworks to Power Devel.—(See "Data on Power Development")

OWNER Upper Connecticut River Imp. Co.

REMARKS Primary H.P. 90 ; time 24

4/28/1939

Tabulation By Date April, 1939

M E M O R A N D U M

DATE: October 23, 1974

FROM: Francis C. Moore and Donald M. Rapoza, Engineers

SUBJECT: First Connecticut Lake Dam Inspection - #194.02, Pittsburg

TO: Vernon A. Knowlton, Chief Water Resources Engineer

On October 11, 1974, Francis C. Moore and Donald M. Rapoza inspected First Connecticut Lake Dam in part with New England Power Company Dam Operator Lindsay Covill. The following deficiencies were noted:

1. Piers at gate house were badly eroded.

2. Concrete at gate section was badly eroded, especially on upstream face.

3. Downstream face of dam at gate house had some erosion.

4. Along riverside face of downstream left abutment there was some seepage which apparently was carrying sediment. In June, it is recommended to inspect this seepage to see how a high lake level affects seepage and sediment carrying capacity.

5. Left abutment upstream appears to be satisfactorily stabilized after pinning repairs were made a few years ago.

6. Left dike should be inspected for seepage in June (at full pond). Also check amount of leakage at what Lindsay Covill says is his salt-lick for deer on the left embankment slope downstream.

7. Suggest further inspection of upstream concrete in late fall 1974 when lake is down more than in October to get a better idea of the extent of concrete erosion and its effect on safety of the dam. New England Power Co. engineers should accompany WRB engineers on this inspection.

8. Notify N.E. Power Co. that a periodic inspection of the dam shows it to be approaching a state of disrepair, and what are their plans to repair it.

fcm/js

M E M O R A N D U M

DATE: November 22, 1974

FROM: Stephen C. Burritt, Civil Engineer

SUBJECT: First Connecticut Lake Inspection in Pittsburg - #194.02

TO: Vernon A. Knowlton, Chief Water Resources Engineer

On November 19, 1974, Don Rapoza and I inspected the First Connecticut Lake Dam with Charles Harrington and Denton Nichols from New England Power System. This was a follow-up to an inspection by Don Rapoza and Francis Moore made in the fall. We inspected this dam as a follow-up to the earlier inspection when there was a report of cracked and eroded concrete on the upstream side near the gate house.

We were unable to see any additional area, as the lake had not been drawn down. Harrington said that the best time was the spring drawdown, and that he would notify us. He is also sending us a list of all of their dams that are under the supervision of the Federal Power Commission, and he is sending us any extra copies of the inspection reports of all of these dams.

scb/js

M E M O

TO: Vernon A. Knowlton, Chief Water Resources Engineer

FROM: Stephen C. Burritt, Civil Engineer

File

SUBJECT: Inspection of 1st & 2nd Conn. Lakes - Pittsburg (194.02 & 194.07)

Date : April 2, 1976

On April 1st, I inspected the dams at 1st & 2nd Conn. Lakes. With me on the inspection were two members of the New England Power engineering staff, one member of their construction staff, and three members of their operating staff.

2nd Lake:

This dam appears to be in good shape. The only thing that would need any work is the southern (left side) bridge pier. This has a small section of concrete that is deteriorating. This does not appear to endanger the bridge at this time but it should be watched. See copy of Plan.

1st Lake:

1. The concrete on the upstream side of the dam under the Gate House and to the left of the Gate House has been repaired. This was done in November 1975.

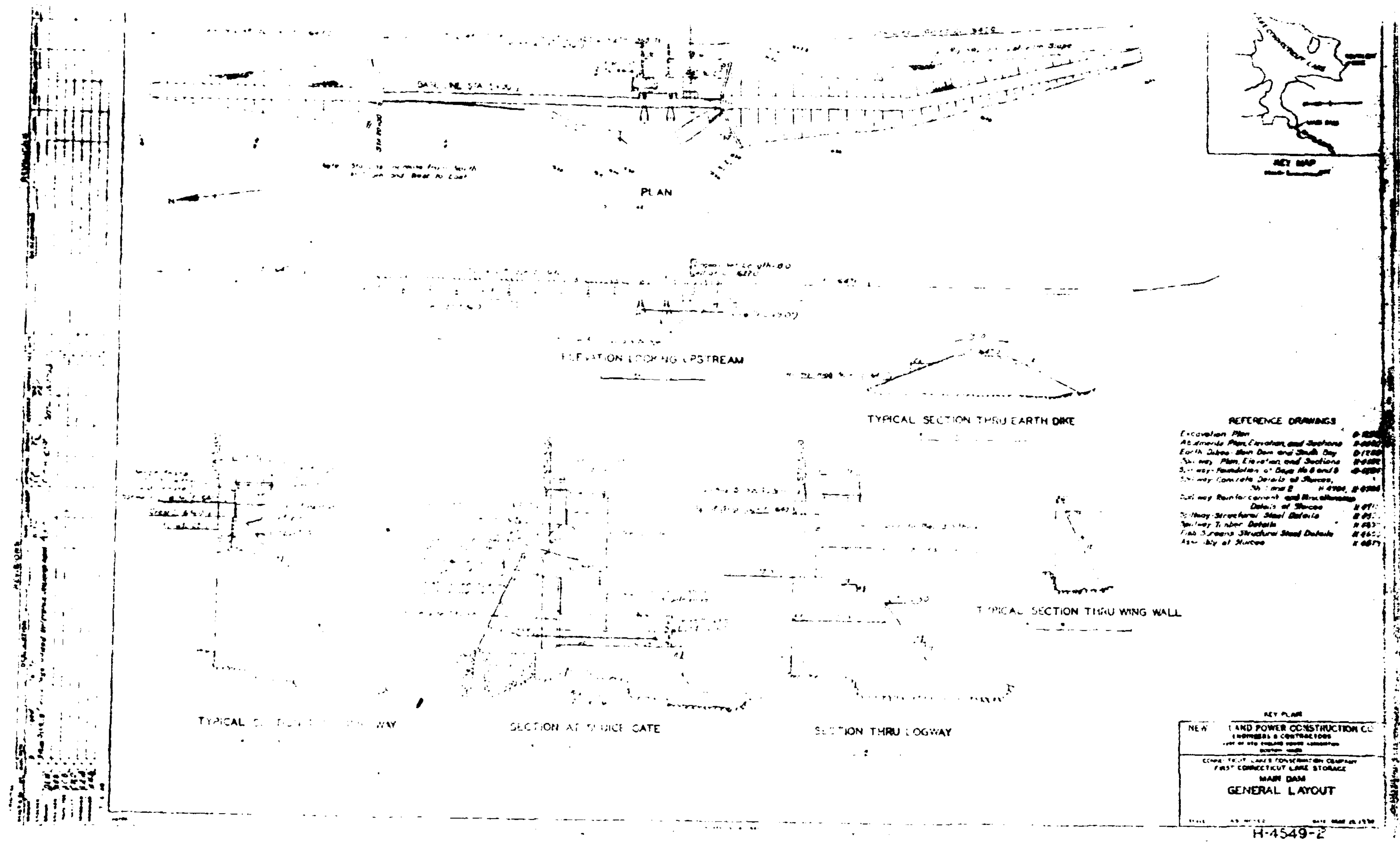
2. Concrete at intake to the gates is eroded. This is under the area where repairs were made last November. This area is where the emergency stoplogs would be placed so that work could be done on the gates.

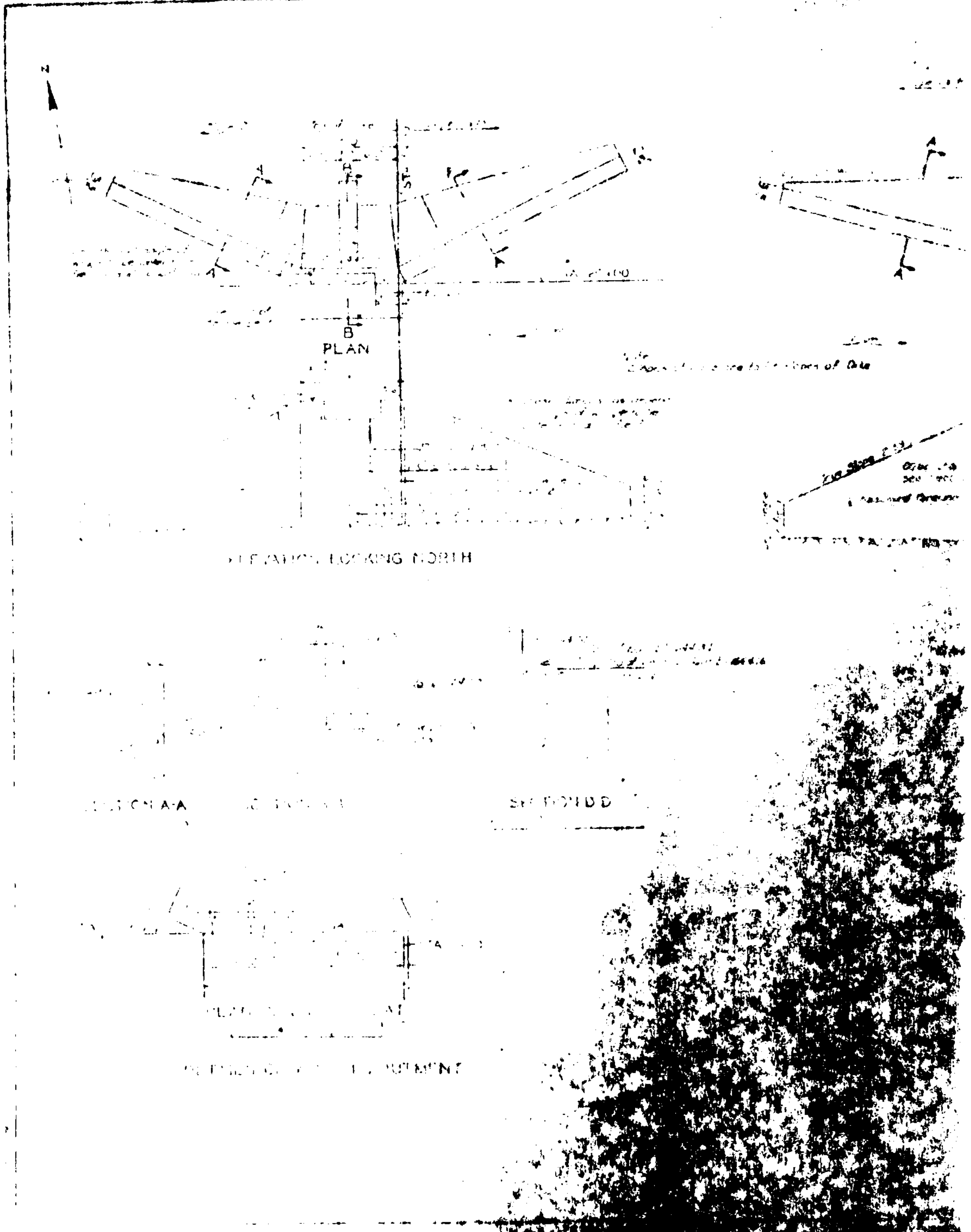
3. There is an area between Southern abutment and southern spillway wall where the earth fill on the downstream side has failed. This area had failed some year back and the grass had re-established itself in the area. This area is protected by the spillway wall and the abutment both of which are founded on ledge. This area should be watched for any further developments. New England Power plans no work on this at this time. They plan to monitor any further development and re-evaluate the situation in a year or upon any changes.

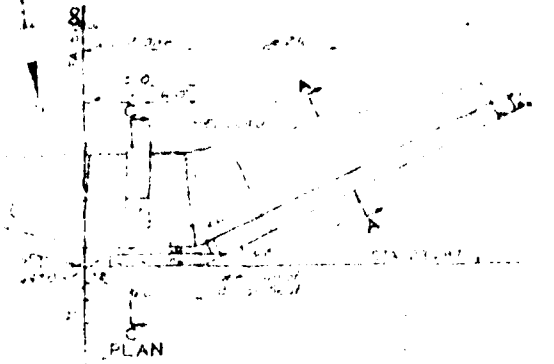
4. The two piers under the gate house on the upstream side show signs of deterioration and should be checked next year.

5. Concrete on the upstream face of the logway has deteriorated since last year's inspection. This should be repaired in the near future.

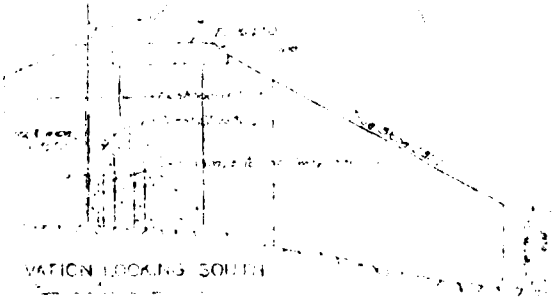
SCB:L


PLAN
KEY MAP
ELEVATION LOOKING UPSTREAM
TYPICAL SECTION THRU EARTH DIKE
REFERENCE DRAWINGS
Excavation Plan
Earth Dikes Main Dam and South Bay
Spillway Plan, Elevation and Sections
Spillway Timber Details
Assembly of Sluices
TYPICAL SECTION THRU WING WALL
SECTION AT SLUICE GATE
SECTION THRU LOGWAY
KEY PLAN
FIRST CONNECTICUT LAKE STORAGE
MAIN DAM
GENERAL LAYOUT
H-4549-2


PLAN



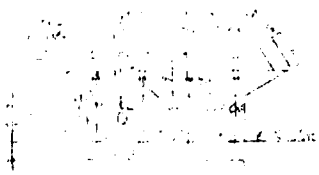
PLAN



VATION LOOKING SOUTH

HORIZONTAL JOINTS

NOTES

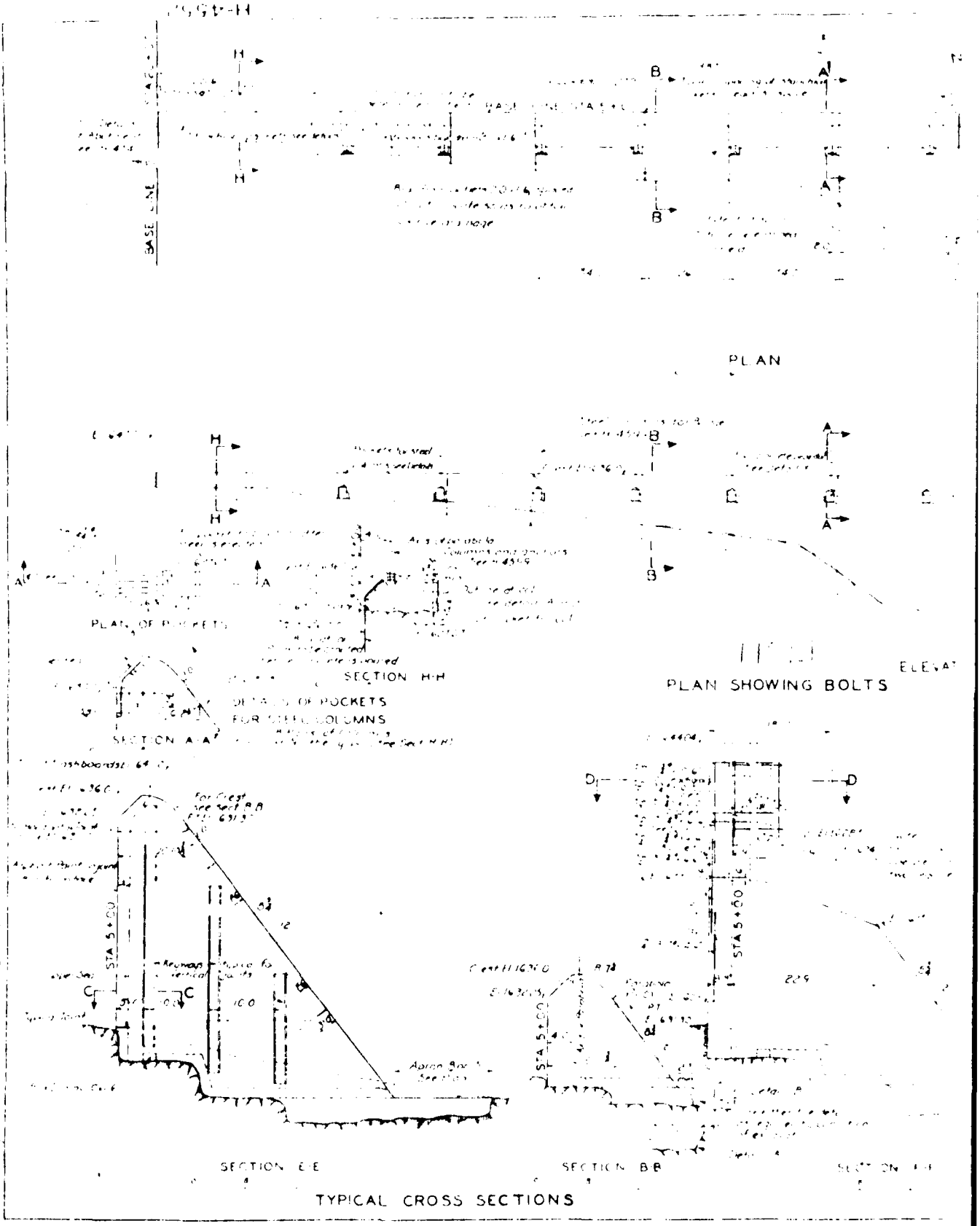


OF BRIDGE SEAT

DETAILS OF SOUTH ABUTMENT

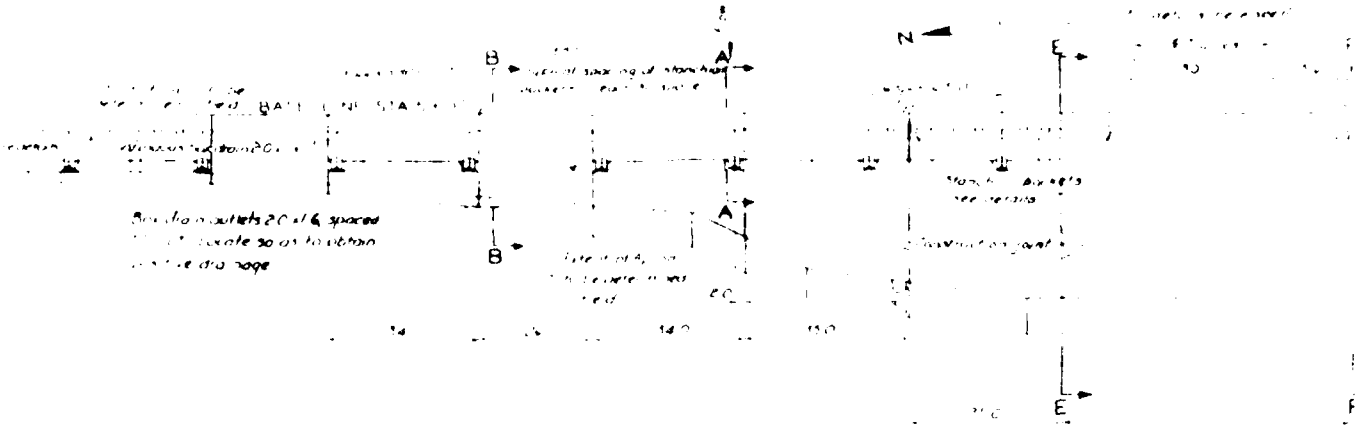
MAIN SPAN
CONCRETE PLAN, ELEVATION
AND SECTIONS

21

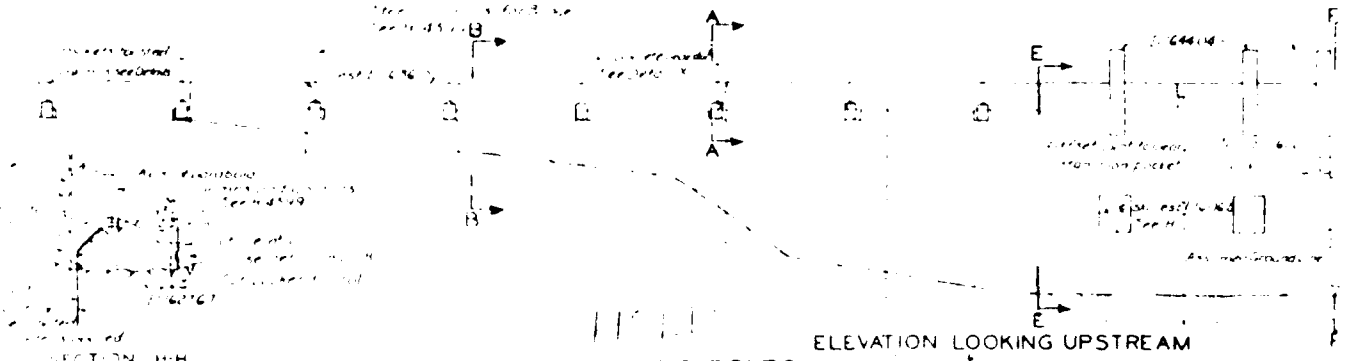


TYPICAL CROSS SECTIONS

1

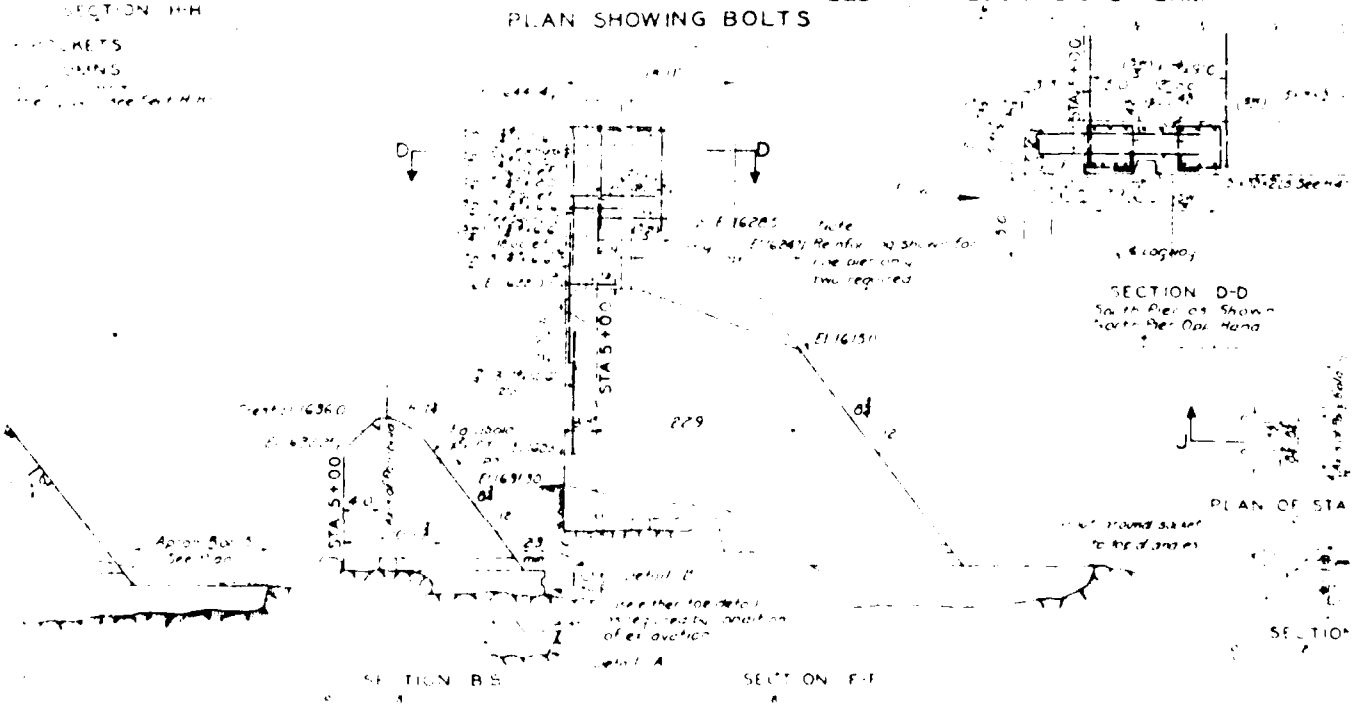


PLAN



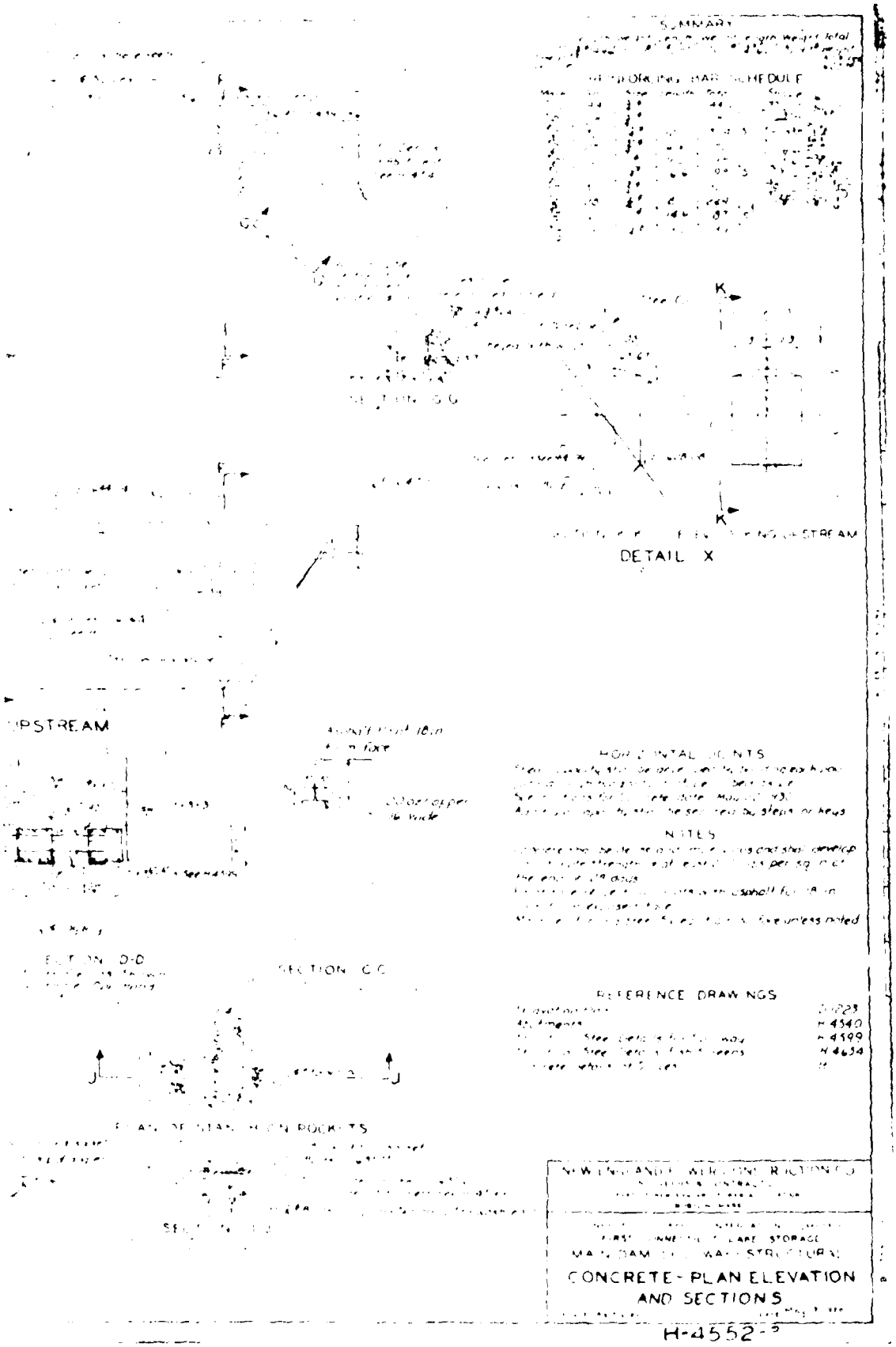
ELEVATION LOOKING UPSTREAM

PLAN SHOWING BOLTS



SECTION D-D

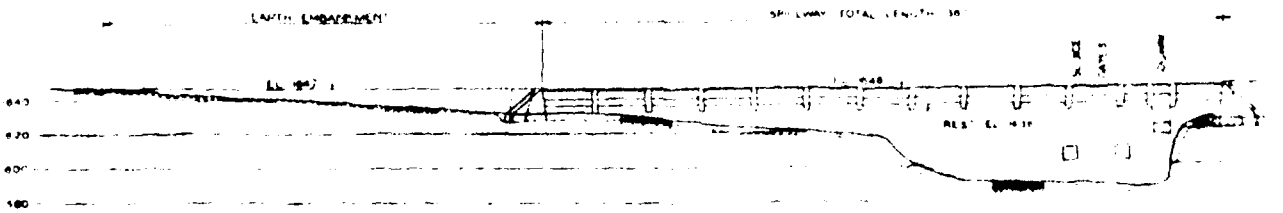
TYPICAL CROSS SECTIONS

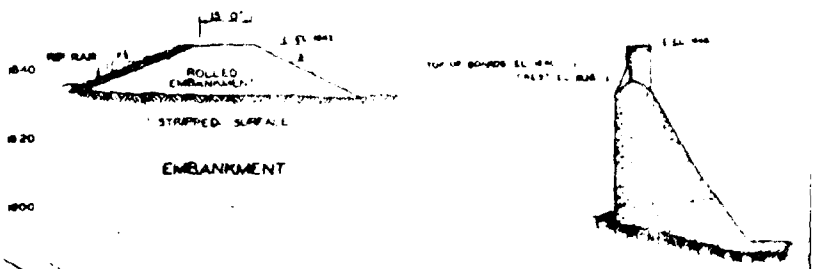

SUMMARY
REINFORCING BAR SCHEDULE
DETAIL X
UPSTREAM
HORIZONTAL JOINTS
NOTES
SECTION D-D
SECTION C-C
REFERENCE DRAWINGS
NEW ENGLAND WATER CONSTRUCTION CO.
FIRST CONNECTICUT LAKE STORAGE
CONCRETE - PLAN ELEVATION AND SECTIONS

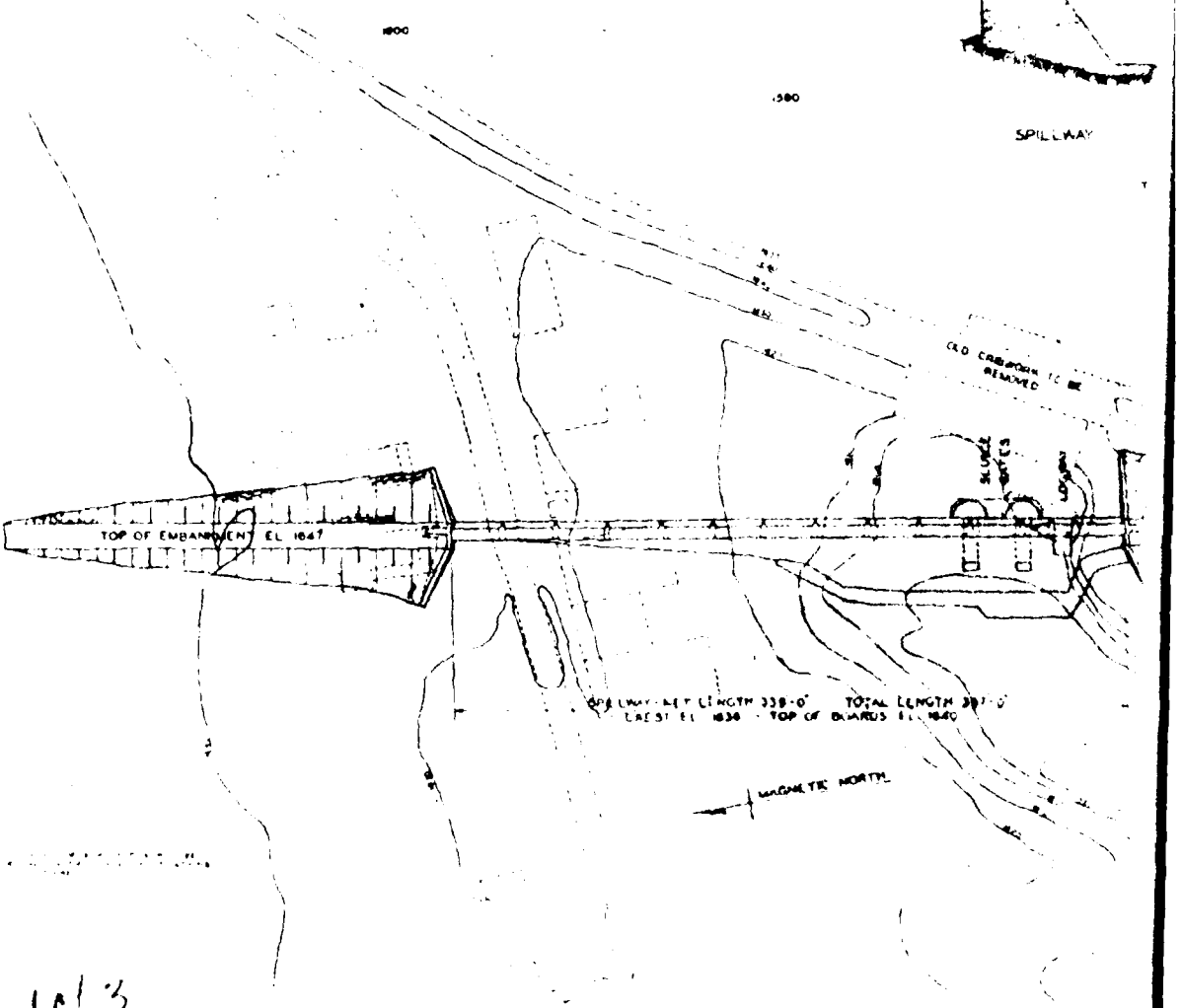
H-4552-5

(3)

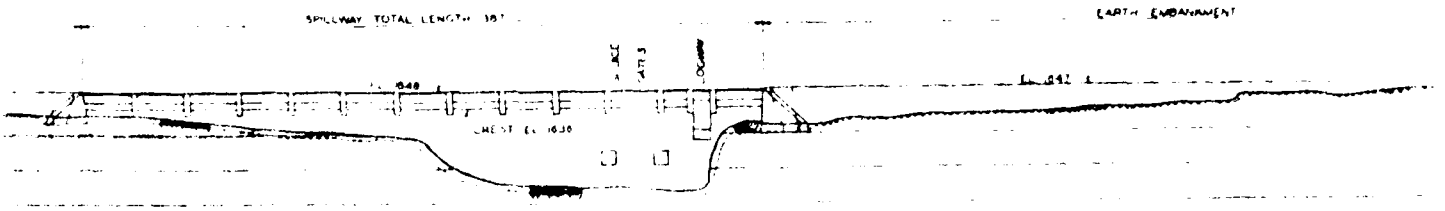
H-4482-




ROLLED EMBANKMENT
STRIPPED SURFACE
EMBANKMENT
SPILLWAY


TOP OF EMBANKMENT EL 1647
MAGNETIC NORTH

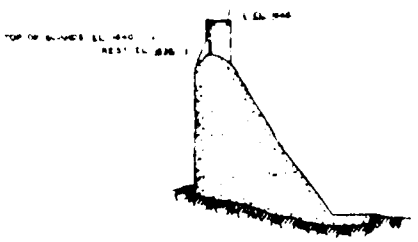
1 of 3



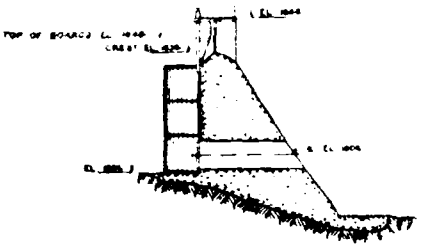
ELEVATION LOOKING UPSTREAM

SCALE 0 40 80 120

EMBANKMENT



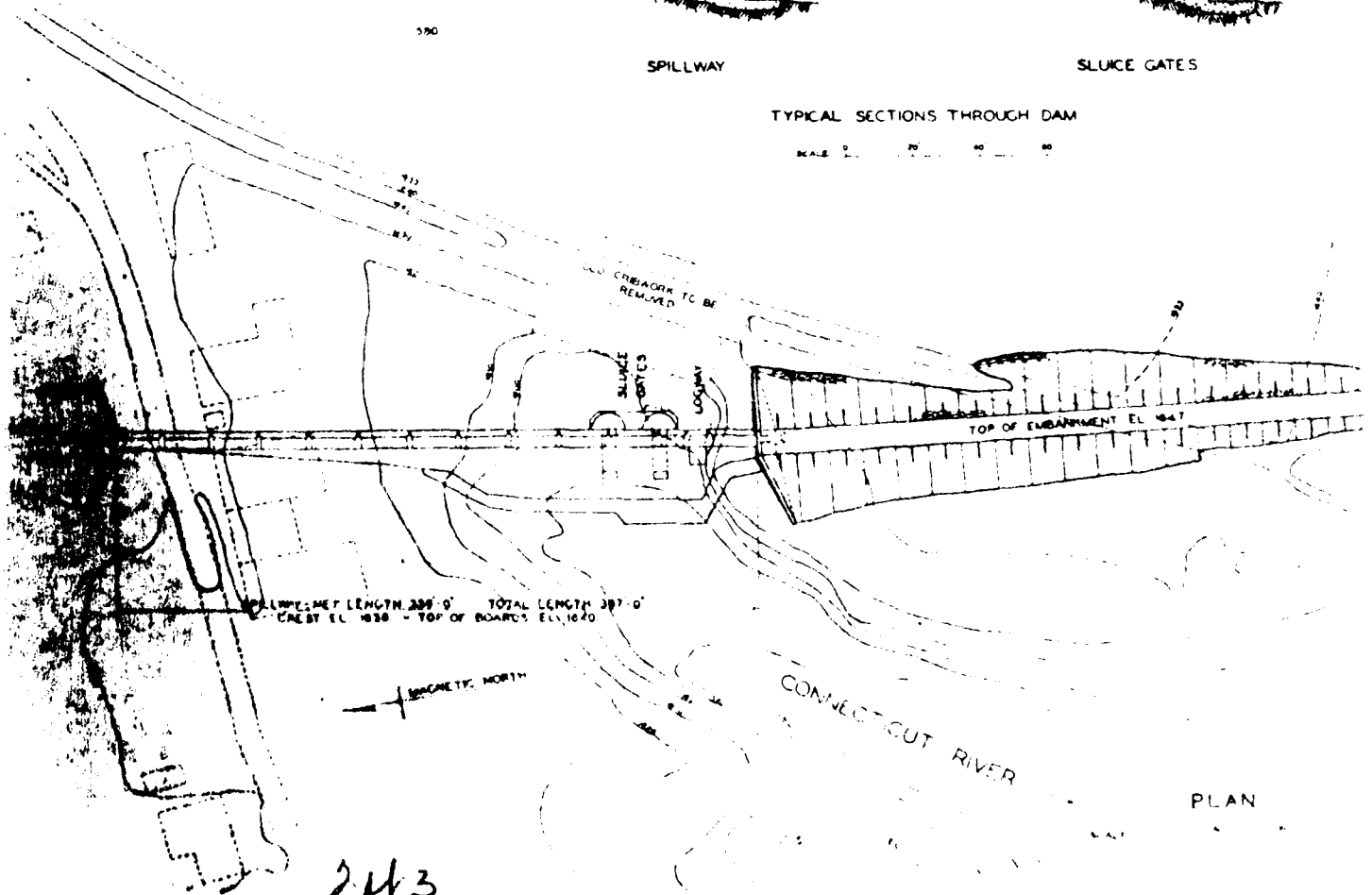
SPILLWAY



SLUICE GATES

TYPICAL SECTIONS THROUGH DAM

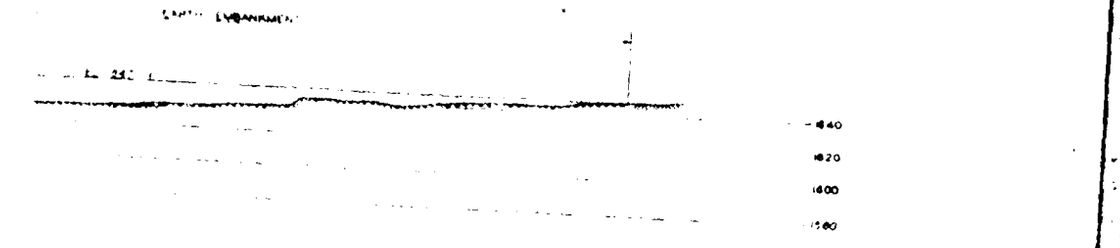
SCALE 0 20 40 80

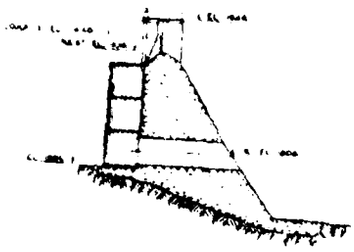


PLAN

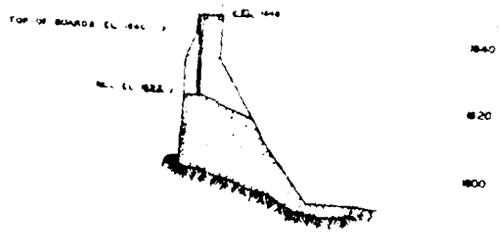
SCALE 1" = 40'

243



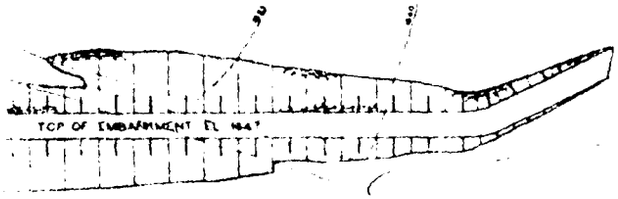


SLUICE GATES



LOGWAY

THROUGH DAM



PLAN

REVISION OF MARCH 17 1933

NEW ENGLAND POWER CONSTRUCTION CO
ENGINEERS & CONTRACTORS

FIRST CONNECTICUT LAKE STORAGE
MAY DAM
PLAN AND SECTIONS

3a/3

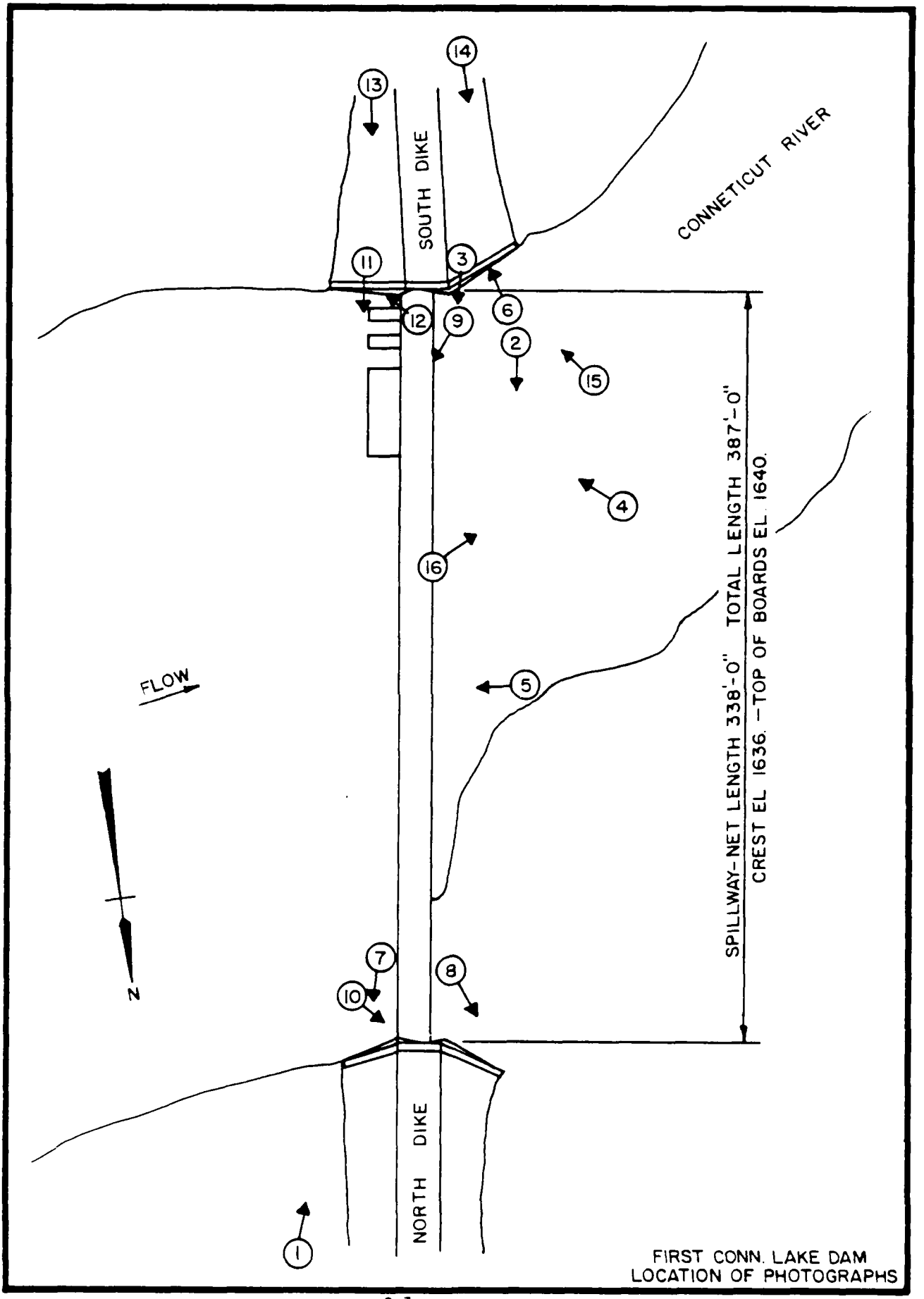
H-4462

APPENDIX C

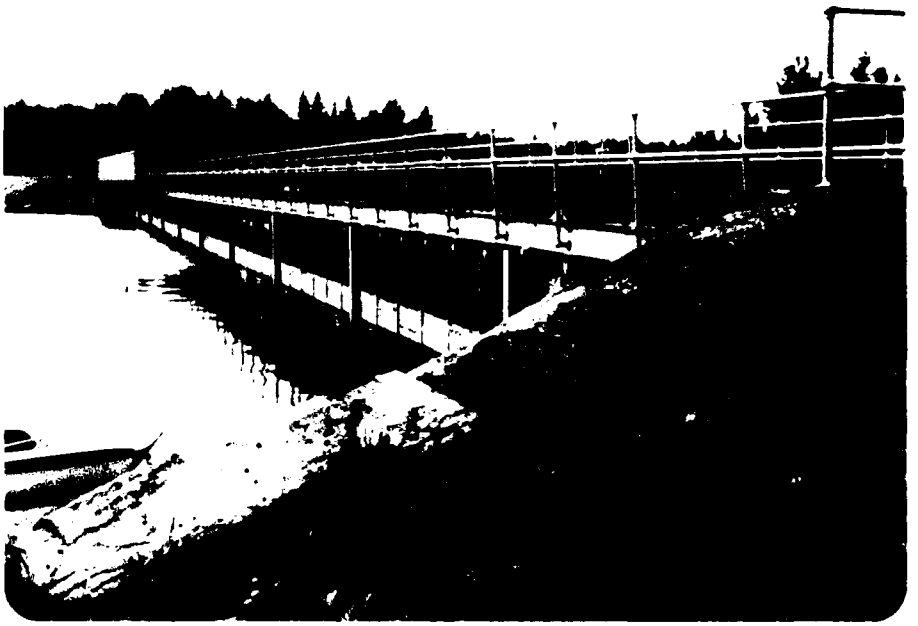
PHOTOGRAPHS

APPENDIX C

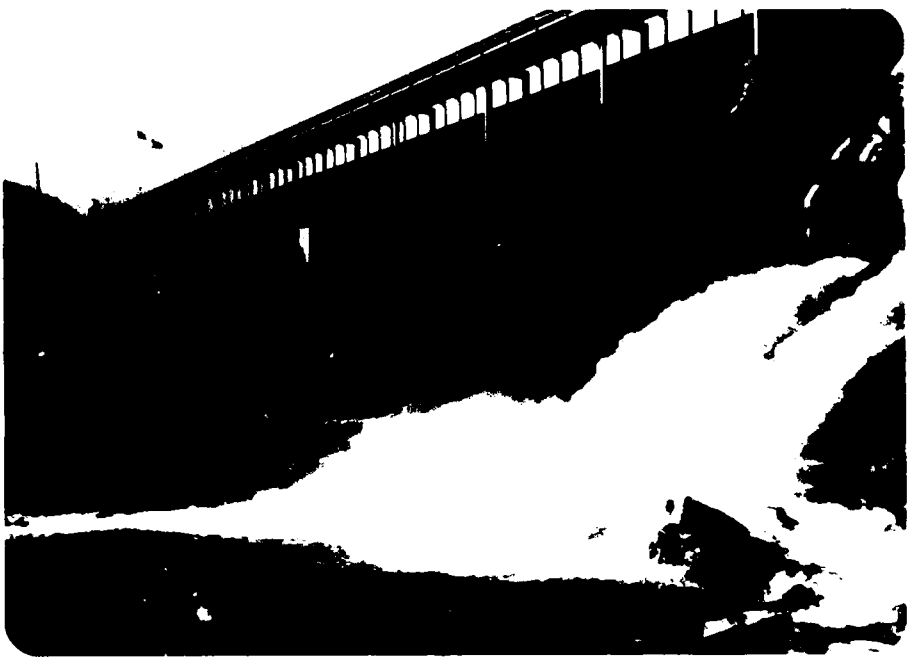
REPRESENTATIVE PHOTOGRAPHS OF PROJECT



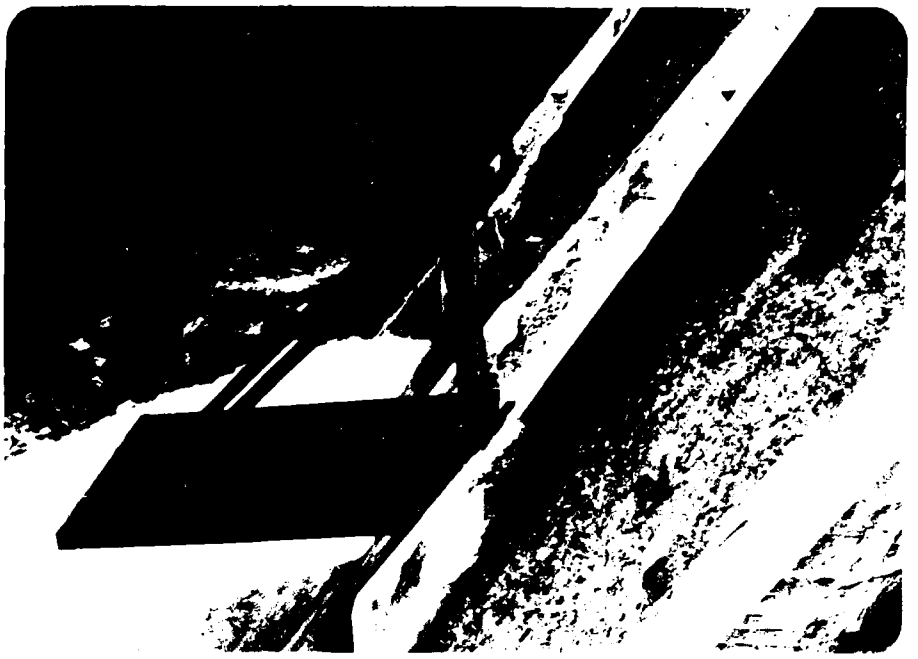
FIRST CONN. LAKE DAM
LOCATION OF PHOTOGRAPHS



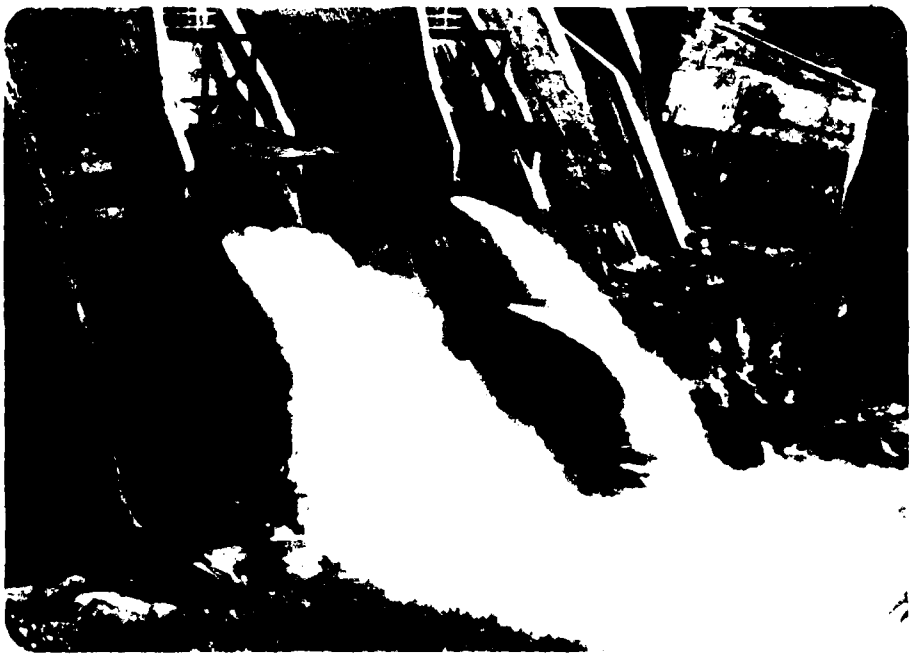
1. Upstream side of dam, showing flashboards and footbridge, looking south.



2. Downstream side showing north bank and erosion of concrete facing.



j. Looking downstream over gate sluices, showing erosion of concrete curbs.



i. Downstream face with one gate open, fish pipe flowing, and south abutment at right.

5. Downstream face, showing concrete erosion at construction joints.

6. South abutment, showing efflorescence in concrete.

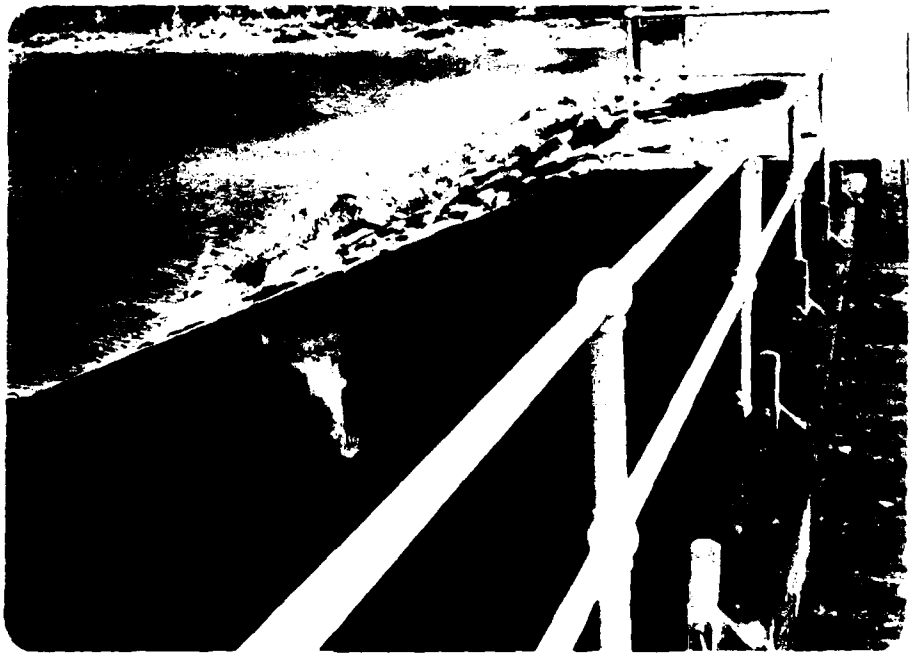
7. North abutment on upstream side.

8. North abutment on downstream side.

9. Concrete piers near south abutment and downstream face of spillway.

10. Footbridge support at north abutment with timber floor...

11. New concrete piers for log way near south end of dam.

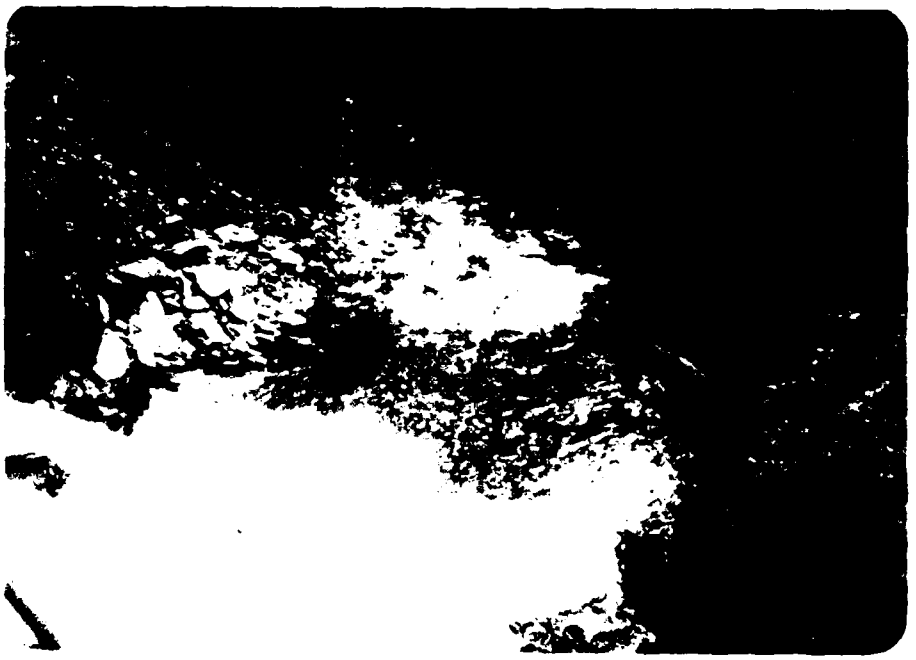


12. South abutment on the upstream side.

13. Upstream slope of south dike.

14. Downstream slope of south dike.

15. Erosion of south bank downstream. On the left; south abutment above, retaining wall below.



16. Downstream [illegible] river, looking from the footbridge.

APPENDIX D

HYDROLOGIC & HYDRAULIC COMPUTATIONS

APPENDIX – D

FAY, SPOFFORD & THORNDIKE, INC.
ENGINEERS
BOSTON

PROJECT [illegible]

SUBJECT [illegible]
[illegible]

FILE NUMBER [illegible]
SHEET NUMBER
DATE [illegible]
COMPUTED BY [illegible]
CHECKED BY

For determining the spillway test flood inflow hydrograph, the total drainage area above the First Connecticut Lake Dam was considered to be the area contributing run-off into the First Connecticut Lake for the sake of conservative analysis.

DA = 83.0 square miles
Size classification = Large

Hazard classification = Low
Spillway test flood = ½ PMF to PMF

Calculate PMF using "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations, March 1978".

Use Mountainous

∴ PMF for First Connecticut Lake = 83.0 x 1247
= 103,500 cfs

∴ Spillway test flood peak inflow = 103,500 cfs

FAY SPOFFORD & THORNDIKE INC
ENGINEERS
BOSTON

PROJECT EN-101(1)

FILE NUMBER
SHEET NUMBER
DATE
COMPUTED BY
CHECKED BY

SUBJECT Unit Hydrographs

SPILLWAY TEST FLOOD INFLOW HYDROGRAM
(BASED ON SCS DIMENSIONLESS UNIT HYDROGRAPH)

Length of Travel = 52,200'

Difference in Elevation = 1,559'

$$T_c = \frac{(52{,}200)^{1.15}}{7700 \times (1559)^{0.38}}$$

$$= \frac{266{,}350.0}{7700 \times 16.3}$$

$$= 2.13 \text{ hr} \approx 2.0 \text{ hr.}$$

SPILLWAY TEST FLOOD INFLOW HYDROGRAPH
(BASED ON SCS DIMENSIONLESS UNIT HYDROGRAPH)

$T_c = 2.0$ hrs.

SPILLWAY TEST FLOOD PEAK INFLOW = 103,500 cfs

T (hrs)	T/Tc	Q/Qp	Q (cfs)
0.50	0.25	0.05	5175
1.00	0.50	0.18	18,630
1.50	0.75	0.73	75,555
2.00	1.00	1.00	103,500
2.50	1.25	0.80	80,801
3.00	1.50	0.40	41,400
3.50	1.75	0.25	25,875
4.00	2.00	0.17	17,595
5.50	2.75	0.06	6,210
7.00	3.50	0.02	2,070
8.00	4.00	0.01	1,035

SUBJECT [illegible] CONNECTICUT LAKE DAM
COMPOSITE DISCHARGE RATING TABLE

REFER TO PAGES 5, 6, AND 7

ELEVATION	DISCHARGE THROUGH SPILLWAY CFS	[illegible] OF SPILLWAY CFS	SLUICE GATES DISCHARGE CFS	[illegible] DISCHARGE CFS	TOTAL DISCHARGE
[illegible]	18[illegible]		3500	15	[illegible]
[illegible]	[illegible]	[illegible]	3560	15	[illegible]
[illegible]	[illegible]	1100	3560	15	6773
[illegible]	[illegible]	[illegible]	[illegible]	15	7799
[illegible]	2311	3100	[illegible]	15	9026
[illegible]	2460	[illegible]500	3649	15	[illegible]
[illegible]	2531	5800	[illegible]	16	[illegible]
[illegible]	2644	7400	[illegible]	16	13760
[illegible]	2758	8900	[illegible]20	16	15394

DISCHARGE RATING FOR SPILLWAY:

Discharge through the spillway

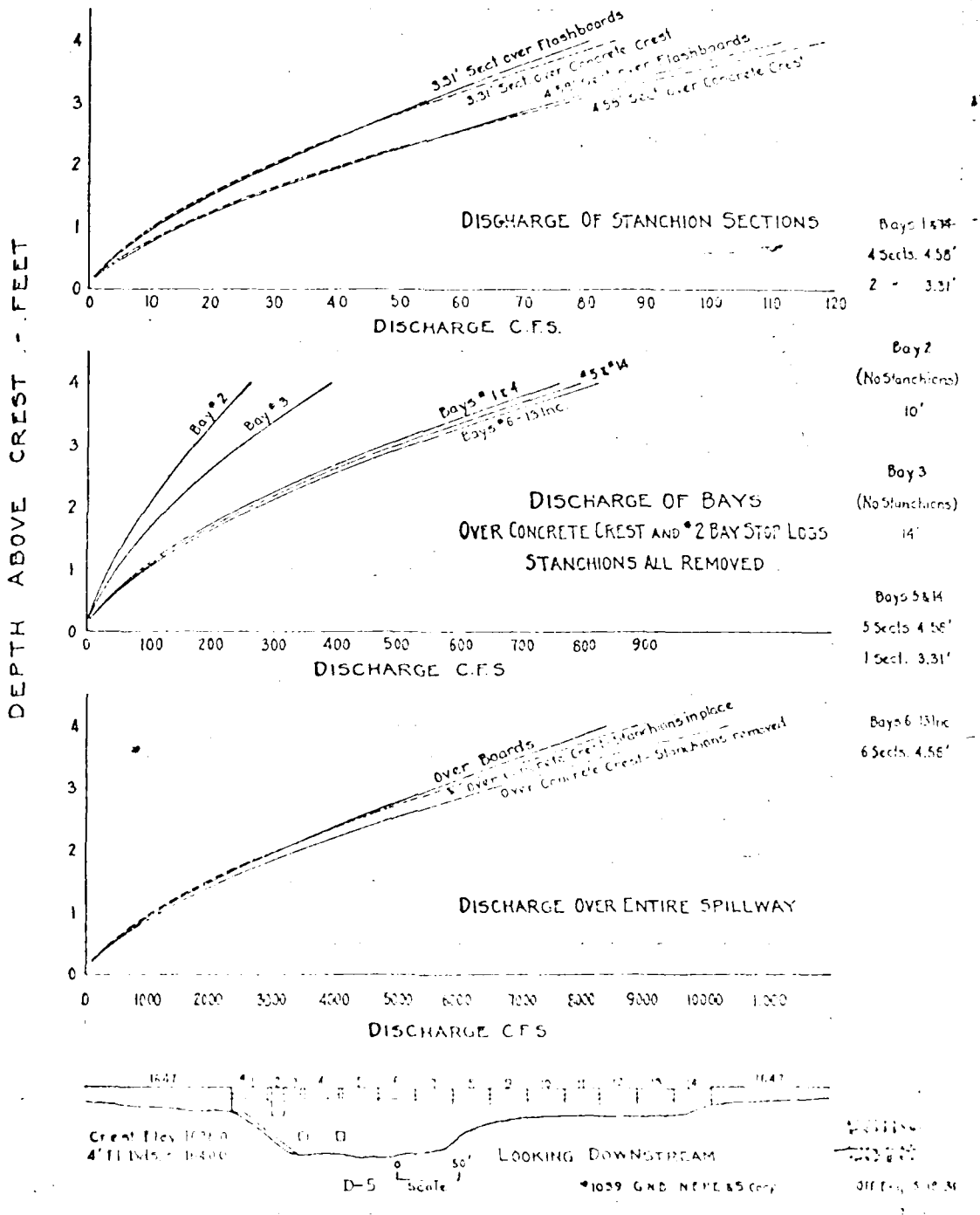
$$Q = C_d \, b \, B \sqrt{g\, y_1} = C_d \cdot b/y_1 \cdot B \cdot \sqrt{g} \cdot y_1^{3/2}$$

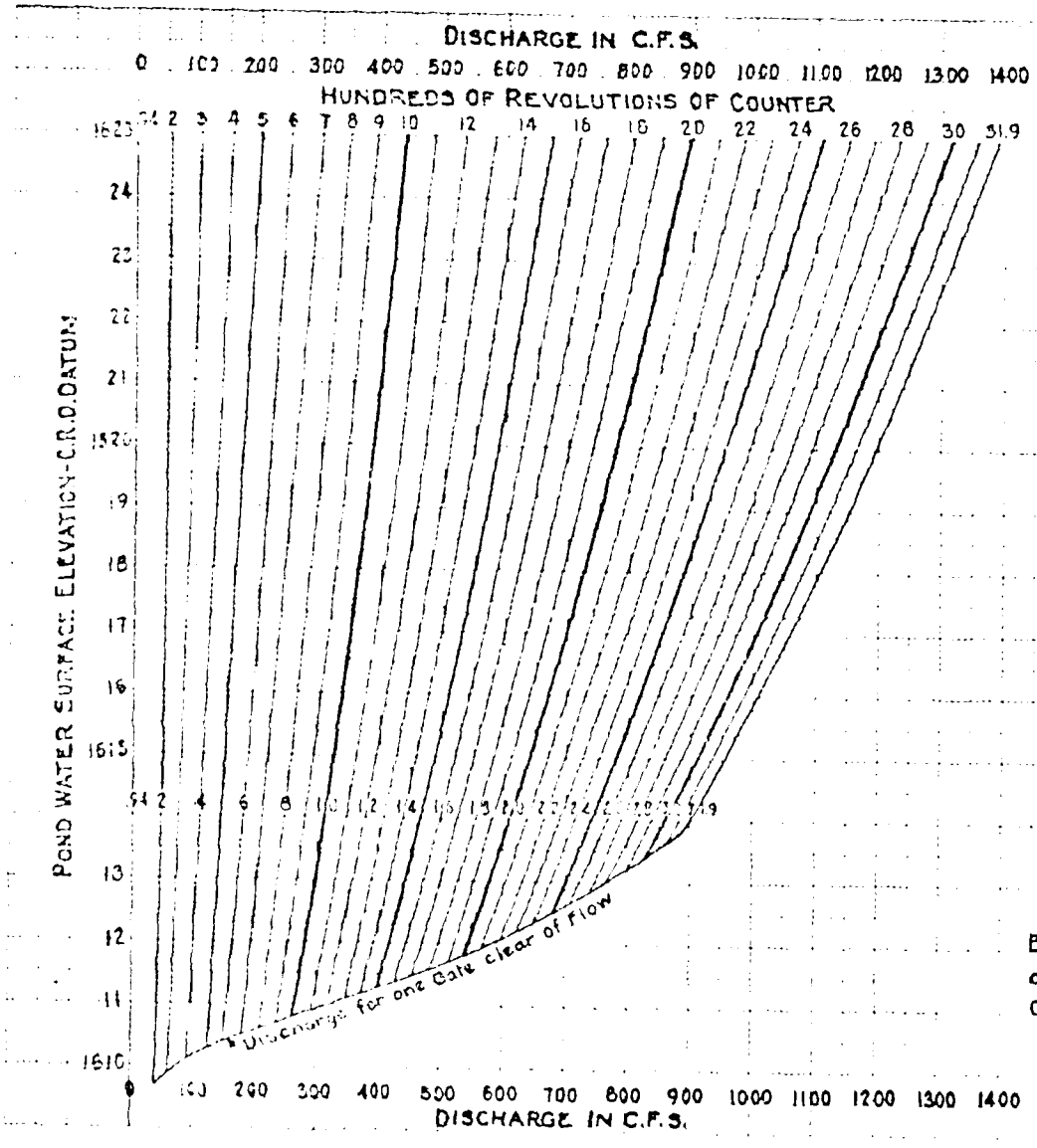
$B = 10$ ft

FOR $b = y_1$, $b/y_1 = 1$ ∴ $C_d = 0.45$ (REFER: ENGINEERING HYDRAULICS PAGE 537).

$$Q = 0.45 \times 10 \times \sqrt{g} \cdot y_1^{3/2}$$
$$= 36.11\ y_1^{3/2}$$

FIRST CONNECTICUT LAKE
SPILLWAY DISCHARGE RATINGS





Fish Pipe

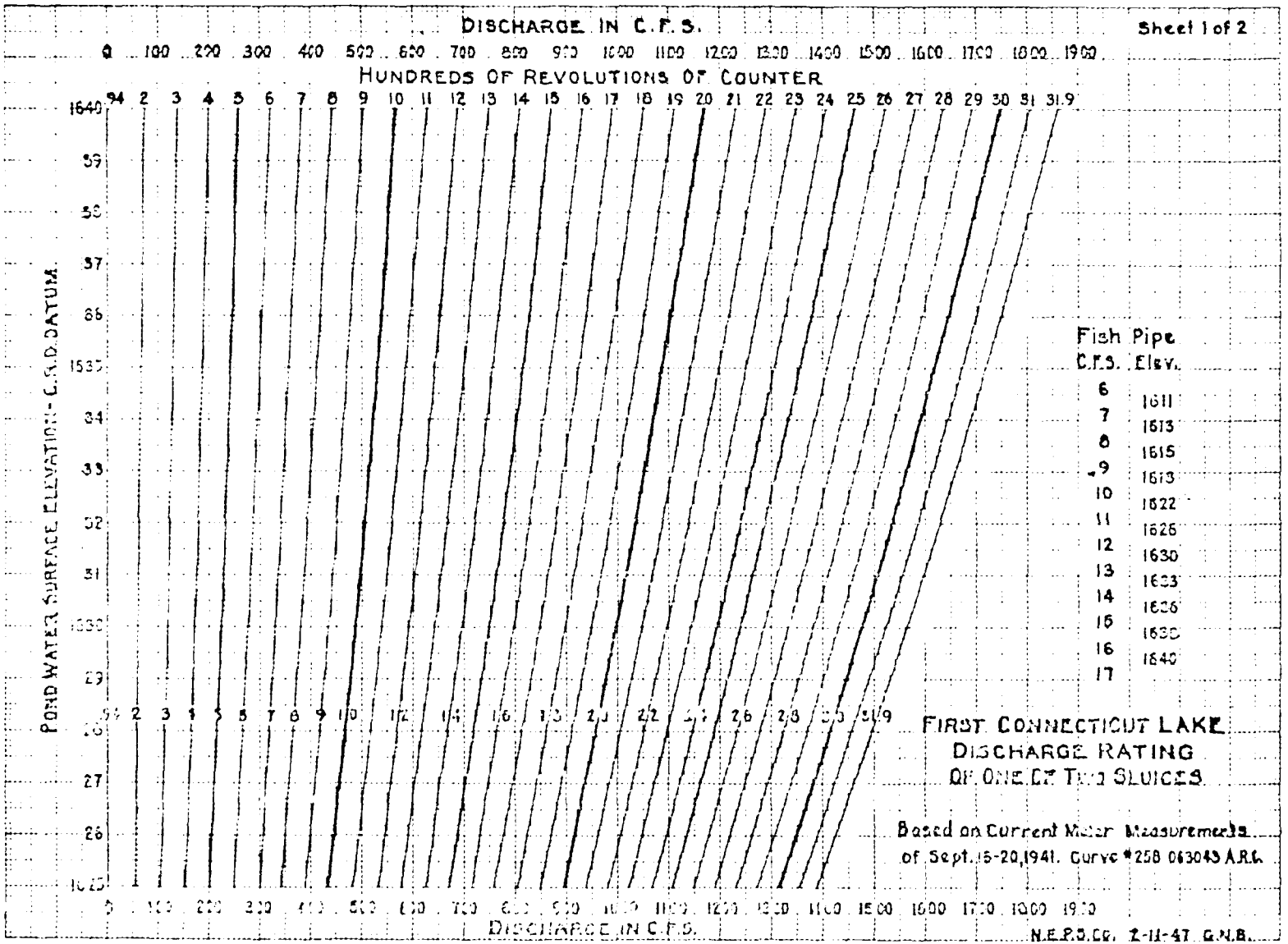
C.F.S.	Elev.
6	1611
7	1613
8	1615
9	1618
10	1622
11	1626
12	1630
13	1633
14	1636
15	1638
16	1640
17	

FIRST CONNECTICUT LAKE DISCHARGE RATING OF ONE OF TWO SLUICES

Based on Current Meter Measurements of Sept. 16-20, 1941. Curve #258 063043 A.R.C. Counter setting by A.T.S. 10-11-46.

N.E.P.S. Co. 2-11-47 G.N.B.

P46E-6


DISCHARGE IN C.F.S.
Sheet 1 of 2
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900
HUNDREDS OF REVOLUTIONS OF COUNTER
94 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 31.9
POND WATER SURFACE ELEVATION - C.S.G.D. DATUM.
1640
39
38
37
36
1635
34
33
32
31
1630
29
28
27
26
1625
Fish Pipe
C.F.S. Elev.
6 1611
7 1613
8 1615
9 1618
10 1622
11 1626
12 1630
13 1633
14 1636
15 1638
16 1640
17
FIRST CONNECTICUT LAKE
DISCHARGE RATING
OF ONE OF TWO SLUICES
Based on Current Meter Measurements
of Sept. 15-20, 1941. Curve #258 063043 A.R.L.
DISCHARGE IN C.F.S.
N.E.P.S.Co. 2-11-47 G.N.B.

FAY SPOFFORD & THORNDIKE INC
ENGINEERS
BOSTON

PROJECT EN-[illegible] ~~FILE NUMBER EN-606~~

SHEET NUMBER 8

DATE 2/[illegible]

COMPUTED BY [illegible]

CHECKED BY

SUBJECT FIRST CONNECTICUT LAKE, NH

STORAGE CURVE U.S. ARMY ELEV 1636

ELEVATION	STORAGE ABOVE ELEV. 1610 ACRE-FT	STORAGE ABOVE ELEV. 1636 ACRE-FT	STORAGE ABOVE ELEV. 1636 FT^3
1626.0	64,272	0	0
1626.5	65,710	1,497	65.21×10^6
1627.0	67,276	3,003	130.91×10^6
1627.5	68,799	4,517	196.76×10^6
1628.0	70,314	6,041	263.15×10^6
1628.5	71,845	7,572	329.98×10^6
1629.0	73,386	9,113	396.96×10^6
1629.5	74,925	10,662	464.44×10^6
1630.0	76,492	12,220	532.30×10^6

REFER TO TABLE ON PAGES 9 TO 14

FIRST CONNECTICUT LAKE
Storage Above Elevation 1610.

Sheet 1 of 6
D.A.=83.0 Sq.Mi.

U.S.G.S. Elev.	Acres	Acre-Feet	C.F.S. Days	Inches on 37.6 Sq.Mi.	Inches on Sq.Mi.	Million Cub.Ft.
1610.0	[illegible]	0	0	0	0	0
.1	1676	167	94	.093	.042	8.2
.2	1882	375	189	.187	.085	16.4
.3	1888	564	284	.281	.127	24.6
.4	1894	753	383	.376	.170	32.8
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	1906	1133	572	.565	.256	49.4
.7	1912	1324	668	.660	.299	57.7
.8	1918	1515	764	.756	.342	66.0
.9	1924	1707	861	.852	.386	74.4
1611.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	1936	2093	1055	1.044	.473	91.2
.2	1941	2287	1153	1.141	.517	99.6
.3	1946	2482	1251	1.238	.561	108.1
.4	1952	2677	1349	1.335	.605	116.6
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	1963	3066	1547	1.530	.693	133.6
.7	1968	3265	1646	1.628	.737	142.2
.8	1974	3462	1745	1.726	.782	150.8
.9	1980	3659	1845	1.825	.827	159.4
1612.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	1990	4056	2045	2.023	.916	176.7
.2	1995	4256	2145	2.122	.961	185.4
.3	2000	4456	2246	2.222	1.006	194.1
.4	2005	4656	2347	2.322	1.052	202.8
.5	2010	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	2015	5058	2550	2.522	1.143	220.3
.7	2020	5260	2652	2.623	1.188	229.1
.8	2025	5462	2754	2.724	1.234	237.9
.9	2030	5664	2856	2.825	1.279	246.7
1613.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	2040	6072	3061	3.028	1.371	264.5
.2	2045	6276	3164	3.130	1.418	273.4
.3	2050	6480	3267	3.232	1.464	282.3
.4	2055	6686	3371	3.334	1.510	291.2
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	2065	7098	3579	3.540	1.603	309.2
.7	2070	7304	3683	3.643	1.650	318.2
.8	2075	7512	3787	3.746	1.697	327.2
.9	2080	7720	3892	3.849	1.744	336.3
1614.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	2090	8136	4102	4.057	1.838	354.4
.2	2095	8346	4208	4.162	1.885	363.5
.3	2100	8556	4314	4.267	1.933	372.7
.4	2105	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	2115	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.7	2120	9400	4739	4.687	2.123	409.4
.8	2125	9612	4846	4.793	2.171	418.7
.9	2130	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1615.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

FIRST CONNECTICUT LAKE
Storage Above Elevation 1610.

Sheet 2 of 6
D.A.=83.0 Sq.Mi.

U.S.G.S. Elev.	Acres	Acre-Feet	C.F.S. Days	Inches on 37.6 Sq.Mi.	Inches on 83.0 Sq.Mi.	Million Cub.Ft.
1615.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	2140	10,251	5169	5.112	2.316	446.5
.2	2145	10,465	5277	5.219	2.364	455.9
.3	2150	10,680	5385	5.326	2.413	465.2
.4	2155	10,896	5493	5.434	2.461	474.6
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	2165	11,328	5711	[illegible]	[illegible]	[illegible]
.7	2170	11,544	5820	5.757	2.608	502.9
.8	2175	11,761	5930	5.866	2.657	512.3
.9	2180	11,979	6040	5.974	[illegible]	521.8
1616.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	2190	12,417	6260	[illegible]	[illegible]	540.9
.2	2194	12,636	6371	6.302	2.854	550.4
.3	2199	12,855	6481	6.411	2.904	560.0
.4	2203	13,075	6592	6.521	2.954	569.6
.5	[illegible]	[illegible]	[illegible]	6.631	[illegible]	579.2
.6	2212	13,517	[illegible]	6.741	3.053	[illegible]
.7	2217	13,738	6927	6.851	3.103	598.4
.8	2221	13,960	7039	6.962	3.154	608.1
.9	2226	14,182	7151	7.073	3.204	617.8
1617.0	[illegible]	[illegible]	[illegible]	[illegible]	3.254	627.5
.1	2235	14,629	7376	7.295	3.305	637.2
.2	2239	14,852	7489	7.407	3.355	647.0
.3	2244	15,076	7602	7.519	3.406	656.7
.4	2248	15,301	7715	7.631	3.456	666.5
.5	2253	[illegible]	[illegible]	7.743	3.507	676.3
.6	2257	15,752	7942	7.856	3.558	686.1
.7	2262	15,978	8056	7.968	3.609	696.0
.8	2266	16,204	8170	8.081	3.660	705.8
.9	2271	16,431	8284	8.194	3.712	715.7
1618.0	2275	[illegible]	[illegible]	[illegible]	[illegible]	725.6
.1	2280	[illegible]	8514	8.421	3.815	735.5
.2	2284	17,114	8629	8.535	3.866	745.5
.3	2289	17,343	8744	8.649	3.918	755.4
.4	2293	17,572	8860	8.763	3.970	765.4
.5	2298	17,801	8975	8.877	4.021	775.4
.6	2302	18,031	9091	8.992	4.073	785.4
.7	2307	18,262	9208	9.107	4.125	795.5
.8	2311	18,493	9324	9.222	4.178	805.5
.9	2316	18,724	9441	9.338	4.230	815.6
1619.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	2324	[illegible]	9675	[illegible]	[illegible]	835.8
.2	2329	19,421	9792	9.685	4.387	846.0
.3	2334	19,654	9909	9.801	4.440	856.1
.4	2338	[illegible]	10,027	9.918	[illegible]	[illegible]
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	2347	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.7	2352	20,591	10,382	10.269	4.652	896.9
.8	2356	20,826	10,501	10.386	4.705	907.2
.9	2361	[illegible]	10,620	[illegible]	[illegible]	917.5
1620.0	[illegible]	[illegible]	10,739	[illegible]	[illegible]	[illegible]

FIRST CONNECTICUT LAKE
Storage Above Elevation 1610.

Sheet 3 of 6
D.A.-83.0 Sq.Mi.

U.S.G.S.	Acres	Acre-Foot	C.F.S. Days	Inches on 37.6 Sq.Mi.	Inches on 83.0 Sq.Mi.	Million Cub. Ft.
1620.0	2365	21,289	10,739	10,632	4.811	927.8
.1	2370	21,535	10,858	10,760	4.865	936.1
.2	2374	21,772	10,978	10,838	4.918	948.4
.3	2379	22,010	11,098	10,976	4.972	958.8
.4	2383	22,248	11,218	11,096	5.026	969.1
.5	2387	22,487	11,338	11,284	5.079	979.5
.6	2392	22,726	11,458	11,333	5.134	989.9
.7	2397	22,965	11,579	11,453	5.188	1000.4
.8	2401	23,205	11,700	11,573	5.242	1010.8
.9	2406	23,446	11,821	11,693	5.296	1021.3
1621.0	2410	23,687	11,942	11,813	5.351	1031.8
.1	2414	23,928	12,064	11,933	5.405	1042.3
.2	2418	24,169	12,186	12,053	5.460	1052.8
.3	2422	24,411	12,308	12,174	5.514	1063.3
.4	2426	24,654	12,430	12,295	5.569	1073.9
.5	2430	24,896	12,553	12,416	5.624	1084.5
.6	2434	25,140	12,675	12,537	5.679	1095.1
.7	2438	25,383	12,798	12,659	5.734	1105.7
.8	2442	25,627	12,921	12,780	5.789	1116.3
.9	2446	25,872	13,044	12,902	5.844	1127.0
1622.0	2450	26,116	13,168	13,024	5.900	1137.6
.1	2454	26,362	13,291	13,147	5.955	1148.3
.2	2458	26,607	13,415	13,269	6.011	1159.0
.3	2462	26,853	13,539	13,392	6.066	1169.7
.4	2466	27,100	13,664	13,515	6.122	1180.5
.5	2470	27,347	13,788	13,638	6.177	1191.2
.6	2474	27,594	13,913	13,761	6.233	1202.0
.7	2478	27,841	14,038	13,884	6.289	1212.8
.8	2482	28,089	14,163	14,008	6.345	1223.6
.9	2486	28,338	14,288	14,132	6.402	1234.4
1623.0	2490	28,587	14,413	14,256	6.458	1245.2
.1	2494	28,836	14,539	14,381	6.514	1256.1
.2	2498	29,085	14,665	14,505	6.570	1266.9
.3	2502	29,335	14,791	14,629	6.627	1277.8
.4	2506	29,586	14,917	14,754	6.683	1288.7
.5	2510	29,837	15,043	14,878	6.740	1299.7
.6	2514	30,088	15,170	15,003	6.797	1310.6
.7	2518	30,339	15,297	15,130	6.854	1321.6
.8	2522	30,591	15,424	15,256	6.911	1332.5
.9	2526	30,844	15,551	15,382	6.968	1343.5
1624.0	2530	31,097	15,679	15,509	7.025	1354.6
.1	2534	31,350	15,806	15,634	7.082	1365.6
.2	2538	31,603	15,934	15,760	7.139	1376.6
.3	2542	31,857	16,062	15,887	7.196	1387.7
.4	2546	32,112	16,191	16,014	7.254	1398.8
.5	2550	32,367	16,319	16,141	7.312	1409.9
.6	2554	32,622	16,448	16,269	7.370	1421.0
.7	2558	32,877	16,577	16,396	7.427	1432.1
.8	2562	33,133	16,706	16,523	7.485	1443.3
.9	2566	33,389	16,835	16,651	7.543	1454.4
1625.0	2570	33,645	16,964	16,778	7.601	1465.6

FIRST CONNECTICUT LAKE
Storage Above Elevation 1610.

Sheet 4 of 6
D.A.-83.0 Sq.Mi.

U.S.G.S. Elev.	Acres	Acre-Feet	C.F.S. Days	Inches on 37.6 Sq.Mi.	Inches on 83.0 Sq.Mi.	Million Cub.Ft.
1625.0	2570	33,[illegible]	[illegible]	16.[illegible]	7.[illegible]	[illegible]
.1	2574	33,[illegible]	17,[illegible]	16.[illegible]	7.659	1476.8
.2	2578	34,161	17,224	17.036	7.717	1488.1
.3	2582	34,419	17,354	17.165	7.775	1499.3
.4	2586	34,678	17,484	17.294	7.834	1510.6
.5	2590	34,937	17,615	17.423	7.892	1521.8
.6	2594	35,196	17,746	17.552	7.951	1533.1
.7	2598	35,455	17,877	17.681	8.009	1544.4
.8	2602	35,715	18,008	17.811	8.068	1555.7
.9	2606	35,976	18,139	17.941	8.127	1567.1
1626.0	2610	36,237	18,270	18.071	8.186	1578.5
.1	2614	36,498	18,402	18.202	8.245	1589.8
.2	2618	36,759	18,534	18.332	8.304	1601.2
.3	2622	37,021	18,666	18.463	8.363	1612.6
.4	2626	37,284	18,798	18.594	8.422	1624.1
.5	2630	37,547	18,931	18.725	8.482	1635.5
.6	2634	37,810	19,064	18.856	8.541	1647.0
.7	2638	38,073	19,197	18.987	8.601	1658.5
.8	2642	38,337	19,330	19.119	8.660	1670.0
.9	2646	38,602	19,463	19.251	8.720	1681.5
1627.0	2650	38,867	19,596	19.383	8.780	1693.0
.1	2654	39,132	19,730	19.515	8.839	1704.6
.2	2658	39,397	19,864	19.647	8.900	1716.1
.3	2662	39,663	19,998	19.780	8.960	1727.7
.4	2666	39,930	20,132	19.913	9.020	1739.3
.5	2670	40,197	20,266	20.046	9.080	1750.9
.6	2674	40,464	20,402	20.179	9.141	1762.6
.7	2678	40,732	20,537	20.313	9.201	1774.2
.8	2682	41,000	20,672	20.447	9.262	1785.9
.9	2686	41,268	20,807	20.580	9.322	1797.6
1628.0	2690	41,536	20,943	20.714	9.383	1809.3
.1	2694	41,805	21,078	20.849	9.444	1821.0
.2	2698	42,075	21,214	20.983	9.505	1832.8
.3	2702	42,345	21,350	21.117	9.566	1844.6
.4	2706	42,616	21,487	21.252	9.627	1856.3
.5	2710	42,887	21,623	21.387	9.688	1868.1
.6	2714	43,158	21,760	21.523	9.749	1879.9
.7	2718	43,429	21,897	21.658	9.811	1891.8
.8	2722	43,701	22,034	21.794	9.872	1903.6
.9	2726	43,974	22,171	21.930	9.934	1915.5
1629.0	2730	44,247	22,309	22.066	9.995	1927.4
.1	2734	44,520	22,447	22.202	10.057	1939.3
.2	2738	44,793	22,585	22.338	10.119	1951.2
.3	2742	45,067	22,723	22.475	10.181	1963.1
.4	2746	45,340	22,861	22.612	10.243	1975.1
.5	2750	45,614	22,999	22.747	10.305	1987.0
.6	2754	45,888	23,138	22.886	10.367	1999.0
.7	2758	46,163	23,277	23.023	10.429	2011.0
.8	2762	46,438	23,417	23.161	10.491	2023.1
.9	2766	46,713	23,556	23.299	10.553	2035.1
1630.0	2770	46,988	23,696	23.437	10.615	2047.2

FIRST CONNECTICUT LAKE Sheet 5 of 6
Storage Above Elevation 1610. D.A.-83.0 Sq.Mi.

U.S.G.S. Elev.	Acres	Acre-feet	C.F.S. Days	Inches on 37.6 Sq.Mi.	Inches on 83.0 Sq.Mi.	Million Cub. Ft.
1630.0	2770	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	2774	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.2	2778	47,561	23,975	23.714	10.742	2071.3
.3	2782	47,829	24,115	23,852	10.805	2083.4
.4	2786	48,103	24,256	23,991	10.868	2095.6
.5	2790	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	2794	48,665	24,537	24,270	10.994	2119.9
.7	2798	48,945	24,678	24,409	11.057	2132.0
.8	2802	49,225	24,819	24,549	11.120	2144.2
.9	2806	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1631.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	2814	50,078	25,244	24,969	11.310	2180.9
.2	2817	50,349	25,386	25,109	11.374	2193.2
.3	2820	50,631	25,528	25,250	11.438	2205.5
.4	2824	50,913	25,670	25,390	11.501	2217.8
.5	2828	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	2831	51,479	25,956	25,673	11.629	2242.4
.7	2834	51,762	26,098	25,814	11.693	2254.7
.8	2838	52,046	26,241	25,955	11.757	2267.1
.9	2842	52,330	26,385	26,097	11.821	2279.5
1632.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	2846	52,899	26,671	26,391	11.953	2304.3
.2	2852	53,184	26,815	26,523	12.014	2316.7
.3	2855	53,469	26,959	26,665	12.079	2329.1
.4	2859	53,755	27,103	26,808	12.143	2341.5
.5	2863	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	2866	54,327	27,392	27,093	12.272	2366.5
.7	2869	54,614	27,536	27,236	12.337	2379.0
.8	2873	54,901	27,681	27,379	12.402	2391.5
.9	2876	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1633.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	2884	55,764	28,118	27,810	12.587	2428.1
.2	2887	56,053	28,261	27,954	12.662	2441.7
.3	2890	56,342	28,407	28,098	12.728	2454.2
.4	2894	56,631	28,553	28,242	12.793	2466.8
.5	2898	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	2901	57,210	28,850	28,531	12.919	2491.1
.7	2904	57,501	28,992	28,676	12.989	2504.7
.8	2908	57,791	29,138	28,820	13.055	2517.4
.9	2912	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1634.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	2920	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.2	2922	58,957	29,726	29,402	13.318	2568.2
.3	2926	59,250	29,874	29,548	13.385	2580.9
.4	2929	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	2936	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.7	2939	60,423	30,466	30,133	13.650	2630.0
.8	2943	60,717	30,613	30,280	13.716	2642.8
.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1635.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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FIRST CONNECTICUT LAKE
Storage Above Elevation 1619

Sheet 6 of 6
D.A.=83.0 Sq.Mi.

U.S.G.S. Elev.	Acres	Acre-feet	C.F.S. Days	Inches on 37.6 Sq.Mi.	Inches on 83.0 Sq.Mi.	Million Cub. Ft.
1635.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	2953	61,[illegible]	31,[illegible]	[illegible]	[illegible]	[illegible]
.2	2957	61,[illegible]	31,[illegible]	[illegible]	[illegible]	2696.2
.3	2960	62,193	31,[illegible]	31.035	[illegible]	2709.1
.4	[illegible]	62,[illegible]	31,[illegible]	[illegible]	[illegible]	[illegible]
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	2971	63,[illegible]	31,[illegible]	[illegible]	[illegible]	2747.9
.7	2975	63,379	31,[illegible]	31.607	14.317	2760.8
.8	2978	63,677	32,[illegible]	31.756	14.385	2773.8
.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1636.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.2	2992	64,871	32,708	32.381	14.654	2825.8
.3	2995	65,170	32,859	32.530	14.722	2838.8
.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	3005	66,071	33,313	32.980	14.929	2878.0
.7	3009	66,371	33,464	33.100	14.983	2891.1
.8	3013	66,673	33,616	33.250	15.061	2904.3
.9	3017	66,974	33,768	33.400	15.[illegible]	2917.4
1637.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	3024	67,578	34,073	33.701	15.266	2943.7
.2	3027	67,881	34,225	33.852	15.334	2956.9
.3	3031	68,184	34,378	34.003	15.403	2970.1
.4	3034	68,487	34,531	34.154	15.471	2983.3
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	3041	69,094	34,837	34.467	[illegible]	3009.7
.7	3045	69,399	34,991	34.609	15.677	3023.0
.8	3048	69,703	35,144	34.761	15.746	3036.3
.9	3051	70,008	[illegible]	[illegible]	[illegible]	[illegible]
1638.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	3058	70,619	[illegible]	[illegible]	[illegible]	3076.2
.2	3062	70,925	35,760	35.370	16.022	3089.5
.3	3065	71,232	35,915	35.523	16.091	3102.8
.4	3069	71,538	[illegible]	[illegible]	[illegible]	[illegible]
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	3076	72,153	[illegible]	[illegible]	[illegible]	3129.0
.7	3079	72,461	36,535	36.136	16.369	3156.4
.8	3083	72,769	[illegible]	[illegible]	[illegible]	3169.8
.9	3086	[illegible]	[illegible]	[illegible]	[illegible]	3183.2
1639.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	3093	[illegible]	[illegible]	[illegible]	[illegible]	3210.2
.2	3097	74,094	37,313	36.976	16.738	3223.6
.3	3100	74,314	37,[illegible]	37.050	16.788	3237.1
.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	3111	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.7	3114	75,257	38,026	37.650	17.056	3291.3
.8	3118	75,[illegible]	38,[illegible]	37.[illegible]	17.[illegible]	3304.8
.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1640.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

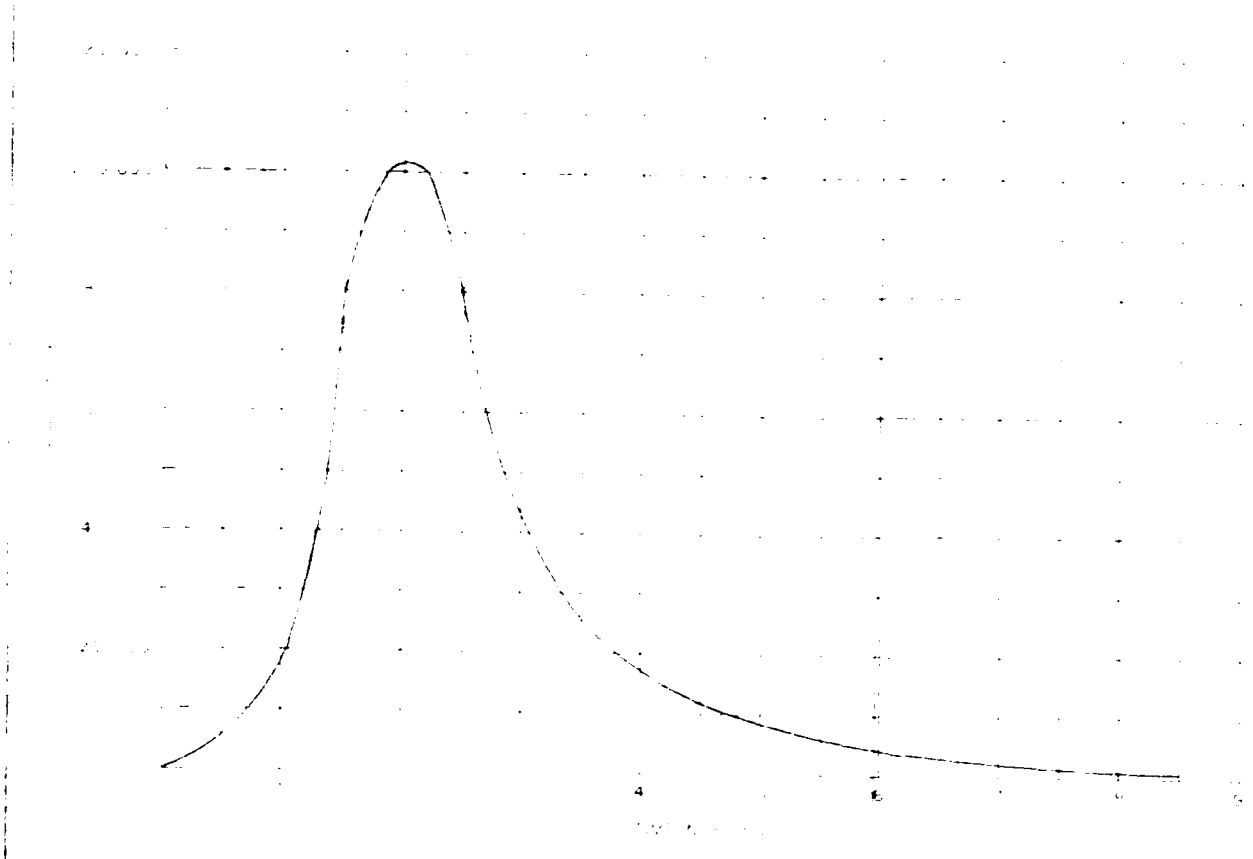
NEPS CO. C.E. Dept.
L.D.P. 2/10/[illegible]

FAY, SPOFFORD & THORNDIKE INC.
ENGINEERS
BOSTON

PROJECT EN-614(1)

FILE NUMBER EN-614
SHEET NUMBER 15
DATE
COMPUTED BY
CHECKED BY

SUBJECT FIRST CONNECTICUT LAKE DAM
FLOOD ROUTING COMPUTATIONS



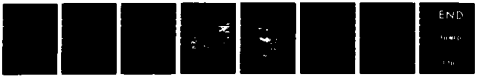
SPILLWAY TEST FLOOD INFLOW HYDROGRAPH

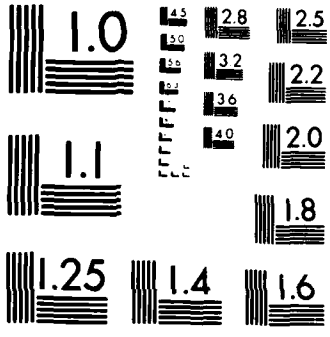
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

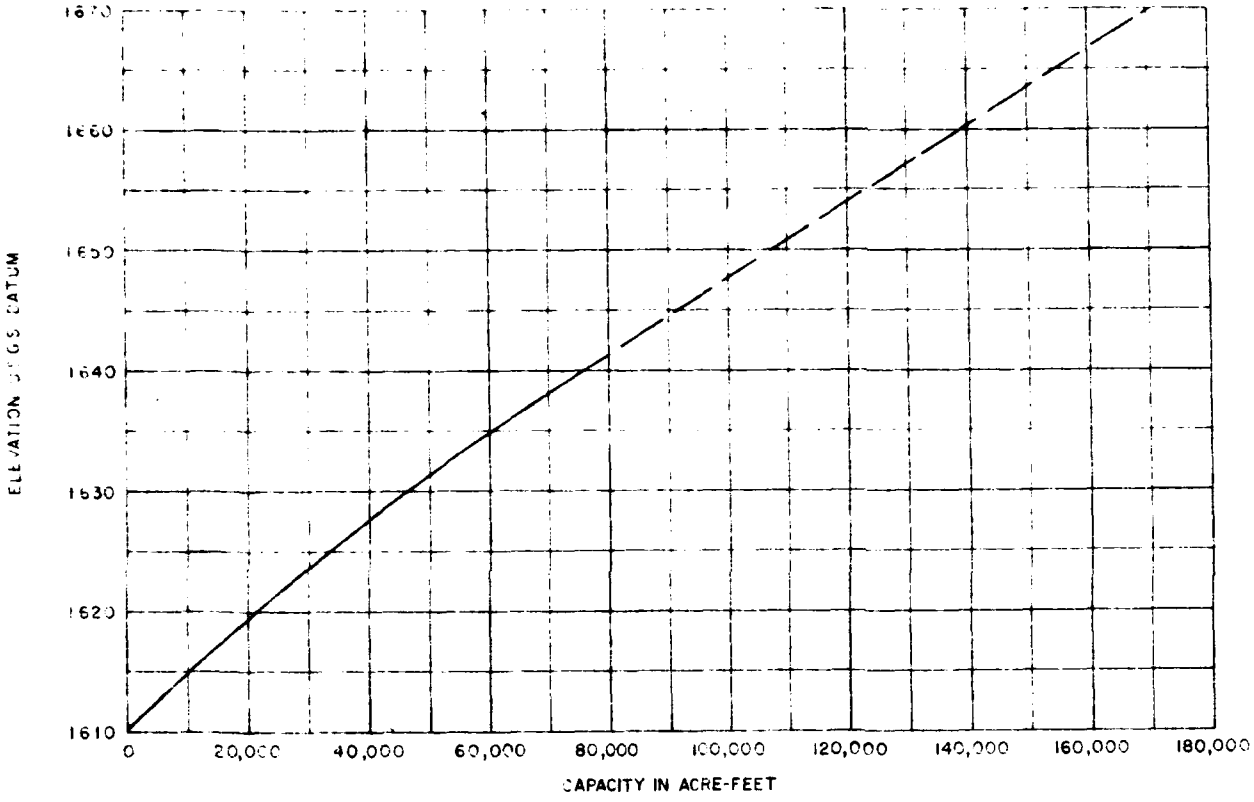
FIRST CONNECTICUT LAKE DAM

AD-A156 424 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAM 2/2
FIRST CONNECTICUT LAKE..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV MAY 79

UNCLASSIFIED F/G 13/13 NL







STORAGE CAPACITY - ELEVATION CURVE

106.5 (LOCAL DATUM) = 825 USGS (ESTIMATED)

FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS BOSTON, MASS.	U.S. ARMY ENGINEER D.V. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

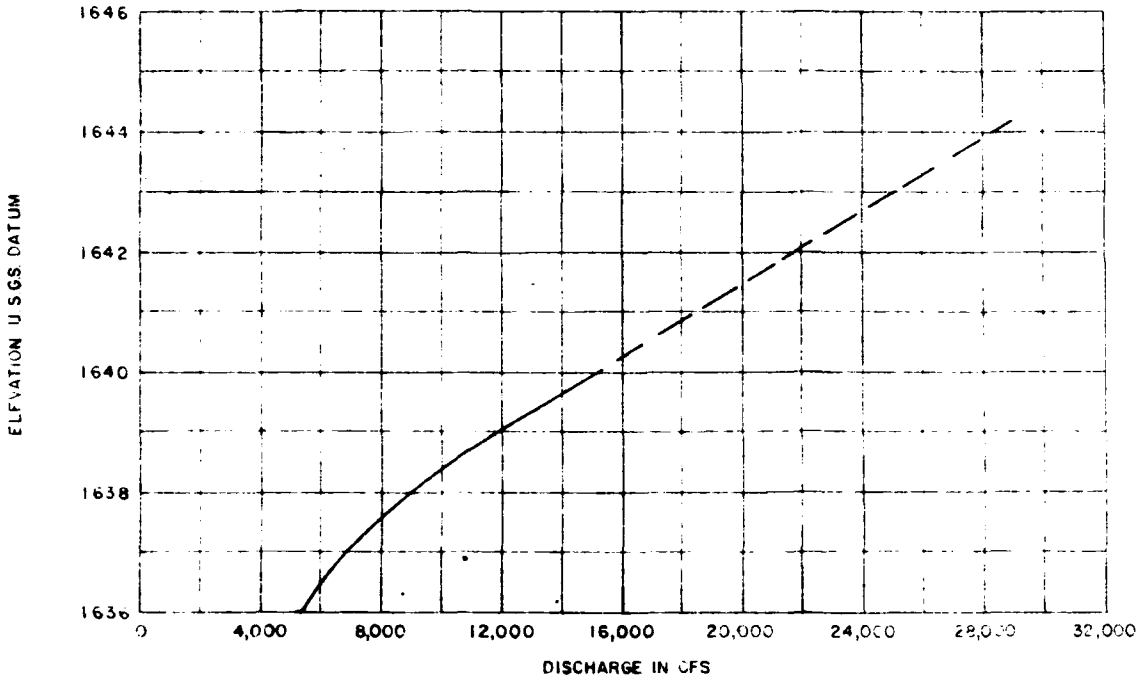
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

FIRST CONNECTICUT LAKE DAM

CONNECTICUT RIVER — NEW HAMPSHIRE

SCALE	AS SHOWN
DATE	AUGUST, 1978

D-17



RATING CURVE FOR SPILLWAY AND DAM

1065 (LOCAL DATUM) = 825 USGS (ESTIMATED)

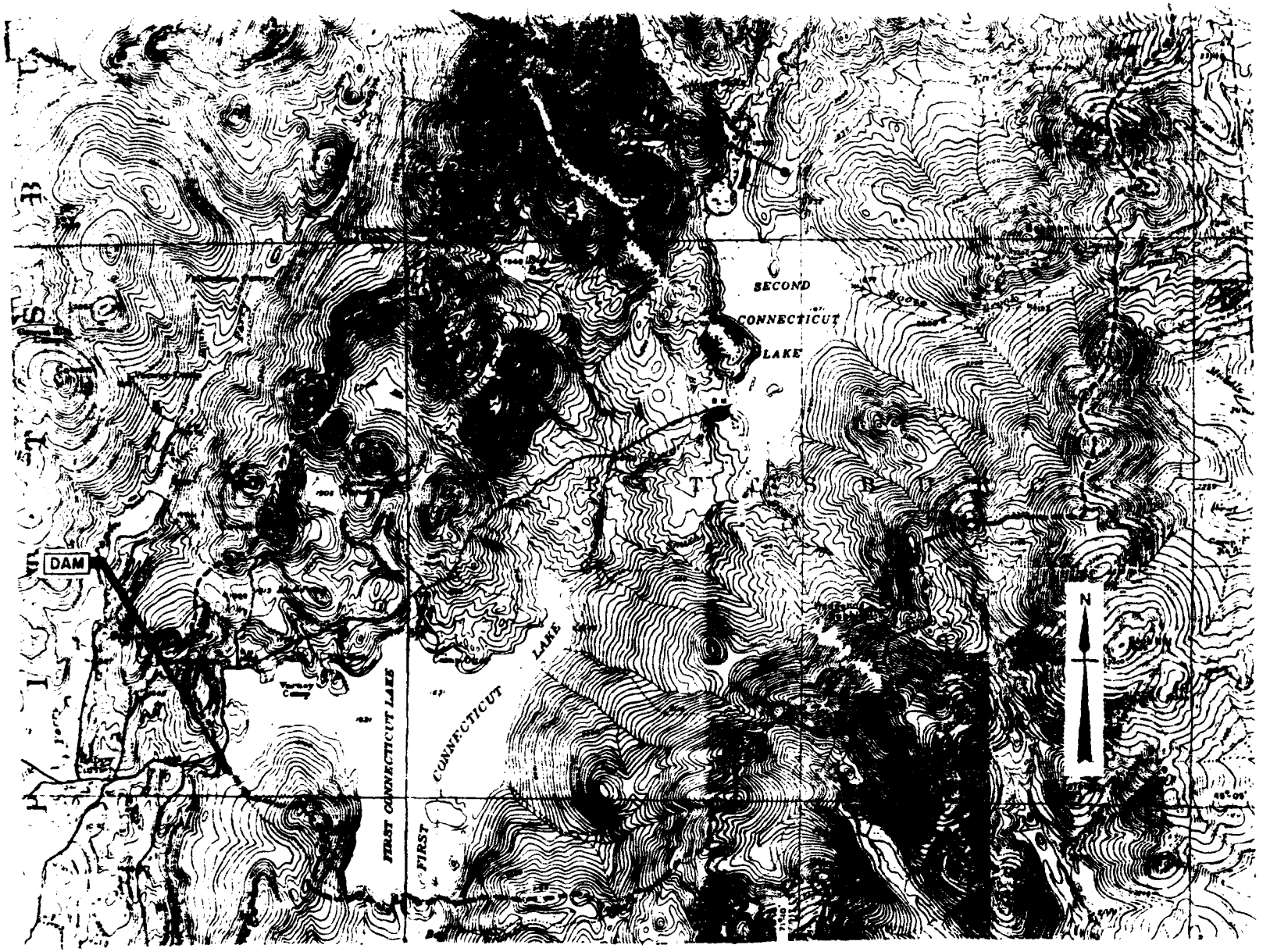
FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS BOSTON, MASS.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

FIRST CONNECTICUT LAKE DAM

CONNECTICUT RIVER — NEW HAMPSHIRE

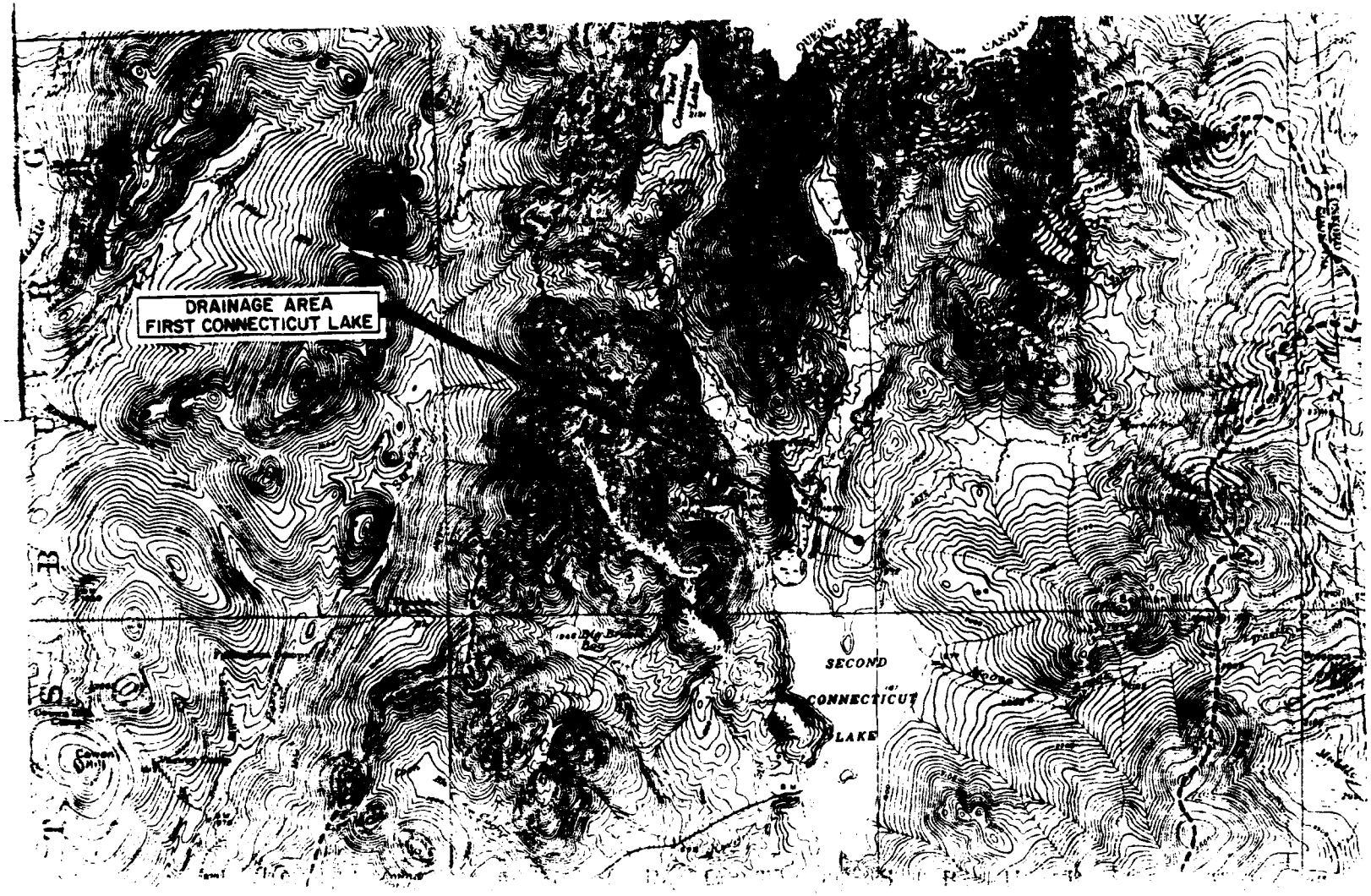
SCALE	AS SHOWN
DATE	AUGUST, 1978



SCALE 1:62500 (ACTUAL)

UNITED STATES
DEPARTMENT OF THE INTERIOR

NEW HAMPSHIRE-VERMONT
INDIAN STREAM QUADRANGLE 1926


DRAINAGE AREA
FIRST CONNECTICUT LAKE
SECOND
CONNECTICUT
LAKE

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

(1) ALT	(2) NATIONAL NUMBER	(3) REVISED	(4) STATE	(5) COUNTY	(6) CONGR DIST.	(7) STATE	(8) COUNTY	(9) CONGR DIST.	(10) NAME	(11) LATITUDE (NORTH)	(12) LONGITUDE (WEST)	(13) REPORT DATE DAY	MO	YR
N	100	NED	NH	007	02				FIRST CONNECTICUT LAKE DAM	4505.3	7117.5	08	SEP	78

(14) POPULAR NAME	(15) NAME OF IMPOUNDMENT
	FIRST CONNECTICUT LAKE

(16) REGION	(17) BASIN	(18) RIVER OR STREAM	(19) NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	(20) DIST FROM DAM (MI.)	(21) POPULATION
01	08	CONNECTICUT RIVER	PITTSBURG	8	726

(22) TYPE OF DAM	(23) YEAR COMPLETED	(24) PURPOSES	(25) STRUCTURAL HEIGHT (FT.)	(26) HYDRAULIC HEIGHT (FT.)	(27) IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	NORMAL (ACRE-FT.)	(28) DIST	(29) OWN	(30) FED R	(31) PRV/FED	(32) SCS A	(33) VER/DATE
RECTPG	1930	SCR	56	46	114000	91000	NED	N	N	N	N	15SEP78

(34) REMARKS

(35) D/S BAS	(36) SPILLWAY CREST LENGTH	(37) TYPE	(38) WIDTH (FT.)	(39) MAXIMUM DISCHARGE (CFS)	(40) VOLUME OF DAM (CY)	(41) POWER CAPACITY INSTALLED (MW)	PROPOSED (MW)	(42) NAVIGATION LOCKS NO	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH
1	1120	C	358	15000												

(43) OWNER	(44) ENGINEERING BY	(45) CONSTRUCTION BY
NEW ENGLAND POWER CO	OWNER	OWNER

(46) REGULATORY AGENCY DESIGN	CONSTRUCTION	(47) OPERATION	MAINTENANCE
NH WATER RES BD	NH WATER RES BD	NH WATER RES BD	NH WATER RES BD

(48) INSPECTION BY	(49) INSPECTION DATE DAY	MO	YR	(50) AUTHORITY FOR INSPECTION
FAY SPOFFORD + THORNDIKE, INC.	28	JUN	78	PL92-367

(51) REMARKS

END

FILMED

8-85

DTIC