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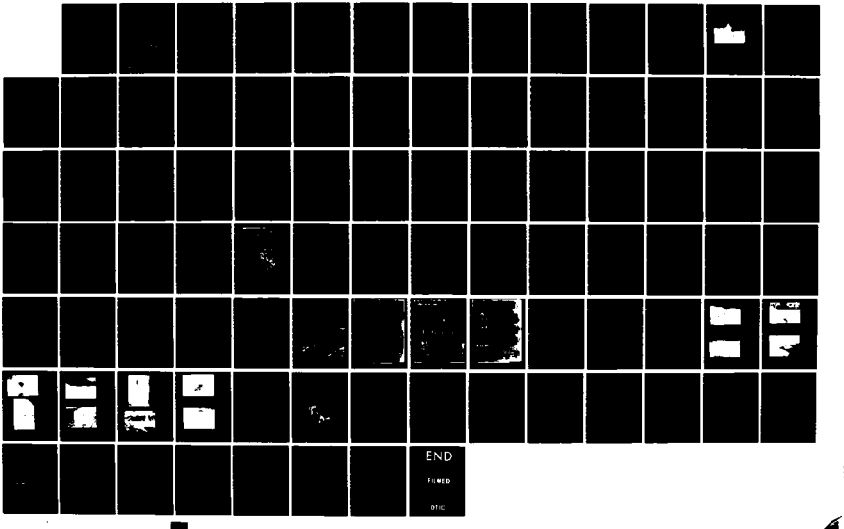

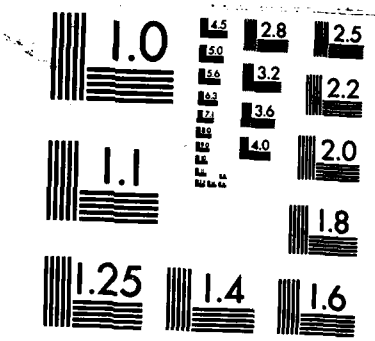

(1)

HOOSIC RIVER BASIN
NORTH ADAMS, MASSACHUSETTS

MOUNT WILLIAMS RESERVOIR DAM
MA 00282

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

JUNE 1979

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Hoosic River Basin
North Adams, Massachusetts
Paull Brook

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

The dam consists of a 700 foot long, 40 foot high earthen dam with a 2500 ft. long earth dike extending from its right abutment. The dam is in fair condition. The size is intermediate and the hazard potential is high. Investigations are recommended to determine the need and means of increasing spillway capacity.

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

REPLY TO ATTENTION OF
NEDED

OCT 11 1979

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

Dear Governor King:

Inclosed is a copy of the Mount William Reservoir 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, City of North Adams, 10 Main Street, City Hall, North Adams, Massachusetts 01247.

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

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

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

MOUNT WILLIAMS RESERVOIR
MA 00282

HOOSIC RIVER BASIN
NORTH ADAMS, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Identification No. : MA 00282
Name of Dam: MOUNT WILLIAMS RESERVOIR DAM
Town: CITY OF NORTH ADAMS
County and State: BERKSHIRE, MA
Stream: PAULL BROOK
Date of Inspection: 30 APRIL 1979

BRIEF ASSESSMENT

Mount Williams Reservoir Dam consists of a 700 foot long, 40 foot high earthen dam with a 2,500 foot long earth dike extending from its right abutment. The maximum height of the dike is approximately 20 feet. The dike has a crest elevation approximately 2 feet above the crest of the dam. A 20 foot wide, 6 foot deep concrete spillway is located at the left abutment of the dam. The intakes for the water supply are located in a control tower near the junction of the dam and dike. A 24 inch reservoir drain passes through the dam at maximum height and is controlled from a manhole extending downward from the dam's crest. The dam was constructed during the years of 1914-1915.

The dam is in fair condition. Evidence of seepage was observed at the toe of the dam and dike. In addition, flowing water was apparent at the bottom of the reservoir drain manhole. The concrete spillway discharge channel has deteriorated to the point of failure for a portion of its length.

Based on the size classification, intermediate, and hazard classification, high, in accordance with Corps of Engineers Guidelines, the spillway test flood is the Probable Maximum Flood (PMF). Hydraulic analysis indicates that the spillway capacity with water surface at the top of the dam, is approximately 850 cfs which is about 32 percent of the routed test flood outflow of 2,650 cfs. The estimated test flood stage is about 0.7 feet above the top of the dam.

Investigations are recommended to determine the need and means of increasing spillway capacity, the necessary modifications and/or reconstruction of the spillway discharge channel and to determine the significance of the observed seepage conditions. Recommended remedial measures include the clearing of weeds and brush from the dam and dike, the filling of animal burrows, the regrading of the dam and dike crests, the repairing of upstream dike erosion, the monitoring of seepage conditions, the removal of overhanging trees at the spillway, the patching of minor concrete deterioration at the spillway, the repairing of the reservoir drain concrete top surface,

the replacement of missing manhole rungs or removal of all manhole rungs at the reservoir drain manhole, the straightening or replacement of the bent valve operating shaft for the reservoir drain, the resetting of the access bridge railings, the repair of the access bridge bearing area at the control tower, the repair of the access bridge undermined abutment, the cleaning and recoating of interior metal work in the control tower and the repair of the exterior surface of the control tower. The Owner should develop a formal maintenance program, operational procedure and emergency preparedness 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.

CAMP DRESSER & McKEE INC.

Roger H. Wood

Roger H. Wood
Vice President

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

Joseph W. Finegan

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

Joseph A. McElroy

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, CHAIRMAN
Chief, Structural Section
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

Jane B. Fryar

JANE 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.

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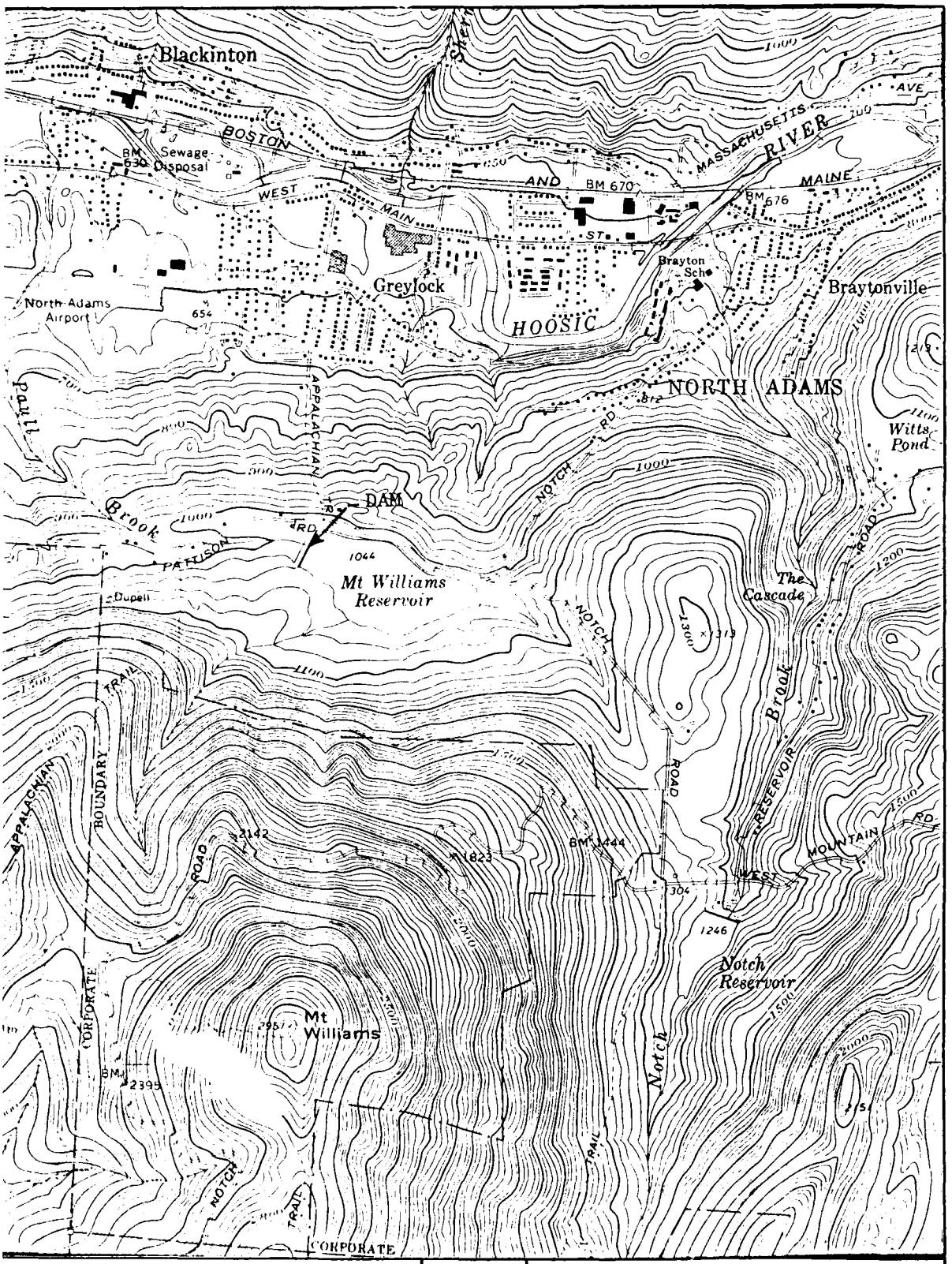
1. OVERVIEW OF UPSTREAM FACE OF DAM FROM WEST END OF DIKE. GATEHOUSE IN FOREGROUND. NOTE MISSING DECK PLANK IN BRIDGE.



DAM Mt. Williams Reservoir Dam

IDENTIFICATION NO. MA 00282

LOCATION MAP
USGS QUADRANGLE

Williamstown, Mass.-VT

APPROX. SCALE: 1" = 2000'

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General - Mt. Williams Reservoir is a water supply dam consisting of a 700-ft. long dam embankment 40-ft. high and a 2500-ft. long dike of varying height located on Paull Brook in the City of North Adams. In addition to the drainage area of Paull Brook, Mt. Williams Reservoir supply may be augmented from Notch Reservoir as well as from the Broad Brook watershed which is located to the north of the Hoosic River. The dam is an earth embankment with a concrete core wall. A 20-ft. wide spillway is located at the left end of the dam. The spillway has provisions for 30-in. of flashboards. The spillway discharge channel immediately downstream of the dam is approximately 15 feet wide by 5 feet hign with concrete side walls for about 450 feet. The downstream face of the spillway has a slope of 4:1 for approximately 35 feet. The discharge is conveyed about 9,000 feet in Paull Brook to the Hoosic River.

b. Design Data - There is no hydraulic/hydrologic design data available for this dam, except for a reservoir stage-storage relationship chart.

c. Experience Data - No records of past flood events are available for the dam site.

d. Visual Observations - The visual inspection of the dam and reservoir was made on 30 April 1979. At that time, three 7-1/2 in. sections of flashboards were in place and a fourth flashboard was being readied for insertion which would bring the height of flashboards to 30-in. A water depth of 2-ft. was present in the spillway approach channel and with the exception of some floating logs and debris which was hung up on top of the flashboards, the spillway was found to be in good hydraulic condition.

e. Test Flood Analysis - Based upon the Corps of Engineers Guidelines, the recommended test flood for the size (intermediate) and hazard potential (high) is the PMF (Probable Maximum Flood). The PMF was determined using the Corps of Engineers Guidelines for "Estimating Maximum Probable Discharge" in Phase I Dam Safety Investigations. The terrain in the drainage area is heavily forested and steeply sloped. Therefore, a peak inflow rate of 2,675 cfs per square mile was selected, which results in a peak test flood inflow of 3,750 cfs for the 1.4 sq. mi. watershed.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures - In general, there is no written procedure for the operation of the dam.

4.2 Maintenance of the Dam - The caretaker of the dam lives at the site and maintains the facility. However, there is no written formal procedure for the maintenance of the dam.

4.3 Maintenance of Operating Facilities - The dam is visited once a day by the operator. Gates are regulated according to the need for water in the City of North Adams. Maintenance of the operating facilities is performed on the basis of need.

4.4 Description of Warning System in Effect - There is no established warning system or emergency preparedness plan in effect for this structure.

4.5 Evaluation - Formal operational procedures, maintenance programs, warning systems and emergency preparedness plans should be established for this dam.

e. Downstream Channel - Paull Brook, also known as Lillie Brook, which connects Mount Williams Reservoir to the Hoosic River in the City of North Adams, Massachusetts, flows on a steep gradient for half of the distance to the Hoosic River. The change in slope occurs just south of North Adams Airport where the brook goes under the runway and taxiway and continues down under State Route 2 where it turns to the west and continues into the Town of Williamstown before joining the Hoosic River. The upper region of Paull Brook has only 1 house along its' bank while the lower portion has development along its banks from the vicinity of State Route 2 to the Hoosic River.

3.2 Evaluation

Based on the visual observations, the dam and dike embankments are considered to be in fair condition. No conditions which would warrant urgent remedial treatment were observed.

The observed seepage conditions below the dam and dike are not considered serious at this time. However, changes in the pattern or quantity of seepage could indicate the development of problems within the embankments.

The upstream erosion noted along the dike does not appear to present any immediate hazard. However, the slope should be repaired and riprap restored before more serious deterioration occurs.

The spillway discharge channel is in poor condition. Portions of the structure have failed while other areas are approaching failure. Other structures at this site; the control facility for the reservoir drain and the control tower need attention. The valve shaft for the reservoir drain is bent, the access bridge railings are missing and the bridge abutment undermined and the control tower's exposed surfaces are starting to deteriorate.

The spillway shown in Photos 4 and 5 is in good condition. There are some trees overhanging the inlet to the spillway and there are some minor chipped areas, open joints, efflorescence and vegetation growth on the spillway concrete. The downstream concrere discharge channel is in poor condition. Not only is the concrete cracked and deteriorated but some sections of the wall have completely failed while other sections are leaning as shown in Photo 7. Water from the spillway goes below the top of the rock lining on the discharge base slab in one section of the discharge channel and possibly beneath the base slab itself before emerging as shown in Photo 6. The invert of the discharge channel contains considerable debris and vegetation growth.

The control facility of the reservoir drain, the top of which is shown in Photo 12, is in fair condition. The interior wooden upper platform has deteriorated to the point that it is essentially gone. One manhole rung appeared to be missing from the west wall. There also appeared to be water flowing parallel to the dam's core wall at the invert of and within the manhole. The gate valve operator shaft which extends unsupported almost the full height of the dam is bowed. The top surface of the manhole exhibits surface deteriorated.

The control tower shown in Photos 1 and 10 is in fair condition. The parge coat on the exterior brick has one large spall present and there is some cracking and efflorescene present on the interior face of the brick. Rusting is occurring on interior metalwork and cracking is present in the exterior face of the concrete substructure. The railings of the access bridge have been removed and are lying on the dike as shown in Photo 11. The bridge stringers are set in the control tower concrete which is cracked at these locations. The shore abutment of the bridge is undermined.

d. Reservoir Area - The reservoir is along the stream that traverses a mountain slope. It is fed by two small streams; one coming in at the east end of the reservoir and the other at the south side of the reservoir. There is no development along the shoreline of the reservoir. The local road goes along the north side of the reservoir parallel to the dike. It is a scenic area and attracts motorists to stop and walk in the general area. Although the slopes to the south of the reservoir are steep, they do flatten somewhat as they approach the reservoir. There is no observed significant potential for landslides into the pond which would create waves that might overtop the dam. No conditions were noted that would result in a sudden increase in sediment load into the pond.

slope. Slight, somewhat cloudy flow was evident within this zone. However, no significant evidence of soil particle movement was observed. No evidence of flow was discernible in the area at the discharge end of the reservoir drain.

c. Appurtenant Structures - The present performance of the dike embankment appears to be generally satisfactory although some deficiencies which require repair were noted. The following remarks outline the observed condition of the dike embankment:

(1) Portions of the crest and sideslopes of the dike are overgrown with grass, weeds, and brush. Other parts have been cleared by burning as shown by Photo 8.

(2) Numerous abandoned animal burrows were noted on the dike slopes.

(3) The visible portion of the upstream slope has riprap consisting of cobbles to 2 ft. stones extending generally 0.5 to 2.5 ft. above water level. Displacement of riprap and erosion of the upstream slope is apparent at several locations. Erosion is particularly noticeable in an area located 1300 to 1600 ft. east of the gate house. At one point, located about 1325 ft. from the gatehouse and shown in Photo 9, the slope has been eroded back to the edge of the crest.

(4) There is about a 2 ft. increase in crest elevation for the portion of the dike east of a point approximately 350 ft. from the gatehouse. This change in crest elevation apparently corresponds to the end of the concrete core wall which is included in the west portion of the dike and the dam embankment. The crest is less than 16 ft. wide at some places.

(5) There were wet places and puddles at several locations along the area between the dike toe and Pattison Rd. The pavement at these locations was deteriorated. No evidence of flow or soil particle movement was observed.

(6) Evidence of seepage flow was noted at several locations along the slope below Pattison Rd. No indication of soil particle movement was observed.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General - The Phase I visual inspection of Mount Williams Reservoir was conducted on 30 April, 1979.

In general, the earthen embankments, spillway and control tower were observed to be in fair condition. The reservoir level at the time of the site examination was 4.1 feet below the dam crest elevation.

Visual inspection checklist for the site visit are included in Appendix A and selected photographs are given in Appendix C.

b. Dam - Visual observations indicate that the present performance of the dam embankment is generally satisfactory, although some deficiencies were noted. The following remarks outline the observed condition of the dam embankment:

(1) The visible portion of the upstream face has riprap consisting of cobbles to 2 by 3 ft. stones extending about 0.5 to 2.5 ft. above water level. There appears to have been some relatively recent placement of white marble stones at several locations. The upper portion of the slope is overgrown with grass, weeds and brush. There is some slight erosion at the right spillway training wall.

(2) The crest is overgrown with grass, weeds and brush as shown in Photo 2. The crest surface is rutted and irregular and may vary up to 1.0 ft. in elevation.

(3) The downstream slope is overgrown with grass, weeds and brush, as shown by Photo 3. Some erosion was noted along the right spillway training wall. Abandoned animal burrows extending 3 to 4 ft. into the slope were discovered at several locations on the downstream face. No evidence of slope instability was distinguishable but assessment was hindered by the presence of brush.

(4) Two wet areas were noted below the toe of the dam. A zone located about 100 ft. from the spillway was soggy within 15 to 20 ft. of the toe but there was no apparent flow. Another wet zone was noted starting about 150 ft. right of the reservoir drain within an area about 100 ft. along the toe and extending about 35 ft. from the base of the

SECTION 2: ENGINEERING DATA

2.1 Design Records - The design records for this dam consists of a set of 5 drawings dated July 1914 entitled City of North Adams Extension of Water Supply. In addition, 2 other drawings dated January 1917 show the changes made to the dam and dike and the details of the reservoir drain actually used in the construction. The set of specifications for the construction were located in the City's Annual Reports. In addition, the City Annual Reports also include comments by the designer and a report of a geologist's preliminary recognizance of the site.

2.2 Construction Records - The only construction records located were the reports contained in the City's annual reports and the 2 drawings mentioned above indicating the changes made during the construction.

2.3 Operational Records - No operational records other than County and State inspection reports were located.

2.4 Evaluation

a. Availability - Documents described above are available at the City Engineer's Office, City of North Adams, Massachusetts.

b. Validity - The general configuration of the dam as shown on the design plans is in good agreement with the configuration observed in the field.

c. Adequacy - The available data, in combination with the visual inspection described in the following section, is adequate for the purposes of the Phase I investigation.

(8) Cutoff----------Two cutoff trenches

(9) Grout Curtain----------None

h. Diversion and Regulating Tunnel ----------None

i. Spillway

(1) Type----------20-ft wide concrete rectangular channel with provisions for up to 30-in. of flashboards

(2) Length of weir----------20 feet

(3) Crest Elevation----------1028.0

(4) Gates----------Provisions for flashboards

(5) U/S Channel----------Mount Williams Reservoir

(6) D/S Channel----------35-ft wide masonry channel with 5-ft high training wall

j. Regulating Outlets - The reservoir drain consists of a 24-in. cast iron pipe at inlet invert elevation 995 located at about the mid point of the dam. Two manually operated gate valves control the discharge to a small stilling pool at the toe of the dam. The upstream gate is located at the upstream face of the core wall and is housed in a 5-foot square vault. The downstream gate valve is located at the toe of the dam with the stem operator projecting slightly above ground level.

e. Storage (acre-feet)

(1) Normal pool----------427

(2) Flood control pool----------N/A

(3) Spillway crest pool----------427

(4) Top of dam----------791

(5) Test flood pool----------841

f. Reservoir Surface (acres)

(1) Normal pool----------45

(2) Flood-control pool----------N/A

(3) Spillway crest----------45

(4) Test flood pool----------58

(5) Top of dam----------57

g. Embankments		Dam	Dike
(1)	Type	Earth, with corewall	Earth, with partial corewall
(2)	Approx. Length (ft)	700	2500
(3)	Approx. Height (ft)	40	20
(4)	Nominal Top Width & Elevation	16 ft. at elev. 1034	16 ft at elev. 1036
(5)	Side Slopes	2H to 1V U/S and D/S	2H to 1V 2H to 1V or flatter D/S
(6)	Zoning	None	"Spoil" in D/S slope, east portion
(7)	Impervious Core	Concrete Corewall	Concrete corewall, east end.

(1) Outlet works: 24" cast-iron pipe with approximately 90 cfs capacity with reservoir at elevation 1028

(2) Maximum known flood at damsite----------Unknown

(3) Ungated spillway capacity at top of dam 850 cfs @ 1034.0 elev.

(4) Ungated spillway capacity at test flood elevation 1,000 cfs @1034.7 elev.

(5) Gated spillway capacity at normal pool----------N/A

(6) Gated spillway capacity at test flood elevation--------N/A

(7) Total spillway capacity at test flood elevation 1,000 cfs @ 1034.7 elev.

(8) Total project discharge at test flood elevation 2,650 cfs @ 1034.7 elev.

c. Elevation (ft. above local datum)

(1) Streambed at centerline of dam----------994 (Est.)

(2) Test flood tailwater----------Below elev. 1000

(3) Upstream portal invert diversion tunnel----------N/A

(4) Normal pool----------1028

(5) Full flood control pool----------N/A

(6) Spillway crest----------1028

(7) Design surcharge (Original Design)----------Unknown

(8) Top of dam----------1034

(9) Test flood surcharge----------1034.7

d. Reservoir (feet)

(1) Length of test flood pool----------2,800

(2) Length of normal pool----------2,400

(3) Length of flood control pool----------N/A

g. Purpose of the Dam - Mount Williams Reservoir Dam collects and stores water as part of the water supply to the City of North Adams, Massachusetts.

h. Design and Construction History - The dam was constructed during the years of 1914-1915. The designer was William S. Johnson of Boston, Massachusetts. Middlesex Contracting Company of Framingham, Massachusetts was the contractor. Frank H. Carter of Boston, Massachusetts was the resident engineer in charge of construction. During the end of the design and the beginning of construction, a number of changes were made. They consisted of moving the northerly end of the dam upstream about 175 feet farther than in the original design. At the suggestion of the County, the concrete core wall for the dam was constructed to an elevation 2 feet higher than originally proposed and the crest of dike was constructed 2 feet higher than originally proposed. The control tower was moved further into the reservoir so that it could be constructed in natural soil rather than within the dam embankment. Lastly, the pipe that carried the brook through the construction area was retained as a reservoir drain in the final construction. In 1957 a gate valve was added to the reservoir drain at the downstream toe of the dam as shown on Photo 13.

i. Normal Operational Procedures - The dam is visited each day by the Operator. The caretaker of the dam lives at the site. Brush is cut once per year.

1.3 Pertinent Data

The original design drawings for the dam indicate that the crest of the spillway is at elevation 1028. The USGS Quadrangle Williamstown, Massachusetts, 1973, indicates a reservoir water surface elevation of 1044. In this report, the local datum used on the design plans will be utilized.

a. Drainage area - The drainage area tributary to the dam site is 1.4 square miles. The watershed is steeply sloped, heavily forrested and contains no development. Mount Williams Reservoir accounts for approximately 5 percent of the total drainage area. In addition to the geographical watershed for this reservoir, the reservoir can also receive water from Notch Reservoir via a 36-inch overflow line and from Broad Brook via the 24-inch water transmission main which leads to the control tower.

b. Discharge at Dam Site - There are no records of discharges at the dam site.

takes gated on the inside of the control tower serve as intakes from the reservoir. The inverts of the intakes are 33-1/2 feet below the crest of the dam. The 24 inch cast-iron water transmission main starts at the rear chamber of the control tower where it is gated and passes through the core wall of the dam on its way to the City of North Adams. There is one 8 foot by 8 foot by 2 foot concrete cutoff wall on this line between the control tower and the core wall. The screens are changed by a chain hoist positioned above the screen guides.

The dike, located along the north side of the reservoir, is approximately 2,500 feet long with a maximum height of approximately 20 feet. It has a crest width of 16 feet and crest height approximately 8 feet above spillway crest. The upstream face of the dike is on a 2 horizontal to 1 vertical slope and is protected with riprap approximately 18 inches in depth. The main portion of the dike is constructed of rolled earth and has 2 cutoff trenches on the upstream side of the crest. The rolled earth terminates on a 2 horizontal to 1 vertical downstream slope which starts approximately 9 feet downstream of the front edge of the crest and 2 feet below the crest of the dike. From that plane to a slope 3 horizontal to 1 vertical or flatter the dike is filled with spoil from the stripping at the dam, dike and reservoir.

c. Size Classffication - The height of the dam is approximately 40 feet and the estimated storage capacity is 791 acre-feet at the top of the dam. According to guidelines established by the Corps of Engineers, the dam is classified in the intermediate category based on the height.

d. Hazard Classification - The results of the dam failure analysis indicate that a flood wave resulting from a failure of the dam embankment could cause severe damage to the runway at North Adams Airport. Two dwellings on Pattison Road and scores of dwellings downstream of the airport would be affected. In that the potential loss of life would be much greater than 10 persons, the dam is classified in the "high" hazard category.

e. Ownership - The dam is owned by the City of North Adams. The owner is represented by Mr. Joseph Girardi, Commissioner of Public Works, 10 Main Street, City Hall, North Adams, MA. 01247 (Phone 413/663-6765).

f. Operator - Mr. Robert Galipeau, Superintendent of Water Department, is assigned responsibility for operation of the dam. His address is City Yard, Ashland Street, North Adams, MA. (Phone 413/663-5510). The dam caretaker is Raymond Jones, Patterson Rd. (Phone 413/662-2280).

b. Description of Dam and Appurtenances - The facility at Mount Williams Reservoir consists of an earthen dam at the west end of the reservoir and an earthen dike along the north side of the reservoir. There is no natural ground separating the dike and dam, the dike being a continuation of the dam embankment. A concrete spillway is at the left abutment of the dam while the control tower and water supply intake is near the right abutment of the dam. The reservoir drain passes through the center of the dam and is controlled by a gate in the manhole at the center of the dam and by a second gate located at the downstream toe. The dike starts at the right abutment of the dam near the gatehouse and extends eastward almost the full length of the north shoreline of the reservoir.

The dam has a crest width of 16 feet with upstream and downstream slopes of 2 horizontal to 1 vertical. The dam is approximately 700 feet long and 40 feet high. The crest of the dam is approximately 6 feet above the spillway crest. It is constructed of clayey glacial lake deposits with a concrete core wall extending up to 4 feet above spillway crest elevation. It has two cutoff trenches on the upstream side of the dam. The upstream slope of the dam is paved with stone at least 12 inches thick and placed on 6 inches of broken stone. The crest and downstream face of the dam is loamed and seeded. The spillway has a channel width of 20 feet with an invert 6 feet below the top of the dam. It is of concrete construction with the dam core wall serving as the cutoff wall for the spillway. The spillway does not contain a weir, the rectangular channel forms the control of the water surface. The outlet channel is also of concrete construction but has stone paving on top of the base slab. The channel extends down to the streambed below the dam where the discharge walls are flared at about 45 degrees.

The reservoir drain is a 24 inch cast-iron pipe encased in concrete from the inlet end to the core wall of the dam. It has concrete cutoff walls in this region spaced every 20 feet. Downstream of the cutoff wall, the cast-iron pipe is not encased. The drain line is gated in a manhole adjacent to the upstream side of the core wall. The manhole has internal dimensions of 5 feet by 5 feet, which enlarge at the valve itself. The downstream end of the pipe, located at the brook, has a second gate valve and is protected by a U-shaped concrete headwall.

The control tower is constructed of concrete to the crest elevation of the dam and has a brick superstructure and timber roof. The substructure of the control tower is circular in shape with a 12 foot internal diameter. It is divided into two chambers by two lines of double screens. Three 24-inch cast-iron pipe in-

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

MT. WILLIAMS RESERVOIR DAM
MA 000282

SECION 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. 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.

1.2 Description of Project

a. Location - Mt. Williams Reservoir Dam is located on the south side of Pattison Road 2500 feet west of Notch Road intersection in the City of North Adams, Massachusetts, as shown on the report's Location Map. The dam impounds the waters of Paull Brook, also known as Lillie Brook, approximately 2 miles upstream of its confluence with the Hoosic River. The coordinates for the dam are 73 degrees-09.4 minutes longitude and 42 degrees-41.2 minutes latitude.

Surcharge storage routing of the test flood inflow under the condition of no flashboards in the spillway resulted in a peak outflow of 2,650 cfs at a stage of 1034.7. The peak outflow would overtop the dam by approximately 0.7 feet.

f. Dam Failure Analysis - Based on Corps of Engineers Guidelines for Estimating Dam Failure Hydrographs, and assuming that a failure would occur along 40 percent of the length of the dam embankment, the peak failure outflow was estimated to be 76,550 cfs. Immediately prior to failure, with the reservoir level at top of dam (elev. 1034), the spillway discharge would be 850 cfs. In the event of a dam failure, Pattison Road, about 1400 ft downstream, would be overtopped and two dwellings would be affected. The right channel overbank would be overtopped, creating some sheet flow over the mountainside. While most of the dam failure outflow would be confined to the Paull Brook channel, a small portion of the flow could potentially overtop Pattison Road and flow down the steep, undeveloped mountain side. The North Adams Airport runway embankment would be overtopped causing low depth sheet flow flooding of the area between the airport and the Hoosic River. In excess of 100 dwellings would be affected in this area. The capacity of the Hoosic River at the point where it would receive the dam failure outflow of Mount Williams Reservoir is about 25,000 cfs. The dam failure outflow would overtop the banks of the Hoosic River and create a potential for further loss of life and property downstream.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations - There was no visible evidence of dam, spillway, or dike instability during the site examination on 30 April, 1979. However, the spillway discharge channel walls do exhibit instability in that the walls are tilted and some have failed. Evidence of seepage and erosion were discovered but the dam and dike embankments are in fair condition. Visual observations were hindered by the presence of brush.

b. Design and Construction Data - The drawings and specifications obtained from the City Engineer show the basic cross-section of the dam and dike and the method of placement of material. The preliminary report by the geologist indicates the soils which were probably used for construction. However, there is little data on the physical properties of the material actually used in the dam and dike. Based on a review of the available documents and assuming that the dam and dike were constructed according to the design, it is expected that the embankments should have an adequate margin of safety with respect to structural stability under static conditions.

c. Operating Records - Except of the continued existence and apparently satisfactory performance of the embankments since 1915 (see County and State inspection reports in Appendix B), there are no operating records to aid in the evaluation of structural stability.

d. Post-Construction Changes - There are no known modifications or post-construction changes for this facility. Changes in the design made during the actual construction are contained in Section 1.2 h: Design and Construction History.

e. Seismic Stability - Mount Williams Reservoir Dam is located in Seismic Zone No. 2 and in accordance with recommended Phase 1 guidelines, does not warrant seismic analysis.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition - Based on the visual examination, the facility is considered to be in fair condition. Seepage and erosion features were noted but no conditions requiring urgent remedial action were observed.

b. Adequacy of Information - The evaluation of the facility has been based primarily on the visual examination, consideration of available documents and past performance and application of engineering judgement. 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 embankment seepage conditions be obtained as outlined below in Section 7.2.

c. Urgency - The recommendations for additional investigations and remedial measures, outlined in Sections 7.2 and 7.3 respectively, should be undertaken by the Owner within one year after receipt of this report.

d. Need for Additional Investigation - Additional investigations should be performed as outlined in Section 7.2.

7.2 Recommendations

It is recommended that the Owner arrange for the following investigations to be performed by a registered professional engineer:

(1) Evaluate the significance of the observed seepage conditions with respect to long term embankment stability and assess the need for remedial measures. The evaluation should also consider the apparent water flow in the reservior drain manhole.

(2) A detailed hydrologic-hydraulic investigation to determine the needs and means of increasing the spillway discharge capabilities.

(3) A detailed structural investigation of the spillway discharge channel to determine the necessary modifications and/or reconstruction to provide a stable, structurally adequate channel. The investigation should consider the results of the hydrologic-hydraulic investigation in any modification of the channel.

The Owner should implement corrective action as required based on the above engineering evaluations.

7.3 Remedial Measures

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

(1) The dam and dike embankments should be cleared of weeds and brush and mowed at regular intervals to permit visual inspection.

(2) Animal burrows in the embankments should be filled. An annual inspection should be made to check for evidence of burrowing activity and corrective action should be taken as required.

(3) Dam and dike crests should be regraded to provide uniform crest elevations of 1034 and 1036 respectively to permit access by maintenance vehicles.

(4) Upstream dike erosion should be repaired and riprap should be restored to a uniform elevation.

(5) Seepage conditions should be visually monitored on a regular basis at least until an investigation to assess the need for remedial measures is completed.

(6) Remove overhanging trees from the spillway and patch minor chipped concrete and open concrete joints.

(7) Repair deteriorated concrete surface at the top of the reservoir drain manhole. Replace missing manhole rung and ensure that all rungs are structurally sound or remove all manhole rungs within the manhole. Straighten or replace the bent valve operating shaft within the manhole.

(8) Reset the control tower access bridge railings. Repair the control tower concrete at the access bridge stringer bearing. Fill and compact the undermined bridge shore abutment and protect the area from future erosion.

(9) Clean interior metalwork in the control tower of rust and apply a protective coating. Repair the cracked and spalled exterior surface of the control tower.

(10) Institute a program of annual technical inspections.

(11) Provide surveillance of dam and dike during periods of unusually heavy preciptation.

(12) Establish a formal maintenance program, operational procedures and emergency preparedness plan and warning system. The procedures plan should include the removal of flashboards during major flooding events.

7.4 Alternatives - There are no practical alternatives recommended.

APPENDIX A

INSPECTION TEAM ORGANIZATION AND CHECK LIST

VISUAL INSPECTION PARTY ORGANIZATION

NATIONAL DAM INSPECTION PROGRAM

DAM: MOUNT WILLIAMS RESERVOIR DAM

DATE: 30 APRIL 1979

TIME: 1330 to 1730

WEATHER: 70° F to 75° F - Clear - Light Breeze

WATER SURFACE ELEVATION UPSTREAM: 1' - 10'1/2" upstream of weir; 3-1/4" over flashboards (20' weir)

STREAM FLOW: $Q = CLH^{1.5} = (3.3)\ (20')\ (0.27)^{1.5} = 9$ cfs $\pm$

INSPECTION PARTY:

1. Roger H. Wood - CDM
2. Joseph E. Downing - CDM
3. Peter LeCount - H & A
4. Douglas G. Gifford - H&A
5. John Critchfield - H&A

PROJECT FEATURE	INSPECTED BY	REMARKS
1. Dam	D. Gifford	
2. Dike	D. Gifford	
3. Spillway	R. Wood	
4. Outlet Structure	R. Wood	
5. Control Tower	R. Wood	

PRESENT DURING INSPECTION:

1. Mr. Robert Galipeau (part-time) - North Adams
2.
3.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: MOUNT WILLIAMS RESERVOIR DAM DATE: 30 APRIL 1979

EMBANKMENT: DAM BY: PLL, JWC, DGG

CHECK LIST	CONDITION
1. Upstream Slope	1.
a. Vegetation	a. Grass, weeds & brush.
b. Sloughing or Erosion	b. Slight erosion of right spillway training wall.
c. Rock Slope Protection - Riprap Failures	c. Riprap generally extends 0.5 to 2.5 ft. above water level. Cobbles to 2 X 3 ft. pieces. Some apparently recently placed marble riprap at local areas.
d. Animal Burrows	d. None observed.
2. Crest	2.
a. Vegetation	a. Grass, weeds & locally thick brush.
b. Sloughing or Erosion	b. None observed.
c. Surface Cracks	c. None observed.
d. Movement or Settlement	d. Some rutting, now mostly overgrown with vegetation.
3. Downstream Slope	3.
a. Vegetation	a. Weeds & locally thick brush, few small saplings.
b. Sloughing or Erosion	b. Slight erosion along rt. spillway train. wall.
c. Surface Cracks	c. None observed.
d. Animal Burrows	d. Several, up to 3 or 4 ft. deep, abandoned.
e. Movement or Cracking near toe	e. None observed.
f. Unusual Embankment or Downstream Seepage	f. Two wet areas near toe. Approx. 100 ft. from spillway, within 15-20 ft. of toe, wet but no evident flow. Area approx. 150 ft. right of drain and within about 35 ft. of toe wet with slight seepage along toe. Water slightly cloudy.
g. Piping or Boils	g. No evidence of significant soil particle movement in seepage.
h. Foundation Drainage Features	h. None known.
i. Toe Drains	i. None known.
4. General	4.
a. Lateral Movement	a. None observed, somewhat obscured by brush.
b. Vertical Alignment	b. Crest elevation varies 3.9 to 5.2 ft. above reservoir level.
c. Horizontal Alignment	c. Horizontal alignment looks good, somewhat obscured by brush.
d. Condition at Abutments and at Structures	
e. Indications of Movement of Structural Items	
f. Trespassing	
g. Instrumentation Systems	

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: MOUNT WILLIAMS RESERVOIR DAM DATE: 30 APRIL 1979

EMBANKMENT: DAM (cont'd) BY: PLL, JWC, DGG

CHECK LIST	CONDITION
1. Upstream Slope a. Vegetation b. Sloughing or Erosion c. Rock Slope Protection - Riprap Failures d. Animal Burrows	d. Good. e. None observed. f. Frequent hiking on worn trail. g. None
2. Crest a. Vegetation b. Sloughing or Erosion c. Surface Cracks d. Movement or Settlement	
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	
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	

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: MOUNT WILLIAMS RESERVOIR DAM DATE: 30 APRIL 1979

EMBANKMENT: NORTH DIKE BY: PLL, JWC, DGG

CHECK LIST	CONDITION
1. Upstream Slope a. Vegetation b. Sloughing or Erosion c. Rock Slope Protection - Riprap Failures d. Animal Burrows	1. a. Varies; grass, burned brush, cut brush and low brush. b. Slope eroded to vertical scarp from 1300 to 1600 ft. southeast of gatehouse (1300 to 1325 ft. cut back to upstream edge of crest of dike). c. Cobbles to 1 to 2 ft. boulders; generally from 0.5 to 2.5 ft. above water line; several areas at or below water line; plus from 1300 to 1325 ft. from gatehouse riprap is at or below waterline. d. Numerous field mice burrows.
2. Crest a. Vegetation b. Sloughing or Erosion c. Surface Cracks d. Movement or Settlement	2. a. Same as 1a. b. None noted. c. None noted. d. None noted.
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. Same as 1a. b. None noted. c. None noted. d. Numerous abandoned burrows. e. None noted. f. Saturated ground and some puddles from 1080 to 2000 ft. southeast at gatehouse;no significant seepage rate. g. None noted. h. None noted. i. None noted.
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. None noted. b. Crest varies from 3.7 to 5.8 ft. above waterline. c. None noted. d. Dike graded to natural ground at east embankment. e. None noted. f. No significant worn trails. g. None noted.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: MOUNT WILLIAMS RESERVOIR DAM DATE: 30 APRIL 1979

SPILLWAY: BY: R. WOOD

CHECK LIST	CONDITION
1. Approach Channel a. General Condition b. Obstructions c. Log Boom etc.	1. a. Good. b. Overhanging branches left side. 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. 1' - 7-1/4" flashboard weir (3 boards). b. See a. c. Mass on lt. wall, minor growth in joint. d. Minor eff. spot D/S lt. wall. e. None observed. f. None observed. g. Good - Minor opening to 1 ft. above invert front face of core wall rt. side. h. Minor chipping rt. wall top edge. 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. Water flows down cascade and then under racks for 30 ft. and emerges. b. None. c. See a. d. Brush growth in channel. e. Flow in the channel precluded observation of seepage. f. See a. & d. also some branches. g. Discharge channel in very poor condition. Minor cracks present; both walls are leaning and are on the verge of failure, and section rt. side is missing.
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. See 1., 2. & 3.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: MOUNT WILLIAMS RESERVOIR DAM DATE 30 APRIL 1979

OUTLET WORKS: BY: R. WOOD

CHECK LIST	CONDITION
1. Inlet a. Obstructions b. Channel c. Structure d. Screens e. Stop Logs f. Gates	1. Inlet underwater - not visible.
2. Control Facility a. Structure b. Screens c. Stop Logs d. Gates e. Conduit f. Seepage or Leaks	2. a. Concrete MH. Top D/S side deteriorated. Wooden top platform gone. One rung appears missing. D/S face sloped. Concrete walls in good condition. b., c. None. d. Horizontal gate valve-Valve stem bowed and unsupported full height. e. CI pipe. f. Flowing water parallel to dam at bottom of MH.
3. Outlet a. Structure b. Erosion or Cavitation c. Obstructions d. Seepage or Leaks e. Other	3. a. Concrete headwall for 20" CI pipe good condition. Backfill eroding rt. side. b. None observed. c. None bush D/S channel chocked with brush. d. None observed. e. Gate valve 24'± upstream of discharge; only top of stem above ground.
4. Mechanical and Electrical a. Crane Hoist b. Hydraulic System c. Service Power d. Emergency Power e. Lighting f. Lightning Protection	4. a., b., d., e., f. None c. Manually operated stem from crest of dam.
5. Other	

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: MOUNT WILLIAMS RESERVOIR DAM DATE: 30 APRIL 1979

CONTROL TOWER AND SERVICE BRIDGE: BY: R. WOOD

CHECK LIST	CONDITION
1. Control Tower	1.
a. Seepage or Efflorescence	a. Interior of superstructure brick has eff. present.
b. Rust or Stains	b. None observed.
c. Cracks	c. Crack in brich D/S face.
d. Condition of Joints	d. No joints observed.
e. Spalls, Voids or Erosion	e. Exterior surface of substructure concrete deteriorated. Many cracks.
f. Visible Reinforcement	f. None observed.
g. General Struct. Condition	g. Good condition. Parge coat is missing from brick below window D/S face. Lifting beam in house rusted. Floor is good but has dirt debris present. Hatches over screens rusted - hard to operate.
h. Other	h. 3 intake valves in open position and one shut-off valve D/S side in open position.
2. Service Bridge Superstructure	2.
a. Bearings and Anchor Bolts	a. Structure rests on weathered timber.
b. Longitudinal Members	b. Steel rusted.
c. Transverse Members	c. Steel rusted.
d. Bracing	d. None.
e. Underside of Deck	e. Timber - weathered.
f. Deck	f. Timber plank; one missing, one loose board.
g. Expansion Joints	g. N/A
h. Drainage System	h. Deck has 3/4 opening between planks.
i. Railings	i. None. Railing presently laying on dike.
j. Paint	j. None.
3. Service Bridge Abut. & Piers	3.
a. Bridge Seat	a. Stringers poured into Control Tower wall; crack at junction-both stringers.
b. Backwall	b. & c. Steel rests on timber which rests on concrete. Concrete is undermined.
c. Abut. Alignment	d. Approach is good - level.
d. Bridge Approach	e. Abut. poor due to undermining.
e. General Struct. Condition	

APPENDIX B

LIST OF AVAILABLE DOCUMENTS AND PRIOR INSPECTION REPORTS

108

INSPECTION REPORT - DAMS AND RESERVOIRS

Location: ~~City/Town~~ CITY NORTH ADAMS. Dam No. 1-2-209-8.

Name of Dam Mt. Williams Reservoir. Inspected by: RDJordan-RSpaniol.

Date of Inspection 11-16-76.

Prev. Inspection X.

Owner/s: per: Assessors_____.

Reg. of Deeds_____. Pers. Contact_____

1. City of North Adams City Hall North Adams, MA 01247
   Name St. & No. City/Town State Tel
2. _____
   Name St. & No. City/Town State Tel
3. _____
   Name St. & No. City/Town State Tel. No.

Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name St. & No. City/Town State Tel. No.

No. of Pictures taken 1.

Degree of Hazard: [if dam should fail completely]*

1. Minor_____. 2. Moderate_____.
3. Severe_____. 4. Disastrous X.

*This rating may change as land use changes [future development]

Outlet Control: Automatic_____. Manual X.

Operative X yes_____no.

Comments:_____

_____

Upstream face of Dam: Condition:

1. Good X. 2. Minor Repairs_____.
3. Major Repairs_____. 4. Urgent Repairs_____.

Comments:_____

_____

_____

APPENDIX B-14

12. Remarks & Recommendations: [Fully Explain]

The City has not completed removal of the brush on the downstream slope. The caretaker informed me that the slope will be cleared by late spring.

The embankment appears to be in sound condition. There is no visible evidence of sloughing or settlement.

The upstream slope is in need of repairs. There are several areas of erosion along the face above the riprap. The erosion is not serious, however, backfilling and seeding should be done in the near future, to prevent further slope damage.

The city should be advised to keep the water level below the top of the riprap. This would prevent erosion caused by excessive storage.

Except for the noted minor deficiencies, the dam appears to be sound and in my opinion it is safe.

A description of the structure was submitted in 1972. There are no changes to be noted. For location see Topo Sheet 4#A.

13. Overall Condition:

1. Safe X .
2. Minor repairs needed _____
3. Conditionally safe - major repairs needed _____.
4. Unsafe _____.
5. Reservoir impoundment no longer exists [explain]

   Recommend removal from inspection list _____.

8. Downstream Face of Dam: Condition: 1. Good____. 2. Minor Repairs x.
3. Major Repairs___ 4. Urgent Repairs___.

Comments:_____

_____.

9. Emergency Spillway: Condition: 1. Good x. 2. Minor Repairs_____.
3. Major Repairs____.4. Urgent Repairs____.

Comments:_____

_____

_____

10. Water level @ time of inspection: 0.1 ft. above x. below_____.
top of dam_____.
principal spillway x.
other_____.

11. Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment x.
Animal Burrows and Washouts_____.
Damage to slopes or top of dam_____.
Cracked or Damaged Masonry_____.
Evidence of Seepage_____.
Evidence of Piping_____.
Erosion x.
Leaks_____.
Trash and/or debris impeding flow_____.
Clogged or blocked spillway_____.
Other_____.

L-108

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/~~XXXX~~ North Adams. Dam No. 1-2-209-8.

Name of Dam Mt. Williams Reservoir. Inspected by: RDJordan-PFFezzie.

Date of Inspection 3/25/74.

2. Prev. Inspection X.

Owner/s: per: Assessors_____.

Reg. of Deeds_____. Pers. Contact_____.

	Name	St. & No.	City/Town	State	Tel. No.
1.	City of North Adams	City Hall	N. Adams		663-3455
2.					
3.					

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name	St. & No.	City/Town	State	Tel. No.

4. No. of Pictures taken 4.

5. Degree of Hazard: [if dam should fail completely]*

1. Minor_____. 2. Moderate_____.

3. Severe_____. 4. Disastrous x.

*This rating may change as land use changes [future development]

6. Outlet Control: Automatic_____. Manual x.

Operative x yes:_____no.

Comments:_____

_____

Upstream face of Dam: Condition:

1. Good_____. 2. Minor Repairs x.

3. Major Repairs_____. 4. Urgent Repairs_____.

Comments:_____

_____

12. Remarks & Recommendations: [Fully Explain]

Much of the minor repair work listed on the 1971 report has been completed. Most of the brush has been removed from the slope and the undermining at the spillway has been repaired. The embankment shows no signs of seepage, sloughing or settlement. The dam appears to be in sound structural condition.

13. Overall Condition:

1. Safe X .
2. Minor repairs needed _____ .
3. Conditionally safe - major repairs needed _____ .
4. Unsafe _____ .
5. Reservoir impoundment no longer exists [explain]

   Recommend removal from inspection list _____ .

8. Downstream Face of Dam: Condition: 1. Good X. 2. Minor Repairs___.
3. Major Repairs___ 4. Urgent Repairs___.

Comments:_____

_____.

---

9. Emergency Spillway: Condition: 1. Good X. 2. Minor Repairs_____.
3. Major Repairs_____.4. Urgent Repairs_____.

Comments:_____

_____

_____

---

10. Water level @ time of inspection: _____. ft. above____. below_____.
top of dam_____.
principal spillway_____.
other 1" over flash boards.

---

11. Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment X.
Animal Burrows and Washouts NONE.
Damage to slopes or top of dam X.
Cracked or Damaged Masonry "
Evidence of Seepage "
Evidence of Piping "
Erosion "
Leaks "
Trash and/or debris impeding flow "
Clogged or blocked spillway "
Other_____.

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INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: ~~XXX~~/Town North Adams. Dam No. 1-2-209-8.

Name of Dam Mount Williams Reservoir Inspected by: R D Jordan.

Date of Inspection May 24, 1972

2. Prev. Inspection X.

Owner/s: per: Assessors_____.

Reg. of Deeds_____. Pers. Contact_____.

1. City of North Adams City Hall 663-3455
Name St. & No. City/Town State Tel. No.

2. _____
Name St. & No. City/Town State Tel. No.

3. _____
Name St. & No. City/Town State Tel. No.

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Genesio Breda City Hall North Adams 663-3455
Name St. & No. City/Town State Tel. No.

4. No. of Pictures taken 0.

5. Degree of Hazard: [if dam should fail completely]*

1. Minor_____. 2. Moderate_____.

3. Severe_____. 4. Disastrous X.

*This rating may change as land use changes [future development]

6. Outlet Control: Automatic_____. Manual X.

Operative X yes:_____no.

Comments: 24" water main

7. Upstream Face of Dam: Condition:

1. Good X. 2. Minor Repairs_____.

3. Major Repairs_____. 4. Urgent Repairs_____.

Comments:

1-2-209-8
Dam #16-8

INSPECTION OF DAMS

City or Town of North Adams Date June 14, 1971 1

Name of Dam Mount Williams Reservoir Inspector R. Northrup & P. Fezzie

Owner City of North Adams Address City Hall, North Adams, Mass.

Caretaker City of North Adams Address City Hall, North Adams, Mass.

Location West of intersection of Notch and Pattison Road.

Type of Dimensions Earth concrete core wall 1000' long, 35' high, top 18' wide avg.

Spillway, type and size Concrete 20' long, 5' freeboard.

Outlets, type and size 24" pipe C.I.

Flashboards, type and height 27" wood.

Date Built 1915 Condition Good

When last repaired 1956 By whose orders Owner

Nature of Repairs 24" disc. pipe extended 12'. New W.W. and 24" blow off pipe.

Purpose of Dam Water supply.

Approximate storage of water 26,000,000 cubic feet.

Approximate area of water shed 1 square mile.

Possible damage due to failure of dam Disastrous to life and property below.

Remarks Spillway sidewalls beginning to undermine. Spillway floor eroded, embankment covered with brush.

Recommendations Repair concrete at spillway.

Corrective Action

COUNTY OF BERKSHIRE, MASS.

INSPECTION OF DAMS 1-2-209-8

City or Town of North Adams Date August 30, 1968

Name of Dam Mount Williams Reservoir Inspector William A. Heaphy

Owner City of North Adams Address City Hall, North Adams, Mass Tel. 663-6765

Caretaker Raymond James Address Paterson Rd. Tel.

Location Intersection of Notch and Paterson Roads

Type and Dimensions Earth- masonry core walls 1000' long and 35' high average width of top 18'

Spillway, type and size Concrete 20' wide with 5' freeboard

Outlets, type and size 24" pipe

Flashboards, type and height Wood 12" high

Date Built 1915 Condition Good

When last repaired 1956 By whose orders Commissioner of Public Works

Nature of Repairs 24" discharge pipe extended 12' New Headwall and 24" blow off valve

Purpose of Dam Storage reservoir for city

Approximate storage of water 26,000,000 Cubic Feet.

Approximate area of water shed 1 square mile

Possible damage due to failure of dam Roads and property in Greylock

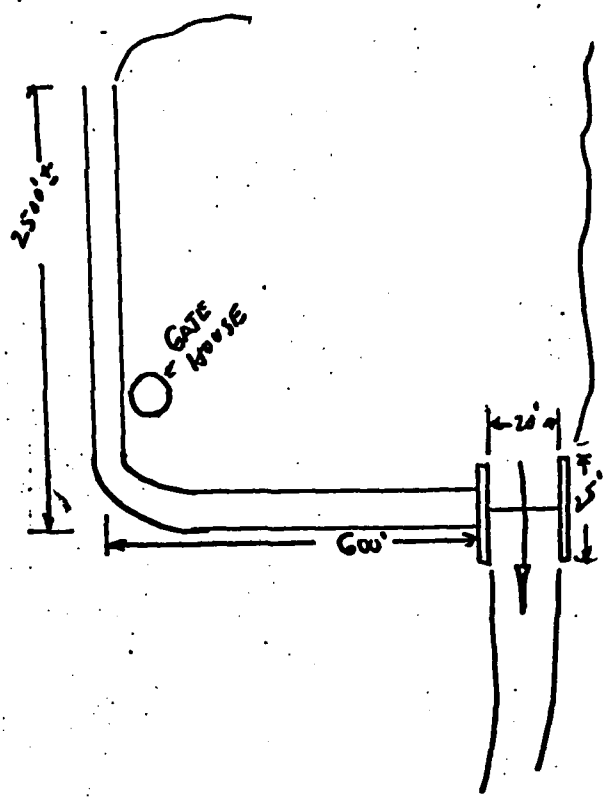
Remarks Water level about 2' below spillway, spillway should have all growth removed and concrete patched or refaced.

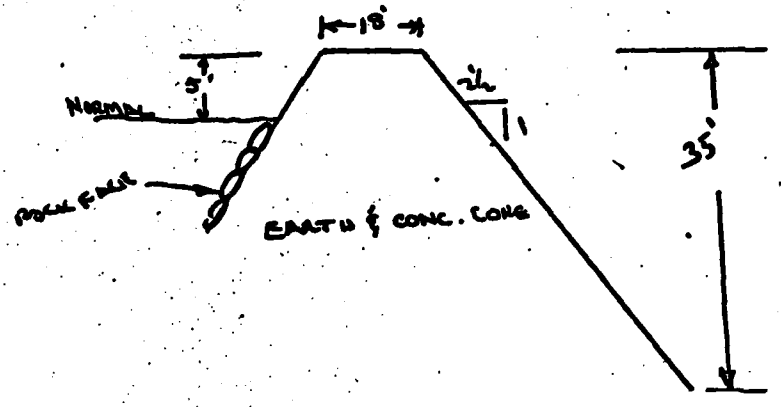
Recommendations Grass and brush should be cleared both upstream and downstream. Flashboards should be removed in fall.

APPENDIX B-6

APPENDIX B-5

MT. WILLIAMS RESV. 1-209-8





L-169 A

DAM NO. 1-2-209-8.

10.

Risk to life and property in event of complete failure.

No. of people 200+.

No. of homes 75+.

No. of Businesses 5+.

No. of Industries 2+. Type_____.

No. of Utilities_____. Type_____.

Railroads 1.

Other dams_____.

Other_____.

11.

Attach Sketch of dam to this form showing section and plan on 8-1/2" x 11" sheet.

L-169

DESCRIPTION OF DAM

DISTRICT ONE.

Submitted by R D Jordan Dam No. 1-2-209-8

Date May 24, 1972. XXXX/Town North Adams

Name of Dam Mt. Williams Reservoir

---

1. Location: Topo Sheet No. 4-A.

   Provide 8-1/2" x 11" in clear copy of topo map with location of Dam clearly indicated.

---

2. Year built: 1915. Year/s of subsequent repairs 1956

---

3. Purpose of Dam: Water Supply X. Recreational _____.

   Irrigation _____. Other _____.

---

4. Drainage Area: ONE sq. mi. _____ acres.

---

5. Normal Ponding Area: _____ Acres; Ave. Depth _____.

   Impoundment: 196 MG gals; _____ acre ft.

---

6. *No. and type of dwellings located adjacent to pond or reservoir* _____

   i.e. summer homes etc. _____

---

7. Dimensions of Dam: Length 500'. Max. Height 35'.

   Slopes: Upstream Face Rock Face 2:1.

   Downstream Face Earth 2½:1.

   Width across top 18'.

---

8. Classification of Dam by Material:

   Earth _____. Conc. Masonry _____. Stone Masonry _____.

   Timber _____. Rockfill _____. Other Earth-Concrete Core.

---

9. A. Description of present land usage downstream of dam: 25 %rural; 75 % urban.

   B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure

   Yes _____. No X.

APPENDIX B-2

LIST OF AVAILABLE DOCUMENTS
MOUNT WILLIAMS RESERVOIR DAM

DOCUMENT	LOCATION
1. Eight Drawings of Mount Williams Reservoir Dam and Appurtenant Structures. July 1914.	City of North Adams Commissioner of Public Works 10 Main Street City Hall North Adams, MA 01247
2. Soils Investigations, Specifications and Project Completion Reports to the Commissioner of Public Works. "City of North Adams Annual Report" 1913, 1914, and 1915 respectively.	City of North Adams Commissioner of Public Works 10 Main Street City Hall North Adams, MA 01247

Downstream Face of Dam: Condition: 1. Good____. 2. Minor Repairs X.
3. Major Repairs____. 4. Urgent Repairs____.

Comments:_____

_____

9.

Emergency Spillway: Condition: 1. Good X. 2. Minor Repairs_____.
3. Major Repairs____. 4. Urgent Repairs____.

Comments:_____

_____

_____

10.

Water level @ time of inspection: 2.0'. ft. above____. below X.
top of dam_____.
principal spillway emergency spillway
other_____.

11.

Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment X.
Animal Burrows and Washouts_____.
Damage to slopes or top of dam_____.
Cracked or Damaged Masonry_____.
Evidence of Seepage_____.
Evidence of Piping_____.
Erosion_____.
Leaks X.
Trash and/or debris impeding flow_____.
Clogged or blocked spillway_____.
Other_____.

Remarks & Recommendations: [Fully Explain] PREVIOUS INSPECTION DATE: March 25, 1974

The upstream face is in good shape, no settlement was noted in the rock face. The top of the dam, downstream face, and toe are covered with brush and weeds. It was very difficult to satisfactorily inspect the structure. The owner should be advised to conduct a general cleanup of the entire dam.

At the top of the dam opposite the control house, a large leak is visible. Water department personnel advised us that it is a break in the waterline. Although not measured, the leak is flowing at a heavy rate. A contractor has been retained to excavate and repair the pipe. Work is to begin on this date.

The City Water Department is maintaining a constant watch on the leak.

For location see Topo Sheet 4A.

13. Overall Condition:

1. Safe ____X____.
2. Minor repairs needed ____X____
3. Conditionally safe - major repairs needed ____X____.
4. Unsafe ____.
5. Reservoir impoundment no longer exists [explain]

   Recommend removal from inspection list ____.

L-168

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: ~~City/Town~~ City of North Adams Dam No. 1-2-209-8

Name of Dam Mr. Williams Reservoir Inspected by RDJordan-RSpaniol

Date of Inspection July 16, 1978

Previous Inspection November 16, 1976

2. Owner/s per: Assessors _____
Reg.of Deeds _____ Personal Contact _____

1. City of North Adams City Hall North Adams, MA _____
Name St. & No. City/Town/State Tel. No.

2. _____
Name St. & No. City/Town /State Tel No.

3. Caretaker (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

_____
Name St.& No. City/Town /State Tel.No.

4. No. of Pictures taken 2

5. Degree of Hazard: (If dam should fail completely)*

1. Minor 2 Moderate _____

3. Severe X 4. Disastrous _____

*This rating may change as land use changes (future development)

6. Outlet Control: Automatic _____ Manual X

Operative X Yes _____ No _____

Comments: _____

_____

7. Upstream Face of Dam:

Condition: 1. Good _____ 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: See report...

L-168-A

DAM NO. 1-2-209-8

8. Downstream Face of Dam:

Condition: 1. Good _____ 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs See report....

9. Emergency Spillway

Condition: 1. Good _____ 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

_____

10. Water level at time of inspection 6' above _____ below x

top of dam x

principal spillway _____

other _____

11. Summary of Deficiencies Noted:

x Growth (Trees & Brush) on Embankment _____

_____ Animal Burrows and Washouts _____

_____ Damage to slopes or top of dam _____

_____ Cracked or damaged masonry _____

_____ Evidence of seepage _____

_____ Evidence of piping _____

_____ Erosion _____

_____ Leaks _____

_____ Trash and/or debris impeding flow _____

_____ Clogged or blocked spillway _____

_____ Other _____

L-168B

DAM NO. 1-2-209-8

12. Remarks & Recommendations; (Fully Explain)
PREVIOUS INSPECTION DATE: November 16, 1976

Due to heavy growth of grass, weeds, and brush, it is practically impossible to inspect this structure.

The owners should be directed to clear the entire structure of the growth to provide access for inspection.

For location see Topo Sheet 4-a.

13. Overall Condition:

_____ 1. Safe _____

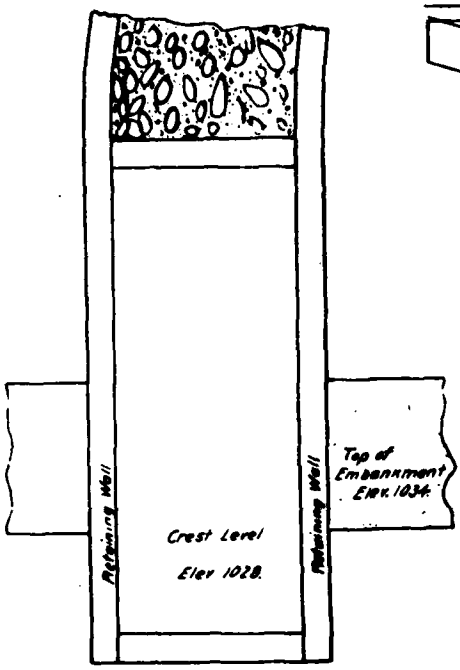
_____ 2. Minor repairs needed _____

_____ 3. Conditionally safe - major repairs needed _____

_____ 4. Unsafe _____

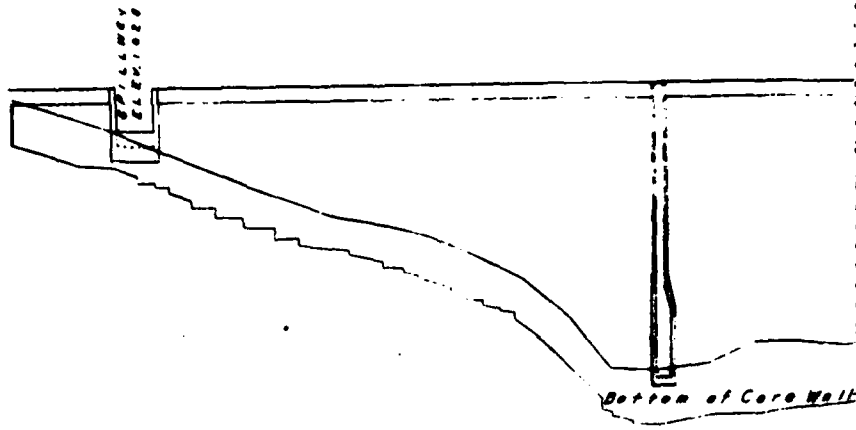
_____ 5. Reservoir impoundment no longer esists (explain)

Recommend removal from inspection list _____



PLAN OF SPILLWAY

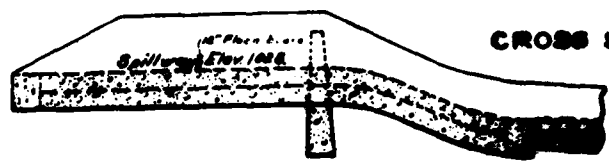
Scale 1 inch = 8 ft.



LONGI

S

20

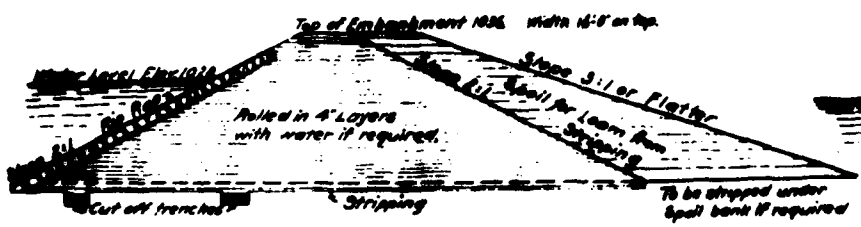


CROSS SEC

Scale

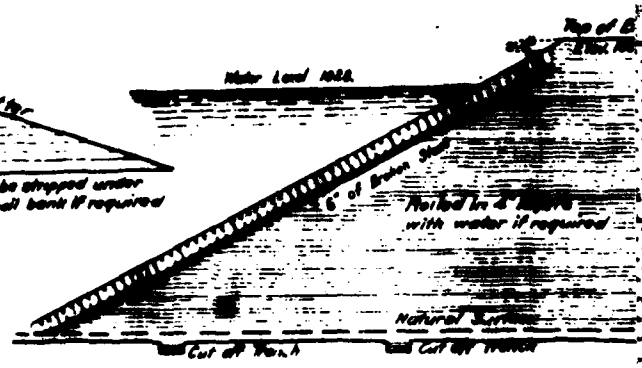
LONGITUDINAL SECTION OF SPILLWAY

Scale 1 inch = 8 ft.



SECTION OF DIKE

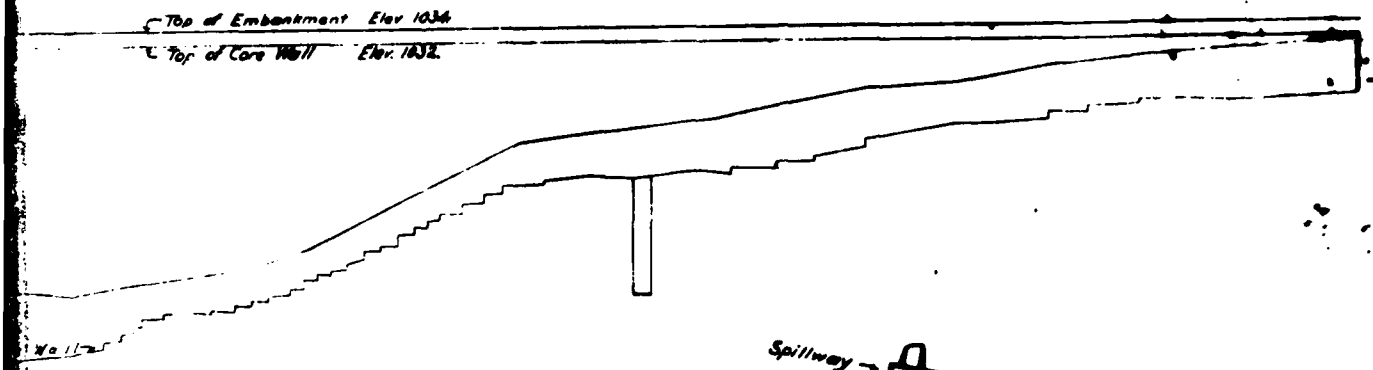
Scale 1 inch = 10 ft.



SECTION

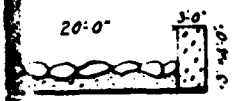
Scale 10 ft.

192



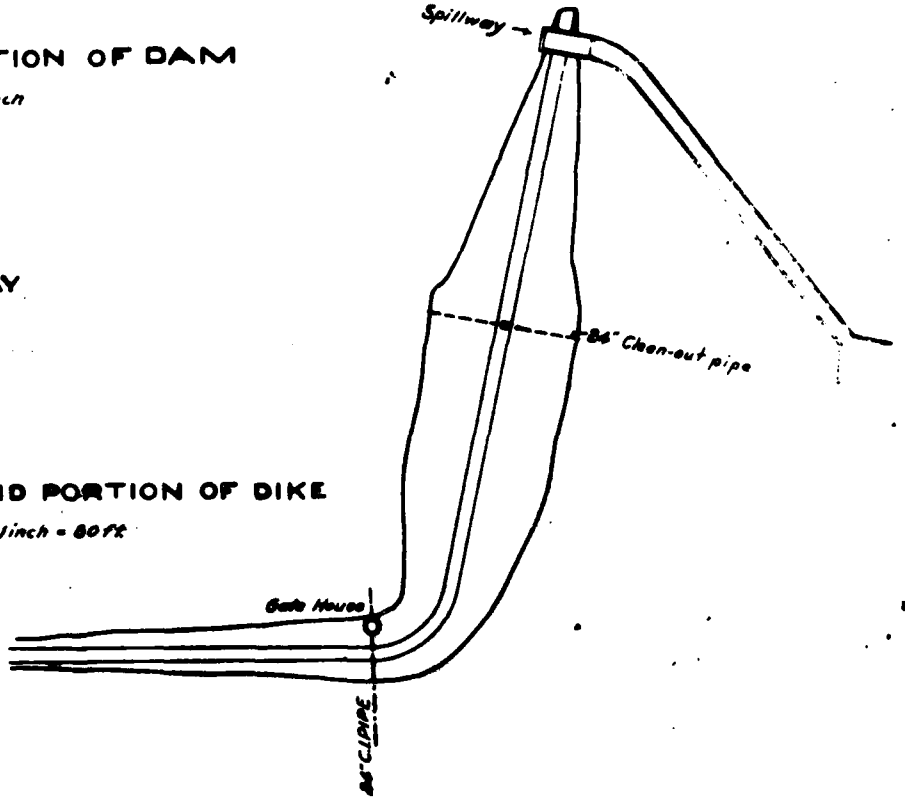
NGITUDINAL SECTION OF DAM

Scales 40 and 10. ft per inch



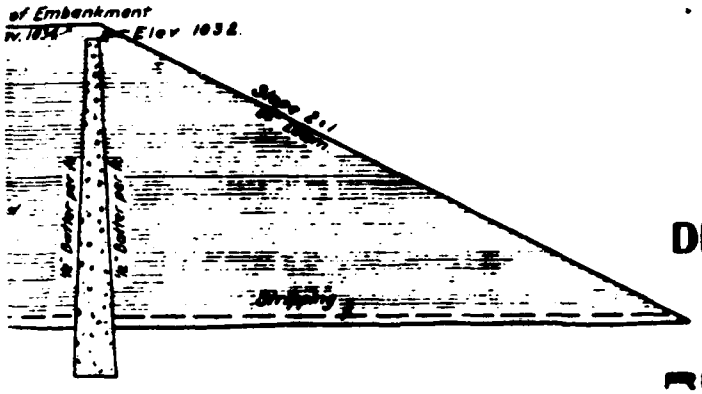
ECTION OF SPILLWAY

Scale 1 inch = 8 ft



PLAN OF DAM AND PORTION OF DIKE

Scale 1 inch = 80 ft



N OF DAM

10 ft. = 1 inch

CITY OF NORTH ADAMS

EXTENSION OF WATER SUPPLY

GENERAL PLAN
DETAILS OF DAM AND SPILLWAY

JULY, 1914 SCALES AS NOTED

REPLOTTED IN JAN. 19

292

Special Butt Strap Hinges of wrought iron & metal. 5'6" & 6" riveted to door and bolted to frame

Two rings on each door

8" wrought iron 5'0" x 12" each

DETAIL OF M H FRAME AND COVER

Scale: 3" = 1'

This iron work to be furnished by City and set by Contractor.

Screens to be furnished by City.

Wall of Plain Concrete 36" Thick

"Merrimac" Cover Type J

Ladder ¾" round wrought iron rungs

24" Outlet Pipe

6" Special Channels ⅜" Flange 15.2 lbs per ft Required 34.4 long each

Hooks of ¾" Round Bronze brazed

¼" Bronze Plate Drilled as shown for 2" wood screws

2½" x ⅜" Bronze Drilled as shown for 2" wood screws

4'-9"

Copper Wire Cloth No 10 Wire U.S. Gauge with ½" between wires

Scale 1" = 1 Ft.

PLAN OF GATE HOUSE

Scale 1 in. = 4 Ft.

2" Standard Galvanized Wrought Iron Pipe Posts

3" Plank Floor

6" Special Channels ⅜" Flange Channels to be furnished and set by Contractor

4"x6" H P dipped in Creosote Oil Bolted with Copper bolts.

DETAILS OF SCREENS

Scale 1 in. = 1 Ft.

2" Galvanized Wrought Iron Pipe Fence

13'0" Diam.

4'-4"

3" H P Planking

4"x6" H P

Four 12" Standard Channels with 6-4½" angle connections

El. 1094.0

12'0"

Two 12" Channels

Two 18" Standard I-Beams 55 lbs.

Concrete 8'x 25'x 4"

Slope 2:1

Elevation 1034.0 Width 16'0"

SEC

24" Gate Valve

24" Cast Iron Pipe

24" Cast Iron Pipe

24" Cast Iron Pipe

Concrete Cut-Off 6'x 8'x 2'

24" Cast Iron Pipe

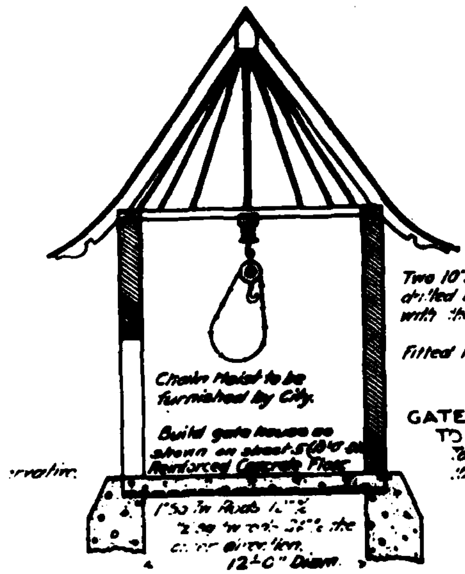
El. 999.0

Concrete Foundation 24' Deep

SECTION THROUGH DIKE AND GATEHOUSE

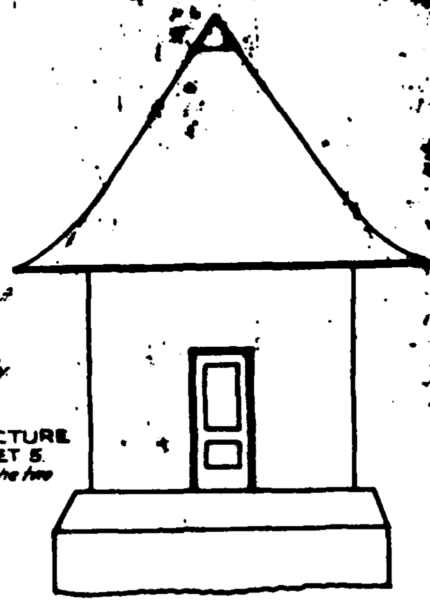
Scale 1" = 4 Ft.

192

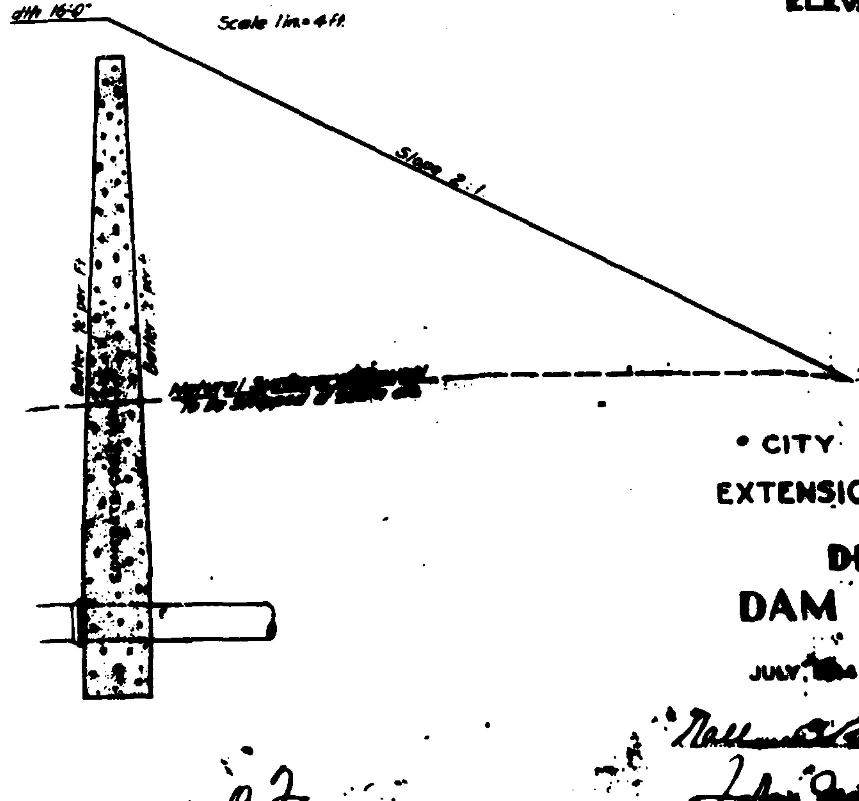


SECTION OF GATEHOUSE

Scale 1in = 4 ft.



ELEVATION OF GATEHOUSE



• CITY OF NORTH A

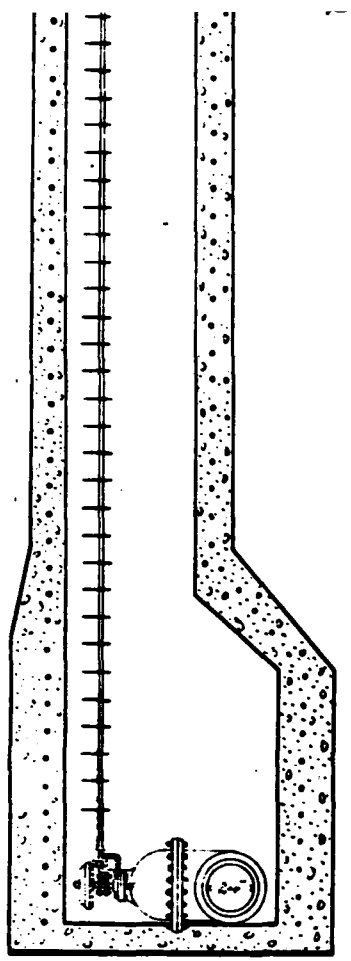
EXTENSION OF WATER SU

DETAILS OF

DAM AND SPILLWAY

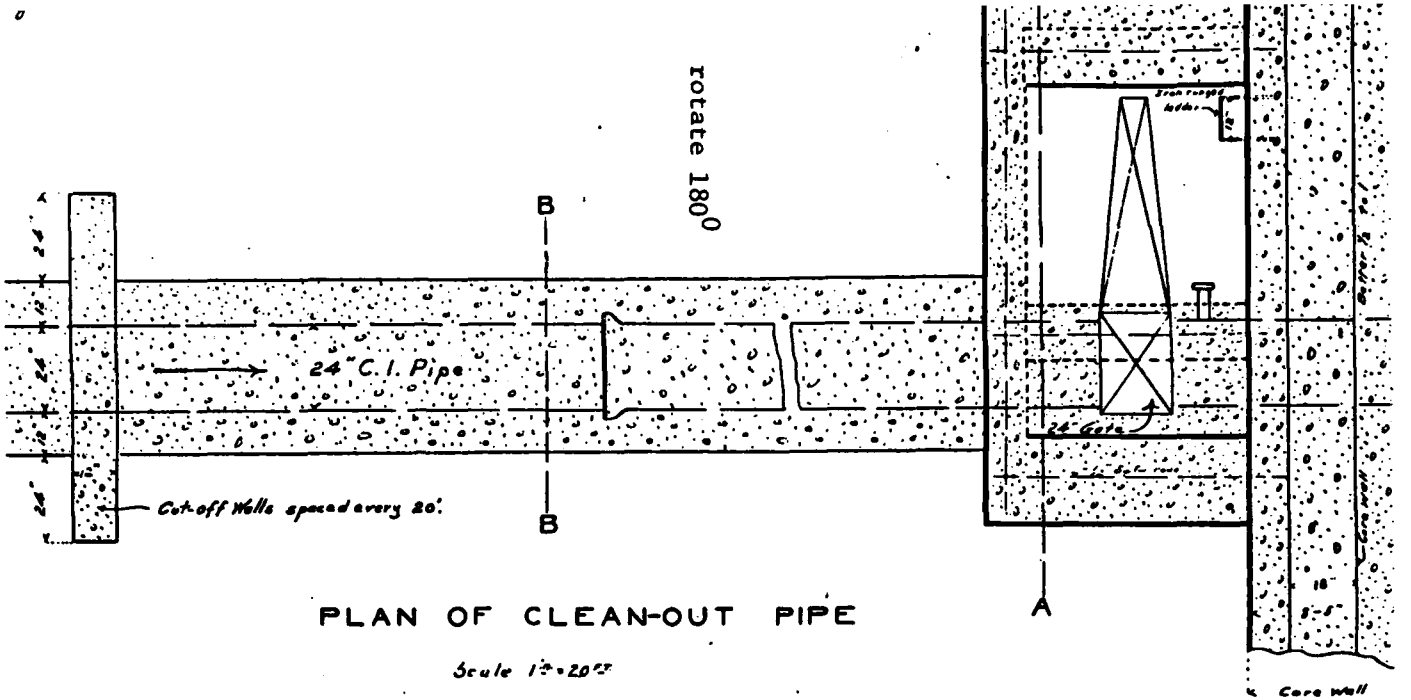
JULY, 19 SCALE

282



SECTION ON A-A

Scale 1in = 5FT.



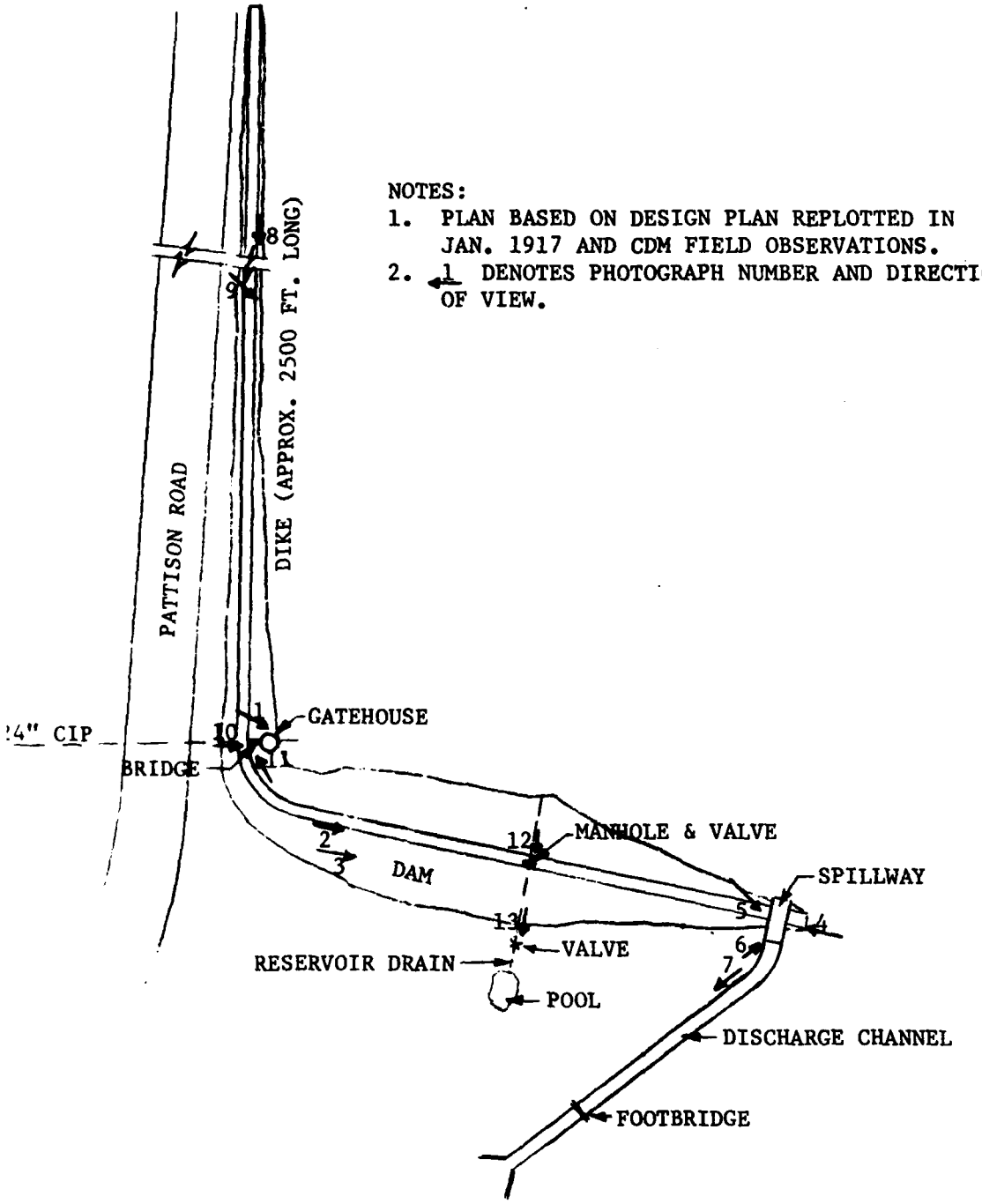
PLAN OF CLEAN-OUT PIPE

Scale 1in = 20FT.

APPENDIX C

SELECTED PHOTOGRAPHS OF PROJECT

NOTES:
1. PLAN BASED ON DESIGN PLAN REPLOTTED IN JAN. 1917 AND CDM FIELD OBSERVATIONS.
2. 1 DENOTES PHOTOGRAPH NUMBER AND DIRECTION OF VIEW.



P DRESSER & McKEE, INC.
OSTON, MASSACHUSETTS

U.S.ARMY ENG. DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

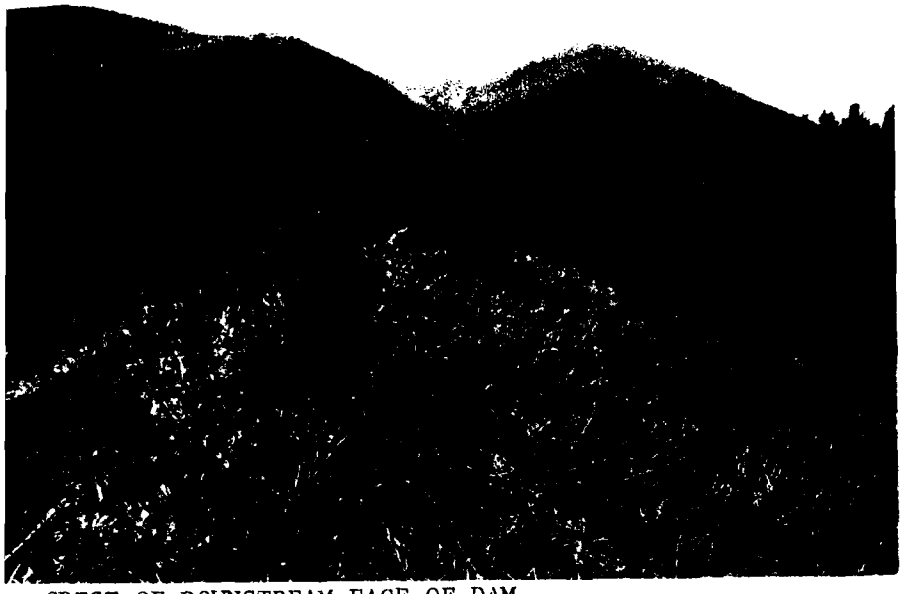
LOCATION OF PHOTOGRAPHS

NT WILLIAMS RESERVOIR MASSACHUSETTS

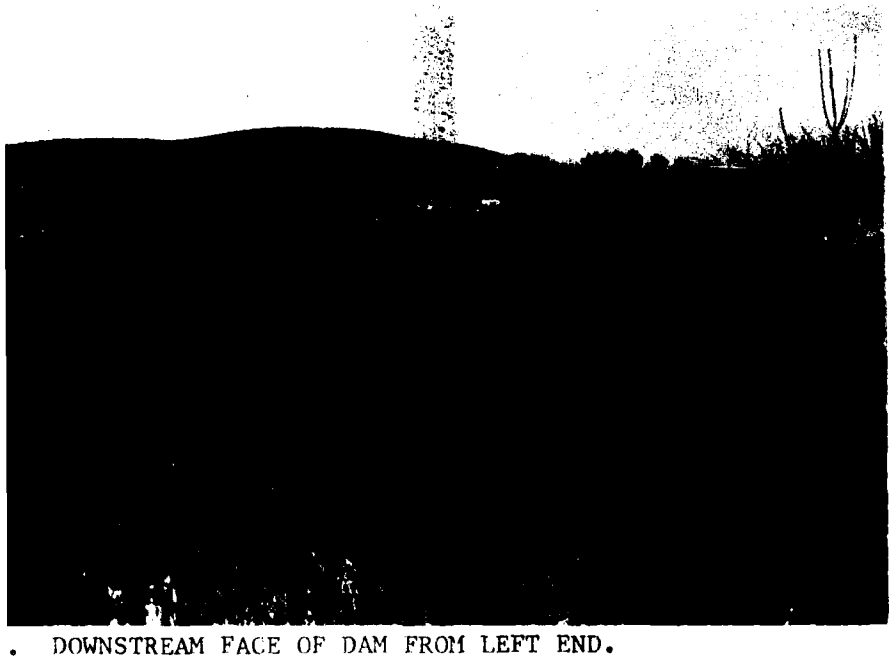
Scale; Not To Scale
Date; June 1979

NORTH

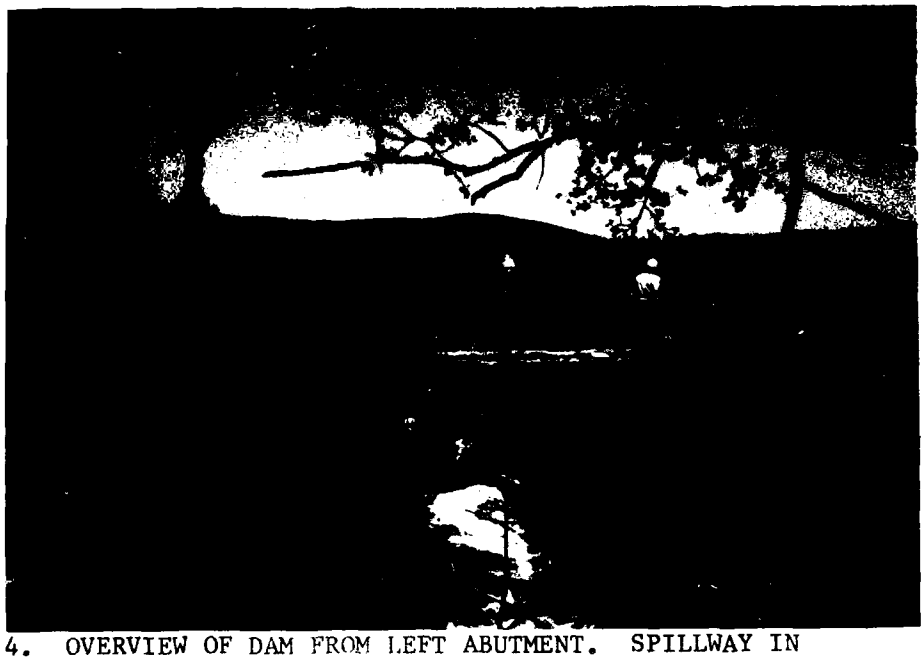
APPENDIX C-1



CREST OF DOWNSTREAM FACE OF DAM.



DOWNSTREAM FACE OF DAM FROM LEFT END.



4. OVERVIEW OF DAM FROM LEFT ABUTMENT. SPILLWAY IN FOREGROUND. NOTE DAM CORE WALL IN SPILLWAY RIGHT WALL.

5. SPILLWAY WEIR (FLASHBOARDS) AND LEFT SIDEWALL.

DAM FAILURE ANALYSIS

Determine Dam Failure Flow, Qp:

$Q_p = 8/27 (W_b)(g)^{1/2}(Y_o)^{3/2}$ where: W_b = A max. of 40% of the dam length measured at mid height
= 0.4 x 450 = 180 ft

$g = 32.2$ ft/sec^2

Y_o = height of water column @ time of dam failure. Assume WS at crest of dam @ failure
= 40 ft.

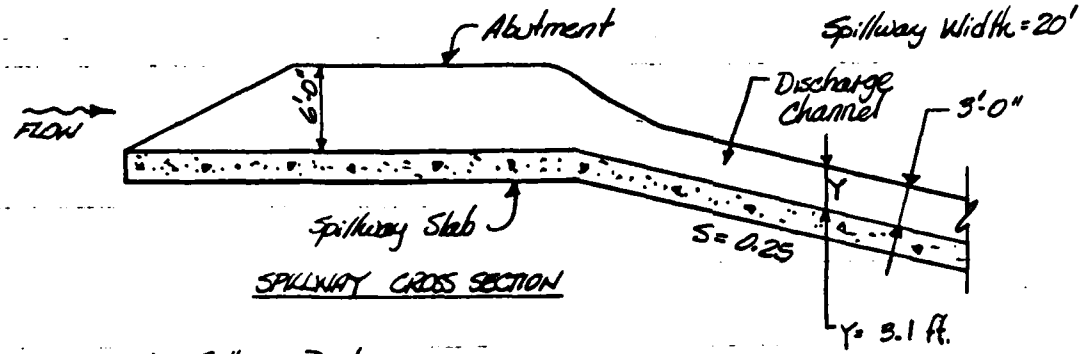
$Q_p = 8/27 (180)(32.2)^{1/2}(40)^{3/2}$
= 76,560 cfs

Reach 1 – Dam to Pattison Road; Length = 1400 ft.

In this reach a couple of things happen. Some flow will overtop the right bank and disperse over the side of the hill, and some storage will occur. Assume that 73,000 cfs is diverted to Paull Brook. The culvert under Pattison Road is a 5'ϕ conc. pipe with area approx. 20 sq.ft. The flow through the culverts is insignificant relative to the total flow. At the culvert, the road is about 2 ft above the crown of the pipe and it fades into the local surface contours at either side. Based on a trapezoidal channel approximation upstream of the road, there will be about 7-feet of water overtopping the road. Velocities up to 20 feet per second are probable.

CAMP DRESSER & McKEE INC. CLIENT COE JOB NO 280-6-RT-4 PAGE 7
PROJECT Dam Inspection DATE CHECKED 8-16-79 DATE 8-16-79
DETAIL Mt. Williams Res. Dam CHECKED BY J.R.A. COMPUTED BY JED

TAILWATER ANALYSIS



SPILLWAY CROSS SECTION

Max. Spillway Discharge:
$Q_{max} \rightarrow H_{max} = 6'$

$$Q_{max} = CLH^{3/2} = 2.9 \times 20 \times 6^{3/2} = 852 \text{ cfs}$$

Flow in spillway approach will be subcritical flow.

Flow will pass thru critical depth where channel bottom changes from mild to steep sloped.

Find criticle depth (Y_c)

$$\frac{Q^2}{g} = \left(\frac{A^3}{B}\right)_{Y=Y_c} \quad \text{or} \quad \frac{(852)^2}{32.2} = \frac{(20 \times Y_c)^3}{20}$$

$$Y_c = \left[\frac{20(852)^2}{32.2}\right]^{1/3} \div 1/20 = 3.83 \text{ ft.}$$

Find supercritical depth in discharge channel

$$Q = AV = \frac{1.49}{.02} \times (20 \times Y)\left(\frac{20 \times Y}{20 + 2Y}\right)^{2/3}(.25)^{1/2}$$

$Y = 3'$, $Q = 3900$ cfs
$Y = 2'$, $Q = 3,094$ cfs
$Y = 1'$, $Q = 700$ cfs
} $Q = 852$ cfs, $Y = 1.12$ ft.

Conclussion: Spillway discharge channel sidewalk appear adequate to contain max. spillway discharge of 852 cfs. without overtopping or flooding out weir.

SURCHARGE STORAGE ROUTING

Test Flood, Q_{p_1} = 3,750 cfs (see page 2 for Test Flood Determination)

Surcharge Height to pass Q_{p_1} is El. 1034.9'

$STOR_1 = \frac{\text{Surcharge Storage}}{\text{Drainage Area}} = \frac{430 \text{ ac-ft} \times 12"/ft}{891.7 \text{ acres}} = 5.787$ inches

Probable Maximum Flood: $Q_{p_2} = Q_{p_1}\left(1 - \frac{STOR_1}{19}\right) = 3{,}750\left(1 - \frac{5.787}{19}\right) = 2{,}608$ c

Surcharge Height to pass Q_{p_2} is El. 1034.65'

$STOR_2 = \frac{410 \text{ ac-ft} \times 12"/ft}{891.7 \text{ acres}} = 5.518$ inches

$STOR_{AVG} = \frac{5.787 + 5.518}{2} = 5.65$ inches

$Q_{p_3} = 3{,}750\left(1 - \frac{5.65}{19}\right) = 2635$ cfs

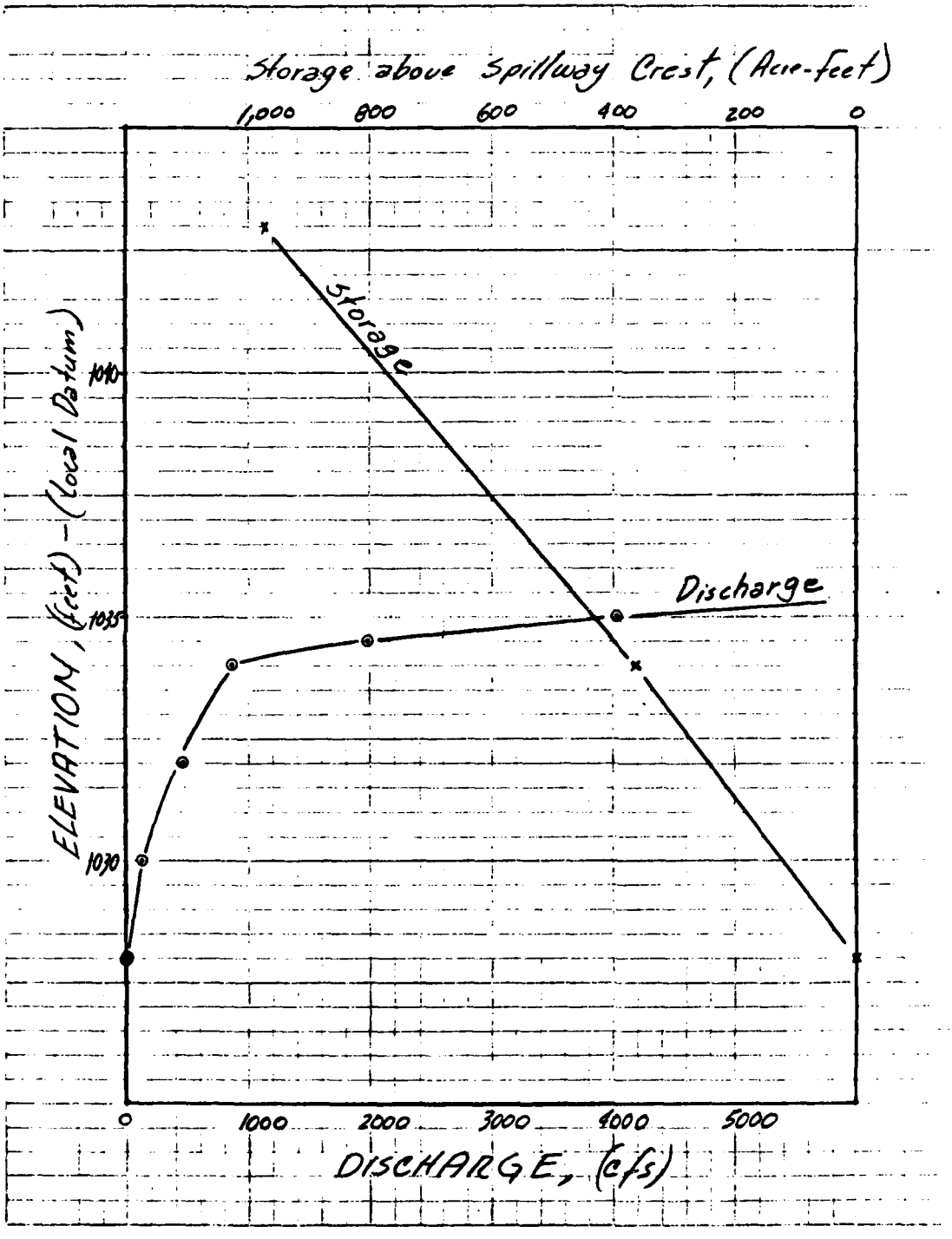
say 2,650 cfs

∴ Test Flood inflow = 3,750 cfs

Test Flood outflow = 2,650 cfs

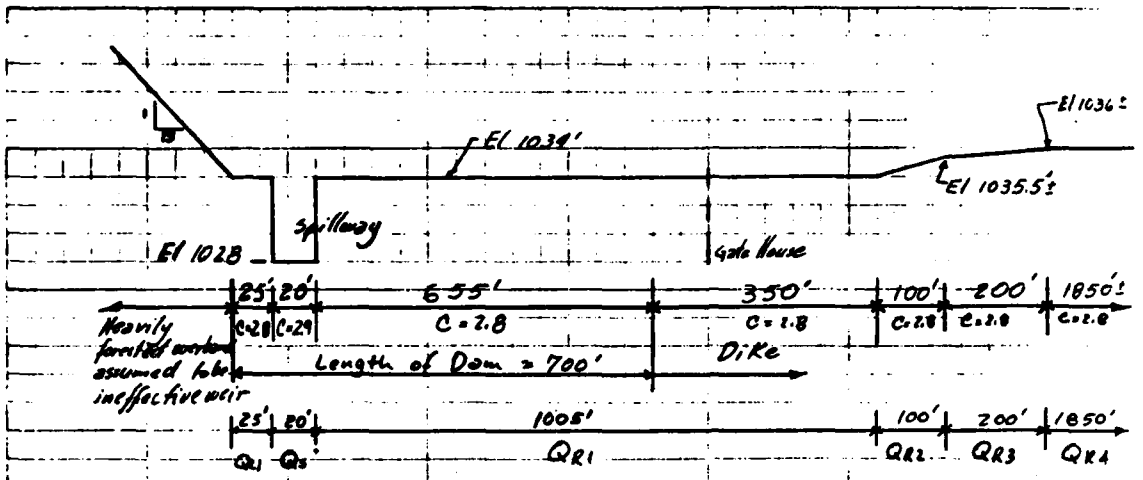
Surcharge Elev. = 1034.7 feet

CAMP DRESSER & McKEE INC. CLIENT COE JOB NO 380-6-RT-4 PAGE 5
PROJECT Dam Inspection DATE CHECKED 7/23/79 DATE 5-7-79
DETAIL Mt. Williams Res. Dam CHECKED BY JED COMPUTED BY Joe H.



APPENDIX D-6

GANG DRESSER & MANSE INC. CLIENT COE JOB NO 380-6-RI-4 PAGE 4
PROJECT Dam Inspections DATE CHECKED 7/23/79 DATE 5-9-79
DETAIL Mt. Williams Res. Dam CHECKED BY JED COMPUTED BY Joe H.



WEIR PROFILE

Compute Stage-Discharge Relationship:

Stage-Discharge Relationship

W.S. El. (ft)	Spillway Flow, cfs Q_S	Left Embk. Flow, cfs Q_{L1}	Right Embankment Flow cfs Q_{R1}	Q_{R2}	Q_{R3}	Q_{R4}	Total Flow (cfs)
1028	–	–	–	–	–	–	ZERO
1030	164	–	–	–	–	–	164
1032	464	–	–	–	–	–	464
1034	852	–	–	–	–	–	852
1034.5	961	25	995	12	–	–	1993
1035	1074	70	2814	66	–	–	4024
1035.5	1191	129	5170	182	–	–	6672

CAMP DRESSER & MCKEE INC. CLIENT COE JOB NO 380-6-RI-4 PAGE 3
PROJECT Dam Inspection DATE CHECKED 7/28/79 DATE 5-9-79
DETAIL Mt. Williams Res. Dam CHECKED BY JBD COMPUTED BY Joe A.

TEST FLOOD DETERMINATION

Mount Williams Reservoir Dam is classified as being of intermidiate size and high hazard. The size classification is based on the hydraulic height of the dam.

Based on the size and hazard classifications attributable to Mt. Williams Reservoir Dam, the Test Flood, according to NED Corps of Engineers Guidelines, should be a full PMF

∴ use PMF

The watershed is steeply sloped and heavily forested. Therefore the PMF should be derived from the "mountainous" curve of the NED Corps of Engineers' "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations." March 1978

$PMF = 2{,}675 \frac{cfs}{sq.mi} \times 1.4 \text{ sq. mi. DA} = 3{,}745 \text{ cfs}$

say 3,750 cfs

STAGE-DISCHARGE RELATIONSHIP

At time of field inspection, there was about 1½ ft of flashboards inplace. The S-O relationship will be based on the condition that no flashboards will be in place at the occurence of a major flood event, especially a PMF. The assumption of such a condition is reasonable because it is normal operating procedure to remove all flashboards during high runoff periods of the year and an operator resides at the site of the dam and could respond quickly to remove the flashboards at any time of the year.

The effective weir profile is shown on next page.

Weir flow is computed using the following equation.

$$Q(cfs) = CLH^{1.5}$$

where C = weir coeff. stated on weir profile sketch
L = length of weir, ft.
H = Head over crest of weir, ft.

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PROJECT Dam Inspection DATE CHECKED 5/9/79 DATE 5-9-79
DETAIL Mt Williams Reservoir Dam CHECKED BY JED COMPUTED BY Joe A.

ELEVATIONS

Spillway Crest without flashboards 1028.0'
The spillway has provisions for flashboards.
The spillway crest elevation at time of field inspection was about 1029.45'.

Crest of Dam 1034.0

Above elevations based on drawings shown in Appendix B

SURFACE AREAS

Mount Williams Reservoir Surface Area – 45.0 acres

Drainage Area – 891.7 acres; 1.39 sq. mi.

Surface area @ elevation 1044 (1060 based on NGVD) – 76.2 acres

STORAGE VOLUMES

@ Spillway Crest (El. 1028.0) based on operator's records and assuming zero siltation ≈ 570 ac-ft. However, operator indicated that some siltation has taken place. If we assume that 1/4 of storage volume is taken up by silt, the storage at spillway crest is approx. 427 ac-ft

@ Top of Dam (El. 1034.0), Storage = $427 + \left(\frac{45+76.2}{2}\right) 6 = 791$ ac-ft

@ Elevation 1044, Storage = $791 + \left(\frac{45+76.2}{2}\right) 10 = 1397$ ac-ft

SIZE CLASSIFICATION

Hydraulic Height = 40 ft. ∴ Intermediate

Storage @ Top of Dam = 791 ac-ft ∴ Small

HAZARD CLASSIFICATION

Three houses above the airport and scores of houses below the airport will be affected. Pattison, State Route 2 and the Airport will be overtopped.

∴ hazard is HIGH

CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT Corps of Engineers
PROJECT Dam Study
DETAIL Mt Williams Res.

JOB NO 380-6-RT-4
DATE CHECKED 5-7-79
CHECKED BY Jbe A.

PAGE 1
DATE 4/11/
COMPUTED BY C.P.M.

Scale of MAPPING 1 1/" = 2000' Sq. in x 91.83 = # Acres (A)

#A ÷ 640 = # mi²

DRAINAGE AREA

1. 9.79
2. 9.69

9.71 AVE = 9.71 in² = 891.7 A = 1.393 mi² ✓

WATER SURFACES

EL. 1044 ≈ Spillway Crest

1. 0.48
2. 0.50

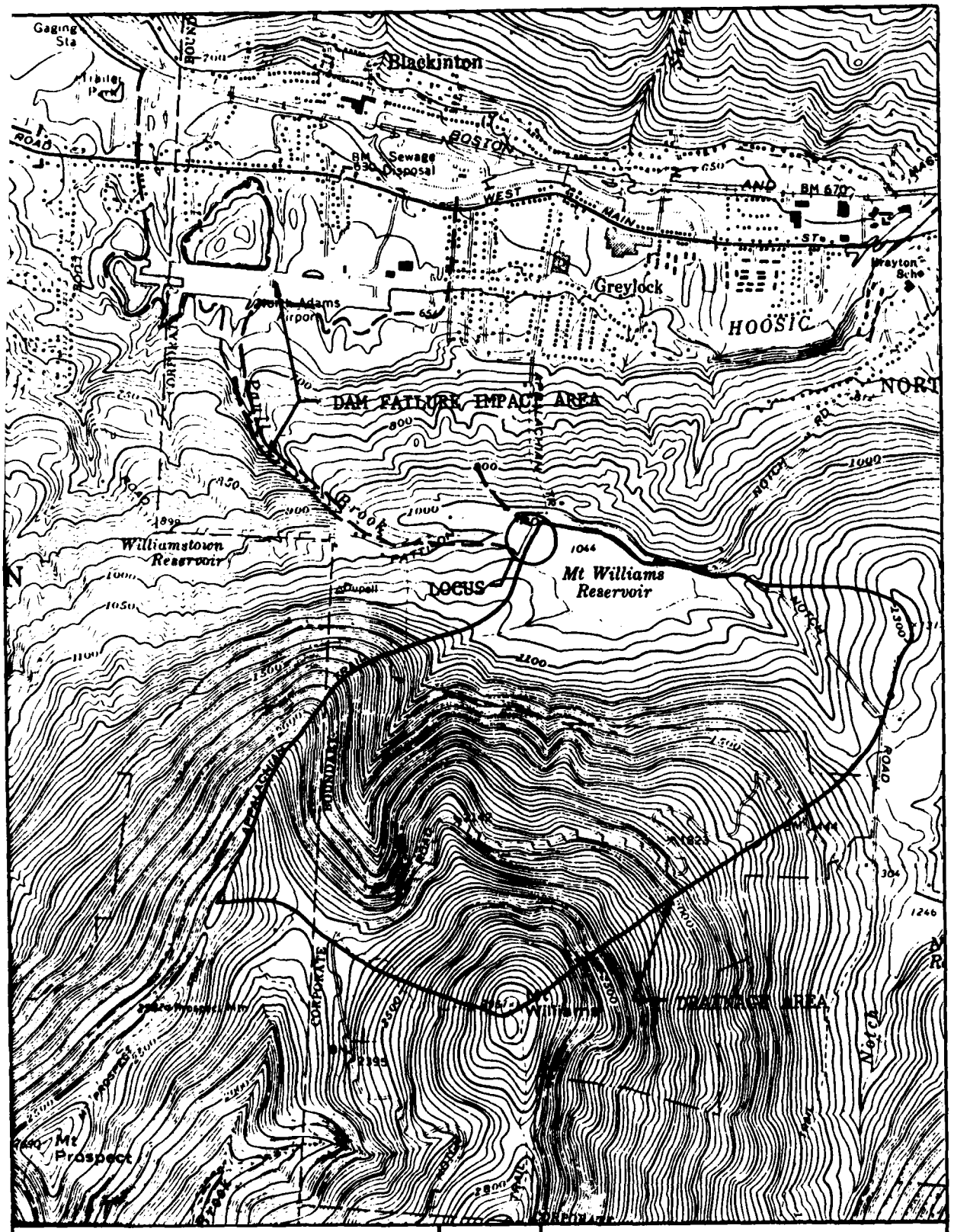
0.49 AVE = 0.49 in² = 45.0 A = 0.070 mi² ✓

EL. 1060

1. 0.83
2. 0.83

0.83 AVE = 0.83 in² = 76.2 A = 0.119 mi² ✓

Note: Above Elevations are based on 1929 National Geodetic Vertical Datum. Elevations used in this report refers to drawings shown in Appendix B.



DAM MOUNT WILLIAMS RESERVOIR

IDENTIFICATION NO. MA 00282

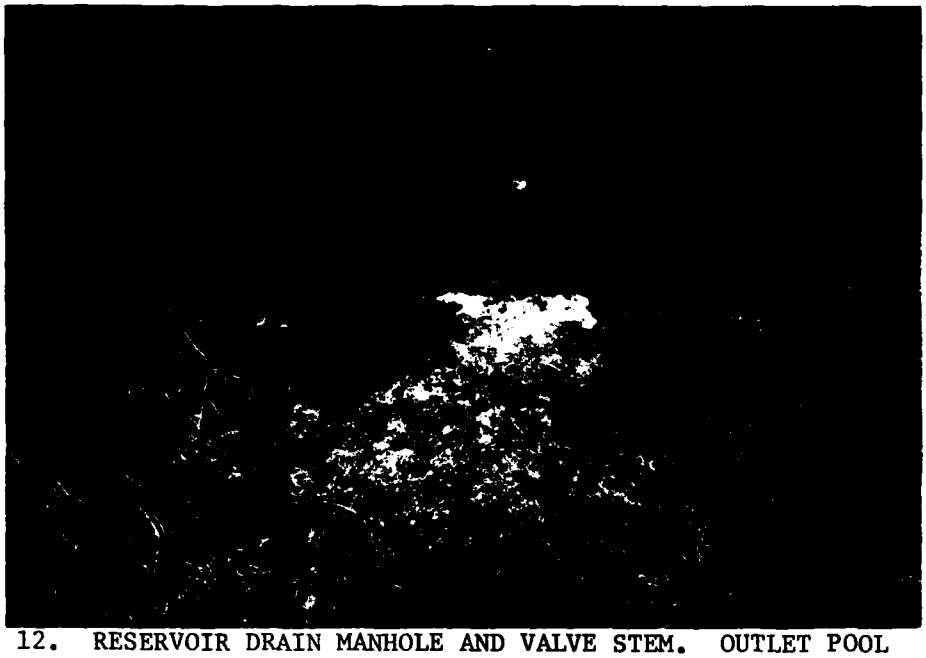
DRAINAGE AREA AND DAM FAILURE IMPACT AREA MAP

APPROX. SCALE: 1" = 2000'

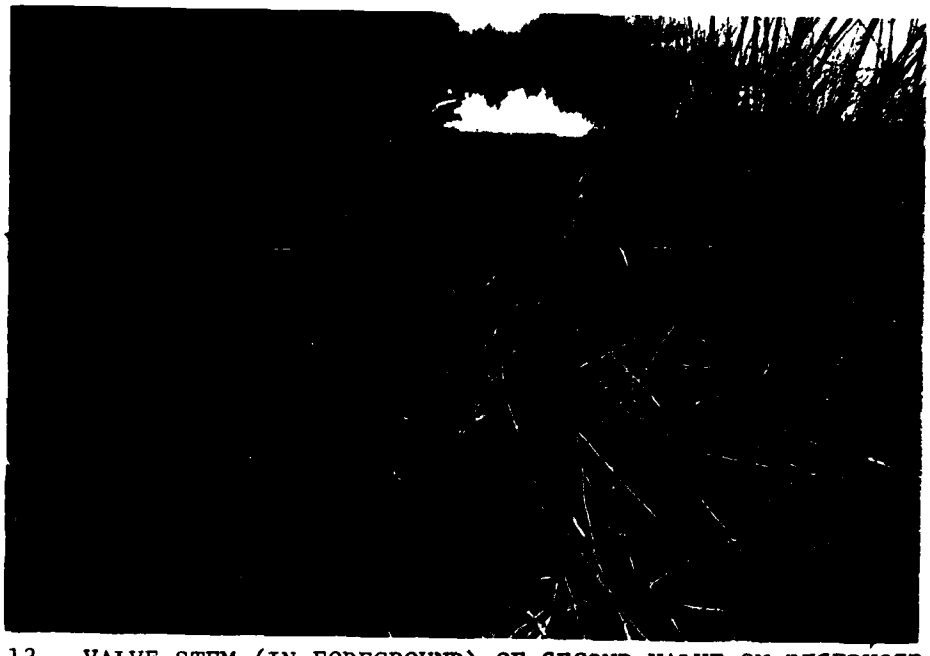
APPENDIX D-1

APPENDIX D

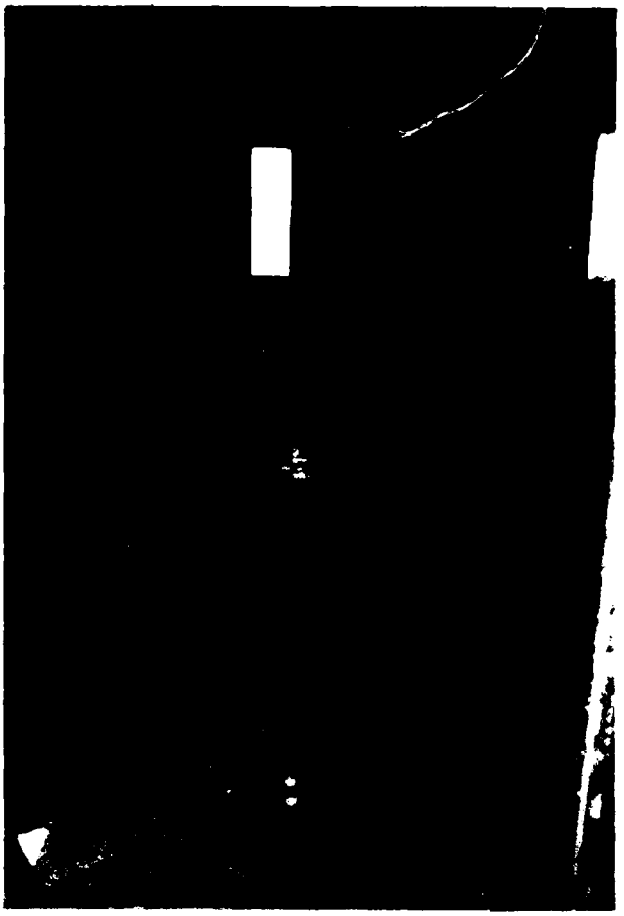
MAPS AND HYDRAULIC/HYDROLOGIC COMPUTATIONS



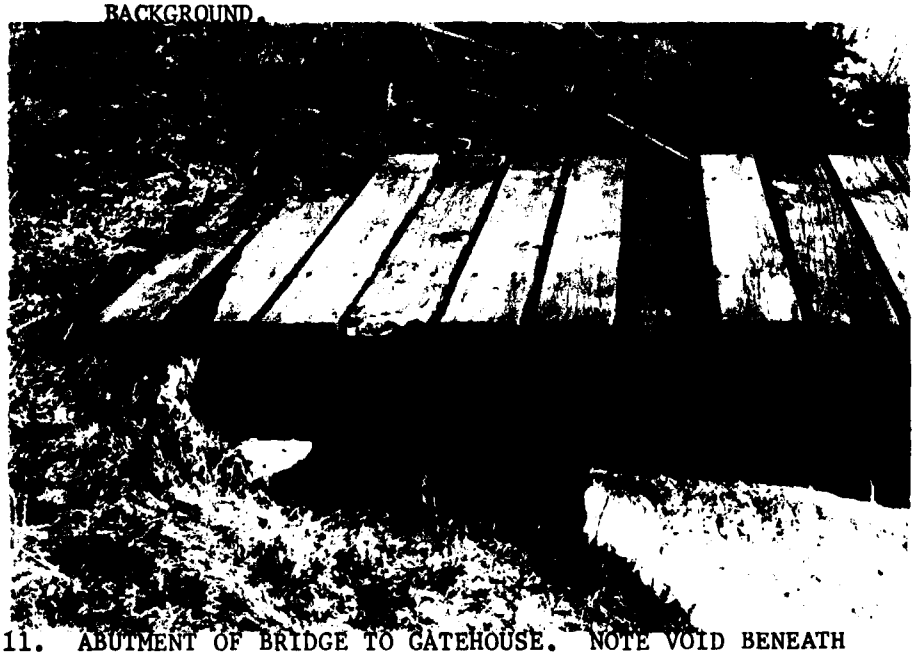
12. RESERVOIR DRAIN MANHOLE AND VALVE STEM. OUTLET POOL IN BACKGROUND.



13. VALVE STEM (IN FOREGROUND) OF SECOND VALVE ON RESERVOIR DRAIN DOWNSTREAM OF TOE OF DAM. OUTLET POOL IN BACKGROUND.



10. INTERIOR OF GATEHOUSE. ACCESS MANHOLE COVER AND TRANSMISSION MAIN SHUT OFF IN FOREGROUND. SCREEN SLOT COVERS IN CENTER. 3 VALVE FOR INTAKES IN BACKGROUND.



11. ABUTMENT OF BRIDGE TO GATEHOUSE. NOTE VOID BENEATH ABUTMENT AND LOOSE DECK PLANK. RAILING ON GROUND IN BACKGROUND.

8. VIEW LOOKING WEST ALONG DIKE FROM APPROXIMATELY 1/3 THE DISTANCE FROM THE EAST END.

9. UPSTREAM FACE EROSION NEAR CENTER OF DIKE.

6. VIEW OF SPILLWAY FROM DISCHARGE CHANNEL. NOTE WATER DISAPPEARING UNDER ROCK.

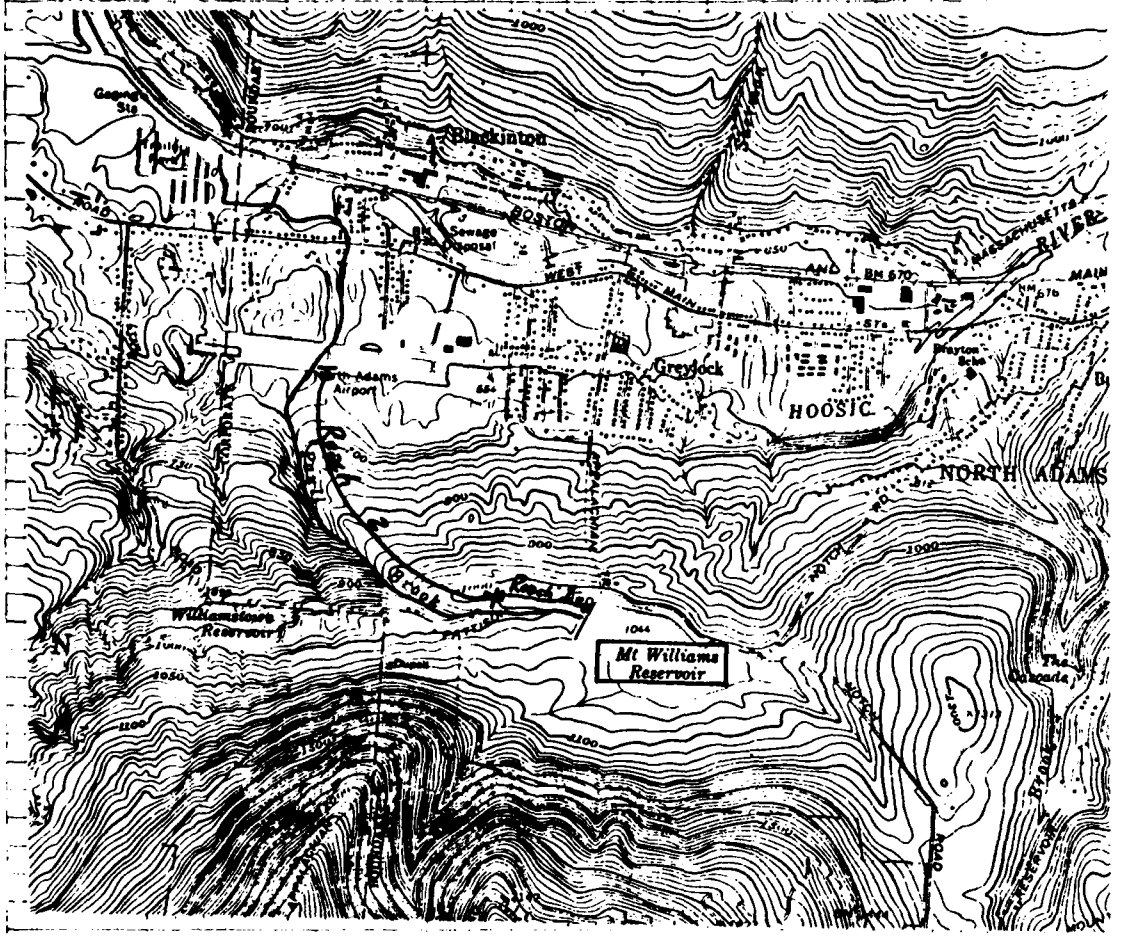
7. DISCHARGE CHANNEL DOWNSTREAM OF SPILLWAY. NOTE WATER REAPPEARING FROM BENEATH ROCK IN BACKGROUND, TILTED RIGHT CHANNEL WALL AND YOUNG TREES IN CHANNEL.

CAMP DRESSER & MCKEE INC.

CLIENT Corps of Engineers JOB NO 380-6-RI-1 PAGE 9

PROJECT Dam Inspection DATE CHECKED 7/28/79 DATE 5-9-77

DETAIL Mt. Williams Res. Dam CHECKED BY JED COMPUTED BY Joe A.



Location of Reaches

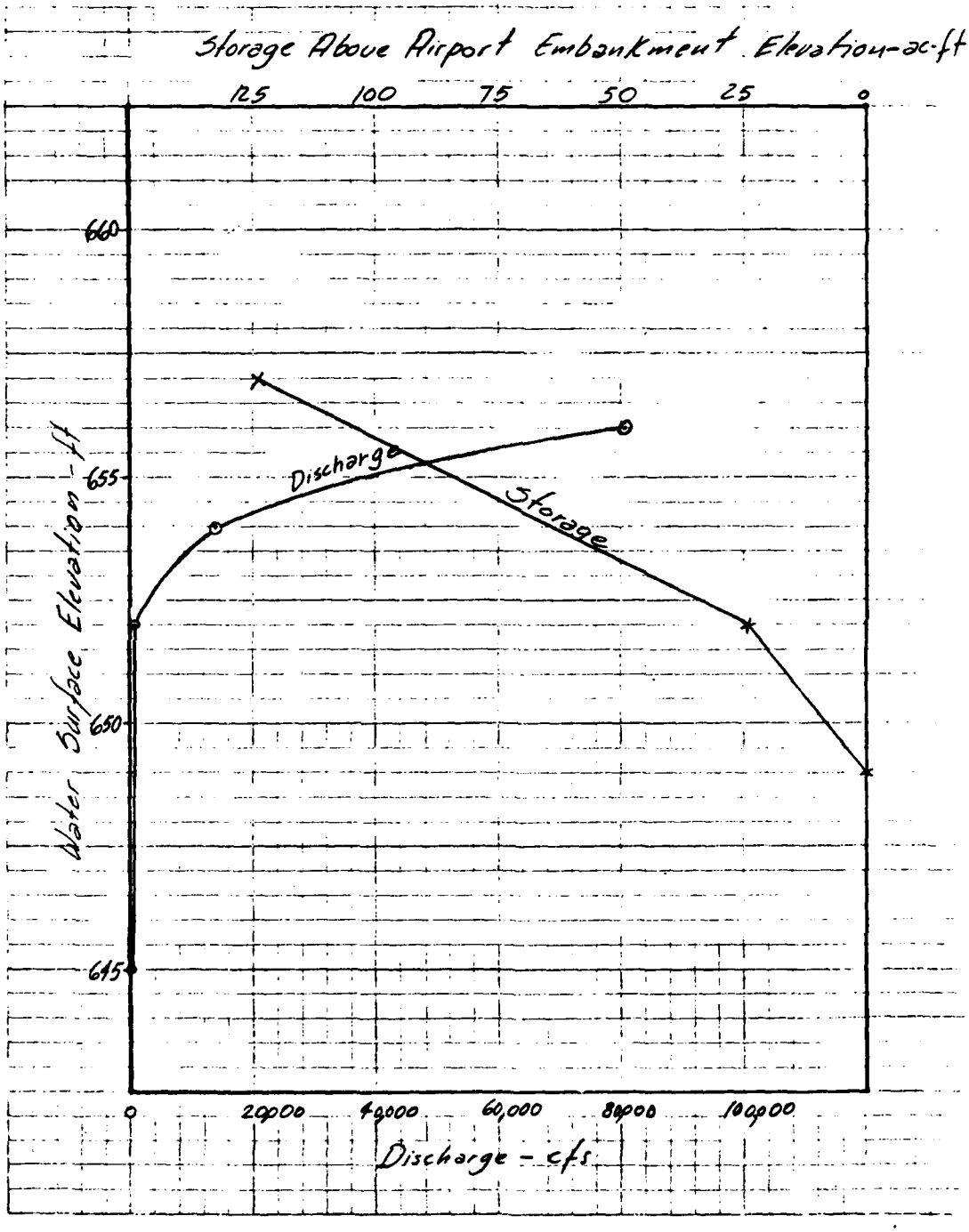
APPENDIX D-10

CAMP DRESSER & McKEE INC.

CLIENT COE
PROJECT Dam Inspection
DETAIL Mt. Williams Reservoir

JOB NO 300-6-RT-4
DATE CHECKED 1/23/79
CHECKED BY J&D

PAGE 10
DATE 5-9-79
COMPUTED BY Lee A.



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PROJECT Dam Inspection DATE CHECKED 7/23/79 DATE 5-9-79
DETAIL Mt. Williams Rec. Dam CHECKED BY JED COMPUTED BY Joe A.

Reach 2 – Pattison Road to North Adams Airport
Length = 5200 ft.

The average slope in this reach is about 12.5 percent. No storage will occur except just upstream of the air port runway embankment. Two 5'Ø RCP culverts run under the airport runway; the runway is about 2 ft above the crown of the culverts.

Determine the storage and rating curve for the culverts and the embankment:

Storage

Surface Area (Acres)	Average depth of water (ft)	Storage (Ac-ft)	WSE (ft)
0	0	0	649
8	3	24	652
32	8	184	660

Stage - Discharge Relationship

Total flow = Flow through Culverts + Weir Flow over Runway

WSE (ft)	Culvert Q (cfs)	Length of Weir (ft)	Flow over Runway cfs	Total Flow (cfs)
652	450	0	0	450
654	500	2000	14,200	14,700
656	600	9000	80,000	80,600
658	650	9,500	165,400	166,000

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PROJECT Dam Insp. DATE CHECKED 2/23/79 DATE 5-9-79
DETAIL Mt. Williams Res. Dam CHECKED BY JED COMPUTED BY Joe A

Route Flow Through Storage Area Upstream of Airport Embankment

Q_{p_1} = 73,000 cfs = estimated flow just upstream of airport.

S = 791 acre-feet = pond storage at time of dam failure. Assume WS @ crest of dam

Stage Required to pass Q_p is 655.85; the resulting Storage, V_1 is 100 acre-feet.

$$Q_{p_{2\,Trial}} = Q_{p_1}\left(1 - \frac{V_1}{S}\right) = 73{,}000\left(1 - \frac{100}{791}\right) = 63{,}770 \text{ cfs}$$

Stage req'd to pass Q_{p_2} is 655.65; resulting storage V_2 is 97 acre-ft.

$$Q_{p_2} = Q_{p_1}\left(1 - \frac{V_{avg}}{S}\right) = 73{,}000\left(1 - \frac{99}{791}\right) = 63{,}860 \text{ cfs}$$

Use 63,860 cfs as the flow crossing over the airport runway. A sheet of water about 3.5 feet high will cross over the airport runway resulting in extensive damage. Water will also flow around the edges of the airport, thus expanding the dam failure impact area downstream of the airport. Resulting damage from the high velocity sheet flood will affect an area about 0.25 miles squared between the airport and the Hoosic River. Loss of life and property would be extensive.

Before discharging to Hoosic River, the flow must cross Route 2. Two culverts exist within the area affected by the dam failure. The one serving the Mount Williams Reservoir discharge (Paull Brook) is a concrete arch with an area of opening approx. 25 ft sq. the other culvert serves an intermittan brook and is probably smaller. The combine capacity of both culverts is negligible with 95 plus percent of the flow going over Route 2 into Hoosic River.

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DETAIL McWilliams Res. Dam CHECKED BY JED COMPUTED BY Joe H

The addition of 63,000 cfs to the Hoosic River would overtop the river's banks, creating a potential for further loss of life and property downstream.

APPENDIX E
INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
MA	282	NED	MA	003	01				MOUNT WILLIAMS RESERVOIR DAM	4241.2	7309.4	31	MAY	79

POPULAR NAME	NAME OF IMPOUNDMENT
	MOUNT WILLIAMS RESERVOIR

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI.)	POPULATION
02	02	PAULL BROOK	NORTH ADAMS	0	18400

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
REPG	1914	S	40	40	791	427	NED	N	N	N	N	

REMARKS
17- ALSO KNOWN AS LILLIE BROOK

D/S HAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
1	700	U	20	850												

OWNER	ENGINEERING BY	CONSTRUCTION BY
CITY OF NORTH ADAMS	WILLIAM S JOHNSON	MIDDLESEX CONTRACTING

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
CAMP DRESSER & MCKEE INC	30	APR	79	PUBLIC LAW 92-367

REMARKS

END

FILMED

7-85

DTIC