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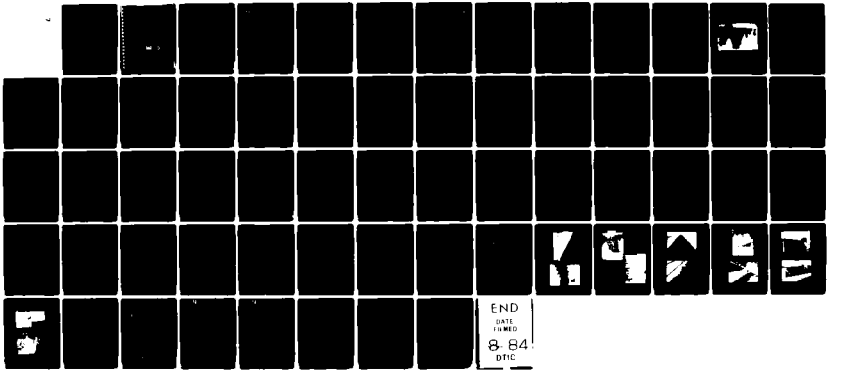

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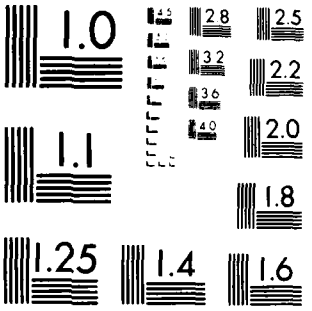

CONNECTICUT WESTERN COASTAL AREA
EASTON, CONNECTICUT

EASTON RESERVOIR DAM
CT 00020

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

SEPTEMBER 1978

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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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,

Easton Reservoir Dam
Conn. Western Coastal Area

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

The Easton Reservoir Dam is a gravity concrete dam, built in 1926. The dam section is 1,040 ft. long with a maximum height of 123 ft. The top of the dam is about 12 ft. wide. The downstream side slopes are 0.7 horizontal to 1 vertical. The spillway is 100 ft. long wigh an "Ogee" crest. The maximum spillway capacity, at top of dam is about 25% of the peak outflow rate of the test flood. The peak rate of discharge from the test flood will overtop the dam by 2.5 ft.

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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

AUG 16 1979

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

Dear Governor Grasso:

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

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, Bridgeport Hydraulic Company, 835 Main Street, P.O. Box 702, Bridgeport, Connecticut 06609.

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

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

Sincerely yours,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

EASTON RESERVOIR DAM

CT 00020

CONNECTICUT WESTERN COASTAL AREA

EASTON, CONNECTICUT

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION REPORT

A-1

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam: EASTON RESERVOIR DAM

State Located: Connecticut

County Located: Fairfield County

Stream: Mill River

Date of Inspection: 2 AUGUST 1978

BRIEF ASSESSMENT

The Easton Reservoir Dam is a gravity concrete dam, built in 1926. The dam section is 1,040 feet long with a maximum height of 123 feet. The top of the dam is 12 feet wide. The downstream side slopes are 0.7 horizontal to 1 vertical. The upstream slope is 0.05 horizontal to 1 vertical. The spillway is 100 feet long, with an "Ogee" crest.

Based on the visual inspection of the site, review of available information, and the past performance of the dam, the dam is judged to be in good condition. The concrete surface has deteriorated and major spalling has occurred. Some dampness was noted at the joints.

The maximum spillway capacity, at top of dam, is about 25 percent of the peak outflow rate of the test flood. The peak rate of discharge from the test flood will overtop the dam by 2.5 feet.

Concrete surfaces of the downstream face and top of dam affected by spalling should be repaired by the owner. A definite plan for around the clock surveillance should be implemented during periods of unusually heavy rains and a formal warning system should be developed for use in the event of an emergency.

Recommendations and remedial measures described should be implemented by the owner within two years after receipt of this Phase I Inspection Report.

S. Giavara, P.E.
Principal

Registered, CT 7634

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

Charles G. Tiersch

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

Fred J. Ravens Jr.

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

Saul Cooper

SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

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

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

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

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

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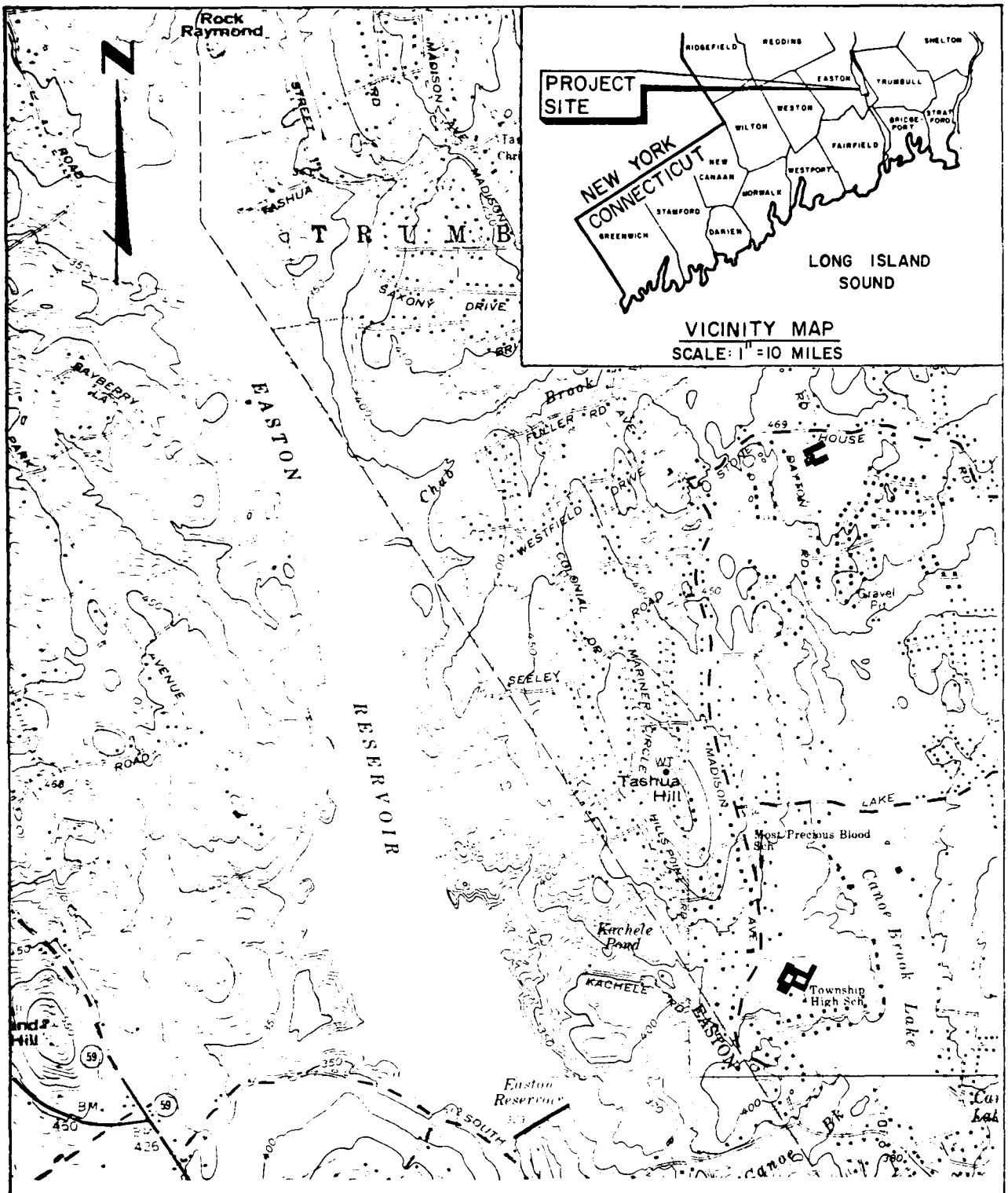
EASTON RESERVOIR DAM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FULLER RD
Brook
WESTFIELD
COLONIAL DR
SEELEY ROAD
MARINER CIRCLE
Tashua Hill
HILLS POINT RD
MADISON AVE
LAKE
Most Precious Blood Sch
Canoe Brook Lake
Kachele Pond
KACHELE RD
Township High Sch
EASTON
Easton Reservoir
SOUTH
Gravel Pit
STORE
HOUSE
BAYSON RD
BM
Canoe BK
SCALE IN FEET
2000 0 1000 2000
LOCATION MAP
EASTON RESERVOIR DAM
EASTON, CONNECTICUT

PHASE I INSPECTION REPORT
EASTON RESERVOIR DAM CT 00020

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL:

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection through 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. Flaherty Giavara Associates, P.C. 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 was issued to Flaherty Giavara Associates, P.C. under a letter of 25 April 1978 from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0309 has been assigned by the Corps of Engineers for this work.

b. Purpose.

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

2) Encourage and assist the States to initiate quickly effective dam safety programs for non-federal dams.

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

1.2 DESCRIPTION OF PROJECT:

a. Description of Dam and Appurtenances. The structure is a gravity concrete dam, built in 1926. The dam section is 1,040 feet long with a maximum height of 123 feet. The top of the dam is 12 feet wide. The downstream side slopes are 0.7 horizontal to 1 vertical. The upstream slope is 0.05 horizontal to 1 vertical. The spillway is 100 feet long, with an "Ogee" crest.

b. Location. The dam is located in the Town of Easton approximately 2 miles north of Plattsville development on Mill River within the Connecticut western coastal area.

c. Size Classification. The applicable guideline indicates that for a large category the storage in acre-feet for the impoundment must be greater than or equal to 50,000 or the dam height must be greater than or equal to 100 feet. The size classification may be determined by either storage or height, whichever gives the larger size category. Based on the height of the dam, the size classification is large. The top of Easton Reservoir Dam is 103 feet above the downstream riverbed.

d. Hazard Classification. The dam is classified as having a high hazard potential. This classification is based on the 10 or more houses situated along the narrow valley which would be affected by a dam failure flood wave. The Plattsville development which is highly populated would also be effected.

e. Ownership. Easton Reservoir Dam is owned by the Bridgeport Hydraulic Company having its headquarters in Bridgeport, Connecticut.

f. Purpose of Dam. The dam was constructed to form an impounding reservoir. The reservoir forms part of the water company's supply and distribution system, providing potable water to the residents of the Greater Bridgeport area.

g. Design and Construction History. The dam was completed in 1926. The dam was designed by Albert B. Hall, Consulting Engineers of New Haven, Connecticut. Subsequent modifications are unknown.

h. Normal Operating Procedures. Water is taken through the intake structure through eight 36-inch by 48-inch sluice gates and delivered to the distribution system via twin 36-inch diameter water supply mains. A 36-inch blow off is provided. Treatment consists of chlorination, fluoridation and corrosion control.

1.3 PERTINENT DATA:

a. Drainage Area -	12.8 Sq. Miles
b. Discharge at Dam Site -	
Maximum Known Flood	Unknown
Warm Water Outlet	Not Available
Div. Tunnel Low Pool Outlet	None
Diversion Tunnel Outlet	None
Gated Spillway	None
Ungated Spillway at Max. Pool	3,100 CFS @ 1 Ft. freeboard
Total Spillway Cap. at Max. Pool	4,400 CFS @ no freeboard
c. Elevation (above M.S.L.) -	
Top of Dam	305
Max. Design Pool	Not Available
Full Flood Control Pool	Not Available
Recreation Pool	Not Available
Spillway Crest Ungated	300
Upstream Portal Invert. Div. Tunnel	Not Applicable
Downstream Portal Invert. Div. Tunnel	Not Applicable
Streambed at Centerline of Dam	200
Maximum Tailwater	Not Available
d. Reservoir -	
Length of Max. Pool	17,000 feet
Length of Recreation Pool	Not Applicable
Length of Flood Control Pool	Not Applicable
e. Storage -	
Recreation Pool	Not Applicable
Flood Control Pool	Not Applicable
Design Surcharge	Not Applicable
Top of Dam	36,000 Acre-Feet
f. Reservoir Surface (acres) -	
Top of Dam	Not Available
Max. Pool	Not Available
Flood Control Pool	Not Applicable
Recreation Pool	Not Applicable
Spillway Crest	488

g. Dam -

Type:	Gravity concrete
Length:	1,040 feet
Height:	123 feet
Top width:	12 feet
Side slopes:	Downstream: 1 vertical to 0.7 horizontal
	Upstream: 1 vertical to 0.05 horizontal
Zoning:	Not Applicable

Impervious core: Concrete core
Grout Curtain: Unknown

h. Diversion and Regulating Tunnel -

Type:	Not Applicable
Length:	Not Applicable
Diameter:	Not Applicable
Access:	Not Applicable
Regulation:	Not Applicable

i. Spillway -

Type:	Ogee
Length of Weir:	100 feet
Crest Elevation:	300
Gates:	Ungated
Upstream Channel:	Reservoir
Downstream Channel:	Bedrock channel
Spillway is founded on:	Bedrock

j. Regulating Outlets -

Gates:	8 36-inch x 48-inch sluice gates
Conduits:	Twin 36-inch diameter cast iron pipe to distribution system 36-inch drain cast iron pipe to blow off/ drain

SECTION 2 - ENGINEERING DATA

2.1 DESIGN:

The designer of the Easton Reservoir Dam was Arthur B. Hill, Consulting Engineer, New Haven, Connecticut. Two drawings were reviewed as part of this study.

a. Bridgeport Hydraulic Co. - Easton Lake Dam. General Plans of Upper and Lower Gate Houses. Revised July 1919.

b. Bridgeport Hudraulic Co. - Proposed Cross-Section of Easton Lake Dam - Resultant Pressure Curves, dated April 1917.

The design assumptions are summarized as follows:

Concrete weight per cubic foot	150 lbs.
Water weight per cubic foot	62.5 lbs.
Wind pressure per square foot Normal to face of dam	30 lbs.
Ice pressure per linear foot of dam at El. 300	40,000 lbs.

Water pressures normal to back of dam

Uplift due to water under base:

1) Full head of Reservoir at Heel varying uniformly to zero at toe of Dam

2) One half full head of Reservoir at heel varying uniformly to zero at toe of Dam.

Based on several operating conditions, factors of safety against rotation and maximum pressures were calculated as indicated in Appendix B . No design calculations are available relative to a sliding analysis.

2.2 CONSTRUCTION:

No construction records are available for this project. Information presented in this report was primarily obtained by interviews and direct measurements of the existing structures.

2.3 OPERATION:

No operation records were made available for use during this investigation.

2.4 EVALUATION:

a. Availability. Only plans showing some of the dimensional features are available. Specifications indicating the properties of the materials used and construction procedures are not available.

b. Adequacy. Information available is adequate for Phase I purposes.

c. Validity. There is no reason to question the validity of the documents reviewed.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS:

a. General. The dam is in fair condition with concrete surfaces on the top and downstream face severely spalled. No structural cracks were observed, nor was any visible evidence of abnormal settlements, heaving, deflections or lateral movements noted. The downstream slope was generally in good condition with no sloughing or wet spots noted.

b. Dam.

1) Upstream Face - This face is in good condition. Some minor areas of exposed aggregate were noted.

2) Top of Dam - The top surface of the dam for nearly the full length has many areas of surface spalling, joint spalling and general deterioration. The coping has deteriorated and spalled at several areas west of the gatehouse. To the east of the gatehouse, the lip at both the upstream and downstream face, for nearly the entire length, has deteriorated and spalled. At about Station 7+15, the lip has deteriorated to such an extent that the anchorage for the post of the railing has completely pulled away from the concrete.

3) Downstream Face - The downstream face of the dam is severely deteriorated. For nearly the entire length of the downstream face of the dam there are large areas of surface spalling, joint spalling and efflorescence. The central concrete panel (vicinity of the gatehouse) at both construction joints exhibits extensive joint spalling and efflorescence for the full depth of the exposed face of the dam. Minor seepage is evident.

4) Spillway - The spillway is in good condition. There is some horizontal scouring of concrete, exposing the aggregate, at about 4 feet down from the crest of the spillway between Station 9+40 to Station 9+70. At the spillway section adjacent to the dam there is a wet spot several feet long at a horizontal pour joint about 5 feet down from the top of spillway. There is some joint spalling at the vertical construction joint at Station 9+70. There is some slight spalling of the downstream face beyond Station 9+90. At about Station 9+80 at the crest of the spillway there is an area about 2 feet long and several inches deep that has deteriorated and spalled off.

5) Downstream Slope - The downstream slope was recently mowed and is generally in good condition with no sloughing or wet spots noted.

At approximately Station 3+25 a large inlet structure exists adjacent to the concrete dam which is approximately 5.5 feet wide and 10 feet long and 3 feet deep. The outlet appears to be located along the downstream edge of the inlet structure and is covered by a large flat rock. The direction of the outlet flow is not known.

At approximately Station 3+0, another hole was located in the embankment which was 2 feet wide and 1 foot deep and extended approximately 6 feet into the embankment through a layer of blasted rock. A similar hole was located in the embankment on the left slope in the vicinity of Station 5+25. The outlets of neither of these holes could be located during the site visit.

No holes made by burrowing animals were located during inspection of the downstream slopes.

There are several apparent stone inlets on the upstream side of the lower access road. The inlets appear to connect to 30-inch culverts which are laid underneath the access road and which appear to discharge on the downstream slope adjacent to the road with the exception of the culvert near the lower gatehouse, which discharges into the spillway channel.

c. Appurtenant Structures.

1) Spillway Channel - The spillway channel is in good condition. The low concrete wall on the right side of the channel is also in good condition. The massive mica schist and mica gneiss bedrock is exposed on the bottom of the channel and along the left side of the channel. At these locations, the bedrock is approximately planar, strikes approximately S85°W and dips 15° north. There are some obstructions on the bottom of the channel consisting of small bushes and some grass growing along the bottom. The spillway channel flows into a steep sided ravine near the end of the concrete wall which has been created by differential erosion along foliation of the banded mica gneiss.

2) Upper Gatehouse - The upper gatehouse was clean and neat and in good condition. The intake valves are exercised periodically and appear to be easy turning. Minor cracking of the walls was noted.

The filtration screens for the water supply mains have electrical power hoists in good condition. Electrical equipment for the hoists, interior light, dam floodlights, and deicer pumps appeared in good condition. All interior wiring was enclosed in conduits free of corrosion and dirt.

3) Lower Gatehouse - Generally good condition. The 36" blow-off valve was operated to ensure proper functioning. No problems were encountered during the test.

d. Reservoir Area. The reservoir perimeter is composed of cobble and/or bedrock. The banks are wooded above the high water line.

There was no evidence of slides or sloughing. No noticeable debris or obstructions were seen in the vicinity of the upper gatehouse. The depth of sediment, and rate of accumulation in the reservoir, is unknown.

e. Downstream Channel. Discharges from the blow-off and spillway channel flow into the natural river south of the dam. It has a width of about 20 feet and a coarse gravel and cobble bed. The banks were stable, but the bed appears to be aggrading due to the accumulation of fractured rock, probably the result of discharge channel erosion. Beginning 100 feet downstream of the blow-off outlet, the river banks and bed are heavily overgrown.

3.2 EVALUATION:

Based on the visual inspection, the dam appears to be in good condition. There is no evidence from the visual examination that the dam is unstable. The concrete surfaces have deteriorated and should be repaired. Particular attention at the joints adjacent to the gatehouse is warranted.

The spillway channel contained some obstructions on the bottom and it is important it be maintained to allow unobstructed flow during peak discharge periods. Some trees immediately adjacent to the left side of the spillway channel should be removed.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES:

Water is withdrawn through the upper gatehouse service gates and treated at a plant just downstream of the dam. Two 36" supply lines service customers in the greater Bridgeport region.

4.2 MAINTENANCE OF DAM:

The dam and associated structures are generally well maintained with a regular program of grass mowing and general maintenance in effect. Yearly routine inspections are carried out by Bridgeport Hydraulic Company staff. A consultant was hired to perform a cursory inspection of Bridgeport Hydraulic Company dams during November 1976. It was recommended that spalling concrete at Easton dam be repaired.

4.3 MAINTENANCE OF OPERATING FACILITIES:

The operating valves were inspected recently; although the results of the inspection are not available, generally the valves/valve stems need some repair.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT:

There was no warning system of any kind in effect at the time of the inspection.

4.5 EVALUATIONS:

The Easton Reservoir, which is about 60 years old, is well operated and maintained. Although not designed for rapid drawdown, it should be noted that, if the need should arise, drawdown could be effected by the following procedure:

a. Allowing for maximum discharge through the 36-inch and 10-inch blow-off.

The blow-off was operated during the site visit and found to be serviceable. The valve should be operated on a periodic basis to insure continued serviceability.

SECTION 5 - HYDRAULICS/HYDROLOGY

5.1 EVALUATION OF FEATURES:

a. Design Data. There is no available information on the hydraulic design criteria for this dam and appurtenances. Under established criteria (OCE Guidelines), the recommended spillway design flood for the size (large) and hazard potential (high) classification is the probable maximum flood (PMF). The PMF is the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

An estimate of the magnitude of the test flood at the site is based on an analysis of several sets of regional flood frequency data as presented in Appendix II.

As a conservative approach to the investigation, the more critical test flood hydrograph was used throughout. A peak inflow rate of 20,000 CFS was used in evaluating the spillway adequacy.

A stage-discharge relationship was calculated for the spillway and indicates the following flows, based upon a coefficient of 3.9 and a length of 100 feet.

Stage - Discharge Relationship

Stage	Head, Ft.	Discharge Rate, CFS
300	0	0
301	1	390
302	2	1,100
303	3	2,030
304	4	3,120
305	5	4,360

The maximum spillway capacity, with no freeboard, is about 25 percent of the peak discharge rate of the test flood. (Compare 4,360 CFS with 18,850 CFS.) In order to determine the effect of the reservoir storage capacity, a hydrograph of the test flood was routed through the reservoir.

The hydrograph was formed by assuming the test flood had a duration of 24 hours, with the peak of 20,000 CFS occurring at 8 hours from the beginning of runoff. The rising and falling limbs of the hydrograph were assumed to be changing at a constant rate, forming a triangle. The routing operation indicated that the peak rate of discharge would be reduced to 18,850 CFS, resulting in a stage elevation of 307.5 feet.

b. Experience Data. Discussion with water company personnel indicates that the dam satisfactorily passed the record floods of October, 1955 without overtopping.

c. Visual Observations. The on-site inspection of the dam provided the data for the hydraulic evaluation of the spillway.

d. Overtopping Potential. The maximum spillway capacity is equal to less than one-half of the test flood. The peak rate of discharge from the test flood will overtop the dam by 2.5 feet.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATIONS OF STRUCTURAL STABILITY:

a. Visual Observations. No evidence was observed that would indicate structural instability. The concrete surface has deteriorated, and some dampness was noted at the joints.

b. Design and Construction Data. The design and construction data available are not sufficient to formally evaluate the stability of the dam.

c. Operating Records. There are no available records which indicate evidence of stability problems since the dam was constructed in 1926. As the Easton Reservoir dam was designed and constructed as a water supply dam and has been subjected to a full head of water a majority of the time since construction, its stability could be considered to be adequate based on past performance.

d. Post-Construction Changes. A treatment facility and floride storage shed was constructed downstream of the dam, south and east of the lower gatehouse. Neither of these changes affects the structural stability of the dam.

e. Seismic Stability. This dam is in Seismic Zone 1 and, in accordance with recommended Phase I guidelines, does not warrant seismic analysis.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT:

a. Condition. Based on the visual inspection, records available, and past operational performance the dam is judged to be in fair condition. The area of concern is the major spalling of most concrete surfaces and joint deterioration.

The project will not pass the test flood without overtopping the dam, and therefore, the spillway capacity is inadequate. The spillway can pass only 25 per cent of the test flood and therefore the spillway capacity is judged seriously inadequate.

b. Adequacy of Information. The information available is such that the assessment of the safety of the dam must be based on the visual inspection.

c. Urgency. The recommendations and remedial measures should be implemented by the owner within two years after receipt of the Phase I Report.

d. Need for Additional Investigation. Additional investigations to further assess the adequacy of the dam do not appear necessary. However, an investigation and design of the most appropriate method of repair for the surface spalling should be undertaken by the owner, and detailed investigations should be initiated by the owner to determine requirements for obtaining additional spillway capacity.

7.2 RECOMMENDATIONS:

It is recommended that the following measures be undertaken by the owner:

a. Concrete surfaces of downstream face and top of dam affected by spalling should be repaired.

7.3 REMEDIAL MEASURES:

Although the dam is generally maintained in good condition, it is considered important that the following items be accomplished:

a. Alternatives. Not applicable.

b. Operation and Maintenance and Procedures.

1) Arrangements should be made to periodically operate the blow-off, assuring continued serviceability.

2) A definite plan for around the clock surveillance should be implemented during periods of unusually heavy rains and a formal warning system should be developed for use in the event of an emergency.

3) The owner should provide continued periodic inspections at a two year frequency.

APPENDIX A

VISUAL INSPECTION - CHECK LIST

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam **DATE** August 2, 1978

INSPECTOR Anthony D. Rummo **DISCIPLINE** Structural

INSPECTOR Robert C. Smith **DISCIPLINE** Project Manager

AREA EVALUATED	CONDITION
CONCRETE DAM STRUCTURE	
General Condition Concrete Surfaces	Fair, major spalling of top and downstream face of dam.
Movement or Settlement of Crest	None observed. Vertical and horizontal alignment good.
Vertical Alignment	
Horizontal Alignment	
Condition at Abutment and Other Structures	Good
Structural Cracking	None observed
Spalling	Excessive
Visible Reinforcing	
Rusting or Staining of Concrete	
Condition of Monolith/ Construction Joints	
Drains - Foundation, Joint, Faces	
Any Seepage or Efflorescence	Seepage at some joints, especially central portion of dam.
Foundation Damage, Undermining	None
Water Passages	Good, some surface spalling.
Abutments	

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam — DATE August 2, 1978

INSPECTOR Richard F. Murdock — DISCIPLINE Geotechnical

INSPECTOR Robert C. Smith — DISCIPLINE Project Manager

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	300
Current Pool Elevation	298
Maximum Impoundment to Date	
Surface Cracks	
Pavement Condition	
Movement or Settlement of Crest	None observed
Lateral Movement	None
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	Numerous drainage holes (stone) along downstream slope.
Sloughing or Erosion of Slopes or Abutments	None
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None
Unusual Embankment or Downstream Seepage	None

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam DATE August 2, 1978

INSPECTOR Richard F. Murdock DISCIPLINE Geotechnical

INSPECTOR Robert C. Smith DISCIPLINE Project Manager

AREA EVALUATED	CONDITION
DAM EMBANKMENT - (continued)	
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam DATE August 2, 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	
Crest Elevation	
Current Pool Elevation	
Maximum Impoundment to Date	
Surface Cracks	
Pavement Condition	
Movement or Settlement of Crest	
Lateral Movement	
Vertical Alignment	
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	
Indications of Movement of Structural Items on Slopes	
Trespassing on Slopes	
Sloughing or Erosion of Slopes or Abutments	
Rock Slope Protection - Riprap Failures	
Unusual Movement or Cracking at or near Toes	
Unusual Embankment or Downstream Seepage	

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam DATE August 2, 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
DIKE EMBANKMENT - (continued)	
Piping or Boils	
Foundation Drainage Features	
Toe Drains	
Instrumentation System	

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam **DATE** August 2, 1978

INSPECTOR _____ **DISCIPLINE** _____

INSPECTOR _____ **DISCIPLINE** _____

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	None
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	
Condition of Concrete	
Stop Logs and Slots	

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam — DATE August 3, 1978

INSPECTOR James MacBroom — DISCIPLINE Hydraulics/ Hydrology

INSPECTOR _____ — DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	The upper gate house in good condition.
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam **DATE** August 3, 1978

INSPECTOR James MacBroom **DISCIPLINE** Hydraulics/ Hydrology

INSPECTOR _____ **DISCIPLINE** _____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER (continued)	
Service Gates	Good
Emergency Gates	Operable blow off
Lightning Protection System	Good
Emergency Power System	
Wiring and Lighting System In Gate Chamber	Good

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam DATE August 2, 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam DATE August 2, 1978

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain Holes	
Channel	
Loose Rock or Trees Overhanging Channel	
Condition or Discharge Channel	

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam — DATE August 2, 1978

INSPECTOR James MacBroom — DISCIPLINE Hydraulics/ Hydrology

INSPECTOR Richard Murdock — DISCIPLINE Geotechnical

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	Reservoir
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	
General Condition of Concrete	
Rust or Staining	
Spalling	
Any Visible Reinforcing	
Any Seepage or Efflorescence	
Drain Holes	None observed
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Some healthy trees on the bank.
Floor of Channel	Bedrock with some vegetation present.
Other Obstructions	

PERIODIC INSPECTION CHECK LIST

PROJECT Easton Reservoir Dam **DATE** August 2, 1978

INSPECTOR _____ **DISCIPLINE** _____

INSPECTOR _____ **DISCIPLINE** _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	None
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutments & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

APPENDIX B

ENGINEERING DATA

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Easton Reservoir

I.D. NO. CT 00020

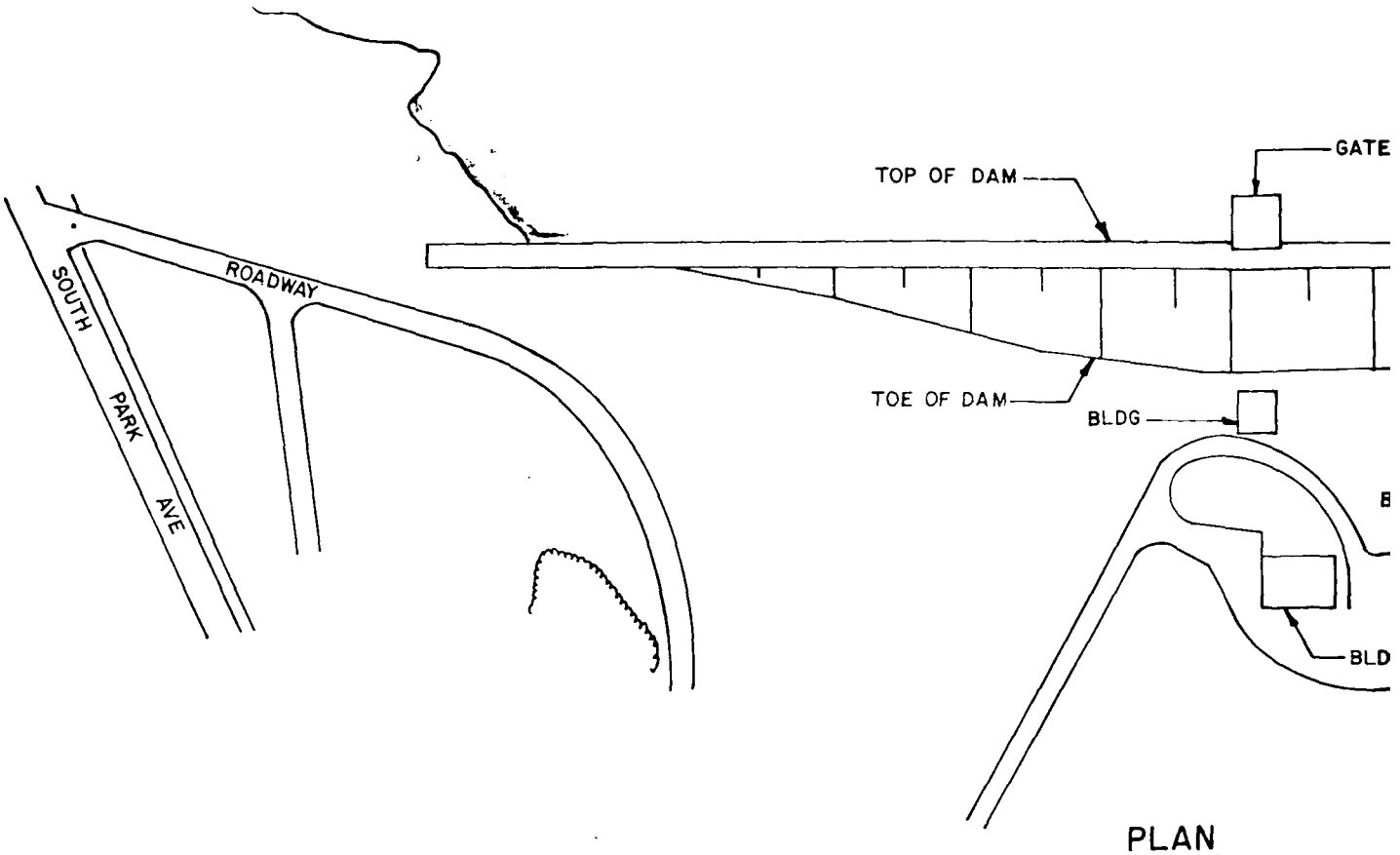
ITEM	REMARKS
AS-BUILT DRAWINGS	None Exist
REGIONAL VICINITY MAP	Available From U.S.G.S.
CONSTRUCTION HISTORY	Unknown
TYPICAL SECTIONS OF DAM	Available From Plan
OUTLETS - Plan	From Plans, Not Complete
- Details	From Plans, Not Complete
- Constraints	Unknown
- Discharge Ratings	Unavailable
RAINFALL/RESERVOIR RECORDS	From Bridgeport Hydraulic Co.
DESIGN REPORTS	None
GEOLOGY REPORTS	None
DESIGN COMPUTATIONS	None
HYDROLOGY & HYDRAULICS	None
DAM STABILITY	Available From Plan
SEEPAGE STUDIES	None
MATERIALS INVESTIGATIONS	None
BORINGS RECORDS	None
LABORATORY	None
FIELD	None

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

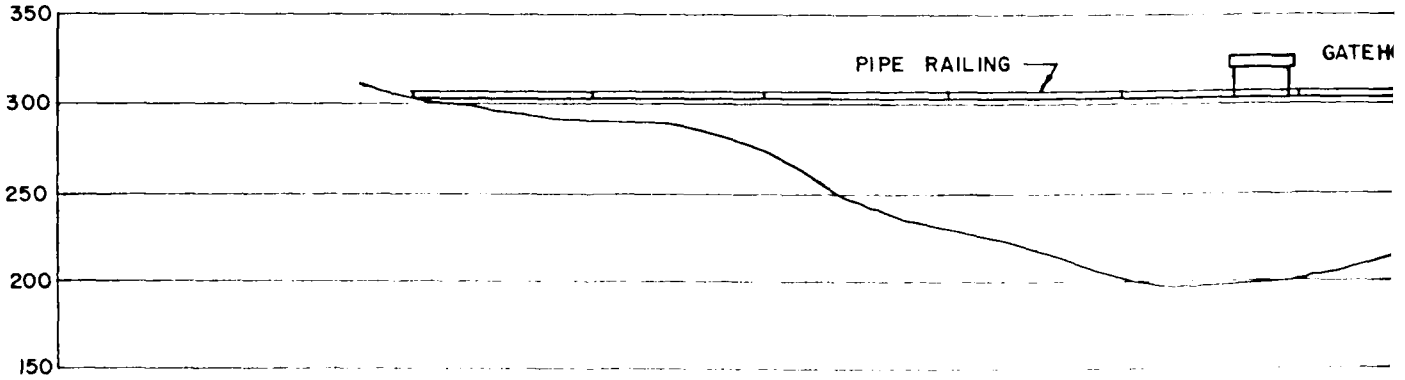
NAME OF DAM Easton Reservoir

I.D. NO. CT 00020

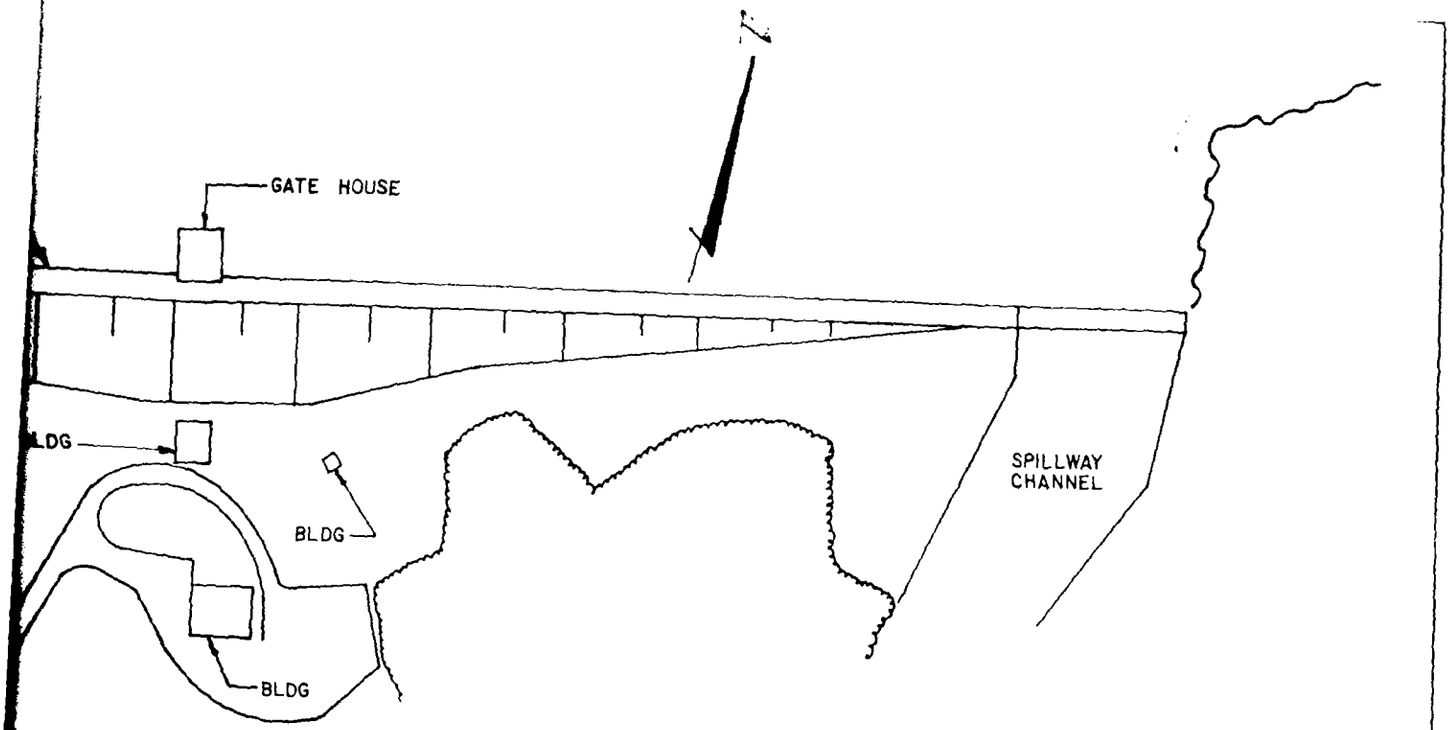
ITEM	REMARKS
POST-CONSTRUCTION SURVEYS OF DAM	None Available
BORROW SOURCES	Unknown
MONITORING SYSTEMS	None
MODIFICATIONS	Unknown
HIGH POOL RECORDS	Approximate From Bridgeport Hydraulic Co. Records
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	Inspection Reports From Bridgeport Hydraulic Co.
SPILLWAY PLAN	
SECTIONS	From Field Measurements
DETAILS	None
OPERATING EQUIPMENT PLANS & DETAILS	Plans



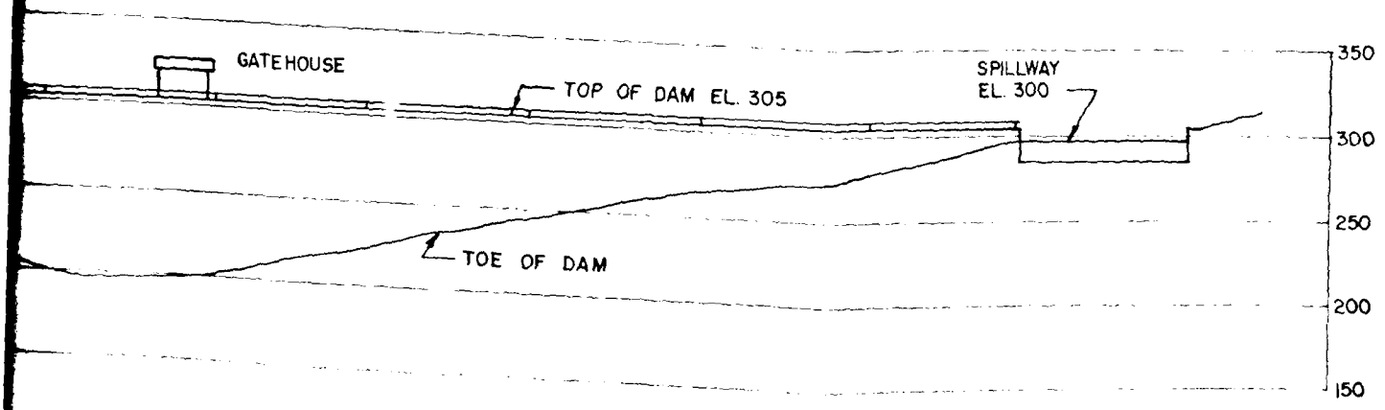
PLAN
NTS



DOWNSTREAM ELEVATION OF
NTS

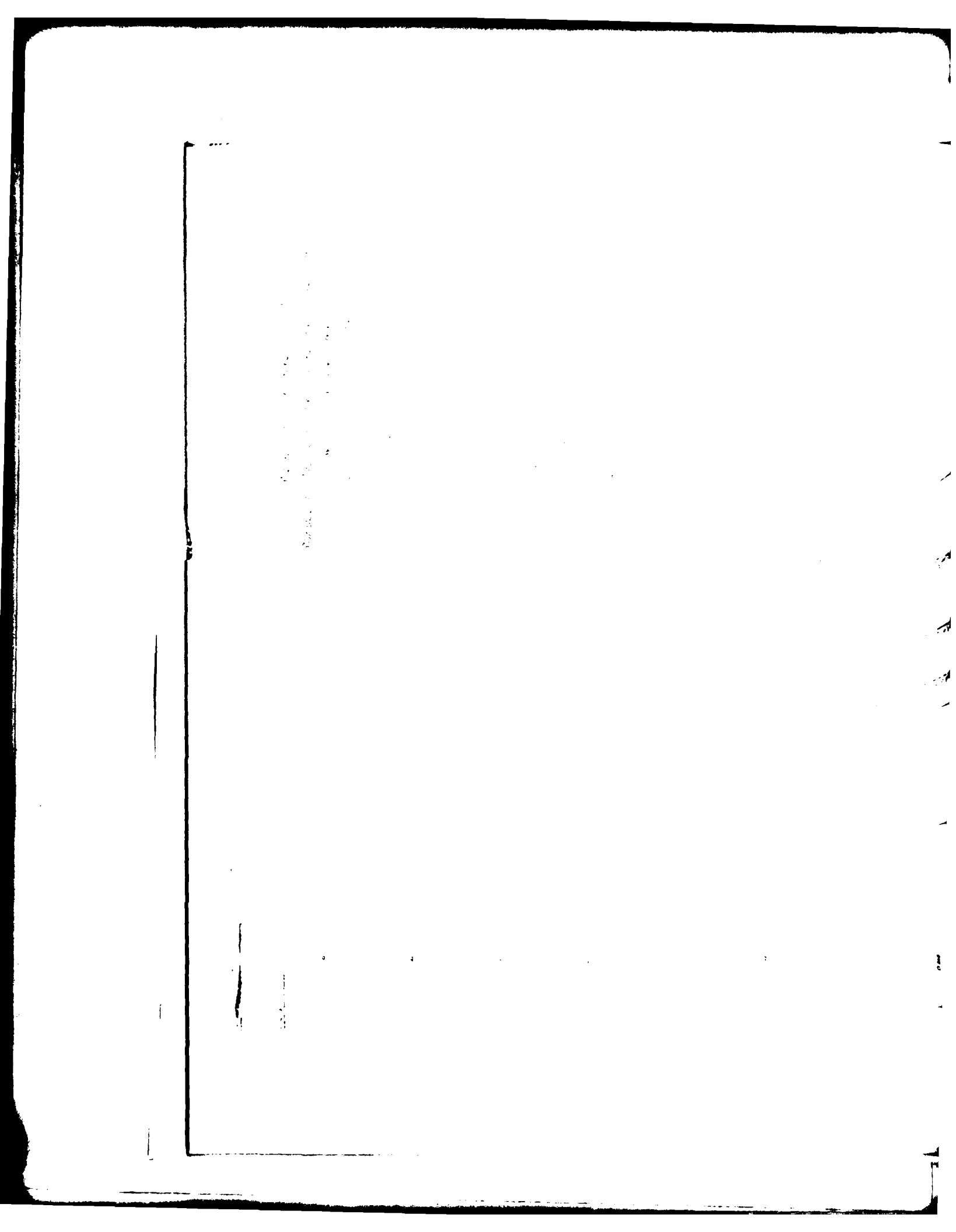


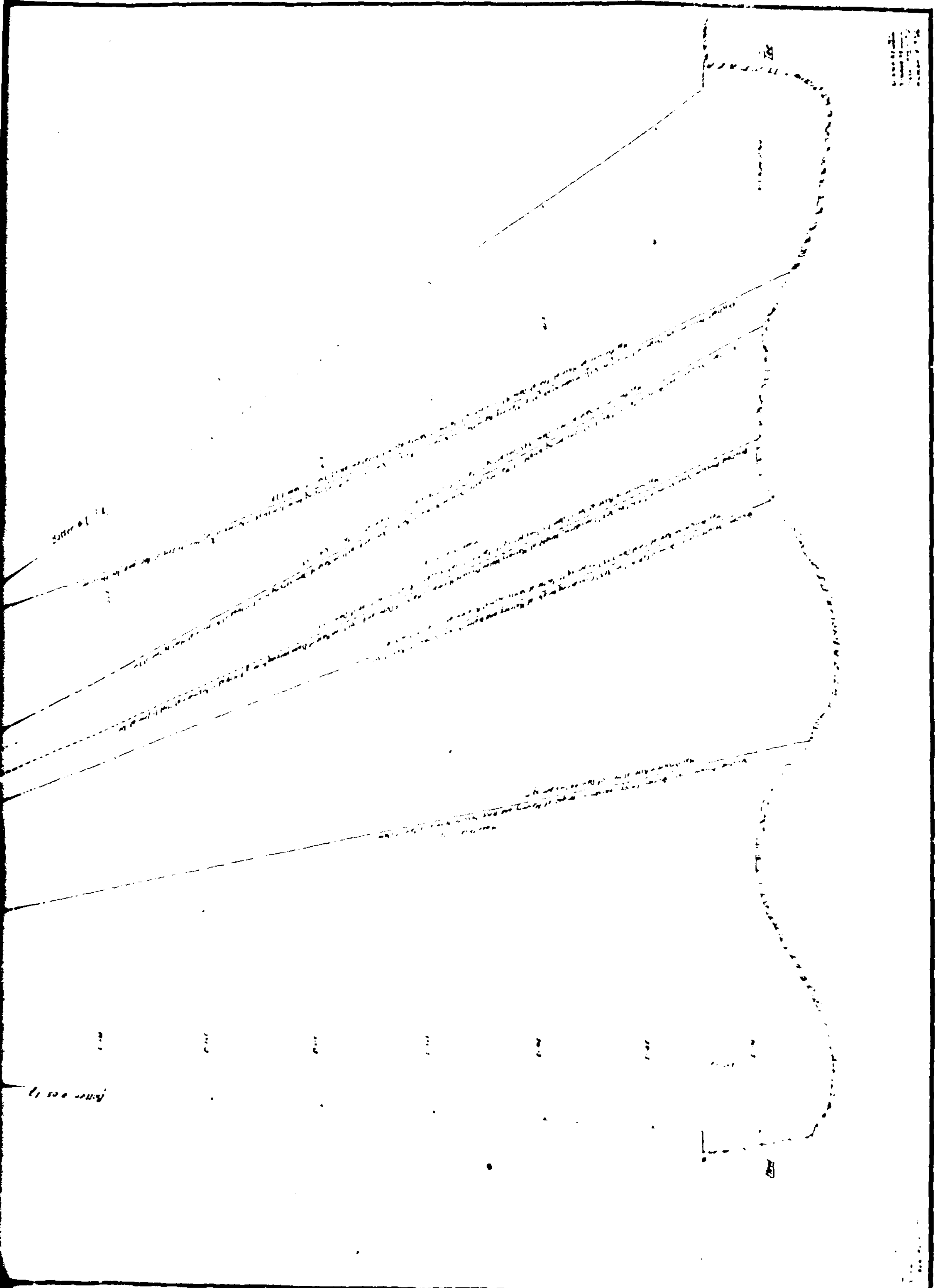
PLAN
NTS



ELEVATION OF DAM
NTS

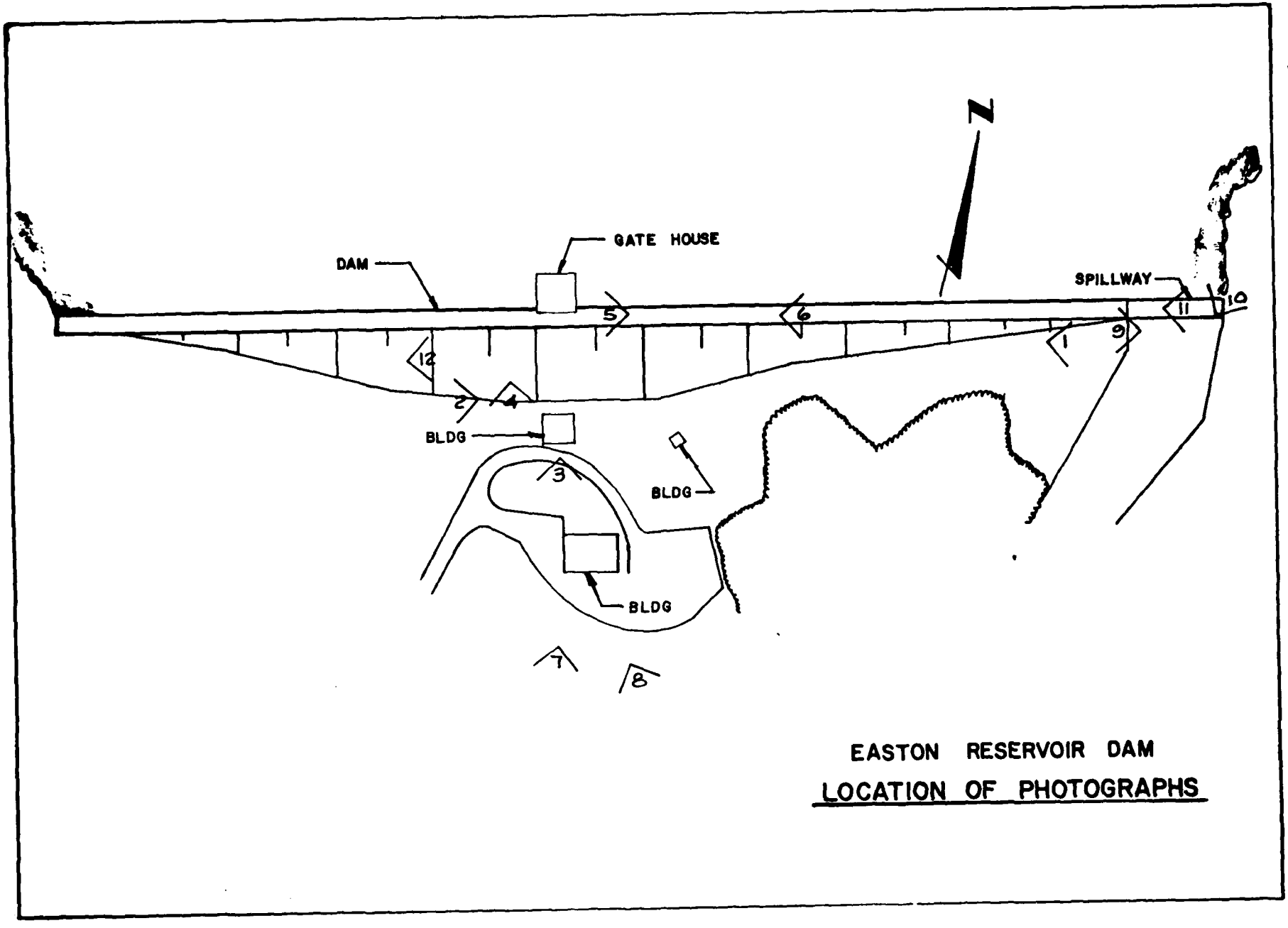
EASTON RESERVOIR DAM
MILL RIVER





APPENDIX C

PHOTOGRAPHS



EASTON RESERVOIR DAM

LOCATION OF PHOTOGRAPHS

PHOTO #1: Downstream face of dam and west abutment.

PHOTO #2: Downstream face of dam and east abutment.

PHOTO #3: Front view of the dam, showing the upper and lower gate houses.

PHOTO #4: Construction joint adjacent to the gate houses. Note extensive spalling.

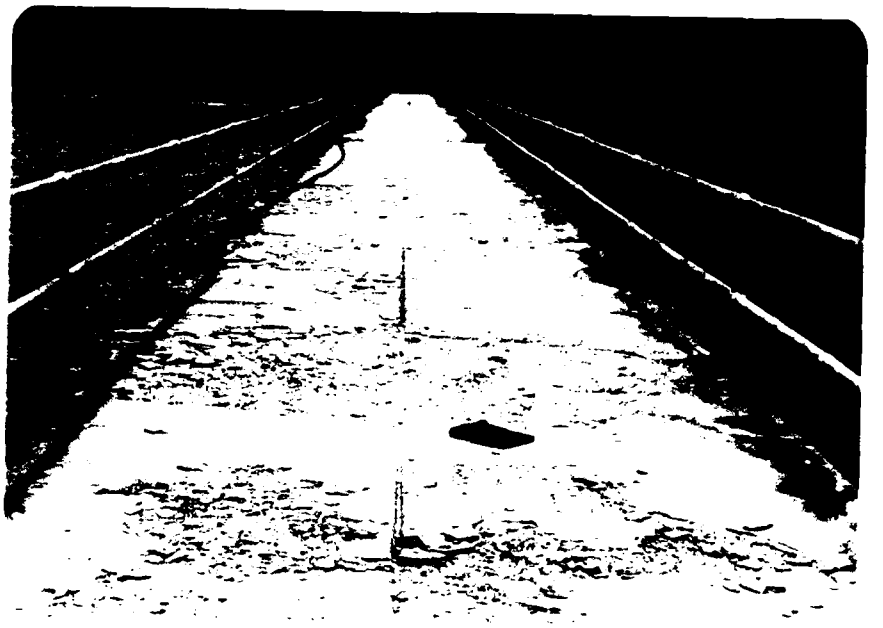


PHOTO #5: View along crest of dam, looking east.

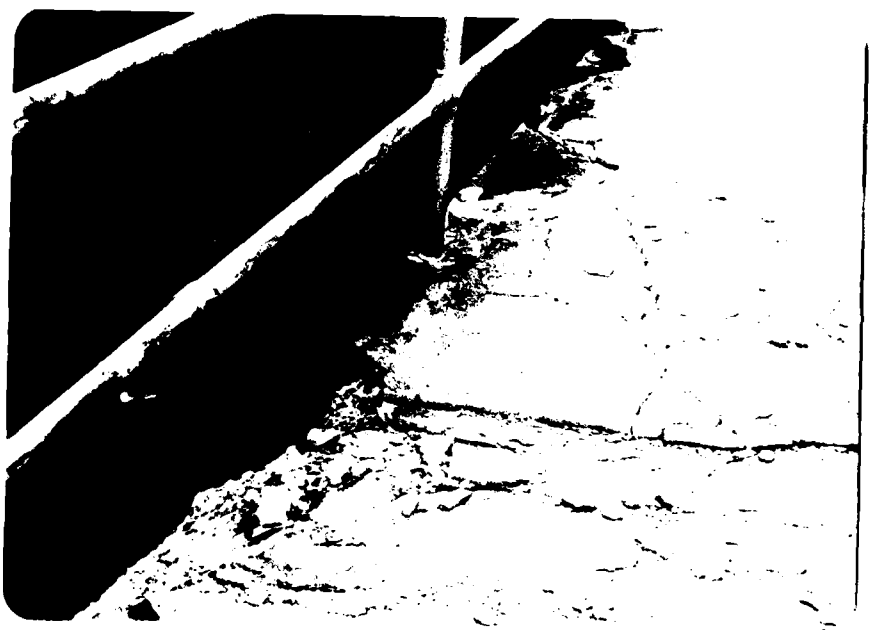


PHOTO #6: Typical concrete surface conditions along edge and top of crest.

PHOTO #7: View of the blow-off discharge point, and immediately above it, the paved stilling basin for the bottom of the spillway discharge channel.

PHOTO #8: Discharge from the 36" blow-off valve partially open.

PHOTO #9: Downstream face of the spillway, looking east.

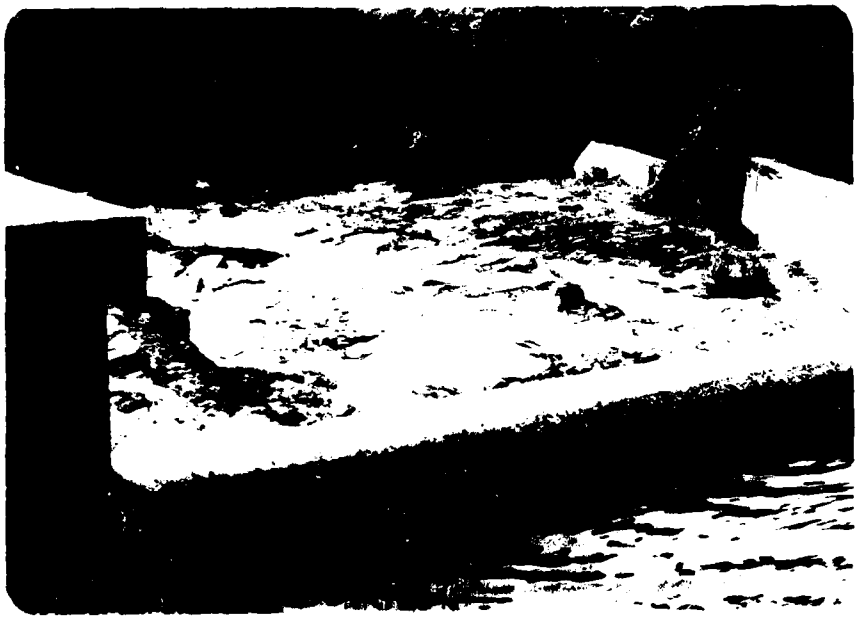


PHOTO #10: View over the top of the spillway, looking south.

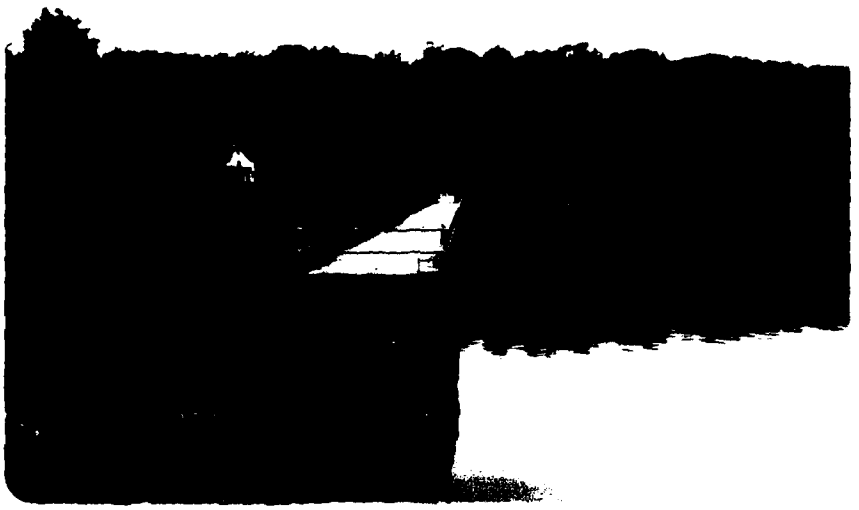
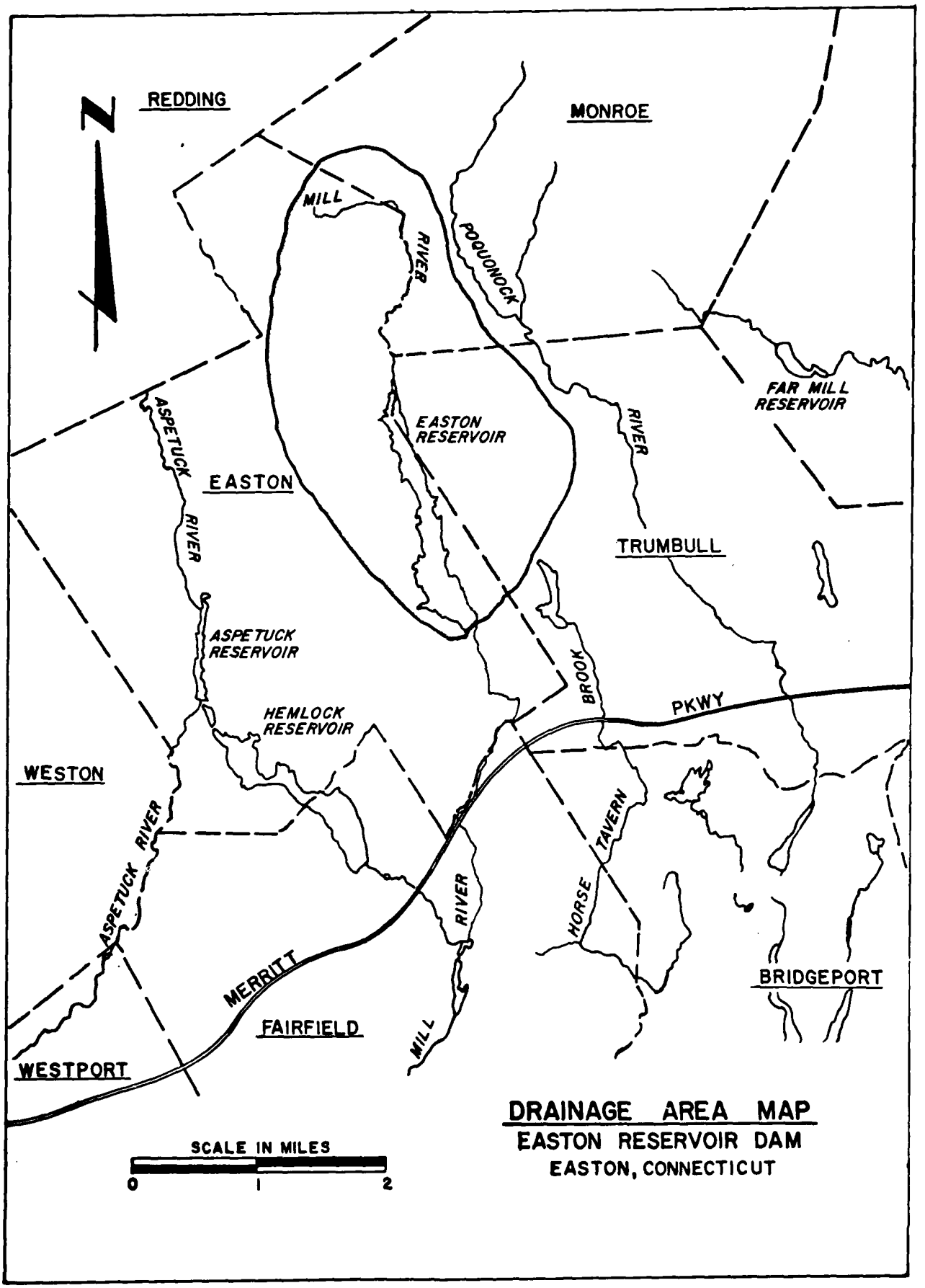


PHOTO #11: View from the east end of the spillway, looking west.

PHOTO #12: Borrow hole in earth embankment.

APPENDIX D

HYDROLOGIC COMPUTATIONS


N
REDDING
MONROE
MILL
RIVER
POQUONOCK
RIVER
FAR MILL
RESERVOIR
EASTON
RESERVOIR
ASPETUCK
RIVER
EASTON
RIVER
TRUMBULL
ASPETUCK
RESERVOIR
BROOK
PKWY
HEMLOCK
RESERVOIR
WESTON
ASPETUCK RIVER
TAVERN
HORSE
RIVER
MERRITT
BRIDGEPORT
FAIRFIELD
MILL
WESTPORT
SCALE IN MILES
0
1
2
DRAINAGE AREA MAP
EASTON RESERVOIR DAM
EASTON, CONNECTICUT

78-36-10
EASTON DAM

FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

SHEET NO. 1 OF 2
BY JGM DATE 8/21/78
CHK'D. BY [illegible] DATE 8/29/78

P.M.F. PEAK FLOW ESTIMATE

DRAINAGE AREA IS 12.8 SQ. MILES

METHOD #1

REFER TO "PRELIMINARY GUIDANCE FOR ESTIMATING PMF DISCHARGES" BY NEW ENGLAND DIVISION, CORPS OF ENGINEERS

UNIT FLOW = 1575 CFS/MI^2 (ROLLING CURVE)
PMF $\approx$ (12.8 MI^2) $\times$ (1575 CFS/MI^2) = 20,160 CFS

METHOD #2

REFER TO "CONN. WATER RESOURCES BULLETIN NO. 17, PART 4" BY USGS

MEAN ANNUAL FLOOD = 500 CFS
Q_{100} = 5 $\times$ MAF = 5 $\times$ (500 CFS) = 2500 CFS

PMF $\approx$ 5 $\times$ Q_{100} (APPROXIMATE)
PMF $\approx$ 5 $\times$ (2500 CFS) = 12,500 CFS

METHOD #3

REFER TO FAIRFIELD, CT. F.I.A. FLOOD INSURANCE STUDY, "FREQUENCY, DISCHARGE, DRAINAGE AREA CURVES"

Q_{100} = 3100 CFS
PMF $\approx$ 5 $\times$ Q_{100} = 5 $\times$ (3100 CFS) = 15,500 CFS

FOR EVALUATING THE SPILLWAY CAPACITY, USE A TEST FLOOD OF 20,000 CFS.

78-36-10
EASTON DAM

FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

SHEET NO. 2 OF 2
BY TGM DATE 8/21/78
CHK'D. BY EJK DATE 8/29/78

FORMATION OF INFLOW HYDROGRAPH

1) TEST FLOOD = 20,000 CFS

2) FORM A TRIANGULAR HYDROGRAPH WITH A 24 HOUR DURATION, PEAK @ 8 HOURS

TIME HOURS	UNIT FLOW RATE	FLOW RATE, CFS
0	0.00	0
2	0.25	5,000
4	0.50	10,000
6	0.75	15,000
8	1.00	20,000
10	0.875	17,500
12	0.75	15,000
16	0.50	10,000
20	0.25	5,000
24	0.00	0

3) PEAK SPILLWAY CAPACITY

$$Q = C\ L\ H^{3/2}$$

L = 100 FT
C = 3.9 (Ogee crest)
H = 5 FT

$$Q = 3.9(100)(5)^{3/2} = 4360 \text{ CFS}$$

4) $\frac{\text{SPILLWAY CAPACITY}}{\text{TEST FLOOD FLOW}} = \frac{4360 \text{ CFS}}{20{,}000 \text{ CFS}} = 21.8\%$

EASTON DAM 78-36-10 FLOOD ROUTING JGM 8/21/78

INPUT DATA: UNSUBMERGED WEIR
SEGMENT 1 DISCHARGE COEFFICIENT = 3.9 LENGTH OF WEIR = 100 ELEVATION OF WEIR = 300
SEGMENT 2 DISCHARGE COEFFICIENT = 3 LENGTH OF WEIR = 946 ELEVATION OF WEIR = 305
IE=300 IV= 0.0 E=300 A=488.00 E=320 A=488.00

HOUR	INFLOW	MASS INFLOW	WATER EL.	TAIL WATER	OUTFLOW	MASS OUTFLOW	STORAGE(R)	STORAGE(A)
0.00	0CFS	0.00AC-F	300.00FT	0.00FT	0CFS	0.00AC-F	0.00AC-F	0.00AC-F
2.00	5,000CFS	413.22AC-F	300.79FT	0.00FT	278CFS	23.04AC-F	390.17AC-F	390.17AC-F
4.00	10,000CFS	1,652.89AC-F	302.95FT	0.00FT	1,982CFS	209.96AC-F	1,442.92AC-F	1,442.92AC-F
6.00	15,000CFS	3,719.00AC-F	305.68FT	0.00FT	6,900CFS	944.17AC-F	2,774.83AC-F	2,774.83AC-F
8.00	20,000CFS	6,611.57AC-F	307.36FT	0.00FT	18,156CFS	3,015.06AC-F	3,596.50AC-F	3,596.50AC-F
10.00	17,500CFS	9,710.74AC-F	307.45FT	0.00FT	18,846CFS	6,073.20AC-F	3,637.54AC-F	3,637.54AC-F
12.00	15,000CFS	12,396.69AC-F	307.08FT	0.00FT	15,861CFS	8,941.61AC-F	3,455.07AC-F	3,455.07AC-F
16.00	10,000CFS	16,528.92AC-F	306.41FT	0.00FT	11,105CFS	13,398.97AC-F	3,129.94AC-F	3,129.94AC-F
20.00	5,000CFS	19,008.26AC-F	305.57FT	0.00FT	6,370CFS	16,287.69AC-F	2,720.56AC-F	2,720.57AC-F
24.00	0CFS	19,834.71AC-F	304.03FT	0.00FT	3,165CFS	17,863.90AC-F	1,970.80AC-F	1,970.80AC-F
30.00	0CFS	19,834.71AC-F	301.90FT	0.00FT	1,027CFS	18,903.53AC-F	931.17AC-F	931.17AC-F
48.00	0CFS	19,834.71AC-F	300.26FT	0.00FT	52CFS	19,706.98AC-F	127.72AC-F	127.72AC-F

APPENDIX E

INFORMATION - NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
CT	20	NED	CT	001	05				EASTON RESERVOIR DAM	4114.9	7315.5	08	SEP	78

POPULAR NAME	NAME OF IMPOUNDMENT
	EASTON RESERVOIR

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM CAM (MI.)	POPULATION
01	07	MILL RIVER	PLATTSVILLE	2	1000

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
CTPG	1926	S	125	121	36000	35100		N	N	N	N	23AUG78

REMARKS

DIS HAS	SPILLWAY LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
1	1040	U	100	6400												

OWNER	ENGINEERING BY	CONSTRUCTION BY
BRIDGEPORT HYDRAULIC CO	ALBERT B HALL	

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
FLAHERTY-GIAVARA, ASSOCIATES, PC	02	AUG	78	PL 92-367

REMARKS


FI
8