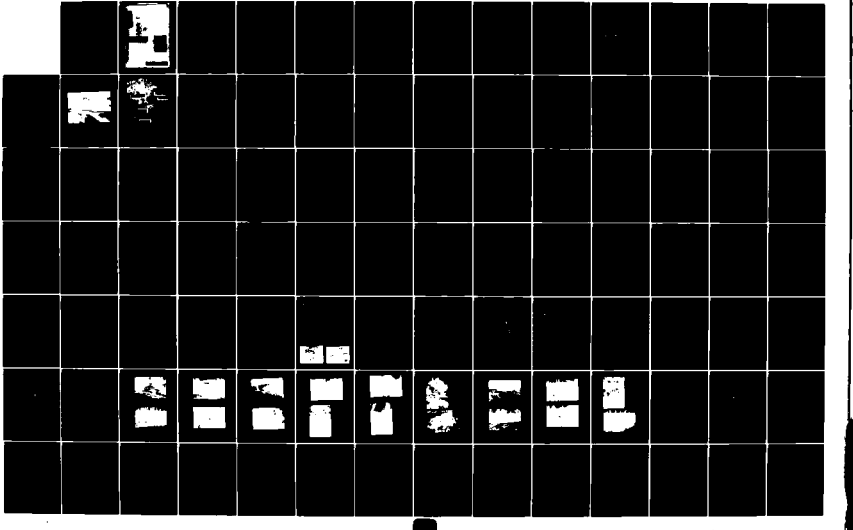
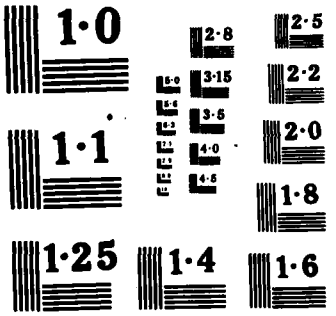
AD-A157 628 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 1/2
LOWER EDDY POND DAM (..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV MAR 81

UNCLASSIFIED F/G 13/13 NL




1·0
1·1
1·25
2·8
3·15
3·5
4·0
4·5
2·5
2·2
2·0
1·8
1·4
1·6

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTR. BEFORE COMPLETING FORM
1. REPORT NUMBER VT 00230	2. GOVT ACCESSION NO. AD A157 625	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Lower Eddy Pond Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE March 1981 13. NUMBER OF PAGES 55
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

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,

Richelieu River Basin
Rutland VT.
Mussey Brook

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

The dam is an earth embankment with a length of 250 ft. and is 20 ft. high. The dam appears to have had little or no maintenance in recent years. The condition of the dam is in very poor. It is small in size with a high hazard potential. A major breach of the dam could cause appreciable damage to property and loss of a few lives in the downstream area. There are various remedial measures and recommendations which are to be undertaken by the owner.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

JUL 14 1981

REPLY TO
ATTENTION OF:

NEDED-E

Honorable Richard A. Snelling
Governor of the State of Vermont
State Capitol
Montpelier, Vermont 05602

Dear Governor Snelling:

Inclosed is a copy of the Lower Eddy Pond Dam (VT-00230) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis.

The visual inspection of Lower Eddy Pond Dam indicated that the dam is in very poor condition with a serious internal seepage problem that could affect its stability. The Vermont Department of Water Resources was informed of this situation at the time of the inspection and has initiated action in a timely manner. In addition to the seepage problem, the preliminary hydrologic analysis has indicated that the spillway capacity would likely be exceeded by floods greater than seven percent of the Probable Maximum Flood (PMF). Our screening criteria specifies that a dam classified as high hazard with a spillway capacity insufficient to discharge fifty percent of the PMF, should be judged as having a seriously inadequate spillway. As a result of the concerns with the dam stability and the serious inadequacy of the spillway, the dam has been assessed as unsafe emergency until corrective measures are completed.

We recommend that the owner immediately implement the recommendations of the Vermont Department of Water Resources. Until such time these corrective measures are completed a detailed emergency operation plan and warning system should be promptly deployed and round-the-clock surveillance should be provided during periods of heavy precipitation or high project discharge.

I approve the report and support the findings and recommendations described in Section 7, with qualifications as noted above. I request that you keep me informed of the actions taken to implement these recommendations since this follow-up is an important part of the program.

NEDED-E
Honorable Richard A. Snelling

Copies of this report have been forwarded to the Department of Water Resources and to the owner, Landtect Recreation Association, Rutland, Vermont. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Water Resources for your cooperation in this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

LOWER EDDY POND DAM

VT 00230

RUTLAND, VERMONT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.:	VT 00230
Name of Dam:	LOWER EDDY POND DAM
City:	RUTLAND
County and State:	RUTLAND, VERMONT
Stream:	MUSSEY BROOK
Date of Inspection:	5 DECEMBER 1980

BRIEF ASSESSMENT

Lower Eddy Pond Dam is an earth embankment dam having a length of 250 feet and a height of 20 feet. The top of dam storage is estimated to be 70 acre-feet. The dam was originally constructed around 1900 for the purpose of forming an ice pond. Lower Eddy Pond now serves as a recreational water body.

The dam appears to have had little or no maintenance in recent years. The concrete spillway works have failed by washout and an area westerly of the dam center is manifesting signs of active and progressive internal erosion by piping. Several large trees are growing out of the embankment, some of which are leaning.

Although there are reports that a pond drain exists for this dam, no such drain could be located during this inspection. Based on the results of the visual inspection the condition of the dam is judged to be very poor.

Because the dam has a small size and a high hazard classification, the test flood was selected as 50% of the Probable Maximum Flood (½ PMF). The test flood inflow from the 2.5 square mile drainage area was estimated to be 2800 cfs. Effects of reservoir storage would reduce the test flood inflow to a routed test flood outflow of 2730 cfs which would overtop the east end of the dam by about 2.8 feet. This assumes unobstructed flow over the ledge outcrop at the easterly abutment.

The capacity of this ledge overflow is estimated to be 420 cfs which is 15% of the routed test flood outflow.

A major breach of the dam could cause appreciable property damage and loss of a few lives in the downstream area. The downstream area is continuing to develop and the potential for loss of life will tend to increase in the future. Because of the immediate safety hazards of the dam, the findings of this visual inspection have been reported to the State of Vermont Department of Environmental Conservation. After formal hearings, the Vermont Water Resources Board has declared the dam unsafe and a threat to public safety. The Water Resources Board has issued a set of orders to the owners requiring that the impoundment be drained and the dam made safe or removed in its entirety. The orders of the Vermont Water Resources Board are included in Appendix B.

The recommendation of this report is immediate compliance with the orders of the Water Resources Board in order to alleviate the immediate safety hazards posed by the dam. Unless the dam is to be removed in its entirety, the owner should comply with the Recommendations listed in Section 7.2. These recommendations should be implemented immediately upon receipt of this Phase I Inspection Report.

These recommendations in general are as follows:

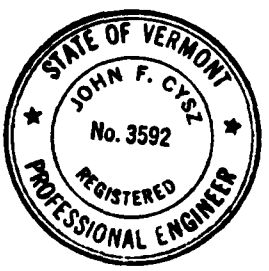
Retain a qualified Registered Professional Engineer to:

- Design a permanent means to drain the pond.
- Perform a detailed hydrologic and hydraulic study to determine methods of increasing the project discharge and to design a new spillway.
- Make a thorough structural evaluation of the dam and foundation and design methods to repair or reconstruct the earth embankment.
- Design measures to prevent surface erosion of the embankment.
- Design procedures to remove trees from those portions of the embankment to be retained and for at least 25 feet downstream of the dam.

The owner should carry out all of the recommendations made by the engineer.

In addition the owner should, after the dam is repaired or reconstructed, implement the recommended Remedial Program listed in Section 7.3 including establishment of a formal written program for operation and maintenance, and establishment of a formal written program for surveillance and downstream warning. A qualified Registered Professional Engineer should be engaged to make a comprehensive annual technical inspection of the dam.

As an alternative, to repair or reconstruction of the dam, the order of the Water Resources Board permits the dam to be removed in its entirety and sets conditions under which this is to be done.



John F. Cysz
Project Manager
VT P.E. No. 3592

This Phase I Inspection Report on Lower Eddy Pond Dam (VT-00230) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

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

ARAMAST MAHTESIAN, MEMBER
Geotechmical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Design 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.

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

SECTION 4
OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 OPERATIONAL PROCEDURES

a. General

Operational procedures for the project are not established. Maintenance of the dam appears to have been neglected for many years.

b. Description of any Warning System in Effect

The Vermont Water Resources Board, on December 9, 1980, issued an order requiring the dam owners to develop a written contingency plan for warning those individuals who might reasonably be expected to be affected by the failure of the dam (see Appendix B).

4.2 MAINTENANCE PROCEDURES

a. General

There is no formal maintenance plan for the project. The only maintenance carried out is mowing of the crest.

b. Operating Facilities

There are no operational procedures for this structure. The reported drain outlet cannot be located. The drain has not been operated in 30 to 40 years. There are no records of its location. The spillway works have not been maintained and have failed, now constituting an obstruction to flow around the dam.

4.3 EVALUATION

The inability to drain the pond in an emergency situation is in itself a serious safety deficiency. The Vermont Water Resources Board, in view of the numerous deficiencies at this dam, has issued an order to drain the pond. This requirement is consistent with the findings of this inspection and evaluation.

3.2 EVALUATION

Based on the visual inspection, Lower Eddy Pond Dam is judged to be in very poor condition.

The sink hole at the top of the dam and the collapsed areas on the upstream and downstream slopes, coupled with flows entering and exiting from the embankment indicate a condition of active and progressive internal erosion of the earth fill. The extent of the internal distress or the rate at which the erosion is occurring is not known. Some external manifestations of this condition, namely the 2-foot diameter sink hole at the crest, were not previously noted by the dam owners and were not noted in the last inspection of the dam by the Vermont Department of Water Resources in 1974. Leakage at the west end of the dam was noted during the 1974 inspection but no subsidence of the embankment was noted. Maintenance of the dam appears to have been neglected for many years.

The failed concrete spillway is now an obstruction to flows passing over the ledge outcrop at the easterly abutment and erosion of the embankment is progressing from the spillway in a westerly direction. There are several large trees on the embankment, some of which are leaning. Should these trees become uprooted and fall over, a breach in the embankment could result. Fallen trees could also obstruct flow at the damsite. The presence of animal burrows are a further threat to the earth embankment.

The area of boulder deposits near the east end of the dam both on the upstream and downstream slopes preclude detailed inspection of the embankment in this area.

The discharge channel at the base of the dam is causing slow but progressive erosion of the downstream toe.

The reported drain outlet through the dam could not be located during this inspection and previous efforts to locate it have been unsuccessful. The drain has not been operated in 30 to 40 years. The inability to drain the pond in an emergency situation is a serious safety deficiency.

at the east end of the dam is about 2 feet lower than the west end of the dam (see Profile in Appendix B).

Both the upstream and downstream slopes have a heavy growth of trees, some in excess of 10 inches in diameter.

The embankment width and slope angle are variable indicating that filling may have been done on the slopes particularly in the area to the east of the dam center where an area of dumped boulders is visible. Boulders are also visible in the upstream slope.

A number of animal burrows and voids in the boulder fill can be seen on the upstream slope. There are several trees on the upstream slope which are leaning towards the pond.

The easterly dike, approximately 3-feet wide and 1½-feet high is part of the lawn area for the house east of the dam. There is a concrete pad which is the former location of a mobile home (see Photograph 13, Appendix C). The top of this dike is roughly 2 feet below the maximum top of dam elevation. A drainage swale leads from behind this dike to the edge of Curtis Avenue. There is no evidence of any recent overtopping of the dam or easterly dike.

c. Appurtenant Structures

The concrete spillway at the easterly end of the dam has failed as a result of water outflanking its sides. The concrete remains are broken up and now constitute an obstruction to flow around the dam. At present, the ledge outcrop at the east abutment is functioning as a spillway and is the control for the water surface elevation of Lower Eddy Pond (see Photograph 3, Appendix C). The pond elevation was once regulated by flashboards set into slots in the concrete spillway.

A previous owner reported that there is a 3-foot conduit which once served as a drain for the pond. This feature could not be located during this inspection.

d. Reservoir Area

The normal reservoir surface for Lower Eddy Pond is approximately 7 acres. Local residents report that the reservoir has become shallower in recent years as a result of siltation. There are no structures immediately adjacent to the shore of the pond. There is a house to the east of the dam which would experience shallow flooding of its yard as a result of high water in Lower Eddy Pond (see Photograph 1, Appendix C). The Tennis Club at the west end of the dam is below the elevation of the pond and is separated from it by a dike as shown in Figure 1, Appendix B-3. The low end of the westerly dike is approximately 1 foot higher than the maximum top of dam.

e. Downstream Channel

The discharge cascades over the ledge outcrops at the east end of the dam and then travels in a westerly direction along the toe of the dam. The channel bottom is gravel, cobbles and small boulders.

The discharge channel makes a 90° turn to a northerly direction just to the west of the dam center. The channel then crosses under Curtis Avenue in a corrugated metal arch culvert (see Photograph 15, Appendix C). There is erosion along the toe of the embankment particularly where the channel makes the abrupt turn. Trees growing out of the embankment lean toward the discharge channel.

SECTION 3
VISUAL INSPECTION

3.1 FINDINGS

a. General

Lower Eddy Pond Dam was inspected on December 5, 1980. The weather was clear, temperature around 20°F. At the time of inspection water was flowing through the spillway at an average depth of approximately 5 inches. Because this inspection revealed a number of unsafe conditions at the dam, the Corps of Engineers immediately notified the State of Vermont, Agency of Environmental Conservation, Department of Water Resources and Environmental Engineering. A state dam safety engineer met at the site with the Corps of Engineers inspection team on December 6, 1980. Also present at this meeting were City of Rutland officials and a representative of the dam owner.

On December 9, 1980 the Commissioner of Water Resources and Environmental Engineering issued a written order to the owners (copy contained in Appendix B) outlining steps to be immediately implemented to alleviate unsafe conditions. The Vermont Water Resources Board held a hearing on December 12, 1980 in which a formal order was issued by the Water Resources Board. A copy of this order is attached in Appendix B. This order included the immediate draining of Lower Eddy Pond. A subsequent ammendment (attached in Appendix B) extended the time in which the pond should be drained.

b. Dam

The general layout of Lower Eddy Pond Dam is shown in Appendix B. Photographs showing features and conditions at the dam are included in Appendix C.

The dam is showing signs of serious internal erosion by piping as evidenced by a 2-foot diameter, 1-foot deep sink hole on the crest located approximately 180 feet west of the center of the spillway (see Photographs 5 and 6, Appendix C). The piping condition is further manifested by a collapsed area at the upstream face of the dam opposite the sinkhole where a flow of water can be seen entering the embankment (see Photograph 8, Appendix C). Water can be observed exiting from collapsed and undermined areas at the downstream slope approximately 140 feet west of the center of the spillway (see Photograph 11, Appendix C). (The exiting flow rate was visually estimated to be between 25 and 50 gallons per minute.) Fine grained soil deposits are visible in areas where the flow emerges from the dam embankment (see Photograph 12, Appendix C).

The sides of the sink hole show bare earth which indicate that this is an active feature. The owners' representative stated that the sink hole had not been noted during summer of 1980.

There are two 24-inch diameter corrugated metal pipe sumps with 4-inch plastic piping on the downstream slope near the area of the exiting flow (see Photographs 9 and 10, Appendix C). These pipes appear to be a previous attempt at controlling seepage at the west end of the dam. The sumps are dry and are not effective in controlling the flows passing through the dam.

There is active erosion of the embankment at the east end of the dam adjacent to the remains of the concrete spillway. This erosion appears to be progressing in a westerly direction along the interface between the bedrock surface and the earth embankment. The erosion is most pronounced in an area within about 25 feet east of the center of the spillway. The crest elevation

SECTION 2
ENGINEERING DATA

2.1 DESIGN DATA

No design data were available for Lower Eddy Pond Dam.

2.2 CONSTRUCTION DATA

No construction records for the original construction or any subsequent repairs were available. Any information about construction was obtained through interview of Mr. Norman Spafford, a previous owner.

2.3 OPERATION DATA

There is presently no operation associated with this dam. The concrete spillway is washed out to ledge and the reported pond drain has not been located. According to Mr. Spafford, the pond drain has not been operated in 30 to 40 years.

During the years when the pond was used for ice harvesting, the water level was adjusted by flashboards in the concrete spillway. In the summertime, the pond was drawn down through a 3-foot diameter pond drain. A sluice gate was located on the upstream face of the dam and was reached from a wooden platform in the pond. The sluice gate was operated by a gate key.

The present owners have performed no operation or maintenance, other than mowing the top of the dam.

2.4 EVALUATION OF DATA

a. Availability
No engineering data for design, construction or operation are available.

b. Adequacy
The final assessment and recommendations are based on the visual inspection, hydraulic and hydrologic calculations, and sound engineering judgment.

c. Validity
No engineering design were available to validate.

(7) Impervious Core - unknown.

(8) Cutoff - unknown.

(9) Grout Curtain - unknown.

h. Dike (West)
(1) Type - earth embankment/gravity.

(2) Length - 100 feet.

(3) Height - varies 5 to 8 feet.

(4) Top Width - 5 feet.

(5) Side Slopes - upstream varies from 6 to 3H:1V.

(6) Zoning - unknown.

(7) Impervious Core - unknown.

(8) Cutoff - unknown.

(9) Grout Curtain - unknown.

(10) East Dike - 50 feet long, 1 to 2 feet high, 3 feet wide.

i. Diversion and Regulating Tunnel - not applicable.

j. Spillway
(1) Type - ledge outcrop overflows around remains of old concrete spillway.

(2) Length of Weir - not applicable. (Ledge length = 40 feet.)

(3) Crest Elevation - ledge surface = 584.7± NGVD.

(4) Gates - none.

(5) U/S Channel - marshy area of Lower Eddy Pond.

(6) D/S Channel - cascades over ledge at east abutment and then in stream along toe of dam for 100 feet; passes under Curtis Avenue in 3.5'H x 6'W arch culvert.

(7) General - outlet partially obstructed by remains of old spillway.

k. Regulating Outlets
(1) Invert - unknown.

(2) Size - reported to be 3-foot diameter - not located.

(3) Description - unknown.

(4) Control Mechanism - reported to be sluice gate - not located, not operable.

(7) Design Surcharge (Original Design) - unknown.

(8) Top of Dam - 587 at low point near spillway,
589 at center section.

(9) Test Flood Surcharge - 589.8 (½ PMF),
588.7 (¼ PMF).

d. Reservoir (length in feet)
(1) Normal Pool - 1200.

(2) Flood Control Pool - not applicable.

(3) Spillway Crest Pool - 1200.

(4) Top of Dam - 1400.

(5) Test Flood Pool - 1600.

e. Storage (acre-feet)
(1) Normal Pool - 45.

(2) Flood Control Pool - not applicable.

(3) Spillway Crest Pool - 45.

(4) Top of Dam - 55 at 587 NGVD, 70 at 589 NGVD.

(5) Test Flood Pool - 78 at 589.8 NGVD.

f. Reservoir Surface (acres)
(1) Normal Pool - 7.

(2) Flood Control Pool - not applicable.

(3) Spillway Crest - 7.

(4) Top of Dam - 8.

(5) Test Flood Pool - 10.

g. Dam
(1) Type - earth embankment/gravity.

(2) Length - 250 feet.

(3) Height - 20 feet.

(4) Top Width - varies 10 to 30 feet.

(5) Side Slopes - downstream variable, 1.5H:1V average,
upstream not visible.

(6) Zoning - unknown.

Approximately 75% of the drainage area is wooded, including about 15% which is Aitken State Forest. The remaining 25 percent is pasture and scattered residential development. Several rural roads and a power line transect the area. The topography varies from low rolling terrain in the lower one-third of the watershed to moderate and steep slopes in the upper two-thirds. Elevations vary from 585 at Lower Eddy Pond to 2090 on Bald Mountain.

Upper Eddy Pond, located on a tributary of Mussey Brook, about one mile upstream, is the only other significant water body in the watershed. Lower Eddy Pond covers 7 acres which is less than 1 percent of the total drainage area.

b. Discharge at Damsite

Discharge at the damsite is over a ledge outcrop around the remains of the old concrete spillway. There is presently no provision for flashboards. There is reported to be a 3-foot diameter pond drain through the dam controlled by a sluice gate. The inlet, outlet and control mechanism could not be located for inspection. The elevation of the normal water level of lower Eddy Pond is interpolated from the USGS quadrangle as being 585 NGVD. Spillway capacities assume the ledge overflow is unobstructed by existing concrete.

(1) Outlet Works - reported 3' diameter, not located; not operable.

(2) Maximum Flood at Damsite - November, 1927, according to previous owner; dam was sand-bagged to prevent washing out.

(3) Ungated Spillway Capacity at Top of Dam - (low point at spillway) 420 cfs at 587 NGVD.

(4) Ungated Spillway Capacity at Test Flood Elevation - 1340 cfs at 589.8 NGVD.

(5) Gated Spillway Capacity at Normal Pool Elevation - not applicable.

(6) Gated Spillway Capacity at Test Flood Elevation - not applicable.

(7) Total Spillway Capacity at Test Flood Elevation - 1340 cfs at 589.8 NGVD.

(8) Total Project Discharge at Top of Dam - 420 cfs at 587 NGVD.

(9) Total Project Discharge at Test Flood Elevation - 2730 cfs at 589.8 NGVD.

C. Elevation (feet above NGVD)

(1) Streambed at Toe of Dam - 569.

(2) Bottom of Cutoff - unknown.

(3) Maximum Tailwater - unknown.

(4) Normal Pool - 585.

(5) Full Flood Control Pool - not applicable.

(6) Spillway Crest (on ledge) - 584.7± (average).

Landtecht Recreational Associates, 40 Curtis Avenue, Rutland, VT 05701. The owners operate Brookside Tennis & Racquetball, which is located at the same address. The manager, and a partner in Landtecht, is Mr. Phil Dechert, telephone (802) 775-1971. The deed to the property including the dam includes certain water rights held by other parties.

f. Operator

There is no operation associated with this dam. The spillway is washed out to bedrock and the reported pond drain has not been located. According to previous owner, Norman Spafford, the pond drain has not been operated in 30 to 40 years.

g. Purpose of Dam

The dam impounds Lower Eddy Pond which was used for ice harvesting and later for ice manufacturing until about 1960. A commercial development on Route 7 also drew water from the pond for fire protection. The fire pumps were reportedly removed several years ago when a municipal water line was installed. The pond is now used for recreational purposes.

h. Design and Construction History

According to Mr. Norman Spafford, Lower Eddy Pond Dam was built by an ice company (probably Eddy Ice Company) about 1900. No file data concerning design or construction of the dam were available from the previous owners, Rutland City records, or Vermont Department of Water Resources records.

No records of any repairs were available, although a state dam inspection report dated February 17, 1974 (a copy of which is included in Appendix B). referred to an apparent attempt to control leakage through the dam. It is not known who performed this work.

i. Normal Operation Procedures

There is presently no operation associated with this dam. The concrete spillway is washed out to ledge and the reported pond drain has not been located. According to Mr. Norman Spafford, a previous owner, the pond drain has not been operated in 30 to 40 years.

During the years when the ice company used the pond, the water level was adjusted by flashboards in the concrete spillway. In the summertime, the pond was drawn down through a reported 3-foot diameter pond drain. A sluice gate was located on the upstream face of the dam and was reached from a wooden platform in the pond. The sluice gate was operated by a gate key.

The present owners have performed no operation or maintenance, other than mowing the top of the dam. There have been no emergency preparedness or downstream warning plans in the past. However, as a result of this inspection program, the owners have contacted the homeowner immediately downstream about the safety of the dam.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area contributing to Lower Eddy Pond is 2.5 square miles. The drainage area is oriented with its long axis in an east/west direction and has a length of 2.4 miles and an average width of 1 mile. Approximately 1% of the watershed lies in the City of Rutland with the remaining 99% lying in the Town of Rutland. The drainage area is drained by Mussey Brook and its tributaries.

upstream and downstream slopes have heavy tree growth. There is an area of boulders on the downstream slope near the easterly end of the dam. These boulders appear to have been dumped in this location. There are also dumped boulders on the upstream slope near the east end and center of the dam. The easterly abutment of the dam is on bedrock as evidenced by the large carbonate rock outcrop (see Figure 1, Appendix B). At present the ledge outcrop acts as an overflow spillway and controls the water level in Lower Eddy Pond. There are remnants of a concrete spillway with provisions for flashboards at the east end of the dam. This spillway previously controlled the pond level. The concrete spillway is now broken up and washed out around its sides (see Photograph 4, Appendix C).

The discharge which passes over the ledge outcrop at the east abutment flows in a westerly direction along the toe of the dam (see Photograph 3, Appendix C) for about 100 feet and then makes a 90° turn in a northerly direction. The discharge then passes through a 3.5'H x 6'W CMP arch culvert beneath Curtis Avenue. At present there is no operable drain outlet for Lower Eddy Pond. A previous owner reports that there is a 3-foot diameter conduit through the embankment with a gate valve at the upstream end. Past attempts to locate this conduit have been unsuccessful.

There are two 24-inch diameter corrugated metal pipe sumps on the downstream slope near the westerly end of the dam. These sumps represent past attempts to control embankment seepage in this area. The sumps are dry and 4-inch plastic pipes leading from the sumps are broken.

There is a 3-foot wide 1½-foot high, 50-feet long dike located beyond the east abutment (see Figure 1, Appendix B). This dike extends from the ledge spillway in a southeasterly direction. The top elevation of this dike is approximately the same as the top elevation of the easterly end of dam, which is about 2 feet lower than the dam through the center.

There is also a dike upstream of the west abutment. The lowest part of the west dike is about 1-foot above the maximum top of dam elevation. The west dike is about 100 feet long and has a top width of about 5 feet and 6 to 3H:1V side slope on the pond side.

c. Size Classification

The dam has a maximum hydraulic height of 20 feet and a top of dam storage of 70 acre-feet. According to criteria contained in the Recommended Guidelines for the Safety Inspection of Dams, (height less than 40 feet and storage 50 to 1000 acre-feet) the structure is classified as small size because of its height and storage capacity.

d. Hazard Classification

The dam is in a high hazard category because a major breach of the dam could cause loss of more than a few lives and appreciable property damage in the Curtis Avenue area and in the mobile home park 1000 feet downstream of the dam (see Section 5.5).

e. Ownership

The dam was previously owned by Mr. Norman Spafford who purchased it from the Eddy Ice Company. In 1972, it was sold to Mr. Brian Lea. In 1975, a mortgage held by Proctor Trust Company was foreclosed and the property was sold to the current owners in December 1975. The dam is currently owned by

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
LOWER EDDY POND DAM
SECTION I - 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 Inspection of Dams within the New England region. Robert G. Brown & Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the Commonwealth of Massachusetts and State of Vermont. Authorization and notice to proceed were issued to Robert G. Brown & Associates, Inc. under a letter of 23 October 1980 from William E. Hodgson, Colonel, Corps of Engineers. Contract Number DACW33-81-C-0004 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

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

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

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

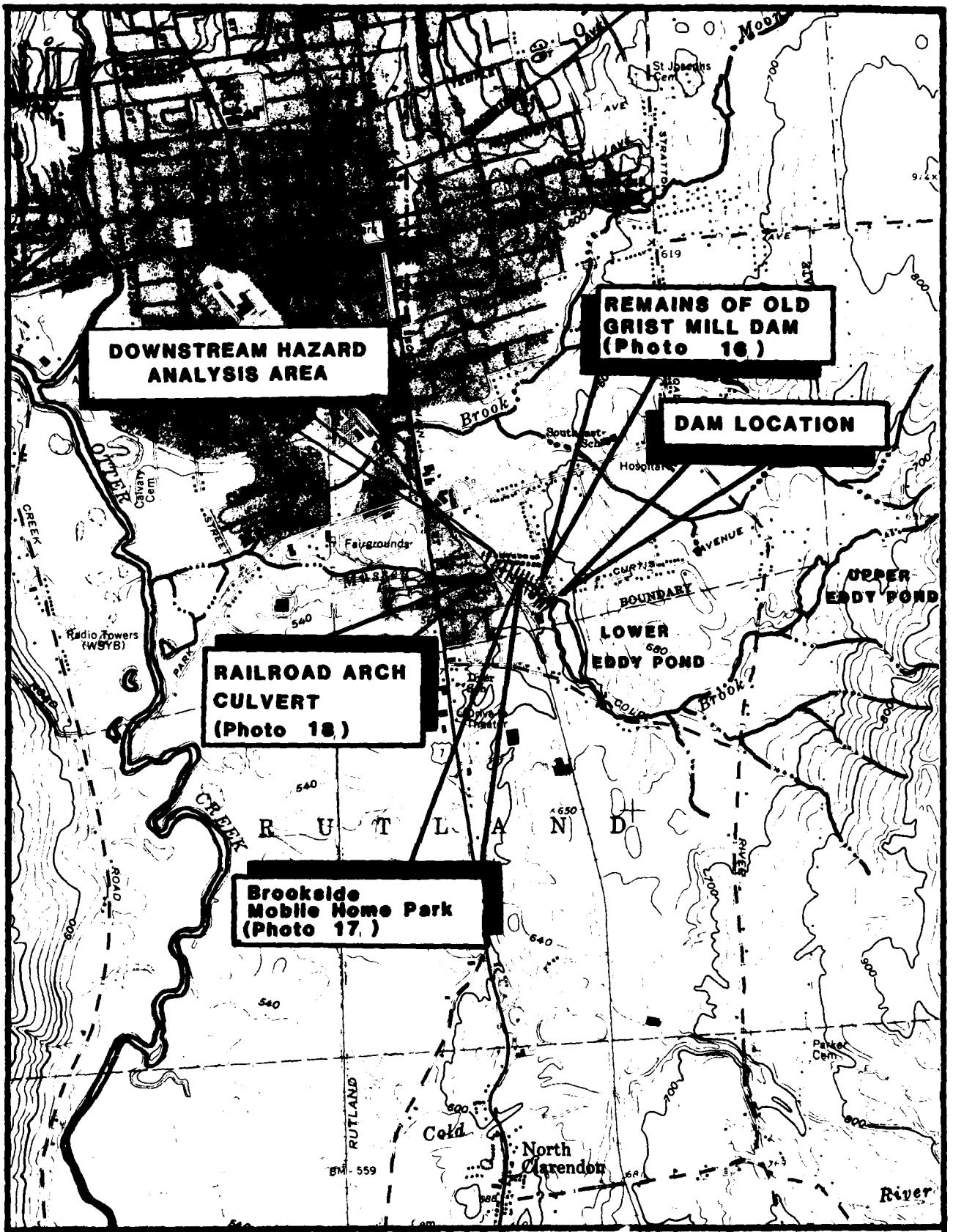
1.2 DESCRIPTION OF PROJECT

a. Location

Lower Eddy Pond Dam is located in the City of Rutland, Vermont. Lower Eddy Pond straddles the boundary line between Rutland City and Rutland Town. The dam is on Mussey Brook approximately 1.2 miles upstream from the brook's confluence with Otter Creek. The dam impounds Lower Eddy Pond which is used primarily for recreation. In the past it has been used as a fire protection supply for a commercial development. It was originally used as an ice pond. Lower Eddy Pond Dam is shown on the USGS Rutland, Vermont quadrangle at latitude 43° 35.5' and longitude 72° 57.8'. Access to the damsite is from Curtis Avenue. The pond is also called Lower Eddy Ice Pond.

b. Description of Dam and Appurtenances

Lower Eddy Pond Dam is an earth fill dam, approximately 250 feet long, with a maximum hydraulic height of about 20 feet, measured from the top of the dam to the bottom of the stream channel at the toe of the dam. The top of the dam has a variable width of from 10 to 30 feet. The axis of the dam is oriented in an east/west direction. The downstream slope is generally 1.5H to 1V with localized areas being slightly steeper. The upstream slope above the level of the pond is irregular and has a general slope of 2H to 1V. The upstream slope is steeper in areas where it appears that rock fill has been placed. Both the



LOWER EDDY POND DAM

RUTLAND, VT.

Identification No. VT 00230

N

vi

LOCATION PLAN

Rutland Quadrangle

1:24000

From upstream. Spillway at right end, area of piping at left end of dam.

OVERVIEW OF LOWER EDDY POND DAM

SECTION 5
EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 GENERAL

The total drainage area contributing to Lower Eddy Pond Dam is 2.5 square miles. Approximately 75% of the watershed is wooded with the remaining 25% being pasture with scattered residential development. The topography varies from low rolling terrain in the lower one-third of the watershed to moderate and steep slopes in the upper two-thirds. Elevations vary from 585 at Lower Eddy Pond to 2090 on Bald Mountain. Upper Eddy Pond, located on a tributary to Mussey Brook, is the only other significant water body in the watershed. The drainage area is shown on the map in Appendix D.

5.2 DESIGN DATA

No hydraulic or hydrologic design data or criteria were available.

5.3 EXPERIENCE DATA

The concrete spillway structure has washed out. According to a previous owner the dam was protected by sandbags during the flood of November, 1927 to protect it against overtopping and washout. There is no evidence of any recent overtopping. However, the embankment is eroding progressively in a westerly direction from the east end. The east end of the dam is about 2 feet lower than the dam at its center.

5.4 TEST FLOOD ANALYSIS

Lower Eddy Pond Dam is classified as small size having a hydraulic height of 20 feet and a top of dam storage of 70 acre-feet. Using the Recommended Guidelines for Safety Inspection of Dams, the test flood range is 50% to 100% of the Probable Maximum Flood (PMF). The ½ PMF was selected as the test flood because the dam has a small impoundment. In this analysis it was assumed that the ledge outcrop at the easterly end of the dam acts as an unobstructed spillway with a width of 40 feet. The analysis further assumes that the dam remains intact during the test flood. The Probable Maximum Flood was estimated using methods contained in "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations" issued by the New England Division Corps of Engineers. A curve midway between mountainous and rolling terrain was used in this estimate.

The ½ PMF test flood inflow from the 2.5 square mile drainage area was estimated to be 2800 cfs. Storage effects would reduce the test flood inflow to a routed test flood outflow of approximately 2730 cfs.

During test flood conditions, water would rise to elevation 589.8 which is about 0.8 feet above the top of dam at its center and about 2.8 feet over the east end of the dam. Water would be passing over the easterly dike at a depth of approximately 2.8 feet and would be passing over the ledge outcrop spillway at the east end of the dam at a depth of 5 feet.

The capacity of the ledge outcrop spillway with water at the east end top of dam elevation is 420 cfs which is 15% of the routed test flood outflow. This capacity is approximately 75% of the 100-year flow established by the U.S. Department of Housing and Urban Development.[1]

Because there are no spillway training walls or other means to contain flows within the ledge outcrop at the east abutment, it is likely that the main embankment would erode rapidly during high discharge conditions. Any overtopping of the dam could lead to a breach by erosion.

5.5 DAM FAILURE ANALYSIS

The impact of failure of the dam was assessed using Corps of Engineers "Rule of Thumb" Guidance for Estimating Downstream Dam Failure Hydrographs. The estimate assumes:

a. the reservoir surface is at the top of the dam at the time of the breach, and

b. a breach of 40% of the dam length at mid-height occurs (60 feet).

The estimated discharge resulting from the breach would be approximately 9000 cfs, which when added to the antecedent flow of approximately 1400 cfs gives a total downstream breach flow of 10,400 cfs.

This flow would cause water to pass over the low point in Curtis Avenue (150 feet downstream) at an estimated depth of 6 feet. There is one house on the north side of Curtis Avenue. This house has a floor level about 2 feet above the street. Antecedent flow prior to breach would pass over the low point in Curtis Avenue at a depth of 1 foot with possible basement flooding at the nearby house.

Approximately 300 feet downstream of the Lower Eddy Pond Dam there is a bedrock outcrop in the stream channel and the remains of an old stone dam. The existing channel is constricted at this point (see Photograph 16, Appendix C).

Approximately 1200 feet downstream of Lower Eddy Pond Dam, Mussey Brook passes beneath a 35-foot high railroad embankment in a 10-feet wide by 10-feet high, stone arch culvert. The estimated capacity of this culvert is 1500 cfs with water 18 feet above the culvert bottom at its upstream end (see Photograph 18, Appendix C). There is a mobile home park now being developed in this area. The area is being regraded and filling of the channel for Mussey Brook is taking place (see Photograph 17, Appendix C). Flows resulting from a major breach of the dam would exceed the capacity of this culvert and cause water to rise to a level about 5 feet above the rear portion of the mobile home park before flowing towards Moon Brook. Approximately 6 to 10 mobile homes would be flooded by water about 1 foot above their floor levels. There would be no flooding in the mobile home park as a result of antecedent flows.

---

[1] Flood Insurance Study; City of Rutland Vermont
October 1977, U.S. Department of Housing and Urban Development Federal Insurance Administration.

Flows from the breach which exceed the capacity of the railroad culvert would pass into the Moon Brook watershed.

Because of the potential for the loss of more than a few lives, the property damage including public services as a result of impact and flooding, Lower Eddy Pond Dam was classified as High Hazard.

SECTION 6
EVALUATION OF STRUCTURAL STABILITY

6.1 VISUAL OBSERVATIONS

The active internal erosion of the earth embankment is a serious problem. The extent of the internal distress cannot be fully determined by a strictly visual inspection. However, this condition is progressive and at a rate that could change very quickly.

The spillway works have failed and flows over the rock ledge outcrop are causing erosion of the embankment in a westerly direction along the interface between the bedrock surface and the earth fill. The east end of the embankment is roughly 2 feet lower than the dam near its center.

There are large trees growing out of the embankment both at the upstream and downstream slopes. Some of the trees are leaning and at the verge of falling over. There are also animal burrows and erosion scars in the embankment. An area of dumped boulders at the east downstream end of the dam precludes a detailed inspection of this area for possible seepage. The discharge channel for the spillway originating at the easterly abutment is tending to erode the toe of the dam particularly where the channel makes an abrupt change in direction.

6.2 DESIGN AND CONSTRUCTION DATA

No design or construction records for the original construction (approximately 1900) were available either through present and previous owners, or state or city sources.

6.3 POST-CONSTRUCTION CHANGES

No plans or records of any changes or repairs to the dam were available. The two 24-inch corrugated metal sumps with 4" plastic piping appear to have been constructed around 10 years ago, but this could not be confirmed.

6.4 SEISMIC STABILITY

The dam is located in Seismic Zone No. 2 and in accordance with the recommended Phase I guidelines, does not warrant seismic analysis.

SECTION 7
ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition

The Phase I visual inspection of Lower Eddy Pond Dam indicates that the dam is in very poor condition. The deficiencies in this structure are outlined in the previous Sections 3, 4, 5 and 6 of this report.

b. Adequacy of Information

The lack of in-depth engineering data did not allow for a definitive review. Therefore, the condition of this structure is based primarily on the visual inspection, supplemented by previous inspection reports of the State of Vermont, Agency of Environmental Conservation, and discussions with present and previous owners.

c. Urgency

The results of the visual inspection have been reported to the Agency of Environmental Conservation. Due to the number and seriousness of the deficiencies noted, the Vermont Water Resources Board, after formal hearings, has declared this dam unsafe and has issued a set of orders requiring the owners to take immediate action to protect the public safety. A copy of the Water Resources Board orders with an implementation schedule is included in Appendix B.

7.2 RECOMMENDATIONS

This report recommends immediate compliance with the order of the Water Resources Board in order to alleviate the immediate safety hazards posed by this dam. Unless the dam is to be removed in its entirety, the owner should, immediately upon receipt of this report, engage a qualified Registered Professional Engineer to:

(1) Design a permanent means to drain the pond in the event of an emergency or for repairs to the dam.

(2) Perform a detailed hydrologic and hydraulic study to determine methods to increase the project discharge capacity. A new spillway structure should be designed. The feasibility of relocating the spillway and spillway discharge channel to the west end of the dam should be evaluated.

(3) Make a thorough structural evaluation of the dam embankment to determine its construction and stability. Methods should be designed to either repair the internal erosion that has taken place or to reconstruct the entire earth embankment. An internal drainage system should be designed if necessary to collect embankment seepage and to prevent erosion of the embankment material. The structural evaluation should include the foundation of the dam.

(4) Design slope protection to prevent erosion of the upstream slope. An erosion resistant surface for the crest and downstream slope should be designed.

(5) Design procedures for and supervise removal of trees from those portions of the embankment to be retained and for at least 25 feet downstream of the toe of the dam, including backfill of resulting depressions with suitable materials.

The owner should carry out all the recommendations made by the engineer. All work should be done under supervision of the engineer. Refilling of the pond after repair or reconstruction of the dam should be done under the supervision of the engineer.

7.3 REMEDIAL MEASURES

The order of the Vermont Water Resources Board requires that certain actions be taken to alleviate the immediate safety hazards posed by this dam. These actions include preparation of a formal downstream warning plan, drainage of the pond, and daily inspections under the supervision of a qualified Registered Professional Engineer. If the dam is to be retained, the owner should implement the following remedial measures after the dam is repaired or reconstructed:

(1) Establish a formal written program for operation and maintenance including routine exercising of and servicing of gates, cutting of brush, mowing of grassed areas and monitoring flow from any drains which may be included in the project.

(2) Establish a formal written program for surveillance and downstream warning including round-the-clock surveillance during periods of unusually heavy precipitation.

(3) Engage a qualified Registered Professional Engineer to make an annual comprehensive technical inspection of the dam.

7.4 ALTERNATIVES

The order of the Vermont Water Resources Board permits the dam to be removed in its entirety and sets conditions under which this is to be done (see Appendix B).

APPENDIX A

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION PARTY ORGANIZATION

NATIONAL DAM INSPECTION PROGRAM

DAM: Lower Eddy Pond Dam VT 00230

DATE: 5 December 1980

TIME: 9:00 a.m.

WEATHER: Clear - 20°

W.S. ELEV. 585 U.S. 570 DN.S.

ELEV. DATUM: Interpolated from USGS Quadrangle

Note: Assumed datum is about 1 foot higher than datum used in HUD Flood Insurance Study for Town of Rutland.

INSPECTION PARTY:

1. J. F. Cysz, P.E.
2. J. E. Walsh, P.E. (Baystate Environmental Consultants, Inc.)
3. Robert E. Hoogs
4.
5.
6.

OTHERS PRESENT DURING INSPECTION:

1. Phil Dechert - Manager/Partner Land-Techt Recreational Assoc.
2. Normal Spafford (during interview at site on 14 November 1980)
3.
4.

Corps of Engineers, State Dam Engineer, and owners were notified by phone about piping condition at westerly end of dam.

VISUAL INSPECTION CHECKLIST

DAM: Lower Eddy Pond Dam VT 00230 DATE: December 5, 1980

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	El. 589 based on 4' above interpolated surface elev. from USGS sheet.
Current Pool Elevation	El. 585.
Maximum Impoundment to Date	El. 589 in 1927 (Norm Spafford, former owner)
Surface Cracks	Sink holes at top and at d/s slope westerly end of dam.
Pavement Condition	No pavement
Movement or Settlement of Crest	Yes, sink hole, depressions up to 6".
Lateral Movement	None observed but d/s slope extended by boulder fill at easterly end of dam.
Vertical Alignment	Varies within 1' range - crest is 2' low near spillway.
Horizontal Alignment	D/S slope extended by boulder and earth fill. Upstream slope is irregular due to erosion and filling.
Condition at Abutment and at Concrete Structures	Poor - spillway walls are uplifted, broken, outflanked.
Indications of Movement of Structural Items on Slopes	No structural items on slopes
Trespassing on Slopes	Excavated area 5' x 6' x 1' deep at westerly end.
Vegetation	Heavily treed
Sloughing or Erosion of Slopes or Abutments	Yes - spillway walls outflanked erosion on d/s slope, west end due to flow through dam, and west of spillway.
Rock Slope Protection - Riprap Failures	Dislocated and irregular on upstream slope - poor dumped boulders on downstream easterly face.

VISUAL INSPECTION CHECKLIST

DAM: Lower Eddy Pond Dam VT 00230 DATE: December 5, 1980

AREA EVALUATED	CONDITION
DAM EMBANKMENT continued	
Unusual Movement or Cracking at or near Toes	Undermined area with heavy seepage flow at westerly end of dam.
Unusual Embankment or Downstream Seepage	Yes - serious seepage flow at westerly toe area - 1 seep on d/s face at mid height estimated 25 - 50 gpm associated with surface sink holes. Area seepage at embankment (mid height) just west of spillway.
Piping or Boils	No boils - serious piping at westerly end as indicated by flow into dam at pool level on upstream face, 2' diam. sink hole on crest, large exit flows at downstream slope with undermined areas and surface erosion and deposits of fine materials noted at toe (westerly end).
Foundation Drainage Features	2 - 24" perforated CMP sumps with 4" plastic outlet pipes at westerly end downstream slope in area of piping flow. Appears to be a previous attempt to control seepage on downstream slope - only minor interception of flow by these sumps.
Toe Drains	None observed other than above noted sumps.
Instrumentation System	None

VISUAL INSPECTION CHECKLIST

DAM: Lower Eddy Pond Dam VT 00230 DATE: December 5, 1980

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	No outlet works are visible. There reportedly is a 3' diameter pond drain, location unknown by owner.
a. Approach Channel	
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	
Condition of Concrete	
Stop Logs and Slots	

VISUAL INSPECTION CHECKLIST

DAM: Lower Eddy Pond Dam VT 00230 DATE: December 5, 1980

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	There is no control tower or gate house.
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System in Gate Chamber	

VISUAL INSPECTION CHECKLIST

DAM: Lower Eddy Pond Dam VT 00230 DATE: December 5, 1980

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	Outlet works are not visible. Outlet should be located.
General Condition of Concrete	
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

VISUAL INSPECTION CHECKLIST

DAM: Lower Eddy Pond Dam VT 00230 DATE: December 5, 1980

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	There is no outlet structure or outlet channel visible.
General Condition of Concrete	
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain Holes	
Channel	
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	

7. The pond drain has not been used for an extended period of time, perhaps 40 years, and its operability and safety if utilized to drain the pond has not been established. At the time of the hearing, the pond drain could not be located.

8. The dam's current owner, of its own volition, has taken a number of actions recommended by the Department of Water Resources in its letter of December 9, 1980, including; the placement of fill in the sink hole on the upstream face, providing notice of the dam's condition to the residents of the house immediately downstream and the initiation of a daily inspection program. The dam owner has also made arrangements to obtain the services of a diver and the use of a metal detector in an effort to locate the pond drain.

9. Despite the placement of earthen fill on the upstream face, the sustained period of internal erosion has weakened the dam's strucutral integrity to an unknown degree. An acceleration in the present rate of seepage through the dam could cause it to fail within a relatively short period of time perhaps less than one hour.

10. Failure of the dam, depending upon the mode of failure, could result in injury and conceivably the loss of life as a result of damage to Curtis Avenue, a public highway, as well as to the residence of Kenneth Cota.

CONCLUSIONS OF LAW

1. The so-called Lower Eddy Pond Dam is in an unsafe condition and constitutes a potentially serious hazard to the public safety.

2. The draining of Lower Eddy Pond and the maintenance of as small a pond as possible until the dam is either rehabilitated or removed will alleviate the hazards created by the unsafe condition of the Lower Eddy Pond Dam.

ORDER

Landtech Recreation Association, d/b/a Brookside Tennis and Racquetball are hereby ordered to operate and maintain the Lower Eddy Pond Dam in accordance with the following conditions:

1. The water level shall be lowered by means of pumps, siphons or the use of the pond drain to the bottom of the pond drain by December 26, 1980, and shall be maintained at that level. The pond drain shall be used to drain the pond only after it has been determined to be in a safe condition.

2. The dam's owner shall take such measures to mitigate any adverse impacts associated with the release of sediment or stream bank erosion downstream from the dam site in accordance with the recommendations of the Department of Water Resources.

5. Department of Public Safety by Earl Osgood.

There was no objection to according party status in this proceeding to all those entering an appearance.

At the hearing the following documents were entered into the record:

Exhibit 1 - A letter dated December 9, 1980, addressed to the Water Resources Board from John Ponsetto, Commissioner of the Department of Water Resources.

Exhibit 2 - A letter dated December 9, 1980, addressed to Mr. Phil Dechert from John Ponsetto, Commissioner of the Department of Water Resources with enclosed copies of correspondence relating to the condition of the Lower Eddy Pond Dam dated February 7, 1974; February 1, 1974; and May 22, 1952.

FINDINGS OF FACT

1. The so-called Lower Eddy Pond Dam is a 20 foot high earthfill structure located immediately to the south of Curtis Avenue in the City of Rutland. The dam creates an impoundment with a surface area of six acres and a volume of approximately forty acre-feet at normal water level.

2. The dam is presently owned by Landtech Recreation Association, d/b/a - Brookside Tennis and Racquetball.

3. The Lower Eddy Pond Dam was inspected on December 5, 1980, in conjunction with the dam inspection program administered by the U.S. Army Corps of Engineers in accordance with the provisions of Public Law 92-367. In the course of that routine inspection, seepage or leakage was discovered at the westerly side of the dam and the Vermont Department of Water Resources was notified.

4. The dam was inspected on December 6, 1980, by A. Peter Barranco, Jr., Dam Safety Engineer for the Department of Water Resources in the presence of representatives of the dam's owner and the City of Rutland.

5. The dam is presently experiencing internal erosion or piping caused by water seeping through the structure as evidenced by the discovery of a sink hole on the upstream face and sediment deposits on the downstream face. The process of piping has been in progress for a sustained period of time possibly for as long as one year.

6. The dam has not been adequately maintained for a number of years by a succession of owners as shown by Exhibit 2 and as evidenced by the growth of trees on the impoundment structure and the deteriorated condition of the spillway.

12/19/80

STATE OF VERMONT

VERMONT WATER RESOURCES BOARD

Landtech Recreation Association
Landtech Corporation, d/b/a -
Brookside Tennis & Racquetball
Lower Eddy Pond
Rutland, Vermont

Findings of Fact
Conclusions of Law
&
Order

INTRODUCTION

On December 9, 1980, the Commissioner of the Department of Water Resources requested that the Water Resources Board conduct a hearing under the provisions of 10 V.S.A., section 1095 for the purpose of determining whether or not the Lower Eddy Pond Dam is in an unsafe condition. Due to the potential seriousness of this matter, the Board scheduled a hearing for 10:00 a.m. on December 12, 1980, at the Rutland District Courthouse. Notice of this hearing was provided by telephone to all parties thought to have an interest in this matter including the dam's owner - Landtech Recreation Association by Phil Dechert and their counsel Leonard Wing, Esq.; the City of Rutland; the Town of Rutland; the State of Vermont by the Agency of Environmental Conservation and the Director of Civil Defense; and Mr. and Mrs. Norman Spafford. Repeated efforts to contact Mr. Kenneth Cota by telephone were unsuccessful. Notice of the hearing was also provided to the Vermont Press Bureau.

Appearances at the hearing were entered by:

1. Landtech Recreation Association by Phil Dechert and Harold Berger, Esq.
2. Agency of Environmental Conservation by A. Peter Barranco and David Callum.
3. City of Rutland by Aldo Manfredi.
4. Town of Rutland by Clifford Young.

8. The Landtect Recreation Association shall take such measures to mitigate any adverse impacts associated with the release of sediment or water downstream from the dam site in accordance with the recommendations of the Department of Water Resources.

9. The dam may be removed in its entirety at the owner's expense provided that:

   a. the pond is first drained in accordance with the provisions of Condition 1 above.

   b. Removal of the dam is under the direct supervision of a professional engineer registered in the State of Vermont.

   c. Not less than 72 hours prior notice has been given to the City of Rutland and the Vermont Department of Water Resources.

   d. Measures are taken to mitigate the adverse impacts associated with the release of silt downstream in accordance with the recommendations of the Vermont Department of Water Resources.

Done this 5th day of January, 1981, at Montpelier, Vermont.

By Authority of the Water Resources Board

William A. Bartlett

WILLIAM A. BARTLETT
Executive Secretary

1. The pond shall be drained as soon as possible but not later than February 20, 1981, by the use of pumps, siphons or by such other methods as the Department of Water Resources may approve in writing. The water level shall be lowered to and maintained at the bottom of the pond drain or at such other level as the Department of Water Resources indicates in writing will adequately provide for the public safety.

2. The Landtect Recreation Association shall provide timely written and/or verbal reports on the status of dam's condition or in its efforts to drain the pond and render the dam to a safe condition upon request by the Water Resources Board, the Department of Water Resources or the City of Rutland.

3. Prior to actually draining the pond, but not later than January 20, 1981, the Landtect Recreation Association shall advise the Water Resources Board, Water Resources Department and the City of Rutland in writing, of the method by which it proposes to drain Eddy Pond and shall provide the Water Resources Department with such information regarding the intended methodology as the Department may request.

4. On or before January 20, 1981, the dam owner shall advise the Water Resources Board, the Water Resources Department and the City of Rutland in writing, regarding the manner in which the Lower Eddy Pond dam is to be repaired, modified or breached.

5. The dam owner, after consultation with the appropriate representatives of the City of Rutland, shall develop a written contingency plan for warning those individuals who might reasonably be expected to be effected by the failure of the dam. This plan shall provide for direct notice to Mr. Kenneth Cota and Mr. Yolanda Cioffi as well as a means for warning individuals using Curtis Avenue and shall clearly indicate, the circumstances under which it would be implemented and those responsible for such decision making as may be needed. This plan shall be submitted for the review and approval of the Water Resources Board by January 8, 1981.

6. As soon as possible, but not later than January 8, 1981, the dam owner shall place suitable fill material in the so-called sink hole on the westerly end of the upstream face of the dam.

7. Until such time as the pond is fully drained in accordance with the provisions of Condition 1 above, the Landtect Recreation Association shall insure that the dam is inspected daily and that a written record of each observation is maintained. Inspections may be conducted by individuals instructed by and under the supervision of a professional engineer registered in the State of Vermont. The supervising engineer shall inspect the dam at least once each week and at such other times as sound engineering judgement would warrent. The supervising engineer shall notify the Civil Defense Director for the City of Rutland and the Dam Safety Engineer of the Department of Water Resources of any change in the dam's condition.

9. Failure of the dam at full pond would wash out a portion of Curtis Avenue and, depending upon the mode of failure, could flood above the first floor of the Kenneth Cota residence.

10. The potential threat to the public safety in the event of the dam's failure would be substantially mitigated by the development of a contingency plan for warning those individuals potentially effected should a failure appear imminent.

11. As the level of the pond is lowered, the risk of failure and the magnitude of the potential threat to the public safety in the event of failure is lessened.

12. The level of the pond fluctuates with fluctuations in the volume of water flowing into the pond. When such flows exceed the hydrolic capacity of the dam's spillway, the pond level raises. Precipitation or thaw conditions sufficient to raise the level of the pond to a significant degree could occur at any time but are least likely to occur during the winter and are most likely to occur during the spring runoff.

13. Periodic inspection of the dam since December 6, 1980, have not uncovered indications of further deterioration, the internal erosion which the dam has experienced has weakened its structural integrity to an unknown degree. The dam's overall condition is poor and it creates a serious and unpredictable situation.

14. An individual with instruction by a professional engineer, would be sufficiently qualified to conduct the daily observations to determine if there is any change in the seepage through the dam.

CONSLUSIONS OF LAW

1. Landtect has made a good faith effort to comply with the Water Resouces Board order dated December 16, 1980.

2. The Lower Eddy Pond Dam is in an unsafe condition and constitutes a potentially serious hazard to the public safety.

3. The draining of Lower Eddy Pond and the maintenance of a small pond as possible until the dam is either rehabilitated or removed, will alleviate the hazards created by the unsafe condition of the Lower Eddy Pond Dam.

ORDER

The Vermont Water Resources Board hereby amends its order dated December 16, 1980, and hereby orders the Landtect Recreation Association d/b/a Brookside Tennis and Racquetball to operate and maintain the Lower Eddy Pond Dam in accordance with the following conditions:

FINDINGS OF FACT

1. Landtect has engaged the services of a professional engineer registered in the State of Vermont to inspect the dam in accordance with Condition 3 of the Board's order dated December 16, 1980, and to evaluate the feasibility of various alternatives for draining the pond and removing or modifying the dam.

2. Landtect has implemented a number of the recommendations contained in Commissioner Ponsetto's letter of December 9, 1980, including the placement of sand bags in the sink hole on the upstream face of the dam, removal of debris from the spillway and contacting the residents of the house immediately downstream of the dam as well as local civil defense authorities.

3. The dam's owner, the Landtect Recreation Association (hereinafter Landtect) did not drain Eddy Pond by December 26, 1980, in accordance with the provision of Condition 1 of the Board's order dated December 16, 1980.

4. Landtect attempted to physically locate the pond drain with the assistance of a metal detector on December 13, 1980. This effort proved unsuccessful.

5. After failing to locate the pond drain, Landtech made preliminary arrangements to obtain pumps of an adequate capacity to drain the pond from the Vermont Civil Defense Office, but abandoned the effort because of the anticipated costs. The cost of the gasoline to run the pumps under consideration for a period sufficient to drain the pond was estimated to be in excess of $5,000.00.

6. After abandoning efforts to drain the pond using pumps, Landtect, on December 18, 1980, began evaluating the feasibility of using five inch irrigation pipe available through the Vermont Civil Defense Office to drain the pond by siphoning. On December 22, 1980, this effort was determined to be unfeasible with the equipment under consideration due to the fact that the couplings for the irrigation pipe was not sufficiently air-tight to use in a siphon.

7. On December 23, 1980, Landtect began efforts to locate pipe suitable for creating a siphon. As of December 30, 1980, Landtect was seeking further information regarding pumps available through the U.S. Army Corps of Engineers and is seeking additional technical expertise regarding alternative methods of draining the pond.

8. Lower Eddy Pond has not been drained for an extended period time, perhaps not since the 1940's. As a result, the pond contains an unknown, but potentially substantial, quantity of silt. Depending upon the methods used to drain the pond and subsequently modify the dam, some quantity of silt will be released downstream.

STATE OF VERMONT

VERMONT WATER RESOURCES BOARD

Landtect Recreation Association
Landtect Corporation d/b/a
Brookside Tennis & Racquetball
Lower Eddy Pond
Rutland, Vermont

Findings of Fact
Conclusions of Law & Order

INTRODUCTION

On December 12, 1980, the Water Resources Board conducted a hearing at Rutland, Vermont under the provision of 10 V.S.A., Section 1095. As a result of that proceeding, the Board determined that so-called Lower Eddy Pond Dam presently owned by the Landtect Recreation Association is in an unsafe condition. On December 16, 1980, the Board issued an order directing that Landtect Recreation Association take various actions including the draining of the pond by December 26, 1980, in order to protect the public safety.

On December 30, 1980, the Water Resources Board conducted a second public hearing for the purpose of determining the status of the Landtect Recreation Association's efforts to comply with the Board's order of December 16, 1980, and to consider whether or not that order should be amended.

Appearances at the hearing on December 30th were entered by:

1. Landtect Recreation Association by Phil Dechert, John Wright, P.E. and Harold Berger, Esq.
2. Agency of Environmental Conservation by A. Peter Barranco and David Callum.
3. Department of Public Safety by Earl Osgood.
4. Kenneth Cota, downstream property owner.
5. Yolanda Cioffi, downstream property owner.

PREVIOUS INSPECTION REPORTS AND CORRESPONDENCE

A. The Vermont Water Resources Board held two public hearings in December 1980 regarding the safety of the dam. Copies of the 5 January 1981 and 16 December 1980 Findings of Fact, Conclusions of Law, and Order are attached, along with related correspondence dated 9 December 1980.

B. Inspection of the dam was performed by the Vermont Agency of Environmental Conservation, Department of Water Resources, in February 1974 and May 1952. Copies of Reports and related correspondence are attached.

LIST OF AVAILABLE DESIGN,

CONSTRUCTION AND MAINTENANCE RECORDS

A. PLANS AND SPECIFICATIONS

No plans or specifications for the dam were available. (A 1972 survey plan of land including the dam site was made available by the surveyors, A.C.F. Precision Surveys, Inc., Rutland, VT.)

B. DESIGN RECORDS

No design records were available.

C. CONSTRUCTION RECORDS

No construction records were available.

D. MAINTENANCE

No maintenance records were available.

APPENDIX B

ENGINEERING DATA

VISUAL INSPECTION CHECKLIST

DAM: Lower Eddy Pond Dam VT 00230 DATE: December 5, 1980

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	No spillway and no spillway bridge.
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

VISUAL INSPECTION CHECKLIST

DAM: Lower Eddy Pond Dam VT 00230 DATE: December 5, 1980

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS cont'd.	
Floor of Channel	Boulders, gravel, bedrock.
Other Obstructions	Fallen trees. 3.5'H x 6'W road culvert at Curtis Avenue - 100' d/s of toe of dam. Old dam remains about 150' d/s of Curtis Avenue.

VISUAL INSPECTION CHECKLIST

DAM: Lower Eddy Pond Dam VT 00230 DATE: December 5, 1980

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	Concrete spillway works have failed and now constitute an obstruction. Water level now controlled by bedrock in spillway discharge channel.
a. Approach Channel	Approach channel is a pond. Reed growth at east.
General Codnition	Fair
Loose Rock Overhanging Channel	No
Trees Overhanging Channel	Yes, westerly side of spillway on upstream face of dam.
Floor of Approach Channel	Silted, growth of marsh reeds (see photograph).
b. Weir and Training Walls	
General Condition of Concrete	Failed and now constitute an obstruction to pond outflow. Concrete walls undermined, outflanked, broken, tipped.
Rust or Staining	No reinforcement visible in concrete. Concrete walls are dislodged from bedrock foundation.
Spalling	
Any Visible Reinforcing	
Any Seepage or Efflorescence	
Drain Holes	
c. Discharge Channel	Note discharge channel at spillway is bedrock.
General Condition	Poor - overflow onto earth embankment, and cuts along toe of dam.
Loose Rock Overhanging Channel	No
Trees Overhanging Channel	Yes

3. Until such time as the pond is fully drained in accordance with the provisions of condition 1 above, the dam's owner shall insure that the dam is inspected daily by a professional engineer registered in the State of Vermont who shall keep a written record of his/her observations. The supervising engineer shall notify the City of Rutland and the Dam Safety Engineer of the Department of Water Resources of any change in the dam's condition during this period.

4. After draining the pond, the dam shall be inspected daily to insure that the pond is maintained in compliance with condition 1 above. The individual inspecting the dam on the owner's behalf shall keep a written record of his/her observations.

5. The dam may be removed in its entirety at the owner's expense provided that:

   a. The pond is first drained in accordance with the provisions of condition 1 above.

   b. Removal of the dam is under the direct supervision of a professional engineer registered in the State of Vermont.

   c. Not less than 72 hours prior notice has been given to the City of Rutland and the Vermont Department of Water Resources.

   d. Measures are taken to mitigate the adverse impacts associated with the release of silt downstream in accordance with the recommendations of the Vermont Department of Water Resources.

Done this 16th day of December, 1980, at Montpelier, Vermont.

By Authority of the Water Resources Board

William A. Bartlett

WILLIAM A. BARTLETT
Executive Secretary

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources and Environmental Engineering
Division of Protection
Natural Resources Conservation Council

Montpelier, Vermont 05602
Department of Water Resources
and
Environmental Engineering
Water Quality Division
(802) 828-2761

December 9, 1980

Mr. Phil Dechert, Manager
Brookside Tennis & Racquetball
40 Curtis Avenue
Rutland, Vermont 05701

RE: Lower Eddy Pond Dam - Rutland City

Dear Mr. Dechert:

This letter is in reference to the meeting at the Lower Eddy Pond Dam on Saturday, December 6 concerning the serious problems discovered by engineers from Robert G. Brown and Associates during their inspection of the dam on December 5, 1980. It is my understanding that the dam is owned by Land Techt Recreational Associates who own the Brookside Tennis and Racquetball facility. Present at the meeting were yourself, John F. Cysz, P.E., and Robert Hoogs of Robert G. Brown and Associates, James E. Walsh, P.E, (Geotechnical sub contractor to Brown), Warren E. Connor, P.E, City Engineer, Richard Barron, City Fire Chief, and A. Peter Barranco, Jr, P.E., Dam Safety Engineer from the Department of Water Resources.

As you know, the inspection was carried out by the above firm under contract to the New England Division, Corps of Engineers as part of the National Dam Inspection Program (PL 92-367). Under this program about 75 dams have been inspected in Vermont since 1978. The Department has been cooperating State agency in this program and has supplied the names of dams to be inspected.

During the course of the inspection on December 5, 1980, it was noted that seepage and/or leakage through the dam near the left abutment was causing internal erosion (piping) of the soil in the dam which was evident from the deposits of soil at various points on the downstream face end toe. The water passing through the dam has caused undermining and subsidence of the downstream slope. A sink hole (about 2 feet in diameter and a foot deep) on the crest of the dam opposite a cavity on the upstream face at the waterline where water was entering the embankment from the pond was another manifestation of the internal erosion. This is a very serious situation with an earthfill dam and could cause the dam to wash out.

This condition (piping) at this dam is of particular concern because of the house located just below the dam which could be damaged with possible loss of life if the dam were to fail. Based on these circumstances the dam is considered to be unsafe and a menace to people and property downstream and should be drained as soon as possible.

It should be noted that in addition to the piping condition the dam has other serious problems which includes heavy brush and tree growth on the upstream and downstream slopes, seepage and leakage near the right end of the embankment adjacent to the spillway, a disintegrated spillway control structure, lack of protection of the embankment at the spillway and no apparent way to drain the pond. It is reported that a drain exists but neither upstream or downstream ends or the control mechanism or gate are visible. The spillway is inadequate to safely pass large flood flows. Overall the dam is considered to be in poor condition.

As Mr. Barranco discussed with you, draining the pond is only a short term measure to reduce the hazard presented because the relatively large drainage area compared to the surface area of the pond means that the pond could refill rapidly even with a moderate amount of runoff. Breaching the dam after the pond is drained will probably be necessary.

It is recommended that the following steps, if not already implemented, should be taken at once:

1. Plug the hole on the upstream face near the waterline at the left (tennis court) side of the dam. Sand bags and/or earthfill should be placed in the cavity to prevent direct access from the pond.

2. Contact the residents of the house below the dam to make them aware of the problems with the dam and the steps being taken to deal with the situation.

3. Inspect the dam daily, or more often during rain or a thaw. Particular attention should be paid to the seepage/leakage at the left end. Increases in flow rate or muddy water could indicate the internal erosion is accelerating.

4. Develop and implement a plan to warn and evacuate the residents in the house if the situation worsens. The Rutland Civil Defense office and/or the State Civil Defense office should be contacted for help.

5. The spillway should be cleared to provide for more unobstructed flow. This involves removing the remains of the old concrete and timber spillway that rests on ledge at the right end of the dam. It is important that the earth fill on the dam side of the ledge not be distrubed. The concrete rubble could be placed along the side of the earth embankment adjacent to the spillway as a means of protecting it against high flows.

6. Locate and determine if pond drain is operable. This will require the services of a diver. It may be possible that a State Police diver could do this, if not, a commercial diver should be contacted.

If the drain can be located and made operational and if the down-

stream end of the pipe can be located and the pipe inspected to see if it can pass sufficient flow without rupturing, this would appear to be a satisfactory way to drain the pond. If this can not be done, it will be necessary to use large capacity pumps and/or siphons to drain the pond sufficiently to allow the drain to be opened or the dam breached.

Draining the pond or breaching the dam can not be done without Department concurrence.

During previous inspections by the Department, in 1952 and 1974, seepage and other serious deficiencies which are still present were noted. (see attached inspection reports and correspondence). Although the piping has probably been going on undetected for sometime, the sink hole and visible soil deposits appear to be more recent. The dam is probably not in imminent danger of failure, however, the situation could change quickly and it is the Department's opinion that the prudent thing to do at this time is to drain the pond and breach the dam.

Since jurisdiction over the construction and safety of all dams, except power and agricultural dams, rests with the Water Resources Board under Title 10 Chapter 43, V.S.A., I am requesting that the Board declare the dam unsafe and a menace to people and property and order the pond drained and the dam breached.

I appreciate your cooperation and interest in the safety of the dam that you have shown and look forward to your continuing cooperation and timely actions. I would request that you advise me by return mail as to the steps you have taken to implement the six recommendations made by the Department.

Please be assured that the Department will provide what help it can to help resolve the problems at the dam.

Sincerely,

John R. Ponsetto, Commissioner
Water Resources and Environmental Engineering

cc: E. Perkins Gould, New England Division, Corps of Engineers
John F. Cysz, P.E. - Robert G. Brown and Associates
Warren E. Connor, P.E. - City Engineer
Aldo Manfredi - Rutland Civil Defense Director
William A. Bartlett - Executive Secretary, Water Resources Board
Leonard Wing, Esq - Ryan, Smith and Carbine

Enclosure:

ROUTING		
TO		DATE
		2/7/74
		2-7-74
FILE		

MANAGEMENT & ENGINEERING DIVISION

February 7, 1974

Mr. Brian Lea
40 Curtis Avenue
Rutland, Vermont 05701

Dear Mr. Lea:

While in Rutland recently, I inspected your dam on the former lower Eddy Ice Pond. The dam appears to be in fair condition, but it could use some extra maintenance. At the rock-ledge spillway, there are two items:

First, the remains of the concrete control structure should be removed to provide an obstructed flow through the spillway;

Secondly, the earth fill next to the spillway should have some erosion protection, such as heavy stone.

The trees on the embankment should all be cut down; trees and brush tend to hold extra water in earth slopes, and this weakens an earth dam.

I noticed the leakage at the west end and the efforts to control. The efforts are commendable, but they do nothing to stop the leakage. Should the leakage increase, it may be necessary to perform remedial measures.

If you have any questions, please don't hesitate to get in touch with me.

Sincerely,

Donald H. Spies
Dam Construction Engineers

DHS:csf

State of Vermont

FILE COPY

Department of Fish and Game
Department of Forests and Parks
Department of Water Resources
Environmental Board
Division of Environmental Protection
Division of Recreation
Division of Planning
Natural Resources Conservation Council

ROUTING

GENERAL TO	NOTED	DATE
AHY		
D.H.	1pm	2/7/74
DHS	Dufs	2-7-74

SUSPEND TO

FILE

AGENCY OF ENVIRONMENTAL CONSERVATION
MARTIN L. JOHNSON, Secretary
Montpelier, Vermont 05602
DEPARTMENT OF WATER RESOURCES
MANAGEMENT & ENGINEERING DIVISION

To: File

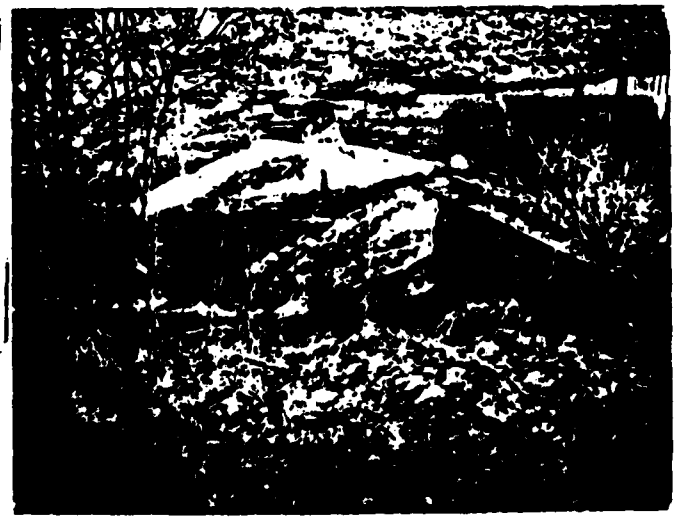
From: D. H. Spies

Re: Eddy Ice Pond (Lower) - Rutland City

Date: February 1, 1974

The writer and Alan Nye inspected the subject structure on January 30, 1974. The dam appears to be an earth-fill structure. The right abutment consists of rock ledge and serves as an overflow spillway. The remains of a concrete control structure are on the ledge. There is no rip-rap or other protection on this end of the earth fill.

Seepage was noted at the left abutment; two 24" GCMP had been set into embankment to contain seepage and direct water to a stone-lined gutter. There are trees along the top of slope on both faces of the dam.



CRS
10/25/74

INSPECTION REPORT
ON
Eddy Pond (Lower) Dam

1. Date of inspection 5/22/52 2. Water conditions normal

GENERAL DATA:

3. Location of dam Mussey Br.; Rutland town
4. Owner and operator Eddy Ice Co.
5. Characteristic features of dam earth dam 200' long about 25' high - with overflow over ledge at east end.
6. Other related data Pond area = 6 acres, Volume = 1,800,000 cu. ft. D.A. = 3 sq. mi. - use = recreation

OBSERVATIONS:

7. Condition of structure embankment - much seepage at maximum base section - no toe protection from spillway discharge along dam - maintenance needed to clean up slopes.
Spillway - end walls in partial failure - discharge not confin
8. Condition of equipment none
9. Operation Keep maximum pond level
10. Maintenance Poor

REMARKS: Dam at edge of Rutland city - stream running thru city

Inspected by JHA

B-17

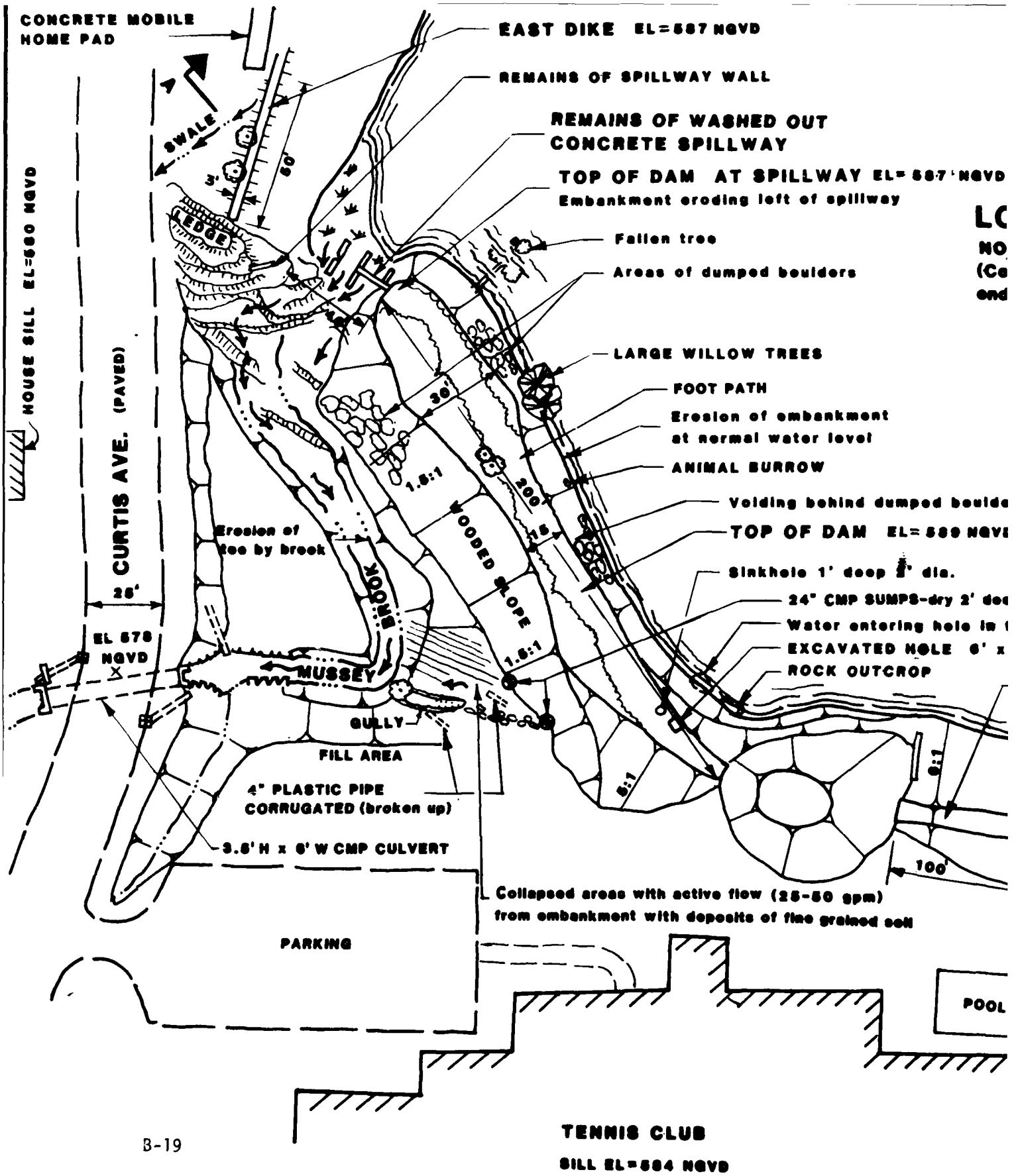
A. SKETCHES COMPILED DURING PHASE I INSPECTION SHOWING GENERAL LAYOUT OF DAM, TYPICAL SECTIONS AND DETAILS OF SIGNIFICANT FEATURES:

Figure 1. General Plan of Damsite

Figure 2. Profile

B. RECORD PLANS:

None available.


CONCRETE MOBILE HOME PAD
EAST DIKE EL=587 NGVD
REMAINS OF SPILLWAY WALL
REMAINS OF WASHED OUT CONCRETE SPILLWAY
TOP OF DAM AT SPILLWAY EL=587 NGVD
Embankment eroding left of spillway
Fallen tree
Areas of dumped boulders
LARGE WILLOW TREES
FOOT PATH
Erosion of embankment at normal water level
ANIMAL BURROW
Voiding behind dumped boulde
TOP OF DAM EL=589 NGVD
Sinkhole 1' deep 2' dia.
24" CMP SUMPS-dry 2' dee
Water entering hole in
EXCAVATED HOLE 6' x
ROCK OUTCROP
SWALE
3'
50'
EDGE
HOUSE SILL EL=580 NGVD
CURTIS AVE. (PAVED)
25'
EL 578 NGVD
Erosion of toe by brook
BROOK
MUSSEY
WOODED SLOPE
1.5:1
30'
200'
75'
GULLY
FILL AREA
4" PLASTIC PIPE CORRUGATED (broken up)
3.5'H x 6' W CMP CULVERT
Collapsed areas with active flow (25-50 gpm) from embankment with deposits of fine grained soil
PARKING
POOL
100'
TENNIS CLUB
SILL EL=584 NGVD

AY EL= 587 NGVD
spillway

LOWER EDDY POND

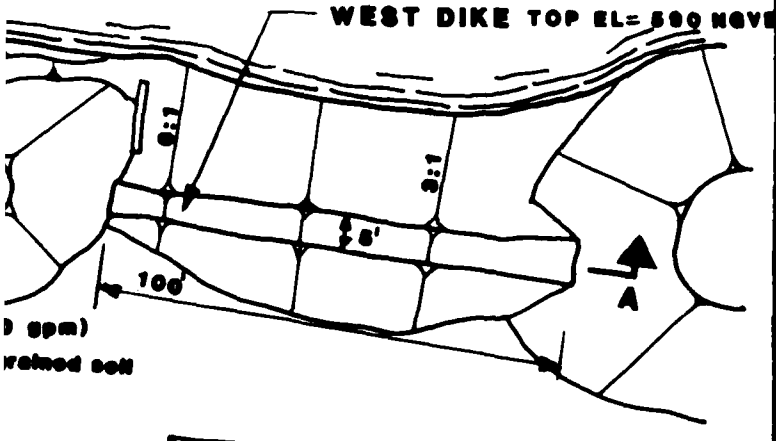
NORMAL POOL EL=585 NGVD
(Controlled by ledge outcrop at east end of dam)

ore

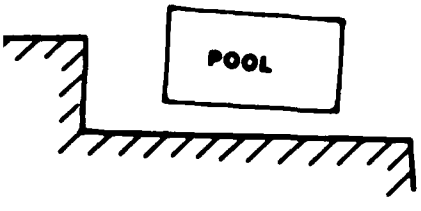
ikment
level

hind dumped boulders
)AM EL= 580 NGVD

' deep 8" dia.
CMP SUMPS-dry 2' deep
or entering hole in this area
AVATED HOLE 6' x 5' x 1' deep
K OUTCROP

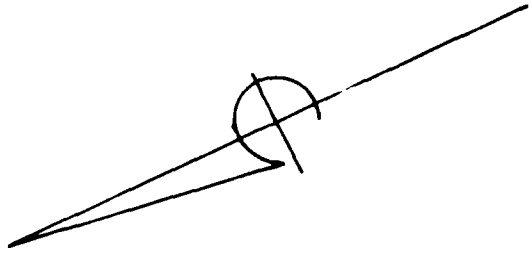


) gpm)
rained soil



NOTE: Elevation Datum is based on elevation of Lower Eddy Pond interpolated from USGS Rutland, Vermont Quadrangle Normal pool assumed elevation = 585 NGVD

NOTE: There are no operable outlet conduits or means to lower or drain pond



GENERAL PLAN

APPENDIX B FIGURE 1

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS

ROBERT G. BROWN & ASSOCIATES, INC.
Pittsfield, Massachusetts

NATIONAL PROGRAM FOR
INSPECTION OF NON-FEDERAL DAMS

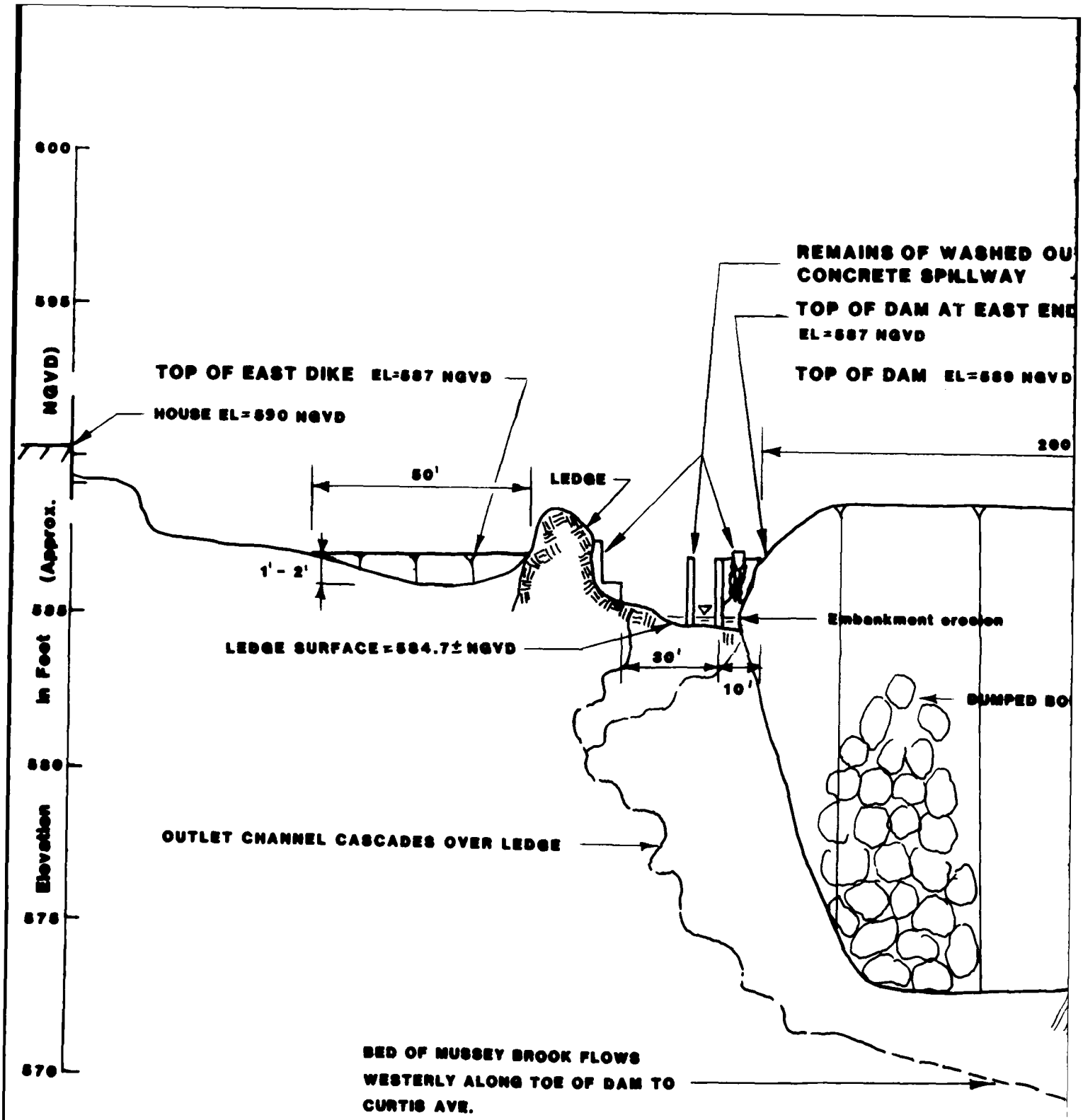
LOWER EDDY POND DAM

VT 00230

MUSSEY BROOK

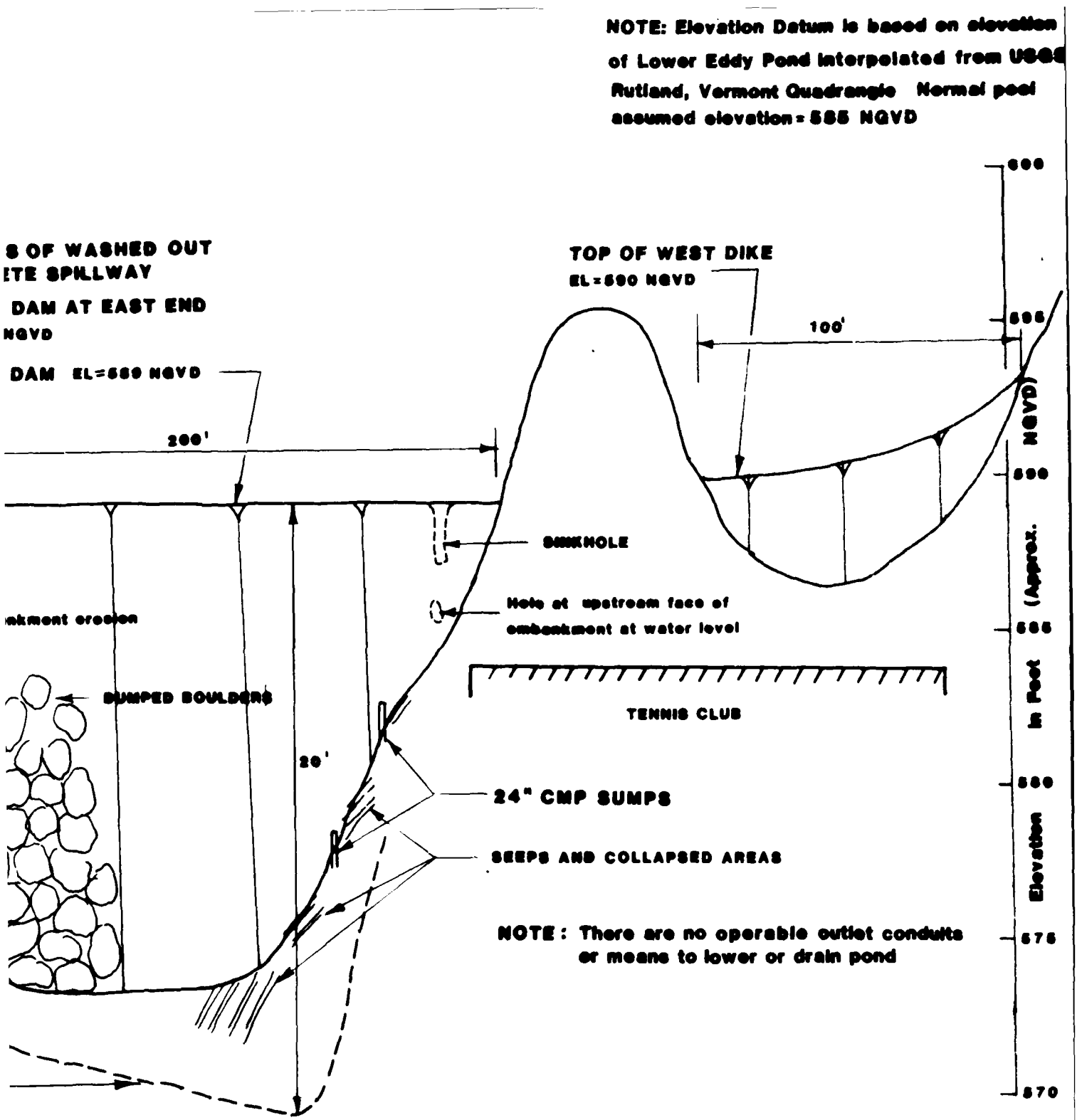
RUTLAND VERMONT

SCALE: NOT TO SCALE | DATE: JAN 1981



SECTION A-

NOT TO SCALE



APPENDIX B FIGURE 2

SECTION A-A

NOT TO SCALE

LOWER EDDY POND DAM

TYPICAL BORING LOGS

None available.

APPENDIX C

PHOTOGRAPHS

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB Vt. 230 Lower Eddy Pond Dam
SHEET NO. 1 OF 15
CALCULATED BY JFC DATE 1/9/81
CHECKED BY JMC DATE 1/12/81
SCALE

Drainage Area - 1600 Ac ✓ 3.5 Sq. Mi ✓

Size - Small
Hazard - High
Test Flood Range - ½ PMF to PMF

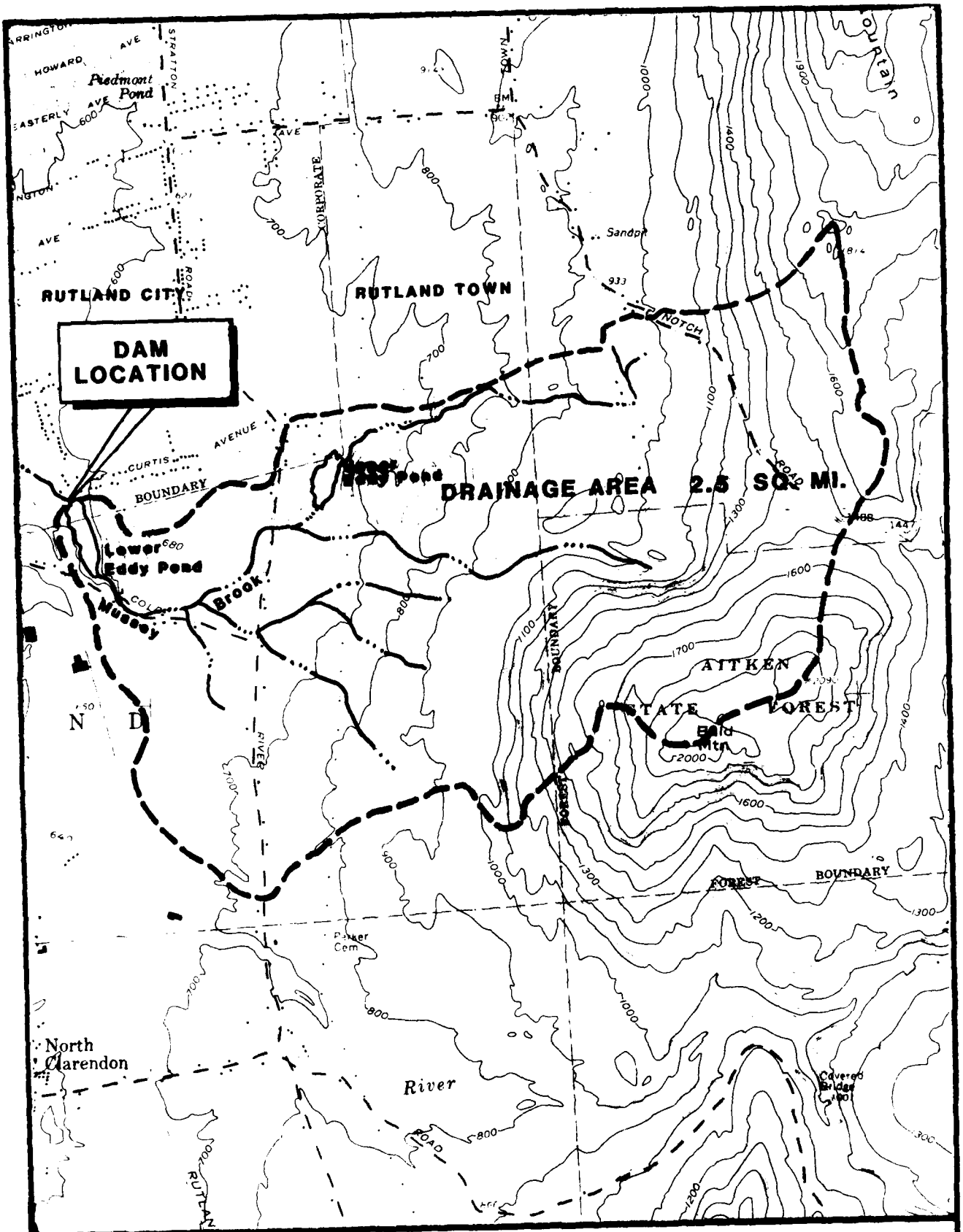
Estimate PMF using "Preliminary Guidance For Estimating Maximum Probable Discharges in Phase I Dam Saftey Investigations" - New England Division Corps of Engineers, Mar. 1978

Watershed slope steep in upper portion, rolling in lower watershed; weighted ave. slope ≈ 15% ✓
Ratio of Ponds / D.A ≈ 15/1
Use CSM_{PMF} rate ½± between rolling & Mountainous terrain - CSM_{PMF} = 2250 CSM ✓

PMF = 2250 × 2.5 = 5625 cfs ✓
½ PMF = 5625/2 = 2813 cfs ← Selected Test Flood

¼ PMF = 5625/4 = 1406 cfs ✓

Compute stage v. discharge and stage v. storage curves



LOWER EDDY POND DAM

RUTLAND, VT.

Identification No. VT 00230

N

Rutland Quadrangle

1:24000

APPENDIX D-1

APPENDIX D

HYDRAULIC AND HYDROLOGIC COMPUTATIONS

Photograph 17

View of mobile home park area upstream of railroad embankment 1200 feet downstream of dam. Note channel of brook being filled.

Photograph 18 - Upstream end of 10' wide by 10' high stone arch culvert beneath railroad embankment. Note overhanging trees at inlet. Flows in excess of culvert capacity could flow north (to right) along railroad tracks towards Moon Brook.

Photograph 15 - Upstream end of CMP arch culvert at Curtis Avenue.

Photograph 16 - View of bedrock outcrop and remains of old dam approximately 150 feet downstream of Curtis Avenue. View looking upstream towards Curtis Avenue. House and garage are to the left of photograph.

Photograph 13 - East dike showing rock ledge overflow to the left of photograph. Note concrete trailer pad at right and drainage swale beyond dike. House is also shown in Photograph 14.

Photograph 14 - View from top of dam of area immediately downstream. Note culvert shown in Photograph 15 and house to the north of Curtis Avenue.

Photograph 11

Collapsed areas with flow on downstream slope. Note pipe sump higher up on slope.

Photograph 12 - Collapsed area on the downstream slope where water is exiting from the embankment. Note deposits of fine grain soil.

Photograph 9 - View of 2 - 24-inch CMP sumps about 10 years old; appear to be a previous attempt to control seepage near west end of dam. Note slump at right.

Photograph 10

View of downstream slope in area of upper pipe sump showing large trees and area of erosion.

Photograph 7 - Crest of dam looking northeast showing house north of Curtis Avenue from near sink hole.

Photograph 8

Collapsed area on upstream face showing where water is entering into the embankment. Note water in this area is not frozen.

Photograph 5 - View of 2-foot diameter, 1-foot deep sink hole on crest of dam (Photograph 6) and collapsed area on upstream face (Photograph 8). Excavated area in front of sink hole is man made.

Photograph 6 - Close up of sink hole in crest shown in Photograph 5 (looking downstream).

Photograph 3 - Rock outcrop at easterly abutment which acts as an overflow spillway and controls the level of Lower Eddy Pond.

Photograph 4 - Remains of concrete spillway (washed out) at rock outcrop at east end of dam. Looking in southerly direction.

Photograph 1 - Crest looking east. Note large leaning trees on both upstream and downstream slopes.

Photograph 2 - Looking east along downstream slope showing wooded embankment and discharge channel along toe of embankment. Collapsed areas are on right, uphill of Elm tree.

AY EL= 587 NGVD
pillway

LOWER EDDY POND

NORMAL POOL EL= 585 NGVD
(Controlled by ledge outcrop at east end of dam)

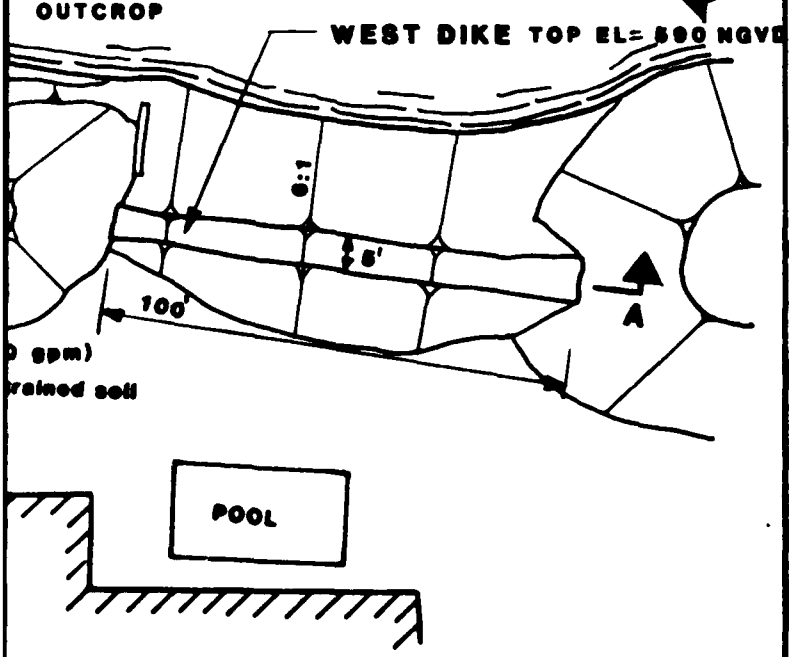
ra

kment
evel

hind dumped boulders
AM EL= 588 NGVD

deep 2' dia.
MP SUMPS-dry 2' deep
r entering hole in this area
VATED HOLE 6' x 5' x 1' deep
OUTCROP

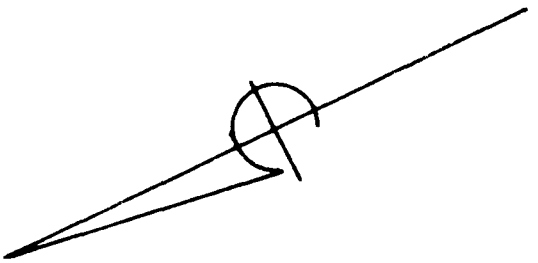
OVERVIEW



gpm)
rained soil

NOTE: Elevation Datum is based on elevation of Lower Eddy Pond interpolated from USGS Rutland, Vermont Quadrangle Normal pool assumed elevation: 585 NGVD

NOTE: There are no operable outlet conduits or means to lower or drain pond



1 — INDICATES PHOTOGRAPH NUMBER AND DIRECTION IN WHICH PHOTOGRAPH WAS TAKEN

16 — TAKEN 350' DOWNSTREAM SHOWING OLD GRIST MILL DAM

17 — NEW TRAILER PARK 800' DOWNSTREAM

18 — TAKEN DOWNSTREAM SHOWING RAILROAD ARCH CULVERT

APPENDIX C-1

PHOTOGRAPH INDEX

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS

ROBERT G. BROWN & ASSOCIATES, INC.
Pittsfield, Massachusetts

NATIONAL PROGRAM FOR
INSPECTION OF NON-FEDERAL DAMS

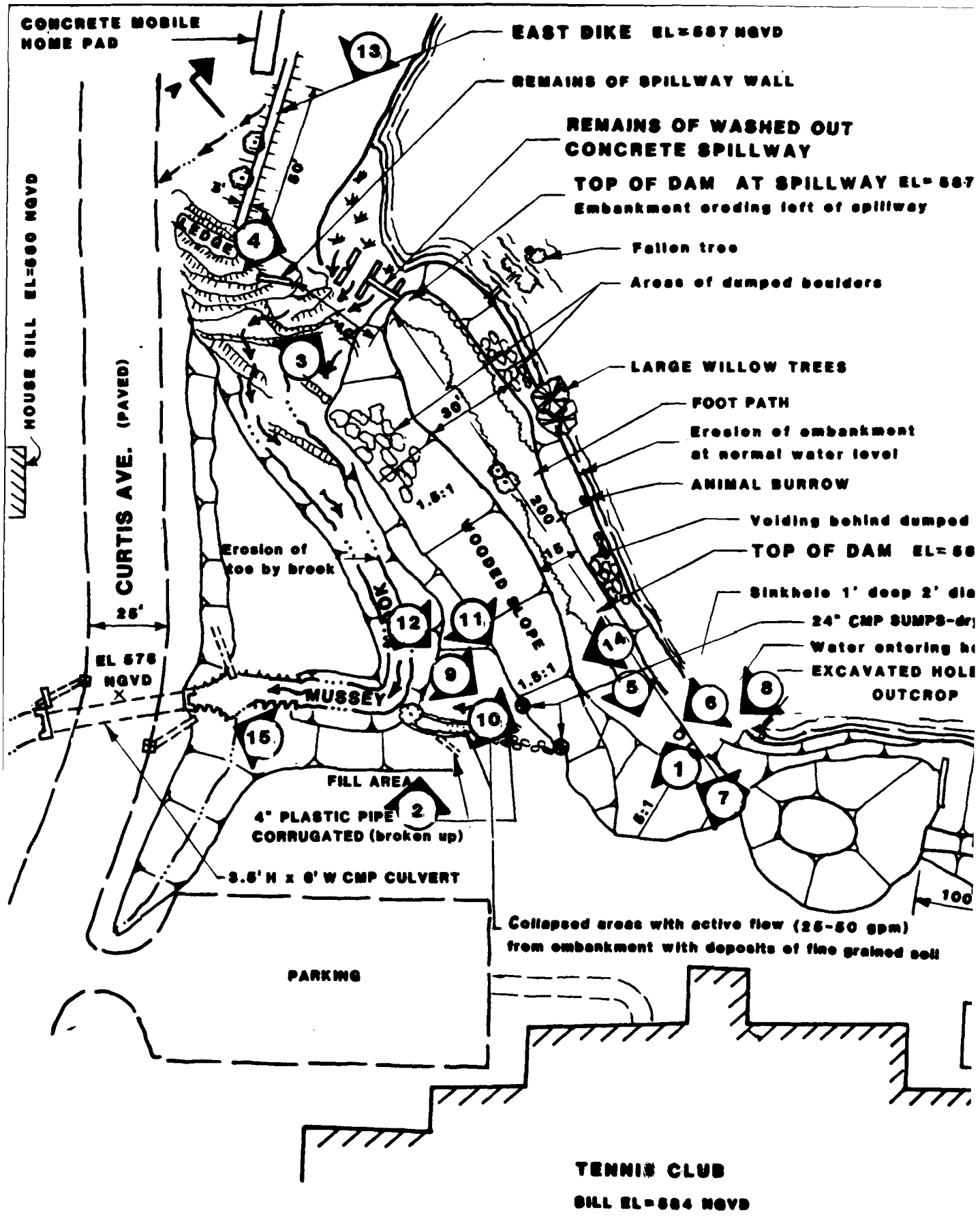
LOWER EDDY POND DAM

VT 00230

MUSSEY BROOK

RUTLAND VERMONT

SCALE: NOT TO SCALE | DATE: JAN 1981


CONCRETE MOBILE HOME PAD
EAST DIKE EL=587 NGVD
REMAINS OF SPILLWAY WALL
REMAINS OF WASHED OUT CONCRETE SPILLWAY
TOP OF DAM AT SPILLWAY EL=587
Embankment eroding left of spillway
Fallen tree
Areas of dumped boulders
LARGE WILLOW TREES
FOOT PATH
Erosion of embankment at normal water level
ANIMAL BURROW
Voiding behind dumped
TOP OF DAM EL=58
Sinkhole 1' deep 2' dia
24" CMP SUMPS-dr
Water entering h
EXCAVATED HOLE
OUTCROP
HOUSE SILL EL=580 NGVD
CURTIS AVE. (PAVED)
25'
EL 576 NGVD
Erosion of toe by brook
MUSSEY
FILL AREA
4" PLASTIC PIPE CORRUGATED (broken up)
3.5' H x 6' W CMP CULVERT
PARKING
Collapsed areas with active flow (25-50 gpm) from embankment with deposits of fine grained soil
TENNIS CLUB
SILL EL=584 NGVD
EDGE
60'
30'
200'
1.5:1
5:1
100
13
4
3
12
11
9
10
14
5
6
8
1
7
15
2

JFC 1/6/31

VT 230 LOWER EDDY POND DAM
DISCHARGE RATING

ELEV.	FLOW THRU SPILLWAY (East) C	L (1)	H	Q	FLOW OVER DAM C	L	H	Q	FLOW C
585	3.0	40'	0.3	20					
586	↓	↓	1.3	178					
587			2.3	419					2.8
589			4.3	1070	2.6	225'	0	0	↓
590			5.3	1464	↓	↓	1	585	
590.5			5.8	1676			1.5	1075	
591	↓	↓	6.3	1898	↓	↓	2	1655	↓

(1) Without obstruction from existing concrete spillway remains

Opening is presently obstructed by concrete blocks (40%) (see photos) Old spillway was about 7' wide - now washed out

There is no operable outlet conduit for this structure

FLOW OVER DIKE (East)				FLOW OVER DIKE (West)				TOTAL Q	REMARKS
C	L	H	Q	C	L	H	Q	(cfs)	
								20	Ledge Crest 584.7± ave
								178	
2.8	70	0	0					419	Top of east dike
		2	554					1624	Top of dam
		3	1018	2.8	50	0	0	3067	Top of west dike
		3.5	1283	"	"	0.5	49	4083	
		4	1568	2.8	"	1	140	5261	

Note - Water Surf elev. normal 585 by interpolation from USGS Quadrangle

Discharge Rating
Vt. 230
Lower Eddy Pond Dam
Note: Assumed elevations subject to change about ½ higher than datum used for Flood Ins. Study
Elev. NGVD from USGS Quad Sheet
592
591
590
589
588
587
586
585
584.0
1000
1500
2000
2500
3000
3500
4000
Discharge in cfs
½ PMF (TEST FLOOD)
¼ PMF
100 YR. FEE HUD FLOOD STUDY
Top of dike East
Top of dam at east end Spillway
Top of dike West
Top of Dam at Center
Discharge
Spillway Ledge Crest @ East
ELEVATION

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB Vt. 230 Lower Eddy Pond Dam
SHEET NO. 4 OF 15
CALCULATED BY JFC DATE 1/6/80
CHECKED BY JMC DATE 1/21/80
SCALE

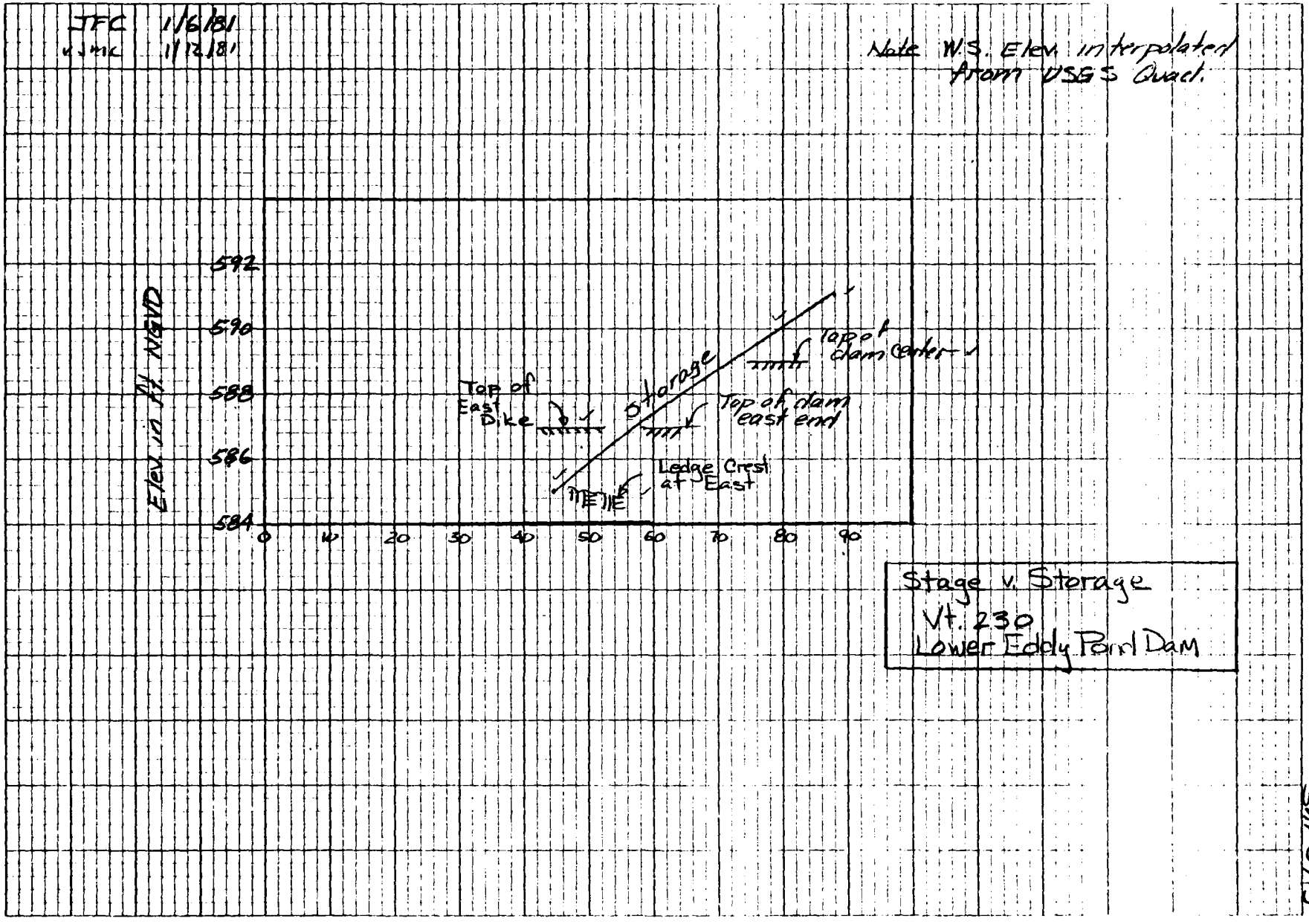
Stage v. Storage

Elev.	Area (Ac)	ΔStorage (Ac ft)	ΣStorage (Ac ft)
585	6 ✓		45 ✓
590	8 ✓	35 ✓	80 ✓
591	8 ✓	8 ✓	88 ✓

- Estimate based on ave depth of 0.4 max. depth

JFC 1/6/81
WJHC 1/12/81

Note W.S. Elev. interpolated from USGS Quad.



Sht 5/15

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB Vt. 230 Lower Eddy Pond Dam
SHEET NO. 6 OF 15
CALCULATED BY JFC DATE 1/9/81
CHECKED BY JMC DATE 1/21/81
SCALE

Surcharge Estimates

1/4 PMF

Q_{P_1} = 1400 cfs → El. 588.6 → 70 Ac ft

Storage @ 585 → 45 Ac ft
Δ Storage = 25 Ac ft
$25 \text{ Ac ft} \times \frac{1}{2.5 \text{ SM}} \times \frac{\text{in·SM}}{53.3 \text{ Ac ft}} = 0.19''$ (STOR 1)

$Q_{P_2} = Q_{P_1} \times \left(1 - \frac{\text{STOR 1}}{19/4}\right)$

$Q_{P_2} = 1400 \times \left(1 - \frac{0.19}{4.75}\right)$

Q_{P_2} = 1345 cfs → El. 588.7 → 69 Ac ft
Δ Storage = 24 Ac ft

$24 \times \frac{1}{2.5} \times \frac{1}{53.3} = 0.18''$ (STOR 2)

$\text{STOR}_{AVE} = \frac{\text{STOR 1} + \text{STOR 2}}{2}$

$\text{STOR}_{AVE} = \frac{0.19 + 0.18}{2} = 0.185''$

$0.185'' \times 2.5 \text{ SM} \times \frac{53.3 \text{ Ac ft}}{\text{in·SM}} = \cancel{24.6}\ 25 \text{ Ac ft}$

(25 Ac ft + 45 Ac ft) → 70 Ac ft →
El. 588.7 → 1350 cfs

1/4 PMF Routed Outflow

Note - Water flowing through spillway, over top of dam west of spillway, over dike to east of spillway.

1/2 PMF

Q_{P_1} = 2800 cfs → El. 589.8 → 78 Ac ft

Storage @ 585 → 45 Ac ft.
Δ Storage = 33 Ac ft
$33 \times \frac{1}{2.5} \times \frac{1}{53.3} = 0.25''$ (STOR 1)

$Q_{P_2} = Q_{P_1} \times \left(1 - \frac{\text{STOR 1}}{19/2}\right)$

$Q_{P_2} = 2800 \times \left(1 - \frac{0.25}{9.5}\right)$

Q_{P_2} = 2725 cfs → El. 589.8 → 77 Ac ft
Δ Storage = 32 Ac ft

$32 \times \frac{1}{2.5} \times \frac{1}{53.3} = 0.24''$ (STOR 2)

$\text{STOR}_{AVE} = \frac{0.25 + 0.24}{2} = 0.245''$

$0.245'' \times 2.5 \times 53.3 = \cancel{32.6}\ 33 \text{ Ac ft}$

(33 Ac ft + 45 Ac ft) → 78 Ac ft →
El. 589.8 → 2730 cfs

1/2 PMF Routed Outflow

Note Water flowing through spillway, over entire top of dam, and over dike to east of spillway.

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB Vt. 230 Lower Eddy Pond Dam
SHEET NO. 7 OF 15
CALCULATED BY JFC DATE 1/6/81
CHECKED BY JMC DATE 1/12/81
SCALE

Summary

	½ PMF	½ PMF (Test Flood)
1. Inflow	1400 cfs ✓	2800 cfs
2. Routed Flood Outflow	1350 cfs ✓	2730 cfs
3. Flood Elev.	588.7 ✓	589.8
4. Storage at Flood Elev	70 Ac ft ✓	78 Ac ft
5. Spillway Capacity at Flood Elev.	$Q = 3.0 \times 40 \times (4)^{1.5} =$ 960 cfs ✓ * assumes spillway clear	$Q = 3.0 \times 40 \times (5)^{1.5} =$ 1342 cfs ✓
6. Top of dam at east end; east dike	El. 587 ✓	El. 587 ✓
7. Top of Dam at Center	El. 589 ✓	El. 589 ✓
8. Depth of Overtopping east end of dam & east dike	1.7 ft ✓	2.8 ft. ✓
9. Depth of Overtopping Dam at Center	— ✓	0.8 ft ✓
10. Spillway Cap. at Low point in Top of dam (east end)	420 cfs ✓	420 cfs ✓
11. Spillway Cap. as % of Routed Outflow	31 % ✓	15 %
Conclude	that spillway can not pass 50% of test flood	test flood or

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB Vt. 230 Lower Eddy Pond Dam
SHEET NO. 8 OF 15
CALCULATED BY JFC DATE 1/6/81
CHECKED BY JMC DATE 1/12/81
SCALE

Breach Analysis

Breach width assumed @ 40% Crest length at Mid ht

$W_b = 0.4 \times 150' = 60'$ ✓

Assume breach w/ water at top of dam 589.

y_o = 20' ✓ ht from stream bed to pool at failure

$$Q_p = 8/27\ W_b \sqrt{g}\ y_o^{3/2}$$

$$Q_p = 8/27 \times 60' \times 32.3^{1/2} \times 20^{3/2} = 9023\ cfs$$ ✓

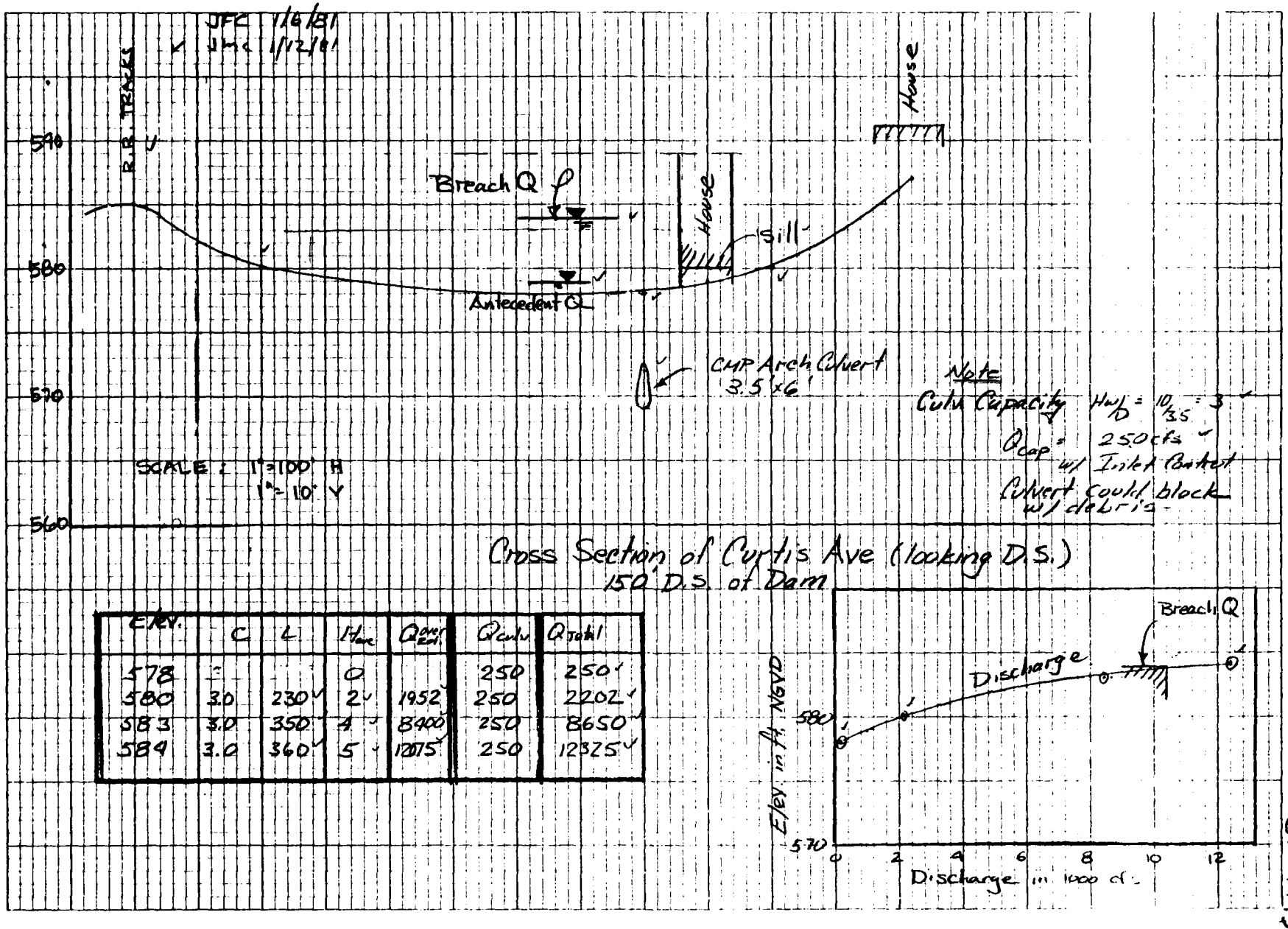
Plus spillway flow + flow over dike

≈ 1400 cfs ✓

Total Breach Q = 10,400 cfs ✓

S = Storage at top of dam = 70 Ac ft ✓

JFC 1/6/81
JMC 1/12/81



Note
Culv Capacity $H_w/D = 10/3.5 = 3$
Q_{cap} = 250 cfs
Q_{cap} w/ Inlet Basket
Culvert could block w/ debris

Cross Section of Curtis Ave (looking D.S.)
150' D.S. of Dam

Elev.	C	L	H_{face}	Q_{over}	Q_{culv}	Q_{total}
578	-	-	0	-	250	250
580	3.0	230	2	1952	250	2202
583	3.0	350	4	8400	250	8650
584	3.0	360	5	12075	250	12325

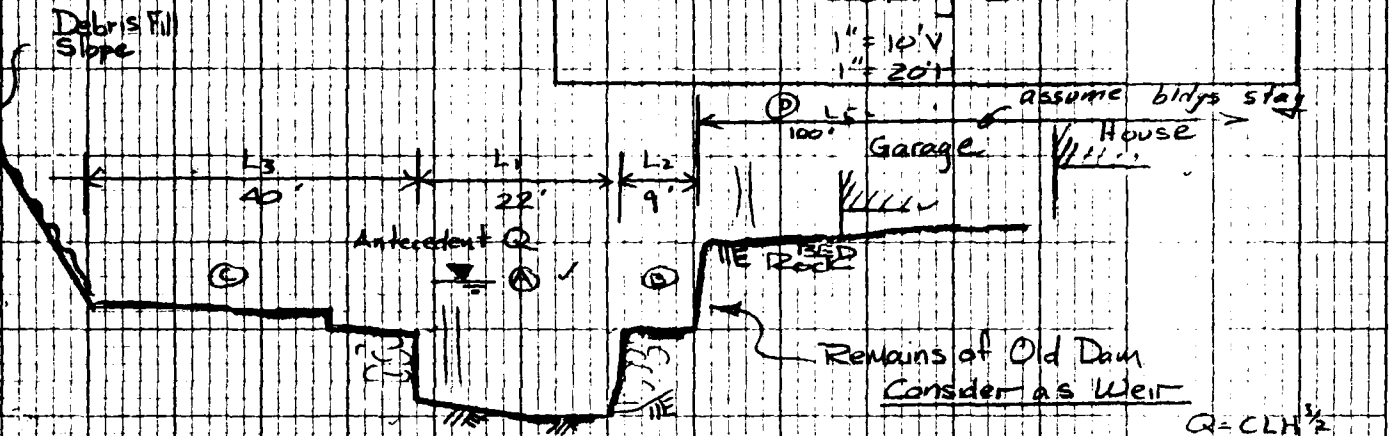
Sht 9/15

JFC 1/6/81
VJMc 1/12/81

Cross Section at Remains of Old Dam 300' D.S. of Lower Eddy Pond Dam

Looking D.S.

1" = 10' V
1" = 20' H



$Q = CLH^{3/2}$

Elev.	A C	A L_1	A H	A Q_1	B C	B L_2	B H	B Q_2	C C	C L_3	C H	C Q_3	Q Total
560	2.9	22	0										0
565	"	"	5	713	2.9	9	0	0					713
570	"	"	10	2018	"	"	5	292	2.8	40	4	896	3206
573	"	"	13	2990	"	"	8	590	"	"	7	2074	5654

add flow thru yard

$Q = 2.5 \times 100 \times 2.5^{3/2} = 988$

$(5659 + 988) = 6642$ cfs

Sht 10/15

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB Vt 230 Lower Eddy Pond Dam
SHEET NO. 11 OF 15
CALCULATED BY JFC DATE 1/6/81
CHECKED BY UMC DATE 1/12/81
SCALE

Notes on Downstream Hazard —

① One house on the north side of Curtis Ave would be flooded approx. 3-4 feet above first floor level, velocity estimated 6 to 10 fps in area of house and garage. Remains of old stone dam and bedrock outcrop in the channel near this house cause a constriction of the channel downstream of Curtis Ave. Also channel is being filled from the west.

Under Antecedent flow conditions water would be passing over the low pt in Curtis Ave at a depth of about 1' which could cause basement flooding of the house on the north side.

② Approximately 1000' downstream of Curtis Ave, Mussey Brook passes through a stone arch culvert beneath a 35'± high railroad embankment. The culvert is clear and has a width of 10 ft± and a max height of 10 ft. This culvert has an estimated capacity of about 1500 cfs* with water at top of bank. New development is taking place in this area (Mobile home park) and filling of the channel is on-going. Mobile homes being placed near the top of bank would be subject to flooding particularly as the channel of Mussey Brook is filled in. Under present conditions flooding of the mobile home park would not be expected due to antecedent flows assuming the culvert beneath the railroad embankment remains clear.

* See Sht 14

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB Vt 230 Lower Eddy Pond Dam
SHEET NO 12 OF 15
CALCULATED BY JFK DATE 1/7/81
CHECKED BY DATE
SCALE

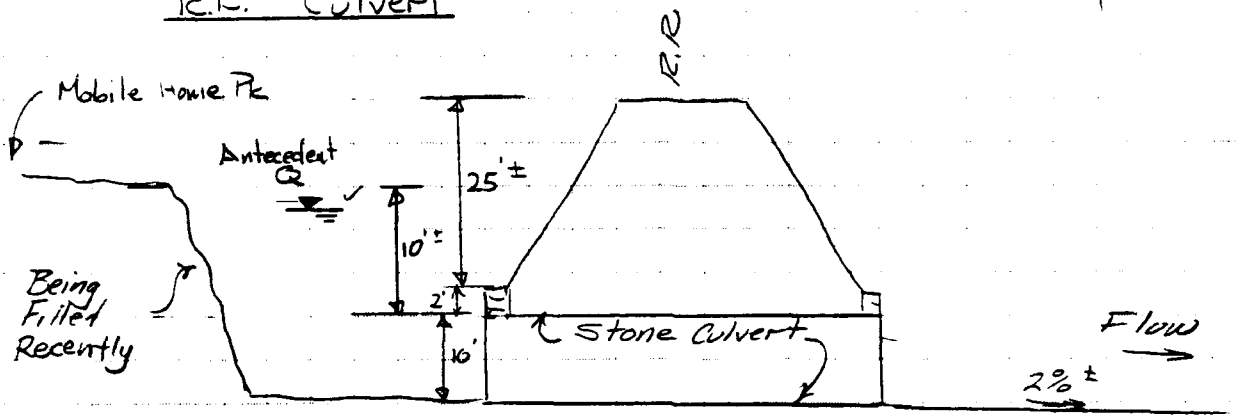
③ Under the assumed breach flow conditions, the capacity of the railroad culvert would be exceeded. Water would pond upstream of the culvert and flood over into the rear portion of the mobile home park. Excess flows would travel northerly along the railroad tracks toward Moon Brook. There are 6 to 10 Mobile Homes in this park which could receive impact and flooding about 1 foot above their floors. This mobile home park is continuing to develop.

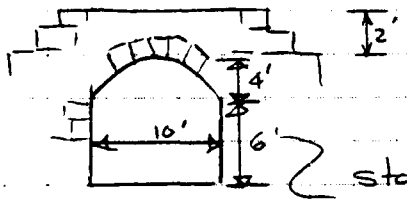
④ Because of the potential for loss of a few lives in the event of a dam breach, and because the continuing development downstream further increases the potential for loss of life, the hazard class for this dam is judged to be High.

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB Vt. 230 Lower Eddy Pond Dam
SHEET NO. 13 OF 15
CALCULATED BY JFC DATE 1/7/81
CHECKED BY ____ DATE ____
SCALE ____

R.R. Culvert 1200'± D.S. of Curtis Ave. (see photos 17, 18)





Estimate Culvert Capacity w/ Water 20' above Culvert invert
Assume Culvert to be 10' wide × 8' high box effective size

For Inlet Control $H_w/D = 20/8 = 2.5$, Headwall w/o wingwalls
$Q = 150\ cfs/ft \times 10\ ft = 1500\ cfs$

For Outlet Control ; $k_e = 0.5$ $n = 0.02$ $h_o = 3/4 D = 7.5'$, $V = \frac{1500}{80} = 18.8'$

$$H = \left(1 + k_e + \frac{29 n^2 L}{R_h^{1.33}}\right)\frac{V^2}{2g} = \left(1 + 0.5 + \frac{29(0.02)^2(100')}{(80/36)^{1.33}}\right)\left(\frac{18.8^2}{64.4}\right) = 10.4'$$

$$H_w = H + h_o - L S_o = 12.6 + 7.5 - (100 \times 0.02) = 18.1'$$

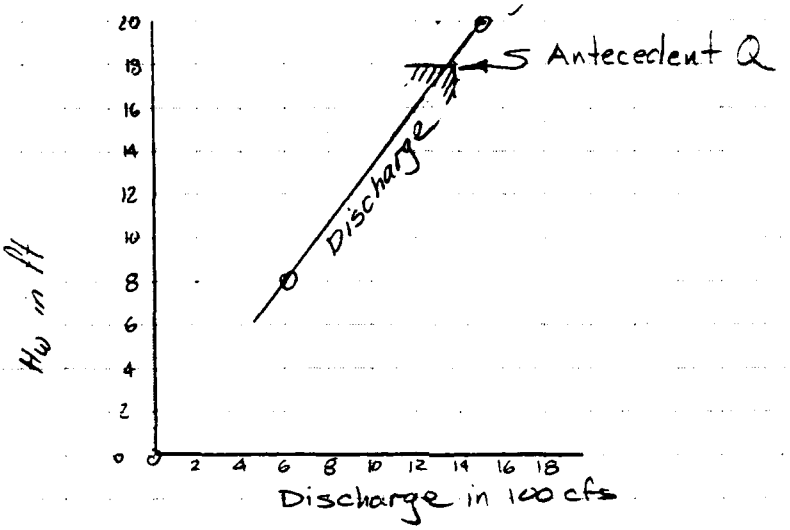
$H_w = 20' > 18'$ => Inlet Controls $Q_{capacity} \approx 1500\ cfs$

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB Vt. 230 Lower Eddy Pond Dam
SHEET NO. 14 OF 15
CALCULATED BY JFC DATE 1/7/21
CHECKED BY DATE
SCALE

For $Hw/D = 1.0$ ✓

$Q = 65 cfs/ft \times 10' = 650 cfs$ ✓



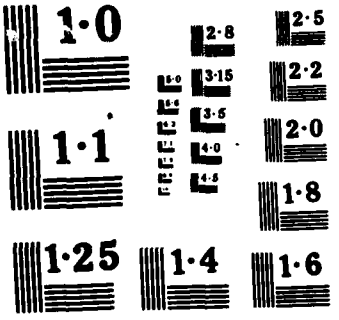
Approx. Discharge Rating for Railroad Culvert 1200' D.S. of Curtis Ave.

AD-A157 628 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS LOWER EDDY POND DAM (..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV MAR 81 2/2

UNCLASSIFIED F/G 13/13 NL

END

8-85


1·0
1·1
1·25
2·8
3·15
3·5
4·0
4·5
1·4
2·5
2·2
2·0
1·8
1·6

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB Vt. 230 Lower Eddy Pond Dam
SHEET NO. 15 OF 15
CALCULATED BY JFC DATE Rev. 4/30/81
CHECKED BY REF DATE 5/7/81
SCALE

Attenuate Breach Flow as a result of valley storage in area upstream of railroad culvert (Presently being filled in from east) -

Use Vave = 150' wide × 600' length × 5' ave depth of avail stor. above antecedent Flow

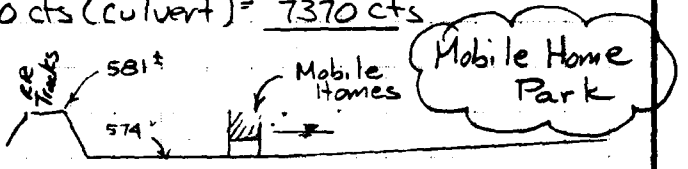
Vave = 10.3 Ac.ft.
S = 70 Ac.ft

$$Q_{P_2} = Q_P \left(1 - \frac{V_{ave}}{S}\right) = 10{,}400 \text{ cfs} \left(1 - \frac{10.3}{70}\right) = 8870 \text{ cfs}$$

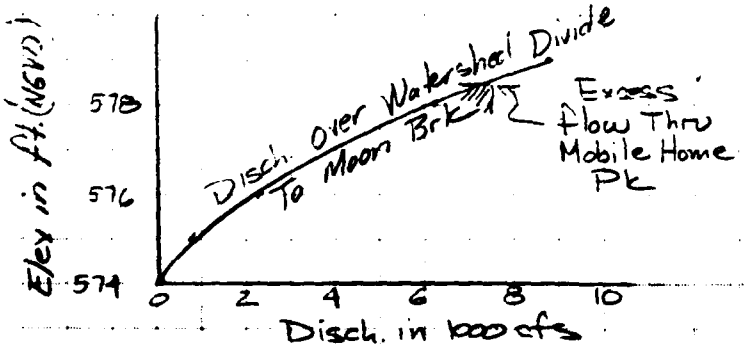
Analyze Excess Q to Moon Brook watershed
Ref. Grading plan by ACF Engineering & Survey Corp. - Rutland Vt.
Overflow to Moon Brook when water behind R.R. culvert is higher than ~574± - Consider weir flow over divide 300' length (also see quad).

Excess Q = 8870 cfs - 1500 cfs (culvert) = 7370 cfs

Elev	C	L_1	H_1	Q_1
574	2.6	300	0	0
575			1	780
576			2	2206
578			4	6240
579			5	8720
579.5			5.5	10,000



Sect. Through Mobile Home Pk at Watershed Divide - Moon Brk
No Scale



Note 6 to 10 mobile homes have floor levels at 577 to 578

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

Lower Eddy Pond Dam

NOT AVAILABLE AT THIS TIME