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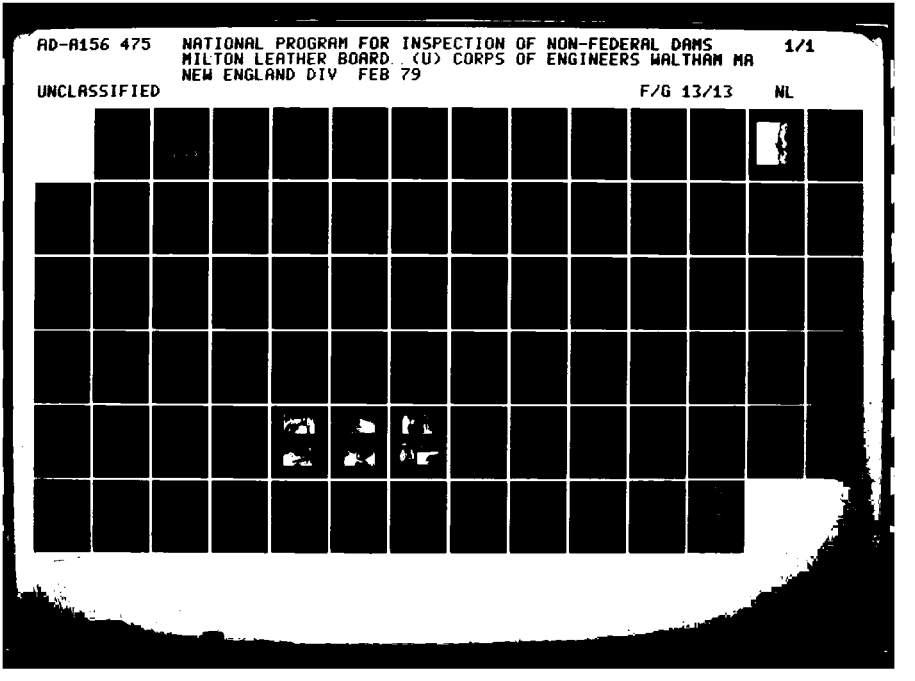
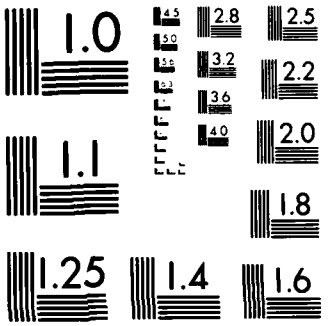
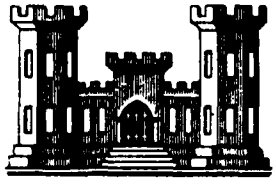




PISCATAQUA RIVER BASIN
MILTON, NEW HAMPSHIRE

MILTON LEATHER BOARD DAM
N.H. - 00316

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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

FEBRUARY 1979

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

REPLY TO
ATTENTION OF:
NEDED

JUN 18 1979

Honorable Hugh J. Gallen
Governor of the State of New Hampshire
State House
Concord, New Hampshire 03301

Dear Governor Gallen:

I am forwarding to you a copy of the Milton Leather Board 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 Water Resources Board, the cooperating agency for the State of New Hampshire. In addition, a copy of the report has also been furnished the owner, Milton Land Corporation, P.O. Box 453, Plaistow, New Hampshire 03865.

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 Water Resources Board for your cooperation in carrying out this program.

Sincerely yours,

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

PISCATAQUA RIVER BASIN

MILTON, NEW HAMPSHIRE

MILTON LEATHER BOARD DAM

N.H.-00316

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

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,

Piscataqua River Basin
Milton, New Hampshire
Salmon Falls River,

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

The dam is a mortar laid stone masonry and concrete gravity dam founded on bedrock. It varies from 2 to 32 ft. high and is about 350 ft. long. It is assessed to be in fair condition. Areas of major concern regarding the long term safety of the include deterioration of the concrete dike section and the concrete stop log piers. It is small in size with a significant hazard potential.

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NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

NH-00316

MILTON LEATHER BOARD DAM

MILTON

STRAFFORD COUNTY, NEW HAMPSHIRE

SALMON FALLS RIVER

November 15, 1978

BRIEF ASSESSMENT

The Milton Leather Board Dam is a mortar-laid stone masonry and concrete gravity dam founded on bedrock. The dam varies from about 2 feet to about 32 feet high, and is about 350 feet long. It is abutted by the Milton Leather Board Mill on the west and bedrock on the east.

Based on the visual inspection and reports of past operational performance, the Milton Leather Board Dam is assessed to be in fair condition. Areas of major concern regarding the long-term safety of the dam include deterioration of the concrete dike section and the concrete stop log piers.

Based on the Corps of Engineers guidelines, the dam is classified as a small dam having a significant hazard potential. The spillway test flood is one-half the probable maximum flood (PMF). The spillway capacity is only about 9 percent of the test flood and 4.5 percent of the PMF. However, it is not considered seriously inadequate because of the lack of high hazard conditions downstream. During the test flood water would overtop the dam by about 6.6 feet.

The following recommendations and items of remedial maintenance, as outlined in Section 7 should be implemented within 12 months after receipt of this report by the owner to enhance the integrity of the structure: 1) repair concrete piers; 2) repair concrete dike wall; 3) develop a formal warning system; 4) conduct 24-hour surveillance during heavy runoff periods; and 5) institute a program of annual periodic technical inspection. A qualified engineer should make a further evaluation of the hydrology and hydraulics of the watershed and dam and design additional spillway capacity as may be warranted.

EDWARD C. JORDAN CO., INC.

Stanley E. Walker, P.E.
Project Officer

THE STATE OF NEW HAMPSHIRE - STANLEY E WALKER NO. 2826 REGISTERED PROFESSIONAL ENGINEER

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

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

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

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

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

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

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C PHOTOGRAPHS

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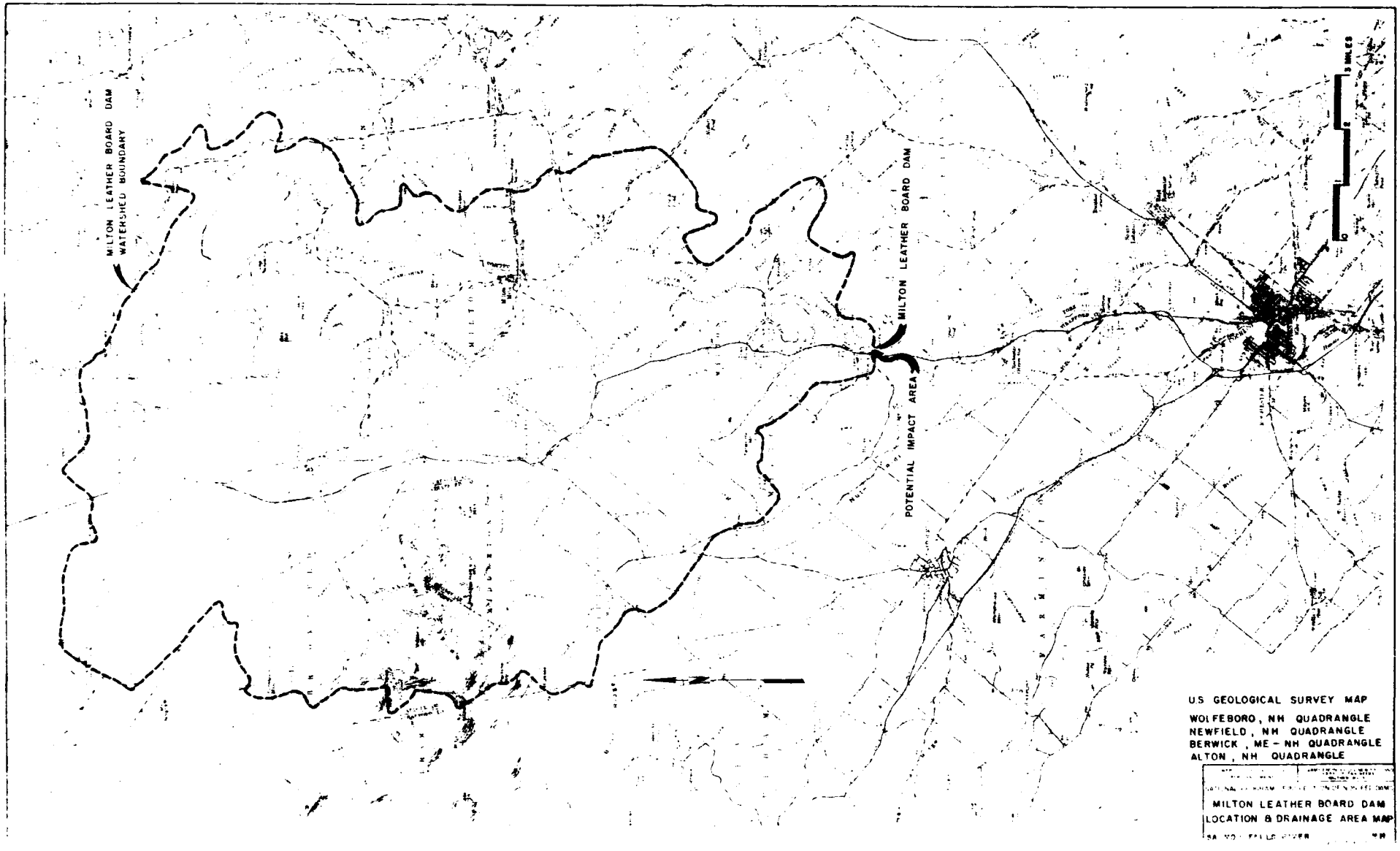
OVERVIEW


MILTON LEATHER BOARD DAM
WATERSHED BOUNDARY
MILTON LEATHER BOARD DAM
POTENTIAL IMPACT AREA
3 MILES
U.S GEOLOGICAL SURVEY MAP
WOLFEBORO, NH QUADRANGLE
NEWFIELD, NH QUADRANGLE
BERWICK, ME - NH QUADRANGLE
ALTON, NH QUADRANGLE
MILTON LEATHER BOARD DAM
LOCATION & DRAINAGE AREA MAP

PHASE I INSPECTION REPORT

MILTON LEATHER BOARD DAM

SECTION 1

PROJECT INFORMATION

1.1 GENERAL

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Edward C. Jordan Co., Inc. has been retained by the New England Division to inspect and report on selected dams in the states of Maine and New Hampshire. Authorization and notice to proceed were issued to Edward C. Jordan Co., Inc. under a letter of December 1, 1978 from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0017 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) To 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) To encourage and prepare the states to initiate quickly effective dam safety programs for non-Federal dams.

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

1.2 DESCRIPTION OF PROJECT

a. Location. The Milton Leather Board Dam is located on the Salmon Falls River in the town of Milton, New Hampshire. N 43°-24.5', W 70°-59.2'.

b. Description of Dam and Appurtenances. The Milton Leather Board Dam is a mortar-laid stone masonry and concrete gravity dam founded on bedrock. The dam varies in height from about 14 feet at the 35-foot long concrete gated outlet section, and 2 to 8 feet along the 230 foot long concrete dike section, to about 32 feet at the 70 foot long mortar-laid stone masonry stop log spillway section.

The dam abuts the Milton Leather Board Mill building on the west and bedrock on the east. Plan, profile, and cross-section sketches are presented in Appendix B.

c. Size Classification. The Milton Leather Board Dam has a storage capacity of 67 acre-feet and a height of 32 feet. According to Corp of Engineer's "Recommended Guidelines for Safety Inspection of Dams," a dam with storage capacity less than 1,000 acre-feet and a height less than 40 feet is classified as a small dam.

d. Hazard Classification. If the Milton Leather Board Dam should fail, the mill at and downstream of the dam might incur damage, and there could be a potential for loss of life if the mill were occupied. The mill is not operating at the present time; however, maintenance workers are occasionally in the building. Therefore, the dam is classified as having a significant hazard potential.

The water surface of Spaulding Pond, located approximately 6000 feet downstream of the Milton Leather Board Dam, would rise approximately 2 feet if the Milton Leather Board Dam were to fail. The Spaulding Pond Dam would be capable of discharging the peak flow from failure without overtopping. It does not appear that any permanent structures for human habitation between the two dams would be affected by the failure of Milton Leather Board Dam.

e. Ownership.

Current Owner: Milton Land Corporation
P.O. Box 453
Plaistow, New Hampshire
Tel: (603) 382-8176

Previous Owner: Great Falls Manufacturing Co.
Dates: Unknown

Public Service Company of
New Hampshire
Unknown - 1963

f. Operator.

Gordon Oickle
Milton Leather Board Co.
Milton, New Hampshire
Tel: (603) 652-4531

g. Purpose of Dam. This dam is designed as a head pond for hydromechanical power generation for the Milton Leather Board Mill at the dam site. The mill is currently not in operation.

h. Design and Construction History. There is very little design and construction data pertinent to this dam. According to the Owner, the dam was designed by J.W. Jones & Co. and constructed by Abathaw Construction Co. prior to 1904. The concrete buttresses and sill were added in 1959.

i. Normal Operating Procedure. Because the mill is not in operation, no formal operating and maintenance program is followed. The operator reported that he occasionally lubricates the outlet gates and operates them to maintain enough water in the pond during the summer for recreational purposes. The normal water surface elevation is approximately the top of the stop log spillway section (elev. 398.5, MSL).

1.3 Pertinent Data

a. Drainage Areas. The drainage area above the Milton Leather Board Dam is approximately 109 square miles. The watershed is primarily forested with some urbanized area. The terrain is generally flat to moderately sloping. Flow of the Salmon Falls River at the Milton Leather Board Dam is regulated by the Milton Three Ponds Dam located approximately 0.5 miles upstream of the Milton Leather Board Dam. The drainage area above the Milton Three Ponds Dam is approximately 108 square miles. The capacity of

Milton Three Ponds Dam is 15,000 acre-feet at top of dam.

b. Discharge At Damsite. Releases from the Milton Leather Board Dam can be made at both the outlet works located near the east abutment and the stop log spillway at the west end of the dam. The following discharges were estimated assuming a water surface at top of dam at the stop log spillway (elev. 399.6 MSL).

(1) Outlet Works - two 5-ft. by 5-ft. gates with invert elev. 386.8 ± MSL
Total capacity - 900 cfs.

(2) Stop log spillway - 9 stop log bays measuring approximately 5.5'x4.5' each

(a) capacity (with stop logs in place) - 125 cfs.

(b) capacity (all stop logs removed) - 1,550 cfs.

(4) Maximum historical flood discharge at the damsite is unknown. There is a U.S.G.S. gaging station just downstream of the Milton Three Ponds Dam (installed in October, 1968). The maximum discharge recorded is 3,500 cfs on March 15, 1977. At a discontinued U.S.G.S. gaging station on the Salmon Falls River at South Lebanon, Maine (drainage area = 147 sqare miles), the maximum discharge recorded was 5,490 cfs during March, 1936.

(5) Total project discharge at the PMF is 35,000 cfs with a resulting water surface elevation of 410.0 MSL.

(6) Total project discharge at 1/2 PMF is 17,800 cfs with a resulting water surface elevation of 406.3 MSL.

c. Elevation. During the field inspection, no physical reference of the dam elevation to mean sea level was readily available. An approximate elevation based on mean sea level was calculated by noting the dam's location on a U.S.G.S. topographic map.

The following elevations above mean sea level are approximate only.

ITEM	ELEVATION ABOVE MSL
Streambed at Centerline of Main Dam	367.9
Maximum Tailwater	Unknown
Invert at Entrance to Mill	Unknown
PMF Pool	410.0
1/2 PMF Pool	406.3
Full Flood Control Pool	Not Applicable
Spillway Crest	394.0
Top of Dam	Crest varies from 399.7 to 401.1
Normal Water Surface (top of stop logs)	398.5
Invert of Outlet Works	386.8

d. Reservoir. The lengths of the reservoir at normal pool and top of dam pool (elev. 399.7 MSL) were estimated using average streambed slopes.

ITEM	LENGTH (FEET)
Normal pool	1,700
Top of dam	1,800

e. Storage.

ITEM	STORAGE (ACRE-FEET)
Normal pool	60
Top of dam (elev. 399.7)	67
PMF pool	195
1/2 PMF pool	140

f. Reservoir Surface.

ITEM	SURFACE AREA (ACRES)
Normal water surface	3.7
Top of dam (elev. 399.7)	4.1
Spillway crest	3
PMF pool	20
1/2 PMF pool	14

g. Dam.

Type - the dam is a mortar-laid stone masonry and concrete gravity dam founded on bedrock. The dam abuts the Milton Leather Board Mill on the west and bedrock on the east.

Length - The length between abutments is about 335 feet.

Height - The dam varies in height from about 14 feet at the gated outlet and 2 to 8 feet along the 230-foot long concrete dike wall, to about 32 feet at the stop log spillway.

Top Width - See plan and cross-sections in Appendix B.

Side Slopes - See plan and cross-section sketches in Appendix B.

Zoning - None.

Impervious Core - None.

Cutoff - Stone masonry and concrete walls placed on bedrock.

Grout Curtain - None.

h. Division and Regulating Tunnel. Not applicable.

i. Spillway.

Type - The spillway is a broad crested weir with stop logs supported by concrete piers. See cross-sections, Appendix B.

Length - 55 feet.

Crest Elevation - 394 (MSL).

Gates - Control of the spillway is by stop logs located between the concrete piers. The stop logs must be removed manually.

Downstream Channel - The channel of the Salmon Falls River just below the stop log spillway and gated outlet works is composed of bedrock. Beginning

about 200 feet downstream of either outlet, the channel bed is covered with gravel to cobble-size material. The overbanks are heavily forested and contain a moderate growth of brush and grasses. The remnants of two small timber crib dams are located less than one mile downstream of Milton Leather Board Dam. The Spaulding Pond Dam is located about 1.1 miles below the Milton Leather Board Dam.

j. Regulating Outlets.

(1) Invert elev.(MSL) - Outlet Gates 386.8
(2) Size - Outlet gates - 2 outlet gates at 5 ft. x 5 ft. each.
(See plan and cross-section sketches in Appendix B.)

(3) Description - Outlet gates consist of vertical lift timber gates approximately 5 feet square.

(4) Control Mechanism. Outlet gates - manually operated hoisting equipment.

SECTION 2

ENGINEERING DATA

2.1 DESIGN

Very little design data were available for the Milton Leather Board Dam. A Corps of Engineers phase I inspection report for Milton Three Ponds Dam (August 1978), located about 0.6 miles upstream of Milton Leather Board Mill, was used in the hydraulic computations.

2.2 CONSTRUCTION

No engineering data were available regarding construction of the dam.

2.3 OPERATION

No engineering operational data were available.

2.4 EVALUATION

a. Availability. There are essentially no engineering data or plans available that would be useful in evaluating the integrity of the Milton Leather Board Dam.

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

c. Validity. Not applicable.

SECTION 3

VISUAL INSPECTION

3.1 FINDINGS

a. General. The Milton Leather Board Dam is a run-of-the-river structure which impounds a small reservoir. It is located in a broad shallow valley section of the Salmon Falls River but closes a deep narrow gorge within the section. The dam appears to be founded directly on bedrock throughout its length.

b. Dam.

(1) Structural - The dam is constructed of mortar-laid stone masonry and concrete. The highest section, the westerly end which closes the gorge, is mortar-laid stone masonry with a concrete cap. The remaining sections of the dam are constructed of concrete. The dam can be classified as a gravity type structure. The stone masonry section of the dam appears to be in good condition, but the concrete sections are generally in poor condition. See Appendix A for detailed inspection findings.

The visual inspection resulted in the following major findings:

(a) There is no evidence of horizontal or vertical movement of the structure. It appears true to line and grade.

(b) The stone masonry portion of the dam appears to be in good condition. The masonry appears tight and no unusual seepage or leakage was observed.

(c) The westerly section of the dam has apparently been rehabilitated since original construction. Four concrete buttresses and a sill have been added to the downstream face and the stop log support piers have been replaced. The buttresses and sill appear to be in good condition. The concrete stop log piers

are badly spalled and reinforcing steel is exposed.

(d) The concrete dike section which extends from the stop log spillway to the gated outlet section is severely deteriorated. This section of the dam ranges in height from 2 to 8 feet and is founded on bedrock. It consists of a vertical downstream face and sloping upstream face. The downstream face is severely deteriorated with deep spalling and cracking through the wall to the upstream face. Heavy leakage is occurring through this section. The westerly portion of the concrete dike is at a slightly lower elevation than the remaining portion. Flow was occurring through and over the dike wall at time of inspection.

(e) The gated outlet section of the dam is in generally good condition. Some minor leakage is occurring at the junction with the bedrock and very minor leakage is occurring through the face. Some leakage was occurring around one of the gates.

(f) Two saddles exist along the east abutment. Markings on the trees indicate that flow frequently occurs through these areas. The saddles appear to be underlain by bedrock at a shallow depth, and no significant erosion is evident.

(2) Hydraulics - Hydraulic control of the reservoir's water surface is provided by the gated outlet works near the east abutment and the stop log spillway at the west end of the dam. At the time of inspection, there was virtually no freeboard provided at the dam. The low portion of the concrete dike had water passing over it. Stop logs were one foot below the top of the spillway and concrete dike sections. Some debris had collected between the stop logs and the service bridge.

c. Appurtenant Structures. The control outlet of the dam and headworks at the mill were found to be well maintained and in good condition. The gate operating equipment is manual and is in good condition.

d. Reservoir Area. The reservoir shoreline is forested with predominantly moderate slopes above the high water level. The potential for slope failure above the reservoir appeared minimal. No residences or buildings are located along the shores of the reservoir. A railroad bridge crosses the reservoir basin near the upstream end.

e. Downstream Channel. The channel of the Salmon Falls River just below the stop log spillway and gated outlet works is composed of bedrock. Beginning about 200 feet downstream of either outlet, the channel bed is covered with gravel to cobble size material. The overbanks are heavily forested and contain a moderate growth of brush and grasses. The remnants of two small timber crib dams are located less than one mile downstream of Milton Leather Board Dam.

3.2 EVALUATION

Based on the visual inspection findings, the dam appears to be in fair condition. The concrete dike wall and the concrete stop log piers are badly deteriorated. The stone masonry portion of the dam and the gated outlet section appear to be in good condition. As outlined in Section 7, rehabilitative construction is necessary to assure the long-term safety of the structure. Less than one foot of freeboard exists between the top of the stop logs and the natural saddles east of the gated outlet.

SECTION 4

OPERATING PROCEDURES

4.1 PROCEDURES

The outlet gates are operated manually to control the reservoir surface elevation, currently for recreational purposes only. The dam was operated to supply the Milton Leather Board Mill with hydro-mechanical power generation and process water, when the mill was operating.

4.2 MAINTENANCE OF DAM

Reportedly, maintenance to the dam is performed on an as-needed basis. There are no maintenance records available.

4.3 MAINTENANCE OF OPERATING FACILITIES

The spillway stop logs are generally in fair condition. The outlet gates are in good operating condition and are reportedly lubricated on an as-needed basis. There appears to be no scheduled maintenance program for the dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

No warning system is known to be in effect.

4.5 EVALUATION

The Milton Leather Board Dam operating equipment is generally in fair condition. Although no regularly scheduled program of maintenance is in effect, the Milton Leather Board Co. has an individual at the site regularly to discourage vandalism of the mill and dam and to operate the dam. No formal warning system for either high water or structural distress is in effect at the dam.

SECTION 5

HYDROLOGIC/HYDRAULIC

5.1 EVALUATION OF FEATURES

a. General. The Milton Leather Board Dam is a run-of-the-river gravity type structure and was used for hydromechanical power production and process water for the mill located at the site. The mill is not in operation. The dam consists of a 32 foot high concrete capped stone masonry section at the west end which supports a stop log spillway, two 5 ft. x 5 ft. outlet gates, located near the east abutment of the dam, and a concrete dike wall section connecting the outlet works and stop log spillway.

Flow to the dam is regulated by the Milton Three Ponds Dam, located about 0.6 miles upstream of the Milton Leather Board Dam.

b. Design Data. No original hydrologic and hydraulic design data were disclosed.

c. Experience Data. The U.S. Geologic Survey maintains a stream gage just below Milton Three Ponds Dam. The gage was established in October, 1968. The maximum discharge recorded at the gage to date is 3,500 cfs which occurred on March 15, 1977. The height of overtopping of the Milton Leather Board Dam during this event is not known. During a flood event in March, 1936, a discharge of 5,490 cfs was recorded on the Salmon Falls River at South Lebanon, Maine (drainage area = 147 square miles). From observations made during the field inspection, it appears that the concrete dike portion of the dam has been frequently overtopped.

d. Visual Observations. Water level at the Milton Leather Board Dam can be controlled by either the gated outlet works or the stop log spillway. Considerable leakage was occurring through the concrete dike section of the dam at the time of inspection. Discharges occurring at the concrete dike section enter a small natural drainageway located west of the main channel. Flow in this drainageway enters the main channel approximately 1000 feet below the dam.

e. Test Flood Analysis. The Milton Leather Board Dam is classified as having a significant hazard potential. Based on Corps of Engineers "Recommended Guidelines for Safety Inspection of Dams," the spillway test flood is one-half the probable maximum flood (PMF). Flow to the Milton Leather Board Dam is regulated by the Milton Three Ponds Dam. A Phase I Inspection Report completed for the Milton Three Ponds Dam (August, 1978) gives a PMF outflow from that dam of 35,000 cfs and a 1/2 PMF outflow of 17,500 cfs. The intervening drainage area between Milton Three Ponds Dam and Milton Leather Board Dam is less than 1% of the total drainage area above Milton Leather Board Dam, therefore, is considered insignificant. The surcharge storage capacity of the Milton Leather Board Dam is not sufficient to reduce the dam's discharge at 1/2 PMF inflow. The 1/2 PMF discharge at the dam is taken to be 17,500 cfs. The spillway capacity with all stop logs removed is approximately 9% of the 1/2 PMF discharge. During the 1/2 PMF event, water would overtop the dam by about 6.7 feet. Height of overtopping during the PMF event would be about 10.4 feet.

f. Dam Failure Analysis. To determine the hazard classification for the Milton Leather Board Dam, the potential impact of failure of the dam with water level at the top of dam was assessed. The failure analysis relied upon the rule of thumb guidance outlined in an attachment to ETL 1100-2-234. Although a failure along the concrete dike section of dam would be much more likely than a failure of the spillway section, no significant downstream hazard would exist as a result of dike failure. Therefore, the hazard potential was determined by calculating downstream hydrographs which might result from a breach of the main spillway section of the dam.

The flood peak at the dam from failure was estimated to be about 6,300 cfs. It would take the reservoir approximately 15 minutes to empty. The inflow to Spaulding Pond, located about 6,000 feet downstream, was estimated to be 1,000 cfs. This flow would cause water levels in the pond to rise about 2 feet. The spillway of the Spaulding Pond Dam is estimated to have sufficient capacity to accommodate the peak flow from failure of Milton Leather Board Dam without overtopping.

The significant hazard potential below the dam is limited to the mill located at and below the dam. The mill is currently not in operation; however, maintenance people in the building from time to time. There are no inhabitable structures between Milton Leather Board Dam and Spaulding Pond that would be affected by a breaching of Milton Leather Board Dam.

The maximum discharge capability of Milton Leather Board Dam with water surface at top of dam (elev. 399.6 MSL) is approximately 2,450 cfs. A failure of the spillway section of the dam with the dam discharging at its maximum would increase downstream flows from 2,450 to 8,000 cfs. Inflow to Spaulding Pond would be about 2,500 cfs. This would cause a water surface increase of about 4 feet at the pond.

The dam is founded on bedrock throughout its entire length. Although the concrete dike section is in very poor structural condition, failure of this section of the dam would not pose a significant downstream hazard. The stop log spillway section of the dam has greater hazard potential, but it appears to be structurally sound and is considered to be generally resistant to short periods of overtopping.

SECTION 6

STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. Based on visual observations, the Milton Leather Board Dam appears to be in fair structural condition. The westerly section of the dam consists of mortar-laid stone masonry with concrete buttresses and stop log piers. This section appears generally sound, but the concrete piers which support the stop logs are badly spalled. The concrete dike wall which extends from the stop log spillway section to the easterly gated outlet section is in poor condition. Deterioration of the downstream face of the dike includes cracks, spalls and erosion to a depth of 6 to 8 inches in many areas. Heavy leakage is occurring through this section. The easterly gated outlet section appears to be in good condition. The joint between the bedrock and the concrete is weathered and some leakage is occurring. Minor leakage is also occurring through the downstream face; however, the concrete surfaces appear to be in good condition.

b. Design and Construction Data. No data concerning original design or construction of the Milton Leather Board Dam was disclosed in this investigation.

c. Operating Records. None available.

d. Post-Construction Changes. Since original construction (about 1912) there has been only one major change. This alteration involved the addition of four buttresses to the downstream face of the stone masonry section of the dam. This construction was done in 1959 and new stop log piers were constructed at the same time.

e. Seismic Stability. The dam is located in Seismic Zone 2 and in accordance with recommended Phase I guidelines, does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition. Based on the visual inspection and performance history, the Milton Leather Board Dam is assessed to be in fair condition. The inspection identified the following major items of concern:

(1) Deterioration of concrete at stop log piers.

(2) Deterioration of concrete dike section.

(3) Apparent lack of sufficient freeboard.

b. Adequacy of Information. The information available is very limited, therefore, the assessment of the condition of the dam must be based primarily on the visual inspection, the past operational performance of the dam, and engineering judgment.

c. Urgency. The recommendations and remedial measures outlined in 7.2 and 7.3 below should be implemented within 12 months after receipt of this report by the owner.

d. Need for Additional Investigation. Additional investigation is not considered necessary for the current (Phase I) assessment.

7.2 RECOMMENDATIONS

Since the spillway capacity is considered inadequate, a qualified engineer should make a further evaluation of the hydrology and hydraulics of the watershed and dam and design additional spillway capacity as may be warranted. The owner should have a qualified engineer supervise the design and construction for rehabilitation of the dike.

7.3 REMEDIAL MEASURES

a. Operating and Maintenance Procedures. A program of regular inspection and maintenance of the dam

should be implemented and recorded and should include the following specific maintenance and operating procedures:

(1) The concrete stop log piers should be repaired or replaced to prevent further deterioriation of the concrete.

(2) The concrete dike section should be rehabilitated, either by sealing of the upstream face and cleaning and filling of the voids and cracks in the downstream face or replacement.

(3) Provide around-the-clock surveillance during periods of heavy runoff.

(4) Develop and implement a formal warning system for use in the event of an emergency.

(5) Provide for annual inspections of the facility by qualified engineers.

7.4 ALTERNATIVES

Until the remedial measures can be implemented, a safety measure would be to remove the stop logs from the spillway to lower the pond surface elevation and reduce hydrostatic pressure on the dam during low flow conditions.

APPENDIX A

VISUAL INSPECTION CHECK LIST

AND

SUPPLEMENTARY INSPECTION NOTES

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Milton Leather Board Dam

DATE 11-15-78

TIME P.M.

WEATHER Sunny, cool

W.S. ELEV. 398.5 U.S. DN.S.

PARTY:

1. Stephen Cole
2. Scott Decker
3. Tim Noonan
4. Brian Bisson
5. John Devine
6. John Kimble
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Geotechnical	S. Cole	
2.	Structural	Cole, Decker, Devine	
3.	Hydraulics/Hydrology	Bisson, Devine	
4.	Civil	Decker	
5.	Photography	Decker, Bisson	
6.	Survey	Noonan, Kimble	
7.			
8.	Review Inspection	S. Walker, C. Horstmann	
9.	12-1-78	The pond was frozen over. No sig-	
10.		nificant differences in the con- dition of the dam were observed.	

NOTE: See Supplementary Inspection Notes Following Checklist

INSPECTION CHECKLIST

PROJECT Milton Leather Board Dam DATE 11-15-78

PROJECT FEATURE Embankment NAME Cole

DISCIPLINE Geotechnical NAME

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	No earth embankment.
Current Pool Elevation	Not Applicable
Maximum Impoundment to Date	
Surface Cracks	
Pavement Condition	
Movement or Settlement of Crest	
Lateral Movement	
Vertical Alignment	
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	
Indications of Movement of Structural Items on Slopes	
Trespassing on Slopes	
Sloughing or Erosion of Slopes or Abutments	
Vegetation	

AREA EVALUATED	CONDITIONS

DAM EMBANKMENT (cont.)

Rock Slope Protection - Riprap Failures

Unusual Embankment or Downstream Seepage

Piping or Boils

Foundation Drainage Features

Toe Drains

Instrumentation System

INSPECTION CHECKLIST

PROJECT Milton Leather Board Dam DATE 11-15-78

PROJECT FEATURE Intake Channel, Structure NAME Cole, Decker

DISCIPLINE Geotechnical, Structural Hydraulics/Hydrology NAME Bisson, Devine

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	East End of Dam
a. Approach Channel	
Slope Conditions	Flat, stable, wooded
Bottom Conditions	Appear silted but unobstructed
Rock Slides or Falls	None
Log Boom	None
Debris	None
Condition of Concrete Lining	No lining
Drains or Weep Holes	None
b. Intake Structure	
Condition of Concrete	Good
Stop Logs and Slots	None

INSPECTION CHECKLIST

PROJECT Milton Leather Board Dam DATE 11-15-78

PROJECT FEATURE Outlet Works NAME Cole, Decker

DISCIPLINE Structural, Geotechnical Hydraulics/Hydrology NAME Bisson, Devine

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Masonry and Structural	
General Condition	Good
Condition of Joints	Joint to bedrock appears weathered
Spalling	None
Visible Reinforcing	Only rods left for addition of a training wall
Rusting or Staining of Concrete	Some lime stain
Any Seepage or Efflorescence	Seepage at joint to bedrock and minor through face
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	Leaks around gates only
Cracks	One crack east of gates
Rusting or Corrosion of Steel	None
b. Mechanical and Electrical	
Air Vents	None
Float Wells	None
Gate Hoist	Gate hoisting equipment good.
Elevator	None

AREA EVALUATED	CONDITIONS
OUTLET WORKS - CONTROL TOWER (cont.)	
Hydraulic System	None
Service Gates	Gates appear to be in good condition.
Emergency Gates	As above
Lightning Protection System	None
Emergency Power System	None
Wiring and Lighting System	None

INSPECTION CHECKLIST

PROJECT Milton Leather Board Dam DATE 11-15-78

PROJECT FEATURE Transition and Conduit NAME Cole, Decker

DISCIPLINE Structural, Geotechnical Hydraulics/Hydrology NAME Bisson, Devine

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	Surface repair evident. Some spalling observed.
Rust or Staining on Concrete	None
Spalling	Some spalling
Erosion or Cavitation	Some erosion of sides
Cracking	None
Alignment of Monoliths	N/A
Alignment of Joints	Okay
Numbering of Monoliths	N/A

PERIODIC INSPECTION CHECKLIST

PROJECT Milton Leather Board Dam DATE 11-15-78

PROJECT FEATURE Outlet Structure/Channel NAME Cole, Decker

DISCIPLINE Structural/Geotechnical NAME Bisson, Devine
Hydraulics/Hydrology

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	Fair
Rust or Staining	Some lime stain
Spalling	Minor spall downstream face
Erosion or Cavitation	None
Visible Reinforcing	Rods left for addition of training wall
Any Seepage or Efflorescence	Seepage at bedrock and minor seepage through face
Condition at Joints	Joint to bedrock weathered
Drain holes	One good, three clogged
Channel	Bedrock, good
Loose Rock or Trees Overhanging Channel	Trees on banks
Condition of Discharge Channel	Good

INSPECTION CHECKLIST

PROJECT Milton Leather Board Dam — DATE 11-15-78

PROJECT FEATURE Spillway — NAME Cole, Decker

DISCIPLINE Structural, Geotechnical Hydraulics/Hydrology — NAME Bisson, Devine

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	Long section of concrete dike wall and western stop log controlled spillway
a. Approach Channel	
General Condition	Some floating debris
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Trees on banks
Floor of Approach Channel	Silted but unobstructed
b. Weir and Training Walls	No training walls except mill building, west end
General Condition of Concrete	Poor, much cracking
Rust or Staining	None
Spalling	Severe spalling, especially at joint to bedrock
Any Visible Reinforcing	Many places near bottom of downstream face of long wall
Any Seepage or Efflorescence	Leakage at cracks, joints
Drain Holes	None
c. Discharge Channel	
General Condition	Good, bedrock
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Trees on banks
Floor of Channel	Good, bedrock
Other Obstructions	None

INSPECTION CHECKLIST

PROJECT Milton Leather Board Dam DATE 11-15-78

PROJECT FEATURE Service Bridge NAME Cole

DISCIPLINE Structural NAME Decker

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	
a. Super Structure	
Bearings	Okay
Anchor Bolts	Okay
Bridge Seat	Okay
Longitudinal Members	Good
Under Side of Deck	Good
Secondary Bracing	None
Deck	Good
Drainage System	None
Railings	Good
Expansion Joints	None
Paint	Good
b. Abutment & Piers	
General Condition of Concrete	Poor - spalled
Alignment of Abutment	Good
Approach to Bridge	Okay - from west poor - from east
Condition of Seat & Backwall	Okay

MILTON LEATHER BOARD DAM
MILTON, NEW HAMPSHIRE

APPENDIX A

SUPPLEMENTARY INSPECTION NOTES

I. CONCRETE AND STONE MASONRY STRUCTURES IN GENERAL

a. Concrete Surfaces. The concrete gated outlet section is in generally good condition. Some lime staining is evident, but no spalling has occurred. The concrete dike section is in generally poor condition with major spalling and exposed reinforcing steel (see Photographs 6 and 7). General erosion of the downstream face of the concrete has occurred in areas to a depth of six to eight inches. The westerly section of the dam is constructed of mortar-laid stone masonry. The concrete buttresses and concrete surface were reportedly added later. The stone masonry and mortar appears to be in good condition, however, the volume of water overflowing this section made detailed inspection impossible. The concrete in the stop log spillway section is in good condition in its lower portion, but the stop log piers are in very poor condition with severe spalling and some exposed reinforcing steel. The concrete buttresses and sills making up the lower portions of this section show some erosion, but appear to be in generally good condition.

b. Structural Cracking. One structural crack exists at the gated outlet section just east of the gates. The concrete dike section was found to be cracked throughout much of its length. Erosion and spalling has occurred along these cracks, and some large voids exist in the downstream face of the dike wall. This section of dam is only two to eight feet in height. No structural cracking of the stop log spillway section was observed.

c. Movement, Horizontal and Vertical Alignment. In general, horizontal alignment of the dam appears true to original lines. The vertical alignment also appears true to original grade, however, the westerly end of the concrete dike section is as

much as 0.2 feet lower than the easterly portion. This difference in elevation can not be directly attributed to settlement. It appears that the dam was constructed with the westerly end of the dike somewhat lower than the easterly end. At the time of inspection, water was flowing over the westerly portion of the dike.

d. Junctions. The junction between the easterly abutment and the underlying bedrock appears to be in fair to good condition. Minor leakage through this junction is apparent. The junction between the gated outlet section and the easterly end of the concrete dike wall is cracked and substantial leakage is occurring. The junction between the westerly end of the concrete dike wall and the stop log spillway is also cracked and substantial leakage is occurring. The westerly abutment of the dam is the Milton Leather Board Mill building. The junction between the mill and the dam appears sound; however, substantial leakage is occurring at this junction.

e. Drains. Four drain pipes, approximately 1-1/2 inches in diameter exist along the lower 1/3 of the easterly section of the dam. One drain was flowing about 1/4 full and the remaining drains were clogged or plugged at the time of inspection. No other drains were observed in the dam.

f. Water Passages. The gated outlet sluiceways appear to be in good condition. The interior surfaces of the gated outlet sluiceways have been previously repaired and are in generally good condition with same spalling.

The top surface of the concrete dike wall section is in generally good condition with only minor erosion of the concrete surface. The downstream face of the concrete dike wall is seriously spalled and eroded. There are many cracks through the dike wall.

The stop log piers are severely spalled and eroded. The buttresses and sills beneath the piers appear to be in generally good condition with only minor concrete surface erosion.

g. Seepage or Leakage. A small amount of leakage is occurring at the interface of the bedrock and the concrete gated outlet section. Leakage is also occurring at the junction between the gated outlet section and the easterly section of the concrete dike wall. Along the downstream dike face, particularly at the interface between the bedrock and the concrete, a large volume of leakage is occurring through large cracks, which appear to extend through the wall. The amount of leakage occurring through the stop log spillway could not be determined due to the volume of water overflowing the top. Substantial leakage was noted at the interface between the westerly end of this section and the Milton Leather Board Mill building.

h. Monolith Joints and Construction Joints. The vertical construction joints and mastic placed in the joints of the dam appear to be in generally good condition with little or no leakage occurring. The horizontal joints consist of numerous uncontrolled, uneven joints between subsequent concrete placements. These joints show some leakage, especially in the deteriorating dike section.

i. Foundation. The entire dam appears to be founded directly on schist bedrock which is extensively jointed and varyingly weathered where exposed. Near the easterly abutment the bedrock surface consists of large blocks with wide joints. The joint between the concrete and the bedrock surface is very poor in many areas due to deterioration of concrete at the interface. Large voids exist in the base of the concrete dike wall section.

j. Abutments. The easterly abutment is founded directly on bedrock. The concrete appears to be tightly bonded to the bedrock surface. Some minor seepage was observed. The westerly abutment is essentially the Milton Leather Board Mill building.

2. EMBANKMENT STRUCTURES

Not applicable.

3. SPILLWAY STRUCTURE

The westerly section of the dam is made up of piers with stop logs located between the piers. The stop logs at the water surface were observed to be only one-inch boards and were substantially bowed downstream. Approximately two inches of water was overflowing the top of the stop logs at the time of inspection.

a. Control Gates and Operating Machinery. There are no hoists or mechanical equipment for removal of stop logs. There is a service bridge which runs across the piers supporting the stop logs. There are no spillway gates.

b. Unlined Saddle Spillways. Two channels, forming unlined saddle spillways, are located east of the dam. No evidence of any significant erosion in these saddle spillways was observed. It appears that both are underlain by shallow bedrock. Markings on the trees indicate that flow occurs frequently through this area.

c. Approach and Outlet Channel. The approaches and outlet channels at the concrete dike wall and stop log spillway section are generally clear and unobstructed. A substantial amount of debris, including logs, was floating immediately upstream of the stop logs.

d. Stilling Basin. The stilling basins below the concrete dike wall and stop log spillway section, are both bedrock lined channels with no substantial erosion or scour. The area below the stop log spillway could not be inspected in detail due to the depth of tailwater and water overflowing the stop logs.

4. OUTLET WORKS

There are two gated outlets located in the easterly portion of the dam. They consist of vertical lift gates approximately five feet square.

a. Intake Structure. The intake of the outlet gates consists of a concrete structure supporting the gates. There are no screens or trash racks upstream of the gates. The area upstream of the gates is clear and unobstructed.

b. Operating and Emergency Control Gates. The manually operated equipment for the gates consists of a rack-and-gear and reduction gears for hoisting the vertical lift timber gates. The gate stems are in good condition and the operating equipment appears to be well maintained.

c. Conduits, Sluices and Water Passages. The interior surfaces of the outlet gate sluiceways appear to have been repaired and are in good condition with little erosion or spalling of the concrete surface.

d. Stilling Basin. Stilling basin downstream of the outlet gates consists of a bedrock channel. Little or no erosion has occurred in the channel.

e. Approach and Outlet Channel. Both the approach and outlet channel from the gated outlet works are clear and unobstructed.

f. Drawdown Facilities. Primary hydraulic control of the reservoir is provided by the gated outlet works and the stop log spillway. The gated outlet works can provide almost complete drainage of the reservoir to facilitate repairs or maintenance. The power wheel may be bypassed and the headworks used as a drawdown facility. A gated headworks also exists at the mill for supplying water to the power wheel.

5. SAFETY AND PERFORMANCE INSTRUMENTATION

There is no safety or performance instrumentation at the dam.

6. RESERVOIR

a. Shore Line. No major active or inactive landslide areas were observed. There is a low lying area along the shore line near the east abutment.

b. Sedimentation. The extent of sedimentation in the reservoir is not known and could not be determined during the visual inspection. However, the sediment accumulation did not appear to impede flow to the spillway or outlet works. The watershed is primarily forested with some interspersed urbanized

areas. Milton Three Ponds Dam probably provides some settling of sediment laden waters upstream of the Milton Leather Board Dam.

c. Potential Upstream Hazard Area. No significant hazard potential was observed upstream.

d. Watershed Runoff Potential. No significant changes in watershed runoff potential are expected to occur in the near future.

7. DOWNSTREAM CHANNEL

The channels just below the stop log spillway and gated outlet works composed of bedrock. Within 200 feet of either outlet, the channels become primarily composed of gravel to cobble size bed material. The overbanks are heavily forested and contain a moderate growth of brush and grasses. The remnants of two timber crib dams are located less than one mile downstream of Milton Leather Board Dam.

8. OPERATING AND MAINTENANCE FEATURES

a. Reservoir Regulation Plan. No formal plan was disclosed.

b. Maintenance. Based on the visual inspection, it appears that the gate works of the dam are maintained frequently and are in good working condition. The stop logs at the spillway section also appear to be well maintained. However, the concrete portion of the structure is not maintained regularly and is in a deteriorated condition. The service bridge over the stop log spillway is in good condition.

APPENDIX B

ENGINEERING DATA

This appendix lists the engineering data collected either from project records or other sources of data developed as a result of the visual inspection. The contents of this appendix are listed below.

Appendix	Description
B-1	General Project Data
B-2	Past Inspection Reports

APPENDIX B-1

GENERAL PROJECT DATA

The following material is available at the office of the New Hampshire Water Resources Board, 37 Pleasant Street, Concord, New Hampshire.

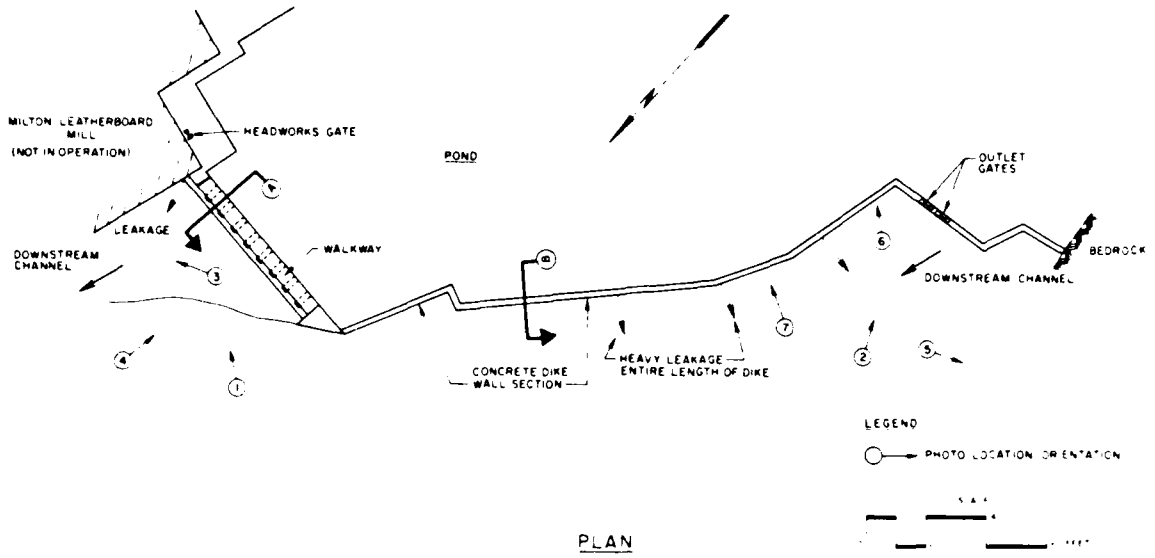
A. Periodic inspection reports, copies of which are attached as Appendix B-2 of this report.

B. Photographs taken of dam at various times during the period 1935 to present.

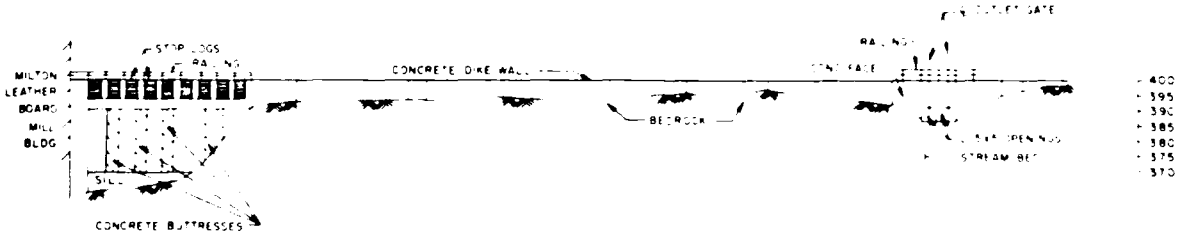
C. Miscellaneous correspondence and survey data.

D. Copy of the Corps of Engineers "National Dam Inspection Program, Phase I Inspection Report, Milton Three Ponds Dam," August, 1978.

The following plan, profile and cross-section sketches of the dam were developed from a limited stadia survey performed during visual inspection, field notes taken by inspection team members, and photographs taken during the visual inspection. The survey was referenced to an arbitrary local datum. Approximate U.S.G.S. elevations were obtained by adding 300.0 feet to the local reference.



PLAN

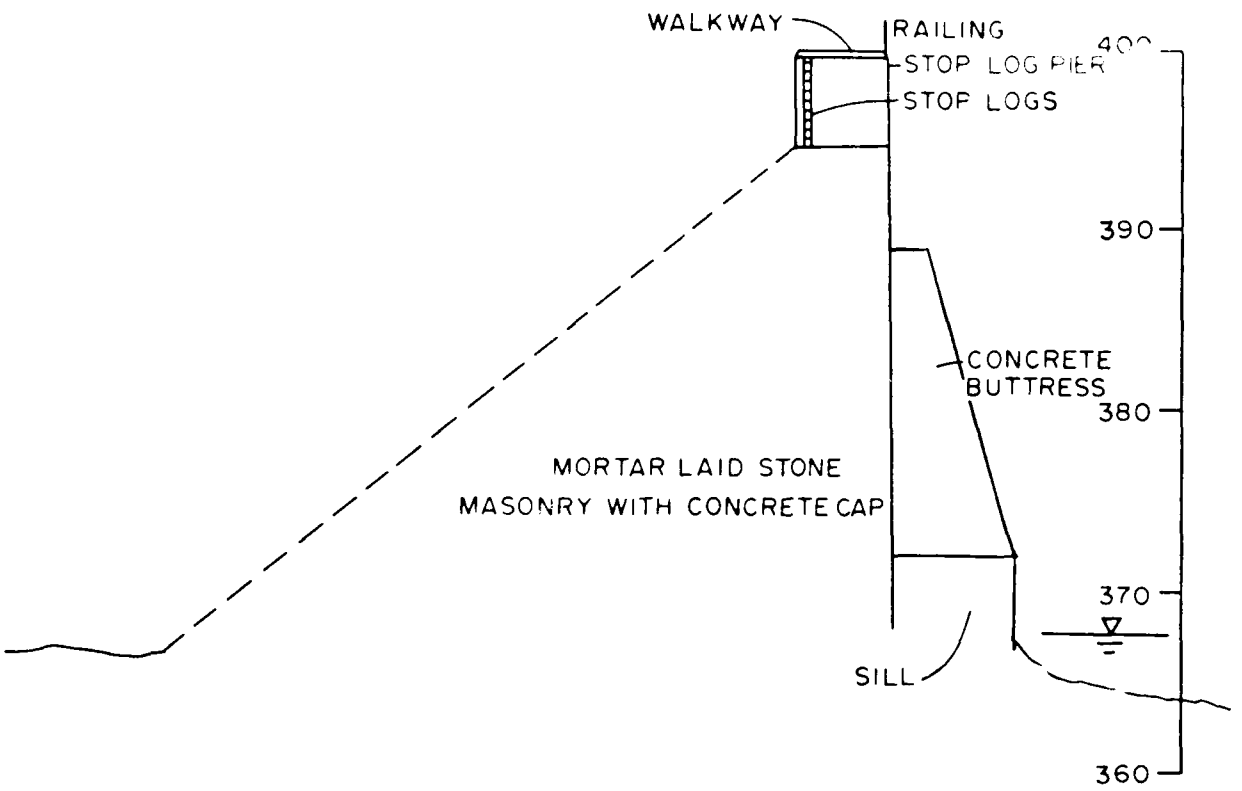


DOWNSTREAM PROFILE

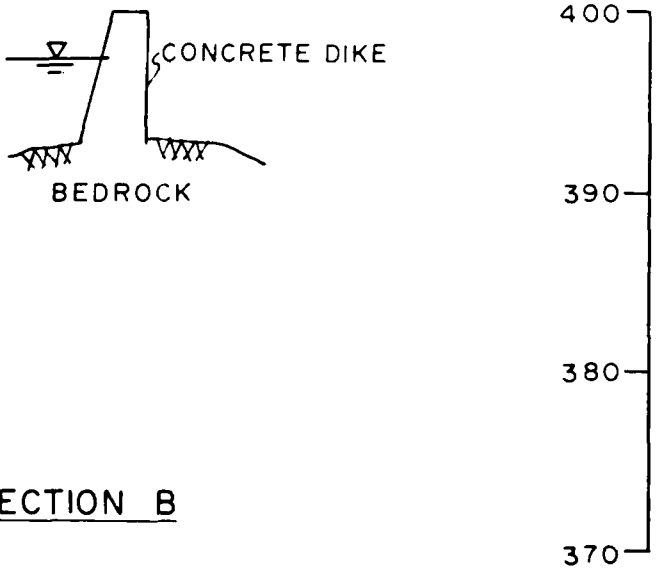
NATIONAL PROGRAM OF INSPECTION OF NON FED DAMS

MILTON LEATHERBOARD DAM
PLAN & PROFILE
SALMON FALLS RIVER N.H.

B-1.2



SECTION A



SECTION B

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

MILTON LEATHERBOARD DAM

X-SECTIONS

SALMON FALLS RIVER N.H.

B-1.3

APPENDIX B-2

PAST INSPECTION REPORTS

Attached are copies of inspection reports pertaining to the Milton Leather Board Dam on file with the New Hampshire Water Resources Board in Concord, New Hampshire.

State of New Hampshire
PUBLIC SERVICE COMMISSION

C O P Y

October 8, 1975

COPY

Milton Leatherboard Company
Milton, New Hampshire

Dear Sir:

Pursuant to the duty imposed upon it by Chapter 318 of the Public Laws of New Hampshire, the Public Service Commission will inspect the dams in the vicinity of Milton on October 8, 1975.

Town Records indicate that you are the owner of a dam in the Town of Milton, which will be inspected on the above mentioned date. We should be pleased to have you or your representative present during this inspection.

Under statute all dams in your vicinity will be inspected to determine whether or not they would be a menace to the public safety if improperly maintained. Dams which would not be a menace to the public safety will not be subject to a later periodic inspection. It is our intention to inspect the dams which would be a menace to the public safety if improperly maintained about once every five years.

There will be a nominal charge for each dam inspected, which we will endeavor to keep as reasonable as possible consistent with a competent inspection. Our inspector is an expert on dam construction and maintenance, and since you will be charged for his inspection we hope you will be able to be present when he views your dam so that you may avail yourself of his services.

Very truly yours,

N. H. PUBLIC SERVICE COMMISSION

Samuel J. Lord
Hyd. Eng.

B-2.2

Milton Leather Board Dam

PUBLIC SERVICE COMMISSION OF NEW HAMPSHIRE—DAM RECORD I-4820

TOWN	Milton	TOWN NO. 4	STATE NO. 161.04
RIVER STREAM	Salmon Falls River		
DRAINAGE AREA	116 Sq. Mi.	POND AREA	
DAM TYPE	Gravity	FOUNDATION NATURE OF	Ledge
MATERIALS OF CONSTRUCTION	Split Stone, Concrete		
PURPOSE OF DAM	POWER—CONSERVATION—DOMESTIC—RECREATION—TRANSPORTATION—PUBLIC UTILITY		
HEIGHTS, TOP OF DAM TO BED OF STREAM	35'	TOP OF DAM TO SPILLWAY CRESTS	6' –
SPILLWAYS, LENGTHS DEPTHS BELOW TOP OF DAM	9-4⅓' bays 6' deep	LENGTH OF DAM	Approx. 372'
FLASHBOARDS TYPE, HEIGHT ABOVE CREST	Removable 6'		
OPERATING HEAD CREST TO N. T. W.	28'	TOP OF FLASHBOARDS TO N. T. W.	34'
WHEELS, NUMBER KINDS & H. P.	1-Hunt, McCormick 36" Twin 1- " " Single		
GENERATORS, NUMBER KINDS & K. W	1-Allis-Chalmers 600V-60A – 36 KW		
H. P. 90 P. C. TIME 100 P. C. EFF.		H P. 75 P.C. TIME 100 P. C. EFF.	
REFERENCES, CASES, PLANS, INSPECTIONS REMARKS			

OWNER- Milton Leatherboard Company

CONDITION- Good

MENACE- Yes. Will be subject to periodic inspection.

COPY

To the Public Service Commission:

The foregoing memorandum on the above dam is submitted covering inspection made October 8, 1935, according to notification to owner dated October 5, 1935, and bill for same is enclosed.

Samuel J. Lord
Hyd. Eng.

Oct. 14, 1935
Copy to Owner

B-2.3

Milton Leather Board Dam

NEW HAMPSHIRE WATER RESOURCES BOARD

INVENTORY OF DAMS AND WATER POWER DEVELOPMENTS

DAM

BASIN Ocean NO. 4 - 70 - I-4820
RIVER Salmon Falls MILES FROM MOUTH ___ D.A.SQ.MI. 113 [illegible]
TOWN Milton OWNER Milton Leatherboard Co. Dover N.H.
LOCAL NAME OF DAM ___
BUILT ___ DESCRIPTION Gravity — Split Stone & Concrete on ledge

POND AREA-ACRES ___ DRAWDOWN FT. ___ POND CAPACITY-ACRE FT. ___
HEIGHT-TOP TO BED OF STREAM-FT. 35 MAX. ___ MIN. ___
OVERALL LENGTH OF DAM-FT. 372± MAX.FLOOD HEIGHT ABOVE CREST-FT. ___
PERMANENT CREST ELEV.U.S.G.S. ___ LOCAL GAGE ___
TAILWATER ELEV.U.S.G.S. ___ LOCAL GAGE ___
SPILLWAY LENGTHS-FT. 9 - 4.Conc. FREEBOARD-FT. 6.0
FLASHBOARDS-TYPE, HEIGHT ABOVE CREST 6.0 Removed [illegible]

WASTE GATES-NO.	WIDTH	MAX. OPENING	DEPTH SILL BELOW CREST

REMARKS Condition Fair
SH. Into Piscataqua R., Atlantic Ocean

COPY

POWER DEVELOPMENT

UNITS	NO.	RATED HP	HEAD FEET	C.F.S. FULL GATE	KW	MAKE
	1	[illegible]	[illegible]	[illegible]		82" Hunt McCormick Twin
	1	[illegible]				" " Single
	1				36	Allis Chalmers Gen'r [illegible]

USE Power

REMARKS ___

B-2.4

Milton Leather Board Dam

DATE 11/8/35

NEW HAMPSHIRE WATER CONTROL COMMISSION
DATA ON DAMS IN NEW HAMPSHIRE

LOCATION STATE NO. 121.04

Town Milton : County Strafford

Stream Salmon Falls R.

Basin-Primary Piscataqua R. : Secondary Salmon Falls R.

Local Name

Coordinates—Lat. 43° 25'-3200 : Long. 71° 0'-3500

GENERAL DATA

Drainage area: Controlled Sq. Mi.: Uncontrolled Sq. Mi.: Total 113 Sq. Mi.

Overall length of dam 372 ft.: Date of Construction

Height: Stream bed to highest elev. 35 ft.: Max. Structure 39' ft.

Cost—Dam : Reservoir

DESCRIPTION Gravity Split stone concrete foundation ledge

Waste Gates

Type

Number : Size ft. high x ft. wide

Elevation Invert : Total Area sq. ft.

Hoist

Waste Gates Conduit

Number : Materials

Size ft.: Length ft.: Area sq. ft.

Embankment

Type

Height—Max. ft.: Min. ft.

Top—Width : Elev. ft.

Slopes—Upstream on: Downstream on

Length—Right of Spillway : Left of Spillway

Spillway

Materials of Construction

Length—Total 2-4½ bays 6' deep ft.: Net Total 40.5 ft.

Height of permanent section—Max. 27' ft.: Min. ft.

Flashboards—Type Removable : Height 6' ft.

Elevation—Permanent Crest : Top of Flashboard 34'

Flood Capacity 1945 cfs.: cfs/sq. mi.

Abutments

Materials:

Freeboard: Max. 6' ft.: Min. ft.

Headworks to Power Devel.—(See "Data on Power Development")

OWNER Milton Leather Board Co. Power N. H.

REMARKS Condition good subject to periodic inspection

NEW HAMPSHIRE WATER CONTROL COMMISSION

REPORT ON DAM INSPECTION

TOWN [illegible] DAM NO. [illegible] STREAM [illegible] River

OWNER [illegible] ADDRESS [illegible]

In accordance with Section 20 of Chapter 133, Laws of 1937, the above dam was inspected by me on [illegible] ~~accompanied by~~

COPY

NOTES ON PHYSICAL CONDITION

Abutments [illegible]

Spillway Fair – [illegible]

Gates 2 Board [illegible]

~~Other~~ [illegible]

CHANGES SINCE LAST INSPECTION [illegible]

FUTURE INSPECTIONS

This dam (is) ~~(is not)~~ a menace because [illegible]

REMARKS [illegible]

Copy to Owner	Date

[illegible]
INSPECTOR

B-2.6

(Additional Notes Over)
Milton Leather Board Dam

APPENDIX C

PHOTOGRAPHS

The following are photographs referenced in this report. See Sheet B-1 for photograph locations and orientations.

1

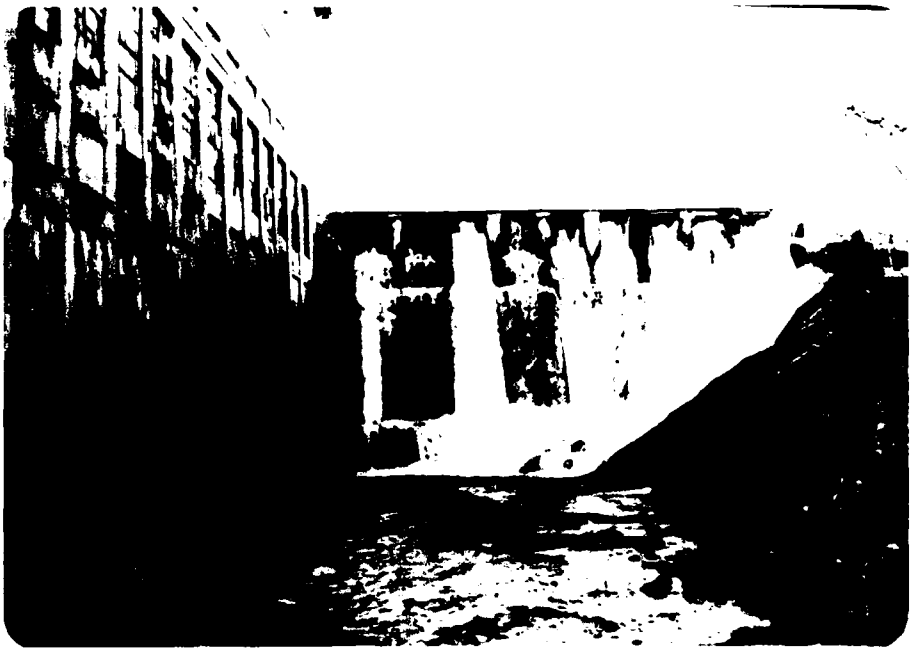
STOP LOG SPILLWAY

2

OUTLET GATES

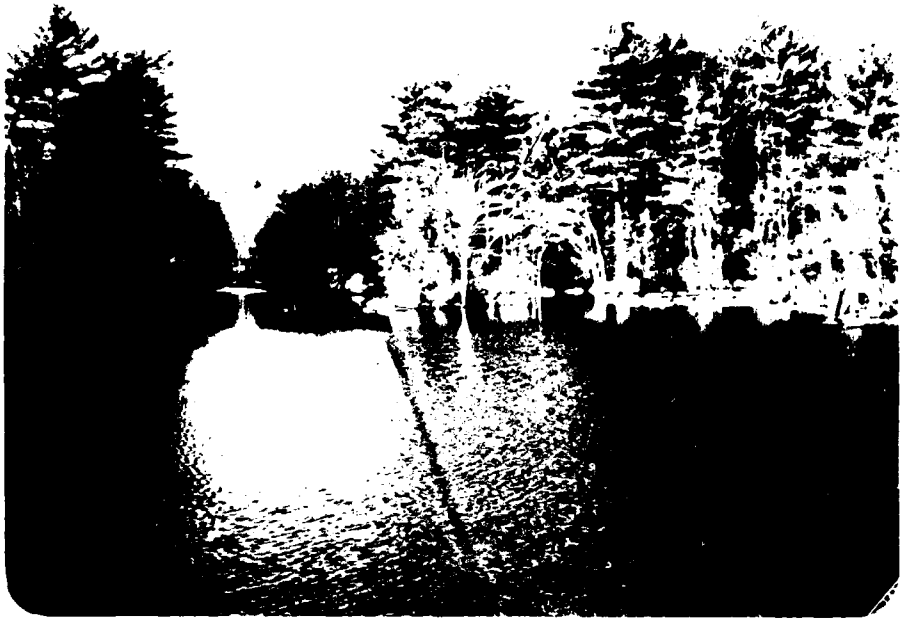
3

CHANNEL-BELOW STOP LOG SPILLWAY



4

DOWNSTREAM FACE-STOP LOG SPILLWAY



5

UPSTREAM CHANNEL

6

DOWNSTREAM FACE-DIKE SECTION

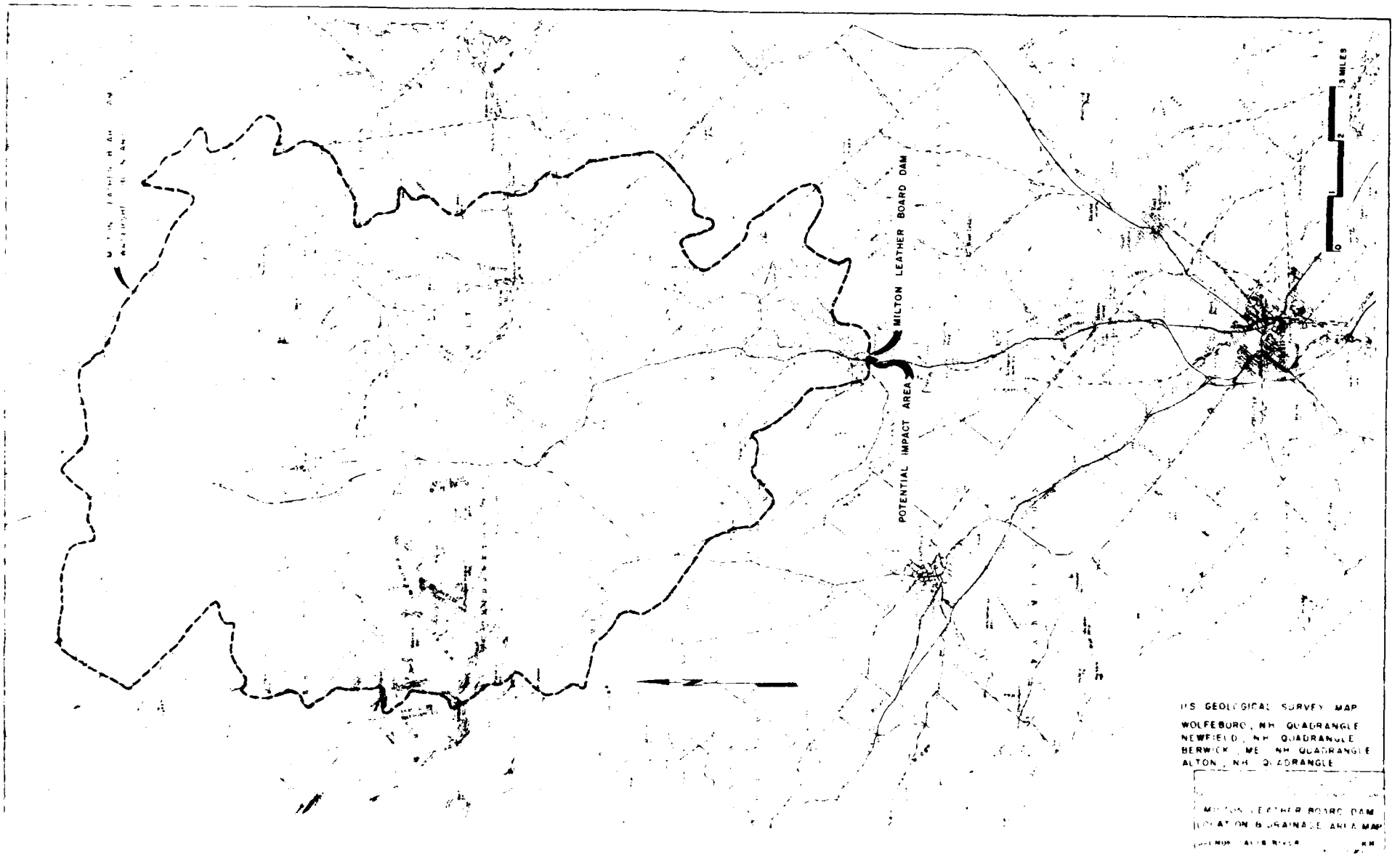
7

DOWNSTREAM FACE-DIKE SECTION

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

Hydrologic computations pertinent to this investigation are attached. The following figure shows the Salmon Falls River watershed at the Milton Leather Board Dam.


MILTON LEATHER BOARD DAM
POTENTIAL IMPACT AREA
3 MILES
2
1
0
U.S. GEOLOGICAL SURVEY MAP
WOLFEBORO, NH QUADRANGLE
NEWFIELD, NH QUADRANGLE
BERWICK, ME-NH QUADRANGLE
ALTON, NH QUADRANGLE

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
Milton Leather Board Dam	[illegible]	[illegible]
[illegible]	CHK BY BTB	DATE [illegible]

Test Flood Analysis

Flow at the Milton Leather Board Dam is regulated by the Milton Three Ponds Dam which is located approximately 0.5 mile upstream. The drainage area above the Milton Three Ponds Dam is 108 square miles. The drainage area above the Milton Leather Board Dam was planimetered from USGS maps and found to be 108.4 square miles.

A Phase I Inspection Report was completed for Milton Three Ponds Dam in August, 1978. Because the intervening drainage area between the two dams is less than 1.0% of the total drainage area, it can be considered as insignificant. Therefore the outflow from the Milton Three Ponds Dam is the inflow to the Milton Leather Board Dam. According to the Phase 1 Inspection Report of Milton Three Ponds Dam, the inflow PMF of 42,660 cfs[1] is routed to 35,000 cfs. Using data from Appendix D of the Report, a ½ PMF of 21,330 cfs would be routed to 17,500 cfs.

∴ PMF inflow to Milton Leather Board Dam = 35,000 cfs
½ PMF = 17,500 cfs

[1] The PMF flow was computed in the Phase I Report of Milton Three Ponds Dam using the "flat" curve. We concur with the use of this curve.

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
	CHK BY BTB	DATE

A) Stop-log spillway rating
- COMPUTE FOR ALL STOP-LOGS REMOVED AND STOPLOGS IN PLACE

Survey datum elev. (ft)	Approx m.s.l elev.[3] (ft)	H (ft)	C[1]	L (ft)	Q (stoplogs removed) (cfs)	Q (held in by stoplogs in place) cfs[4]
94.0		0				
			2.60	40.5[2]	37.2	0
95.0	395.0	1.0	2.63	40.5[2]	109	0
			[illegible]		197	0
96.0	396.0	2.0	2.65	"	304	0
			2.67	"	427	0
97.0	397.0	3.0	2.66	"	560	0
			2.68	"	711	0
98.0	398.0	4.0	2.70	"	975	0
			2.74	"	1,059	0
99.0	399.0	5.0	2.79	"	1,263	37
99.6		5.6	2.88	"	1,546	125
100.0	400.0	6.0	"	"	1,714	197
					1,933	304
101.0	401.0	7.0			2,160	427
					2,376	560
102.0	402.0	8.0		"	2,631	711
				"	2,891	975
103.0	403.0	9.0		"	3,149	1,059
				"	3,415	1,263
104.0	404.0	10.0		"	3,639	1,504
				"	[illegible]	1,714
105.0	405.0	11.0		"	4,255	1,933
106.0	406.0	12.0	"	"	4,849	2,376
107.0	407.0	13.0	"	"	5,467	2,891
108.0	408.0	14.0	"	"	6,110	3,415
109.0	409.0	15.0	"	"	6,776	3,769
110.0	410.0	16.0	"	"	7,465	4,545
111.0	411.0	17.0	"	"	8,176	5,155
115.0	415.0	21.0	"	"	11,225	7,919

1/ King & Brater, "Handbook of Hydraulics", Table 5-3, pg 5-40, broad crest with stop-logs removed 15 feet. For H > 5.5 ft, assume C = 2.88

2/ Nine stop-log sections of 4½ ft. wide

3/ Estimated from USGS quad "Berwick, Me-N.H. Elevation 100.0 of the survey datum was estimated to be at ~ elev = 400 ft above m.s.l.

4/ Top of stoplogs = survey elev 98.5 ft "C" value dependent on "H"

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
	CHK BY BTB	DATE

B) Main Dam Flow

Survey datum elev. (ft)	Approx m.s.l. elev. (ft)	H (ft)	C [1]	L [2] (ft)	Q (cfs)
99.6		0			0
100.0	400.0	0.4	2.50	16	10
			2.68	"	37
101.0	401.0	1.4	2.65	"	70
			2.65	"	111
102.0	402.0	2.4	2.67	"	171
			2.66	"	210
103.0	403.0	3.4	2.68	"	290
			2.70	"	333
104.0	404.0	4.4	2.74	"	415
			2.78	"	488
105.0	405.0	5.4	2.86	"	574
110.0	410.0	10.4	2.88	"	1,546
115.0	415.0	15.4	2.88	"	2,755

[1] King & Brater, Handbook of Hydraulics, Table 5-3, pg 5-40. Crest of piers is 5 feet.
[2] 9 piers at 2 feet wide (does not include abutments or connection to remainder of dam)

C) Concrete Portion of Dam at crest elev = 99.6 (assume the entire concrete wall behind step in spillway and outlet works = 230 ft.) In actuality, about 20 feet of the eastern portion of the concrete wall is at elev 99.8 ft with the remainder at elev 99.6

Survey datum elev (ft)	Approx m.s.l. elev. (ft)	H (ft)	C (from King & Brater, Table 5-3, crest = 2)	L (ft)	Q (cfs)
99.6		0		206	0
100.0	400.0	0.4	2.61	"	36
			2.63	"	463
101.0	401.0	1.4	2.77	"	945
			2.86	"	1,543
102.0	402.0	2.4	3.03	"	2,321
			3.17	"	3,225
103.0	403.0	3.4	3.30	"	4,262
104.0	404.0	4.4	3.32	"	6,312
105.0	405.0	5.4	3.32	"	8,582
110.0	410.0	10.4	3.32	"	22,938
115.0	415.0	15.4	3.32	"	41,332

PROJECT	COMP BY	JOB NO.
	CHK BY BTB	DATE

D) Concrete Portion of Dam at crest elevation 100.1 ft

Survey datum elev. (ft)	Approx m.s.l elev (ft)	H (ft)	C 1/	L (ft)	Q (cfs)
100.1	400.1	0		42	0
		0.4	2.50	"	27
101.0	401.0	0.9	2.63	"	96
			2.65	"	187
102.0	402.0	1.9	2.65	"	291
			2.67	"	417
103.0	403.0	2.9	2.66	"	552
			2.68	"	706
104.0	404.0	3.9	2.70	"	873
			2.74	"	1,062
105.0	405.0	4.9	2.78	"	1,266
106.0	406.0	5.9	2.83	"	1,734
108.0	408.0	7.9	"	"	2,692
110.0	410.0	9.9	"	"	3,769

1/ King & Brater, "Handbook of Hydraulics", Table 5-3, pg 5-40, breadth ≈ 5 ft

E) Outlet Works at East Abutment

2 - 5'x5' gated outlet works with invert elevation of 86.8 ft

$Q = CA\sqrt{2gh} \times 2$ (two gates)

Survey datum elev (ft)	Approx m.s.l elev. (ft)	H (ft)	C	(ft²) A	(cfs) Q
91.8	391.8	2.5	0.7	25	444
92.0	392.0	2.7	0.7		461
93.0	393.0	3.7	"	"	540
94.0	394.0	4.7	"	"	609
95.0	395.0	5.7	"	"	670
96.0	396.0	6.7	"	"	727
97.0	397.0	7.7	"	"	779
98.0	398.0	8.7	"	"	829
99.0	399.0	9.7	"	"	875
100.0	400.0	10.7	"	"	919 → @ 100.1' Q = 923 cfs
101.0	401.0	11.7	"	"	961
102.0	402.0	12.7	"	"	1,001
103.0	403.0	13.7	"	"	1,040
104.0	404.0	14.7	"	"	1,077

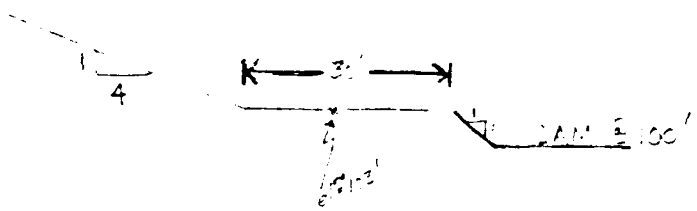
PROJECT	COMP BY	JOB NO.
[illegible]	[illegible]	[illegible]
	CHK BY BTB	DATE [illegible]

E) continued (Cubic [illegible])

Survey [illegible] elev (ft)	Approx M.S.L. elev (ft)	H (ft)	[illegible]	(cfs) q	(cfs) Q
105.0	405.0	15.7	0.7	25	1,113
106.0	406.0	16.7	"	"	1,148
108.0	408.0	18.7	"	"	1,215
110.0	410.0	20.7	"	"	1,278

F) Overland Flow

(1) East overbank (drawn from field inspection notes)

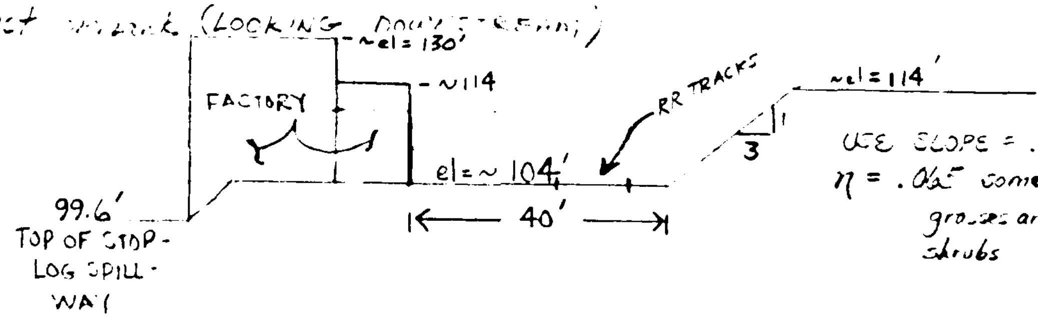


average slope in vicinity of dam = .017
n = .125 very grassy [illegible] trees and brush

@ elev = 104 , $A = 31(1) + \frac{1}{2}(1)(4) + \frac{1}{2}(1)(1) = 33.5$
$P = 35.5$
$R = .944$ $R^{2/3} = .962$
$Q = 50$ cfs

insignificant

(2) West overbank (LOOKING DOWNSTREAM)



USE SLOPE = .017
n = .065 some brush grasses and shrubs

@ elev 110', $A = 40(6) + \frac{1}{2}(6)(18) = 294$, $P = 65$ ft , $R = 4.523$
$Q = 2,396$ cfs
@ elev 108', $A = 4(40) + \frac{1}{2}(4)(12) = 184$, $P = 57$ ft , $R = 3.228$, $R^{2/3} = 2.184$
$Q = 1,198$ cfs

PROJECT	COMP BY	JOB NO.
M[illegible] [illegible] Board Dam	[illegible]	[illegible]
[illegible]	CHK BY BTB	DATE [illegible]

AREA - CAPACITY DATA

ELEVATIONS :

ITEM	USING SURVEY DATUM	USING APPROX M.S.L. DATUM
1. CREST OF STOP LOG SPILLWAY	94.0	394.0
2. TOP OF DAM AT STOP LOG SPILLWAY	99.6	399.6
3. TOP OF DAM AT CONCRETE DIKE	99.6 - 99.8	399.6 - 399.8
4. INVERT OF 5' BY 5' OUTLET GATES	86.3	386.3
5. TOP OF DAM AT OUTLET GATES	100.1	400.1

AREA CALCS :

SURFACE AREA AT ELEV = 399.7 FT (WATER SURFACE AT TIME OF INSPECTION) :

LENGTH OF RESERVOIR = 1,800 FT. (FROM FIELD INSPECTION)

AVERAGE WIDTH = 100 FT (FROM FIELD INSPECTION)

AREA = 4.1 ACRES

SURFACE AREA AT ELEV 410 FT (USING INTERPOLATED 410' CONTOUR ON USGS MAP) = 21 ACRES

CAPACITY CALCS :

ELEV	AREA	AVG. AREA	DEPTH	Δ VOL	VOL
368.4	0				0
		2.1	31.3	67	
399.7	4.1				67
		12.6	10.3	130	
410	21				197

IF SURCHARGE HEIGHT OF 10 FT. ABOVE TOP OF DAM IS REQUIRED TO PASS PMF, SURCHARGE STORAGE OF ≈150 AC-FT WOULD BE USED; THEREFORE,

$$STOR_1 = \frac{150}{63,180} \times \frac{12}{1} = .026'' \text{ AND } \frac{STOR}{19} \cong 0$$

∴ SURCHARGE STORAGE DOES NOT DECREASE PMF OR ½ PMF USING $Q_{P2} = Q_{P1}\left(1 - \frac{STOR}{19}\right)$ FOR PMF, LET [illegible]

PROJECT	COMP BY [illegible]	JOB NO. [illegible]
	CHK BY BTB	DATE [illegible]

RATING CURVE AT DAM

COL. 1 APPROX MSL ELEV (FT)	COL. 2 OUTLET WORKS Q 1/ (CFS)	COL. 3 SPILLWAY Q STOPLOGS REMOVED (CFS)	COL. 4 SPILLWAY Q STOPLOGS IN PLACE (CFS)	COL. 5 FLOW OVER REMAINING WEIRS 2/ (CFS)	COL. 6 OVERLAND FLOW (CFS)	COL. 7 Q AT DAM WITH OUTLET WORKS CLOSED AND STOPLOGS IN PLACE
392	461	0	0	0	0	0
393	540	0	0	0	0	0
394	609	0	0	0	0	0
395	670	109	0	0	0	0
396	727	304	0	0	0	0
397	779	560	0	0	0	0
398	829	875	0	0	0	0
399	875	1263	37	0	0	37
400	919	1714	197	146	0	343
401	961	2160	427	1111	0	1538
402	1,000	2639	711	2771	0	3482
404	1,077	3639	1504	7510	0	9014
406	1,148	4549	2396	13553	600	[illegible]
408	1,215	6,110	3415	20456	1198	[illegible]
410	1,273	7,4[illegible]	4543	29152	23[illegible]	[illegible]

COL. 7 = COL. 4 + COL. 5 + COL. 6

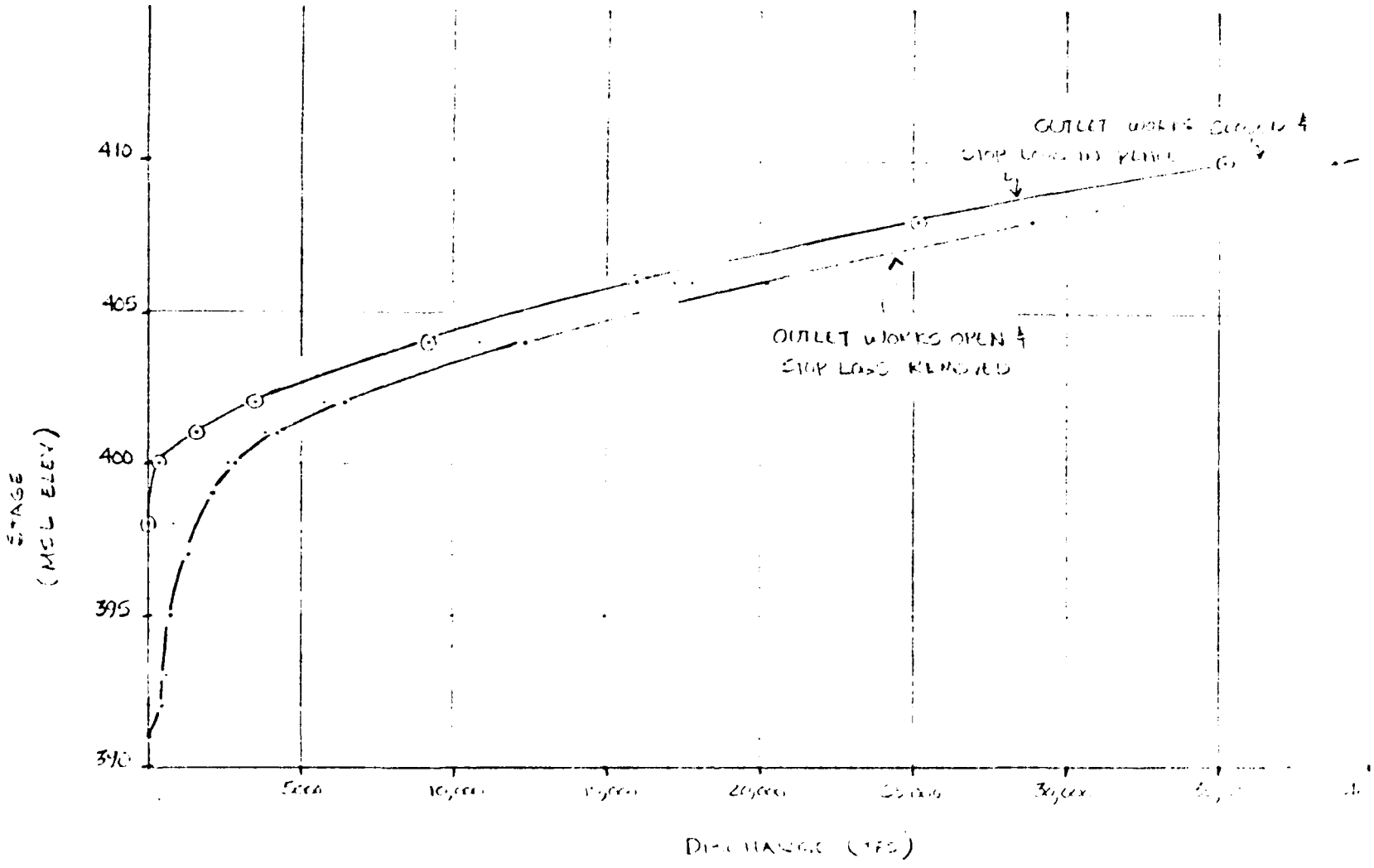
SINCE THERE IS POOR ACCESS TO THE OUTLET WORKS AND THE PROBABILITY OF NO MAINTENANCE PEOPLE BEING AT THE MILL, PMF AND 1/2 PMF ELEVATIONS WERE DETERMINED ASSUMING OUTLET CLOSED AND STOPLOGS IN PLACE.

1/2 PMF OF 17,500 CFS @ ELEV 406.3 FT

PMF OF 35,000 CFS @ ELEV 410.0 FT

1/ ASSUME FULL OPEN
2/ INCLUDES CONCRETE DIKE + MAIN DAM PIERS

STAGE - DISCHARGE RATING CURVES
MILTON (CARTHAGE) FLOOD DAM



PROJECT

COMP BY

CHK BY

JOB NO

DATE

PROJECT	COMP BY	JOB NO.
MILTON LEATHER BOARD DAM DAM FAILURE ANALYSIS	[illegible]	[illegible]
	CHK BY BTB	DATE 1-17-7[illegible]

DAM FAILURE ANALYSIS

(1) STORAGE AT TIME OF FAILURE = 67 ACRE-FEET

(2) PEAK FAILURE OUTFLOW, Q_{P1}

$$Q_P = \frac{8}{27} W_b \sqrt{G} \, Y_0^{3/2} \qquad W_b = .4 \times 125 \text{ FT} = 50 \text{ FT}$$

T[illegible] LOCATION FOR A BREACH OF THE DAM [illegible] DIKE [illegible] BETWEEN THE OUTLET [illegible] AND THE STOP LOG SPILLWAY. HOWEVER THE [illegible] HEIGHT OF THE SECTION IS ≈ 8 FT. THE LENGTH OF THE SECTION [illegible] IS ≈ [illegible] FEET. [illegible] FLOW OF [illegible] CFS. THE [illegible] WITHOUT SIGNIFICANT FLOODING.

A MUCH LESS LIKELY LOCATION OF FAILURE, BUT WITH MORE [illegible] IS IN THE STOP LOG [illegible] SECTION. THE STOP LOG SPILLWAY [illegible] THE [illegible] DISTINCT AND [illegible] DAM [illegible]

$$W_b = .4 \times \left(\frac{7[illegible] + 3[illegible]}{2} \right) = 2[illegible] \qquad 7[illegible]$$

$$Y_0^{3/2} = ([illegible])^{3/2} = [illegible]$$

Q_{P1} = 6300 CFS

(3) TIME FOR RESERVOIR TO EMPTY, T

$$T = \frac{12.1[illegible]}{[illegible]} = .26 \text{ HRS} = 15 \text{ MINUTES}$$

(4) FLOW AT TIME OF FAILURE WITH [illegible] (WITH WATER LEVEL AT TOP OF DAM, ELEV = 97.6)

TOP OF STOP LOGS = 95.5

H = 1.1 , L = 40.5 , C = 2.68

Q = 125 CFS JUST PRIOR TO FAILURE (HOWEVER, 4 [illegible] WOULD BE INVOLVED IN FAILURE)

Q = 6300 + 70 ≅ 6370 CFS (ASSUME SPILLWAY Q IS INSIGNIFICANT)

(5) FLOW AT TIME OF FAILURE WITH STOP LOGS REMOVED WITH WATER SURFACE AT 97.6 FT.

Q = 1,550 CFS JUST PRIOR TO FAILURE

Q = 6,300 + [illegible] = 7160 AT FAILURE (4 PORTS WOULD BE INVOLVED IN FAILURE)

PROJECT	COMP BY	JOB NO.
	CHK BY BTB	DATE

CROSS - SECTION #1

$S = 67$ AC-FT

$q_1 = 6300$ CFS TRIAL STAGE = 337.7' (9.7 FT.)

$V_1 = \frac{812 \times 1500}{43,560} = 27.9$ A-F

$q_2 = 6300\left(1 - \frac{27.9}{67}\right) = 4,370$ CFS

$V_2 = \frac{550 \times 1500}{43,560} = 18.9$ A-F

$V_{AVE} = 23.4$

$Q_1 = 6300\left(1 - \frac{23.4}{67}\right) = 4,100$ CFS STAGE = 336.3 (7.3 FT)

EFFECT OF VALLEY STORAGE ON TRIAL S REDUCTION OF ~ 1.5-2.0 FT

CROSS - SECTION #2

$S = 67$ AC-FT

$Q_1 = 4,100$ CFS TRIAL STAGE = 5.3 FT

$V_1 = \left(\frac{488+525}{2}\right) \times \frac{1100}{43,560} = 13.7$ A-F

$q_2 = 4,100\left(1 - \frac{13.7}{67}\right) = 3,260$ CFS

$V_2 = \left(\frac{433+520}{2}\right) \times \frac{1100}{43,560} = 12.4$ A-F

$V_{AVE} = 13.1$

$Q_2 = 4,100\left(1 - \frac{13.1}{67}\right) = 3,300$ CFS STAGE = 4.7 FT

EFFECT OF VALLEY STORAGE IN TRIAL IS CREDIT OF ~ 1.4 FT

CROSS - SECTION #3

$S = 67$ A-F

$Q_2 = 3,300$ CFS TRIAL STAGE = 262.5 FT (4.5)

$V_1 = \left(\frac{1,331+416}{2}\right) \times \frac{1600}{43,560} = 33.0$ A-F

$q_2 = 3300\left(1 - \frac{33.0}{67}\right) = 1,674$ CFS

$V_2 = \left(\frac{820+254}{2}\right) \times \frac{1600}{43,560} = 19.7$ A-F

$V_{AVE} = 26.4$

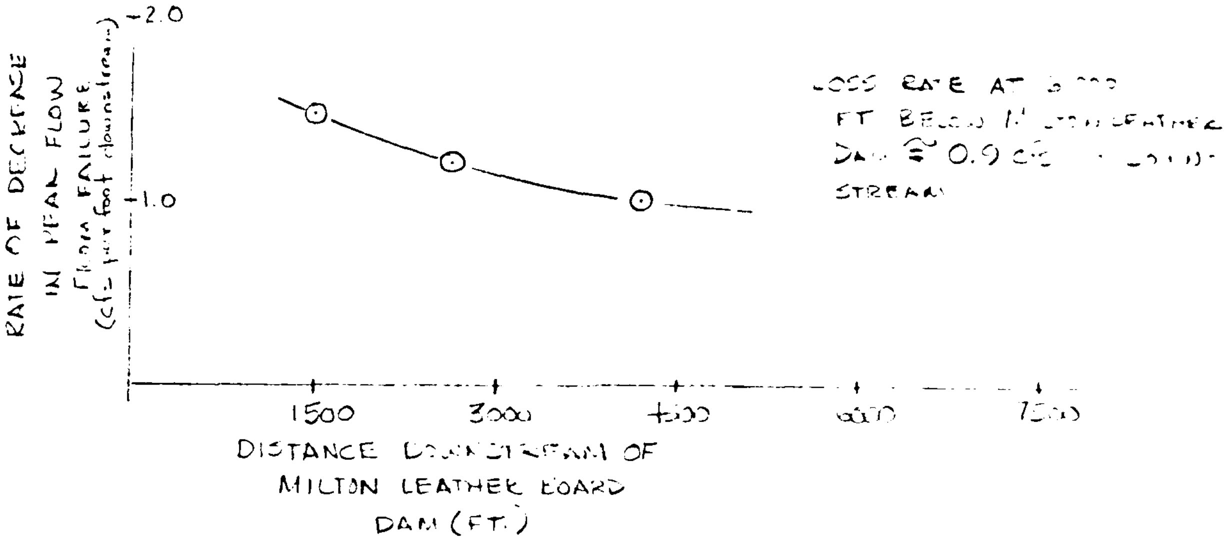
$Q_3 = 3300\left(1 - \frac{26.4}{67}\right) = 2,000$ CFS

STAGE = 3.6 FT

RATE IN REDUCTION OF PEAK = 4300 cfs / 4000 ft = 1 cfs / ft

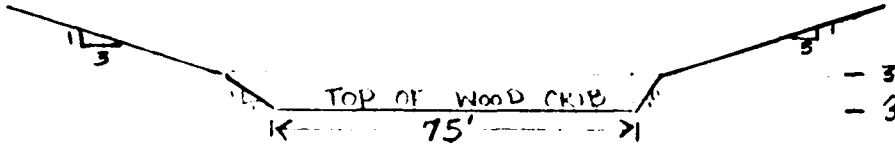
PROJECT	COMP BY	JOB NO.
	CHK BY BTB	DATE

[illegible] FROM [illegible] SPAULDING POND, THE FOLLOWING GRAPH CAN BE APPLIED



THE INFLOW TO SPAULDING POND FROM A FAILURE OF MILTON LEATHER BOARD DAM IS ESTIMATED AS [6,300 CFS − 6,000 FT (0.9 CFS/FT)]

≅ 700 CFS.



- 362'
- 358' (estimated from USGS quads)

ASSUME STRUCTURE REMAINS INTACT DURING OVERTOPPING

WEIR FLOW:

ELEV	H	C	L	Q_W	Q_{OF}	Q_{TOT}
359	1	2.64	75'	198		
360	2	"	"	560		
362	4	"	"	1,584	40	1,624
364	6	"	"	2,910	~140	3,050
366	8	"	"	4,480	235	4,715
368	10	"	"	6,261	273	6,534
369	11			7,023	~300	7,323

OVERLAND FLOW

$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

$S = .029$ (AVG. OF THE STREAMBED IN THE VICINITY OF MILTON LEATHER BOARD DAM)

$n = .125$ (THICK GROWTH OF TREES AND DENSE UNDERBRUSH)

AT ELEV 362:

$A = 16\ FT^2$ $P = 11.3\ FT$ $R = 1.416$

$\therefore Q = 40\ cfs$

AT ELEV 366:

$A = 16 + \frac{1}{2}(4)(12) + \frac{1}{2}(4)(20) = 80$ $P = 11.3 + 33.0 = 44.3$ $R = 1.80$

$Q = 235$

AT ELEV 368:

$A = 96$ $P = 56$ $R = 1.714$

$Q = 273$

D-13

Milton Leather Board Dam

PROJECT

COMP BY

CHK BY BTB

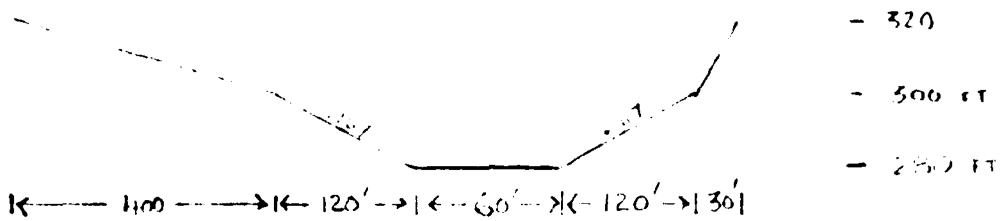
JOB NO.

DATE 1-18-77

EDWARD C. JORDAN CO., INC.

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
	CHK BY BTB	DATE



SLOPE = .016 (FROM 280 TO 300 CONTOUR)

n_s = .050

n_o = .125

ELEV	[illegible]		[illegible]		P		R		S	Q		[illegible]
	n_s	n_o	n_s	n_o	n_s	n_o	n_s	n_o		n_s	n_o	
285	[illegible]	11.9	300	150	60	6.1	5.00	[illegible]	.016	[illegible]	411	3,706
286	29.7	11.9	360	216	60	[illegible]	6.00	2.95	.016	1,465	670	5,135
284	29.7	11.9	240	96	60	47	4.00	1.96	.016	[illegible]	226	2,496
283	[illegible]	11.9	180	54	60	[illegible]	[illegible]	[illegible]	.016	1,406	[illegible]	1,518

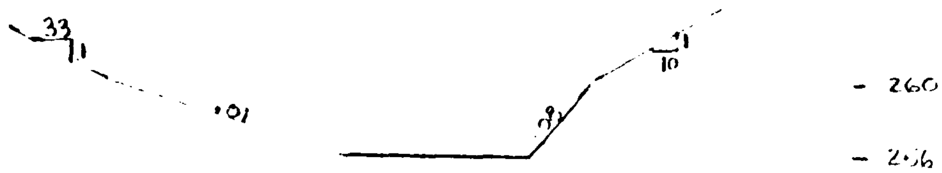
EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY [illegible]	JOB NO. [illegible]
	CHK BY BTB	DATE 1-13-77

X - SECTION #[illegible]

[illegible] 4,200 FT DOWNSTREAM OF DAM

[illegible]



S = .005 (260 FT [illegible] TO SPAULDING POND)
n_s = .050 (STREAM CHANNEL)
n_o = .125 (OVERBANK)

ELEV	1.486/n n_s	1.486/n n_o	A n_s	A n_o	P n_s	P n_o	R n_s	R n_o	S	Q n_s	Q n_o	Q_{TOT}
258	[illegible]	11.9	120	225	60	[illegible]	2.00	1.00	.005	400	[illegible]	589
259	29.7	11.9	180	506	60	338	3.00	1.497	"	738	507	[illegible]
260	29.7	11.9	240	900	60	450	[illegible]	[illegible]	"	1,270	1,202	2,472
261	29.7	11.9	300	1322	60	493	5.00	2.6[illegible]	"	1,940	2,145	[illegible]
262									"			

APPENDIX E

Information as Contained in the National

Inventory of Dams

INVENTORY OF DAMS IN THE UNITED STATES

STATE	NATIONAL INVENTORY NUMBER	DIVISION	STATE CONGR DIST	COUNTY CONGR DIST	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY MO YR
NH	310	020	017 01		MILTON LEATHER BOARD DAM	1324.5	7059.2	30MAR79

POPULAR NAME	NAME OF IMPOUNDMENT
SPRINGFIELD DAM	

RIVER BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	SALMON FALLS RIVER	MILTON	0	2500

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)	DIST	DAM	FED R	PRV/FED	SCS A	VER/DATE
PGCT	1909	0	32	32	67	60	ED	N	N	N	N	30MAR79

REMARKS
21=MORTAR-LAID STONE MASONRY + CONCRETE 23=HYDROMECHANICAL

DIS HAS	SPILLWAY LENGTH (FT.)	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (CFS)	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.)
2	335	C	55	1550		.										

OWNER	ENGINEERING BY	CONSTRUCTION BY
MILTON LAND CORP	J.A.JONES AND CO.	ABATHAW CONSTR. CO.

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NH WATER RES BD	NH WATER RES BD	NH WATER RES BD	NH WATER RES BD

INSPECTION BY	INSPECTION DATE DAY MO YR	AUTHORITY FOR INSPECTION
EDWARD C JORDAN CO INC	15NOV78	PUBLIC LAW 92-367 8AUG1972

REMARKS
31=STOP LOGS 33=WITHOUT STOPLOGS

END

FILMED

8-85

DTIC