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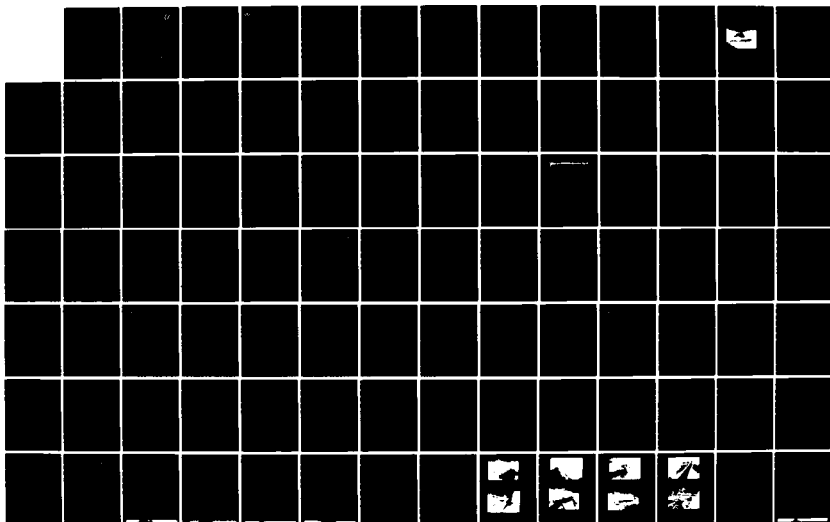
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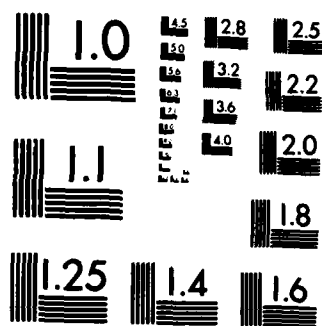
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THAMES RIVER BASIN
DUDLEY, MASSACHUSETTS



SOUTH VILLAGE DAM
MA 00107

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

NOVEMBER 1979

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Thames River Basin Dudley, Massachusetts		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) South Village Pond Dam is a concrete gravity dam approximately 160 feet long and 18 feet high. The facility is considered to be in fair condition. Based on size classification, small, and hazard potential classification, high, the spillway test flood is 1/2 PMF.		



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

REPLY TO
ATTENTION OF
NEDED

JAN 17 1980

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

Dear Governor King:

Inclosed is a copy of the South Village 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 Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Dudley-Webster Realty Corporation, Webster, Massachusetts 01570.

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

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

Sincerely,


MAX B. SCHEIDER

Colonel, Corps of Engineers
Division Engineer

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SOUTH VILLAGE POND DAM
MA 00107

THAMES RIVER BASIN
WEBSTER, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Identification No.: MA 00107
Name of Dam: SOUTH VILLAGE POND DAM
Town: WEBSTER-DUDLEY
County and State: WORCESTER COUNTY, MA
Stream: FRENCH RIVER
Date of Inspection: 24 September 1979

BRIEF ASSESSMENT

South Village Pond Dam was reconstructed in 1939. The structure is a concrete gravity dam approximately 160 feet long and 18 feet high. The center portion of the dam is a curved overflow section forming an ogee weir approximately 108 feet long. The overflow section contains a waste gate near its left end. To the left of the dam, there is an abandoned canal. The canal wall adjacent to the river is a concrete gravity section with a 100 foot overflow spillway approximately 90 feet downstream of the dam. Downstream of the overflow spillway, there is an abandoned timber gate structure for the canal.

The facility is considered in fair condition. Stone masonry walls at the left abutment of the dam have collapsed or have been washed away by flood. Erosion of the abutment area has taken place. Concrete surface erosion has occurred at both abutments of the dam.

Based on the size classification, small, and hazard potential classification, high, in accordance with Corps of Engineers Guidelines, the spillway test flood is 1/2 Probable Maximum Flood (1/2 PMF). Hydrologic analysis indicates that the spillway capacity with water surface at the top of the dam abutments is approximately 3,200 cfs with another 1,450 cfs going over the canal overflow spillway which totals to about 30 percent of the routed test flood outflow of 15,600 cfs. The estimated test flood stage is approximately 4.5 feet above the dam abutments at which time significant submergence of the dam would be present.

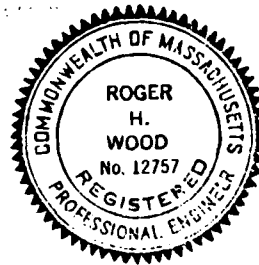
Investigations are recommended to develop a spillway design flood by detailed hydrologic/hydraulic methods, to determine the structural stability of the dam, spillways and canal dike during the spillway design flood, to determine the need and means of providing erosion protection at the abutments of the dam and the embankment portions of the dike and to determine the required structural repairs of deteriorated concrete at the outlet works and right training wall. Recommended remedial measures include the removal of the remaining flashboard pins from the overflow section of the dam, performing of maintenance work at the dam, the canal and the waste gate, replacement of missing stones in the shore side masonry wall of the canal, removal of vegetation from joints in the same wall, removal of vegetation and debris from within the canal, removal of dense brush and trees from the canal dike and fill resulting holes, rebuilding of eroded areas on the dike between the main spillway and canal overflow and sealing of all outlet pipes leaking water from the canal.

The Owner should develop a formal maintenance program, operational procedure, and emergency procedures plan and should institute a program of annual technical inspections. The remedial measures and recommendations should be performed within one year of receipt of this report by the Owner.

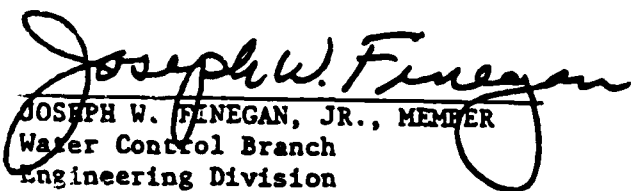
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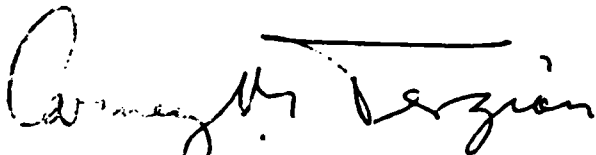
Roger H. Wood

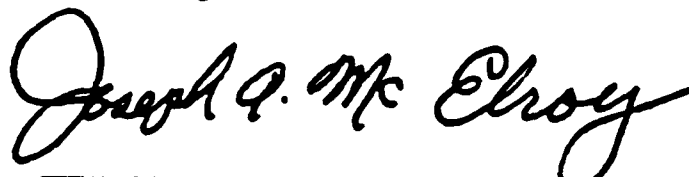
Roger H. Wood
Vice President



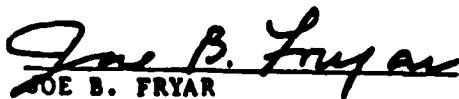
This Phase I Inspection Report on South Village Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and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


JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division


CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division


JOSEPH A. MCELROY, CHAIRMAN
Chief, NED Materials Testing Lab.
Foundations & Materials Branch
Engineering Division

APPROVAL RECOMMENDED:


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 Investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the test flood is based on the estimated "probable maximum flood" for the region (greatest reasonably possible storm runoff), or a fraction 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.

TABLE OF CONTENTS

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

REPORT

1. PROJECT INFORMATION

1.1 General	
a. Authority	1-1
b. Purpose of Inspection	1-1
1.2 Description of Project	
a. Location	1-2
b. Description of Dam and Appurtenances	1-2
c. Size Classification	1-3
d. Hazard Classification	1-3
e. Ownership	1-3
f. Operator	1-3
g. Purpose of Dam	1-3
h. Design and Construction History	1-3
i. Normal Operational Procedures	1-4
1.3 Pertinent Data	1-4

2. ENGINEERING DATA

2.1 Design	2-1
2.2 Construction	2-1
2.3 Operation	2-1
2.4 Evaluation	2-1

3. VISUAL INSPECTION

3.1 Findings	
a. General	3-1
b. Dam	3-1
c. Appurtenant Structures	3-1
d. Reservoir Area	3-3
e. Downstream Channel	3-3
3.2 Evaluation	3-3

4. OPERATIONAL PROCEDURES

4.1 Procedures	4-1
4.2 Maintenance of Dam	4-1
4.3 Maintenance of Operating Facilities	4-1
4.4 Description of any Warning System in Effect	4-1
4.5 Evaluation	4-1

TABLE OF CONTENTS (Cont'd)

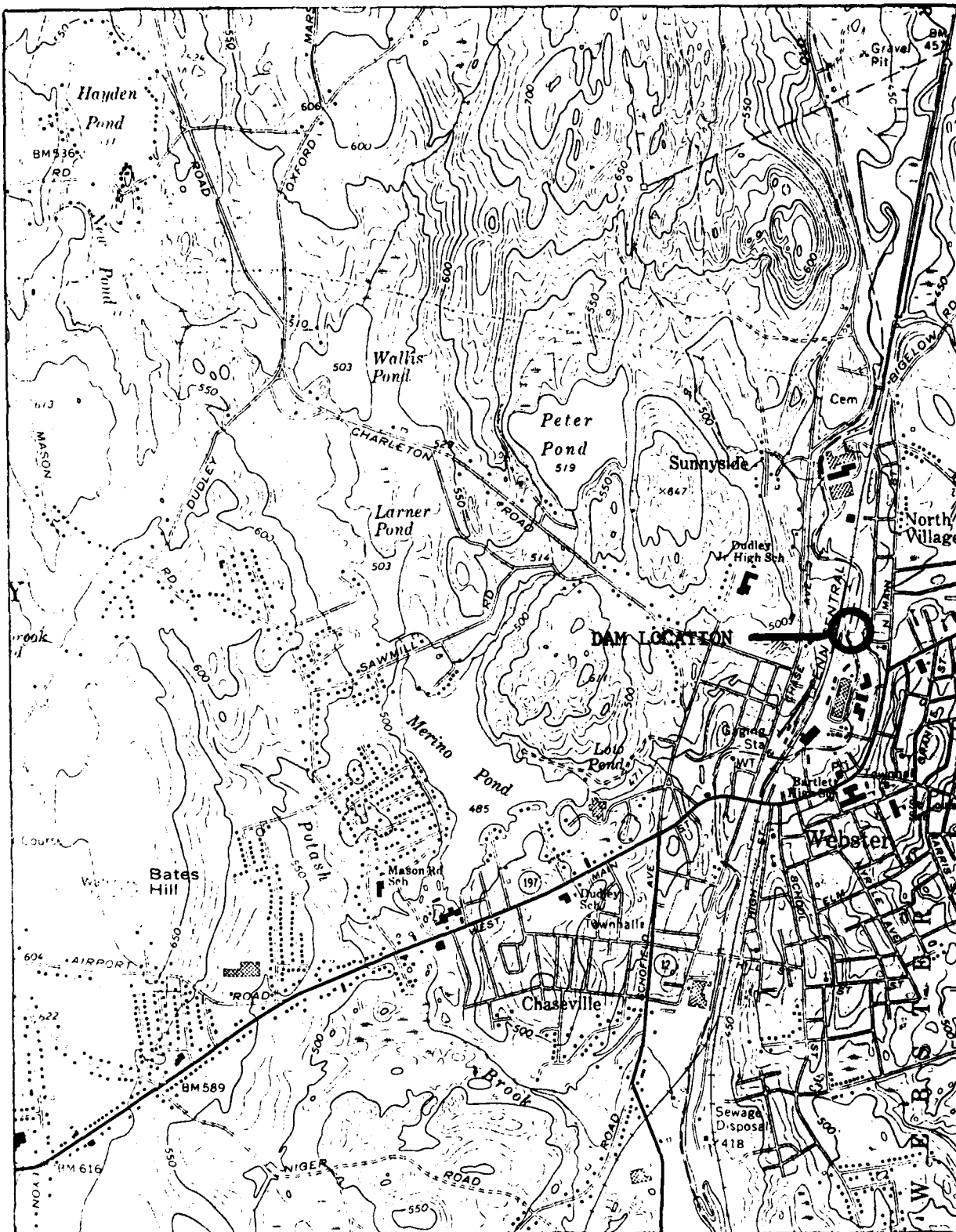
	<u>Page</u>
5. HYDRAULIC/HYDROLOGIC	
5.1 Evaluation of Features	5-1
a. General	5-1
b. Design Data	5-1
c. Experience Data	5-1
d. Visual Observations	5-1
e. Test Flood Analysis	5-1
f. Dam Failure Analysis	5-2
6. STRUCTURAL STABILITY	
6.1 Evaluation of Structural Stability	6-1
a. Visual Observation	6-1
b. Design and Construction Data	6-1
c. Operating Records	6-1
d. Post-Construction Changes	6-1
e. Seismic Stability	6-1
7. ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES	
7.1 Dam Assessment	7-1
a. Condition	7-1
b. Adequacy of Information	7-1
c. Urgency	7-1
d. Need for Additional Investigation	7-1
7.2 Recommendations	7-1
7.3 Remedial Measures	7-1
a. Operation and Maintenance Procedures	7-1
7.4 Alternatives	7-2

APPENDIXES

APPENDIX A - INSPECTION CHECKLIST	A-1
APPENDIX B - ENGINEERING DATA	B-1
APPENDIX C - PHOTOGRAPHS	C-1
APPENDIX D - HYDROLOGIC AND HYDRAULIC COMPUTATIONS	D-1
APPENDIX E - INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS	E-1



1. OVERVIEW OF DAM FROM ABANDONED RAILROAD BRIDGE ABUTMENT.



DAM SOUTH VILLAGE POND DAM

IDENTIFICATION NO. MA 00107



LOCATION MAP
USGS QUADRANGLE

WEBSTER, MA-CONN

APPROX. SCALE: 1" = 2000'

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

SOUTH VILLAGE POND DAM
MA 00107

SECTION 1: PROJECT INFORMATION

1.1 General

- a. Authority - Public Law 92-367, 8 August 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.

Camp Dresser & McKee 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 Camp Dresser & McKee Inc. under a letter of 27 March 1979, from Colonel John P. Chandler, Corps of Engineers. Contract No. DACW 33-79-C-0053 has been assigned by the Corps of Engineers for this work. Contract Modification No. P 00001, dated 24 August 1979, was subsequently issued by Colonel William E. Hodgson, Jr., Corps of Engineers. Haley and Aldrich, Inc. has been retained by Camp Dresser & McKee Inc. for the soils and geological portions of the work.

- b. Purpose - The primary purpose of the investigation is to:
- (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) Update, verify and complete the National Inventory of Dams.

- a. Location - South Village Pond Dam is located at the end of Church Court off of North Main Street in the Town of Webster, Massachusetts, as shown on the report's Location Map. Access to the west end of the dam is from an abandoned spur track near Boys Club Street off of Oxford Street in the Town of Dudley, Massachusetts. The dam is on the French River, 2,750 ft. upstream of the U.S. Gaging Station in the Town of Dudley. The coordinates for the dam are 71 degrees - 52.8 minutes longitude and 42 degrees 03.3 minutes latitude.
- b. Description of Dam and Appurtenances - South Village Pond Dam consists of a curved concrete spillway structure with outlet gates at the left end. A canal with a concrete overflow weir extends approximately 400 ft. downstream from the left end of the dam and is separated from the river by a dike formed by concrete and masonry training walls. Plans of the dam and appurtenances are included in Appendix B.

The concrete dam is approximately 160 feet long and 16 feet high. The right end of the dam is a 42 ft. long plain concrete gravity wall. As it intersects the overflow section, it turns downstream and forms a 31 foot long plain concrete gravity training wall. The overflow portion of the dam is curved towards the downstream channel and has a cord of approximately 107.5 feet. It is also constructed as a plain concrete gravity section with a beveled upstream edge and an approximate ogee section for its downstream surface. The downstream toe of this section forms an apron approximately 5 feet long. At the left end of the overflow section there is a manually operated control gate over a 4 foot by 4 foot opening thru the dam. Above this opening there is a 2 foot 9 inch wide by 2 feet 3 1/2 inches high opening behind the gate stem. This opening has an invert elevation approximately at the top of proposed flashboards. The purpose of this opening is unknown. The overflow portion of the dam was detailed to receive 12 inches of flashboards. Access to the gate operator is by a reinforced concrete bridge spanning approximately 7 feet from the left abutment. The left abutment of the dam is a plain concrete gravity section approximately 6 feet 3 inches long in the direction of the dam but it extends along the river side of the canal approximately 23 feet and along the left side of the downstream river channel approximately 34 feet. The section of wall along the downstream channel appears to be a facing of a stone retaining wall for a railroad bridge abutment rather than an independent concrete wall.

Immediately to the left of the dam is an entrance to a canal. The shore side of the canal is formed by a stone masonry wall while the river side wall of the canal is constructed of plain reinforced gravity sections. Starting at approximately 90 feet downstream of the dam the river side wall becomes an overflow spillway 100 feet in length. The crest elevation of this

overflow is approximately 1 foot above the crest elevation of the main dam. From the end of the canal spillway, the river side wall extends downstream approximately 120 feet. Immediately downstream of the canal spillway there is a wooden gate structure across the waterway to control the canal.

Between the concrete canal wall and the river, downstream of the canal spillway, there is a canal dike approximately 30 ft. wide and has a maximum height of about 19 ft. above the stream bed. The surface of the dike is somewhat irregular but generally slopes toward the river at 3H to 1V, or flatter. There is a stone masonry wall which retains the dike toe, along the river.

The dike appears to merge with natural ground near the remains of a burned-out structure located roughly 400 ft. downstream of the dam. The canal has been filled in downstream of this building ruins.

- c. Size Classification - The height of the dam is approximately 16 feet and the estimated storage capacity is 120 acre-feet at the top of dam. According to Guidelines established by the Corps of Engineers, the height of the dam is in the "small" category based on both height and storage capacity.
- d. Hazard Classification - The results of the dam failure analysis indicates that a failure during a flood stage would increase the downstream flooding by five to six feet. The impact area contains a number of factories and mills as well as a portion of the business district of Webster, Massachusetts. The economic losses would be high and it would place more than a few lives in jeopardy. Consequently, the dam is classified in the "high" hazard classification.
- e. Ownership - The dam is owned by the Dudley-Webster Realty Corporation. The owner is represented by Mr. Edward S. Kunkel, President, 661 South Main Street, Webster, MA 01570. (Phone: 617/943-0591).
- f. Operator - There is no formally assigned operator to this dam.
- g. Purpose of the Dam - South Village Pond Dam was originally constructed to provide hydro-electric power and water to the mills downstream. This use has been abandoned and the present use of the dam is to provide a reservoir for incidental recreation.
- h. Design and Construction History - South Village Pond Dam was reconstructed in 1939. The plan on file with the Worcester County Engineering Department indicates that Mr. Charles L. Ware was the engineer. County inspection reports indicate that Chester W. Patten Company, Melrose, Massachusetts was the

contractor. The river side wall of the canal was reconstructed approximately 3 years earlier, 1936. The design engineer and contractor for this work are unknown. Inspection Reports from 1925 to 1955 indicate the owner of the dam was the American Woolen Company. The 1956 inspection reports indicates the Kunkel Brothers were the owners. The 1957 inspection reports indicate the dam was owned by its present owner, The Dudley-Webster Realty Corporation. The present owner indicates that they have owned the dam for approximately 24 years and the previous owner was Textron.

- i. Normal Operational Procedures - Maintenance of the dam is performed on a demand basis. There is no operator assigned to the dam.

1.3 Pertinent Data

Elevations given in this report are on the local datum used on the plans on file with the Worcester County Engineering Department. This datum is approximately 4 1/2 feet higher than the National Geodetic Vertical Datum (NGVD).

- a. Drainage Area - The dam impounds waters of the French River in the Towns of Webster and Dudley Massachusetts. The total watershed above the dam is 84.6 square miles of which 57.6 square miles contributes flow initially to the Hodges Village and Buffumville Flood Control Reservoirs. About 1/2 of the remaining 27 square miles is tributary to Lake Chaubunagungamaug which has considerable storage potential.
- b. Discharge at Dam Site - The discharge at the dam site during the 1955 flood was estimated to be 14,400 cfs. A flow of 4,700 cfs was estimated to have taken place on 19 March 1936.
 - (1) Outlet works size - Two orifices at left abutment of spillway. One is 4 feet by 4 feet at an invert of 429.6, the other is 2.5 feet by 2.75 feet at an invert of 436.6.
 - (2) Maximum known flood at dam site - 19 August 1955 at 14,400 cfs.
 - (3) Ungated spillway capacity at top of dam
2,950 cfs @ 439.9 elev.
 - (4) Ungated spillway capacity at test flood elevation
9,350 cfs @ 444.4 elev.
 - (5) Gated spillway capacity at normal pool elevation.....N/A
 - (6) Gated spillway capacity at test flood elevation.....N/A
 - (7) Total spillway capacity at test flood elevation
9,350 cfs @ 444.4 elev.
 - (8) Total project discharge at test flood elevation
15,600 cfs @ 444.4 elev.

c. Elevation (ft. above Local Datum)

- (1) Streambed at centerline of dam.....424.0
- (2) Test flood tailwater.....Lower than 435.6
- (3) Upstream portal invert diversion canal.....433 (Est.)
- (4) Recreation pool.....435.6
- (5) Full flood control pool N/A
- (6) Spillway crest.....435.6
- (7) Design surcharge (Original Design).....N/A
- (8) Top of dam.....439.9
- (9) Test flood design surcharge.....444.4

d. Reservoir (feet)

- (1) Length of test flood pool.....5,000
- (2) Length of recreation pool.....800
- (3) Length of flood control pool N/A

e. Storage (acre-feet)

- (1) Recreation pool.....12
- (2) Flood control pool.....N/A
- (3) Spillway crest pool.....12
- (4) Top of dam.....120
- (5) Test flood pool.....230

f. Reservoir Surface (acres)

- (1) Recreation pool.....4
- (2) Flood-control pool.....N/A
- (3) Spillway crest.....4
- (4) Test flood pool.....45
- (5) Top of dam.....24

g. Dam

- (1) Type plain concrete gravity section
- (2) Length 160 ft
- (3) Height 16 ft
- (4) Top width 4.5 ft
- (5) Side slopes N/A
- (6) Zoning N/A
- (7) Impervious Core N/A
- (8) Cutoff Unknown
- (9) Grout Curtain Probably None

h. Diversion and Regulating Tunnel N/A

i. Spillway

- (1) Type plain concrete gravity ogee section
- (2) Length of weir 108 ft
- (3) Crest elevation 435.6 (without flashboards)
- (4) Gates 4' x 4' waste gate
- (5) U/S Channel French River
- (6) D/S Channel French River, gradients
are generally flat both
U/S and D/S

j. Regulating Outlets - The outlet works are located at the left spillway abutment. They consist of one 4 foot square orifice at an invert of 429.6, and another, 2.5 feet high by 2.75 feet wide, at an invert of 436.6. The lower orifice is controlled by a manual gate at the upstream face of the dam, while the other is not controlled.

SECTION 2: ENGINEERING DATA

- 2.1 Design Records - No design records for the original dam were located. A copy of a design plan for the reconstruction of the river side canal wall entitled "Plan of New Canal Retaining Walls and Spillway", dated September 29, 1936, and the specifications for this work were located at the Worcester County Engineering Department. Also located at the same source was a copy of a plan entitled "Plan of Reconstruction of the Dam" dated March 28, 1939. This plan shows the details of the dam observed at the site.
- 2.2 Construction Records - No records of the original construction other than the field inspection reports by the County Engineers were located. The County inspection reports for the reconstruction of the dam are more detailed than usual, during one period, they were made on a daily basis.
- 2.3 Operation Records - No operation records other than County and State inspection reports were located.
- 2.4 Evaluation
- a. Availability - The records are available at the Worcester County Engineering Department, Worcester, Massachusetts.
 - b. Validity - The plans are in good agreement with the conditions observed at the site.
 - c. Adequacy - The available data, in combination with the visual inspection described in the following section, are adequate for the purposes of the Phase I investigations.

SECTION 3: VISUAL INSPECTION

3.1 Findings

- a. General - The Phase I visual examination of South Village Pond Dam was conducted on 24 September 1979.

In general, the concrete dam is in fair condition. The concrete at the left abutment area is severely eroded, while the concrete on the right gravity wall, downstream face, shows surface cracking and efflorescence. The top of the downstream right training wall shows considerable deterioration and erosion. Flow over the overflow section of the dam precluded an inspection of this section.

Visual inspection check lists for the site visit are included in Appendix A and selected photographs are given in Appendix C. Prior inspection reports are included in Appendix B.

- b. Dam - The concrete dam is generally in fair condition. There was no evidence of significant settlement or lateral movement, but there has been considerable surface erosion of the training walls on the downstream side of the overflow section.

The following specific items were noted:

- (1) The portion of the dam to the right of the overflow section has considerable cracking and efflorescence along its downstream face. The training wall extending downstream from this section immediately adjacent to the overflow portion of the dam has severe deterioration and erosion at the top of the wall.
 - (2) In general, the overflow section of the dam was not visible during inspection due to flow. The flashboard pins at the weir crest are severely corroded and some are missing.
 - (3) The left abutment area of the dam, as shown in Photo 6, contains the waste gate structure. The upper portions of the concrete section show severe erosion. The short concrete bridge to the operating area, at the left of the waste gate, has exposed reinforcing bars. The left training wall extending downstream from this area also exhibits severe erosion.
 - (4) The waste gate is inoperative.
- c. Appurtenant Structures - The canal dike is generally in a poor condition, based on visual observations. There was no evidence of major lateral movement or settlement of the dike structure. However, there has been severe erosion of earth

materials and portions of the stone retaining walls along the river have failed. The concrete wall and spillway along the dike are in better condition. The deficiencies noted along the wall and spillway were generally in the form of minor joint deterioration, surface spalls and efflorescence. The timber gate structure, across the canal downstream of the overflow spillway, is in disrepair. However, downstream of the gate structure, the canal has been terminated by the placement of fill. Upstream of the gate structure, the canal was noted to contain some vegetation and brush. Downstream of the gate structure, the water in the canal is stagnant and contains considerable debris.

The following specific items were noted:

- (1) The surface of the dike is covered by grass, weeds, dense brush and trees, as shown in Photo 7.
- (2) There has been severe erosion of the dike between the main spillway and the canal overflow weir as shown in Photos 5 and 7. Local erosion was also noted along the dike downstream of the canal overflow weir.
- (3) The stone retaining wall which parallels the river has failed in the area between the dam and canal overflow and in the area near the downstream end of the overflow as shown in Photo 7. Evidence of local displacement was noted at other places of the wall which extends downstream.
- (4) At the downstream end of the canal, there are the remains of a burned out structure. At this location there is only about 10 feet between the canal wall and the basement wall of the ruins. There is an outlet pipe extending from the canal into the old basement which is valved. A small amount of leakage (perhaps 5 to 10 gpm) was noted coming from the pipe.
- (5) The canal has some vegetation and branches present in the upstream portion and vegetation and debris present downstream of the timber gate structure.
- (6) The canal timber gate structure is in disrepair. There are openings through the bulkhead, the timber gates appear to be silted in and inoperative, and portions of the timber frame are sprung and exhibit some rot.
- (7) The stone masonry wall on the shore side of the canal has some stones missing and vegetation growing in the joints.
- (8) The concrete canal wall and overflow spillway have minor spalls along its length and a major face spall on the right side wall of the overflow spillway. A diagonal crack was

noted near the base of the overflow spillway right side wall. Vertical joints in these walls have started to deteriorate and some vegetation is present.

- d. Reservoir Area - The upstream pool is part of the French River. The river has a slight meander in this area. The banks on each side of the pool are undeveloped and forested. They rise up to a railroad track on the right side and to a residential development in the Town of Webster on the left side. There appears to be no significant potential for landslides into the pool which would cause waves to overtop the dam. No conditions were noted that would cause a sudden increase of sediment load into the river.
 - e. Downstream Channel - The downstream channel is flat with thick vegetation on both banks. There is a stone masonry wall along portions of the left bank. A mill complex is present along the right bank further downstream.
- 3.2 Evaluation - Except for the items noted in the visual examination, South Village Pond Dam and canal spillway appear to be in a satisfactory condition. The left abutment area of the dam appears to have the most deterioration. The concrete in this area is severely eroded and stone masonry walls, shown on the design plans to be located along the toe between the dam left abutment and the canal spillway, apparently have collapsed. This may have occurred during the 1955 flood which overtopped the dam.

SECTION 4: OPERATIONAL PROCEDURES

- 4.1 Procedures - There is no formal established routine for the operation of the dam.
- 4.2 Maintenance of the Dam - The appearance of the dam indicates that little maintenance has been performed at this facility in recent years. Maintenance of this facility is based on necessity rather than a formally established routine or procedure.
- 4.3 Maintenance of Operating Facilities - The operating facilities at this dam have not been used for some time. The canal gates are in disrepair and the single waste gate at the dam appears not to have been used for some time. Maintenance of the outlet facilities appears only to be performed when absolutely necessary.
- 4.4 Description of any Warning System in Effect- There is no established warning system or emergency preparedness plan in effect for this structure.
- 4.5 Evaluation - Maintenance of this facility is being performed only when absolutely necessary. There is currently no formal operational procedures in effect for South Village Pond Dam. Formal operational procedures, maintenance programs, warning system and emergency preparedness plan should be established.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

- a. General - South Village Pond Dam is a "run-of-the-river" project on the French River at the Dudley-Webster Corporate Town Line, Massachusetts. The watershed is 84.6 square miles of mostly rolling terrain, most of which drains to two U.S. Army Corps of Engineers Flood Control Projects. At spillway crest elevation 435.6 (Local Datum) the reservoir storage is 12 ac-ft., increasing to 120 ac-ft at top of dam (El. 439.9). The spillway is an ogee shaped structure about 100 foot long and 15 ft. high, with concrete abutments. The outlet works is located at the left end of the spillway. At one time a 30 ft. wide canal at the left abutment of the dam served the power generating facilities at the American Woolen Co. about 700 feet downstream of the dam. These facilities have been abandoned and part of the canal has been filled-in. The dam is basically a high spillage-low surcharge project.
- b. Design Data - No hydraulic/hydrologic design data for the dam was located.
- c. Experience Data - The flood of record for the dam occurred on 19 August 1955. The flow recorded at the USGS Gaging Station located at Webster, Massachusetts, about 2,750 feet downstream of the South Village Pond Dam was 14,400 cfs with a corresponding gage height of 26.05 feet above the "zero" of the gage, which is at elev. 411.24 (Local Datum). The resulting water surface at the dam was recorded at elev. 443.9 (Local Datum), and that just downstream of the dam at about 3 feet lower. The depth of water over the spillway would have been about 8 feet. Prior to the August 1955 event, a flow of 4,700 cfs was estimated at the gaging station on 19 March 1936.

Recorded high water marks for the area indicate severe flooding along the French River as a result of the 1955 flood. This information is documented in the U.S. Geological Survey Water-Supply Paper 1420 titled "Floods of August - October 1955 New England to North Carolina."

- d. Visual Observations - The visual inspection of the dam was made on 24 September 1979. At the time, the water depth over the full length of the spillway was 0.3 feet. The water depth upstream of the dam was variable, and the freeboard was about 4.7 feet. There was no obstruction to flow over the spillway. The downstream channel was flat with thick vegetation on both banks. A stone masonry wall is present along some of the left bank and a mill complex is present along the right bank further downstream. The gate to the outlet works was closed.
- e. Test Flood Analysis - Based on Corps of Engineers Guidelines, the recommended test flood range for the size (small) and hazard (high) is 1/2 PMF to a PMF (Probable Maximum Flood).

A 1/2 PMF was adopted as the test flood for this project. The test flood was calculated using the Corps of Engineers "Guidelines for Estimating Maximum Probable Discharge in Phase I Dam Safety Investigations". The watershed is hydrologically divided into three separate parts. About 31.1 square miles of the drainage area flows to the US Corps of Engineers Hodges Village Reservoir flood control project, and another 26.5 square miles drains to the US Corps of Engineers Buffumville Reservoir flood control project (both flood control projects were constructed after the 1955 flood). Each of these projects has enough "usable [storage] capacity" to contain about 80 to 90 percent of the 1/2 PMF, which is the adopted test flood for the South Village Pond Dam. Therefore, it is reasonable to discount any discharge contribution from both those drainage areas to the peak flow generated from the 27 square mile drainage area downstream of those projects and upstream of the South Village Pond Dam. The watershed characteristics for the areas draining to the flood control projects and for the area draining to South Village Pond Dam are also markedly different. The areas tributary to the flood control projects are "rolling" with little storage while the area tributary to South Village Pond Dam is much flatter and offers a significant amount of storage as verified by the storage potential of Lake Chaubunagungamaug located to the east of South Village Pond Dam. Based on the watershed characteristics for the 27 square mile area downstream of Hodges Village and Buffumville Reservoirs and the area upstream of South Village Pond dam, the 1/2 PMF peak inflow rate of 588 csm was selected for the South Village Pond Dam. The resulting test flood inflow to South Village Pond Dam is approximately 15,850 cfs.

The routed test flood outflow is 15,600 cfs at a stage of 444.4, neglecting outlet works capacity. The depth of water over the spillway would be 8.8 feet. The spillway capacity at the test flood elevation would be about 9,350 cfs or approx. 60 percent of the routed test flood outflow. The outlet works capacity at spillway crest elevation is approximately 9.5 cfs. However, it should be noted that under test flood conditions the dam would have significant submergence by tailwater conditions.

- f. Dam Failure Analysis - Both wet weather and dry weather dam failures were analyzed. Based on the Corps of Engineers Guidelines for Estimating Dam Failure Hydrographs, and assuming a failure would occur along 50 percent of the length of the spillway (50 ft) for both cases, the peak dry weather dam failure outflow would be 3,300 cfs and the peak wet weather dam failure outflow would be 8,500 cfs. The dry weather failure assumes zero flow over the spillway and a water level at spillway crest (El. 435.6) prior to failure, while a wet weather failure assumes a water level at the top of dam (El. 439.9), with the corresponding spillway discharge (about 4,650 cfs) and downstream flooding conditions prior to failure.

The dry weather failure would not overtop the normal river channel and the resulting hazard would be "low". In the event of a wet weather failure, downstream conditions would be quite different. The spillway discharge would be about 4,650 cfs prior to failure, which would flood the American Woolen Co. mill complex by about 2 feet and raise the river stage just slightly below the top of river bank downstream. The additional flow resulting from a dam failure would increase the river stage 5 to 6 feet. Consequently, the river banks would be overtopped considerably, affecting several houses, and additional buildings of the American Woolen Co. About 8 bridges would be overtopped including two railroad bridges and Main Street which also serves as State Route 12, 197, and 31. Thus, the hazard classification due to a wet weather dam failure would be "high".

The 19 August 1955 flood discharge was recorded at 14,400 cfs. This exceeds both the dry weather and the wet weather dam failure outflows of 3,300 cfs and 8,500 cfs respectively. The stage for the 1955 flood averages about 4 feet higher than that which would result from a wet weather dam failure. There was extensive flooding along the French River due to the 1955 flood. Since the 1955 flood, two Corps of Engineers flood control projects were constructed upstream of South Village Dam.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

- a. Visual Observations - There was no visible evidence of dam or spillway instability during the site examination on 24 September 1979. However, severe erosion has occurred at the embankment portion between the main spillway and the canal spillway. Portions of the stone retaining wall along the toe have failed or have been taken out by prior floods. At the downstream end of the canal dike, a portion of the canal wall is supported by only 10 feet of earth, retained by the basement wall of a burned out structure. While these conditions have weakened the dike embankment, they are not considered to warrant urgent remedial action.
- b. Design and Construction Data - The drawings obtained from the Worcester County Engineering Department show the basic cross-section of the dam and the canal concrete walls and spillway. However, there is no data on the earlier dam and canal water retaining structures at this site. The impact of the original structures on the reconstruction of the dam and canal walls is unknown. The concrete sections for this structure appear to have adequate stability for the design water surface, water surface just below the top of the concrete dam. However, it cannot be assumed that these same structures will have an adequate factor of safety for static stability of water surfaces above the top of the dam.
- c. Operating Records - There are no operating records for the dam other than State and County inspection reports. However, calculations indicate that during the August 1955 flood, the dam was overtopped by approximately 4 feet of water. It should be noted that since the 1955 flood, two Corps of Engineers Flood Control Reservoirs have been constructed upstream of South Village Pond Dam.
- d. Post-Construction History Changes - The dam was reconstructed in 1939. The plan showing details of this work and records of inspection visits were obtained from the Worcester County Engineering Department. In 1936, modifications were made to the canal dike including the addition of a concrete canal wall and construction of a new canal overflow spillway. A plan showing details of this work was also obtained from the Worcester County Engineering Department. Based on a review of these documents, there is no reason to believe that the structures, as constructed, would have been unstable under the design static loading conditions.
- e. Seismic Stability - South Village Pond Dam is located along the boundary between Seismic Zones No. 1 and 2 and, in accordance with recommended Phase I Guidelines, does not warrant seismic analysis.

SECTION 7: ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment

- a. Condition - Based on the results of the visual examination, the dam is considered to be in fair condition. Although some repairs are needed, no conditions which would warrant urgent remedial action were noted.
- b. Adequacy of Information - The evaluation of the dam has been based primarily on the visual examination, consideration of available records and past performance and application of engineering judgment. Generally, the information available or obtained was adequate for the purposes of the Phase I Assessment. However, it is recommended that additional information relative to the discharge capabilities of the spillway and structural stability of the dam and appurtenant water retaining structures be obtained as outlined in Section 7.2.
- c. Urgency - The recommendations for additional investigations and remedial measures, outlined in Section 7.2 and 7.3 respectively, should be undertaken by the Owner within one year of his receipt of this report.
- d. Need for Additional Investigations - Additional investigations should be performed by the Owner as outlined in Section 7.2.

7.2 Recommendations - It is recommended that the Owner arrange for the following investigations to be undertaken by a registered professional engineer. The Owner should implement corrective measures as required based on the engineering evaluations.

- a. A detailed hydrologic/hydraulic investigation to determine an appropriate spillway design flood considering tailwater submergence and determining, if necessary, the need of erosion protection at the abutments of the dam and the embankment portions of the dike.
- b. An investigation to determine the structural stability of the dam, spillways and canal dike during a spillway design flood. Consideration should be given to the stabilizing effect of the tailwater during such flood discharges.
- c. An investigation to determine the required structural repairs of deteriorated concrete at the right training wall of the dam and at the outlet works.

7.3 Remedial Measures

- a. Operation and Maintenance Procedures - The following remedial work should be undertaken by the Owner:

- (1) Remove the remaining flashboard pins from the overflow section of the dam.
- (2) Perform maintenance work on the concrete at the dam and canal. This should include the removal of vegetation from expansion joints, the sealing of expansion joints, the patching of spalls and cracks, and the resurfacing of the eroded concrete areas.
- (3) Perform maintenance work on the dam's waste gate to return it to an operating condition.
- (4) Replace missing stones in the shore side masonry wall of the canal. Remove vegetation from joints in the same wall.
- (5) Remove vegetation and debris from within the canal.
- (6) Remove dense brush and trees from the canal dike and fill resulting holes with compacted granular material.
- (7) Rebuild eroded areas on the dike between the main spillway and canal overflow with compacted granular fill and cover with rock.
- (8) Seal all outlet pipes leaking water from the canal.
- (9) Establish a formal maintenance program and operational procedure for the dam.
- (10) Develop an emergency preparedness plan and warning system for the dam.
- (11) Institute a program of annual technical inspections.

7.4 Alternatives - The canal downstream of the canal overflow spillway currently serves no purpose. An alternative to performing maintenance work and investigations downstream of the canal spillway would be to remove the existing canal timber gates and fill that portion of the canal with compacted earth. The upstream face of the fill should be protected with stone riprap.

APPENDIX A
INSPECTION TEAM ORGANIZATION AND CHECK LIST

VISUAL INSPECTION PARTY ORGANIZATION

Page No.

A-1

VISUAL INSPECTION CHECK LIST

Spillway: Main Dam
Spillway: Canal Overflow
Embankment: Dike
Outlet Works: Canal

A-2

A-3

A-4

A-5

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: South Village Pond Dam

DATE: 24 Sept. 1979

SPILLWAY: Canal Overflow

BY: R. Wood

CHECK LIST	CONDITION
1. Approach Channel a. General Condition b. Obstructions c. Log Boom etc.	1. a. Canal. b. Some vegetation and brush in canal. c. None.
2. Weir a. Flashboards b. Weir Elev. Control (Gate) c. Vegetation d. Seepage or Efflorescence e. Rust or Stains f. Cracks g. Condition of Joints h. Spalls, Voids Or Erosion i. Visible Reinforcement j. General Struct. Condition	2. a. None. b. None. c. Slight growth in joints. d. Negligible efflorescence. e. None observed. f. None observed. g. Vertical joints started to deteriorate. h. Minor spalls D/S face - surface slightly eroded. i. None observed. j. Good.
3. Discharge Channel a. Apron b. Stilling Basin c. Channel Floor d. Vegetation e. Seepage f. Obstructions g. General Struct. Condition	3. a. None observed. b. None observed. c. Main river channel. d. None observed. e. None observed. f. Clear. g. Good
4. Walls a. Wall Location _____ (1) Vegetation (2) Seepage or Efflorescence (3) Rust or Stains (4) Cracks (5) Condition of Joints (6) Spalls, Voids or Erosion (7) Visible Reinforcement (8) General Struct. Condition	4. a. Upstream Wall (1) None observed. (2) Slight efflorescence. (3) None observed. (4) 1 diagonal crack near base of wall. (5) See (6). (6) Major face spall weir side at Vert Jt. (7) None. (8) Good. b. Downstream Wall (1) None observed. (2) None observed. (3) None observed. (4) None observed. (5) Good. (6) None observed. (7) None observed. (8) Good.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: South Village Pond Dam

DATE: 24 Sept. 1979

EMBANKMENT: Dike (between canal and river)

CHECK LIST	CONDITION
1. Upstream Slope a. Vegetation b. Sloughing or Erosion c. Rock Slope Protection - Riprap Failures d. Animal Burrows	1. a. Not applicable. (U/S side formed by concrete retaining wall). b. Not applicable. (U/S side formed by concrete retaining wall). c. Not applicable. (U/S side formed by concrete retaining wall). d. Not applicable. (U/S side formed by concrete retaining wall).
2. Crest a. Vegetation b. Sloughing or Erosion c. Surface cracks d. Movement or Settlement	2. a. See 3. b. See 3. c. See 3. d. See 3.
3. Downstream Slope a. Vegetation b. Sloughing or Erosion c. Surface cracks d. Animal Burrows e. Movement or Cracking near toe f. Unusual Embankment or Downstream Seepage g. Piping or Boils h. Foundation Drainage Features i. Toe Drains	3. a. Thick brush, grass & trees. b. Significant erosion and apparent failure of D/S stone wall, U/S from canal overflow. D/S from canal, there is local erosion and wall displacement. c. None observed. d. None observed. e. See 3b. f. None observed. g. None observed. h. None known. i. None known.
4. General a. Lateral Movement b. Vertical Alignment c. Horizontal Alignment d. Condition at Abutments and at Structures e. Indications of Movement of Structural Items f. Trespassing g. Instrumentation Systems	4. a. Surface of dike generally irregular. No evidence of movement except along D/S wall as noted above. b. Surface of dike generally irregular. No evidence of movement except along D/S wall as noted above. c. Surface of dike generally irregular. No evidence of movement except along D/S wall as noted above. d. Significant erosion in area between dam and canal overflow. e. D/S wall displacements noted above. f. Unrestricted. g. None known.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: South Village Pond Dam DATE 24 Sept. 1979
OUTLET WORKS: Canal BY: R. Wood

CHECK LIST	CONDITION
1. Inlet a. Obstructions b. Channel c. Structure d. Screens e. Stop Logs f. Gates	1. a. Minor branches in water. b. Appears silted in. c. See Spillway - main dam. d. None. e. None. f. None.
2. Control Facility a. Structure b. Screens c. Stop Logs d. Gates e. Conduit f. Seepage or Leaks	2. a. Timber frame weathered - some rot present portions sprung. b. None. c. None. d. Timber gates unknown size silted in. e. Open channel. f. Opening thru bulkhead.
3. Outlet a. Structure b. Erosion or Cavitation c. Obstructions d. Seepage or Leaks	3. See Canal Overflow Downstream end of the canal filled in.
4. Mechanical and Electrical a. Crane Hoist b. Hydraulic System c. Service Power d. Emergency Power e. Lighting f. Lightning Protection	4. Manual operation only-inoperable.
5. Other	5. Left side of canal is stone masonry wall, some stones missing-some vegetation in joints. Right side is concrete one exp. jt. broken with seepage downstream face.

APPENDIX B
ENGINEERING DATA

DOCUMENTS

Page No.

List of Available Documents
Description of Dam (Worcester County)

B-1
B-2

PRIOR INSPECTION REPORTS

DATE

BY

January 8, 1925	Worcester County	B-3
February 7, 1927	Worcester County	B-4
April 23, 1934	Worcester County	B-5
March 20, 1936	Worcester County	B-6
November 9, 1936	Worcester County	B-7
August 10, 1939	Worcester County	B-8
August 11, 1939	Worcester County	B-9-10
August 12, 1939	Worcester County	B-11-12
August 13, 1939	Worcester County	B-13-14
August 14, 1939	Worcester County	B-15-16
August 14, 1939	Worcester County	B-17-18-19
August 16, 1939	Worcester County	B-20-21
August 17, 1939	Worcester County	B-22-23
August 21, 1939	Worcester County	B-24-25
August 22, 1939	Worcester County	B-26-27
August 24, 1939	Worcester County	B-28
August 28, 1939	Worcester County	B-29-30
August 31, 1939	Worcester County	B-31-32
September 1, 1939	Worcester County	B-33-34
September 7, 1939	Worcester County	B-35-36
December 11, 1940	Worcester County	B-37
June 2, 1944	Worcester County	B-38
December 10, 1945	Worcester County	B-39
December 30, 1945	Worcester County	B-40
December 1, 1947	Worcester County	B-41
December 18, 1950	Worcester County	B-42
July 25, 1955	Worcester County	B-43
September 13, 1955	Worcester County	B-44
1956	Worcester County	B-45
1956	Worcester County	B-46
May, 1957	Worcester County	B-47
May 7, 1957	Worcester County	B-48
October 25, 1963	Worcester County	B-49
January 8, 1972	Mass. Div. of Waterways	B-50

DRAWINGS

No.

TITLE

1	Plan of Reconstruction of Dam, March 28, 1939	B-51
2	New Canal Retaining Walls and Spillway, September 29, 1936	B-52

LIST OF DOCUMENTS

SOUTH VILLAGE POND DAM

All available documents are included in Appendix B

TOWN OR CITY <i>Webster</i>	DEGREE NO.	PLAN NO.	DAM NO.
LOCATION <i>American Wooten Co. Webster Plant</i>			C.C. DOCKET NO.
DESCRIPTION OF DAM		DESCRIPTION OF RESERVOIR & WATERSHED	
Type		Name of Main Stream	<i>French River</i>
Length		" " any other Streams	
Height		Length of Watershed	
Thickness top		Width	
bottom		Is Watershed Cultivated	
Downstream Slope		Percent in Forests	
Upstream		Steepness of Slope	
Length of Spillway		Kind of Soil	
Size of Gates		No. of Acres in Watershed	
Location of Gates		" " " Reservoir	
Flashboards used		Length of Reservoir	
Width Flashboards or Gates		Width	
Dam designed by		Max Flow Cu. Ft. per Sec.	
constructed by		Head of Flashboards-Low Water	
Year constructed		" " " High	
GENERAL REMARKS		GENERAL REMARKS	
		<i>Canal at crest El. 95-03.</i> <i>1936 new rail way and canal</i> <i>retaining walls.</i> <i>100' spillway</i>	

TOWN OR CITY <i>Webster</i>	DEGREE NO.	PLAN NO.	DAM NO. <i>55-0</i>
LOCATION <i>American Wooten Co. Webster Plant</i>			C.C. DOCKET NO. <i>14-03</i>
DESCRIPTION OF DAM		DESCRIPTION OF RESERVOIR & WATERSHED	
Type <i>part stone abut. Part stone & log crib</i>	El. 100'	Name of Main Stream	<i>French River</i>
Length	85'	" " any other Streams	
Height	72'	Length of Watershed	
Thickness top	18'	Width	
bottom	32'	Is Watershed Cultivated	
Downstream Slope		Percent in Forests	
Upstream		Steepness of Slope	
Length of Spillway	<i>El. Crest of Dam 435.1</i>	Kind of Soil	<i>Rocky Hardpan ledge</i>
Size of Gates	<i>Canal to east of spillway</i>	No. of Acres in Watershed	
Location of Gates		" " " Reservoir	
Flashboards used	Yes.	Length of Reservoir	
Width Flashboards or Gates	<i>El top = 96</i>	Width	
Dam designed by	<i>American Wooten Co. Andrew McIl</i>	Max Flow Cu. Ft. per Sec.	
constructed by	<i>1939 Chester W. Patton Co. McIl</i>	Head of Flashboards-Low Water	
Year constructed	<i>1939</i>	" " " High	
GENERAL REMARKS		GENERAL REMARKS	
<i>See Dudley 14-03 for information</i> <i>Inspected Mar. 20, 1936 - M.F. H.D.V.</i> <i>Nov. 9, 1936 - L.D.M. & Mr. Brunt</i> <i>Aug. 9, 1939 - E.H. Spofford</i> <i>10' L.O.M.</i> <i>11' L.D.M.</i> <i>12' E.H. Spofford</i> <i>13' L.D.M.</i> <i>14' L.P.M. L.H.S.</i>		<i>1937 Owned by the American Wooten Co.</i> <i>Inspected Aug. 15, 1939 - L.O.M. L.H.S.</i> <i>16' L.H.S.</i> <i>17' L.H.S.</i> <i>21' L.H.S.</i> <i>22' L.H.S.</i> <i>24' W.A. Lindquist</i> <i>25' L.H.S.</i> <i>1936 Flood El. 435.4</i>	

Decree No.

Dam No. 14-03

COUNTY OF WORCESTER, MASSACHUSETTS
OFFICE OF COUNTY ENGINEER

Neg. Nos.

INSPECTION OF DAMS, RESERVOIR DAMS AND RESERVOIRS

Town Webster Date Jan. 8, 1928 Dam No.
Location Below Slaters Cotton Mill Name of Pond or Stream French River
Inspected by H. O. Marden
Owner American Woolen Co. Use Power and Washing
MATERIAL & TYPE Stone abt. part stone and log crib wood apron
part way.
Elevations in feet: above (+) or below (-) full pond or reservoir level.
FOR DAM Bed of stream below top of spillway 25' +
FOR RESERVOIR
top of dam 10' + top of flashboards 20' 11" high ground surface below
level of overflow pipe length in feet 100'
width top in feet 18' width bottom in feet 32' size pipe to mill
inches length spillway in feet 70' head in feet
Size of wheel H. P. developed
Size of gates location of gates 200' from spillway
Foundation and details of construction 10' from base of dam
rocky soil at lodge condition of embankment
Constructed by date
Designed by location
Recent repairs and date none
Evidence of leakage none
Condition good
Topography of country below valleys widens
Nature of buildings and roads below dam mills and town
No. Acres in watershed No. Acres in pond
Plans secured Percent watershed in cultivation
Percent in forests Note: Cross out word not applicable.

Canal embankment granite masonry from spillway below
RR. bridge then earth-stone downstream 10' wide on top
30' waste way off canal about 150 feet below dam

County of Worcester
OFFICE OF COUNTY ENGINEER
Court House, Worcester, Mass.

L. O. Marden
County Engineer

Feb. 7, 1927

1925.
1926

Town Dudley Webster

Dam No 14-03
55-06

Location South Village

American Woolen Co.
Webster, Mass.

The County Commissioners of Worcester County, acting under Chapter 253, General Laws, as amended by Chapter 178 of the Acts of 1924, said section being headed "Safety of Dams and Reservoirs", have ordered an inspection of your dam. The above Acts states in part regarding the inspection of dams,—

"The county commissioners shall as often as once in two years cause a thorough examination to be made of every reservoir, reservoir dam and mill dam by the breaking of which loss of life or damage to a road or bridge is likely to be caused,—

The commissioners shall cause every examination to be made by a competent engineer who shall report in detail and the work or the changes required for safety and the public good." The County Commissioners hereby order that the following repairs be made to your dam:— (Note:— Repairs to be made are marked with a cross.)

1. Repair down stream wall.....
2. " up " "
3. " walls to spillway section..... west end XXXXXXXX
4. " " canal or flume.....
5. " concrete walls.....
6. " apron to spillway.....
7. " Leaks at.....
8. Renew planks and timbers.....
9. Clean out waste gate pipe or flume.....
10. " " canal to mill.....
11. Provide new waste pipe or flume.....
12. " " pipe to mill thru embankment.....
13. Remove flashboards.....
14. Lower "
15. Construct spillway section..... spillway to be..... feet long and..... feet deep..... at.....
16. Cut off brush and trees from embankment.....
17. Fill up holes and regrade embankment.....

Kindly notify us either in person or by letter after you have made these repairs.

Yours very truly,

County Engineer.

COUNTY OF WORCESTER MASSACHUSETTS

COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by L. O. Marden, Civil Engr. M.A. Date 4-23-34 Dam No. 55-03
14-03

Town Webster Location French River
 Owner American Woolen Company Use power and washing
 Material and Type

Dam Designed by Constructed by Year

SPILLWAY—Length Feet Depth Feet

El. top Abutment El. Crest El. Apron El. Streambed

Width top Abutment Width top Crest Width bottom Spillway

Width Flashboards carried Kind Flashboards

El. Flowline Cleanout Pipe Size and Kind Cleanout Pipe

Kind of Foundation under Spillway

Condition West abutment should be rebuilt, should cut brush out of east abutment to eliminate leaks during low water

EMBANKMENT—Length overall Feet

El. Top El. Natural Ground Width Top

Width of Bottom Upstream Slope Downstream Slope

Kind of Corewall Riprap

Material in Embankment Foundation

Condition OK

GATES Location

Size Kind El. Flowline

Condition OK

WHEEL Kind Size Rated H. P.

Location Ave. Head

Evidence of Leaks in Structure see above

Recent Repairs and Date none

Topography of Country below Dam

Nature of Buildings and Roads below Dam

Number of Acres in Pond Drainage Area in Square Miles

Discharge in Second Feet per Square Mile

Estimated Storage Million Cubic Feet

COUNTY OF WORCESTER MASSACHUSETTS

COUNTY ENGINEER

Inspection of Dams, Reservoir Dams and Reservoirs.

Inspected by Finlayson and Vasselín Date 6/20/36 Dam No. 14-03
~~55-06~~

Town Webster Location French River

Owner American Woolen Co. Use _____

Material and Type _____

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY—Length _____ Feet. Depth _____ Feet

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition _____ see other side of sheet.

EMBANKMENT—Length overall _____ Feet

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES _____ Location _____

Size _____ Kind _____ El. Flowline _____

Condition _____

WHEEL _____ Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number of Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

COUNTY OF WORCESTER MASSACHUSETTS

COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by L.O.M. and Mr. Brett Foreman Date 11/9/36 Dam No. 14-03

Town Webster Location French River

Owner American Woolen Co. Use

Material and Type retaining walls to canal and canal wasteway under construction. Work is satisfactory.

Dam Designed by Constructed by Year

SPILLWAY—Length Feet. Depth Feet

El. top Abutment El. Crest El. Apron El. Streambed

Width top Abutment Width top Crest Width bottom Spillway

Width Flashboards carried Kind Flashboards

El. Flowline Cleanout Pipe Size and Kind Cleanout Pipe

Kind of Foundation under Spillway

Condition foundation to heel of canal wasteway completed.

EMBANKMENT—Length overall Feet

El. Top El. Natural Ground Width Top

Width of Bottom Upstream Slope Downstream Slope

Kind of Corewall Riprap

Material in Embankment Foundation

Condition New concrete retaining wall constructed to join with easterly abutment of wastewear of main dam.

GATES Location

Size Kind El. Flowline

Condition

WHEEL Kind Size Rated H. P.

Location Ave. Head

Evidence of Leaks in Structure

Recent Repairs and Date

Topography of Country below Dam

Nature of Buildings and Roads below Dam

Number of Acres in Pond Drainage Area in Square Miles

Discharge in Second Feet per Square Mile

Estimated Storage Million Cubic Feet

WORCESTER COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Messrs Ware-Rolton & Miller contractor present

Inspected by L.O.M.L.H. Spafford Date 8-10-1939 Dam No. 14-03

Town Webster Location French River

Owner American Woolen Co. Use _____

SPILLWAY

El. top abutment _____ El. Crest _____ El. Apron _____ El. St. Bed _____

Width top Abut. _____ Width top Crest _____ Width bottom Sp. way _____

Width flashboards _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Pipe _____

Kind of Foundation under Spillway _____

Condition started reconstruction of new dam without notifying eng. office- easterly abutment of spillway forms in place- foundation spillway on bed of stream must lower at least 18 inches. foundation hardpan and large boulders.

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Borrom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES

Location _____

Size _____ Kind _____ El. Flowline _____

Condition _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Number Acres in Pond _____ Drainage Area in Sq. Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

WORCESTER COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

14-03

Inspected by J. H. Allyn Date Aug 11 1939 Dam No. 55-03

Town Uxbridge Location Amesbury River in

Owner _____ Use (over)

SPILLWAY

El. top abutment _____ El. Crest _____ El. Apron _____ El. St. Bed _____

Width top Abut. _____ Width top Crest _____ Width bottom Sp. way _____

Width flashboards _____ Kind Flashboards _____

El. Flowline Clearout Pipe _____ Size and Kind Pipe _____

Kind of Foundation under Spillway _____

Condition There is a depth of 12' down - much in it - all over the

material

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width top _____

Width at Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Piering _____

Material in Embankment _____ Foundation _____

Condition _____

GATES

Location _____

Size _____ Kind _____ El. Flowline _____

Condition _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Number Acres in Pond _____ Drainage Area in Sq. Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

...to the ... and ... all ...
... to ... Mr. ...
... to ... has been made as
... by Mr. ... Work started ...
... (6' deep by 8 or 9 ft long) ...
... into west end of ... and ...
... the old dam. The intention is to put up ...
... and support the ... which ...
... out of the ... work. The ... is ...
... considerably in ... side of ... into the
... large ... moved until 1-30 when I ...
... the place ... for ... work due to
... of ... and after ... with
... the ... work ... by 13th (Sunday)
... when pond can be lowered. Recommendation
... pond side of old dam be reinforced with a
... of reinforcing steel or wooden poles and
... weight of sand bags placed there - when
... down ... pole out the ... with
... the ...

COUNTY OF WORCESTER MASSACHUSETTS

COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

14-03

Inspected by L. H. Spafford Date Aug 12/1939 Dam No. 55-05

Town Webster Location American Wooden Co.

Owner _____ Use (over)

Material and Type _____

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition _____

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES

Size _____ Kind _____ El. Flowline _____

Condition _____

WHEEL

Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

Aug 12, 1954
Visited job & found that Mr. Ware had been there
and did not want boulders removed. Pond was
drawn down about 3 1/2 ft and work again
commenced undercutting boulders. A timber shore
and a timber thrust were placed to secure boulders.
Blas day was removed down to about grade
420 where gravel and hard pan were
encountered. Forms were built and concrete
totalling 22 bags of cement of a mix somewhat
stronger than 1:2:4 was poured. Just before
completion, a considerable amount of
earth and rock fell from the
west side of the ditch narrowly
escaping injuring a man.

COUNTY OF WORCESTER MASSACHUSETTS
COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by R. H. Spafford Date Aug 13/39 Dam No. 55-02

Town Wichita Location American Western Co.

Owner _____ Use _____

Material and Type _____ (over)

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition _____

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES

Size _____ Kind _____ Location _____ El. Flowline _____

Condition _____

WHEEL

Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

Aug 13, 1954

Visited job in afternoon - no progress
since Saturday except a small amount
of form work for the main spillway.
No excavating work done on this side.

COUNTY OF WORCESTER MASSACHUSETTS
COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by J. H. Drafford - L. O. Harb Date 8/14/39 Dam No. 55-03

Town Webster Location American Works Co

Owner _____ Use _____

Material and Type _____ (concrete)

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition Concrete spillway with some pouring around gate structure
inspection - 10/21

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES

Location _____

Size _____ Kind _____ El. Flowline _____

Condition _____

WHEEL _____ Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

Arrived at job at 1:30 P.M. Excavation work E-14-39
going on at east end of spillway and forms
being placed in preparation for pouring tomorrow.
Retained copy of letter and supplementary plan
to Mr. Ford.

COUNTY OF WORCESTER MASSACHUSETTS

COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

14-03

Inspected by H. J. Gifford Date 8/15/39 Dam No. 55-03

Town Webster Location American Works Co.

Owner _____ Use _____

Material and Type _____ (over)

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition _____

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES

Size _____ Kind _____ Location _____ El. Flowline _____

Condition _____

WHEEL

Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

8-15-39
Mr. Tharden called job at 8-15 and ordered
no pouring of concrete until personal inspection
by him of foundations. Arrived at job
& found some concrete already poured but
no pouring going on at that time as per
his orders. Mr. Tharden recommended that
the grade be lowered in one respect and
the trouble rectified with grant before
pouring & grade was lowered and
pouring resumed. Horizontal key was
placed and bulldozed machine to slope
the front of end of shafted section.

WORCESTER COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by L.O. Marden Date 8-15-1939 Dam No: 65-01

Town Lobster Location French River

Owner American Woolen Co. Use

SPILLWAY

El. top abutment El. Crest El. Apron El. St. Bed

Width top Abut. Width top Crest Width bottom Sp. way

Width flashboards Kind Flashboards

El. Flowline Cleanout Pipe Size and Kind Pipe

Kind of Foundation under Spillway

Condition easterly abutment poured-also easterly section new open spillway-have excavated westerly bank for additional cutoff foundation under spillway excavated toward west side River.

EMBANKMENT

El. Top El. Natural Ground Width Top

Width of Borrom Upstream Slope Downstream Slope

Kind of Corewall Riprap

Material in Embankment Foundation

Condition

GATES

Location

Size Kind El. Flowline

Condition

Evidence of Leaks in Structure

Recent Repairs and Date

Number Acres in Pond Drainage Area in Sq. Miles

Discharge in Second Feet per Square Mile

Estimated Storage Million Cubic Feet

COUNTY OF WORCESTER MASSACHUSETTS
COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

14-03

Inspected by C.H. Spafford Date 8/14/39 Dam No. 55-A2

Town Webster Location American Works Co.

Owner _____ Use _____

Material and Type _____ (over)

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition _____

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES

Size _____ Kind _____ El. Flowline _____

Condition _____

WHEEL

Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

8-14-59

Arrived at job at 9-15. Paving had not yet
been started. Existing grade was rough and
not properly cleared out. Had the loose
material cleared out and the base
levelled off. Paving started at 11 A.M.
Mixer broke down at 1-15, was out of
commission for one hour. Then cleared
three tailbacks and broke again. Paving
suspended for the day.

COUNTY OF WORCESTER MASSACHUSETTS
COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by J. H. Spafford Date 8/17/39 Dam No. 5-03 14-03

Town Webster Location American Water Co.

Owner _____ Use _____

Material and Type _____ (over)

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition _____

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES

Location _____

Size _____ Kind _____ El. Flowline _____

Condition _____

WHEEL _____ Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

8-17-59
Arrived at job at 2-30. Paving
was in process on parking previous
inspected. Everything apparently OK.

**COUNTY OF WORCESTER MASSACHUSETTS
COUNTY ENGINEER**

Inspection of Dams, Reservoir Dams, and Reservoirs.

14-03

Inspected by J.H. [unclear] Date 5/24/30 Dam No. 5522

Town Uxbridge Location American Water Co.

Owner _____ Use _____

Material and Type _____ (concrete)

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition _____

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES _____ Location _____

Size _____ Kind _____ El. Flowline _____

Condition _____

WHEEL _____ Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

8-21-39

Arrived at job at 9:45 AM. In morning
had been out to end of lower canyon
section. Council section had been in
the way on the south side for
about 15 ft back from end of work.
Had been out of being out of line
and again. Told me that I
had not been out of line for
the day.

**COUNTY OF WORCESTER MASSACHUSETTS
COUNTY ENGINEER**

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by P.H. Spafford Date 8/22/39 Dam No. 55-03 14-03

Town Webster Location American Water Co.

Owner _____ Use Cover

Material and Type _____

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition _____

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES _____ Location _____

Size _____ Kind _____ El. Flowline _____

Condition _____

WHEEL _____ Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

B-22-39

Visited job at 9-30 A.M. - Forms were
being put up for the main spillway. Men
were digging out loose concrete as per
my memorandum to Mr. Cook yesterday.

COUNTY OF WORCESTER MASSACHUSETTS
COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by *R. D. Lindsay*

Date *Aug 21 59*

Dam No. *55-03*
14-53

Town *Worcester*

Location

Owner *Amer. Woolen Co*

Use

Material and Type *Inspected paving of conc in spillway*

Dam Designed by

Constructed by

Year

SPILLWAY

El. top Abutment

El. Crest

El. Apron

El. Streambed

Width top Abutment

Width top Crest

Width bottom Spillway

Width Flashboards carried

Kind Flashboards

El. Flowline Cleanout Pipe

Size and Kind Cleanout Pipe

Kind of Foundation under Spillway

Condition

EMBANKMENT

El. Top

El. Natural Ground

Width Top

Width of Bottom

Upstream Slope

Downstream Slope

Kind of Corewall

Riprap

Material in Embankment

Foundation

Condition

GATES

Location

Size

Kind

El. Flowline

Condition

WHEEL

Kind

Size

Rated H. P.

Location

Ave. Head

Evidence of Leaks in Structure

EXAMINED

8-21-59

Recent Repairs and Date

Topography of Country below Dam

Nature of Buildings and Roads below Dam

Number Acres in Pond

Drainage Area in Square Miles

Discharge in Second Feet per Square Mile

Estimated Storage Million Cubic Feet

COUNTY OF WORCESTER MASSACHUSETTS
COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

14-03

Inspected by J. H. Lafford Date 8/28/37 Dam No. 55-03

Town Woburn Location American

Owner _____ Use _____

Material and Type _____ (Cover)

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition _____

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES

Location _____

Size _____ Kind _____ El. Flowline _____

Condition _____

WHEEL _____ Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

8-26-39

Visited job at 10 A.M. and inspected
foundation of west structure. Had a
laborer strike with pick to observe
hardness of footing. Down to grade and
hard except in one section where
some clay had worked in. Called
Mr. Lord's attention to this and he
agreed to remove the clay and clear
out some of loose rocks and to
make it for the grade.

COUNTY OF WORCESTER MASSACHUSETTS
COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by S. H. Spofford Date 8/31/37 Dam No. 45-3

Town Worcester Location Indian Orchard

Owner _____ Use Cover

Material and Type _____

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition _____

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES

Size _____ Kind _____ Location _____ El. Flowline _____

Condition _____

WHEEL

Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

8-31-39
Visited job at 2 PM. Pouring of last section
of Spillway was in process. Keys were placed
properly. Everything apparently OK.

COUNTY OF WORCESTER MASSACHUSETTS

COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by L. H. Spiller Date 9/1/39 Dam No. 5563

Town Uxbridge Location American Water Co.
 Owner _____ Use (Cover)
 Material and Type _____

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY—Length _____ Feet Depth _____ Feet

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____

Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____

Width Flashboards carried _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____

Kind of Foundation under Spillway _____

Condition _____

EMBANKMENT—Length overall _____ Feet

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES _____ Location _____

Size _____ Kind _____ El. Flowline _____

Condition _____

WHEEL _____ Kind _____ Size _____ Rated H. P. _____

Location _____ Ave. Head _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

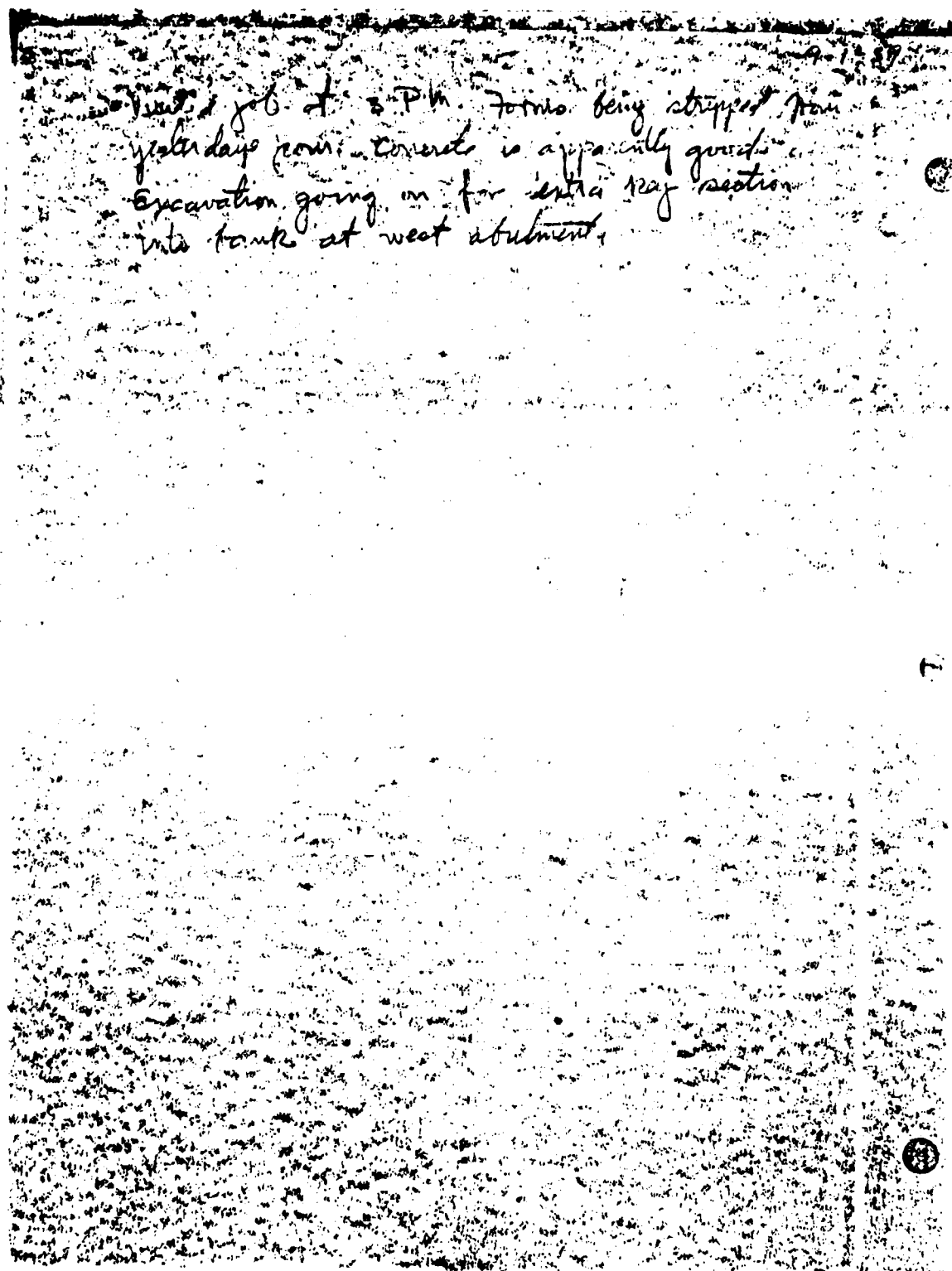
Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number of Acres in Pond _____ Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____



COUNTY OF WORCESTER MASSACHUSETTS

COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by L. H. Safford Date Sept 7 1937 Page No. ET-02

Name Union Location American Water Co.

Owner Am. Water Co. Use (C-1)

Material and Type (C-1)

Dam Designed by Constructed by Year

SPILLWAY—Length Feet. Depth Feet

El. top Abutment El. Crest El. Apron El. Streambed

Width top Abutment Width top Crest Width bottom Spillway

Width Flashboards carried Kind Flashboards

El. Flowline Cleanout Pipe Size and Kind Cleanout Pipe

Kind of Foundation under Spillway

Condition

EMBANKMENT—Length overall Feet

El. Top El. Natural Ground Width Top

Width of Bottom Upstream Slope Downstream Slope

Kind of Corewall Riprap

Material in Embankment Foundation

Condition

GATES Location

Size Kind El. Flowline

Condition

WHEEL Kind Size Rated H. P.

Location Ave. Head

Evidence of Leaks in Structure

Recent Repairs and Date

Topography of Country below Dam

Nature of Buildings and Roads below Dam

Number of Acres in Pond Drainage Area in Square Miles

Discharge in Second Feet per Square Mile

Estimated Storage Million Cubic Feet

Sept 2, 1939

Had final inspection today. Concrete including extra work has all been poured. All concrete appears to be C.K. Got information from Mr. Ford on dimensions of extra work.

COUNTY OF WORCESTER MASSACHUSETTS
COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by W. A. Lindquist Date Dec. 11, 1950 Dam No. 14-03

Town Dudley Location French River - on Water T. Line
Owner American Elec. Co. Use _____
Material and Type _____

Dam Designed by _____ Constructed by _____ Year _____

SPILLWAY

El. top Abutment _____ El. Crest _____ El. Apron _____ El. Streambed _____
Width top Abutment _____ Width top Crest _____ Width bottom Spillway _____
Width Flashboards carried _____ Kind Flashboards _____
El. Flowline Cleanout Pipe _____ Size and Kind Cleanout Pipe _____
Kind of Foundation under Spillway _____
Condition O.K. 1937 repairs and new gate completed

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____
Width of Bottom _____ Upstream Slope _____ Downstream Slope _____
Kind of Corewall _____ Riprap _____
Material in Embankment _____ Foundation _____
Condition O.K.

GATES

Location _____
Size _____ Kind _____ El. Flowline _____
Condition O.K.

WHEEL

Kind _____ Size _____ Rated H. P. _____
Location _____ Ave. Head _____
Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Topography of Country below Dam _____

Nature of Buildings and Roads below Dam _____

Number Acres in Pond _____

Drainage Area in Square Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

WORCESTER COUNTY ENGINEERING DEPT.
WORCESTER, MASS.

DATE June 2, 1948

SUBJECT: Dam No. 14-03 - Dredging

TO

Leaks thru entire face of west half
Spillway

BAR USED
CAR MILEAGE
END TRIP
BEGIN TRIP
TRIP MILES

D. Marden

SIGNATURE

COUNTY OF WORCESTER MASSACHUSETTS
COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by R. M. [unclear]

Date 12-10-45

Dam No. 10-5

Town Dunstable

Location French River

Owner Amherst Water Co. Inc.

Use

Material and Type

Dam Designed by

Constructed by

Year 1912

SPILLWAY

El. top Abutment

El. Crest

El. Apron

WORCESTER COUNTY
ENGINEERING DEPT.

Width top Abutment

Width top Crest

Width bottom Spillway

Width Flashboards carried

Kind Flashboards

El. Flowline Cleanout Pipe

Size and Kind Cleanout Pipe

Kind of Foundation under Spillway

Condition A.R.

EMBANKMENT

El. Top

El. Natural Ground

Width Top

Width of Bottom

Upstream Slope

Downstream Slope

Kind of Corewall

Riprap

Material in Embankment

Foundation

Condition A.R.

GATES

Location

Size

Kind

El. Flowline

Condition OK

WHEEL

Kind

Size

Rated H. P.

Location

Ave. Head

Evidence of Leaks in Structure

Recent Repairs and Date

Topography of Country below Dam

Nature of Buildings and Roads below Dam

Number Acres in Pond

Drainage Area in Square Miles

Discharge in Second Feet per Square Mile

Estimated Storage Million Cubic Feet

WORCESTER COUNTY ENGINEER
Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by _____ Date 12-30-45 Dam No. _____

Town _____ Location _____

Owner _____ Use _____

SPILLWAY
El. top abutment _____ El. Crest _____ El. Apron _____ El. Ft. Bed _____

Width top Abut. _____ Width top Crest _____ Width bottom Sp. way _____

Width flashboards _____ Kind Flashboards _____

El. Flowline Cleanout Pipe _____ Size and Kind Pipe _____

Kind of Foundation under Spillway _____

Condition _____

EMBANKMENT

El. Top _____ El. Natural Ground _____ Width Top _____

Width of Bottom _____ Upstream Slope _____ Downstream Slope _____

Kind of Corewall _____ Riprap _____

Material in Embankment _____ Foundation _____

Condition _____

GATES

Location _____

Size _____ Kind _____ El. Flowline _____

Condition _____

Evidence of Leaks in Structure _____

Recent Repairs and Date _____

Number Acres in Pond _____ Drainage Area in Sq. Miles _____

Discharge in Second Feet per Square Mile _____

Estimated Storage Million Cubic Feet _____

TOWN Dudley-WebsterDAM NO. 14-03-55LOCATION Am. Woolen Co. PlantSTREAM French R.

WORCESTER COUNTY ENGINEERING DEPARTMENT

WORCESTER, MASSACHUSETTS

DAM INSPECTION REPORT

OWNED BY Am. Woolen Co.PLACE WebsterUSE power-ind-INSPECTED BY L.O. MardenDATE Dec. 1, 1947TYPE OF DAM Concrete spillway typeCONDITION goodSPILLWAYFLASHBOARDS IN PLACE 12"RECENT REPAIRS noneCONDITION goodREPAIRS NEEDED noneEMBANKMENTRECENT REPAIRS noneCONDITION goodREPAIRS NEEDED noneGATESRECENT REPAIRS noneCONDITION goodREPAIRS NEEDED none ; except need walkway from across canal to gates at spillway.LEAKSHOW SERIOUS none visibleDATE Dec. 1, 1947*L.O. Marden*
COUNTY ENGINEER

NAME DUGAN, J. WEBSTER DAM NO. 78-05
 LOCATION IN CO. PLACE WEST STREAM REACH
WORCESTER COUNTY ENGINEERING DEPARTMENT
WORCESTER, MASSACHUSETTS
DAM INSPECTION REPORT
 OWNED BY AMERICAN NO. 10 PLACE WEST USE Power
 INSPECTED BY J. J. Gannon DATE Oct 11, 1968
 TYPE OF DAM Roller Compacted CONDITION Stagnant
SPILLWAY
 FLASHBOARDS IN PLACE _____ RECENT REPAIRS _____
 CONDITION _____
 REPAIRS NEEDED _____
EMBANKMENT
 RECENT REPAIRS _____
 CONDITION _____
 REPAIRS NEEDED _____
GATES
 RECENT REPAIRS _____
 CONDITION _____
 REPAIRS NEEDED _____
LEAKS
 HOW SERIOUS Numerous leaks in Stone Dam on West side of Reach
 DATE _____
 COUNTY ENGINEER _____

Town Dudley-Webster

LOCATION Am. Woolen Co.

and 42 Zeebich R.

**WORCESTER COUNTY ENGINEERING DEPARTMENT
WORCESTER, MASSACHUSETTS**

DAM INSPECTION REPORT

OWNED BY Dudley-Webster Realty Corporation PLACE Webster, Mass. USE industrial
INSPECTED BY L.O. Marden-W.O. Lindquist DATE July 25, 1955

TYPE OF DAM Stone and concrete CONDITION good, except around east gate section.

SPILLWAY

FLASHBOARDS IN PLACE yes RECENT REPAIRS none

CONDITION East abutment of spillway in bad condition - concrete spalling off.
REPAIRS NEEDED Need to wire mesh and gunnite abutment

EMBANKMENT

RECENT REPAIRS None
CONDITION appears O.K.
REPAIRS NEEDED cut off brush

GATES

RECENT REPAIRS None
CONDITION East end spillway, cleanout gates concrete structure spalled
REPAIRS NEEDED badly around top two gate openings - East gate mechanism is missing. Need to repair concrete - probably "gunnite" is quickest and easiest process.

LEAKS

HOW SERIOUS Water over spillway, and cannot determine whether any leaks.

DATE July 25, 1955

L. O. Marden
COUNTY ENGINEER

TOWN DudleyDAM NO. 1205

LOCATION _____

STREAM _____

WORCESTER COUNTY ENGINEERING DEPARTMENT
WORCESTER, MASSACHUSETTS

DAM INSPECTION REPORT

OWNED BY Amherst Wood

PLACE _____

USE _____

INSPECTED BY LHS, LHSDATE Sept. 13, 1955

TYPE OF DAM _____

CONDITION _____

SPILLWAY

FLASHBOARDS IN PLACE _____

RECENT REPAIRS _____

CONDITION OK - both main & end spillways

REPAIRS NEEDED _____

EMBANKMENT

RECENT REPAIRS _____

CONDITION _____

REPAIRS NEEDED water end overtopped - No apprec. damageGATES

RECENT REPAIRS _____

CONDITION _____

REPAIRS NEEDED Rock & iron appear OKLEAKS

HOW SERIOUS _____

DATE _____

COUNTY ENGINEER _____

TOWN Dorchester DATE 5/23/57
LOCATION French River STREAM French River

WORCESTER COUNTY ENGINEERING DEPARTMENT
WORCESTER, MASSACHUSETTS

DAM INSPECTION REPORT

OWNED BY Webster-Dudley Realty Co. PLACE _____ USE _____
INSPECTED BY L.O.M. DATE May 1957

TYPE OF DAM _____ CONDITION _____

SPILLWAY

FLASHBOARDS IN PLACE _____ RECENT REPAIRS _____
CONDITION _____
REPAIRS NEEDED _____

EMBANKMENT

RECENT REPAIRS _____
CONDITION _____
REPAIRS NEEDED _____

GATES

RECENT REPAIRS _____
CONDITION Poor condition and cannot be worked
REPAIRS NEEDED Mechanism of one gate missing
Can form the walls for supporting gates in poor condition
Bridge shall be constructed from east bank of canal to gate
structure. Plans shall be drawn by competent Engineer

LEAKS

HOW SERIOUS _____

DATE _____

Letter sent to Kunkel Brock Co.
in May 3, 1957.

COUNTY ENGINEER _____

TOWN Dudley - Webster

DAM NO. 17-1014

LOCATION _____

STREAM _____

WORCESTER COUNTY ENGINEERING DEPARTMENT

WORCESTER, MASSACHUSETTS

DAM INSPECTION REPORT

OWNED BY Kimball Pond

PLACE Webster

USE Navy

INSPECTED BY LDM

DATE

1956

TYPE OF DAM _____

CONDITION _____

SPILLWAY

FLASHBOARDS IN PLACE

None

RECENT REPAIRS

None

CONDITION

Looks - good - within spec

REPAIRS NEEDED _____

EMBANKMENT

RECENT REPAIRS

None

CONDITION

Fair

REPAIRS NEEDED

Fill in against abt

GATES

RECENT REPAIRS

None

CONDITION

Poor - Concrete walls disintegrated

REPAIRS NEEDED

Some of gate mechanism disappeared

LEAKS

HOW SERIOUS

cant tell

DATE _____

L. O. Mason
COUNTY ENGINEER

NAME Webster DAM NO. 553
LOCATION Central Works STREAM 18-93

WORCESTER COUNTY ENGINEERING DEPARTMENT
WORCESTER, MASSACHUSETTS

DAM INSPECTION REPORT

OWNED BY Kunkel Bros PLACE Webster USE _____
INSPECTED BY Lou DATE 12
TYPE OF DAM _____ CONDITION _____

SPILLWAY

FLASHBOARDS IN PLACE None RECENT REPAIRS _____
CONDITION Looks OK.
REPAIRS NEEDED _____

EMBANKMENT

RECENT REPAIRS None
CONDITION Fair
REPAIRS NEEDED _____

GATES

RECENT REPAIRS None
CONDITION Concrete bulkheads poor - 1 gate missing
REPAIRS NEEDED Rebuild

LEAKS

HOW SERIOUS _____

DATE 1973

Im
COUNTY ENGINEER

LOCATION Concord (North) Dam
270 Am. Webster St

DAM NO. 100
STREAM Concord River

WORCESTER COUNTY ENGINEERING DEPARTMENT
WORCESTER, MASSACHUSETTS

DAM INSPECTION REPORT

OWNED BY Kunkel Bros PLACE Webster USE Power

INSPECTED BY L. E. M. DATE May 7, 1957

TYPE OF DAM Spillway CONDITION Poor at gate section at spillway

SPILLWAY

FLASHBOARDS IN PLACE None RECENT REPAIRS None

CONDITION Spillway looks OK

REPAIRS NEEDED At concrete abut in which gate section is located

EMBANKMENT

RECENT REPAIRS None

CONDITION OK

REPAIRS NEEDED None

GATES

RECENT REPAIRS None

CONDITION Concrete gate structure on island in poor condition

REPAIRS NEEDED Need to completely rebuild - one gate frame & hoist has fallen into River - Needs cotter pins

LEAKS

HOW SERIOUS None

DATE May 7, 1957

L. E. M.
COUNTY ENGINEER

TOWN Dudley-Webster DAM NO. 14-03
LOCATION Above the Mills STREAM Fresh River

South Village

WORCESTER COUNTY ENGINEERING DEPARTMENT
WORCESTER, MASSACHUSETTS

DAM INSPECTION REPORT

Dudley-Webster Realty Corp - 19.5

Owned by _____ Place Webster Use Mill Pond

Inspected by WOL Date Oct 25, 1963

Type of Dam Stone and concrete Condition Fair

SPILLWAY

Flashboards in Place No boards Recent Repairs _____

Condition The concrete near the flood gate is beginning to

Repairs Needed disintegrate. This spillway should be maintained

EMBANKMENT

Recent Repairs Good condition

Condition The concrete abutment wall on the westerly and

Repairs Needed at the spillway is beginning to spall.

GATES

Recent Repairs The flood gate near the center of the dam

Condition is inoperative. No walkway.

Repairs Needed _____

LEAKS

How Serious _____

DATE: _____ County Engineer

INSPECTION REPORT & DATA FOR DAMS

Owner: DUDLEY - WEBSTER REALTY CORP
 His Address: 331 S. MAIN ST WEBSTER
 Function of Dam: SOUTH VILLAGE DAM & MILL POND

Location & Access: 100 yds SOUTH FLEMING ST
S. MAIN ST & MAIN ST
 USGS Quad. Webster Lat. 42°03'15" Long. 71°52'50"
 Drain. Ar. 25.39 Sq. Mi.; Ponds: ac.; Res. @ dam: 1500
 Character of D.A.:

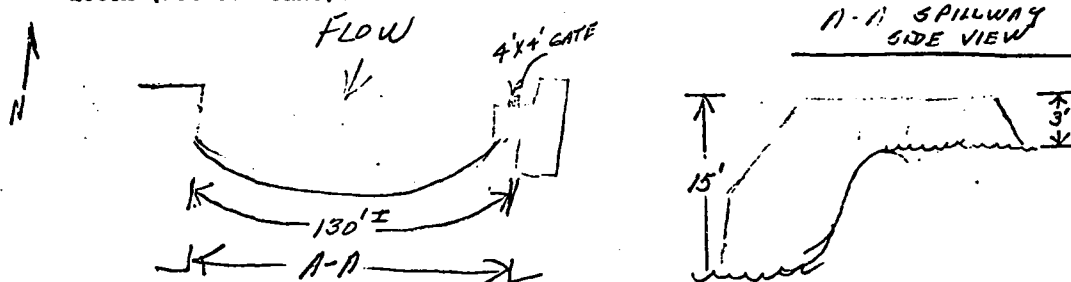
Dam No. 14-03
 Town: WEBSTER
 Stream: CHANNING RIVER
 Pond:
 Date: 1/18/72
 By:
 CONDITION RATING
 Structural: Good
 Hydraulic: 130' X 3'
 General: G.P.D.
 PRIORITY: Normal

Estimated
 Discharge:
 Capacity:

General Description of Dam and Discharge Control:

4' X 4' GATE AT EASTERLY END OF DAM SPILLWAY - NOT
IN USE. GATE CONTROLS RUSTED & ROTTED. SPILLWAY
HAS SOME FLASHBOARDS ON TOP BUT NOT CONTINUOUS.

Sketch (Not to Scale):



Remarks and Recommendations:

Date

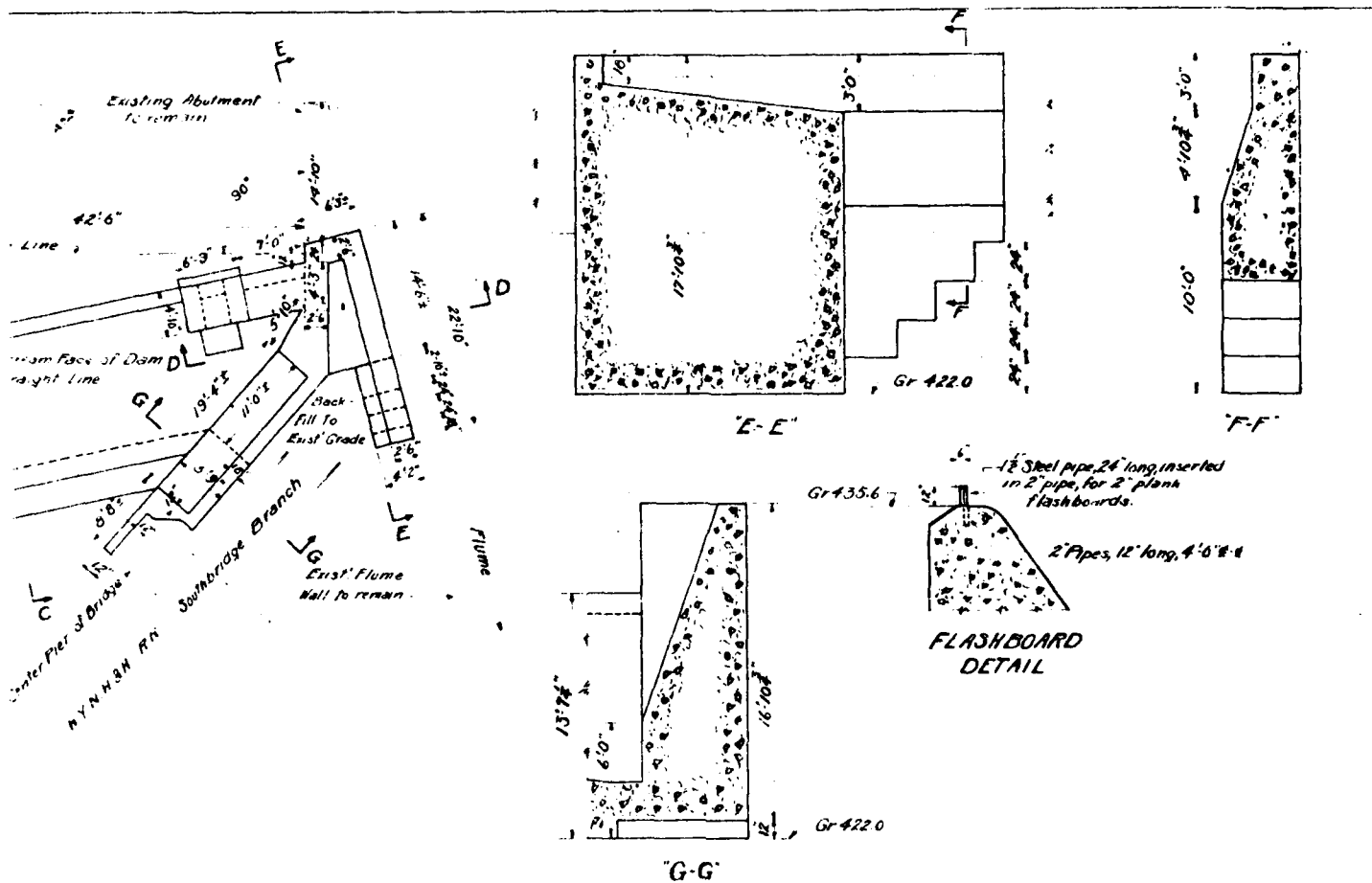
1/18/72

By

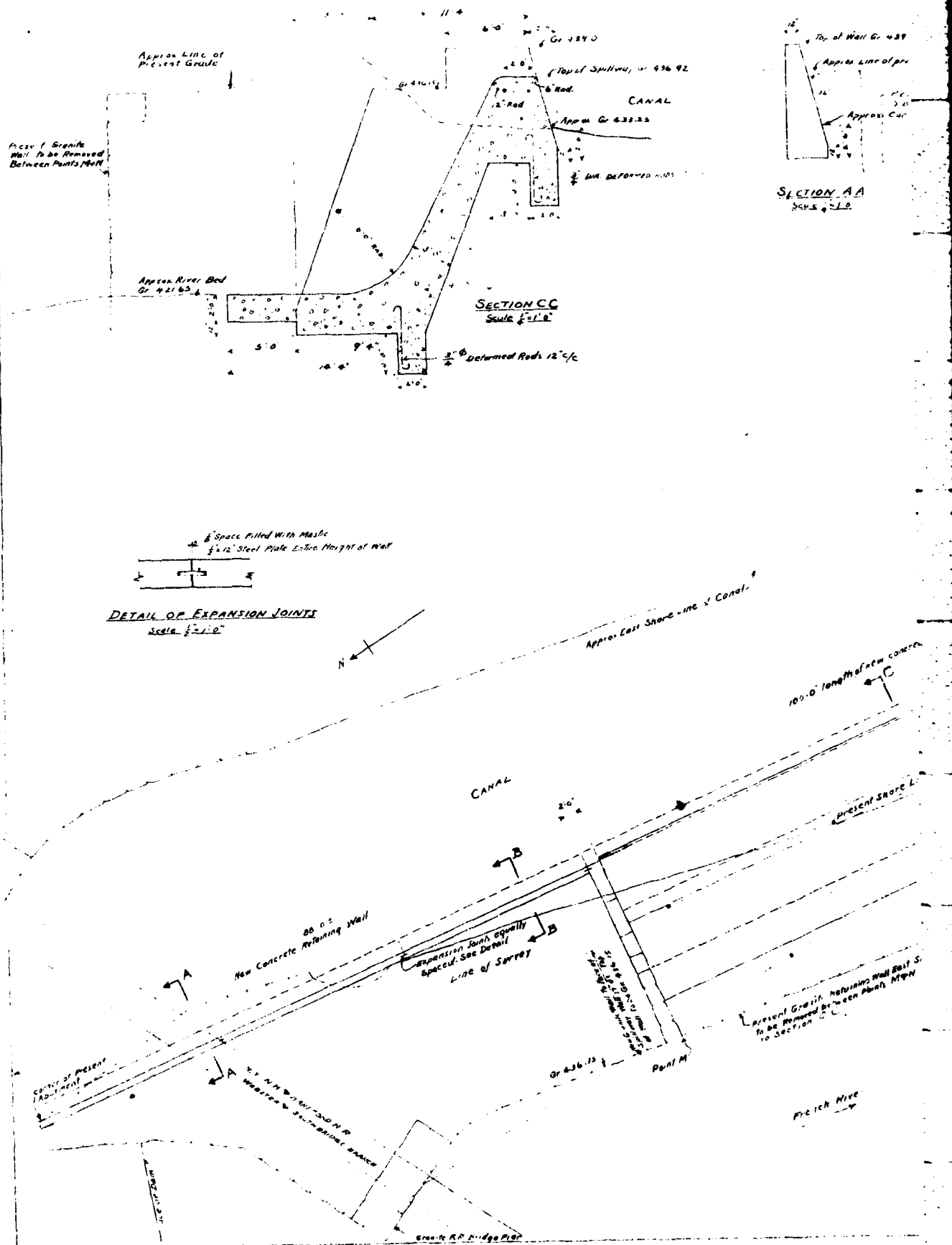
VFP
RA

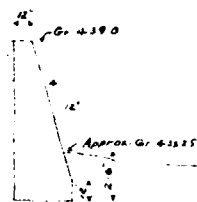
Comment

Dam No. 14-03



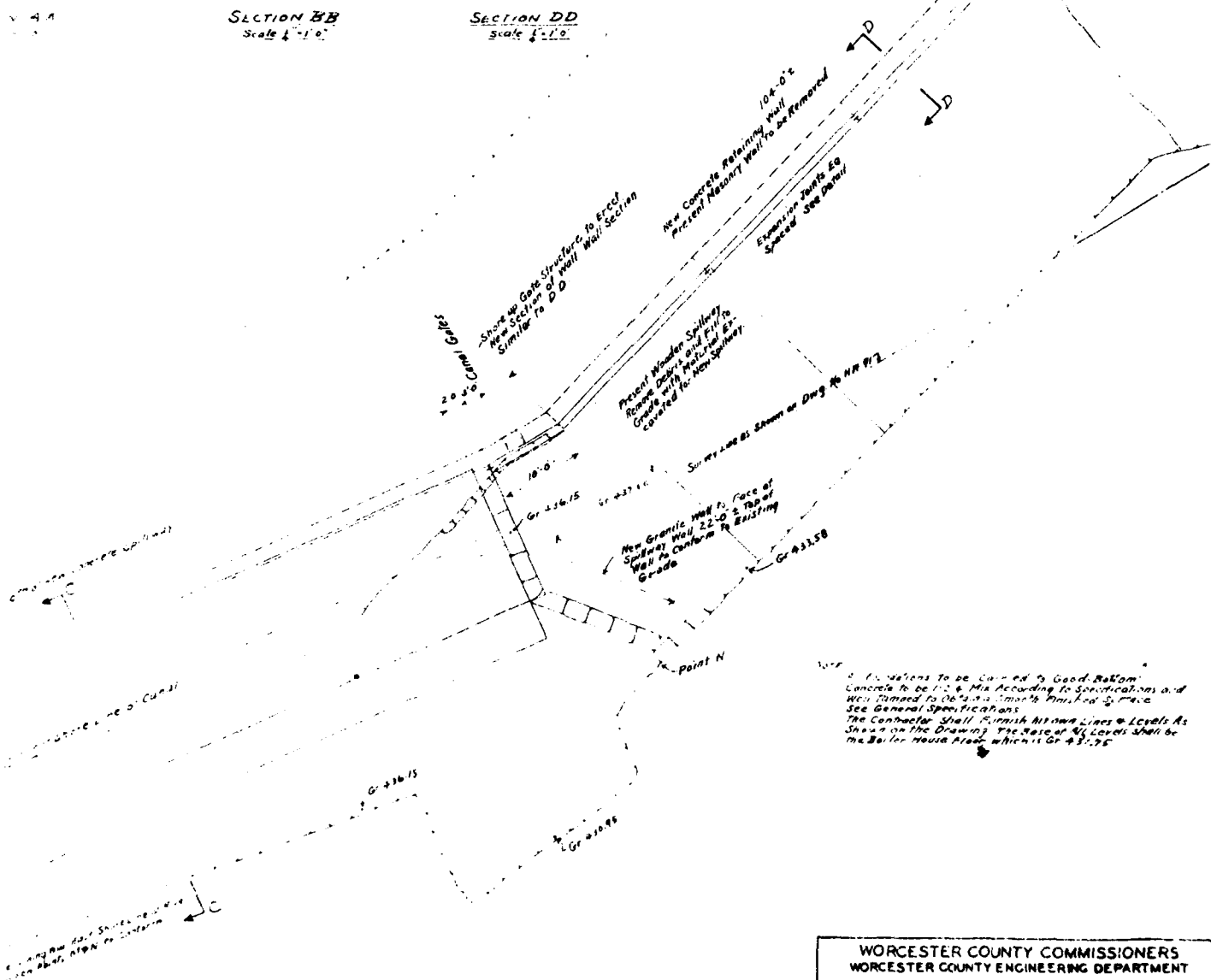
WORCESTER COUNTY COMMISSIONERS WORCESTER COUNTY ENGINEERING DEPARTMENT PLAN OF RECONSTRUCTION OF DAM ACROSS FRENCH RIVER IN WEBSTER AND DUDLEY MASS. FOR AMERICAN WOOLEN CO. INC. AS FILED AND APPROVED BY THE COUNTY COMMISSIONERS	
SCALES AS NOTED	
APPROVED: March 20 1939 <i>Charles L. Ware</i> CHAIRMAN BOARD OF COUNTY COMMISSIONERS	SUBMITTED FOR APPROVAL March 20 1939 <i>Charles L. Ware</i> COUNTY ENGINEER
2100 X 15/16 COUNTY COMMISSIONER Francis J. Connelley COUNTY COMMISSIONER	CHARLES L. WARE ENGINEER DAM NO. 55-03





SECTION BB
Scale 1" = 10'

SECTION DD
scale 1"=10'



2. The waters to be carried to Good-Bottom
Conduit to be laid out According to Specifications and
Well-Plans for the same to be finished by June
See General Specifications
The Contractor shall furnish his own Lines & Levels As
Shown on the Drawing. The Rate of 4/1 Levels shall be
the Bailer House Piers which is Gr 43.25.

APPENDIX C
SELECTED PHOTOGRAPHS OF PROJECT

LOCATION PLAN

Location of Photographs

Page No.

C-1

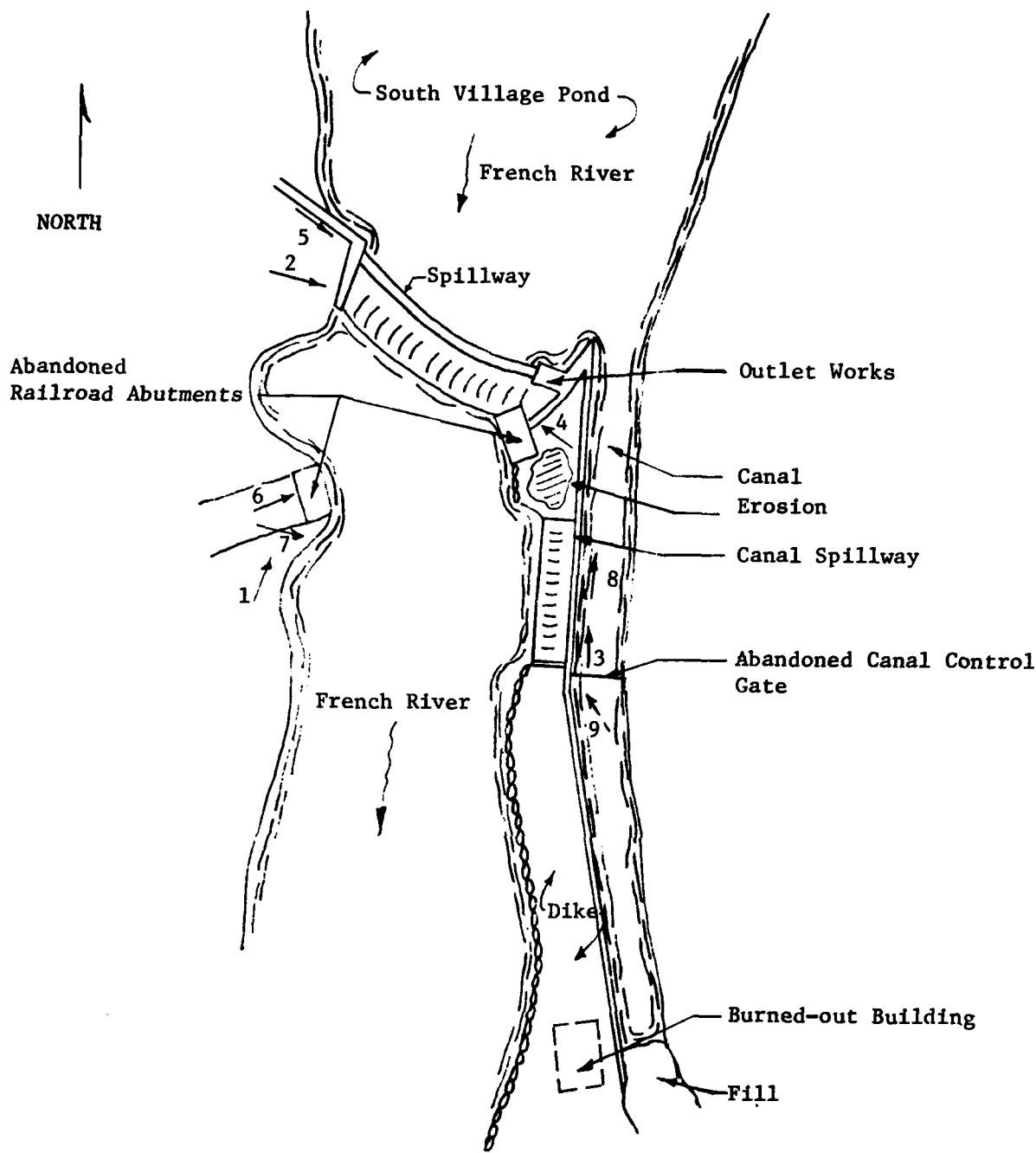
PHOTOGRAPHS

No.

Title

Page No.

- | | | |
|----|--|-----|
| 1. | Overview of Dam from Abandoned
Railroad Bridge Abutment | iv |
| 2. | Overview of Dam from Right Bank | C-2 |
| 3. | Overview of Dam from Downstream
end of Canal Spillway | C-2 |
| 4. | Overview of Main Spillay Crest
and Right Abutment | C-3 |
| 5. | Overview of Crest and Left Abutment | C-3 |
| 6. | Outlet Works at Left Abutment
of Dam | C-4 |
| 7. | Downstream Face of Canal Spillway | C-4 |
| 8. | Right Sidewall of Canal Spillway | C-5 |
| 9. | Abandoned Canal Control Gates | C-5 |



Notes:

1. PLAN BASED ON SEPT. 1936 AND MARCH 1939 DRAWINGS AND CDM FIELD OBSERVATIONS.
2. 1 DENOTES PHOTOGRAPH NUMBER AND DIRECTION OF VIEW.

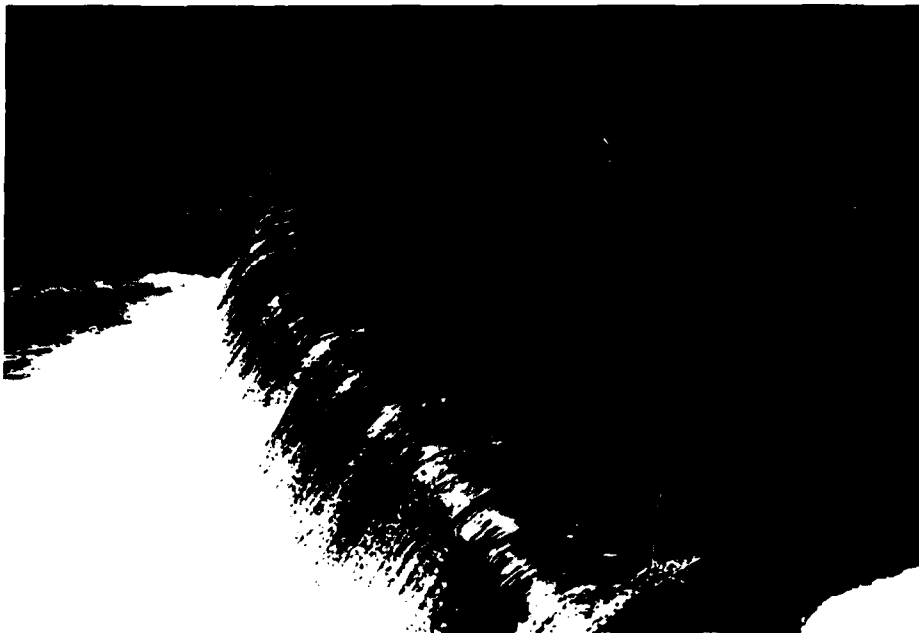
CAMP DRESSER & McKEE, INC. BOSTON, MASSACHUSETTS		U.S. ARMY ENG. DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.	
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS			
LOCATION OF PHOTOGRAPHS			
SOUTH VILLAGE POND DAM		MASSACHUSETTS	
		Scale: Not To Scale	
		Date: November 1979	



2. OVERVIEW OF DAM FROM RIGHT BANK.



3. OVERVIEW OF DAM FROM DOWNSTREAM END OF CANAL SPILLWAY.



4. OVERVIEW OF MAIN SPILLWAY CREST AND RIGHT ABUTMENT.



5. OVERVIEW OF CREST AND LEFT ABUTMENT.



6. OUTLET WORKS AT LEFT ABUTMENT OF DAM.



7. DOWNSTREAM FACE OF CANAL SPILLWAY.



8. RIGHT SIDEWALL OF CANAL SPILLWAY.



9. ABANDONED CANAL CONTROL GATES.

APPENDIX D

HYDRAULIC AND HYDROLOGIC COMPUTATIONS

FIGURES

Page No.

Drainage Area Map
Dam Failure Impact Area Map

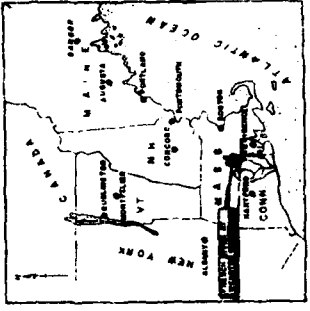
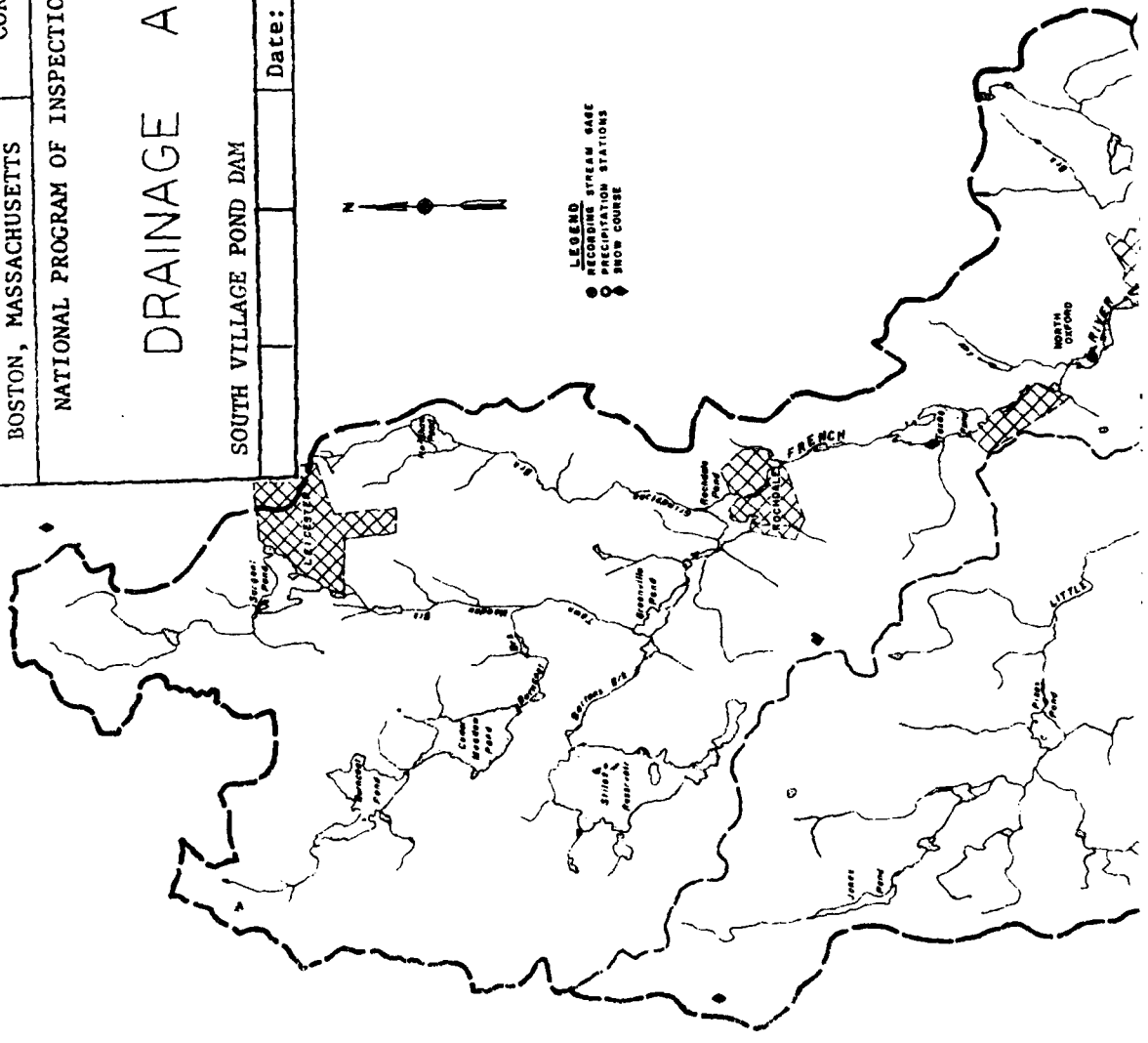
D-1
D-2

COMPUTATIONS

Test Flood Development
Discharge and Storage Capacities
Surcharge-Storage Routing; Outlet Works Capacity
Tailwater Analysis
Dam Failure Analysis

D-3-4
D-5-8
D-9
D-10
D-11-17

CAMP DRESSER & MCKEE, INC. BOSTON, MASSACHUSETTS		U.S. ARMY ENG. DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.	
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS			
DRAINAGE AREA MAP		WEBSTER, MASSACHUSETTS	
SOUTH VILLAGE POND DAM		Date: November, 1979	



- LEGEND**
- RECORDING STREAM GAGE
 - PRECIPITATION STATIONS
 - SNOW COURSE

LOCATION MAP
SCALE IN MILES
0 10 20

AD-A145 330

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
SOUTH VILLAGE DAM (MA.) (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV NOV 79

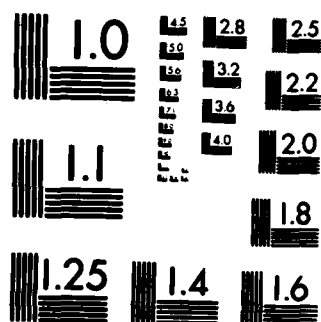
2/2

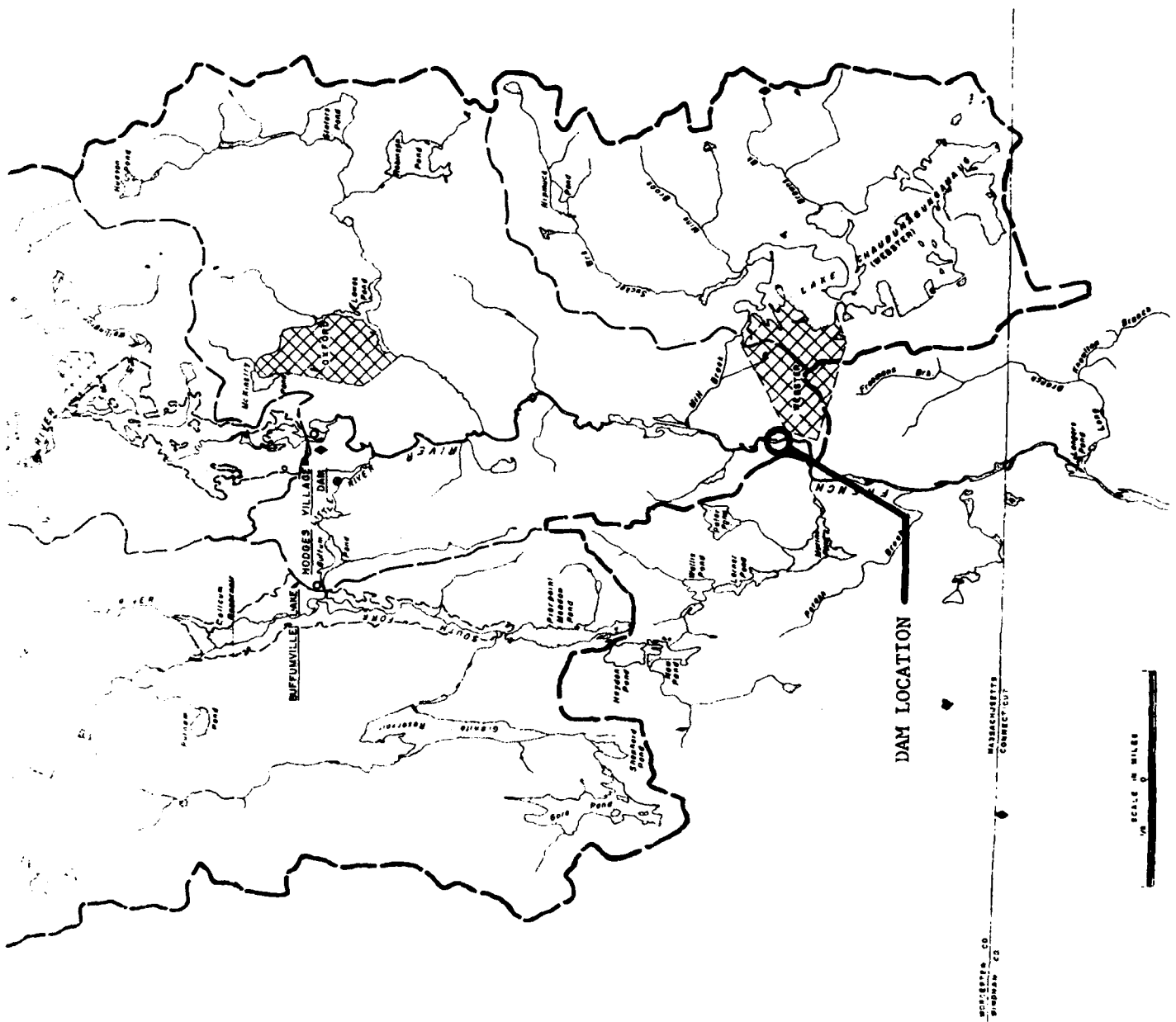
UNCLASSIFIED

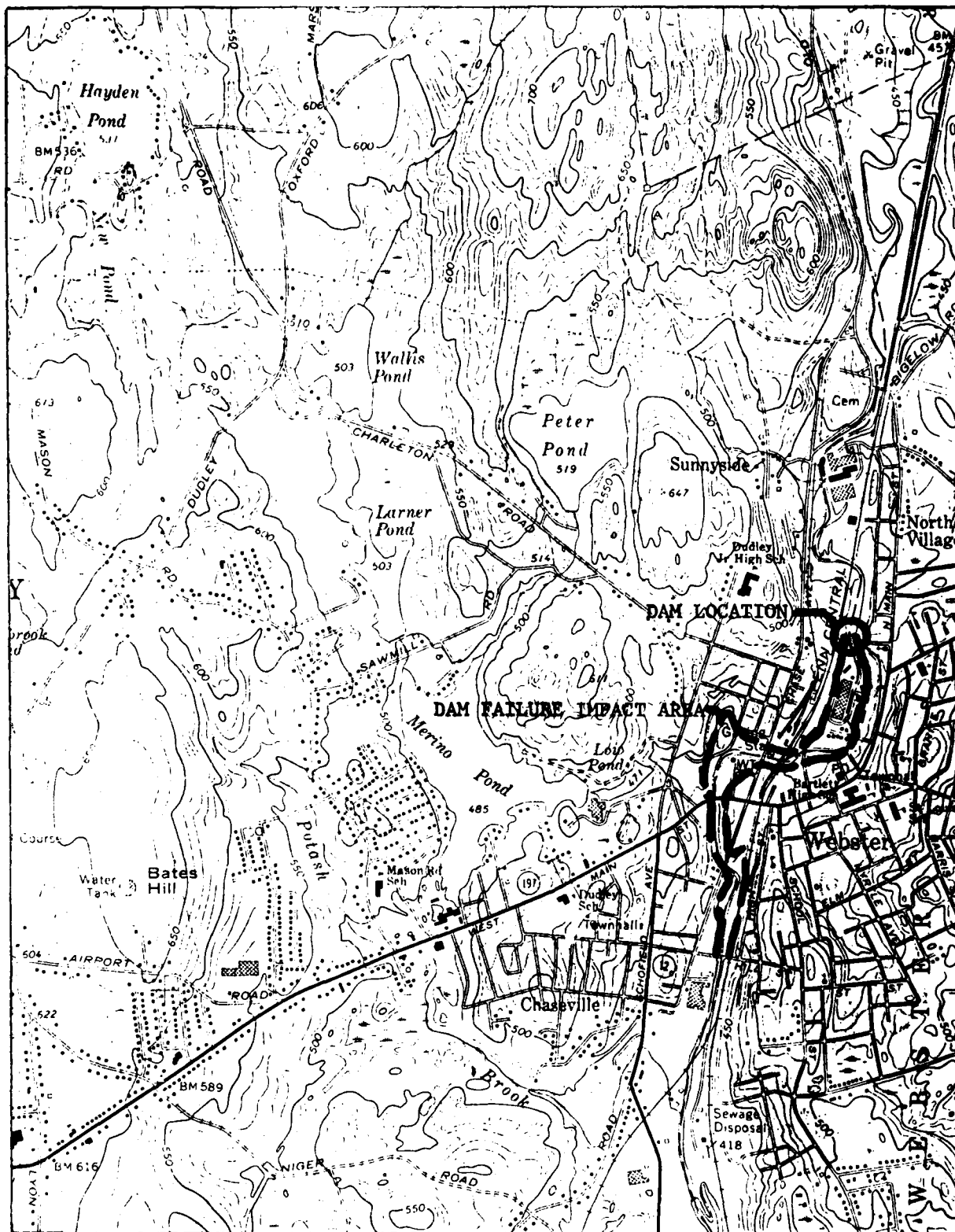
F/G 13/13

NL

END







DAM SOUTH VILLAGE POND DAM

IDENTIFICATION NO. MA 00107



DAM FAILURE IMPACT AREA MAP
USGS QUADRANGLE

WEBSTER, MA-CONN

APPROX. SCALE: 1" = 2000'

CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT CDE
PROJECT Dam Insp.
DETAIL South Village Dam

JOB NO. 382-6-RF-4
DATE CHECKED 10-19-79
CHECKED BY NED

COMPUTED BY Joe H.
DATE 10-15-79
PAGE NO 1

Elevations (based on Local Datum, which is 4.5 feet higher than N.G.V. Datum. Local Datum is the datum referred to on the plans in Appendix B)

Spillway Crest	435.6
Crest of Dam (Abut. El.)	439.9
Toe of Dam	424.0

SURFACE AREAS

Drainage Area = (Drainage Area to U.S.G.S. Gauging^{station} at Webster, MA, about 2,750 ft. downstream of Dam) - (D.A. between Dam and U.S.G.S. Gauging Station)
= 85.3 - 0.70 = 84.6 sq. miles.

Area of Pool at Spillway Crest (El. 435.6) = 4 acres
" " " " Elevation 444.5 = 16 acres
" " " " " 454.5 = 273 acres

STORAGE

@ Spillway Crest El. (El. 435.6), storage, based on above configuration is equal to 12 ac-ft
@ Water Surface El. 444.5, storage = $12 + ((464) / 2) 8.9 = 235 \text{ ac-ft}$
@ W.S. El. 454.5, storage = $235 + ((273 + 46) / 2) 10 = 1830 \text{ ac-ft}$

TEST FLOOD DETERMINATION

The dam size is "small" based on a height of about 16-feet and a storage at the top of dam of 120 ac-ft. The hazard is "high" based on a wet-weather dam failure. Therefore, based on NED, Corps of Engineers Guidelines, the Test Flood range for South Village Dam is:

Test Flood = $\frac{1}{2}$ PMF to a PMF, use $\frac{1}{2}$ PMF

The drainage area to South Village^{Dam} is 84.6 square miles total. Hydrologically, it is divided into three parts as a result of the construction of Hodges Village and the Buffumville Flood Control Reservoirs after the August 1955 Flood in the trench River Basin. Both reservoirs are upstream of South Village Dam and hydrologically divide the watershed into the portion tributary to Hodges Village Reservoir, the portion tributary to Buffumville Reservoir and the intervening portion between the Reservoirs and South Village Dam. Both reservoirs are Corps of Engineers Flood Control impoundment areas.

The drainage area tributary to Hodges Village Reservoir is 31.1 sq. mi, and its "usable capacity" is 577,000,000 cubic feet, based on U.S. Dept. of Interior "Water Resources Data for Massachusetts, New Hampshire, Rhode Island, and Vermont". Based on the same reference, the drainage area tributary to Buffumville Reservoir is 26.5 sq. miles and its "usable capacity" is 555,000,000 cu. ft.

The runoff for a $\frac{1}{2}$ PMF is 9.5 inches. Given such a runoff from the D.A. tributary to the Hodges Village Reservoir, the reservoir could potentially retain up to 95 percent of the runoff. The Buffumville Reservoir could potentially retain about 89 percent of the total runoff tributary to it under a $\frac{1}{2}$ PMF condition. Therefore, assume a contribution of zero flow from the drainage areas tributary to both Hodges Village and Buffumville Reservoirs to the peak inflow at South Village Dam. Thus, the test flood for South Village Dam is based on the drainage area downstream of the flood control reservoirs and upstream of the dam, or an area of 27 square miles. About half of this area is tributary to Lake Chaubunagungamaug, which has considerable storage potential. The other half lies along the French River which offers a wide flood plain. The test flood inflow rate is based on a point $\frac{1}{2}$ the way between the "rolling" and "flat and coastal" curves of the NED Corps of Engineers "Preliminary Guidance for Estimating Maximum Probable Discharge in Phase I Dam Safety Investigations" March 1978. It is noteworthy that the Hodges Village and Buffumville Reservoirs were both used as data points in the development of the above mentioned curves. Both reservoirs fall on the "rolling curve". However, their watershed characteristics differ markedly from those for the 27 sq. mi. drainage area downstream.

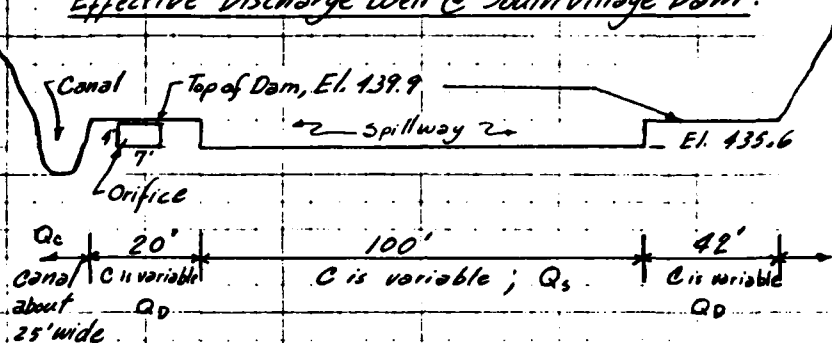
$$\text{Test Flood Inflow} \approx \frac{1}{2} (1175 \text{ cfs/sq. mi.} \times 27 \text{ sq. mi.}) = 15,860 \text{ cfs.}$$

say 15,850 cfs

The approximate flow over the dam at the peak of the August 1955 flood was 14,300 cfs, based on an interpolation of the 14,400 cfs recorded at the USGS gaging sta. about 2,750 ft downstream.

STAGE-DISCHARGE RELATIONSHIP

Effective Discharge Weir @ South Village Dam:



The canal runs along the left bank of the French River for 200 or so feet with a concrete wall separating it from the River. The canal begins to discharge to the river when the water surface reaches an elevation of 436.6, or a foot higher than the spillway crest. Discharge from the canal is initially via a length of 103 feet of wall with elevation 436.6, then along the whole length of the canal at water elevations greater than 439.9, see Appendix B for plans of the dam and the canal. Based on the March 1936 and the August 1955 floods, a rating curve was developed for the canal as shown on the next page. This curve takes into account the discharge recorded at the gaging station just downstream of the dam which was then adjusted to discount inflow from the intervening drainage area as well as flows occurring over the dam and the spillway. The capacity of the spillway and the dam crest were determined by conventional hydraulic relationships.

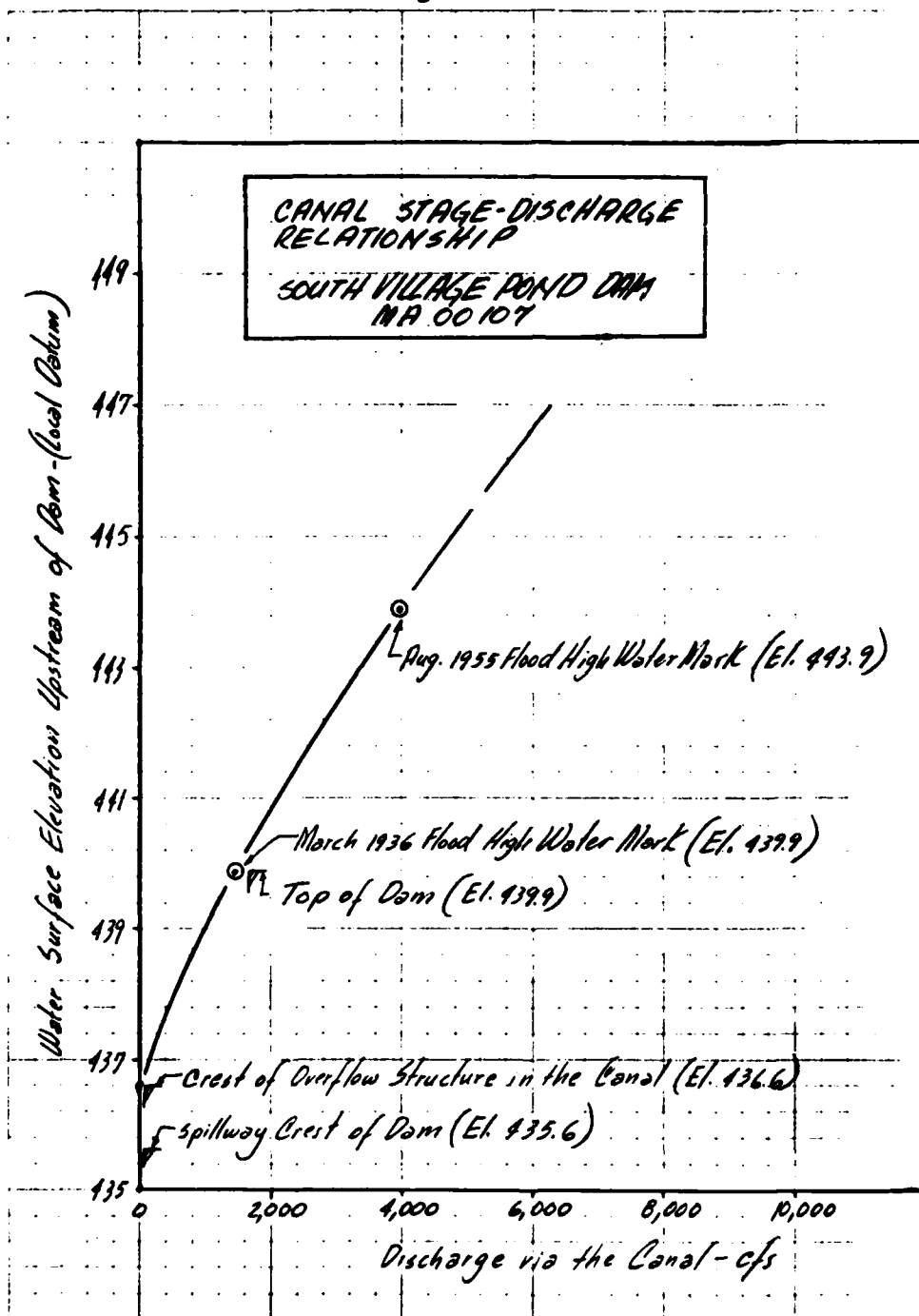
The stage-discharge relationship for South Village Dam is detailed on page 5 and presented in a graphical form on page 6.

CAMP DRESSER & MCKEE
Environmental Engineers
Boston, Mass.

CLIENT COF
PROJECT Dam Insp.
DETAIL South Village Dam

JOB NO. 300-6-RF-14
DATE CHECKED 10-19-79
CHECKED BY JED

COMPUTED BY Jac A.
DATE 10-18-79
PAGE NO 4



CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT COP
PROJECT Dam Fail.
DETAIL South Village Dam

JOB NO. 240-6-REM COMPUTED BY Joe A.
DATE CHECKED 10-19-79
CHECKED BY JED

DATE 10-15-79
PAGE NO. 5

W.S.EI. (Local Data)	Spillway Discharge			Discharge over Top of Dam			Arch. Through Orifice @ Left Abut., Q _o	Disch. Through The Canal Q _c	Total Project Discharge
	C	H	Q _s	C	H	Q _d			
435.6	-	-	Zero	-	-	Zero	Zero	Zero	Zero
437	2.8	1.4	165	-	-	-	30	150	645
438.5	3.0	2.9	1480	-	-	-	95	750	2,325
439.9 **	3.3	4.3	2940	-	-	-	255	1455	4,650
441	3.4	5.4	4265	2.6	1.1	185	310	2100	6,860
442	3.5	6.4	5665	2.7	2.1	510	355	2700	9,230
443	3.55	7.4	7145	2.75	3.1	930	390	3400	11,865
443.9 **	3.55	8.3	8490	2.8	4.0	1390	425	3995	14,300
445	3.6	9.4	10345	2.85	5.1	2035	460	4750	17,620
446	3.6	10.4	12075	2.85	6.1	2660	490	5,500	20,725

** Elevation 439.9 and discharge 4,650 correspond to March 1936 flood. Elevation 443.9 and discharge 14,300 cfs correspond to August 1955 Flood.

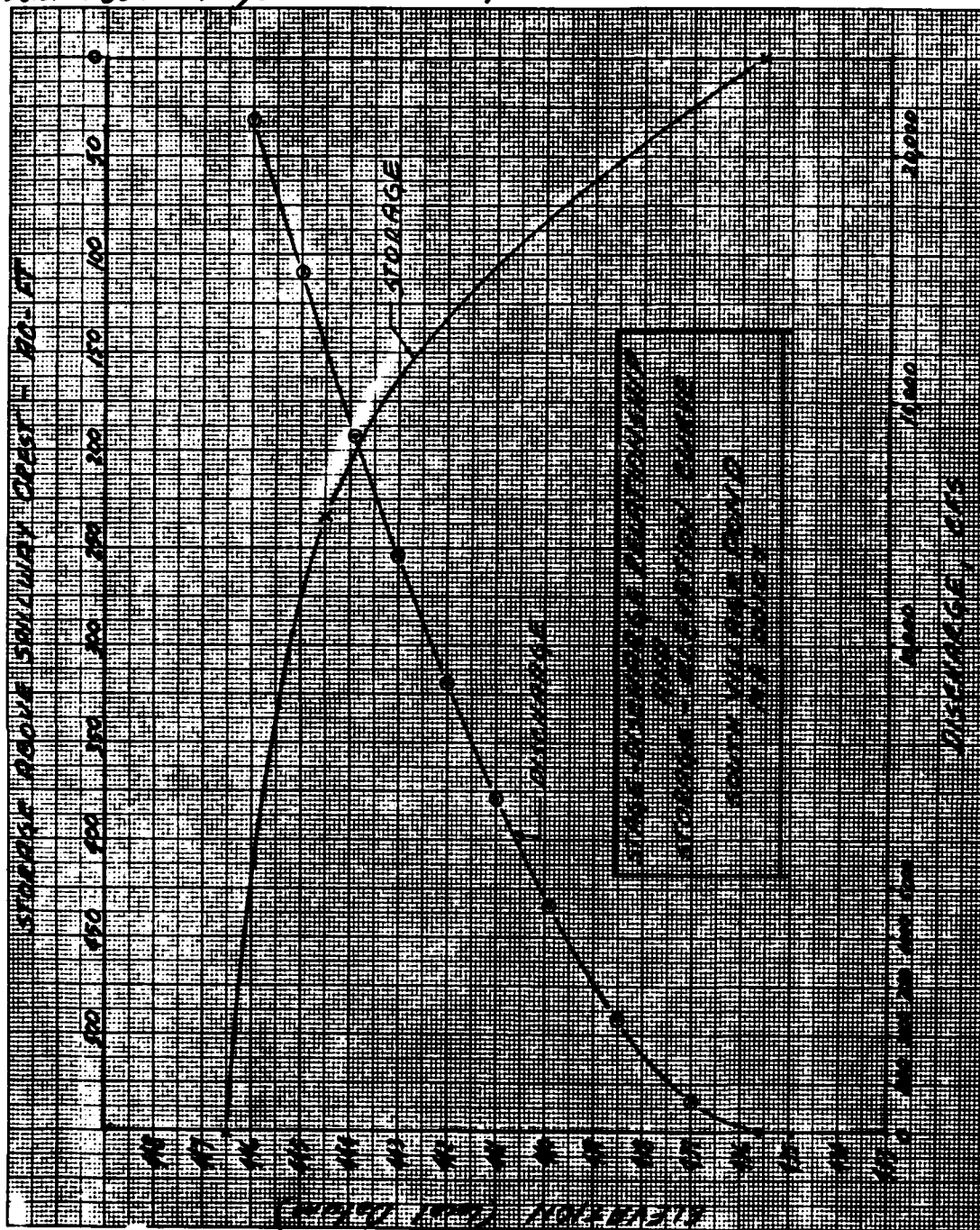
* Discharge through orifice at left abutment is based on

1. @ W.S.EI ≤ 439.6 $Q = CLH^{1.5}$ @ $C = 2.8$; $L = 7'$

2. @ W.S.EI > 439.6 $Q = CH\sqrt{2gh}$ @ $C = 0.75$; $A = 28"$

Client: COE
 Detail: South Village Pond Dam Inspection

6



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DATE CHECKED 10-19-79
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DATE 10-15-79
PAGE NO 7

SURCHARGE-STORAGE ROUTING

Inflow Test Flood, $Q_p = 15,850$ cfs

Surcharge Height to pass Q_p is El. 444.95

$$STOR_1 = \frac{\text{Surcharge Storage}}{\text{Drainage Area}} = \frac{230 \text{ ac-ft} \times 12 \frac{\text{in}}{\text{ft}}}{17,280 \text{ acres}} = 0.16 \text{ inches}$$

$$\text{Probable Max. Flood, } Q_{p_2} = Q_p \left(1 - \frac{STOR_1}{9.5}\right) = 15,850 \left(1 - \frac{0.16}{9.5}\right) = 15,580 \text{ cfs}$$

Surcharge Height to pass Q_{p_2} is El. 444.35

$$STOR_2 = \frac{225 \text{ ac-ft} \times 12 \frac{\text{in}}{\text{ft}}}{17,280 \text{ acres}} = 0.156 \text{ inches}$$

$$STOR_{AVG} = \frac{0.16 + 0.156}{2} = 0.158 \text{ inches}$$

$$Q_{p_3} = 15,850 \left(1 - \frac{0.158}{9.5}\right) = 15,585 \text{ cfs, say } 15,600 \text{ cfs}$$

Test Flood Inflow = 15,850 cfs

Routed Test Flood Outflow = 15,600 cfs

Surcharge Elevation ≈ 444.4

Spillway capacity at Test Flood Elevation (elev. 444.4):

$$Q = C L H^{1.5} = 3.58 (100) (8.8)^{1.5} = 9,345, \text{ say } 9,350 \text{ cfs}$$

OUTLET WORKS CAPACITY

The outlet works are two orifices at the left abutment of the spillway. One has an invert elev. of 429.6 and an area of 4'W x 4'H. The other is at invert elev. of 436.6 and has an area of 2.75'W x 2.5'H.

With water surface at spillway crest, the capacity of the outlet works is:

$$Q = C A_1 \sqrt{2 g h_1} + C A_2 \sqrt{2 g h_2} = [0.75 (16) \sqrt{2 (32.2) 4}] + \text{zero}$$
$$= 193 \text{ say } 195 \text{ cfs}$$

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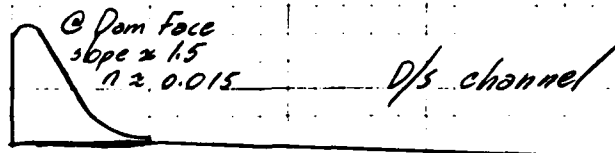
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DATE 10-15-79
PAGE NO 6

TAILWATER ANALYSIS

Based on the plans shown in Appendix B, the sketch below indicates a cross-section of the spillway.



Water depths on the D/S face of the dam.

<u>Height of Water</u>	<u>Discharge over Dam</u>	
0.5	3,110 cfs	
1.0	9,800	∴ Supercritical flow
1.5	19,110	
2.0	30,720	
2.5	44,280	

Water depths in D/S Channel (from Historical Data)

<u>Discharge @ Spillway</u>	<u>Water Depths in Channel, ft</u>	
2,940	8.0	
8,490	16.8	∴ Subcritical flow

Based on the hydraulic jump conjugal depth analysis, the hydraulic jump will occur downstream of the toe of the dam. Therefore, tailwater does not appear to affect discharge at the spillway.

DAM FAILURE ANALYSIS

1. Dry Weather Dam Failure Analysis

Determine Outflow: $Q_p = \frac{8}{127} (g)^{1/2} (W_b)(Y_b)^{3/2}$

where: $g = 32 \text{ ft/sec}^2$

W_b = Length of failure section. Assume 50% of the spillway fails, then $W_b = 50 \text{ ft}$

Y_b = height of hydraulic failure section
= 11.5 ft

$$Q_p = \frac{8}{127} (32.2)^{1/2} (50) (11.5)^{1.5} = 3,278 \text{ cfs, say } 3,300 \text{ cfs.}$$

By examining the 1955 Flood Water Surface profile downstream of the dam together with the rating curve at the USGS gaging station located 2,750 ft downstream of the dam, one can approximate a water surface profile for a flow of 3,300 cfs. Such a profile indicates that the flow due to a dry weather failure would be contained within the natural boundaries of the channel with a resulting "low" hazard. Approximate water surface profiles and support data are shown on the next four pages.

2. Wet Weather Dam Failure Analysis

- Determine Discharge at the dam prior to a dam failure. Assume water surface at the top of dam (El. 439.9).

$$Q = \text{flow through spillway} + \text{flow through the orifice at the left abutment} + \text{flow via the canal}$$

from page 5, discharge @ W.S. El 439.9 is 4,650 cfs

Again, based on the historical data mentioned above, the interpolated Water Surface Profile for $Q \approx 4,650 \text{ cfs}$ indicates that the 62'W x 11.5'H stone channel which directs the French through the American Woolen Co. Courtyard about 700 feet downstream would be overtopped by about 2 to 2.5 feet. The American

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DATE 10-15-79
PAGE NO 9A

FLOODS, AUGUST-OCTOBER, 1955

SO. FRENCH RIVER AT WEBSTER, MASS.

Location.—Lat 42°03'03", long 71°53'08", on right bank 50 ft upstream from Pleasant Street bridge at Webster, Worcester County, and 1.1 miles upstream from Potash Brook.

Drainage area.—85.3 sq mi.

Gage-height record.—Water-stage recorder graph except 1:15 p.m. Aug. 10 to 4:30 p.m. Aug. 22, Sept. 2-6, and Oct. 16-18. Gage heights for period 1:15-6 p.m. Aug. 19 are from graph based on floodmarks and readings from reference points and for period 4 p.m. Aug. 21 to noon Aug. 22 from graph based on engineer's tape-gage reading. Datum of gage is 406.74 ft above mean sea level, datum of 1929.

Discharge record.—Stage-discharge relation for 1955 flood period defined by current-meter measurement below 2,400 cfs and by indirect measurement at 14,400 cfs. Discharge for periods 8 p.m. Aug. 19 to noon Aug. 21, Sept. 2-6, Oct. 16-18 estimated on basis of records for Quinebaug River at Westville and Little River at Buffumville. Backwater from debris at times. Shifting-control method used at times. Peak discharge of Mar. 19, 1936, by computation of flow over dam about half a mile upstream.

Maxima.—Given in the following table.

August-October 1955:	Discharge (cfs)	Gage height (ft)
Aug. 19, 6 p.m.	14,400	26.05
Oct. 17	1,300	
1948 to July 1955:		
Sept. 12, 1954	2,320	11.64
1936:		
Mar. 19	4,700	

Remarks.—Flow appreciably affected by reservoirs above station. Flow for flood of August 19, affected by failure of dams upstream.

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1955

Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge
Aug. 17			Aug. 18—Con.			Aug. 20—Con.		
12 p.m.	4.90	46	8 a.m.	10.75	1,930	4 p.m.	8.92	1,300
Aug. 18			9	11.67	2,280	8	9.73	1,120
1 a.m.	4.94	80	10	12.37	2,780	12 p.m.	9.54	1,080
2	4.98	104	11	14.26	3,670			
3	5.01	108	12 m.	15.99	4,970	Aug. 21		
4	5.03	112	1 p.m.	19.22	7,300	4 a.m.	9.40	954
5	5.06	115	2	20.30	7,920	8	9.31	946
6	5.14	167	3	20.83	8,690	12 m.	9.22	912
7	5.23	230	4	21.77	9,670	4 p.m.	9.18	900
8	5.35	218	5	24.30	11,800	8	9.22	912
9	5.48	190	6	26.06	14,400	12 p.m.	9.14	883
10	5.45	182	7					
11	5.59	220	8	13.00	11,400	Aug. 24		
12 m.	5.82	300	9	16.00	16,000	4 a.m.	9.07	828
1 p.m.	5.72	263	10			8	8.96	828
2	5.63	230	11			12 m.	8.86	783
3	5.62	226	12 m.			4 p.m.	8.75	747
4	5.50	204	1 p.m.			8	8.62	708
5	5.73	266	2			12 p.m.	8.50	664
6	5.86	335	3					
7	5.80	283	4			Aug. 25		
8	5.86	302	5			2 a.m.	8.45	640
9	5.94	344	6			4	8.40	633
10	6.01	360	7			8	8.36	629
11	6.10	380	8			12 m.	8.26	625
12 p.m.	6.20	397	9			4	8.32	671
Aug. 19			10			8	8.29	726
1 a.m.	6.30	408	11			12 m.	8.26	756
2	6.46	488	12 m.			4	8.26	756
3	7.15	653	1 p.m.			8	8.26	756
4	7.06	613	2			12 p.m.	8.26	756
5	6.87	510	3					
6	6.41	3,400	4			Aug. 26		
7 a.m.	10.09	1,670	5			2 a.m.	8.00	634
			6			4	8.00	631
			7			8	8.04	613
			8			12 p.m.	8.04	756

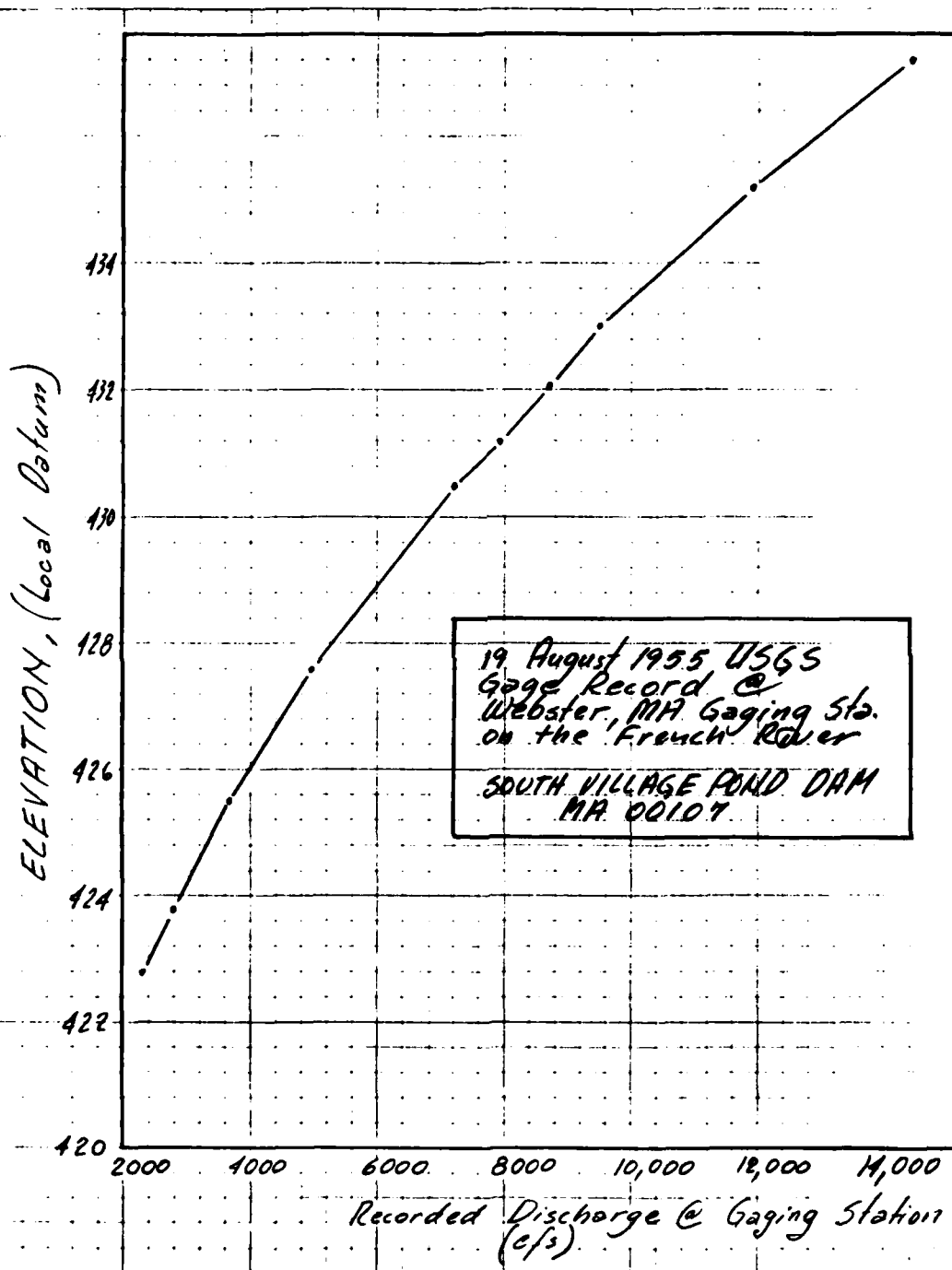
Note Elevations above refer to N.G.V. Datum.

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PAGE NO 9B



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THAMES RIVER BASIN

141

TABLE 4.—Flood-crest data—Continued

Stream and location	Miles above mouth	Date (1866)	Elevation (feet)
Thames River basin—Continued			
French River:			
North Oxford, Mass., Ivanhoe Tool Co. dam, headwater (partly washed out).	17.5	Aug. 19.....	514.2
North Oxford, Mass., Old Charlton Road bridge (washed out).	16.3	do.....	490.5
Hodges Village, Mass., Old Howarth Road bridge (washed out).	14.9	do.....	476.4
Hodges Village, Mass., Oxford Looms dam, headwater (partly washed out).	14.8	do.....	473.8
Hodges Village, Mass., below Oxford Looms dam.	14.8	do.....	473.2
West Oxford, Mass., Dudley Road bridge.	13.7	do.....	470.2
Oxford, Mass., Harwood Street bridge (washed out).	12.4	do.....	466.5
Webster, Mass., Bigelow Street bridge.	10.2	do.....	457.9
Webster, Mass., Dudley Woolen Co. dam, headwater (elevation of crest 480.9 ft).	10.0	do.....	457.8
Webster, Mass., New York, New Haven & Hartford R.R. bridge.	9.5	do.....	442.2
Webster, Mass., American Woolen Co. dam, headwater (elevation of crest 431.1 ft).	9.2	do.....	439.4
French River—Continued			
Webster, Mass., American Woolen Co. bridge.	9.1	Aug. 19.....	436.1
Webster, Mass., Peter Street bridge.	9.0	do.....	436.1
Webster, Mass., Tracey Court bridge (washed out).	8.9	do.....	435.6
Webster, Mass., New York, New Haven & Hartford R.R. bridge.	8.8	do.....	435.3
Webster, Mass., USGS gaging station 50 ft upstream from Pleasant Street bridge, right bank.	8.8	do.....	432.6
Webster, Mass., Main Street bridge.	8.4	do.....	430.8
Webster, Mass., Chase Avenue bridge (washed out).	8.2	do.....	422.1
Webster, Mass., Hill Street bridge.	8.0	do.....	422.4
Webster, Mass., New York, New Haven & Hartford R.R. bridge.	7.7	do.....	416.5
Perryville, Mass., Perryville Road bridge.	6.7	do.....	407.0

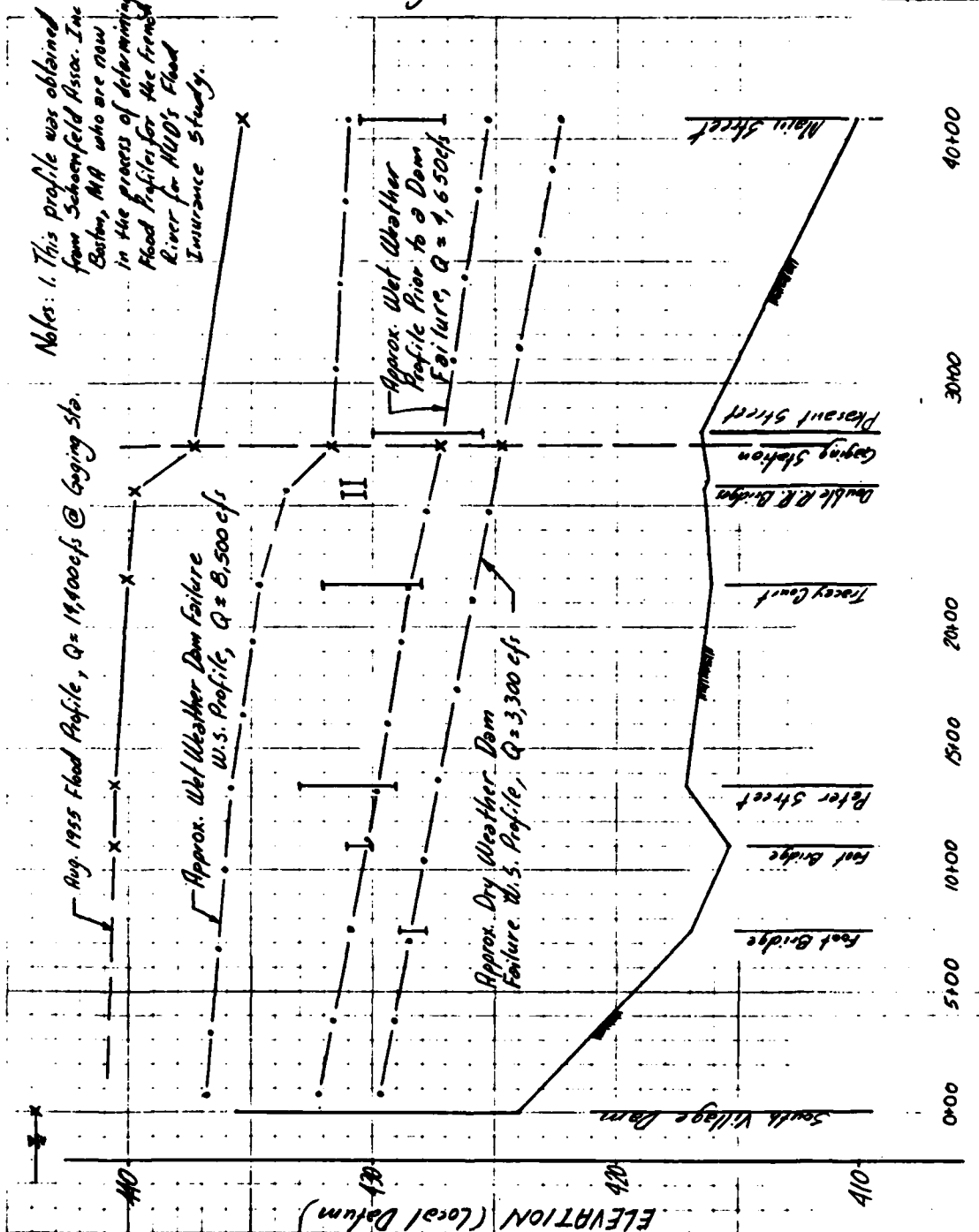
Note: Elevations above refer to N.G.V. Datum.

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Notes: 1. This profile was obtained from Schoenfeld Assoc. Inc. Boston, MA who are now in the process of determining Flood Profiles for the French River for HUD's Flood Insurance Study.



Woolen Co. mill buildings, on both banks of the channel would be flooded by about two feet of water, which would probably cause evacuation of the mill. Also, two bridges in the courtyard would be flooded.

Beyond the American Woolen mill complex, the natural river channel appears to be adequate to contain the project discharge of 4,650 cfs, without hazard to overbank development. *(occurring prior to dam failure)*

- Determine Wet Weather Dam Failure Outflow, Q_p

$$Q_p = \text{flow due to a dam failure} + \text{spillway flow} + \text{canal flow} + \text{orifice flow}$$

$$= \frac{8}{157} (g) (W_b) (Y_o)^{1.5} + C H L^{1.5} + \text{canal flow from graph} + C A \sqrt{2g h}$$

where $g \approx 32.2 \text{ ft/sec}^2$

W_b = length of failure section. Assume 50% of the spillway fails
= 50 ft

Y_o = hydraulic height of failure section. From page 110, the Tailwater Analysis indicates no backwater at the dam prior to a dam failure i.e. $Q \approx 4,650 \text{ cfs}$ therefore $Y_o = 15.9 \text{ ft}$
= 15.9 ft

$$Q_p = \frac{8}{157} (32.2)^{0.5} (50) (15.9)^{1.5} + (0.5 (2940)) + 1455 + 255$$

from page 5.

$$= 5,330 + 1,470 + 1,455 + 255$$

$$= 8,510 \text{ cfs, say } 8,500 \text{ cfs}$$

Based on the Aug. 1955 Flood Water Surface Profile and the rating curve at the USGS gaging station located 2,750 ft downstream of the dam, the interpolated water surface profile for a discharge of 8,500 cfs indicates that the following conditions would prevail downstream.

The depth of flooding at the American Woolen Co. would increase from about 2 feet prior to a dam failure to about 7 feet after failure. Water would be about 3 feet above window sill elevations, thus causing high economic damage to the mill complex. Given that the wet weather conditions prior to failure led to an evacuation of the mill, the additional flooding due to a dam failure should not endanger mill personnel.

Between the American Woolen Co. and Peter Street, which is about 1,350 feet downstream of the dam, there would be overbank flooding of about 5 feet. The 60' W x 15' H Peter Street bridge would be overtopped by about 3 feet. Several homes on the right bank would be overrun by about 5 feet of water.

Between Peter Street bridge and Tracey Court Bridge located about 2,280 feet downstream of the dam, a mill building on the right bank would be flooded by about 3 feet endangering the workers in the mill and causing economic damage. The Tracey Court Bridge is a concrete bridge similar to the Peter Street Bridge.

Downstream of Tracey Court Bridge, Pleasant Street would be overtopped by about 2 feet, and Main Street, also called Rt 197, 12 and 31, would be overtopped by about 3 feet. The overbanks in this reach are heavily developed and would be flooded by about 3 to 4 feet of water.

Downstream of Main Street, there would be additional flooding of the development along the left bank down to Hill Street. Beyond Hill Street the flood wave would attenuate to a level about that existing prior to a dam failure due to wet weather conditions.

Based on the foregoing analysis, a wet weather failure of the South Village dam would cause

"HIGH" Hazard
downstream of the dam.

APPENDIX E
INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS



INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	NAME	COUNTY	REPORT DATE
MA	107	NED	HA 1027	02
SOUTH VILLAGE POND DAM		4203-1-1152-0-200128		

POPULAR NAME		NAME OF IMPONDMENT	
AMERICAN MOORE CO. DAM		FRENCH RIVER	
RIVER OR STREAM		NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	
FRENCH RIVER		DUDLEY	
TYPE OF DAM	YEAR COMPLETED	PURPOSES	IMPONDING CAPACITIES
1	1930	10	120
REMARKS		DIST OWN FED R PRV/PED SCB A VER/DATE	
		NED N N : M	

REMARKS					
13-FRENCH RIVER DAM 21-CONCRETE 22-RECD. STRUCTED					
OR	SPILLWAY	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CU YD)	POWER CAPACITY (KW)	NAVIGATION LOCKS
1	100	100	2050	100	100

OWNER	ENGINEERING BY	CONSTRUCTION BY
AUDLEY-HEWSTER REALTY	CHARLES L. WARE	CHESTER M. BATTEN
DESIGN	CONSTRUCTION	OPERATION
NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE	AUTHORITY FOR INSPECTION
CAMP DRESSER & HENKE INC	2001-1-11	PL 92-1367
REMARKS		

END

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