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NATIONAL BUREAU OF STANDARDS-1963-A

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MERRIMACK RIVER BASIN
LAWRENCE, MASSACHUSETTS

STEVENS POND OUTLET DAM

MA 00232

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

AD-A154 921

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

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam appears to be in good condition. The "V" spillway is 90 ft. long with effective abutments of about 10 ft. on either end. The dam is about 15 ft. high at the abutments. Although the dam is in the small size category the hazard potential is extremely high and thus the situation was analyzed using the full probable maximum flood. A failure of the dam would overflow the left bank immediately below the dam, flood nearby buildings and streets. -		



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

REPLY TO
ATTENTION OF:

NEDED

OCT 2 1979

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

I am forwarding to you a copy of the Stevens Pond Outlet 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 Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Lawrence Industrial Association, 550 Broadway, Lawrence, Mass. 01841.

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 Quality Engineering for your cooperation in carrying out this program.

Sincerely,


MAX B. SCHEIDER

Colonel, Corps of Engineers
Division Engineer

Incl
As stated

STEVENS POND OUTLET DAM

MA 00232

MERRIMACK RIVER BASIN
LAWRENCE, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification No.: MA 00232
Name of Dam: Stevens Pond Outlet
Town: Lawrence, Massachusetts
County and State: Essex County, Massachusetts
Stream: Spicket River
Date of Inspection: June 15, 1978

BRIEF ASSESSMENT

Stevens Pond Outlet is an over 100-year old granite block dam of obvious quality of design and construction. It appears to be in good condition. The "V" spillway is 90 feet long with effective abutments of about 10 feet on either end. The dam is about 15 feet high at the abutments; freeboard between crest and abutments is 5 feet. The structure is founded on ledge rock.

The reservoir behind the dam is quite small, 7 or 8 acres. Both above and below the dam the river runs through a highly industrialized area in which there are numerous factories and dwellings. About two miles downstream the Spicket River joins the Merrimack River.

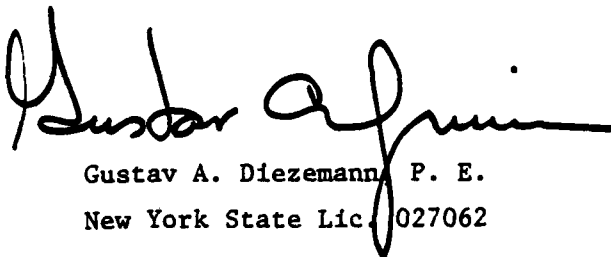
Although the dam is in the small size classification, the hazard potential is extremely high and thus the situation was analyzed using the full probable maximum flood.

The drainage area contributing to flow at the Stevens Pond Outlet is relatively large, over 40,000 acres, and provides a PMF of about 30,000 cfs. The small reservoir does not appreciably reduce this flow, thus a test flood of the same quantity was used to assess the effects. The spillway can only pass about 3,300 cfs, or 11 percent of the test flood, before overtopping occurs. Theoretically, assuming flow confined to the spillway and its abutments, the test flood would impose a 16-foot surcharge on the abutments. Actually, the river would overflow its banks and flood industrial and residential areas on either side. A failure of

the dam during such high flows would add little to the total flows as the dam would be at least partly submerged. Also the massive granite block structure spans the width of the natural river channel with little chance of a large breach developing by erosion, if the dam is overtopped.

A failure of the dam coincident with full spillway discharge could result in a flow of about 6,000 cfs which would overflow the left bank immediately below the dam, and flood nearby buildings and streets. Whether or not the remaining channel leading to the Merrimack River can safely carry 6,000 cfs cannot be determined readily.

Additional investigations or major modifications are not required. However, remedial measures that should be implemented by the owner within 24 months of the receipt of this Phase I Inspection Report are described in Section 7. The owner should implement inspection and maintenance procedures, make any needed repairs, clear the spillway discharge channel of growth and debris, and develop a flood warning system.


Gustav A. Diezemann, P. E.
New York State Lic. 027062

This Phase I Inspection Report on Stevens Pond Outlet 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.

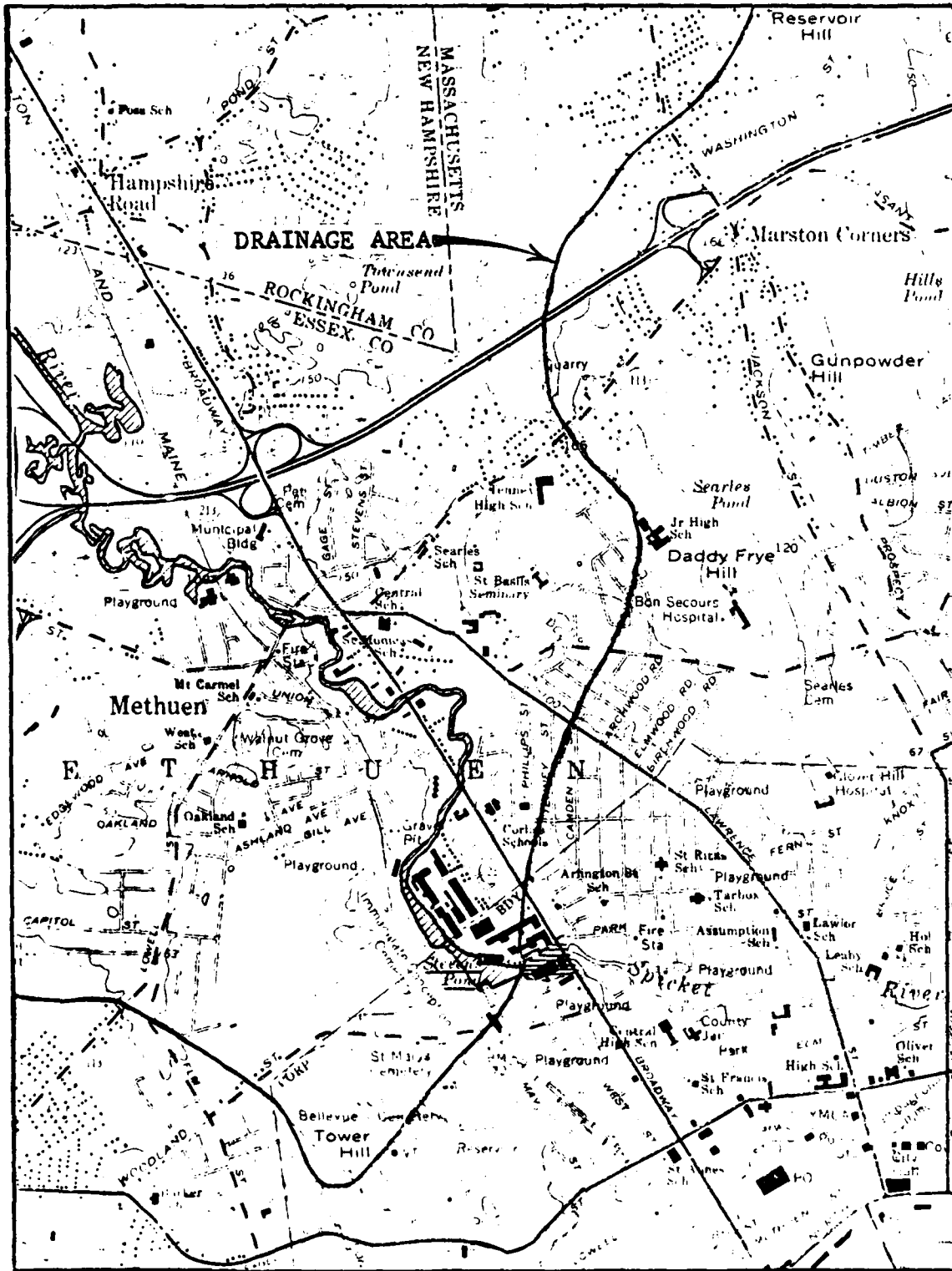
Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because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

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OVERVIEW PHOTO



STEVENS POND OUTLET

LAWRENCE, MASS. - N.H.
Scale 1:24000

PHASE I INSPECTION REPORT

STEVENS POND OUTLET

SECTION I

PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Chas. T. Main, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed were issued to Chas. T. Main, Inc. under a letter of May 3, 1978, from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-D328 has been assigned by the Corps of Engineers for this work.

b. Purpose.

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

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

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

1.2 Description of Project

a. Location. The Stevens Pond Outlet, on the Spicket River, is located in the Town of Lawrence, Essex County, Massachusetts.

b. Description of Dam and Appurtenances. The dam consists of a granite block overflow section 90 feet long. From bedrock to spillway crest is 10 feet. The freeboard is 5 feet. The outlet works are operable but are not used. The granite block structure and its short abutments span the width of the natural stream and it is bounded on both banks by streets and buildings. Therefore, there is little embankment area that could be subject to erosion during a major flood which exceeded the normal capacity of the spillway.

APPENDIX A

(4) The owner should develop a formal warning system with local officials for alerting downstream residents in case of emergency.

(5) The spillway should be inspected under a no-flow condition when possible.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. The condition of this 100-year old granite block structure, founded on ledge rock, and its appurtenances appear to be good.

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

c. Urgency. The required repair and maintenance work should be accomplished within two years of receipt of this report by the owner.

d. Need for Additional Investigation. There is no need for additional investigation.

7.2 Recommendations

Additional engineering investigations or major modifications to the dam are not required.

7.3 Remedial Measures

a. Alternatives. Not applicable.

b. Operating and Maintenance Procedures. Presently required maintenance includes the repair of any loose or spalled concrete at the abutments and the general dressing-up of the facility. The owner of the dam should develop and implement procedures which would include:

(1) Continue periodic inspections on a bi-annual frequency and the initiation of repairs, as required.

(2) The channel between the dam and Broadway should be cleared, and kept clear, of growth and debris.

(3) Around the clock surveillance should be provided by the owner during periods of unusually heavy precipitation.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. Nothing was noted which would indicate that the dam is unstable.

b. Design and Construction Data. No design or construction data are known to exist.

c. Operating Records. Not applicable.

d. Post Construction Changes. No data concerning any post construction changes are known to exist.

e. Seismic Stability. The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines does not warrant seismic analysis.

The Peak Failure Outflow of 2,700 cfs, combined with the spillway discharge at full pond, results in a flow of about 6,000 cfs. As near as can be determined, the channel immediately downstream can carry only about 4,000 cfs before the left bank is overtopped and water flows around the industrial buildings and onto Broadway and other streets in Lawrence. From inspection of the U.S.G.S. Quadrangle maps, it cannot be determined whether or not the channel through the City between Broadway and the confluence of the Spicket and Merrimack Rivers is hydraulically capable of carrying 6,000 cfs.

The areas of potential impact are shown on the location map.

SECTION 5

HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data. The hydraulic/hydrologic analysis was made in accordance with "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations", "Estimating Effect of Surcharge Storage on Maximum Probable Discharges", and "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs" as furnished by the New England Division, Corps of Engineers and "Recommended Guidelines for Safety Inspection of Dams" as issued by the Department of the Army, Office of the Chief of Engineers.

U.S.G.S. Quadrangle maps were used to determine reservoir and drainage areas. Where practicable, spillway dimensions were obtained by direct measurement. Hydraulic coefficients were assigned on the basis of experience and engineering judgment.

b. Experience Data. No specific experience data with respect to the hydraulic/hydrological characteristics of the project are known to exist.

c. Visual Observations. This is a small, run-of-river project with virtually no storage. Industrial buildings surround the dam, both up and downstream. Large surcharges would probably not be confined to the dam and abutments, but would spread out through the buildings.

d. Overtopping Potential. A Probable Maximum Flood of 30,000 cfs was determined. Although the dam falls within the small size classification, the hazard potential is extremely high. The full PMF was used to determine the Peak Outflow (or test flood) which, owing to the very small reservoir area, is not measurably reduced from the PMF of 30,000 cfs. The spillway has the capability of discharging only 3,300 cfs before the abutments are overtopped.

If discharge is confined to the spillway and its short abutments, in the event of the test flood the abutments would be overtopped by some 16 feet. Actually, the river would leave its banks and flow around and through the various industrial and other structures on either side. In the river channel immediately downstream of the dam, the test flood would create an average water level of approximately El. 62. As this is only one foot below the spillway crest, the dam is effectively hydraulically submerged and a failure of the dam during the test flood would add little to the total flow.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

Water is withdrawn from the pond well upstream of the dam.

4.2 Maintenance of Dam

There appear to be no regular procedures for maintaining the dam.

4.3 Maintenance of Operating Facilities

There appear to be no regular procedures for maintaining the outlet works.

4.4 Warning System

There is no warning system.

4.5 Evaluation

There appears to be a complete lack of definite operational procedures. Recommendations for improving these conditions are given in Section 7.3.

3.2 Evaluation

The visual inspection revealed a low, old, but obviously well-constructed dam founded on ledge rock. The dam and adjacent gate house are in good condition. The reservoir itself is not a factor in evaluating the dam. The effects of high flows in the channel between the dam and the Merrimack River cannot be determined within the scope of this investigation. It is obvious, however, that major flows would cause serious downstream problems.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The Phase I visual inspection of the Stevens Pond Outlet Dam took place on June 15, 1978. The dam is located on the Spicket River in a highly industrialized area. The river is semi-channelized, the dam spanning what was probably most of the original river channel. The areas on either side of the dam are paved.

b. Dam. The over 100 year old dam is constructed on bed rock and is apparently in good condition. The granite block structure, although appropriately weathered, appears to be structurally sound. No significant horizontal or vertical misalignments were noticeable. Overflow prevents determining whether or not there is leakage through the joints. There is some growth at the left abutment and where the spillway joins the gate house on the right abutment.

c. Appurtenant Structures. The only appurtenant structure, the brick gate house, appears to be in good condition in spite of some growth in the joints. The outlet works are said to be operable, although seldom used.

d. Reservoir Area. There are several factories along the periphery of the reservoir and close to the water's edge. The reservoir is narrow and shallow and is well-silted as evidenced by the growth just upstream of the spillway lip. This light growth would obviously be washed away by any significant flow. There is no possibility of landslides or sudden increase of sediment in the reservoir.

e. Downstream Channel. Immediately downstream of the dam is a steel and concrete bridge spanning the river. While the left abutments of the bridge and dam are integral, the bridge would have little or no effect on the discharge capability of the spillway. Below the dam the river is semi-channelized and flows through highly industrialized and residential areas before it discharges into the Merrimack River about 2 miles downstream.

SECTION 2
ENGINEERING DATA

2.1 Design

No design data are known to exist.

2.2 Construction

The Stevens Pond Dam was built in 1877. There are no detailed construction records available.

2.3 Operation

There is no formal operation of the dam. The fixed spillway crest controls the water level of the reservoir.

2.4 Evaluation

- a. Availability. There are no engineering data available.
- b. Adequacy. The lack of in-depth engineering data does not allow for a definitive review. Therefore, the adequacy of this dam, structurally and hydraulically, cannot be assessed from the standpoint of review of design calculations, but must be based primarily on the visual inspection, past performance history, and sound hydrologic and hydraulic engineering judgment.
- c. Validity. N/A

g. Dam

(1)	Type	Granite block
(2)	Length	90 feet
(3)	Height	10 feet
(4)	Top Width	N/A
(5)	Side slope	N/A
(6)	Zoning	N/A
(7)	Impervious core	N/A
(8)	Cutoff	Unknown
(9)	Grout curtain	Unknown
(10)	Other	N/A

h. Spillway

(1)	Type	Ungated weir
(2)	Length of weir	90 feet
(3)	Crest elevation	El. 63 ±
(4)	Gates	None
(5)	U/S Channel	N/A
(6)	D/S Channel	Stream bed
(7)	General	N/A

i. Regulating Outlets. The owner has stated that the outlet works are operable, but are no longer used.

c. Elevation (Feet Above MSL)

(1)	Top of dam	El. 68 ±
(2)	Maximum design surcharge	El. 68 ±
(3)	Full flood control pool	N/A
(4)	Recreation pool	N/A
(5)	Spillway crest (gated)	El. 63 ± (assumed reference)
(6)	Upstream portal invert diversion tunnel	N/A
(7)	Streambed at centerline of dam	El. 53 ±
(8)	Maximum tailwater	El. 62 ±

d. Reservoir (Feet)

(1)	Length of maximum pool	5,000 ±
(2)	Length of recreation pool	N/A
(3)	Length of flood control pool	N/A

e. Storage (Acre-Feet)

(1)	Recreation pool	40 ± (at crest)
(2)	Flood control pool	N/A
(3)	Design surcharge	80 ±
(4)	Top of dam	80 ±

f. Reservoir Surface (Acres)

(1)	Top of dam	8 ±
(2)	Maximum pool	8 ±
(3)	Flood control pool	N/A
(4)	Recreation pool	N/A
(5)	Spillway crest	8 ±

c. Size Classification. Owing to its impoundment of roughly 100 acre feet and its height of 15 feet, the dam falls within the small size classification.

d. Hazard Classification. As there are many factories and other structures downstream of the dam which would be endangered if the dam failed, the dam is considered to have a high hazard potential classification.

e. Ownership. The dam is owned by the Lawrence Industrial Association located at 550 Broadway in Lawrence, Massachusetts.

f. Operator. Mr. Robert Melanson, Higgins Avenue, Sandowne, New Hampshire, (603) 887-3882.

g. Purpose of Dam. The water impounded by the dam is used for industrial purposes. Water is taken from the pond about a half mile upstream of the dam.

h. Design and Construction History. Nothing is known of the design and construction history of the dam other than it was constructed in 1877.

i. Normal Operating Procedures. Apart from withdrawing water for industrial purposes and allowing the remainder to spill over the fixed crest, there are no operating procedures.

1.3 Pertinent Data

a. Drainage Area. The Stevens Pond has approximately 63 square miles of drainage area of varying nature.

b. Discharge at Damsite.

(1) The outlet works, consisting of two gated conduits, have been closed and are inoperable.

(2) The maximum known flood at the damsite is unknown.

(3) The ungated spillway capacity before the dam is overtopped is about 3,300 cfs, or approximately 11 percent of the test flood.

(4) There is no gated spillway capacity.

(5) There is no gated spillway capacity.

(6) The total spillway capacity at maximum pool, El. 68, is 3,300 cfs.

INSPECTION CHECK LIST

PROJECT STEVENS POND OUTLET

DATE 6/15/78

PROJECT FEATURE _____

NAME _____

AREA EVALUATED	CONDITION
<p><u>DIKE EMBANKMENT</u></p> <p>Crest Elevation</p> <p>Current Pool Elevation</p> <p>Surface Cracks</p> <p>Pavement Condition</p> <p>Movement or Settlement of Crest</p> <p>Lateral Movement</p> <p>Vertical Alignment</p> <p>Horizontal Alignment</p> <p>Condition at Abutment and at Concrete Structures</p> <p>Indications of Movement of Structural Items on Slopes</p> <p>Trespassing on Slopes</p> <p>Sloughing or Erosion of Slopes or Abutments</p> <p>Rock Slope Protection - Riprap Failures</p> <p>Unusual Movement or Cracking at or near Toes</p> <p>Unusual Embankment or Downstream Seepage</p> <p>Piping or Boils</p> <p>Foundation Drainage Features</p> <p>Toe Drains</p> <p>Instruments on System</p>	<p style="text-align: center;"><i>NOT APPLICABLE</i></p>

INSPECTION CHECK LIST

PROJECT STEYENS POND OUTLET

DATE 6/15/78

PROJECT FEATURE _____

NAME _____

AREA EVALUATED	CONDITION
<p><i>Granite</i> CONCRETE DAM (<i>Overflow Section</i>)</p>	
<p>Concrete Surfaces <i>Granite</i></p>	<p><i>Some spalling</i></p>
<p>Structural Cracking</p>	<p><i>none</i></p>
<p>Movement -- Horizontal & Vertical Alignment</p>	<p><i>none</i></p>
<p>Junctions</p>	<p>-</p>
<p>Drains -- Foundation, Joint, Face</p>	<p>-</p>
<p>Water Passages</p>	<p>-</p>
<p>Seepage or Leakage</p>	<p><i>Leakage thru gates</i></p>
<p>Monolith Joints -- Construction Joints</p>	
<p>Foundation</p>	

INSPECTION CHECK LIST

PROJECT STEVENS POND OUTLET

DATE 6/15/78

PROJECT FEATURE _____

NAME _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u></p> <p>a. Approach Channel</p> <ul style="list-style-type: none">Slope ConditionsBottom ConditionsRock Slides or FallsLog BoomDebrisCondition of Concrete LiningDrains or Weep Holes <p>b. Intake Structure</p> <ul style="list-style-type: none">Condition of ConcreteStop Logs and Slots	<p>} NOT APPLICABLE</p> <p>GATE HOUSE</p> <p>FAIR</p> <p>NONE</p> <p style="text-align: right;">4</p>

INSPECTION CHECK LIST

PROJECT STEVENS POND OUTLET

DATE 6/15/78

PROJECT FEATURE _____

NAME _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - TRANSITION AND CONDUIT</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining on Concrete</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Cracking</p> <p>Alignment of Monoliths</p> <p>Alignment of Joints</p> <p>Numbering of Monoliths</p>	<p><i>NOT APPLICABLE</i></p> <p>5</p>

INSPECTION CHECK LIST

PROJECT STEVENS POND OUTLET

DATE 6/15/78

PROJECT FEATURE _____

NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	—
General Condition	—
Loose Rock Overhanging Channel	none
Trees Overhanging Channel	none
Floor of Approach Channel	—
b. Weir and Training Walls	
General Condition of Concrete	some spalling
Rust or Staining	none
Spalling	—
Any Visible Reinforcing	none
Any Seepage or Efflorescence	none
Drain Holes	none
c. Discharge Channel	
General Condition	—
Loose Rock Overhanging Channel	none
Trees Overhanging Channel	none
Floor of Channel	some debris & vegetation
Other Obstructions	

INSPECTION CHECK LIST

PROJECT STEVENS POND OUTLET

DATE 6/15/78

PROJECT FEATURE _____

NAME _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - CONTROL TOWER</u></p> <p>a. Concrete and Structural</p> <p> General Condition</p> <p> Condition of Joints</p> <p> Spalling</p> <p> Visible Reinforcing</p> <p> Rusting or Staining of Concrete</p> <p> Any Seepage or Efflorescence</p> <p> Joint Alignment</p> <p> Unusual Seepage or Leaks in Gate Chamber</p> <p> Cracks</p> <p> Rusting or Corrosion of Steel</p> <p>b. Mechanical and Electrical</p> <p> Air Vents</p> <p> Float Wells</p> <p> Crane Hoist</p> <p> Elevator</p> <p> Hydraulic System</p> <p> Service Gates</p> <p> Emergency Gates</p> <p> Lightning Protection System</p> <p> Emergency Power System</p> <p> Wiring and Lighting System</p>	<p style="text-align: center;"><i>NOT APPLICABLE</i></p>

INSPECTION CHECK LIST

PROJECT STEVENS POND OUTLET

DATE 6/15/78

PROJECT FEATURE _____

NAME _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Visible Reinforcing</p> <p>Any Seepage or Efflorescence</p> <p>Condition at Joints</p> <p>Drain holes</p> <p>Channel</p> <p>Loose Rock or Trees Overhanging Channel</p> <p>Condition of Discharge Channel</p>	<p style="text-align: center;">NOT APPLICABLE</p> <p style="text-align: right;">8</p>

INSPECTION CHECK LIST

PROJECT STEVENS POND OUTLET

DATE 6/15/78

PROJECT FEATURE _____

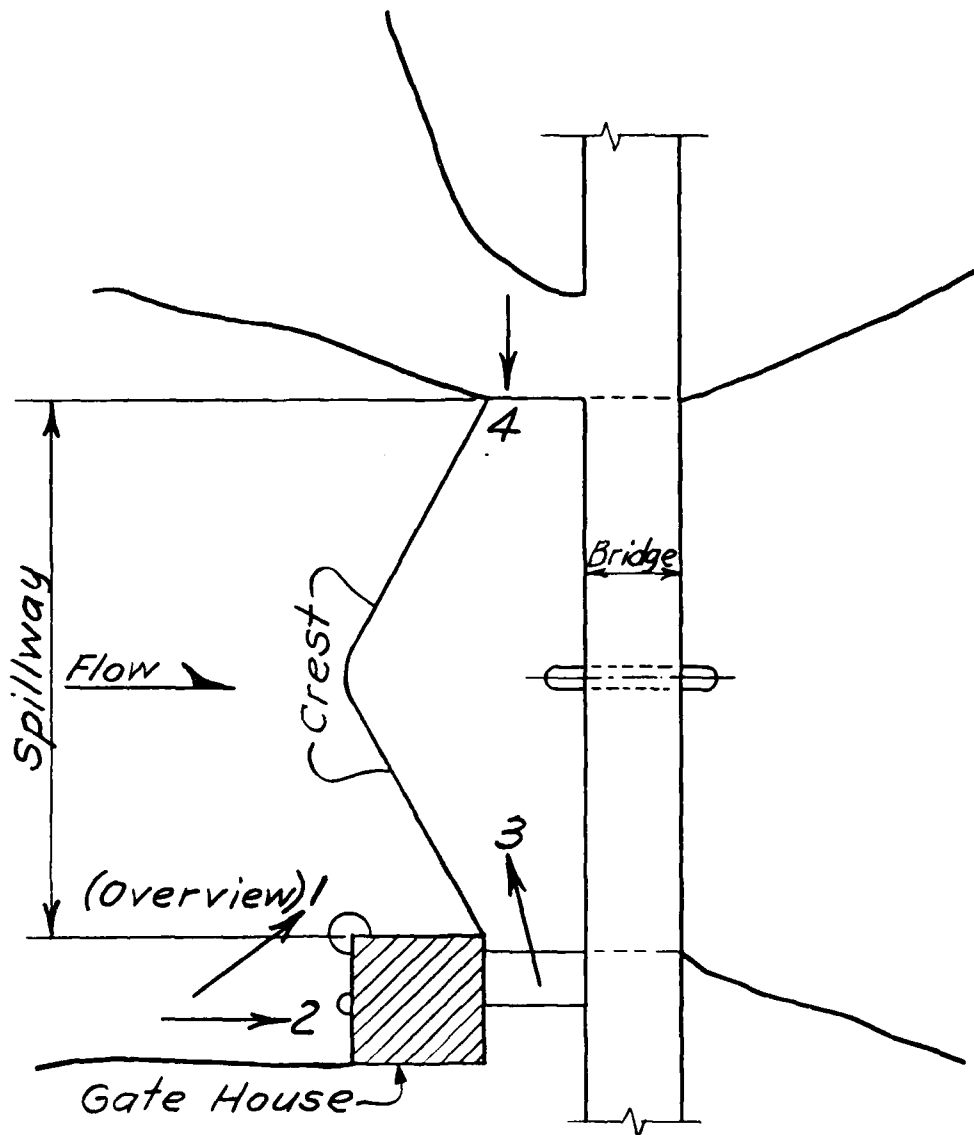
NAME _____

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - SERVICE BRIDGE</u></p> <p>a. Super Structure</p> <ul style="list-style-type: none"> Bearings Anchor Bolts Bridge Seat Longitudinal Members Under Side of Deck Secondary Bracing Deck Drainage System Railings Expansion Joints Paint <p>b. Abutment & Piers</p> <ul style="list-style-type: none"> General Condition of Concrete Alignment of Abutment Approach to Bridge Condition of Seat & Backwall 	<p style="text-align: center;"><i>NOT APPLICABLE</i></p> <p style="text-align: right;">9</p>

APPENDIX B

No records of the design and construction
of this project were located.

APPENDIX C



Note:
Nos. denote
direction of
Photos.

PLAN

STEVENS POND OUTLET



Upstream View of Spillway
from Right Bank

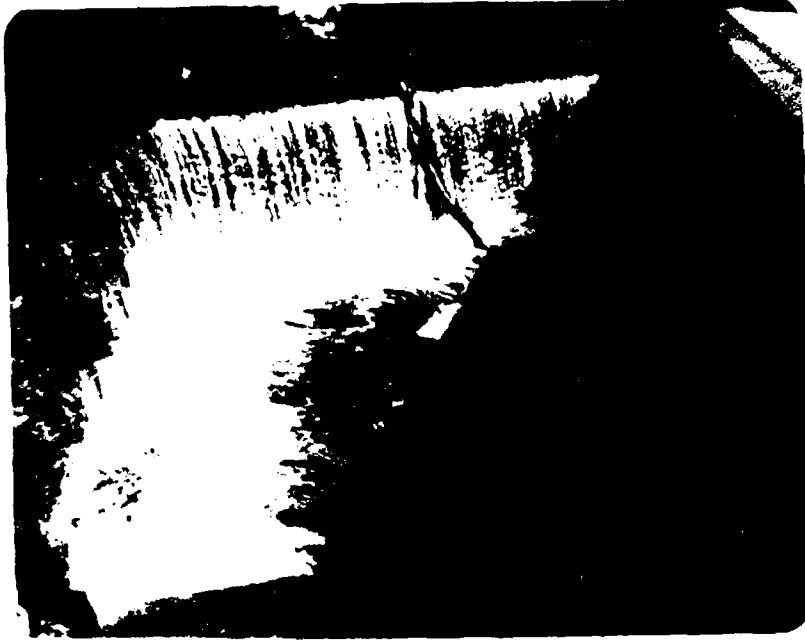


Upstream View of Gate House
from Right Bank

STEVENS POND OUTLET

1

2



3

Downstream View of Spillway
from Right Bank



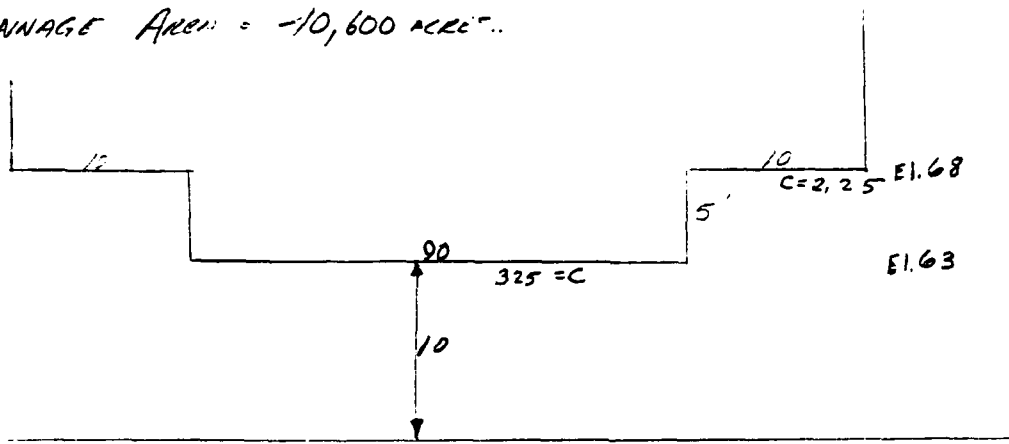
4

Downstream View of Spillway
from Left Bank

STEVENS POND OUTLET

APPENDIX D

PMF = 30,000 cfs.
 RESERVOIR AREA = 7.5 ACRES.
 DRAINAGE AREA = 10,600 ACRES.



$Q = CLH^{1.5}$

H	Q
1	290
3	1520
5	3270
6	4300 + 45 = 4345
8	6620 + 230 = 6850
10	9250 + 500 = 9750
12	12160 + 830 = 12990
14	15,320 + 1,215 = 16,535
16	18,720 + 1,640 = 20,360
18	22,390 + 2,110 = 24,500
20	26,160 + 2,615 = 28,775
22	30,180 + 3,155 = 33,335

SURCHARGE AT = 20.5' TO PASS Q_{P1}

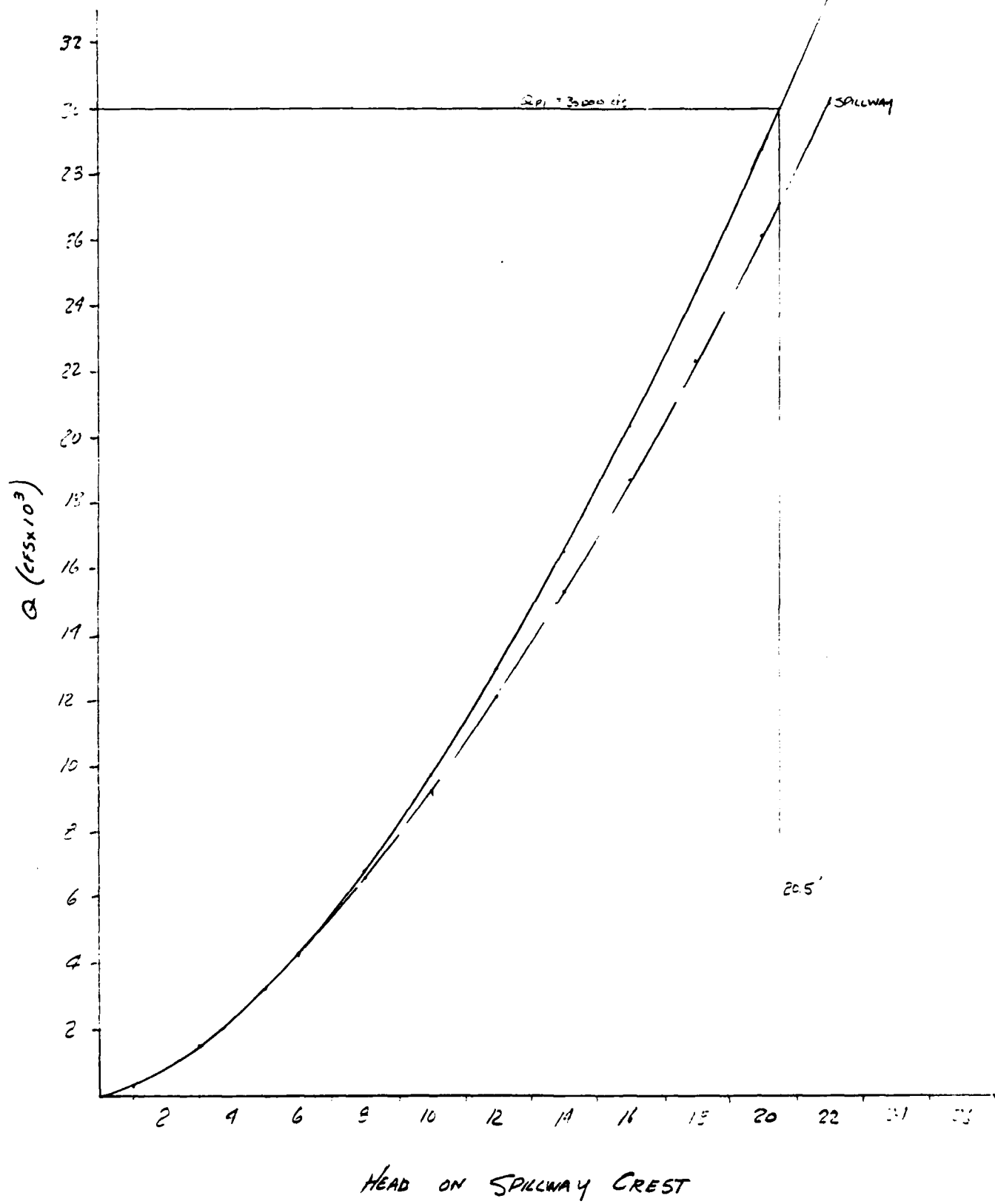
$$STOR. = \frac{7.5(20.5)^2}{40,600} = .05''$$

NEGLECT STORAGE

Q_{PS} = 30,000 cfs = PEAK OUTFLOW

Client USACE
Subject SPILLWAY BND

Job No. 1345-065 Sheet 2 of 6
By V. J. ... Date 8 AUG. 1978
Ckd. _____ Rev. _____



HEAD ON SPILLWAY CREST

Client City of

Job No. 1345-065 Sheet 3 of 6

Subject STEVENS POND

By L. Vertch Date AUG. 1973

Ckd. _____ Rev. _____

PEAK FAILURE OUTFLOW $y_0 = 15'$ $w_b = .3(90) = 27'$

$$Q_{p1} = \frac{8}{27} (27) \sqrt{32.2} (15)^{1.5}$$

$$= 2640 \text{ CFS.}$$

DOWNSTREAM DESCRIPTION: 10 x 50' lined channel along two factory buildings with parking lot + more buildings on other. 600' downstream: Broadway Str. Bridge. (75-3-11111)

Channel Capacity Flowing full $A = 500 \text{ ft}^2$ $n = .03$
 $S = .002$ $HP = 70'$

$$Q = \frac{1.49}{.03} (500) \left(\frac{500}{70}\right)^{.67} \sqrt{.002} = 4,150 \text{ CFS}$$

$$V = 5.3 \text{ ft/sec.}$$

PEAK FAILURE OUTFLOW CONTROLLED WITHIN CHANNEL - CRITICAL CONDITION WILL HANDLE FLOW.

CRITICAL CONDITION: PEAK FLOW 30,000 CFS.

ASSUMING CHANNEL @ 4150 CFS USE 25,850 THROUGH NATURAL CHANNEL FOR APPROX. DEPTH.

Client City E

Job No. 1345-065 Sheet 4 of 6

Subject STEVENS FOND

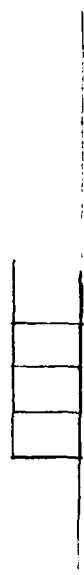
By J. VETICH Date 3 AUG 1973

Ckd. _____ Rev. _____

Section 1

1:100
1:500

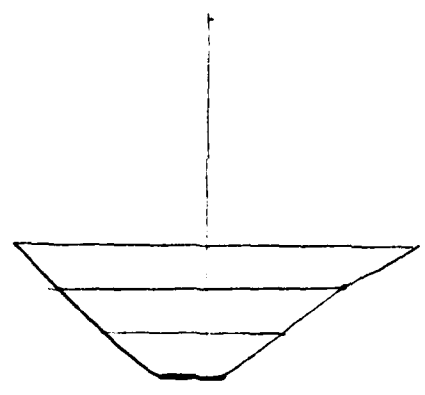
70
60
50



L=600'

Sec 2

70
60
50



I.	A.	WP	II.	A.	WP
55	750	160	55	1350	400
60	1500	170	60	3925	630
65	2250	180	65	7750	900

REACH I
S = .002
n = .035

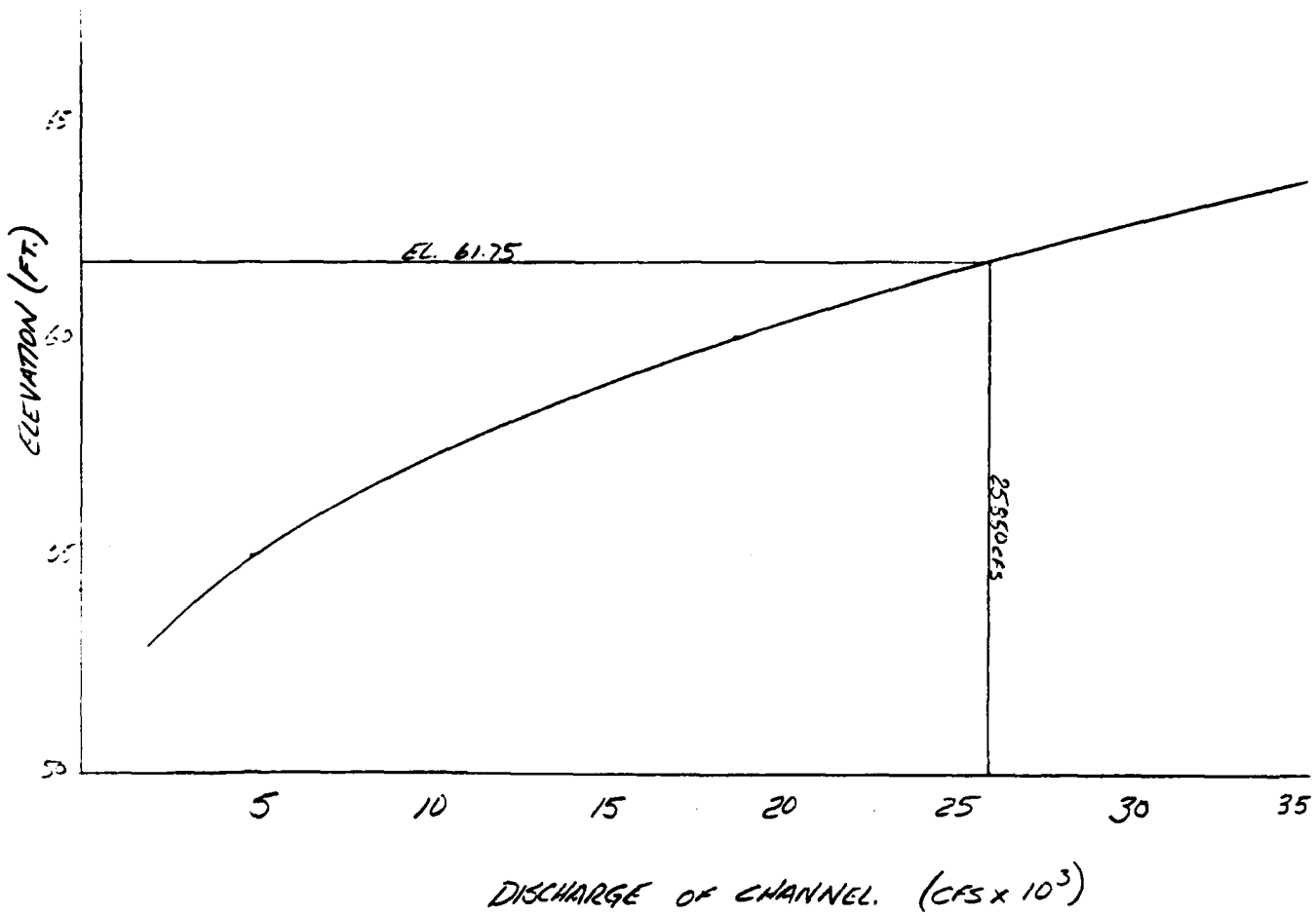
EL. 55 $Q = \frac{1.49}{.035} (1050) \left(\frac{1050}{25} \right)^{.67} \sqrt[.002]{.002} = 4250$ G (CFS)

60 $= \frac{1.49}{.035} (2712) \left(\frac{2712}{400} \right)^{.67} \sqrt[.002]{.002} = 12615$

65 $= \frac{1.49}{.035} (5000) \left(\frac{5000}{540} \right)^{.67} \sqrt[.002]{.002} = 42290$

Client C of E
Subject STEVENS POND

Job No. 1325-065 Sheet 5 of 6
By J. VEITZ Date 3 AUG. 1972
Ckd. _____ Rev. _____

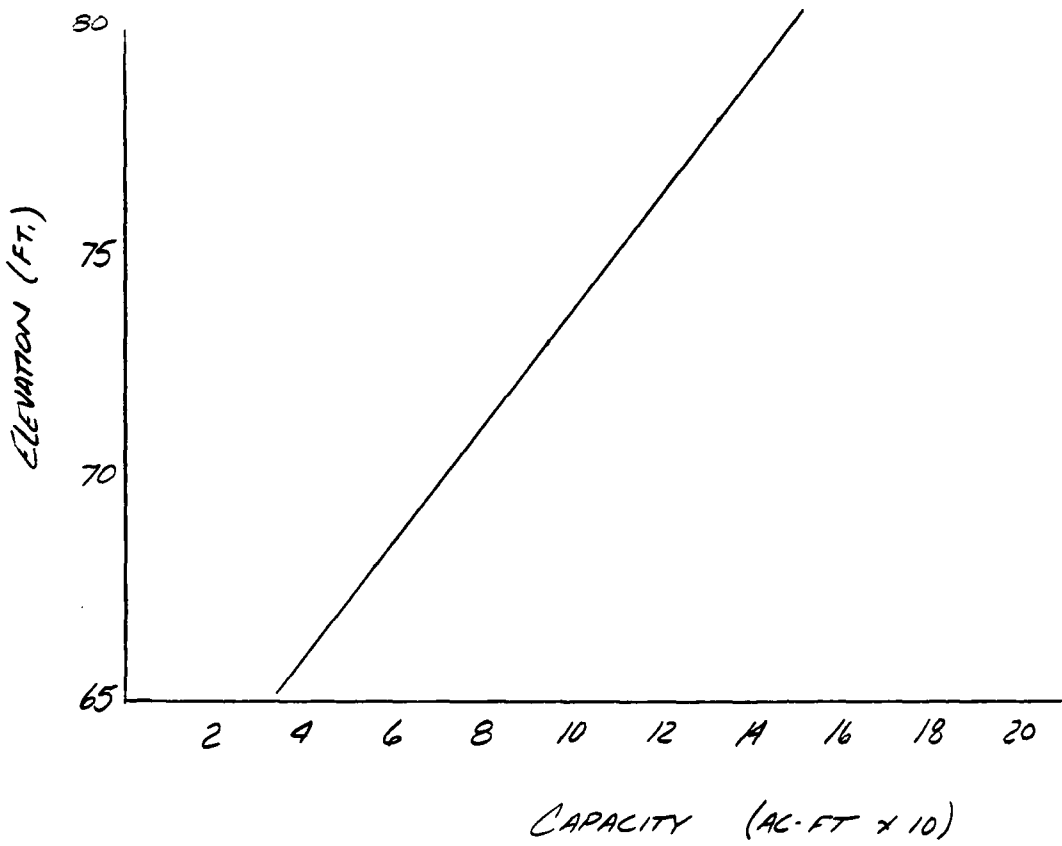


REACH I Q = 25850 CFS. EL. 61.75

RESULTS IN FIRST REACH DISASTROUS - EXTREME FLOODING
THROUGH FACTORY AREA - OVER BROADWAY INTO RESIDENTIAL
AREA. LARGE HAZARD TO LIFE

Client C O F E.
Subject STEVENS POND -
CAPACITY CURVE.

Job No. 1345-065 Sheet 6 of 6
By J. VEITCH Date 23 AUG. 1978
Ckd. _____ Rev. _____



APPENDIX E
INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

END

FILMED

7-85

DTIC