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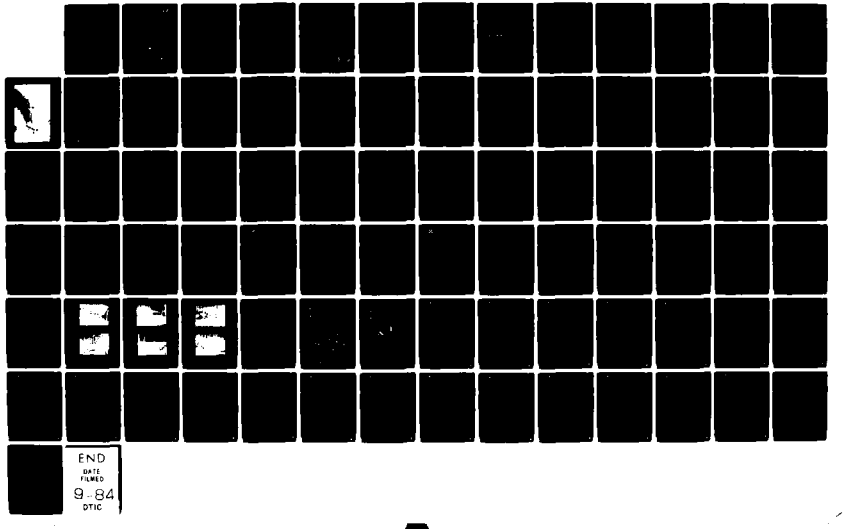

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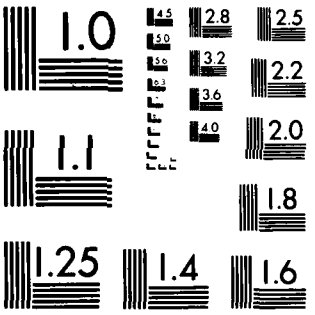

CONNECTICUT COASTAL BASIN

NEWTOWN, CONNECTICUT

HATTERTOWN POND DAM
CT 00313

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

MAY 1981

UNCLASSIFIED

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

The existing Hattertown Pond Dam consists of an earth and rockfill dam approximately 95 feet long, 11 feet high and 8 feet wide at the crest. A 19-foot-long spillway with a concrete crest located at the left dam abutment is the only outlet from the site. Based on the visual inspection of the site and past performance of the dam, the facility is judged to be in very poor condition. The project is considered to be small in size.It has a significant hazard classification.

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

REPLY TO
ATTENTION OF:
NEDED

JUN 10 1981

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

Dear Governor O'Neill:

Inclosed is a copy of the Hattertown Pond Dam (CT-00313) 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.

The brief assessment at the beginning of the report describes Hattertown Pond Dam as being in very poor condition. Therefore, it is recommended that the measures described in Section 7 should be instituted immediately upon the owner's receipt of this 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 Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, Bridgeport Hydraulic Co., Bridgeport, CT.

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 Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely,

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

Incl
As stated

HATTERTOWN POND DAM

CT 00313

CONNECTICUT COASTAL BASIN

NEWTOWN, CONNECTICUT

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification No: CT 00313
Name of Dam: Hattertown Pond Dam
Town: Newtown
County and State: Fairfield, Connecticut
Stream: Lewis Brook
Date of Inspection: December 11, 1980

BRIEF ASSESSMENT

The existing Hattertown Pond Dam consists of an earth and rockfill dam approximately 95 feet long, 11 feet high and 8 feet wide at the crest. A 19-foot-long spillway with a concrete crest located at the left dam abutment is the only outlet from the site. The dam is currently owned by Bridgeport Hydraulic Company, Bridgeport, Connecticut and serves no specific purpose, however, the impoundment is used for recreation. The original Hattertown Pond Dam, completed in 1840, was a 12-foot-high earth buttress that impounded Hattertown Pond in the Town of Newtown, Connecticut. However, the purpose nor the exact location of the original structure were available.

Based on the visual inspection of the site and the past performance of the dam, the facility is judged to be in very poor condition. Evidence of recent breaches, erosion of the embankment, seepage through the dam, and growth of large trees and brush on the dam were noted. In addition, the spillway section was in a state of extreme disrepair.

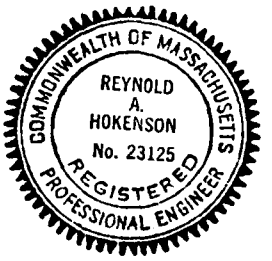
In accordance with the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the top of dam storage capacity (90 ac-ft) and the height of the dam (11 feet), the project is considered to be SMALL in size. In addition, the dam has been assigned a SIGNIFICANT hazard

classification as a result of the potential for the loss of a few lives due to a breach of the dam. Consequently, the test flood will be equivalent to a 100-year frequency flood. The resulting inflow to the pond is 760 cubic feet per second per square mile (cfs/sq. mi.) or 1,050 cubic feet per second (cfs). The test flood outflow is approximately 380 cfs; and the capacity of the spillway, with the water surface at the top of the dam, is 120 cfs or 14 percent of the routed test flood outflow. Therefore, the dam would be overtopped by about 1.5 feet.

It is recommended that the owner retain the services of a qualified registered professional engineer to repair and grade the embankment, perform detailed hydrologic-hydraulic investigations to develop an adequate spillway design to increase the project discharge capacity, provide a low-level outlet, develop an operations and maintenance manual, and clear, excavate and armor a spillway discharge channel. The improvements outlined above and the recommendations and remedial measures described in Section 7 should be instituted immediately upon the owner's receipt of this report.

Reynold A. Hokenson, P.E.

Reynold A. Hokenson, P.E.
Project Manager
International Engineering Company, Inc.



This Phase I Inspection Report on Hattertown Pond 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 judgement and practice, and is hereby submitted for approval.

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

ARAMAST MAHTESIAN, MEMBER
Geotechmical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed 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 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 aid 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.

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

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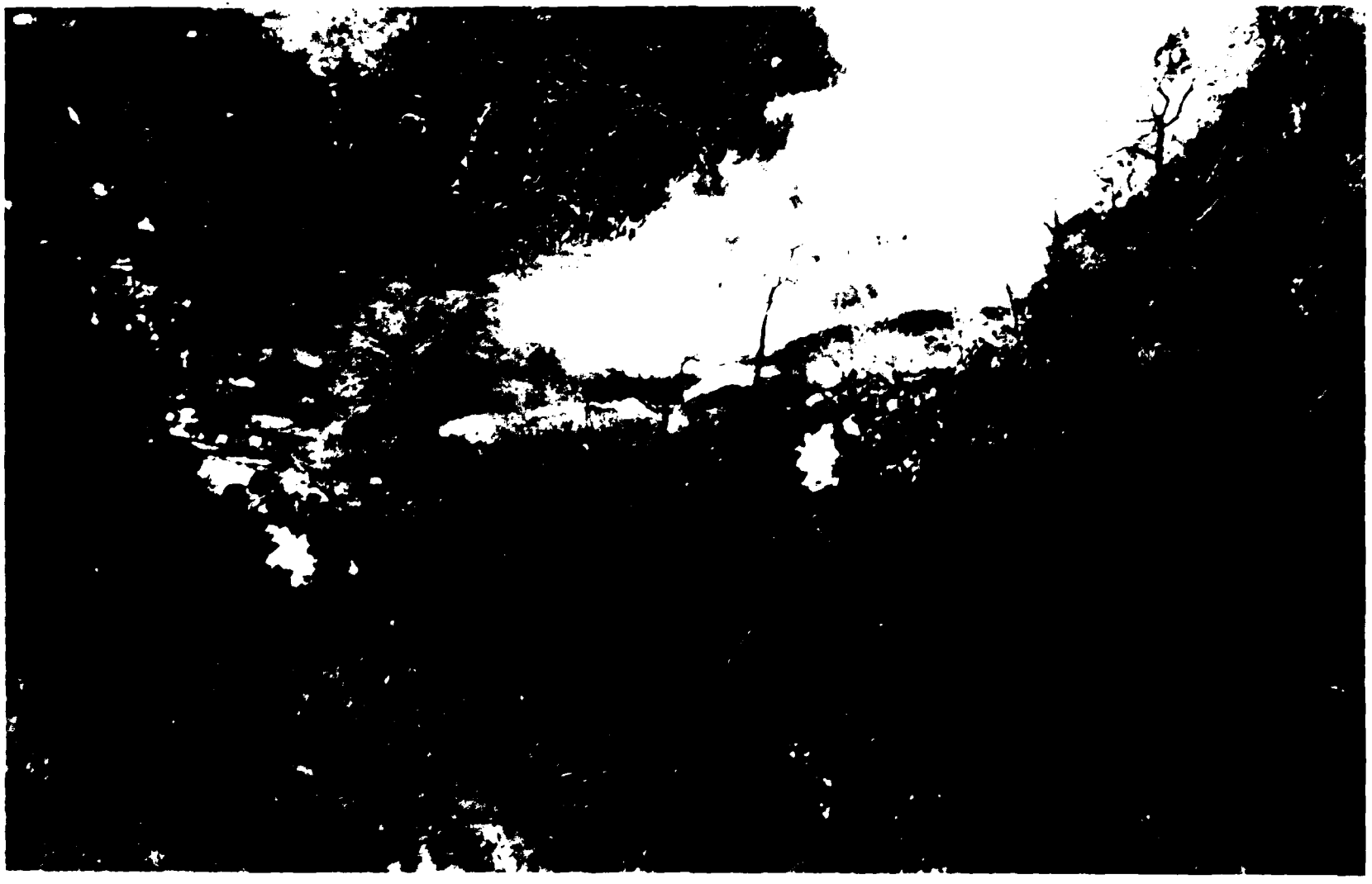
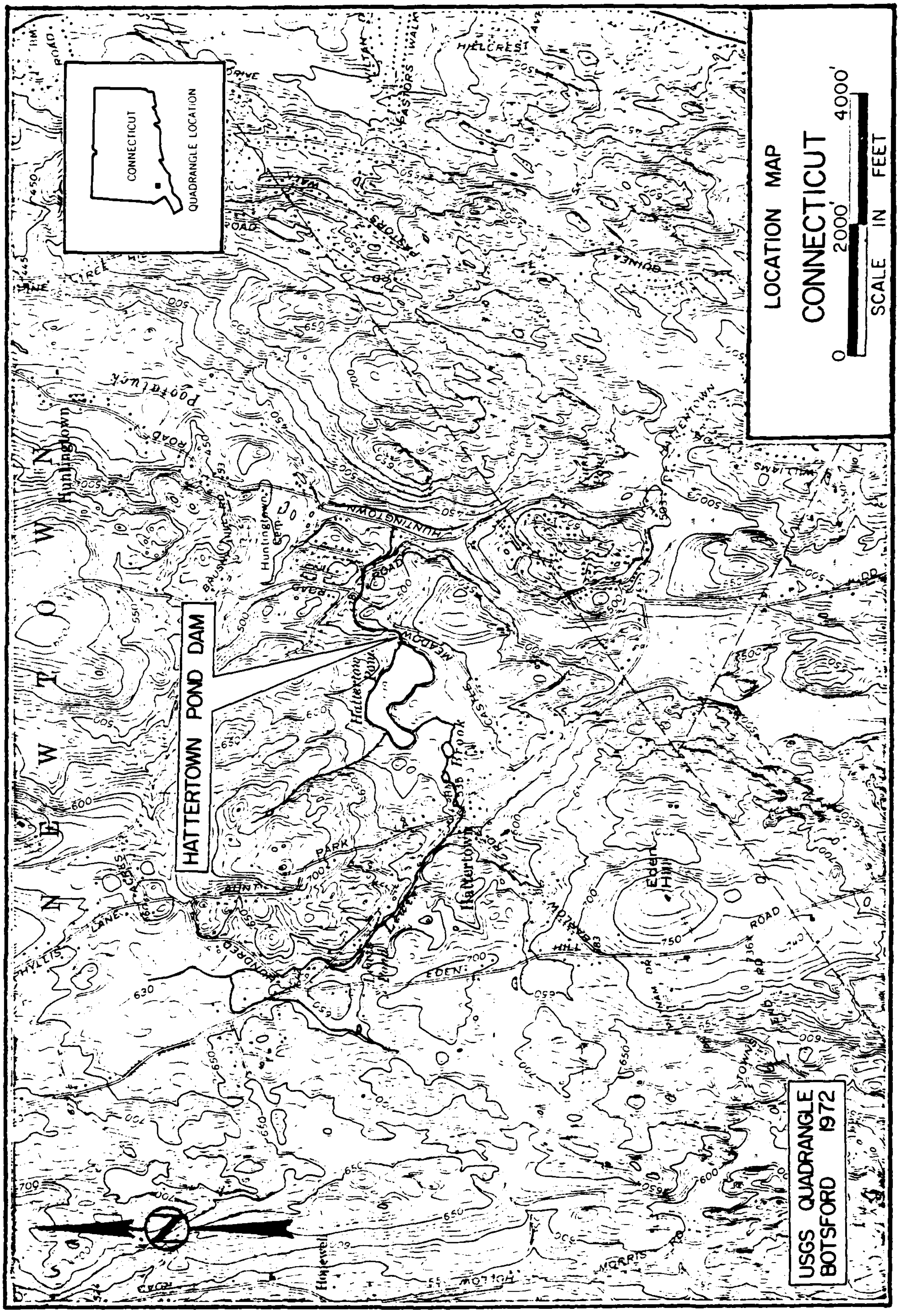


OVERVIEW PHOTO-HATTERTOWN POND DAM
FEBRUARY 7, 1981



HATTERTOWN POND DAM
LOCATION MAP
CONNECTICUT
0 2000' 4000'
SCALE IN FEET
CONNECTICUT
QUADRANGLE LOCATION
USGS QUADRANGLE
BOTSFORD 1972

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

HATTERTOWN POND 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. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the the New England region. International Engineering Company, Inc. has been retained by the Corps' New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to International Engineering Company, Inc. in a letter dated November 5, 1980, from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0015 has been designated by the Corps for this work.

b. Purpose of Inspection Program — The purposes of the program are to:

(1) Perform technical inspections and evaluations of non-federal dams to identify conditions requiring correction in a timely manner by non-Federal interests.

(2) Encourage and prepare the States to quickly initiate effective dam inspection programs for non-Federal dams.

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

c. Scope of Inspection Program — The scope of this Phase I Inspection Report includes:

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

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

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

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

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

1.2 DESCRIPTION OF THE PROJECT

a. Location — The dam is located on Lewis Brook and impounds a pond in a rural area of the Town of Newtown, Fairfield County, Connecticut approximately 2,700 feet upstream from the confluence with the Pootatuck River. The location of the dam is defined by the coordinates latitude N41°20.6' and longitude W73°18.0' on the Botsford, Connecticut, USGS Quandrangle Map.

b. Description of the Dam and Appurtenances — The dam consists of a 95-foot-long, 11-foot-high rock and earthfill embankment. The 19-foot-long spillway crest, located near the left abutment of the

dam, is defined only by a concreted, rock lined, depression along the top of the dam. The spillway crest is approximately 1.5 feet wide and located 1 foot below the top of the dam. It was assumed that the spillway crest elevation corresponded to the pond surface elevation shown on the Botsford, Connecticut, USGS Quadrangle Map (519 NGVD). Therefore, all key elevations computed from field measurements have been tied into the spillway crest elevation. (Note: All elevations are referenced to the National Geodetic Vertical Datum (NGVD)). The dam crest is approximately 8 feet wide and the upstream and downstream faces have 2H:1V and 1H:1V slope respectively (see Plan, Elevations and Sections Appendix B, pg B-1).

c. Size Classification - SMALL — The classification for size is based on the height of the dam above the natural streambed or the maximum storage potential which is considered to be the storage resulting from the water surface elevation within the impoundment being equal to the elevation of the top of the dam. The size of the dam is then determined by either storage or height depending on which criteria yields the larger size category. Hattertown Pond Dam has a maximum potential storage capacity of 90 ac-ft which is within the established limits for the small size category (50 ac-ft to 1,000 ac-ft) while the height of the dam (11 feet) is below the limits for the small size category (25 feet to 40 feet). Consequently, the dam is considered to be SMALL in size.

d. Hazard Classification - SIGNIFICANT — The hazard classification is based on the estimated loss of life and the anticipated property damage due to a dam breach when the water surface within the impoundment is at the top of the dam. The failure of Hattertown Pond Dam would cause the water level within the impact area to rise from 0.9 feet at a prefailure outflow of 120 cfs to 3.2 feet after the failure. Consequently, the resulting flood would inundate the ground floor of one home to a depth of 1 to 2 feet, damage the bridge culverts at Castle Meadow and Maltbie Roads, and potentially cause the loss of a few lives; no prefailure damage is anticipated. Therefore, the dam has been classified as having a SIGNIFICANT hazard potential.

e. Ownership — Bridgeport Hydraulic Company
P. O. Box 702
Bridgeport, CT 06609
(203) 367-6621

f. Operator — None

g. Purpose of Dam — The dam serves no specific purpose, however, the impoundment is used for recreation.

h. Design and Construction History — There was no information available concerning the original design and construction in 1840.

i. Operational Procedure — There are no operational procedures performed at the site.

1.3 PERTINENT DATA

a. Drainage Area — The drainage area consists of 1.38 square miles of relatively undeveloped, rolling, wooded terrain.

b. Discharge at Dam Site — Discharges from the pond normally pass over the spillway section.

(1) There are no outlet works, other than the spillway, at the dam.

(2) The maximum known flood at the dam site could not be determined, since there are no flow or gage records maintained for Lewis Brook.

(3) Ungated capacity of the spillway is 120 cfs at elevation 520.0.

(4) Ungated spillway capacity at test flood elevation (521.5) is 380 cfs.

(5) Gated spillway capacity at normal pool elevation — N/A.

(6) Gated spillway capacity at test flood elevation — N/A.

(7) Total spillway capacity at test flood elevation (521.5) is 380 cfs.

(8) Total project discharge at top of dam (elevation 520.0) is 120 cfs.

(9) Total project discharge at test flood (elevation 521.5) is 880 cfs.

c. Elevations (feet above NGVD)

(1)	Streambed at toe of dam	509
(2)	Bottom of cutoff	Unknown
(3)	Maximum tailwater	Unknown
(4)	Normal pool	519
(5)	Flood-control pool	N/A
(6)	Spillway crest	varies from 519 to 518.4
(7)	Design surcharge (original design)	Unknown
(8)	Top of dam	varies from 520 to 519
(9)	Test flood surcharge	521.5

d. Reservoir (length in feet)

(1)	Normal pool	1,600
(2)	Flood-control pool	N/A
(3)	Spillway crest pool	1,600

(4)	Top of dam	1,750
(5)	Test flood pool	1,850

e. Storage (acre-feet)

(1)	Normal pool	70
(2)	Flood-control pool	N/A
(3)	Spillway crest pool	70
(4)	Top of dam	90
(5)	Test flood pool	120

f. Reservoir Surface (acres)

(1)	Normal pool	18
(2)	Flood-control pool	N/A
(3)	Spillway crest	18
(4)	Top of dam	36
(5)	Test flood pool	37

g. Dam

(1)	Type	Rock and earthfill embankment
(2)	Length	95 ft

(3)	Height	11 ft
(4)	Top Width	Varies from 3 ft to 9 ft
(5)	Side Slopes	Irregular
(6)	Zoning	Unknown
(7)	Impervious core	Unknown
(8)	Cutoff	Unknown
(9)	Grout Curtain	Unknown
(10)	Other	None
h.	Diversion Canal	N/A
i.	Spillway	
(1)	Type	Concrete-capped wier
(2)	Length of wier	19 ft
(3)	Crest elevation	Varies from 519 to 518.4
(4)	Gates	None
(5)	U/S Channel	Hattertown Pond
(6)	D/S Channel	Lewis Brook
j.	Regulating Outlets	None

SECTION 2: ENGINEERING DATA

2.1 DESIGN DATA

No design data were available for the Hattertown Pond Dam.

2.2 CONSTRUCTION DATA

No construction data were available for the Hattertown Pond Dam.

2.3 OPERATIONS DATA

No operations data were available for the Hattertown Pond Dam.

2.4 EVALUATION OF DATA

a. Availability — No documentation pertaining to the design, construction, and usage of the original structure was available. However, correspondence between Bridgeport Hydraulic Company, the State of Connecticut Water Resources Department, and an engineering consultant, S. E. Minor & Company, Inc., Greenwich, Connecticut were obtained. In addition, an inspection report documenting a site evaluation conducted by S. E. Minor & Company, Inc., dated April 29, 1974, was also obtained. In this report, the dam was described as being "...unsafe and potentially dangerous to the properties downstream." (see Appendix B, pg B-11).

b. Adequacy — There were no detailed engineering data available pertaining to the dam. However, the inspection report by S. E. Minor & Company, Inc. identified and described the features of the dam.

c. Validity — The field inspection indicated that the external features of the existing Hattertown Pond Dam coincided relatively well with those shown in the drawing prepared by S. E. Minor & Company, Inc., dated April 24, 1974.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General — The field inspection of Hattertown Pond Dam was conducted on December 11, 1980. At the time of the inspection, the water surface was slightly above the damaged portion of the spillway crest (El. 518.4); which resulted in flow over the structure.

b. Dam — The dam is a crude rock and earthfill embankment with a concreted spillway section located at the left abutment (Photo 1). Two portions of the existing dam have been breached and filled with rocks and other rubble (Photos 2, 3, and 4). The remainder of the dam has been overgrown with trees ranging from 4 to 10 inches in diameter. Erosion along root networks was extensive thus increasing the deviations from the intended horizontal and vertical alignments. The top of the dam is very irregular and varies from 3 to 9 feet in width and up to 1 foot vertically. In addition, a total of approximately 20 to 30 gallons per minute (gpm) were seeping under the concrete spillway crest, through the repaired breach adjacent to the spillway, and along the toe near the center of the dam. The seepage appeared to contain no suspended particles and was generally clear.

The downstream slope and spillway discharge channel are strewn with debris from previous failures of the existing dam and the remains of another breached dam located 40 feet downstream. The Hattertown Pond Dam is located in a wooded area; consequently, the downstream channel has also been overgrown with trees and brush (Photo 5). The upstream slope was, for the most part, beneath the water surface, however those portions of the slope that were exposed lacked riprap protection and appeared irregular due to erosion near the exposed tree roots.

The concrete on a 12-foot-long section of the spillway crest and some of the rocks beneath it have been washed away causing the crest elevation, of this portion of the structure, to be reduced approximately 0.6 feet below the normal crest elevation. The remaining 7-foot-long portion of the spillway was irregular and seepage was observed beneath the concrete crest.

c. Appurtenant Structures — There are no other structures associated with the dam.

d. Reservoir Area — The pond is relatively shallow, 3 to 6 feet deep, and is marshy near the outer edges. The area surrounding the pond is sparsely developed and heavily wooded.

e. Downstream Channel — The downstream channel follows the natural path of Lewis Brook through a heavily wooded area. Lewis Brook then passes through another breached dam approximately 1,200 feet downstream of the pond before flowing under Castle Meadow Road (Photo 6). The 6-foot-high by 7-foot-wide breach and the 6-foot-high by 15-foot-wide bridge culvert compose the first downstream constriction.

The second constriction is a culvert under Maltbie Road located about 400 feet downstream from the Castle Meadow Road culvert. The brook then continues in a southeasterly direction, parallel to Maltbie Road, for approximately 800 feet before the first downstream home is encountered. The USGS Quadrangle Map shows a home closer to the dam, but this structure was destroyed by fire and is no longer inhabited.

The downstream channel is obstructed by trees and bushes within the channel boundary and an accumulation of rocks and other debris (Photo 5).

3.2 EVALUATION

Based on the visual inspection of the Hattertown Pond Dam, it has been determined that the structure is in very poor condition. There were a number of problem areas sited that have apparently caused breaches in the past and would continue to induce the deterioration of the structure. For example:

(1) The inadequacy of the spillway structure and discharge capacity would eventually cause the dam to be overtopped.

(2) The lack of slope protection and the extensive root networks in the embankment will encourage the erosion of the embankment.

(3) The trees on the dam may be up rooted thus causing an immediate failure of the dam and the decay of the root networks may promote seepage through the dam in the future.

(4) Obstructions in the discharge channel will hinder the release of flood waters from the site.

(5) Seepage through the embankment and under the spillway crest could accelerate erosion of the dam.

(6) The absence of a low-level outlet to drawdown the pond level prohibits repair of the structure.

SECTION 4: OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 OPERATIONAL PROCEDURES

a. General — There are no operational procedures employed at the site.

b. Description of any Warning System in Effect — There is no formal or informal downstream warning system currently in effect at the dam.

4.2 MAINTENANCE PROCEDURES

a. General — The available maintenance records indicate that the owner had repaired the dam upon the request of the State of Connecticut Water Resources Department in 1974 (see correspondence in Appendix B). However, there were no observable indications, at the site, that these repairs were performed. According to local residents two partial breaches of the dam were filled with rocks by the townspeople in order to maintain the impoundment (Note: The location of the partial breaches are identified on the plan view of the dam, Appendix B, pg B-1).

b. Operating Facilities — There are no operating facilities at the site that would require regular maintenance.

4.3 EVALUATION

The operation and maintenance procedures currently employed at the site are poor. The recommendations and remedial measures presented in Section 7 should be implemented immediately.

SECTION 5: EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 GENERAL

The watershed is 1.38 square miles of relatively undeveloped, rolling, and wooded terrain. The size of the watershed has been revised as a result of the field observations and the hydrologic/hydraulic investigations conducted for the site. A check of the ridge lines was performed and a low saddle area was identified which was a possible location for an interbasis diversion from the Eden Hill drainage area to the Hattertown Pond drainage area (see Appendix D, pg D-1). However, a field investigation revealed that there was no possibility for this interbasin diversion to occur (see Saddle Detail Appendix D, pg D-2). Consequently, the drainage area was adjusted from the 1.89 sq.mi. previously established by the New England River Basin Commissions' study "Potential for Hydropower Development at Existing Dams in New England (NERBC) Hydropower Expansion Study) Volume III," dated January, 1980, to 1.38 sq. mi.

The dam is a crude rock and earthfill embankment with a 19-foot-long spillway located on the left abutment. The embankment is approximately 11 feet high and 92 feet long including the spillway section.

Based on the visual inspection of the Hattertown Pond Dam it has been determined that the structure is in very poor condition. The top and slopes of the embankment are extremely irregular, and there was seepage through the repaired breach near the spillway and along the toe of the dam. The severe deterioration of the spillway has resulted in the destruction of an 12-foot-long portion of the concrete crest and seepage under the remainder of the crest. The spillway is the only outlet structure at the site.

5.2 DESIGN DATA

No design data could be found for the original dam construction.

5.3 EXPERIENCE DATA

The dam currently impounding Hattertown Pond has been partially breached several times. The breached portions of the structure have been filled with rocks and other rubble so as to maintain the pond. At present, there is no evidence to substantiate the fact that the existing structure is the original Hattertown Pond Dam that was reportedly constructed in 1840.

5.4 TEST FLOOD ANALYSIS

The maximum potential storage capacity (90 ac-ft) and the height (11 ft) of the Hattertown Pond Dam are within the limits established by the Corps in the "Recommended Guidelines for Safety Inspection of Dams", dated September 1979, for the SMALL size category. The hazard classification for the dam is SIGNIFICANT, since there is the potential for the loss of a few lives due to the breach of the dam. Based on the storage capacity, height, and hazard, the recommended test flood for this dam is between a 100-year flood and one-half the Probable Maximum Flood (1/2 PMF). Since the storage capacity of the dam is within the lower limits of the small size category (50 to 1,000 ac-ft) and the height (11 feet) is below the range of values for this category (25 to 40 feet), the test flood will be equivalent to the smallest recommended test flood or the 100 year frequency flood. The test flood discharge was determined by interpolating from rainfall maps for a 100-year 24-hour storm from the Soil Conservation Service Publication "Urban Hydrology for Small Watersheds" (January 1975). The amount of rainfall for this area is 6.5 inches. The discharge resulting from this amount of precipitation, assuming no abstraction, was calculated as shown in Appendix D, (pg D-21). The peak inflow to the reservoir due to this flood in a 1.38 square mile (sq.mi.) rolling watershed is 760 cfs/sq.mi. The inflow due to the test flood (1,050 cfs) and the resulting outflow (880 cfs) will cause the water surface elevation within the impoundment to rise to 521.5 or 1.5 feet above the top of the dam. The capacity of the spillway is 120 cfs with the water surface at the top of the dam (El. 520) or 14 percent of the routed test flood outflow.

5.5 DAM FAILURE ANALYSIS

Utilizing the "Rule of Thumb Guidance for Estimating Downstream Failure Hydrographs", dated April 1978, the failure outflow due to the water surface within the impoundment at the top of the dam was calculated to be 2,330 cfs. The resulting breach width (36 ft) did not include the spillway section, therefore the discharge of the spillway (120 cfs) at the time of failure was included in the failure outflow.

The failure of the Hattertown Pond Dam will cause the water surface within the impact area to rise from 0.9 feet, at a prefailure outflow of 120 cfs to 3.2 feet after the failure. As a result, the breach of the dam would cause the water surface to flood the ground floor of one home to a depth of 1 to 2 feet and damage the bridge culverts at Castle Meadow and Maltbie Roads and could cause the loss of a few lives; no prefailure damage is anticipated. Therefore, the dam has been classified as having a SIGNIFICANT hazard potential.

SECTION 6: EVALUATION OF STRUCTURAL STABILITY

6.1 VISUAL OBSERVATIONS

The visual inspection of Hattertown Pond Dam did reveal indications of stability problems. The top of the dam and the downstream slope were very irregular and two partially breached sections of the dam were found. The existing spillway was in a state of extreme disrepair and seepage was noted under the intact portions of the concreted spillway crest. Seepage flows of various intensities were also noted through the partial breach near the spillway section and near the toe of the dam. The total seepage flow through the dam was estimated to be from 20 to 30 gpm.

6.2 DESIGN AND CONSTRUCTION DATA

No design and construction data were available to perform an in-depth assessment of the structural stability of the dam.

6.3 POST-CONSTRUCTION CHANGES

There were no records available concerning post-construction changes of the dam.

6.4 SEISMIC STABILITY

The dam is located in Seismic Zone 1 and in accordance with the Corps of Engineers' Guidelines does not warrant seismic analysis.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition — The visual inspection of the facility and an evaluation of its past performance reveal that the dam is in very poor condition. At the time of the inspection, the vertical and horizontal alignments of the embankment were poor, the top of the embankment was irregular, seepage under the spillway crest on the downstream slope and through the repaired breach near the spillway section was observed, and indications of prior breaches were found. The spillway has been almost completely destroyed and it does not appear that it can function adequately in its current state. In addition, there was no low-level outlet at the site.

Based on the "Preliminary Guidance for Estimating Downstream Dam Failure Hydrographs", dated April 1978, and the hydraulic/hydrologic computations, the peak inflow and outflow for the test flood are 1,050 cfs and 880 cfs, respectively. The spillway capacity with the water surface at the top of the dam (El. 520 NGVD) is 120 cfs or 14 percent of the routed test flood outflow.

b. Adequacy of Information — The information available is such that an assessment of the condition and stability of the dam must be based largely on the visual inspection, past performance, and sound engineering judgement.

c. Urgency — It is recommended that the measures presented in Section 7.2 and 7.3 be implemented immediately upon the owner's receipt of this report.

7.2 RECOMMENDATIONS

It is recommended that the Owner employ a registered professional engineer qualified in dam design and inspection to renovate the entire facility. This should include but not limited to:

(1) Removal of the trees and roots on and within the embankment. The resulting voids should be backfilled with a suitable compacted material and grass planted to prevent erosion.

(2) Repair and grade the embankment with a suitable compacted material. Riprap slope protection for the upstream face should be sized and placed according to the specifications of the engineer. Grass should be planted on the remainder of the embankment to prevent further erosion.

(3) Perform a detailed hydrologic-hydraulic investigation to assess further the potential of overtopping the dam and the need for and the means to increase project discharge capacity.

(4) Perform a detailed hydrologic-hydraulic investigation to determine an adequate spillway capacity and design and construct a spillway in accordance with the findings of this investigation.

(5) Provide a low-level regulating outlet that would allow drawdown of the pool.

(6) Develop an operations and maintenance manual for the renovated facility.

(7) The discharge channel should be cleared of the remains of the breached dam, trees, stumps, and any other debris that may obstruct discharge from the site. In addition, a spillway discharge channel should be excavated and armored according to the specifications of the engineer.

The owner should implement the recommendations of the Engineer.

7.3 REMEDIAL MEASURES

Operation and Maintenance Procedures — The following measures should be undertaken immediately upon the owner's receipt of this report.

(1) Implement a program of diligent and periodic maintenance including, but not limited to: mowing, clearing brush on slopes, and cleaning debris from the spillway. In addition, the dam should be monitored during periods of intense rainfall.

(2) Institute the program of operation and maintenance developed by the engineer in the operations and maintenance manual and document all procedures performed for future reference.

(3) Develop an "Emergency Action Plan" that will include an effective preplanned downstream warning system, locations of emergency equipment, materials, and manpower; authorities to contact; potential areas that require evacuation; and monitoring the project during periods of intense rainfall.

(4) Institute a program of annual technical inspection by a qualified registered professional engineer.

7.4 ALTERNATIVES

As an alternative to the above recommendations and remedial measures, the Owner should consider removing the dam.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT HATTERTOWN POND DAM

DATE 12/11/80

TIME 10:45 a.m.

WEATHER Clear, Cold, 25°F

W.S. ELEV. 518.4

PARTY:	INITIALS:
1. Reynold A. Hokenson	RH
2. Miron B. Petrovsky	MP
3. Jerry R. Waugh	JW
4. Ernst H. Buggisch	EB

PROJECT FEATURE:	INSPECTED BY:
1. Dam Embankment	RH, MP, JW, EB
2. Spillway and Discharge Channel	RH, JW, MP, EB

PERIODIC INSPECTION CHECK LIST

PROJECT: HATTERTOWN POND DAM DATE: 12/11/80

PROJECT FEATURE: Dam Embankment NAME: RH, MP, JW, EB

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Top of Dam Embankment	520.0
Current Pool Elevation	518.4
Maximum Impoundment to Date	Unknown
Surface Cracks	Portions of dam have been breached.
Pavement Condition	N/A
Movement or Settlement of Crest	Excessive
Lateral Movement	Excessive
Vertical Alignment	Poor
Horizontal Alignment	Poor
Condition at Abutment	Well rooted trees are on both abutments as well as the remainder of the dam.
Indications of Movement of Structural Items on Slopes	N/A
Trespassing on Slopes	Entire dam overgrown with trees ranging from 4 to 16 inches in diameter.
Sloughing or Erosion of Slopes or Abutments	Excessive, several parts of dam have been breached and crudely repaired.
Rock Slope Protection - Riprap Failures	N/A
Unusual Movement or Cracking at or near Toes	Downstream slope of dam is no longer discernible. Toe is not clearly defined.

PERIODIC INSPECTION CHECK LIST

PROJECT: Hattertown Pond Dam DATE: 12/11/80

PROJECT FEATURE: Dam Embankments (Continued) NAME: RH, MP, JW, EB

AREA EVALUATED	CONDITION
Unusual Embankment or Downstream Seepage	Seepage occurs at several locations on the dam.
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

PERIODIC INSPECTION CHECK LIST

PROJECT: Hattertown Pond Dam DATE: 12/11/80

PROJECT FEATURE: Spillway and Discharge Channel NAME: RH, MP, JW, EB

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	Hattertown Pond
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir	
General Condition of Concrete	A 12-foot-long portion of the crest has been damaged and is 0.6 feet below the normal crest. Concrete crest in poor condition.
Rust or Staining	N/A
Spalling	Concrete missing along damaged portion of crest.
Any Visible Reinforcing	N/A
Any Seepage	Seepage under concreted crest.
Drain Holes	None
c. Discharge Channel	
General Condition	Poor
Loose Rock Overhanging Channel	Loose rock from breaches of existing dam and remains of dam immediately downstream.
Trees Overhanging Channel	Heavily wooded. Trees range in size from 4 to 10 inches in diameter.

PERIODIC INSPECTION CHECK LIST

PROJECT: Hattertown Pond Dam DATE: 12/11/80

PROJECT FEATURE: Spillway and Discharge Channel (Continued) NAME: RH, MP, JW, EB

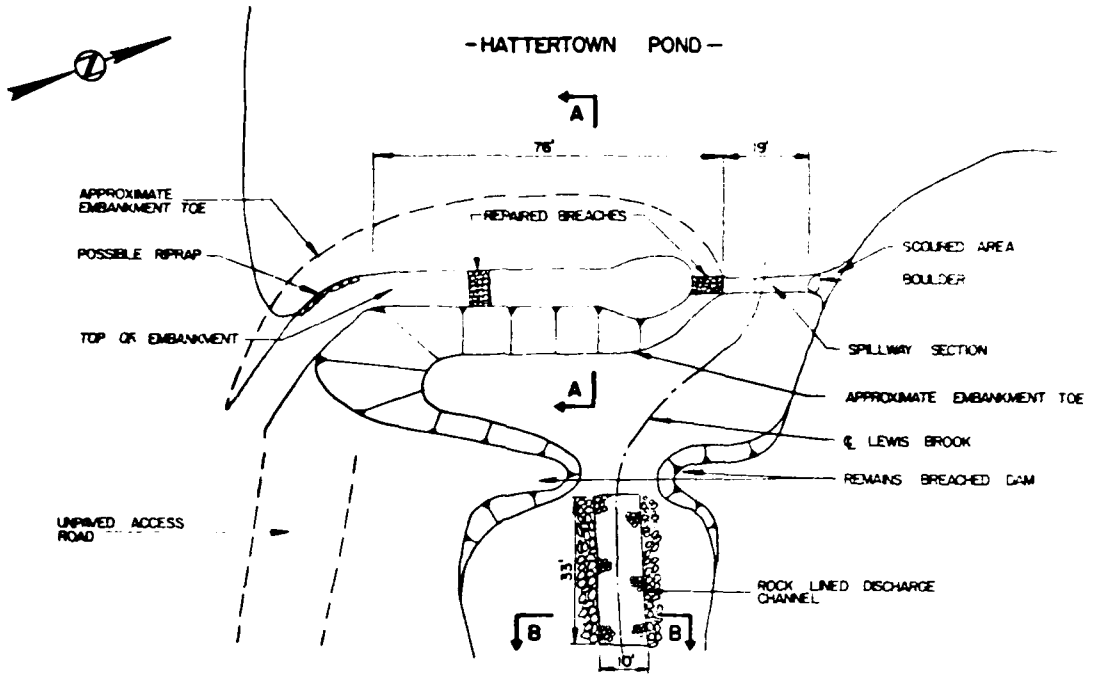
AREA EVALUATED	CONDITION
Floor of Channel	Obstructed by rock, trees, and brush.
Other Obstructions	Remains of what appeared to have been a rock-lined channel for the breached dam remains. Also there are the breached remains of another dam near the Castle Meadow Road culvert.

APPENDIX B

ENGINEERING DATA

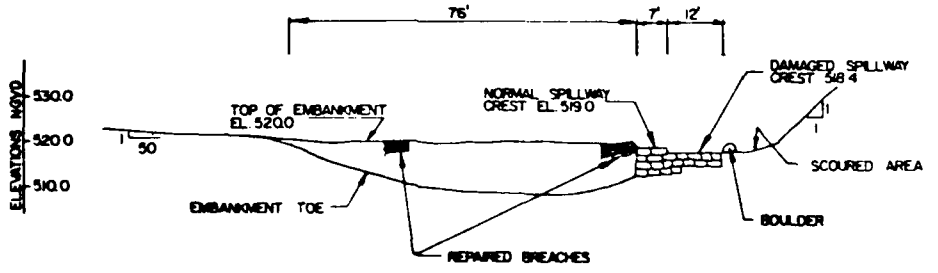
SUMMARY OF DATA AND CORRESPONDENCE

DATE	TO	FROM	SUBJECT	PAGE
1/81	---	---	Plan and Sections	B-2
10/14/64	---	Connecticut DEP	Water Resource Inventory Data Sheet	B-3
6/28/74	Dr. R. P. Singhal *Project Engineer* Bridgeport Hydraulic Co.	Connecticut DEP	Review of planned dam renovations	B-4
6/14/74	V. F. Galgowski Supt. of Dam Maintenance State of Connecticut Water Resource Dept.	Dr. R. P. Singhal	Proposed renovations	B-5
5/6/74	D. W. Loiselle Bridgeport Hydraulic Co.	V. F. Galgowski	Notification to repair dam	B-7
5/1/74	V. F. Galgowski	S. E. Minor & Co., Inc. Civil Engineers	Assessment of dam	B-8
4/15/74	S. E. Minor & Co., Inc.	V. F. Galgowski	Notification to proceed with the dam assessment	B-12



PLAN

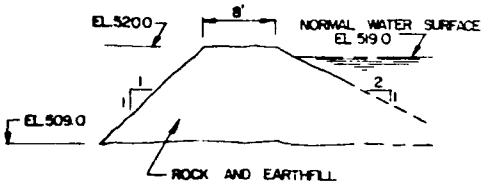
SCALE: 0 20' 40' 60'



DOWNSTREAM ELEVATION

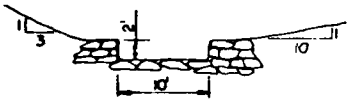
SCALE: 0 20' 40' 60'

2



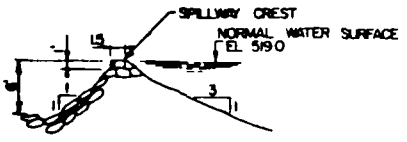
SECTION A-A

SCALE: 0 10' 20'



SECTION B-B

SCALE: 0 10' 20'



TYPICAL SPILLWAY SECTION

SCALE: 0 10' 20'

NOTES:

1. THIS PLAN WAS COMPILED FROM THE SKETCH PREPARED BY S.E. MINOR & CO., INC., FOR THE STATE OF CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION (1974) AND SUPPLEMENTARY MEASUREMENTS MADE BY IECO ENGINEERS.
2. THE SECTIONS DO NOT NECESSARILY DEPICT THE CURRENT CONDITION OF THE DAM. THESE SECTIONS ARE, IN SOME CASES, AN ATTEMPT TO DESCRIBE THE INTENDED OR ORIGINAL CONFIGURATION OF THE STRUCTURE.
3. ALL ELEVATIONS WERE REFERENCED TO THE NORMAL SPILLWAY CREST ELEVATION WHICH WAS ASSUMED TO CORRESPOND TO THE WATER SURFACE ELEVATION SHOWN ON THE BOTSFORD, CT USGS QUADRANGLE MAP

INTERNATIONAL ENGINEERING CO. DARIEN, CONNECTICUT ENGINEER	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FEDERAL DAMS

PLAN, ELEVATION AND SECTIONS

HATTERTOWN POND DAM

LEWIS BROOK NEWTOWN, CONNECTICUT

DRAWN BY	CHECKED BY	APPROVED BY	SCALE AS NOTED	
M Hudson			DATE FEB 1981	SHEET 8-1

C1-5?5

5

No. ~~NE 39~~

WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA Long 73-18.0

LAT 41-20.6

Inventoried By WPS

Date 14 OCTOBER 1964

Name of Dam or Pond HATTERTOWN POND (MORGAN POND)

Code No. H 28.4 PK 9.2 LW 0.6

Nearest Street Location CASTLE MEADOW ROAD

Town NEWTOWN

U.S.G.S. Quad. BOTSFORD

Name of Stream LEWIS BROOK

Owner Bridgeport Hydraulic Co. ok

Address 835 Main St. 7/73

Bridgeport - [illegible]

Pond Used For RECREATION DA 1.E7SM

Dimensions of Pond: Width 500 FEET Length 1400 FEET Area 20 ACRES

Total Length of Dam ~~80~~ 125 FEET Length of Spillway ~~12~~ 12' FEET

Location of Spillway NORTH END OF DAM

Height of Pond Above Stream Bed 10 FEET

1840 Height of Embankment Above Spillway ~~2~~ 1.4' FEET

Type of Spillway Construction CONCRETE

Type of Dike Construction EARTH

Downstream Conditions WOODS

Summary of File Data

Remarks TREES GROWING ON DIKE, POND APPEARS TO BE SHALLOW.

Would Failure Cause Damage? YES Class B

COPY

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING • HARTFORD, CONNECTICUT 06115

COPY

June 28, 1974

Dr. R. P. Singhal
Project Engineer
Bridgeport Hydraulic Company
835 Main Street
Bridgeport, Connecticut 06609

Re: Hattertown Pond Dam, Newtown

Dear Dr. Singhal:

In response to your letter dated June 14, 1974 and subsequent telephone correspondence to this office, I have reviewed the plans you have prepared for repairs to be made to the Hattertown Pond Dam in Newtown.

It is the finding of this office that the spillway capacity for the design submitted may be inadequate and should be checked.

This office uses United States Department of Agriculture, Soil Conservation Service criteria given in Engineering Memorandum CT-3 (Rev. 2) as a basis. The Hattertown Pond Dam having a drainage area greater than 640 acres and a height-storage capacity product, as defined in Engineering Memorandum 27, of less than 3000, must be designed to withstand a storm of 50 year intensity and 24 hour duration and provide freeboard of 1.5 feet. As you know, Freeboard should be measured from the design water surface elevation to the top of the embankment and not from the spillway crest elevation to the top of the embankment as shown in your plans.

If your office wishes to use a technique other than the Soil Conservation Service method for determining spillway capacity, please obtain permission from this office before doing so.

Very truly yours,

Robert E. Sonnichsen
Engineer-Intern
Water and Related Resources
Telephone 566-5506

RES:n

BRIDGEPORT HYDRAULIC COMPANY

June 14, 1974

State of Connecticut
Dept. of Environmental Protection
Water & Related Resources Unit
State Office Building
Hartford, Connecticut 06115

Attention: Mr. Victor F. Galgowski

Re: Hattertown Pond Dam-Newtown

Dear Mr. Galgowski:

As requested in your letter dated May 6, 1974 on the subject, we inspected the dam at the site. The drainage area of the pond is only about 1.3 square miles, and the structure is quite small.

We agree with you that repairs are called for, and we propose to undertake the same, as enumerated below:

1. The site will be cleared of fallen branches of trees, roots, stumps, dislodged boulders, etc.

2. The earth dam will be raised to provide two feet freeboard above the spillway crest.

3. Seepage through the dam will be stopped with Bentonite, or similar material.

4. Repairs will be done to the spillway and bypassing of water will be stopped.

5. Three or four trees standing within the discharge channel and its banks will be removed.

6. A general site clearance will be done.

The enclosed drawing shows the work proposed to be done.

We feel that the above-mentioned repairs are necessary and sufficient to maintain the works in a safe condition. The

835 MAIN STREET · BRIDGEPORT, CONNECTICUT 06609 · TEL. (203) 367-6621

pond is very small and is not used for water supply.

On receipt of approval of our proposal, and the construction permit, we will proceed with this work.

Yours truly,

Dr. R. P. Singhal
Project Engineer

RPS:w

Enc.

COPY

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING • HARTFORD, CONNECTICUT 06115

COPY

May 6, 1974

Bridgeport Hydraulic Co.
835 Main Street
Bridgeport, Connecticut 06600

ATTN: MR. DONALD W. LOISELLE

RE: Hattertown Pond Dam - Newtown

Dear Mr. Loiselle:

According to records maintained in this office the subject dam located north of Castle Meadow Road in the Town of Newtown, is owned by your company. Since this is a dam that could cause damage in the event of failure, it does come under the jurisdiction of this department.

At our request the site was recently inspected by one of our engineering consulting firms. It is their opinion that the dam is unsafe and potentially dangerous.

You are requested to either place this structure in a safe condition or remove it.

Any repairs to the structure or its removal shall be carried our in accordance with engineering plans prepared by an engineer registered in Connecticut and submitted to this office for approval and for the issuance of a permit.

Will you please inform us within two weeks your intentions in regard to this matter.

Very truly yours,

Victor F. Galgowski
Supt. of Dam Maintenance
Water & Related Resources Unit
Telephone No. 566-3707

VFG:am

ESTABLISHED 1887

S. E. MINOR & CO., INC.
CIVIL ENGINEERS
161 MASON STREET
GREENWICH, CONNECTICUT 06830

May 1, 1974

State of Connecticut
Department of Environmental Protection
State Office Building
Hartford, Connecticut 06115

Attention: Mr. Victor F. Galgowski
Superinetndent of Dam Maintenance
Water and Related Resources

Dear Mr. Galgowski:

I am enclosing three copies of our report on the Hattertown Pond Dam. As you will see by the recommendation, a great deal of study and design for a new structure would be required. This perhaps would not fall within the realm of your Department but instead would be the responsibility of local authorities.

Should you have any questions or require more information regarding the report, feel free to contact me.

Very truly yours,

S. E. MINOR & CO., INC.

Edward F. Ahneman Jr. (16.)

Edward F. Ahneman, Jr.
Chief Engineer

EFA:lb
Enclosures

Report and Recommendations
to
State of Connecticut
Department of Environmental Protection
for

Hattertown Pond Dam
Castle Meadow Road
Newtown, Connecticut

ESTABLISHED 1907

S. E. MINOR & CO., INC.
CIVIL ENGINEERS
161 MASON STREET
GREENWICH, CONNECTICUT 06830

April 29, 1974

State of Connecticut
Department of Environmental Protection
State Office Building
Hartford, Connecticut 06115

Attention: Mr. Victor F. Galgowski
Superintendent of Dam Maintenance
Water and Related Resources

Re: Hattertown Pond Dam
Castle Meadow Road
Newtown, Connecticut

Dear Mr. Galgowski:

In accordance with your request of April 15, we have inspected the Hattertown Pond Dam in the Town of Newtown, Connecticut. It is an earth dam with a masonry spillway. I am enclosing a sketch of the dam together with certain cross sections which are to be considered a part of this report.

We attempted to obtain construction plans of the dam or any information that would be helpful in inspecting same but were unable to come up with anything. Our recommendation, therefore, is based strictly on our visual inspection of the dam together with experience we have had with similar structures.

Section 1-1 on the plan indicated the earth embankment which varies in width at the top from 4 - 6 feet. There is approximately one foot of freeboard at the top of the dam. In this portion of the dam, the earth embankment is breached on the downstream side, and a steady stream of water pours from the opening. If this is not corrected, further erosion will take place within the embankment and will result in failure of the dam. In addition, there has been considerable erosion at the top of the embankment around a wide-spread system of tree roots. Since there is but one foot of freeboard, the danger of overtopping would cause erosion and additional failure.

In the vicinity of Section 2-2 it appeared that a topping of rubble masonry has recently been installed. Considerable seepage was observed coming underneath said rubble masonry section. This seepage is causing erosion which further deteriorates the dam and could also cause failure.

Sections 3-3 and 4-4 indicate the condition of the spillway at two points. Said spillway consists of a makeshift pile of boulders and a natural fallsway in bedrock. Both of these sections have a very limited flow capacity.

After examining the subject dam, it is our considered opinion that this dam is unsafe and potentially dangerous to the properties downstream. Based on our experience with small dams, we recommend that the entire earth dam be completely replaced with a modern structure. Should you have any questions regarding this report, feel free to contact this office.

Respectfully submitted,

S. E. MINOR & CO., INC.

Edward F. Ahneman, Jr.
Chief Engineer

EFA:lb

COPY

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING • HARTFORD, CONNECTICUT 06115

COPY

15 April 1974

S. E. Minor and Company
161 Mason Street
Greenwich, CT 06830

Re: Hattertown Pond Dam
Newtown

Gentlemen:

Under the terms of your contract to act as a consultant to the Department of Environmental Protection, would you please inspect the subject dam and submit a report to this office giving its present condition and what, if any, repairs or alterations are required to consider it safe.

The dam is located north of Castle Meadow Road in the southwest portion of Newtown.

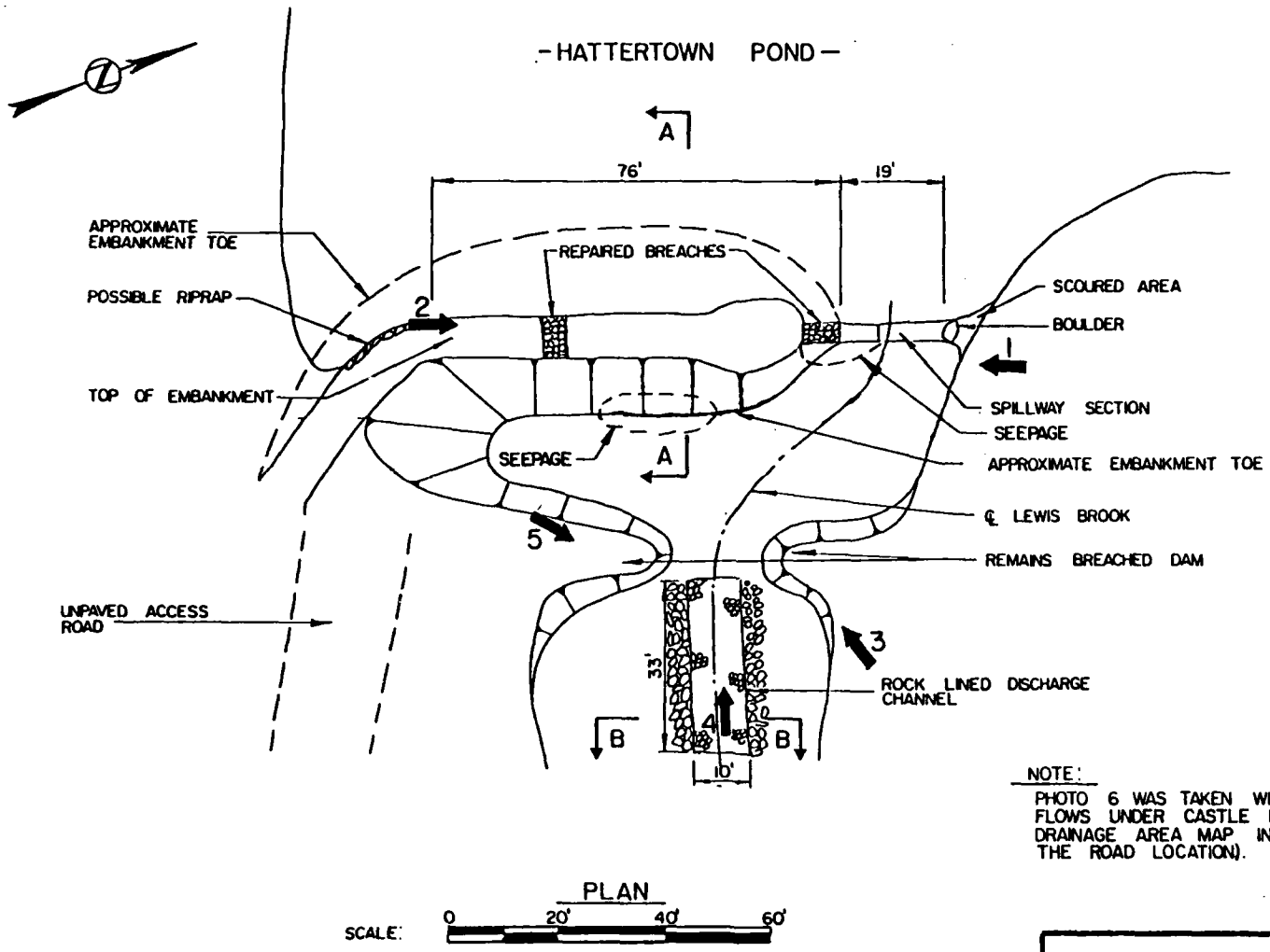
Very truly yours,

Victor F. Galgowski
Supt. of Dam Maintenance
Water & Related Resources
Telephone no. 566-5506

VFG:ljg

APPENDIX C

PHOTOGRAPHS



NOTE:
PHOTO 6 WAS TAKEN WHERE LEWIS BROOK FLOWS UNDER CASTLE MEADOW ROAD (SEE DRAINAGE AREA MAP IN APPENDIX D FOR THE ROAD LOCATION).

PHOTO LOCATION PLAN

HATTERTOWN POND DAM

Photo 1 Spillway (foreground), top and downstream slope of embankment.

Photo 2 Top of embankment with repaired breached area and downstream slope.

Photo 3 Top and downstream slope of embankment and breached earth dam in foreground.

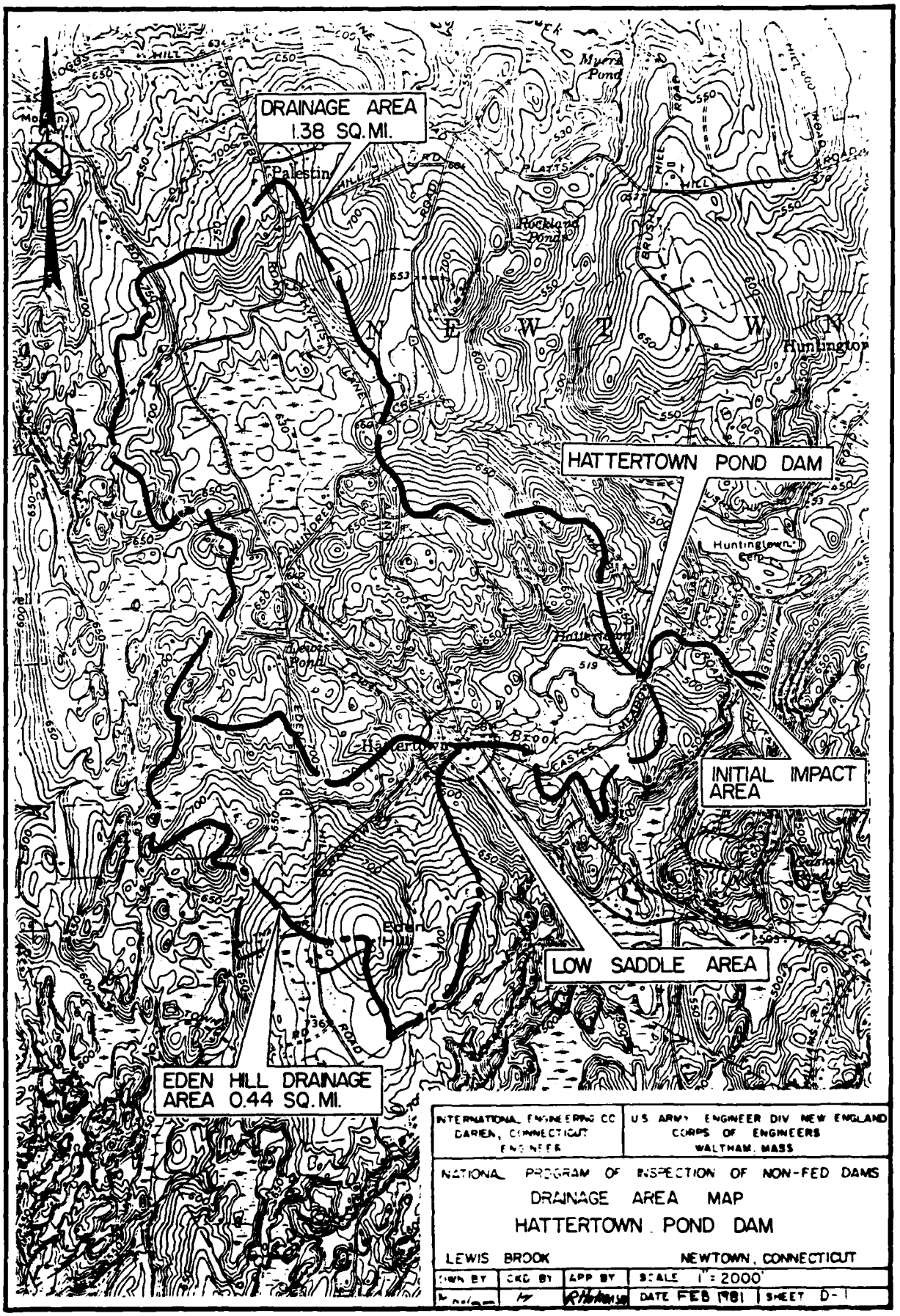
Photo 4 Downstream slope of existing dam, outlet channel, and remains of breached earth dam.

Photo 5 Existing spillway discharge channel and left abutment of remains of breached dam.

Photo 6 Breached dam near Castle Meadow Road bridge culvert.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



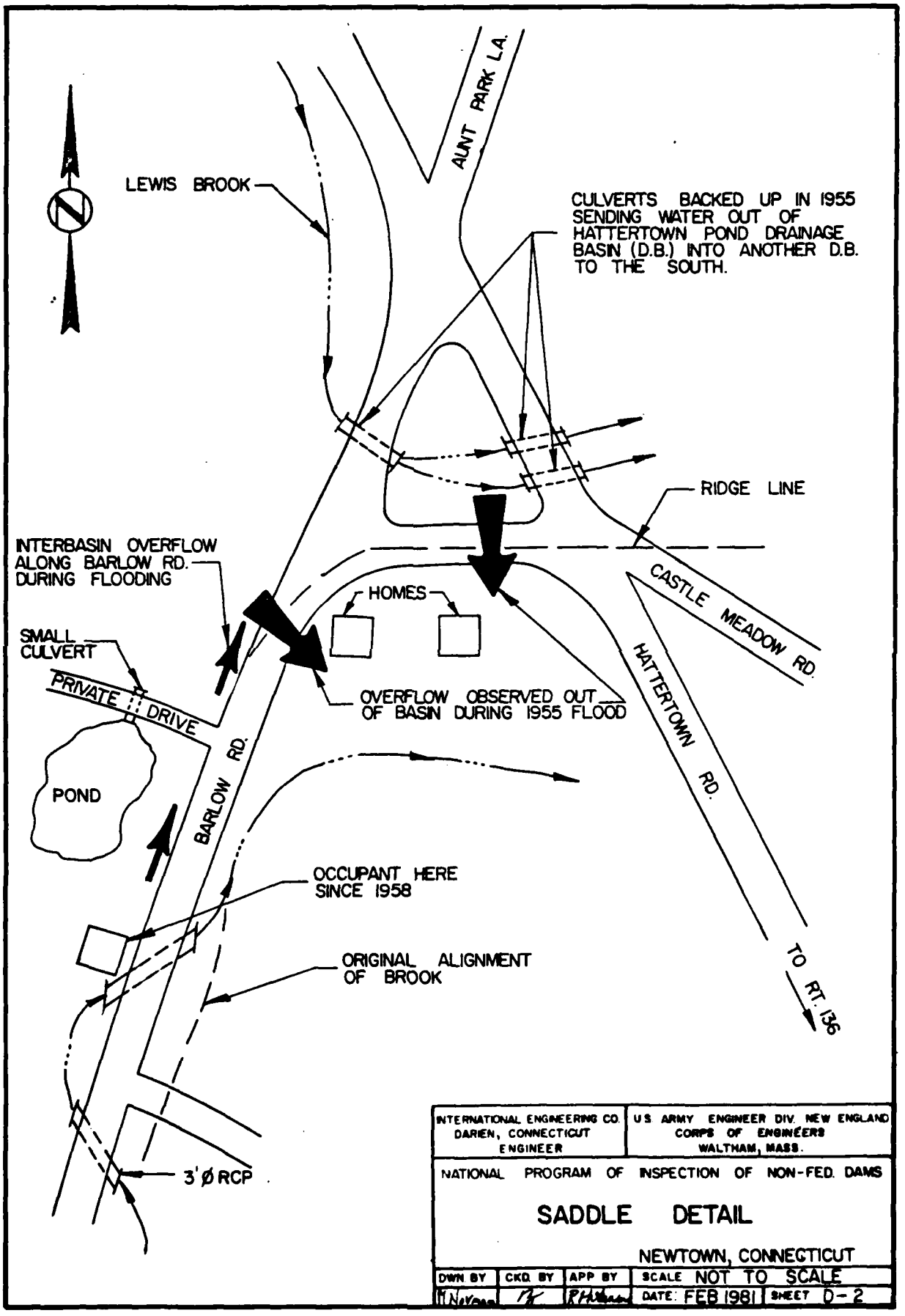
INTERNATIONAL ENGINEERING CO DARIEN, CONNECTICUT ENGINEER	U S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

DRAINAGE AREA MAP
HATTERTOWN POND DAM

LEWIS BROOK NEWTOWN, CONNECTICUT

DRWN BY	CKD BY	APP BY	SCALE 1" = 2000'
[illegible]	[illegible]	[illegible]	DATE FEB 1981 / SHEET D-1


AUNT PARK LA.
LEWIS BROOK
CULVERTS BACKED UP IN 1955 SENDING WATER OUT OF HATTERTOWN POND DRAINAGE BASIN (D.B.) INTO ANOTHER D.B. TO THE SOUTH.
RIDGE LINE
INTERBASIN OVERFLOW ALONG BARLOW RD. DURING FLOODING
HOMES
CASTLE MEADOW RD.
SMALL CULVERT
PRIVATE DRIVE
OVERFLOW OBSERVED OUT OF BASIN DURING 1955 FLOOD
HATTERTOWN RD.
POND
BARLOW RD.
OCCUPANT HERE SINCE 1958
ORIGINAL ALIGNMENT OF BROOK
TO RT. 136
3'Ø RCP
INTERNATIONAL ENGINEERING CO. DARIEN, CONNECTICUT ENGINEER
U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
SADDLE DETAIL
NEWTOWN, CONNECTICUT
DWN BY
CKD BY
APP BY
SCALE NOT TO SCALE
DATE FEB 1981
SHEET D-2

HYDRAULIC/HYDROLOGIC INSPECTION
HATTERTOWN POND DAM NEWTOWN, CT

DRAINAGE BASIN - A CONTRADICTION IN THE DRAINAGE BASIN SIZE WAS NOTED IN THE PROCESS OF DETERMINING PMF ESTIMATES. A CHECK OF RIDGE LINES WAS PERFORMED AND A COL SADDLE AREA WAS IDENTIFIED (SEE SHEET A-2) WHICH WAS A POSSIBLE LOCATION FOR AN INTERBASIN DIVERSION FROM THE EDEN HILL AREA (ALSO SHOWN ON SHEET A-1) SOUTHWEST OF THE SADDLE INTO THE HATTERTOWN POND DRAINAGE AREA (D.A.).

A FIELD INVESTIGATION WAS PERFORMED AND NO CULVERT WAS FOUND WHICH COULD DIVERT FLOW FROM AN UNNAMED CHANNEL DRAINING THE EDEN HILL BASIN DURING PERIODS OF NORMAL RUNOFF.

THE SUM OF THE HATTERTOWN POND DA. AND EDEN HILL DA. YIELD 1.81 sq mi WHICH IS RELATIVELY CLOSE TO THE VALUE OF 1.89 SQMI PREVIOUSLY ESTABLISHED BY THE NEW ENGLAND RIVER BASIN COMMISSION (NERBC). LOCAL RESIDENTS WERE INTERVIEWED ONE OF WHICH WAS WITNESS TO THE 1955 FLOOD. DURING THAT EVENT CULVERTS FOR THE UNNAMED CHANNEL BACKED UP SPILLING FLOOD FLOWS ONTO BARLOW ROAD

(SEE SHEET D-2) WHICH PROBABLY ENTERED THE HATTERTOWN POND BASIN. HOWEVER, CULVERTS EMPTYING LEWIS BROOK THROUGH THE TRIANGULAR INTERSECTION WERE ALSO DROWNED SENDING APPRECIABLE FLOWS INTO PROPERTIES SOUTH OF THE INTERSECTION AND OUT OF THE BASIN. IN CONCLUSION MORE FLOW IS EXPECTED TO LEAVE HATTERTOWN POND BASIN THAN ENTER IT DURING FLOODING AND THEREFORE, UNDER THE PRESENT DRAINAGE SYSTEM, A DRAINAGE AREA OF 1.38 SQ MI WAS IMPLEMENTED.

I. PERFORMANCE AT PEAK FLOOD CONDITIONS

1. MAXIMUM PROBABLE FLOOD

a. WATERSHED CLASSIFIED AS "ROLLING".

b. WATERSHED AREA (D.A.) = 1.38 sq. mi. *

c. EXTRAPOLATING FROM NED-ACE GUIDE CURVES:

PMF = 2225 CFS/sq. mi.

d. THEREFORE; PEAK OUTFLOW:

PMF = 2225 x 1.38 = 3070 CFS

½ PMF = 1535 CFS

2. SURCHARGE AT PEAK INFLOWS (PMF AND ½ PMF)

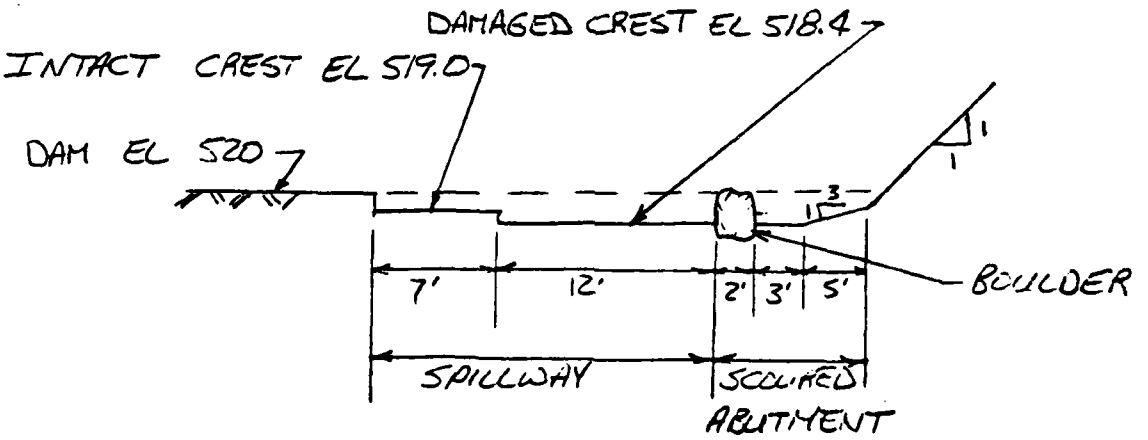
a. OUTFLOW RATING CURVE

i. SPILLWAY

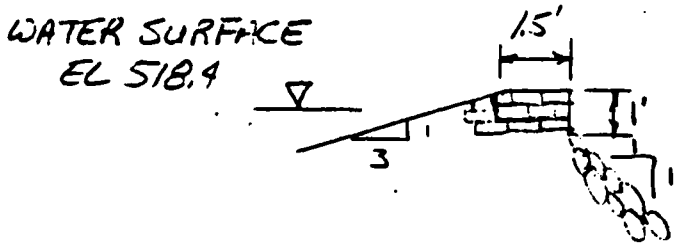
THE HATTERTOWN POND DAM SPILLWAY IS A 19-FOOT-LONG MASONRY STRUCTURE. THE EXISTING SPILLWAY STRUCTURE CONSISTS OF A 7-FOOT-LONG, 1.5-FOOT-WIDE IMPACT CONCRETED CREST AND A 12-FOOT-LONG SECTION ADJACENT TO

*D.A. FROM IECO MEASUREMENTS ON THE BOTSFORD, CT, USGS QUADRANGLE MAP.

THE LEFT ABUTMENT, THAT HAS BEEN DAMAGED. THE INTACT PORTION OF THE SPILLWAY IS 1 FOOT BELOW THE TOP OF THE DAM (EL 520) AND THE CREST OF THE DAMAGED SPILLWAY SECTION IS 1.6 FEET BELOW THE TOP OF THE DAM. THE LEFT SPILLWAY ABUTMENT IS DEFINED BY A LARGE BOULDER WHICH SEPERATES THE SPILLWAY FROM A SCOURED AREA AT THE DAM ABUTMENT. AN ELEVATION AND SECTION OF THE SPILLWAY ARE SHOWN BELOW.



ELEVATION



SECTION

ASSUMING A DISCHARGE COEFFIENT OF C = 3.0 FOR A TRAPAZOIDAL WEIR (SEE BRATER AND KING PG 5-43), C = 2.7 FOR THE SCOURED SECTION, AND USING THE DAMAGED SPILLWAY CREST ELEVATION (518.4 NGVD) AS DATUM (ie. H IS DEPTH ABOVE DAMAGED SPILLWAY) THE SPILLWAY DISCHAGE MAY BE APPROXIMATED BY:

i) (1) DAMAGED PORTION OF SPILLWAY

$$Q_1 = CLH^{3/2} = 3 \times 12 \times H^{3/2} = 36 H^{3/2}$$

(2) INTACT PORTION OF SPILLWAY:

$$Q_2 = 3 \times 7 \times (H - 0.6)^{3/2} = 21 (H - 0.6)^{3/2}$$

(3) WASHED-OUT PORTION OF LEFT ABUTMENT:

LEVEL SECTION: $Q_3' = 2.7 \times 3 \times H^{3/2} = 8.1 H^{3/2}$

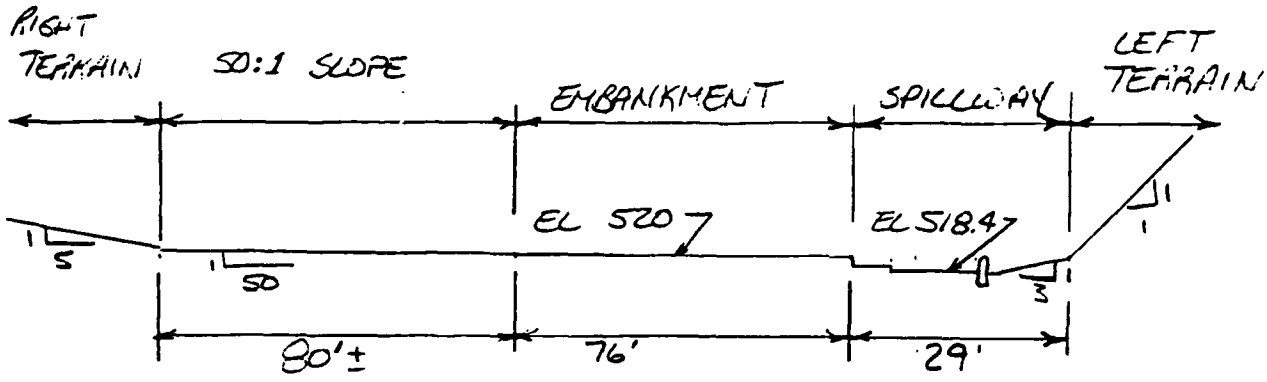
SLOPING SECTION: $Q_3'' = C_1 L_{eq} H^{3/2}$, WHERE $L_{eq} = \frac{2}{5} \times 3 \times H$

$\therefore Q_3'' = 2.7 \times 1.2 \times H^{5/2} \cong 3.3 H^{5/2}$

TOTAL SPILLWAY CAPACITY $Q_s = 44.1 H^{3/2} + 21 (H - 0.6)^{3/2} + 3.3 H^{5/2}$
WHERE $(0 \leq H \leq 1.67)$

ii). EXTENSION OF THE RATING CURVE FOR SURCHARGE OVERTOPPING THE DAM AND/OR ADJACENT TERRAIN.

DUE TO THE IRREGULARITIES IN THE PROFILE (SEE SKETCH SHEET (D-8) AN EQUIVALENT WEIR



LENGTH MUST BE COMPUTED FOR THE ENTIRE INUNDATED LENGTH OF THE PROFILE.

ASSUMING A DISCHARGE COEFFICIENT C = 2.7 FOR THE OVERTOPPED PORTIONS OF THE DAM AND ADOPTING THE DAMAGED SPILLWAY CREST AS DATUM (EL 518.4), THE OVERFLOW MAY BE APPROXIMATED BY THE FOLLOWING EQUATIONS:

(1) LEVEL DAM EMBANKMENT SECTION AND 50:1 SLOPE: $L_e = \frac{2}{5}(50)(H-1.6)+76 = 20(H-1.6)+76$

$$Q_D = 2.7(20)(H-1.6)(H-1.6)^{3/2} + 2.7(76)(H-1.6)^{3/2}$$

$$Q_D = 54(H-1.6)^{5/2} + 205.(H-1.6)^{3/2}$$

(2) RIGHT TERRAIN

EQUIVACENT LENGTH $L_S = \frac{2}{5}(5)(H-3.2)$

$$L_S = 2(H-3.2)$$

$$Q_{AT} = 2.7\left[2(H-3.2)\right](H-3.2)^{3/2}$$

$$Q_{RT} = 5.4\,(H-3.2)^{5/2}$$

(3) LEFT TERRAIN

EQUIVALENT LENGTH: $L_S = \frac{2}{5}(1)(H-1.67)$

$$L_S = \frac{2}{5}(H-1.67)$$

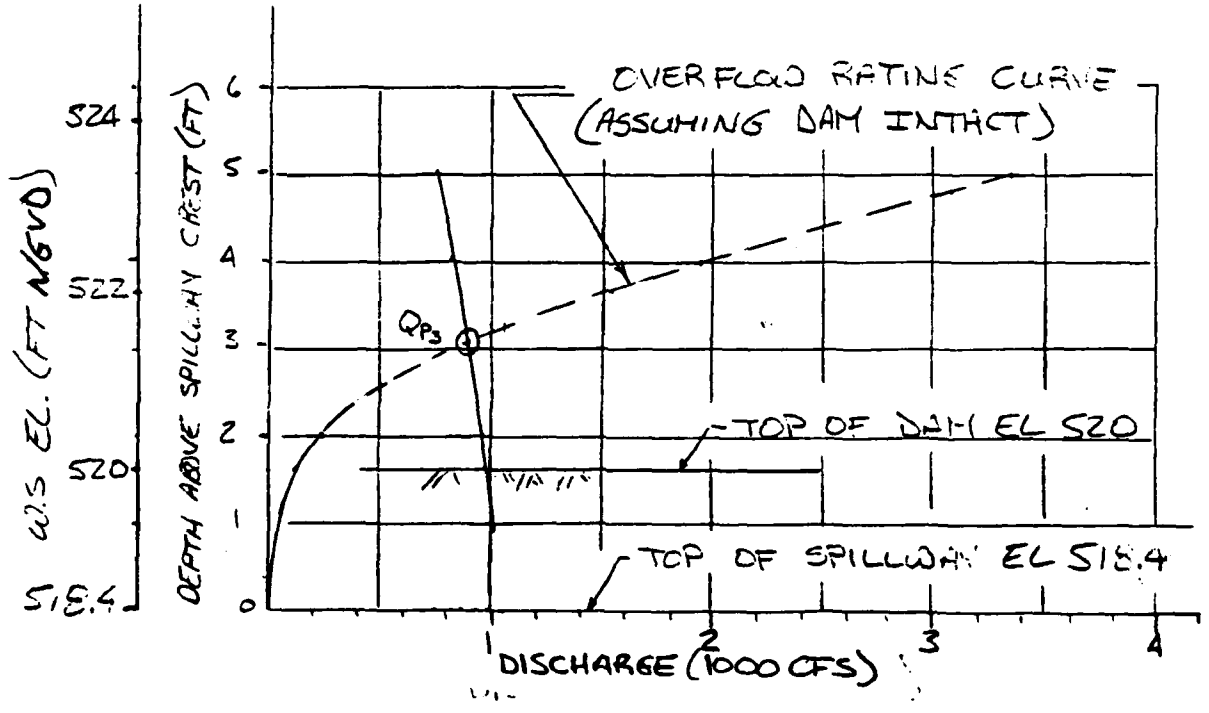
$$Q_{LT} = 2.7\left(\frac{2}{5}\right)(H-1.67)(H-1.67)^{3/2}$$

$$Q_{LT} = 1.1\,(H-1.67)^{5/2}$$

THEREFORE THE TOTAL OUTFLOW MAY BE APPROXIMATED BY:

$$Q_T = 44.1H^{3/2} + 21(H-0.6)^{3/2} + 3.3H^{5/2}\left[1-\left(1-\frac{1.67}{H}\right)^{5/2}\right] + 54(H-1.6)^{5/2}\left[1-\left(1-\frac{3.2}{H}\right)^{5/2}\right] + 205(H-1.6)^{3/2} + 5.4(H-3.2)^{5/2} + 1.1(H-1.67)^{5/2}$$

OUTFLOW RATING CURVE



b. SURCHARGE HEIGHT TO PASS PEAK INFLOWS (Q_{P_1}, Q_{P_1}')

i. @ Q_{P_1} = PMF = 3070 cfs $H_1 \approx 4.8$ FT

ii. @ Q_{P_1}' = ½ PMF = 1535 cfs $H_1' \approx 3.7$ FT

II DOWNSTREAM FAILURE HAZARD

1. POTENTIAL IMPACT AREA

THE IMPACT AREA IS COMPOSED OF THE CASTLE MEADOW AND MALTBIE ROAD BRIDGE CULVERTS WHICH ARE LOCATED APPROXIMATELY 1200 FEET AND 1600 FEET DOWNSTREAM OF THE DAM RESPECTIVELY. IN ADDITION, THERE IS ONE HOME LOCATED 800 FEET FROM THE MALTBIE ROAD BRIDGE CULVERT. THE BASEMENT ELEVATION OF THIS HOME IS LESS THAN 2 FEET ABOVE THE STREAMBED. CONSEQUENTLY, THE STRUCTURE IS CONSIDERED A POTENTIAL DOWNSTREAM HAZARD.

2. FAILURE OF HATTERTOWN POND DAM

a. BREACH WIDTH

i HEIGHT OF DAM

TOP OF DAM 520.0 NGVD

DAM DOWNSTREAM TOE EL 509 NGVD

∴ HEIGHT OF DAM ≈ 11 FT

ii. MID-HEIGHT OF DAM EL 515 NGVD

iii APPROXIMATE MID HEIGHT LENGTH ℓ = 90'

iv. BREACH WIDTH (SEE NED-ACE DOWNSTREAM FAILURE GUIDELINES)

$W_b = 0.4(90) = 36$ FT

b. PEAK FAILURE OUTFLOW (Q_F)

ASSUME SURCHARGE AT TOP OF DAM EL 520

i HEIGHT AT TIME OF FAILURE : $Y_o = 11$ FT

ii SPILLWAY DISCHARGE AT TIME OF FAILURE
$Q_s = 121$ CFS

NOTE: ASSUME SPILLWAY NOT INCLUDED IN DAM BREACH

iii. BREACH OUTFLOW (Q_b)

$$Q_b = 8/27\ W_b \sqrt{g}\ Y_o^{3/2}$$

$$Q_b = \frac{8}{27}(36)\sqrt{32.2}\ (11)^{3/2} = 2208 \text{ CFS}$$

iv. PEAK FAILURE OUTFLOW (Q_{P_1}) TO LEWIS BROOK

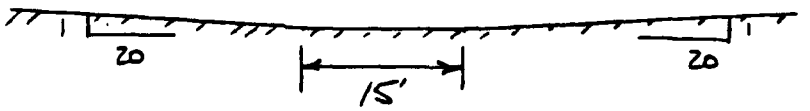
$Q_{P_1} = Q_s + Q_b \approx 2330$ CFS

c. FLOOD DEPTH IMMEDIATELY DOWNSTREAM FROM DAM.

$Y = 0.44\ Y_o = 0.44(11) \approx 4.8$ FT

d. ESTIMATE OF DOWNSTREAM FAILURE CONDITIONS AT POTENTIAL IMPACT AREA (SEE NED-ACE GUIDELINES FOR ESTIMATING D/S FAILURE HYDROGRAPHS):

i. THE REACH OF LEWIS BROOK BETWEEN HATTERTOWN POND DAM AND THE ENDANGERED HOME IS APPROXIMATELY 3000 FEET LONG. THE HOUSE IS LOCATED ABOUT 100 FEET FROM THE STREAMBED AND THE FIRST FLOOR IS 10 FT ABOVE THE NORMAL STREAM LEVEL. HOWEVER, THE BASEMENT IS JUST 1 TO 2 FEET ABOVE THE STREAM. THE SHAPE OF THE CHANNEL IS SHOWN IN THE SKETCH BELOW.



THE AVERAGE SLOPE OF THE REACH IS 3%

ii. HATTERTOWN POND'S STORAGE AT TIME OF FAILURE:

THE ONLY AVAILABLE STORAGE DATA WAS CONTAINED IN THE ACE INVENTORY OF DAMS DATED SEPT. 16, 1980. USING THE APPROXIMATING FORMULA $S = 0.5 A_0 \bar{H} + \bar{A}H$ (A_0 = POND SURFACE AREA AT THE TOP OF THE DAM EL 520 $\cong$ 18.4 AC; AVERAGE DEPTH OF POND BELOW TOP OF DAM ASSUME $\bar{H}$ = 6 FT; $\bar{A}$ = AVERAGE POND SURCHARGE AREA, ASSUME $\bar{A}$ = 21 AC, H = 1.6 SURCHARGE HEIGHT TO THE TOP OF THE DAM) THE STORAGE IS 90 ± AC-FT.

THEREFORE ASSUME S_{MAX} = 90 AC-FT* ($\frac{S_{MAX}}{2}$ = 45)

iii. PEAK INFLOW TO REACH: Q_{P_1} = 2330 CFS.

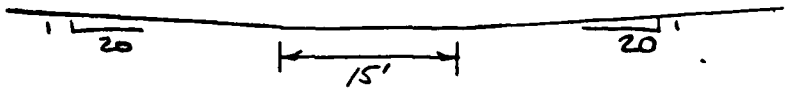
iv. APPROXIMATE STAGE AT POTENTIAL IMPACT AREA DUE TO THE FAILURE OF HATTERTOWN POND DAM:

Q_{P_1} = 2330 CFS Y** = 3.45 FT V = 16.2 AC-FT < $\frac{S_{MAX}}{2}$ OK
Q_s = 121 CFS Y_s = .9 FT V = 1.7 AC-FT

*ACE INVENTORY OF DAMS GIVES S_{MAX} = 110 AC-FT AND S_{NORM} = 100 AC-FT

** BASED ON A 2400-FT-LONG REACH WITH A 3% SLOPE (SEE STAGE DISCHARGE CURVE)

CHANNEL STORAGE:

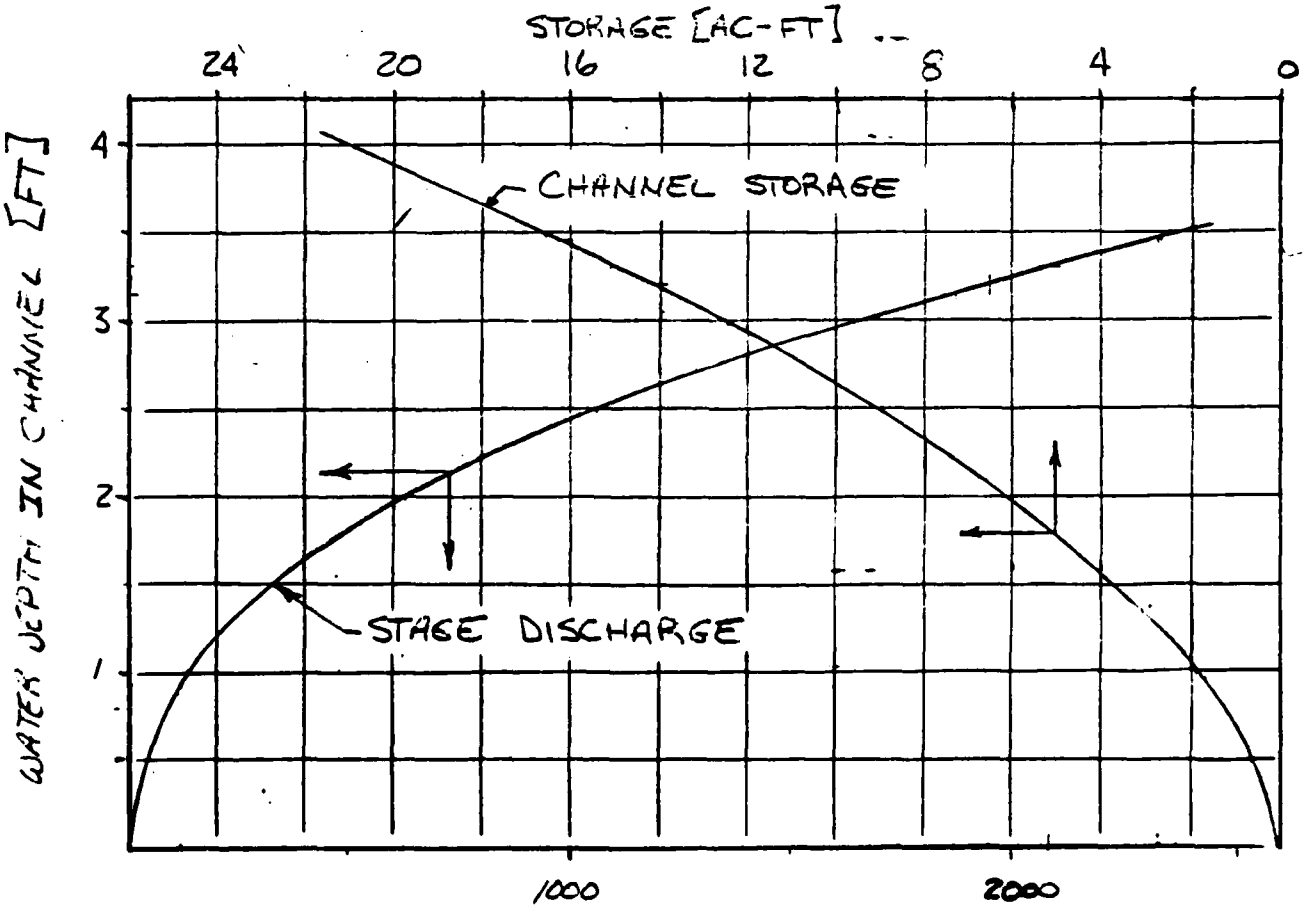


CHANNEL CROSS SECTION AT DOWNSTREAM HOME

$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$ WHERE $S = 0.03$ $n = 0.05$

$Q = 5.15 A R^{2/3}$

STAGE DISCHARGE - CHANNEL STORAGE RATING CURVE



$Q_{P_2} = Q_{P_1}\left(1 - \frac{V}{S_{MAX}}\right) = 2330\left(1 - \frac{16.2-1.7}{90}\right) = 1955$ cfs, $Y_2 = 3.2$ ft

$V_2 = 14.0$ AC-FT $\quad \bar{V} = 15.1$ AC-FT

$\therefore Q_{P_3} = 2330\left(1 - \frac{15.1-1.7}{90}\right) \approx 1980$ CFS

$\therefore$ REACH OUTFLOW : $Q_{P_3} = 1980$ CFS

STAGE = 3.2 FT

e. APPROXIMATE STAGE BEFORE FAILURE

$Q_S = 121$ CFS $\therefore Y \approx .9$ FT

f. RISE IN STAGE WITHIN IMPACT AREA

$\Delta Y = Y_3 - Y = 3.2 - 0.9 = 2.3$ FT

III SELECTION OF TEST FLOOD

1. CLASSIFICATION OF DAM ACCORDING TO NED-ACE GUIDELINES:

a. SIZE STORAGE MAX ≈ 90 AC-FT (50 < S < 1000 AC-FT)

HEIGHT = 11 FT (H < 25FT)

NOTE: STORAGE (SEE p D-17)

$\therefore$ SIZE CLASSIFICATION : SMALL

b. HAZARD POTENTIAL : BASED ON THE DOWNSTREAM FAILURE ANALYSIS AND

AS A RESULT OF THE EFFECTS ON THE POTENTIAL IMPACT AREA DESCRIBED ON p D-14, THIS DAM IS CLASSIFIED AS HAVING A SIGNIFICANT HAZARD POTENTIAL.

2. TEST FLOOD : THE HEIGHT AND STORAGE CAPACITY FOR THIS DAM ARE WITHIN THE LOWER LIMITS OF THE SMALL SIZE CATEGORY AND THE HAZARD IS SIGNIFICANT. THEREFORE, THE SMALLEST TEST FLOOD HAS BEEN SELECTED FROM THE CORPS RECOMMENDED VALUES (100yr - 1/2 PMF) HENCE THE TEST FLOOD WILL BE EQUIVALENT TO THE 100yr FLOOD.

INTERPOLATING FROM THE RAINFALL MAPS FOR A 100yr - 24 hour STORM FROM THE SOIL CONSERVATION SERVICE (SCS) PUBLICATION "URBAN HYDROLOGY FOR SMALL WATERSHEDS" (JANUARY 1975) THE AMOUNT OF RAINFALL FOR THIS AREA IS 6.5 IN. ASSUMING NO ABSTRACTION.

TO DETERMINE THE TIME BASE FOR A STORM IN THIS REGION IT WAS NECESSARY TO USE THE CORPS TEST FLOOD CRITERIA AND BACK CALCULATE ∴.

FOR 19IN PRECIPITATION THE TEST FLOOD FOR A 1.38 SQMI DA IS 3070 CFS (PMF).

ASSUMING A TRIANGULAR HYDROGRAPH:

$$3070\,\text{CFS} = \frac{\frac{19''}{12}(1.38\,\text{SQMI})(5280)^2}{\frac{T\text{HRS}\,(3600\,\text{SEC/HR})}{2}}$$

$T \approx 11$ HRS

∴ FOR A 100YR FLOOD:

$$Q_{P_1} = \frac{\frac{6.5}{12}(1.38)(5280)^2}{\frac{11\,(3600)}{2}} = 1052\,\text{CFS}$$

USE $Q_{P_1} = 1050$ CFS

3. TEST FLOOD ANALYSIS.

a. SURCHARGE HEIGHT TO PASS TEST FLOOD

Q_{P_1} = 1050 CFS H_1 = 3.2 FT*

*H_1 IS DEPTH OF FLOW ABOVE DATUM (EL 518.4) AS DETERMINED FROM THE OUTFLOW RATING CURVE PG D-9.

b. EFFECT OF STORAGE ON PEAK OUTFLOWS:

i. AVERAGE POND AREA WITHIN EXPECTED SURCHARGE

1) POND AREA AT EL 519 *A_{519} = 18.4 AC

2) POND AREA AT EL 524 *$A_{521.6}$ = 37.1 AC

3) POND AREA AT EL 530 *A_{530} = 59.6 AC

ii. ASSUME NORMAL POOL AT EL 519.0

iii DISCHARGE (Q_{P_2}) AT VARIOUS HYPOTHETICAL SURCHARGES:

USING A LINEAR INTERPOLATION THE SURCHARGE MAY BE APPROXIMATED BY: $V = \left[18.4 + \frac{X}{5}\left(\frac{18.7}{2}\right)\right] X$; WHERE $1 \leq X \leq 5$

H=5	V = 139 ac-ft	$\therefore S = \frac{139}{1.38(533)} = 1.89$
H=4	103	1.10
H=3	72	0.98
H=2	44	0.60
H=1	20	0.27

*MEASURED FROM BOTSFORD, CT USGS QUAD.

FROM APPROXIMATE ROUTING NED-ACE GUIDELINES AND 19IN MAXIMUM PROBABLE RUNOFF IN NEW ENGLAND $Q_{P_2} = Q_{P_1}\left(1 - \frac{S}{19}\right)$ ∴ FOR 100YR FLOOD AND 6.5IN MAXIMUM PROBABLE RUNOFF FOR THIS REGION (SEE D-21) $Q_{P_2} = Q_{P_1}\left(1 - \frac{S}{6.5}\right)$

∴ FOR PREVIOUS HYPOTHETICAL SURCHARGES:

H=5 Q_{P_2} = 745 CFS

H=4 Q_{P_2} = 820 CFS

H=3 Q_{P_2} = 890 CFS

H=2 Q_{P_2} = 950 CFS

H=1 Q_{P_2} = 1000CFS

C. TEST FLOOD OUTFLOW (Q_{P_3}) USING NED-ACE GUIDELINES "SURCHARGE STORAGE ROUTING" ALTERNATE METHOD AND OUTFLOW RATING CURVE

$Q^*_{P_3}$ = 880CFS H^*_3 = 3.1 FT

* SEE OUTFLOW RATING CURVE D-9.

4. SPILLWAY CAPACITY RATIOS

a. SPILLWAY CAPACITY TO TOP OF DAM (EL520)

$H = 1.6$ $Q_S = 44.1H^{3/2} + 21(H-0.6)^{3/2} + 3.3H^{5/2}$

$Q_S = 121$ CFS

∴ THE TOTAL SPILLWAY CAPACITY TO TOP OF THE DAM IS 11.5% OF THE TEST FLOOD INFLOW (Q_{P_1}) AND 14% OF THE TEST FLOOD OUTFLOW (Q_{P_3}).

DURING THE TEST FLOOD $H = 3.1$ FT ∴

$Q_S = 380$ cfs.

IV SUMMARY

1. TEST FLOOD 100 YR = 1050 CFS

2. PERFORMANCE AT TEST FLOOD CONDITIONS

   a. Q_{P_1} = 1050 CFS H_1 = 3.2 FT

   b. Q_{P_3} = 880 CFS H_3 = 3.1 FT

   c. SPILLWAY CAPACITY

      W.S EL 520.0 Q_s = 121 CFS OR 11.5% OF Q_{P_1} AND 14% OF Q_{P_3}.

   ∴ AT TEST FLOOD THE DAM WILL BE OVERTOPPED BY 1.5 FT.

3. DOWNSTREAM FAILURE CONDITIONS

   a. PEAK FAILURE OUTFLOW Q_b = 2330 CFS,
   NOTE SPILLWAY NOT INCLUDED IN BREACH
   PREFAILURE - OUTFLOW 121 CFS

   b. FLOOD DEPTH IMMEDIATELY DOWNSTREAM FROM DAM 4.8 FT

   c. CONDITIONS IN IMPACT AREA

      i. APPROXIMATE STAGE BEFORE FAILURE .9 FT

      ii. APPROXIMATE STAGE AFTER FAILURE 3.2 FT

      iii RISE IN STAGE: 2.3 FT

APPENDIX E

INFORMATION AS CONTAINED IN THE

NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME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LME