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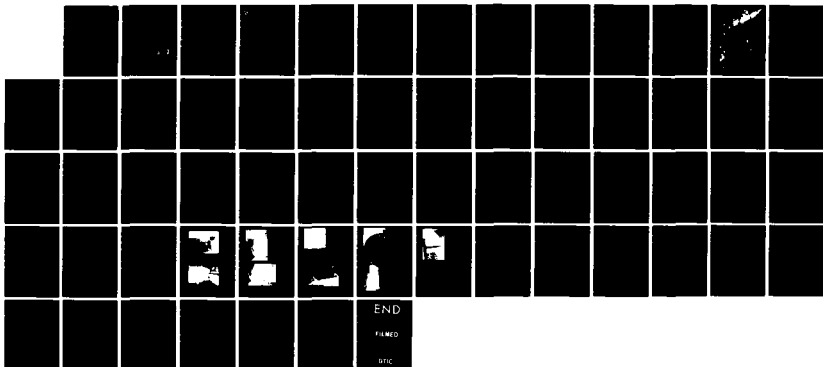
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
SPRINGFIELD WATER WOR. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV APR 78

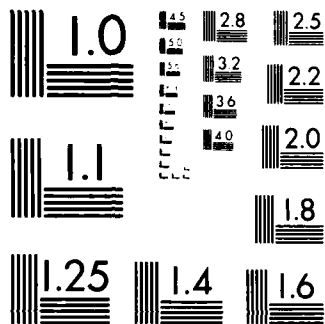
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AD-A155 200

CONNECTICUT RIVER BASIN
RUSSELL, MASSACHUSETTS

SPRINGFIELD WATER
WORKS INTAKE
MA 00708

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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ELECTE
JUN 20 1985
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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

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AUGUST 1978

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is about 295 ft. long. It is a concrete masonry structure spanning a gorge in the Little River. Based on size and hazard classifications in accordance with Corps guidelines, the test flood is in the range between the 100 year to 1/2 Probable Maximum Flood. The visual inspection of the dam did not disclose any findings that indicate an unsafe condition.		



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

REPLY TO
ATTENTION OF:

NEDED

OCT 26 1978

Honorable Michael S. Dukakis
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor Dukakis:

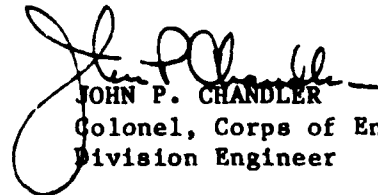
I am forwarding to you a copy of the Springfield Water Works Intake Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief 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, the City of Springfield, c/o Water Department, City Hall, Springfield, Massachusetts 01103.

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 yours,


JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

Identification No.: MA. 00708
Name of Dam: Springfield Water Works Intake
Town: Russell
County and State: Hampden County, Massachusetts
Stream: Little River
Date of Inspection: June 1, 1978

The Springfield Water Works Intake dam is an approximate 295 foot long concrete masonry structure spanning a gorge in the Little River. This dam is built on a 180 foot radius and appears to be functioning as an arch. A set of construction drawings and specifications were made available by the City of Springfield and reviewed. No design calculations or construction records were found. This structure was built in 1909.

The visual inspection of this dam did not disclose any findings that indicate an unsafe condition. The reservoir behind this dam is relatively small and there is no development along the stream below the dam for approximately three miles. The area is not readily accessible and as such is not conducive to development. Based on size and hazard classifications in accordance with Corps guidelines, the test flood is in the range between the 100 year to $\frac{1}{2}$ Probable Maximum Flood.

The spillway for this dam is able to pass a $\frac{1}{2}$ PMF flow from its own drainage area of 3.15 s.m. It must be noted however, that the

Cobble Mountain Reservoir, some 2.75 miles upstream, could affect the flow at this site. Should the Cobble Mountain Reservoir be full and overflowing its spillway at a time of flooding conditions, the flow at this site would change significantly. Indeed it was stated, though not documented, that this dam was overtopped by about 4± feet during the August 1955 flood.

It is recommended that the owner have repairs made to certain spalled areas of the intake structure and wasteway. Although these spalls have no bearing on the safety of the dam they will become more costly with time. It is also recommended that the spalling of the gunite surface of the spillway face be continually monitored. Again although not detrimental to the dam's safety at this time it could become more serious if left unchecked over a period of years. Also a more efficient method of being able to operate the gate on the draw down waste pipe would be prudent. As of now this pipe is located at the center of the spillway and one must traverse the spillway to operate this gate.

None of these recommendations are of an urgent nature.

Ronald H. Cheney, P.E.
Associate

Hayden, Harding & Buchanan, Inc.
Boston, Massachusetts



Ronald H. Cheney

This Phase I Inspection Report on Springfield Water Works Intake 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

(Stamp: CONFIDENTIAL)

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PREFACE

This report is prepared under guidance contained in Department of the Army, Office of the Chief of Engineers, Recommended Guidelines for Safety Inspection of Dams, for a Phase I Investigation. 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.

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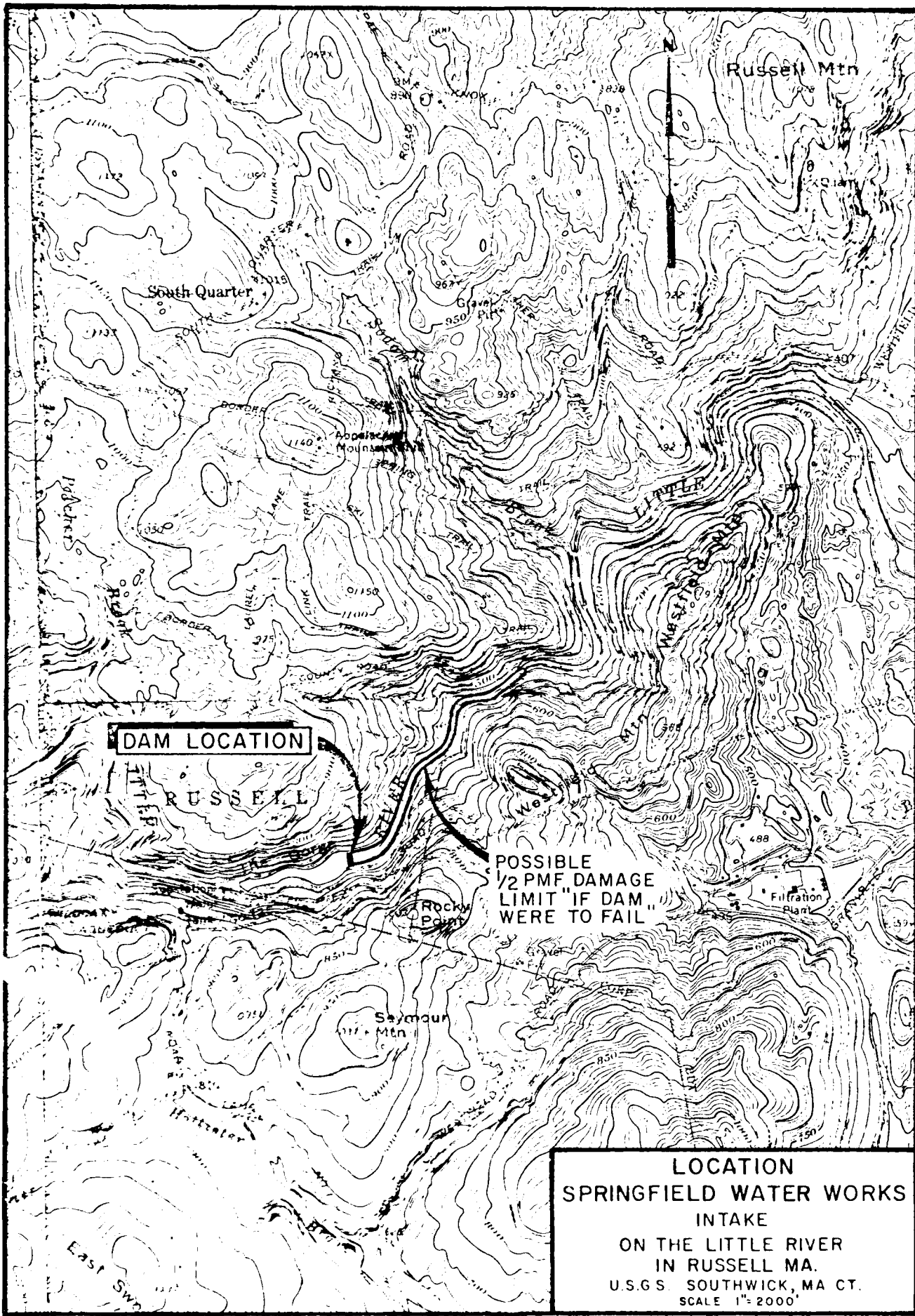
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DAM LOCATION

RUSSELL

POSSIBLE
1/2 PMF DAMAGE
LIMIT "IF DAM"
WERE TO FAIL

LOCATION
SPRINGFIELD WATER WORKS
INTAKE
ON THE LITTLE RIVER
IN RUSSELL MA.
U.S.G.S. SOUTHWICK, MA CT.
SCALE 1"=2000'

Section 5.1 Continued

A $\frac{1}{2}$ PMF was computed by determining the watershed drainage area from the USGS maps in combination with Corps discharge guide curves (mountainous terrain).

Storm runoff from the 3.15 s.m. drainage area downstream of Cobble Mountain dam will result in a $\frac{1}{2}$ PMF discharge of 3775 cfs (1198 csm), resulting in a water level of 499.70' msl, which is 4.30 feet below top of dam.

It must be noted however that the Cobble Mountain Reservoir could contribute significantly to flow in this river. Should the Cobble Mountain Reservoir be full at a time of flooding conditions the flow from its spillway into the Little River would be significant. This input has not been considered in the hydraulic calculations. The Cobble Mountain reservoir dam was built about 1938.

SECTION 5
HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

There are no hydraulic design calculations available for this site.

b. Experience Data

This dam was constructed in 1909 and has experienced the floods of Nov. 1927, March 1936, Sept. 1938 and Aug. and Oct. 1955. It was stated by one of the caretakers that in 1955, flood water reached the top rail of the railing on top of the gate house. This would place the water surface at approximately 12 feet over the spillway and 4 feet over the top of the dam. No apparent damage was caused by this flow. This flow is not officially documented.

c. Visual Observations

Visual observations of the area show it to be in general agreement with the USGS map for the area. A detailed description of the drainage area is given in Section 1.3 of this report.

d. Overtopping Potential

This dam carries an intermediate classification for size with a low hazard potential and as such must be capable of passing a flood in the range between a 100 year and $\frac{1}{2}$ PMF.

Section 4.3 Continued

since the reservoir was last cleaned in the mid to late 1950's. This is the only pipe that could be used to completely drain the reservoir.

The sluice gate at the head of the wasteway and the 36" diameter blow off is controlled by the electric company which operates the generating station upstream. The sluice gate is normally operated and checked annually.

4.4 Description of Any Warning Systems

The river is subject to rapid rising when the generating station is put on line. Therefore warning signs line areas of the river bank warning of this potential. There are no other warning systems in effect.

4.5 Evaluation

The reservoir behind this dam is relatively small and there are no developed areas downstream until approximately 3 miles. As such, the hazard potential is low. However it would be prudent to have this dam inspected annually by qualified personnel to identify conditions which, if left unchecked, could jeopardize the dam.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

The retained reservoir of this dam is used for water supply by the City of Springfield. The 72" diameter intake supply line feeds the tunnel leading to the West Parish Filter Plant some 6,000 feet away. This line is left open at the dam site and flow is controlled at the filter plant. All other pipes and gates at the dam normally remain closed.

When the electric generating station upstream is on line, excess water not carried by the 72" diameter intake flows over the spillway. This overflow is normally about 1 to 2 feet above the spillway crest.

4.2 Maintenance of Dam

This dam had a major program of gunite repair in 1938. The spillway has many 1"± diameter pipes extending from its face. It is possible that these were used for pressure grouting the interior of the dam. A great amount of the efflorescence shown in the photographs emerges from these pipes.

The reservoir was drained and cleaned in the mid to late 1950's.

4.3 Maintenance of Operating Facilities

The gate on the 72" supply pipe is normally left open with flow controlled at the filter plant. The 36" diameter draw down pipe at the centerline of the spillway has not been operated

Section 3.1 d. Continued

drainage area is given in Section 1.3 of this report. The amount of siltation behind the dam is unknown. This reservoir was last drained and cleaned in the mid to late 1950's.

e. Downstream Channel

The downstream channel is the natural stream bed. The stream bed is well armored with natural stone and free flowing. The side slopes are steep and heavily wooded. Much ledge outcropping is to be seen in this area.

3.2 Evaluation

The visual inspection itself did not indicate any immediate safety problems.

Examination of outcrops in the dam vicinity indicate that the dam is founded on hard, competent rock. Regionally, the orientation and degree of both foliation and jointing indicate conditions which are favorable to the stability of the abutments and foundation of the dam.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

The Springfield Water Works Intake dam was inspected on June 1, 1978. At the time of inspection, water was approximately 2 feet below the spillway crest.

A follow-up visit was made on June 26, 1978 to more thoroughly inspect the foundation rock.

b. Dam

The dam is a concrete masonry dam. The inspection revealed some spalling of the gunite surface which was applied in 1938. No seepage was found at either abutment's interface with the foundation rock. The toe of the dam was under a shallow pool of water, however, no seepage or flow could be noticed.

c. Appurtenant Structures

The concrete of the gate house, intake chamber and the wasteway was found in good condition. Some spall areas were found on the face of the intake chamber above the trash rack and on the concrete face behind the wasteway sluice gate.

The 36" diameter waste pipe at the centerline of the spillway had a very small amount of water discharge.

d. Reservoir Area

The general area around this site is heavily wooded with very steep side slopes. A more detailed description of the

SECTION 2: ENGINEERING DATA

2.1 Design

A set of construction drawings dated 1910 and containing the name of Mr. Elbert E. Lochridge, chief engineer and a set specifications were obtained at the Water Department of the City of Springfield. No structural or hydraulic design calculations were found.

2.2 Construction

No construction records were made available. The plans bear the name of F.T. Ley and Co. as contractors.

2.3 Operation

No operational manual exists for this dam.

2.4 Evaluation

a. Availability

Other than the information referred to above, no additional material is available.

b. Adequacy

The lack of definitive design calculations do not allow for the review of such data. Therefore the adequacy of this dam both structurally and hydraulically can not be assessed from the review of design calculations but must be based primarily on the visual inspection, past performance history and hydrologic and hydraulic assumptions.

The field inspection showed that the dam substantially agrees with the information shown on the furnished plans.

Section 1.3 Continued

- (5) Side Slopes-u/s vertical, d/s 1:2
- (6) Zoning-none
- (7) Impervious Core-concrete
- (8) Cutoff-indicated as cut into solid rock-10' to 30'±
- (9) Grout curtain-none indicated

i. Spillway

- (1) Type-"ogee" - approximate
- (2) Length of weir-160'
- (3) Crest elevation-496
- (4) Gates-none
- (5) U/S Channel-vertical
- (6) D/S Channel-vertical drop 6' to 1:2 batter
- (7) General upstream curve-varies 3.9', 4.0', 4.85'

radii

j. Regulating Outlets

The several regulating outlets for this dam have been described and the inverts given in Section 1.3 b. of this report.

The 72" diameter supply is normally left open at the dam and its flow controlled by a float valve at the filtration plant.

The gates on the 36" diameter pipe leading to the blow off chamber and the 36" diameter waste pipe at the centerline of the spillway are manually operated and left closed.

The 8'X12' sluice gate at the wasteway is motor operated and is normally left closed.

Section 1.3 Continued

c. Elevation (ft. above MSL)

- (1) Top Dam-504.0
- (2) $\frac{1}{2}$ PMF surcharge - 499.70
- (3) Spillway crest (ungated) - 496.0 (no gate)
- (4) Water supply pool varies - flow taken from Cobble

Mountain Reservoir as needed-495±

(5) Upstream portal invert diversion tunnel - no
diversion tunnel

(6) Stream bed at centerline of dam - 445±

(7) Maximum tailwater - 454.

d. Reservoir

- (1) Length of $\frac{1}{2}$ PMF pool - 2,000'±
- (2) Length of water supply pool-2,000'±

e. Storage (acre-feet) - does not include river storage

(1) Water supply pool-draws water from Cobble Mountain
Reservoir as needed-84± a.f.

(2) $\frac{1}{2}$ PMF surcharge - 96±

(3) Top of Dam - 116

f. Reservoir Surface (acres)

(1) Water supply - varies about 2.8±

(2) $\frac{1}{2}$ PMF pool - 3.5±

(3) Top Dam - 4.6±

g. Dam

(1) Type-concrete (CYCLOPEAN MASONRY) gravity

(2) Length-300'±

(3) Height-75'± (El. 496 to 421)

(4) Top Width-10'

Section 1.3 Continued

b. Discharge at Dam Site

There are several means of discharging water from this dam. They are as follows:

1. 72" diameter supply pipe at invert elev. 475.0 which feeds the tunnel flowing to the filtration plant.
2. 36" diameter blowoff pipe invert elev. 466.5 which empties into the blow off chamber beside the wasteway.
3. Wasteway sluice gate 8'X12' invert elev. 490.0 which is motor controlled and empties into the wasteway.
4. 36" diameter waste pipe at center line of spillway invert elev. 448.6.

Except for the 72" diameter supply the other discharges are kept closed. The 72" diameter supply is controlled by a float valve at the filtration plant.

The maximum known flood at the dam site is unknown. The dam did however pass the August 1955 flood. One of the caretakers stated that the water reached the top rail of the railing located on the top of the gate house. This would give an elevation of 508± or 12 feet above the spillway crest.

The spillway is ungated and has a maximum flow capacity of 12,854 c.f.s. at a pool elevation of 504.0.

Section 1.2 Continued

h. Design and Construction History

The as built construction plans for the dam are dated 1910 and bear the name of Mr. Elbert E. Lochridge as chief engineer. The construction of the dam was completed in 1909. The intake tunnel was modified in 1931 with the 72" diameter intake pipe and a section of new tunnel added. The wasteway and its controlling sluice gate were added in 1932. In 1938 the dam was given a gunite coating.

1.3 Pertinent Data

a. Drainage Area

The Little River flows some 2.75 miles in an easterly direction from Cobble Mountain Reservoir to this dam. It begins just below the Cobble Mountain Reservoir and is confined to a narrow stream bed with steep banks. Runoff comes from 2,017 acres (3.15 s.m.) of wooded, mountainous area bordering the north and south banks.

The majority of water reaching this dam is controlled by the requirements of an electric power generating station located 2,000 feet upstream. This station is operated during periods of peak load requirements. Water is drawn from the Cobble Mountain Reservoir through an aqueduct for operation of the generating station and then discharged into the Little River.

Below the dam there is no development along the river since the area is not readily accessible and the banks are very steep. The river flows about 3 miles before any developed areas are reached.

Section 1.2 Continued

The wasteway is gated by an 8'x12' motor operated sluice gate.

The main pipe for emptying the dam is a 36" diameter C.I. pipe at the approximate center line of the spillway.

c. Size Classification

This dam falls into the intermediate size classification due to its hydraulic height and storage capacity of 51 feet and 116 a.f. respectively.

d. Hazard Classification

The reservoir behind this dam is relatively small. Also there is no developed area below this dam until about 3 miles downstream. Land along the river is steep and not easily accessible. Therefore the hazard potential of this dam can be classified as low since there would be little or no damage.

e. Ownership

The dam is owned by the City of Springfield and has always been part of their water supply system.

f. Operator

The dam is maintained by the City of Springfield Water Department, located at City Hall, Court Square, Springfield, Massachusetts. Mr. Francis Broderick of the Department can be contacted regarding the dam. (Tel. No. 413-736-2711).

g. Purpose of Dam

The purpose of the dam is for water supply for the City of Springfield, Massachusetts.

1.2 Description of Project

a. Location

The Springfield Water Works Intake is located on the Little River in the town of Russell in Hampden County, Massachusetts.

b. Description of Dam and Appurtenances

The dam consists of a 160 foot long concrete spillway flanked on both sides by concrete abutments all founded on rock. The right abutment contains an intake structure, a gate house and concrete wasteway. The structural height of the dam is 75 feet.

The spillway has a vertical upstream face while the downstream face is battered 1 horizontal to 2 vertical with the lower portion built on a 25 foot radius.

The abutments have a vertical upstream face and a 1 horizontal to 2 vertical battered downstream face. The upstream edge of the spillway is built to a 180 foot radius in plan view.

The gate house contains two 36" diameter C.I. pipes. One is a waste pipe which transitions to 42" diameter and leads to a blow off chamber adjacent to the wasteway. The other pipe transitions to 54" diameter and was the original intake. This pipe was later bypassed by a 72" diameter intake located in the intake chamber directly behind the gate house. This newer intake feeds a tunnel which carries water to the West Parish Filter Plant some 6,000 feet from the dam site.

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
NAME OF DAM: SPRINGFIELD WATER WORKS INTAKE

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 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. Hayden, Harding & Buchanan, 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 was issued to Hayden, Harding & Buchanan, Inc. under a letter of May 3, 1978, from Mr. Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW 33-78-C-0307 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.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

The visual inspection did not disclose any apparent stability problems with this concrete masonry dam.

b. Design and Construction Data

Design drawings and construction specifications exist and indicate this dam to be of concrete masonry construction founded on rock. The specifications note the dam to be constructed as "Cyclopean Masonry". This masonry is made of large natural stone embedded in concrete. The surface of the dam is concrete and was subsequently gunited in 1938.

c. Operating Records

No operating records were available.

d. Post Construction Changes

The 72" diameter supply and a section of the tunnel feeding the filter plant were added in 1931.

The concrete wasteway was added in 1932.

The dam was gunited in 1938.

e. Seismic Stability

The dam is located in seismic zone 2 according to U.S. Corps of Engineers guidelines and does not require special analysis for seismic stability.

SECTION 7

ASSESSMENT RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Conditions

The visual inspection did not disclose any findings that indicate an unsafe condition.

b. Adequacy of Information

The information available is such that a Phase I investigation can be performed satisfactorily.

c. Urgency

There appears to be no condition at this dam which requires urgent remedial measures.

d. Necessity for Additional Investigation

The findings of the Phase I inspection do not warrant additional investigation.

7.2 Recommendations

The owner should have repairs made to the spalled areas of concrete referred to in Section 3.1c of this report. These spalls are not detrimental to the safety of the dam, but will lead to more costly repairs if left unchecked.

7.3 Remedial Measures

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

Section 7.3 Continued

a. Alternatives

Not applicable to this report.

b. Operation and Maintenance Procedures

1) The owner should continually monitor the spalling of the gunite surface. Although it cannot be considered serious as to the dam's safety at this time, continued erosion allowed to go unchecked over a period of years could become serious.

2) The owner should check and insure that the gate on the draw down pipe at the centerline of the spillway is in working order, since this is the only outlet which can lower the reservoir completely.

3) A method by which this gate could be operated from the right abutment should be considered. The method of going out onto the spillway proper which now is required is dangerous at best.

4) This dam should be inspected annually by qualified personnel who can identify conditions which, if left unchecked, could jeopardize the safety of the dam.

APPENDIX A

VISUAL INSPECTION CHECK LIST

VISUAL INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Springfield Water Works Intake DATE June 1, 1978

TIME 10:30 A.M.

WEATHER Sunny 75°

W.S. ELEV. 494.0 U.S. _____ DN.S. _____

PARTY:

- | | |
|--|-----------|
| 1. <u>Ronald H. Cheney</u> | 6. _____ |
| 2. <u>Daniel P. LaGatta</u> | 7. _____ |
| 3. <u>Robert Rigal, Sprinfield Water Works</u> | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

PROJECT FEATURE

INSPECTED BY

REMARKS

- | | | |
|--|---------------------|--|
| 1. <u>Concrete masonry dam abutments</u> | <u>D.P. LaGatta</u> | |
| 2. <u>Concrete masonry dam</u> | <u>R.H. Cheney</u> | |
| 3. _____ | | |
| 4. _____ | | |
| 5. _____ | | |
| 6. _____ | | |
| 7. _____ | | |
| 8. _____ | | |
| 9. _____ | | |
| 10. _____ | | |

PERIODIC INSPECTION CHECK LIST

PROJECT Springfield Water Works Intake DATE June 1, 1978
 PROJECT FEATURE Concrete Dam NAME D.P. LaGatta
 DISCIPLINE Geotechnical Engineer NAME R.H. Cheney
Structural Engineer

AREA EVALUATED	CONDITIONS
<u>DAM EMBANKMENT</u>	Concrete Dam
Crest Elevation	504.0
Current Pool Elevation	2' below spillway 494.0
Maximum Impoundment to Date	Unknown
Surface Cracks	Some cracks and spalls on gunite surface
Pavement Condition	No pavement
Movement or Settlement of Crest	None observed
Lateral Movement	None observed
Vertical Alignment	No missalignment observed
Horizontal Alignment	No missalignment observed
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	None observed
Trespassing on Slopes	None observed
Sloughing or Erosion of Slopes or Abutments	None observed
Rock Slope Protection - Riprap Failures	None observed
Unusual Movement or Cracking at or near Toes	None observed
Unusual Embankment or Downstream Seepage	None observed
Piping or Boils	None observed
Foundation Drainage Features	None observed
Toe Drains	None
Instrumentation System	None

PERIODIC INSPECTION CHECK LIST

PROJECT Springfield Water Works Intake DATE June 1, 1978
 PROJECT FEATURE Concrete Dam NAME D. P. LaGatta
 DISCIPLINE Geotechnical Engineer NAME R. H. Cheney
Structural Engineer

AREA EVALUATED	CONDITIONS
<u>OUTLET WORKS - CONTROL TOWER</u>	
a. Concrete and Structural	
General Condition	Good.
Condition of Joints	Good.
Spalling	Some.
Visible Reinforcing	None observed.
Rusting or Staining of Concrete	None observed.
Any Seepage or Efflorescence	None observed.
Joint Alignment	Good.
Unusual Seepage or Leaks in Gate Chamber	
Cracks	None observed.
Rusting or Corrosion of Steel	None observed.
b. Mechanical and Electrical	
Air Vents	Wasteway regulator gate is electrically operated. This gate is maintained and checked once a year by Electric Co.
Float Wells	
Crane Hoist	36" dia. waste pipe at center line spillway Manually operated.
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	36" dia. waste pipe at gate house Manually operated.
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System in Gate Chamber	72" dia. service pipe is manually operated. This gate is left open and flow is controlled at filter plant.

PERIODIC INSPECTION CHECK LIST

PROJECT Springfield Wrtter Works Intake

DATE June 1, 1978

PROJECT FEATURE Concrete Dam

NAME D. P. LaGatta

DISCIPLINE Geotechnical Engineer
Structural Engineer

NAME R. H. Cheney

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>One 36" dia. outlet pipe at center line of spillway empties directly into channel.</p> <p>One 36" dia. outlet pipe at gate house empties into blow off chamber below dam which inturn empties into concrete wasteway.</p> <p>Concrete in wasteway is in good condition. Some minor spalling on weirs and floor. Max. 1/2 inch deep. All walls and joints in good alignment.</p>

PERIODIC INSPECTION CHECK LIST

PROJECT Springfield Water Works Intake DATE June 1, 1978

PROJECT FEATURE Concrete Dam NAME D. P. LaGatta

DISCIPLINE Geotechnical Engineer
Structural Engineer NAME R.H. Cheney

AREA EVALUATED	CONDITIONS
<p><u>OUTLET WORKS - OUTLET STRUCTURE AND</u> <u>OUTLET CHANNEL</u></p>	
<p>General Condition of Concrete</p>	<p>No outlet structure other than wasteway. See comments on Wasteway on preceding sheet.</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>Same channel as for spillway. See comments noted for spillway.</p>
<p>Condition of Discharge Channel</p>	

PERIODIC INSPECTION CHECK LIST

PROJECT Springfield water Works Intake DATE June 1, 1978
 PROJECT FEATURE Concrete Dam NAME D. P. LaGatta
 DISCIPLINE Geotechnical Engineer NAME R. H. Cheney
Structural Engineer

AREA EVALUATED	CONDITIONS
<p><u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u></p> <p>a. Approach Channel</p> <p> General Condition</p> <p> Loose Rock Overhanging Channel</p> <p> Trees Overhanging Channel</p> <p> Floor of Approach Channel</p> <p>b. Weir and Training Walls</p> <p> General Condition of Concrete</p> <p> Rust or Staining</p> <p> Spalling</p> <p> Any Visible Reinforcing</p> <p> Any Seepage or Efflorescence</p> <p> Drain Holes</p> <p>c. Discharge Channel</p> <p> General Condition</p> <p> Loose Rock Overhanging Channel</p> <p> Trees Overhanging Channel</p> <p> Floor of Channel</p> <p> Other Obstructions</p>	<p>This facility has no approach channel.</p> <p>Generally good.</p> <p>None observed.</p> <p>Some spalling of Downstream granite face.</p> <p>Some wire mesh exposed near toe.</p> <p>*Some-mostly thru 1 1/2" dia.± pipes.</p> <p>None.</p> <p>Good.</p> <p>None observed.</p> <p>Wooded both sides but does not present problem.</p> <p>Covered with stone.</p> <p>None.</p> <p>*Purpose of these pipe is unknown. Possibly used to pressure grout dam when gunite applied in 1938.</p>

PERIODIC INSPECTION CHECK LIST

PROJECT Springfield Water Works Intake DATE June 1, 1978
 PROJECT FEATURE Concrete Dam. NAME D. P. LaGatta
 DISCIPLINE Geotechnical Engineer NAME R. H. Cheney
Structural Engineer

AREA EVALUATED	CONDITIONS
<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 and Piers</p> <ul style="list-style-type: none"> General Condition of Concrete Alignment of Abutment Approach to Bridge Condition of Seat and Backwall 	<p>This facility has no service bridge.</p>

APPENDIX B

1. LIST OF DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS
2. PAST INSPECTION REPORTS
3. PLANS AND DETAILS

LIST OF AVAILABLE ENGINEERING DATA

- 1) Construction drawings dated 1910 with additions dated 1931 and 1932.
- 2) Set of Construction Specifications.

Location: City Hall, Court Square, Springfield,
Massachusetts. Water Department.

No other data was made available.

There are no records of any past inspection reports.

117
7-18-72
v.s.
FDD



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

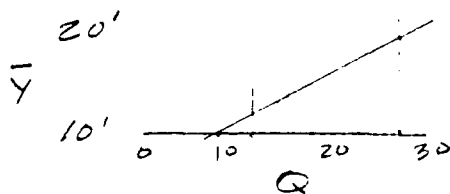
SHEET NO. 5

JOB Dams
SUBJECT Spillway
CLIENT Corps

STA 17+00 ELEV. 426 strm bed.

$$Q_{In} = 26,700.$$

section is still similar to 4+00!



$$\bar{y} = 20' \text{ elev } 446$$

$$V_{c1} = \frac{2500 + 2700}{2} \times \frac{800'}{43560} = 48' \approx 47'$$

$$Q_{p2} = 26700 \left(1 - \frac{48}{94}\right) = 13,140 \pm \text{ cfs}$$

$$V_{ave} = 41'$$

$$\bar{y} = 2' \text{ elev } 438' \quad A = 1125$$

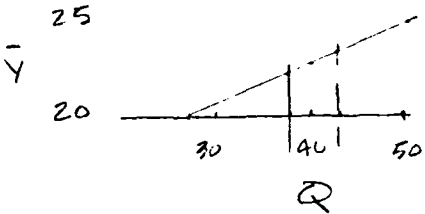
$$V = \frac{1125 + 2700}{2} \times \frac{800}{43560} = 35' \approx 47' \text{ OK}$$

$$Q_{p3} = 26700 \left(1 - \frac{41}{94}\right) = 15,053' \text{ cfs}$$

Elev 439'

This flood wave will be dissipated prior to sta 30+00. From USGS maps no homes, structures, or bridges exist in this area. Agricultural land use is not feasible until sta 100+00 or beyond. The only development is near sta 163+00, but the wave would be gone.

$$Q_{P2} = 65,831 \cdot \left(1 - \frac{40}{94}\right) = 37,817$$



$$y = 22' \quad \text{Elev} = 22' \quad A = 2750$$

$$V = \frac{2750 + 4380}{2} \times \frac{400}{43560} = 32.7 \text{ d.f. } < 47 \text{ ok}$$

$$V_{\text{ave}} = 36.25$$

$$Q_{P3} = 65,831 \cdot \left(1 - \frac{36.25}{94}\right) = 40,374 \text{ cfs}$$

St 9+00 Elev 434.5 $Q_{\text{IN}} = 40,400 \pm \text{cfs}$ $S^{1/2} = .1414$

same section as 4+00 $\bar{y} = 22'$ Elev₁ = 456.5 ±

$$A = 2500 + 460 = 2960 \text{ sf}$$

$$V = \frac{2960 + 2750}{2} \times \frac{500}{43560} = 33 \text{ d.f. } < 47 \text{ ok}$$

$$Q_{P2} = 40,400 \cdot \left(1 - \frac{33}{94}\right) = 26,220 \text{ cfs}$$

$$\bar{y} \approx 19'$$

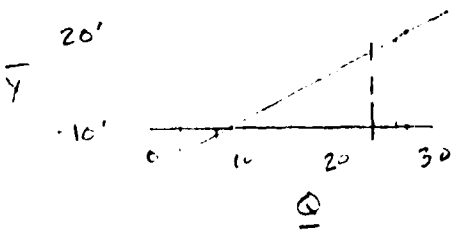
$$A = 2500 - 125 = 2375 \text{ sf}$$

$$V = \frac{2375 + 2960}{2} \times \frac{500}{43560} = 31 \text{ d.f.}$$

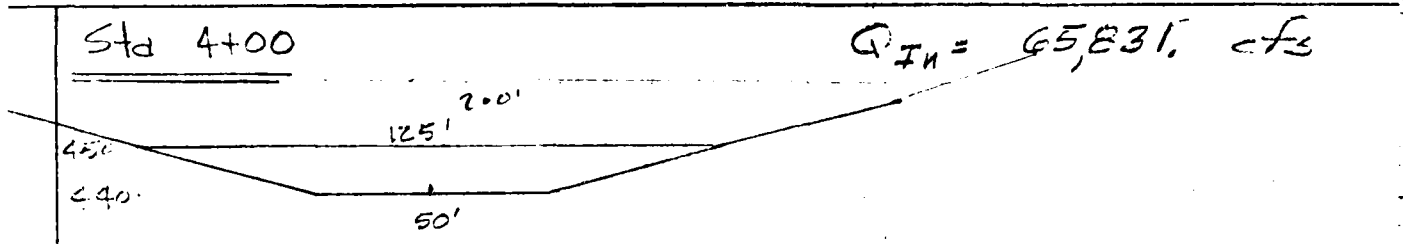
$$V_{\text{ave}} = 32'$$

$$Q_{P3} = 40,400 \cdot \left(1 - \frac{32}{94}\right) = 26,664'$$

Elev. 455



78.117
 7-18
 m A
 FOD



let $y = 10'$ $A = 50(10) + 37.5(10) = 875 \text{ sf}$ $wp = 130'$
 $R = 6.73$

$V = \frac{1.486}{0.06} (2.59) (.0125)^{1/2} = 9.94 \text{ fps}$

$Q = 8698$ < req'd ✓

let $y = 20'$ $A = 875 + 125(10) + 38(10) = 2500$ $wp = 210'$
 $R = 11.93$

$V = \frac{1.486}{.08} (5.26) (.112) = 11 \text{ fps}$

$Q = 27,300$ < req'd ✓

let $y = 30'$ $wp = 260'$ $A = 2500 + 2000 + 300 = 4800$
 $R = 18.46$ 7.05

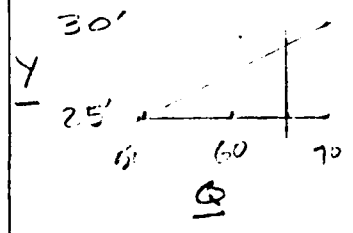
$V = 18.56 (7.05) (.112) = 14.7 \text{ fps}$

$Q = 70,400$ ✓

let $y = 25'$ $wp = 230'$ $A = 3750$ $R = 16.30$ 6.5

$V = 13.53$

$Q = 50,720$



$y = 28$ Elev 468'
 $A = 4380 \text{ sf}$

$V_0 = 4380(400) \div 43500 = 40 \text{ ft} < 470$

7/18/78

M.A.

RDD



HAYDEN, HARDING & BUCHANAN, INC
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 2

JOB Dam Insp.

SUBJECT Springfield

CLIENT Corps

$$Q_{P1} = 3,782 \text{ cfs} \quad \text{Elev. } 499.70'$$

$$S_{\text{stor}_1} = 11.47 \text{ a-f} (12 \text{ "/f}) \div 2017 \text{ a} = 0.068 \text{ inch}$$

$$Q_{P2} = 3782 \left(1 - \frac{0.068}{19} \right) = 3,768 \text{ cfs}$$

$$H^{3/2} = \frac{3768}{3.32(160)} = 7.09 \quad \therefore H \approx 3.69'$$

$$Q_{P3} = 3,775 \text{ cfs} \quad \text{Elev. } 499.70'$$

Determine affects if dam were to fail!

$$S = 94.23 \text{ a-f}$$

$$W_b = 240' (.4) = 96'$$

$$Y = 55'$$

$$Q_p = \frac{8}{27} (96) \sqrt{\frac{5.674}{32.2}} (55)^{3/2} = 65,831 \text{ cfs}$$

JOB NO. 78.117
 DATE 7/13/78
 BY MA
 D'D BY FDD

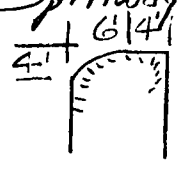
HH & B HAYDEN, HARDING & BUCHANAN, INC
 CONSULTING ENGINEERS
 BOSTON, MASSACHUSETTS

SHEET NO. 1
 JOB Dam Springfield Dam
 SUBJECT Springfield Dam
 CLIENT Corps

Phase I

Size - Intermediate (55' hyd. 113± d.f.)
 Hazard - Low (little development below dam)

Design Check: 1/2 PMF
 Drainage Area: 2,017.2, 3.152 s.m.
 Spillway: Concrete, 160' long, 8' deep



King $C = 3.32$

mountainous terrain

$Q_{In} = 2400 \times 3.152 \div 2 = 3782 \text{ cfs } (Q_{P1})$

$Q = CLH^{3/2}$ $3782 = 3.32 (160) H^{3/2}$
 $H^{3/2} = 7.12$
 $H = 3.7$ Elev 499.70

Spillway will pass 1/2 PMF without overtop.
 What is affect downstream if dam fail.
 Assume Cobble Mtn controls its 1/2 PMF
 from its tributary area

<u>Elev</u>	<u>Area</u>	<u>Ave Area</u>	<u>Height</u>	<u>Storage</u>	<u>Accum</u>
	<u>a.</u>	<u>a</u>	<u>ft.</u>	<u>d-f</u>	<u>d-f</u>
445.0	0.5	-	-	-	-
496.0	2.8	1.65	51.00	84.15	84.15
499.70	3.4	3.10	3.70	11.47	95.62
501.00	3.7	3.55	1.30	4.62	100.24
504.00	4.6	4.15	3.00	12.45	112.69

Tailwater Depth \approx 454'

APPENDIX D

1. HYDROLOGIC COMPUTATION
2. DRAINAGE AREA



PHOTO NO. 9 - Looking into
wasteway from top of dam.
Blow-off chamber at right
top of picture.

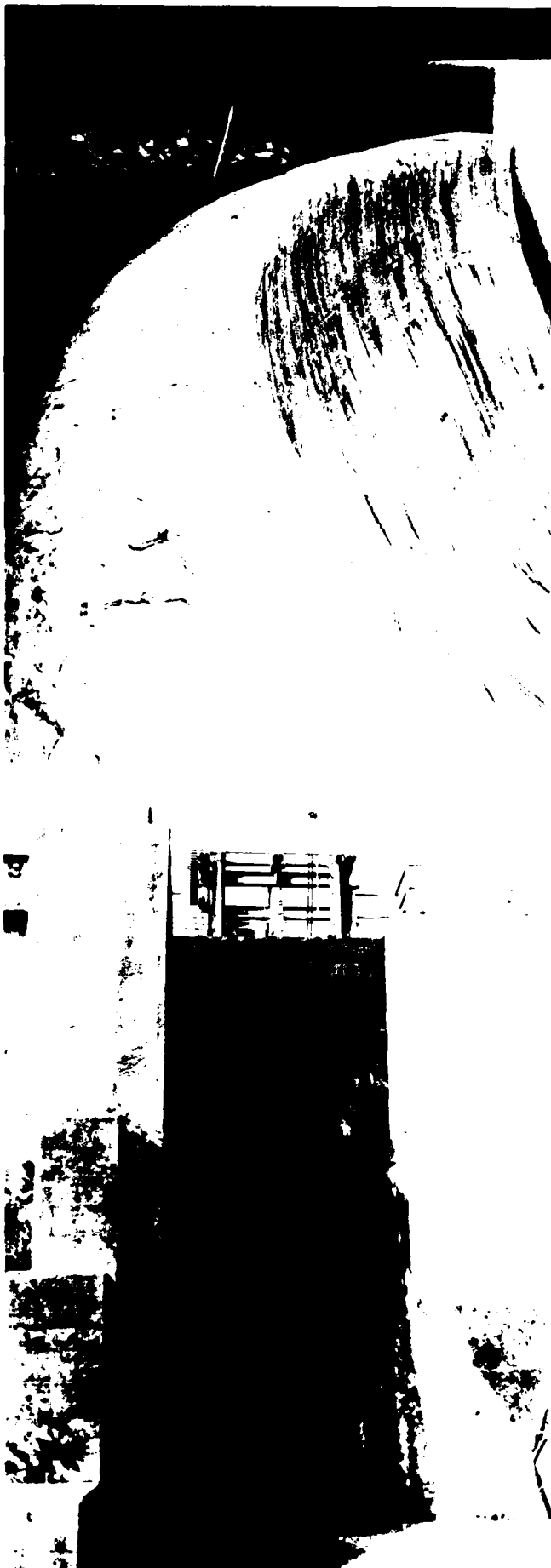


PHOTO NO. 7 - Looking across
crest of Spillway.

PHOTO NO. 8 - Sluice gate at
head of wasteway.



PHOTO NO. 5 - Right abutment
area.

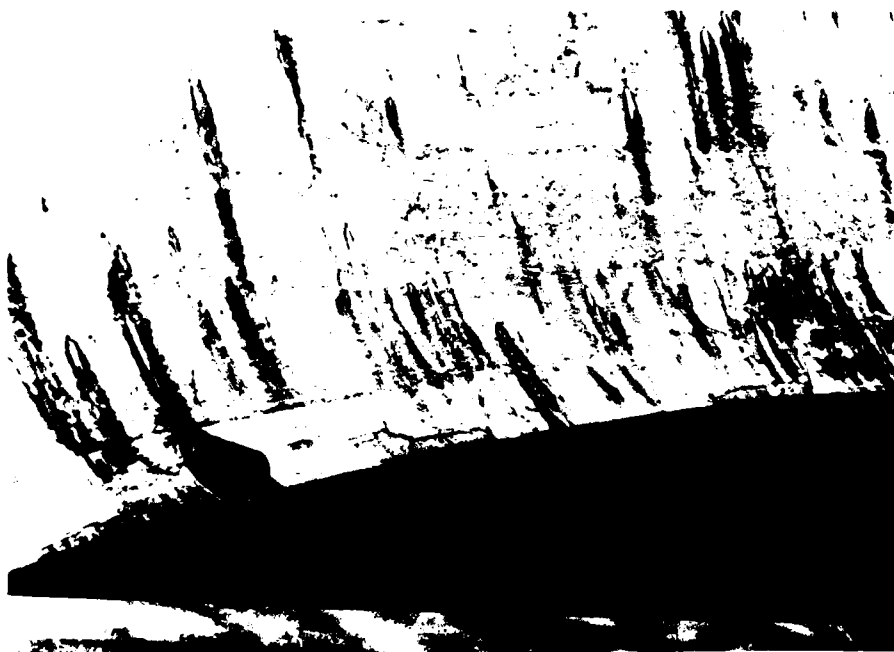


PHOTO NO. 6 - Outlet pipe (36" dia.) at center line of
Spillway.



PHOTO NO. 3 - Left Abutment
showing rock slope.



PHOTO NO. 4 - Left abutment showing rock slope and rock
in outlet channel.

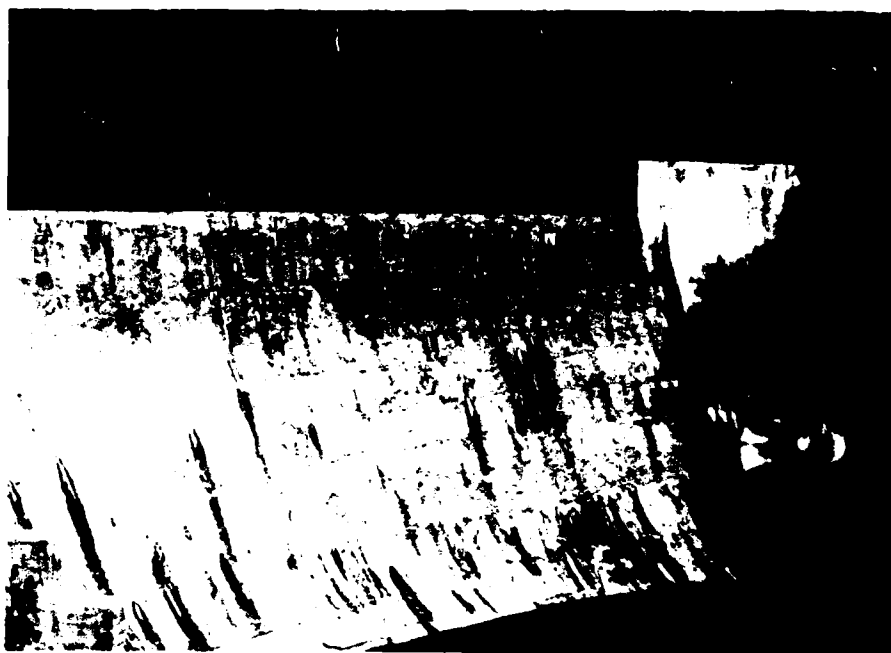
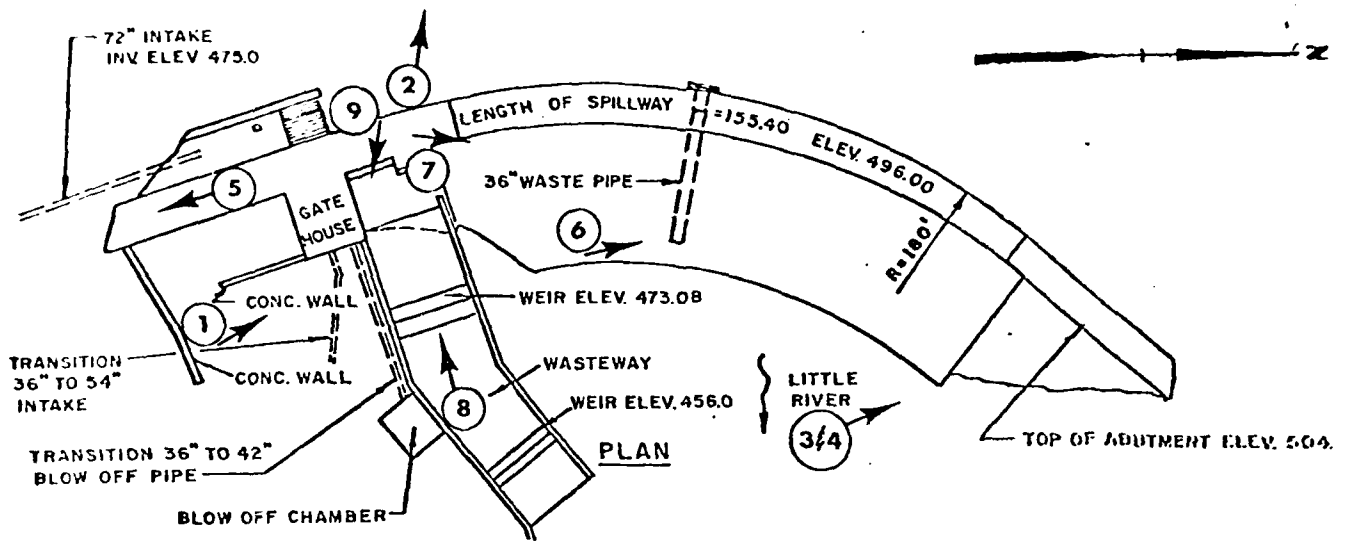


PHOTO NO. 1 - Face of Spillway and left abutment.



PHOTO NO. 2 - Reservoir behind dam.



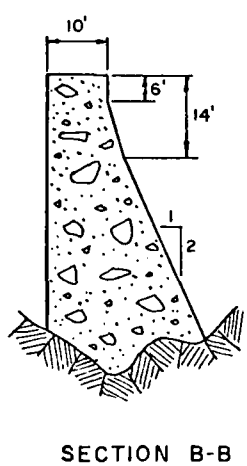
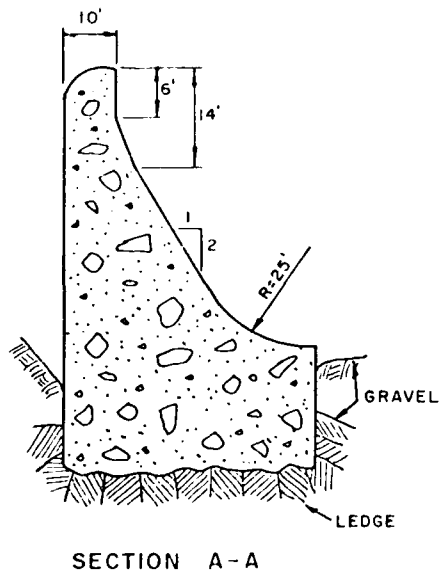
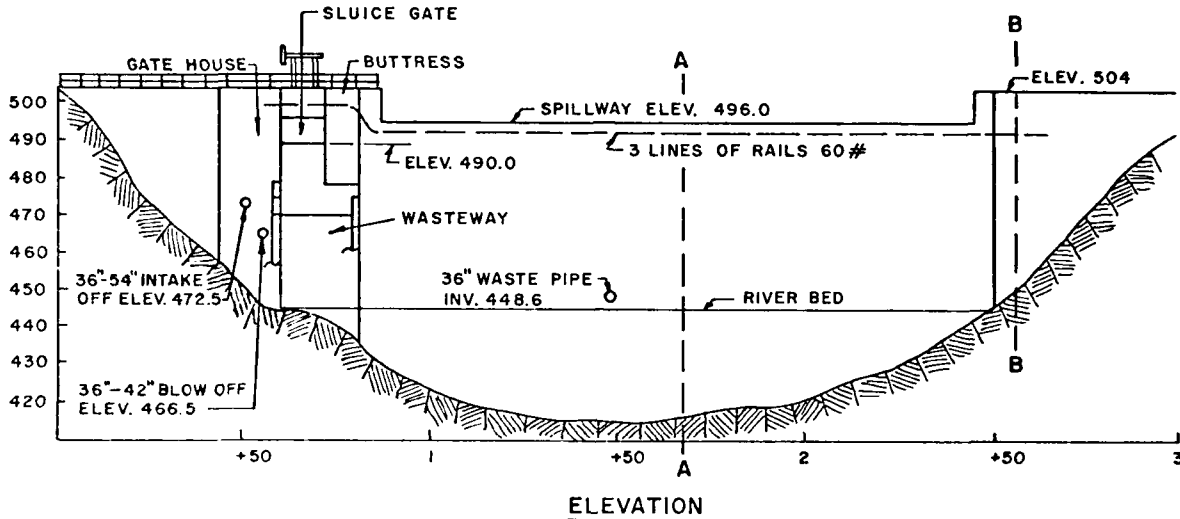
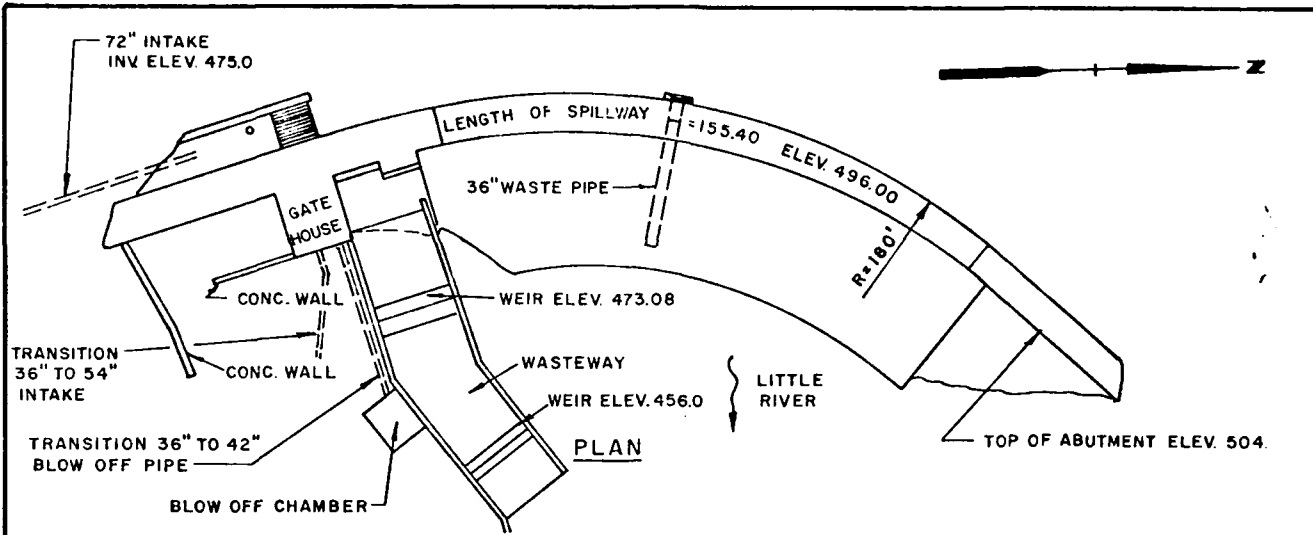
LOCATION OF PHOTOGRAPHS
 SPRINGFIELD WATER WORKS
 INTAKE
 ON THE LITTLE RIVER
 IN
 RUSSELL, MA.

NOT TO SCALE

JULY 1978

APPENDIX C

PHOTOGRAPHS



**SPRINGFIELD WATER WORKS
INTAKE
ON THE LITTLE RIVER
IN
RUSSELL, MA.**

INFORMATION SHOWN COPIED
FROM PLANS DATED 1910, 1931 & 1932

NOT TO SCALE JULY 1978

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7/17/73

1.5

F013

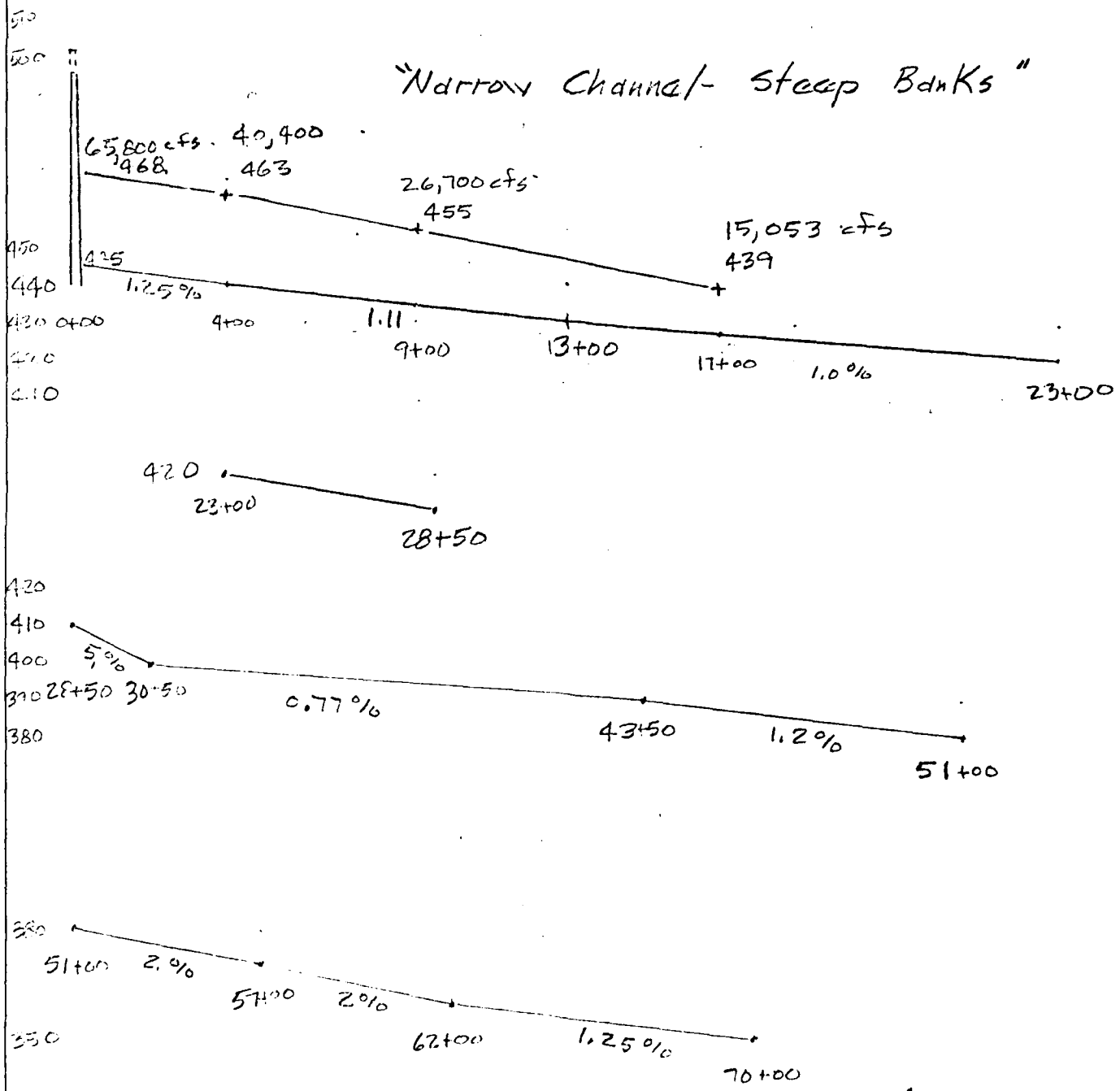


HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 6

JOB Dam F15P.
SUBJECT Springfield water
CLIENT Corps

"Narrow Channel - Steep Banks"



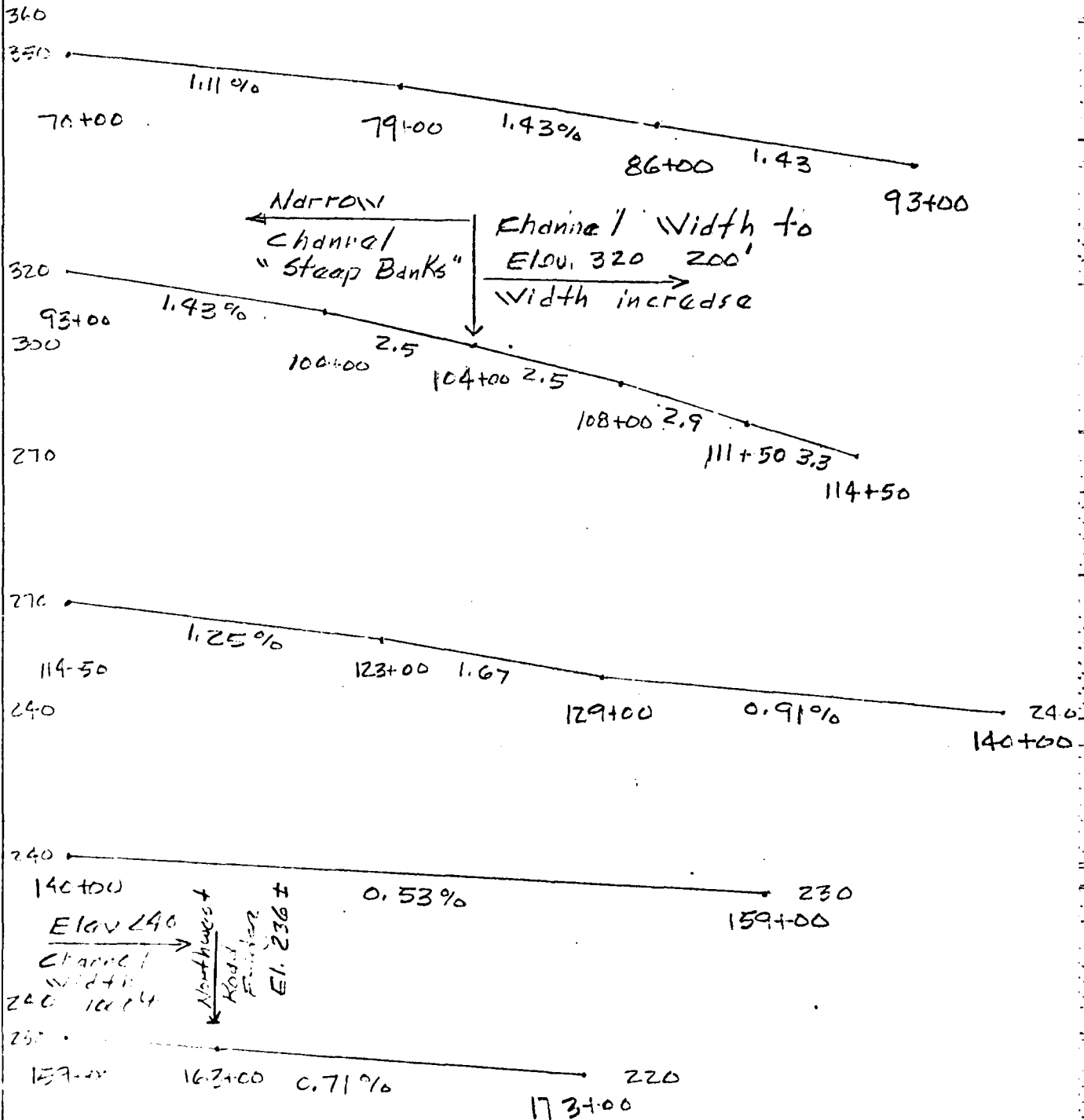
7/18/78
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HAYDEN, HARDING & BUCHANAN, INC
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. _____
JOB Dam Insp.
SUBJECT Springfield Wat.
CLIENT Corps

correct sta by 400

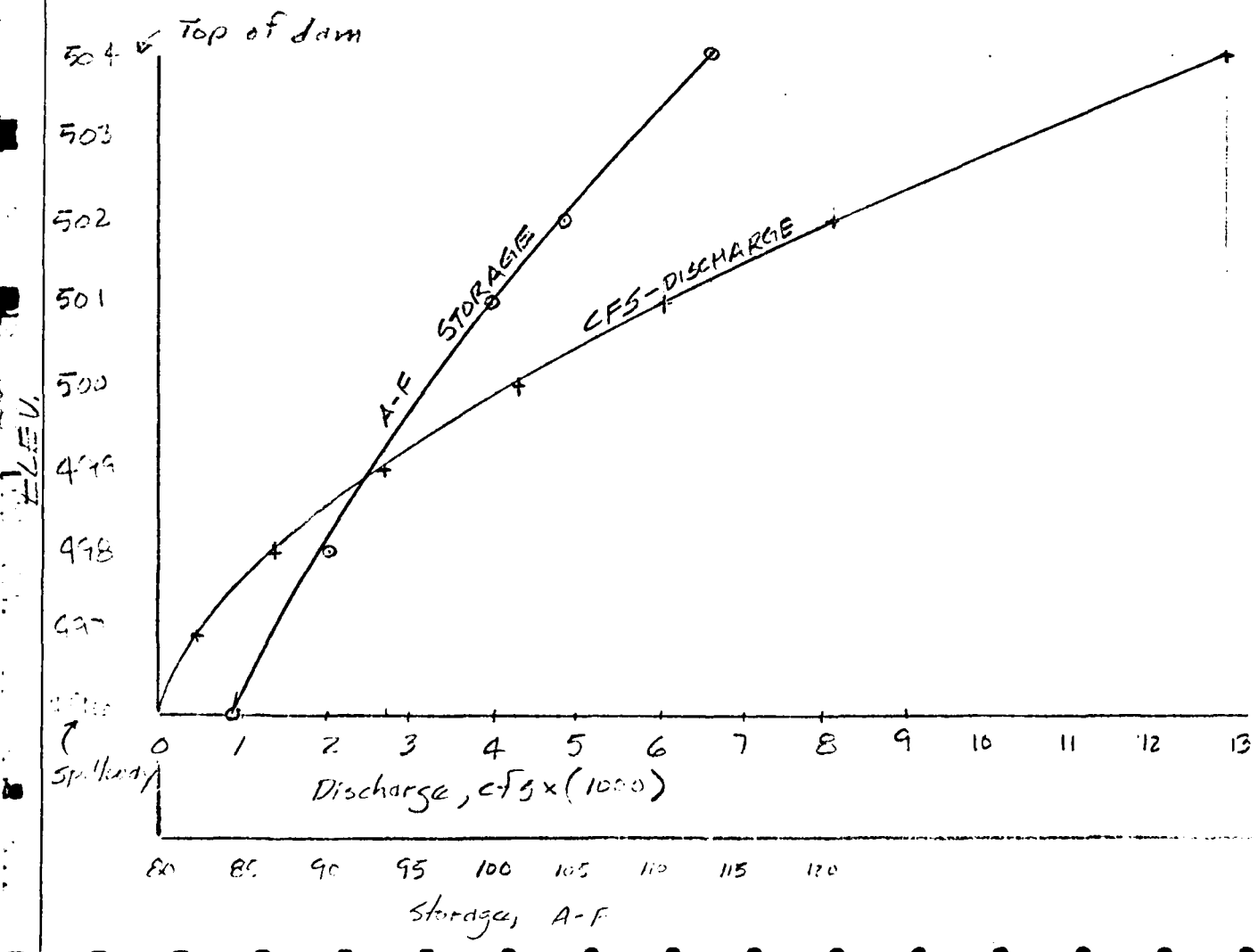


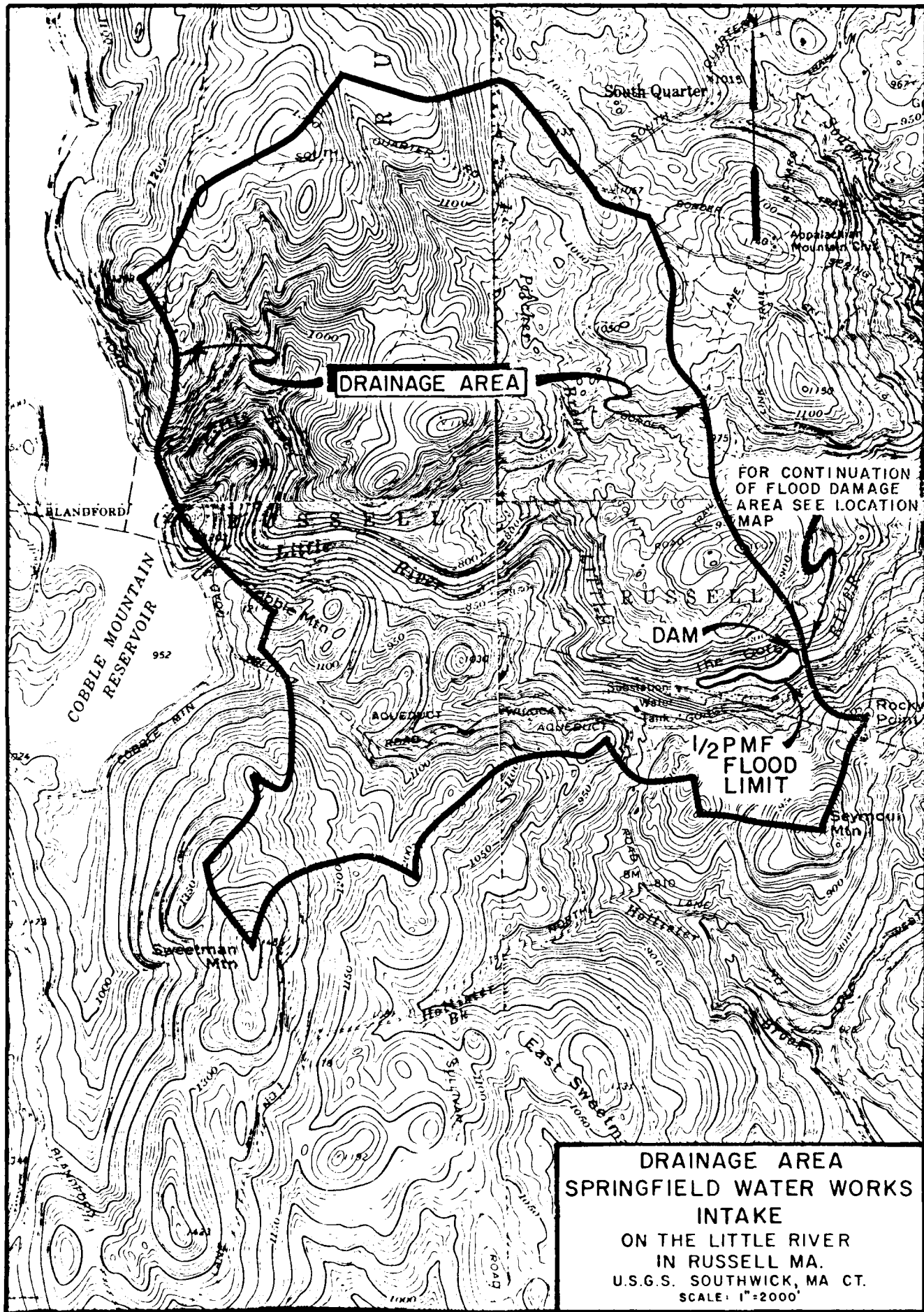
check homes are 400'± from River channel along Northwest Rd. at elev 235 to 240± no other homes are close to River for another 11,000' below sta 163+00

Stage Discharge / Storage

$Q = C L H^{3/2}$ $C (King)$

Y	C	L	H ^{3/2}	=	Q cfs
1	3.11	160	1	≈	500
2	3.14		2.83	=	14,220
3	3.26		5.2	=	27,120
4	3.37		8.0	=	43,140
5	3.4		11.18	=	60,820
6	3.45	160	14.70	=	81,140
8	3.55	160	22.63	=	128,540





APPENDIX E
INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

END

FILMED

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