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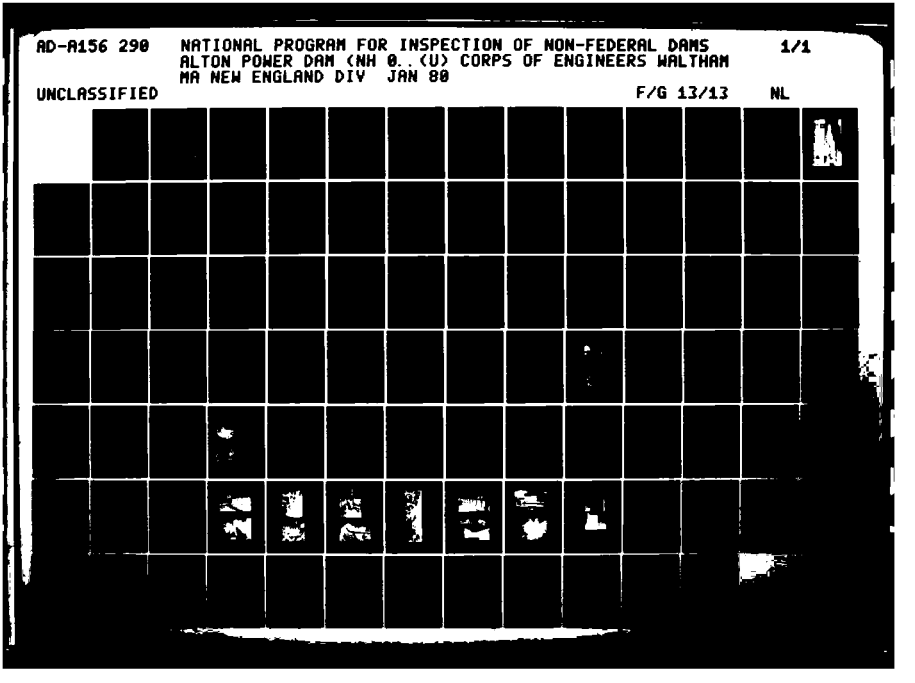
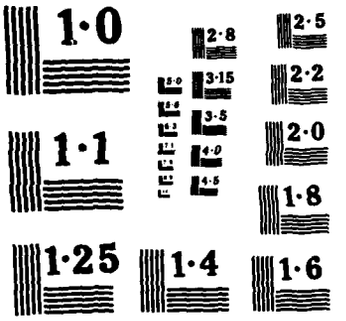
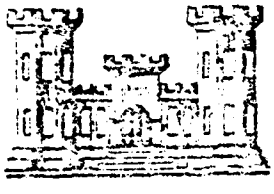




MERRIMACK RIVER BASIN
ALTON, NEW HAMPSHIRE

ALTON POWER DAM
NH 00011

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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

JANUARY 1980

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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)

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Merrimack River Basin
Alton, New Hampshire
Merrymeeting River

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

The dam consists of a concrete gravity spillway and outlet works with an earth embankment at the left end. The dam is about 190 ft. long and its height is 16 ft. The dam is in fair condition. It is intermediate in size with a high hazard potential.

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MERRIMACK RIVER BASIN
ALTON, NEW HAMPSHIRE

ALTON POWER DAM
NH 00011

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

JANUARY 1980

NATIONAL DAM INSPECTION PROGRAM
PHASE I INVESTIGATION REPORT

Identification No.:	NH 00011
Name of Dam:	Alton Power
Town:	Alton
County and State:	Belknap, New Hampshire
Stream:	Merrymeeting River
Date of Site Visit:	1-2 November 1979

BRIEF ASSESSMENT

Alton Power Dam consists of a concrete gravity spillway and outlet works with an earth embankment at the left end. The spillway has twelve stoplog-controlled bays. The outlet works is a sluice gate intake connected to a short section of steel penstock. A footbridge, allowing access to the stoplogs, runs above the spillway and forms the top of the dam. The overall length of Alton Power Dam, including the earth embankment, is approximately 190 ft. and its height is about 16 ft. The dam was completed in 1923 for private hydroelectric power generation.

Due to the extent of downstream development that would be affected in the event the dam were to fail, Alton Power Dam is confirmed as having a "high" hazard potential in accordance with Corps of Engineers Guidelines.

The dam is in fair condition, based on a visual examination of the structure. Although some deficiencies were noted, there was no evidence of settlement, lateral movement or signs of structural failure, or other conditions which would warrant urgent remedial action.

Based on the "intermediate" size and "high" hazard potential classifications in accordance with Corps of Engineers guidelines, the test flood for this dam is the Probable Maximum Flood (PMF). Hydraulic analyses indicate that the routed test flood outflow of 10,200 cfs (inflow 12,900 cfs or 550 csm) would overtop the dam by about 4.5 ft. assuming 2.8 ft. of stoplogs in place. With the water level at the top of the dam, the spillway capacity with stoplogs in place is approximately 1,410 cfs, which is 14 percent of the routed test flood outflow. With all stoplogs removed, the routed test flood outflow is about 9,700 cfs and the spillway capacity at top of dam is about 3,730 cfs, or 38 percent of the routed test flood outflow.

The State of New Hampshire Fish and Game Department,

owner of the dam, should conduct the following investigations under the direction of a registered professional engineer: 1) perform a detailed hydraulic/hydrologic investigation to determine the need and means of increasing the discharge capacity of this facility, 2) determine the nature of the observed seepage and its effect on the stability of the left embankment, 3) inspect the spillway during a period of low flow to assess its structural condition, and 4) determine the required work to insure the operability of the outlet works and make the penstock supports structurally adequate, as outlined in Section 7.2.

Any necessary modifications resulting from the investigations, and remedial measures, including clearing brush and trees from the embankments, repairing spalled areas of concrete, repairing the timber stoplog supports and monitoring of seepage on the left downstream side, as outlined in Section 7.3, should be implemented by the Owner within one year after receipt of this report. The owner should also prepare a formal operations and maintenance manual for the dam and establish an emergency preparedness plan and downstream warning system that would compliment the State's existing disaster operations plan, "Link-Up".

HALEY & ALDRICH, INC.
by:

Harl Aldrich
President

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, DC 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 will 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 run-off), 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 aid 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. Consideration of downstream flooding other than in the event of a dam failure is beyond the scope of this investigation.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

TABLE OF CONTENTS

TABLE OF CONTENTS
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TABLE OF CONTENTS
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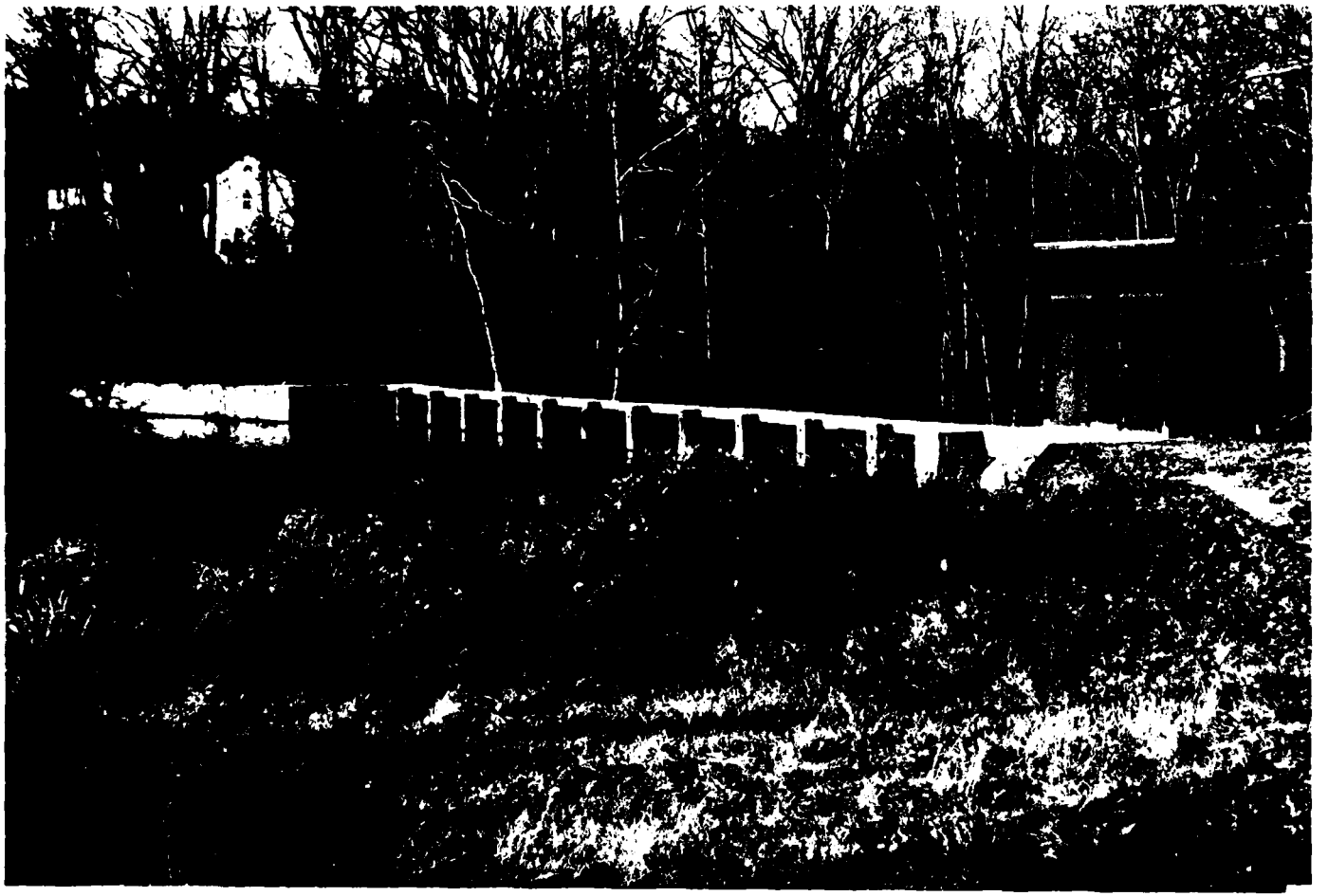

1. Overview of Alton Power Dam showing upstream side

FILE NO 4454 A6

DAM: Alton Power

IDENTIFICATION NO. NH 00011

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LOCATION MAP

U.S.G.S. QUADRANGLE

ALTON, NH

APPROX. SCALE: 1" = 1 MILE

PHASE I INVESTIGATION REPORT
NATIONAL DAM INSPECTION PROGRAM

ALTON POWER DAM
NH 00011

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.

Haley & Aldrich, Inc. has been retained by the New England Division to inspect and report on selected dams in the States of New Hampshire and Maine. Authorization and notice to proceed were issued to Haley & Aldrich, Inc. under a letter dated 31 October 1979 from Colonel William E. Hodgson, Jr., Corps of Engineers. Contract No. DACW33-80-C-0009 has been assigned by the Corps of Engineers for this work. Camp, Dresser & McKee, Inc. was retained as consultant to Haley & Aldrich, Inc. on the structural, mechanical/electrical and hydraulic/hydrologic aspects of the Investigation.

b. Purpose of Inspection. The primary purposes of the National Dam Inspection Program are 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 prepare the states to initiate 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. The dam is located at the northwestern end of Wentworth Pond in Alton, New Hampshire, as shown on the Location Map, page vii. The latitude and longitude of

the dam site are N43°27.3' and W71°13.8', respectively. Spillway discharge is conveyed by Merrymeeting River approximately one mile to Alton Bay at the southern end of Lake Winnipesaukee.

b. Description of Dam and Appurtenances. Alton Power Dam consists of a concrete gravity spillway and outlet works with an earth embankment at the left end. The spillway is 81.8 ft. long with twelve stoplog-controlled bays. The outlet works is located at the right end of the spillway and consists of a sluice gate intake connected to a short section of 5 ft. nominal diameter steel penstock. The earth embankment at the left end is well-defined and was designed to be approximately 65 ft. long. A short embankment at the right end is ill-defined and will be referred to as the right abutment.

A footbridge, allowing access to the stoplogs, runs 6 ft. above the permanent spillway crest and forms the top of the dam. The overall length of Alton Power Dam, including earth embankments, is approximately 190 ft. and its height is about 16 ft. As recorded in prior State of New Hampshire inspection reports, the distance from the left end of the left headwall to the distant end of the right headwall is approximately 136 ft. The dam was built over an old dry-laid stone masonry dam that previously occupied the site.

The spillway has an ogee shape. Stoplogs are used to maintain the level of Wentworth Pond at approximately 3 ft. above the permanent crest of the spillway during normal flow. Downstream beyond the toe of the spillway, stone has been placed to prevent erosion.

The outlet works, and penstock were originally used to conduct water to a downstream power station. Since the power generating capabilities of the dam were abandoned in 1958, the wooden portion of the penstock has been disassembled and the only present use of the outlet works is as a reservoir drain. The gate lift mechanism for the outlet works is housed in a wooden gatehouse.

Alton Power Dam was designed to have a concrete cutoff or core wall starting 16 ft. into the right abutment, running along the upstream side of the dam and ending at the left training wall. Positive cutoff beyond the left training wall was intended to be achieved by facing the old dry-laid stone with a minimum of 12 in. of concrete and carrying this facing down to impervious soil. This concrete facing forms a headwall, 30 ft. in length, along the upstream side of the left embankment.

c. Size Classification. The storage at the top of Alton Power Dam is estimated to be 4,760 acre-ft. and the corresponding hydraulic height of the dam is approximately 16 ft. Storage of from 1,000 to 50,000 acre-ft. and/or a height of from 40 to 100 ft. classifies a dam in the "intermediate" size category, according to the guidelines established by the Corps of Engineers. Although the height of this dam is much less than 40 ft., it is classified as an "intermediate" size dam by virtue of its storage capacity.

d. Hazard Classification. The dam is currently classified as having a "high" hazard potential in the Corps of Engineers National Inventory of Dams. Dam failure analysis computations in Appendix D, which are based on "Guidance for Estimating Downstream Dam Failure Hydrographs", confirm this classification. Analyses indicated that a failure of the Alton Power Dam would effect in excess of 20 residential homes, a motel and a marina. The potential loss of life would be more than a few.

e. Ownership. The name, address and phone number of the current owner of Alton Power Dam are:

State of New Hampshire
Fish and Game Department
Box 2003
34 Bridge Street
Concord, New Hampshire 03301
Phone (603) 271-3421

The original owner of the dam, George H. Jones, sold it and all deeded rights to the Public Service Company of Manchester, New Hampshire, on 15 January 1946. On 20 October 1958, the State of New Hampshire, Fish and Game Department, became owner of the dam and has maintained and operated the structure since that time.

f. Operator. Mr. Franklin Alden, Hatchery Superintendent at the Powder Mill Rearing Station of the Fish and Game Department, has been responsible for the operation maintenance and safety of the dam since 1970. His phone number is (603) 859-2043.

g. Purpose of Dam. The Alton Power Dam was originally constructed for hydroelectric power generation. The power generating facilities were abandoned in May 1958 and the present functions of the dam are primarily to provide a waterfowl habitat, watershed protection and flood control.

h. Design and Construction History. The present dam was designed from 1921 to 1923 by I.W. Jones & Co. of Milton, New Hampshire for George H. Jones of New Durham, New Hampshire. Relevant portions of the design information in the form of three drawings by I.W. Jones & Co. are included in Appendix B.

The construction of Alton Power Dam is believed to have been completed in 1923. The powerhouse, penstock and associated works were completed in 1925, the first year the facility generated electricity. The name of the construction contractor is unknown but a copy of the original Specifications and Contract is on file at the State of New Hampshire Water Resources Board.

In 1959, the engineering and maintenance division of the Fish and Game Department rehabilitated the deteriorated concrete portions of the dam. Additional work has been performed as needed over the years. Most recently, the concrete on the footbridge was patched and the stoplogs were replaced on 22 April 1979.

i. Normal Operational Procedures. There is no formal written procedure for the operation of the dam. The dam is visited once a week and debris is removed from the upstream face of the spillway when observed. Approximately 2.8 ft. of stoplogs are normally kept in each of the 12 spillway bays except during the winter when approximately 1.25 ft. of stoplogs (two boards) are removed from the bays at either end. When the river stage rises to about 6 in. above the top of stoplogs, local flooding occurs which prompts residents to telephone the dam operator who in turn removes some stoplogs. Repairs to the dam are made on an as-needed basis.

1.3 Pertinent Data

All elevations reported herein are based on or were measured relative to a USGS permanent spillway crest elevation given in a New Hampshire Water Resources Board, Inventory of Dams and Water Power Developments report dated 22 July 1935. By comparison with information given on the USGS Alton Quadrangle Map, it appears reasonable to assume the given elevation is correct and that the elevations presented in this report are based on National Geodetic Vertical Datum (NGVD).

a. Drainage Area. The drainage area tributary to Alton Power Dam is 34.5 square miles. Merrymeeting Lake, which is located in the upper portion of the watershed, has a tributary drainage area of 11 sq. mi. to Merrymeeting Lake Dam, which forms the lake. The remaining portion of the watershed downstream of Merrymeeting Lake is heavily forested and sparsely developed. A significant portion of the lower watershed is marsh lands drained by Coffin Brook.

b. Discharge at Dam Site

1)	Outlet works	400 cfs at El. 526.1 (top of stoplogs)
2)	Maximum known flood at dam site	Unknown
3)	Ungated spillway capacity at top of dam (without stoplogs)	3,730 cfs
	(with stoplogs)	1,410 cfs
4)	Ungated spillway capacity at test flood pool elevation (without stoplogs)	7,000 cfs at El. 532.6
	(with stoplogs)	5,630 cfs at El. 533.8
5)	Gated spillway capacity at normal pool elevation	Not applicable
6)	Gated spillway capacity at test flood pool elevation	Not applicable
7)	Total project capacity at test flood pool elevation (with stoplogs removed)	9,700 cfs at El. 532.6
8)	Total project discharge at test flood pool elevation (with stoplogs in place)	10,200 cfs at El. 533.8

c. Elevation (ft. above NGVD)

1)	Streambed at centerline of dam	513.3
2)	Test flood tailwater	522.5
3)	Upstream portal invert diversion tunnel	Not applicable
4)	Normal pool	526.1
5)	Full flood control pool	Not applicable
6)	Spillway crest (without stoplogs)	523.3
	(with stoplogs)	526.1
7)	Design surcharge-original design	Unknown
8)	Top of dam	529.3
9)	Test flood surcharge (without stoplogs)	532.6
	(with stoplogs)	533.8

d. Reservoir Area (acre-ft.)

1)	Length of test flood pool...	4.0 mi. (Est.)
2)	Length of normal pool.....	3.9 mi. (Est.)
3)	Length of flood control pool.....	Not applicable

e. Storage (acre-ft.)

1)	Normal pool.....	1,120
2)	Flood control pool.....	Not applicable
3)	Spillway crest.....	1,120
4)	Top of dam.....	4,670
5)	Test flood pool (without stoplogs).....	6,720
	(with stoplogs).....	7,520

f. Reservoir Surface (acres)

1)	Normal pool.....	230
2)	Flood control pool.....	Not applicable
3)	Spillway crest.....	230
4)	Top of dam.....	984
5)	Test flood pool.....	1,000

g. Dam

1)	Type.....	Concrete gravity spillway with earth embankment at left end
2)	Crest length.....	Approx. 190 ft. overall
3)	Height.....	16 ft.
4)	Top width of embankment.....	Approx. 8 ft.
5)	Side slopes.....	Embankment slopes not well defined; designed 1-1/2H to 1V
6)	Zoning.....	Not known
7)	Impervious core.....	Designed 16 ft. into right abutment and along front of left embankment to impervious soil
8)	Cutoff.....	Concrete cutoff wall to impervious soil designed at front of dam
9)	Grout curtain.....	None
10)	Other.....	Reservoir level maintained with 3 stoplogs in place

h. Diversion and Regulating Tunnel. Not applicable

i. Spillway

1)	Type.....	Concrete ogee with 12 bays separated by 1-ft. wide concrete piers
2)	Total length of weir.....	81.8 ft.
3)	Effective length of weir....	70.5 ft.
4)	Crest elevation.....	523.3
5)	Gates.....	None (stoplogs are kept at a maximum of 2.8 ft. in heigth)
6)	U/S channel.....	Wentworth Pond
7)	D/S channel.....	Merrymeeting River to Lake Winnipesaukee, approximately one mile
8)	General.....	Spillway crest approx. 19 ft. above normal level of Lake Winnipesaukee

j. Regulating Outlets. The outlet works for the Alton Power Dam consist of a manually operated wooden sluice gate followed by a 6-ft. to 5-ft. reducer and a short section of 5-ft. nominal diameter steel penstock. The sluice gate was last operated in 1972. The invert elevation of the penstock is El. 516.7. The present outlet works once served as a forebay with debris rack for an approximately 250-ft. long wooden penstock which conveyed water to a generating facility located on the right downstream bank of the river. The penstock and generating facility have long been abandoned and the outlet works now discharges directly to the downstream river channel.

SECTION 2 - ENGINEERING DATA

2.1 Design Data

A copy of the original specifications and contract document prepared by I.W. Jones & Co. dated 16 July 1922 and blue print copies of design drawings are on file at the State of New Hampshire Water Resources Board.

A review of the specifications indicates that attention was given primarily to the requirements for constructing the concrete work. Embankments at either end were proposed to be thoroughly compacted and have side slopes of 1.5 horizontal to 1 vertical with no other particular considerations for stability.

The above documents and a copy of a letter submitted by I.W. Jones & Co. to the Public Service Commission of New Hampshire dated 7 August 1923 for their approval to build the dam, comprises all the available design information known to exist.

2.2 Construction Data

No as-built data or records of the construction of the dam were located and none are believed to exist.

2.3 Operation Data

No operational data on the dam were located other than the conditions reported in prior inspection reports dating back to 1935.

2.4 Evaluation of Data

a. Availability. A list of the engineering data available for use in preparing this report is included on page B-1. Selected documents from the listing are also included in Appendix B.

b. Adequacy. There was a sufficient amount of engineering data available to aid in the evaluation of Alton Power Dam. A review of these data in combination with visual examination, preliminary hydraulic and hydrologic computations, consideration of past performance and application

of engineering judgement, was adequate for the purposes of a Phase I assessment.

c. Validity. The information contained in the engineering data may generally be considered valid. However, details on the drawings are shown as designed and may vary slightly from those actually built. For example, the debris rack was not present over the outlet works intake, the shape of the headwall on the left side of the outlet works and the spillway length were found not to be as shown on prints of the original design. The as-built depths and configurations of the dam cutoff walls are unknown.

SECTION 3 - VISUAL EXAMINATION

3.1 Findings

a. General. The Phase I visual examination of the Alton Power Dam was conducted on 1-2 November 1979.

The upstream water surface elevation was about 3.1 ft. below the top of the dam on both days with water flowing over the stoplogs and spillway. On 2 November 1979, Mr. Frank Alden of the Fish and Game Department attempted unsuccessfully to operate the outlet works gate lift mechanism.

In general, the project was found to be in fair condition. Several deficiencies which require correction were noted.

A visual inspection check list is included in Appendix A and selected photographs of the project are given in Appendix A. The "Site Plan Sketch", page C-1, shows the direction of view for each photograph.

b. Dam. The concrete spillway of Alton Power Dam appeared to be in good condition. However, flow over the structure precluded its close examination, Photo No. 2. The alignment of the visual portions of the spillway and the footbridge over the spillway did not indicate evidence of major lateral movement or unusual settlement, Photo No. 3. The concrete training walls at either end of the spillway appeared to be sound with no major deficiencies observed.

There was no visual indication of significant settlement or movement of the earth embankment at the left end. However, at the right abutment, some erosion along a small path and an apparent cobble-concrete repair were observed adjacent to the outlet works, Photo No. 4. The erosion is minor but the repair is of poor quality with several large voids evident. Somewhat visible in Photo No. 5 are boulders that formed a foundation, on the downstream side of the right abutment, that predates the dam. Overall, the right abutment is considered to be in generall satisfactory condition.

The top of the left embankment is covered with small

saplings and a number of trees up to 8 in. in diameter Along the upper portion of the left downstream slope are several large oaks, birch and small maple trees. A difference in grade was observed between the top downstream surface of the left training wall and the adjacent embankment, Photo No. 6. The embankment might have been constructed this way or the difference may be caused by natural settlement of the embankment due to insufficient compaction effort during its construction. Some minor erosion was also apparent along the downstream side and adjacent to the left training wall.

There was considerable seepage at the base of the old dry-laid stone wall located along the left side of the downstream channel, Photo No. 7. Seepage was also evident from 3 to 6 in. above the water level in the area left and downstream of the spillway left training wall, Photo No. 8. The water was clear. According to Mr. Franklin Alden, the seepage condition has been present for at least 20 years, although prior inspection reports, Appendix B, do not mention seepage

Several areas of cobbles and numerous large boulders, up to a cubic yard in size, were observed on the downstream slope of the left embankment. The locations of the areas of seepage and stone are shown on the "Site Plan Sketch", page C-1.

c. Appurtenant Structures. There is a concrete footbridge with railing constructed over the crest of the spillway on concrete piers that form the 12 stoplog bays. The footbridge is in good condition with numerous sections of recent patchwork evident. The railing is sound but with corrosion apparent.

The condition of the individual stoplogs was obscurred by the flow of water. However, the Dam Operator stated during the site examination that the stoplogs had been replaced on 22 April 1979. The wooden restraints forming the tracks in which the stoplogs are placed were deteriorated in the vicinity of the water line and did not appear to be in good condition, Photo No. 9. The support at the centerline of the spillway, located between bays 6 and 7, was partially rotted and damaged to such a degree as to place its serviceability in question.

The outlet works is in good condition with the exception of the discharge conduit or penstock. There is some spalling

of the concrete at the outlet works intake headwalls, Photo No. 10, and cracking of the concrete at the downstream face of the outlet works. The section of steel penstock is about 33 ft. long and, though rusted, appears serviceable. However, concrete U-shaped footings located under the penstock have shifted and become displaced with time as shown in Photo No. 11. In turn, the footings give little or no support to the penstock.

The gate lift mechanism, Photo No. 12, is enclosed by a wooden gate house which is also used to store spare stoplogs. Overall, the gate house was found to be in good condition as shown in Photo No. 13. However, the outlet works gate lift mechanism, when tried, could not be operated during the site examination. The Dam Operator reported that the gate was last opened sometime in 1972. The debris rack, originally located in front of the intake, has been removed at some unknown time.

d. Reservoir Area. The impounded portion of Merrymeeting River is bordered mainly by forested rolling terrain with the exception of within one mile of the dam. This portion has shoreline development subject to flooding during high reservoir stages. The impoundment immediately upstream of the dam is known locally as Wentworth Pond. The reservoir area is crossed by two bridges which could exercise a degree of hydraulic control during flood flows. Although the dam is considered a run-of-the-river dam, the four mile length of the upstream pool results in the availability of substantial storage.

There is no significant probability of landslides into the reservoir affecting the safety of the dam. Sedimentation has occurred behind the spillway to the degree that sediment is present in some areas to the top upstream edge of the weir. Little siltation has occurred in the outlet works intake channel.

e. Downstream Channel. Discharge from the spillway is carried by Merrymeeting River about one mile to Alton Bay at the southern end of Lake Winnipesaukee. Stone has been placed immediately downstream of the spillway apron and stone exists on the banks and in the channel providing protection against scouring during normal flows. The initial channel slope as it leaves the dam is approximately 0.003.

Existing development along the river in the vicinity of the dam is sparse. However, approximately 1,500 ft. upstream of its confluence with Alton Bay, extensive residential development is present along the banks of the river.

3.2 Evaluation

The masonry portions of the Alton Power Dam appear to be in good condition and performing satisfactorily at the present time with the exception of the outlet works. The outlet works, which provides the only means of draining the reservoir, needs attention to ensure its operability. The steel penstock is in serviceable condition. The concrete supports for the penstock have been damaged and displaced to the point where their structural adequacy is in doubt. The seepage observed downstream of the left embankment warrants further investigation and monitoring.

Based on the visual examination conducted on 1-2 November 1979, the Alton Power Dam is considered to be in fair condition. The remedial measures outlined in Section 7.3 should be implemented to correct the noted deficiencies in the outlet works and lef. dam embankment.

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General. In general, there are no formal procedures for the operation of the dam. Approximately 2.8 ft. of stoplogs are normally kept in each of the 12 spillway bays except during the winter when approximately 1.25 ft. of stoplogs (2 boards) are removed from the bays at both ends. Some stoplogs are reportedly removed when the river stage rises to about 6 in. above the top of stoplogs.

b. Description of any Warning System in Effect. There is no specific warning system or emergency preparedness plan in effect for this structure. However, the Owner, the New Hampshire Fish and Game Department, is within the framework of the operations plan "Link-Up", an inter-agency plan in the State of New Hampshire for natural and man-made disaster operations. The plan establishes the procedure for notifying and calling upon the resources of other state agencies in times of emergency.

4.2 Maintenance Procedures

a. General. There are no established formal procedures or manuals for inspection and maintenance of the dam. Remedial measures such as the replacement of stoplogs is reportedly performed on an as-needed basis.

b. Operating Facilities. The spillway structure appears to have received regular maintenance. The facility is visited once a week and debris is removed from the upstream face of the spillway when observed. A number of spare stoplogs are kept in the gate house. There is no formal plan to maintain the outlet works control gate. The drain was reportedly last opened in 1972. An unsuccessful attempt was made to operate the gate during the site inspection.

4.3 Evaluation

Maintenance of the facility is being performed on the basis of need. There is currently no formal operational procedures in effect for Alton Power Dam. Formal operational procedures and maintenance programs should be established. A detailed emergency preparedness plan and warning system should be established for the specific dam to compliment the existing operations plan "Link-Up".

SECTION 5 - EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

The Alton Power Dam is a run-of-the-river dam approximately 190 ft. in length with a concrete ogee spillway having an effective crest length of 70.5 ft. The spillway consists of 12 bays having the following widths: right bay 5 ft. 7 in., left bay 4 ft. 11 in., and all remaining bays 6 ft. each. The bays are formed by 12 in. wide concrete piers which support a concrete walkway and incorporate slots for the insertion of stoplogs. A gated 5-ft. diameter penstock which can be used as a reservoir drain is located at the right abutment of the spillway. A substantial segment of the Merrymeeting River is controlled by the dam. The upstream pool extends for approximately 4 mi. and serves to attenuate peak flows.

5.2 Design Data

There are no hydraulic/hydrologic design data available for the dam.

5.3 Experience Data

No records of historical floods were located for the Merrymeeting River. According to the operator, the river has never risen more than 6 in. above the stoplogs in the past 20 years.

5.4 Test Flood Analysis

Based on the Corps of Engineers Guidelines, the recommended test flood for the size "intermediate" and hazard potential "high" is the Probable Maximum Flood (PMF). The PMF was determined using the Corps of Engineers Guidelines for "Estimating Maximum Probable Discharge" in Phase I Dam Safety Investigations. The upper 11 sq. mi. of the watershed was assumed to be controlled by Merrymeeting Lake and was therefore not included in the development of the test flood inflow. The remaining 23.5 sq. mi. of the tributary drainage area is drained by the Merrymeeting River and Coffin Brook, both of which are relatively flat. A peak inflow rate of 550 csm was selected for the PMF inflow which results in a test flood inflow of 12,900 cfs.

Surcharge storage routing of the test flood inflow, assuming 2.8 ft. of stoplogs in place, resulted in a routed test flood outflow of 10,200 cfs at a stage elevation of 533.8. The routing did not consider the potential additional upstream surcharge storage that may exist due to the probable hydraulic constrictions of the Gilmanton Road and Route 28 bridges located upstream of Alton Power Dam on the Merrymeeting River. At test flood stage, the dam would be overtopped by approximately 4.5 ft. With all stoplogs removed, the routed test flood outflow is determined to be 9,700 cfs at flood stage elevation of 532.6 or 3.3 ft. above top of dam.

5.5 Dam Failure Analysis

Based on Corps of Engineers Guidelines for estimating dam failure hydrographs, and assuming that a failure would occur in the left embankment which is slightly less than 40 percent of the overall length of the dam, the peak failure outflow is estimated to be 7,000 cfs in addition to the 1,400 cfs spillway discharge occurring prior to failure. As a result of a dam failure, substantial flooding would occur to approximately 20 residential homes, a motel and a marina which are all located along the 1 mile reach of the Merrymeeting River between the dam and Alton Bay. The increase in downstream channel water depth resulting from a failure would produce stages approximately 2 to 6 ft. above the sill elevations of existing homes. Most of these structures would not be flooded prior to a failure of the Alton Power Dam.

The potential loss of life and property resulting from a dam failure would be great and the dam is accordingly classified in the "high" hazard category.

SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

There was no visual evidence of settlement, lateral movement or other signs of structural instability of the concrete portions of Alton Power Dam. However, the spillway was obscurred by flowing water during the site examination making a detailed observation impossible. Based on conditions which were observed, no reason was found to question the structural stability of the spillway.

There was no visual evidence of settlement or lateral movement in the earth embankment. However, the seepage observed downstream of the left embankment during the site examination could cause piping and potential instability.

6.2 Design and Construction Data

Design plans and specifications for Alton Power Dam were located. The spillway weir was designed to be constructed over portions of an old dry-laid stone dam that previously occupied the site. Part of the structure is founded directly on the streambed soils. The exact configuration of the dam's foundation is not delineated on the plans. It is essentially the same foundation used for the prior dry-laid stone dam. A proposed concrete cutoff wall is indicated on the plans, but, the extent of the wall as constructed is not known. It is therefore not practical to determine the theoretical stability of the structure by calculations. However, the general dimensions of the spillway cross-section are within the range of what usually would be expected for a stable structure of this size. For this reason, combined with the conditions observed during the site examination, the spillway is expected to have an adequate factor of safety relative to overall stability.

The original specifications called for the earth embankment (dike) at the left end to have a crest width of 8 ft. and steep upstream and downstream slopes of 1.5 horizontal to 1 vertical. The fill was to be compacted by some means of rolling. No criteria on the type of soil used, or its gradation, was given in the original specifications. The lack of available information on the

construction and composition of the embankment, makes it unfeasible to evaluate its stability by conventional analysis. However, the embankment crest width and side slopes, though somewhat steep, are generally consistent with usual design practice. Past performance of the embankment has been satisfactory and in the absence of seepage problems, the embankment would be expected to be stable. But, the seepage occurring along the left downstream channel is of significance and places the overall stability of the embankment in question.

6.3 Post-Construction Changes

The dam was rehabilitated during 1959 after the ownership was transferred to the Fish and Game Department. Little is known about the extent of the rehabilitation as no plans of the work were located. However, field measurements and newspaper clippings appear to indicate various portions of the spillway were refaced which should have no material effect on the spillway's structural stability.

6.4 Seismic Stability

Alton Power Dam is located in a 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. The visual examination of the masonry portion of Alton Power Dam revealed that this part of the structure was in good condition. The seepage detected during the examination of the left earth embankment warrants attention and places the dam in a generally fair condition. No signs of impending structural failure or other conditions which would warrant urgent remedial action were observed.

Based on the results of computations included in Appendix D and described in Section 5, the spillway is not capable of passing the test flood, which for this structure is the PMF. The routed test flood outflow of 10,200 cfs (inflow 12,900 cfs or 550 csm) would overtop the dam by about 4.5 ft., assuming 2.8 ft. of stoplogs in place. With the water level at the top of dam the spillway capacity with stoplogs in place is about 1,410 cfs, which is 14 percent of the routed test flood outflow. With all stoplogs removed, the routed test flood outflow is about 9,700 cfs and the spillway capacity at top of dam is about 3,730 cfs, or 38 percent of the routed test flood outflow.

b. Adequacy of Information. This evaluation of the dam is based primarily on visual examination, preliminary hydraulic and hydrologic computations, consideration of past performance and application of engineering judgement. Generally, the information available or obtained was adequate for the purposes of a Phase I assessment. However, it is recommended that additional information regarding the condition of the unobserved portion of the spillway, the composition of the left embankment and as-built configuration of the left wingwall as outlined in Section 7.2, be obtained.

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 and completed within one year after receipt of this report.

7.2 Recommendations

It is recommended that the following investigations be performed under the direction of a registered professional engineer:

1. A detailed hydraulic/hydrologic investigation to determine the need and means for increasing the spillway capacity.

2. Perform an investigation to determine the nature of the observed seepage, its effect on the stability of the left embankment and possible means of providing cut-off. As part of this investigation, a small wooden weir, or some other means, should be installed to measure the quantity of seepage occurring in the area of the old dry-laid stone wall. Variations in seepage flow could then be correlated with rainfall, snowmelt and reservoir level.

3. Perform an inspection of the spillway during a period of low flow to assess its structural condition.

4. Perform an investigation to determine the required work to insure the operability of the outlet works and make the penstock supports structurally adequate. An alternative to the rehabilitation of the penstock supports would be to remove the penstock as it now exists. A small portion could be cantilevered from the gate house wall to serve as the outlet works discharge pipe.

The Owner should then implement corrective measures on the basis of the engineering evaluations.

7.3 Remedial Measures

Although the dam is generally in fair condition, it is considered important that the following items be accomplished:

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

1. Repair the spalled areas of concrete on the outlet works head walls and the cracks in the concrete, at the downstream face of the outlet works.

2. Repair the timber stoplog supports.

3. Cut and remove the trees and brush located on the crest and slopes of the left embankment. If the stumps are left in place or removed, with voids

filled, should be determined in conjunction with the seepage investigation recommended above. In either case, a selective procedure of tree removal should be used.

4. Clear away leaves and vegetation in the vicinity of the seepage on the left downstream slope and make periodic visual observations noting carefully the extent and location of wet areas.

5. Prepare an operations and maintenance manual for the dam. The manual should include provisions for annual technical inspection of the dam and for round-the-clock surveillance of the dam during periods of heavy precipitation and high discharges. The procedures should delineate the routine operational procedures and maintenance work to be done on the dam to ensure safe, satisfactory operation and to minimize deterioration of the facility.

6. Develop a written emergency preparedness plan and warning system to be used in the event of impending failure of the dam or other emergency conditions for the specific dam. The plan should be developed in cooperation with local officials and downstream inhabitants and should compliment the existing disaster operations plan, "Link-Up".

7.4 Alternatives

None.

APPENDIX A - INSPECTION CHECK LIST

VISUAL INSPECTION PARTY ORGANIZATION
NATIONAL DAM INSPECTION PROGRAM

Dam: Alton Power

Date: 1-2 November 1979

Time: 1330 to 1530 - 1 November
0730 to 1130 - 2 November

Weather: Clear with moderate temperatures (60° to 65°F)

Water Surface Elevation Upstream: 526.2 (NGVD)

Stream Flow: Unknown

Inspection Party:

Harl P. Aldrich, Jr.	-	Soils/Geology
Charles R. Nickerson Haley & Aldrich, Inc.		
Joseph E. Downing	-	Hydraulic/Hydrologic
Francis Luttazi Camp, Dresser & McKee, Inc.	-	Structural/Mechanical

Present During Inspection:

Kenneth T. Stern, State of New Hampshire, Water Resources Board, 1 November
Franklin Alden, Sr., State of New Hampshire, Fish and Game Department, 2 November

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Alton Power Dam DATE: 1 Nov. 79

AREA EVALUATED	CONDITION
DAM EMBANKMENT (Left end of spillway)	
Crest Elevation	El. 529.3
Current Pool Elevation	El. 526.2
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed
Pavement Condition	No pavement
Movement or Settlement of Crest	None observed, but some settlement may have occurred adjacent to left spillway training wall
Lateral Movement	None observed
Vertical Alignment	Satisfactory
Horizontal Alignment	Satisfactory
Condition at Abutment and at Concrete Structures	Satisfactory; some erosion adjacent to left spillway training wall
Indications of Movement of Structural Items on Slopes	No structural items on slopes
Trespassing on Slopes	Unrestricted, but not common
Animal Burrows in Embankment	None observed
Vegetation on Embankment	Grass, weeds, small saplings and a few large trees, especially on downstream slope
Sloughing or Erosion of Slopes or Abutments	Some sloughing on downstream slope, not recent but includes boulders and other surface debris
Rock Slope Protection - Riprap Failures	No rockfill or riprap
Unusual Movement or Cracking at or Near Toes	None observed, but downstream slope irregular and hard to examine
Unusual Embankment or Downstream Seepage	Considerable seepage, 200 to 300 gpm, at locations shown on page C-1. Water clear (see text)
Piping or Boils	None observed
Foundation Drainage Features	None known to exist
Toe Drains	None known to exist
Instrumentation Systems	None

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Alton Power Dam DATE: 1 Nov. 79

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Spillway weir fronts on Wentworth Pond
Loose Rock Overhanging Channel	Not applicable
Trees Overhanging Channel	Trees were observed overhanging left side of channel
Floor of Approach Channel	Not observable. Submerged
b. Weir and Training Walls	
General Condition of Concrete	Good
Rust or Staining	Minor staining observed at flashboard bays
Spalling	None observed
Any Visible Reinforcing	None observed
Any Seepage or Efflorescence	Not observable
Drain Holes	None observed
c. Discharge Channel	
General Condition	Fair
Loose Rock Overhanging Channel	Not applicable
Trees Overhanging Channel	Right and left embankments of discharge channel noted to be wooded areas with several overhanging trees on both sides
Floor of Channel	Floor of discharge channel obstructed by mature tree growth, stone rubble and debris
Other Obstructions	Remains of old wooden penstock and concrete cradle supports were observed at the right of the discharge channel downstream of the gatehouse

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Alton Power Dam DATE: 1 Nov. 79

AREA EVALUATED	CONDITION
OUTLET WORKS - BRIDGE OVER SPILLWAY	
a. Super Structure	
Bearings	Not applicable - Concrete slab deck monolithic with spillway abutments
Anchor Bolts	Not applicable - see "Bearings"
Bridge Seat	Not applicable - see "Bearings"
Longitudinal Members	Not applicable
Under Side of Deck	Minor spalling observed
Secondary Bracing	Not applicable
Deck	Concrete deck in good condition. Evidence of recent repair work for localized spalling noted
Drainage System	None observed
Railings	One railing observed at D/S side of walkway. Several posts show signs of advanced rusting but their size is substantial and all railing components were observed to be structurally sound
Expansion Joints	None observed
Paint	Minor chipping of railing paint noted. Rust staining also noted at the railing. Concrete deck is not painted
b. Abutment & Piers	
General Condition of Concrete	Good. Spalling observed behind (left side) left bridge abutment
Alignment of Abutment	Good
Approach to Bridge	Approach to bridge from the left consists of wooded, earthen dam embankment. A grass covered earthen dam embankment constitutes the right approach
Condition of Seat and Backwall	Not applicable - see "Bearings"

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Alton Power Dam DATE: 2 Nov. 79

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	Intake approach channel is common to spillway weir approach channel. See "Outlet Works - Spillway Weir, Approach and Discharge Channels"
b. Intake Structure	Intake structure is common to gate-house facility. See "Outlet Works - Control Tower"
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	Good
Condition of Joints	Good
Spalling	Spalling observed at both right and left headwalls at gate chamber inlet beneath gatehouse
Visible Reinforcing	None observed
Rusting or Staining of Concrete	None observed
Any Seepage or Efflo-rescence	None observed
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	Not observable. Submerged
Cracks	Evidence of cracking observed at right inside wall of gate chamber be-neath gate house, apparently or-iginating at spalled area in the right abutment of the gate chamber inlet channel. (See "Spalling" above). Cracking observed at D/S face of gate house facility just above penstock exit
Rusting or Corrosion of Steel	None observed

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Alton Power Dam DATE: 2 Nov. 79

AREA EVALUATED	CONDITION
b. Mechanical and Electrical	
Air Vents	None observed
Float Wells	None observed
Crane Hoist	None observed
Elevator	None observed
Hydraulic System	None observed
Service Gates	6.5 ft. by 6.5 ft. wooden gate controlled by manually operated ratchet type gate mechanism. Gate lift mechanism was inoperable at time of inspection
Emergency Gates	None
Lightning Protection System	None observed
Emergency Power System	None
Wiring and Lighting System in Gate Chamber	None
OUTLET WORKS - PENSTOCK AND PENSTOCK OUTLET	A 4'-10½" inside diameter riveted steel penstock serves as the outlet for the gate house facility. Evidently the steel penstock fed into a wooden penstock at one time, which carried flow to a power station downstream of the dam. The wooden penstock is completely deteriorated while the riveted steel portion of pipe was noted to be structurally sound. The support system for the piping consisted of concrete cradles, only one of which was observed to be in serviceable condition. The remainder of the cradles have been dislodged from their original positions and exhibit various degrees of deterioration. There exists approximately 33 ft. of

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Alton Power Dam DATE: 2 Nov. 79

AREA EVALUATED	CONDITION
	riveted steel pipe, 16 ft. of which is cantilevered from the cradle support noted above. Capacity for full pipe flow is questionable due to this condition
Erosion or Cavitation	There were no erosion or cavitation conditions noted at the penstock outlet

APPENDIX B - ENGINEERING DATA

LIST OF AVAILABLE DATA
ALTON POWER DAM

Document	Contents	Location
Information regarding dams in the Town of Alton	Lists the owner's name and address for dams in Alton dated 27 November 1917	Water Resources Board State of New Hampshire 37 Pleasant Street Concord, New Hampshire 03301
Specifications and Contract for Construction of Concrete Dam, Forebay and Dikes at Alton, N.H. for George H. Jones, New Durham, N.H., I.W. Jones & Company, Engineering, Milton, N.H.	Original specifications for construction of dam dated 16 July 1922	Water Resources Board State of New Hampshire
Letter from I.W. Jones & Co. to Public Service Commission, Concord, N.H.	Letter sent to State of New Hampshire for approval of then proposed dam dated 7 August 1922	Water Resources Board State of New Hampshire
Miscellaneous correspondence	Ten items dated from 21 August 1923 to 16 July 1935	Water Resources Board State of New Hampshire
Report schedule of dams, Town of Alton, New Hampshire and an index of dams in Alton	Lists the owner's and address for dams in Alton dated 26 June 1935. Index lists dam's name, location, owner and owner's address	Water Resources Board State of New Hampshire

LIST OF AVAILABLE DATA
ALTON POWER DAM
(continued)

Document	Contents	Location
New Hampshire Water Resources Board Inventory of Dams and Water Power Developments	Inspection report with data on dam and power development, two pictures of dam and hand drawn figures of dam dated 22 July 1935	Water Resources Board State of New Hampshire 37 Pleasant Street Concord, New Hampshire 03301 (See Appendix pages B-4 through B-7)
Dam Record	Information in reference to 22 July 1935 inspection dated 11 September 1935	Water Resources Board State of New Hampshire (see Appendix page B-8)
New Hampshire Water Control Commission, data sheets	Information sheets on dam and power development dated 28 September 1938	Water Resources Board State of New Hampshire (see Appendix pages B-9 and B-10)
Water Control Commission form letter to George H. Jones	Survey data sheet on dam performance during flood of September 21-24, 1938, dated 26 October 1938	Water Resources Board State of New Hampshire
Data on Reservoirs and Ponds in New Hampshire	Information tabulated on 13 April 1939	Water Resources Board State of New Hampshire
Questionnaire, Water Powers of New Hampshire and Index card	Questionnaire checking information on file dated 16 July 1942	Water Resources Board State of New Hampshire

LIST OF AVAILABLE DATA
ALTON POWER DAM
(continued)

Document	Contents	Location
Report on Dam Inspection	Inspection record and accompany sketch on dam dated 7 August 1950	Water Resources Board State of New Hampshire (see Appendix pages B-11 and B-12)
Memo	Note on date N.H. Fish and Games purchased dam about 1962, undated	Water Resources Board State of New Hampshire
Dam Safety Inspection Report	Inspection by N.H. Water Resources Board including two photographs dated 27 October 1975	Water Resources Board State of New Hampshire (see Appendix pages B-13 through B-15)
Letter to Fish & Game Department	Notification to owner on results of dam inspection on 27 October 1975	Water Resources Board State of New Hampshire

NEW HAMPSHIRE WATER RESOURCES BOARD

INVENTORY OF DAMS AND WATER POWER DEVELOPMENTS

DAM

6.02

BASIN [illegible] NO. [illegible]

RIVER [illegible] MILES FROM MOUTH D.A.SQ.MI [illegible]

TOWN [illegible] OWNER [illegible]

LOCAL NAME OF DAM

BUILT [illegible] DESCRIPTION [illegible]

POND AREA-ACRES [illegible] DRAWDOWN FT. POND CAPACITY-ACRE FT.

HEIGHT-TOP TO BED OF STREAM-FT. [illegible] MAX. MIN.

OVERALL LENGTH OF DAM-FT. [illegible] MAX.FLOOD HEIGHT ABOVE CREST-FT.

PERMANENT CREST ELEV.U.S.G.S. [illegible] LOCAL GAGE

TAILWATER ELEV.U.S.G.S. LOCAL GAGE

SPILLWAY LENGTHS-FT. [illegible] FREEBOARD-FT. [illegible]

FLASHBOARDS-TYPE,HEIGHT ABOVE CREST [illegible]

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

REMARKS

[illegible] Piscataquog River

POWER DEVELOPMENT

Co-ordinates from A.E.
43° 25' + 14,900 ft.
71° 15' − 5,300 ft.

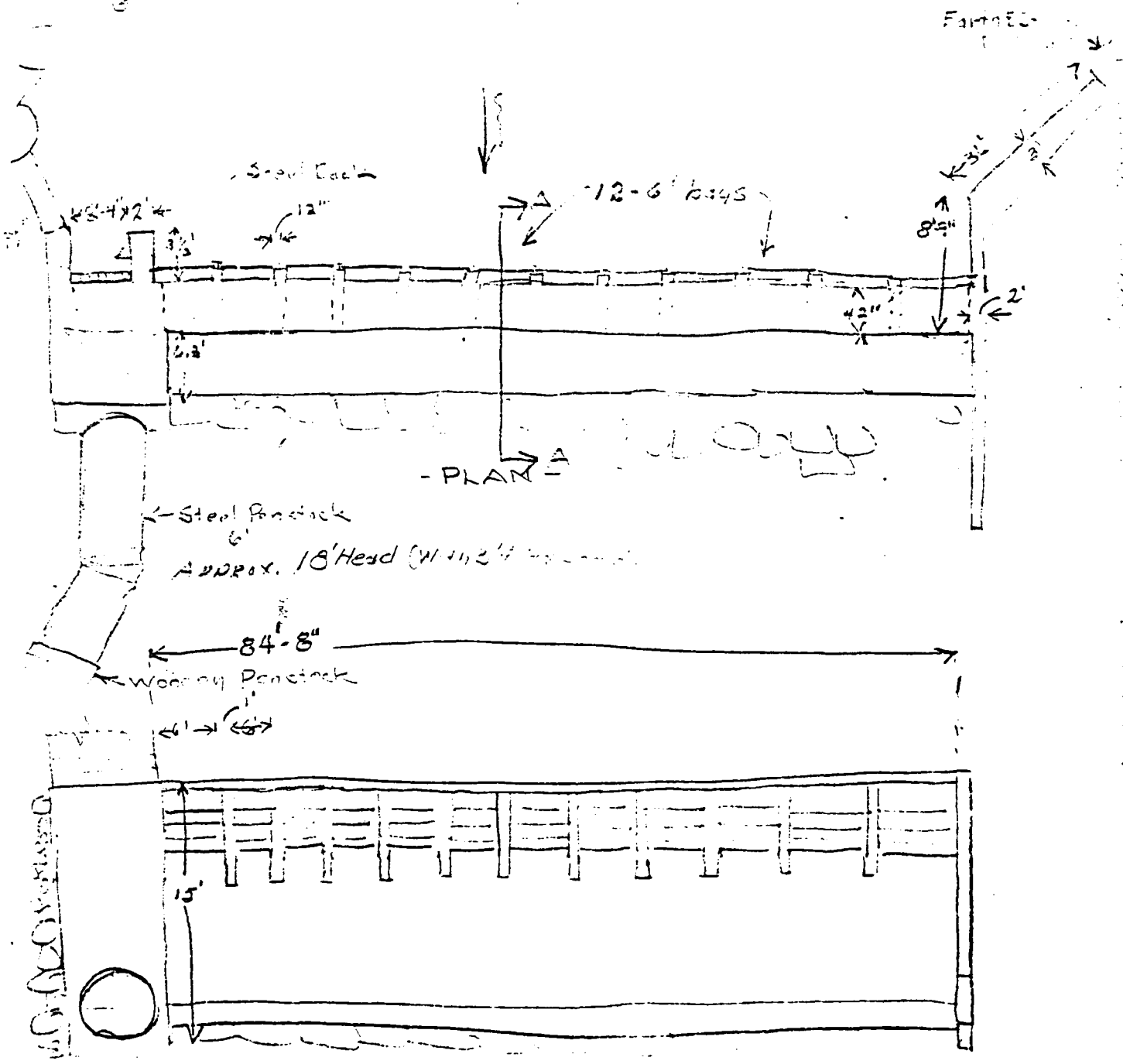
UNITS NO.	RATED HP	HEAD FEET	C.F.S. FULL GATE	KW	MAKE
1	160	18			24" [illegible]
1				120	[illegible] 216 A 600 [illegible]
					[illegible]

USE Power

REMARKS [illegible] water rights [illegible]

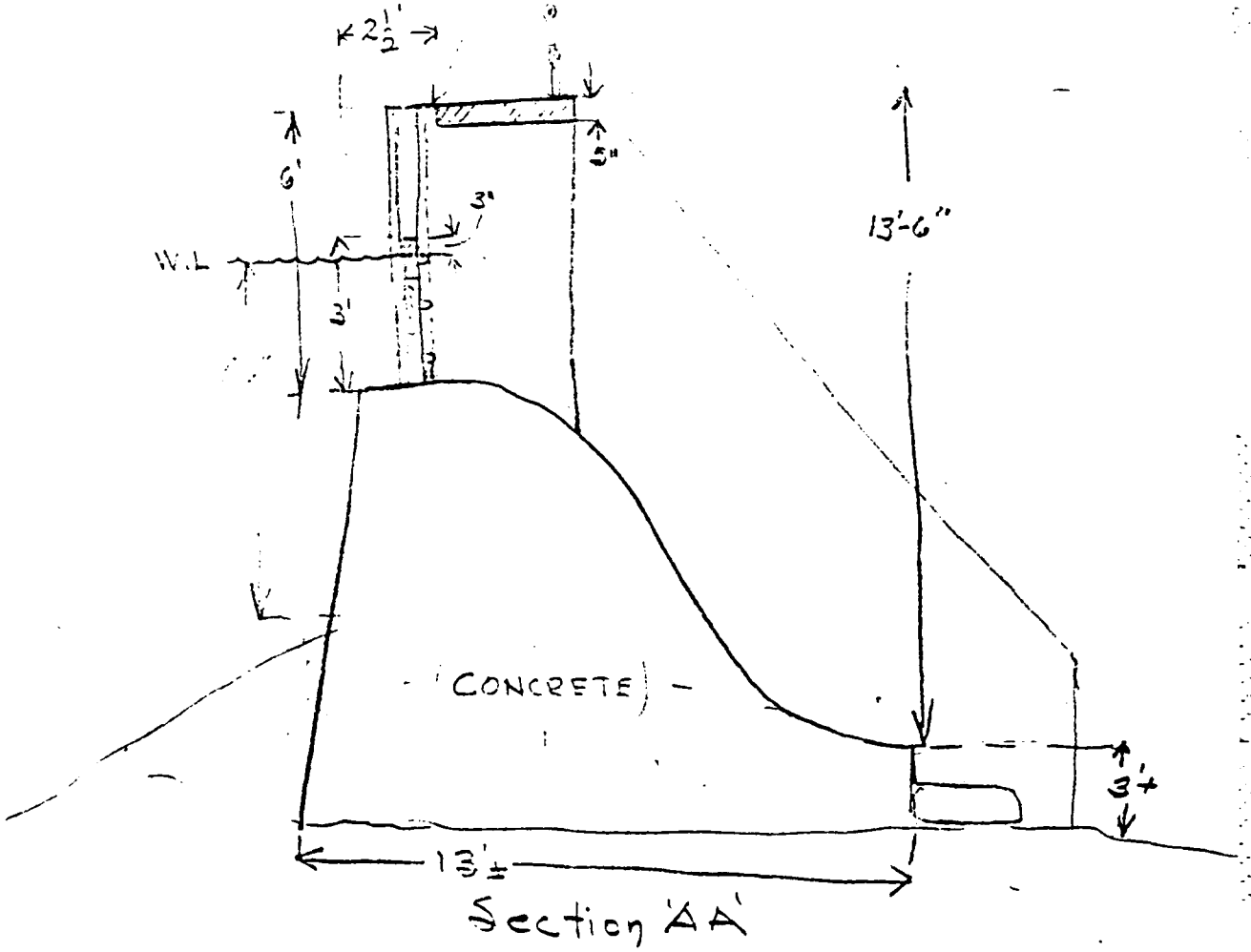
DATE [illegible]

7-22-35 6.02



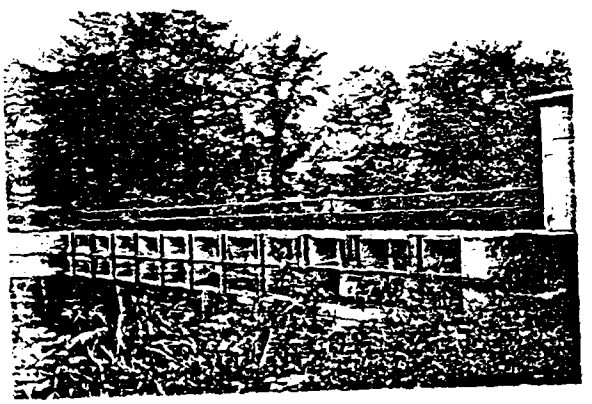
FOUNDATION
HEADPLAN

(over)



Section 'AA'

MERRYMEETING RIVER IN ALTON
July 22, 1935
George H. Jones



PUBLIC SERVICE COMMISSION OF NEW HAMPSHIRE—DAM RECORD I-4377

TOWN	Alton	TOWN NO.	STATE NO.
RIVER STREAM	Merrymeeting River		
DRAINAGE AREA	37 Sq. Mi.	POND AREA	
DAM TYPE	Gravity	FOUNDATION NATURE OF	Hardpan
MATERIALS OF CONSTRUCTION	Concrete		
PURPOSE OF DAM	POWER—CONSERVATION—DOMESTIC—RECREATION—TRANSPORTION—PUBLIC UTILITY		
HEIGHTS, TOP OF DAM TO BED OF STREAM	15'	TOP OF DAM TO SPILLWAY CRESTS	6'-0"
SPILLWAYS, LENGTHS DEPTHS BELOW TOP OF DAM	84'-8" 12-6' bays		LENGTH OF DAM 136'
FLASHBOARDS TYPE, HEIGHT ABOVE CREST	Removable 3'-0"		
OPERATING HEAD CREST TO N. T. W.	16'	TOP OF FLASHBOARDS TO N. T. W.	18'
WHEELS, NUMBER KINDS & H. P.	1-Leffel Vertical Turbine 84" 160 HP		
GENERATORS, NUMBER KINDS & K. W.	G. E. A. C. Direct Connected Vertical 4000V-21.6A 120 Kw. 60 Cycle 3 phase 225 R.P.M 0.8 P. F.		
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- Mr. George H. Jones

CONDITION- Good

MENACE- Yes. Will be subject to periodic inspection.

To the Public Service Commission:

The foregoing memorandum on the above dam is submitted covering inspection made July 22, 1935 according to notification to owner dated July 15, 1935, and bill for same is enclosed.

Sept. 11, 1935
Copy to Owner

Samuel J. Lord
Hyd. Eng.

7204

NEW HAMPSHIRE WATER CONTROL COMMISSION
DATA ON DAMS IN NEW HAMPSHIRE

LOCATION STATE NO. ....

Town: Alton : County: Belknap

Stream: [illegible] Meeting River

Basin-Primary: Merrimack River : Secondary: Lake [illegible]

Local Name: [illegible] Mills

Coordinates—Lat. 43° 25' ± 14,700 : Long. 71° 15' – 5300

GENERAL DATA

Drainage area: Controlled .... Sq. Mi.: Uncontrolled .... Sq. Mi.: Total 37 Sq. Mi.

Overall length of dam 113 ft.: Date of Construction 1922

Height: Stream bed to highest elev. 15 ft.: Max. Structure 9 ft.

Cost—Dam .... : Reservoir No

DESCRIPTION Gravity Type Concrete Const. on hard pan foundation

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: Concrete

Length—Total 34' 8 (12 ~~–3~~ ft. Bays) ft.: Net .... ft.

Height of permanent section—max. 9' ft.: Min. .... ft.

Flashboards—Type: Stop Planks–Removable : Height 3'–5' removable ft.

Elevation—Permanent Crest 9' : Top of Flashboard ....

Flood Capacity 4825 cfs.: 130 cfs/sq. mi.

Abutments

Materials: Cement

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

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

OWNER George H Jones—Alton Bay N.H.

REMARKS G H Jones owns full water rights
Condition Good

B-9

Tabulation By [illegible] Date [illegible] 193[illegible]

7206

NEW [illegible]MPSHIRE WATER CONTROL CC[illegible]IISSION
DATA ON WATER POWER DEVELOPMENTS IN NEW HAMPSHIRE

LOCATION AT DAM NO. 3.02

Town Alton : County Belknap

Stream Merry Meeting River

Basin-Primary Merrimack River : Secondary Lake Winnipesaukee

Local Name Wentworth Mills

GENERAL DATA

Head-Max. 17 ft.: Min. ft.: Ave. 13' WITH 3' FLASH BOARDS ft.

Date of Construction 1928-31 : Use of Power Lumber Mill

Pondage 500 ac. ft.: Storage ac. ft.

DESCRIPTION

Racks

Size of Rack Opening

Size of Bar : Material

Area: Gross Sq. Ft.: Net sq. ft.

Head Gates

Type

Number : Size ft. high x ft. wide

Elevation of Invert : Total Area sq. ft.

Hoist

Penstock

Number 1 : Material Steel & Wood

Size 8' Dia : Length

Turbines

Number 1 : Makers Leffel Vertical

Rating HP. per unit 24" 180 H.P. : Total Capacity HP.

Max. Dement C.F.S., per unit : Total cfs.

Drive

Type

Generator

Number 1

Make G.E. A.C. Direct Connected Vertical

Rating KW. per unit 100 K.W. [illegible] 60 cycle 3 phase : Total Capacity 225 R.P.M. [illegible] K. W.

Exciter

Number : Make

Rating-per unit : Total Capacity K. W.

OUTPUT—KWHRS

19.......	:	19.......	
19.......	:	19.......	
19.......	:	19.......	
19.......	:	19.......	
19.......	:	19.......	

OWNER George H. [illegible] Alton Bay N.H.

B-10

Tabulation By [illegible] Date Sept. [illegible], 193[illegible]

NEW HAMPSHIRE WATER CONTROL COMMISSION

REPORT ON DAM INSPECTION

TOWN ______ DAM NO. ______ STREAM [illegible]

OWNER Public Service Co. of N.H. ADDRESS Manchester, N.H.

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

NOTES ON PHYSICAL CONDITION

Abutments [illegible]

Spillway [illegible]

Gates [illegible]

Other

CHANGES SINCE LAST INSPECTION [illegible]

FUTURE INSPECTIONS [illegible]

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

REMARKS [illegible]

Copy to Owner	Date

[illegible signature]
INSPECTOR

(Additional Notes Over)

B-11

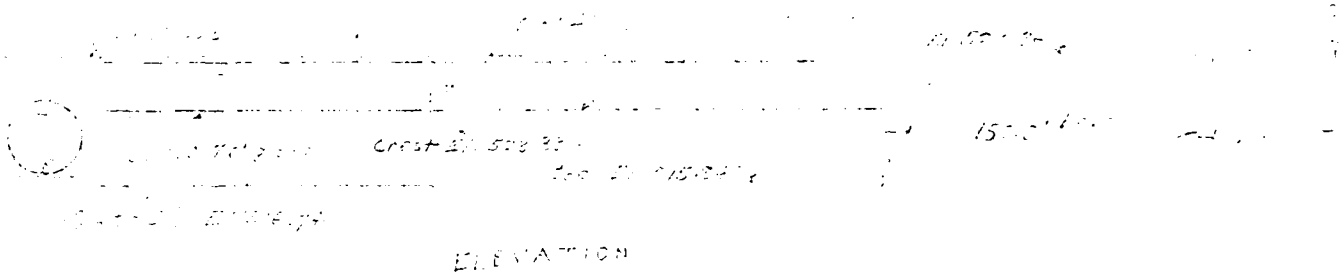
HAMPSHIRE
R RESOURCES
BOARD
CORD, N. H.

PROJECT ..... FILE 6

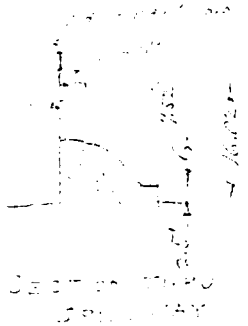
SUBJECT ..... ACC. .....

COMPUTER ..... CHECKER ..... CONT. FROM ACC. ..... CONT. ON ACC. ..... SUMMARY ON ACC. ..... DATE.....

PLAN



ELEVATION



N. H. WATER RESOURCES BOARD
Concord, N. H. 03301

DAM SAFETY INSPECTION REPORT FORM

Town: Alton Dam Number: 6.02

Inspected by: S Burnett Date: 27 Oct 1975

Local name of dam or water body: Merrimeeting Marsh

Owner: Fish & Game dept Address: Concord

Owner was/~~was not~~ interviewed during inspection.

Drainage Area: 37 sq. mi. Stream: _____

Pond Area: 500 Acre, Storage _____ Ac-Ft. Max. Head 15 Ft.

Foundation: Type Hard pan, Seepage present at toe - Yes/No, _____

Spillway: Type 12 Stoplog seats, Freeboard over perm. crest: 3,

Width 6, ~~Flashboard~~ Stoplog height 3,

Max. Capacity _____ c.f.s.

Embankment: Type _____, Cover _____ Width _____,

Upstream slope _____ to 1; Downstream slope _____ to 1

Abutments: Type _____, Condition: Good, Fair, Poor

Gates or Pond Drain: Size 6' Dia Capacity _____ Type Ponstock

Lifting apparatus ? Operational condition ?

Changes since construction or last inspection: wood sections of Ponstock have been Removed

Downstream development: _____

This dam would/~~would not~~ be a menace if it failed.

Suggested reinspection date: _____

Remarks: Concrete on walk way in poor shape

Overall Condition: Good (Fair) Poor Ruins Removed Breached

B-12

NEW HAMPSHIRE
WATER RESOURCES BOARD

SITE EVALUATION DATA

OWNER: Fish & Game Dept TELEPHONE NO.

MAILING ADDRESS: Bridge St Concord

SITE LOCATION (TOWN OR CITY) Alton

NAME OF STREAM OR WATERBODY: Merrymeeting River

QUADRANGLE: Alton LOCATION RT 1" 3.09 Dn

HEIGHT OF (PROPOSED, EXISTING) DAM 15 LENGTH 136

TYPE OF (PROPOSED, EXISTING) STRUCTURE Concrete spillway with 2 Stoplog sections

DRAINAGE AREA 37.5 m POND AREA 500 A

AVAILABLE ARTIFICIAL STORAGE: PERMANENT: TEMPORARY: TOTAL

EXISTING DEVELOPMENT DOWNSTREAM OF (PROPOSED, EXISTING) STRUCTURE

Houses Alton Bay

POTENTIAL DEVELOPMENT DOWNSTREAM OF (PROPOSED, EXISTING) STRUCTURE

POTENTIAL DAMAGE DOWNSTREAM OF STRUCTURE (EXPLAIN IN DETAIL AND INCLUDE ANY POTENTIAL LOSS OF LIFE ESTIMATE) Damage To some Houses washout of the Marina Damage To Bridge in Alton Bay

OTHER COMMENTS:

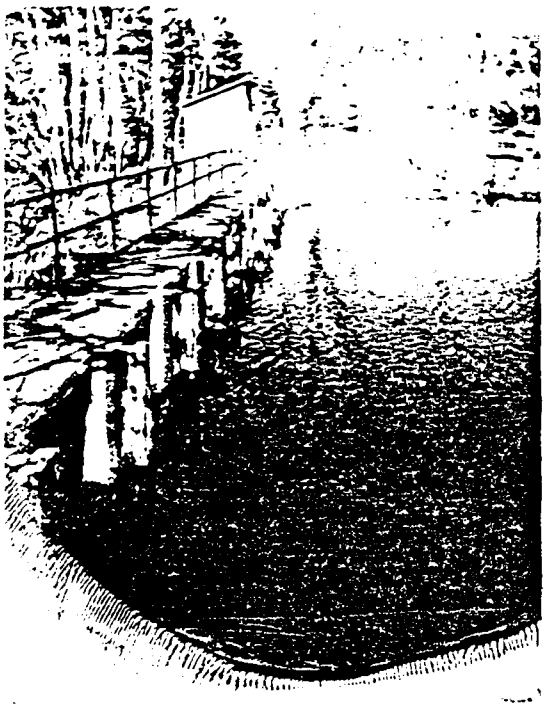
CLASS OF STRUCTURE -- NON MENACE: MENACE A (B) C DAM # 6.02

DATE OF INSPECTION: 27 Oct 75

SIGNED Stephen Burnett

SIGNATURE

DATE:



6.02

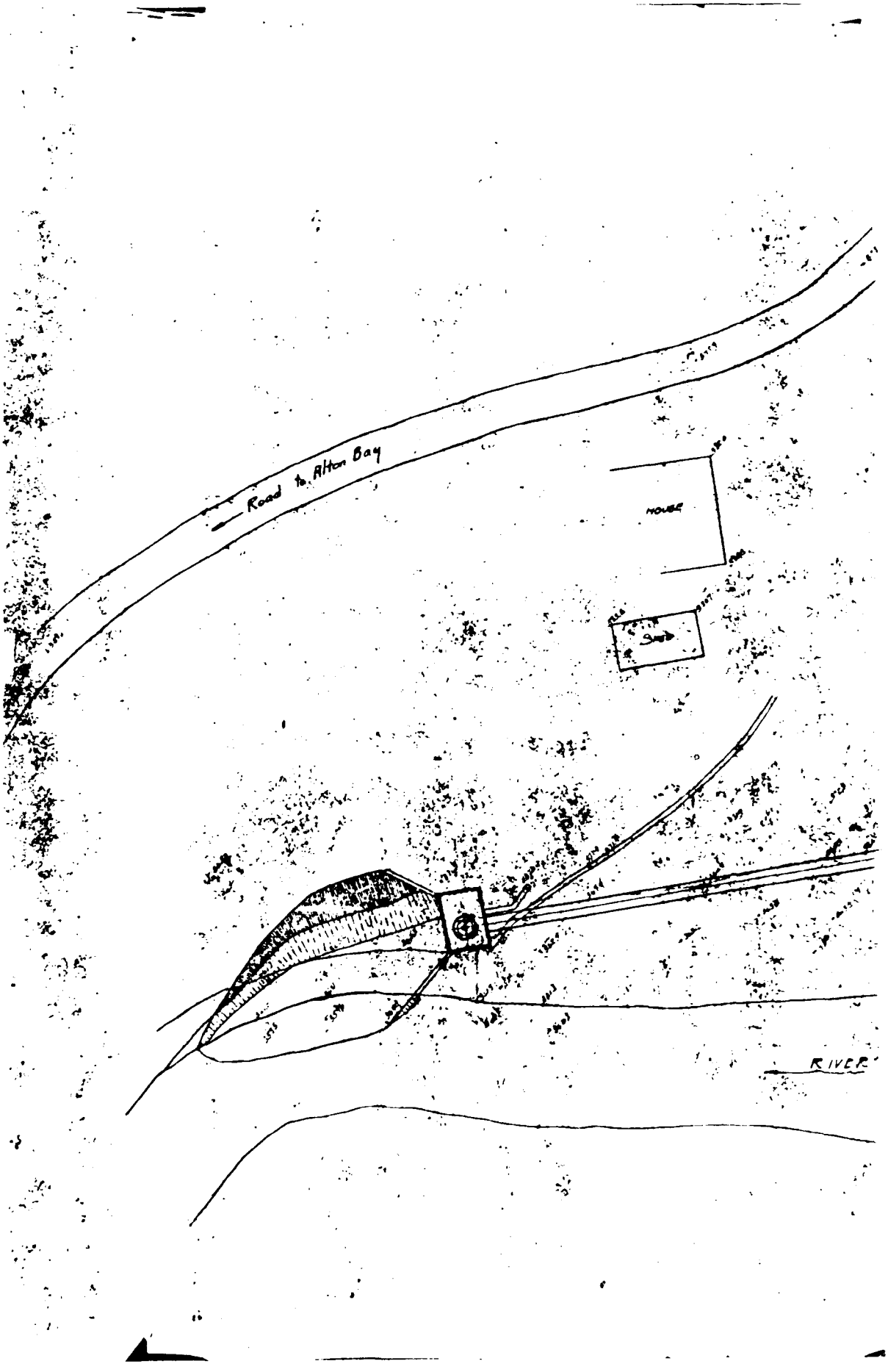
27 Oct. 75

Alton Stephen Burritt

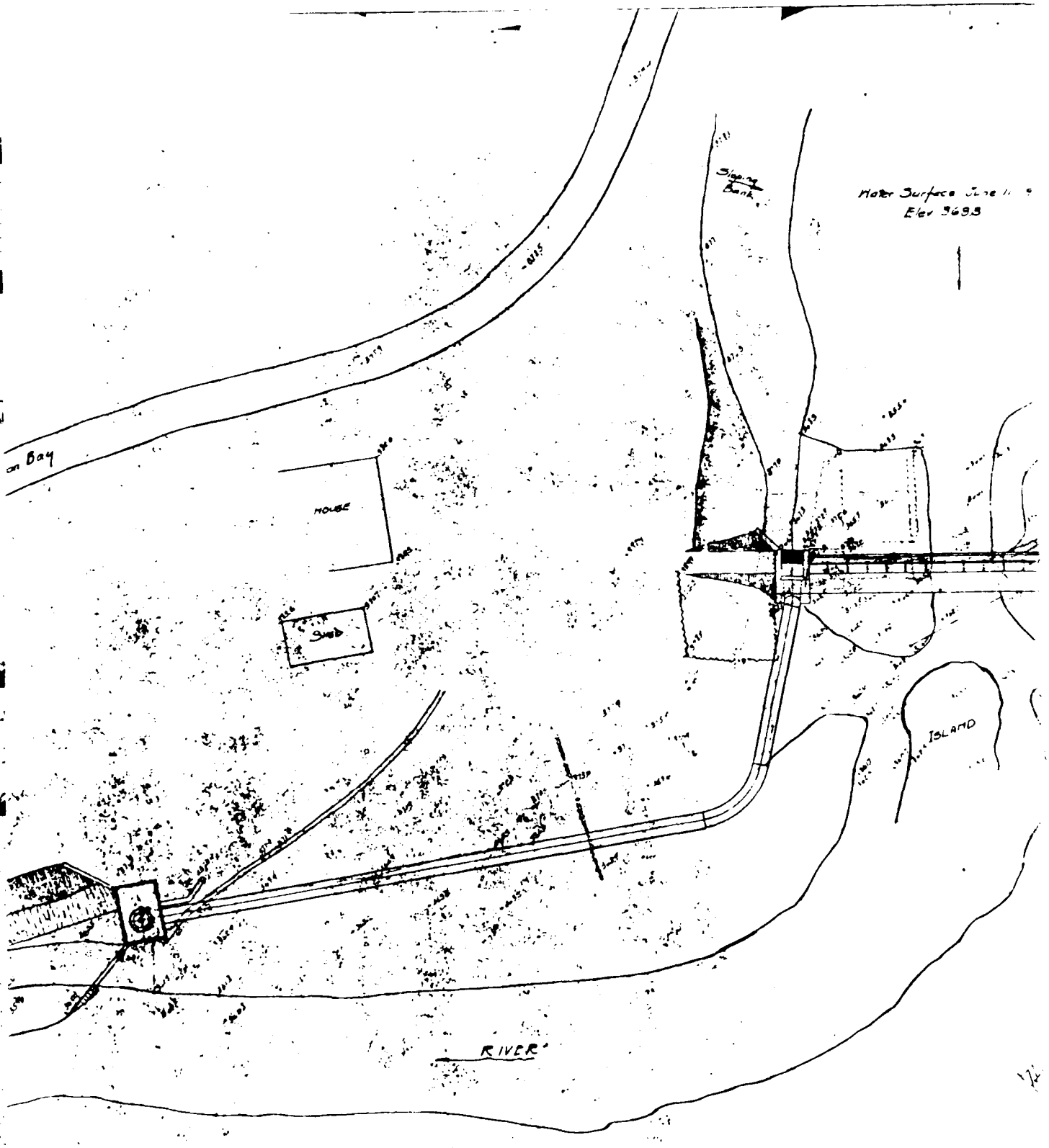
6.02

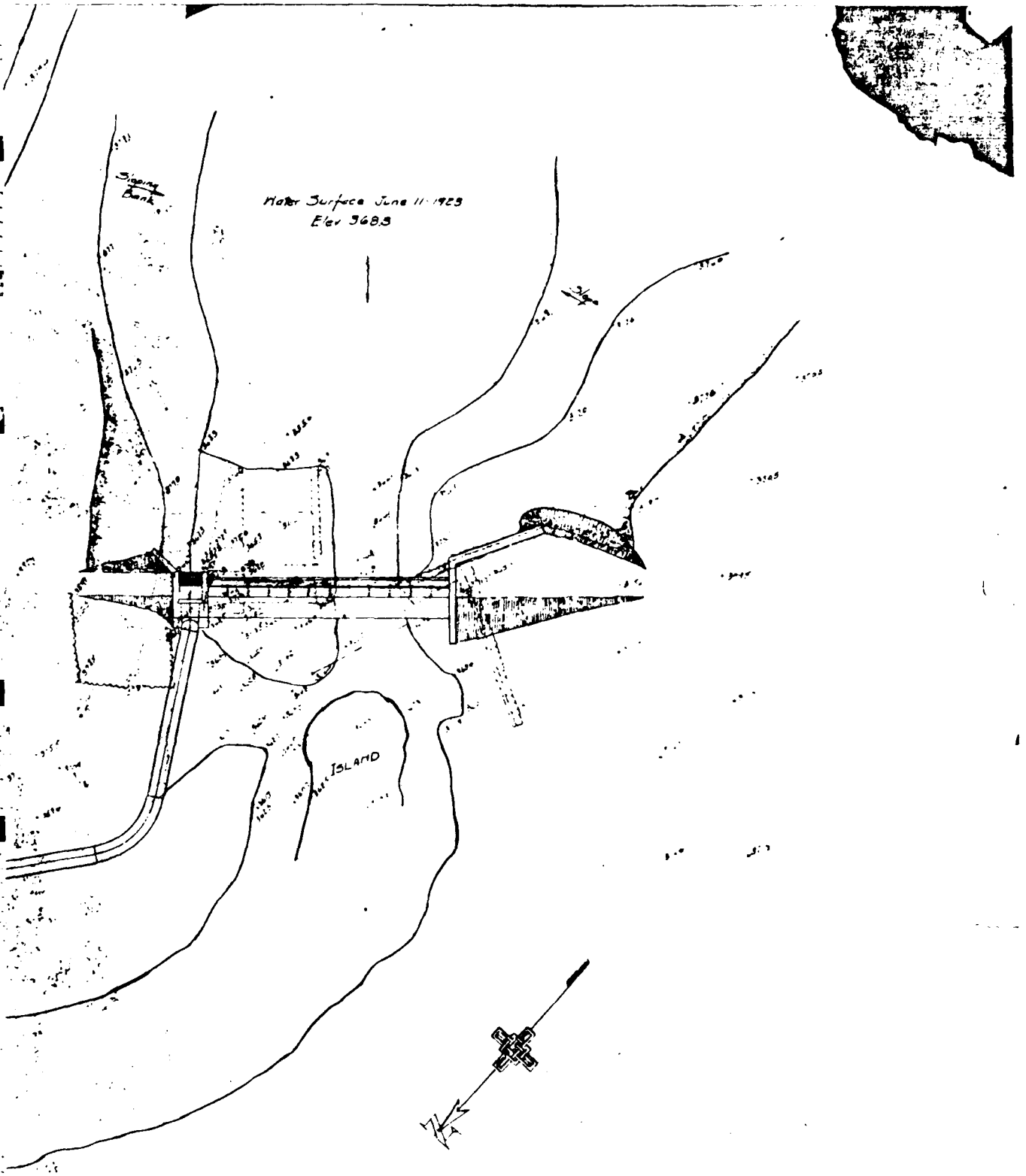
27 Oct. 1975

Alton Stephen Burritt



FILE NO. 4454 B24





NOTE:

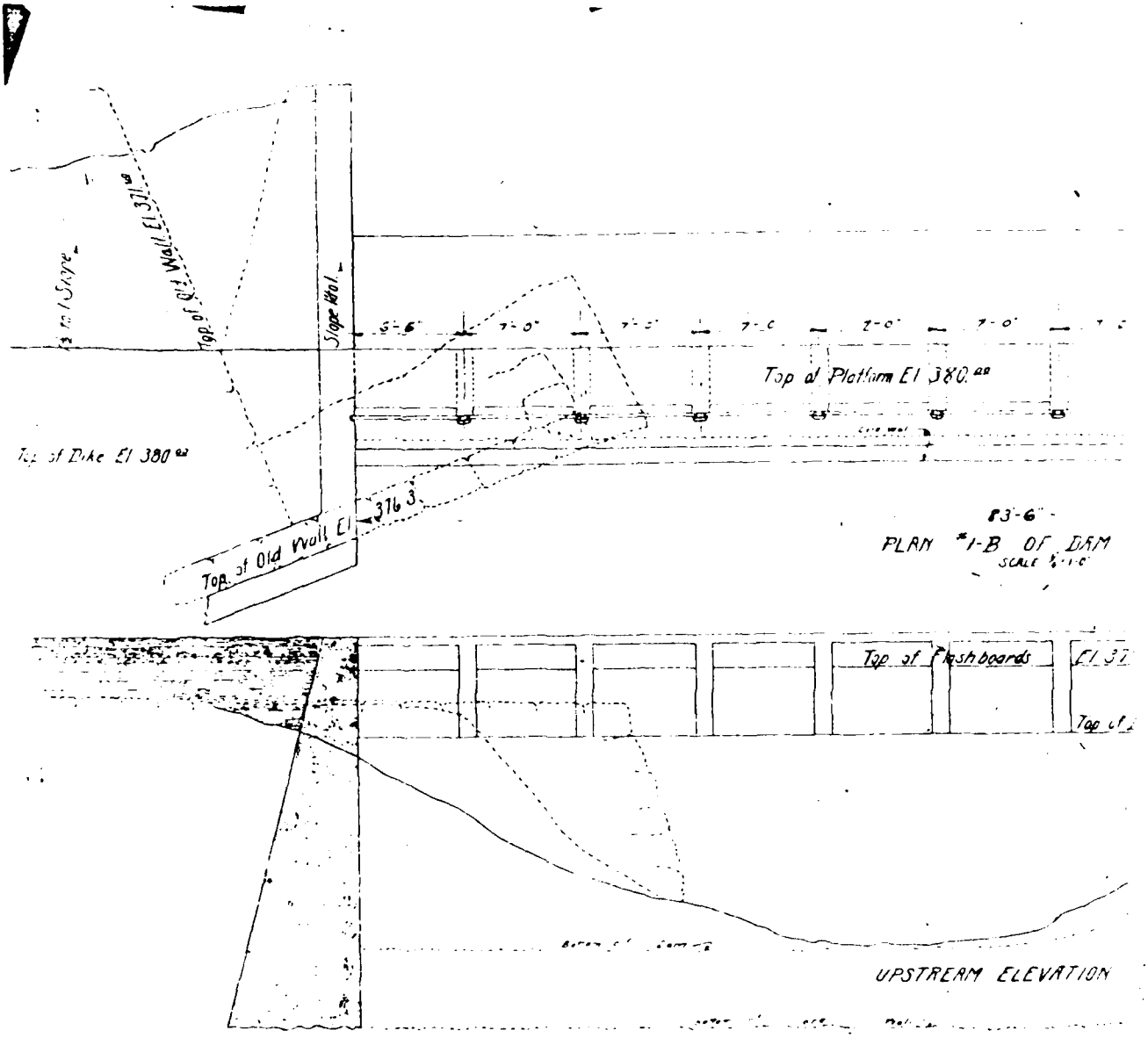
ALL ELEVATIONS GIVEN ON THIS SHEET ARE BASED ON AN UNKNOWN LOCAL OR ASSUMED DATUM AND NOT NVGD

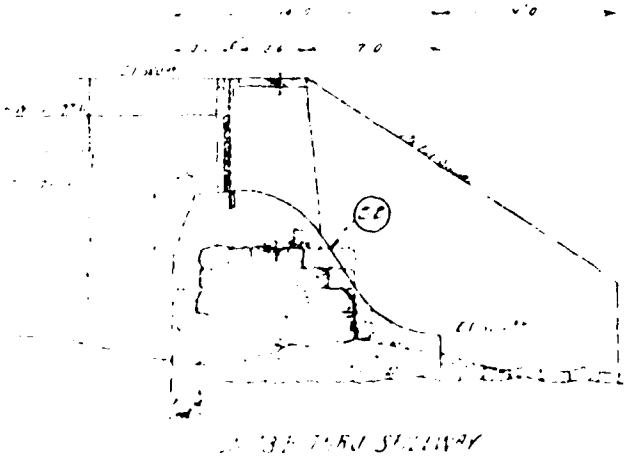
622

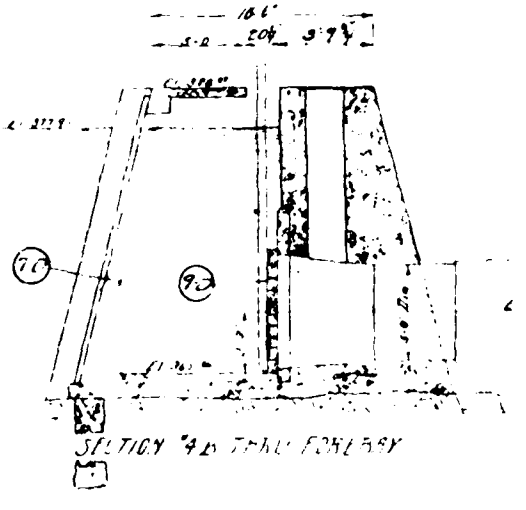
Sheet - A

GENERAL PLAN & SURVEY

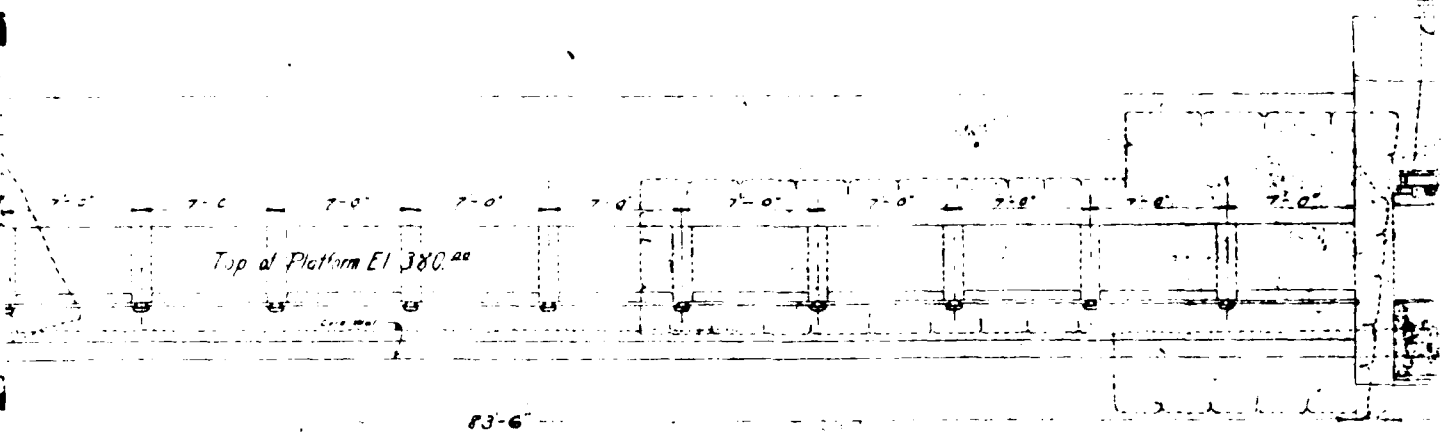
HYDRO ELECTRIC DEVELOPMENT
ALTON, N.H.
GEORGE H. JONES
NEW DURHAM, N.H.



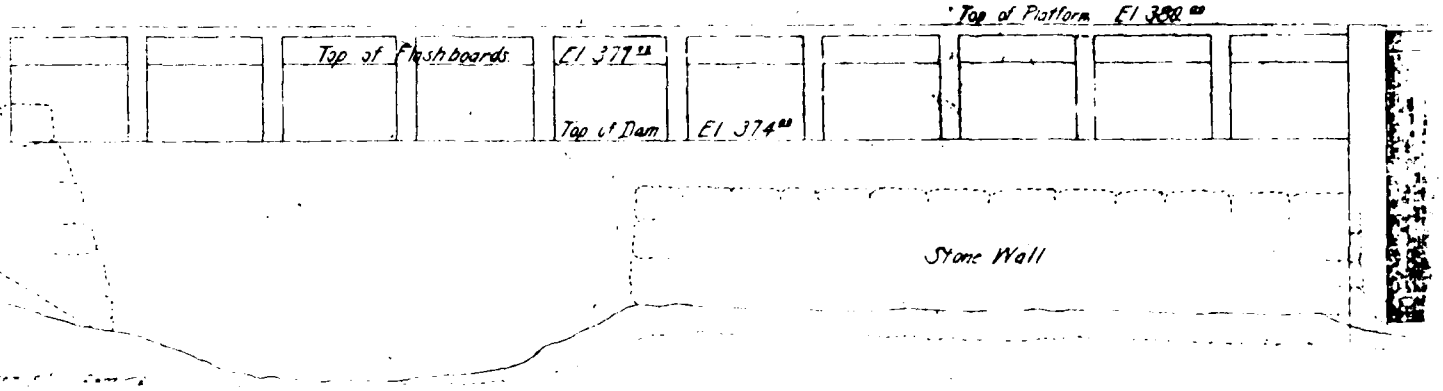




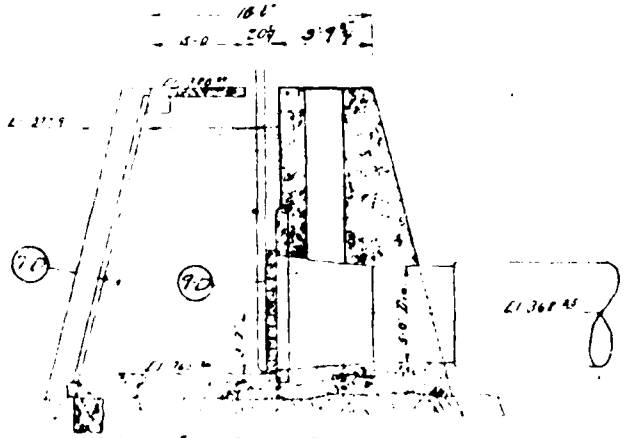
SECTION "A" THRU FOREBAY



PLAN #1-B OF DAM AND FOREBAY
SCALE 1/4"-1'-0"



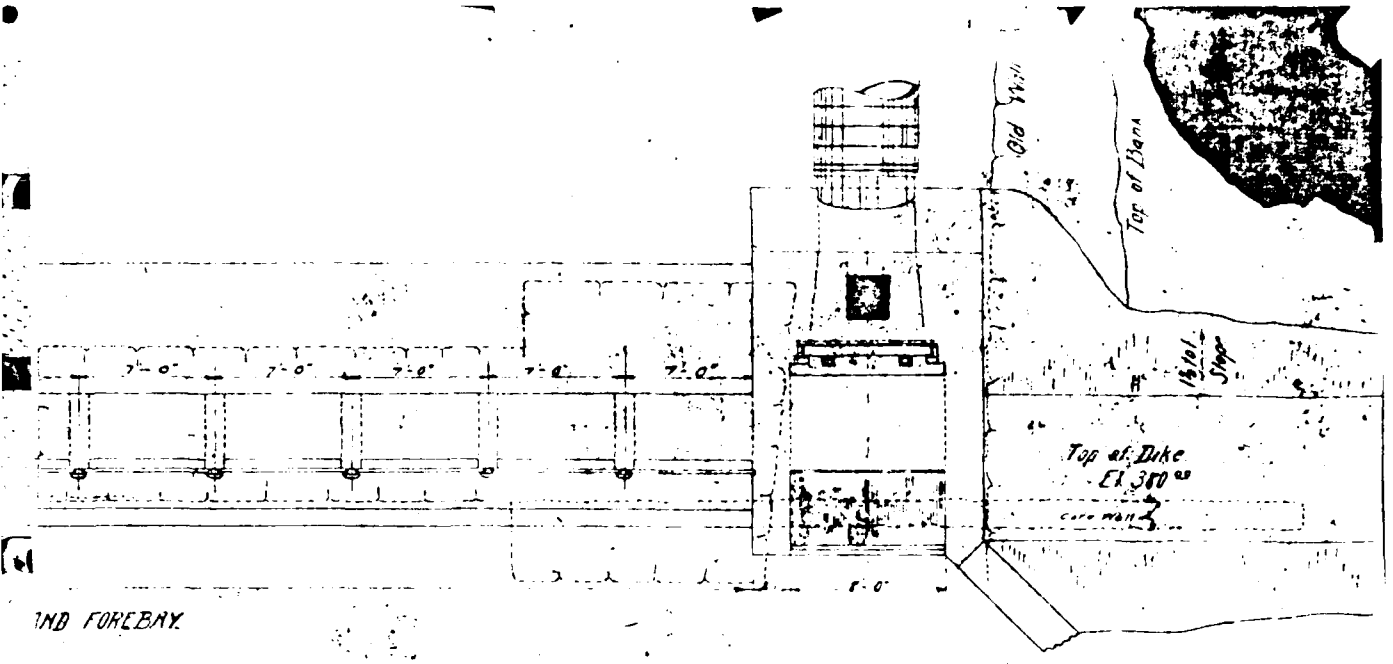
UPSTREAM ELEVATION #2-B OF DAM AND FOREBAY
SCALE 1/4"-1'-0"



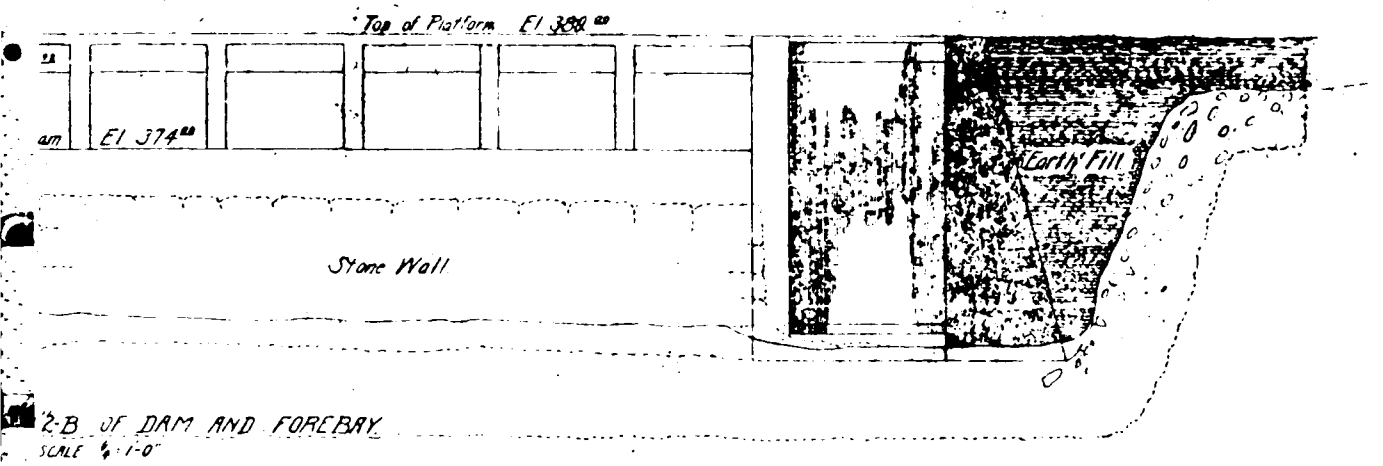
SECTION "A" THRU FOREBAY

NOTE:

ALL ELEVATIO
ON THIS SHE
BASED ON AN
LOCAL OR AS
AND NOT NVG



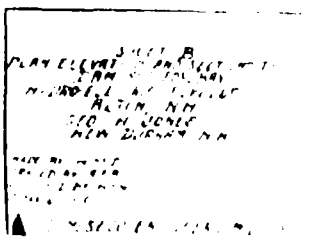
IND FOREBAY.

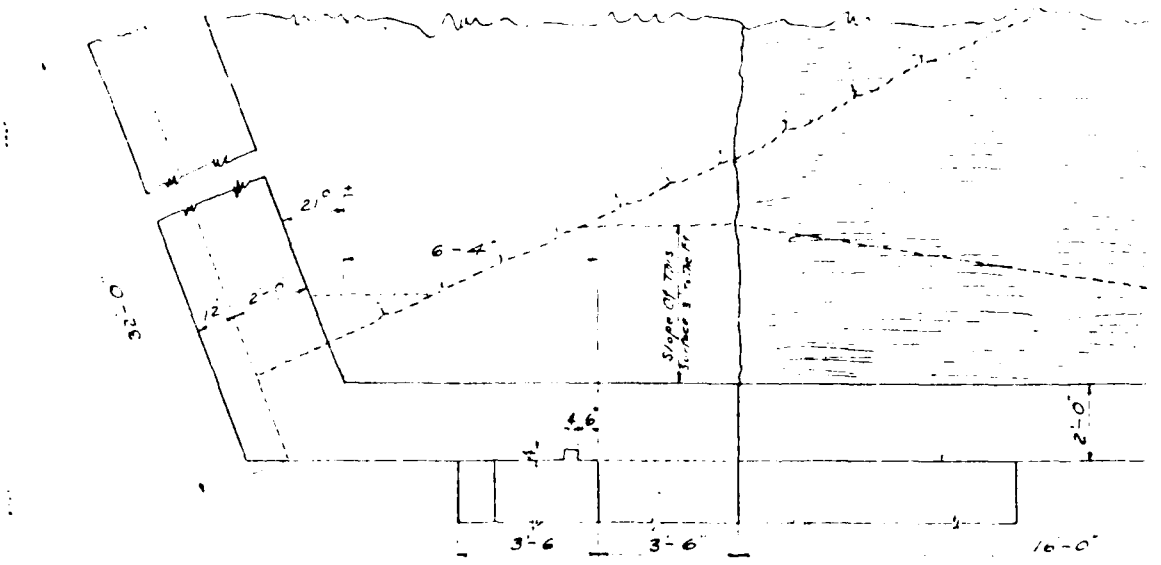


2-B OF DAM AND FOREBAY.
SCALE ¼"=1'-0"

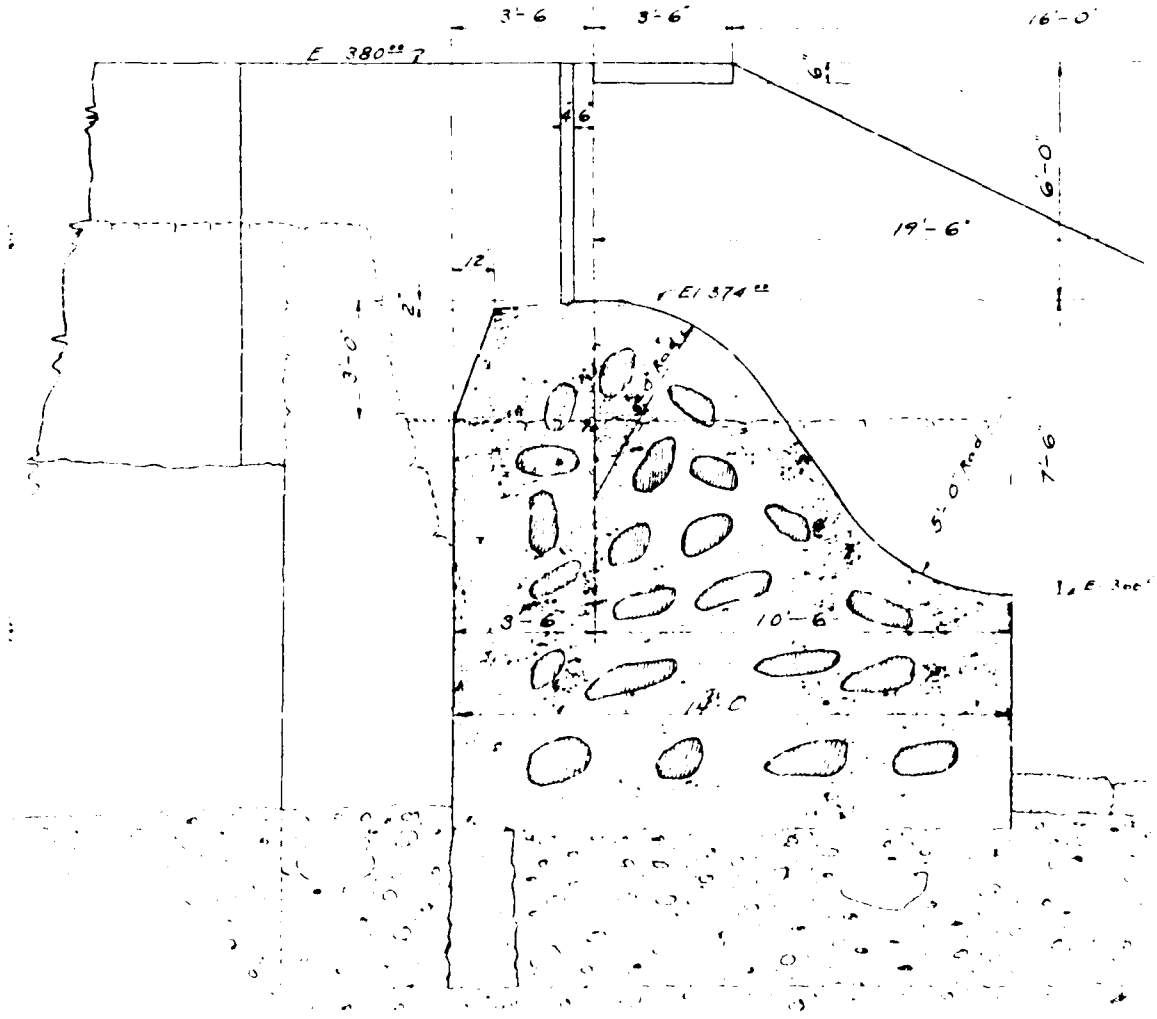
NOTE:

ALL ELEVATIONS GIVEN ON THIS SHEET ARE BASED ON AN UNKNOWN LOCAL OR ASSUMED DATUM AND NOT NVGD



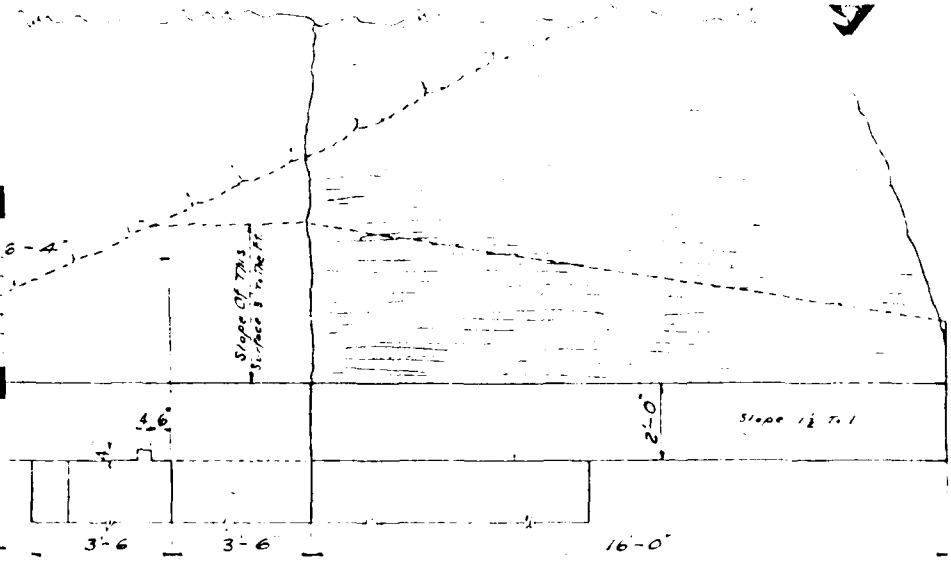


PLAN N°1-E

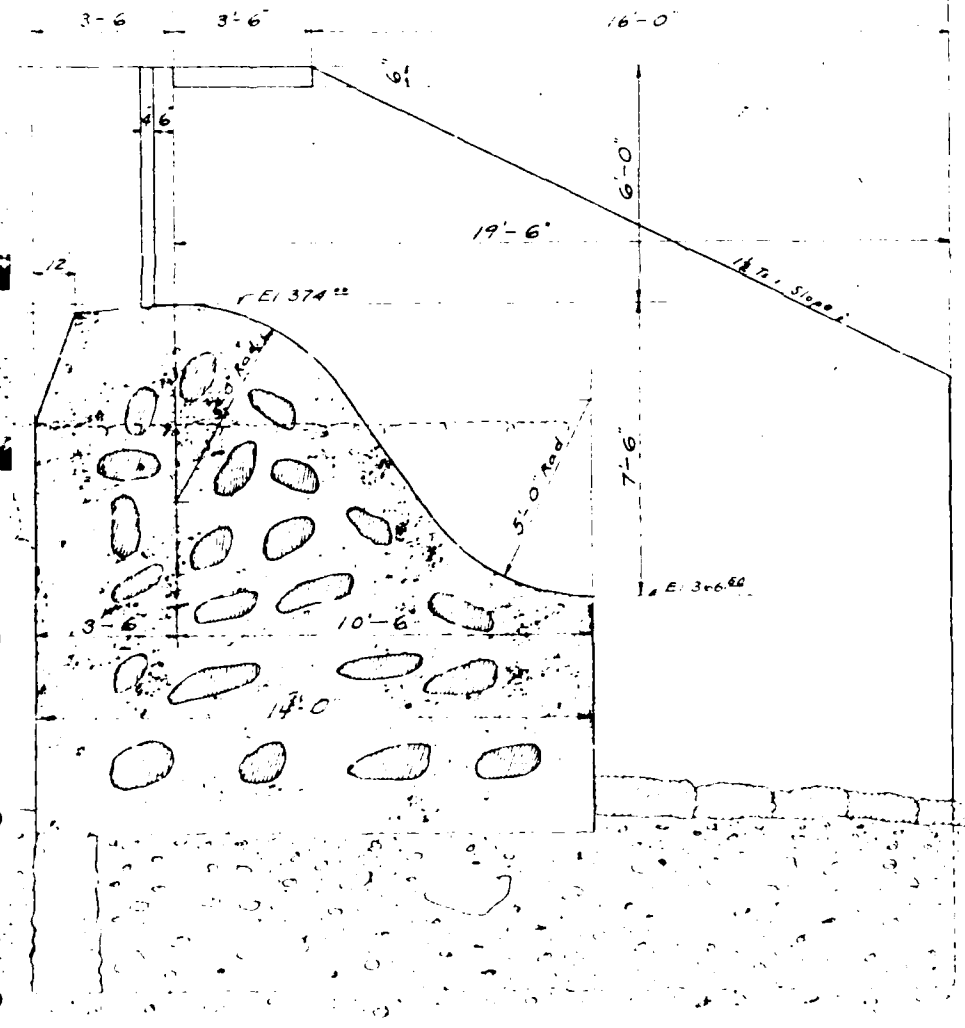


SECTION N°2-E OF ABUTMENT

FILE NO. 4454 826

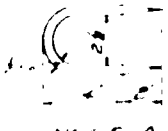


PLAN N°1-E
Scale 1/2" = 1'-0"

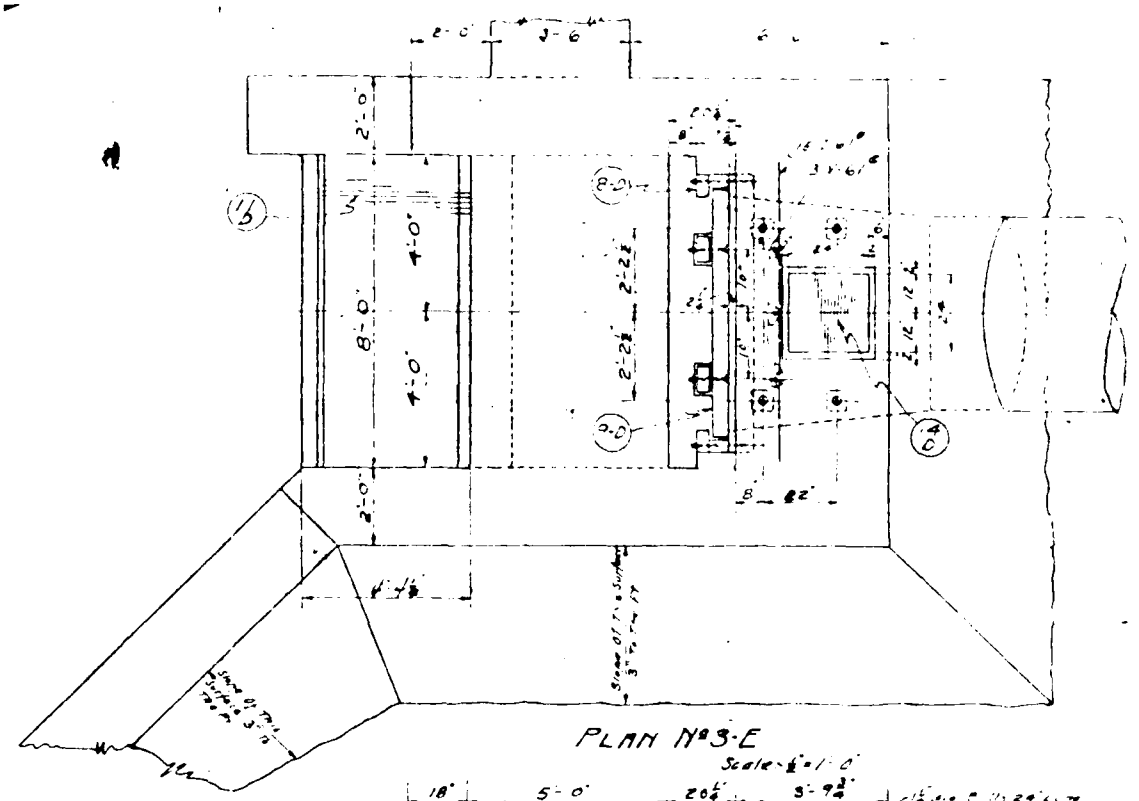


SECTION N°2-E OF ABUTMENT
Scale 3/4"=1'-0"

NOTE:
ALL ELEVATIONS GIVEN ON THIS SHEET ARE BASED ON AN UNKNOWN LOCAL OR ASSUMED DATUM AND NOT NVGD

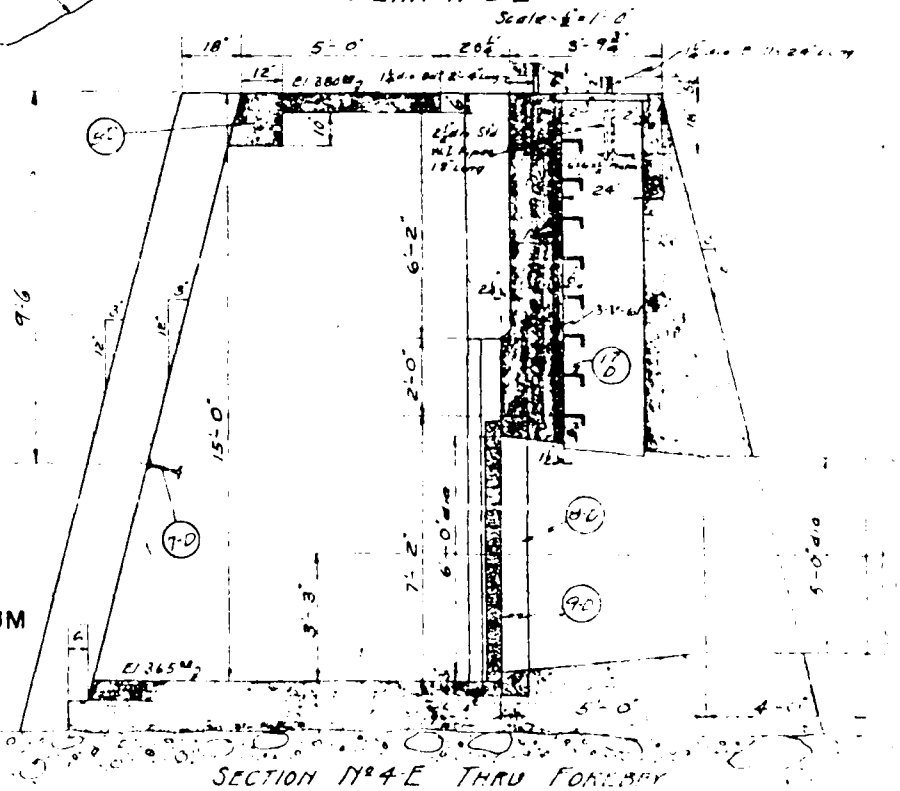


DETAIL N°6-E OF STAPLE
96 Req'd
Scale 3"=1'-0"



PLAN Nº 3-E

Scale-1"=1'-0"

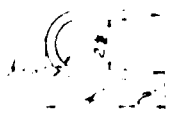


SECTION Nº 4-E THRU FOREBAY

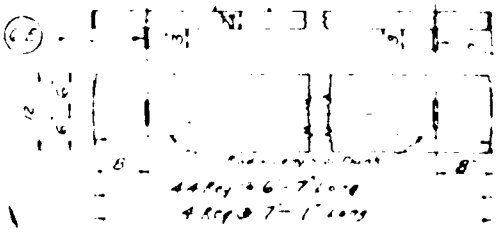
Scale-1"

NOTE:

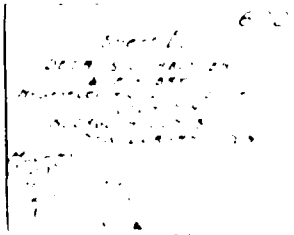
ALL ELEVATIONS GIVEN ON THIS SHEET ARE BASED ON AN UNKNOWN LOCAL OR ASSUMED DATUM AND NOT NVGD



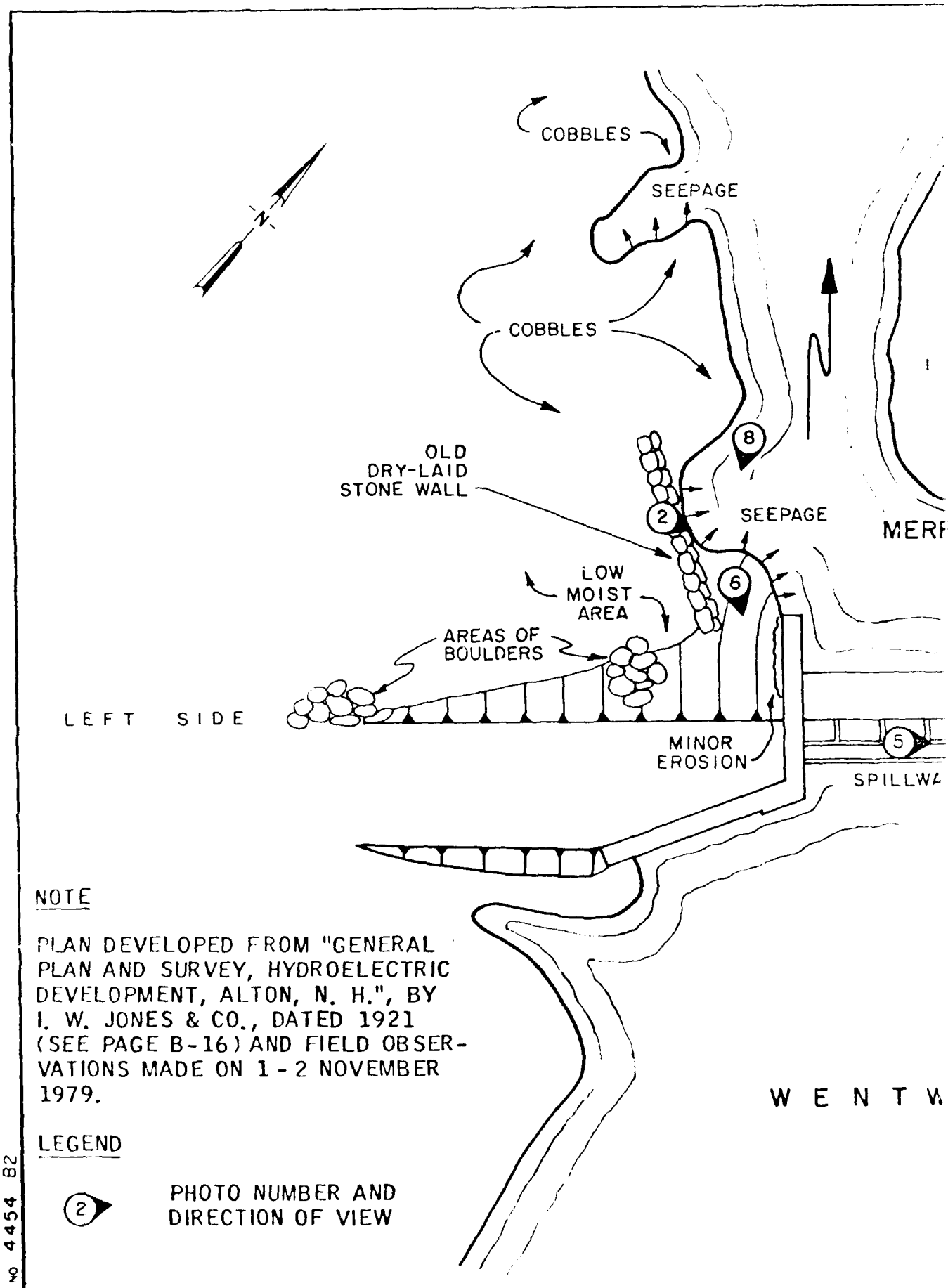
DETAIL Nº 6E OF STAPLE



DETAIL Nº 5E OF REINFORCING



APPENDIX C - PHOTOGRAPHS



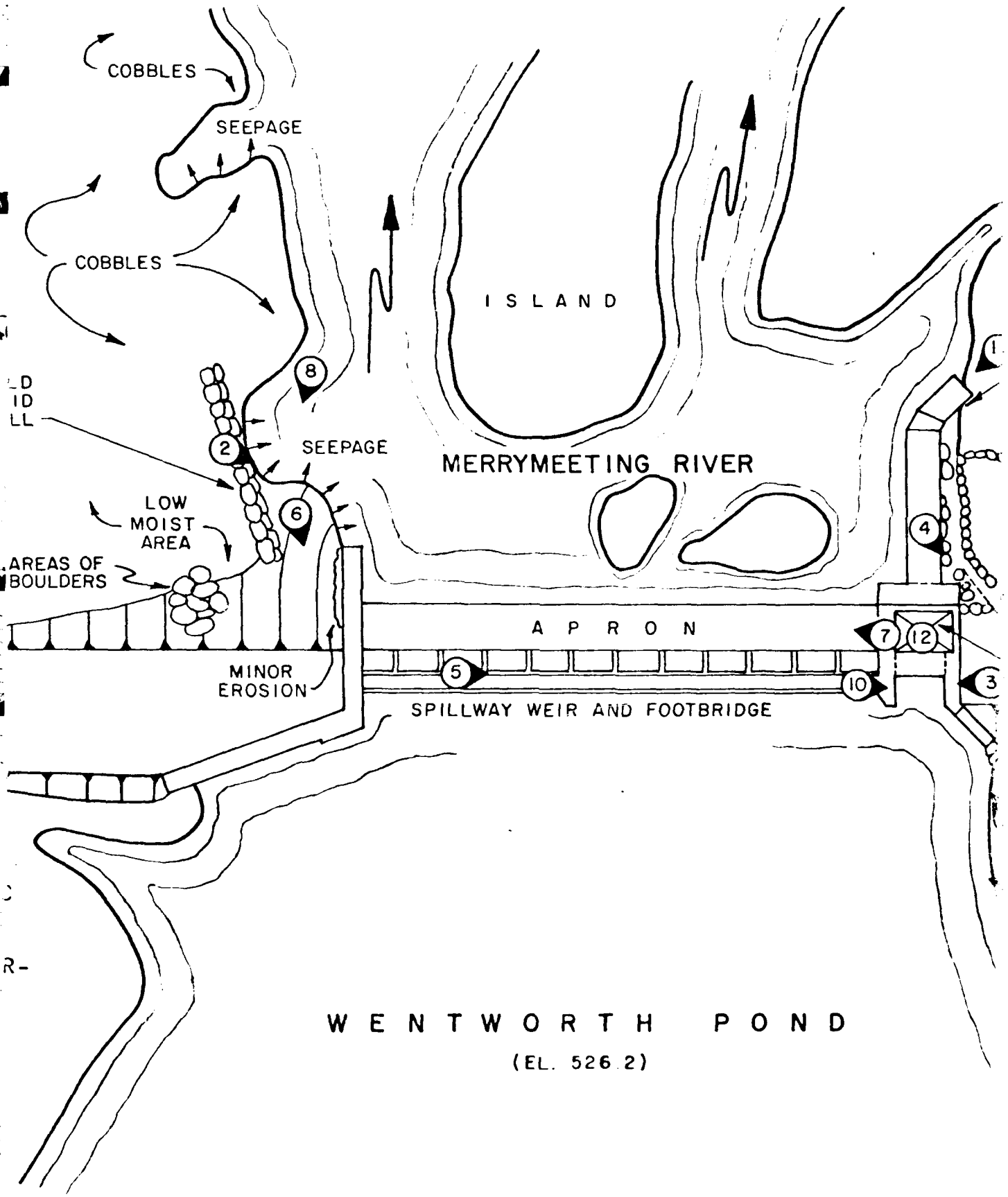
NOTE

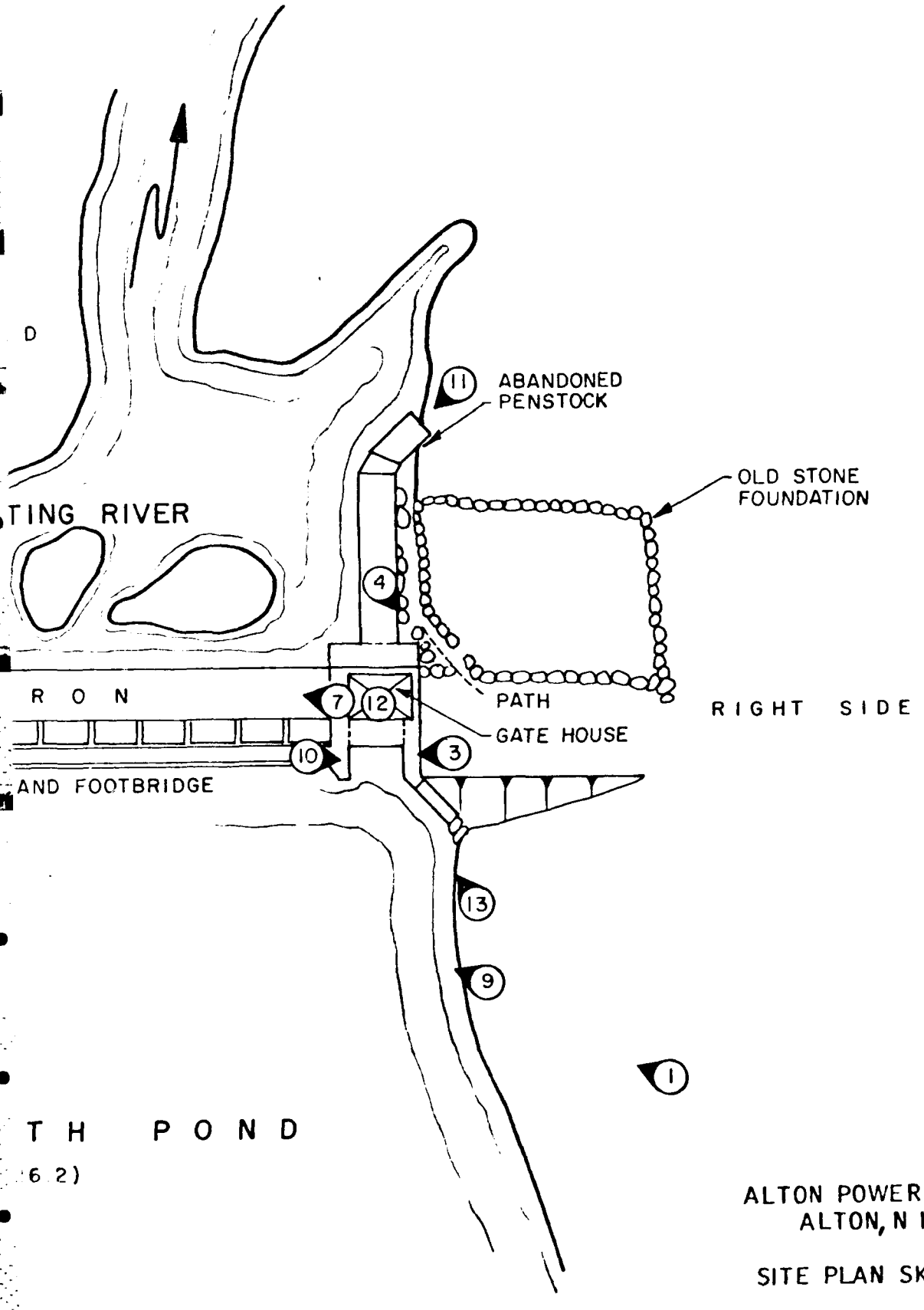
PLAN DEVELOPED FROM "GENERAL PLAN AND SURVEY, HYDROELECTRIC DEVELOPMENT, ALTON, N. H.", BY I. W. JONES & CO., DATED 1921 (SEE PAGE B-16) AND FIELD OBSERVATIONS MADE ON 1 - 2 NOVEMBER 1979.

LEGEND

(2) PHOTO NUMBER AND DIRECTION OF VIEW

FILE NO 4454 B2

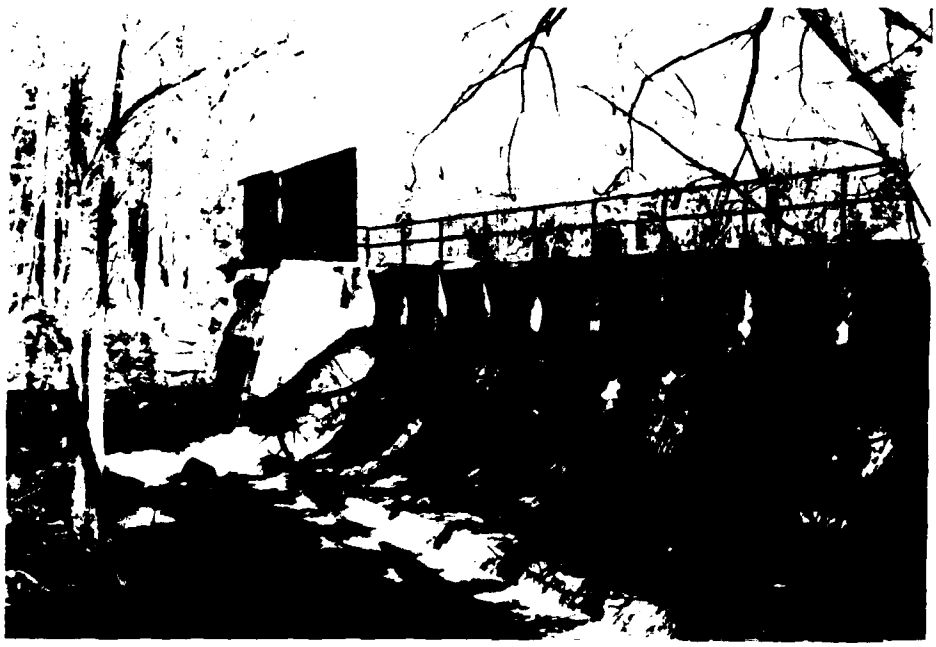




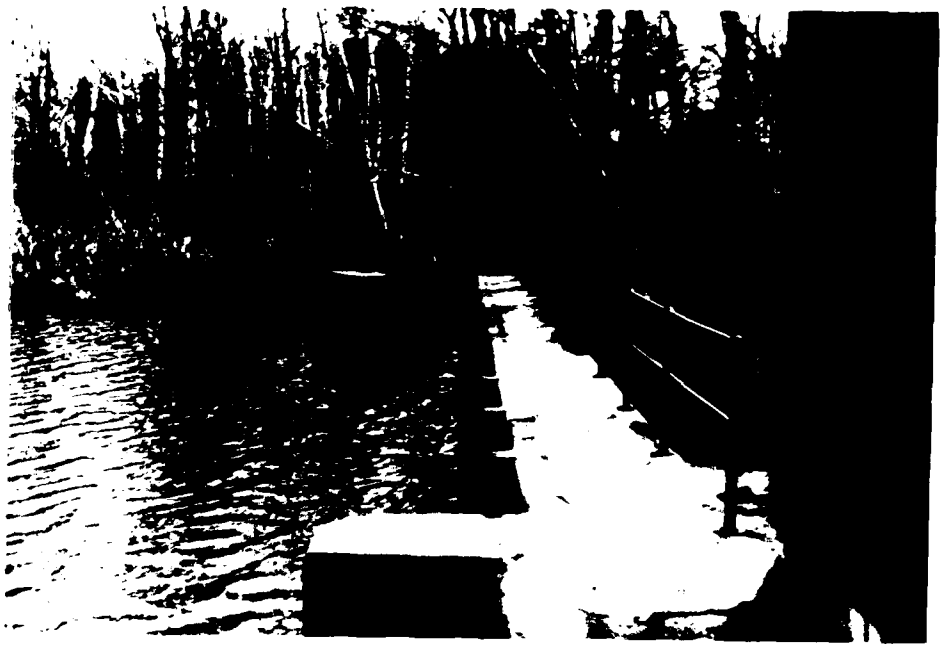
ALTON POWER DAM
ALTON, N H

SITE PLAN SKETCH

Scale: 1" = 20' January 1980



2. Overview of spillway and downstream channel



3. Alignment of dam from right abutment

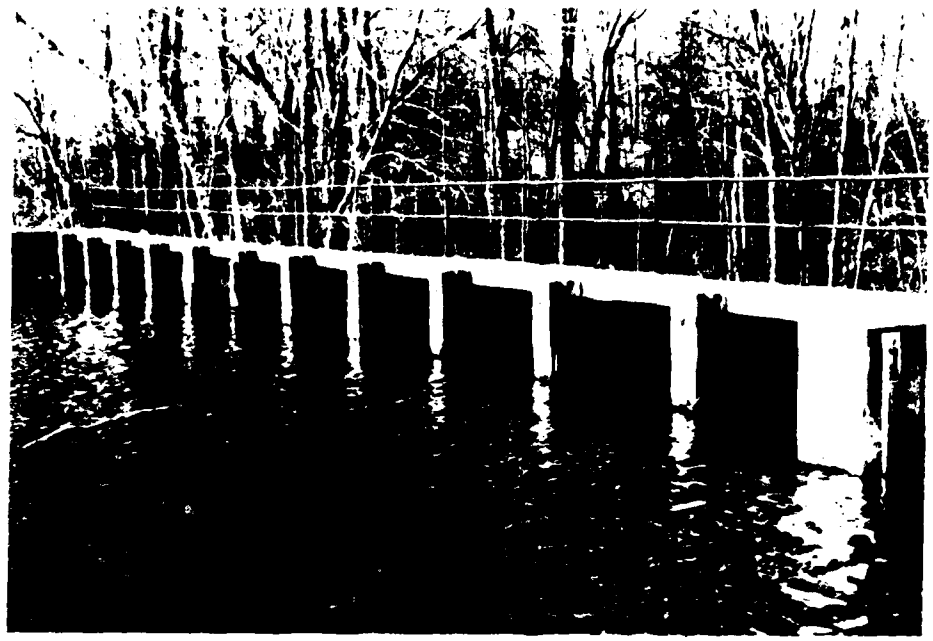
4. Path and cobble-concrete repair adjacent to outlet works, downstream

5. Right side of dam from footbridge

6. Left embankment adjacent to left training wall, downstream

7. Old stone masonry wall, left training wall and embankment, downstream

8. Close up of area of seepage, downstream toe of left embankment adjacent to left training wall

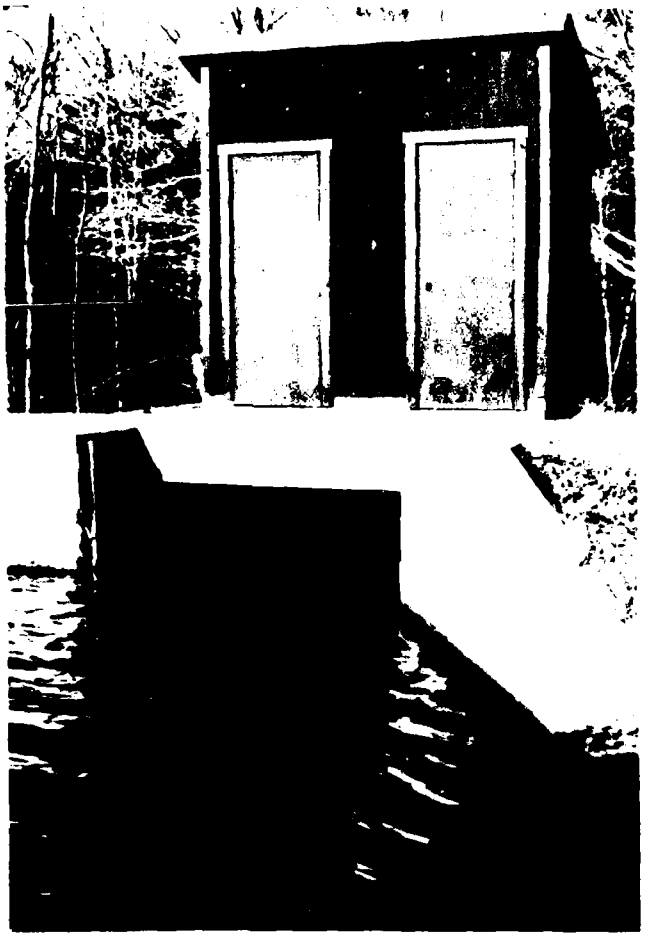


9. Deteriorated stoplog supports along upstream side of spillway

10. Spalling concrete at right headwall, upstream

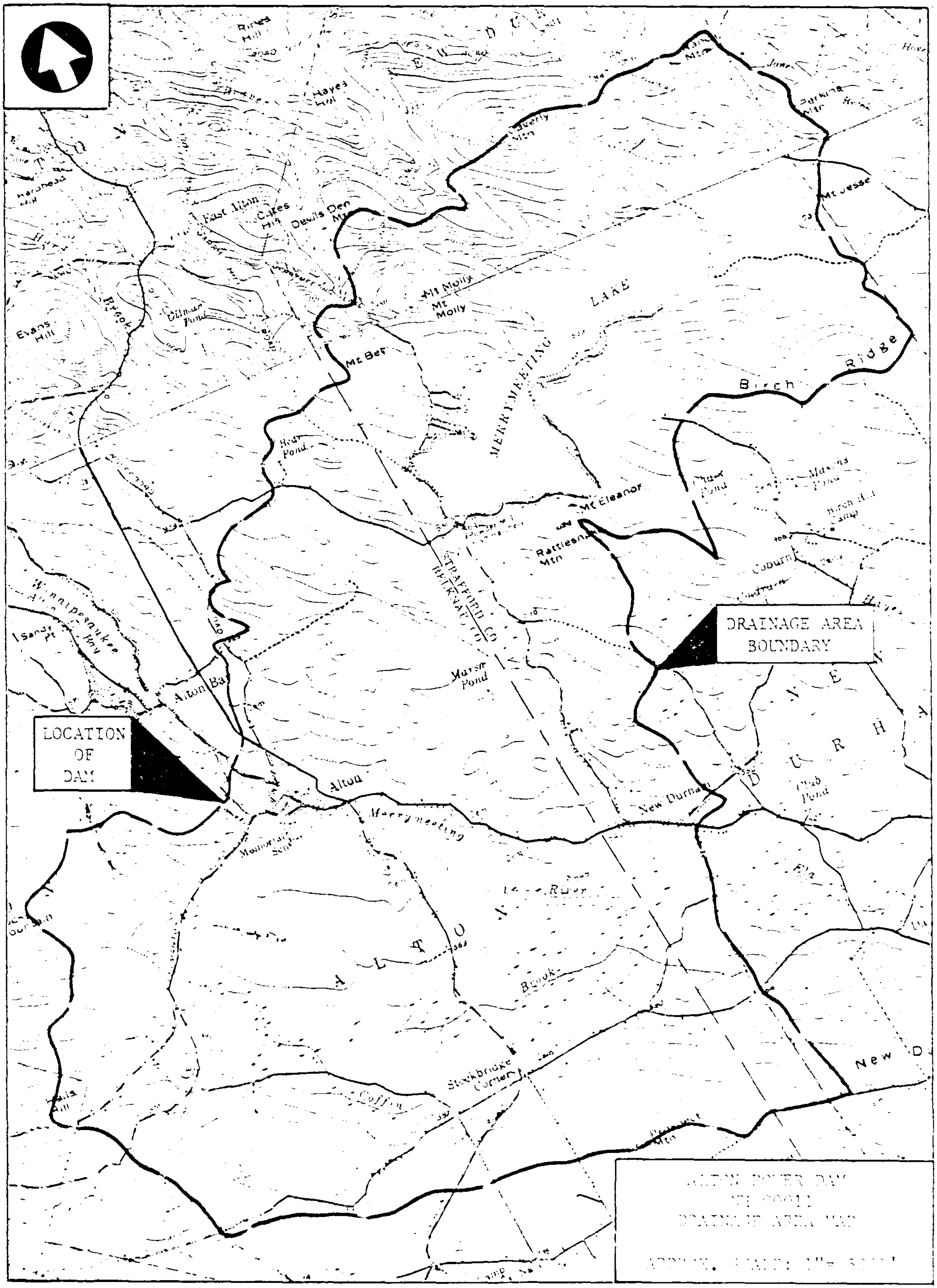
11. Steel penstock, downstream

12. Gate lift mechanism

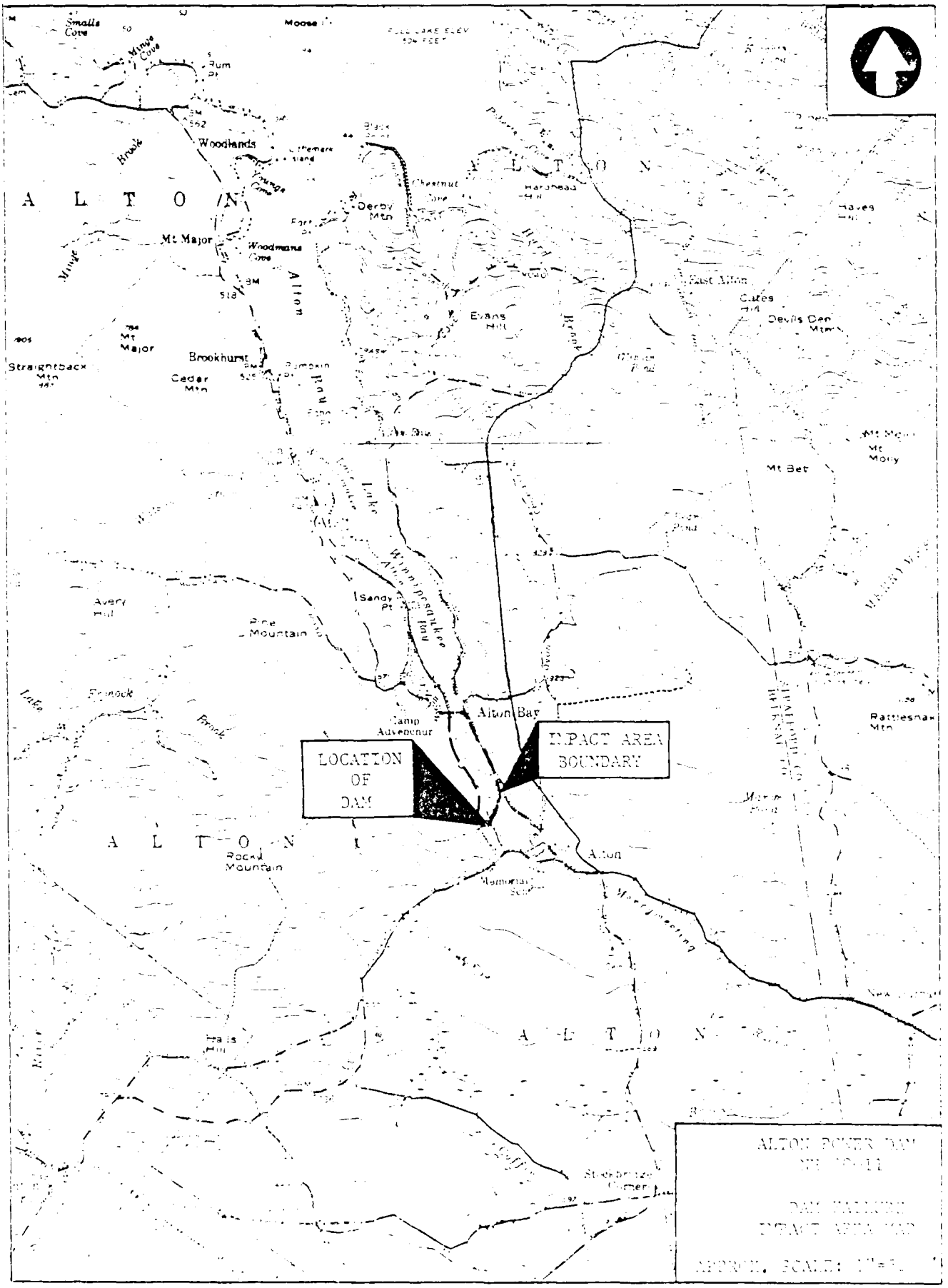


13. Right headwall, gate house and outlet works intake, upstream

APPENDIX D - HYDROLOGIC AND HYDRAULIC COMPUTATIONS



DRAINAGE AREA BOUNDARY
LOCATION OF DAM
MERRYMEETING LAKE
Birch Ridge
Mt Molly
Mt Bet
Mt Eleanor
Mt Jesse
Rattlesnake Mtn
Evans Hill
East Alton
Gates Hill
Devils Den Mtn
Hayes Hill
Dillman Pond
Marsh Pond
Chalk Pond
Club Pond
Alton Bay
Alton
New Durham
Stockbridge Corner
Sandy Pt
STRAFFORD CO
BELKNAP CO


LOCATION OF DAM
IMPACT AREA BOUNDARY
ALTON
Woodlands
Mt Major
Derby Mtn
Brookhurst
Straightback Mtn
Cedar Mtn
Evans Hill
Devils Den Mtn
Mt Bet
Avery Hill
Pine Mountain
Sandy Pt
Alton Bay
Camp Adventour
Rocky Mountain
Halls Hill
Rattlesnake Mtn
Lake Winnipesaukee
ALTON POWER DAM

CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT HALEY & ALDRICH
PROJECT DAM INSP.
DETAIL ALTON POWER

JOB NO. 561-10-RT-2
DATE CHECKED 11-28-79
CHECKED BY bz A.

COMPUTED BY JED
DATE 11/26/79
PAGE NO 1

ELEVATIONS

Top of Dam Elev. 529.33
Spillway Crest Elev. 523.33
Toe of Ogee Elev. 515.84
Inv. of Outlet Works Elev. 516.74
Toe of Dam Elev. 513.33

SURFACE AREAS

from USGS Quad: Alton, N.H. - 1957

Drainage Area = 34.5 sq. mi.

Merrymeeting River W.S. (assume = 523.3)
① between dam and Gilmanton Rd. : 12.0 acres
② between Gilmanton Rd. & Rt. 28 : 62.0 "
③ between Rt. 28 and Rt. 11 : 156.0 "
230.0 acres

Top of Dam (Elev. 529.33), estimated
① 17 acres
② 75 "
③ 872 "
964 acres

STORAGE CAPACITIES

Spillway Crest: 12 ac. × 10' = 120 ac.-ft
+ 62 ac. × 6' = 372 ac.-ft
+ 156 ac. × 4' = 624 ac.-ft.
1,116 ac.-ft.

Top of Dam: (12+37)/2 × 6 + 120 = 267
+ (62+75)/2 × 6 + 372 = 783
+ (156+872)/2 × 6 + 624 = 3,708
4,758 ac.-ft.

SIZE CLASSIFICATION

Height = 529.33 - 513.33 = 16 ft.

Storage at Top of Dam = 4,758 ac.-ft.

∴ Size is INTERMEDIATE based on Storage Capacity

HAZARD CLASSIFICATION

A dam failure would result in the potential loss of several lives.

∴ Hazard Classification is HIGH

TEST FLOOD DETERMINATION

Intermediate size and High hazard : COE Guidelines require full Probable Maximum Flood (PMF)

The drainage area is typically rolling in the upper basin and flat in the lower basin. The upper basin, approx. 11 sq. mi., is tributary to Merrymeeting Lake which has a surface area of 1120 acres or 16% of it's tributary drainage area. The lower portion of the watershed has substantial marsh areas along Coffin Brook which is tributary to Merrymeeting River.

Assume that the 11 sq. mi. portion of the watershed tributary to Merrymeeting Lake is essentially controlled and that the peak inflow to the Alton Power Dam results from from the heavily forested, flat and coastal 23.5 sq. mi. drainage area downstream of Merrymeeting Lake.

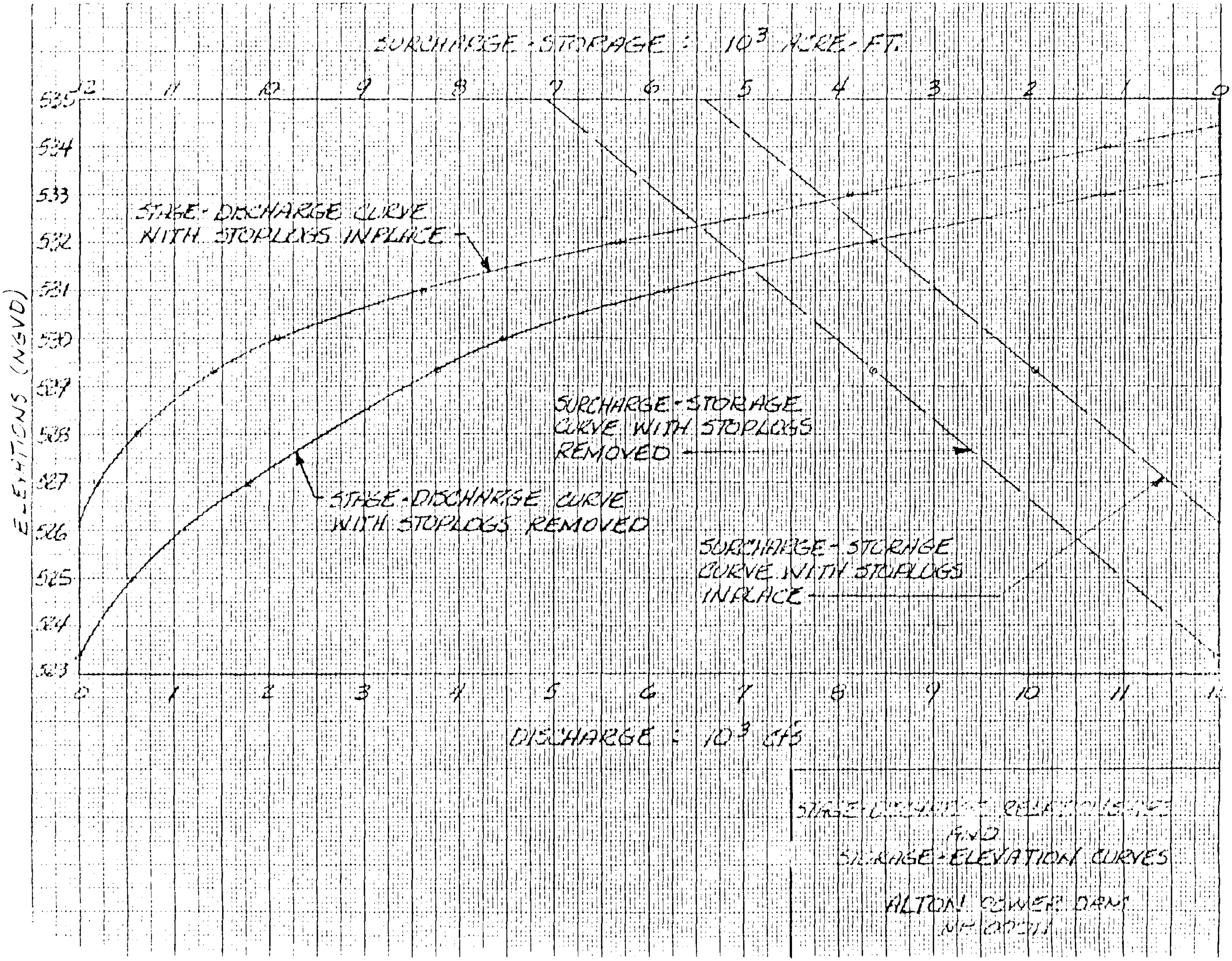
From COE Guidelines, for Flat / Coastal terrain, use 550 cfs/sq. mi.

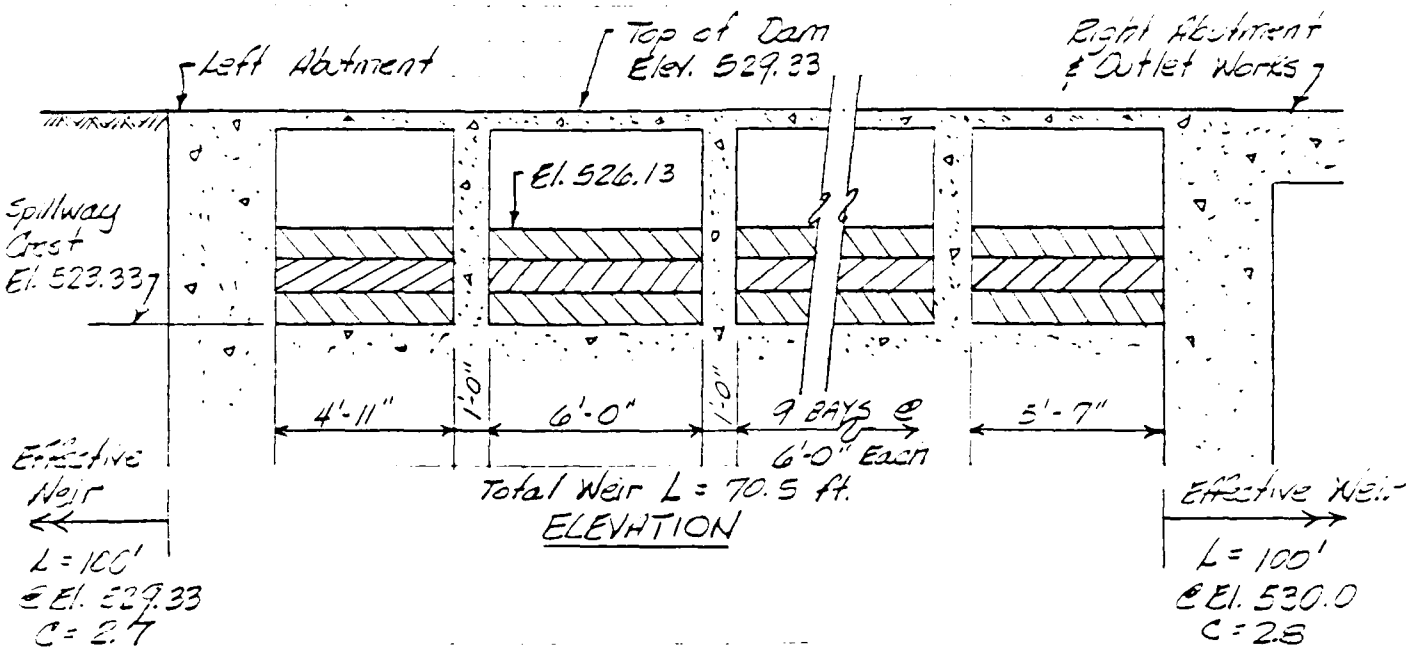
∴ Test Flood Inflow = 550 x 23.5 = 12,925 cfs
say 12,900 cfs

STAGE-DISCHARGE RELATIONSHIPS

Normal procedure is to leave 2.8 ft. height of stoplogs in each bay, except during the winter months when 2 boards are removed from each of the end bays.

Based on the above, assume that the test flood occurs with 2.8 ft. of stoplogs in all 12 bays.


SURCHARGE - STORAGE : 10^3 ACRE-FT.
12 11 10 9 8 7 6 5 4 3 2 1 0
ELEVATIONS (NGVD)
535 534 533 532 531 530 529 528 527 526 525 524 523
STAGE-DISCHARGE CURVE WITH STOPLOGS INPLACE
SURCHARGE-STORAGE CURVE WITH STOPLOGS REMOVED
STAGE-DISCHARGE CURVE WITH STOPLOGS REMOVED
SURCHARGE-STORAGE CURVE WITH STOPLOGS INPLACE
0 1 2 3 4 5 6 7 8 9 10 11
DISCHARGE : 10^3 CFS
AND
STORAGE-ELEVATION CURVES
ALTON POWER DAM



ELEV.	SPILLWAY "C"	SPILLWAY Q (cfs)	LEFT BANK Q (cfs)	RIGHT BANK Q (cfs	TOTAL Q (cfs)	
526.13	-	0	-	-	0	
527.0	3.38 x 0.98	190	-	-	190	
528.0	3.54 x 0.97	620	-	-	620	
529.33	3.65 x 0.96	1,410	0	-	1,410	; 3,730 cfs w/ stoplogs
530.0	3.80 x 0.95	1,940	150	0	2,090	
531.0	3.87 x 0.94	2,760	580	280	3,620	
532.0	3.93 x 0.94	3,700	1160	790	5,670	
533.0	4.0 x 0.94	4,770	1900	1450	8,120	; 7,400 cfs w/o stoplogs, spillway only
534.0	4.0 x 0.94	5,850	2720	2240	10,810	

SURCHARGE - STORAGE ROUTING WITH STOPLOGS IN PLACE

Test Flood Inflow = 12,900 cfs = Q_{P_1}
Surcharge Height to pass Q_{P_1} ≈ 534.8

$$STOR_1 = \frac{5,300 \text{ ac-ft} \times 12"/ft}{23.5 \text{ sq.mi.} \times 640 \text{ ac/sq.mi.}} = 4.23 \text{ inches}$$

$$Q_{P_2} = Q_{P_1}\left(1 - \frac{STOR}{19"}\right) = 12,900\left(1 - 4.23/19\right) = 10,030 \text{ cfs}$$

Surcharge Height to pass Q_{P_2} ≈ 533.7

$$STOR_2 = \frac{4,600 \text{ ac-ft} \times 12"/ft}{23.5 \text{ sq.mi.} \times 640 \text{ ac/sq.mi.}} = 3.67 \text{ inches}$$

$STOR_A = \frac{3.67 + 4.23}{2} = 3.95$ inches

$Q_{P3} = 12,900\ (1 - 3.95/19) = 10,220$ cfs, say 10,200 cfs

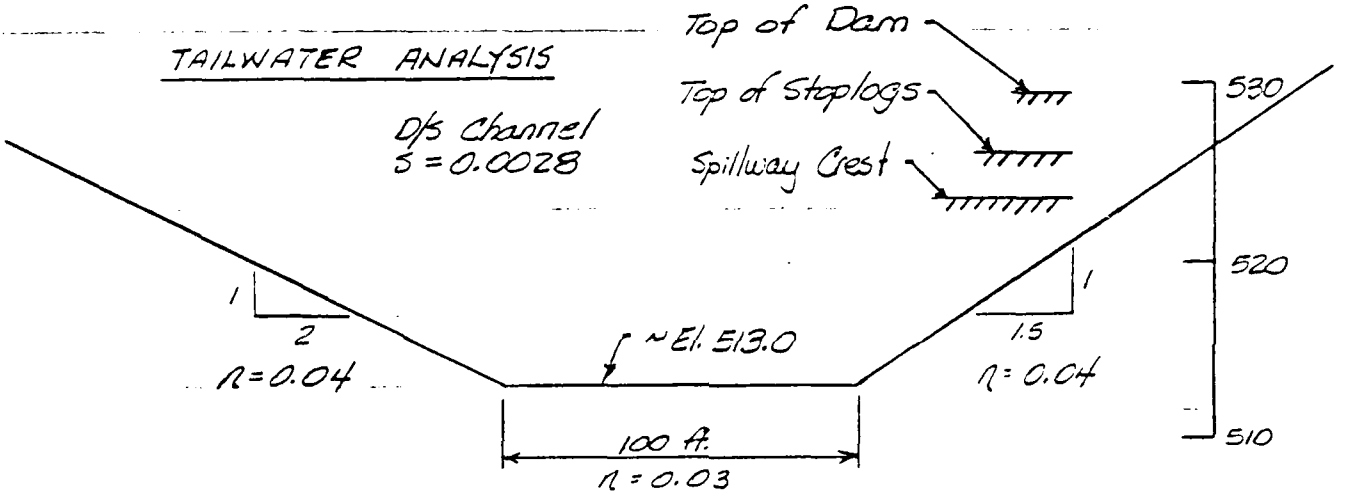
TEST FLOOD INFLOW = 12,900 cfs

ROUTED TEST FLOOD OUTFLOW = 10,200 cfs

TEST FLOOD ELEVATION = 533.8

TAILWATER ANALYSIS

D/s Channel
S = 0.0028



Comp. 'n' = 0.035

CHANNEL X-SECT. AT TOE OF DAM

W.S. ELEV.	AREA (sq. ft.)	W.P. (ft.)	HYD. RAD.	Q (cfs)
518.0	544	120	4.53	3355
520.0	786	128	6.14	5940
522.0	1042	136	7.66	9120
522.5	1108	138	8.03	10,000

∴ Tailwater @ T.F. ≈ El. 522.5 < Spillway crest elev.

OUTLET WORKS

Outlet works consists of a 6'-0" sq. wooden gate followed by a 6'x5' reducer and a length of 5'ϕ St'l pipe
Gate Inv. Elev. 516.74

Capacity @ Top of Stoplogs = $0.85 \times 19.6 (5.4 \times 7.4)^{0.5} = 400$ cfs

SURCHARGE-STORAGE ROUTING WITH STOPLOGS REMOVED

W.S. ELEV.	SPILLWAY Q (cfs)	OVERBANK Q (cfs)	TOTAL Q (cfs)	ESTIMATED SURCH.-STOR.
523.33	0	-	0	0
525.00	550	-	550	
527.00	1,780	-	1780	
529.33	3,730	0	3,730	3642
530.00	4,310	150	4,460	
531.00	5,320	860	6,180	
532.00	6,390	1970	8,360	
533.00	7,420	3350	10,770	
534.00	8,600	4960	13,560	6,477

Test Flood Inflow = 12,900 cfs = Q_{P_1}

Surcharge Ht. to pass Q_{P_1} = 533.8

$$STOR_1 = \frac{6,350 \text{ ac-ft.} \times 12"/\text{ft.}}{23.5 \text{ sq. mi.} \times 640 \text{ ac/sq. mi.}} = 5.07"$$

$$Q_{P2} = Q_{P_1}(1 - STOR/19") = 12,900(1 - 5.07/19) = 9,460 \text{ cfs}$$

Surcharge Ht. to pass Q_{P_2} = 532.5

$$STOR_2 = \frac{5,550 \times 12}{23.5 \times 640} = 4.43"$$

$$STOR_A = (4.43 + 5.07)/2 = 4.75"$$

$$Q_{P3} = 12,900(1 - 4.75/19) = 9,675 \text{ cfs, say } 9,700 \text{ cfs}$$

TEST FLOOD INFLOW = 12,900 cfs

ROUTED TEST FLOOD OUTFLOW = 9,700 cfs

TEST FLOOD ELEVATION = 532.6

DAM FAILURE ANALYSIS

Spillway discharge prior to failure w/ pond W.S. at top of dam; assume 2.8 ft. of stoplogs in place

Crest Length = 10 bays @ 6 ft. ea + 1 @ 5'-7" + 1 @ 4'-11"
= 70.5 ft.

head = 3.2 ft.
"C" = 3.65 × 0.96 = 3.5

$\therefore Q_s = (3.5)(70.5)(3.2)^{1.5} = 1{,}410$ cfs

Length of dam, including right and left embankments = 190 ft.
Length of Maximum failure = 190' × 40% = 76 ft.
Length of Left embankment = 65 ft., ∴ assume W_b = 65 ft.

$\therefore Q_f = 8/27\ \sqrt{g}\ W_b\ Y_o^{1.5}$

$= 8/27 \times (32.2)^{.5} \times 65 \times (16)^{1.5} = 7{,}000$ cfs

$Q_{P_1} = Q_s + Q_f = 1{,}410 + 7{,}000 = 8{,}410$ cfs

Merrymeeting River flows approx. 1 mi. from the dam to Alton Bay where it joins Lake Winnipesaukee.

Existing development downstream of dam which would be impacted by a dam failure consists of the following:

1. Road leading from dam to Alton Bay is 4 to 6 ft. above normal river stage between the dam and Rt. 11 with three homes having sill elev. ~ 6 to 10 ft. above normal river W.S.

2. Sill elev. 8 ft. above normal river at house located at junction of Rt. 11

3. New development located ~ 1500 ft. u/s of Alton Bay consists of 5 homes on the right bank and 4 homes on left bank with sill elev. from 2 to 10 ft. above normal river. Development not shown on Quad sheet.

CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT [illegible]
PROJECT DAM INSP.
DETAIL DAM FAILURE

JOB NO [illegible]
DATE CHECKED 11-28-79
CHECKED BY Joe A

COMPUTED BY E
DATE [illegible]
PAGE NO 7

4. At the confluence of the river with Alton Bay there are ~10 homes, a motel, and a large marina all located along the banks of the river.

While a spillway discharge of 1,410 cfs would cause some flooding d/s stream, the addition of 7500 cfs would substantially increase the depth and magnitude of downstream flooding.

At Area #1, no flooding of the roadway or homes would be expected prior to failure. Following failure, the road would be flooded by 2 - 4 ft of water and 2 homes would have water ~2 ft above sill elev.

At Area #2, the river stage would be about equal to the sill elev. of the exist. homes following failure.

At Area #3, approx. 3 to 4 homes would experience some flooding prior to failure. Following failure, water depths would increase by about 5 to 6 feet, flooding an additional 5 to 6 homes.

At Area #4 depth of flooding would increase by about 6 ft. causing substantial damage.

∴ Potential loss of life is great and Hazard Classification is HIGH

APPENDIX E - INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

PART I - INVENTORY OF DAMS IN THE UNITED STATES

(PURSUANT TO PUBLIC LAW 92-367)

See reverse side for instructions

STATE	IDENTITY NUMBER
NH	00011

IDENTIFICATION

DIVISION	STATE	COUNTY	CONGR DIST	STATE	COUNTY	CONGR DIST	NAME	LATITUDE (North)	LONGITUDE (West)	REPORT DATE (DAY MO YR)
NE	NH	001	01				ALTON POWER DAM	43 27.3	071 13.8	25 TAN 80

IDENTIFICATION (Continued)

POPULAR NAME	NAME OF IMPOUNDMENT
	WENTWORTH POND

LOCATION

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST FROM DAM (mi)	POPULATION
01	05	MERRYMEETING RIVER	ALTON BAY	1	500

STATISTICS

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (ft)	HYDRAULIC HEIGHT (ft)	IMPOUNDING CAPACITIES MAXIMUM (acre-ft)	IMPOUNDING CAPACITIES NORMAL (acre-ft)	CORPS ENGR. DIST.	OWN.	FED. R.	PRV/FED	SCS A.	VERIFICATION DATE (DA MO YR)	BLANK
MS RE	1923	DC	1	16	120		NED	N	N	M	N		

REMARKS

REMARKS
23-FRIVIDE WATERFALL HABITAT 34-ESTIMATED

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PART II – INVENTORY OF DAMS IN THE UNITED STATES

(PURSUANT TO PUBLIC LAW 92-367)

See reverse side for instructions

STATE	IDENTITY NUMBER
NH	00011

STATISTICS

DISTRICT	CREST LENGTH (ft)	SPILLWAY TYPE	SPILLWAY WIDTH (ft)	SPILLWAY MAXIMUM DISCHARGE (cfs)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO	LOCK 1 LENGTH (ft)	LOCK 1 WIDTH (ft)	LOCK 2 LENGTH (ft)	LOCK 2 WIDTH (ft)	LOCK 3 LENGTH (ft)	LOCK 3 WIDTH (ft)	LOCK 4 LENGTH (ft)	LOCK 4 WIDTH (ft)	BLANK
1	190	C	82	3730													5

MISC DATA

OWNER	ENGINEERING BY	CONSTRUCTION BY
NH FISH AND GAME DEPT	I W JONES & CO		6

MISC DATA (Continued)

REGULATORY AGENCY: DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NH PUBLIC SERV COMMONE		NONE	MH WATER RES BOARD	7

MISC DATA (Continued)

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
HALEY & ALDRICH, INC.	02	NOV	79	PUBLIC LAW 92-367	8

REMARKS

REMARKS
	9

ENG FORM 4474A

(1)

PART III INVENTORY OF DAMS IN THE UNITED STATES
SUPPLEMENTARY DATA

STATE	IDENTITY NUMBER
MH	00011

	(A-1)	(A-2)	(A-3)	(A-4)	(A-5)
LOCATION	TOWN	NED PERMIT NO	STATE NUMBER	FERC NO	USGS SHEET
A	ALTON		6.02		ALTON MH

	(B-1)	(B-2)	(B-3)	(B-4)	(B-5)	(B-6)	(B-7)	(B-8)	(B-9)	(B-10)	(B-11)	(B-12)
DRAINAGE CHARACTERISTICS	DRAINAGE AREA SQ MI	FLOW DATA MIN CFS	FLOW DATA AVE CFS	FLOW DATA MAX CFS	CREST ELEV MSL	ABUT ELEV MSL	USABLE STORAGE ACRE FEET	RESERVOIR AREA ACRES	FLASH BOARD HT FEET	OUTLET CONDUITS NO	OUTLET CONDUITS SIZE	INVERT ELEV MSL
B	35				523	529		230		3	01 5FT DIA	517

	(C-1)	(C-2)	(C-3)	(C-4)	(C-5)	(C-6)	(C-7)
POWER DATA	GENERATION UNITS INSTALLED NO	GENERATION UNITS INSTALLED CAP KW	GENERATION UNITS PLANNED NO	GENERATION UNITS PLANNED CAP KW	AVERAGE ANNUAL GENERATION KWH	LAST GEN YEAR	RETIRED YEAR	FORMER USE	APACITY FACTOR
C						1958	1958		

D

E

NED FORM 1 JAN 79 80(TEST)

END

FILMED

8-85

DTIC