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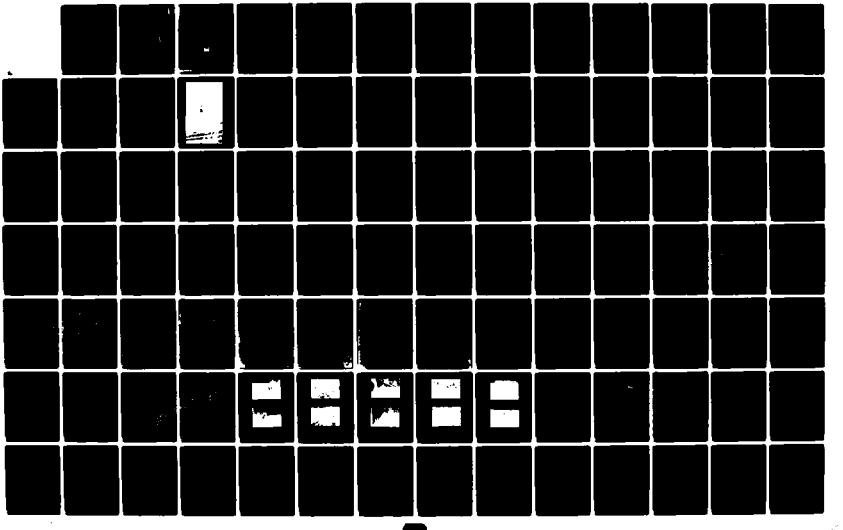

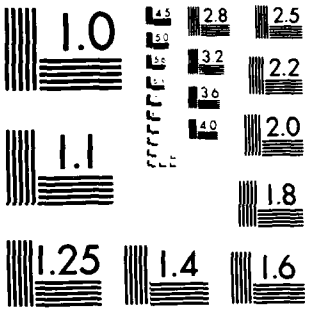

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NAUGATUCK RIVER BASIN
WATERBURY, CONNECTICUT

EAST BRASS MILL DAM
CT 00031

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

MARCH 1980

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18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Naugatuck River Basin
Waterbury, Conn
East Brass Mill Dam

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

The East Brass Mill Dam, also known as the Scovill Da, consists of an earth embankment with a maximum height of 25 ft., a top width of approximately 15 ft., an upstream slope of 2 horizontal to 1 vertical and a downstream slope of 1.7 horizontal to 1 vertical. The dam is 420 ft. long, including a 101 ft. concrete ogee spillway section located near the left end of the dam. The freeboard from the spillway crest to the top of the left embankment is 5.4 ft.Flashboards, 1.6 ft. in height are normally in place, reducing the freeboard to 3.8 ft. The left end of the spillway and the left spillway wall were constructed around a boulder approx. 16 ft. in diameter.

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

REPLY TO
ATTENTION OF
NEDED-E

MAY 23 1980

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

Inclosed is a copy of the East Brass Mill Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis. A brief assessment is included at the beginning of the report.

The preliminary hydrologic analysis has indicated that the spillway capacity for the East Brass Mill would likely be exceeded by floods greater than 11 percent of the one half Probable Maximum Flood (1/2 PMF), the test flood for spillway adequacy. Our screening criteria specifies that a dam of this class which does not have sufficient spillway capacity to discharge fifty percent of the PMF, should be adjudged as having a seriously inadequate spillway and the dam assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The term "unsafe" applied to a dam because of an inadequate spillway does not indicate the same degree of emergency as that term would if applied because of structural deficiency. It does indicate, however, that a severe storm may cause overtopping and possible failure of the dam, with significant damage and potential loss of life downstream.

It is recommended that within twelve months from the date of this report the owner of the dam engage the services of a professional or consulting engineer to determine by more sophisticated methods and procedures the magnitude of the spillway deficiency. Based on this determination, appropriate remedial mitigating measures should be designed and completed within 24 months of this date of notification. In the interim a detailed emergency operation plan and warning system should be promptly developed. During periods of unusually heavy precipitation, round-the-clock surveillance should be provided.

NEDED-E
Honorable Ella T. Grasso

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

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. This report has also been furnished to the owner of the project, the Century Brass Products, Inc., Waterbury, Connecticut.

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

I wish to take this opportunity to thank you and the Department of Environmental Protection for the cooperation extended in carrying out this program.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

EAST BRASS MILL DAM
a/k/a SCOVILL DAM
CT 00031

NAUGATUCK RIVER BASIN
WATERBURY, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

4901

MARCH 1980

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

IDENTIFICATION NO: CT 00031

NAME OF DAM: East Brass Mill Dam

TOWN: Waterbury

COUNTY AND STATE: New Haven County, Connecticut

STREAM: Mad River

DATE OF INSPECTION: December 21, 1979

BRIEF ASSESSMENT

The East Brass Mill Dam, also known as Scovill Dam, consists of an earth embankment with a maximum height of 25 feet, a top width of approximately 15 feet, an upstream slope of 2 horizontal to 1 vertical and a downstream slope of 1.7 horizontal to 1 vertical. The dam is 420 feet long, including a 101 foot concrete ogee spillway section located near the left end of the dam. The freeboard from the spillway crest to the top of the left embankment is 5.4 feet. Flashboards, 1.6 feet in height are normally in place, reducing the freeboard to 3.8 feet. The left end of the spillway and the left spillway wall were constructed around a boulder approximately 16 feet in diameter. As-built plans indicate an upstream cutoff wall of steel sheet piling and concrete under the spillway section. Center and downstream cutoff walls are concrete and not as deep as the upstream cutoff. A steel sheet piling and concrete corewall extend into the earth embankment at each end of the spillway. Interstate 84 crosses the right abutment of the dam. The outlet works located to the right of the spillway consist of a control tower or gate house with a high and low

level inlet which discharges through two 24-inch outlet sluice gates to a 2'-3" high by 4'-0" wide sluiceway that outlets to the downstream face of the spillway. The dam impounds City Mills Pond, an industrial water supply reservoir for a downstream industrial complex.

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the dam is classified as "Small" in size with a "High" hazard potential. A Test Flood equal to one-half the Probable Maximum Flood (1/2 PMF) was selected. Due to the small size of the impoundment, the Test Flood outflow was assumed to equal the calculated inflow of 16,600 cfs.

The spillway has a capacity of 4,000 cfs without flashboards and 1,900 cfs with flashboards before overtopping the low point of the dam crest. With the flashboards in place the spillway can pass 11 percent of the Test Flood. Without flashboards the spillway can pass 24 percent of the Test Flood. Without the flashboards in place, the Test Flood would overtop the low point of the dam crest by 3.6 feet.

Based on the visual inspection and a review of all available pertinent data, the condition of the dam is judged to be fair. The future integrity of the dam can be affected by continued seepage and erosion in the vicinity of the downstream end of the right spillway wall; continued seepage through the earth embankment; continued deterioration of the concrete spillway; and inadequate spillway capacity.

It is recommended that the owner engage the services of a qualified, registered engineer experienced in the design of dams to investigate the seepage and erosion in the vicinity of the downstream end of the right spillway wall; to investigate the seepage downstream of the earth embankment; to evaluate the condition of the concrete in

the spillway and spillway apron; and to perform a detailed hydraulic and hydrologic analysis to determine the need for and means to provide additional project discharge capacity. Corrective measures should be taken based on the findings of these investigations and analyses. The tree and brush growth on the earth embankment should be removed by uprooting and the root zones backfilled as directed by a qualified, registered engineer. In addition, the flashboards should be removed; technical inspections by a qualified, registered engineer should be made annually; a formal operations and maintenance manual should be prepared; and a formal warning system should be put into effect.

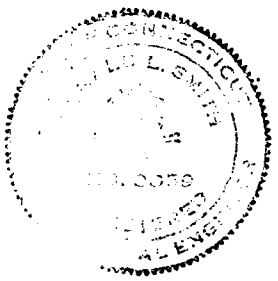
The owner should implement the recommendations as described herein and in greater detail in Section 7 within one year after receipt of this Phase I Inspection Report.

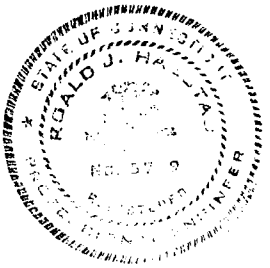
Donald L. Smith

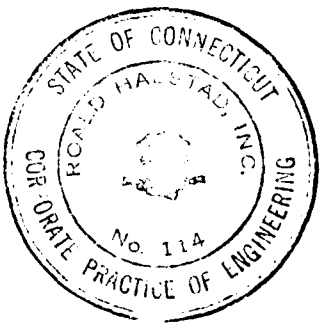
Donald L. Smith, P.E.
Project Engineer

Roald Haestad

Roald Haestad,
President







This Phase I Inspection Report on East Brass Mill Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Richard J. DiBuono

RICHARD DIBUONO, MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

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

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

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

condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest 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.

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 of the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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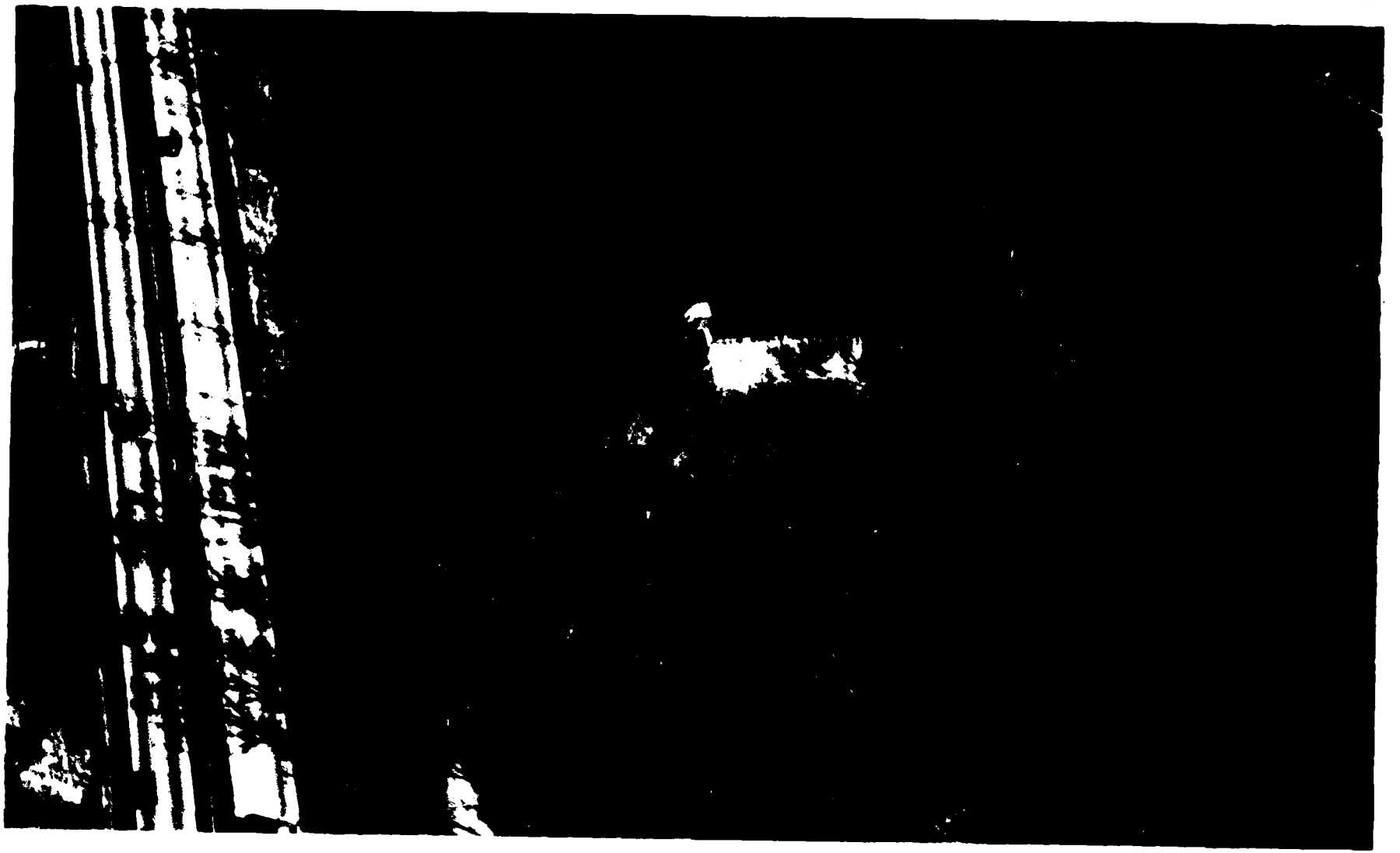
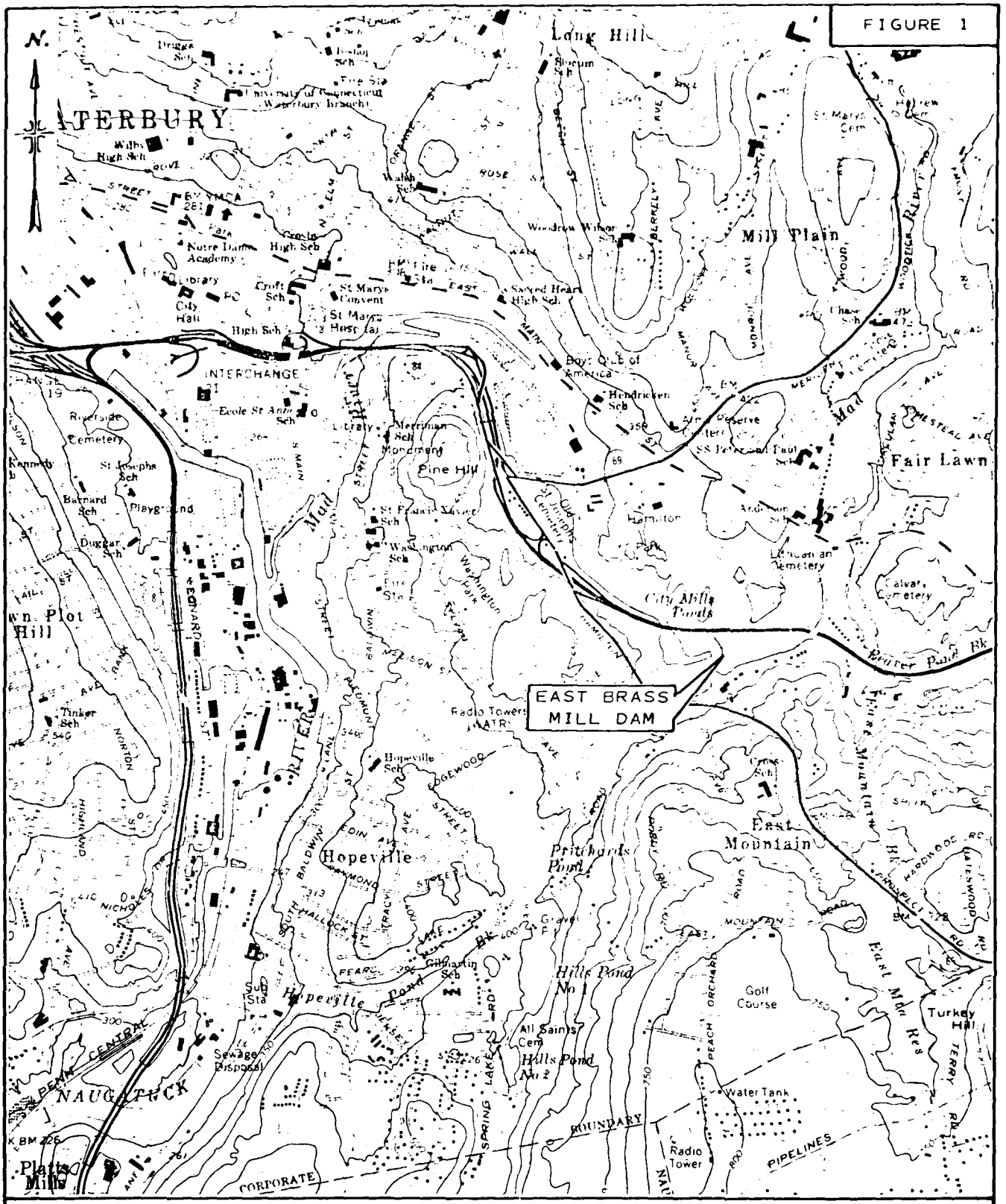


OVERVIEW PHOTO

U S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	EAST BRASS MILL DAM - MAD RIVER WATERBURY, CONNECTICUT
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		CT 00031 27 NOV '79

FIGURE 1



LOCATION PLAN

EAST BRASS MILL DAM
WATERBURY, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC. WATERBURY QUADRANGLE 1972

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

PROJECT INFORMATION
SECTION 1

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. Roald Haestad, Inc., has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Roald Haestad, Inc. under a letter of November 1, 1979, from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-80-C-0015 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

The purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring correction in a timely manner by non-federal interest.
2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dams.
3. To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

The dam is located on the Mad River, south of Interstate 84 and north of Harpers Ferry Road in Waterbury, Connecticut. The dam is shown on the Waterbury Quadrangle Map having coordinates of latitude N 41° 32.3', and longitude W 73° 00.9'.

b. Description of Dam and Appurtenant Structures

The dam consists of an earth embankment with a maximum height of 25 feet, a top width of approximately 15 feet, an upstream slope of 2 horizontal to 1 vertical and a downstream slope of 1.7 horizontal to 1 vertical. The upstream slope is protected below normal water elevation by a layer of 18-inch riprap over an 8-inch gravel base. A heavy tree and brush growth covers the remaining portion of the upstream embankment slope and parts of the crest and downstream slope. The dam is 420 feet long, including a 101 foot concrete ogee spillway section located near the left end of the dam. The freeboard from spillway crest to the top of the left embankment is 5.4 feet. The right embankment is approximately 1 foot higher in elevation. Normally 1.6 feet of flashboards are in place, reducing the freeboard to 3.8 feet. The left end of the spillway and the left spillway wall were constructed around a boulder approximately 16 feet in diameter. The spillway section has an upstream batter of 1 in 20 and a downstream batter of 8 in 12. As-Built plans indicate an upstream cutoff wall of steel sheet piling and concrete that extends down to ledge or to elevation 333.75, approximately 17 feet below the original streambed. A center cutoff wall and downstream cutoff wall, both

constructed of concrete, contain 4-inch vitrified tile pipe drains. At each end of the concrete spillway, a steel sheet piling and concrete core wall extends into the earth embankment. At the left end of the spillway the core wall extends 40 feet into the embankment. At the right end of the spillway the core wall extends approximately 70 feet into the embankment.

The outlet works located to the right of the spillway consist of a control tower or gate house with a high and low level inlet which discharges through two 24-inch outlet sluice gates to a 2'-3" high x 4'-0" wide sluiceway that outlets to the downstream face of the spillway.

c. Size Classification - "Small"

According to the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, a dam is classified as "Small" in size if the height is between 25 feet and 40 feet or the dam impounds between 50 Acre-Feet and 1,000 Acre-Feet. The dam has a maximum height of 25 feet and a maximum storage capacity of 180 Acre-Feet. Therefore the dam is classified as "Small" in size.

d. Hazard Classification - "High"

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the Hazard Classification for the dam is "High". A dam failure analysis indicates that extensive industrial development downstream would be affected by a dam breach with the possible loss of more than a few lives. The depth of flow prior to the dam breach in the area of one plant located approximately 6,000 feet downstream of the dam is 6.3 feet above river bed,

based on the maximum spillway capacity without flashboards of 4,000 cfs. The peak flow in this area due to the dam breach is 7,200 cfs equivalent to a depth of flow of 8.2 feet in the river, or 2 feet above the floor of the buildings.

e. Ownership

Former Owner: The Scovill Manufacturing Company

Present Owner: Century Brass Products, Inc.
59 Mill Street
Waterbury, Connecticut 06720
(203) 574-7700

f. Operator

William Goss, Jr., Vice President
Century Brass Products, Inc.
59 Mill Street
Waterbury, Connecticut 06720
(203) 574-7700

g. Purpose of Dam

The purpose of the dam is to impound water for industrial water supply.

h. Design and Construction History

The dam was designed in 1913 by the American Brass Company, Engineering Department, and constructed between 1915 and 1916 by the Scovill Manufacturing Company. The embankment to the left of the spillway overtopped during the August 1955 flood. A section of the dam crest eroded to the concrete core wall. The eroded area was repaired following the flood.

i. Normal Operational Procedures

Gates in the gatehouse are operated as required to supplement the flow over the spillway to maintain the water level in a small downstream pond. Water is drawn from this pond for manufacturing purposes. The water level in the East Brass Mill Dam impoundment, known as City Mills Pond, is essentially constant, maintained by regulating the flow from upstream impoundments.

1.3 Pertinent Data

a. Drainage Area

The drainage area consists of 23.7 square miles of "rolling" terrain, with significant residential and commercial developments throughout. There are several lakes, ponds and highway embankments on the watershed which will affect the peak runoff.

b. Discharge at Damsite

Water normally discharges over the 101 ft. long concrete overflow spillway. Outlet works consist of a gatehouse or control tower with high and low level inlets which discharge through two 24-inch outlet sluice gates to a 2'-3" high x 4'-0" wide sluiceway that outlets to the downstream face of the spillway. The left embankment of the dam overtopped during the August 1955 Flood.

1.	Outlet Works (conduits) Size: Invert Elevation: Discharge Capacity:	2-24 inch 352.47 140 cfs (Total)
2.	Maxumum Known Flood At Damsite:	Approximately 3,300 cfs August 1955
3.	Ungated Spillway Capacity: at Top of Dam with Flashboards: at Top of Dam w/out Flashboards: Elevation:	 1,900 cfs 4,000 cfs 373.85*
4.	Ungated Spillway Capacity at Test Flood Elevation: Elevation:	 10,300 cfs 378.0
5.	Gated Spillway Capacity at Normal Pool Elevation: Elevation:	 N/A N/A
6.	Gated Spillway Capacity at Test Flood Elevation: Elevation:	 N/A N/A
7.	Total Spillway Capacity at Test Flood Elevation: Elevation:	 10,300 cfs 378.0
8.	Total Project Discharge at Top of Dam: Elevation:	 4,000 cfs 373.85*
9.	Total Project Discharge at Test Flood Elevation: Elevation:	 16,600 cfs 378.0

*Low point in dam crest.

c. Elevation - Feet Above Mean Sea Level

1. Streambed at Toe of Dam:	350
2. Bottom of Cutoff:	333.75
3. Maximum Tailwater:	N/A
4. Recreation Pool:	N/A
5. Full Flood Control Pool:	N/A
6. Spillway Crest:	369.05
7. Design Surcharge - Original Design:	Unknown
8. Top of Dam:	Left Embank: 374.4 Right Embank: 375.6
9. Test Flood Surcharge:	378.0

d. Reservoir - Length in Feet

1. Normal Pool:	1,200 ft.
2. Flood Control Pool:	N/A
3. Spillway Crest Pool:	1,200 ft.
4. Top of Dam:	1,200 ft.
5. Test Flood Pool:	1,200 ft.

e. Storage - Acre-feet

1. Normal Pool:	120 Ac.-Ft.
2. Flood Control Pool:	N/A
3. Spillway Crest Pool:	120 Ac-Ft.
4. Top of Dam:	180 Ac.-Ft.
5. Test Flood Pool:	280 Ac.-Ft.

f. Reservoir Surface - Acres

1. Normal Pool:	12 Acres
2. Flood-Control Pool:	N/A
3. Spillway Crest:	12 Acres
4. Test Flood Pool:	19 Acres
5. Top of Dam:	12 Acres

g. Dam

1.	Type:	Earth Embankment, 320 feet long Concrete Ogee Spillway Section, 101 feet long
2.	Length:	420 feet
3.	Height:	25 feet
4.	Top Width:	15 feet
5.	Side Slopes:	2 Horiz. to 1 Vert. - Upstream 1.7 Horiz. to 1 Vert. - Downstream
6.	Zoning:	Unknown
7.	Impervious Core:	Steel Sheet Piling and concrete core wall extend into earth embankment about 40' to left and 70' to right of spillway. (See plans in Appendix B)
8.	Cutoff:	Steel Sheet Piling and concrete cutoff under spillway section. (See plans in Appendix B)
9.	Grout Curtain:	N/A
10.	Other:	

h. Diversion and Regulating Tunnel - N/A

i. Spillway

1.	Type:	Concrete Ogee Overflow Section
2.	Length of Weir:	101 ft.
3.	Crest Elevation with Flashboards: without Flashboards:	 370.65 369.05
4.	Gates:	N/A
5.	Upstream Channel:	N/A
6.	Downstream Channel:	Natural Streambed of Mad River
7.	General:	Upstream cutoff wall consisting of two rows of steel sheet piling and concrete (See Appendix B)

j. Regulating Outlets

1.	Invert:	352.47
2.	Size:	2-24-inch diameter sluice gates
3.	Description:	Sluice gates located in gate house or control tower discharge through 2'-3" high x 4'-0" wide sluiceway to spillway face.
4.	Control Mechanism:	Manually operated sluice gates
5.	Other:	Total capacity 140 cfs

ENGINEERING DATA
SECTION 2

2.1 Design Data

Design data available for review consists of a set of plans for the dam prepared by The American Brass Company, Engineering Department in 1913, and a plan of the North Abutment and Gate Chambers dated July 1915.

2.2 Construction Data

Construction data available for review consists of an As-Built Plan of the spillway section of the dam, dated January 27, 1916. Several differences were noted between the design plans and the As-Built Plans.

2.3 Operational Data

There are no records kept of reservoir levels. The embankment to the left of the spillway reportedly overtopped during the August 1955 Flood. Correspondence on file at the State of Connecticut, Department of Environmental Protection indicates that repairs to the embankment were proposed following the August 1955 Flood.

2.4 Evaluation of Data

a. Availability

Existing data was provided by the State of Connecticut, Department of Environmental Protection, Century Brass Products, Inc., and Anaconda American Brass Company.

b. Adequacy

The information that was available, along with the visual inspection, past performance history, and hydraulic and hydrologic calculations were adequate to assess the conditions of the facility.

c. Validity

Field inspections and surveys indicate that the dam was constructed substantially as shown on the As-Built plans. Repairs to restore the embankment to its original design height following the 1955 Flood are reported to have been made; however, the top of the left embankment is approximately 1 foot lower than the right embankment.

VISUAL INSPECTION

SECTION 3

3.1 Findings

a. General

The visual inspection of the dam was conducted on November 29, 1979. The inspection team was accompanied by Mr. Charles Stickney and Mr. E. B. Goss of Century Brass Products, Inc. At the time of the inspection, the water level was approximately 0.1 feet above the top of the flashboards. The general condition of the dam at the time of inspection was fair.

The dam consists of a concrete ogee spillway section and an earth embankment section. The outlet works located to the right of the spillway consist of a gatehouse or control tower with high and low level inlets which discharge through two 24-inch outlet sluice gates to a 2'-3" high x 4'-0" wide sluiceway that outlets to the downstream face of the spillway.

b. Dam

The spillway is a concrete ogee type with a total length of 101 feet and is located near the left end of the earth embankment, Overview Photo. The left end of the spillway and the left spillway wall were constructed around a large boulder, approximately 16 feet in diameter, Photo 1.

The following conditions were observed in the vicinity of the downstream end of the right spillway wall, Photos 2, 3, and 4.

1) Rust-stained seepage exiting from under and around a boulder and from along side the spillway wall at the downstream end, Photo 3.

2) Ercsion of the earth embankment and of the river bank at and downstream of the end of the spillway wall, Photo 3.

3) Water flowing from a 6-inch diameter pipe downstream of the spillway wall, Photo 4. The discharge was measured to be 45 to 50 gpm.

4) A small stone block retaining wall on the embankment slope above the downstream end of the spillway wall, Photo 3. What appeared to be a rock bolt or soil anchor was observed in one of the blocks.

5) Rotten wooden forms at the base of the right side of the spillway wall at the downstream end.

6) A cluster of several trees growing out of the base of the earth embankment near the downstream end of the spillway wall just above the area of rust-stained seepage described in Item 1, Photo 3.

One small area of seepage was observed exiting from the left bank of the river approximately 100 feet downstream of the left spillway wall.

Minor spalling and deterioration of the concrete on the downstream face of the spillway was observed, Photo 1. Minor concrete deterioration was also noted at the downstream end of the left spillway wall.

An area of very irregular flow was observed over the downstream apron of the spillway adjacent to the right spillway wall, downstream of the outlet works discharge. It is not known whether

this is an indication of possible deterioration or damage to the spillway apron, or if it is due to the discharge of the outlet works, Photo 5.

Some erosion was observed on the downstream side of the left embankment, exposing a portion of the core wall, Photo 6.

The earth embankment section of the dam, to the right of the spillway, is approximately 250 feet long. Available plans indicate that the upstream slope of the earth embankment was constructed with 18-inch riprap over an 8-inch gravel layer. The riprap was observed to cover the upstream slope only up to the water level existing at the time of the inspection. Erosion of the upstream slope was observed above the water level.

Several wet areas were observed at the toe of the downstream slope, Photo 7. No water flow was observed in these areas; however, some rust-staining and an oily sheen at the surface were observed, Photo 8. The area in Photo 7 is a natural low area which collects surface runoff as well as seepage from the dam.

Heavy tree and brush growth exists on the upstream slope, Photo 9, and on the crest and downstream slope, Photos 9 and 10.

As stated previously, water was observed discharging from a 6-inch diameter pipe located downstream of the right spillway wall, Photo 4. The location of this pipe suggest that it may be a toe drain for the embankment; however, no toe drain was shown on the available plans.

c. Appurtenant Structures

The appurtenant structures consist of 1) a gatehouse or control tower located to the right of the right spillway wall and 2) outlet pipes from the gatehouse which exit through a 2'-3" high x 4'-0" wide sluiceway to the downstream spillway face.

The gatehouse or control tower appeared to be in good condition. The gates were not operated during the inspection.

d. Reservoir Area

There were no indications of instability along the edges of the reservoir in the vicinity of the dam. An embankment for Interstate 84 forms the entire right side of the impoundment.

e. Downstream Channel

The downstream channel consists of the natural streambed of the Mad River. No significant obstructions to flow were observed in the streambed immediately downstream of the dam.

3.2 Evaluation

On the basis of the visual inspection and a review of available design and construction data, the dam is judged to be in fair condition. The following conditions could affect the future stability of the dam:

1) Continued seepage and erosion in the vicinity of the downstream end of the right spillway wall could eventually cause a breach of the dam.

2) Continued seepage through the earth embankment, as evidenced by rust-stained wet areas at the downstream toe and possibly

by the flow discharging from the pipe located downstream of the right spillway wall, could lead to internal erosion of the dam.

3) Continued erosion of the upstream slope of the earth embankment above the riprap could eventually decrease the freeboard.

4) The root systems of the trees and brush on the earth embankment could provide pathways for internal erosion of the dam.

5) Continued deterioration of the concrete in the spillway and the spillway apron could jeopardize the stability of the dam.

OPERATIONAL AND MAINTENANCE PROCEDURES

SECTION 4

4.1 Operational Data

a. General

The impoundment is used to store water for a downstream industrial complex. Water from the impoundment flows to a small downstream pond, where it is withdrawn for use in manufacturing processes. The sluice gates of the East Brass Mill Dam are operated as required to supplement the flow over the spillway in order to maintain a flow of approximately 3 inches over the spillway of the small downstream pond. The water level in the East Brass Mill Dam impoundment, known as City Mills Pond, is maintained essentially constant by regulating the flow from upstream impoundments.

b. Description of Any Warning System In Effect

There is no formal warning system in effect. The dam is monitored during heavy rains and the outlet gates are opened fully.

4.2 Maintenance Procedures

a. General

There are no formal maintenance procedures in effect for the dam. An annual inspection of the dam is made by the owners and repairs made as deemed necessary.

b. Operating Facilities

No formal maintenance procedures exist for the operating facilities. Work on the gatehouse has been performed in the past to repair damage caused by vandals.

4.3 Evaluation

Present operations and maintenance procedures are inadequate as is evidenced by the heavy tree and brush growth on the embankment and the erosion of portions of the embankment. A formal operations and maintenance manual should be prepared for the dam and operating facilities. A formal warning system should be established. The warning system should include monitoring of the dam during extremely heavy rains and procedures for notifying downstream authorities in the event of an emergency.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

SECTION 5

5.1 General

The spillway for East Brass Mill Dam consists of a 101 foot long concrete gravity ogee section with a crest height 5.4 feet below the top of the left embankment. The right embankment is 6.6 feet above spillway. Flashboards with a height of 1.6 feet above spillway crest are normally in place. The gatehouse has two 24-inch blowoff outlets controlled by sluice gates. The blowoffs connect to a single 2.25' x 4.0' sluiceway which discharges through the downstream face of the spillway.

The watershed area is 23.7 square miles of "rolling" terrain, with significant residential and commercial development throughout. A section of the City of Waterbury and most of the Town of Wolcott are located within the watershed. Elevations range from about 950 at the upper end of the watershed to spillway elevation of 369. There are seven lakes, a number of ponds and several highway embankments located within the watershed. A more detailed analysis would show the modifying effect of these water bodies and structures on the Test Flood.

5.2 Design Data

No computations were found for the design of the spillway or the dam. However, the original construction plans and "As-Built" plans were found for the dam.

5.3 Experience Data

During the August 1955 Flood, the left embankment was overtopped and suffered some erosion damage. The flashboards were in place and remained intact throughout the flood. Maximum depth of flow above the concrete spillway crest was 6'-2". The peak discharge was estimated at 3,300 cfs.

5.4 Test Flood Analysis

The dam is classified as "Small" in size, with a "High" hazard potential. According to the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the Test Flood for a "Small", "High" hazard dam is between one-half the Probable Maximum Flood (1/2 PMF) and the Probable Maximum Flood (PMF), depending on the involved risk.

A Test Flood equal to 1/2 PMF was selected because of the small storage capacity of the impoundment.

An inflow flood peak was calculated for the 23.7 square mile watershed using the guide curves for "rolling" terrain supplied by the Corps of Engineers. The peak flow of 700 cubic feet per second per square mile (csm) was derived from the curve. The peak inflow was then calculated as 16,600 cfs. The outflow is equal to the inflow because the dam's surcharge storage capacity is negligible. The spillway capacity, with water level at the top of the dam, was calculated to be 1,900 cfs with flashboards and 4,000 cfs without flashboards. The two 24-inch blowoffs have a combined capacity of 140 cfs.

The spillway without flashboards and with the blowoffs closed has a capacity equal to 24 percent of the Test Flood. With flashboards, the spillway capacity is equal to 11 percent of the Test Flood. The Test Flood would overtop the left embankment by 3.6 feet without flashboards and by 4.2 feet with flashboards, and would overtop Interstate-84 by approximately 2 feet.

The spillway capacity of this dam is judged to be inadequate, requiring further evaluation and remedial action.

5.5 Dam Failure Analysis

A dam failure analysis was made using the "Rule of Thumb" guidance provided by the Corps of Engineers. Failure was assumed when the water level reached the top of the dam.

The dam breach would release up to 26,500 cfs into the Mad River below the dam. A large portion of the floodwater would be stored in the area between the dam and Interstate-84 (I-84). The I-84 underpass would act as a constriction allowing a peak of approximately 15,000 cfs to flow downstream.

At the Century Brass industrial complex, about 6,000 feet downstream of the dam, the depth of flow prior to dam breach would be 6.3 feet based on a spillway discharge of 4,000 cfs without flashboards. This flow would remain within the stream channel. The dam breach flood in this area would be 7,200 cfs and would produce flood depths of 8.2 feet. This would flood some of the industrial buildings to a depth of 2 feet. The water would also flow down a railroad spur line through the industrial complex before rejoining the river near Section 6, as shown on Figure 5 in Appendix D.

The dam was classified as "High" potential hazard because of the possible loss of more than a few lives and downstream property damage should the dam fail.

EVALUATION OF STRUCTURAL STABILITY

SECTION 6

6.1 Visual Observations

The visual inspection did not disclose any evidences of present structural instability. The future integrity of the dam could be affected by continued seepage and erosion in the area of the downstream end of the right spillway wall, continued seepage through the earth embankment, and continued erosion of the upstream slope.

6.2 Design and Construction Data

The available design information consists of a set of plans for the dam prepared by the American Brass Company, Engineering Department, dated 1913 and a Plan of the North Abutment and Gate Chambers dated July 1915. Construction information consists of an "As-Built" Plan dated January 27, 1916. There are several differences between the Design Plans dated 1913 and the As-Built Plan.

The drawings illustrate the locations and types of construction of the cutoff walls under the spillway and of the core walls in the earth embankments adjacent to the spillway. They do not contain any information regarding the type of soil used in construction of the earth embankment. The data is not sufficient for performance of a formal stability analysis.

6.3 Post Construction Changes

Since construction of the dam, highway embankments have been constructed across the reservoir. The I-84 embankment is located on the right abutment of the dam. A concrete wall was constructed along a portion of the highway upstream of the right abutment to the same elevation as the spillway walls. The wall acts to prevent flooding of the highway before overtopping of the dam occurs.

6.4 Seismic Stability

The dam is located in Seismic Zone I and in accordance with the recommended Phase I inspection guidelines does not warrant seismic stability analysis.

ASSESSMENT, RECOMMENDATIONS, & REMEDIAL MEASURES
SECTION 7

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection and a review of available design and construction data, the dam is judged to be in fair condition.

An evaluation of the hydraulic and hydrologic features of the dam determined that the spillway is capable of passing 11% of the Test Flood (1/2 PMF), with the flashboards in place, and 24% of the Test Flood without flashboards. With the flashboards in place, the earth embankment portion of the dam would be overtopped by 4.2 feet as a result of the Test Flood. Without the flashboards in place, the earth embankment would be overtopped by 3.6 feet due to the Test Flood.

The future integrity of the dam could be affected by the following:

1) Continued seepage and erosion in the vicinity of the downstream end of the right spillway wall.
2) Continued seepage through the earth embankment, as evidenced by the rust-stained wet areas and possibly by the flow discharging from the pipe located downstream of the right spillway wall.
3) Continued erosion of the upstream slope of the earth embankment above the riprap.
4) The tree and brush growth on the earth embankment.
5) Continued deterioration of the concrete in the spillway and the spillway apron.
6) Inadequate spillway capacity.

b. Adequacy of Information

The information available is adequate for a Phase I Investigation.

c. Urgency

The recommendations presented in Section 7.2 and 7.3 should be carried out within one year of receipt of this report by the owner.

7.2 Recommendations

The following recommendations should be carried out under the direction of a qualified, registered engineer:

1. The seepage and erosion in the vicinity of the downstream end of the right spillway wall should be investigated and seepage monitoring and erosion protection measures should be designed and constructed.
2. The wet areas at the downstream toe of the earth embankment and the source of the water discharging from the pipe downstream of the right spillway walls should be investigated and seepage control measures should be designed and constructed, as required. A program for monitoring the seepage should be established. Included in this program should be the periodic monitoring of the reservoir level, the volume of seepage at the downstream end of the right spillway wall, and the discharge from the pipe located downstream of the right spillway wall. A substantial increase or decrease of flow, unrelated to reservoir level, could indicate a potential problem. Monitoring should be done at least monthly for a period of two years and then the monitoring program should be adjusted based on the results of the observations made.

3. Erosion protection for above the water level on the upstream slope of the earth embankment should be designed and constructed.

4. The tree and brush growth on the earth embankment should be removed by uprooting and the root zones should be carefully backfilled with selected soil, placed as directed by the engineer.

5. The condition of the concrete in the spillway and the spillway apron should be evaluated when no water is flowing over the spillway and repairs should be made, as necessary.

6. A detailed hydrologic and hydraulic analysis should be performed to determine the need for and means to provide additional project discharge capacity.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

1. The flashboards should be removed to provide additional spillway capacity.

2. The eroded area which exposes the core wall on the left embankment should be repaired.

3. A program of annual inspections by qualified, registered engineers should be instituted.

4. A formal operations and maintenance manual for the dam and operating facilities should be prepared.

5. A formal warning system should be put into effect and include monitoring of the dam during extremely heavy rains and procedures for notifying downstream authorities in the event of an emergency.

7.4 Alternatives

There are no practical alternatives to the above recommendations.

APPENDIX A

VISUAL CHECK LIST WITH COMMENTS

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT: East Brass Mill Dam

DATE: 11/29/79 TIME: 1:30 - 3:30 p.m. WEATHER: Sunny - 40's

W.S. ELEVATION: 370.75 U.S. N/A DN.S
0.1 ft. over flashboards

	PARTY	DISCIPLINE
1.	Donald L. Smith, P.E., Roald Haestad, Inc.	Civil/Hydrologist
2.	Ronald G. Litke, P.E., Roald Haestad, Inc.	Civil Engineer
3.	Gonzalo Castro, PhD, P.E., Geotechnical Engineers, Inc.	Geotechnical Engineer
4.	John W. France, P.E., Geotechnical Engineers, Inc.	Geotechnical Engineer
5.	Charles Stickney, Century Brass Products, Inc.	Owner's Representative
6.	E. B. Goss, Century Brass Products, Inc.	Owner's Representative

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam Embankment	GC, JWF	Irregular - Trees and Brush Present
	Intake Channel	GC, JWF	Channel Not Observable. Intake
2.	Outlet Works and Structure	RGL, DLS	Structure is Control Tower
	Transition		
3.	Outlet Works and Conduit	RGL, DLS	Not Observable
	(Gatehouse)	GC, JWF	
4.	Outlet Works Control Tower	RGL, DLS	Good Condition
	Outlet Structure	GC, JWF	Structure Opening
5.	Outlet Works and Channel	RGL, DLS	in Spillway Face
	Spillway Weir, App	GC, JWF	
6.	Outlet Works and Disch. Channel	RGL, DLS	Some concrete deterioration
7.			
8.			
9.			
10.			
11.			
12.			

PERIODIC INSPECTION CHECK LIST

PROJECT: East Brass Mill Dam DATE: 11/29/79

PROJECT FEATURE: Right Dam Embankment NAME: GC

DISCIPLINE: Geotechnical Engineer NAME: JWF

AREA ELEVATION	CONDITIONS
DAM EMBANKMENT	
CREST ELEVATION	375±
CURRENT POOL ELEVATION	370.75
MAXIMUM IMPOUNDMENT TO DATE	August 1955 Flood overtopped por- 375.2 tion at left embankment
SURFACE CRACKS	None observed
PAVEMENT CONDITION	N/A
MOVEMENT OR SETTLEMENT OF CREST	Too irregular to judge
LATERAL MOVEMENT	Too irregular to judge
VERTICAL ALIGNMENT	Too irregular to judge
HORIZONTAL ALIGNMENT	Too irregular to judge
CONDITION AT ABUTMENT AND AT CONCRETE STRUCTURES	Seepage and erosion at right spillway wall
INDICATIONS OF MOVEMENT OF STRUCTURAL ITEMS ON SLOPES	N/A
TRESPASSING ON SLOPES	Several footpaths
VEGETATION ON SLOPES	Trees and bushes on both slopes
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	None observed except at right spi right spillway wall
ROCK SLOPE PROTECTION - RIPRAP FAILURES	Riprap below water appears good. No riprap above water level, some erosion.
UNUSUAL MOVEMENT OR CRACKING AT OR NEAR TOES	None observed
EMBANKMENT OR DOWNSTREAM SEEPAGE	Along toe, particularly at spillway wall.
PIPING OR BOILS	None observed
FOUNDATION DRAINAGE FEATURES	None known
TOE DRAINS	Pipe discharging at spillway possibly a toe drain discharge (45-50 gpm).
INSTRUMENTATION SYSTEM	None known

PERIODIC INSPECTION CHECK LIST

PROJECT: East Brass Mill Dam DATE: 11/29/79

PROJECT FEATURE: Outlet Works - Intake Channel and Structures NAME: GC, JWF

DISCIPLINE: Geotechnical and Civil Engineers NAME: RGL, DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
A. APPROACH CHANNEL:	Not observable
SLOPE CONDITIONS	
BOTTOM CONDITIONS	
ROCK SLIDES OR FALLS	
LOG BOOM	
DEBRIS	
CONDITION OF CONCRETE LINING	
DRAINS OR WEEP HOLES	
B. INTAKE STRUCTURE:	Intake Structure is gatehouse or control tower
CONDITION OF CONCRETE	Good
STOP LOGS AND SLOTS	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: East Brass Mill Dam DATE: 11/29/79

PROJECT FEATURE: Outlet Works - Transition and Conduit NAME: DLS

DISCIPLINE: Civil Engineer NAME: RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - TRANSITION AND CONDUIT	Could not be observed
GENERAL CONDITION OF CONCRETE	
RUST OR STAINING ON CONCRETE	
SPALLING	
EROSION OR CAVITATION	
CRACKING	
ALIGNMENT OF MONOLITHS	
ALIGNMENT OF JOINTS	
NUMBERING OF MONOLITHS	

COMMENTS: Conduits consist of two 24-inch cast iron pipes and 2'-3" high x 4'-0" wide concrete sluiceway from Control Tower to downstream face of spillway.

PERIODIC INSPECTION CHECK LIST

PROJECT: East Brass Mill Dam (Gatehouse) DATE: 11/29/79

PROJECT FEATURE: Outlet Works - Control Tower NAME: RGL

DISCIPLINE: Civil Engineers NAME: DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - CONTROL TOWER	
A. CONCRETE AND STRUCTURAL:	
GENERAL CONDITION	Good
CONDITION OF JOINTS	None observed
SPALLING	None observed
VISIBLE REINFORCING	None observed
RUSTING OR STAINING OF CONCRETE	Some present on left wall below window and on D.S. wall below steel door
ANY SEEPAGE OR EFFLORESCENCE	None observed
JOINT ALIGNMENT	No joints observed
UNUSUAL SEEPAGE OR LEAKS IN GATE CHAMBER	Chamber was full of water at time of inspection
CRACKS	None observed
RUSTING OR CORROSION OF STEEL	None observed
B. MECHANICAL AND ELECTRICAL:	
AIR VENTS	N/A
FLOAT WELLS	N/A
CRANE HOIST	N/A
ELEVATOR	N/A
HYDRAULIC SYSTEM	N/A
SERVICE GATES	Both reported in working condition; not operated at time of inspection.
EMERGENCY GATES	N/A
LIGHTNING PROTECTION SYSTEM	N/A
EMERGENCY POWER SYSTEM	N/A
WIRING AND LIGHTING SYSTEM IN GATE CHAMBER	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: East Brass Mill Dam DATE: 11/29/79

PROJECT FEATURE: Outlet Works - Outlet Structure and Channel NAME: GC, JWF

DISCIPLINE: Geotechnical and Civil Engineers NAME: RGL, DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Outlet on downstream face of spillway
GENERAL CONDITION OF CONCRETE	Minor spalling or deterioration of concrete on spillway weir and apron
RUST OR STAINING	None observed
SPALLING	Some spalling
EROSION OR CAVITATION	Irregular flow pattern at discharge may indicate erosion
VISIBLE REINFORCING	None observed
ANY SEEPAGE OR EFFLORESCENCE	None observed
CONDITION AT JOINTS	None observed
DRAIN HOLES	N/A
CHANNEL	Natural streambed
LOOSE ROCK OR TREES OVERHANGING CHANNEL	Some trees, not significant
CONDITION OF DISCHARGE CHANNEL	Good

PERIODIC INSPECTION CHECK LIST

PROJECT: East Brass Mill Dam DATE: 11/29/79

PROJECT FEATURE: Outlet Works - Spillway Weir, Approach and Discharge Channels NAME: GC, JWF

DISCIPLINE: Geotechnical and Civil Engineers NAME: RGL, DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
A. APPROACH CHANNEL:	Reservoir
GENERAL CONDITION	Good
LOOSE ROCK OVERHANGING CHANNEL	None
TREES OVERHANGING CHANNEL	None
FLOOR OF APPROACH CHANNEL	Not observed
B. WEIR AND TRAINING WALLS:	Heavy flow of water at time of inspection.
GENERAL CONDITION OF CONCRETE	Good
RUST OR STAINING	None observed
SPALLING	Some minor deter. or spalling of conc. on weir and at end of left spillway wall
ANY VISIBLE REINFORCING	None observed
ANY SEEPAGE OR EFFLORESCENCE	None observed
DRAIN HOLES	None observed
C. DISCHARGE CHANNEL:	Natural streambed
GENERAL CONDITION	Good
LOOSE ROCK OVERHANGING CHANNEL	None of significance
TREES OVERHANGING CHANNEL	Some trees, not significant
FLOOR OF CHANNEL	Could not be observed
OTHER OBSTRUCTIONS	None

APPENDIX B

ENGINEERING DATA

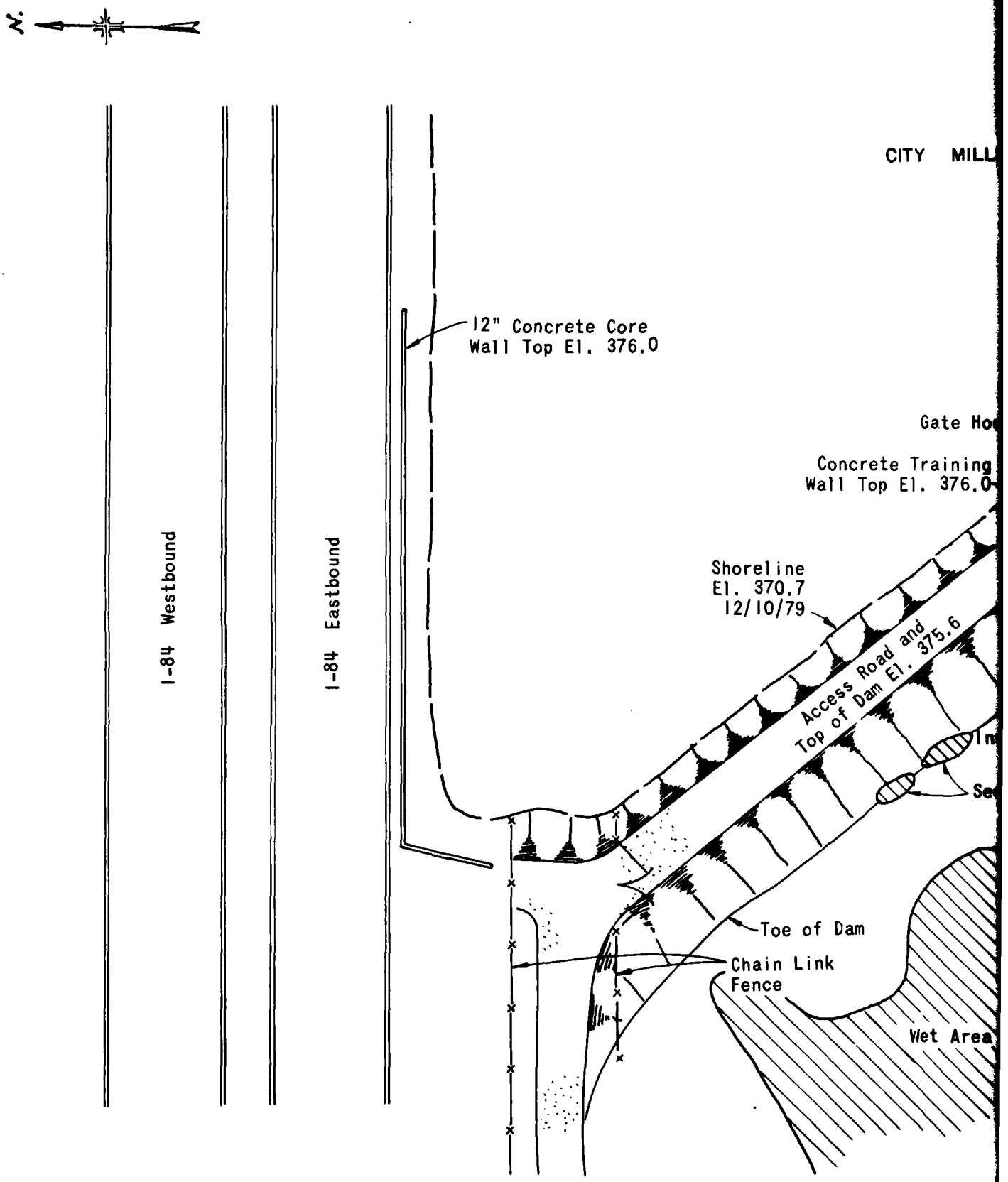
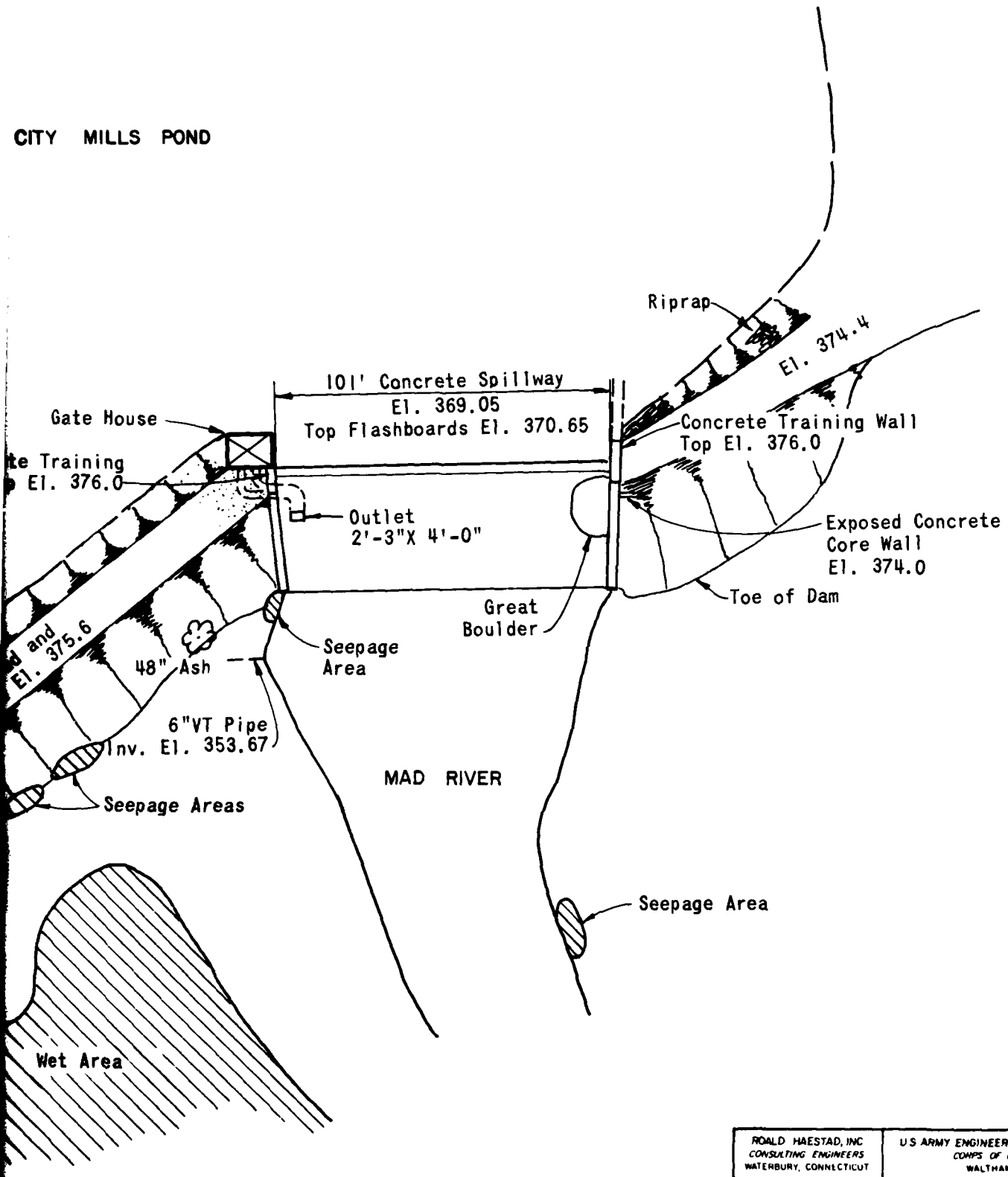

N
I-84 Westbound
I-84 Eastbound
12" Concrete Core
Wall Top El. 376.0
Concrete Training
Wall Top El. 376.0
Shoreline
El. 370.7
12/10/79
Access Road and
Top of Dam El. 375.6
Toe of Dam
Chain Link
Fence
Wet Area

FIGURE 2



ROALD HAESTAD, INC CONSULTING ENGINEERS WATERBURY, CONNECTICUT	U.S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

EAST BRASS MILL DAM

DRAWN	CHECKED	APPROVED	SCALES 1" = 40'	
JRS	DLS		DATE FEB 1980	PAGE B-1

LIST OF REFERENCES

The following reference is located at Century Brass Products Inc., 59 Mill Street, Waterbury, Connecticut:

1. Plan and Sections "North Abutment Gate Chamber, East Brass Mill Dam", The Scovill Manufacturing Company, July 1915.

The following reference is located at the Anaconda American Brass Company, 414 Meadow Street, Waterbury, Connecticut:

2. Design Plans "Masonry Dam", The American Brass Company, Sheet C149 and Sheets C149-1 through C149-5, December 1913.

The following reference is located at the Connecticut Department of Transportation, 24 Wolcott Hill Road, Wethersfield, Connecticut:

3. Plan, Profile, and Sections "Waterbury Expressway" (Interstate 84), Connecticut Department of Transportation, Sheets 13 through 18, and Sheets 66 and 67, 1958.

The following references are located at the Department of Environmental Protection, Office of the Superintendent of Dams, State Office Building, Hartford, Connecticut:

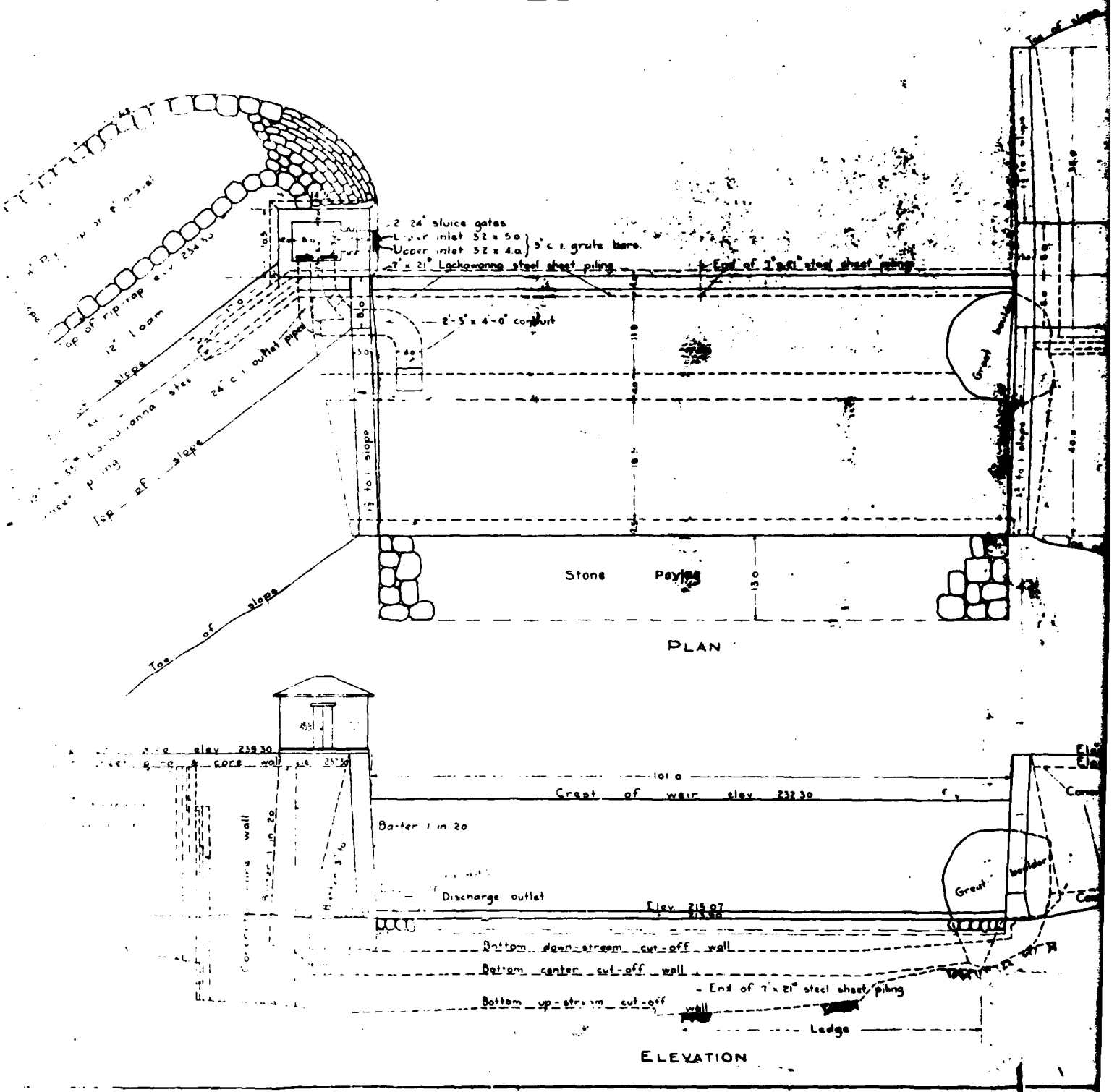
4. As-built Plan, Elevation and Section "East Brass Mill Dam, The American Brass Co., Built by the Scovill Mfg. Co." January 27, 1916

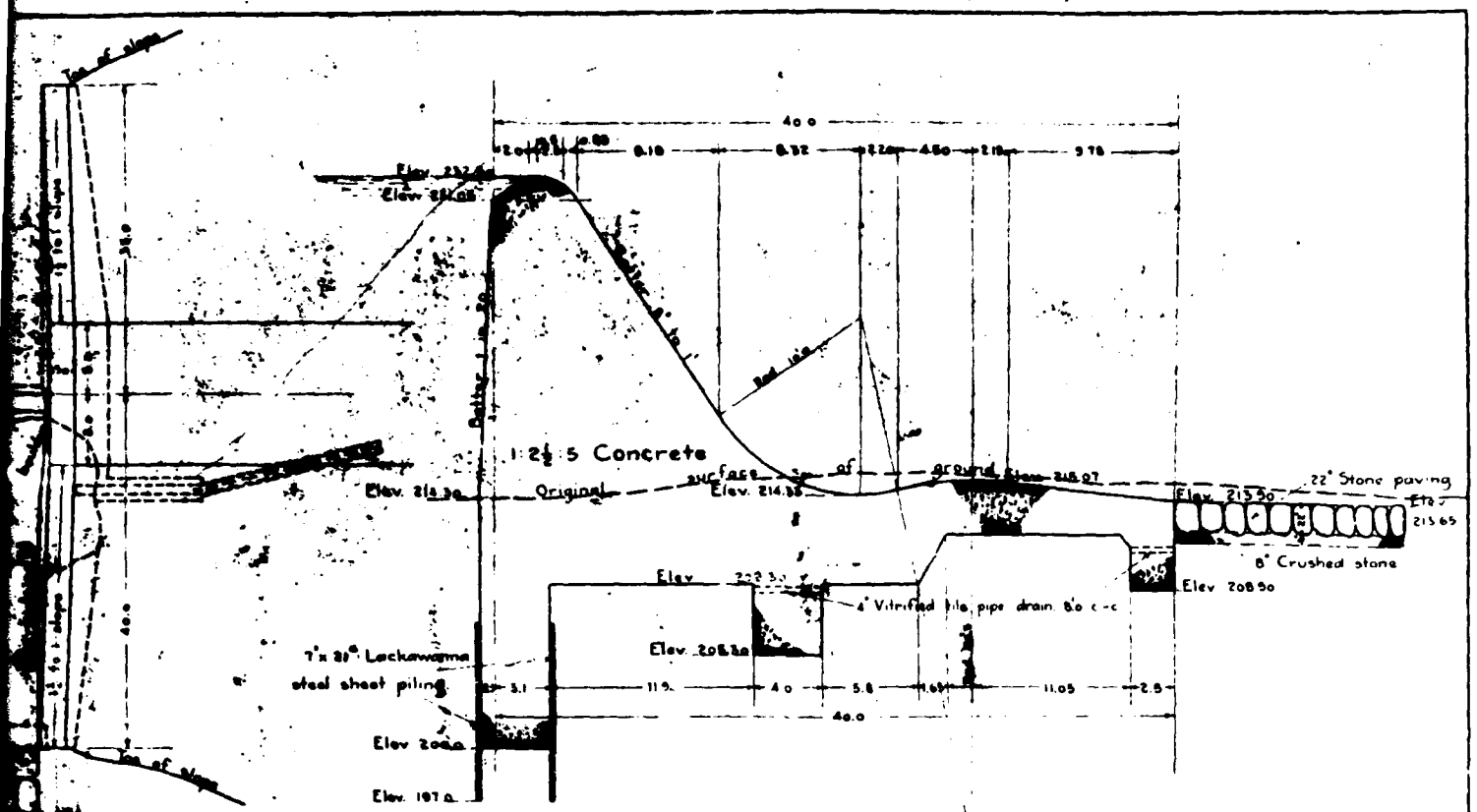
5. Letter from Scovill Manufacturing Company to Mr. William S. Wise, State Board of Supervision of Dams, January 20, 1956, Application for Construction Permit for Repairs to Dam.

6. Letter from V. B. Clarke, Member, State Board of Supervision of Dams, to Mr. Hemingway Merriman, Scovill Manufacturing Company, March 15, 1956 concerning spillway capacity of East Brass Mill Dam.

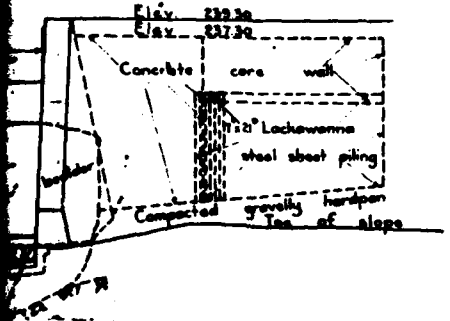
7. Letter from M. R. A. Norton of the Connecticut Highway Department to Mr. W. T. Shuler, April 17, 1956, Recommendations for strengthening Earth Dam at Scovill Pond, Waterbury.

8. Letter from Mr. John Curry, Chief Engineer, State Board of Supervision of Dams, to Mr. Vincent B. Clark, Member, State Board of Supervision of Dams, May 29, 1956, concerning repairs to dam and spillway inadequacy.


2 24' sluice gates
Lower inlet 5'2 x 5.0
Upper inlet 5'2 x 4.0
3' c. i. grate bars.
7' x 21' Lackawanna steel sheet piling
End of 7' x 21' steel sheet piling
2'-3" x 4'-0" conduit
Top of slope
Stone Paving
PLAN
Crest of weir elev 232.30
Batter 1 in 20
Discharge outlet
Elev 215.07
Bottom down-stream cut-off wall
Bottom center cut-off wall
Bottom up-stream cut-off wall
End of 7' x 21' steel sheet piling
Ledge
ELEVATION



TYPICAL SECTION
¼" to 1'



NOTE: ELEVATIONS SHOWN ARE BASED ON CITY OF WATERBURY DATUM

CITY OF WATERBURY DATUM + 136.75 = NGVD

THE AMERICAN BRASS CO.
BUILT BY
THE SCOVILL MFG. CO.

EAST BRASS MILL DAM

Scale ⅛" to 1' Jan. 27, 1916.

NOT TO SCALE

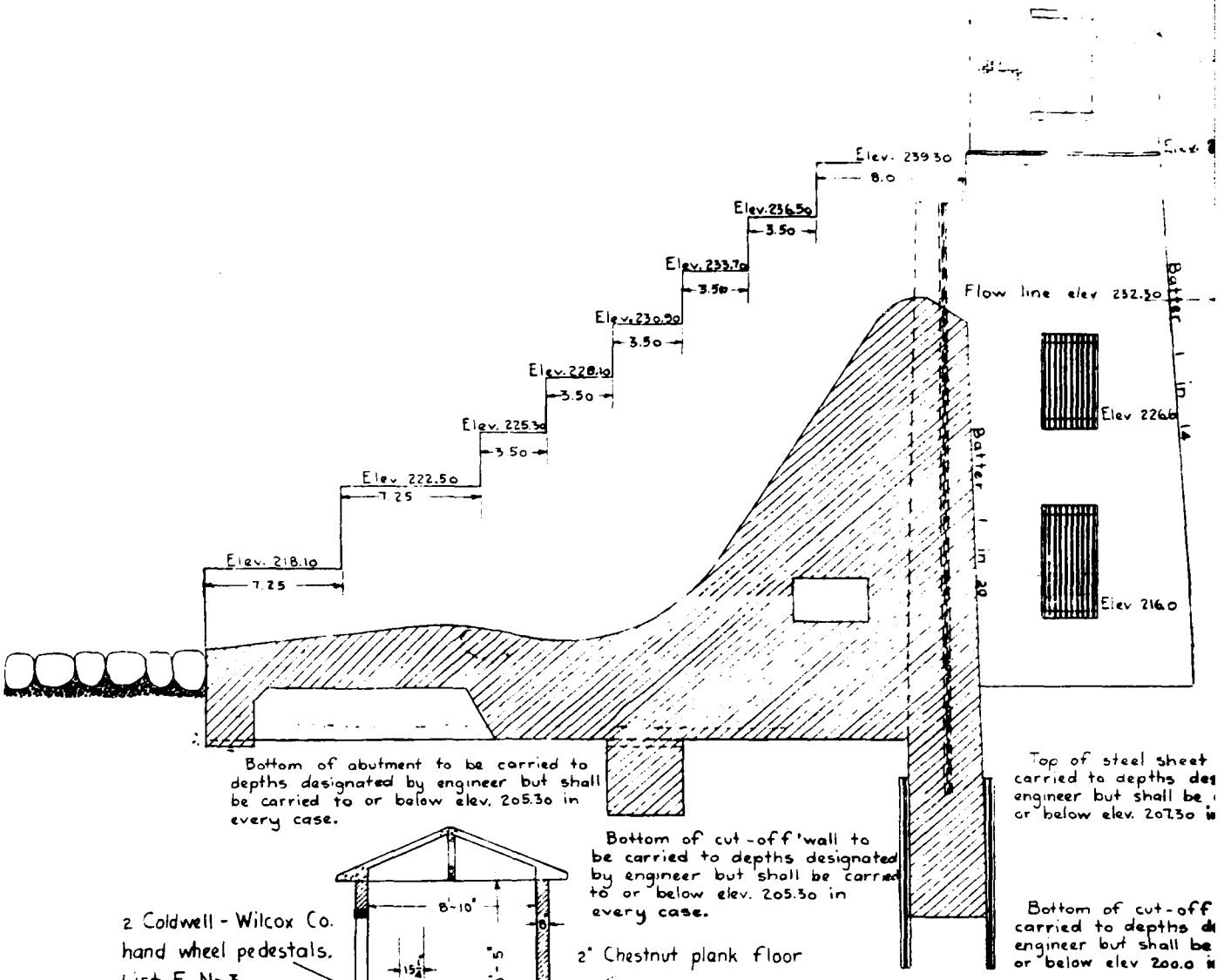
R. A. Cairns, Chief Engineer
I. F. Story, Resident Engineer
William G. Smith
State Inspector of Dams

— CERTIFICATE —

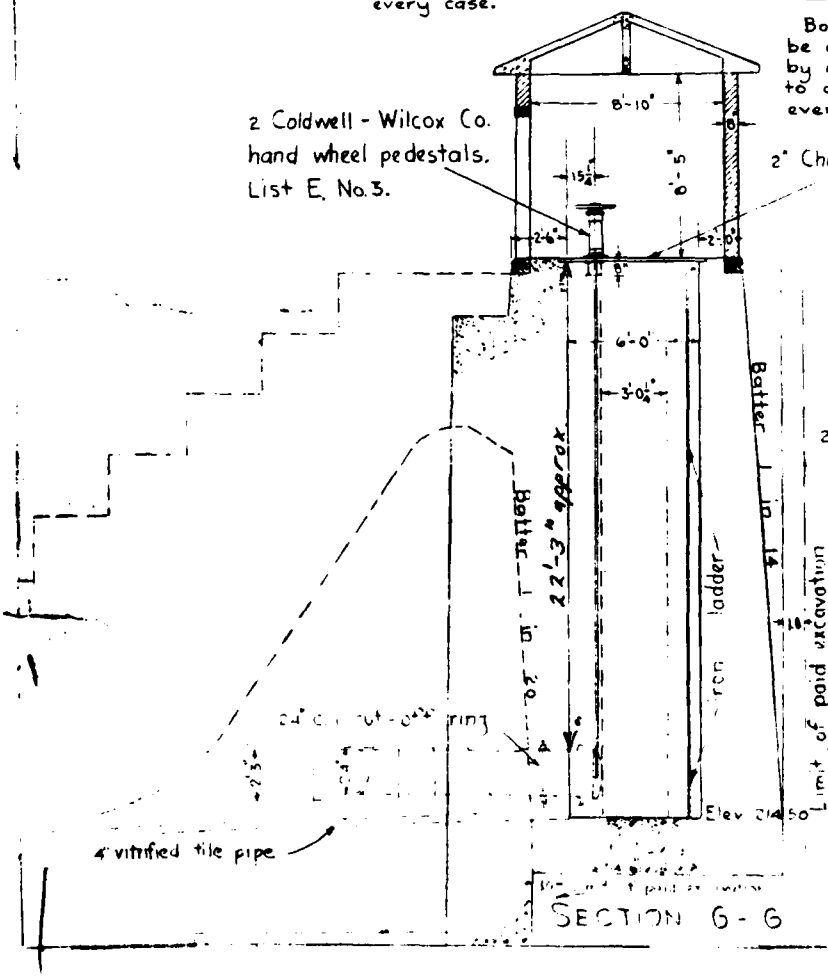
I hereby certify that this plan represents the dam as constructed, to the best of my knowledge and belief.

_____ Inspector

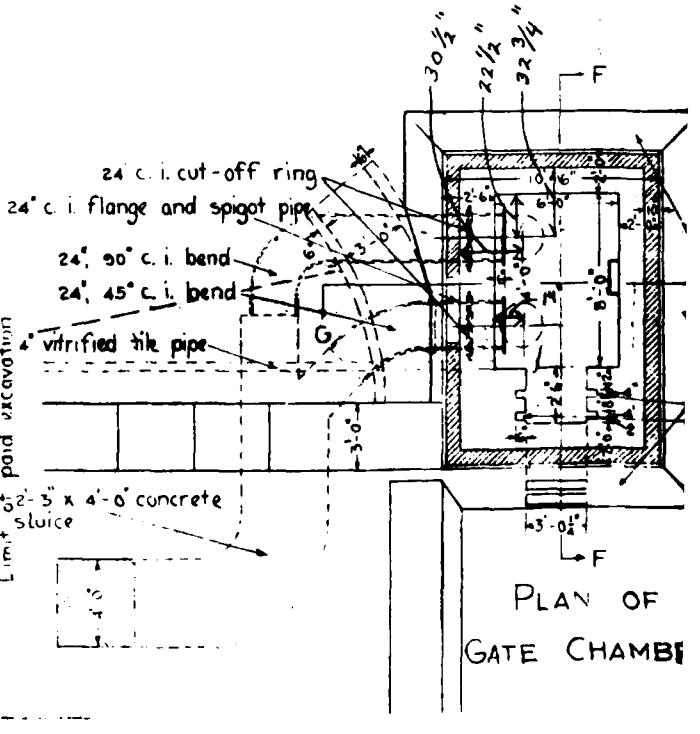
2



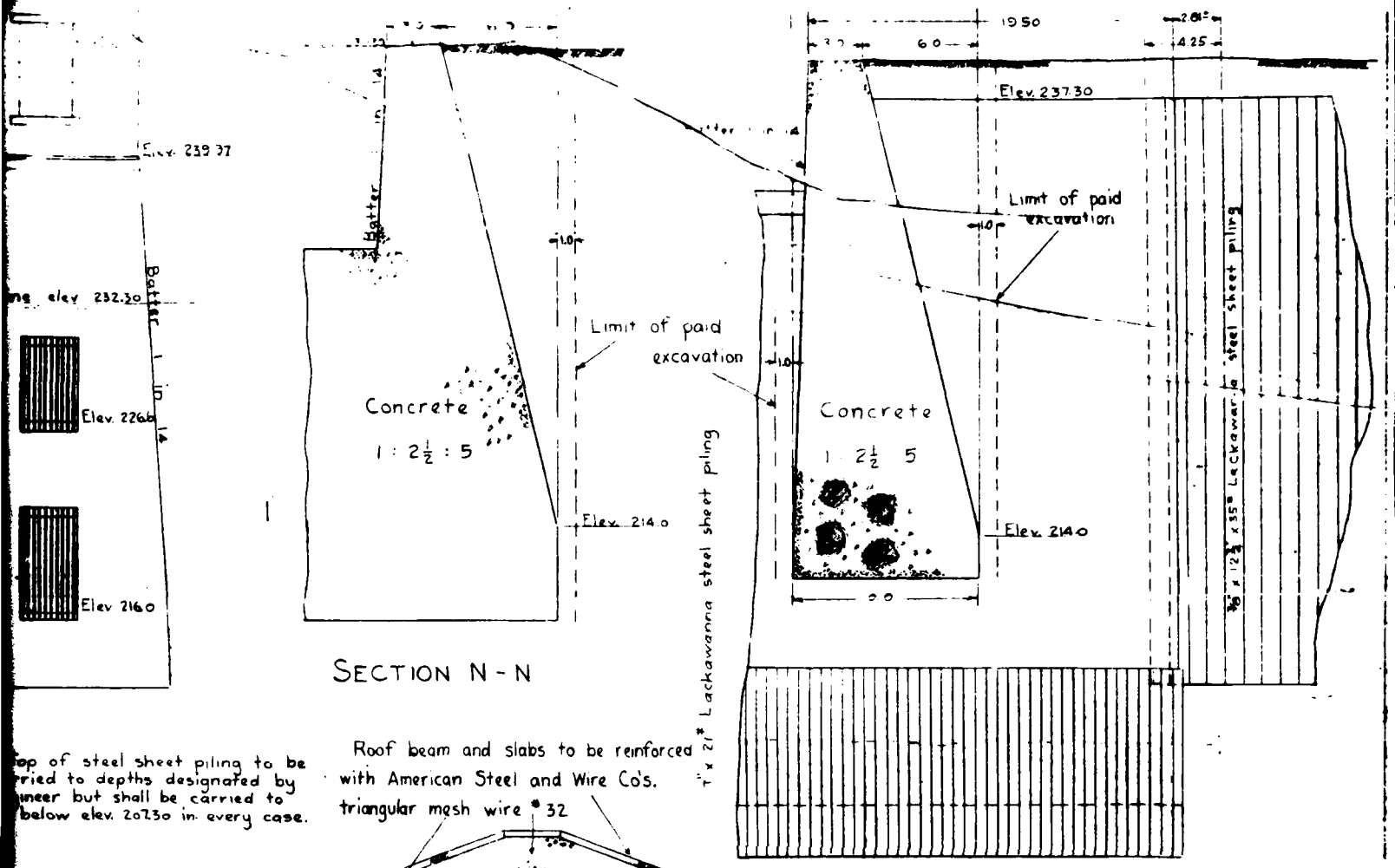
SECTION L - L NORTH ABUTMENT



SECTION G - G



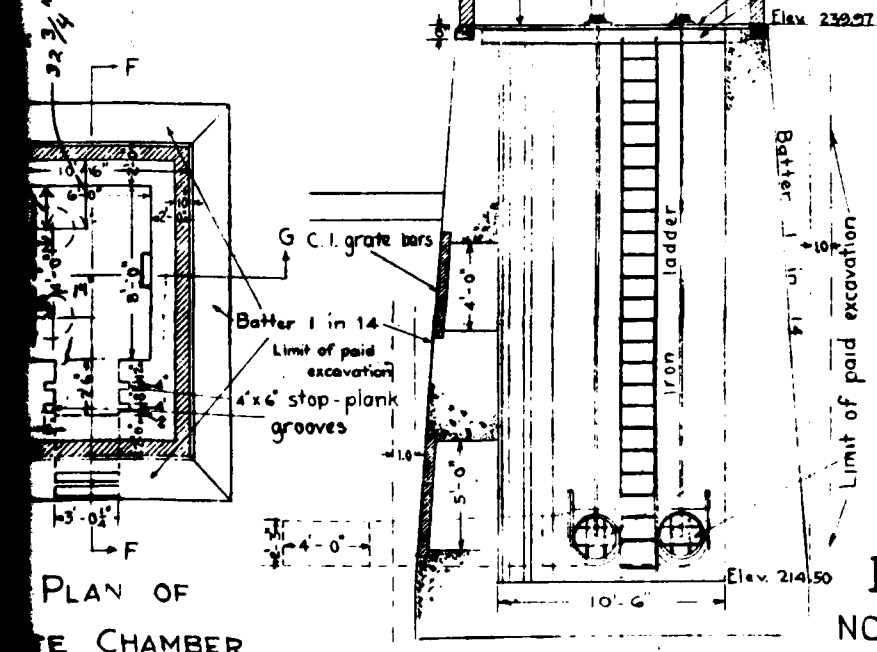
PLAN OF GATE CHAMBE



op of steel sheet piling to be ried to depths designated by ineer but shall be carried to below elev. 207.30 in every case.

ttom of cut-off wall to be ried to depths designated by ineer but shall be carried to below elev 200.0 in every case.

ABUTMENT



PLAN OF E CHAMBER

Roof beam and slabs to be reinforced with American Steel and Wire Co's. triangular mesh wire # 32

SECTION F - F

NORTH ABUTMENT

Note – Iron work to be furnished by the Company and placed by the Contractor as directed.

NOTE:
ELEVATIONS SHOWN ARE BASED ON CITY OF WATERBURY DATUM
CITY OF WATERBURY DATUM +136.75 = NGVD

2, 24" Coldwell - Wilcox Co circular rising stem sluice gates, List. H.

HALF SIZE

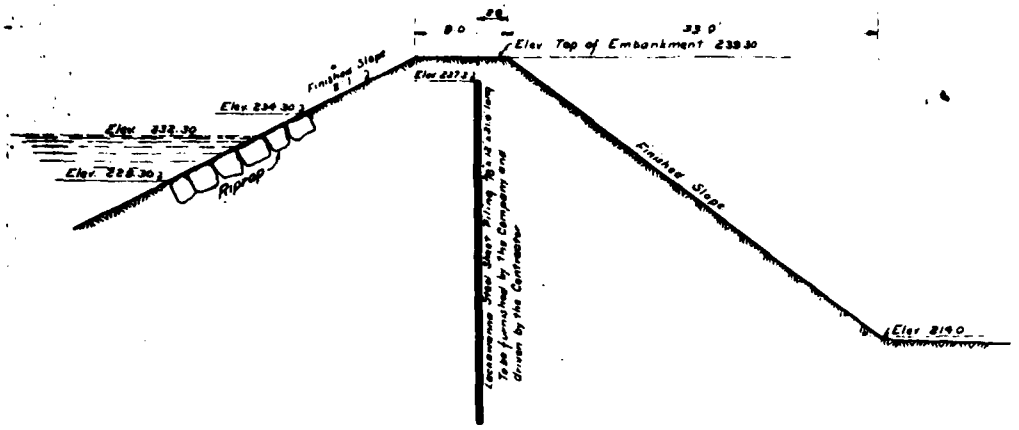
THE SCOVILL MFG. CO.

EAST BRASS MILL DAM

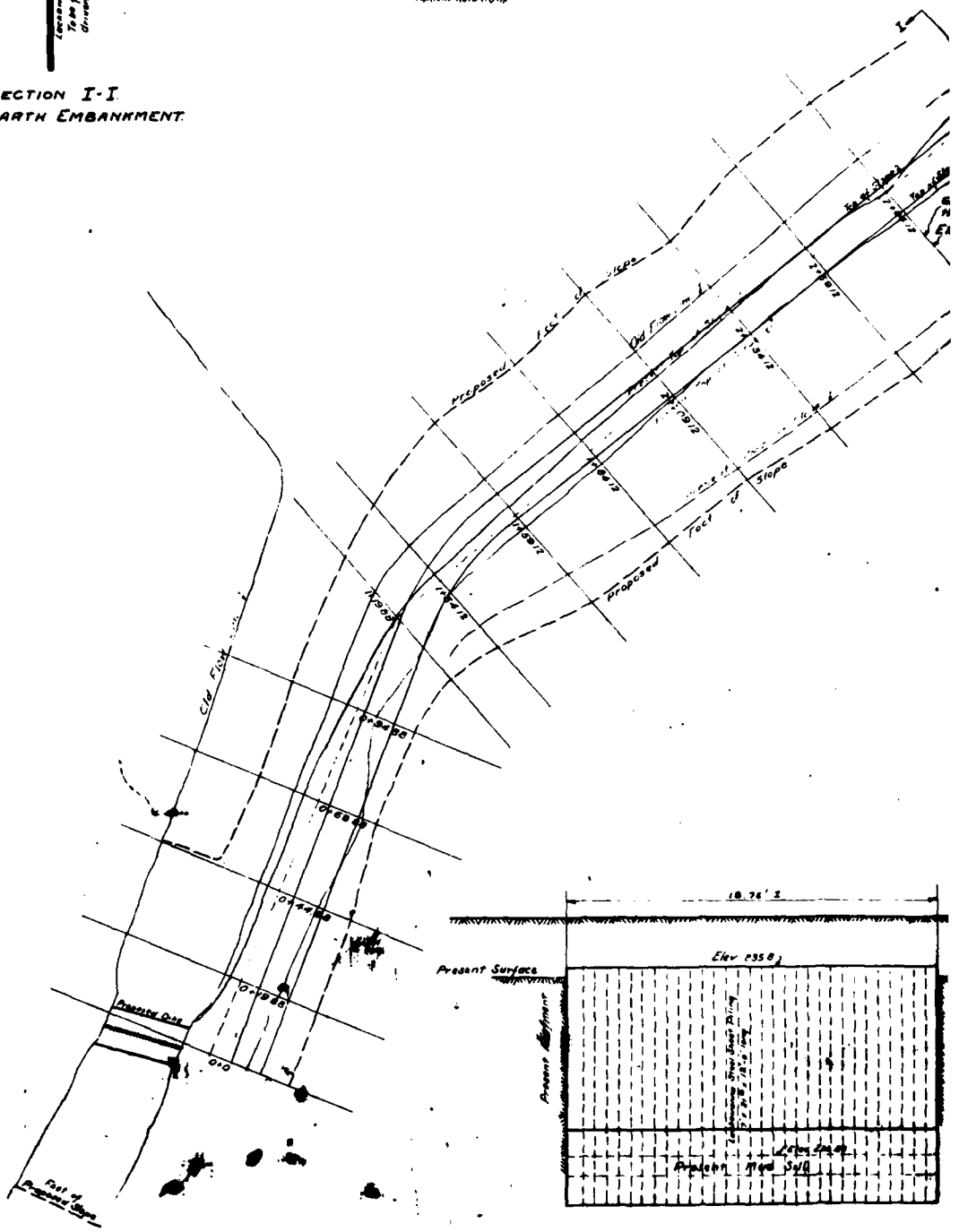
NORTH ABUTMENT & GATE CHAMBER

Scale ¼" to 1' - 897D6 July 1915

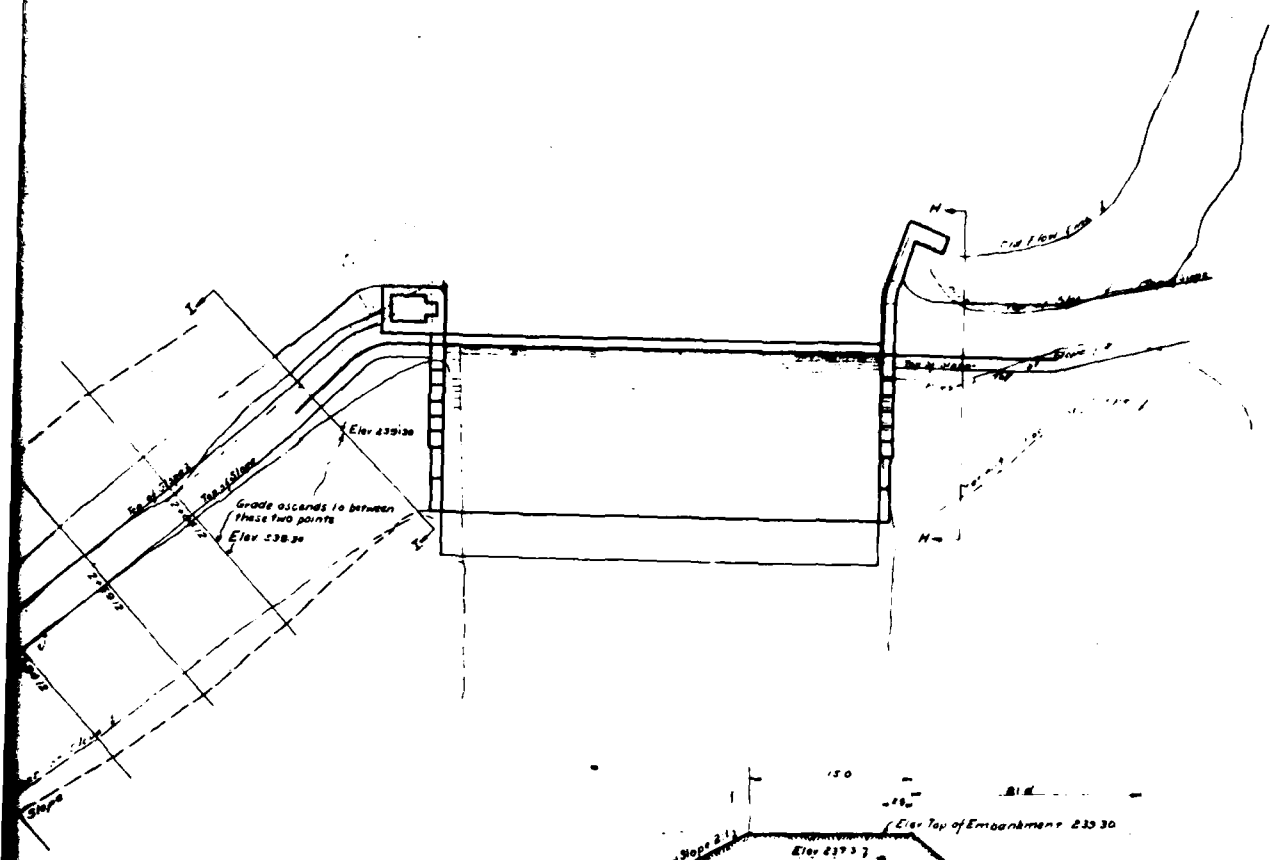
B-4

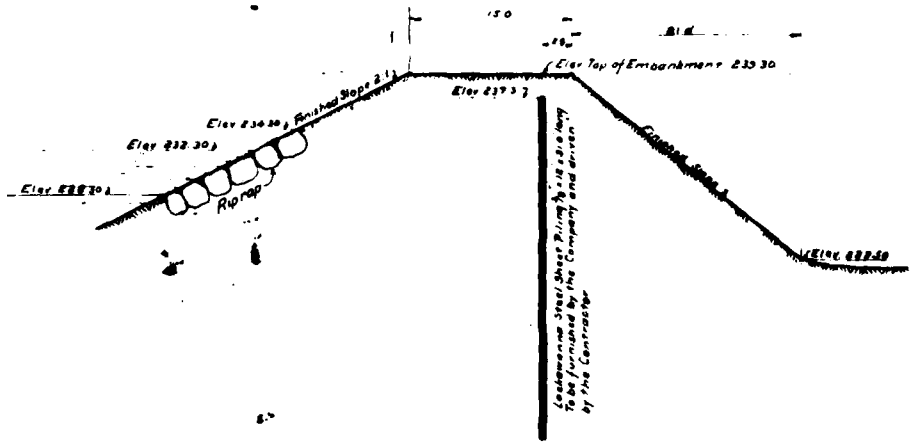


SECTION I-I
EARTH EMBANKMENT

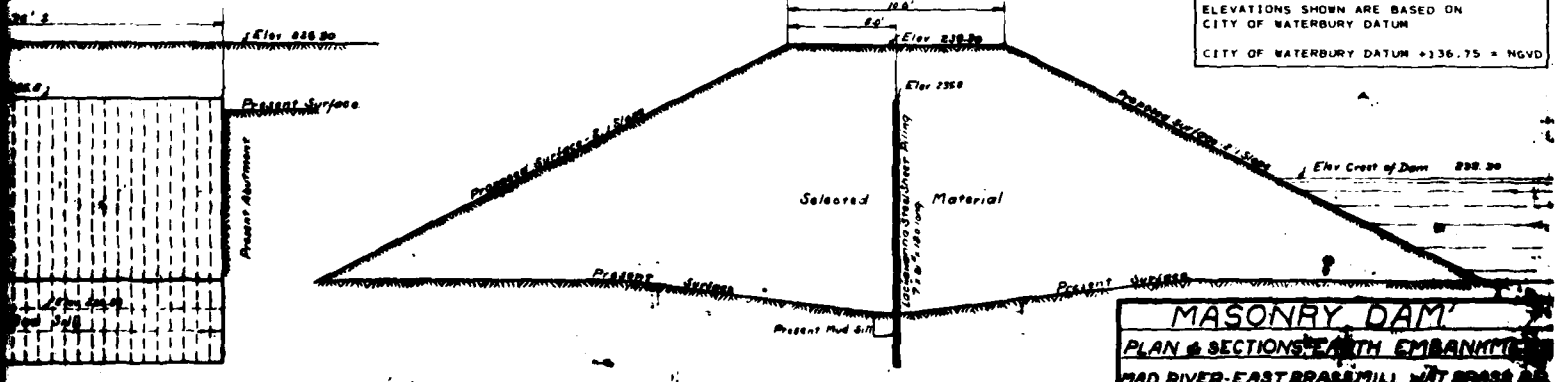


ELEVATION OF PROPOSED DIKE AT
OLD SLUICE GATE SITE





SECTION H-H
EARTH EMBANKMENT



NOTE:

ELEVATIONS SHOWN ARE BASED ON CITY OF WATERBURY DATUM

CITY OF WATERBURY DATUM +136.75 = NGVD

SECTION THRU DIKE AT OLD SLUICE GATE SITE - LOOKING NORTH.

HALF SIZE

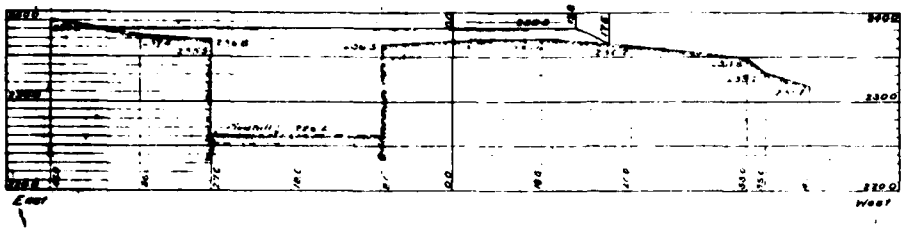
MASONRY DAM

PLAN & SECTIONS EARTH EMBANKMENT

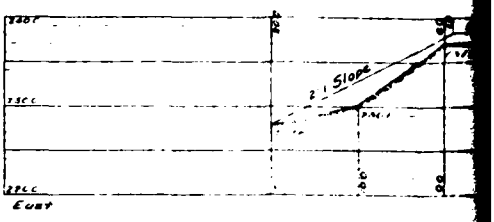
MAD RIVER-EAST BRASSMILL, NAT. BRASS CO.

THE AMERICAN BRASS CO.
ENGINEERING DEPT.

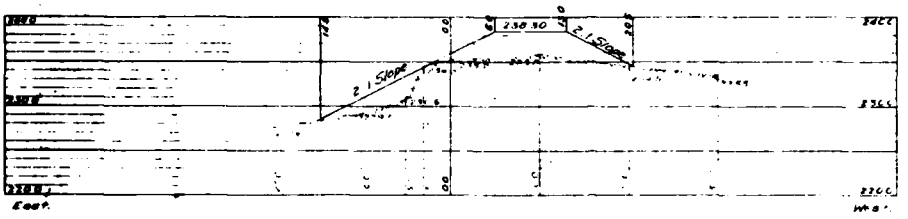
DRAWN BY
TRACED "
CHECKED "
APPROVED "
SCALE



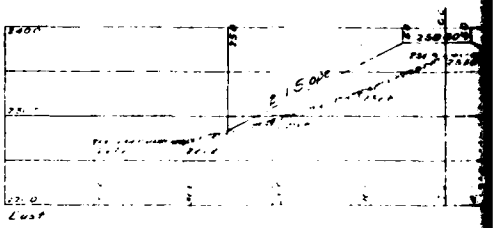
Station 0+0



Station 1+



Station 0+19.88



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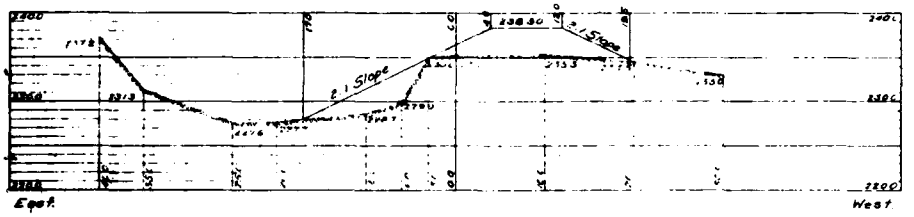

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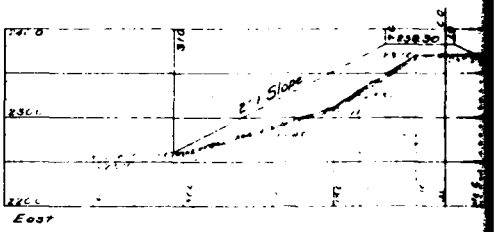
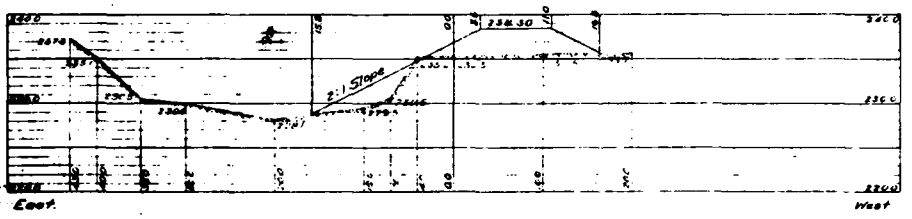
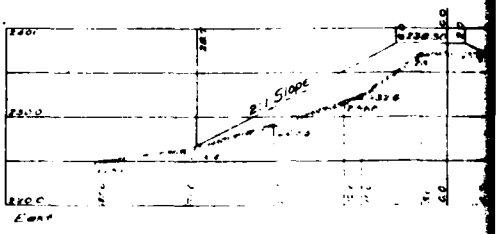


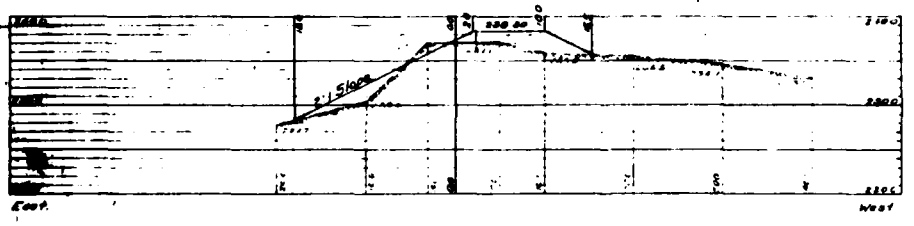
Station 1+



Station 0+69.88



Station 1+



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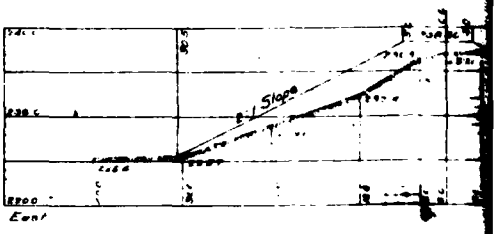
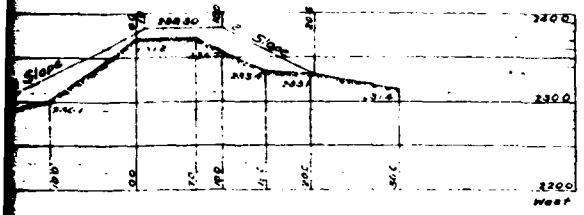
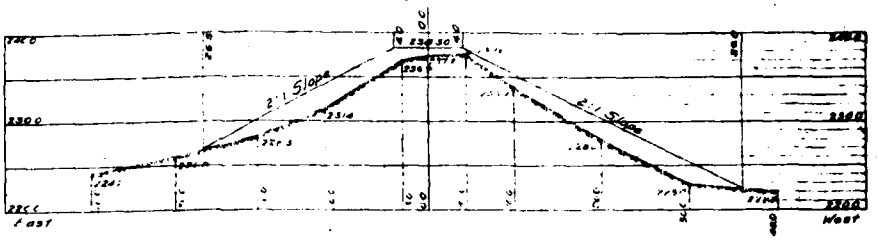


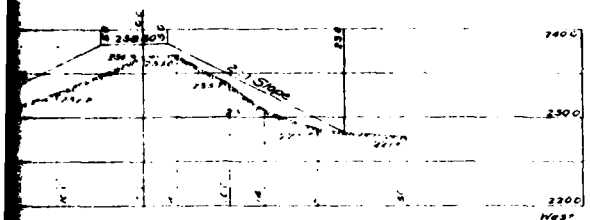
Station 2+



Station 1+19.88



Station 2+34.12



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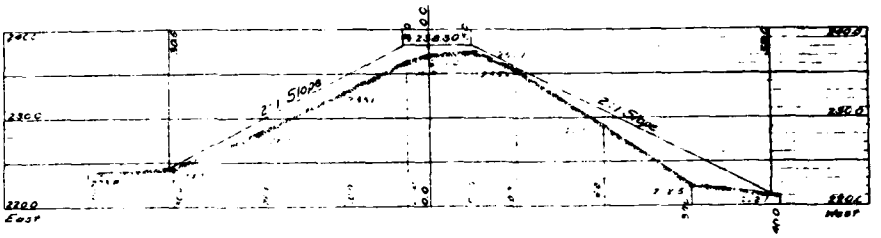

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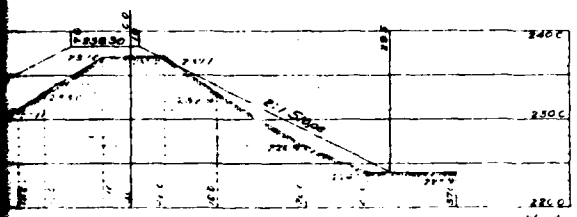
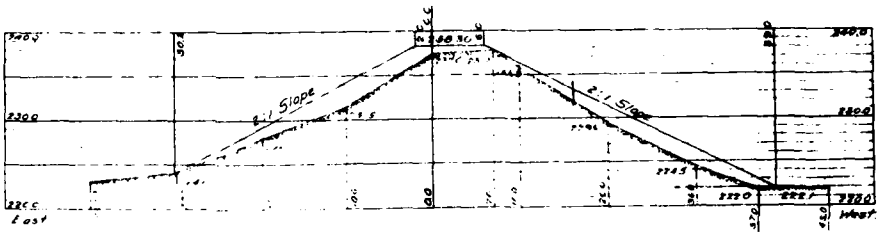


Station 1+59.12



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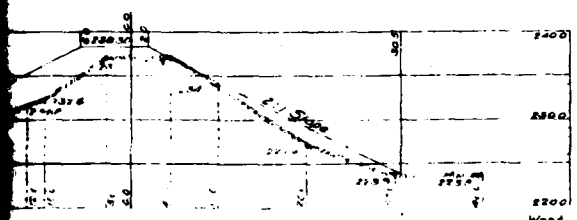

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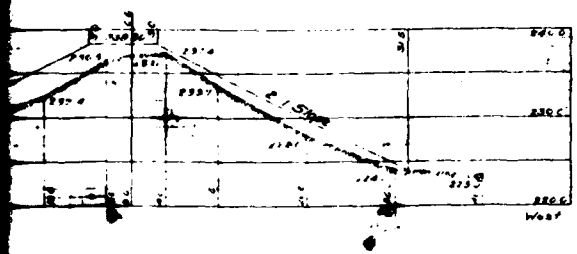


Station 2+09.12

NOTE:

ELEVATIONS SHOWN ARE BASED ON CITY OF WATERBURY DATUM

CITY OF WATERBURY DATUM +136.75 = NGVD

MASONRY DAM

SECTIONS OF EARTH EMBANKMENT

MAD RIVER-EAST BRASS MILL-WAT.

THE AMERICAN BRASS CO.

ENGINEERING DEPT.

DRAWN BY GGS DATE

TRACED "

CHECKED "

APPROVED "

SCALE 1" = 10 FT

2

HALF SIZE

SCOVILL MANUFACTURING COMPANY

WATERBURY, CONNECTICUT

January 20, 1956

Mr. William S. Wise
State Board of Supervision of Dams
317 State Office Building
Hartford 15, Connecticut

Dear Mr. Wise:

I wish to thank you a great deal for giving so much time and attention to the problem of our Brass Mill Dam so-called when we visited with you in Hartford last week.

In accordance with the suggestions given to us, we are enclosing, in triplicate, an application for construction permit as required under Section 4731 of the General Statutes for certain repairs adjacent to the aforesaid Dam.

As you will recall, our Dam suffered no damage during the floods of August or October but the waters did overflow at the south abutment. We wish to do something to correct the situation but understand that before anything is done our application will have to be acted upon. In connection with this I am also enclosing three copies of each of the following prints:

1. American Brass Company built by Scovill Manufacturing Company, dated January 27, 1916.

2. Map of East Brass Mill Pond for Scovill Manufacturing Company, dated November 30, 1935.

If you have any additional questions or if there is any material required in addition to the enclosed, kindly let me know.

Sincerely,

SCOVILL MANUFACTURING COMPANY

Hemiway Merriman
Secretary

HM:HOB
Encs.

STATE BOARD OF SUPERVISION OF DAMS

APPLICATION FOR CONSTRUCTION PERMIT
As required under Section 4731 of General Statutes

THIS APPLICATION TO BE SUBMITTED IN TRIPLICATE ..

Date January 20, 1956

Owner Scovill Manufacturing Company

Tel. No. Plaza 4-1171

P. O. Address 99 Mill St.

Waterbury, Conn.

Location of Structure:
Town Waterbury Shown on USGS Quadrangle

Name of Stream Mad River at inches south of Lat.
north
abd inches east of Long.
west

Directions for reaching site from nearest village or route intersection:
(See sketch on reverse side)
Dam located northwest of and below Harpers Ferry Road near intersection with Route 69 (Hamilton Avenue), enter from Route 69 on Idylwood Avenue for 500', then follow bed for 1000 feet to dam.

This is an application for: ~~(New Construction)~~ (Alteration) (Repair) (Removal)
(describe project)

This pond is to be used for: Industrial water supply

Dimensions of pond: width varies length varies area 723,000 sq. ft.

Depth of water below spillway level: Eighteen feet (18')

Total length of dam: Three hundred and seventy feet (370')

Length of spillway: One hundred and one feet (101')

Height of abutments above spillway: Seven feet (7')

Type of spillway construction: Concrete masonry

Type of dyke construction: Earth with conc. core wall and sheet piling

Character of soil in river bed at spillway location: Ledge and soil

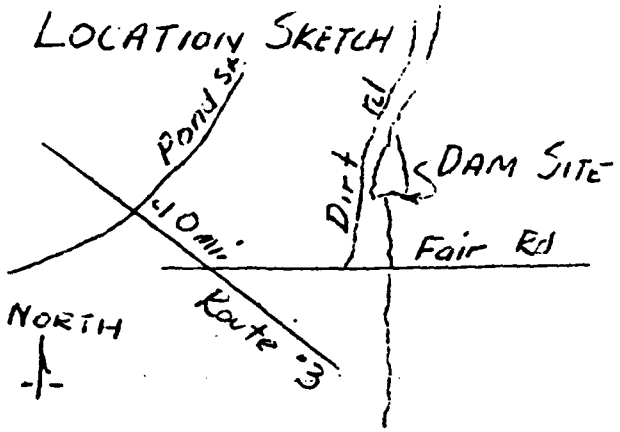
Remarks: No record available of extent of ledge or nature of soil

SCOVILL MANUFACTURING COMPANY

Note: Show details of construction on reverse side.

Signed by Secretary

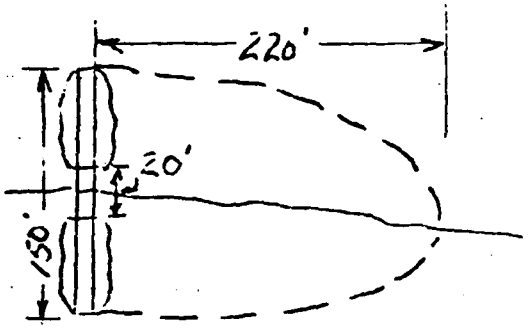
SAMPLE DATA
LOCATION SKETCH



APPLICANT'S DATA
LOCATION SKETCH

See photostat of map attached

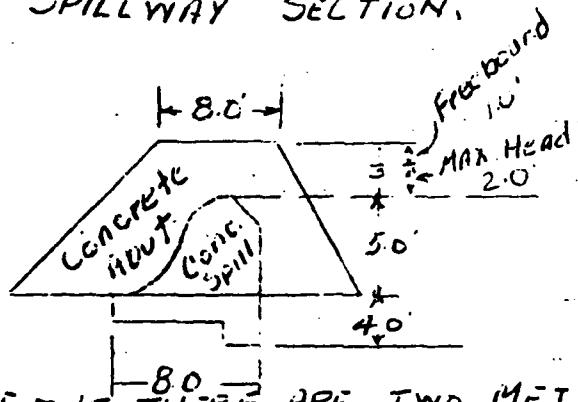
SITE PLAN



SITE PLAN

See photostat of map of East Brass Mill Pond submitted with this application.

SPILLWAY SECTION.

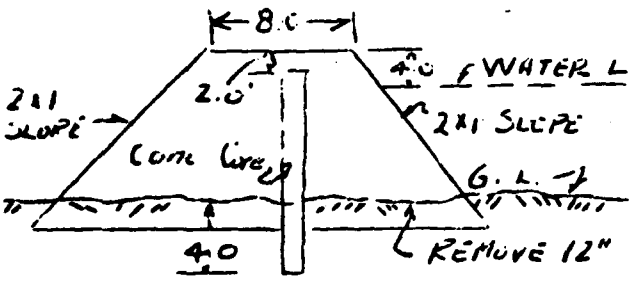


SPILLWAY SECTION

See photostat of drawing for East Brass Mill Dam submitted with this application.

NOTE → IF THERE ARE TWO METHODS OF DISCHARGE SHOW BOTH

DIKE SECTION



DIKE SECTION

See photostat of drawing for East Brass Mill Dam submitted with this application.

COPY

STATE OF CONNECTICUT

State Board for the Supervision of Dams

March 15, 1956

Scovill Manufacturing Company
Hemingway Merriman, Secretary
Waterbury, Connecticut

Re: East Brass Mill Pond

Dear Mr. Merriman:

With reference to our conference about a week ago and your application concerning the repairing of the dam at East Brass Mill Pond, would say that I have given the matter quite a little thought and as a result it is my opinion that the State Highway Department should either raise the elevation of their pavement opposite the North end of the dam about 3-ft. or it might be that they could construct a dyke that would answer the same purpose.

Checking the watershed area for this dam I find the same to be 23.4 sq. miles and that the average slope factor is about 55-ft. per mile. Using what I would consider as they very minimum flood flow, I arrive at a figure of about 5500 cu. ft. per second. The capacity of the spillway with a 5-ft. head or a flow up to elevation 237.30 (37416 by the State Highway Datum) is only 3400 cu. ft. per second. I do not seem to have the distance from the South abutment of the spillway to the South embankment but I would say it would probably be 40 or 50 feet. Even though it were 100 ft. in length and allowing for a one foot flow for the same, it would still not give you anywhere near spillway or overflow capacity enough. Really the State Highway Department has created quite a problem for you.

If I can be of assistance with further information, do not hesitate to call upon me.

Very truly yours,

/s/ V. B.Clarke
V. B. Clarke, Member
State Board for the Supervision of Dams

VBC:O

mhc

Recommendations for Strengthening Earth Dam
at Scovill Pond, Waterbury

4-17-56

Mr. H. T. Schuler

R. A. Norton

On Wednesday, April 11, 1956, I attended a meeting with representatives of the Scovill Company in the office of the State Water and Flood Control Commission in connection with proposed repairs and modifications to Scovill Dam on Mad River, City of Waterbury. This dam was overtopped during the flood of August 1955 and was on the point of failure, as outlined in my memo dated 1-17-56 to Mr. Ralph Hager.

Measurements taken by Highway Department field forces show that the ground surface at the low spot in the dam on the south side is 3' below the top of the concrete endwall of the spillway. It is the intention of the Scovill Company to restore the earth dam to its original design elevation, which was flush with the top of the concrete endwalls of the spillway. After these repairs have been made they plan to study the feasibility of increasing the spillway capacity, possibly by means of cutting down a portion of the spillway crest and installing movable flashboards or gates.

When the earth dam is restored to its design elevation the weak spot will then become the section where Route U.S. 6A crosses the rim of the dam. This occurs at approximately Station 96 on the plans and is caused in part by the fact that the existing ground surface is approximately 1.5' below the design elevation for the top of the earth dam, and in part by the fact that the highway cross section at this station is in a cut of about 1.0' depth.

In order to minimize the possibility of damage to Route U.S. 6A below this dam in the event of a flood greater than the one which occurred last August (which was only about 4 times the mean annual flood for the Mad River, whereas a flood 4 times as great is a distinct possibility in view of the records on other streams during this flood), it is recommended that the earth dam in the vicinity of Station 96 be strengthened as follows and as marked in red on the attached print:

(a) In the vicinity of Station 96 replace any pervious material between the taking lines and the pavement with an impervious fill approximately 15' wide and extending up to elevation 376.2.

(b) Replace any pervious material, including subbase material, under the pavement with an impervious fill approximately 15' wide and extending up to the bottom of the pavement.

(c) Install a drain on each side of the impervious fill, the upstream line draining into Scovill Pond and the downstream line draining into the surface or storm water drainage below Station 95.

(d) Provide a concrete core wall approximately 1' wide by 2 1/2' deep with its top surface at elevation 376.2 from the south taking line opposite Station 96 to a point near the south gutter line, then turning east and extending approximately 200' until the gutter line itself reaches elevation 376.2. A similar concrete core wall should be provided to the same elevation from the north gutter line as far as necessary to insure that there will

be no overtopping between the westbound lanes and the north taking line.

PAN:bas
CC: Mr. E.S.Lawler
Mr. J.F.Willis
Mr. R.Hager
Central Files

Water Commission

May 29, 1956

Mr. Vincent B. Clarke
356 Main Street
Ansonia, Connecticut

Dear Mr. Clarke:

Some weeks back you took a short vacation and during that period a couple of matters came up that I retained. Some time has now passed but you may not have yet been requested for action by others.

In talking with the City Engineer of Waterbury, Mr. Whitlock, he requested that the Board inspect three dams in the Waterbury area for safety. If you have not already inspected these dams since the floods of last year I think it is necessary to comply with this request.

No. 1 - The Chase Dam, formerly called the Clock Company Dam, just above Cherry Street in Waterbury;

No. 2 - The Lakewood Pond near the amusement park in the north end of the City. During the flood water came over the road to a depth of about 1 foot and the structure is reported leaky;

No. 3 - The dam of the Mattatuck Manufacturing Company on the Mad River near Meriden Road.

The representatives of the Scovill Company met in this office on April 11th with the Highway Department, Mr. Wise and myself concerning the lower Scovill Dam on the Mad River. It was pointed out that the spillway capacity was entirely inadequate. Apparently the fill was never placed to the top of the abutment retaining walls or it has settled since it was placed. The Company agreed, as a primary step in rehabilitating this dam, to replace the fill to proper elevation. It has been recommended that the Highway Department improve the highway section through the dike so that no overflow will occur over the highway, at least until the elevation of this new fill is reached. The company was told that this improvement would not provide satisfactory spillway discharge. The Company suggested an additional spillway to the south of the dam. After the company had explained all its uses of the dam, it was suggested that the cheapest and most satisfactory method of providing satisfactory spillway discharge would be to place a gate on the present dam or a part of it. We suggested a positive operating hydraulic leaf gate.

Very truly yours,

John J. Curry
Chief Engineer

JJC/jb
cc: Mr. R. A. Norton
Highway Department

APPENDIX C

PHOTOGRAPHS

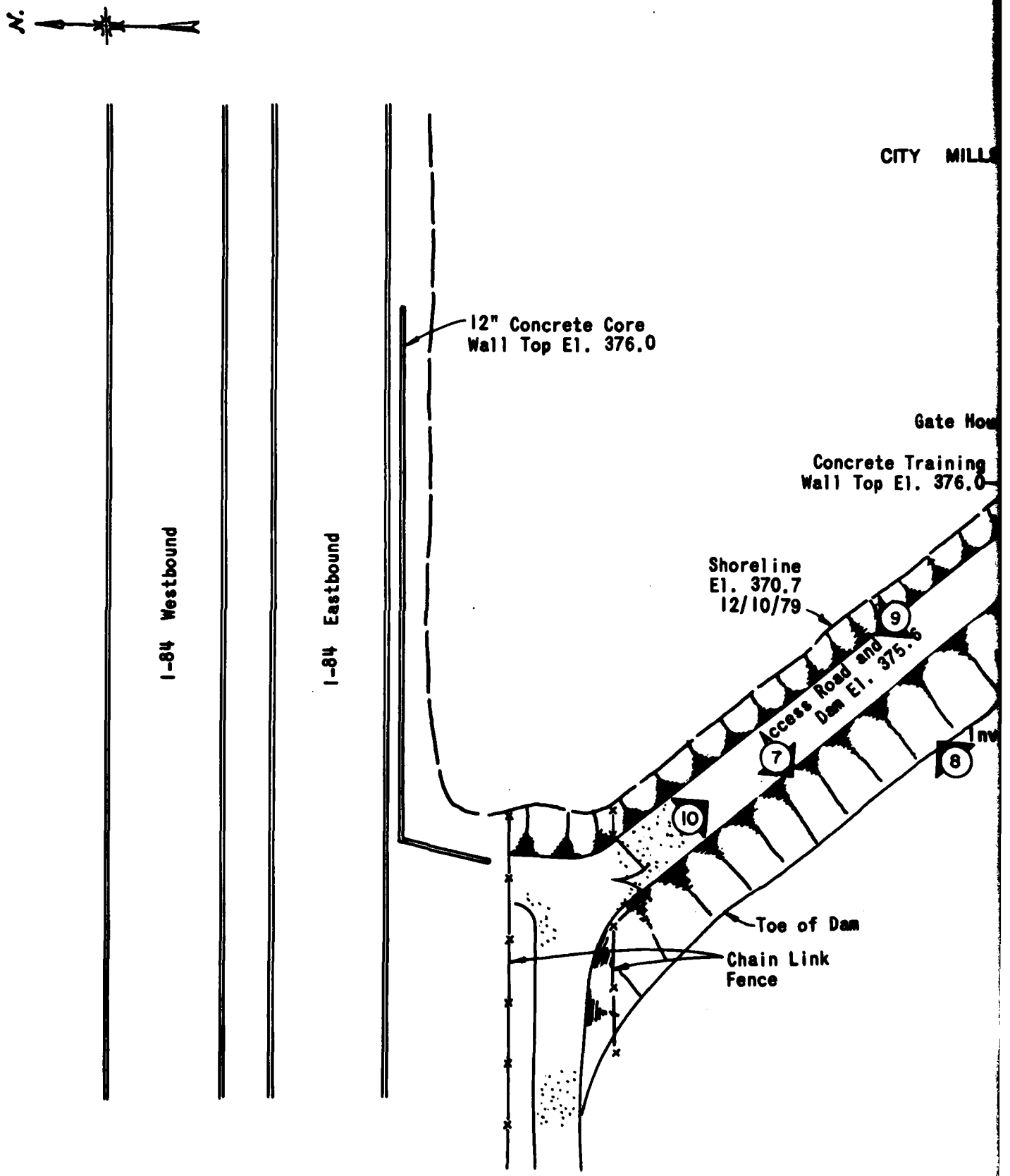
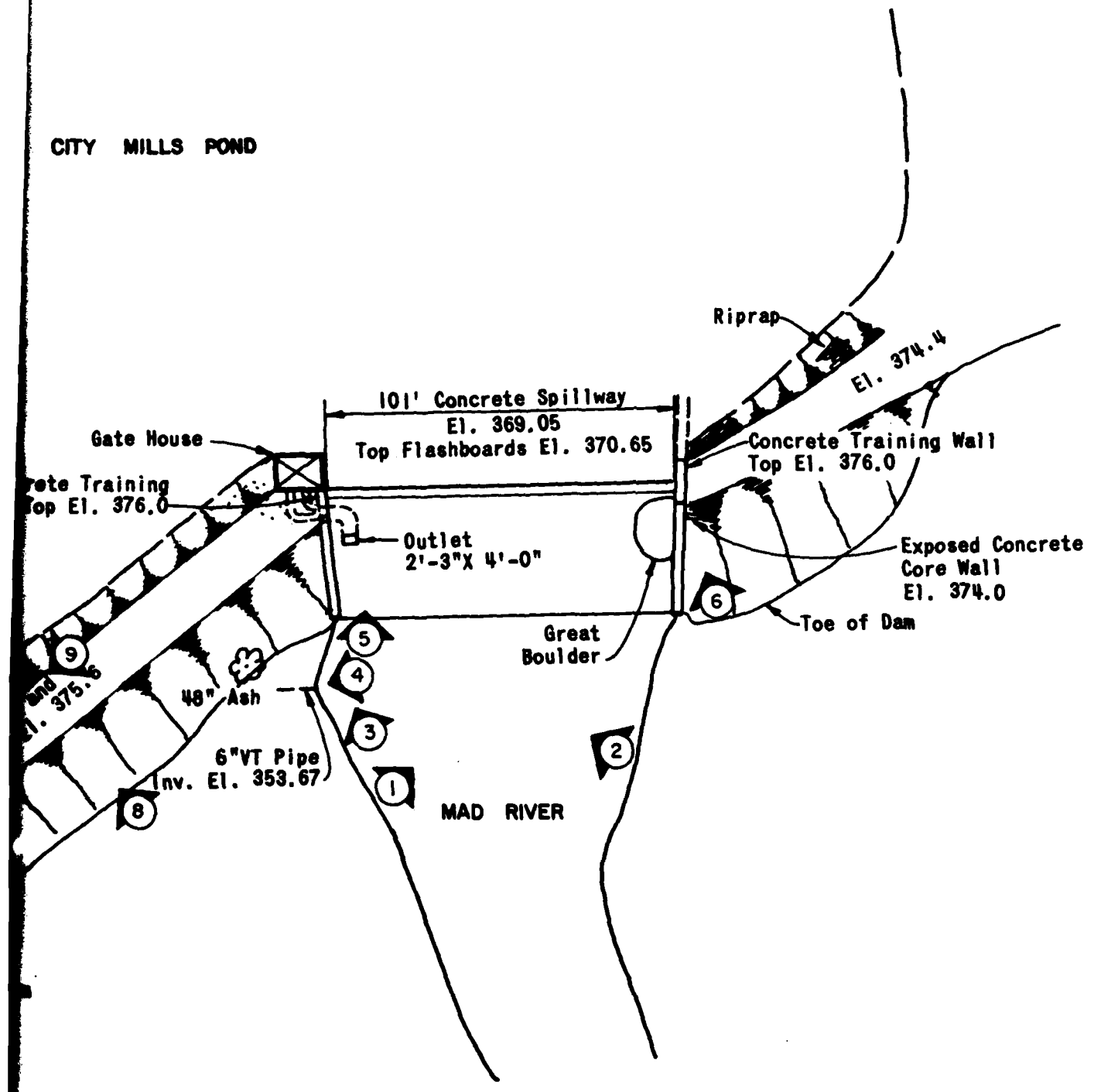

N
I-84 Westbound
I-84 Eastbound
12" Concrete Core
Wall Top El. 376.0
CITY MILL
Gate Hou
Concrete Training
Wall Top El. 376.0
Shoreline
El. 370.7
12/10/79
9
Access Road and
Dam El. 375.6
7
8
10
Toe of Dam
Chain Link
Fence

FIGURE 3



DENOTES PHOTO NUMBER AND DIRECTION IN WHICH PHOTO WAS TAKEN

ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

PHOTO LOCATION PLAN

EAST BRASS MILL DAM

WATERBURY, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALES 1" = 40'
JRS	DLS		DATE FEB 1980 PAGE C-1

PHOTO NO. 1*

LEFT SIDE OF SPILLWAY FROM DOWNSTREAM

PHOTO NO. 2

RIGHT SIDE OF SPILLWAY FROM DOWNSTREAM

*10 JAN '80

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	EAST BRASS MILL DAM MAD RIVER WATERBURY, CONNECTICUT CT 00031 29 NOV '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 3

GENERAL AREA AT DOWNSTREAM END OF RIGHT SPILLWAY WALL. NOTE RUST STAINED SEEPAGE AROUND BOULDER AT RIGHT, EROSION AT RIGHT SIDE OF SPILLWAY WALL AND STONE BLOCK WALL ON SLOPE

PHOTO NO. 4

WATER DISCHARGING AT A RATE OF 45-50 GPM FROM 6-INCH PIPE DOWNSTREAM OF RIGHT SPILLWAY WALL

U S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	EAST BRASS MILL DAM MAD RIVER WATERBURY, CONNECTICUT CT 00031 29 NOV '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 5

RIGHT END OF SPILLWAY APRON
NOTE IRREGULAR FLOW PATTERN AND OPENING IN
DOWNSTREAM FACE OF SPILLWAY

PHOTO NO. 6

CONCRETE CORE WALL EXPOSED BY EROSION
AT THE LEFT SPILLWAY WALL

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	EAST BRASS MILL DAM MAD RIVER WATERBURY, CONNECTICUT CT 00031 29 NOV '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 7

WET AREA AT DOWNSTREAM TOE OF EARTH EMBANKMENT

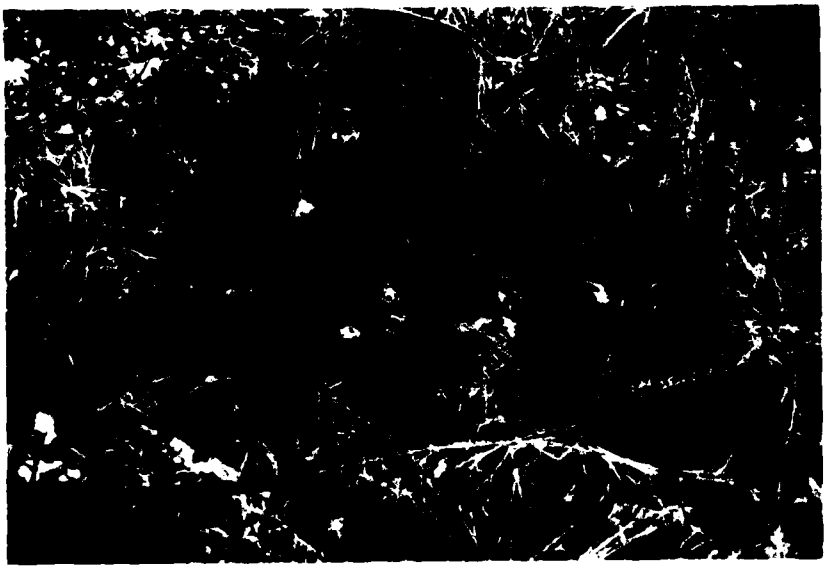


PHOTO NO. 8

WET AREA AT DOWNSTREAM TOE OF EARTH EMBANKMENT
NOTE OILY SHEEN

US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	EAST BRASS MILL DAM MAD RIVER WATERBURY, CONNECTICUT CT 00031 29 NOV '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 9

UPSTREAM SLOPE OF EARTH EMBANKMENT

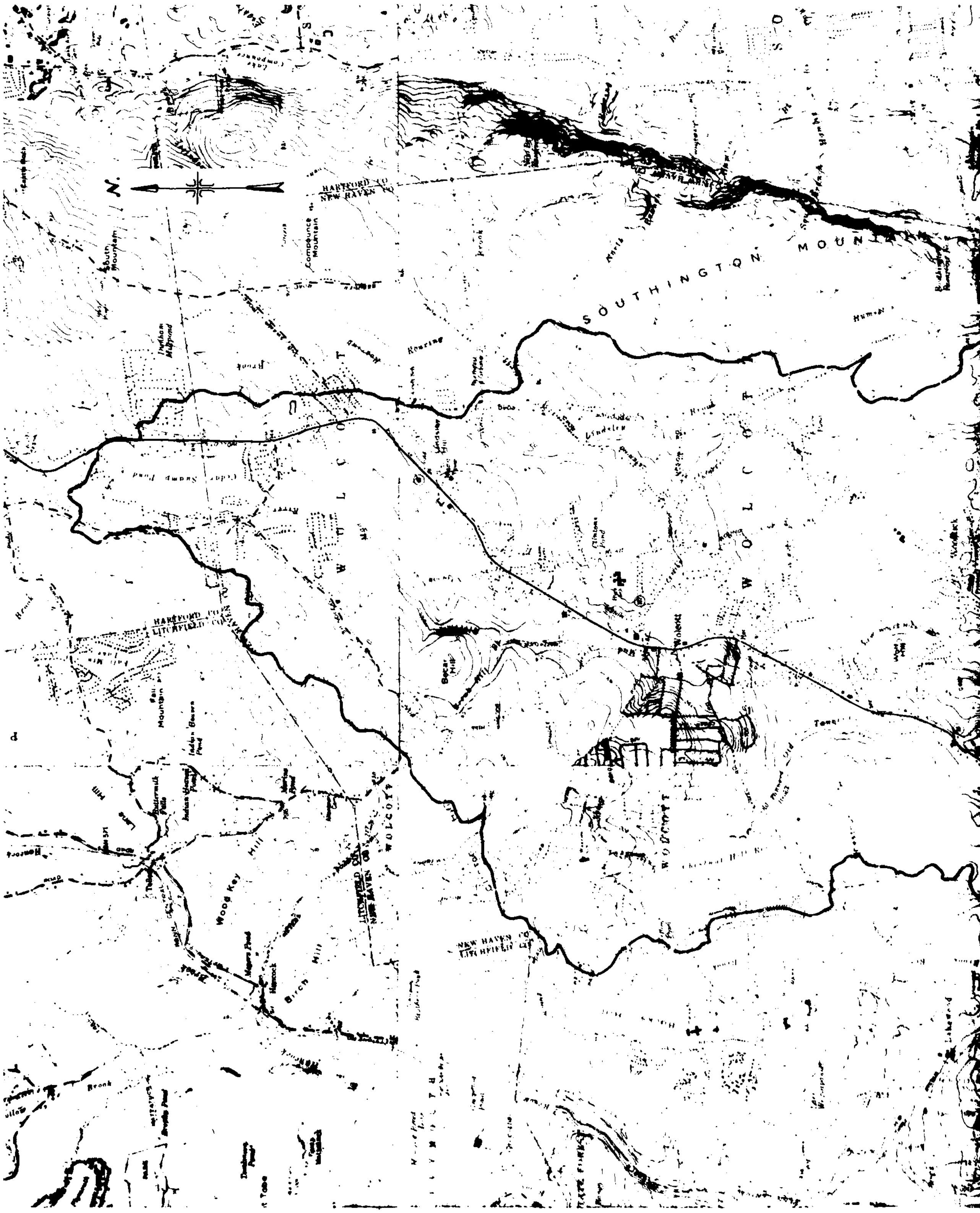
PHOTO NO. 10

TOP OF EARTH EMBANKMENT SECTION OF DAM

U.S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	EAST BRASS MILL DAM MAD RIVER WATERBURY, CONNECTICUT CT 00031 29 NOV '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



N
HARTFORD CO
NEW HAVEN CO
SOUTHINGTON MOUN
LITCHFIELD CO
WOLCOTT

FIGURE 4

ROALD HAESTAD, INC *CONSULTING ENGINEERS* WATERBURY, CONNECTICUT	U.S. ARMY ENGINEER DIV NEW ENGLAND *CORPS OF ENGINEERS* WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

WATERSHED

EAST BRASS MILL DAM

WATERBURY, CONNECTICUT

2

DRAWN	CHECKED	APPROVED	SCALE 1" = 4000'	
JRS	DLS		DATE FEB 1980	PAGE D-1

BY SL DATE 1/23/80 **ROALD HAESTAD, INC.** SHEET NO 1 OF 17

CONSULTING ENGINEERS

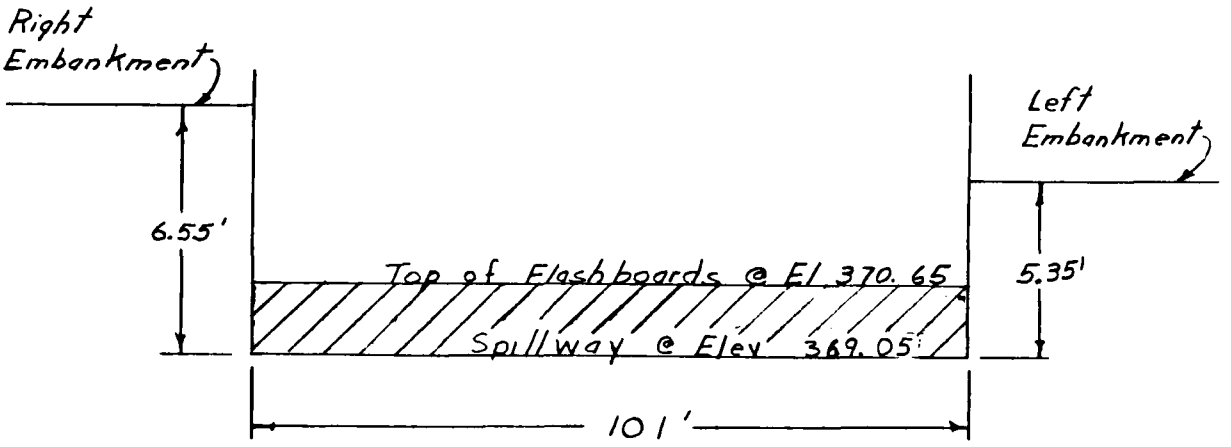
CKD BY DLS DATE 1/28/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-01

SUBJECT EAST BRASS MILL DAM - Spillway Capacity

Spillway Elevation = 369.05

Spillway Length = 100 ft

Coeff @ Spillway = 3.8
Coeff @ Embankment = 2.7
Coeff @ Flashboards = 3.3



W/O Flashboards:

Section	Elev.	Length	Coeff	
①	369.05	101	3.8	Spillway
②	374.40	155	2.7	Left Embank.
③	375.60	380	2.7	Right Embank.

W/Flashboards

Section	Elev	Length	Coeff.	
①	370.65	101	3.3	Spillway
②	374.40	155	2.7	Left Embank.
③	375.60	380	2.7	Right Embank.

BY SL DATE 1/23/80. **ROALD HAESTAD, INC.** SHEET NO 2 OF 17

CKD BY DLS DATE 1/28/80 CONSULTING ENGINEERS 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-01

SUBJECT EAST BRASS MILL DAM - Spillway Capacity

FREEBOARD: 4.8 ft (To low point on Embankment)

Spillway Capacity (W/o Flashboards) $= CLH^{3/2} = 3.8(101)(4.8)^{3/2}$

$= 4,036$ cfs

Spillway Capacity (W/Flashboards) $= CLH^{3/2} = 3.3(101)(3.2)^{3/2}$

$= 1,908$ cfs

W/O Flashboards:

Elev	Section No. 1	Section No. 2	Section No. 3	Total Flow (cfs)
369.05	0	0	0	0
370.00	355	0	0	355
371.00	1,045	0	0	1,045
372.00	1,945	0	0	1,945
373.00	3,013	0	0	3,013
374.00	4,227	0	0	4,227
375.00	5,570	195	0	5,765
375.60	6,508	585	0	7,093
376.00	7,032	847	260	8,139
377.00	8,603	1,755	1,700	12,058
378.00	10,276	2,859	3,815	16,950
379.00	12,046	4,129	6,432	22,607
380.00	13,907	5,546	9,469	28,922
381.00	15,855	7,096	12,875	35,826

BY SL DATE 1/23/80 **ROALD HAESTAD, INC.** SHEET NO 3 OF 11
CONSULTING ENGINEERS
CKD BY DLS DATE 1/29/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-01

SUBJECT EAST BRASS MILL DAM - Spillway Capacity

W/Flashboards:

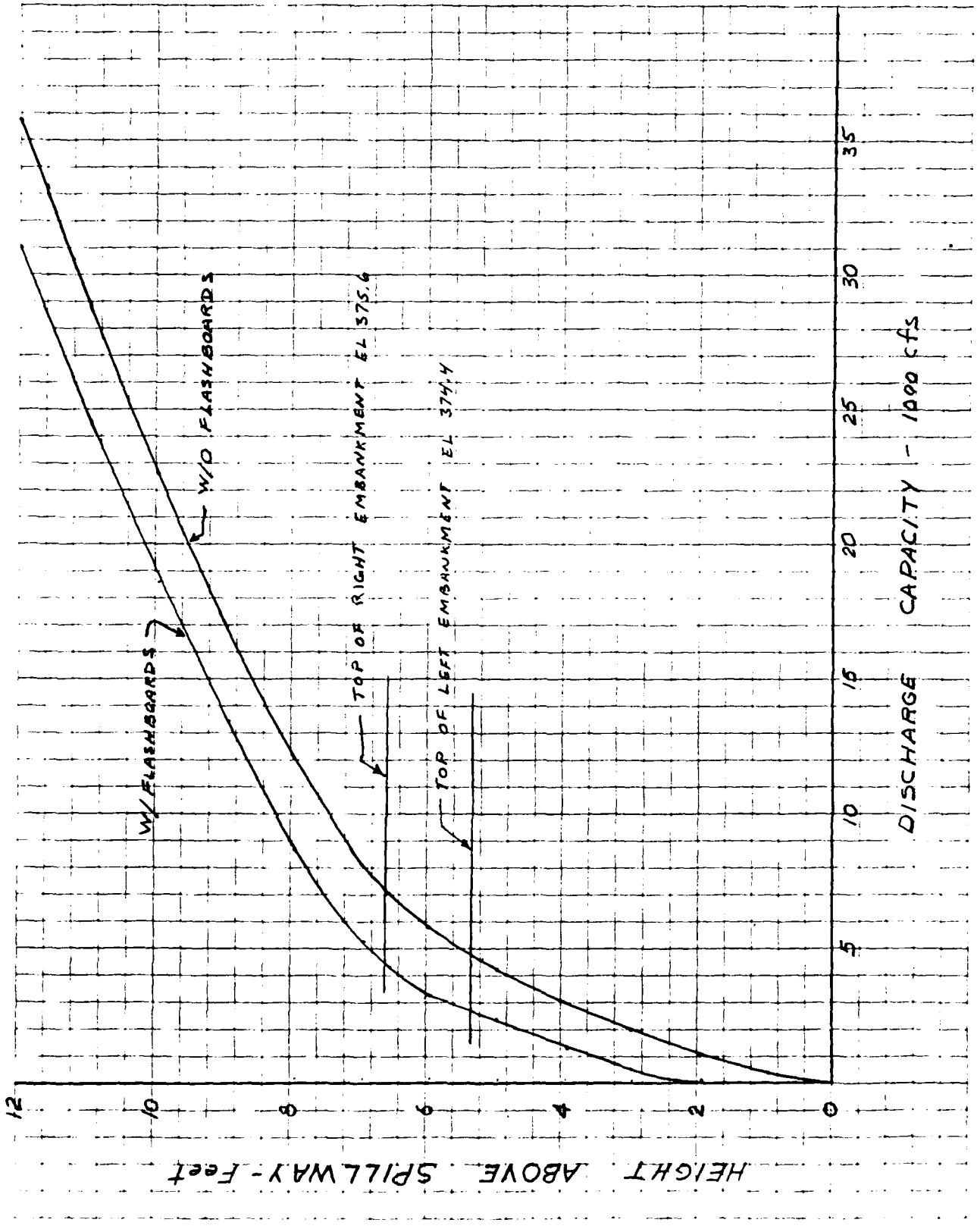
Elev	Section No 1	Section No 2	Section No 3	Total Flow (cfs)
370.65	0	0	0	0
371.00	69	0	0	69
372.00	523	0	0	523
373.00	1,201	0	0	1,201
374.00	2,044	0	0	2,044
375.00	3,024	195	0	3,219
375.60	3,726	585	0	4,311
376.00	4,124	847	260	5,231
377.00	5,333	1,755	1,700	8,788
378.00	6,642	2,859	3,815	13,316
379.00	8,042	4,129	6,432	18,603
380.00	9,529	5,546	9,469	24,544
381.00	11,098	7,096	12,875	31,069
382.00	12,745	8,768	16,612	38,125

BY SL DATE 11/24/80 **ROALD HAESTAD, INC.** SHEET NO 4 OF 17

CONSULTING ENGINEERS

CKD BY DLS DATE 11/29/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-01

SUBJECT EAST BRASS MILL DAM - Spillway Capacity Curve



BY SL DATE 1/24/80 **ROALD HAESTAD, INC.** SHEET NO 5 OF 17
CONSULTING ENGINEERS
CKD BY DLS DATE 1/29/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-01

SUBJECT EAST BRASS MILL DAM - Test Flood - 1/2 PMF

Test Flood - PMF

Drainage Area = 15,174 acres = 23.71 sq. mi.

Using Corps of Eng. Chart for "Rolling" Terrain

MPF = 1,400 cfs/sq. mi.

PMF = 1,400 cfs/sq mi x (23.71 sq mi) = 33,194 cfs

1/2 PMF = 1/2 (33,194 cfs) = 16,597 cfs

USE 16,600 cfs

Note:

Inflow and Outflow will be essentially equal because of the small storage capacity available, at East Brass Mill Dam, in comparison to the size of the watershed.

Spillway Capacity (W/o Flashboards) $= CLH^{3/2} = 3.8(101)(4.8)^{3/2}$

$= 4,036$ cfs

% of 1/2 PMF $= 4,036/16,600 = 24\%$

Spillway Capacity (W/Flashboards) $= CLH^{3/2} = 3.3(101)(3.2)^{3/2}$

$= 1,908$ cfs

% of 1/2 PMF $= 1,908/16,600 = 11\%$

S = Reservoir Storage at time of failure : Storage at Spillway Level + Freeboard Storage

S = Surface Area x (Average depth + Freeboard height)

Assume an average depth for the lake equal to 10 feet.

S = 11.94 acres x (10 ft + 5 ft) = 179.1 use 180 acre-ft

Q_{P1} = Peak Failure Outflow = $\frac{8}{27} W_b \sqrt{g} Y_o^{3/2}$

W_b = Breach Width - 40% of dam length at mid height
= (0.4)(315) = 126 ft.

Y_o = Total height from river bed to pool level at failure = 25 ft

$Q_{P1} = \frac{8}{27}(126)\sqrt{32.2}\,(25)^{3/2} = 26,481$ use 26,480 cfs

SECTION NO 1: (I-84 Underpass) Reach Length = 1,200 ft
(SEE FIGURE 5)

Q_{P1} = 26,480 cfs

H_1 = 21.5 ft

V_1 = 102 ac-ft

Q_{P2} (TRIAL) = $Q_{P1}(1 - V_1/S)$ = 26,480 cfs $(1 - 102/180)$ = 11,475 cfs

H_2 = 15 ft

V_2 = 58 ac-ft

$V_{ave} = \frac{V_2 + V_1}{2} = \frac{58 + 102}{2} = 80$ ac-ft

$Q_{P2} = Q_{P1}(1 - V_{ave}/S)$ = 26,480 cfs $(1 - 80/180)$ = 14,711 cfs

H_2 = 17 ft

SECTION NO 2: Reach Length = 1,200 ft

$Q_{P2} = 14,711$ cfs

$H_2 = 10.4$ ft $A_2 = 1,770$ sq. ft.

$V_2 = A_2 \times Length = (1,770 ft^2 \times 1,200 ft) \times 1 ac\text{-}ft / 43,560 ft^3 = 48.8$ use 49 ac-ft

V_2 is less than 1/2 of S ∴ reach is O.K.

$Q_{P3}(TRIAL) = Q_{P2}(1 - V_2/S) = 14,711 cfs (1 - 49/180) = 10,706$ cfs

$H_3 = 9.3$ ft $A_3 = 1,370$ sq. ft.

$V_3 = A_3 \times Length = (1,370 ft^2 \times 1,200 ft) \times 1 ac\text{-}ft / 43,560 ft^3 = 37.7$ use 38 ac-ft

$V_{ave} = \frac{V_3 + V_2}{2} = \frac{38+49}{2} = 43.5$ ac-ft

$Q_{P3} = Q_{P2}(1 - V_{ave}/S) = 14,711 cfs (1 - 43.5/180) = 11,156$ cfs

$H_3 = 9.4$ ft

SECTION NO 3: (SILVER ST.) Reach Length = 1,500 ft

$Q_{P3} = 11,156$ cfs

$H_3 = 12.8$ ft $A_3 = 1,500$ sq ft

$V_3 = A_3 \times Length = [1,500 ft^2 \times 1,500 ft] \times 1 ac\text{-}ft / 43,560 ft^3 = 51.6$ use 52 ac-ft

V_3 is less than 1/2 of S ∴ reach is O.K.

$Q_{P4}(TRIAL) = Q_{P3}(1 - V_3/S) = 11,156 cfs (1 - 52/180) = 7,933$ cfs

H_4 11.0 ft $A_4 = 900$ sq ft

$V_4 = A_4 \times Length = [900 ft^2 \times 1,500 ft] \times 1 ac\text{-}ft / 43,560 ft^3 = 30.9$ use 31 ac-ft

$V_{ave} = \frac{V_4 + V_3}{2} = \frac{31+52}{2} = 41.5$ ac-ft

$Q_{P4} = Q_{P3}(1 - V_{ave}/S) = 11,156 cfs (1 - 41.5/180) = 8,584$ cfs $H_4 = 11.5$

SECTION NO 4: (JOHN D's DAM)

$Q_{P4} = 8{,}584$ cfs

$H_4 = 8.8$ ft $\quad V_4 = 30$ ac-ft

V_4 is less than 1/2 of S ∴ reach is O.K.

$Q_{P5}(TRIAL) = Q_{P4}(1 - V_4/S) = 8{,}584\text{cfs}(1 - 39/180) = 7{,}153$ cfs

$H_5 = 8.2$ ft $\quad V_5 = 27$ ac-ft

$V_{ave} = \frac{V_5 + V_4}{2} = \frac{30+27}{2} = 28.5$ ac-ft

$Q_{P5} = Q_{P4}(1 - V_{ave}/S) = 8{,}584\text{cfs}(1 - 28.5/180) = 7{,}225$ cfs

$H_5 = 8.2$ ft

SECTION NO 5: (HAMILTON AVE) Reach Length = 2,000 ft

$Q_{P5} = 7{,}225$ cfs

$H_5 = 16$ ft $\quad A_5 = 800$ sq ft

$V_5 = A_5 \times Length = (800\text{ft}^2 \times 2000\text{ft}) \times 1\text{ac-ft}/43{,}560\text{ft}^3 = 36.7$ use 37 ac-ft

V_5 is less than 1/2 of S ∴ reach is O.K.

$Q_{P6}(TRIAL) = Q_{P5}(1 - V_5/S) = 7{,}225\text{cfs}(1 - 37/180) = 5{,}740$ cfs

$H_6 = 13$ ft $\quad A_6$ 640 sq ft

$V_6 = (A_6 \times Length) = (640\text{ft}^2 \times 2{,}000\text{ft}) \times 1\text{ac-ft}/43{,}560\text{ft}^3 = 29.4$ use 29 ac-ft

$V_{ave} = \frac{V_6 + V_5}{2} = \frac{29+37}{2} = 33$ ac-ft

$Q_{P6} = Q_{P5}(1 - V_{ave}/S) = 7{,}225\text{cfs}(1 - 33/180) = 5{,}900$ cfs

$H_6 = 13$ ft

SECTION NO 6: (EAST LIBERTY ST.) Reach Length = 3,000 ft

$Q_{P6} = 5,900$ cfs

$H_6 = 9.2$ ft $\quad A_6 = 670$ sq ft

$V_6 = A_6 \times Length = (670 ft^2 \times 3,000 ft) \times {}^{ac\text{-}ft}/_{43,560 ft^3} = 46.1$ use 46 ac-ft

V_6 is less than 1/2 of S $\therefore$ reach is O.K.

$Q_{P7}(TRIAL) = Q_{P6}(1 - {}^{V_6}/_S) = 5,900 cfs (1 - {}^{46}/_{180}) = 4,392$ cfs

$H_7 = 8.0$ ft $\quad A_7 = 525$ sq ft

$V_7 = A_7 \times Length = (525 ft^2 \times 3,000 ft) \times {}^{ac\text{-}ft}/_{43,560 ft^3} = 36.2$ use 36 ac-ft

$V_{ave} = \frac{V_7 + V_6}{2} = \frac{46+36}{2} = 41$ ac-ft

$Q_{P7} = Q_{P6}(1 - {}^{V_{ave}}/_S) = 5,900 cfs (1 - {}^{41}/_{180}) = 4,556$ cfs

$H_7 = 8.2$ ft

SECTION NO 7: Reach Length = 2,400 ft

$Q_{P7} = 4,556$ cfs

$H_7 = 6.3$ ft $\quad A_7 = 515$ sq ft

$V_7 = A_7 \times Length = (515 ft^2 \times 2,400 ft) \times {}^{ac\text{-}ft}/_{43,560 ft^3} = 28.4$ use 28 ac-ft

V_7 is less than 1/2 of S $\therefore$ reach is O.K.

$Q_{P8}(TRIAL) = Q_{P7}(1 - {}^{V_7}/_S) = 4,556 cfs (1 - {}^{28}/_{180}) = 3,847$ cfs

$H_8 = 5.6$ ft $\quad A_8 = 455$ sq ft

$V_8 = A_8 \times Length = (455 ft^2 \times 2,400 ft) \times {}^{ac\text{-}ft}/_{43,560 ft^3} = 25$ ac-ft

$V_{ave} = \frac{V_8 + V_7}{2} = \frac{25+28}{2} = 26.5$ ac-ft

$Q_{P8} = Q_{P7}(1 - {}^{V_{ave}}/_S) = 4,556 cfs (1 - {}^{26.5}/_{180}) = 3,885$ cfs $\quad H_8 = 5.7$ ft

BY S.L. DATE 1/31/80 **ROALD HAESTAD, INC.** SHEET NO 10 OF 17

CONSULTING ENGINEERS

CKD BY RLS DATE 2/18/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-01

SUBJECT EAST BRASS MILL DAM - Surface Areas

Due to the topography of the land upstream of section no. 1, the storage capacity was calculated from surface areas of contour maps.

Contour 350:

Third = 4.80 sq in		1.18
First = 2.45 sq in		1.18
Start = 1.27 sq in		

Contour 360:

Third = 8.87 sq in		2.67
First = 3.54 sq in		2.68
Start = 0.86 sq in		

$$\text{Storage Capacity at EL 350} = 1.18\,in^2 \times \frac{(400\,ft)^2}{in^2} \times 5\,ft \times \frac{1\,ac\text{-}ft}{43{,}560\,ft^3} = 22\,ac\text{-}ft$$

$$\text{Storage Capacity at EL 360} = \left[1.93\,in^2 \times \frac{(400\,ft)^2}{in^2} \times 10\,ft \times \frac{1\,ac\text{-}ft}{43{,}560\,ft^3}\right] + 22 = 93\,ac\text{-}ft$$

BY SL DATE 1/23/80. **ROALD HAESTAD, INC.** SHEET NO 11 OF 17

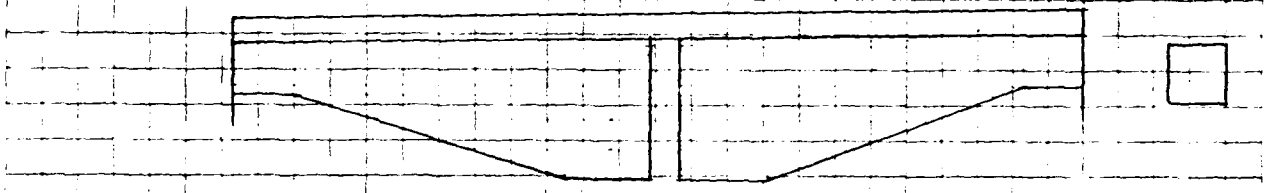
CONSULTING ENGINEERS

CKD BY DLS DATE 1/30/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-01

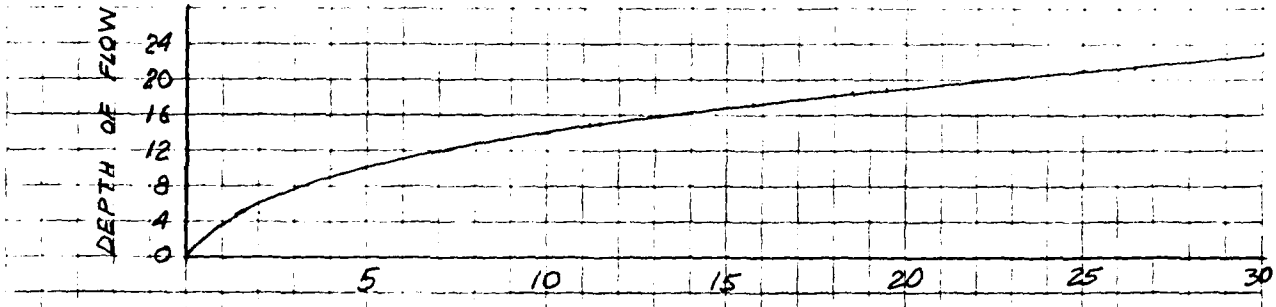
SUBJECT EAST BRASS MILL DAM - Flood Routing

SECTION NO 1: (I-84 Underpass) Scale: 1" = 30' Horiz.
(FIELD MEASURED) 1" = 30' Vert.

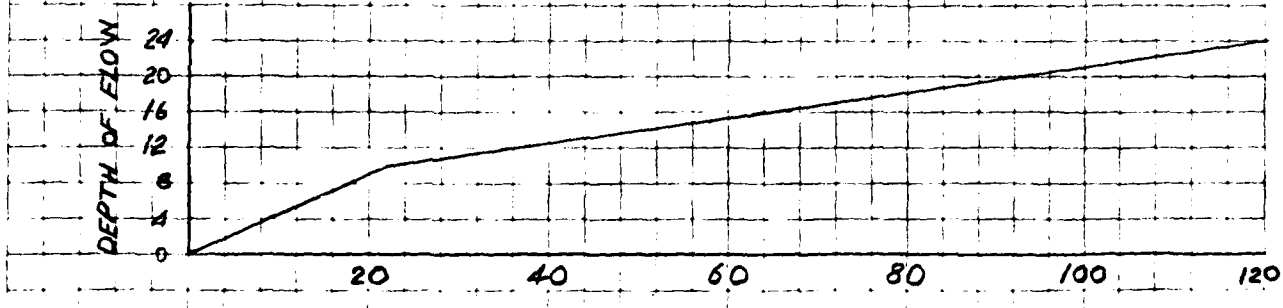
L = 1,200 ft S = 0.009 n = 0.05



D	Wp	A	R	S	V	Q
5	70	223	3.19	0.009	6.1	1,360
10	111	583	5.25	0.009	8.5	4,956
14	146	981	6.72	0.009	10.1	9,908
16	167	1,230	7.37	0.009	10.7	13,161
21	187	1,915	10.24	0.009	13.3	25,470
23	195	2,189	11.23	0.009	14.2	31,084



DISCHARGE CAPACITY - 1000 cfs



STORAGE CAPACITY - Ac-ft

BY S.L. DATE 1/23/80. **ROALD HAESTAD, INC.** SHEET NO. 12 OF 17

CONSULTING ENGINEERS

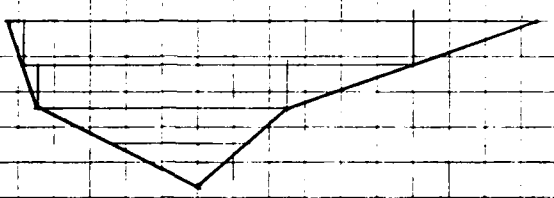
CKD BY DLS DATE 1/31/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 049-01

SUBJECT EAST BRASS MILL DAM - Flood Routing

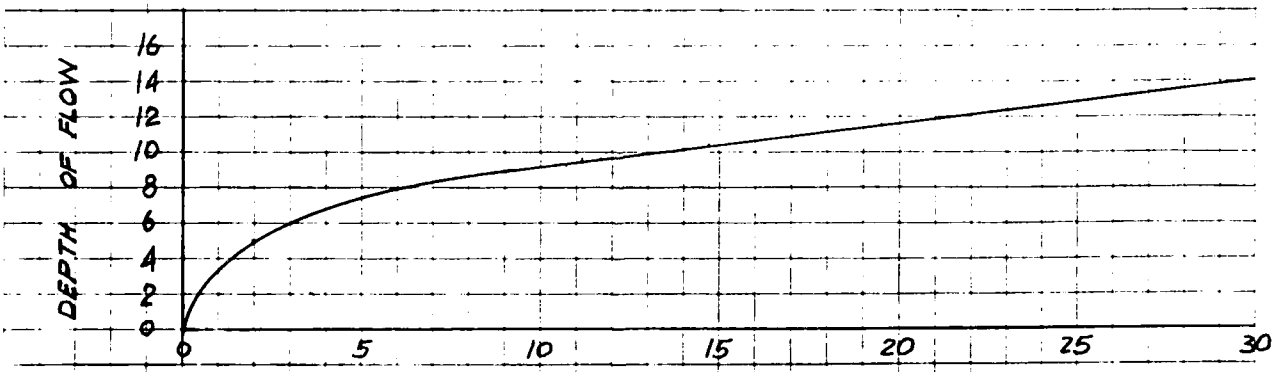
SECTION NO 2:

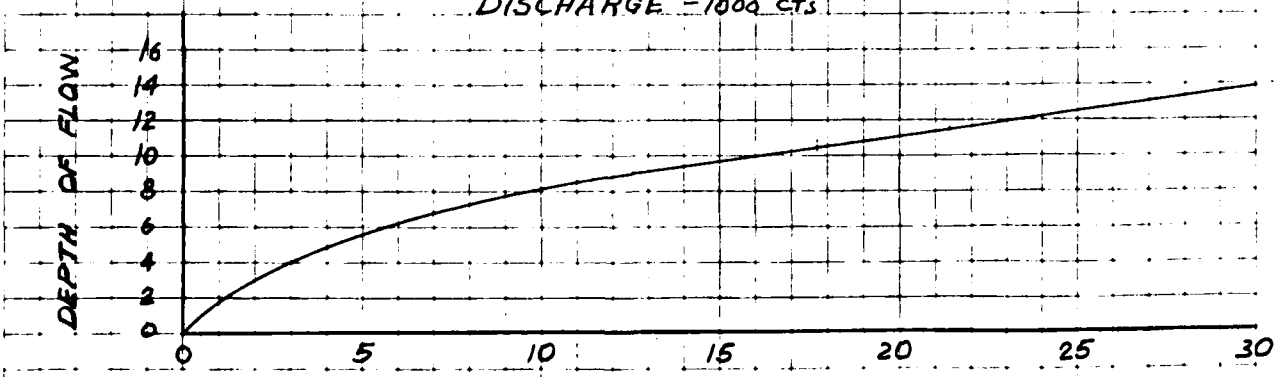
Scale: 1"=200 Horiz
1"=20 Vert

L = 1,200 ft S = 0.008 n = 0.05



D	W_p	A	R	S	V	Q
5	160	400	2.50	0.008	4.9	1,960
9	280	1,260	4.50	0.008	7.3	9,198
14	436	3,048	6.99	0.008	9.7	29,566
19	597	5,585	9.36	0.008	11.8	65,903





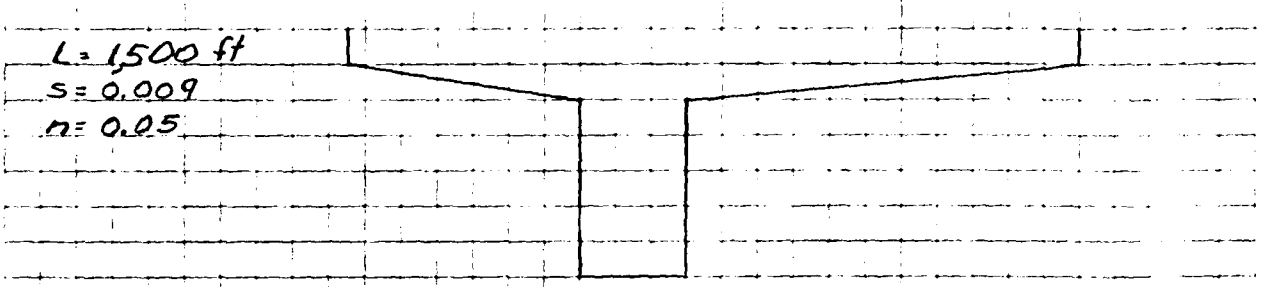
BY S.L. DATE 1/24/80 **ROALD HAESTAD, INC.** SHEET NO. 13 OF 17

CONSULTING ENGINEERS

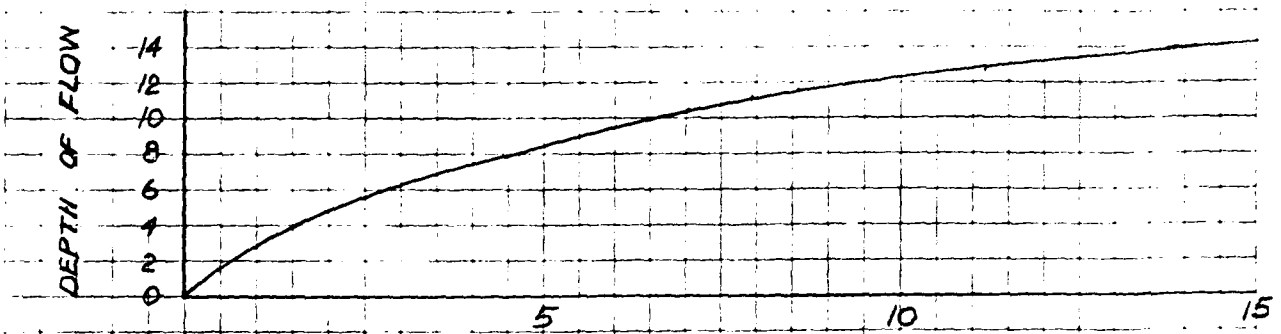
CKD BY D.S. DATE 1/30/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 049-01

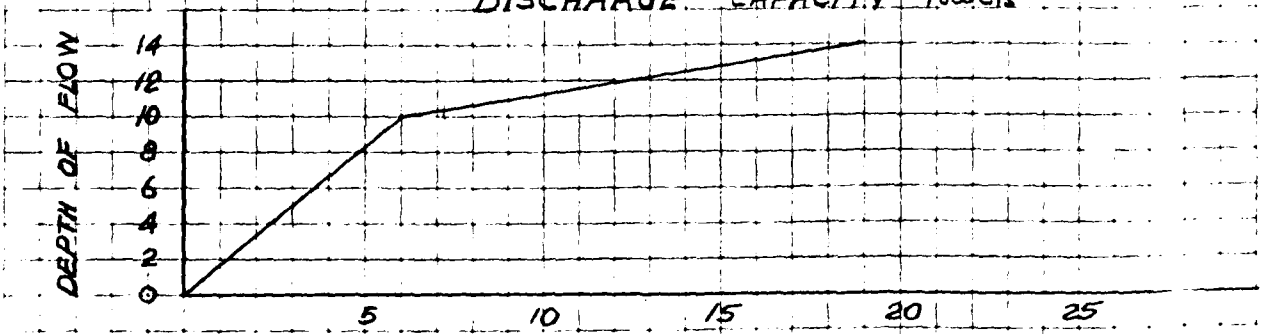
SUBJECT EAST BRASS MILL RAM - Flood Routing

SECTION NO 3: (FIELD MEASURED) Scale 1" = 100' Horiz. 1" = 10' Vert.



D	W_p	A	R	S	V	Q
4	68	240	3.53	0.009	6.6	1,584
8	76	480	6.32	0.009	9.7	4,656
10	80	600	7.50	0.009	10.8	6,480
14	434	1,890	4.35	0.009	7.5	14,175





BY SL DATE 1/28/80 **ROALD HAESTAD, INC.** SHEET NO 14 OF 17

CONSULTING ENGINEERS

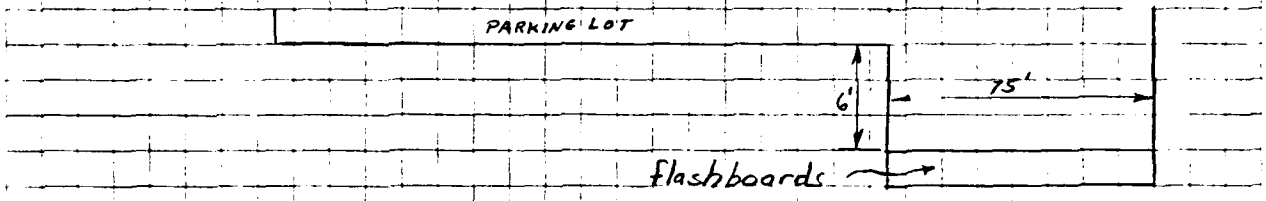
CKD BY DLS DATE 1/30/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-01

SUBJECT EAST BRASS MILL DAM - Flood Routing

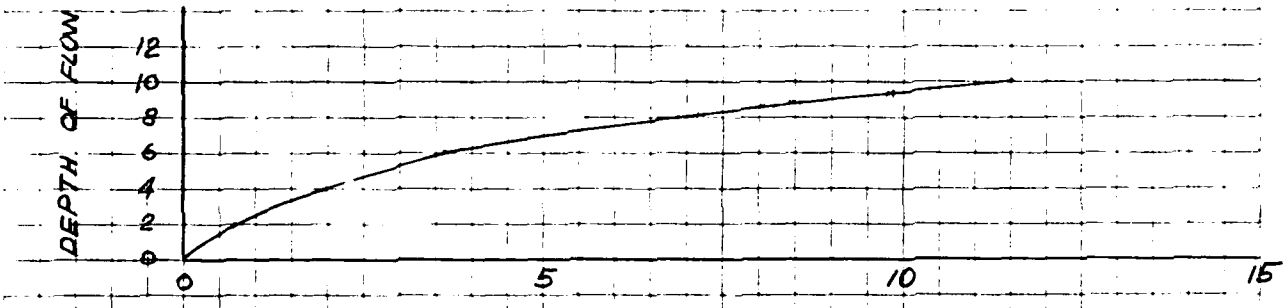
SECTION NO 4:

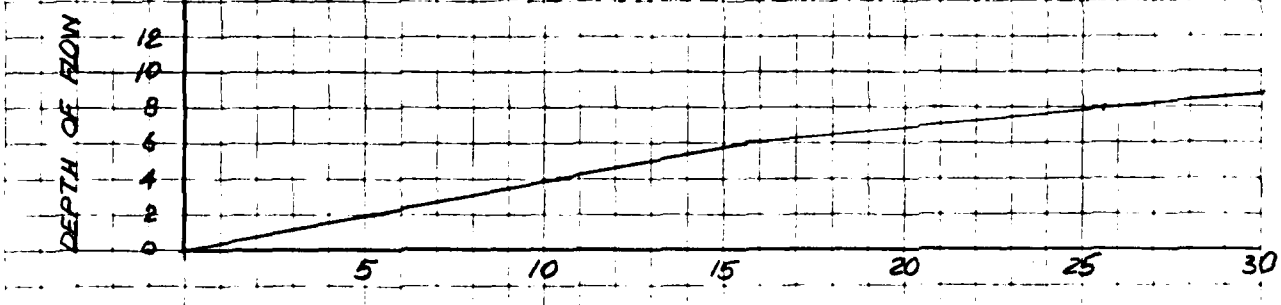
Scale: 1" = 50' Horiz
1" = 10' Vert

Coeff @ Flashboards = 3.3
Coeff @ Pavement = 2.7
Surface Area at Spillway = 2.6 acres (ASSUMED CONSTANT FIRST 6 FEET)



Height Above Spillway (ft)	Main Spillway	Over Parking Area	Total Flow (cfs)	Storage - Capacity (Acre-ft)
2	700	0	700	5.2
4	1,980	0	1,980	10.4
6	3,637	0	3,637	15.6
8	5,600	1,298	6,898	25.6
10	7,827	3,672	11,499	35.6





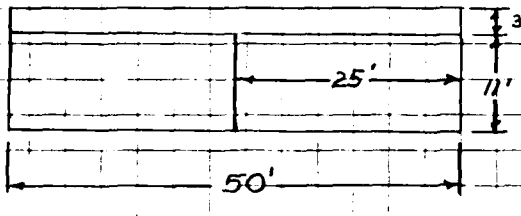
BY SL DATE 1/28/80 **ROALD HAESTAD, INC.** SHEET NO 15 OF 17

CONSULTING ENGINEERS

CKD BY DLS DATE 1/30/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-01

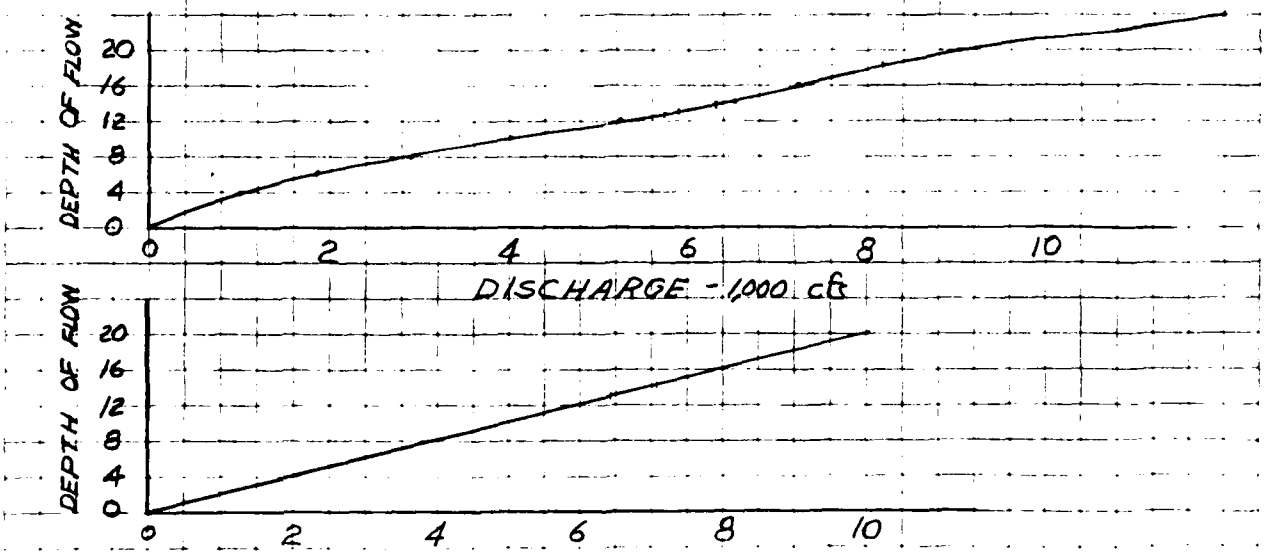
SUBJECT EAST BRASS MILL DAM - Flood Routing

SECTION NO 5: Scale: 1" = 20' Horiz
1" = 20' Vert



Two Concrete box Culverts.

HW (ft)	HW/D (ft/ft)	Q/B (cfs/ft)	B (ft)	Q (cfs)	Q-cfs (for both Culverts)	Area (sq ft)
4	0.36	20	25	500	1000	200
6	0.55	37	25	9.25	1850	300
8	0.73	58	25	14.50	2900	400
10	0.91	92	25	2.000	4.000	500
12	1.09	105	25	2,625	5,250	600
14	1.27	125	25	3,125	6,250	700
16	1.45	145	25	3,625	7,250	800
20	1.82	180	25	4,500	9,000	1,000



AREA - 100 sq ft

BY SL DATE 1/28/80 **ROALD HAESTAD, INC.** SHEET NO 16 OF 17

CONSULTING ENGINEERS

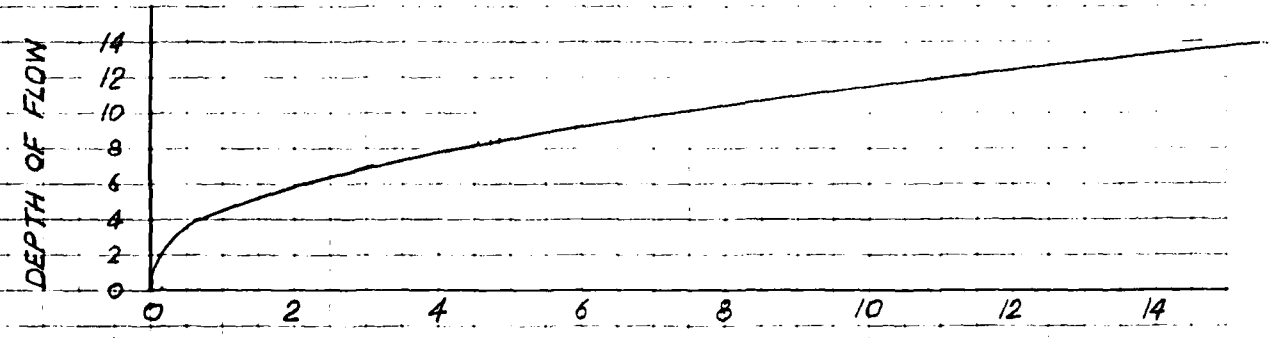
CKD BY DLS DATE 1/30/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-01

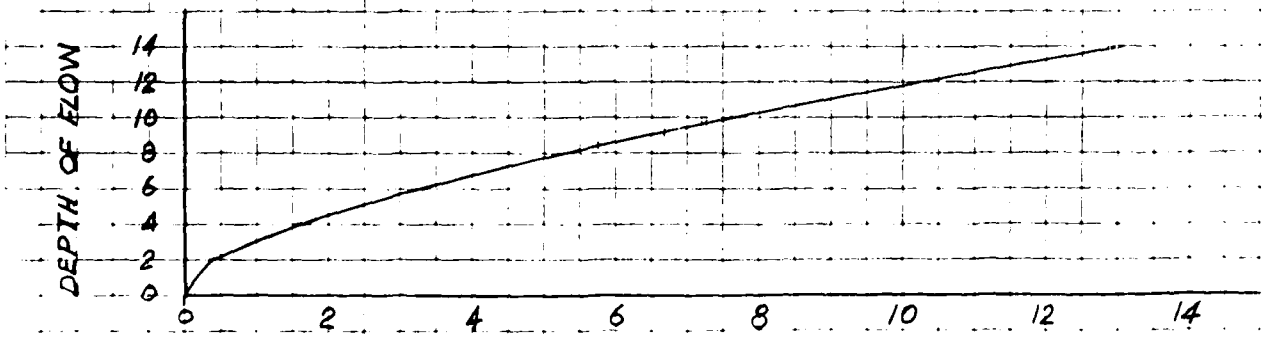
SUBJECT EAST BRASS MILL DAM - Flood Routing

SECTION NO 6: Scale: 1" = 50' Horiz. 1" = 20' Vert.

L = 3,000 ft S = 0.009 n = 0.05

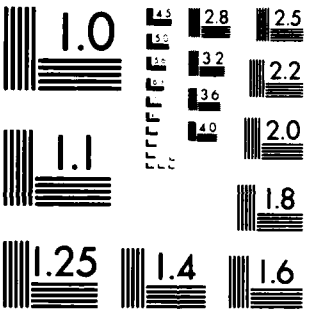
D	W_p	A	R	S	V	Q
2	37	38	1.03	0.009	2.9	110
4	79	156	1.97	0.009	4.4	686
6	92	330	3.59	0.009	6.6	2,178
10	121	760	6.28	0.009	9.6	7,296
14	151	1,304	8.64	0.009	11.9	15,518





AD-A143 166 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS EAST BRASS MILL DAM C..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV MAR 80 2/2

UNCLASSIFIED F/G 13/13 NL



BY ..SL.. DATE ..1/28/80 **ROALD HAESTAD, INC.** SHEET NO ..17.. OF ..17..

CONSULTING ENGINEERS

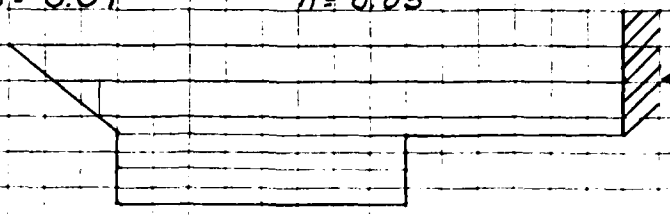
CKD BY ..DLS.. DATE ..1/30/80.. 37 Brookside Road - Waterbury, Conn. 06708 JOB NO ..049-01..

SUBJECT ..EAST BRASS MILL DAM - Flood Routing..

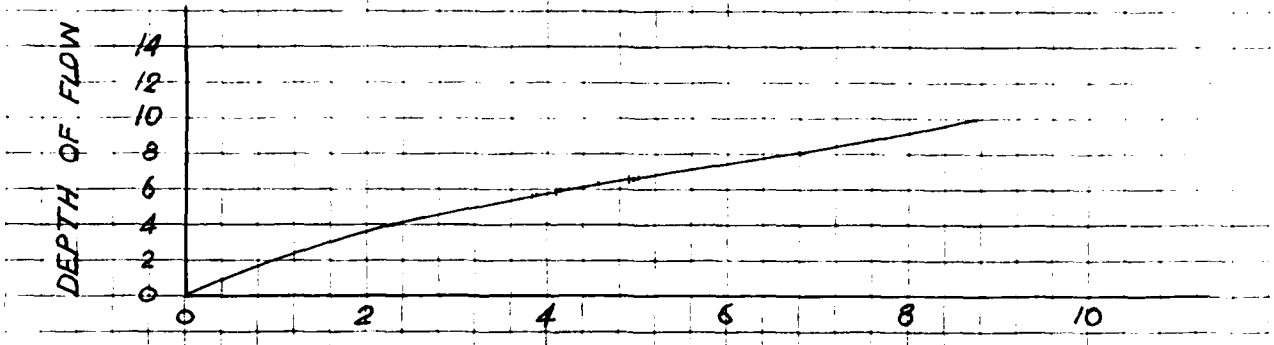
SECTION NO 7:

Scale: 1" = 50' Horiz
1" = 20' Vert

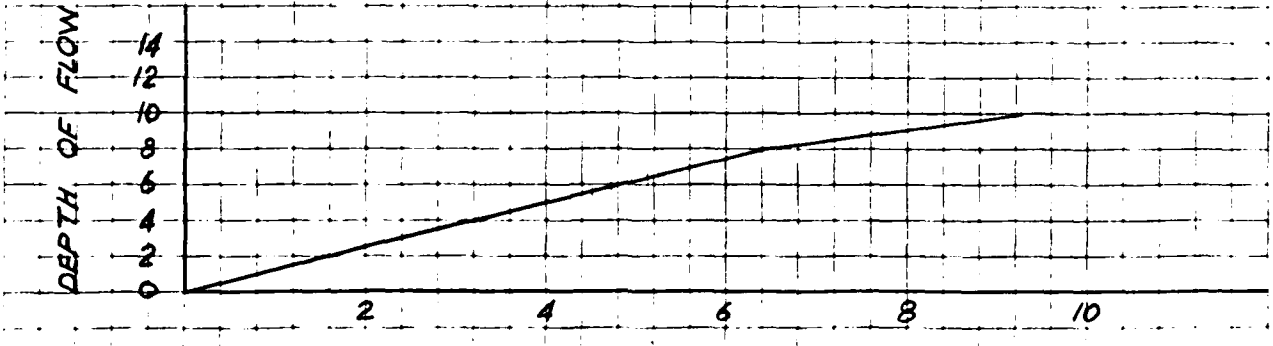
L = 2,400 ft S = 0.01 n = 0.05



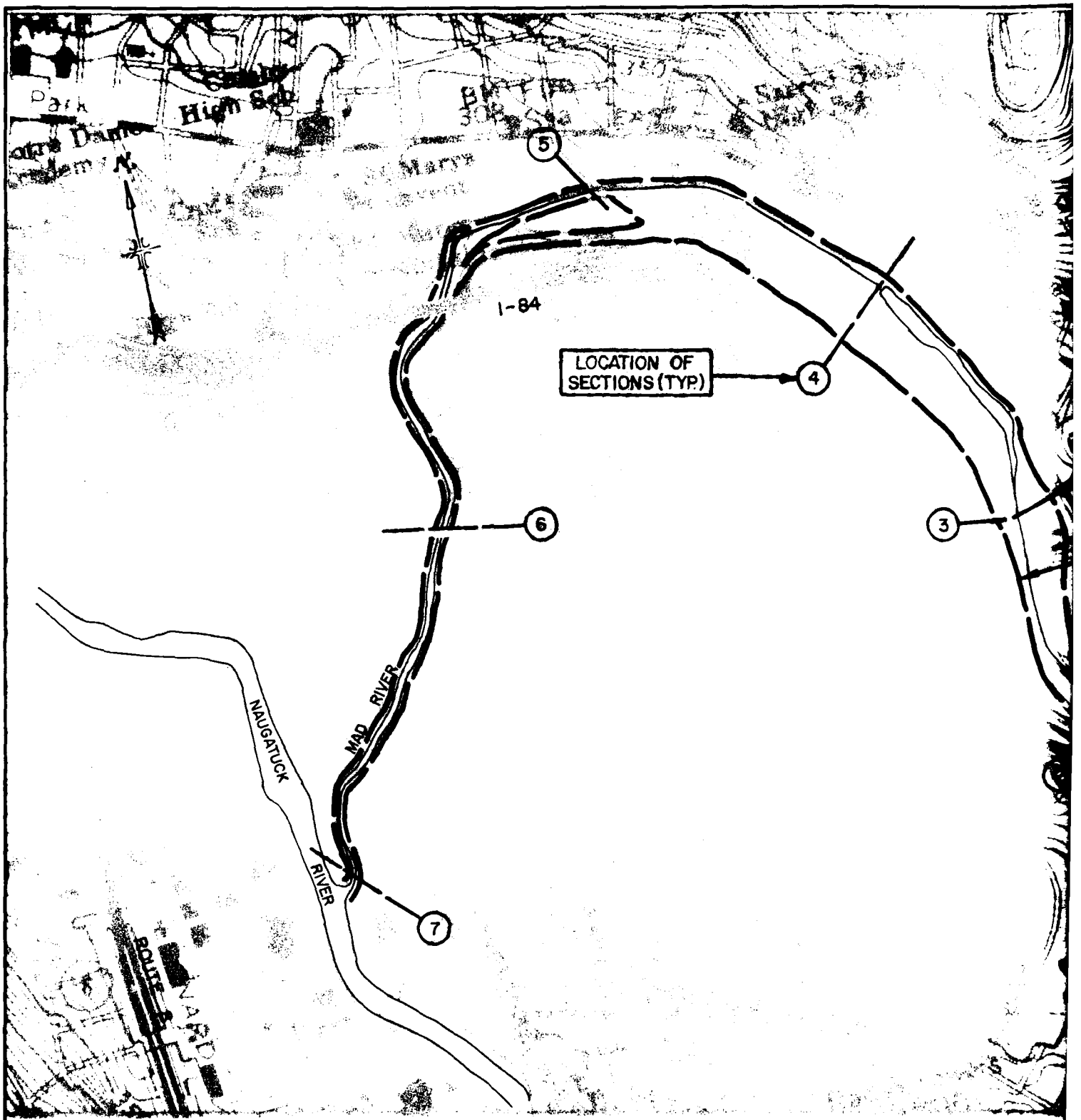
D	Wp	A	R	S	V	Q
4	88	320	3.64	0.01	7.1	2,272
8	96	640	6.67	0.01	10.6	6,784
10	165	926	5.61	0.01	9.4	8,704
14	184	1,530	8.32	0.01	12.2	18,666



DISCHARGE - 1000 cfs

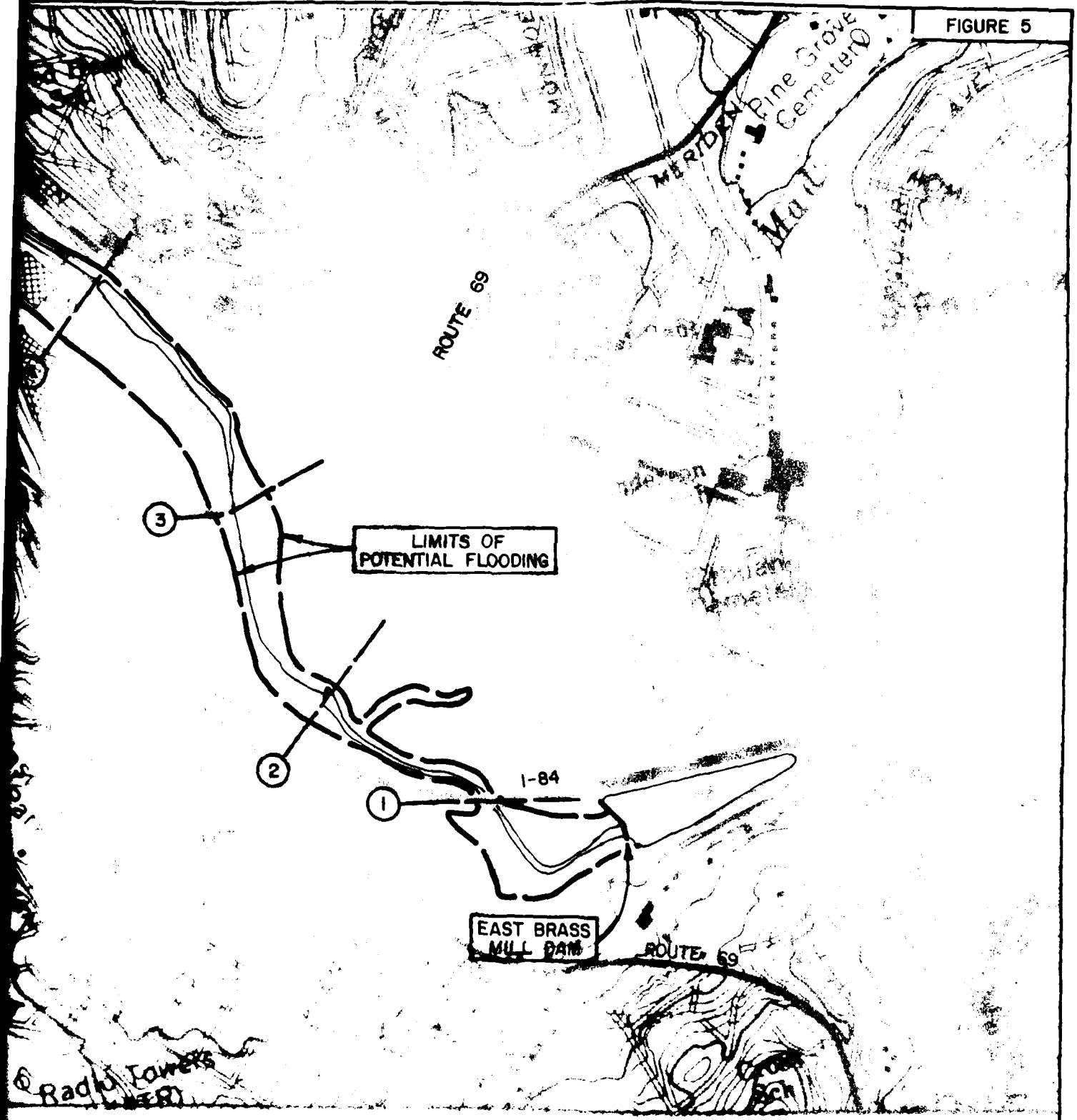


AREA - 100 sq. ft



FROM WATERBURY QUADRANGLE 1972

FIGURE 5



ROALD HAESTAD, INC CONSULTING ENGINEERS WATERBURY, CONNECTICUT	U S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

LIMITS OF POTENTIAL FLOODING

EAST BRASS MILL DAM

WATERBURY, CONNECTICUT

2

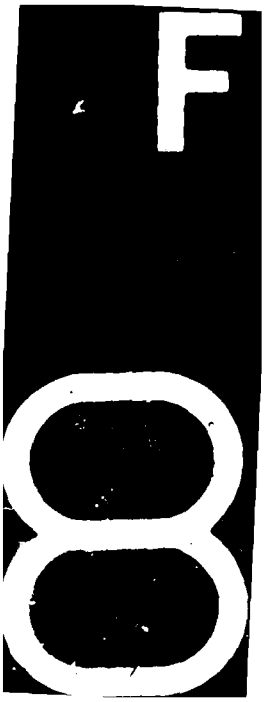
DRAWN	CHECKED	APPROVED	SCALE 1" = 800'
JRS	DLS		DATE FEB. 1980 PAGE D-19

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME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