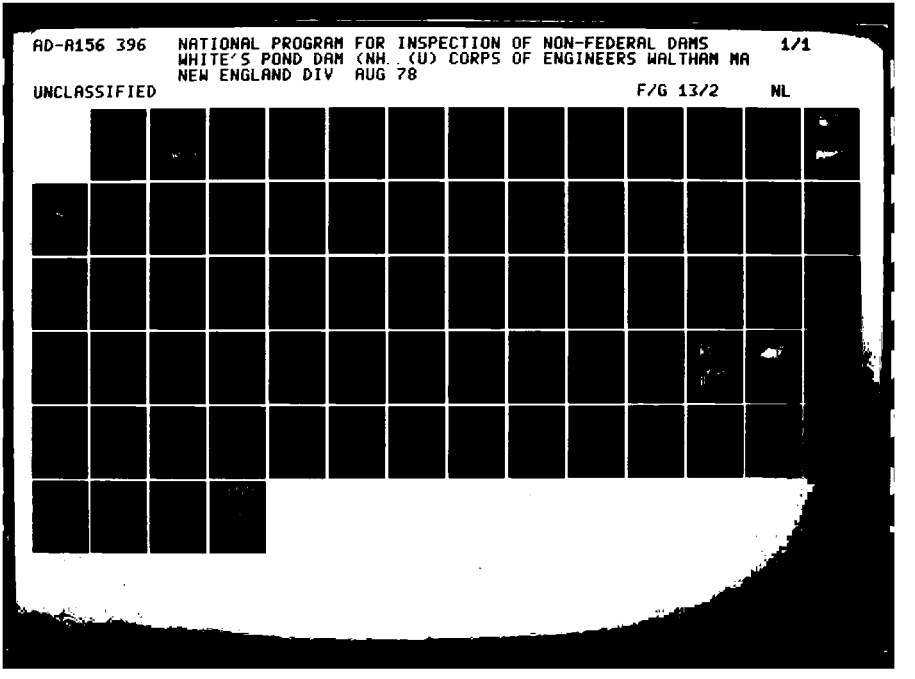
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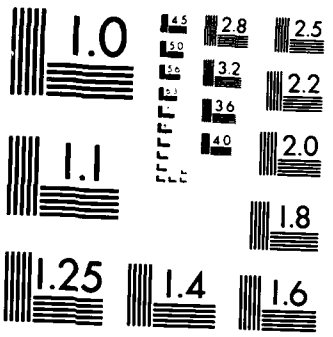


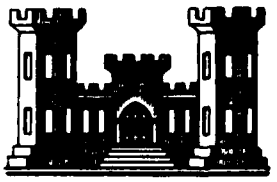
MERRIMACK RIVER BASIN
PITTSFIELD, NEW HAMPSHIRE

WHITE'S POND DAM

NH 00106

NHWRB 195.07

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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

AUGUST 1978

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,

Merrimack River Basin
Pittsfield, New Hampshire
Tributary to the Suncook River

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

The dam consists of a 260 ft. long granite faced dam with spillway, flume and outlet culvert consisting of granite masonry and concrete. It is small in size with a significant hazard potential classification. It is in fair condition. However, there is no immediate concern, features revealed by this inspection do require attention. A formal sequenced operational plan for emergencies involving upstream and downstream dam operations should be developed and submitted to the NHWRB for review and comment.

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REPLY TO
ATTENTION OF:

NEDED

Honorable Meldrim Thomson, Jr.
Governor of the State of New Hampshire
State House
Concord, New Hampshire 03301

NOV 28 1978

Dear Governor Thomson:

I am forwarding to you a copy of the White's Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the 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, Sisters of the Holy Cross, Fairview Road, Pittsfield, New Hampshire 03263, ATTN: Mr. John Stapleton, Superintendent of Maintenance.

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.

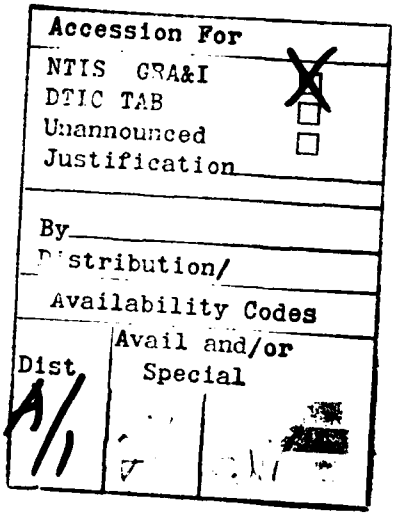
Sincerely yours,

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

WHITE'S POND DAM

NH 00106



MERRIMACK RIVER BASIN

PITTSFIELD, NEW HAMPSHIRE

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification No.	NH00106
NHWRB	195.07
Name of Dam:	WHITE'S POND DAM
Town:	Pittsfield
County and State:	Merrimack County, New Hampshire
Stream:	Tributary to Suncook River
Date of Inspection:	23 May 1978

BRIEF ASSESSMENT

White's Pond Dam and outlet flume, 1 mile southeast of Pittsfield, New Hampshire, on a tributary to the Suncook, consists of a 260 foot long granite faced dam, with spillway, flume and outlet culvert consisting of granite masonry and concrete. The dam is integrated with Rte. 107, which serves as the downstream embankment. There is a 90 foot long, 4 foot high supplementary North Dike, also of granite. The dam was built in 1890, and there are no construction drawings or design data extant.

The drainage area is 2.4 square miles and the 14 foot high dam impounds 457 acre-feet. Its size is thus classified as SMALL. Since economic loss through its failure may be appreciable but not excessive, its hazard potential is SIGNIFICANT.

The privately owned dam's condition is FAIR and the structure is stable. However, while there is no immediate concern, several features revealed by this inspection do require attention. The owners, in fact, have recently solicited and received a proposal from a contractor to effect repairs and improvements in a number of areas, partly in response to suggestions by the New Hampshire Water Resources Board (NHWRB). There is evidence of: lateral movement of the wall toward the pond, probably caused by former and existing trees; heavy scouring and erosion adjacent to the outlet flume caused by undirected highway drainage; vandalized protective railing; leaks through the open masonry of the outlet abutments; heavy brush on the downstream side of the highway embankment, with at least intermittent seepage; dislodging of a granite capstone at the downstream culvert outlet; and a cracked

granite header supporting the roof of the culvert.

Hydrological investigations resulted in a Spillway Test Flood of 900 cfs which results in overtopping the main dam by about 1 foot with stop-logs in place, and the North Dike by almost 0.4 feet. With stop-logs removed, the maximum capacity of the spillway is barely 275 cfs.

It is recommended that: the contractor's proposal to the owners for repairs and improvements be submitted to the NHWRB for review and comment; engineering studies be initiated to investigate combinations of providing augmented discharge capacity and of preparing the North Dike and the embankment of Rte. 107 to receive overtopping flows; open joints be sealed to eliminate leakages and that replacement be made of protective railing, dislodged granite block and cracked header. The program will require the cooperation of the New Hampshire Highway Department.

A formal sequenced operational plan for emergencies involving upstream and downstream dam operations should be developed and submitted to the NHWRB for review and comment. The procedure should include a communications plan permitting prompt warning and response.

The recommendations should be put into effect within 1 to 2 years after receipt by the owners of the Phase I Inspection Report.

William S. Zoino, PE
N.H. Registration 5226

James H. Reynolds, PE
Mass. Registration 8044

This Phase I Inspection Report on White's Pond 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.

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

SAUL COOPER, Member
Chief, Water Control 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 reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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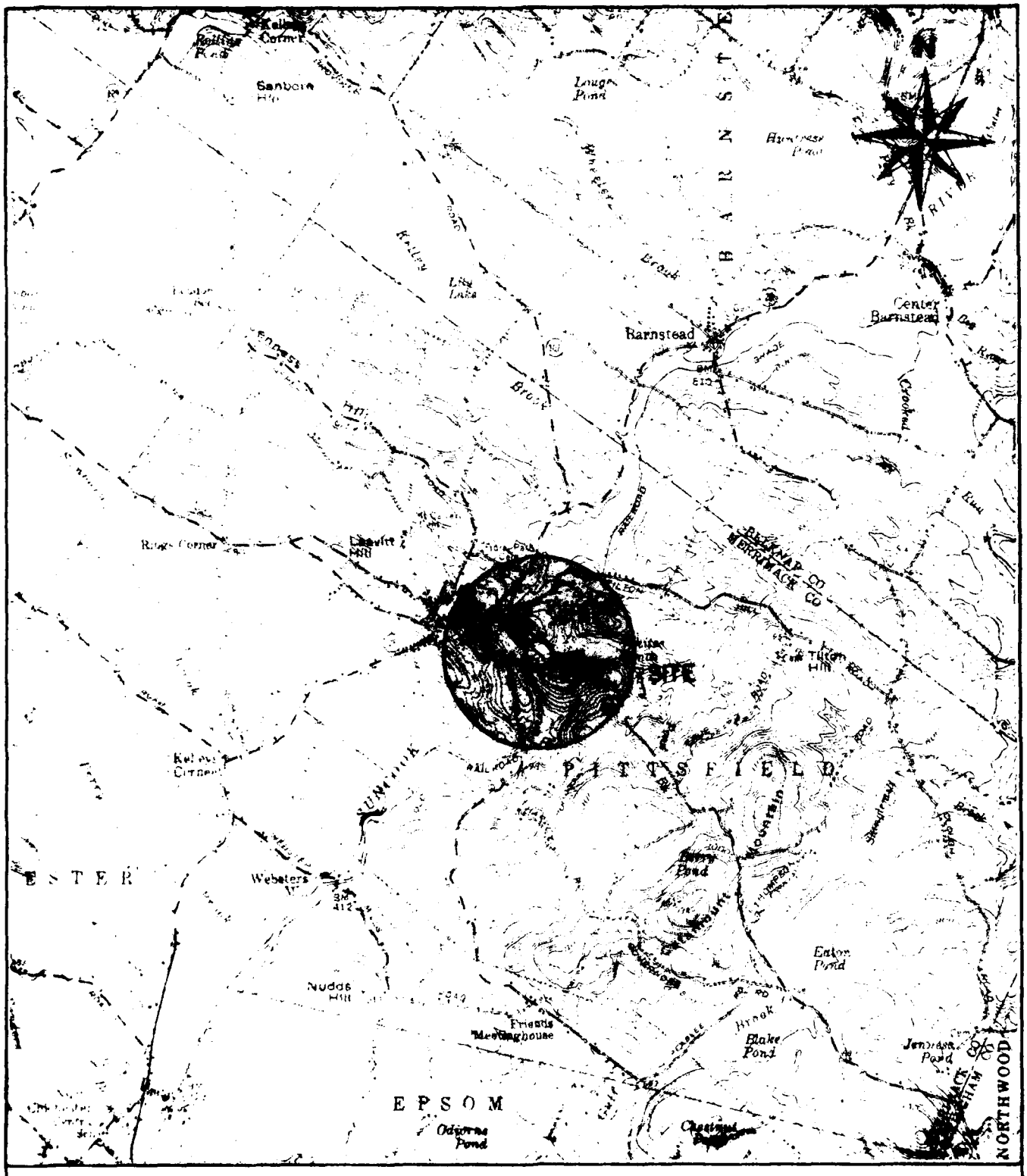
Overview from right abutment

Overview from left abutment



- SCALE -

0 1/2 1 1-1/2 2 miles

FROM: USGS GILMANTON, N.H. QUADRANGLE MAP

FILE NO 2067

GEOTECHNICAL CONSULTANTS

NATIONAL DAM INSPECTION PROGRAM
U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION

WHITE'S POND DAM NH00106
NHWRB 195.07

LOCUS PLAN

JULY 1978

PHASE I INSPECTION REPORT

WHITE'S POND DAM, NH00106

NHWRB 195.07

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 Untied 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. Goldberg, Zoino & Dunnicliff Associates has been retained by the New England Division to inspect and report on selected dams in the State of New Hampshire. Authorization and notice to proceed were issued to Goldberg, Zoino & Dunnicliff Associates under a letter of May 3, 1978 from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0303 has been assigned by the Corps of Engineers for this work.

(b) Purpose

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and prepare the states to initiate quickly effective dam safety programs for non-Federal dams.

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

(c) Scope

The program provides for the inspection of non-Federal dams in the high hazard potential category based upon location of the dams, and those dams in the significant hazard potential category believed to represent an immediate danger based on condition of the dams.

1.2 Description of Project

(a) Location

White's Pond Dam is located in the Merrimack River Basin on State Rte. 107 one mile southeast of Pittsfield, New Hampshire on Berry Brook, a tributary to the Suncook River. It is located on the USGS Gilmanton Quandrangle. See Figures 1 and 2.

(b) General Description

White's Pond Dam and outlet structure consists of a 260 foot long, 14 foot high squared stone granite faced dam, granite spillway, granite walled flume and outlet culvert consisting of stone granite masonry and rubble concrete walls and a combination of granite and reinforced concrete roof. The dam adjoins Rte. 107, which thus becomes an extension of the downstream embankment proper, and under which the spillway discharges in 63 feet long, 13 feet wide masonry culvert.

(c) Size Classification

The 14 foot high dam impounds a maximum of 525 acre-feet and is thus classified as SMALL. The height and impoundment are will below the respective criteria of 25 feet and 1,000 acre-feet established by the "Guidelines" for that category.

(d) Hazard Classification

The dam is located in a rural and agricultural area, and its failure may damage a downstream recreation area, secondary highways, a small industrial park, and may be appreciable, but not excessive, the hazard potential is this considered as not greater than SIGNIFICANT.

(e) Ownership

Earliest known owners from retrieved records were T. Winant of Winsinvale Orchards and in 1934, John G. Winant of Concord, New Hampshire, owner of Maplehurst Fruit Farm, The dam was sold to W. Keenan, circa 1939, and is now owned by the Sisters of the Holy Cross, Fairview Road, Pittsfield, New Hampshire, 03263, Telephone Np. (603) 435-8791.

(f) Operator

The Superintendent of Maintenance for the Sisters of the Holy Cross is Mr. John Stapleton who operates the dam. His office is at the Sister's home, Telephone No. (603) 435-8791.

(g) Purposes of Dam

Purposes are those of conservation and recreation. In addition to directly serving the owners, the impoundment also serves as a source of water for downstream swimming areas.

(h) Design and Construction History

Few informative documents are available and no construction plans whatever appear to exist. The dam was built in 1890. Possible sources of information which were consulted included the New Hampshire Water Resources Board; the New Hampshire Highway Department, Secondary Roads Division; the Town of Pittsfield; the Pittsfield Aqueduct Company; and the Sisters of the Holy Cross.

(i) Normal Operating Procedures

The current owner has not yet had occasion to operate the dam, which in any event, would merely consist of removing stop-logs. Full length dam crest control, formerly effected through flashboards, is no longer operative or practical.

1.3 Pertinent Data

(a) Drainage Areas - 2.4 square miles, hilly, forested

(b) Discharge at Dam Site - See attached Stage-Discharge Curve, Appendix D.

(1) Outlet works (spillway): 275 cfs at 4 feet head, stop-logs out

(c) Elevation (feet above MSL)

(1) Top of dam: 507 (granite blocks crest)

(2) Maximum pool-design surcharge: Unknown

(3) Full flood control pool: Not Applicable

(4) Recreation pool: 505.0 - Assumed normal pond level from USGS map

(5) Spillway crest: 503.25, 505 top of stop-logs

(6) Upstream portal invert diversion tunnel: Not Applicable

(7) Streambed at centerline of dam: 492.6

(8) Maximum tailwater: Unknown

(d) Reservoir

(1) Length of maximum pool - About the same as normal pool length of 3200 feet

(2) Length of recreation pool (normal summer level): 3200 feet

(3) Length of flood control pool: Not Applicable

(e) Storage (acre-feet) - See attached Storage-Elevation Curve, Appendix D

(1) Recreation pool: 457 acre-feet, est.

(2) Flood control pool: Not Applicable

(3) Design surcharge: Unknown

(4) Top of dam: 525

(f) Reservoir Surface (acres)

(1) Top dam: 36± acres

(2) Maximum pool: 36± acres

(3) Flood-control pool: Not Applicable

(4) Recreation pool: 36 acres

(5) Spillway crest: 36 acres

(g) Dam

(1) Type: Double wall dike tied into road embankment

(2) Length: 259 feet

(3) Height: 14.1 feet

(4) Top Width: About 15 feet (dike alone), 76.5 feet including roadway embankment

(5) Side Slopes: Vary

(6) Zoning: Not Applicable

(7) Impervious Core: Unknown

(8) Cutoff: Unknown

(9) Grout Curtain: Not Applicable

(10) Other: North Outlet - see description under item 1.3 (i) (7) below

(i) Spillway

(1) Type: Stone weir with stop-logs

(2) Length of weir: 11.5 feet

(3) Crest elevation: 502.7 feet (Permanent structure)
505.0 feet (top of stop-logs)

(4) Gates: None

(5) Upstream Channel: Shallow Approach from Pond

(6) Downstream Channel: 8 feet x 5 feet Granite box culvert under roadway; irregular, brush clogged channel for 100 feet beyond culvert; then clear to small pond about 500 feet downstream.

(7) General: Emergency spillway located at North Outlet has a length of 90 feet at elevation 507.3 feet.

(j) Regulating Outlets

(1) Invert: 502.7 feet

(2) Size: 11.5 feet long

(3) Description: Removeable stop-log weir normally set at about elevation 505 feet

(4) Control Mechanism: Manual removal of stop-logs

SECTION 2 - ENGINEERING DATA

2.1 Design

While uncomplex, the design of this relatively low head, low storage dam has proven adequate for many years, and the dam will undoubtedly continue to serve satisfactorily given appropriate maintenance. The presence of Rt. 107, incorporated as it is into the dam as a very wide embankment section, and of the 90 foot north dike, does much to mitigate questions of safety, despite the hydraulic implications discussed in Section 5.

2.2 Construction

The initial construction techniques were somewhat crude but as workmanlike as the then state of the art would permit. Again, no data, drawings, or documents appear to exist upon which definitive evaluations could be founded.

2.3 Operation

The owners have come to understand their obligations of maintenance and operation, and are aware that close coordination of operations with operators and owners both upstream and downstream is essential. Nevertheless, it may be desirable if an appropriate state authority would issue to all owner-operators on a given water course a set of coordinated and sequential standing instructions.

2.4 Evaluation (of Data)

As noted earlier the original construction documents and plans are not available, if indeed they still exist. The information herein is necessarily drawn from earlier state inspection documents, sketches and correspondence, supplemented by the recent observations of the inspection team.

Thus, for the combined information from all sources affecting dam evaluation, the availability, adequacy and the validity of the relatively sparse data can only be considered as fair. However, the visual inspection and the dam characteristics are considered as satisfactory bases upon which to form an evaluation.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

(a) General

The double courses of granite, with capstone, which form the dam proper were somewhat unequal in alignment, consistent with early construction techniques (Fig. 3 and Overview Photos). However, displacement pond-ward is evident probably caused by former trees, since removed. One tree, a probable contributor to the movement, still remains. Since the outlet of the dam is located opposite the sag point of Rt. 107 with no controlled drainage, storm runoffs flow towards the flume section and the outlet headwall. This condition has caused surface scour adjacent to the flume walls (Photo 1) and undermining and loss of ground at the northeast wing wall.

Leaks through open masonry joints are evident at both abutments of the outlet works (see Photos 2 and 3). The downstream side of Rt. 107, which is considered as integral to the dam is overgrown. Minor seepage (less than .1 gpm) was observed 22 feet left of the downstream outlet, 3 feet above toe of slope. Considerable oil was contained in the seep, indicating a possible origin in the road surface. The seepage could not be observed on a later inspection June 21.

(b) Appurtenant Structures

(1) Spillway

The spillway structure consists of squared stone granite masonry with unmortared chinking stones (Figures 3, 4, and 5). The spillway is 11.5 feet long by 3.3 feet wide with a 10 foot vertical drop between the spillway sill and the flume invert. A nominal 3 inch by 21 inch timber stop-log is set on top of the spillway and secured by means of restraining angles bolted to the sidewalls of the adjacent flume. The invert of the spillway is 3.7 feet below the top of the granite block facing of the dam. It was observed that continuous seepage is permeating through the second joint coursing of the granite dam facing adjacent to both sides of the spillway; the second capstone joint being below pond level (Photo Nos. 2 and 3).

(2) Flume

The transition flume between the spillway and the culvert is constructed from squared stone granite masonry, and chinking stones laid up dry. The flume width is 11.0 feet and is 7.0 feet long as measured from the downstream side of the spillway to the granite culvert header. Three courses of granite blocks, approximately 6 feet in depth, located between the spillway and the culvert walls on both side walls have been dislodged inward. Joint seepage is prevalent. (See Photo Nos. 2 and 3).

(3) Culvert

The culvert under Rt. No. 107 is approximately 63 feet in length from the granite header adjacent to the flume to the outlet headwall. The culvert is an approximate 15 degree skew with the axis of flow over the spillway. The culvert walls are constructed with a combination of squared stone masonry and chinking stones laid up dry adjacent to the flume, which serves as a transitional section, and parallel cemented rubble stone masonry under the roadway to its channel outlet. The width of the culvert reduces from 11.0 feet at the upstream end to approximately 6.0 feet at the outlet. The roof of the culvert at the upstream end is constructed with granite slabs supported by masonry walls. These granite slabs consist of a granite header, a supplementary granite header at a lower elevation offset to the east (towards Rt. No. 107) by approximately 1.0 foot and an additional granite header offset to the east by an additional 12-inches. The roof of the culvert under the roadway and at the outlet end consists of a reinforced concrete slab. The headwall at the culvert outlet rests on the culvert roof and the adjacent slope. The headwall consists of open joint granite slabs. The southeast wing consists of dry stone masonry. The third granite header from the flume has a transverse crack at mid span. It is apparent that overlap of the second header has precluded failure. The second and first headers appear to be in good condition. There is no evidence of distress or cracks in the cemented rubble stone masonry sidewalls of the culvert. It is in good condition. The reinforced concrete roof slab is in good condition. The headwall at the outlet end of the

culvert has unraveled due to surface erosion. The northeast wing wall has been completely undermined to the extent that a granite slab approximately 6 feet in length, which formed part of the headwall over the culvert has fallen into the brook (See Photo No. 4).

(4) North Dike

The 90 foot long, 4 foot high closure structure on the northside of the pond is, as is the dam proper, constructed of double-wall granite blocks with capstone (Figure 6). It has recently been remortared in several locations, and is in fair condition.

(c) Reservoir Area

The reservoir is located in a shallow basin on Berry Pond Brook, and its shoreline is primarily gently sloping, stable and overgrown with scrub.

(d) Downstream Channel

Scrub timber and marsh growth encroach upon the channel, and considerable debris is located at the culvert outlet beneath Rt. 107.

3.2 Evaluation

The visual inspection is considered as having adequately revealed key characteristics of the dam, as they may relate to its stability and integrity.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures

The operational procedures are somewhat rudimentary, but in suggestion by the State's monitoring Water Resources Board, basic control and maintenance provisions are carried out in good faith by the owners. The owners have recently solicited a proposal from a contractor to effect repairs requested by the State (see Proposal, Appendix B, from John A. Donovan to Sisters of the Holy Cross).

4.2 Maintenance of Dam

The dam has been somewhat neglected, but the Proposal for repairs has now been transmitted to the State Water Resources Board with a schedule for execution. It should be noted that installation of controlled drainage on Rt. 107 by the State Highway Department would mitigate some of the more acute erosional problems.

4.3 Maintenance of Operational Facilities

The stop-logs in the outlet structure are in fair condition, and can be readily removed.

4.4 Warning System

No formal warning system exists, but the operators of Berry's Pond dam upstream and White's Pond are brothers. The frequent communications between the Messrs. Stapleton permit rapid response.

4.5 Evaluation

Operational and maintenance procedures are informal and ad hoc, although responsibily performed. Procedures should be systematized and documented.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

(a) Design Data

The data sources available for the White's Pond Dam include prior inventories and inspections. The basic data on the dam are contained in the New Hampshire Water Resource Boards' (NHWRB) "Inventory of Dams and Water Power Developments" dated July 18, 1934 and the NHWRB's "Data on Dams in New Hampshire" dated April 12, 1932.

The data include an evaluation of the spillway with and without flashboards and indicate a spillway capacity of 260 cfs without flashboards, which is the current condition. However that analysis assumes that the stop-logs are all removed. The dam was inspected in November 1977 by the NHWRB and various maintenance problems were noted. The existing data do not contain any reference to a spillway design flood other than the capacity calculation developed by the NHWRB at an illegible date during the 1930's.

The dam is 259 feet in length with a total height of 14.1 feet. The dam is immediately adjacent to the roadway embankment of Rt. 107. The topwidth including the road embankment is 76.5 feet, whereas the dam alone has a topwidth of approximately 15 feet. The outlet s a weir with manually removeable stop-logs. The width of the weir is 11.5 feet. The drainage area above the dam is 2.37 square miles and the normal surface area of the pond is approximately 36 acres. Additional information on the dam is contained in Section 1.3.

(b) Experience Data

There are no records of flood flows at White's Pond. Conversations with local residents indicated no recollection of the dam ever being overtopped within their memories.

(c) Visual Observations

The dam is immediately adjacent to the Rt. 107 embankment with a swale located between the crest of the dam, a row of granite blocks, and the crest of the highway. As the stream flows over the stop-log weir it

cascades down onto a 8 feet X5 feet granite box culvert which is approximately 63 feet in length. The swale between the two embankments drain into the culvert just downstream of the weir before it passes under the highway. The weir had a total opening of 4.0 feet, but the stop-logs are normally set at 2.1 feet above the bottom or 1.9 feet below the crest of the dam.

A secondary outlet feature of White's Pond is a dike on the northwest shore which prevents flow from normally exiting the pond in that direction. This is on an arm of the pond that extends to the northwest about 1300 feet from White's Pond Dam. The dike is 90 feet in length and has a level crest 2.5 feet above the normal stop-log crest of the dam.

(d) Overtopping Potential

The hydrologic conditions of interest in this Phase I Investigation are those that are required to assess the adequacy of the dam in terms of its overtopping potential and its ability to safely allow an appropriately large flood to pass. This involves investigations to determine how the recommended Spillway Test Flood compares with the dam's discharge and storage capacities. None of the original hydraulic and hydrologic design records were available for use in this study.

Spillway Test Flood (STF) guidelines based on the size and hazard potential classifications of the dam are specified in the "Recommended Guidelines". As shown in table 3 of the "Guidelines", for a dam classified as SMALL in size with a SIGNIFICANT hazard potential, an appropriate STF would be between the 100-year peak flow and one-half the Probable Maximum Flood (PMF).

To determine the 100-year flow an analysis of streamflow gauge records by the U.S. Geological Survey for New Hampshire was utilized. The report entitled "Progress Report on Hydrologic Investigations of Small Drainage Areas in New Hampshire" by Dennis LeBlanc of the U.S. Geological Survey, Water Resource Investigation 78-47, March 1978, provided regression equations to estimate peak flows for various return periods using three independent variables. They are: drainage area in square miles, main channel slope in feet per mile, and a rainfall index for the area which is the 24-hour-2-year peak rainfall. For White's Pond Dam the drainage area used was 2.37 sq. mi., the slope was 169 feet/

mile and the rainfall index was 2.8 inches. The resulting estimate for the 100-year peak inflow to the pond is 396 cfs.

An estimate of the PMF was determined by using the chart of "Maximum Probable Flood Peak Flow Rates" obtained from the Corps of Engineers, N.E.D. White's Pond was considered to have "rolling" topography and a drainage area of about 2.5 square miles. This results in a PMF runoff rate of 2050 cfs/sq.mi. or an upper bound on the SDF of 2429 cfs (one-half PMF = 1/2 x 2050 x 2.37).

The "Recommended Guidelines" suggest that where a range of STF is indicated, the magnitude that most closely relates to the involved risk should be selected. In view of the moderate risk, the dam is placed in the SIGNIFICANT category and an intermediate flood value may reasonably be selected. Given the limits of 396 cfs and 2429 cfs, 1000 cfs was selected as the pond inflow STF, uncorrected to account for surcharge storage.

The Storage-Stage curve used to attenuate the STF was developed based on assuming a pond area of 36 acres and allowing for surcharge storage as the product of depth over the stop-logs and the normal pond area. The curve is contained in Appendix D.

The discharge capacity of White's Pond is dependent on the level of the stop-logs and the lake elevation. It was assumed for the analysis that the stop-logs would not be removed at the time of a major flood due to the lack of on-site equipment. The stop-log weir was evaluated as a weir 11.5 feet long with a coefficient of 3.0. The dam crest was assumed to be a level weir 248.5 feet long with a coefficient of 2.8 and located 1.9 feet above the stop-logs. The north outlet dike is 90 feet long, located 2.5 feet above the stop-logs and with a coefficient of 2.8. The resulting Discharge-Stage curve is contained in Appendix D.

Applying the procedure suggested by the Corps of Engineers, NED, for "Estimating the Effect of Surcharge Storage on Maximum Probable Discharges" results in a final STF of 860 cfs.

As can be seen from the Discharge-Stage Curve this represents a head of 2.85 feet above the stop-log crest. Thus the granite blocks of the main dam are overtopped by approximately 1 foot and the North outlet dike is overtopped by approximately 0.4 feet.

5.2 Hydraulic/Hydrologic Evaluation

White's Pond Dam has a safe spillway capacity of approximatley 90 cfs if the stop-logs are kept at their current elevation. Even if all the stop-logs were removed at the time of a storm the maximum capacity of the spillway would be 275 cfs which would barely handle a 100-year event without overtopping the granite blocks after allowing for surcharge storage. There are several industrial buildings downstream of the White's Pond that could be subject to flooding if the dam failed.

To provide greater protection to White's Pond, localized improvements may be desirable. The area between the dam and highway could be improved to lessen the chance of serious erosion if the granite blocks are overtopped. In fact, major reinforcement of the highway should be investigated to determine the extent of heavy duty paving and riprap necessary to permit the highway to receive the overtopping flows, and serve as a broad-crested weir. The possibility of lowering the north outlet dike and providing an emergency spillway capacity at that location should be investigated, as should the possibility of augmenting outlet provisions at the main dam.

5.3 Downstream Dam Failure Hazard Estimates

The flood hazards in downstream areas that would result from a failure of the dam were estimated through the use of the procedure set forth in "Rule of Thumb Guidelines for Estimating Downstream Dam Failure Hydrographs", Corps of Engineers, NED, April 1978. This procedure allows the attenuation of dam failure hydrographs to be accounted for in computing flows and flooding depths in downstream areas. These calculations take into account the hydraulic and storage characteristics of the stream reaches downstream of the dam.

For the purposes of these calculations it was assumed that failure of the dam would occur when the granite blocks along the crest were overtopped. This is equivalent to an elevation 1.9 feet above the current stop-log weir.

Gas House Brook was divided into two reaches for consideration. The first reach extends 1060 feet from the dam to the second bridge downstream, Fairview Road. The second reach extends 4000 feet from Fairview Road to the third bridge, South Main Street.

The results of the calculations indicate an approximate flooding depth of 5.9 feet in the first reach. This is sufficient to cause flooding on a limited number of structures near the junctions of Clark Road and Fairview Road, but the flooding would be unlikely to cause severe structural damage, given the elevated positions of most structures.

In reach two the average predicted flood depth increases to 8.1 feet, but the distance from the stream to adjacent structures is sufficient to limit the damages to some flooding to the back of property along South Main Street.

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

(a) Visual Observations

There are no design data available for review of the structural stability of the dam and appurtenant structures. The field investigations and findings do not indicate any displacements and/or distress indices of such magnitude as to warrant structural stability calculations based on assumed sectional properties and technical values.

(b) Design and Construction Data

According to the "Inventory of Dams in the U.S.A." dated 12 March 1974, the dam was completed in 1890. As noted earlier, an intense data search in several agencies failed to uncover basic documentation on design and construction.

(c) Operating Records

Not available.

(d) Post Construction Changes

Unknown.

(e) Seismic Stability

Seismic Zone 2 - Not Applicable.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

(a) Condition

White's Pond dam is in FAIR condition, is in no immediate danger and is stable. Nevertheless, the dam proper will be overtopped by the Spillway Test Flood (STF). Preparation of the highway and highway embankment to receive the overtopping flows, with augmented discharge works, will improve the dam's safety.

(b) Adequacy of Information

The most critical information that is unavailable is that associated with the original design, the zoned cross-section of the dam, its foundations, and the materials used. However, the presence of the paved Rte. 107, would be the governing factor in the event of dam overtopping, with discharge relief offered by the north dike. These considerations indicate that the information available is adequate for evaluation.

(c) Urgency

The repairs commented upon herein, should desirably be put in hand in the near term, within 1 to 2 years from date of owner's receipt of the Phase I Inspection Report.

(d) Need for Additional Information

At this time, there is no evident need for additional information.

7.2 Recommendations

The Proposal of Appendix B-9, submitted to the owners for repairs should be implemented; the North Dike should be prepared to serve as an emergency spillway; the highway should be prepared to receive overtopping flows; improved discharge provisions beneath the highway should be initiated to investigate relative roles and configurations of an improved north dike and of augmented outlet works at the main dam. The studies should consider the supplementary solution of reinforcing the highway embankment by heavy paving and riprapping to permit it to serve as a broad crested weir during overtopping.

(1) Dam

The granite joints must be effectively sealed in order to prevent seepage. This seepage, particularly during cold weather conditions, has progressively caused the block coursing in the flume to deflect outward. Progressive deflection will unravel the flume walls which could conceivably result in spillway failure.

Undergrowth should be removed from downstream side at Rte. 107 and frequent reinspection should be made to detect incipient seepage, particularly 20 feet left of downstream outlet.

Railing around spillway should be replaced. The marked tree and two stumps should be removed.

(2) Flume Side Walls

The flume side walls must be removed and reset to their original condition. Controlled weeps are desirable in order to effectively pass seepage in order to avoid future wall displacement. Augmented outlet works are required to discharge the STF but alternatively, subsequent studies may indicate the feasibility of reinforcing the highway to accomodate overtopping flows.

(3) Culvert

The distressed granite header must be replaced in order to preclude structural failure which could block the outlet of White's Pond. A major obstruction in the outlet structure could result in a roadway washout and undermining of culvert sidewalls. Increased culvert capacity will be required to discharge the STF, unless highway reinforcement proves a viable alternative.

(4) Surface Scour

Surface scour should be controlled on the highway approaches by means of paved waterways for directional flow in order to preclude surface erosion adjacent to both flume walls on the west side of the roadway and also on the northeast side of roadway.

7.3 Remedial Measures

(a) Alternatives

Pending results of the recommended studies, the breaching of White's Pond dam, integrated as it is in

the highway, is not a viable solution. Thus, options are limited to providing additional discharge capacity, or to preparing the road to accept overtopping flows.

(b) O & M Maintenance

A definite schedule of preventive maintenance items should be developed by the owners and submitted to the New Hampshire Water Resources Board for review and comment. In addition to conventional items under control of the owners, it is recommended that the State Highway department should also review the feasibility of preparing the highway to receive the overtopping STF, permitting it to act in effect as a broad crested weir.

A formal sequenced operational plan for emergencies involving upstream and downstream dam operations should be developed and submitted to the NHWRB for review and comment. The procedure should include a communications plan permitting prompt warning and response.

APPENDIX A

VISUAL INSPECTION CHECK LISTS

INSPECTION TEAM ORGANIZATION

Date: 23 May 1978 - 11:30 A.M.
NH00106
WHITE'S POND DAM
Pittsfield, New Hampshire
Suncook River
NHWRB 195.07

Weather: Sunny, warm

Inspection Team

James H. Reynolds	Goldberg, Zoino, Dunnicliff & Associates, Inc. (GZDA)	Team Captain
William S. Zoino	GZDA	Soils
Nicholas A. Campagna	GZDA	Soils
Andrew Christo	Andrew Christo Engineers, Inc.	Structural & Concrete
Paul Razgha	Andrew Christo Engineers, Inc.	Structural & Mech.
Richard L. Laramie	Resource Analysis, Inc.	Hydrology

State Official

Gary Kerr, New Hampshire Water Resources Board

Owner's Representatives

John Stapleton, Maint. Supt.; Sisters of the Holy Cross

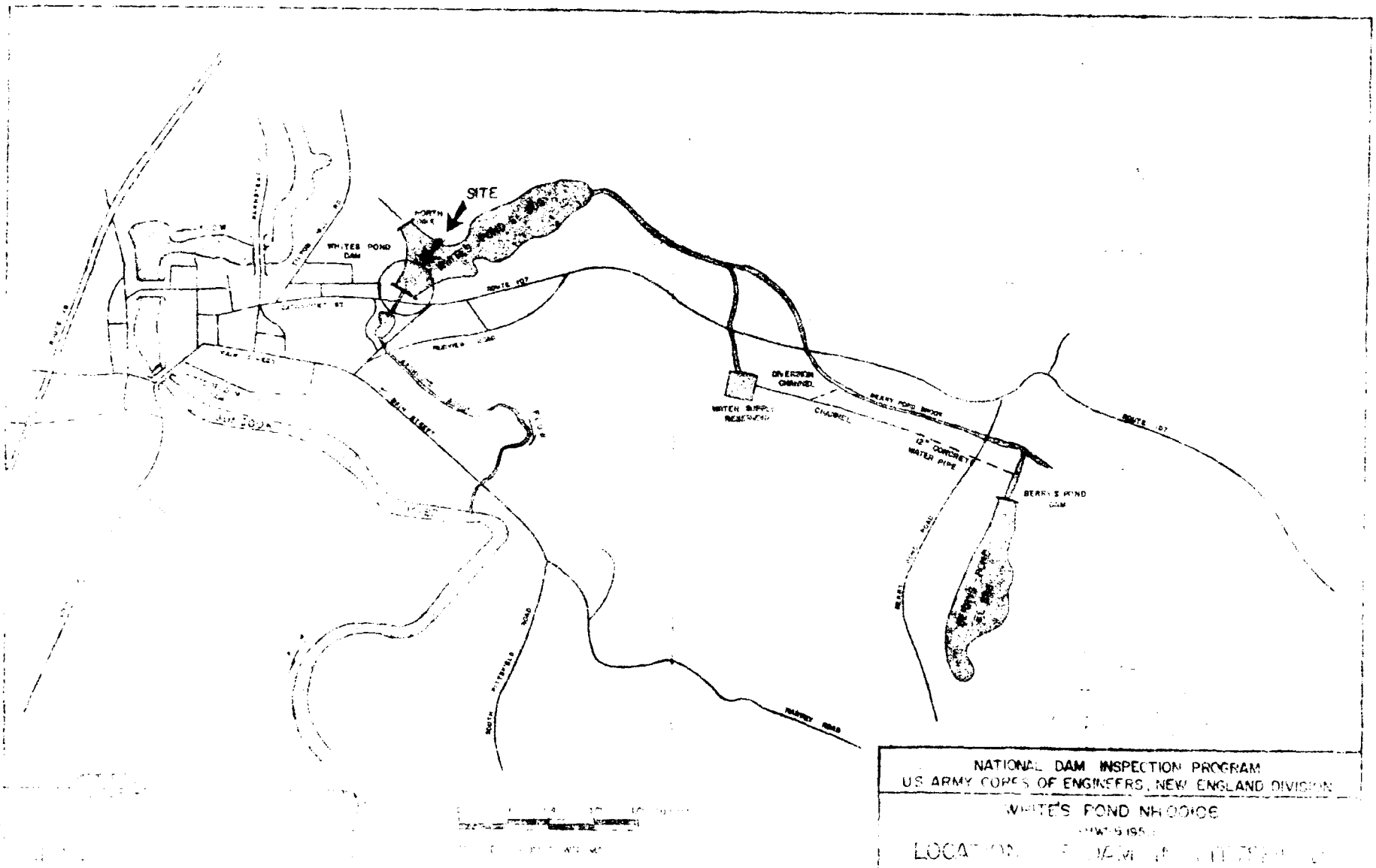
Sr. Louise Torpey; Sisters of the Holy Cross

TEAM MEMBERS CHECK LISTS FOR VISUAL INSPECTION		
AREA EVALUATED	BY	CONDITION
DAM & HIGHWAY EMBANKMENT		
Pavement Condition	MAC	Fair, some cracking
Movement or Settlement of Crest		None
Lateral Movement & Horizontal Alignment		Displacement pondward by trees
Condition at outlet structure		Erosion from highway surface drainage
Trespassing on Slopes		Abuts public way
Unusual Movement or Cracking at or near Toes		None
Unusual Embankment or Downstream Seepage		Only seepage 0.05 gpm, 20' left of downstream outlet, 5 feet up from toe on 5/23. Not discernible on 6/21/78.
Piping or Boils		None
Foundation Drainage Features		Unknown
Toe Drains		Unknown
Instrumentation System		None

TEAM MEMBERS CHECK LISTS FOR VISUAL INSPECTION		
AREA EVALUATED	BY	CONDITION
NORTH DIKE		
General		Fair
Granite Blocks		Recently remortared
Outlet Channel		In three separate loosely placed rubble walled channels through marsh
CULVERT AND HEADWALLS		
Walls		No visible distress - good condition
Granite Headers		The third granite header has a transverse crack at mid span. The first and second headers appear to be in good condition
Roof - Reinforced Conc. Slab		
General Condition		Good
Rust or Staining		Not Visible
Spalling		Not Visible
Visible Reinforcing		Not Visible
Seepage or Efflorescence		None
Headwall at Outlet End		
Alignment and Settlement		Wingwalls undermined due to surface erosion
Stone Dislodging		The northeast wingwall completely undermined, a granite slab approx. 6' in length has fallen into the brook
Floor of Culvert		
Upstream end		Good
Downstream end		Good
Obstructions		Debris in the outlet end

TEAM MEMBERS CHECK LISTS FOR VISUAL INSPECTION		
AREA EVALUATED	BY	CONDITION
SPILLWAY AND GRANITE FACING OF THE DAM		
General Condition		Fair, but repairs needed.
Mortared Joints		Mortar has been washed out
Stone Dislodging		Not extensive
Seepage		Continuous seepage visible through the second joint coursing adjacent to both sides of spillway. It can be assumed that seepage does exist throughout granite facing of the dam
Stop-logs including supports		Good
Spare stop-logs		Not in evidence on the Dam site
FLUME		
General Condition Stone dislodging		In need of repair Some of the granite blocks dislodged inward
Seepage		Seepage through joints in evidence
OUTLET CHANNEL		
Trees overhanging Channel		Encroachment and overhang
Condition of Discharge Channel		Debris at exit from culvert
Rubble Walls		Debilitated, displaced

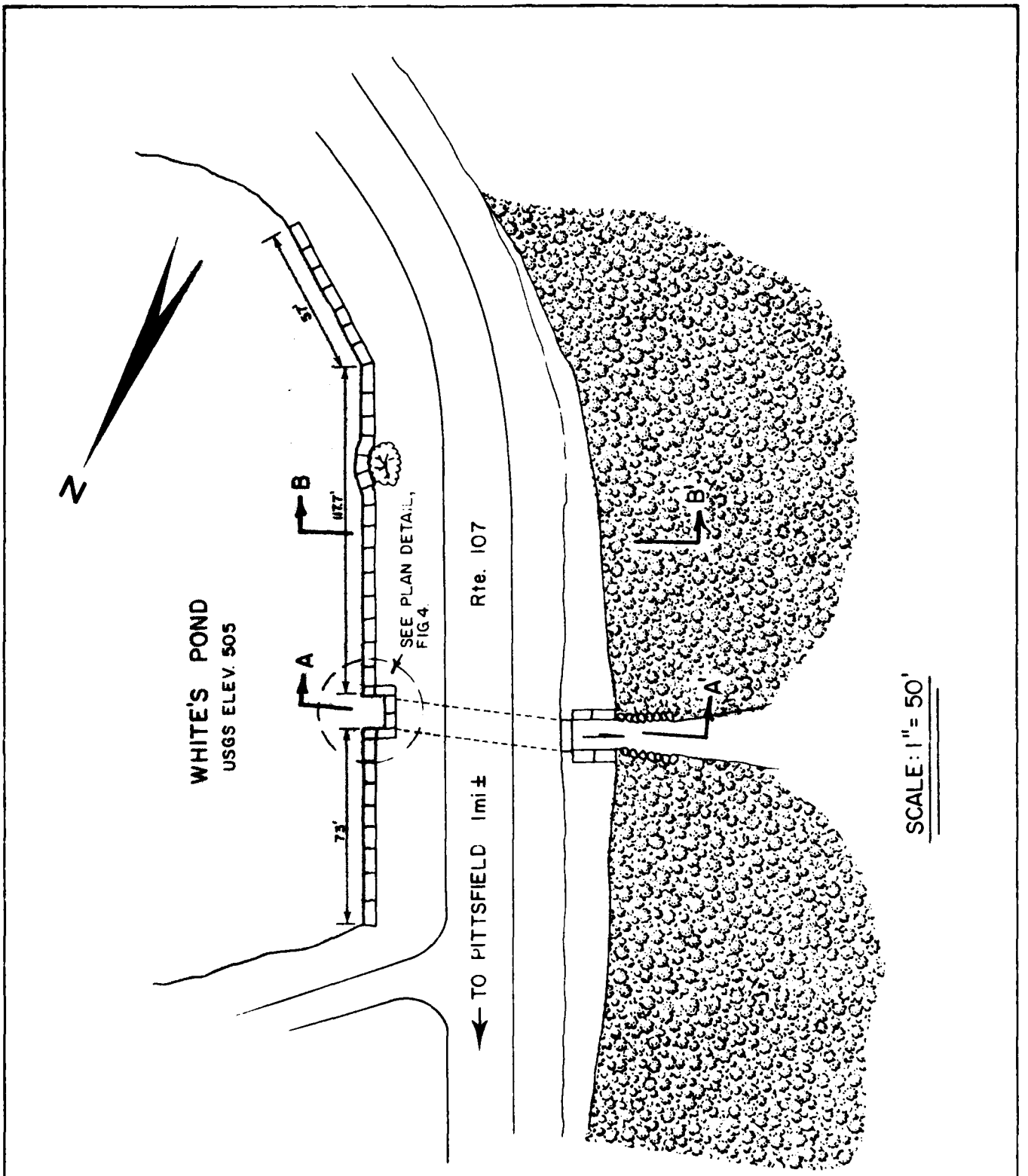
Appendix B



NATIONAL DAM INSPECTION PROGRAM
U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION

WHITE'S POND NH 00106

LOCATION



FILE No 2067

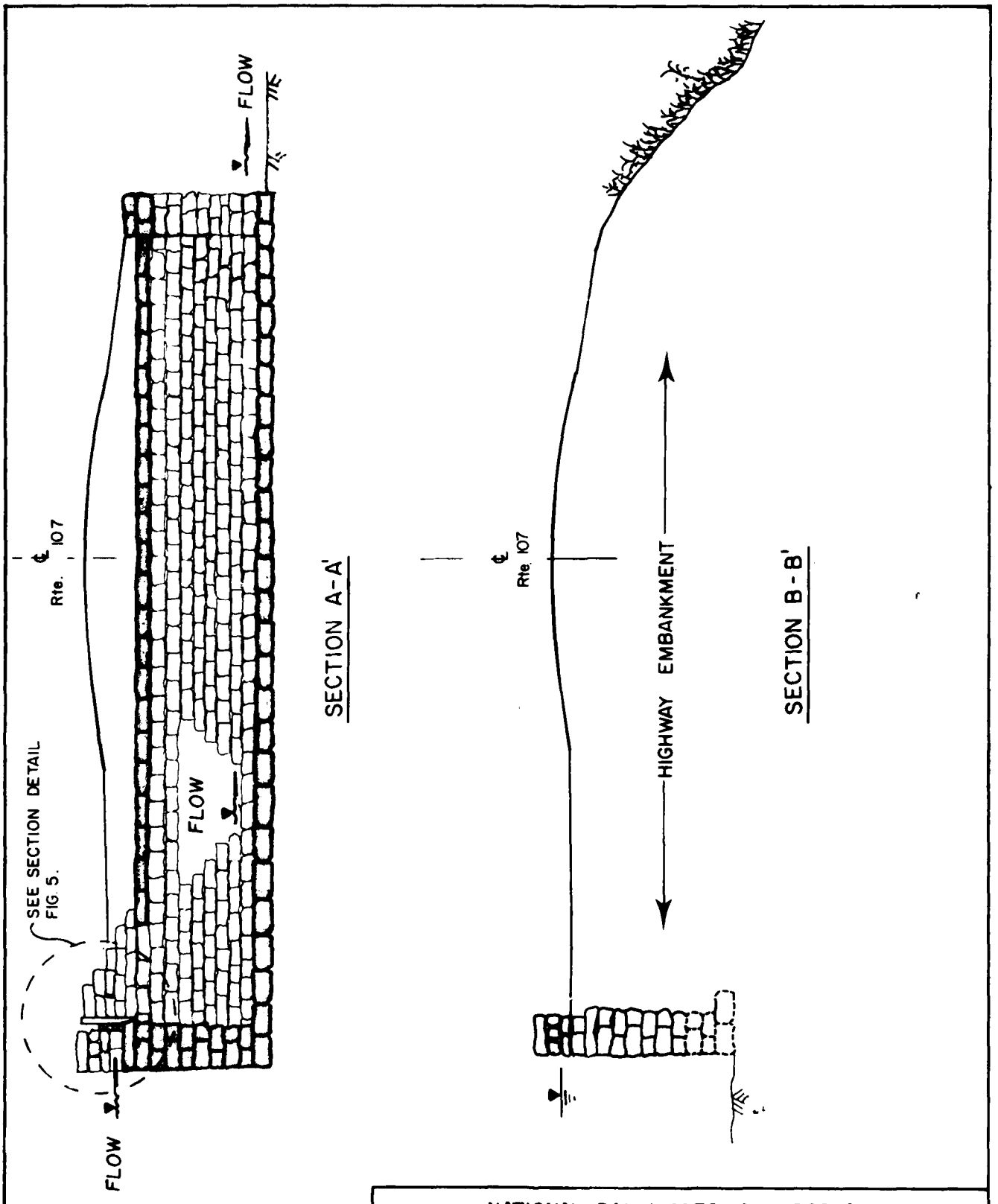
GEOTECHNICAL CONSULTANTS

NATIONAL DAM INSPECTION PROGRAM
U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION

WHITE'S POND NH 00106
NHWRB 195.07

PLAN OF DAM

JULY 1978 | SCALE AS NOTED | FIG. 2



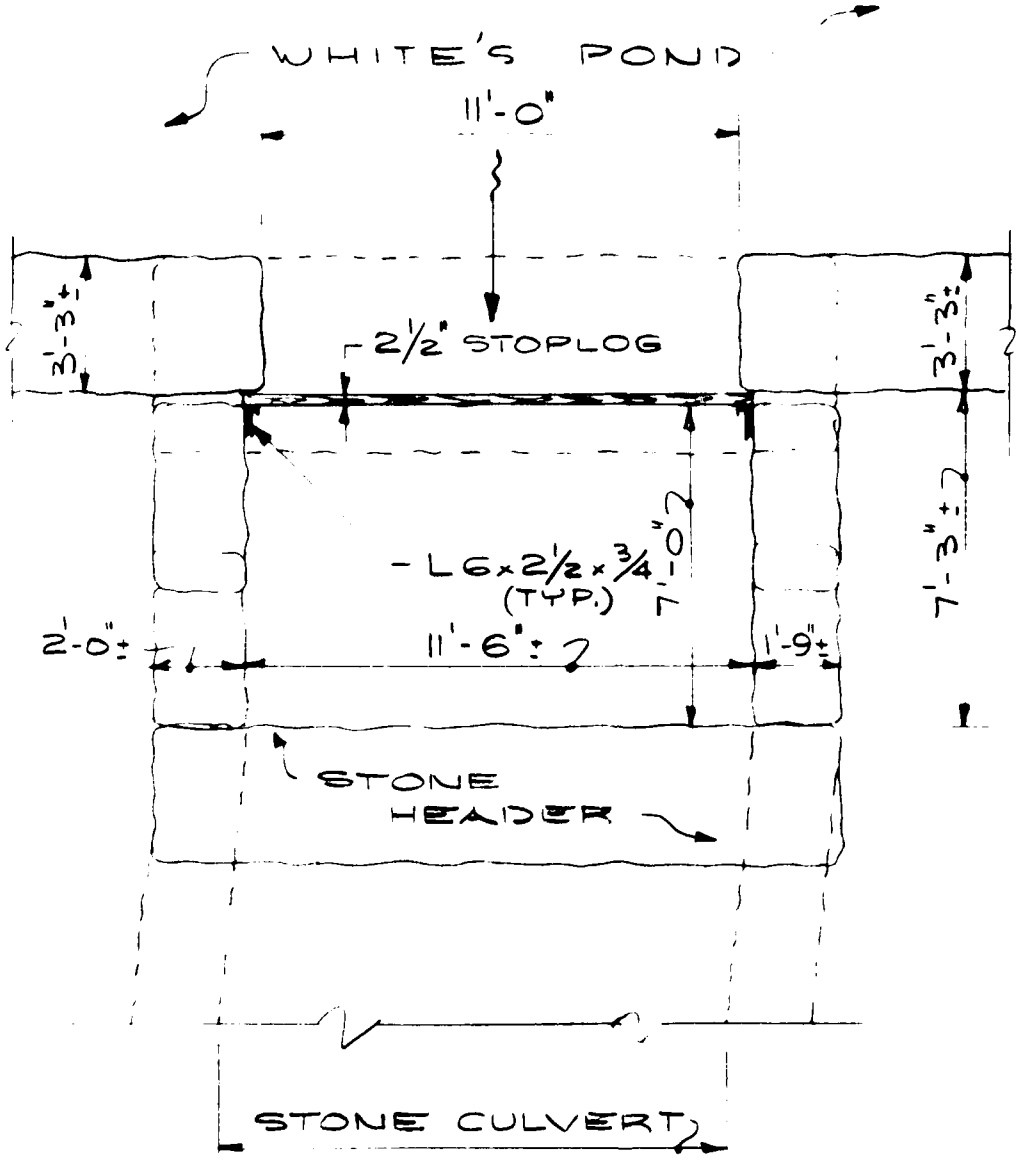
FILE No 2067

GEOTECHNICAL CONSULTANTS

NATIONAL DAM INSPECTION PROGRAM
U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION

WHITE'S POND NH00106
NHWRB 195.07
SECTIONS

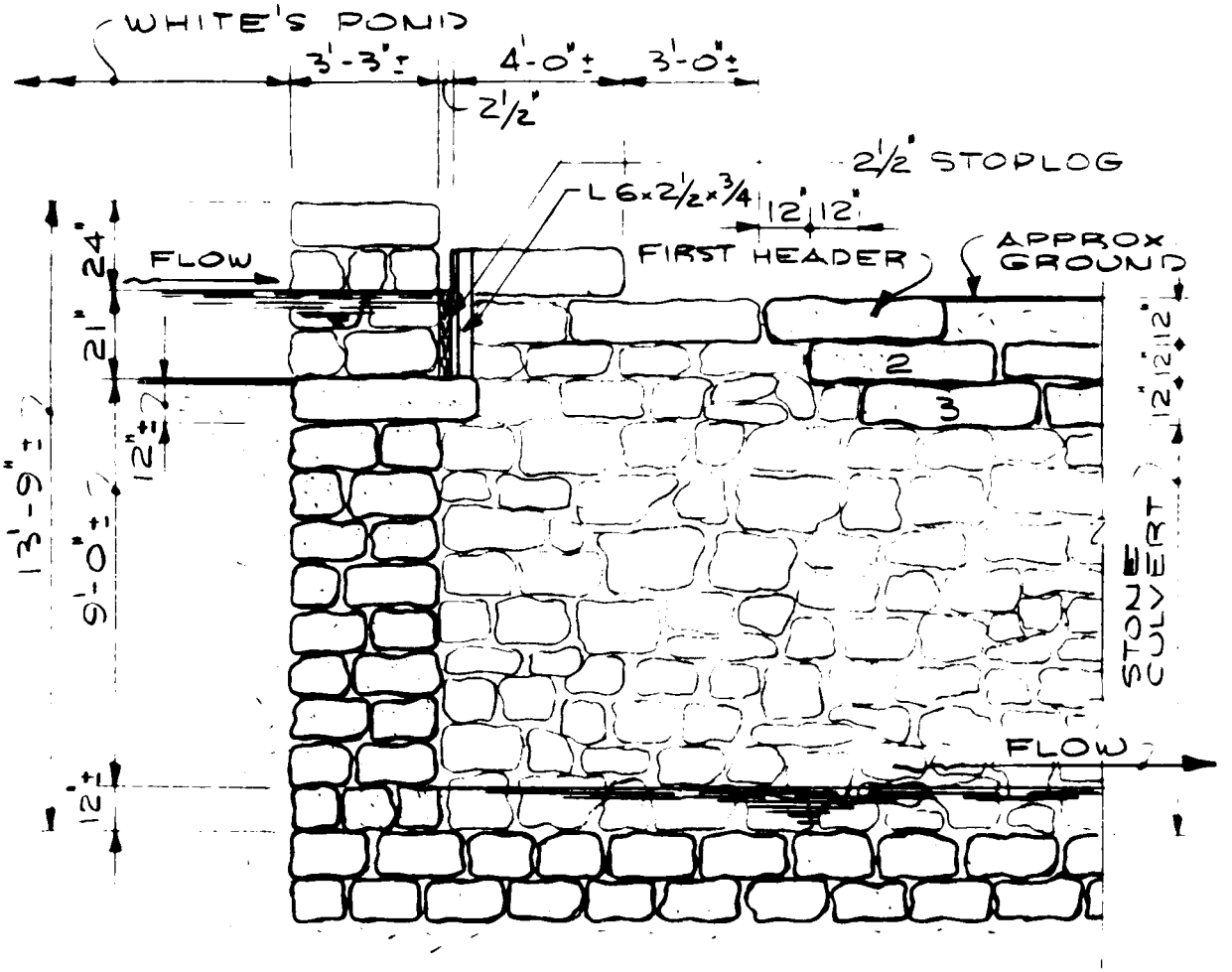
JULY 1978 SCALE: 1"=10' FIG. 3



PLAN DETAIL
SCALE: ¼" = 1'-0"

NATIONAL DAM INSPECTION PROGRAM
U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION

WHITE'S POND NH00106
NHWRB 195.07
PLAN DETAIL, OUTLET STRUCTURE
JULY 1978 SCALE: AS NOTED FIG. 4



SECTION DETAIL

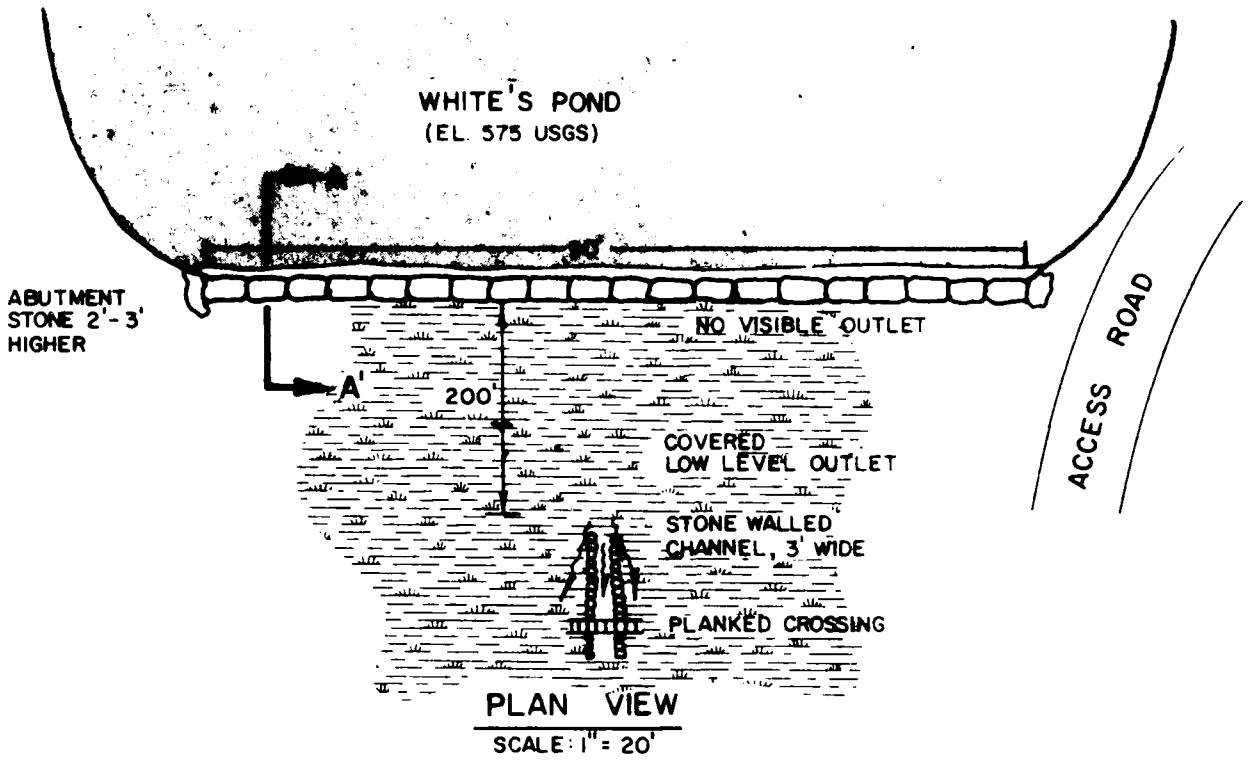
SCALE: ¼" = 1'-0"

NATIONAL DAM INSPECTION PROGRAM
U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION

WHITE'S POND NH 00106
NHWRB 195.07

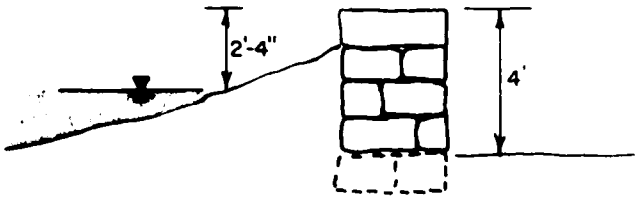
SECTION DETAIL, OUTLET STRUCTURE

JULY 1978 SCALE AS NOTED FIG. 5



PLAN VIEW

SCALE: 1" = 20'



SECTION A-A'

SCALE: 1"=10'

FILE No 2067

GEOTECHNICAL CONSULTANTS

NATIONAL DAM INSPECTION PROGRAM
U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION

WHITE'S POND NH 00106
NHWRB 195.07

PLAN & SECTION, NORTH DIKE

JULY 1978 SCALE: AS NOTED FIG. 6

The following is a list of records which are on file at the New Hampshire Water Resources Board in Concord, New Hampshire and are not included in this report:

(a) New Hampshire Water Resources Board Inspection Report, November 28, 1977

(b) Photographs from the Army Corps of Engineers Dam Inventory Program, March 12, 1974

(c) New Hampshire Water Control Commission Report on Dam Inspection, August 14, 1950

(d) New Hampshire Water Control Commission Data on Reservoirs and Ponds in New Hampshire, August 3, 1939

(e) New Hampshire Water Control Commission Data on Dams in New Hampshire, April 28, 1939

(f) New Hampshire Water Resources Board Inventory of Dams and Water Power Development, July 18, 1934

white's Pond

JOHN H. DONOVAN
Dozing, Sewage Systems, Paving
42 Catamount Street
PITTSFIELD, N H 03263
Phone 435-8816

PROPOSAL SUBMITTED TO: Sisters of Holy Cross	PHONE: 435 8791	DATE: May 8, 1978
STREET: Fairview Rd.	JOB NAME: Repairing dam	
CITY, STATE AND ZIP CODE: Pittsfield, New Hampshire 03263	JOB LOCATION: White's Pond - Pittsfield, N. H.	
ARCHITECT	DATE OF PLANS	JOB PHONE

We hereby submit specifications and estimates for

(1) Replacing granite slabs in spillway

(2) Digging out behind granite wall - ten feet back from spillway on both sides and reinforcing with twelve inch concrete wall

(3) Digging out along spillway wall on both sides and reinforcing with twelve inch concrete wall

(4) Replacing railing around spillway

(5) Removing tree and two stumps

We Propose hereby to furnish material and labor — complete in accordance with above specifications, for the sum of:

Thirty-five hundred dollars ($ 3,500.00)

Payment to be made as follows:

Entire sum due upon completion of work.

Any alteration or deviation from the above specifications involving extra costs will be executed only upon written orders, and will become an extra charge over the sum mentioned in this contract.

State of New Hampshire

WATER RESOURCES BOARD

37 Pleasant Street

Concord, N.H. 03301

TELEPHONE 271-3406

4/21

March 21, 1978

CERTIFIED MAIL

John Stapleton
c/o Sisters of the Holy Cross
Fairview Road
Pittsfield, NH 03263

Dear Mr. Stapleton:

We have recently been advised that the Sisters of the Holy Cross are the owners of the dam at Whites Pond (#195.07). This being the case, subsequent correspondence regarding the dam inspection will be directed to you for reply.

The above mentioned dam under the provisions of RSA Chapter 482, Sections 8 through 15, copy enclosed, was inspected on the 28th of November, 1977, by an engineer of the New Hampshire Water Resources Board. This dam is classified in the files of this office as a menace structure because of its location upstream of populated areas. As such, it must be maintained in a manner not to endanger public safety nor become a dam in disrepair.

As a result of this inspection, it is noted that a couple of items of maintenance or repair are in need of attention and so annotated here:

1. There is one tree on the dam that needs to be removed. This is to prevent possible damage to the embankment or structure by the roots or by an entire tree being uprooted.

2. Leaks exist in both abutments just downstream of the spillway. The cause of these leaks need to be determined with appropriate measures taken to insure the stability of the dam.

Because this dam is classified as a menace structure, we require a schedule of your proposed repairs within a month's time. If you have any questions, please contact us at your convenience.

Very truly yours,

George M. McGee, Sr.
Chairman

GMMG:GK:njk

State of New Hampshire

WATER RESOURCES BOARD

37 Pleasant Street

Concord, N.H. 03301

TELEPHONE 271-3406

January 10, 1978

Mr. Robert S. Charron, Chairman
Board of Selectmen
Town Hall
Pittsfield, New Hampshire 03263

Dear Mr. Charron:

Your Board's dam under the provisions of RSA Chapter 482, Sections 8 through 15, copy enclosed, was inspected on the 28th of November, 1977, by an engineer of the New Hampshire Water Resources Board. This dam (#195.07 Whites Pond) is classified in the files of this office as menace structure because of its location upstream of populated areas. As such, it must be maintained in a manner not to endanger public safety nor become a dam in disrepair.

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2. Leaks exist in both abutments just downstream of the spillway. The cause of these leaks need to be determined with appropriate measures taken to insure the stability of the dam.

Because this dam is classified as a menace structure, we require a schedule of your proposed repairs within a month's time. If you have any questions, please contact us at your convenience.

Very truly yours,

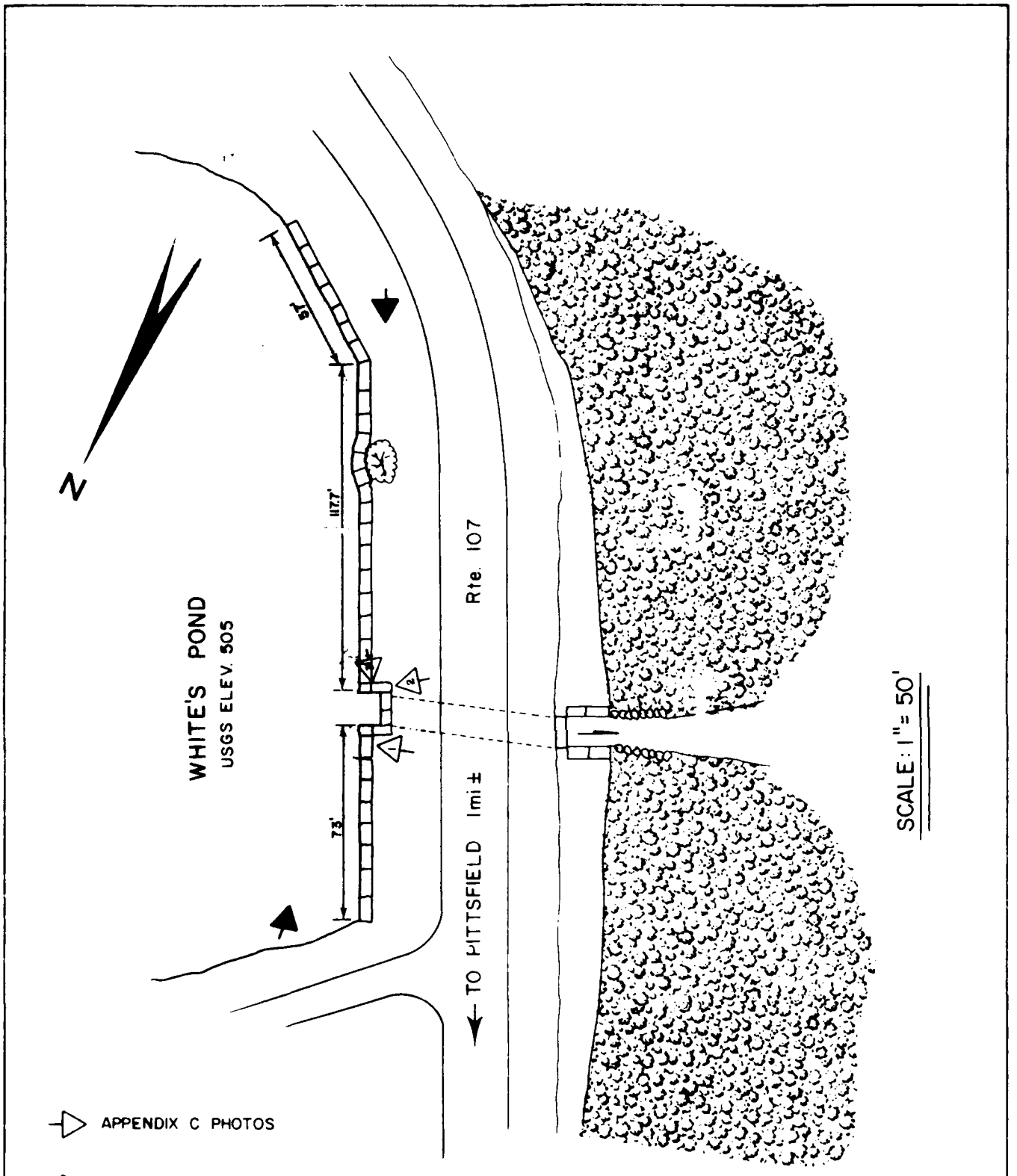
George M. McGee, Sr.
Chairman

GMMG/GK/njk

Enclosure

APPENDIX C

SELECTED PHOTOGRAPHS



FILE No. 2067

GEOTECHNICAL CONSULTANTS

NATIONAL DAM INSPECTION PROGRAM
U.S ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION

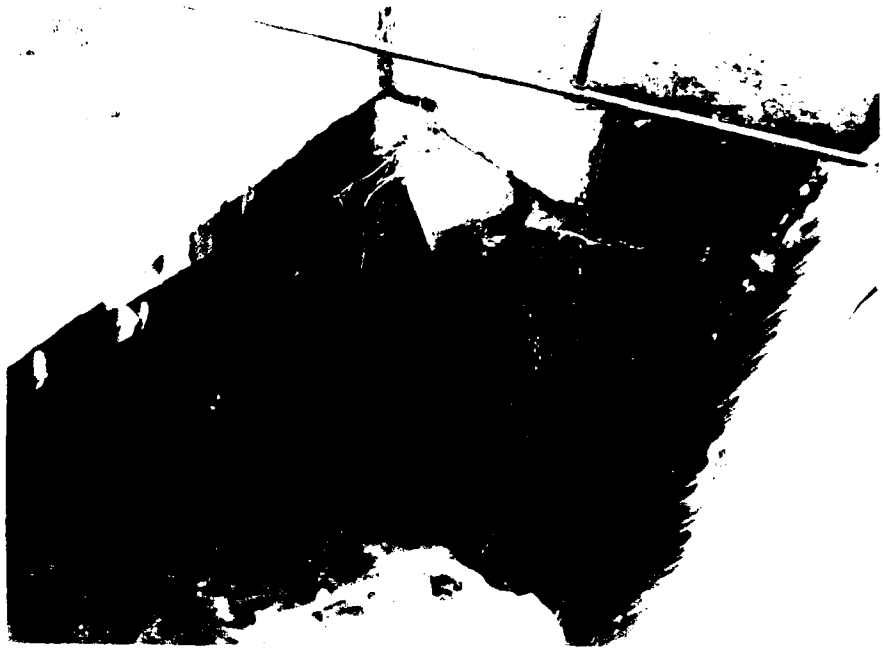
WHITE'S POND NH 00106
NHWRB 195.07

LOCATION AND ORIENTATION OF PHOTOS

JULY 1978 SCALE AS NOTED

1. Leaks through open joints in granite blocks adjoining right side of spillway

2. Leaks through open joints in granite blocks adjoining left side of spillway



3. Spillway from left side showing leaks through masonry

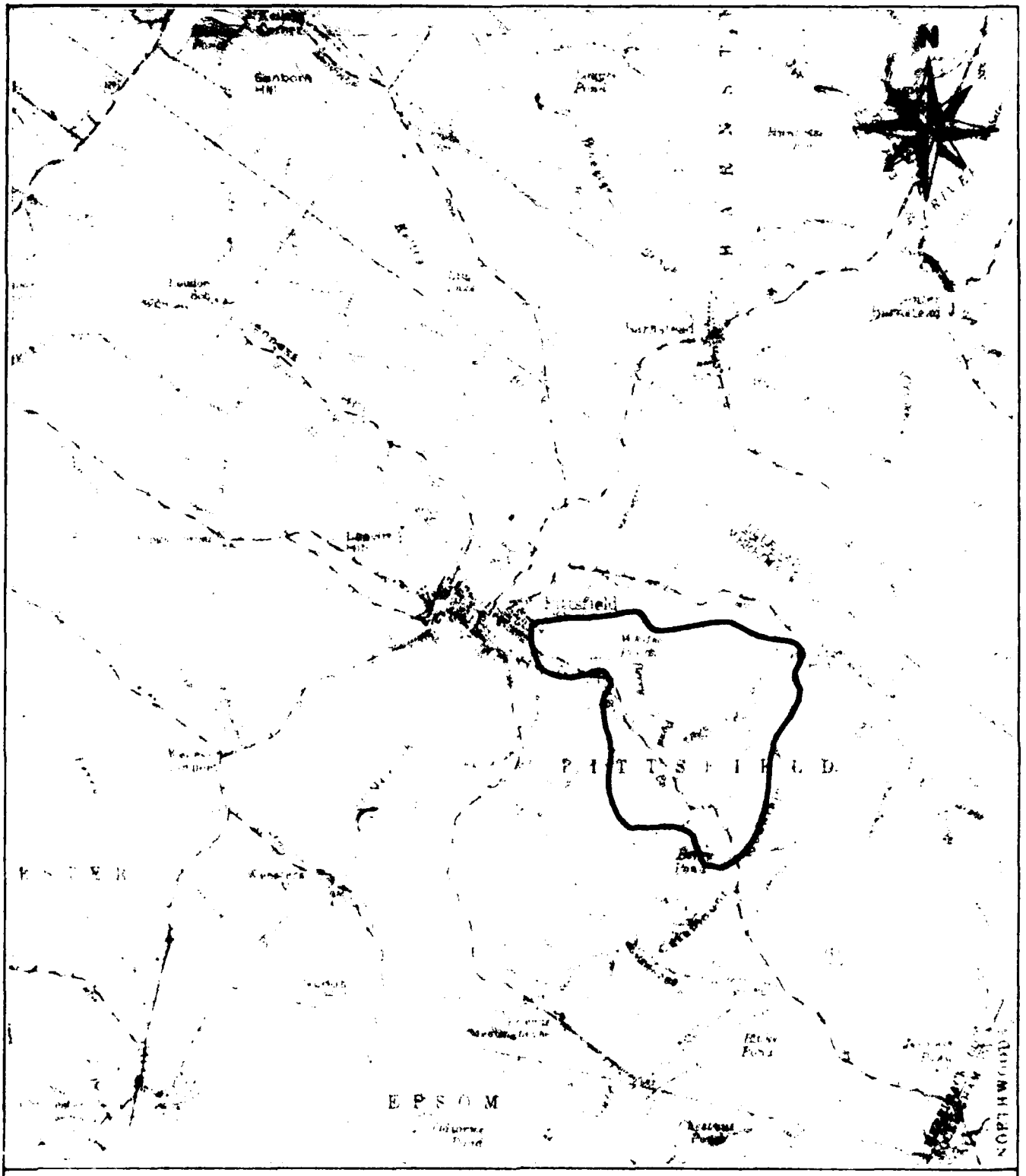
4. Downstream outlet beneath Route 107

APPENDIX D

HYDROLOGIC & HYDRAULIC COMPUTATIONS

FOR

WHITES POND DAM



- SCALE -

0 1/2 1 1-1/2 2 miles

FROM USGS GILMANTON, N.H. QUADRANGLE MAP

GEOTECHNICAL CONSULTANTS

FILE No 2067

NATIONAL DAM INSPECTION PROGRAM

U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION

WHITE'S POND DAM NH00106

NHWRB 195.07

DRAINAGE AREA

JULY 1978

DAMS 148 DWWood 6-19-78 1 of 15

WHITES POND DAM # 7

SIZE CLASSIFICATION = SMALL

HAZARD CLASSIFICATION = SIGNIFICANT

DOWNSTREAM OF WHITES POND THERE IS SUFFICIENT COMMERCIAL DEVELOPMENT TO RATE A SIGNIFICANT CLASSIFICATION

SPILLWAY DESIGN FLOOD: 100 YR TO ½ PMF

FOR 100 YR FLOW WE'LL USE LEBLANC'S REGRESSION EQN'S FOR N.H., USGS WATER RES. INVEST. 78-47.

AREA = 2.37 mi^2 (PLAT), NOT LISTED IN USGS DATA

SLOPE = 3" TOTAL LENGTH, 1" = 1 mi

EL. AT .3" = 505

EL. AT 2.55" = 665

$\frac{665-505}{2.55-.3}$ = 169 ft/mi

RAINFALL INDEX I = 2.8" USED FOR SUNCOOK GAGE 089500 IN REGRESSION

$$P_{100} = 0.55 A^{1.05} S^{.56} I^{2.72}$$

$$= 0.55 (2.37)^{1.05} (169)^{.56} (2.8)^{2.72}$$

$$P_{100} = 396 \text{ cfs}$$

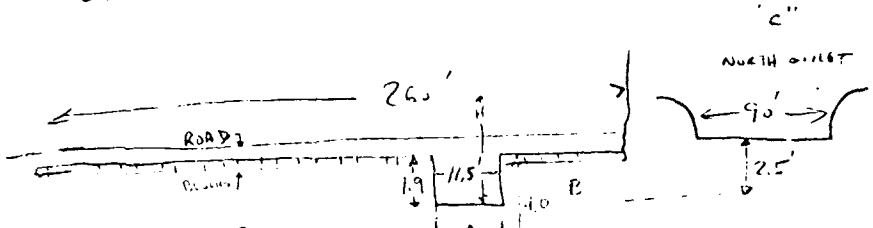
FOR PMF: FROM COE CURVES FOR "ROLLING", DA: 2.5 SMI

2050 cfs/sq mi

$$\tfrac{1}{2}\text{PMF} = \tfrac{1}{2}\left[2.37(2050)\right] = 2429 \text{ cfs}$$

FOR SDF WE SHALL USE 1000 cfs

STAGE DISCHARGE RATING CURVE



$$Q = C_A L_A H^{B\,3/2} + C_B L_B (H-1.9)^{3/2} + C_C L_C (H-2.5)^{3/2}$$

STOP-LOGS ASSUMED TO BE IN PLACE

$$Q = 3.0(11.5)H^{3/2} + 2.8(248.5)(H-1.9)^{3/2} + 2.8(90)(H-2.5)^{3/2}$$

```
LIST
100 REM STAGE DISCHARGE CALC FOR WHITES POND DAM JOB 148
110 PAGE
120 C1=3
130 C2=2.8
140 E=1.5
141 PRINT "TOTAL DISCHARGE FROM WHITES POND AS FUNC OF HEAD"
145 PRINT USING 146:
146 IMAGE // 2T"HEAD"30T"DISCHARGE"
147 PRINT USING 148:
148 IMAGE 10T"TOTAL    Q1        Q2        Q3"
150 FOR H=1 TO 3 STEP 0.1
160 Q1=C1*11.5*H↑E
170 Q2=0
180 IF H<=1.9 THEN 200
190 Q2=C2*248.5*(H-1.9)↑E
200 Q3=0
205 IF H<=2.5 THEN 280
210 Q3=C2*90*(H-2.5)↑E
280 Q7=Q1+Q2+Q3
285 PRINT USING 295:H,Q7,Q1,Q2,Q3
295 IMAGE 2T,2D.2D,8D,8D,8D,8D
300 NEXT H
310 END
```

TOTAL DISCHARGE FROM WHITES POND AS FUNC OF HEAD

HEAD	DISCHARGE			
	TOTAL	Q1	Q2	Q3
1.00	35	35	0	0
1.10	40	40	0	0
1.20	45	45	0	0
1.30	51	51	0	0
1.40	57	57	0	0
1.50	63	63	0	0
1.60	70	70	0	0
1.70	76	76	0	0
1.80	83	83	0	0
1.90	90	90	0	0
2.00	120	98	22	0
2.10	167	105	62	0
2.20	227	113	114	0
2.30	296	120	176	0
2.40	374	128	246	0
2.50	460	136	323	0
2.60	560	145	408	8
2.70	673	153	498	23
2.80	797	162	594	41
2.90	930	170	696	64
3.00	1071	179	803	89

DAMS 148 WHITES POND #7 6-26-75 DWG 5 of 15

STORAGE / STAGE RELATIONSHIP

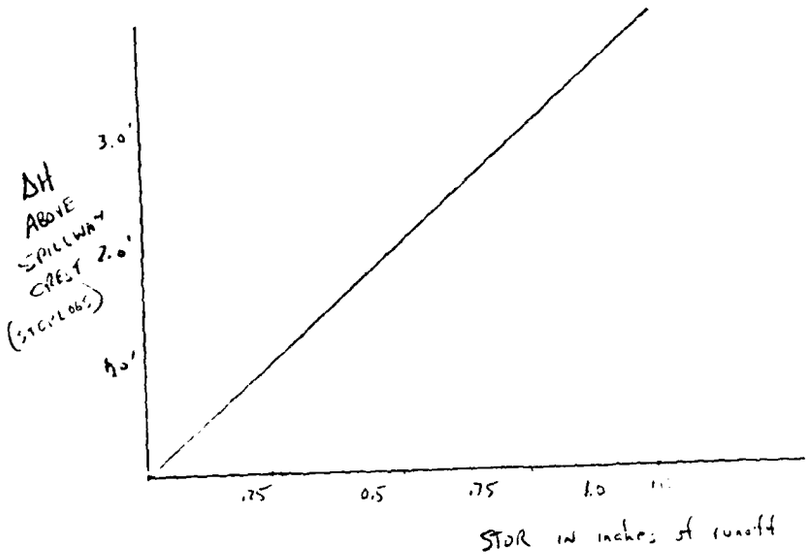
SURFACE AREA OF POND AT SPILLWAY CREST
FROM NHWRB DATA = 36 ACRES

36 ACRES = 0.056 sq. mi

1 inch of runoff would cause:

$\frac{2.37}{3.000}$ = 42.32" rise in water surface

1 FOOT of rise = .28355" of runoff
use 1' ≈ .284" of runoff



DAMS 148 WHITES POND 7-26-78 Dwnd 6 of 15

EFFECT OF SURCHARGE STORAGE ON STF DISCHARGE FROM POND

INFLOW $Q_1 = 1000$ cfs $\Rightarrow H = 2.95'$

2.95' EQUATES TO 0.84" OF RUNOFF

$2.95 \times (.284) = 0.838$

ASSUME TOTAL RUNOFF $\approx$ 6.0", SLIGHTLY GREATER THAN 100 YEAR RAINFALLS.

$$Q_{P2} = Q_{P1} \times \left(1 - \frac{STOR_1}{6}\right) = 1000\left(1 - \frac{.84}{6}\right)$$

$Q_{P2} = 860$ cfs

FOR $Q = 860$, $H \approx 2.85$

$STOR_2 = 2.85(.284) = 0.81$" OF STORAGE

AVG STOR $= (.84 + .81)/2 = .825$"

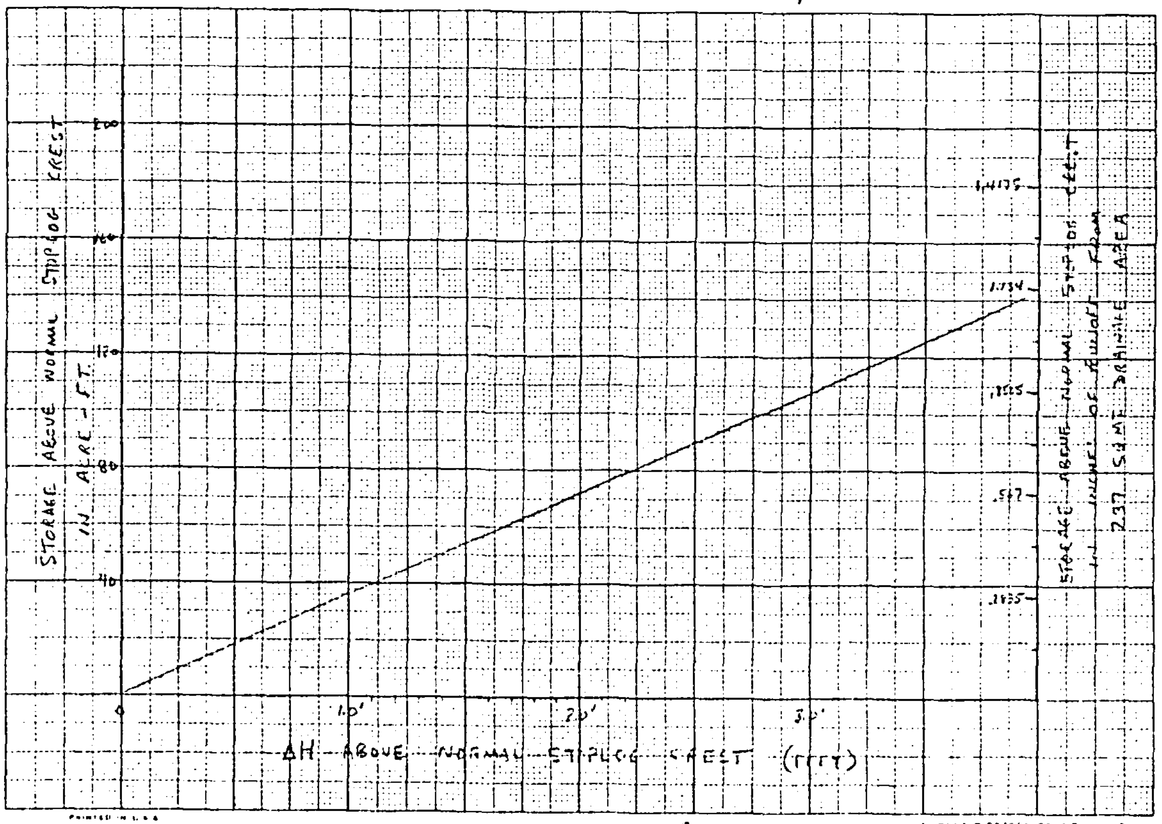
$$Q_{P3} = 1000\left(1 - \frac{.825}{6}\right) = 862.5$$

≈ 860 cfs

Thus STF results in 2.85' of head over stop log, and 0.95' above main granite blocks

DWW 6/26/78

STORAGE - STAGE CURVE WHITES POND # 7



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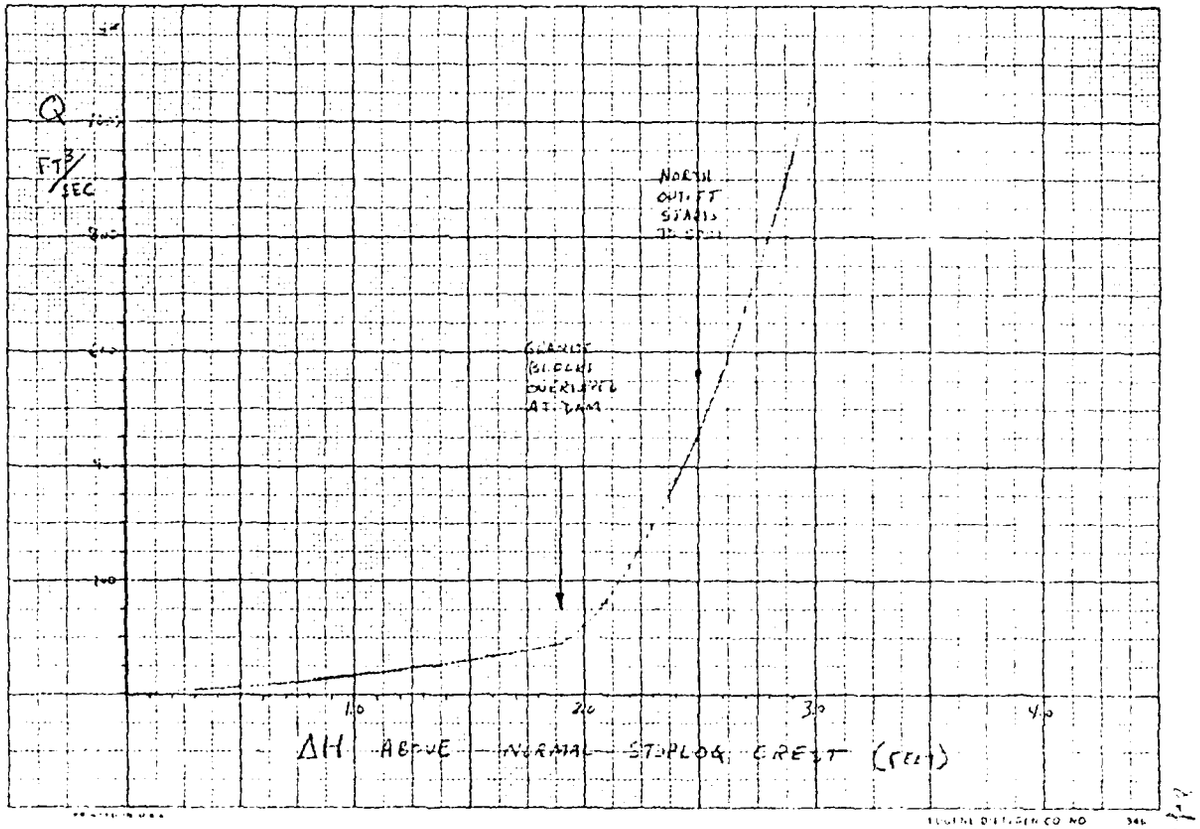
DWN
1/20/78

DISCHARGE - STAGE CURVE WHITES POND #7



WHITES (PSNO) DWW 30 JUN 78 10/15

CALC OF ESTIMATED DOWNSTREAM DAM FAILURE FLOOD STAGES - BASED ON CUE "RULE OF THUMB" GUIDANCE, APRIL 1978.

STEP 1: RESERVOIR STORAGE AT TIME OF FAILURE

ASSUME: FAILURE WHEN STAGE IS JUST OVER CRANDLE BLOCKS OR 1.5 FT ABOVE STOP-LOG WEIR.

S = NORMAL STORAGE PLUS SURCHARGE

S = MAX STOR = 525 AF

STEP 2: PEAK FAILURE OUTFLOW (Q_{P_1})

$$Q_{P_1} = \frac{8}{27} W_b \sqrt{g} h_o^{3/2}$$

$$= \frac{8}{27}(100)\sqrt{32.2}\,(13.75)^{3/2}$$

$$Q_{P_1} = 8572.5 \text{ CFS}$$

$$\approx 8600 \text{ cfs}$$

$W_b \leq 40\%$ OF WIDTH

$\leq .4(250')$

$\approx 100'$

$g = 32.2$

$h_o = 13'9'' = 13.75'$

STEP 3: STAGE DISCHARGE RATING FOR DOWNSTREAM REACHES

ASSUMES CROSS SECTIONAL FILE D.S. REACHES SHOWN ON USGS TOPO MAP ARE AVAILABLE ON THE ATTACHED SHEET.

COMPUTER OUTPUT TABLE OF STAGE-DISCHARGE RELATIONSHIPS ARE ATTACHED.

WHITES POND

Dwn JUNE 30, 1978 11415

STEP 4

REACH 1: $Q_{P1} = 8600$ cfs

$H = 6.1$

AREA AT 6.1 = 420 SQFT

$V_1 = L \times AREA = 1060 \times 420 / 43560 = 10.2$ AF $\leq \frac{1}{2} S$

$Q_{P2T} = Q_{P1}\left(1 - \frac{10.2}{525}\right) = 8433$ cfs

$H = 5.9$

AREA @ 5.9 400 SF

$V_2 = 1060 \times 400 / 43560 = 9.73$ AF $\leq \frac{1}{2} S$

$V_{AVG} = \frac{10.2 + 9.7}{2} = 9.95$

$Q_{P2} = 8603\left(1 - \frac{9.95}{525}\right) = 8437$

$H = 5.9$

REACH 2: Q_{P1} 8437

$H = 8.3$

AREA = 345 SF

V_1 (LXAREA) $4000 \times 345 / 43560 = 31.7$ AF $\leq \frac{1}{2} S$

$Q_{P2T} = 8437\left(1 - \frac{31.7}{525}\right) = 7928$

$H = 8.1'$

AREA = 328

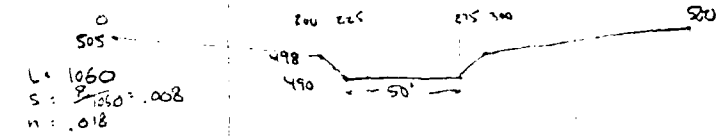
$V_2 = 4000 \times 328 / 43560 = 30.1$ AF $\leq \frac{1}{2} S$

$V_{AVG} = \frac{31.7 + 30.1}{2} = 30.9$

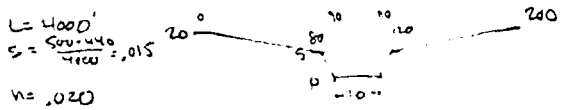
$Q_{P2} = 8437\left(1 - \frac{30.9}{525}\right) = 7940$ $H = 8.1$

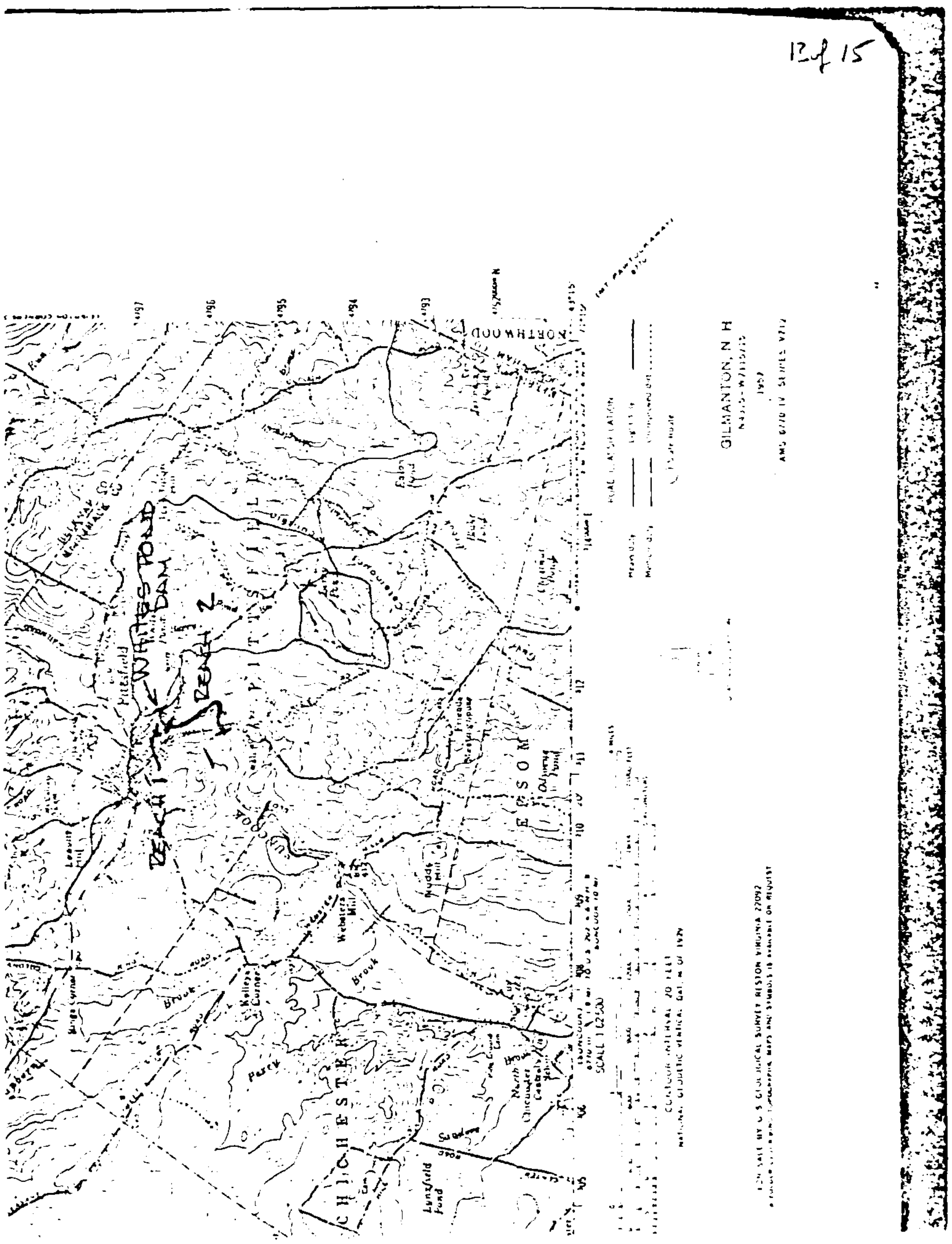
WHITES POND DAM 1

REACH 1 – DAM TO 0.2 MI DS – PARK & REC. POND AREA



REACH 2 – 0.1 MI DS TO 0.2 MI DS – PARK POND AREA

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GILMANTON, N H
NORTHWOOD
CHICHESTER
EPSOM

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.0	490.0	0.0	0.0	0.0	0.0	0.0
1.0	491.0	53.1	56.6	0.9	50.9	377.2
2.0	492.0	112.5	63.1	1.8	165.4	1224.6
3.0	493.0	178.1	69.7	2.6	333.1	2466.2
4.0	494.0	250.0	76.2	3.3	552.0	4086.7
5.0	495.0	328.1	82.8	4.0	822.0	6086.0
6.0	496.0	412.5	89.4	4.6	1144.1	8470.6
7.0	497.0	503.1	95.9	5.2	1519.5	11250.5
8.0	498.0	600.0	102.5	5.9	1950.0	14437.5
9.0	499.0	728.6	159.7	4.6	2005.3	14847.0
10.0	500.0	914.3	216.9	4.2	2387.3	17675.0
11.0	501.0	1157.1	274.0	4.2	3024.5	22393.0
12.0	502.0	1457.1	331.2	4.4	3914.3	28980.7
13.0	503.0	1814.3	388.4	4.7	5072.5	37556.2
14.0	504.0	2228.6	445.6	5.0	6521.3	48283.1
15.0	505.0	2700.0	502.7	5.4	8284.9	61340.1

WHITES POND DAM - REACH 1

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	1.0	22.0	24.5	0.9	20.5	187.0
2.0	2.0	48.0	28.9	1.7	67.3	613.7
3.0	3.0	78.0	33.4	2.3	137.3	1252.7
4.0	4.0	112.0	37.9	3.0	230.8	2105.6
5.0	5.0	150.0	42.4	3.5	348.6	3181.0
6.0	6.0	195.3	53.2	3.7	465.0	4243.0
7.0	7.0	251.3	64.1	3.9	625.5	5706.9
8.0	8.0	318.0	74.9	4.2	834.1	7610.2
9.0	9.0	395.3	85.8	4.6	1095.5	9995.4
10.0	10.0	483.3	96.6	5.0	1414.5	12906.0
11.0	11.0	582.0	107.5	5.4	1795.7	16384.9
12.0	12.0	691.3	118.3	5.8	2243.9	20474.4
13.0	13.0	811.3	129.2	6.3	2763.5	25215.5
14.0	14.0	942.0	140.0	6.7	3359.0	30648.4
15.0	15.0	1083.3	150.9	7.2	4034.5	36812.2
16.0	16.0	1235.3	161.7	7.6	4794.3	43744.9
17.0	17.0	1398.0	172.6	8.1	5642.5	51483.8
18.0	18.0	1571.3	183.4	8.6	6583.0	60065.4
19.0	19.0	1755.3	194.3	9.0	7619.8	69525.4
20.0	20.0	1950.0	205.1	9.5	8756.6	79898.7

WHITES POND DAM - REACH 2

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

(1) STATE	(2) IDENTITY NUMBER	(3) DIVISION	(4) STATE	(5) COUNTY	(6) CONGR DIST.	(7) STATE	(8) COUNTY	(9) CONGR DIST.	(10) NAME	(11) LATITUDE (NORTH)	(12) LONGITUDE (WEST)	(13) REPORT DATE DAY | MO | YR
NH	106	NED	NH	013	01				WHITES POND OUTLET DAM	4318.2	7119.0	15AUG78

(15) POPULAR NAME	(16) NAME OF IMPOUNDMENT
WHITES POND DAM	WHITES POND

(17) REGION	(18) BASIN	(19) RIVER OR STREAM	(20) NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	(21) DIST FROM DAM (MI.)	(22) POPULATION
01	05	TR SUNCOOK RIVER	PITTSFIELD	1	2510

(23) TYPE OF DAM	(24) YEAR COMPLETED	(25) PURPOSES	(26) STRUC TURAL HEIGHT (FT.)	(27) HYDRAU LIC HEIGHT (FT.)	(28) IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	(29) NORMAL (ACRE-FT.)	DIST	OWN	FED H	PRV/FED	SCS A	VER/DATE
REPGRA	1890	R	16	15	525	380	NED	N	N	N	N	01AUG78

(30) REMARKS

(31) D/S HAS	(32) SPILLWAY CREST LENGTH (FT.)	(33) TYPE	(34) WIDTH (FT.)	(35) MAXIMUM DISCHARGE (FT.)	(36) VOLUME OF DAM (CY)	(37) POWER CAPACITY INSTALLED (MW)	(38) PROPOSED (MW)	(39) NAVIGATION LOCKS NO.	(40) LENGTH (FT.)	(41) WIDTH (FT.)	(42) LENGTH (FT.)	(43) WIDTH (FT.)	(44) LENGTH (FT.)	(45) WIDTH (FT.)	(46) LENGTH (FT.)	(47) WIDTH (FT.)
?	259	C	11	275	10350		0									

(48) OWNER	(49) ENGINEERING BY	(50) CONSTRUCTION BY
SISTERS OF HOLY CROSS		

(51) REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NH WATER RESOURCES	NH WATER RES BD	NH WATER RES BD	NH WATER RES BD

(52) INSPECTION BY	(53) INSPECTION DATE DAY | MO | YR	(54) AUTHORITY FOR INSPECTION
GOLDBERG ZOINO DUNNICLIFF + ASSOC	23MAY78	PL92 367

(55) REMARKS

END

FILMED

8-85

DTIC