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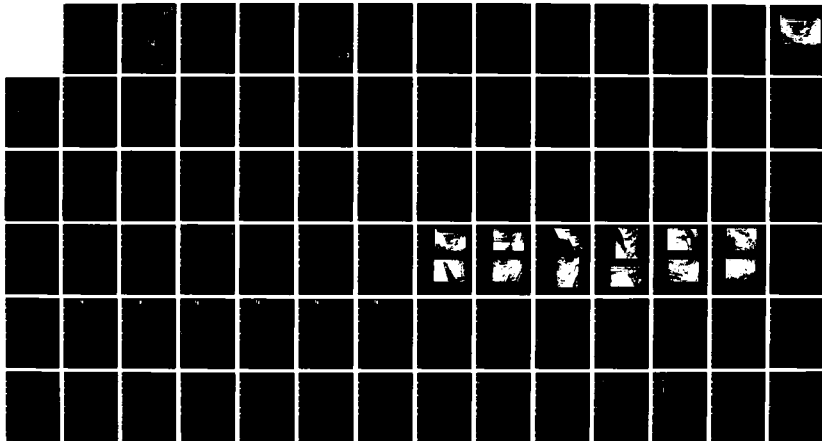
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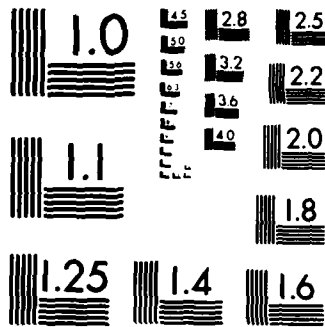
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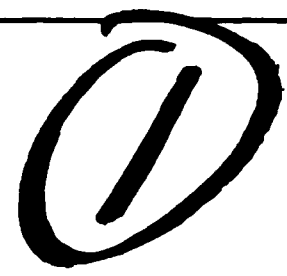
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CONNECTICUT RIVER BASIN  
DURHAM , CONNECTICUT



YMCA POND DAM  
CT 00385

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM



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

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9. PERFORMING ORGANIZATION NAME AND ADDRESS		8. CONTRACT OR GRANT NUMBER(s)
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Connecticut River Basin Durham, Connecticut		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) YMCA Pond is a concrete gravity dam 80 feet in length and 26 feet in height. The pond has a storage volume of 35 acre-feet and a maximum height of 26 feet; the size classification is thus "small". The dam has been classified as having a "significant" hazard potential. Based on the visual inspection, the YMCA Pond Dam appears to be in fair condition. For the combination of dam size (small) and downstream hazard (significant), a range in the magnitude of the spillway test flood of the 100 year frequency to the 1/2 PMF is given.		



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

REPLY TO  
ATTENTION OF  
NEDED

SEP 1 1968

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

Dear Governor Grasso:

Inclosed is a copy of the YMCA Pond 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, Farnam Neighborhood House, 162 Fillmore Street, New Haven, Connecticut 06513.

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,

MAX B. SCHEIDER  
Colonel, Corps of Engineers  
Division Engineer

Incl  
As stated

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YMCA POND DAM

CT 00385

CONNECTICUT RIVER BASIN

DURHAM, CONNECTICUT

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PHASE I INSPECTION REPORT  
 NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM  
PHASE I INSPECTION REPORT

Identification No.: CT 00385  
Name of Dam: YMCA Pond Dam  
Town: Durham  
County and State: Middlesex, Connecticut  
Stream: Tributary To Hersig Brook  
Date of Inspection: 6 November, 1979

BRIEF ASSESSMENT

YMCA Pond is a concrete gravity dam 80 feet in length and 26 feet in height. The upstream face of the dam is vertical. The downstream face of the dam slopes at 1 H to 3 V. A concrete abutment wall 20 feet in length extends from the dam along the edge of the pond at the left abutment. The spillway comprises the central portion of the gravity dam and is 23 feet long. The downstream face of the spillway is curvilinear. Wooden flashboards are in place at the spillway, level with the top elevation of the dam.

The purpose of the dam is to impound the YMCA pond for recreational use. The pond has a storage volume of 35 acre-feet and a maximum height of 26 feet; the size classification is thus "small." Approximately two residential homes would be subject to flooding to a depth of about 3 feet above the first floor elevation due to a dam failure. With the loss of life potential estimated to be few, since no more than a small number of inhabitable structures are located in the probable dam failure impact area, the dam has been classified as having a "significant" hazard potential.

Based on the visual inspection, the YMCA Pond Dam appears to be in fair condition. Water was overflowing the spillway at the time of inspection. Some cracking, spalling and efflorescence of concrete surfaces was observed. The vertical and horizontal alignment of the dam was good. Some erosion of weathered rock at the abutments was noted. Seepage was observed at the right abutment.

For the combination of dam size (small) and downstream hazard

(significant), a range in the magnitude of the spillway test flood of the 100 year frequency to the 1/2 PMF is given. A spillway test flood of the 100 Year Frequency Flood was selected for the project. The maximum spillway capacity without overtopping the dam is 340 CFS (without flashboards.) The capacity of the spillway is inadequate to pass the test flood outflow of 470 CFS without overtopping the dam. The test flood would overtop the dam by 0.3 feet. The spillway is adequate to pass 75 percent of the spillway test flood outflow without overtopping the dam.

Within one year of receipt of the Phase I Inspection Report, the owner should retain a qualified registered engineer to:

- 1) Investigate the erosion and seepage occurring on the downstream portion of the rock abutments and design corrective measures, if needed,
- 2) Conduct more refined hydrologic and hydraulic analysis to determine the need for and methods of increasing the project discharge capacity and
- 3) raise foot-bridge to prevent collection of debris and restriction of flow.

The owner should carry out the recommendations of the engineer.

The owner should also carry out the following operational and maintenance procedures:

- 1) Determine the operability of the outlet works and repair as required. A program of regular valve maintenance should be implemented.
- 2) Institute a program of annual technical inspections of the dam and its appurtenances by a qualified registered engineer.
- 3) Repair all spalled and deteriorated concrete on the downstream face of the dam.
- 4) Establish a surveillance and flood warning plan during and immediately after heavy rainfall, and also a warning program to follow in case of emergency conditions.



---

S. Giavara, P.E.  
President

Registered CT 7634

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

*Richard J. DiBuono*

RICHARD DIBUONO, MEMBER  
Water Control Branch  
Engineering Division

*Aramast Mahtesian*

ARAMAST MAHTESIAN, MEMBER  
Geotechnical Engineering Branch  
Engineering Division

*Carney M. Terzian*

CARNEY M. TERZIAN, CHAIRMAN  
Design 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 to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

## TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Letter of Transmittal	
Brief Assessment	
Review Board Page	
Preface	i
Table of Contents	ii - iv
Overview Photo	v
Location Map	vi

### REPORT

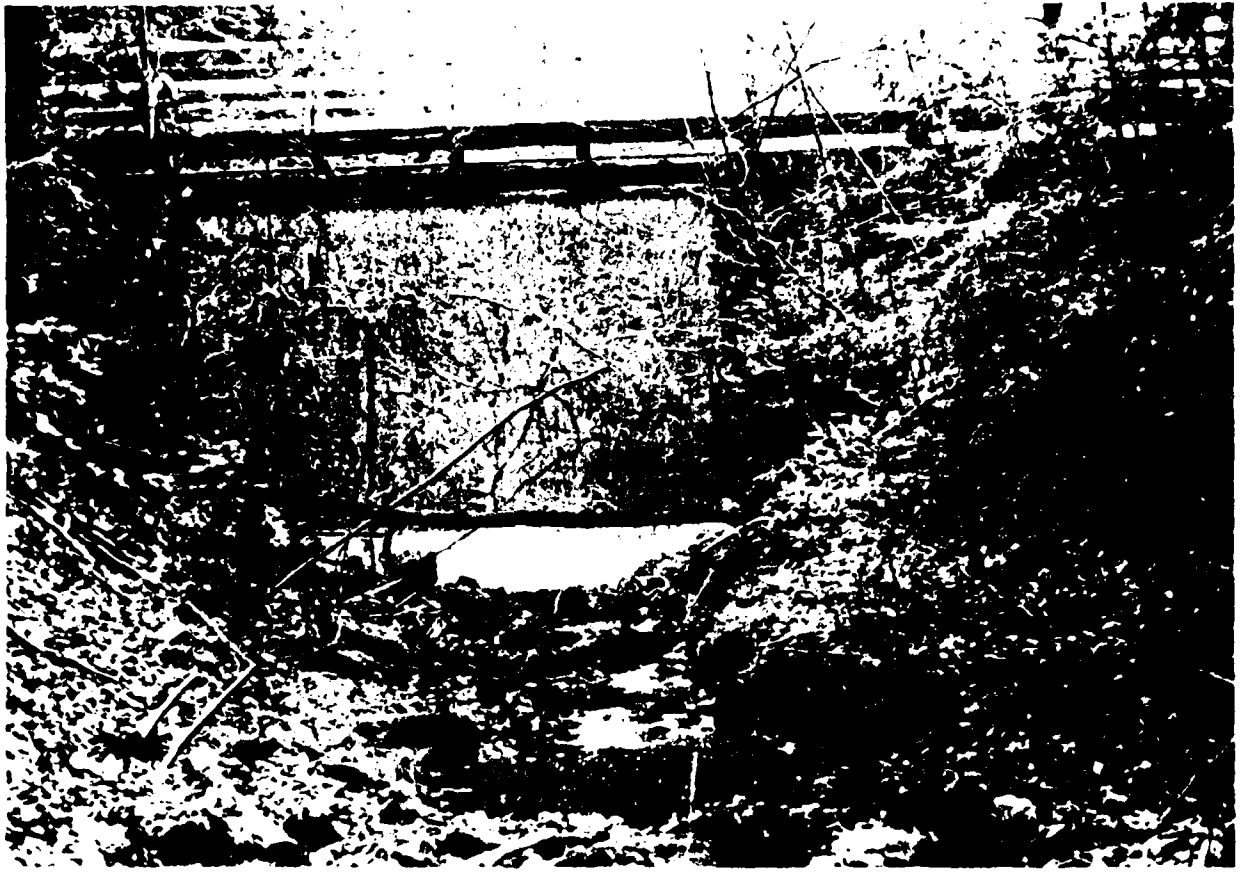
1. PROJECT INFORMATION	.
1.1 General	
a. Authority	1
b. Purpose of Inspection	1
1.2 Description of Project	
a. Location	1
b. Description of Dam and Appurtenances	1
c. Size Classification	2
d. Hazard Classification	2
e. Ownership	2
f. Operator	2
g. Purpose of Dam	2
h. Design and Construction History	2
i. Normal Operational Procedure	2-3
1.3 Pertinent Data	3-5
2. ENGINEERING DATA	
2.1 Design Data	6
2.2 Construction Data	6
2.3 Operation Data	6
2.4 Evaluation of Data	6

<u>Section</u>	<u>Page</u>
<b>3. VISUAL INSPECTION</b>	
<b>3.1 Findings</b>	
a. General	7
b. Dam	7-8
c. Appurtenant Structures	8
d. Reservoir Area	8
e. Downstream Channel	8
<b>3.2 Evaluation</b>	8-9
<b>4. OPERATIONAL AND MAINTENANCE PROCEDURES</b>	
<b>4.1 Operational Procedures</b>	
a. General	10
b. Description of any Warning System in Effect	10
<b>4.2 Maintenance Procedures</b>	
a. General	10
b. Operating Facilities	10
<b>4.3 Evaluation</b>	10
<b>5. EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES</b>	
<b>5.1 General</b>	11
<b>5.2 Design Data</b>	11
<b>5.3 Experience Data</b>	11
<b>5.4 Test Flood Analysis</b>	11-12
<b>5.5 Dam Failure Analysis</b>	13
<b>6. EVALUATION OF STRUCTURAL STABILITY</b>	
<b>6.1 Visual Observation</b>	14
<b>6.2 Design and Construction Data</b>	14
<b>6.3 Post-Construction Changes</b>	14
<b>6.4 Seismic Stability</b>	14

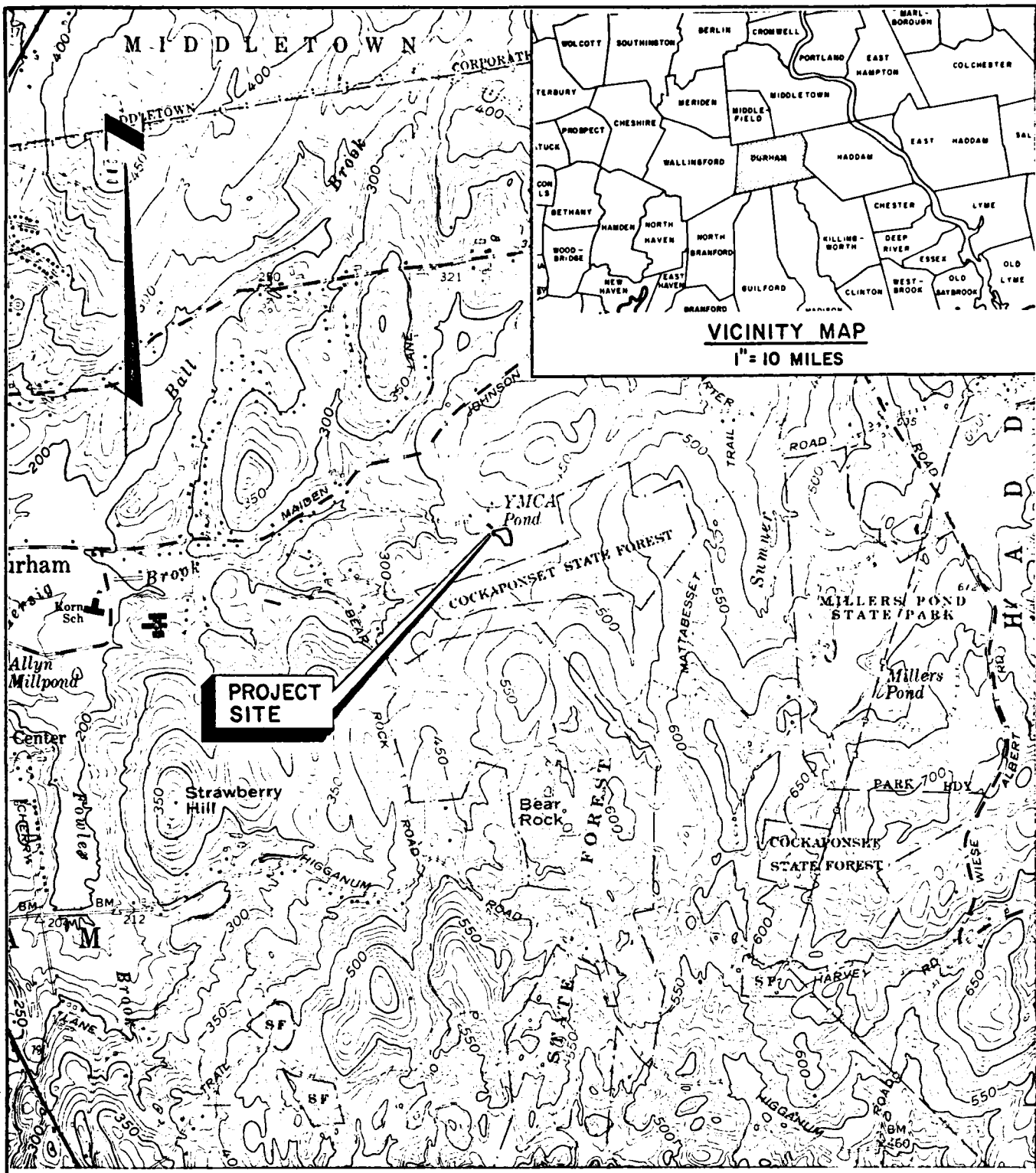
<u>Section</u>	<u>Page</u>
<b>7. ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES</b>	
<b>7.1 Dam Assessment</b>	
a. Condition	15
b. Adequacy of Information	15
c. Urgency	15
<b>7.2 Recommendations</b>	15
<b>7.3 Remedial Measures</b>	15
a. Operation and Maintenance Procedures	
<b>7.4 Alternatives</b>	16

APPENDIXES

<u>Appendix</u>	<u>Description</u>
<b>A</b>	<b>INSPECTION CHECKLIST</b>
<b>B</b>	<b>ENGINEERING DATA</b>
<b>C</b>	<b>PHOTOGRAPHS</b>
<b>D</b>	<b>HYDROLOGIC AND HYDRAULIC COMPUTATIONS</b>
<b>E</b>	<b>INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS</b>



OVERVIEW PHOTO  
YMCA Pond Dam



NATIONAL DAM INSPECTION PROGRAM  
PHASE I INSPECTION REPORT  
YMCA POND DAM - CT 00385

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 19 October 1979 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-80-C-0001 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 THE PROJECT:

a. Location. YMCA Pond Dam is located in Durham, Connecticut approximately one mile east of Durham Center. Access to the dam is from an unimproved road (2000± feet) off Maiden Lane. The reservoir is shown on the U.S.G.S. Topographic map "Durham, Connecticut" at a latitude of 41° 28' 40" and a longitude of 72° 39' 10". The Location Map on page vi shows the location of the dam.

b. Description of Dam and Appurtenances. YMCA Pond is a concrete gravity dam 80 feet in length and 26 feet in height. The upstream face of the dam is vertical. The downstream face of the dam slopes at 1 H to 3 V. The abutments of the dam consist of ledge rock. A concrete abutment wall 20 feet in length extends from the dam along the edge of the pond at the left abutment. The dam crest elevation is El. 350 (NGVD). A 10 foot section of the

dam near the left abutment is at El. 351 (NGVD).

The spillway comprises the central portion of the gravity dam and is 23 feet in length. The downstream face of the spillway is curvilinear but is approximately 1 H to 3 V. Wooden flashboards are in place at the spillway (El. 350), level with the top elevation of the dam. The spillway discharge channel is approximately 10 feet wide, consisting of a cobble and gravel bottom, with wooded banks.

The outlet works consist of a 12 inch dia. cast iron pipe which passes through the base of the concrete gravity dam to the right of the central spillway section. A hand-operated valve is located on the outlet pipe at the downstream face of the dam. The valve has not been operated in several years. The invert elevation of the outlet pipe is approximately at El. 330 NGVD.

c. Size Classification. YMCA Pond Dam has a storage volume of 35 acre-feet and a maximum height of 26 feet. A dam height of greater than 25 feet but less than 40 feet classifies this structure in the "small" category according to guidelines established by the Corps of Engineers.

d. Hazard Classification. The dam is classified as having a "significant" hazard potential. Approximately two residential homes would be subject to flooding to a depth of about 3 feet above the first floor elevation due to a dam failure. With the loss of life potential estimated to be few, since no more than a small number of inhabitable structures are located in the probable dam failure impact area, the dam has been classified as having a "significant" hazard potential. A school is located about 1 mile downstream of the dam, but would not be flooded due to dam failure.

e. Ownership. The dam is owned by the Farnam Neighborhood House, 162 Fillmore Street, New Haven, Connecticut, 06513. Phone: 203-562-9194.

f. Operator. There is no formal operator for this dam. The present Executive Director of the Farnam Neighborhood House is Mr. J. Furuno, Phone: 203-562-9194.

g. Purpose of Dam. The present purpose of the pond is for recreational activity for attendees of a summer camp owned and operated by the Farnam Neighborhood House. The original purpose of the dam is unknown.

h. Design and Construction History. There is no design or construction information available for this dam.

i. Normal Operation Procedure. The water level is maintained principally by the spillway crest elevation. A 12 inch

dia. blow-off passes through the dam structure.

1.3 PERTINENT DATA:

a. Drainage Area. The drainage area is 0.4 square miles of wooded upland terrain. The pond has a single unnamed tributary which begins to the south in a wetland area and flows north collecting runoff from the adjacent hillside. The drainage area is totally undeveloped and approximately 40 percent of the area is state-owned forest (Cockaponset State Forest).

b. Discharge at Dam Site.

1) The outlet works consist of a manually operated valve-box located on the downstream end of a 12 inch dia. cast iron pipe which passes through the dam. The discharge capacity of the 12 inch cast iron pipe (El. 330± NGVD), with a pond level of El. 350± is estimated to be 20 CFS.

2) There are no known records of past floods or flood stage heights at the dam.

3) The ungated (without flashboards) spillway capacity at the top of dam 341 CFS @ El. 351.

4) The ungated spillway capacity at the test flood elevation - 460 CFS @ El. 351.3.

5) The gated (flashboards in place) spillway capacity at normal pool elevation - 70 CFS @ El. 350.

6) The gated spillway capacity at test flood elevation - 434 CFS @ El. 351.6.

7) The total spillway capacity at test flood elevation - 434 CFS @ El. 351.6.

8) The total project discharge at the top of dam - 214 CFS @ El. 351 (flashboards in place) and 341 CFS @ El. 351 (without flashboards).

9) The total project discharge at test flood elevation - 450 CFS @ El. 351.6 (flashboards in place) and 467 CFS @ El. 351.3 (without flashboards).

c. Elevation. (Feet above NGVD)

- 1) Streambed at toe of dam.....325±
- 2) Bottom of cut-off.....Unknown
- 3) Maximum tailwater.....327±

- 4) Recreation pool.....N/A
- 5) Full flood control pool.....N/A
- 6) Spillway crest.....349-without flashboard  
350-with flashboard
- 7) Design surcharge (Original Design).....Unknown
- 8) Top of dam.....351
- 9) Test flood design surcharge.....351.5 with flashboard

d. Reservoir. (Length in feet)

- 1) Normal pool.....300±
- 2) Flood control pool.....N/A
- 3) Spillway crest pool.....300±
- 4) Top of dam.....300±
- 5) Test flood pool.....300±

e. Storage (acre-feet)

- 1) Normal pool.....35
- 2) Flood control pool.....N/A
- 3) Spillway crest pool.....35
- 4) Top of dam.....40
- 5) Test flood pool.....41

f. Reservoir Surface. (acres)

- 1) Normal pool.....3.5
- 2) Flood control pool.....N/A
- 3) Spillway crest.....3.5
- 4) Test flood pool.....3.8
- 5) Top of dam.....3.7

g. Dam.

- 1) Type: Concrete gravity
- 2) Length: 80 feet

- 3) Height: 26 feet
- 4) Top Width: 1 foot
- 5) Side Slopes: U/S vertical; D/S 1 horizontal to 3 vertical
- 6) Zoning: N/A
- 7) Impervious Core N/A
- 8) Cut-off: Unknown
- 9) Grout Curtain: Unknown

h. Diversion and Regulating Tunnel.

- 1) Type: N/A
- 2) Length: N/A
- 3) Closure: N/A
- 4) Access: N/A
- 5) Regulating Facilities: N/A

i. Spillway.

- 1) Type: Concrete gravity
- 2) Length of Weir: 23 feet
- 3) Crest Elevation: Without flashboard - 349  
With flashboard - 350
- 4) Gates: Wooden flashboard
- 5) U/S Channel: Reservoir
- 6) D/S Channel: Natural stream channel, 10 feet wide, wooded side slope, gravel and cobble bed.

j. Regulating Outlets.

- 1) Invert: 330±
- 2) Size: 12 inch diameter
- 3) Description: Cast iron pipe
- 4) Control Mechanism: Manually operated valve box

## SECTION 2 - ENGINEERING DATA

### 2.1 DESIGN:

No engineering data has been found to provide any information about the design of YMCA Pond Dam.

### 2.2 CONSTRUCTION:

No information relative to the construction of the dam is available. Information presented in this report was primarily obtained by interviews and direct field measurements of the existing dam.

### 2.3 OPERATION:

Formal operation records are not available for this dam.

### 2.4 EVALUATION:

a. Availability. There are no plans, specifications or computations available from the owner or State regarding the design, construction or subsequent repairs and modifications to this dam.

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

c. Validity. There is no reason to question the validity of the available data.

## SECTION 3 - VISUAL INSPECTION

### 3.1 FINDINGS:

a. General. Based on the visual inspection, the YMCA Pond Dam appears to be in fair condition. The dam is a concrete gravity structure with base and abutments founded in bedrock. The central portion of the structure is stepped down to form a partial crest spillway. Water was overflowing the spillway at the time of inspection. Some cracking, spalling and efflorescence of concrete surfaces was observed. The vertical and horizontal alignment of the dam was good. Some erosion of weathered rock at the abutments was observed. Seepage was noted at the right abutment.

#### b. Dam.

1) Upstream Face - The upstream face of the dam was below the reservoir level and not visible at the time of the inspection. (See Photo No. 3)

2) Crest - A wooden footbridge spans the crest of the dam, as shown in Photo No. 2 and Photo No. 3.

3) Downstream Face and Abutments - The downstream face of the dam is shown in Photo 4 and the downstream portions of the abutments are shown in Photos No. 1, No. 4, No. 5 and No. 8.

Portions of the rock abutments have been concreted at the contact between the abutments and the downstream face of the dam, as shown in Photo No. 6 and No. 7. Several metal pipes are cast into the concreted areas of the abutments. (See Photo No. 9) Two 1-in.-diameter pipes, one plugged and one discharging a small amount of water, are located in the left abutment adjacent to the downstream face about 5 ft below the crest. Another 1-in.-diameter pipe, plugged with wood, is located adjacent to the downstream face about 5 ft below the crest in the right abutment. A 1-in.-diameter pipe plugged with cement and two 2-in.-diameter pipes plugged with wood are located in the right abutment about 10 ft downstream from the face of the dam at about mid-slope. The function of these pipes is not known.

Weathering and erosion of the rock abutments was observed in several locations. (Photo No. 6 and No. 7) The weathered rock has eroded back about 2-3 ft in an area adjacent to the downstream face at the left abutment, as shown in Photo No. 7. Photo No. 10 shows an example of erosion that has occurred at the downstream edge of the concreted area on the right abutment. The conglomerate bedrock is weathered to gravel in a clayey matrix at these and other locations.

Seepage was observed exiting from the rock on the right abutment at about midslope approximately 12 ft downstream from the face

of the dam at the downstream edge of the concreted portion of the abutment. (Photo No. 11) A smaller seep was observed farther upslope along the rock/concrete contact. It was not possible to determine whether seepage was occurring through the rock at the base of the dam because of the water discharging over the spillway.

4) Spillway - The spillway is located within the central portion of the concrete gravity dam. (Photo No. 1) The concrete forming the spillway section is in fair condition evidenced by concrete erosion and spalling on the downstream face. (Photo No. 8) Wood flashboards are in place within the spillway section (1' high by 2" wide). The flashboards are in good condition.

c. Appurtenant Structures. The outlet works consist of a 12 inch diameter cast iron pipe which passes through the concrete gravity dam. A control valve with valve stem is located at the base of the dam on the downstream side. (See Photo No. 10) The outlet works were not operated during the field review nor have they been operated in several years as reported by the owner. The visible portions of the valve housing and outlet pipe were rusted. The condition of the outlet works passing through the dam is unknown.

d. Reservoir Area. The perimeter of the pond is moderate to steep sloping and wooded. A small beach area is located along the north side of the pond. There was no evidence of slides or slope failures. No sediment deposits were observed above the water level of the reservoir.

e. Downstream Channel. The channel is a natural stream 10 ft. in width with steep sloping banks. (Photo No. 12) The stream bed is lined with cobbles and gravel with wooded banks.

f. Footbridge. A wood footbridge spans the crest of the dam as shown in Photos No. 2 and No. 3. The footbridge is supported by wood blocks attached to the concrete crest by metal angle sections. There is one foot clearance from the crest of the dam to the bottom of the footbridge. The footbridge is in fair condition. Most wooden members of the structure are sound with the exception of several wood supports near the right abutment.

### 3.2 EVALUATION:

Based on the visual inspection, the dam appears to be in fair condition. However, the erosion and seepage observed on the downstream portion of the rock abutments cannot be fully evaluated by visual inspection and warrants further investigation.

Also the outlet works should be restored to an operable condition and the valve should be exercised regularly.

The footbridge causes a potential for collecting debris and restricting flow. Consideration should be given to raising the bridge to provide adequate clearance over the crest of the dam.

## SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

### 4.1 OPERATIONAL PROCEDURES:

a. General. The dam is equipped with a method of lowering the water level by opening a control valve that operates a 12 inch dia. outlet pipe.

b. Description of any Warning System in Effect. There is no warning system of any kind in effect at the dam.

### 4.2 MAINTENANCE PROCEDURES:

a. General. Maintenance of the dam appears to be generally lacking.

b. Operating Facilities. There are no operating facilities at the dam.

### 4.3 EVALUATION:

Regular operational maintenance for this dam and its appurtenances has not been developed or implemented.

An emergency action plan should be prepared to prevent or minimize the impact of failure. This plan should list the expedient action to be taken and authorities to be contacted.

## SECTION 5 - EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

### 5.1 GENERAL DATA:

The YMCA Pond Dam is a concrete gravity structure with a crest length of 80 feet and a height of 26 feet. The spillway is centrally located and is 23 feet in length (El. 349 NGVD). Wood flashboards are presently in place at the spillway (1 foot high by 23 feet wide) to an elevation equal to the crest of the dam (El. 350). With flashboards in place, the entire width of the gravity dam functions as the spillway section. Located near the left abutment is a 10 foot section of the dam one foot higher (El. 351) than the crest of the dam. The approach to the spillway is directly from the reservoir. The depth of the reservoir at the face of the dam is approximately 10 feet. The downstream face of the dam section slopes at approximately 1 H to 3 V. The downstream face of the spillway (23 feet wide) is curvilinear but approximates 1 H to 3 V.

The outlet works consist of a 12 inch cast iron pipe which passes through the concrete gravity dam. The outlet works are only visible at the base of the dam on the downstream side near the right abutment. A manual valve is located at this location on the outlet works pipe. The invert elevation of the outlet pipe is approximately El. 330 NGVD. The watershed area of the dam is 0.4 square miles of wooded upland terrain. The pond has a single unnamed tributary which begins to the south in a wetland area and flows north collecting runoff from the adjacent hillside. The watershed is totally undeveloped and approximately 40 percent of the area is state-owned forest land (Cockaponset State Forest). Future development within the watershed is anticipated to be minimal because of state-ownership combined with limited access.

### 5.2 DESIGN DATA:

There is no design data available for this dam. In lieu of existing design information, U.S.G.S. Topographic Maps (scale 1" = 2000') were used to develop hydrologic parameters. Pertinent hydraulic design data was obtained by actual field measurements at the time of field inspection.

### 5.3 EXPERIENCE DATA:

There is no known experience data available for this dam.

### 5.4 TEST FLOOD ANALYSIS:

The test flood for determining the spillway adequacy is based on Corps of Engineers guidelines. The size of the dam is "small"

based on a storage volume of 35 acre feet and a dam height of 26 feet. The hazard classification is determined to be "significant". Loss of life is anticipated to be few should the dam fail. Two homes would experience flood waters to a depth of about 3 feet above the first floor elevation. Korn School located approximately one mile downstream of the dam would not be flooded due to a dam failure. Corps of Engineers guidelines for a "small" dam with "significant" hazard gives a range for the selection of the test flood from 100 year frequency to 1/2 PMF. The probable maximum flood (PMF) is that flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are possible for the region. The test flood selected for this dam is the 100 year frequency flood (1/4 PMF) based on consideration of the dam's low height and small storage volume.

The magnitude of the test flood was determined using methods developed by the Soils Conservation Service as described in "Design of Small Dams" by the Bureau of Reclamation. A triangular hydrograph was developed based on a test flood flow of 450 CFS and a 20-inch runoff volume.

The developed hydrograph was routed through the reservoir using a computer program based on stage-storage and stage-discharge data. The pond was assumed to be full and level with the spillway crest (flashboards in place) prior to the storm event. An effective length of spillway was utilized to compensate for the footbridge pier obstructions. In addition, it was assumed that the outlet conduit was closed throughout the test flood duration.

The test flood hydrograph routed through the reservoir resulted in a maximum pond level of 351.6 feet NGVD corresponding to a peak outflow rate of 450 CFS. The maximum depth of flow at the spillway section is 1.6 feet. The 10 foot section of the dam near the left abutment would be overtopped by 0.6 feet. All spillway discharges would be confined to the concrete gravity dam section. Assuming the flashboards are removed, the maximum reservoir stage is 351.3 feet NGVD a 0.3 feet reduction.

The spillway capacity without overtopping the 10 foot section near the left abutment is 214 CFS, which is about 52 percent of the test flood outflow. The spillway capacity would be 340 CFS if the flashboards were to be removed which is about 85 percent of the test flood outflow. This spillway inadequacy is not judged to be serious because all flow overtops the concrete gravity dam section.

#### 5.5 DAM FAILURE ANALYSIS:

The downstream impact of dam failure was analysed using a computer program developed based upon the Corps of Engineers "Rule of Thumb Guidance for Estimating Dam Failure Hydrographs" dated April 1978 as used in the National Dam Inspection Program.

The peak outflow rate is calculated by combining the dam failure outflow and the pre-failure discharge. Water surface elevations are calculated for both the pre-failure and post-failure conditions at selected stations downstream of the dam. The output data (see Appendix D) is used to define flood prone areas and select the hazard classification of the dam.

Based on an assumed breach width equal to 40 percent of the dam's length at mid-height, the total peak outflow due to a flood wave would be 7400 CFS. This includes a flow in the downstream watercourse of 230 CFS equivalent to the maximum spillway discharge at the dam.

Approximately two residential homes would be subject to flooding to a depth of 3 feet above the first floor elevation due to a dam failure. The homes are located off Maiden Lane approximately 3,000 feet downstream of the dam. The maximum depth of flow at this location prior to and after dam failure would be 2 feet and 5 feet respectively. Korn School located approximately one mile downstream of the dam would not be flooded as the result of a dam failure. The relationship of computed elevations and stationing to flood prone properties is shown on sheet D-8, Appendix D.

It is anticipated that loss of life due to a dam failure would be few and economic loss would be appreciable. The hazard classification is therefore "significant."

## SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

### 6.1 VISUAL OBSERVATIONS:

The visual inspection did not disclose any immediate stability problems. However, the erosion and seepage on the downstream portion of the rock abutments could affect the future stability of the dam.

### 6.2 DESIGN AND CONSTRUCTION DATA:

No original design and construction data are available. Thus, the assessment of stability is based only on the visual inspection.

### 6.3 POST-CONSTRUCTION CHANGES:

No records are available relative to post-construction changes. The service bridge was constructed after the original construction of the dam but does not effect dam stability.

### 6.4 SEISMIC STABILITY:

YMCA Pond Dam is located in Seismic Zone 1 and, in accordance with the recommended Phase I inspection guidelines, does not warrant seismic stability analysis.

## SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

### 7.1 DAM ASSESSMENT:

a. Condition. Based on visual inspection, the dam appears to be in fair condition. However, the erosion and seepage on the downstream portion of the rock abutments warrant additional investigation as recommended in Section 7.2.

b. Adequacy of Information. The information available is such that the assessment of safety is based solely on the visual inspection, past operational performance of the structure and sound engineering judgement.

c. Urgency. The recommendations and remedial measures presented below should be implemented by the owner within two years after receipt of this Phase I inspection report.

### 7.2 RECOMMENDATIONS:

The owner should retain a qualified registered engineer to:

a. Investigate the erosion and seepage occurring on the downstream portion of the rock abutments and design corrective measures, if needed.

b. Conduct more refined hydrologic and hydraulic analysis to determine the need for and methods of increasing the project discharge capacity.

c. Raise footbridge to prevent collection of debris and restriction of flow.

The owner should carry out the recommendations of the engineer.

### 7.3 REMEDIAL MEASURES:

a. Operating and Maintenance Procedures. The owner should:

1. Determine the operability of the outlet works and repair as required. A program of regular valve maintenance should be implemented.

2. Institute a program of annual technical inspections of the dam and its appurtenances by a qualified registered engineer.

3. Repair all spalled and deteriorated concrete on the downstream face of the dam.

4. Establish a surveillance and flood warning plan during and immediately after heavy rainfall, and also a warning program to follow in case of emergency conditions.

7.4 ALTERNATIVES:

There are no practical alternatives to the recommendations contained in Sections 7.2 and 7.3.

APPENDIX A

INSPECTION CHECK LIST



PERIODIC INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: YMCA Pond Dam

DATE: Nov. 6, 1979

AREA EVALUATED	CONDITIONS
<u>DAM EMBANKMENT</u>	Concrete dam with abutments in rock - no earth embankment.
Crest Elevation	351.0 NGVD
Current Pool Elevation	349.1 NGVD
Maximum Impoundment to Date	Unknown.
Surface Cracks	Some cracking and spalling of concrete on downstream face.
Pavement Condition	N/A.
Movement or Settlement of Crest	None observed.
Lateral Movement	None observed.
Vertical Alignment	No misalignment observed.
Horizontal Alignment	No misalignment observed.
Condition at Abutment and at Concrete Structures	Some erosion of weathered rock at abutments. Seepage at right abutment.
Indications of Movement of Structural Items on Slopes	N/A.
Trespassing on Slopes	N/A.
Sloughing or Erosion of Slopes or Abutments	Some erosion of weathered rock at abutments.
Rock Slope Protection - Riprap Failures	N/A.
Unusual Movement or Cracking at or near Toes	None observed.
Unusual Embankment or Downstream Seepage	Seepage through joints in rock at right abutment.
Piping or Boils	N/A.
Foundation Drainage Features	Possible drain pipes part-way up slope at abutments - all pipes plugged except one at right abutment which was discharging.
Toe Drains	None.
Instrumentation System	None.
Vegetation	N/A.

PERIODIC INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: YMCA Pond Dam

DATE: Nov. 6, 1979

AREA EVALUATED	CONDITIONS
<p><u>DIKE EMBANKMENT</u></p> <p>Crest Elevation</p> <p>Current Pool Elevation</p> <p>Maximum Impoundment to Date</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>Instrumentation System</p> <p>Vegetation</p>	<p>Not applicable</p>

PERIODIC INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: YMCA Pond Dam

DATE: Nov. 6, 1979

AREA EVALUATED	CONDITIONS
<p><u>OUTLET WORKS - INTAKE</u> <u>CHANNEL AND INTAKE</u> <u>STRUCTURE</u></p> <p>a. Approach Channel</p> <ul style="list-style-type: none"><li>Slope Conditions</li><li>Bottom Conditions</li><li>Rock Slides or Falls</li><li>Log Boom</li><li>Debris</li><li>Condition of Concrete Lining</li><li>Drains or Weep Holes</li></ul> <p>b. Intake Structure</p> <ul style="list-style-type: none"><li>Condition of Concrete</li><li>Stop Logs and Slots</li></ul>	<p>Not applicable</p>

PERIODIC INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: YMCA Pond Dam

DATE: Nov. 6, 1979

AREA EVALUATED	CONDITIONS
<u>OUTLET WORKS - CONTROL TOWER</u>	
a. Concrete and Structural	
General Condition	Not applicable
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	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System in Gate Chamber	

PERIODIC INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: YMCA Pond Dam

DATE: Nov. 6, 1979

AREA EVALUATED	CONDITIONS
<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>None</p>

PERIODIC INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: YMCA Pond Dam

DATE: Nov. 6, 1979

AREA EVALUATED	CONDITIONS
<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 style="padding-left: 20px;">Loose Rock or Trees Overhanging Channel</p> <p style="padding-left: 20px;">Condition of Discharge Channel</p>	<p>Water flowing over spillway section during time of inspection. Condition of non-overflow section concrete was fair.</p> <p>None.</p> <p>Some minor spalling of concrete.</p> <p>Erosion of concrete surface.</p> <p>None observed.</p> <p>None observed.</p> <p>Some erosion noted.</p> <p>N/A</p> <p>Natural stream bed</p> <p>Not significant.</p> <p>Not significant.</p>

PERIODIC INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: YMCA Pond Dam

DATE: Nov. 6, 1979

AREA EVALUATED	CONDITIONS
<p><u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u></p> <p>a. Approach Channel</p> <p style="padding-left: 20px;">General Condition</p> <p style="padding-left: 20px;">Loose Rock Overhanging Channel</p> <p style="padding-left: 20px;">Trees Overhanging Channel</p> <p style="padding-left: 20px;">Floor of Approach Channel</p> <p>b. Weir and Training Walls</p> <p style="padding-left: 20px;">General Condition of Concrete</p> <p style="padding-left: 20px;">Rust or Staining</p> <p style="padding-left: 20px;">Spalling</p> <p style="padding-left: 20px;">Any Visible Reinforcing</p> <p style="padding-left: 20px;">Any Seepage or Efflorescence</p> <p style="padding-left: 20px;">Drain Holes</p> <p>c. Discharge Channel</p> <p style="padding-left: 20px;">General Condition</p> <p style="padding-left: 20px;">Loose Rock Overhanging Channel</p> <p style="padding-left: 20px;">Trees Overhanging Channel</p> <p style="padding-left: 20px;">Floor of Channel</p> <p style="padding-left: 20px;">Other Obstructions</p>	<p>Partial crest spillway discharge into down-stream channel which is a natural river bed.</p> <p>Underwater.</p> <p>Some minor spalling and erosion of concrete noted.</p> <p>None observed.</p> <p>Some spalling noted.</p> <p>None.</p> <p>Some efflorescence noted.</p> <p>Drain pipes in right abutment area.</p> <p>Good</p> <p>Not significant.</p> <p>Not significant.</p> <p>Natural river bed, few boulders.</p> <p>None.</p>

PERIODIC INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: YMCA Pond Dam

DATE: Nov. 6, 1979

AREA EVALUATED	CONDITIONS
<p><u>OUTLET WORKS - SERVICE BRIDGE</u></p> <p>a. Superstructure</p> <ul style="list-style-type: none"><li>Bearings</li><li>Anchor Bolts</li><li>Bridge Seat</li><li>Longitudinal Members</li><li>Under Side of Deck</li><li>Secondary Bracing</li><li>Deck</li><li>Drainage System</li><li>Railings</li><li>Expansion Joints</li><li>Paint</li></ul> <p>b. Abutment &amp; Piers</p> <ul style="list-style-type: none"><li>General Condition of Concrete</li><li>Alignment of Abutment</li><li>Approach to Bridge</li><li>Condition of Seat and Backwall</li></ul>	<p>Timber footbridge, recently constructed, in good condition.</p>

APPENDIX B

ENGINEERING DATA

NAME OF DAM YMCA Pond Dam

I.D. NO. CT-00385

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

ITEM	REMARKS
AS-BUILT DRAWINGS	None Available
REGIONAL VICINITY MAP	Available from U.S.G.S.
CONSTRUCTION HISTORY	None
TYPICAL SECTIONS OF DAM	Field Measurements
OUTLETS - Plan	Field Measurements
- Details	Field Measurements
- Constraints	Unknown
- Discharge Ratings	None Available
RAINFALL/RESERVOIR RECORDS	Unavailable
DESIGN REPORTS	None
GEOLOGY REPORTS	None
DESIGN COMPUTATIONS	None
HYDROLOGY & HYDRAULICS	None
DAM STABILITY	None
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** YMCA Pond Dam

**I.D. NO.** CT 00385

**ITEM**

**REMARKS**

**POST-CONSTRUCTION SURVEYS OF DAM**

None available

**BORROW SOURCES**

Unknown

**MONITORING SYSTEMS**

Unknown

**MODIFICATIONS**

New timber bridge over top of dam

**HIGH POOL RECORDS**

None

**POST-CONSTRUCTION ENGINEERING  
STUDIES AND REPORTS**

Unknown

**PRIOR ACCIDENTS OR FAILURE OF DAM  
DESCRIPTION  
REPORTS**

Unknown

**MAINTENANCE OPERATION RECORDS**

Unavailable

**SPILLWAY PLAN**

**SECTIONS**

Field Measurements

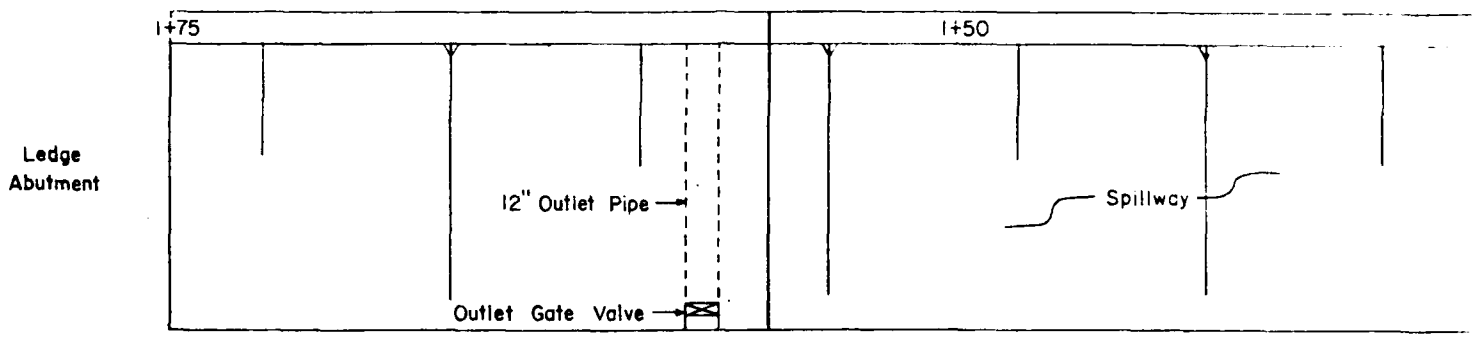
**DETAILS**

Field Measurements

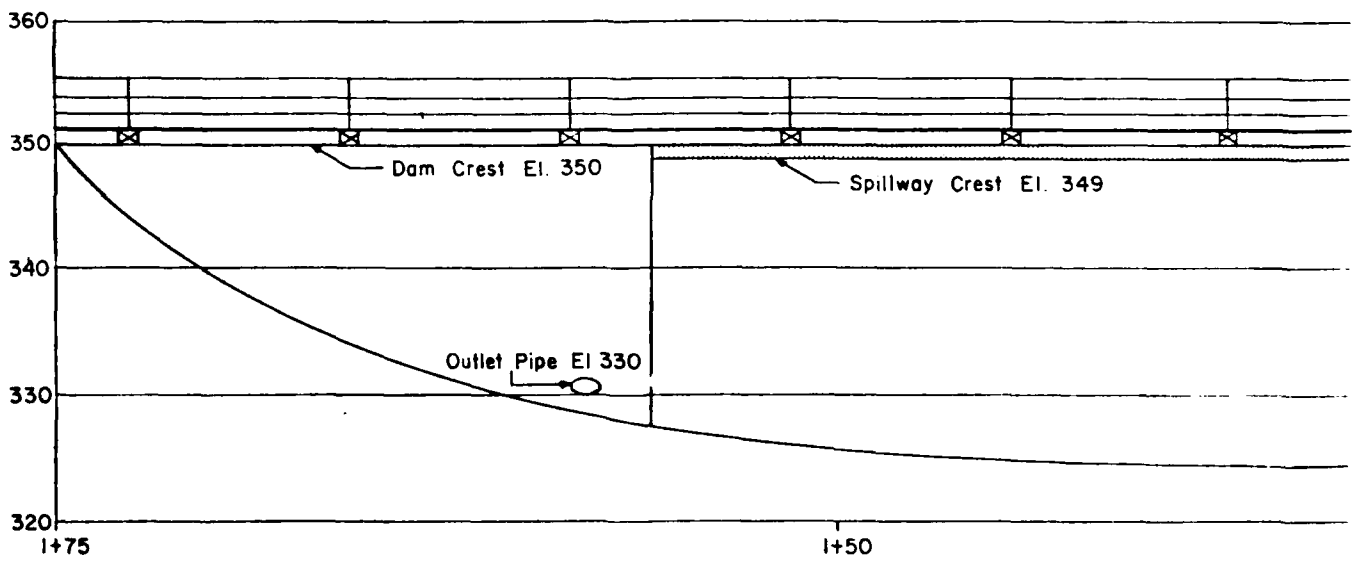
**OPERATING EQUIPMENT  
PLANS & DETAILS**

Not available

YMCA  
POND

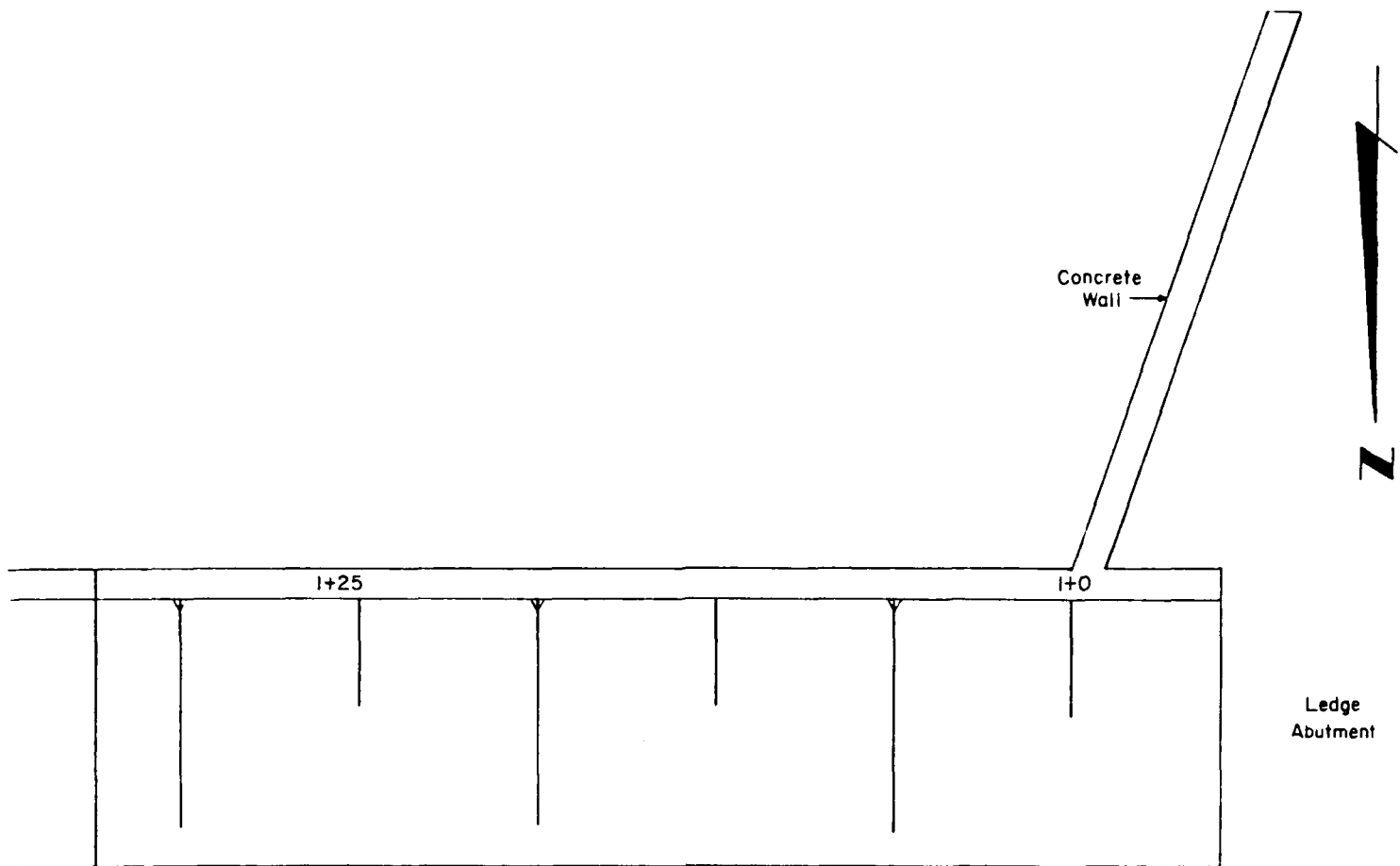


PLAN  
NTS

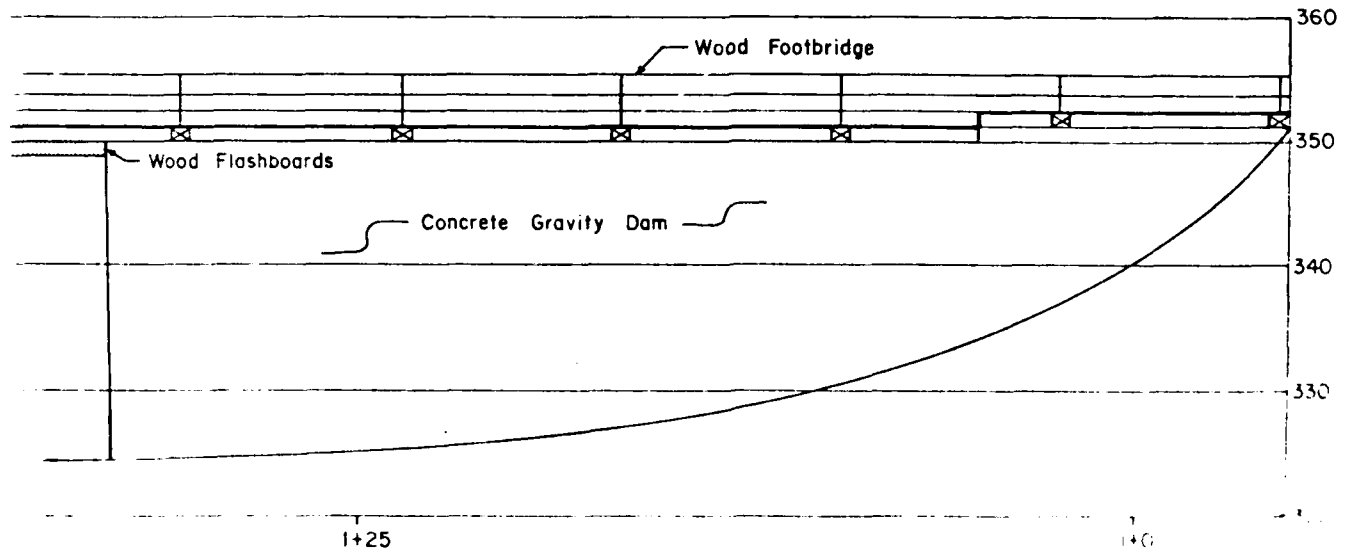


PROFILE  
NTS

Datum : N.G.V.D



AN  
ITS



OFFICE  
ITS

YMCA POND DAM

**Interdepartment Message**

SAVE TIME: *Handwritten messages are acceptable.*

STO-201 REV. 3/77 STATE OF CONNECTICUT  
(Stock No. 697R-051-01)

Use carbon if you really need a copy. If typewritten, ignore faint lines.

<b>To</b>	NAME	Victor F. Galgowski	TITLE	Supt. of Dam Maintenance	DATE	20 November 1978
	AGENCY	Water Resources Unit	ADDRESS			
<b>From</b>	NAME	Charles J. Pelletier	TITLE	Consultant	TELEPHONE	
	AGENCY	Environmental Protection	ADDRESS			
SUBJECT						
Farnam Neighborhood Camp Dam, Durham (YMCA POND DAM)						


This structure was inspected on November 17, 1978.

The dam is a concrete gravity section about 20 feet high and 80 feet long. The structure spans a narrow rock gorge and appears to be founded on rock.

The entire length of the concrete dam can serve as spillway. There is a substantial wooden foot bridge on top of the dam which could adversely affect spillway capacity. However, a severe flood would probably overtop the walkway and wash it downstream without significant damage to the dam itself.

There is a substantial leak in the right abutment. The flow appears to be coming through interstices in the parent rock and is not detrimental to the structure safety. The leakage may make it difficult to retain a full pond during periods of low flow.

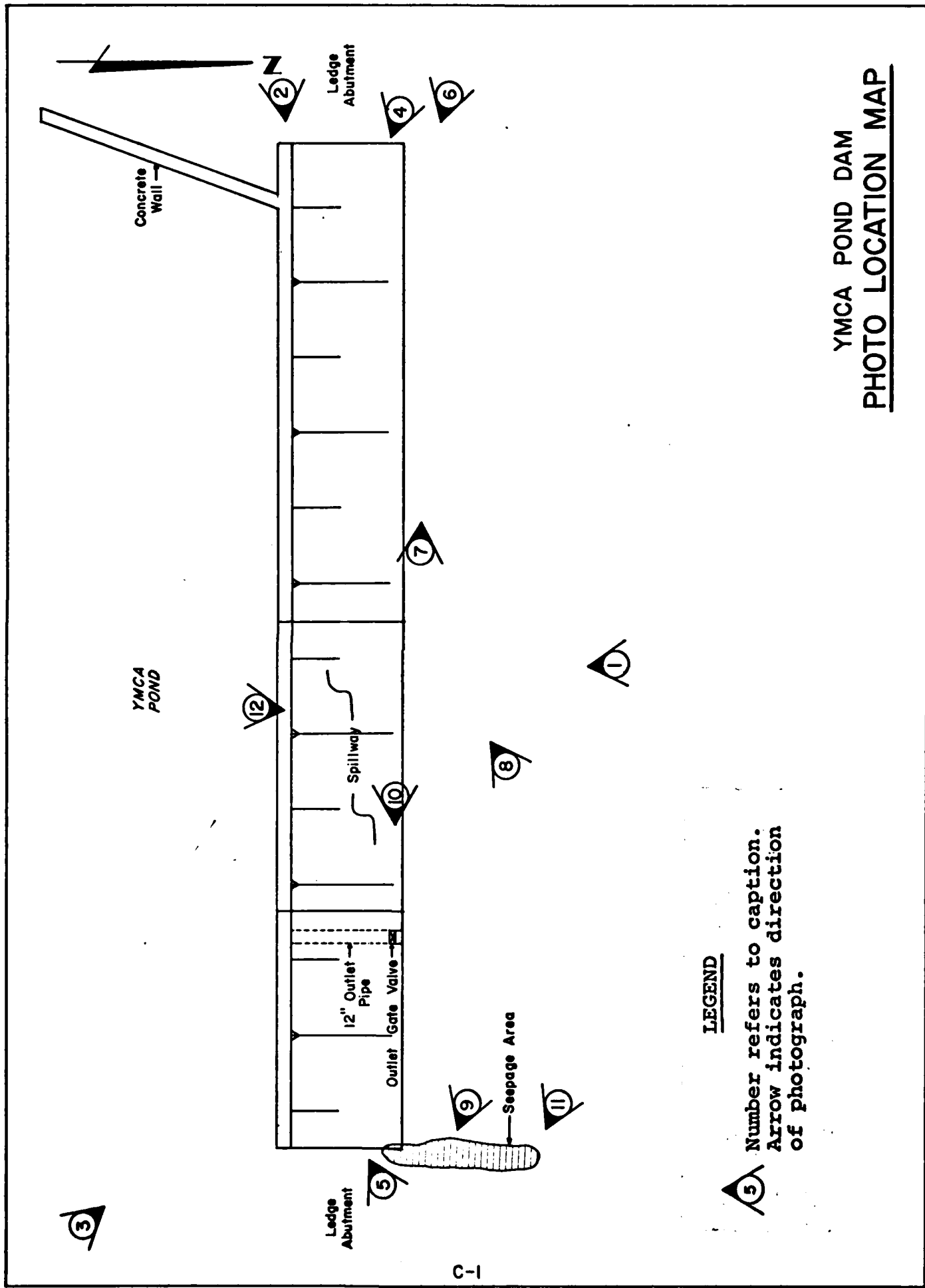
It is our opinion that the dam is safe.

  
Water Resources Unit

CJP:1jk

APPENDIX C

PHOTOGRAPHS



**LEGEND**

Number refers to caption.  
 Arrow indicates direction  
 of photograph.

**YMCA POND DAM  
 PHOTO LOCATION MAP**

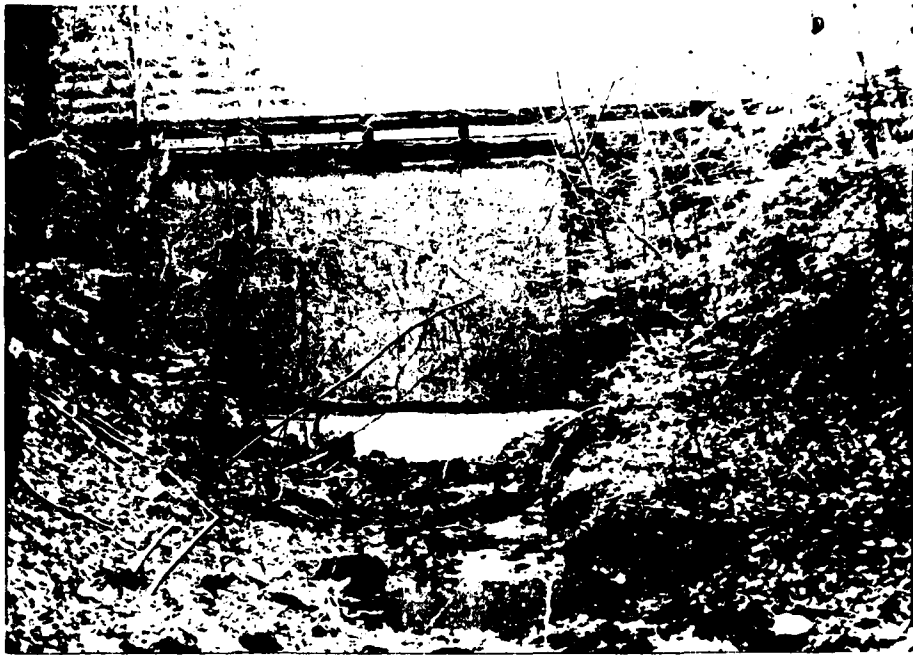


PHOTO #1: Downstream face of dam



PHOTO #2: Top of dam from left abutment



PHOTO #3: Upstream face of dam

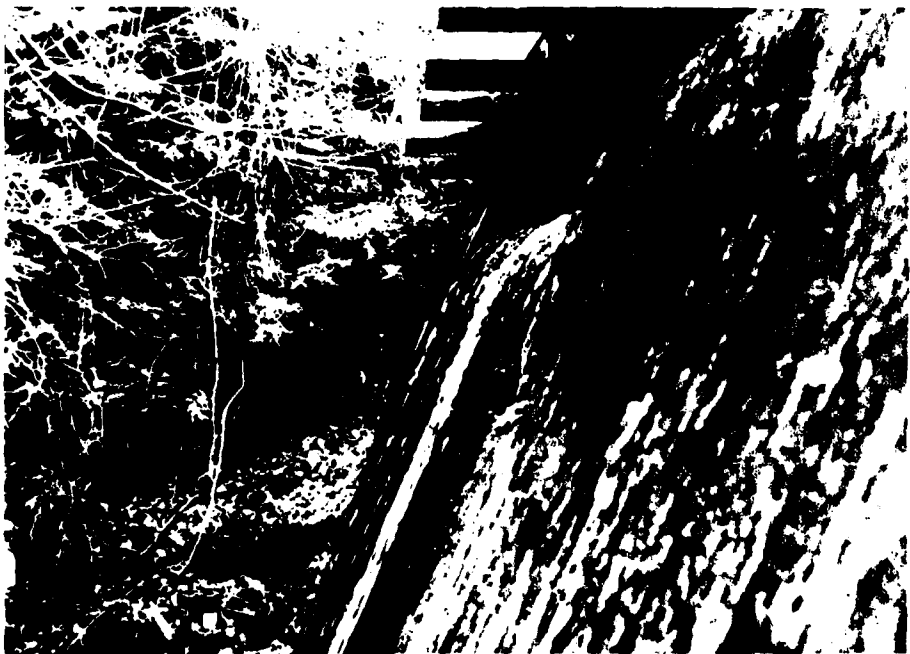


PHOTO #4: Downstream face looking toward right abutment



PHOTO #5: Downstream face looking toward left abutment



PHOTO #6: Right abutment



PHOTO #7: Left abutment



PHOTO #8: Downstream face from right abutment

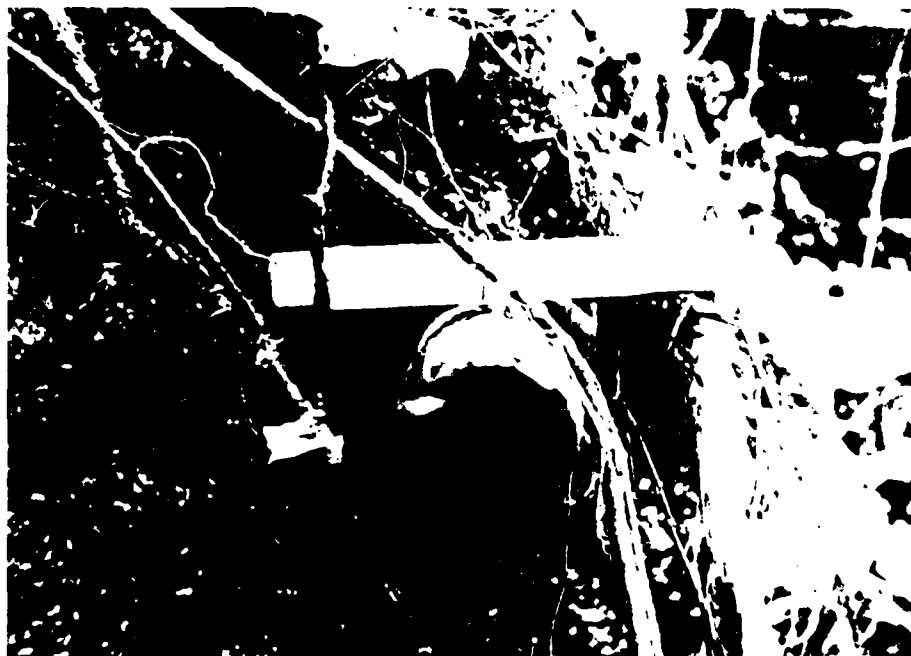


PHOTO #9: Location of 2 inch diameter metal pipe cast into concreted area of right abutment near seepage location



PHOTO #10: Blow-off valve at right abutment

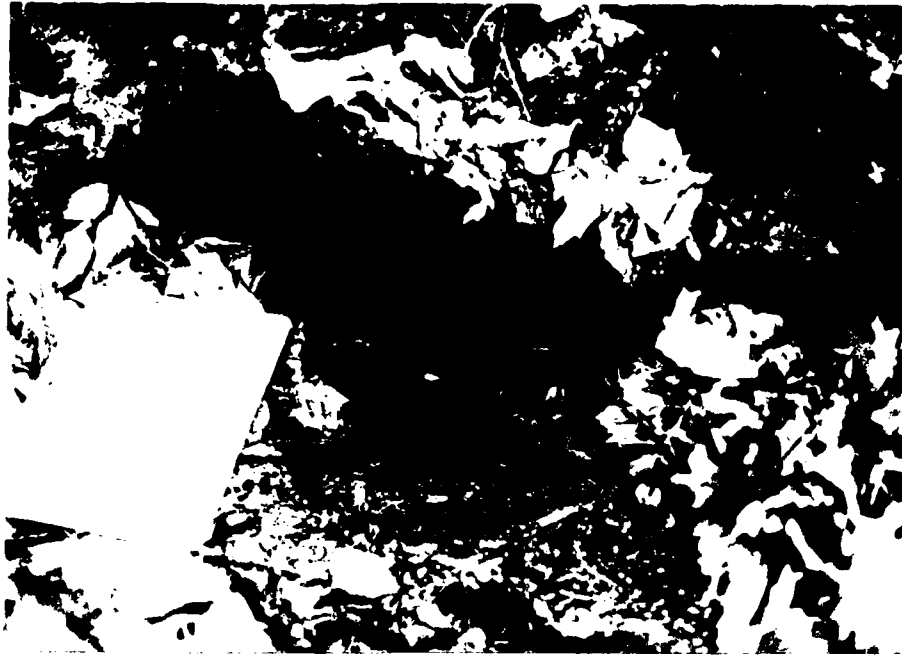


PHOTO #11: Close-up of seepage from the rock in the right abutment



PHOTO #12: Downstream channel

APPENDIX D

HYDROLOGIC AND HYDRAULIC  
COMPUTATIONS

PROJECT 79-90-10  
YMCA POND DAM  
DURHAM, CONN.



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

SHEET NO. 1 OF 7  
 BY PAC DATE 4-17-80  
 CHK'D. BY DKS DATE 4-23-80

DETERMINATION OF SPILLWAY TEST FLOOD

A. SIZE CLASSIFICATION

Storage Volume (Ac.-Ft.) 35  
 Height of Dam (Ft.) 26  
 Size Classification SMALL

B. HAZARD POTENTIAL CLASSIFICATION

<u>Category</u>	<u>Loss of Life</u>	<u>Economic Loss</u>
Low	None expected	Minimal
Significant	<u>Few</u>	<u>Appreciable</u>
High	More than few	Excessive

Hazard Classification SIGNIFICANT

C. HYDROLOGIC EVALUATION GUIDELINES

<u>Hazard</u>	<u>Size</u>	<u>Spillway Test Flood</u>
Low	Small	50 to 100-Year Frequency
	Intermediate	100-Year Frequency to 1/2 PMF
	Large	1/2 PMF to PMF
<u>Significant</u>	<u>Small</u>	100-Year Frequency to 1/2 PMF
	Intermediate	1/2 PMF to PMF
	Large	PMF
High	Small	1/2 PMF to PMF
	Intermediate	PMF
	Large	PMF

Spillway Test Flood 100 YEAR FREQUENCY

\*Based upon "Recommended Guidelines for Safety Inspection of Dams" Department of the Army, Office of the Chief of Engineers, November 1976.



THE PMP RAINFALL IS 24 INCHES FOR A 6 HOUR DURATION STORM, USING A 20% FACTOR FOR IMPERFECT FIT THE EFFECTIVE RAINFALL IS 19.2 INCHES. (FIG. 15, PAGE 48, DESIGN OF SMALL DAMS)

PMP 1 HOUR FIG 18, PG 51

$$(0.5)(19.2) = 9.6 \text{ INCHES}$$

PMP 24 HOUR FIG 16, PG 49

$$(1.2)(19.2) = 23.04 \text{ INCHES}$$

RUNOFF

USING AN ASSUMED CN VALUE OF 80 FOR GLACIAL TILL SOILS, THE RUNOFFS IN INCHES ARE:  
(FIG A-4, PG 542, DESIGN OF SMALL DAMS)

$$1 \text{ HOUR RAINFALL} = 9.6 \text{ INCHES} \rightarrow \text{RUNOFF} = 7.1 \text{ INCHES}$$

$$6 \text{ HOUR RAINFALL} = 19.2 \text{ INCHES} \rightarrow \text{RUNOFF} = 16.5 \text{ INCHES}$$

$$24 \text{ HOUR RAINFALL} = 23.04 \text{ INCHES} \rightarrow \text{RUNOFF} = 20.0 \text{ INCHES}$$

TIME OF CONCENTRATION

$$T_c = \left[ \frac{11.9 L^3}{H} \right]^{.385}$$

$$\Delta H = 280'$$

$$L = 1.3 \text{ MI}$$

$$= \left[ \frac{11.9 (1.3)^3}{280} \right]^{.385} = 0.40$$



100 YEAR FLOOD = 1/4 PMF

$A = 0.40 \text{ mi}^2$

$Q = \frac{484 AR}{T_p}$        $T_p = \frac{D}{2} + 1.6 T_c$

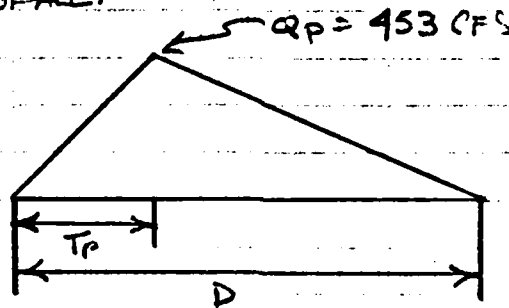
1 HOUR

$T_p = \frac{1}{2} + 1.6 (.4) = .74$

$Q = \frac{484 (.39) (.74)}{.74} = 1811 \text{ CFS} (.25) = 453 \text{ CFS}$

HYDROGRAPH

A TRIANGULAR HYDROGRAPH IS TO BE USED FOR THE ROUTING OF THE TEST FLOOD THROUGH THE RESERVOIR. PEAK FLOW EQUALS 453 CFS, SET DURATION OF RUNOFF SO AS TO CONTAIN VOLUME OF RUNOFF, AND RECEEDING LIMB EQUALS TWICE THE RISING LIMB FOR A 24 HOUR RAINFALL.



VOLUME OF RUNOFF =  
 $.25 \left( \frac{20''}{12''/\text{FT}} \right) \times .4 \text{ MI}^2 \times 640 \text{ AC}/\text{MI}^2 = 107 \text{ AC-FT}$

PROJECT 799010  
MCA Pond Dam  
DURHAM CONA



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

SHEET NO. 4 OF 7  
 BY FLAC DATE 7-9-80  
 CHK'D. BY PB DATE 7-10-80

$$V_{OL} = \frac{1}{2} Q_p D$$

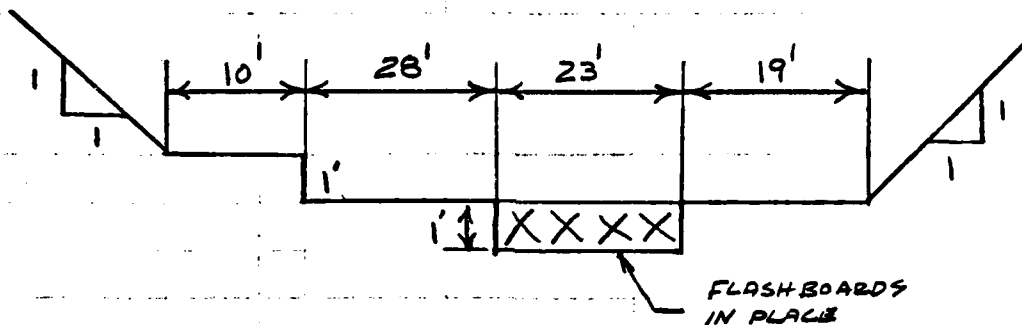
$$D = \frac{(107 \text{ AC-FT}) (43560 \text{ FT}^2/\text{AC})}{15 (453 \text{ CFS}) \times 60 \text{ MIN/hr} \times 60 \text{ SEC/MIN}} = 5.7 \text{ hrs}$$

Say  $T_p = 2 \text{ HRS}$        $D = 6 \text{ HRS}$

<u>TIME (HOURS)</u>	<u>INFLOW (CFS)</u>
0	0
1.0	227
2.0	453
3.0	340
4.0	226
5.0	113
6.0	0



SPILLWAY SECTION N.T.S.



WITHOUT FLASHBOARDS

<u>SEGMENT</u>	<u>ITEM</u>	<u>"C"</u>	<u>EFFECTIVE LENGTH</u>	<u>ELEV</u>
----------------	-------------	------------	-------------------------	-------------

1	CONC SPILLWAY	3.3	9	351
2		3.3	27	350 (U.S.G.S)
3		3.3	21	349
4		3.3	17	350
IE = 350		IV = 0		

E = 350      A = 3.6 ACRES

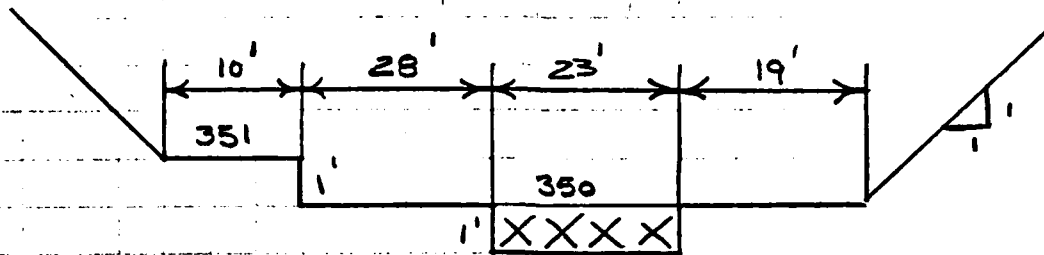
E = 360      A = 4.6 ACRES

WITH FLASHBOARDS

1		3.3	9	351
2		3.3	65	350



STAGE DISCHARGE DATA N.T.S.



WITH FLASHBOARDS

ELEVATION =	350	351	352	353	354
$Q_1 = 3.3 (9) H^{1.5}$		-	30	84	154
$Q_2 = 3.3 (65) H^{1.5}$	-	214	606	1115	1716
TOTAL CAPACITY	0	214	636	1199	1870

PROJECT 7990 10  
INCA POND DAM  
DURHAM CONN



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

SHEET NO. 7 OF 7  
BY RAC DATE 7-10-80  
CHK'D. BY PB DATE 7-10-80

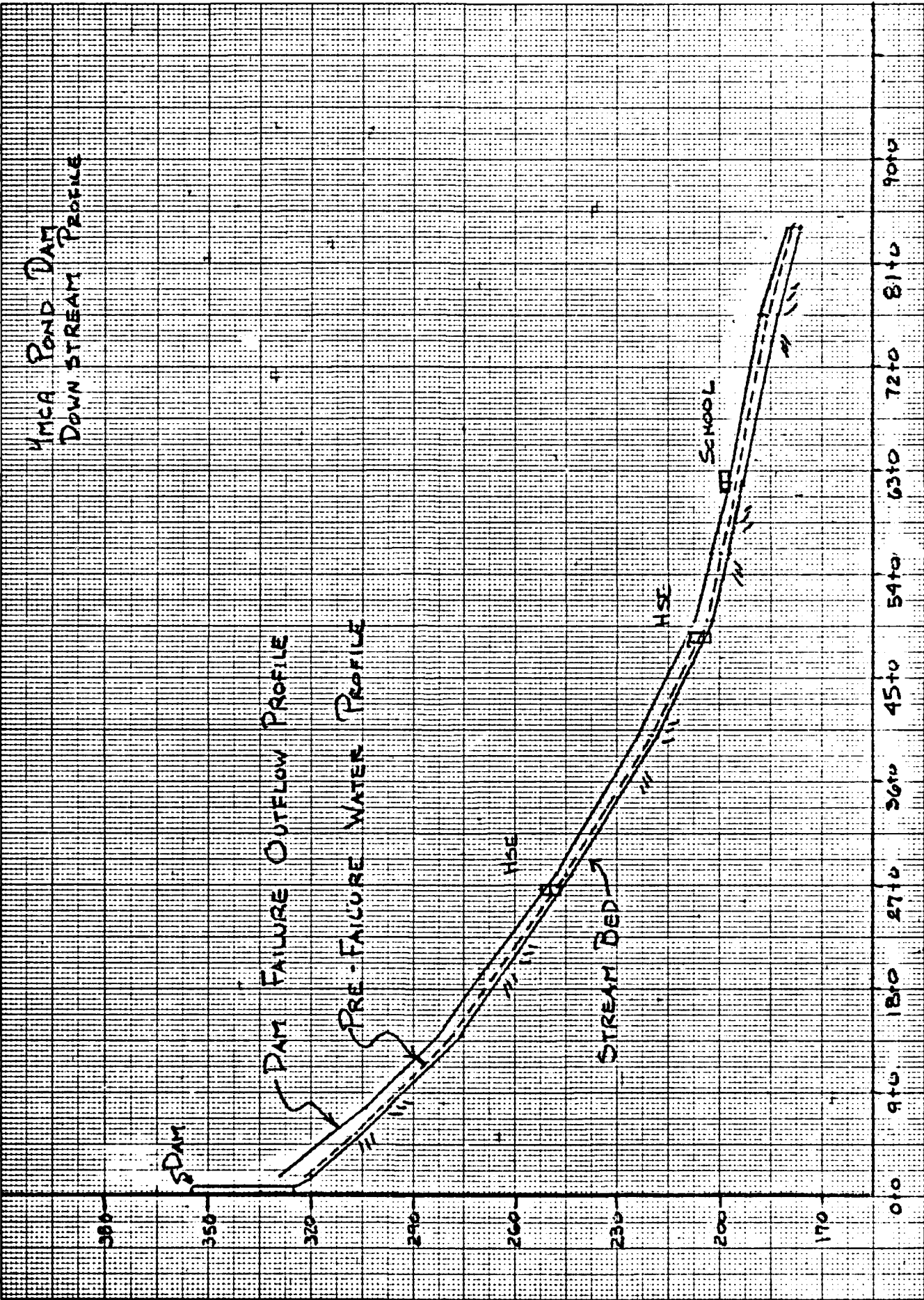
HSE ELEV. BASE FLOW FLOODWAVE BASE FLOW FLOODING FLOODWAVE FLOODING

248	246	251	-	3
209	190	212	-	3

KOEN SCHOOL

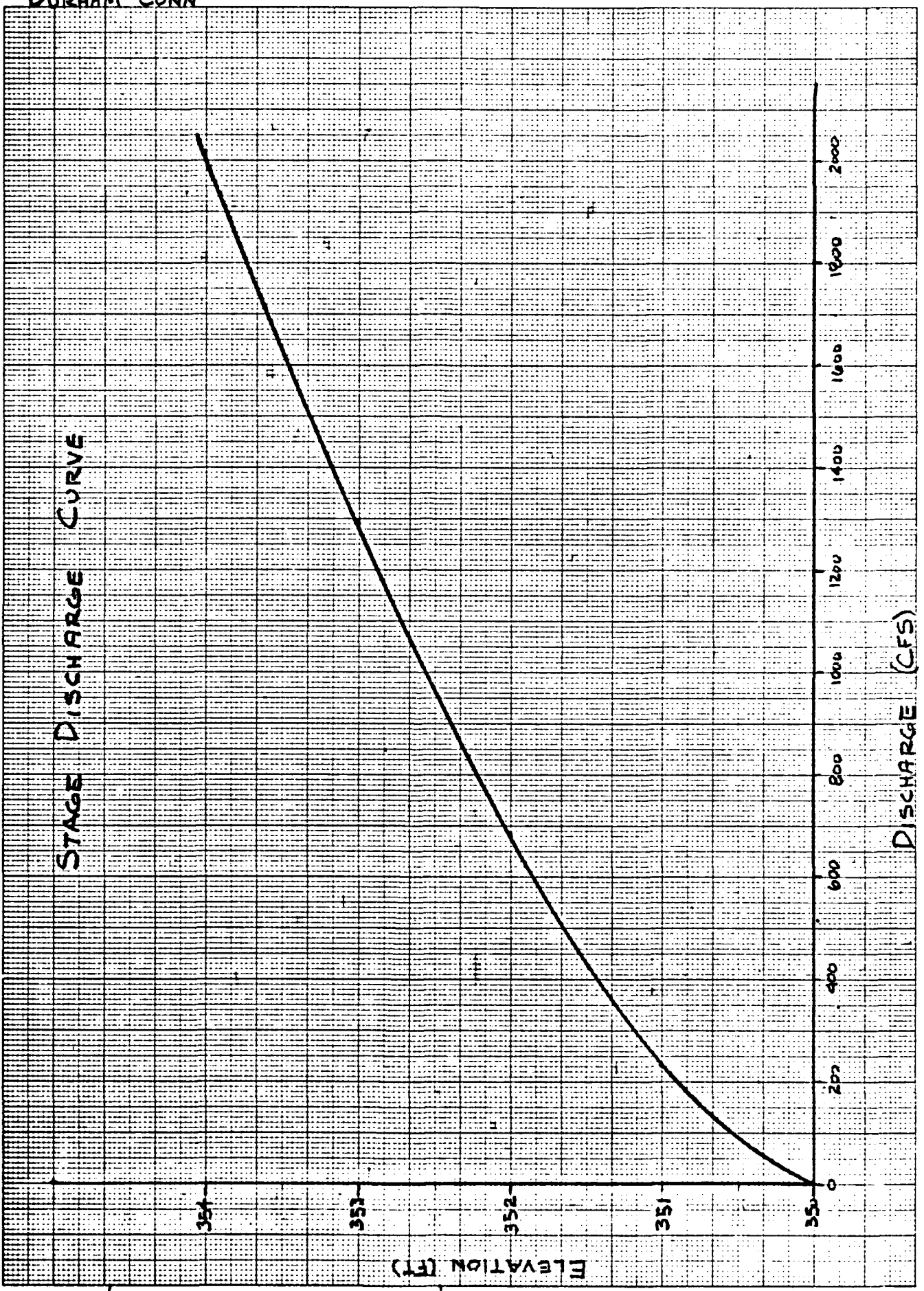
198	196.1	197	-	-
-----	-------	-----	---	---

DATE: 11/22/54 TIME: 10:00 AM DRAWN BY: J. S. HARRIS CHECKED BY: J. S. HARRIS



79 9010  
YMCA POND DAM  
DURHAM CONN

RAC 4-17-80  
DKS 4-23-80



10.5 x 10.5 THIN TIME  
REDFEL & ESSER CO. MADE IN U.S.A.



YMCA POND DAM 799010  
 WITH FLASHBOARDS

FLOOD ROUTING

RAC

JULY 11, 1980  
 CL PS

INPUT DATA:  
 SEGMENT 1 UNSUBMERGED WEIR DISCHARGE COEFFICIENT = 3.3 LENGTH OF WEIR = 9 ELEVATION OF WEIR = 351  
 SEGMENT 2 DISCHARGE COEFFICIENT = 3.3 LENGTH OF WEIR = 65 ELEVATION OF WEIR = 350  
 IE=350.0 IV= 0.0 E=350.0 A= 3.60 E=360.0 A= 4.60

INFLOW	MASS INFLOW	WATER EL.	TAIL WATER	OUTFLOW	MASS OUTFLOW	STORAGE(R)	STORAGE(A)
0.00	0.00AC-F	350.00FT	0.00FT	0CFS	0.00AC-F	0.00AC-F	0.00AC-F
1.00	227CFS	350.80FT	0.00FT	155CFS	6.43AC-F	2.94AC-F	2.94AC-F
2.00	453CFS	351.60FT	0.00FT	452CFS	31.55AC-F	5.92AC-F	5.92AC-F
3.00	340CFS	351.39FT	0.00FT	360CFS	65.13AC-F	5.11AC-F	5.11AC-F
4.00	226CFS	351.06FT	0.00FT	235CFS	89.75AC-F	3.88AC-F	3.88AC-F
5.00	113CFS	350.72FT	0.00FT	133CFS	104.99AC-F	2.65AC-F	2.65AC-F
6.00	0CFS	350.22FT	0.00FT	23CFS	111.48AC-F	0.83AC-F	0.83AC-F

YMCA POND DAM 799010 FLOOD ROUTING RAC JULY 11, 1980  
 WITHOUT FLASHBOARDS CK P/S

INPUT DATA: UNSUBMERGED WEIR LENGTH OF WEIR = 9 ELEVATION OF WEIR = 351  
 SEGMENT 1 DISCHARGE COEFFICIENT = 3.3 LENGTH OF WEIR J = 27 ELEVATION OF WEIR = 350  
 SEGMENT 2 DISCHARGE COEFFICIENT = 3.3 LENGTH OF WEIR = 21 ELEVATION OF WEIR = 349  
 SEGMENT 3 DISCHARGE COEFFICIENT = 3.3 LENGTH OF WEIR I = 17 ELEVATION OF WEIR = 350  
 SEGMENT 4 IE=349.0 IV= 0.0 E=349.0 A= 3.60 E=360.0 A= 4.60

HOOR	INFLOW	MASS INFLOW	WATE I EL.	TAIL WATER	OUTFLOW	MASS OUTFLOW	STORAGE(R)	STORAGE(A)
0.00	0CFS	0.00AC-F	349.00FT	.00FT	0CFS	0.00AC-F	0.00AC-F	0.00AC-F
1.00	227CFS	9.38AC-F	350.25FT	0.00FT	115CFS	4.79AC-F	4.58AC-F	4.58AC-F
2.00	453CFS	37.47AC-F	351.31FT	0.00FT	467CFS	28.90AC-F	8.57AC-F	8.57AC-F
3.00	340CFS	70.24AC-F	351.02FT	0.00FT	351CFS	62.76AC-F	7.48AC-F	7.48AC-F
4.00	226CFS	93.63AC-F	350.71FT	0.00FT	243CFS	87.33AC-F	6.30AC-F	6.30AC-F
5.00	113CFS	107.64AC-F	350.32FT	0.00FT	131CFS	102.81AC-F	4.83AC-F	4.83AC-F
6.00	0CFS	112.31AC-F	349.67FT	0.00FT	38CFS	109.84AC-F	2.46AC-F	2.46AC-F

**FGA FLOOD WAVE ROUTING**

APPROXIMATE FLOOD WAVE ROUTING BASED UPON U.S. ARMY CORPS OF ENGINEERS' "RULE OF THUMB GUIDANCE FOR ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS" DATED APRIL, 1978.

INITIAL STATION = 0 +0  
 INITIAL BASE FLOW = 231 CFS  
 INITIAL WAVE HEIGHT = 26.0 FT  
 ASSUMED BREACH WIDTH = 32.0 FT  
 INITIAL RESERVOIR STORAGE = 24 ACRE-FT  
 COMPUTED FLOOD WAVE PEAK FLOW = 7,128 CFS  
 TOTAL FLOOD WAVE PEAK FLOW = 7,359CFS

**STATION 0+70**

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
N = 0.080					
-370.0 FT	400.0 FT	-120.0 FT	370.0 FT	-50.0 FT	350.0 FT
-35.0 FT	340.0 FT	-20.0 FT	330.0 FT	-10.0 FT	323.0 FT
N = 0.040					
-10.0 FT	323.0 FT	-5.0 FT	320.0 FT	5.0 FT	320.0 FT
10.0 FT	323.0 FT				
N = 0.080					
10.0 FT	323.0 FT	60.0 FT	350.0 FT	360.0 FT	400.0 FT
920.0 FT	450.0 FT				

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
21.5 SF	9.5 FT	0.080	10.0 FPS	217CFS
154.8 SF	21.6 FT	0.040	43.5 FPS	6,750CFS
27.9 SF	11.5 FT	0.080	10.5 FPS	295CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
320.0 FT	8.4 FT	328.4 FT	204 SF	35.5 FPS	7,263 CFS	0.1000
BASE FLOW =		231 CFS	BASE STAGE =		321.4 FT.	

STATION 5 +0

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
N = 0.080					
310.0 FT	360.0 FT	-410.0 FT	350.0 FT	-100.0 FT	330.0 FT
20.0 FT	310.0 FT	-10.0 FT	308.0 FT		
N = 0.040					
10.0 FT	308.0 FT	-5.0 FT	305.0 FT	5.0 FT	305.0 FT
10.0 FT	308.0 FT				
N = 0.080					
10.0 FT	308.0 FT	30.0 FT	310.0 FT	120.0 FT	340.0 FT
420.0 FT	350.0 FT	630.0 FT	360.0 FT		

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
82.0 SF	26.7 FT	0.080	7.3 FPS	603CFS
165.0 SF	21.6 FT	0.040	26.9 FPS	4,442CFS
124.0 SF	32.7 FT	0.080	8.4 FPS	1,047CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
335.0 FT	9.0 FT	314.0 FT	371 SF	16.4 FPS	6,093 CFS	0.0350

BASE FLOW = 231 CFS      BASE STAGE = 306.9 FT.

STATION 8 +0

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
		N = 0.050			
-150.0 FT	310.0 FT	-50.0 FT	300.0 FT	-10.0 FT	300.0 FT
		N = 0.040			
-10.0 FT	300.0 FT	-5.0 FT	297.0 FT	5.0 FT	297.0 FT
10.0 FT	300.0 FT				
		N = 0.080			
10.0 FT	300.0 FT	200.0 FT	330.0 FT		

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
247.1 SF	81.0 FT	0.050	10.2 FPS	2,536CFS
126.7 SF	21.6 FT	0.040	19.8 FPS	2,512CFS
52.9 SF	26.2 FT	0.080	4.8 FPS	258CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
297.0 FT	7.0 FT	304.0 FT	426 SF	12.4 FPS	5,307 CFS	0.0270

BASE FLOW = 231 CFS      BASE STAGE = 299.0 FT.

STATION 14 +0

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
N = 0.050					
-1120.0 FT	310.0 FT	-710.0 FT	300.0 FT	-470.0 FT	290.0 FT
-30.0 FT	280.0 FT	-10.0 FT	279.0 FT		
N = 0.040					
-10.0 FT	279.0 FT	-5.0 FT	276.0 FT	5.0 FT	276.0 FT
10.0 FT	279.0 FT				
N = 0.080					
10.0 FT	279.0 FT	20.0 FT	280.0 FT	300.0 FT	290.0 FT
380.0 FT	300.0 FT	580.0 FT	320.0 FT		

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
173.7 SF	121.7 FT	0.050	7.0 FPS	1,224CFS
111.2 SF	21.6 FT	0.040	20.6 FPS	2,300CFS
102.8 SF	74.7 FT	0.080	4.2 FPS	442CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
276.0 FT	6.3 FT	282.3 FT	387 SF	10.2 FPS	3,960 CFS	0.0350

BASE FLOW = 231 CFS      BASE STAGE = 277.9 FT.

STATION 28 +0

OFFSET	ELEV.	OFFSFT	ELEV.	OFFSET	ELEV.
N = 0.050					
-530.0 FT	300.0 FT	-280.0 FT	260.0 FT	-100.0 FT	250.0 FT
-10.0 FT	246.0 FT				
N = 0.040					
-10.0 FT	246.0 FT	-5.0 FT	243.0 FT	5.0 FT	243.0 FT
10.0 FT	246.0 FT				
N = 0.080					
10.0 FT	246.0 FT	20.0 FT	250.0 FT	50.0 FT	260.0 FT
1000.0 FT	260.0 FT	1100.0 FT	270.0 FT	1760.0 FT	300.0 FT

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
109.7 SF	70.3 FT	0.050	6.1 FPS	679CFS
107.4 SF	21.6 FT	0.040	10.7 FPS	1,798CFS
12.1 SF	8.4 FT	0.080	3.6 FPS	44CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
243.0 FT	6.1 FT	249.1 FT	229 SF	11.0 FPS	2,523 CFS	0.0240

BASE FLOW = 231 CFS      BASE STAGE = 245.1 FT.

STATION 40 + 0

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
N = 0.080					
-450.0 FT	300.0 FT	-190.0 FT	270.0 FT	-100.0 FT	250.0 FT
-70.0 FT	240.0 FT	-10.0 FT	221.0 FT		
N = 0.040					
-10.0 FT	221.0 FT	-5.0 FT	218.0 FT	5.0 FT	218.0 FT
10.0 FT	221.0 FT				
N = 0.080					
10.0 FT	221.0 FT	100.0 FT	250.0 FT	230.0 FT	260.0 FT
950.0 FT	250.0 FT				

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
19.6 SF	11.6 FT	0.080	3.8 FPS	74CFS
115.5 SF	21.6 FT	0.040	16.4 FPS	1,899CFS
19.3 SF	11.5 FT	0.080	3.8 FPS	73CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
218.0 FT	6.5 FT	224.5 FT	154 SF	13.2 FPS	2,047 CFS	0.0210

BASE FLOW = 231 CFS      BASE STAGE = 220.2 FT.

STATION 50 +0

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
N = 0.050					
-350.0 FT	230.0 FT	-300.0 FT	220.0 FT	-250.0 FT	210.0 FT
-10.0 FT	205.0 FT				
N = 0.040					
-10.0 FT	205.0 FT	-5.0 FT	202.0 FT	5.0 FT	202.0 FT
10.0 FT	205.0 FT				
N = 0.050					
10.0 FT	205.0 FT	25.0 FT	210.0 FT	175.0 FT	220.0 FT
350.0 FT	230.0 FT				

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
117.1 SF	106.0 FT	0.050	4.0 FPS	470CFS
89.1 SF	21.6 FT	0.040	12.0 FPS	1,076CFS
7.3 SF	6.9 FT	0.050	3.8 FPS	28CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
202.0 FT	5.2 FT	207.2 FT	213 SF	7.3 FPS	1,575 CFS	0.0160

BASE FLOW = 231 CFS      BASE STAGE = 204.4 FT.

STATION 56 +0

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
N = 0.050					
-1150.0 FT	230.0 FT	-1000.0 FT	210.0 FT	-100.0 FT	200.0 FT
-10.0 FT	200.0 FT				
N = 0.040					
-10.0 FT	200.0 FT	-5.0 FT	197.0 FT	5.0 FT	197.0 FT
10.0 FT	200.0 FT				
N = 0.050					
10.0 FT	200.0 FT	50.0 FT	210.0 FT	800.0 FT	210.0 FT
1050.0 FT	230.0 FT				

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
242.3 SF	227.4 FT	0.050	2.7 FPS	672CFS
75.5 SF	21.6 FT	0.040	7.6 FPS	577CFS
4.6 SF	6.2 FT	0.050	2.1 FPS	100CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
197.0 FT	4.5 FT	201.5 FT	322 SF	3.9 FPS	1,259 CFS	0.0080

BASE FLOW = 231 CFS      BASE STAGE = 199.9 FT.

STATION 58+50

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
N = 0.050					
-1150.0 FT	220.0 FT	-1000.0 FT	210.0 FT	-350.0 FT	200.0 FT
-10.0 FT	198.0 FT				
N = 0.040					
-10.0 FT	198.0 FT	-5.0 FT	195.0 FT	5.0 FT	195.0 FT
10.0 FT	198.0 FT				
N = 0.050					
10.0 FT	198.0 FT	500.0 FT	200.0 FT	1500.0 FT	200.0 FT
1900.0 FT	230.0 FT				

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
131.8 SF	211.7 FT	0.050	1.9 FPS	255CFS
69.9 SF	21.6 FT	0.040	7.2 FPS	507CFS
190.0 SF	305.1 FT	0.050	1.9 FPS	368CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
195.0 FT	4.2 FT	199.2 FT	391 SF	2.8 FPS	1,131 CFS	0.0080

BASE FLOW = 231 CFS      BASE STAGE = 197.9 FT.

STATION 62 +0 (KORN SCHOOL)

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
N = 0.050					
-2000.0 FT	230.0 FT	-1800.0 FT	220.0 FT	-1600.0 FT	210.0 FT
-1400.0 FT	200.0 FT	-10.0 FT	196.0 FT		
N = 0.040					
-10.0 FT	190.0 FT	-5.0 FT	193.0 FT	5.0 FT	193.0 FT
10.0 FT	196.0 FT				
N = 0.050					
10.0 FT	196.0 FT	1400.0 FT	200.0 FT	2000.0 FT	200.0 FT
4400.0 FT	200.0 FT	4700.0 FT	210.0 FT	5200.0 FT	220.0 FT

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
186.7 SF	360.3 FT	0.050	1.4 FPS	277CFS
65.7 SF	21.6 FT	0.040	6.0 FPS	396CFS
186.7 SF	360.3 FT	0.050	1.4 FPS	277CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
193.0 FT	4.0 FT	197.0 FT	439 SF	2.1 FPS	951 CFS	0.0060

BASE FLOW = 231 CFS      BASE STAGE = 196.1 FT.

STATION 76 +0

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
N = 0.050					
-1350.0 FT	240.0 FT	-1200.0 FT	230.0 FT	-1100.0 FT	220.0 FT
-300.0 FT	200.0 FT	-100.0 FT	190.0 FT	-10.0 FT	186.0 FT
N = 0.040					
-10.0 FT	186.0 FT	-5.0 FT	183.0 FT	5.0 FT	183.0 FT
10.0 FT	186.0 FT				
N = 0.050					
10.0 FT	186.0 FT	350.0 FT	190.0 FT	1400.0 FT	200.0 FT
1800.0 FT	210.0 FT	2300.0 FT	220.0 FT	2450.0 FT	230.0 FT

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
21.0 SF	30.8 FT	0.050	1.9 FPS	40CFS
72.3 SF	21.6 FT	0.040	6.9 FPS	502CFS
79.5 SF	110.2 FT	0.050	1.9 FPS	153CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
183.0 FT	4.3 FT	187.3 FT	172 SF	4.0 FPS	696 CFS	0.0070

BASE FLOW = 231 CFS      BASE STAGE = 186.0 FT.

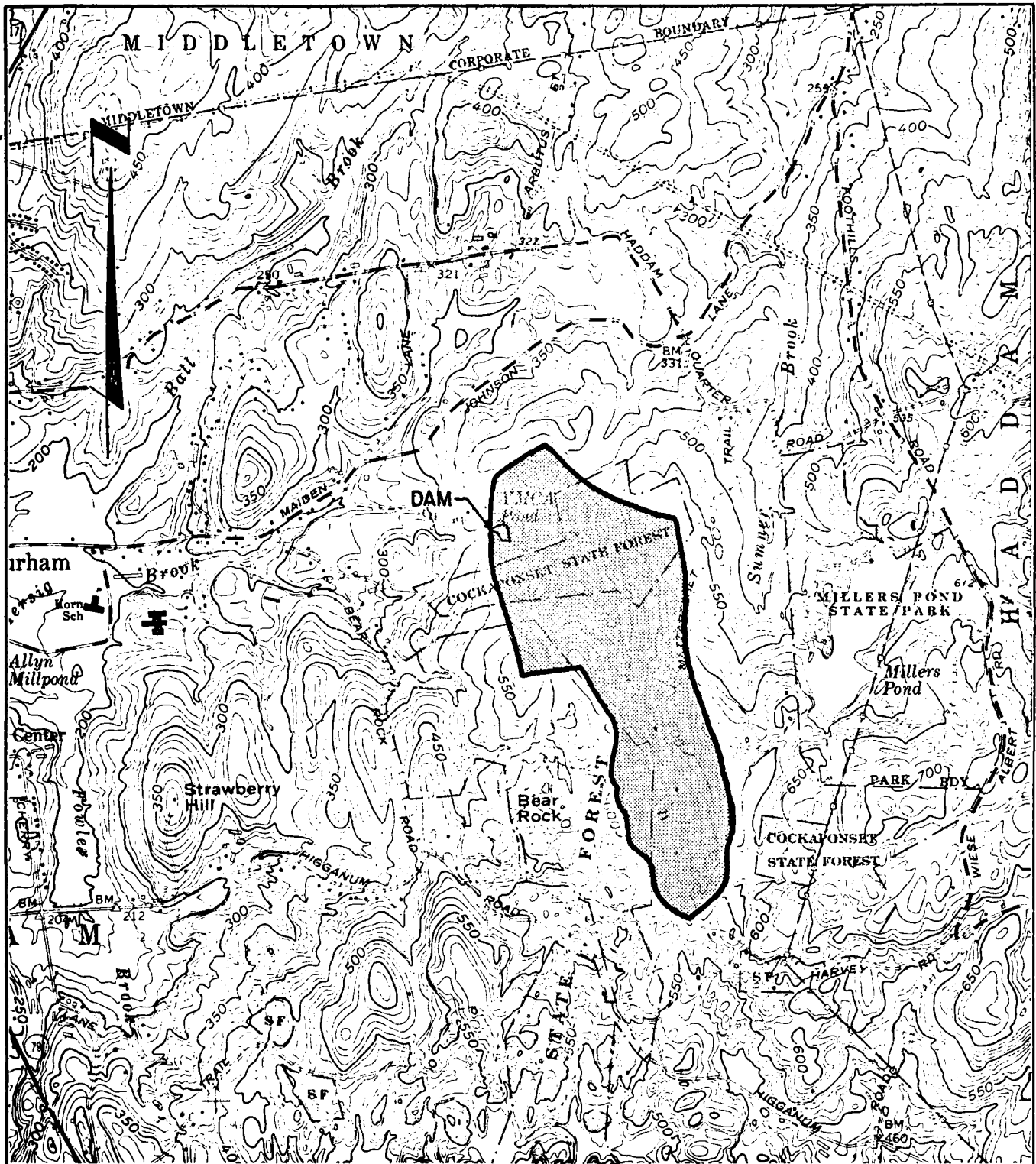
**STATION 24+50**

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
N = 0.050					
-450.0 FT	220.0 FT	-300.0 FT	210.0 FT	-100.0 FT	180.0 FT
-10.0 FT	179.0 FT				
N = 0.040					
-10.0 FT	179.0 FT	-5.0 FT	170.0 FT	5.0 FT	176.0 FT
10.0 FT	179.0 FT				
N = 0.050					
10.0 FT	179.0 FT	450.0 FT	180.0 FT	1050.0 FT	190.0 FT
1200.0 FT	200.0 FT	1600.0 FT	220.0 FT		

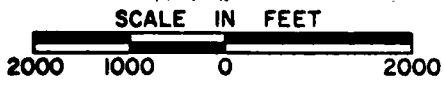
AREA	WETTED PERIMETER	N	VELOCITY	FLOW
23.3 SF	64.7 FT	0.050	1.3 FPS	31CFS
59.3 SF	21.6 FT	0.040	6.5 FPS	386CFS
113.9 SF	316.7 FT	0.050	1.3 FPS	153CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
176.0 FT	3.7 FT	179.7 FT	196 SF	2.9 FPS	571 CFS	0.0080

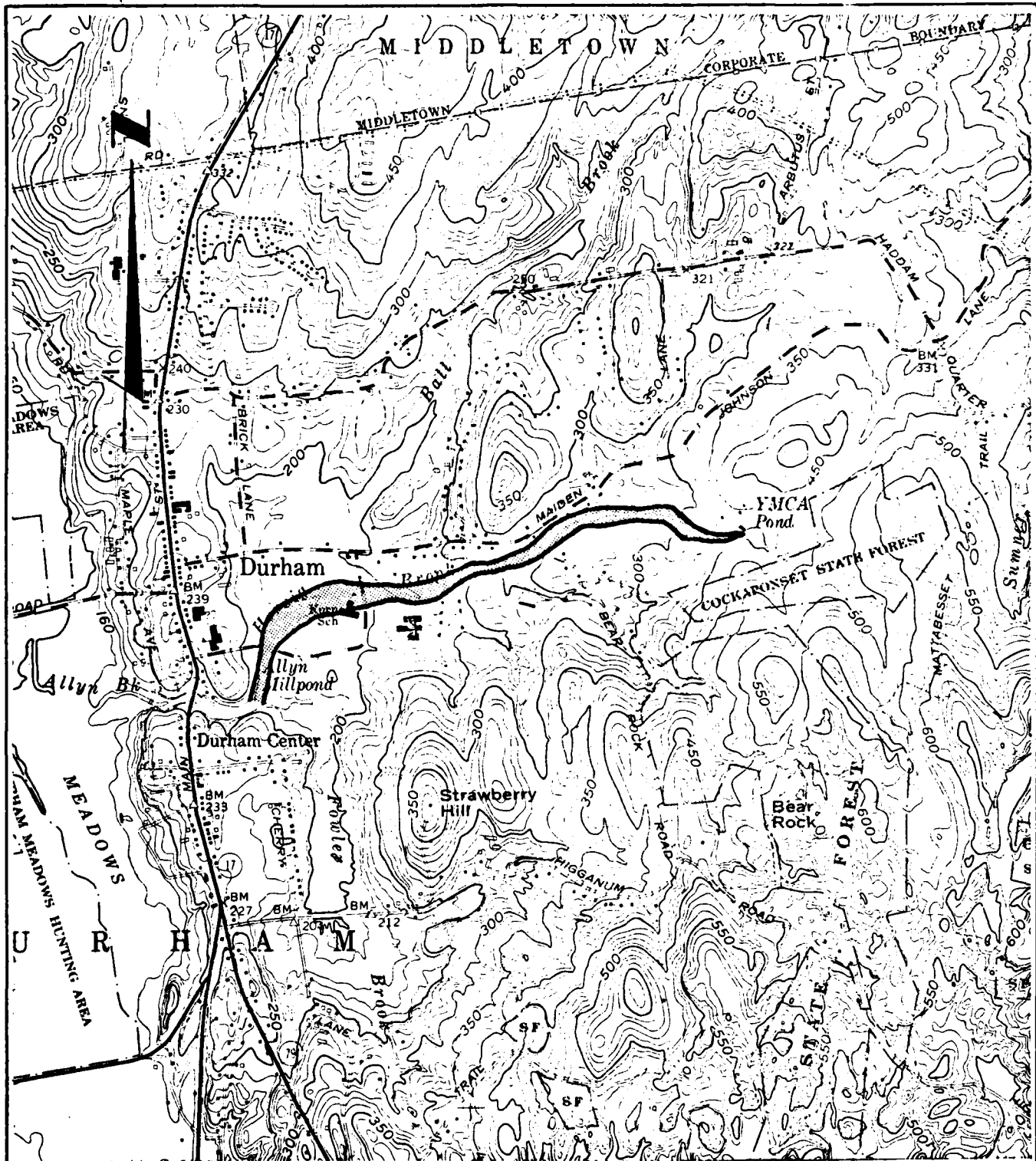
BASE FLOW = 231 CFS      BASE STAGE = 178.9 FT.



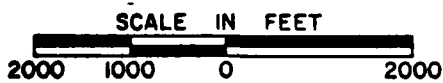
## YMCA POND DAM DRAINAGE MAP



DURHAM, CONNECTICUT



 IMPACT AREA



**YMCA POND DAM**  
**DAM FAILURE ANALYSIS**  
**IMPACT AREAS**  
**DURHAM, CONNECTICUT**

APPENDIX E

INFORMATION AS CONTAINED IN THE  
NATIONAL INVENTORY OF DAMS

# INVENTORY OF DAMS IN THE UNITED STATES

STATE	DIVISION	COUNTY	DISTRICT	NAME	LATTITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE
CT	35	067	02	YMCA POND DAM	41 28.7	73 19.2	01 MAY 80

POPULAR NAME	NAME OF IMPOUNDMENT		
YMCA POND	YMCA POND		
REGION BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST FROM DAM (MI.)
CITY	DURHAM		POPULATION
			5200

TYPE OF DAM	YEAR COMPLETED	PURPOSES	HYDRAULIC STAG. HEIGHT (FT.)	IMPOUNDING CAPACITIES
EGCI	1934	R	26	MAXIMUM (ACRE-FT.)
			44	NORMAL (ACRE-FT.)
			35	MINIMUM (ACRE-FT.)

D.S. HAS	SPILLWAY TYPE	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CU FT)	POWER CAPACITY (MW)	INSTALLED PROPOSED (MW)	LENGTH (FT)	WIDTH (FT)	HEIGHT (FT)
2	U	344		0				

OWNER	ENGINEERING BY
FARMAN NEIGHBORHOOD HSE	

REGULATORY AGENCY	OPERATION
CONSTRUCTION	MAINTENANCE

CONSTRUCTION DEPT	CONSTRUCTION DEPT
CONN DEP	CONN DEP

INSPECTION BY	INSPECTION DATE
FLAMERTY GIAYARA ASSOCIATES	01 NOV 79

AUTHORITY FOR INSPECTION	P.L. #
	02-367

DIST OWN FED N N N N N  
VER/DATE

REMARKS

REMARKS

**END**

**FILMED**

**10-84**

**DTIC**