MEGUNTICOOK RIVER BASIN
CAMDEN, MAINE

MEGUNTICOOK LAKE DAMS
EAST ME-00278
WEST ME-00279

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

AUGUST 1978

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The East and West Dams are unbound stone masonry gravity dams. The East dam has a concrete spillway and the West has a timber spillway. The dams are about 14 ft. high. The dams are judged to be in fair condition. There are areas of major concern which must be corrected to assure the long-term safety of the dams. They are small in size with a hazard potential of high.

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MEGUNTICOOK LAKE DAMS

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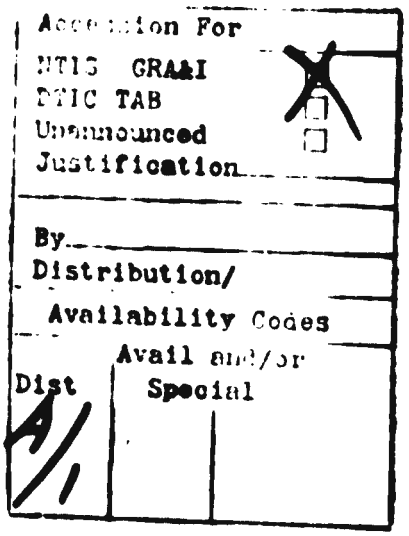
MEGUNTICOOK RIVER BASIN

CAMDEN, MAINE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



NATIONAL DAM INSPECTION PROGRAMS

PHASE I INSPECTION REPORT

EAST ME-00278
WEST ME-00279

MEGUNTICOOK LAKE DAMS

KNOX COUNTY, MAINE

MEGUNTICOOK RIVER

July 17, 1978

BRIEF ASSESSMENT

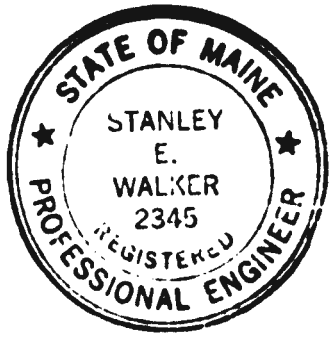
The Megunticook Lake East and West Dams are unbound stone masonry gravity dams. The East Dam has a concrete spillway and the West Dam has a timber spillway. The dams are about 14 feet high. Together the East and West Dams control the outlet of Megunticook Lake.

Based on the visual inspection and reports of past operational performance, the dams are judged to be in fair condition. There are areas of major concern which must be corrected to assure the long-term safety of the dams.

Based on their small size and high hazard classification in accordance with the Corps of Engineers' guidelines the test flood falls between the ½MPF and MPF. The spillway will pass only about 6 percent of the MPF test flood and is considered inadequate. The dams will not pass a flow greater than approximately a 10-year flood without overtopping. As outlined in Section 7, maintenance should be done on the dams within 12 months and an engineering investigation regarding major structural rehabilitation should be made within 24 months after receipt of the report by the owner.

Maintenance should include the installation of a system to protect earth and rockfill embankments downstream of the wing walls of both dams. The investigation of structural rehabilitation should include 1) replacement of the timber spillway and control outlet sluiceway at the West Dam with reinforced concrete, and 2) the construction of concrete downstream faces on both dams to improve the integrity of the stone masonry.

The structures are reasonably resistant to distress caused by overtopping but it is recommended that a definite plan for around-the-clock surveillance be implemented for periods of unusually heavy rain or anticipated runoff and a formal warning system be developed for use should an emergency develop.



EDWARD C. JORDAN CO., INC.

Stanley E. Walker, P.E.
Project Manager

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed 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 "Maximum Probable Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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MEGUNTICOOK LAKE - EAST DAM

OVERVIEW

MEGUNTICOOK LAKE - WEST DAM

EDWARD C. JORDAN CO., INC.
PORTLAND, MAINE

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

MEGUNTICOOK LAKE
EAST & WEST DAMS
LOCATION MAP

MEGUNTICOOK RIVER — MAINE

SCALE AS SHOWN
DATE AUGUST 1978

PHASE I INSPECTION REPORT

MEGUNTICOOK LAKE DAMS

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. Edward C. Jordan Co., Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Maine. Authorization and notice to proceed were issued to Edward C. Jordan Co., Inc. under a letter of June 20, 1978 from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0349 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) To 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) To 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. Outlet of Megunticook Lake in the town of Camden, Maine N 44°-14', W 69°-6'.

b. Description of Dams and Appurtenances. Megunticook East Dam is a dry laid stone masonry dam with concrete apron, upstream face and wing walls. The dam is constructed in a shallow valley in the bedrock. The stone masonry portion of the dam is approximately 55 feet in length and the wing walls are 10 feet and 50 feet in length for the west and east walls respectively.

The Megunticook West Dam is a dry laid stone masonry dam with timber spillway and concrete wing walls. The dam is constructed in a narrow valley in bedrock and is founded entirely on bedrock. The stone masonry portion of the dam is about 18 feet long and the east and west wing walls are about 18 and 73 feet in length respectively.

c. Size Classification. Based on storage capacity both the East and West Dams are classified as intermediate size dams. The East Dam has a height of about 14 feet, and the West Dam has a height of about 12 feet.

d. Hazard Classification. In the event of failure of the East or West Dam, approximately 25 seasonal and year-round dwellings located within 4,700 feet of these structures would be damaged. Considerably more industrial, commercial and residential structures are located directly over or adjacent to the Megunticook River as it passes through the town of Camden. Thus the Megunticook Dams are classified as having a high hazard potential.

e. Ownership: Camden Water & Power Co.
33 Mechanic St.
Camden, Maine 04843

The Camden Water and Power Company is an affiliate of Knox Woolen Mills Company.

f. Operator. Mr. David Stearns
Knox Woolen Mills Co.
33 Mechanic St.
Camden, Maine, Tel. 207-236-3368

g. Purpose of Dam. Storage for process and turbine power water.

h. Design and Construction History. There are no records of design of the Megunticook Lake Dams. The structures likely pre-date 1900. The East dam was rebuilt in the late 1920's and the West dam was rebuilt in 1919. Both structures reportedly were originally built to supply hydro-mechanical power to mills located at the damsites and were rebuilt for the Camden Water and Power Company as storage control facilities. The last major repairs (details unknown) were made at the East Dam in the 1960's and at the West Dam in the 1950's. More recent repairs (1970's) have been made to the timber spillway and control outlet of the West Dam.

i. Normal Operating Procedures. The gates are operated at the Megunticook East and West Dams in order to maintain sufficient flow in the Megunticook River to supply the Knox Woolen Mills Company with process water and water for its turbine. The gates are also regulated to facilitate the passage of heavy runoff such as spring snow melt. There are 1'-2" long iron rods cast into the crest of the Megunticook East Dam spillway which would allow the installation of flashboards, however, flashboards are not used. The gate at the Megunticook West Dam is secured with a chain and padlocked between operations. The gate at the Megunticook East Dam is not locked.

1.3 PERTINENT DATA

a. Drainage Areas. The drainage area above the East and West Dams at the outlet of Megunticook Lake is approximately 31.5 square miles and lies in portions of the Searsmont, Lincolnville, Hope and Camden Townships. About 10 percent of the entire drainage area is storage at Megunticook Lake and Norton, Levenseller, Moody, Hobbs and Fish Ponds. The watershed has a rolling topography varying in elevation from 128 feet to 1100 feet.

b. Discharge at Damsite. Based on the data collected during the visual inspection and discussions with the owner, the following pertinent discharges were estimated. Except as noted, all discharges are referenced to a pool level at the top of the dam (Elevation 144.5, MSL Datum).

Item	East Dam	West Dam
Outlet Works Size	30 inches wide by 36 inches high	42 inches wide by 48 inches high
Outlet Works Upstream Invert	128.5 ft	130.0 ft
Outlet Works Downstream Invert	126.5 ft	128.5 ft
Ungated Spillway Capacity at Maximum Pool Elevation (144.5 feet)	576 cfs	287 cfs
Gated Spillway Capacity	N/A	N/A
Total Spillway Capacity Included Outlet Works	748	529
Maximum Known Flood at Damsite[1]	830	597

[1]Based on 32 inches of head during the April 13, 1940 flood.

c. Elevations. Survey data collected at both the East and West Dams was referenced to a temporary benchmark. The following elevations were later referenced to USGS datum by assuming that the normal lake elevation shown on the USGS maps (Elevation 142 feet) coincides with the spillway crest elevation of the East and West Dams.

Location	Elevation (feet above MSL) East Dam	West Dam
Top of Dam	144.5	144.0
Maximum Pool - Design Surcharge	Unknown	Unknown
Full Flood Control Pool	144.5	144.5
Recreation Pool	142.0	142.0
Spillway Crest	142.0	142.0
Diversion Tunnel Invert	N/A	N/A
Streambed at Centerline of Dam	127.5	129.0
Maximum Tailwater	Unknown	Unknown
Test Flood Elevation (MPF)	153.7	153.7

d. Reservoir. The lengths of the maximum pool (Elevation 144.5) and the recreational or normal pool (Elevation 142.0) were estimated from USGS maps. The lengths shown below are the same for both the East and West Dams:

Location	Length (Feet)
Maximum Pool	30,700
Recreational/Normal Pool	28,300

e. Storage. Storage volumes at Megunticook Lake, including Norton Pond, were estimated from surface storage areas planimetered from USGS maps. Each of the following volumes is based upon a 9,414 acre-feet of storage at normal lake elevation 142.0 feet as reported on the current inventory of Dams in the United States, and is the same for both the East and West Dams.

Item	Storage (acre-feet)
Recreational/Normal Pool	9,414
Design Surcharge	unknown
Top of Dam	13,600

f. Reservoir Surface. The following surface areas are the same for both the East and West Dams.

Item	Surface Area (Acres)
Top of Dam	1,600
Spillway Crest	1,450

g. Dam (1) Megunticook East

Type - Gravity rubble stone masonry with concrete cap on upstream face, and wing walls; no earth embankment.

Length - Gravity stone masonry section approximately 55 feet long; west concrete wing wall 10 feet long; east concrete wing wall 50 feet long.

Height - The gravity stone masonry section is approximately 14' high. The wing walls are 5 to 7 feet high.

Top Width - See cross-sections (Appendix B-1).

Zoning, Impervious Core, and Cutoff - The upstream face of the dam consists of a concrete wall approximately 2 to 3 feet thick placed on bedrock. The concrete wall was apparently placed after the stone masonry was layed up to form an impervious upstream face. See cross-sections (Appendix B-1).

(2) Megunticook West

Type - Gravity rubble stone masonry with timber spillway, concrete wing walls and upstream face; no earth embankment.

Length - The gravity masonry is 18 feet long, the east wing wall is 18 feet long and the west wing wall is 13 feet long.

Height - The gravity masonry section is 12 feet high and the wing walls are 3 to 9 feet high.

Top Width - See cross-sections (Appendix B-1).

Zoning, Impervious Core and Cutoff - The upstream face of the dam consists of concrete wall 15 feet thick placed on bedrock. The concrete wall was apparently placed after construction of the rubble masonry to form an impervious upstream face. See cross-sections in Appendix B-1.

h. Diversion and Regulating Tunnel. Not applicable.

i. Spillway.

Item	Description
Type	East - concrete broad crested weir West - wooden chute spillway
Length of Weir	East - 47.5 ft. West - 18.0 ft.
Crest elevation	East - 242.0 ft. West - 242.0 ft.

j. Regulating Outlet.

(1) East Dam

Type - Stone Masonry conduit through dam. See cross-section Appendix B-1.

Length - 11.5 feet

Depth - Invert of inlet approximately 15 feet below crest of spillway.

Size - 5 feet high x 6 feet wide

Closure - Timber vertical lift gate in steel gate slides

Access - From outlet end of regulating tunnel only

Regulating Facilities - Timber gate operated by rack and gear manually, opening from bottom of channel.

(2) West Dam

Type - Stone Masonry conduit through dam (see cross-sections Appendix B-1).

Length - 14.5 feet.

Depth - Invert of inlet 10 feet below crest of spillway

Size - 4.5 feet height x 6 feet wide

Closure - Steel butterfly gate 4' height by 3.5' wide.

Access - From outlet end of regulating tunnel only. See photograph W-4.

Regulating Facilities - Butterfly gate operated by gear and rack, opening near bottom of channel.

SECTION 2

ENGINEERING DATA

2.1 DESIGN

None Available

2.2 CONSTRUCTION

None Available

2.3 OPERATION

The gates are operated at the Megunticook East and West Dams in order to maintain sufficient flow in Megunticook River to supply the Knox Woolen Mill Company with process water and water for its turbine. In addition, the gates are regulated to pass heavy runoff such as spring snow melt. There are 1.2 foot long iron rods cast into the crest of the Megunticook East Dam spillway which would allow the installation of flashboards, however, flashboards are not used. The gate at the Megunticook West Dam is secured with a chain and padlocked between operations. The gate at the Megunticook East Dam is not locked.

2.4 EVALUATION

a. Availability. No data is available regarding design (including structural, hydrologic, and hydraulics), or construction of the facilities.

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, performance history and engineering judgment.

c. Validity. Not applicable.

SECTION 3

VISUAL INSPECTION

3.1 FINDINGS

a. General. Both dams are located in shallow bedrock valleys. They appear to be founded entirely on bedrock and show no signs of serious distress.

b. Dam.

(1) Structural - Both dams are constructed of dry laid rubble stone masonry and concrete; see plan, profiles and X-sections (Appendix B-1). The structures appear to be in fair to good condition. They appear to lack the benefit of routine maintenance. See Appendix A for detail inspection findings.

The inspection of the East Dam resulted in the following findings:

(a) Some stones are missing from the downstream masonry face of the structure. See Photograph E-9.

(b) Concrete surfaces are spalled in several areas (Photograph E-5).

(c) A small amount of seepage is occurring near the west abutment.

(d) Some cracking of the concrete portions of the structure has occurred.

(e) Several small holes exist in the soil fill below the east wing wall of the dam indicating erosion of surficial sand fill into the rockfill beneath.

The inspection of the West Dam resulted in the following findings:

(a) General condition of concrete is good. The stone masonry appears tight, but is not bound with mortar.

(b) Some cracking in concrete surfaces.

(c) Some seepage is occurring from bedrock below the west abutment and some seepage is occurring through or beneath the east training wall.

(d) The timber spillway and regulating outlet channel are in good repair.

(2) Hydraulics - At the time of the visual inspection the lake level was about 8 inches below the spillway crest of both dams. The only significant discharge was from the partially open vertical-lift gate at the East Dam. Some leakage, however, was evident around the gate seat of the closed butterfly outlet gate at the West Dam.

During operation of the outlet gate at the West Dam, the small ponded area between the fish screen and the dam was virtually dewatered. As shown on photograph W-2 the flow to the outlet of this dam is controlled by an 8-foot concrete weir section in the fish screen. This weir section limits the drawdown at the west dam to about 5 feet below the spillway crest (EL 142.0). Operation of this outlet gate was hampered by accumulated debris.

Operation of the vertical - lift outlet gate at the East Dam indicates that the fish screen also acts as a control section at low lake levels. The approach channel bottom through the 25 foot wide weir section at the fish screen will limit drawdown at this structure to about 7.5 feet below the spillway crest. (Elev. 142.0).

c. Appurtenant Structures. The timber service bridges at both dams are in good repair.

The gate works at the East Dam consist of a timber vertical lift gate operated manually by a rack and gear. The gate works are in good mechanical

order, however there is no provision for locking the gate position and current practice is to use of a stone placed in the gears. See Photograph E-7.

The gate works at the West Dam consist of a butterfly gate manually operated by a vertical stem and horizontal rack and gear. The gate is in good mechanical order and is locked by a chain and padlock. The operating stem shows substantial corrosion. See Photographs W-2 and 3.

A 10-inch pipe runs from the downstream side of the outlet gate on the east dam to an abandoned fish hatchery. Due to leakage around this outlet gate the connection of the water supply line at the dam could not be confirmed.

d. Reservoir Area. The outlet from Megunticook Lake is controlled by two dams separated a distance of approximately 135 feet by a bedrock outcrop island. This island causes a restriction in the approach channel to both dams. Fish screen structures are located approximately 90 feet and 20 feet upstream of the East and West Dams, respectively. See Photograph E-3 for the East Dam fish screen. As indicated above, the drawdown in the approach channels is limited to about 5.0 and 7.5 feet below the spillway crests (142.0) at the west and east dams, respectively. Megunticook Lake has an area of about 2 square miles. The shore line is generally wooded with many cottages and a few year round dwellings situated on it.

e. Downstream Channel. Under low tailwater conditions, the downstream channels at both dams are separated by the bedrock island between the dams. Each channel flows through a restricted bridge opening, these being located approximately 300 feet (east) and 350 feet (west) downstream before flowing into Seabright Pond. Under high tailwater conditions the two channels would merge just upstream of the bridges.

As shown on Photographs E-1, E-4 and W-5 both channels are quite rocky and the overbanks cluttered with trees, bushes and debris. An abandoned fish hatchery and one home are located on the east channel just upstream from the bridges.

3.2 EVALUATION

Based on visual inspection both dam structures appear to be in fair structural and mechanical condition. However, as outlined in Section 7, some maintenance is necessary.

SECTION 4

OPERATING PROCEDURES

4.1 PROCEDURES

The gates are operated at the Megunticook East and West Dams in order to maintain sufficient flow in the Megunticook River to supply the Knox Woolen Mills Company with process water and water for its turbine. The gates are also regulated to facilitate the passage of heavy runoff such as spring snow melt. There are 1'-2" long iron rods cast into the crest of the Megunticook East Dam spillway which would allow the installation of flashboards, however, flashboards are not used. The gate at the Megunticook West Dam is secured with a chain and padlocked between operations. The gate at the Megunticook East Dam is not locked.

4.2 MAINTENANCE OF DAMS

No record of maintenance was available for either East or West Dam. Major repairs (no details available) were reportedly made to the West Dam during the 1960's and more recently (1970's) repairs have been made to the timber spillway and control outlet.

4.3 MAINTENANCE OF OPERATING FACILITIES

No record of maintenance is available. No recent repairs were reported to have been made and none were observed during the field inspection.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

None in effect.

4.5 EVALUATION

Although both Megunticook East and West dams are in fair to good repair, no regular maintenance program is apparently in effect. Repairs have been undertaken in the past on an as needed basis. No warning system for either high water or structural distress is in effect at either dam.

SECTION 5

HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data. Design data was not available for either the East or West Dams.

b. Experience Data. Published hydrologic data for the Megunticook River Basin is almost entirely lacking. It is estimated that the 10-year discharge below Megunticook Lake is approximately 1330 cfs.

A review of weekly lake levels recorded by the Camden Power and Water Company indicates that on April 29, 1923 the water level at Megunticook Lake was 1.9 feet above the crest of the East Dam. This stage corresponds to a combined discharge of about 930 cfs from both dams.

It is also reported that during the flood of April 13, 1940 that the flow at the East Dam was approximately 32 inches above the spillway or about 8 inches above the top of the dam. This stage would correspond to a flow of about 1430 cfs. It is further reported that in December 1969 the flow was about 29 inches above the spillway, in December 1973 about 30 inches above, and in December 1977 about 30 inches above.

c. Visual Inspection. The outlet of Megunticook Lake is controlled by two dams separated by an island. Fish screens located upstream of these dams act as flow controls at low pool elevations. The spillways and outlet gates are generally in good condition. Downstream channels at both dams are quite rocky and the overbanks are cluttered with trees, bushes and debris.

d. Overtopping Potential

(1) The hazard potential was determined by analyzing downstream dam failure hydrographs according to rule of thumb methods as described in an attachment to ETL 1100-2-234.

The failure analysis assumes a breaching of the dam at full spillway capacity. The wave height just downstream of Megunticook East and West Dams would be about 16.8 feet. At the Mountain Street bridges, about 350 feet downstream of the dams, the wave height would be 13.8 feet, and the wave height at the crest of the Seabright Dam, about 8800 feet downstream of the dams, would be about 5.1 feet. In the event of failure of the East or West Dam, approximately 25 seasonal and year-round dwellings located withir 4700 feet of these structures would be damaged. Thus the Megunticook Dams are classified as having a high hazard potential.

(2) Since Megunticook East and West Dams are classified as having a high hazard potential, the dams must be analyzed for passing the maximum probable flood. The maximum probable flood (MPF) has been calculated to be about 40,600 cfs, according to the Corps of Engineers, "Preliminary Guidance for Estimating Maximum Probable Discharges." Consideration of the effect of surcharge storage (according to "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations," March 1978, New England Division, Corps of Engineers) reduces the MPF to 22,300 cfs. The MPF would overtop the dams by about 9.7 feet (or about 12.2 feet on the spillways). The combined spillways of the two dams can pass 1277 cfs which is 5.7% of MPF. This flow is nearly eqivalent to the 10 year frequency flood event.

SECTION 6

STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. Based on visual observations, both dams appear to be in fair condition. Although apparently adequately stable under normal flow conditions, the dams are vulnerable to erosion and related distress under overtopping flows.

b. Design and Construction Data. No data regarding original design or construction is available for either Megunticook Lake East or West Dams.

c. Operating Records. None available.

d. Post Construction Changes. No post construction changes are apparent in either dam except for cracks and spalling of concrete and opening at some construction joints. No settlement or horizontal movement is apparent. Major repairs (no details available) were made at the East Dam in the 1960's and at the West Dam in the 1950's. More recent repair (1970's) have been made to the timber spillway and control outlet of the West Dam.

e. Seismic Stability. The dam is located in seismic Zone No. 1 and in accordance with recommended Phase I guidelines, does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition. The visual inspection and compilation of available engineering data indicate that the Megunticook Lake East and West Dams are in fair condition. The spillways of the dams will pass only approximately a 10-year flood. The stability of both structures was evaluated and is assessed to be good under this condition. The maximum probable flood (MPF) peak flow at the Megunticook Dams has been calculated to be 40,600 cfs. Due to the effect of surcharge storage, the Megunticook Dams have to pass a reduce peak flow of about 22,300 cfs. To pass this flow the structures would be overtopped by about 10 feet, with a spillway capacity of 1280 cfs; the spillways can pass 5.7 percent of MPF (22,300 cfs).

A major concern at both structures is the potential loosening and loss of the downstream stone masonry which could result in a progressive failure of the spillway sections of the structures. Under high flows the downstream faces may be subjected to negative pressures and vibrations which could cause loosening of the unbound dry laid stone masonry. At the East Dam the concrete spillway is a gravity section lying on top of the stone masonry and under high flows when tailwater approaches the height of the bottom of the spillway, negative pressures could develop which would lift the spillway section. At the West Dam, the timber spillway and service bridge would likely not survive the test flood. The loss of this section would result in progressive loss of the unbound stone masonry portion of the dam.

b. Adequacy of Information. The information available is such that the assessment of the condition of the dam must be based primarily on the visual inspection, the past operational performance of the dams, and engineering judgment.

c. Urgency. The remedial maintenance of the facilities should be implemented within 12 months. The recommendations outlined below should be implemented within 24 months after receipt of this report by the owner.

d. Need for Additional Investigation. The spillway discharge capacities of these and the other dams inspected on the Megunticook River are considered inadequate. Further hydrologic studies are necessary to assess the flood discharge characteristics of this watershed and to establish appropriate parameters for the design of spillway improvements for the several dams on the Megunticook River.

7.2 RECOMMENDATIONS

The following measures regarding structural rehabilitation to enhance the long term safety of the dams should be investigated by qualified engineers:

1. Construction of a concrete downstream face to secure the stone masonry at the East Dam. Such a concrete section would have to provide adequate drainage and should be doweled to the spillway concrete. Construction of a concrete downstream face would provide resistance to loss of the masonry and spillway apron during flood flows.

2. Replacement of the timber spillway at the West Dam with one constructed of reinforced concrete. The existing timber spillway is inadequate during flood flows, and would likely be torn loose from the structure during a high overtopping flood. The construction of a concrete downstream face as discussed for the East Dam above should also be investigated for the West Dam.

3. Reconstruction of the timber sluiceway through the West Dam using reinforced concrete.

4. Enlargement or alteration of the spillways to improve the discharge capacity at each dam.

7.3 REMEDIAL MEASURES

a. Alternatives. In lieu of remedial construction at the West Dam, a new concrete gravity dam should be considered.

b. Operating and Maintenance Procedures. Although the dam structures are in generally good repair, a program of regular inspection and maintenance should be developed and a record should be kept. The following operating and maintenance procedures should also be implemented, within 12 months of receipt of this report by the owner:

1. A system to prevent erosion of the embankment materials downstream of the wing walls at both dams should be provided since the spillway is inadequate for flows larger than a 10-year flood event.

2. Repair all spalled surfaces of concrete and fill all joints and cracks.

3. Replace all stones missing from the downstream masonry portions of the dams. Chink voids with small stones to assure a tight masonry face.

4. Install a locking mechanism for the gate works at the East Dam.

5. The area upstream of the regulating outlet at the West Dam should be cleaned of debris and maintained clean.

6. Soil and rock fill should be placed behind (downstream) of the west wing wall at the West Dam.

7. The flashboard rods should be removed from the spillway at the East Dam since flashboards are not used and these rods could catch debris reducing the spillway capacity.

8. The control bridges at both the East and West Dams may act as debris collectors during flood flows. The owner should have equipment and personnel available to keep the spillways clear during flood flows.

9. Because the dams are upstream of populated areas and are subject to overtopping and subsequent distress, around the clock surveillance should be provided during periods of high precipitation or anticipated run-off.

10. The owner should develop and implement a formal warning system which could be used in the event of an emergency.

11. Inspections of the dams should be made by qualified engineers once every two years.

APPENDIX A

FIELD INSPECTION NOTES

Inspection Date: July 17, 1978

Inspection Team:

Name	Discipline
Brian Bisson	Hydrology/Hydraulics
Stephen Cole	Geotechnical
Ernest Jurick	Photographer
Peter Deletetsky	Survey
Frank Nader	Hydrology/Hydraulics
Henry Oatley	Structural

MEGUNTICOOK LAKE EAST DAM

1. CONCRETE AND STONE MASONRY STRUCTURE

a. Concrete surfaces - generally good except spalling has occurred around the center gate works pier, and training walls. See Photograph E-5.

Stone Masonry Surfaces - the downstream portion of the dam including the downstream face is constructed of dry laid stone masonry. The face of this unbound masonry is generally tight but some stones are missing. See Photograph E-9.

b. Structural cracking - no cracking observed which appears related to over-stressing. Several cracks in the east wing wall which appear to be related to shrinkage and temperature.

c. Movement - no horizontal or vertical movement apparent.

d. Junctions - junction at wing wall to bedrock at both ends of dam are cracked but appear to be in good condition and not leaking. Junctions at wing walls to spillway are open and need filler.

e. Drains - none observed - stone masonry portion of dam has inherent drainage capacity.

f. Water Passages - the spillway area shows no sign of significant wear. Training walls adjacent to spillway and the center pier are spalled but deterioration has progessed to only a depth of 1/2 to 3/4 inch.

g. Seepage or Leakage - minor seepage occurring at west end of spillway near toe of stone masonry.

h. Monolith Joints - Construction Joints - Several joints (apparent cold joints occurring during placement) were observed, particularly in the east wing wall. These joints are cracked, open, and in some areas spalled. Lime staining is apparent on several joints on the downstream face.

i. Foundation - foundation was apparently placed on bedrock and no undermining or distress is apparent.

j. Abutments - abutments end on bedrock. The joint from concrete to bedrock appears good at both ends of dam.

2. EMBANKMENT STRUCTURES

Embankment at the Megunticook East dam consists of an area downstream of the east wing wall of the dam which supports the wing wall.

a. Settlement - no settlement of the embankment was observed, however four small holes were noted. These small holes appear related to the migration of the surficial fill materials into a stone fill which is believed to exist below.

b. Slope Stability - The embankment area is retained at the edge of the stream and downstream by stone masonry walls. The walls appear to be in good shape and show no indication of movement. See Photograph E-8.

c. Seepage - none observed in embankment areas.

d. Drainage Systems - none - the stone masonry walls provide inherent drainage.

e. Slope Protection - the embankment area has a nearly flat scope and is retained by stone masonry walls. The surface of the embankment is grassed and shows no sigh of recent erosion.

3. SPILLWAY STRUCTURE

The spillways consist of concrete broad crested weirs. Iron rods exist in the crest for flashboards. The flashboard rods are sized to prohibit failing i.e., 1-inch diameter and 14 inches high. See overview Photograph. Flashboards are, however, reportedly not used. At the time of inspection, July 17, 1978, the water surface was 3 inches below spillway crest.

a. Control Gates - none in spillway.

b. Unlined Saddle Spillways - None.

c. Approach and Outlet Channels - both the approach and outlet channels are clean of debris. A fish screen exists about 90 feet upstream of the dam. The remains of an old coffer dam, which partially blocks the approach channel, exists about 60 feet upstream of the dam. These two structures restrict the approach channel. See Photograph E-3.

d. Stilling Basin - consists of boulders in bedrock channel. Basin and channel show no signs of recent erosion.

4. OUTLET WORKS

a. Inlet Structure - clear and in good condition - some clearance around gate when closed.

b. Operating and Emergency Control Gates - the regulated outlet consists of a vertical lift gate consisting of timber in iron gate slides, the gate is operational and in reasonably good repair. The gate is operated manually by a rack and gear. No provision for locking the gate exists. See Photograph E-7.

c. Water Passages - consists of stone masonry. Stones tight, no indication of erosion. See Photograph E-6.

A 10-inch pipe runs from the downstream side of the outlet gate on the east dam to an abandoned fish hatchery. Due to leakage around this outlet gate the connection of the water supply line at the dam could not be confirmed.

d. Stilling Basin - consists of boulders in bedrock channel. Condition good.

e. Approach and Outlet Channels - the approach channel is clear and in good condition, however, the fish screen acts as a control section at low lake levels.

f. Drawdown Facilities - there is a single gate located at the invert of the old river channel which appears to be insufficient for drawdown of the reservoir.

5. INSTRUMENTATION

None.

6. RESERVOIR

a. Shore Line - no major active or inactive landslide areas on Megunticook Lake were observed.

b. Sedimentation - the watershed has remained essentially rural in nature over the past years. There are no new developments or new sources of sediment loads on the lake.

c. Potential Upstream Hazard Areas - Megunticook Lake has many cottages surrounding it, many of which would be affected by maximum probable flood elevations, but not be by maximum water storage pool elevation.

d. Watershed Runoff Potential - the drainage basin has remained essentially rural with very few changes in development over the past 50 years.

7. DOWNSTREAM CHANNEL

The channel downstream of the dam has sufficient capacity to carry away flood flows from the dams. In the event of failure of the East or West Dams, ap-

proximately 25 seasonal and year-round dwellings located within a mile of these structures would be damaged. Thus the Megunticook Dams are classified as having a high hazard potential.

8. OPERATION AND MAINTENANCE

a. Reservoir Regulation Plan - no formal plan available.

b. Maintenance - no apparent recent maintenance to dam structure. Owner has no regular maintenance program.

MEGUNTICOOK LAKE WEST DAM

1. CONCRETE AND STONE MASONRY STRUCTURE

a. Concrete Surfaces- concrete surfaces are in good shape with no spalling.

Stone Masonry Surfaces - the downstream portion of the dam including the downstream face is constructed of dry laid stone masonry. The face of the unbound masonry appears tight.

b. Structural Cracking - several fine cracks were observed in the wing walls and in the upstream face of the spillway section. All cracking appeared to be related to shrinkage and temperature. See Photograph W-2.

c. Movement Horizontal and Vertical Alignment - no movements apparent.

d. Junctions - all junctions, abutments, corners in wing walls and at spillway appear tight.

e. Drains - none observed - the stone masonry structure was inherently internal drainage.

f. Water Passages - all concrete surfaces around the spillway opening are in good condition. The stone masonry also appears good.

g. Seepage or Leakage - seepage was observed coming from the bedrock downstream below the west wing wall and from the toe of the east training wall.

The seepage from the bedrock on the west side of the spillway appears to be coming from the empoundment. The seepage coming from the right training wall appears to be originating at the outlet of the control outlet sluiceway, through the stone wall and stone fill.

h. Monolith Joints - Construction Joints - few construction joints are apparent and those observed are tight.

i. Foundation - the dam foundation is apparently on bedrock. No damage or undermining was noted.

j. Abutments - dam abutments are at bedrock. The joint to bedrock is good at both ends of structure.

2. EMBANKMENT STRUCTURES

Embankment consists of areas filled downstream of the wing walls of the structure. The embankment appears to consist of soil and rock fill and is retained at the edge of the stream by stone masonry walls.

a. Settlement - no settlement observed.

b. Slope Stability - the embankment east of the spillway is retained by stone masonry walls which are in good condition and show no signs of movement. See overview Photograph.

c. Seepage - Seepage, several gpm was observed coming from the toe of the retaining wall at the edge of the stream just east of the spillway. This seepage appears to be coming from leakage around the control gate and timber sluiceway at the regulated outlet.

d. Drainage Systems - not applicable. The stone masonry walls have inherent drainage capacity.

e. Slope Protection - the east embankment is retained by stone masonry walls which provide erosion protection at the downstream face. The surface of the embankment is stone covered and in good condition. See Photograph W-5. The west embankment has eroded leaving only large stones. See Photograph W-6.

3. SPILLWAY STRUCTURES

The principal spillway consists of a timber chute, see overview Photograph. The timber chute is attached only at the upstream concrete face of the dam and is only supported vertically by the stone masonry. At the time of inspection, July 17, 1978, the water surface was 8 inches below spillway crest.

a. Control Gates - none in spillway.

b. Unlined Saddle Spillways - small opening at end of west wing wall. Channel is all on exposed bedrock. Discharge to river is well downstream of dam.

c. Approach and Outlet Channels - no obstructions apparent in and outlet channel. A large log was observed in the inlet channel which could block the spillway. See Photograph W-1. A trash gate exists about 15 feet upstream of the dam, which limits the drawdown to 5 feet below the spillway crest.

d. Stilling Basin - consists of boulders in a bedrock channel. Basin and channel show no signs of recent erosion.

4. OUTLET WORKS

a. Intake Structure - a log and brush was observed in near the intake structure between the fish screen and the gate. This debris could clog the outlet. See Photograph W-2.

b. Operating and Emergency Control Gates - the regulated outlet consists of a butterfly gate manually operated by a rack and gear on a vertical stem. See Photographs W-2 and 3. The gate is operational, however it leaks when closed and becomes clogged easily with debris during closing. The gate stem appears badly corroded.

c. Conduits, Sluices and Water Passages - the outlet sluice consists of a timber sluice in a stone conduit. See photograph W-4. The timber and stone work are in good condition.

d. Stilling Basin - see 3.d. above.

e. Approach and Outlet Channels - see 3.c. above.

f. Drawdown Facilities - there is a single gate located at the invert of the old river channel which appears to be insufficient for drawdown of the reservoir.

5. SAFETY AND PERFORMANCE INSTRUMENTATION - none.

6. RESERVOIR

Refer to Section 6 under Megunticook East Dam.

7. DOWNSTREAM CHANNEL

Refer to Section 7 under Megunticook East Dam.

8. OPERATION AND MAINTENANCE

a. Reservoir Regulation Plan - no formal plan available.

b. Maintenance - no regular maintenance program exists. Recent maintenance of the timber spillway has been accomplished and the spillway is in good repair, as is the control bridge.

APPENDIX B

ENGINEERING DATA

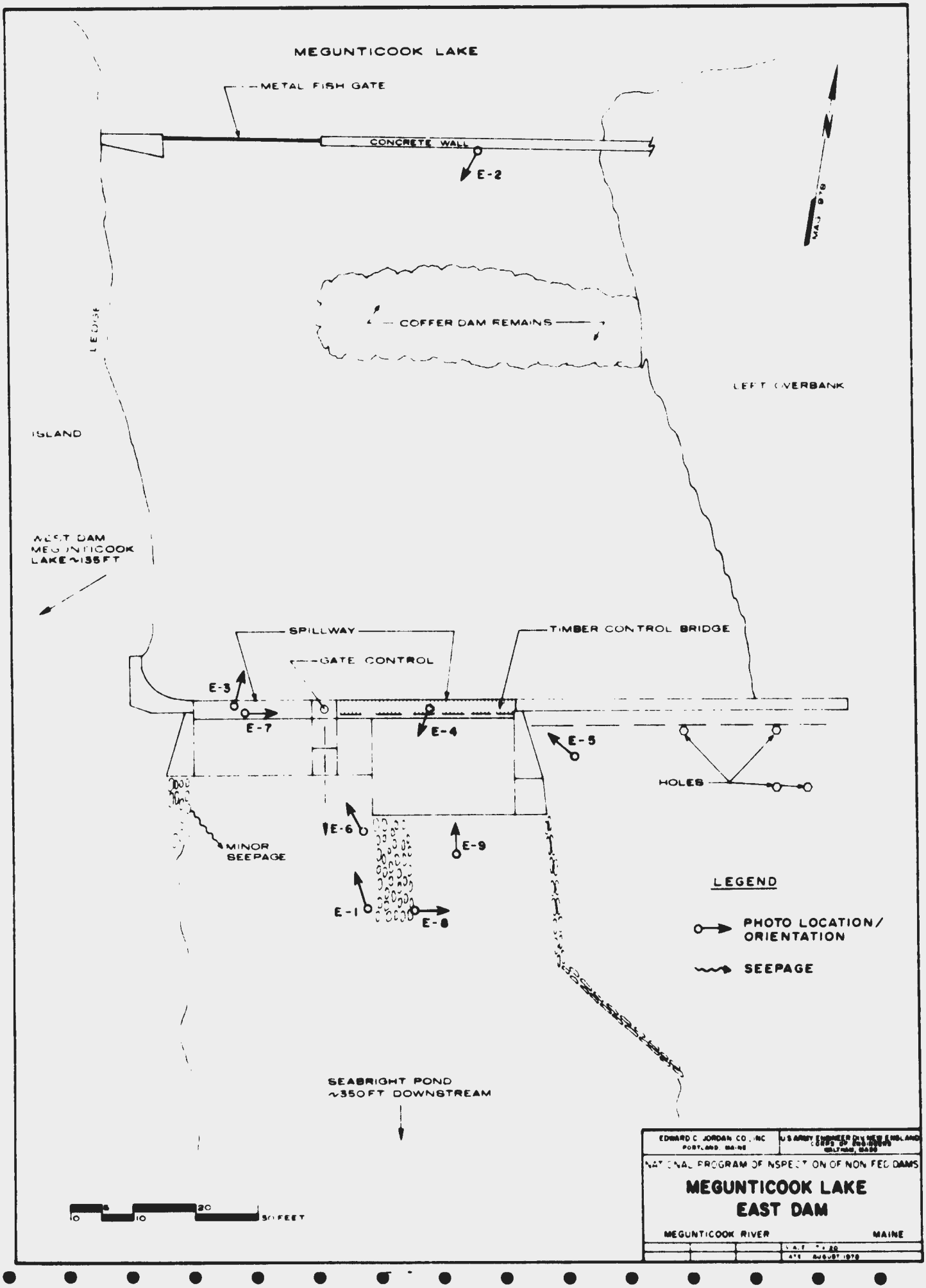
This appendix lists the engineering data collected either from project records and other sources or data developed as a result of the visual inspection. The contents of this appendix are listed below.

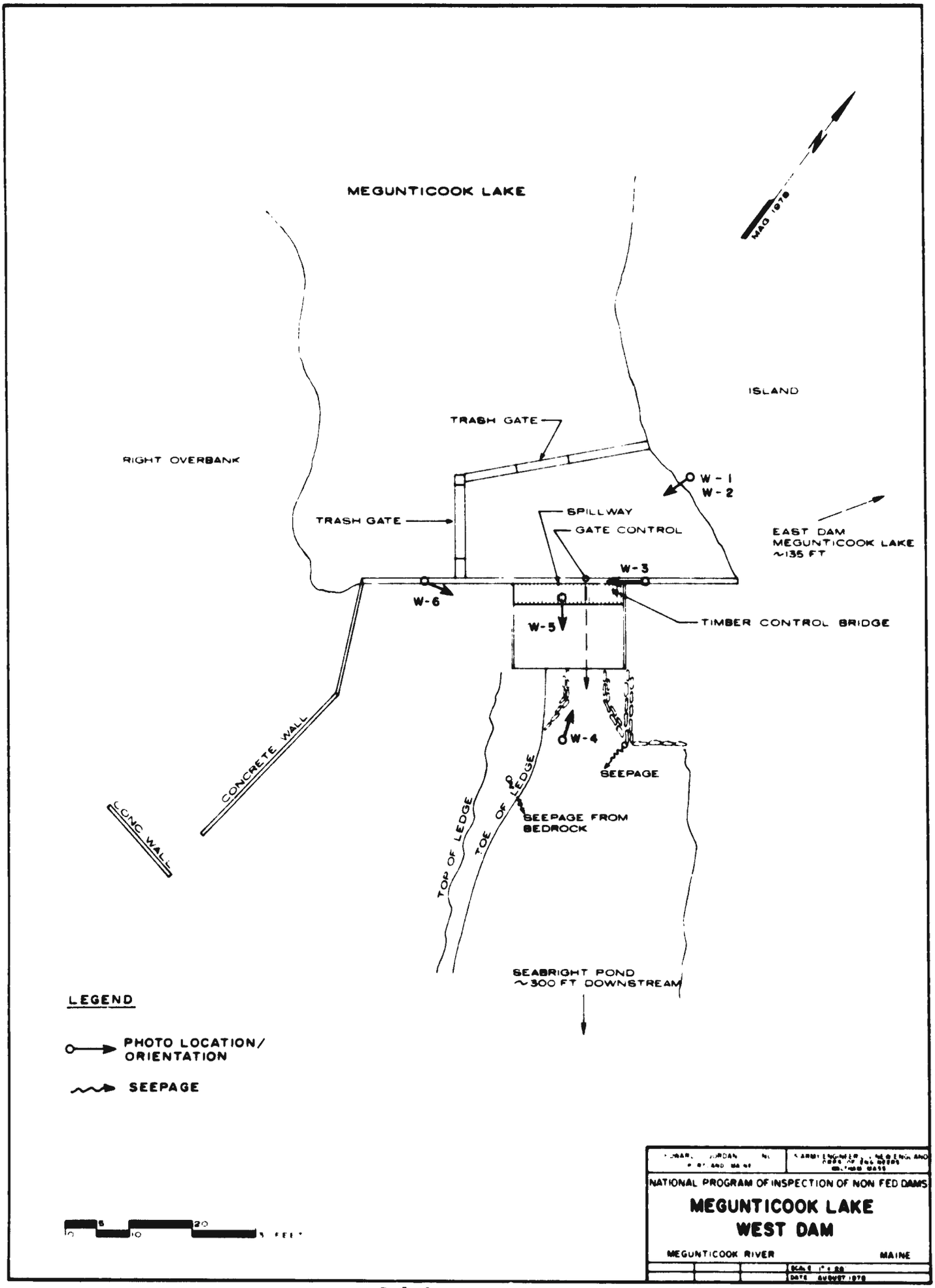
Appendix	Description
B-1	General Project Data
B-2	Inspection History

APPENDIX B-1

GENERAL PROJECT DATA

No "as built" drawings showing plans, elevations and sections of the East and West Dams were available. Plans, elevations and sections, with limited amount of detail developed as a part of the visual inspection of these dams, are attached to this section.


MEGUNTICOOK LAKE
METAL FISH GATE
CONCRETE WALL
E-2
COFFER DAM REMAINS
LEFT OVERBANK
ISLAND
WEST DAM
MEGUNTICOOK
LAKE ~135FT
SPILLWAY
GATE CONTROL
TIMBER CONTROL BRIDGE
E-3
E-7
E-4
E-5
HOLES
E-6
E-9
MINOR
SEEPAGE
E-1
E-8
LEGEND
PHOTO LOCATION/
ORIENTATION
SEEPAGE
SEABRIGHT POND
~350FT DOWNSTREAM
10
10
20
50 FEET
EDWARD C. JORDAN CO., INC.
PORTLAND, MAINE
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
MEGUNTICOOK LAKE
EAST DAM
MEGUNTICOOK RIVER
MAINE
AUGUST 1978

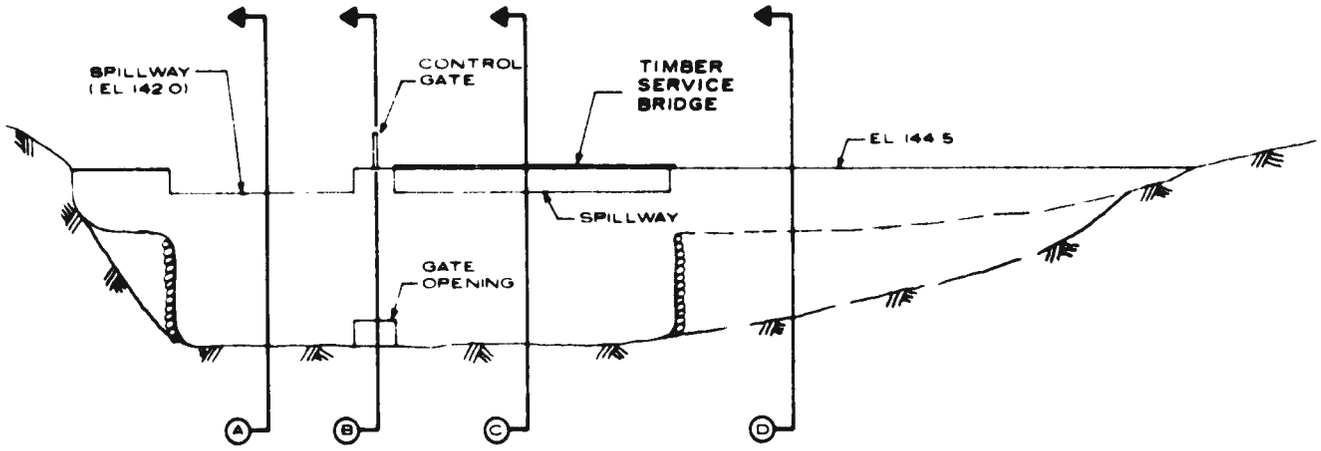


NATIONAL PROGRAM OF INSPECTION OF NON FED DAMS

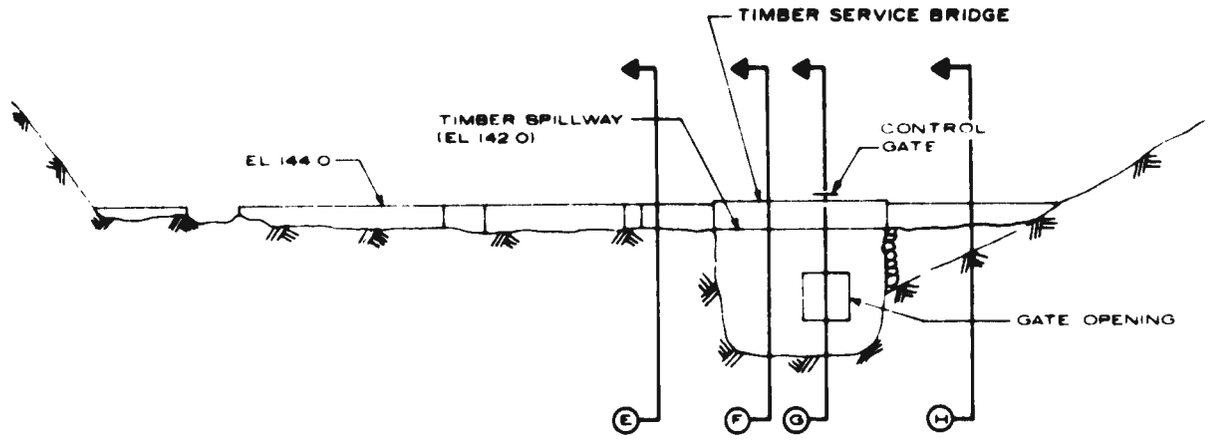
MEGUNTICOOK LAKE
WEST DAM

MEGUNTICOOK RIVER — MAINE

DATE AUGUST 1978



MEGUNTICOOK LAKE - EAST DAM
LOOKING UPSTREAM



MEGUNTICOOK LAKE - WEST DAM
LOOKING UPSTREAM

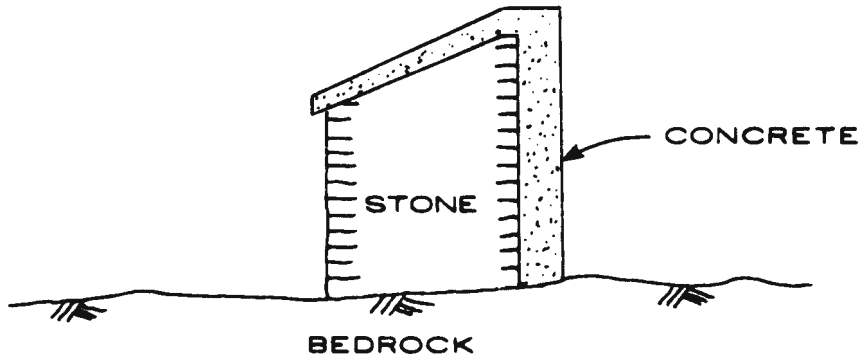
HORIZONTAL & VERTICAL SCALE
0 10 20 30 FEET

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

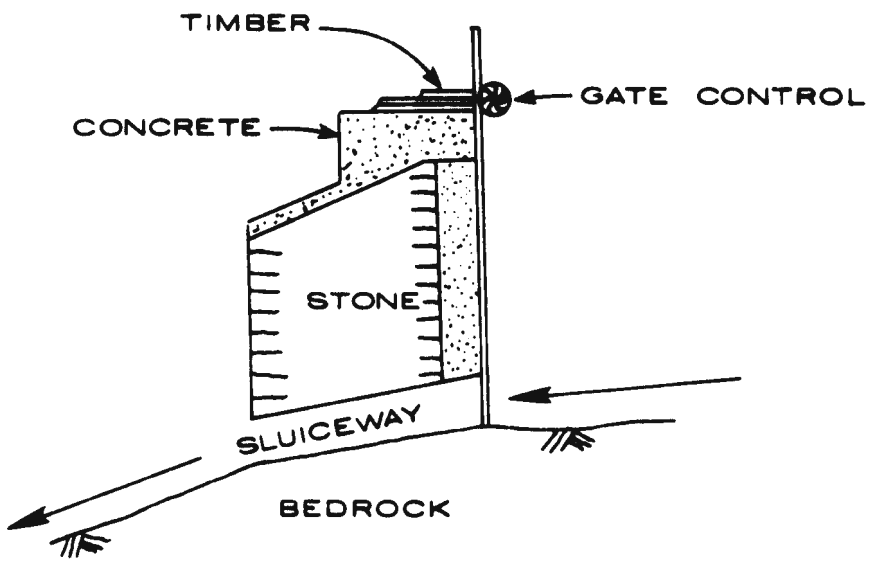
MEGUNTICOOK LAKE
EAST & WEST DAMS
PROFILES

MEGUNTICOOK RIVER MAINE

SCALE 1" = 20'
DATE AUGUST 1978



SECTION A



SECTION B

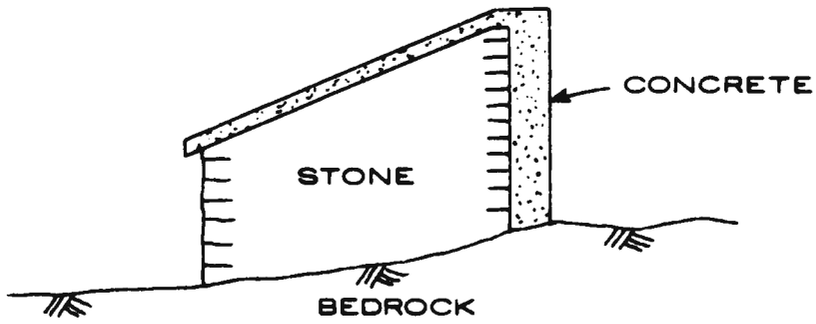
0 5 10 15 FEET

EDWARD C. JORDAN CO., INC.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

MEGUNTICOOK LAKE
EAST DAM
X-SECTIONS

MEGUNTICOOK RIVER MAINE



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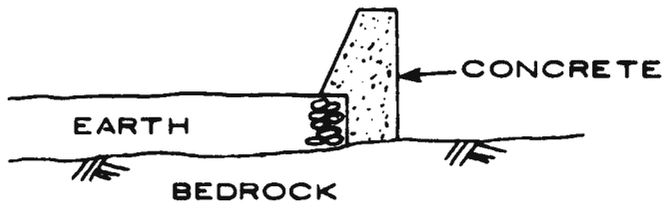

SECTION D

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FOSTER C JOHNSON CO., INC
PORTLAND, MAINE

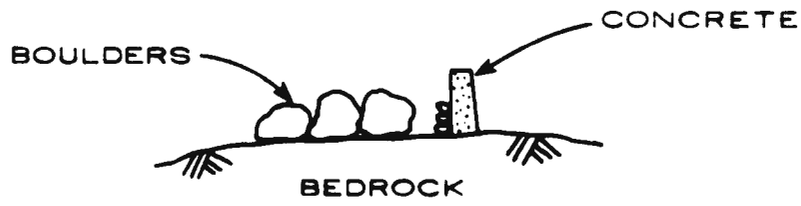
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

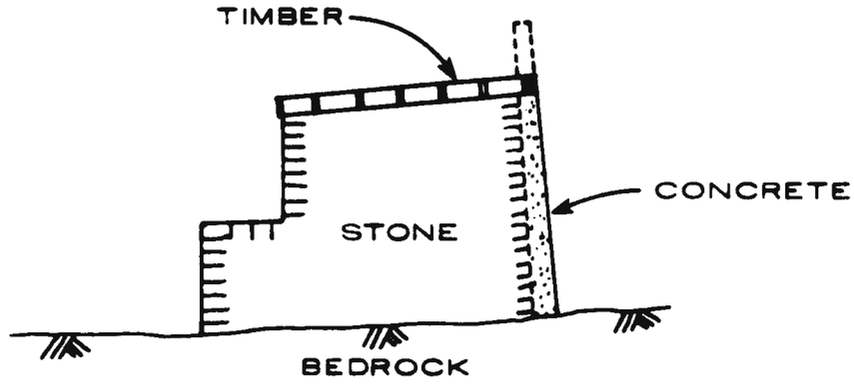
MEGUNTICOOK LAKE EAST DAM X-SECTIONS

MEGUNTICOOK RIVER MAINE

DATE AUGUST 1978



SECTION E



SECTION F

0 5 10 15 FEET

EDWARD C. JORDAN CO., INC.
PORTLAND, MAINE

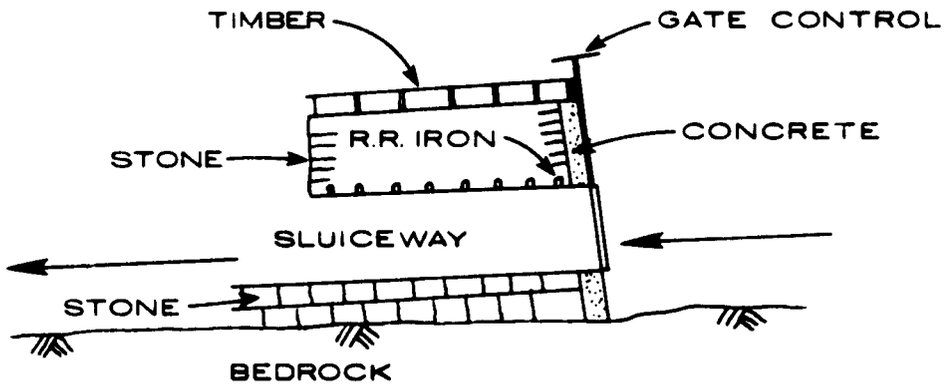
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

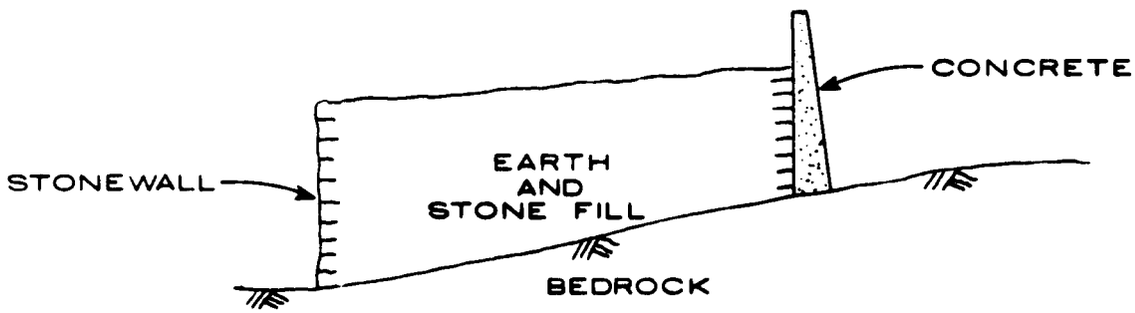
MEGUNTICOOK LAKE
WEST DAM
X-SECTIONS

MEGUNTICOOK RIVER MAINE

SCALE: 1" = 10'
DATE: AUGUST 1978



SECTION G



SECTION H

0 5 10 15 FEET

EDWARD C. JORDAN CO., INC. PORTLAND, MAINE

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

MEGUNTICOOK LAKE WEST DAM X-SECTIONS

MEGUNTICOOK RIVER MAINE

SCALE 1" = 10'

DATE AUGUST 1978

APPENDIX B-2

INSPECTION HISTORY

An annual inspection of the Megunticook Lake Dams has been made for many years by the superintendent of Knox Woolen Mills Company. An inspection was made by Maine Department of Transportation personnel in December, 1977. A copy of their report is attached.

INSPECTION REPORT
FOR THE MEGUNTICOOK DAMS (EAST & WEST)

During the afternoon of December 22, 1977, Everett Barnard, MDOT Assistant Bridge Maintenance Engineer; Charles Norburg, MDOT Geologist; Guy Baker, MDOT Assistant Soils Engineer; and Philip Libby, MDOT Bridge Project Design Engineer, assigned to Dam Inspection traveled around Lake Megunticook and met with David Harding, Superintendent of Knox Woolen Mills, the owner of the Megunticook Lake Dams (East & West). We inspected the dam sites and the stream conditions downstream from the dams.

The site inspection showed two gravity type concrete structures keyed into hard ledge rock that had been blasted out to allow drainage of 10' to 15' below the design crest of the dams. The deep sections of each dam did not seem longer than 25', water and icy conditions prevented measurements and there are no plans. There was about an equal amount of structure with less than half the depth for each structure. The dams were situated on each side of a ledge rock island that separated the dams by 100'± and extended upstream into Megunticook Lake more than 500' making a dual outlet for the Lake.

The principle use for both structures has been to develop water storage and stabilize flow for mills situated on the River downstream from them.

Mr. Hardy said that there had been a mill at the site of the West Dam but that the East Dam had only been used to control the flow. However there were abandoned concrete works that had formed a small fish hatchery downstream from East Dam.

Flow downstream from the dams is controlled by Seabright Mill Dam, owned by O. Lie-Nielson; it is listed as a "2", or less critical, dam by the Corps of Engineers Report dated May 1975. The dam is situated about 1½ miles downstream and impounds water nearly to the Megunticook Dams. The Seabright Dam originally supplied waterpower to a mill that has been abandoned and removed, now it only serves as a pond for recreational purposes and would serve as a buffer for the Megunticook Dams.

Below the Seabright Dam the River flows rapidly for 2± miles thru a narrow valley that has residences and mills on either bank, to a small mill pond at Knox Woolen Co. This pond originally served to form a head of waterpower for the Mill, but recent years the power has been phased out and it is only used as a source of "Process Water" for the Mill. The Knox Woolen Mill is built over the River and Mr. Hardy reports that extreme high water does flood the lowest floor. This flow control is the use they make of the Megunticook Dams.

The other use made of the Dam is to maintain a water level for recreational use of the Lake, which is large enough so that the drainage from the watershed does not create an extreme rise in its level.

12/22/77

DAM INSPECTION #3

BEDROCK REPORT

NAME: Megunticook Lake Dams (East & West)

TOWN: Camden COUNTY: Knox

RIVER: Megunticook

TYPE OF DAM: Gravity

PURPOSE: Water control

HEIGHT(FT.): East — 13 West — 8

CAPACITY(ACRE FT.): 9412

UNDERLYING BEDROCK: Schist and Quartzite of Megunticook Sequence (Penobscot Fm?)

SITUATION: These dams are concrete structures on bedrock. A high angle fault occurs within 2 miles to the south of the dam. Geologic evidence indicates that the faulting occured in excess of 280,000,000 years ago. There is no record of movement in recent time.

Megunticook Dams
(East & West)

The site for the dams is such that a failure of either of the dams is very unlikely and would create little hazard as the flow would have the effect of flowing over a weir which would control the quantity of water flowing downstream. The presence of property downstream would indicate that further analysis would be warranted.

Reported by _____
Philip J. Libby

APPENDIX C

PHOTOGRAPHS

The following are photographs referenced in this report. See sheets B-1.3 and 1.4 for photograph locations and orientations.

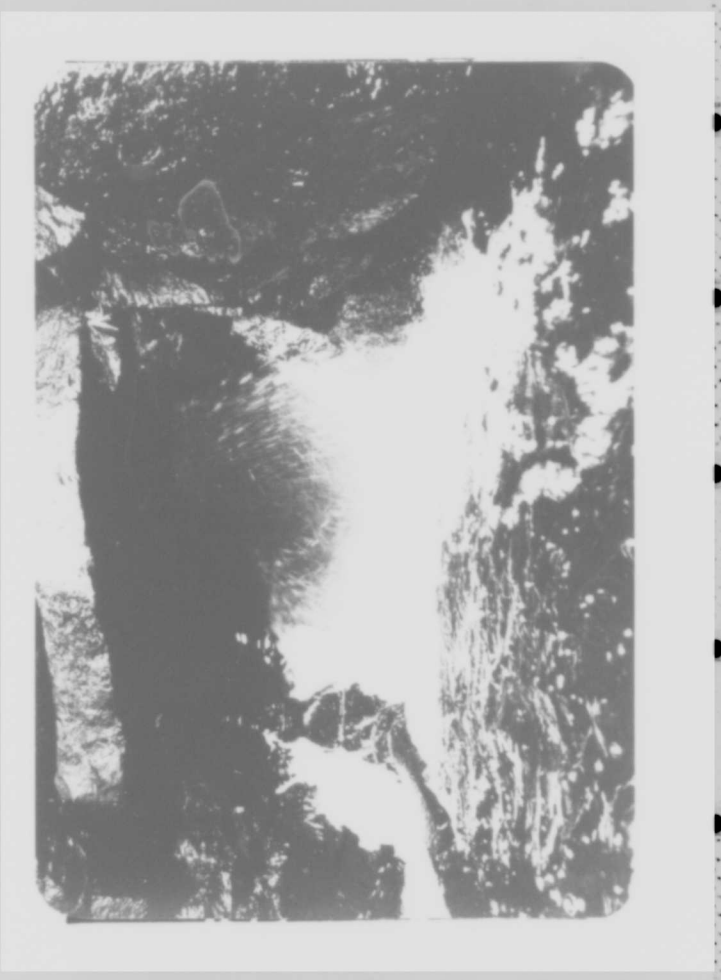
E-1
GATE OPENING AND DOWNSTREAM FACE OF DAM

E-2
UPSTREAM FACE OF DAM AND ABANDONED COFFER DAM

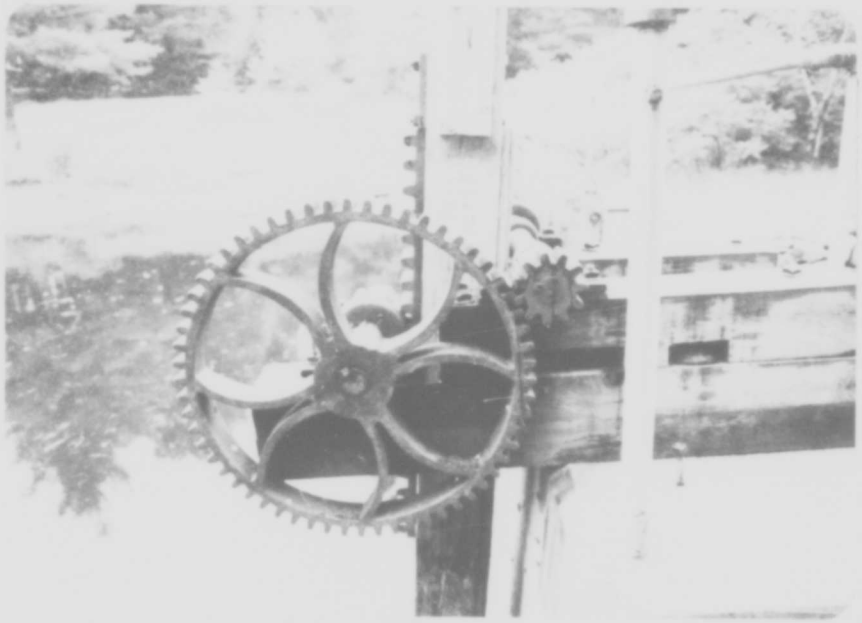
E-3
FISH SCREEN

E-4
DOWNSTREAM CHANNEL

E-5
SPALLED CONCRETE



E-6
GATE OPENING



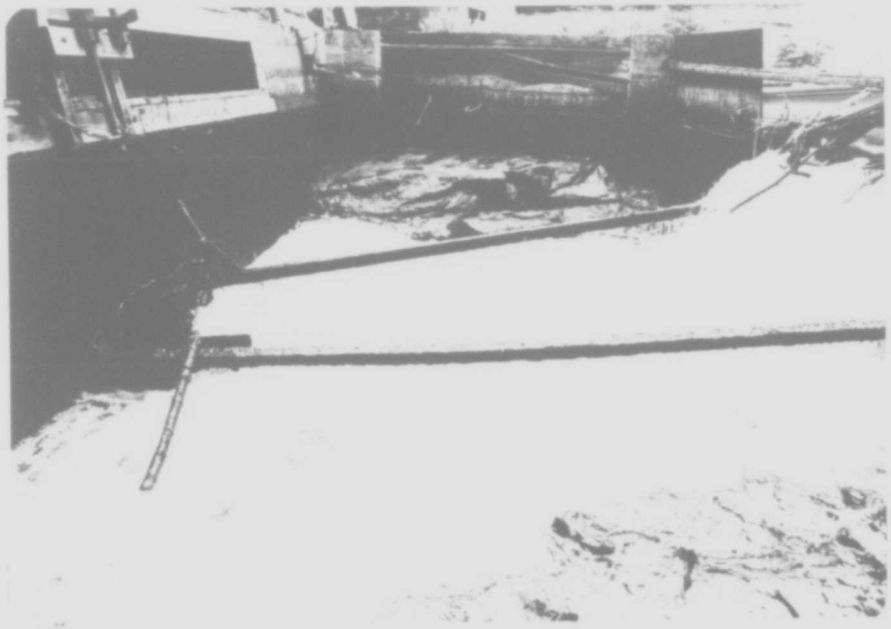
E-7
GATE OPERATING MECHANISM

E-8
EMBANKMENT STRUCTURE

E-9
DOWNSTREAM FACE OF DAM

W-1
UPSTREAM FACE OF DAM

W-2
GATE OPERATING MECHANISM



W-3
UPSTREAM FACE OF DAM

W-4
SLUICEWAY OUTLET

W-5
DOWNSTREAM CHANNEL

W-6
WEST EMBANKMENT

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

There was no hydrologic or hydraulic data except for several pool level readings at notable high water level periods between 1917 and present taken by personnel available from published or project records. Elevations listed in this appendix are based on estimating height above mean sea level by equating crest elevation at the dams with elevation 142 feet which appears on the USGS Camden quadrangle for Megunticook Lake. The following is a list of data which has been developed for this Phase I report. The analyses are attached to this section.

a. The drainage area contributing to the Megunticook Lake Dams is about 31.5 square miles. The drainage area is very hilly, uncharacteristic of most coastal drainage areas, with elevations ranging from 128 feet to 1100 feet at the drainage divide.

b. The elevation of the top of the conservation or normal pool is taken as 142 feet.

c. Storage capacity at spillway crest is 13,600 acre-feet.

d. The elevation at the top of flood control pool (or full spillway) is 144.5.

e. The storage capacity of the flood control pool is 3620 acre-feet.

f. Elevation of the maximum design pool is unknown.

g. Surcharge capacity is unknown.

h. There is no freeboard available at the assumed flood control elevation.

i. The elevation of the top of the East Dam is 144.5 feet, and the elevation of the top of the West Dam is 144.0 feet.

j. The elevation of the crest at Megunticook East and West Dams is 142 feet. Both spillways are broad crested as shown on the plans and X-sections in Appendix B-1.

k. The sluice gate on Megunticook East Dam is 30 inches in width by 36 inches in height. The upstream invert is 128.5 feet and the downstream invert is 126.5 feet. The butterfly gate on Megunticook West Dam is 42 inches in width by 48 inches in height. The upstream invert is 130.0 feet and the downstream invert is 128.5 feet.

l. There are no emergency spillways at either dam.

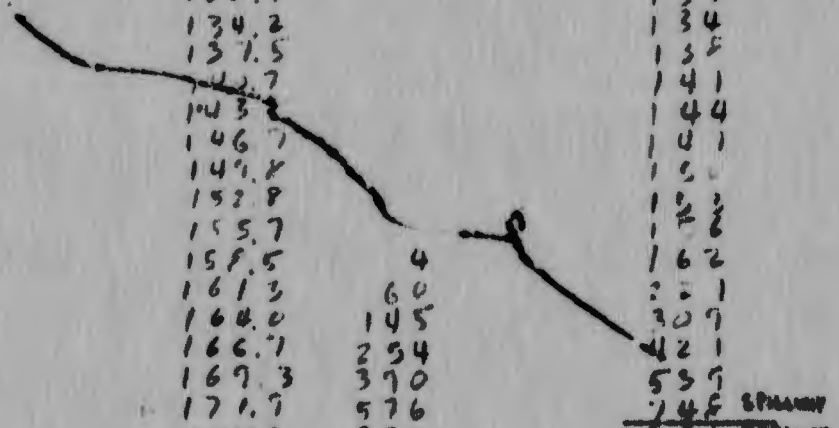
m. There are not any flashboards installed at either dam, although rods are present at East Dam to allow the installation of flashboards at least 1.2 feet high on the spillway crest.

n. There are no identified hydrometeorological gages in the watershed.

o. The Megunticook River runs in a relatively narrow flood plain with the exception of Seabright Pond which is an average of 500 feet wide. The river channel is rocky, but is quite steep with an average slope of 1.5 percent between the Megunticook Lake Dams and Seabright Pond. Reportedly 10-year frequency flood flows (1330 cfs) have not caused appreciable damage.

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MEADOWVIEW EAST DAM HYDRAULICS	CHK BY	DATE 7-21-78



Survey Datum Water Surface Elev.	Embankment Discharge	Total Discharge	TOTAL DISCHARGE cfs
90	55.6		56
90.5	90.1		91
91	95.6		96
91.5	100.1		100
92	104.5		104
92.5	108.6		109
93	112.7		113
93.5	116.5		116
94	120.3		120
94.5	123.1		124
95	127.4		127
95.5	130.7		131
96	134.2		134
96.5	137.5		138
97	140.7		141
97.5	143.8		144
98	146.7		147
98.5	149.8		150
99	152.8		153
99.5	155.7		156
100	158.5	4	162
100.5	161.3	60	221
101	164.0	145	309
101.5	166.7	254	421
102	169.3	390	559
102.5	171.9	576	748 SPILLWAY CREST ELEV
103	174.3	820	994
103.5	177.0	1130	1307
104	179.5	1480	1660
104.5	181.9	1873	2055
105	184.4	2320	2504
105.5	186.8	2856	3043
106	189.1	3371	3560
106.5	191.5	3918	4110
107	193.8	4492	4686
107.5	196.0	5093	5289
108	198.2	5721	5919

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
[illegible] DAM HYDRAULICS	CHK BY	DATE 7 21 75

Survey Datum

Water Surface Elev	Calc. Discharge	Total Weir @	TOTAL DISCHARGE cfs
106.5	200.5	6316	6572
107	207.7	7047	7250
107.5	204.9	7746	7751
110	207.3	8467	8674
110.5	209.2	9210	9419
111	211.3	9973	10184
111.5	213.4	10756	10969
112	215.4	11560	11775
112.5	217.5	12385	12602
113	219.7	13214	13433
113.5	221.5	14054	14275
114	223.5	14962	15185
114.5		15855	16078
115		16771	16994
115.5		17701	17926
116		18648	18872
116.5		19612	19835
117		20591	20814
117.5		21587	21810
118		22594	22817
118.5		23625	23848
119		24666	24889
119.5		25123	25346
120		26794	27017

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MT. GUNTICOOK EAST DAM	BTL	2052-312
HYDRAULICS	CHK BY	DATE
	JCL	7-20-78

$Q = CLH^{3/2}$

Broad-Crested weir C's from Table 10-4 page 282 Linsley & Franzini

Surface Datum Water Surface Elev.	C for Weir (1)	C for Weir (2)	Weir (1) Q cfs	Weir (2) Q cfs	TOTAL WEIR Q, cfs
100	2.70		4		4
100.5	2.70		60		60
101	2.64		145		145
101.5	2.64		254		254
102	2.70		390		390
102.5	2.89		576		576
103		2.70	749	71	820
103.5		2.70	938	192	1130
104		2.64	1140	340	1480
104.5		2.64	1354	519	1873
105		2.70	1581	739	2320
105.5		2.89	1819	1037	2856
106			2068	1303	3371
106.5			2322	1590	3918
107			2577	1895	4492
107.5			2776	2217	5093
108			3165	2556	5721
108.5			3462	2910	6372
109			3768	3279	7047
109.5			4083	3663	7746
110			4406	4061	8467
110.5			4738	4472	9210
111			5077	4896	9973
111.5			5423	5333	10756
112			5778	5782	11560
112.5			6140	6242	12382
113			6509	6715	13224
113.5			6885	7199	14084
114			7268	7694	14962

- Weir (1) = Overflow Weir
- Weir (2) = R/S Rest

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
ALEXANDRIA POOL EAST DAM	BTE	20513 02
HYDRAULICS	CHK BY JCB	DATE 7-20-78

Spillway Datum — Weir ① L = 47.5' — Weir ② L = 40.0'

Water Surface Elev.	C for Weir ①	C for Weir ②	Weir ① Q cfs	Weir ② Q cfs	TOTAL WEIR Q, cfs
114.5	2.89	2.89	10558	5200	15758
115			10055	6716	16771
115.5			8458	9243	17701
116			6865	7780	14645
116.5			9284	10327	19612
117			9707	10884	20591
117.5			10136	11451	21587
118			10571	12027	22598
118.5			11012	12613	23625
119			11457	13207	24666
119.5			11912	13811	25723
120			12376	14426	26794
120.5					
121					
121.5					
122					

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MEGUNTICOOK LAST DAM HYDRAULICS	LTB	2054 [illegible]
	CHK BY: JCB	DATE: 7-20-78

FLOW THROUGH GATE:

$Q = Ca\sqrt{2gh}$ $\qquad a = \dfrac{30" \times 36"}{144} = 7.5^{\square'}$

$C = 0.7$

assume free discharge

Spillway Crest = 99.9'

INV. = 84.6

TOP = 87.1

Water Surface Elev. (Survey Datum)	Free Gate Discharge Q, cfs
90	85.8
90.5	90.8
91	95.6
91.5	100.1
92	104.5
92.5	108.6
93	112.7
93.5	116.5
94	120.3
94.5	123.9
95	127.4
95.5	130.9
96	134.2
96.5	137.5
97	140.7
97.5	143.8
98	146.9
98.5	149.8
99	152.8
99.5	155.7
100 — crest	158.5
100.5	161.3
101	164.0
101.5	166.7
102	169.3
102.5	171.9
103	174.5
103.5	177.0

Water Surface Elev.	Q
104	179.5
104.5	181.9
105	184.4
105.5	186.8
106	189.1
106.5	191.5
107	193.8
107.5	196.0
108	198.2
108.5	200.5
109	202.7
109.5	204.9
110	207.0
110.5	209.2
111	211.3
111.5	213.4
112	215.4
112.5	217.5
113	219.5
113.5	221.5
114	223.5
84.5	0
85	9.0
85.5	18
86	27
86.5	36
87	45
87.5	54.1
88	62.8
88.5	68.1
89	74.6
89.5	80.5

[illegible]

[illegible]

PROJECT	COMP BY CTB	JOB NO. 2054 31.
	CHK BY	DATE 7-21-78

Megunticook F Dam, weir (2):

@ El 110.0 for c = 3.54, Q = 4974 cfs

Try $Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

$Q = 4974$

$n = 0.025$ ✓

$A = (68)(110 - 102.47) = 512$

$R = \frac{A}{P} = \frac{68(110 - 102.47)}{68 + 2(110 - 102.47)} = 6.16$

Solve for S

$$S = \left[\frac{4974}{(1.486/0.025)(512)(6.16)^{2/3}} \right]^2$$

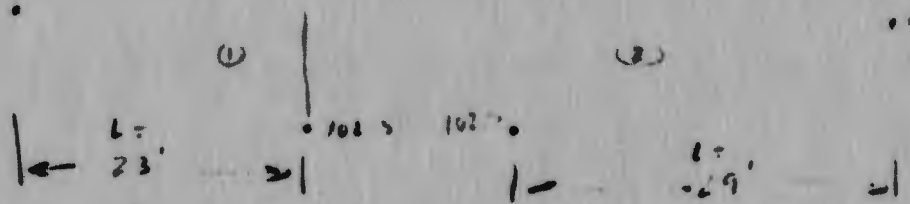
$S = .00236$

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MEGUNTICOOK EAST DAM HYDRAULICS	BTB	2054302
	CHK BY JCB	DATE 7-01-76

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

IN



$$S = \frac{142 - 124}{300} = 0.06 \quad , \quad n = 0.09$$

	Survey Datum Elev.	L ①	L ②	A	R	Q	
	102.5	—	—	—	—	—	
	103	1.0	0.5	0.4	0.267	0	
1	103.5	2.0	4.1	3.0	0.492	0	
	104	3.0	6.7	6.9	0.750	0.1	
2	104.5	4.0	8.2	12.2	1000	0.2	
	105	5.0	10.4	19.2	1.247	0.3	
3	105.5	6.0	12.4	27.6	1.5	0.5	
	106	1.0	14.5	37.6	1.749	0.8	
4	106.5	8.0	16.6	49.2	2.0	1.1	
	107	9.0	18.6	62.1	2.25	1.6	
5	107.5	10.0	20.7	76.8	2.502	2.1	
	108	11.0	22.8	93.0	2.751	2.7	
6	108.5	12.0	24.9	110.7	3.0	3.4	
	109	13.0	26.9	129.7	3.25	4.2	
7	109.5	14.0	29.0	150.0	3.488	5.1	
	110	15.0	29	172.2	3.914	6.3	
8	110.5	16.0	29	194.5	4.322	7.7	
	111	17.0	29	217.2	4.722	9.1	
9	111.5	18.0	29	240.5	5.112	10.6	
	112	19.0	29	264.2	5.504	12.2	
10	112.5	20.0	29	288.5	5.888	14.0	
	113	21.0	29	313.2	6.264	15.8	
11	113.5	22.0	29	338.5	6.637	17.7	
	114	23.0	29	364.2	7.004	19.8	

INSIGNIFICANT

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MEGUNTICOOK WEST DAM HYDRAULICS	[illegible]	[illegible]3203
	CHK BY JCB	DATE 7-21-78

INV = 91.5'

Water Surface Elev. Upstream of Low Flow Gate @ Meg. E.	Gate Discharge	Total Weir Discharge	TOTAL DISCHARGE cfs
95.5	114		114
96	127		127
96.5	139		139
97	151		151
97.5	161		161
98	171		171
98.5	180		180
99	189		189
99.5	198		198
100	206	6	212
100.5	214	32	246
101	221	66	287
101.5	228	113	341
102	235	176	411 SPILLWAY
102.5	242	257	499 OVERTOP
103	249	484	733
103.5	255	723	978
104	262	1019	1281
104.5	268	1398	1666
105	274	1771	2045
105.5	280	2174	2454
106	286	2606	2892
106.5	291	3064	3355
107	297	3546	3843
107.5	302	4053	4355
108	308	4583	4891
108.5	313	5133	5446
109	318	5704	6022
109.5	323	6297	6620
110	328	6917	7235
110.5	333	7538	7871
111	338	8185	8523
111.5	342	8851	9193
112	348	9533	9881
112.5	352	10233	10585
113	357	10950	11307
113.5	361	11682	12043
114	367	12430	12797

91.5 ⇒ 0 | 95.0 ⇒ 43 | 98.5 ⇒ 56
92.0 ⇒ 19 | 96.5 ⇒ 57 | 99.0 ⇒ 100
92.5 ⇒ 35 | 98.0 ⇒ 71

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MEGUNTICOOK WEST DAM HYDRAULICS	T.T.B	2051303
	CHK BY	DATE
		7-24-10

Water Surface Elev Converted to Flow Base @ Reg E.	Gate Discharge	Total Weir Discharge	TOTAL DISCHARGE cfs
114.5	370	13194	13564
115	375	13973	14346
115.5	379	14767	15146
116	383	15574	15957
116.5	388	16396	16784
117	392	17233	17625
117.5	396	18083	18479
118	400	18947	19347
118.5	404	19823	20227
119	40F	20714	21122
119.5	412	21617	22029
120	416	22533	22949

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MEGUNTICOOK WEST DAM	BJB	2058-03
HYDRAULICS	CHK BY: JCB	DATE: 7-21-78

Flow over Weir: $Q = CLH^{3/2}$

C's from Tables 80-3, page 282 Linsley & Franzini

Water Surface Elev.	Converted to Flashboard at Meg. E. +2.13'	C for Weir (1)	C for Weir (2)	Weir (1) Q cfs (weir (1) El. = 99.62-99.75)	Weir (2) Q cfs (weir (2) El. @100.0 = 102.13)	TOTAL WEIR Q, cfs
97.37	99.5	—	—	-	-	-
97.87	100	2.70		6		6
98.37	100.5	2.70		32		32
98.87	101	2.64		66		66
99.37	101.5	2.70		113		113
99.87	102	2.89		116		176
100.37	102.5	↓	2.70	237	50	281
100.87	103		2.70	305	179	484
101.37	103.5		2.64	378	345	723
101.87	104		2.70	456	563	1011
102.37	104.5		2.89	539	859	1398
102.87	105		↓	626	1145	1771
103.37	105.5			717	1457	2174
103.87	106			813	1793	2606
104.37	106.5			912	2152	3064
104.87	107			1015	2551	3546
105.37	107.5			1122	2931	4053
105.87	108			1233	3350	4563
106.37	108.5			1346	3787	5133
106.87	109			1463	4241	5704
107.37	109.5			1584	4713	6297
107.87	110			1707	5200	6707
108.37	110.5			1834	5704	7538
108.87	111			1963	6222	8185
109.37	111.5			2095	6756	8851
109.87	112			2230	7304	9533
110.37	112.5			2368	7865	10233
110.87	113			2509	8441	10950
111.37	113.5			2652	9030	11682
111.87	114			2798	9632	12430

crest El. 99.75'

Input w/s El. - 99.75 =
y^x 1.5 = × RCL (1)
× RCL (2) = R/S
RST

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MEGUNTICOOK WFST Dam 1 HYDRAULICS	ETB	205F303
	CHK BY JCB	DATE 7-24-78

Water Surface Elev	Converted to Elev. based on Mg.E. 92.13'	C for Weir ①	C for Weir ②	L = 15' Weir ① Q cfs	L = 80' Weir ② Q cfs	TOTAL WEIR Q, cfs
114.5		2.89	2.89	2743	10247	12990
115				3092	10873	13965
115.5				3452	11515	14967
116				3408	12167	15574
116.5				3566	12834	16400
117				3721	13506	17227
117.5				3870	14192	18062
118				4056	14891	18947
118.5				4223	15600	19823
119				4394	16320	20714
119.5				4566	17051	21617
120				4740	17792	22533

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MEGUNTICOOK WEST DAM HYDRAULICS	WTL	0503.03
	CHK BY JCL	DATE 1/21/75

Flow Through Gate: $Q = CA\sqrt{2gh}$

$C = 0.7$, $A = 36'' \times H = 4.0' = 14.4$ ☐

assume free discharge

Water Surface Elev.	Converted to Flow Base of Mag Z 92.13'	Free Discharge Q, cfs	Water Surface Elev.	Converted Flow, Z 13'	Free Discharge Q, cfs
93.37	95.5	114	101.37	111.5	342
93.87	96	127	101.87	112	346
94.37	96.5	139	110.37	112.5	352
94.87	97	151	110.87	113	357
95.37	97.5	161	111.37	113.5	361
95.87	98	171	111.87	114	366
96.37	98.5	180	112.37	114.5	370
96.87	99	189	112.87	115	375
97.37	99.5	198	113.37	115.5	377
97.87	100	206	113.87	116	383
98.37	100.5	214	114.37	116.5	388
98.87	101	221	114.87	117	392
99.37	101.5	228		117.5	396
99.87	102	235		118	400
100.37	102.5	242		118.5	404
100.87	103	249		119	408
101.37	103.5	255		119.5	412
101.87	104	262		120	416
102.37	104.5	268			
102.87	105	274			
103.37	105.5	280			
103.87	106	286			
104.37	106.5	291			
104.87	107	297			
105.37	107.5	302			
105.87	108	308			
106.37	108.5	313			
106.87	109	318			
107.37	109.5	323			
107.87	110	328			
108.37	110.5	333			
108.87	111	338			

-92.52

$5' \times 0.1' = 0.5 \times 0.1$

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
STORAGE - DISCHARGE RELATIONSHIP FOR MEGUNTICOOK LAKE	BTL	2653 021 03
	CHK BY JCR	DATE 7-24-78

Water Surface Elev.	Storage Ac.-Ft.	Discharge cfs
94.5		0
95		9
95.5		18
96		27
96.5		36
97		45
97.5		54
98		63
98.5		69
99		75
99.5		80
100		86
100.5		91
101		96
101.5		100
102		118
102.5		137
103		156
103.5		173
94		191
94.5		210
95		227
95.5		245
96		261
96.5		277
97		292
97.5		305
98		318
98.5		330
99		342
99.5		354
100		374
100.5		467
101	1448	576
101.5	2172	762
102	2896	770
102.5	3620	1277
103	4344	1727
103.5	5068	2287

Water Surface Elev.	Storage Ac.-Ft.	Discharge cfs
104	5792	2941
104.5	6516	3721
105	7240	4549
105.5	7964	5471
106	8688	6452
106.5	9412	7465
107	10136	8527
107.5	10860	9644
108	11584	10810
108.5	12308	12018
109	13032	13272
109.5	13756	14571
110	14480	15909
110.5	15204	17290
111	15928	18707
111.5	16652	20102
112	17376	21656
112.5	18100	23185
113	18824	24751
113.5	19548	26249
114	20272	27983
114.5	20996	29647
115	21720	31344
115.5	22444	33072
116	23168	34830
116.5	23892	36621
117	24616	38441
117.5	25340	40391
118	26064	42170
118.5	26788	44077
119	27512	46013
119.5	28236	47977
120	28960	49968

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
EFFECT OF SURCHARGE STORAGE	BTL	20543
	CHK BY	DATE
	JCB	7-24-74

Q_{P_2} = MAX. PROBABLE FLOOD PEAK = 40,600 cfs OK

WATER SURFACE ELEV. = 117.6 ✓
(TO PASS MPF)

SURCHARGE HEIGHT ≈ 17.7' to pass Q_{P_2}

VOLUME OF SURCHARGE ($STOR_1$):

Storage @ 117.6 = 25,485 Ac-ft ✓

D.A. Tributary to Mogul. Cook Lake Outlet = 20,154 Ac

$$STOR_1 = \frac{25,485}{20154} \times \frac{12"}{1'} = \underline{15.17"} \checkmark$$

$$Q_{P_2} = Q_{P_1} \times \left(1 - \frac{STOR_1}{19}\right) \checkmark$$

$$Q_{P_2} = 40600 \times \left(1 - \frac{15.17}{19}\right) = \underline{8184 \text{ cfs}} \checkmark$$

WATER SURFACE ELEV (to pass Q_{P_2}) = 106.8' ✓
SURCHARGE HEIGHT ≈ 6.9' to pass Q_{P_2}

STORAGE @ 106.8 = 9846 Ac-ft ✓

$$STOR_2 = \frac{9846}{20154} \times \frac{12"}{1'} = \underline{5.86"} \checkmark$$

$$\text{AVE. STOR} = \frac{15.17 + 5.86}{2} = \underline{10.52"}$$

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY BTD	JOB NO. 20583
	CHK BY CR	DATE 7-24-78

$10.52'' \times \frac{1'}{12''} \times 20154 = 17{,}661$ Ac.ft

SURCHARGE ELEV = 112.2'

Q_{P3} = 22,268 cfs @ 112.2'

Spillway @ 100.0

Dam @ 102.5

Dam overtopped by 9.7'

Spillway H = 12.2'

$\%\ MPF = \frac{1277}{22268} \times 100 = 5.7\%$

PROJECT	COMP BY	JOB NO.
DAM FAILURE HYDROGRAPHS FOR FAILURE OF MEGUNTICOOK EAST & WEST DAMS	BTB	20583 029 03
	CHK BY SCL	DATE 7-28-78

$\frac{1}{2} Q_p T = 125$

$Q_{p1} = \frac{8}{27} W_b \sqrt{g} Y_o^{3/2}$

Megunticook East Dam $W_b = 0.4(51.5) = 20.6'$
Megunticook West Dam $W_b = 0.4(18.0) = \underline{7.2}$

$W_b = \underline{27.8'}$

$$Y_o = \frac{(102.5 - 84.6)_{17.9} + (102.5 - 86.7)_{15.9}}{2} = \underline{16.8'}$$

$Q_{p1} = \frac{8}{27}(27.8)\sqrt{g}(16.8)^{3/2} = \underline{3219 \text{ CFS}}$ ✓

From Knox Woolen Mill Info:
Source: L. Read Sullivan, Esq.
Boston, MA
October 1927

Megunticook Lake Storage
At Crest = 334,540,800 cu FT

∴ Storage at full Spillways, S: 11,300 Ac-Ft

$S = \frac{334,540,800}{43,560} + 2.5(1448 \text{ Ac}) = \underline{43\cancel{8} \text{ A.-Ft}}$

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MEGUNTICOOK LAKE	BTB	2051302.03
	CHK BY JCL	DATE 8-2-78

Storage @ Spillway Capacity = 13,600 Ac-Ft
(from area-capacity curves)

$\frac{1}{2} Q_p T = 12 S$

$Q_p = 3219$ CFS

$S = \underline{13{,}600}$ Ac-Ft

$\times 3600 \frac{sec}{hr} \left(\frac{ft^3}{sec} \right) hrs = Ac\text{-}Ft \times \frac{43560\ ft^2}{acre}$

$\frac{43560}{3600} = 12.1$

$T = \frac{12.1\ S}{\frac{1}{2} Q_p} = \frac{12.1(13{,}600)}{\frac{1}{2}(3219)} = \underline{102\ hrs}$

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
DOWNSTREAM DAM FAILURE HYDROGRAPH FOR FAILURE OF MEGUNTICOOK EAST & WEST DAMS	BTL	20583 02 03
	CHK BY	DATE
		8-2-78

@ SECTION (1)

Q_{p1} = 32196 CFS

STAGE = ~~133.2~~' 1:5.76
1:.1n - 13.1'

V_1 = 1 Ac-Ft

S = 13,600 AC-FT

∴ NO ROUTING EFFECT

STAGE = ~~135.2~~' 135.7'

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
DOWNSTREAM DAM FAILURE HYDROGRAPH FOR FAILURE OF MEGUNTICOOK EAST & WEST DAMS @ SECTION (2)	BTB	20583 02103
	CHK BY	DATE
		8-2-78

STAGE AT SEABRIGHT DAM:

$Q_{p2} = 3219$ CFS

STAGE = 129.79 [Based on 124' USGS MSL datum = 97' SURVEY DATUM]

$V_1 = 835$ Ac-Ft

$$Q_{p2}(TRIAL) = Q_{p2}\left(1 - \frac{V_1}{S}\right)$$

$$Q_{p2}(TRIAL) = 3219\left(1 - \frac{835}{13,600}\right) = 3021 \text{ CFS}$$

$V_2 = 802$ Ac-Ft

AVE V = 818 Ac-Ft

$Q_{p2} = \underline{3112}$ CFS

STAGE = 129.67'

LOCATION	ELEV	WAVE DEPTH
DAM	144.5	16.8
[illegible] D	131.76	13.76
[illegible] T	127.61'	5.07

EDWARD C. JORDAN CO., INC.

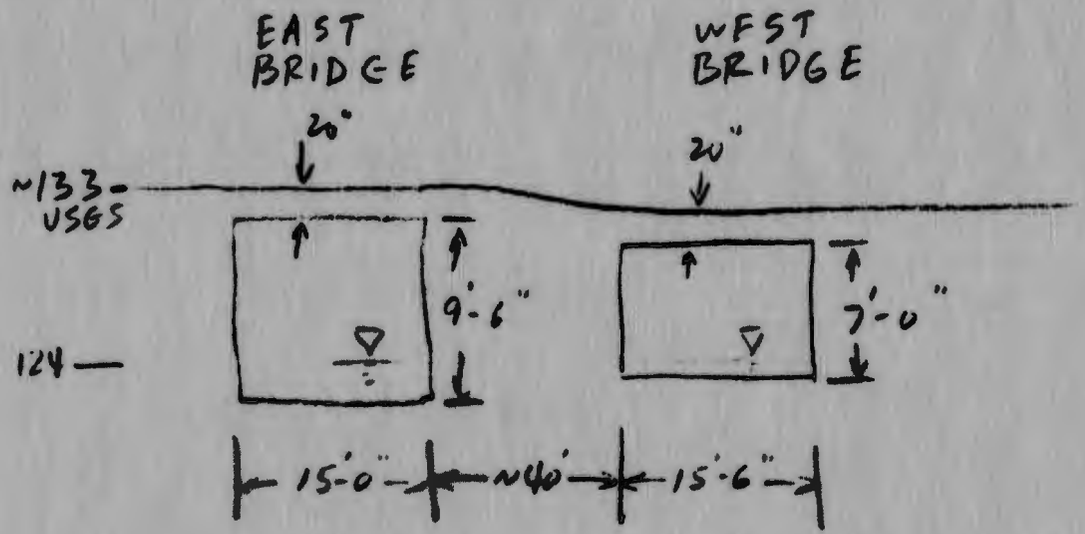
PROJECT	COMP BY	JOB NO.
STORAGE - DISCHARGE RELATIONSHIP AT BRIDGES BELOW MT. CONTICOOK OUTLET	BTD	205-73-02 & 03
	CHK BY	DATE 7-24-78

SECTION 1

ELEV. (above USGS MSL)	Area in Addition to Bridge Area A_f ft²	Wetted Perimeter P_f ft	$R^{2/3}$	Total Discharge cfs	Cross-Section Storage Ac-ft
131					
132	251	74	1.925	~~274~~	0.8
133					0.6
134					1.3
134.5					
135	160	100	1.368	2[illegible]	1.3
135.5					
136				[illegible]	
136.5					
137				[illegible]	
137.5					
138					
138.5					
139					
140	760	216	1.13	1211	1
141					
142					
143					
144					
145	1935	246			6.0

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
BRIDGE DATA FOR BRIDGES DOWNSTREAM OF MEGUNTICOOK LAKE OUTLET	DTB	20503 02 [illegible]
	CHK BY	DATE
	XB	7-24-78



E. BAREA = 142.5 [1] W BAREA = 108.5 [1]

TOTAL AREA = 251 [1]

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

AVE $S = 0.014$

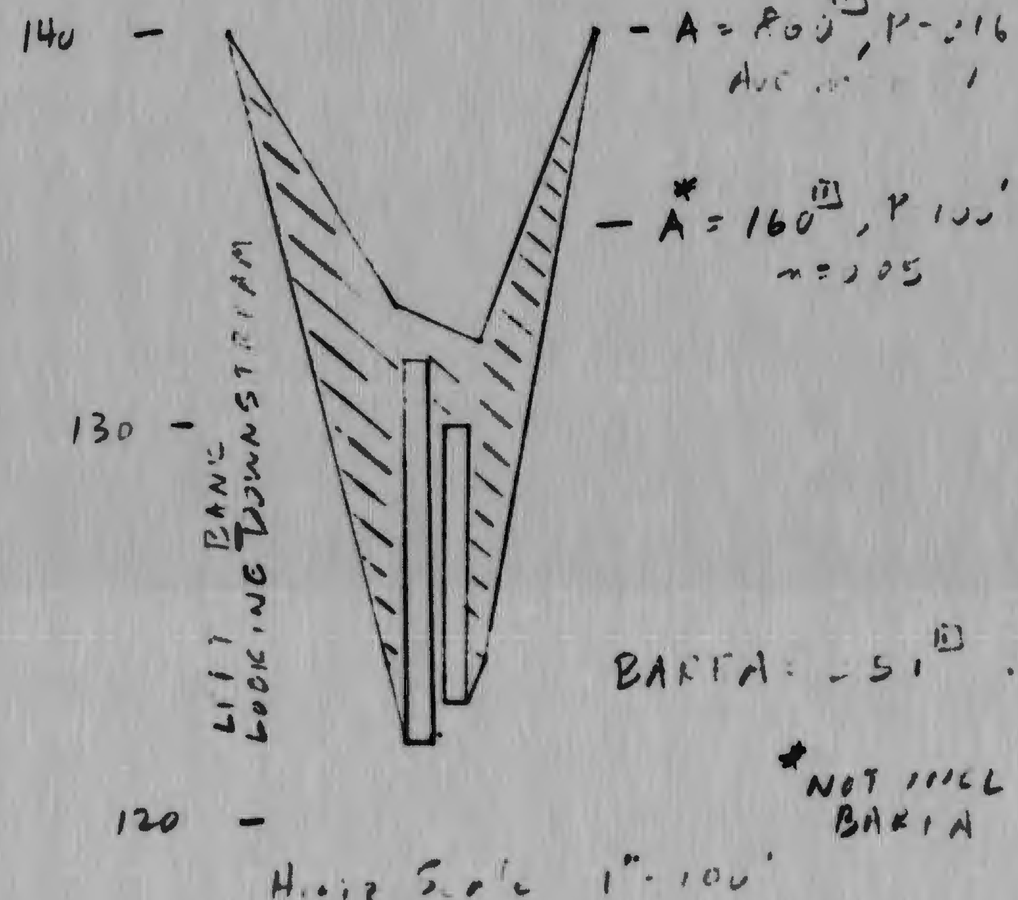
$n = 0.05$ (approx. channel very rocky)

SECTION TAKEN JUST UPSTREAM OF BRIDGE

@ 15: $Q = \frac{1.486}{.205}(231)\left(\frac{251}{94}\right)^{2/3} = 1711$ cfs

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
	BTB	20583
	CHK BY	DATE
		7-24-78




Malden Cliff
Megunticook Lake
Lake City
Crane Island
Fernalds
Megunticook
MOUNT CAMDEN
Mount Battie
Melvin Heights
Camden
Oak Hill Cem
TELEPHONE LINE
WASHINGTON
MECHANIC
Sub Sta

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MT. GUNTICOOK RIVER PROFILE	FRN/BTB	20513
	CHK BY	DATE 8-2-78

LOCATION	STATION	ELEV.		CB	US	US
MSL	0+00	0.0				
RT 2 (MAIN ST)	2+00	20				
RT BRIDGE	4+00					
WASHINGTON ST BR.	6+00					
KNOX DAM	10+50	40				
[illegible] ST	15+00	60				
KNOWLTON DAM	16+50					
POWER LINE	37+50					
UNKNOWN BR.	52+50					
CONTOUR 80	59+00	80				
WASHINGTON ST	63+50					
TENT CO. DAM	76+00					
MT. BATTIE RD	87+50	95				
CONTOUR 100	92+50	100				
SEABRIGHT DAM	100+50	120				
MEGUNTICOOK [illegible]	185+00	122-123				
MEG W. DAM	186+00	140	— CRIST	142	121	150
MEG E DAM	186+50		— CRIST	130	129	128
KNEELAND CUTOFF	293+50					
INLET MEG DAM	384+00					
RT 52/173 BRIDGE	455+00					
INLET N[illegible]	471+00					
ELEV 150	549+00	150				

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
C[illegible]MPUTATION OF FLOOD FLOWS AT M[illegible] DAMS	BTB	205-[illegible]
	CHK BY	DATE
	[illegible]	8-4-7[illegible]

D.A = 31.5 Sq Mi

Ma[illegible] Lake (incl. North Pond) DA [illegible].65 Sq Mi

L[illegible] Pond = 0.06 Sq Mi

Moody Pond = 0.09 Sq Mi

H[illegible] Pond = 0.42 Sq Mi

Fish Pond = 0.23 Sq Mi

Total Pond Area = 3.06 Sq Mi

$\frac{3.06}{31.5} \times 100 =$ 9.7% Pond Area

Use Similar watershed to Determine Flood Flows:

USGS Kettle Brook Gage in Worcester, MA

D.A = 31.3 Sq Mi

Period of Record 1923-5[illegible]

The following [illegible]

Type III [illegible] (weighted [illegible])

[illegible] R[illegible] [illegible]

[illegible]

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
	ET C	2054 3 02
	CHK BY	DATE
		8-4-78

From Kettle Brook log-Pearson III

Recurrence Interval, yrs	Kettle Brook Peak Discharge cfs
2	460
5	896
10	1334
25	2120
50	2904
100	3604
500	5307
500	7620

Kettle Brook Flood Flow =

Mianticook River @ Mouth

Outlet

1. Curve Interval	Peak Flood Flow cfs	Stage at Upper Pond USGS datum	Height[1] above Spillways ft
2	460	142.5	0.5
5	896	143.6	1.6
10	1334	144.6	2.6
25	2120	145.4	3.4
50	2904	146.0	4.0
100	3604	146.6	4.6
500	5307	147.4	5.4
500	7620	148.0	6.0

[1] Spillways 2.5' below top of dam.
Spillway Flow - 1420

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
COE NATIONAL DAM SAFETY PROGRAM Pertinent Hydrologic & Hydraulic Data - Negamkeag Lake Dam	BTB/FRN	20683-02/3
	CHK BY	DATE

p. 1 of —

1. Drainage Areas: (reference USGS quad sheets - 1:24,000)

Item	Area in²	Area ave(in²)	Area acres	Area sq. mi	14 Report sq. mi
a. Total drainage at outlet	219.544 219.395 219.667	219.5	20,156	31.49	27.75
b. Storage Areas					
• Neg. Lake*	16.520 16.351	16.435			
Neg. L. Islands	0.675 0.664	- 0.670			
Net Neg. L.		15.765	1448	2.26	2.20*
• Levenseller Pond	0.393		36.1	0.056	0.08
Needy Pond	0.633		58.1	0.091	0.10
Hobbs Pond	2.891		265.5	0.415	—
Fish Pond	1.630		149.7	0.234	—
• Total Storage			1957.4	3.06	2.38

* includes Norton Pond

2. Percent Storage Area

$$\frac{\text{Total SA}}{\text{Total DA}} = \frac{1957}{20156} \times 100 = 9.7\%$$

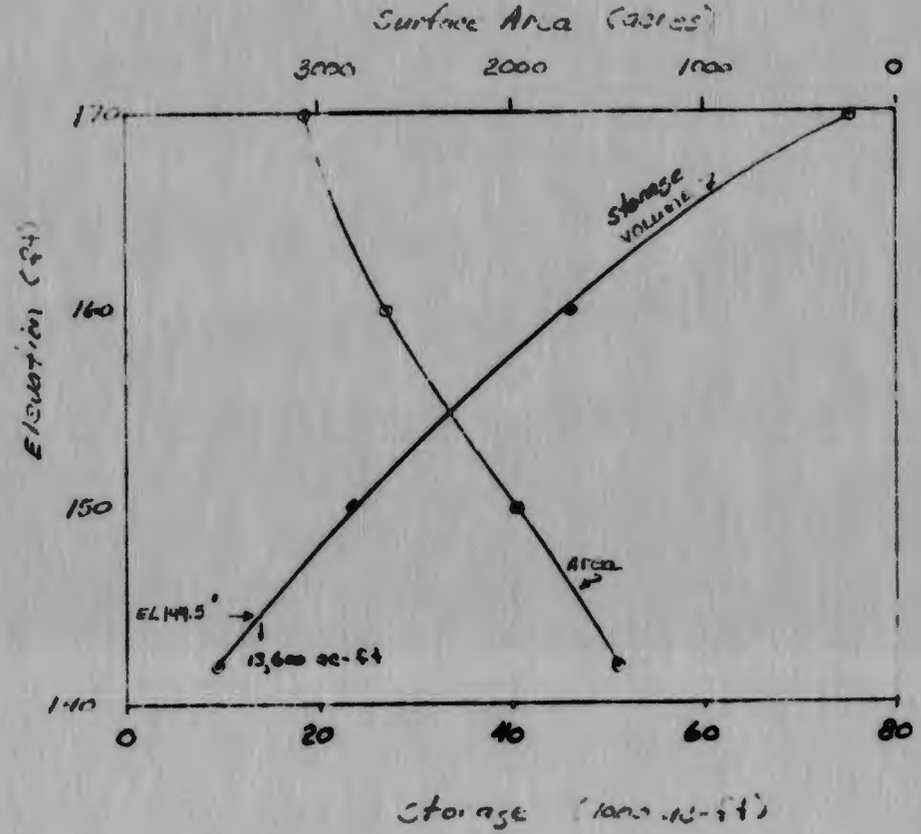
3. Storage @ Negamkeag Lake

1927 Report estimated storage volume for Negamkeag L. as about 7680 ac-ft. Does not include Norton Pond. This Estimate based on ave depth of 6 ft over surface area of 2.6 mi². If Norton pond area is included at the same ave depth, total storage is about 8440 ac-ft

USE storage shown on inventory sheet (9441) as a conservative estimate of storage at normal lake level (1924).

PROJECT	COMP BY	JOB NO.
COE NATIONAL DAM SAFETY PROGRAM Pertinent Hydrologic and Hydraulic Data Meguntucook Lake Dams	BTC/FRW	20583-043
	CHK BY	DATE

Figure 1 - AREA - CAPACITY CURVES - MEGUNTICOOK LAKE



NOTE: storage at normal lake elevation (142 ft) assumed 14,000 ac-ft as reported on inventory sheets. Incremental storage based on ave. area at mid-height x contour interval

4. **Maximum Probable Discharge:**

Drainage area = 31.49 mi² rolling terrain — COE Guide → MPF = 40% (.45)

5. **Dam elevations:**

Locations	Elevation East	Elevation West
Top of Dam	≈144.5	≈144.5
Spillway crest	≈142.0	≈142.0
Downstream toe	≈124.1	≈126.2

Note: elevations taken from relative datum at each site and later tied to USGS datum by assuming spillway crest = normal lake level

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MAXIMUM PROBABLE FLOOD MPF	BTE	20583
	CHK BY JCB	DATE 7-20-78

FROM: Max Probable Flood Peak Flow Rates Dec '77 C.O.E

DAM	AREA (SQ MI)	MPF (CSM)	MPF (CFS)
Megunticook E	31.49	1,290	40,600
Megunticook W	31.49	1,290	
Seabright	34.0	1,280	43,500
Knox Mill	34.87	1,280	44,600

APPENDIX E

INVENTORY FORMS

Inventory forms are attached to this section.