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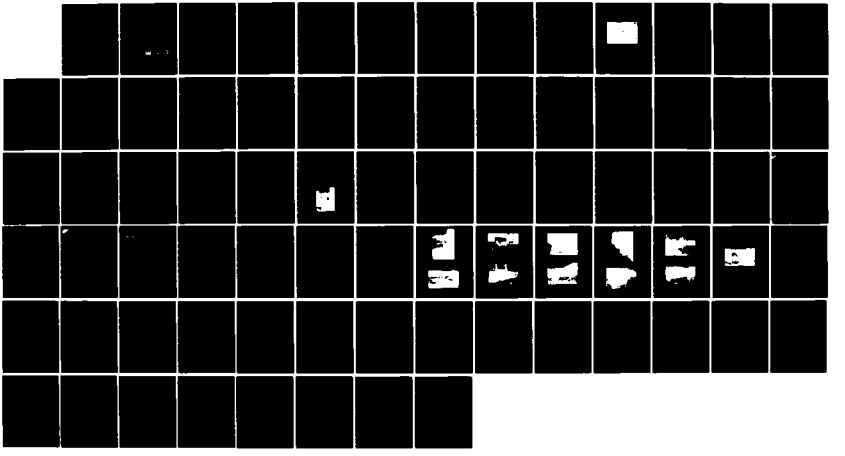

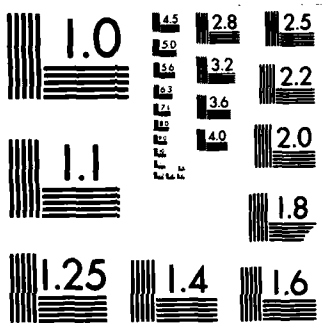

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

PISCATAQUA RIVER BASIN
ROLLINSFORD, NEW HAMPSHIRE

ROLLINSFORD DAM
NH 00396

STATE NO 205.02

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

DECEMBER 1979

UNCLASSIFIED

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NH 00396	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* Rollinsford 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 December 1979 13. NUMBER OF PAGES 35
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,

Piscataqua River Basin
Rollinford New Hampshire
Salmon Falls River

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

The dam is a run of the rive split stone and concrete gravity da. It is 385 ft. long adn 20 ft. high. The dam is in fair condition with a few major concerns which must be corrected. It is small in size with a significant hazard potential.

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

REPLY TO
ATTENTION OF
NEDED

APR 2 3 1980

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

Dear Governor Gallen:

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

A copy of this report has been forwarded to the Water Resources Board, the cooperating agency for the State of New Hampshire. In addition, a copy of the report has also been furnished the owner, the town of Rollinsford.

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

I wish to take this opportunity to thank you and the Water Resources Board for your cooperation in carrying out this program.

Sincerely,

Incl
As stated

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.:	NH00396
Name of Dam:	Rollinsford Dam
Town:	Rollinsford
County and State:	Strafford County, New Hampshire
River:	Salmon Falls River
Date of Inspection:	October 25, 1979

BRIEF ASSESSMENT

Rollinsford Dam is a run-of-the-river split-stone and concrete gravity dam. The dam totals 385 feet in length and has a hydraulic height of 20 feet. The northeast abutment consists of a stone masonry wall. At the southwest abutment are remnants of an approach channel, gates, and penstock structure. The approach channel and gate area have been filled with earth and the gate operators have been removed. The dam is located on the eastern boundary of the State of New Hampshire. The dam impounds a reservoir with a maximum storage capacity of 820 acre-feet. The reservoir is 0.9 miles in length with a surface area of 57 acres. The impoundment behind the dam is utilized as one of the main sources of water for fire protection for the Town of Rolinsford.

The dam is in fair condition. Concerns are the major seepage at the base of the dry stone masonry training wall at the southwest end of the spillway; erosion of the ground between the northeast end of the dam and the railroad pier; possible subsidence of earthfill next to the southwest end of the dam; and no usable low-level outlet.

Based on small size and significant hazard classification in accordance with Corps guidelines, the test flood ranges from the 100-year to ½ the Probable Maximum Flood (PMF). Because the dam's size is in the upper range of the size classification, ½ PMF was selected as the test flood. The watershed consists of 230 square miles of gently to moderately sloping partly wooded terrain. The test flood inflow was determined to be 34,500 cfs. Routing through the reservoir resulted in negligible surcharge storage effects in reducing the peak inflow. Therefore the routed test flood outflow equals the peak inflow value of 34,500 cfs (150 csm) at elevation 82' NGVD. The test flood analysis indicates the dam would be overtopped by about 7.4 feet (12 feet over spillway crest) during the test flood conditions. Spillway capacity at top of dam is 7,010 cfs which is 20 percent of the test flood discharge. A major breach of the dam would probably not result in any loss of life but could cause appreciable property damage.

The owner, Town of Rollinsford, should implement the results of the recommendations and remedial measures given in Sections 7.2 and 7.3 within one year after receipt of this Phase I Inspection Report.

Warren A. Guinan
Project Manager
N.H. P.E. 2339

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

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

RICHARD DIBUONO, CHAIRMAN
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

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

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

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

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

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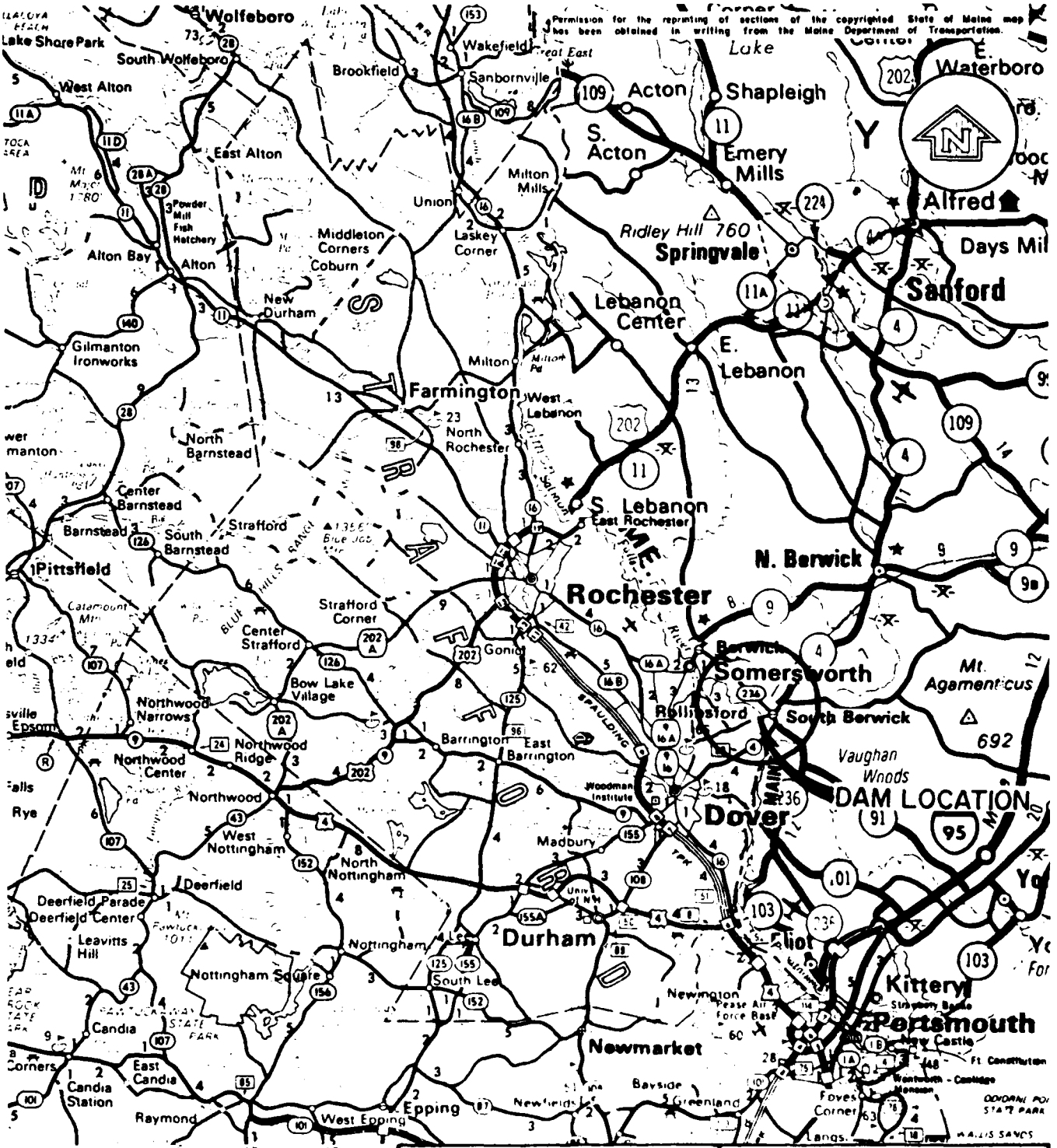
October 1979

Figure 1 - Overview of Rollinsford Dam.



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SCALE IN MILES

5 0 5

MAP BASED ON STATE OF NEW HAMPSHIRE - STATE OF MAINE OFFICIAL HIGHWAY MAPS

Anderson-Nichols & Co., Inc.	U.S. ARMY ENGINEER DIV NEW ENGLAND
CONCORD NEW HAMPSHIRE	CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

ROLLINSFORD DAM
LOCATION MAP

SALMON FALLS RIVER — NEW HAMPSHIRE

			SCALE 1" = 5 Mi.
			DATE: DECEMBER 1979

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
ROLLINSFORD DAM

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972 authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Anderson-Nichols & Company, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of New Hampshire. Authorization and notice to proceed were issued to Anderson-Nichols under a letter of March 22, 1979 from John P. Chandler, Corps of Engineers. Contract No. DACW33-79-C-0050, as changed, has been assigned by the Corps of Engineers for this work.

b. Purpose

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

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

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

1.2 Description of Project

a. Location. Rollinsford Dam, commonly known as Salmon Falls River Dam #2, is located in the Towns of Rollinsford, New Hampshire and Berwick, Maine. The dam is a run-of-the-river dam spanning Salmon Falls River approximately 5 miles above its confluence with the Cocheco River. The centerline of the river serves as the boundary between New Hampshire and Maine. The Piscataqua River originates at the confluence of the Salmon Falls and Cocheco Rivers. Rollinsford Dam is shown on USGS 7.5-Minute Quadrangle, Dover East, Maine - New Hampshire and 15-Minute Quadrangle, Dover, New Hampshire - Maine with coordinates approximately at N 43° 14' 17", W 70° 49' 06". Rollinsford is located in Strafford County, New Hampshire and Berwick is located in York County, Maine. (See Location Map, page vii.)

b. Description of Dam and Appurtenances. Rollinsford Dam is a run-of-the-river dam totaling 385 feet in length and having a hydraulic height of 20 feet. The dam is a split-stone and concrete gravity dam. The northeast spillway abutment consists of a stone masonry wall. An earth fill section exists between this abutment 70 feet to a railroad pier. The concrete gravity spillway is 245 feet long and has a sloping downstream face. At the southwest abutment are remnants of an approach channel, gates, and penstock structure. The approach channel and gate area have been filled with earth and the gate operators have been removed. An access road runs perpendicular to the southwest abutment of the dam.

c. Size Classification. Small (hydraulic height - 20 feet; storage - 820 acre-feet) based on storage ($\geq$ 50 to $<$ 1000 acre-feet) as given in Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification. Significant Hazard. A major breach would probably result in no loss of life but could cause appreciable property damage. The pondage behind this dam is utilized as one of the main sources of water for fire protection for the Town of Rollinsford. Therefore, loss of pondage would result in interruption of the services of a public utility. In addition damage to the railroad bridge piers could occur. (See 5.1 f.)

e. Ownership. No records were found which revealed the original owners of the dam. In 1935, the Public Service Company of New Hampshire is reported to have had ownership. According to found records, the Twin State Gas and Electric Company owned the structure in 1940. In 1950 ownership is again listed as Public Service Company of New Hampshire. Ownership was conveyed to the Town of Rollinsford sometime in 1973. The Town of Rollinsford has since remained the owner of the dam.

f. Operator. The current owner and operator of the Rollinsford Dam is the Town of Rollinsford, Rollinsford, New Hampshire.

g. Purpose of Dam. The purpose of the original construction is believed to have been for water power production for the mill complex downstream. The dam was utilized for hydropower generation for both the Public Service Company and the Twin State Gas and Electric Company. Presently, the pondage behind the dam supplies one of the two main sources of water for fire protection for the Town of Rollinsford.

h. Design and Construction History. No information was found regarding the design or construction of the dam. The dam appears to be of the vintage of the mid 1800's. The southwest end of the dam did contain power generating facilities. The intake channel and headgates to the powerhouse were filled in sometime prior to 1970.

i. Normal Operating Procedures. The dam currently acts only as a river barrier with its pondage providing water for the Rollinsford Fire Department.

1.3 Pertinent Data

a. Drainage Area. The drainage area consists of 230 square miles (147,200 acres) of gently to moderately sloping partly wooded terrain. The normal pool has a surface area of 57 acres, which constitutes 0.04 percent of the watershed.

b. Discharge at Damsite

(1) Outlet works (conduits): None at the present time.

(2) The maximum discharge at damsite is unknown. No records of past overtoppings were disclosed.

(3) Ungated spillway capacity @ top of dam elevation - 7,010 cfs at 74.6' NGVD

(4) Ungated spillway capacity @ test flood elevation - 29,530 cfs at 82' NGVD

(5) Gated spillway capacity at top of dam elevation - not applicable

(6) Gated spillway capacity at test flood elevation - not applicable

(7) Total spillway capacity at test flood elevation - 29,530 cfs at 82' NGVD

(8) Total project discharge at test flood elevation - 34,500 cfs at 82' NGVD

c. Elevation (ft. above NGVD of 1929; formerly Mean Sea Level (MSL), see (6) below.)

(1) Streambed at centerline of dam - 55 (at downstream toe)

(2) Maximum tailwater - unknown

(3) Upstream portal invert diversion tunnel - not applicable

(4) Recreation pool - not applicable

(5) Full flood control pool - not applicable

(6) Spillway crest - 70.0 (obtained from USGS Quadrangle sheet and assumed to be spillway elevation)

(7) Design surcharge (original design) - unknown

(8) Top dam - 74.6

(9) Test flood pool - 82.0

d. Reservoir (miles)

(1) Length of maximum pool - 1

(2) Length of spillway crest - 0.9

(3) Length of flood control pool - not applicable

e. Storage (acre-feet)

(1) Recreation pool - not applicable

(2) Flood control pool - not applicable

(3) Spillway crest pool - 456

(4) Test flood pool - 1525

(5) Top dam - 820

f. Reservoir Surface (acres)

(1) Recreation pool - not applicable

(2) Flood control pool - not applicable

(3) Spillway crest - 57

(4) Test flood pool - 113

(5) Top of dam - 80

g. Dam

(1) Type - split-stone and concrete gravity dam

(2) Length - 385'

(3) Height - 23.5' structural height

(4) Top width - varies

(5) Side slopes - spillway upstream - vertical; downstream - sloping; abutments - vertical upstream and downstream.

(6) Zoning - unknown

(7) Impervious core - unknown

(8) Cutoff - unknown

(9) Grout curtain - unknown

h. Diversion and Regulating Tunnel - not applicable (See j. below)

i. Spillway

(1) Type - overflow spillway

(2) Length of weir - 245'

(3) Crest elevation - 70.0' NGVD

(4) Gates - none

(5) U/S Channel - Salmon Falls River. The banks are tree-lined.

(6) D/S Channel - Salmon Falls River. Discharge from dam flows southerly. A railroad bridge is located immediately downstream of the dam. Bedrock is exposed along most of the length of the dam. A road crossing is located 300 feet downstream of the dam. Salmon Falls River Dam is located 5500 feet downstream of Rollingsford Dam.

j. Regulating Outlets. None operable; all gates and openings have been filled with earth.

SECTION 2
ENGINEERING DATA

2.1 Design

No design data were obtained for Rollinsford Dam.

2.2 Construction Records

No construction records were disclosed.

2.3 Operation

No engineering operational data were found.

2.4 Evaluation

a. Availability. A search of the files of the New Hampshire Water Resources Board revealed only a limited amount of recorded information.

b. Adequacy. Because of the limited amount of detailed data available the final assessments and recommendations of this investigation are based on the visual inspection and the hydrologic and hydraulic calculations.

c. Validity. No engineering data were found to validate.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. Rollinsford Dam is a low dam which impounds a reservoir of small size. The watershed above the reservoir is gently to moderately sloping and partially wooded. The downstream area is flat to moderately sloping.

b. Dam. Rollinsford Dam is a run-of-the-river split-stone and concrete gravity dam, with a hydraulic height of 20 feet and totaling 385 feet in length. (See Appendix C - Figure 2.) Bedrock is exposed across the entire width of the river channel downstream of the dam and this observation is consistent with a statement in an undated data sheet of the New Hampshire Water Control Commission that the dam is founded on "ledge." (See Appendix C - Figure 3.)

Remnants of an approach canal, head gates, and penstock entrance structure are located at the southwest abutment. The approach canal and gate area have been filled with earth and the gate operators have been removed. (See Appendix C - Figure 4.) Also, remnants of a large sluice gate are located just west of the former head gates. (See Appendix C - Figure 5.)

Major leakage is discharging at three locations at the base of the dry stone-masonry training wall at the southwest end of the overflow section of the dam. (See Appendix C - Figure 6.) The remnants of the gate structures are located between this wall and the southwest abutment. This is apparently the same leakage that was noted in the reports of inspections made on 11/30/77, 9/10/73, 6/30/50, and 7/14/40. Along the southwest abutment, just upstream of the dam, are the two pipes which the Rollinsford Fire Department uses to pump water from the impoundment behind the dam. (See Appendix C - Figure 7.)

The northeast abutment of the dam consists of a stone masonry wall. (See Appendix C - Figure 8.) At the northeast end of the dam it appears that flowing water has eroded a channel in the ground between the abutment block at the northeast end of the overflow section of the dam and a railroad pier which is about 75 feet from the end of the dam. (See Appendix C - Figure 9.)

c. Appurtenant Structures.

(1) The earth fill in the former approach channel at the southwest abutment is approximately 18 inches lower than the surrounding granite masonry walls at the gate structure. It could not be determined from the inspection whether this fill

has subsided or was originally placed in that manner. The existing intake structures have been blocked with earth fill, thus making it impossible to inspect. The downstream face of a small abandoned overflow structure, located at the right abutment approximately 30 feet downstream of the principal spillway, was severely eroded and the exposed wooden gate stems are badly weathered.

(2) Principal spillway - Only a limited portion of the spillway at each end could be inspected because of the flow of water over the dam. The surface of the concrete was observed to have minor surface erosion with some of the coarse aggregate exposed. No flashboards were on the spillway crest.

d. Reservoir. The watershed above the reservoir is gently to moderately sloping and partially wooded. (See Appendix C - Figure 10.) No evidence of significant sedimentation was observed.

e. Downstream Channel. Bedrock is exposed for the entire width in the channel downstream of the dam. Some trees overhang the channel and some logs are lodged on an island in the center of the channel but otherwise the channel is generally wide and unobstructed. A bridge crosses the channel about 250 feet downstream of the dam. (See Appendix C - Figure 11.) The channel downstream of this bridge is wide and unobstructed; mill buildings are located on the right bank of the channel. (See Appendix C - Figure 12.) Further downstream,about 600 yards, is the water treatment plant. Beyond this, the river flows into the large pondage area of Salmon Falls River Dam, a low-head hydropower facility.

3.2 Evaluation

Based on the visual inspection, Rollinsford Dam is in fair condition.

Major seepage is discharging at three locations at the base of the dry stone-masonry training wall at the southwest end of the overflow section of the dam. Although this seepage has been mentioned in previous inspection reports dating back to 1940, insufficient information is available to conclude that it poses a potential problem.

Possible subsidence of the earth fill adjacent to the southwest end of the overflow section of the dam could adversely affect the stability of the southwest end of the dam.

Erosion of the ground between the northeast end of the dam and a nearby railroad bridge pier indicates that the northeast abutment has been overtopped. Future overtopping of the abutment could affect the stability of that abutment.

The dam has no usable low-level outlet to lower the pond in case of emergency.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No written operational procedures were found.

4.2 Maintenance of Dam

The Town of Rollinsford is responsible for the maintenance of the dam.

4.3 Maintenance of Operating Facilities

Since no operating facilities exist, this is not applicable.

4.4 Description of Any Warning System in Effect

No written warning system was revealed.

4.5 Evaluation

Maintenance procedures appear to be minimal. Leakages were observed that require attention and all operating facilities have been effectively discontinued by filling gates and openings with earth and gate operating mechanisms completely removed.

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. General. Rollinsford Dam is a run-of-the-river, split-stone and concrete gravity dam which impounds a reservoir of small size. At the southwest abutment there are remnants of an approach canal, gates, and penstock entrance structure. The approach canal and gate area have been filled with earth and the gate operators have been removed. The watershed above the dam consists of 230 square miles of gently to moderately sloping partly wooded terrain.

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

c. Experience Data. No information regarding past overtopping of Rollinsford Dam was revealed.

d. Visual Observation. Based on the visual inspection it appears that overtopping may have occurred between the northeast spillway abutment and the railroad pier.

e. Test Flood Analysis. Rollinsford Dam is classified as being small in size having a hydraulic height of 20 feet and a maximum storage capacity of 820 acre-feet; the dam was determined to have a significant hazard classification because of potential damage to the railroad bridge and loss of the impoundment as a source of water to fight fires in Rollinsford. No loss of life is anticipated. Using the Recommended Guidelines for Safety Inspection of Dams, the test flood ranges from the 100-year to ½ the Probable Maximum Flood (PMF). Because the dam's size is in the upper range of the size classification, ½ PMF was selected as the test flood. The test flood inflow for Rollinsford Dam, having a drainage area of 230 square miles, was determined to be 34,500 cfs. Routing through the reservoir resulted in neglible surcharge storage effects in reducing peak inflows. Therefore, the routed test flood outflow is also equal to the inflow value of 34,500 cfs at elevation 82' NGVD. The test flood analysis indicates that the dam embankment would be overtopped by approximately 7.4 feet during test flood conditions (12 feet over the spillway). The maximum spillway capacity at top of dam is 7,010 cfs which is about 20 percent of the routed test flood outflow.

f. Dam Failure Analysis. The impact of failure of the dam at top of dam was assessed using the Guidance for Estimating Downstream Dam Failure Hydrographs issued by the Corps of Engineers. The analysis covered the reach from the dam to Salmon Falls River Dam, a distance of 1 mile downstream. Salmon Falls River Dam, which is located 1 mile downstream of Rollinsford Dam, provides a large storage area for breach discharge. A breach would result in no loss of lives but may damage the piers of the railroad bridge and the Salmon Falls River Dam downstream. A breach discharge in the

reach between these two would stay in bank. Because the Rollinsford Dam is used for fire protection for the Town of Rollinsford, the loss of the pondage due to dam failure would be considered as public utility loss. The dam was classified Significant Hazard.

SECTION 6
STRUCTURAL STABILITY

6.1 Visual Observations

The visual examination indicates the following potential structural problems:

a. Major seepage at the base of the dry stone-masonry training wall at the southwest end of the overflow section of the dam, which could adversely affect the stability of the gate structure and southwest end of the overflow section of the dam.

b. Erosion of the ground between the northeast end of the overflow section of the dam and a bridge pier on the northeast abutment, which could adversely affect the stability of the northeast end of the dam and abutment.

c. Possible subsidence of the earth fill next to the southwest end of the overflow section of the dam, which may be associated with piping that could adversely affect the stability of the dam.

d. No usable low-level outlet to lower the pondage in case of emergency.

6.2 Design and Construction Data

No design and construction data are available.

6.3 Operating Records

None.

6.4 Post-Construction Changes

An inspection report of 8/10/70 indicates that the head gate channel has been filled in and effectively cuts off flow through the penstock. The penstock has been removed. The report of an inspection dated 11/30/77 indicates that the gate operators were removed and the penstock area filled with dirt.

6.5 Seismic Stability

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

SECTION 7
ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. The visual examination indicates that Rollinsford Dam is in fair condition. The major concerns with respect to the integrity of the dam, if left uncorrected, are:

(1) Major seepage at the base of the dry stone-masonry training wall at the southwest end of the overflow section of the dam.

(2) Erosion at the northeast abutment, possibly the result of overtopping.

(3) Possible subsidence of the earth fill next to the southwest end of the dam.

(4) Uncertainty about the earth fill at the southwest abutment and consequent potential for erosion if area is overtopped.

b. Adequacy of Information. The information available is such that the assessment of this dam must be based primarily on the results of the visual inspection.

c. Urgency. The owner should implement the recommendations in 7.2 and 7.3 within one year after receipt of this Phase I report.

d. Need for Additional Investigation. The information available from the visual inspection is adequate to identify the potential problems which are listed in 7.2 a below. These problems require the attention of a professional engineer experienced in the design and construction of dams who will have to make additional engineering studies to design or specify remedial measures to rectify the problems.

7.2 Recommendations

a. The owner should engage a professional engineer qualified in the design and construction of dams to:

(1) Re-establish a low-level outlet for the impoundment to use in case of emergency.

(2) Inspect the downstream face of the concrete spillway when no water is flowing over the crest.

(3) Investigate the seepage at the base of the dry stone-masonry training wall at the southwest end of the overflow section of the dam and design appropriate remedial measures.

(4) Design repairs and erosion protection for the eroded area on the northeast abutment.

(5) Design repairs for the subsided area of the earth fill at the southwest end of the overflow section of the dam.

(6) Evaluate the earth fill at the southwest abutment with respect to erosion if overtopped, and to recommend remedial measures, if needed.

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

7.3 Remedial Measures

a. Operating and Maintenance Procedures. The owner should:

(1) Visually inspect the dam and appurtenant structures once a month.

(2) Engage a professional engineer qualified in the design and construction of dams to make a comprehensive technical inspection once every year after the recommendations made in 7.2 a have been carried out.

(3) Establish a surveillance program for use during and immediately after heavy rainfall and snowmelt and also a downstream warning program to follow in case of emergency conditions.

7.4 Alternatives. None.

APPENDIX A

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Rollinsford Dam, NH

DATE October 25, 1979

TIME 2:30 PM

WEATHER Sunny, cool

W.S. ELEV. U.S. 70 'NGVD DN.S. 55'NGVD

PARTY:

1. Warren Guinan (ANCo)
2. Stephen Gilman (ANCo)
3. Leslie Williams (ANCo)
4. Terri Sapp (ANCo)
5. Mehdi Miremadi (ANCo)
6. Kenneth Stern (NHWRB)
7. Ronald Hirschfeld (GEI)
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Hydrology/Hydraulics	M. Miremadi/ L. Williams	
2.	Structural Stability	S. Gilman	
3.	Soils & Geology	R. Hirschfeld	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT Rollinsford Dam, NH DATE Oct. 25, 1979

PROJECT FEATURE Intake Channel & Structure NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	
Slope Conditions	Good
Bottom Conditions	Not visible beneath reservoir
Rock Slides or Falls	None
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	None
b. Intake Structure	Intake structures and gates are abandoned and filled in. Not operable and not visible for inspection.
Condition of Concrete	
Stop Logs and Slots	

PERIODIC INSPECTION CHECKLIST

PROJECT Rollinsford Dam, NH DATE Oct. 25, 1979

PROJECT FEATURE Outlet Structure & Channel NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	No outlet works are visible. It appears that all outlet works at the southwest abutment have been removed or filled in and abandoned.
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	None observed
Channel	
Loose Rock or Trees Overhanging Channel	Some trees overhanging channel
Condition of Discharge Channel	Good. Some logs lodged on island at center of channel, but channel is generally wide and unobstructed.

PERIODIC INSPECTION CHECKLIST

PROJECT Rollinsford Dam, NH DATE Oct. 25, 1979

PROJECT FEATURE Spillway Weir NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	A few overhanging channel
Floor of Approach Channel	Not visible beneath reservoir surface
b. Weir and Training Walls	
General Condition of Concrete	Fair. Surface of concrete exposed to water is eroded.
Rust or Staining	Only at embedded item
Spalling	Several exposed areas are spalled to 1" depth. Coarse aggregate is exposed.
Any Visible Reinforcing	None
Any Seepage or Efflorescence	Large quantity of water discharging through stone masonry immediately downstream of southwest end of spillway.
Drain Holes	None observed.
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Some
Floor of Channel	Bedrock
Other Obstructions	Some logs lodged on small island at center of channel.

PROJECT Rollinsford Dam, NH

DATE Oct. 25, 1979

PROJECT FEATURE Reservoir

NAME

AREA EVALUATED	REMARKS
Stability of Shoreline	Good
Sedimentation	Not visible
Changes in Watershed Runoff Potential	None observed
Upstream Hazards	None
Downstream Hazards	Railroad bridge piers, road, dam 1 mile downstream.
Alert Facilities	None posted
Hydrometeorological Gages	None
Operational & Maintenance Regulations	None posted.

APPENDIX B

ENGINEERING DATA

Memo To File
From SC Bennett
Subject Inspection of Dam 205.07
Date 30 Nov 77

This dam is in good shape. The leakage mention by mr Rapoza & mr moore is still evident. The gate operators have been removed and penstock area filled with dirt. There is a lot of debris on the spillway crest

M E M O R A N D U M

DATE: September 17, 1973

FROM: Donald M. Rapoza, Water Resources Engineer

SUBJECT: Dam inspection on Salmon Falls River in Rollinsford, N.H. - #205.02

TO: Vernon A. Knowlton, Chief Engineer, Water Resources Board

On September 10, 1973, I inspected the dam on the Salmon Falls River in Rollinsford. At the present time, the structure is owned by the Town of Rollinsford, which intends to convey the structure to the Salmon Falls River Watershed Association.

The structure is in fairly good shape: the left abutment (in Maine) has relatively little seepage. The right abutment has some leakage at the toe of the spillway. This leakage is not endangering the structure, but should be checked on a yearly basis for any increased discharge. The leakage has been reported in previous inspection reports. The concrete spillway is eroding and will have to be refaced sometime in the future.

I could not locate the leak in the spillway that Francis mentioned in his August 10, 1969 report. Perhaps debris had plugged the area in question.

DMR:js

State of New Hampshire

WATER RESOURCES BOARD

37 Green St.
Concord 03301

September 17, 1973

Mr. Wayne E. Murray
Beamis and Davis
58 High Street
Somersworth, NH 03878

Dear Mr. Murray:

This is in response to your letter requesting the New Hampshire Water Resources Board review the status of a dam owned by the Town of Rollinsford in the Salmon Falls River.

On September 10, 1973, I inspected the structure and found it to be in relatively good shape. There was some leakage at the right abutment which had been previously reported in other inspection reports. At this time there is no serious problems connected with this leakage, but the area should be inspected on a yearly basis.

Due to the flow over the spillway crest, I could not find the leak on the lip of the concrete spillway, as Mr. Moore mentioned in his August 10, 1969 report. There is the possibility that the area in question has been clogged with floating debris. To conduct a thorough inspection of the spillway, flow over the spillway would have to be bulkheaded, or the ponded area drawn down below the spillway crest.

The estimated costs of repairing the concrete lip in Mr. Moore's letter, dated March 3, 1972, should be increased by 20%, making a total of $3,600.

Please feel free to call or write this office if you have any further questions.

Very truly yours,

Donald M. Rapoza
Water Resources Engineer

DMR:js

DATE: August 10, 1970

FROM: Francis C. Moore, P.E.
Water Resources Engineer

SUBJECT: Salmons Falls Power Station Property - Rollinsford

TO: Vernon A. Knowlton
Chief Water Resources Engineer

Forrest Hodgdon and I inspected Public Service Company of New Hampshire power station land and dam at Rollinsford, New Hampshire with Noel Sheldon on 8/6/70.

The land north of the power station is about 30 feet wide and about 350 feet from a town road, mainly occupied by a large pressure concrete penstock. This land would be useful to the mill, Sports Specialties Shoemaker Co. The balance of that lot except the power station and its immediate land would undoubtedly be retained for use of their Sub-Station.

The land across the river in Maine is steep for 50' to 75' from river and sloping to the old railroad right-of-way and highway line. It is remotely possible that the south end of this lot would possibly be of interest to Maine authorities if boat launching into the upper end of the Central Maine Power Company pool could be constructed. The land near the river is ledgy.

This dam is in fairly good shape. Some concreting of the spillway lip is needed to fill a serious leak about midway of the dam. The head gate channel has been filled in and effectively cuts off flow through the penstock to the power house. The shoe shop has an intake to a pipe line to a 75,000 gallon water tank on the hill to furnish fire protection to the mills. This intake is about thirty feet upstream of the gate house - a 5' concrete pipe set into the bank of the pond.

There is possible boat launching from the land at the New Hampshire end of the dam upstream of the intake canal. The river and pond could be navigated up to the next dam about 2 1/2 miles above. Some places the river is 1000' wide but averages around 200'.

The land in Maine at the end of the dam should be conveyed with the dam. It is less than one-third acre in size and offers no boat launching possibilities.

FCM/jb

NEW HAMPSHIRE WATER CONTROL COMMISSION

REPORT ON DAM INSPECTION

TOWN Rollinsford DAM NO. 205.2 STREAM Salmon Falls River

OWNER Pub. Serv. Co. of N.H. ADDRESS Manchester N.H.

In accordance with Section 20 of Chapter 133, Laws of 1937, the above dam was inspected by me on 20 June 1950 ~~accompanied by~~

NOTES ON PHYSICAL CONDITION

Abutments Good

Spillway Good except for some surface disintegration which should be guarded.

Gates Operable

Other Between Canal & right abutment there is a sizable leak. Joint should be repaired when masonry above has fallen. This has been leaking since Calman inspected in '40

CHANGES SINCE LAST INSPECTION None

FUTURE INSPECTIONS Yes

This dam (is) ~~(is not)~~ a menace because of highway, railroad and property downstream

REMARKS The overflow at the powerhouse has extensive but not serious erosion in concrete

About 4" water over permanent Spillway.

Copy to Owner	Date

Francis C. Moore
INSPECTOR

(Additional Notes Over)

TIME: 3:00 P. M.

NEW HAMPSHIRE WATER CONTROL COMMISSION

REPORT ON DAM INSPECTION

TOWN ROLLINSFORD DAM NO. 205.02 STREAM Salmon Falls River

OWNER Twin State Gas & Elec.Co. ADDRESS Dover, N. H.

In accordance with Section 20 of Chapter 133, Laws of 1937, the above dam was inspected by me on July 17, 1940 accompanied by _____

NOTES ON PHYSICAL CONDITION

Abutments Excellent shape No apparent leaks

Spillway Good shape Concrete shows some erosion at pour joints Not dangerous However guniting would be practicable before condition becomes worse.

Gates main canal gates in good condition - operable. Flood gate in canal operable, in good condition

Other Fairly large hole in South West Corner of main spillway section and canal entrance See photo. Granite blocks falling out.

CHANGES SINCE LAST INSPECTION _____

FUTURE INSPECTIONS _____

This dam (is) (~~is not~~) a menace because of location above highway railroad + private property at lower elevation

REMARKS Visited power house operator

Copy to Owner	Date

C D Chase
INSPECTOR

NEW HAMPSHIRE WATER CONTROL COMMISSION
DATA ON DAMS IN NEW HAMPSHIRE

ok

LOCATION STATE NO. 205.02

Town Rollinsford : County Strafford

Stream Salmon Falls River

Basin-Primary Ocean : Secondary Salmon Falls R.

Local Name

Coordinates—Lat. 43°15' - 4050 : Long. 70°50' - 4000

GENERAL DATA

Drainage area: Controlled Sq. Mi.: Uncontrolled Sq. Mi.: Total 230 Sq. Mi.

Overall length of dam 350 ft.: Date of Construction

Height: Stream bed to highest elev. 19 ft.: Max. Structure 14'9" ft.

Cost—Dam : Reservoir

DESCRIPTION Gravity concrete splitstone Foundation ledge

Waste Gates

Type

Number : Size ft. high x ft. wide

Elevation Invert : Total Area sq. ft.

Hoist

Waste Gates Conduit

Number : Materials

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

Embankment

Type

Height—Max. ft.: Min. ft.

Top—Width : Elev. ft.

Slopes—Upstream on: Downstream on

Length—Right of Spillway : Left of Spillway

Spillway

Materials of Construction concrete

Length—Total 255' ft.: Net ft.

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

Flashboards—Type Pin type : Height 1.25 ft.

Elevation—Permanent Crest : Top of Flashboard

Flood Capacity 6885 cfs.: 30 cfs/sq. mi.

Abutments

Materials:

Freeboard: Max. 4'7" ft.: Min. ft.

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

OWNER P.S. of New Hampshire Manchester, N.H.

REMARKS Condition good Subject to inspection

Use power

Tabulation By G.S.W. Date

NEW HAMPSHIRE WATER CONTROL COMMISSION

DATA ON WATER POWER DEVELOPMENTS IN NEW HAMPSHIRE

LOCATION AT DAM NO. 205.02

Town Rollinsford : County Strafford

Stream Salmon Falls R.

Basin-Primary Ocean : Secondary Salmon Falls R.

Local Name

GENERAL DATA

Head-Max. 45 ft.: Min. ft.: Ave. ft.

Date of Construction : Use of Power Public Utility

Pondage ac. ft.: Storage ac. ft.

DESCRIPTION

Racks

Size of Rack Opening

Size of Bar : Material

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

Head Gates

Type

Number : Size ft. high x ft. wide

Elevation of Invert : Total Area sq. ft.

Hoist

Penstock

Number : Material

Size : Length

Turbines

Number 2 : Makers 2- Morgan Smith

Rating HP. per unit 1500 H.P. ea. : Total Capacity 3500 HP.

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

Drive

Type

Generator

Number 2

Make Westinghouse 1250 k.v.a. 1205 amps - 600 v.

Rating KW., per unit ; Total Capacity 1000 K. W.

Exciter

Number : Make

Rating-per unit : Total Capacity K. W.

OUTPUT—KWHRS

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

OWNER Public Service Commission of New Hampshire

Tabulation By R.T. Date

PUBLIC SERVICE COMMISSION OF NEW HAMPSHIRE—DAM RECORD I-4897

TOWN	Rollinsford	TOWN NO. 2	STATE NO. 205.02
RIVER STREAM	Salmon Falls River		
DRAINAGE AREA		POND AREA	
DAM TYPE	Gravity	FOUNDATION NATURE OF	Ledge
MATERIALS OF CONSTRUCTION	Concrete, Split Stone		
PURPOSE OF DAM	POWER—CONSERVATION—DOMESTIC—RECREATION—TRANSPORTATION—PUBLIC UTILITY		
HEIGHTS, TOP OF DAM TO BED OF STREAM	19' Approx.	TOP OF DAM TO SPILLWAY CRESTS	
SPILLWAYS, LENGTHS DEPTHS BELOW TOP OF DAM	Approx. 255'	LENGTH OF DAM	Approx. 350
FLASHBOARDS TYPE, HEIGHT ABOVE CREST	Pin 15"		
OPERATING HEAD CREST TO N. T. W.	45'	TOP OF FLASHBOARDS TO N. T. W.	
WHEELS, NUMBER KINDS & H. P.	2-Morgan Smith 1500 HP each		
GENERATORS, NUMBER KINDS & K. W			
H. P. 90 P. C. TIME 100 P. C. EFF.		H. P. 75 P.C. TIME 100 P. C. EFF.	
REFERENCES, CASES, PLANS, INSPECTIONS			
REMARKS			

OWNER - Public Service Co. of N. H.

CONDITION - Good

MENACE - Yes. Will be subject to periodic inspection.

To the Public Service Commission:

The foregoing memorandum on the above dam is submitted covering inspection made November 6, 1935, according to notification to owner dated November 4, 1935, and bill for same is enclosed.

Samuel J. Lord
Hyd. Eng.

Nov. 14, 1935
Copy to Owner

NEW HAMPSHIRE WATER RESOURCES BOARD

INVENTORY OF DAMS AND WATER POWER DEVELOPMENTS

DAM

BASIN Ocean NO. 2 — 4R — I-4897
RIVER Salmon Falls MILES FROM MOUTH D.A.SQ.MI. 230 WRD
TOWN Rollinsford OWNER Public Service Co. of N.H., Manchester
LOCAL NAME OF DAM
BUILT DESCRIPTION Gravity — Concrete, Split Stone on Ledge

POND AREA-ACRES DRAWDOWN FT. POND CAPACITY-ACRE FT.
HEIGHT-TOP TC BED OF STREAM-FT. 19± MAX. MIN.
OVERALL LENGTH OF DAM-FT. 350± MAX.FLOOD HEIGHT ABOVE CREST-FT.
PERMANENT CREST ELEV.U.S.G.S. LOCAL GAGE
TAILWATER ELEV.U.S.G.S. LOCAL GAGE
SPILLWAY LENGTHS-FT. 255± FREEBOARD-FT. 4.167
FLASHBOARDS-TYPE, HEIGHT ABOVE CREST 1.25 Pin type
WASTE GATES-NO. WIDTH MAX. OPENING DEPTH SILL BELOW CREST

REMARKS Condition Good Freeboard + Elec. Equipment
& I into Piscataqua R. Atlantic Ocean. From Inspection Sheet

Salmon Falls Station PS Company

POWER DEVELOPMENT

UNITS	NO.	RATED HP	HEAD FEET	C.F.S. FULL GATE	KW	MAKE
	2	6500	45			Morgan Smith
	2				1000 e2	Westinghouse 600V.
						1205A 225 RPM (1250 KVA)

USE

REMARKS Menace USGS List Power Plants Says 3000 HP total

DATE 11/6/35

CALCULATION SHEET

Refers to.....

Date .....

Made By .....

1-4897

Public Service Co. of N.H.

Westinghouse

2- 1000KW 1250 KVA

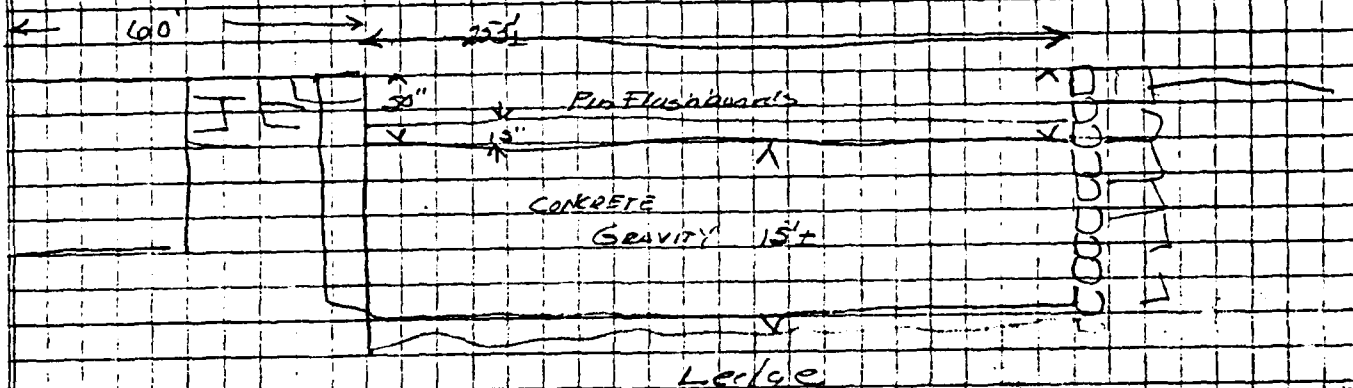
1305 Amps 600V

2- Morgan Smith Wheels 1500 HP each

45' Head Maximum

15" Flushboards

225 RPM



4 Photos

TOWN NO. 1,2 TOWN Rollinsford, N. H. NO. 165 PAGE NO. 10

NAME OF COMPANY Salmon Falls Mfg. Co.

HOME ADDRESS Salmon Falls, N. H.

DRAINAGE AREA 24? SQ. MI. HEAD 48 FT.

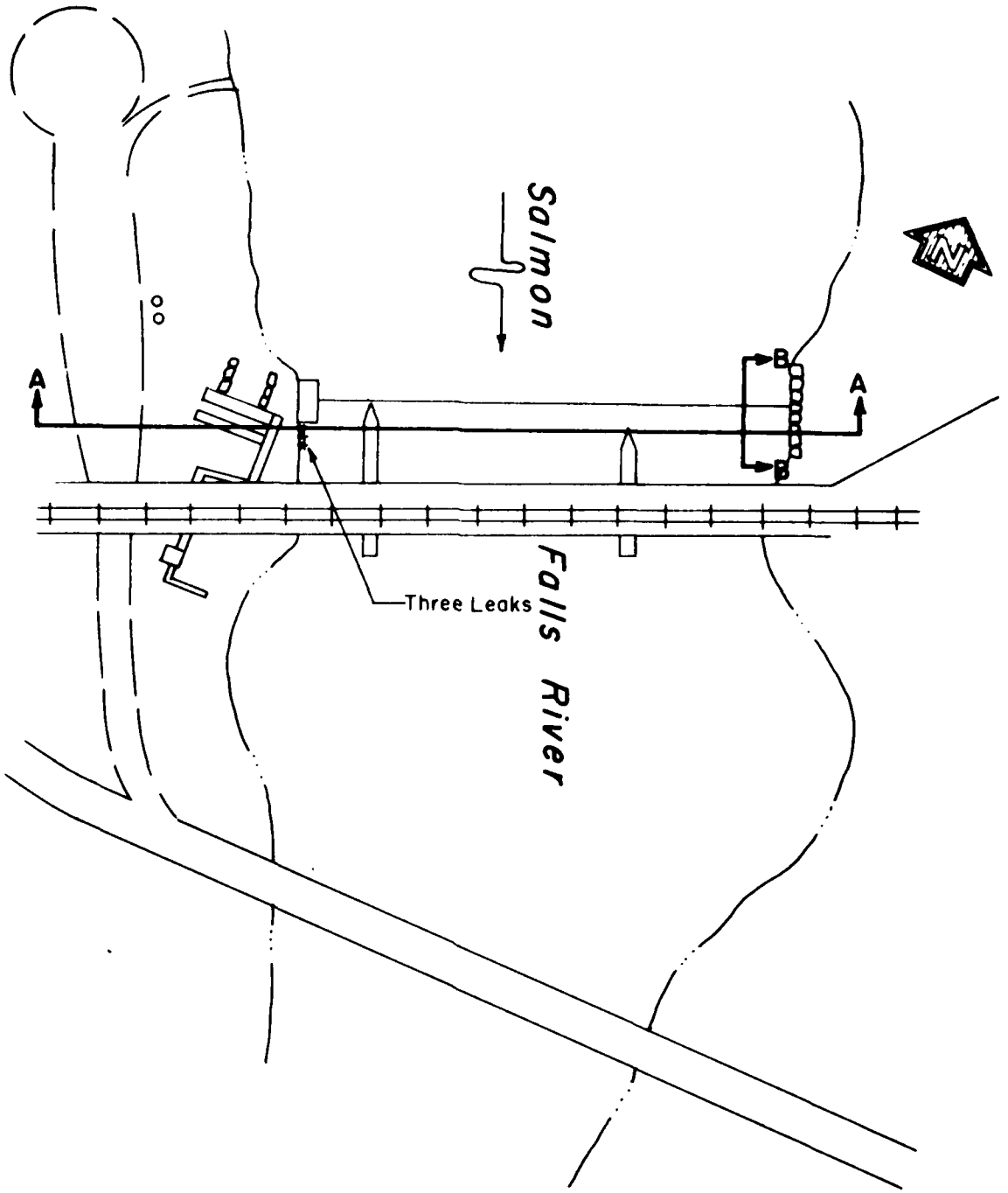
RIVER Salmon Falls RATE SEC. FT. PER SQ. MI. 60% TIME 1.0

RESOURCES

FOR CENTRAL STATIONS		FOR ISOLATED INDUSTRIAL PLANTS	
WHEEL CAP. H. P.	PRIMARY H. P. 60% TIME	WHEEL CAP. H. P.	PRIMARY H. P. 60% TIME
		3000	1077.00

USES

FOR CENTRAL STATIONS		FOR ISOLATED INDUSTRIAL PLANTS		
K. V. A. CAPACITY	ANNUAL KW. H. OUTPUT	K. V. A. CAPACITY	ANNUAL KW. H. PROD. AND CONS. ELECT.	ANNUAL KW. H. PROD. AND CONS. MECH.



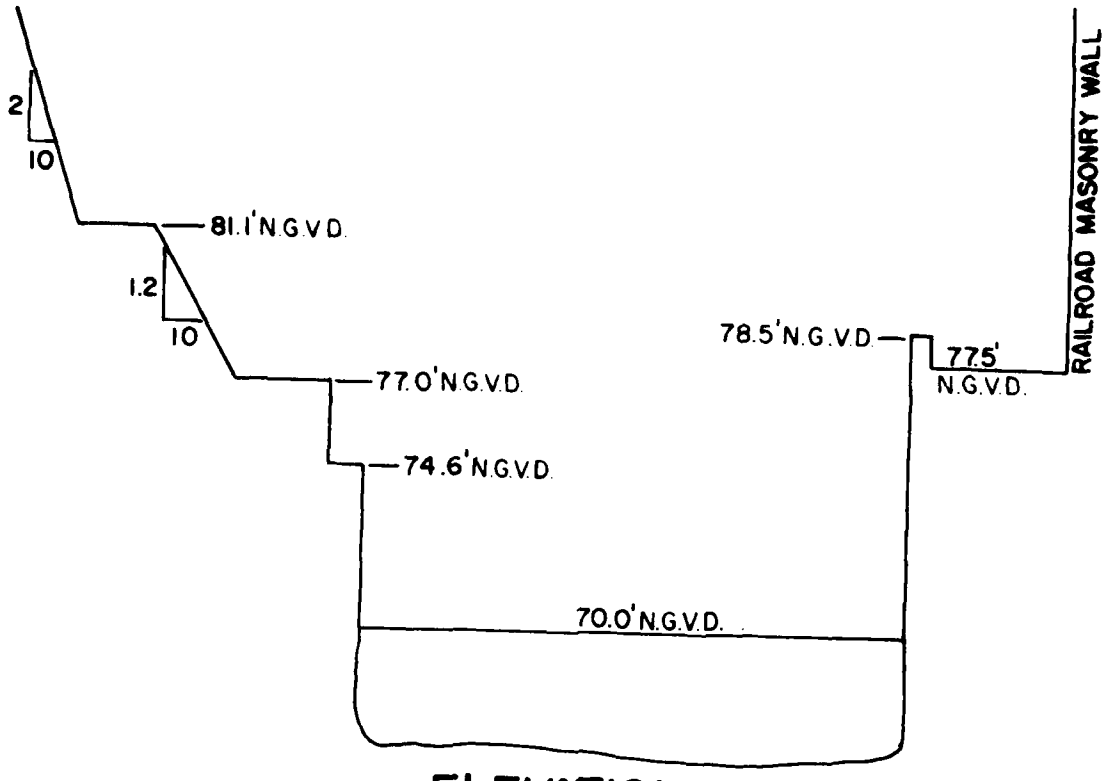
Anderson-Nichols & Co., Inc CONCORD NEW HAMPSHIRE	U S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

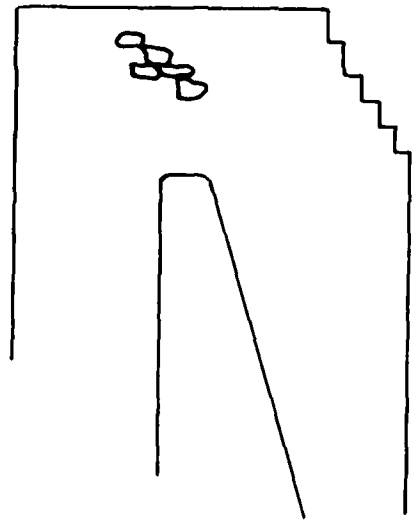
ROLLINSFORD DAM

SALMON FALLS RIVER NEW HAMPSHIRE

SCALE	NOT TO SCALE
DATE	DECEMBER 1979



ELEVATION A-A



CROSS SECTION B-B

Anderson-Nichols & Co, Inc CONCORD NEW HAMPSHIRE	U S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

ROLLINSFORD DAM

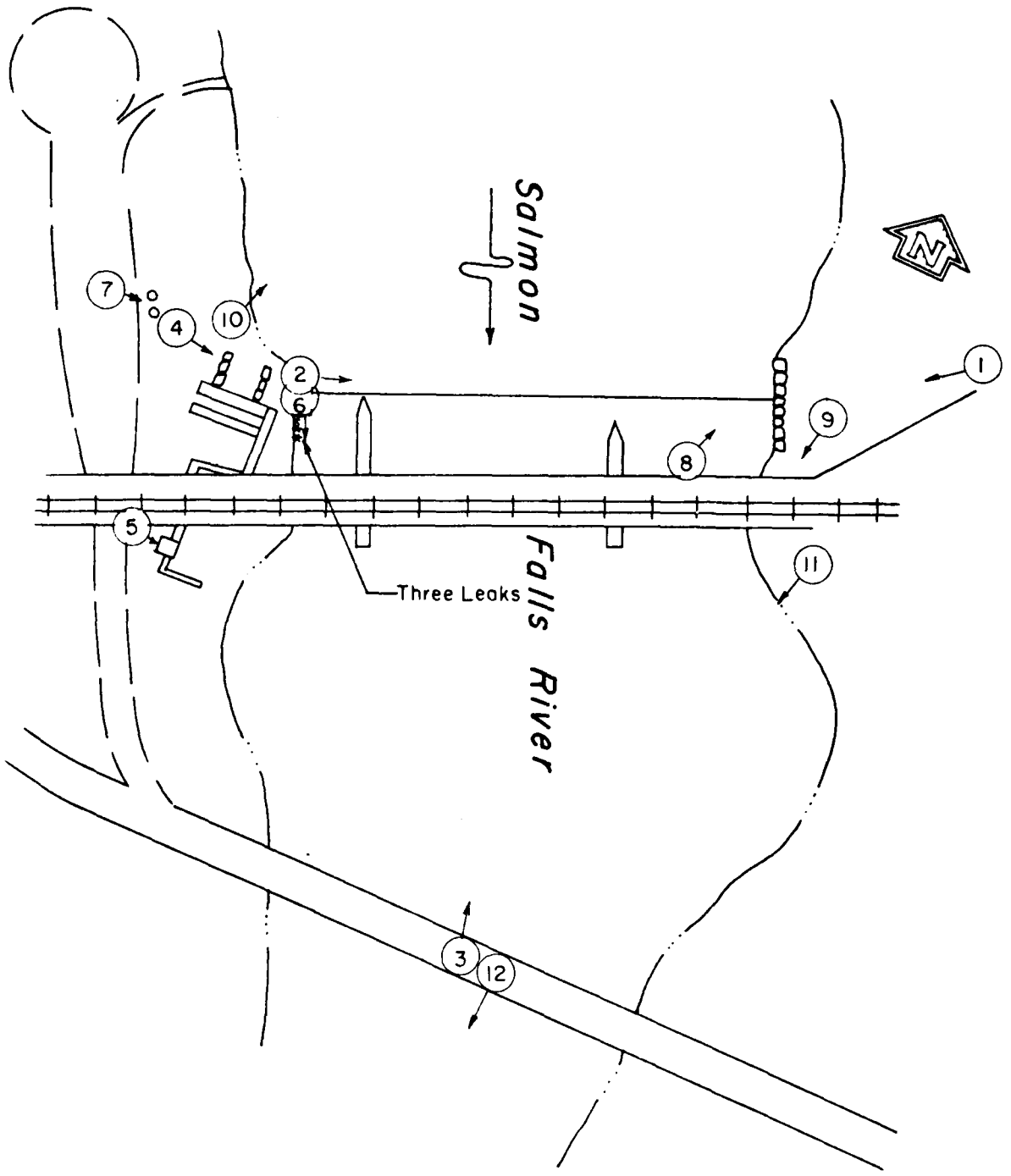
SALMON FALLS DAM — NEW HAMPSHIRE

SCALE NOT TO SCALE

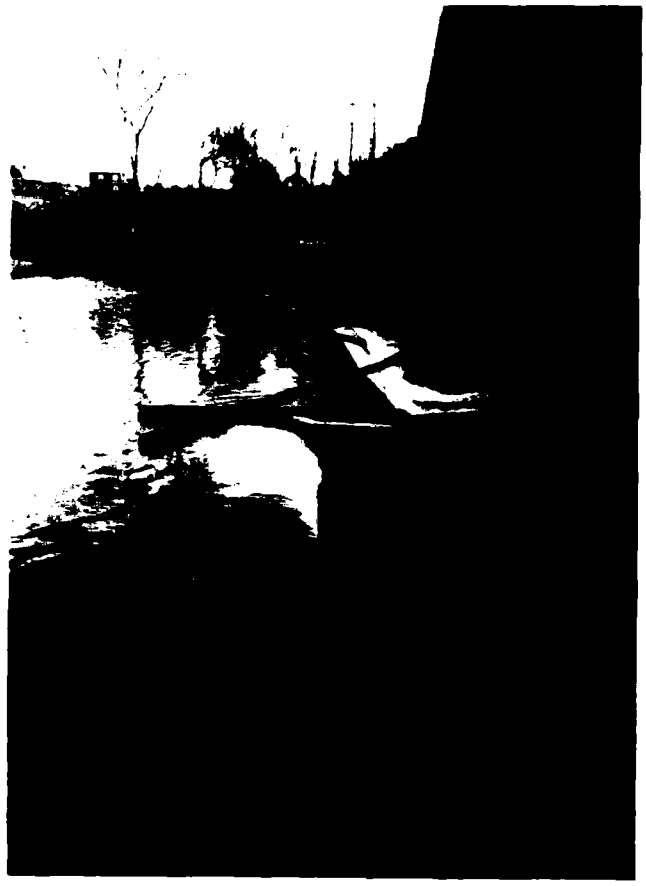
DATE DECEMBER 1979

APPENDIX C

PHOTOGRAPHS



Anderson-Nichols & Co, Inc CONCORD NEW HAMPSHIRE	U S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	
PHOTO INDEX	
SALMON FALLS RIVER NEW HAMPSHIRE	
	SCALE NOT TO SCALE
	DATE DECEMBER 1979



October 25, 1979
Figure 2 - Looking northeast across spillway crest.

October 25, 1979
Figure 3 - View of the downstream face of the dam from the road crossing just downstream.

October 25, 1979

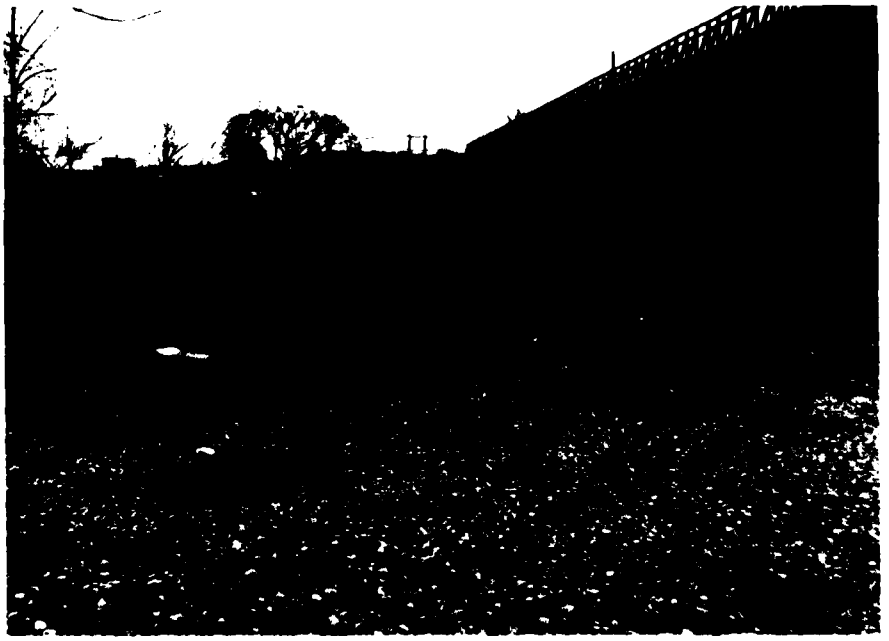
Figure 4 - View of the filled in approach channel and gate structures.

October 25, 1979

Figure 5 - Looking at an inoperable gate on the southwest end of the dam.

October 25, 1979

Figure 6 - View of the three leakages at the southwest end of the spillway.



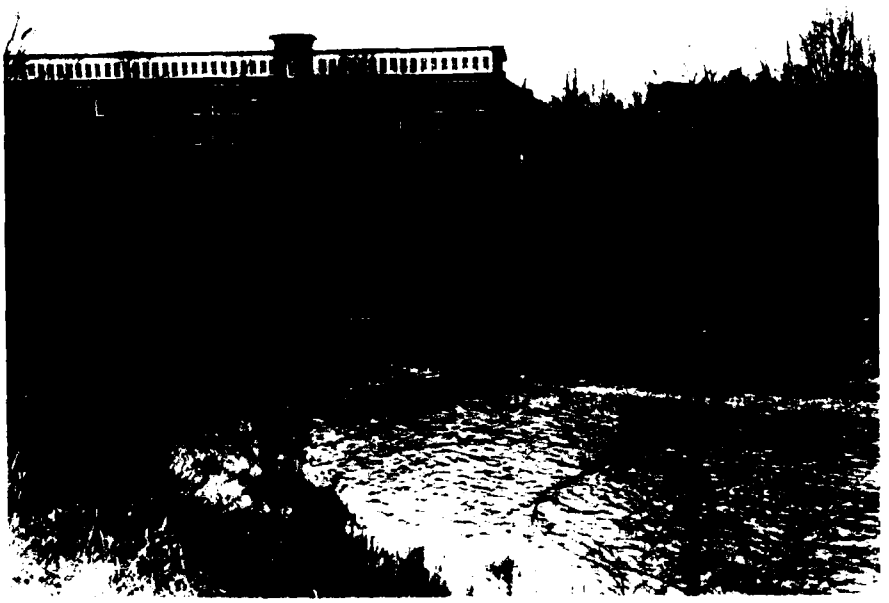
October 25, 1979

Figure 7 - Looking at the two pipes which are utilized to obtain water from the impoundment for use in fire protection for Town of Rollinsford.

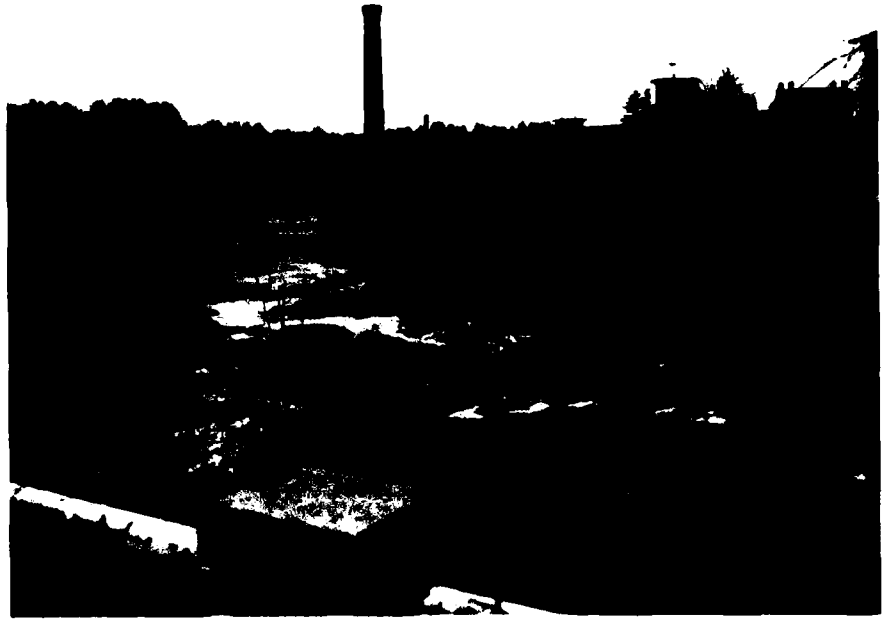
October 25, 1979
Figure 8 - View of the northeast spillway abutment.

October 25, 1979
Figure 9 - Looking at erosion between the northeast spillway abutment and railroad pier.

October 25, 1979
Figure 10 - Looking upstream into the reservoir from the southwest abutment.



October 25, 1979
Figure 11 - Looking downstream at the road crossing from the northeast discharge channel.

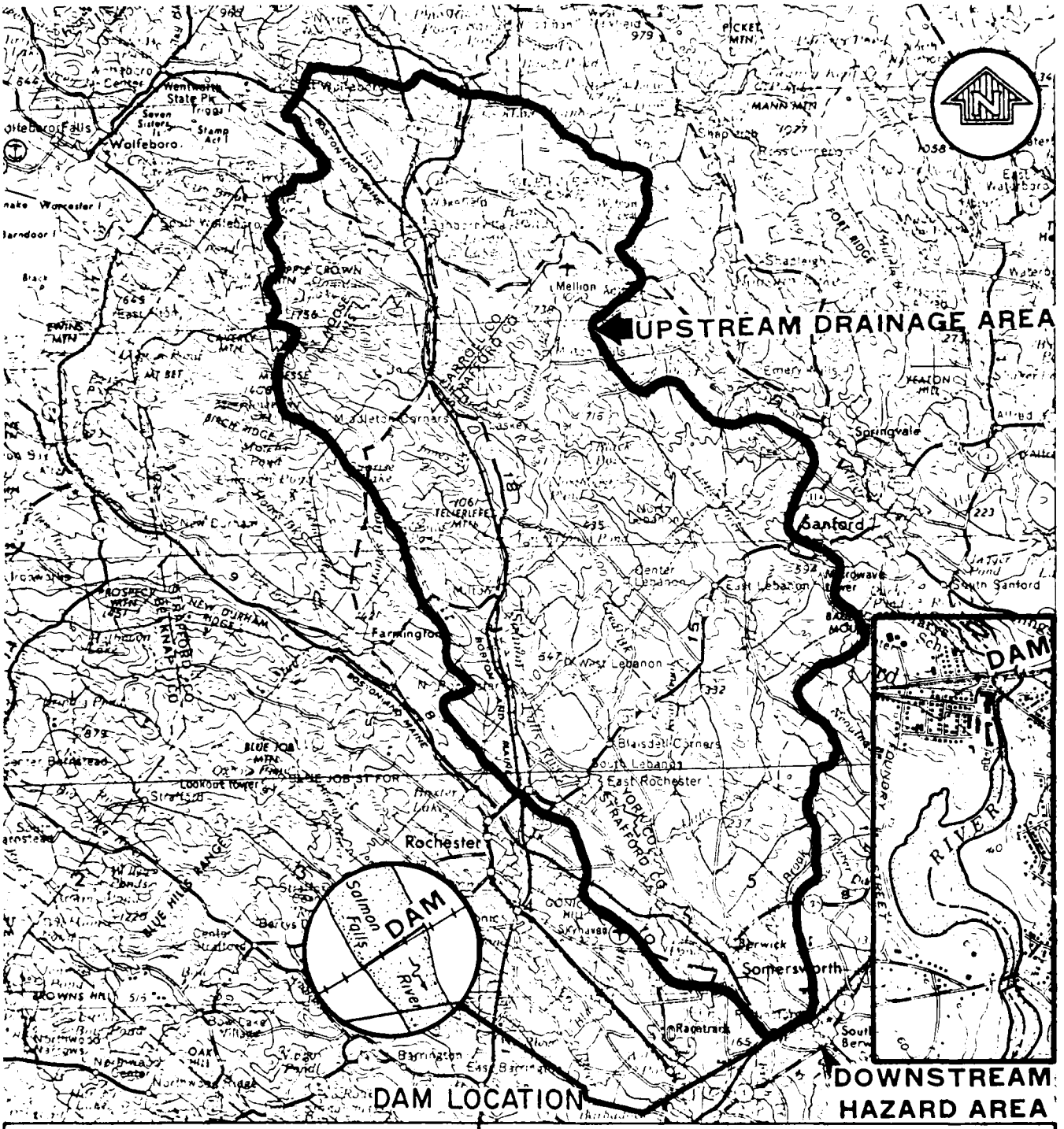


October 25, 1979

Figure 12 - View of the channel downstream of the road crossing shown on Figure 11.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

ROLLINSFORD DAM

ROLLINSFORD, NEW HAMPSHIRE

REGIONAL VICINITY MAP

DECEMBER 1979

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ANDERSON-NICHOLS & CO, INC. CONCORD, NH

MAP BASED ON U.S.G.S. 1:250,000 SERIES TOPOGRAPHIC MAPPING. NK 19-1 PORTLAND ME.-N.H. 1956.

	ROLLINSFORD DAM BREACH ANALYSIS	11-27-79 MNM	1

Purpose: Determine degree of flood hazard.

Assumptions: 1- No flood routing.
2- Breach occurs at top of dam

Following equation is used for peak outflow "Q_{P_1}"

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

where W_b = breach width = 100 Ft
tailwater elev. = 57.8
$y_o = 76.8 - 57.8 = 19.0$ Ft

$$Q_{P_1} = \frac{8}{27} (100) \sqrt{32.2} \, (19.0)^{3/2} = 13925 \text{ CFS}$$

Total Breach Q = 13925 CFS

DAM LOCATED D/S OF ROLLINSFORD DAM:

D. A. = 232 mi

length of the dam = 362

length of spillway = 250 Ft

WEIR SECTION DATA:

STATION	ELEVATION
0	27.5' MSL
60	27.5'
60	20'
278	20'
278	27.5'
362	27.5'

11-27-79
MNM

3/18

DETERMINE THE RATING CURVE (FOR DAM D/S OF ROLLINSFORD DAM)

Assume gates are closed.

STAGE (FT MSL)	DISCHARGE CFS
20	0
25	$Q = 2.9(218)(5)^{3/2} = 7070$
27.5	$Q = 2.9(218)(7.5)^{3/2} = 13000$
30	$Q = 2.9(84)(2.5)^{3/2} + 2.9(218)(10)^{3/2} + 2.9(60)(2.5)^{3/2}$ $= 963 + 20001 + 686$ $= 21650$ CFS

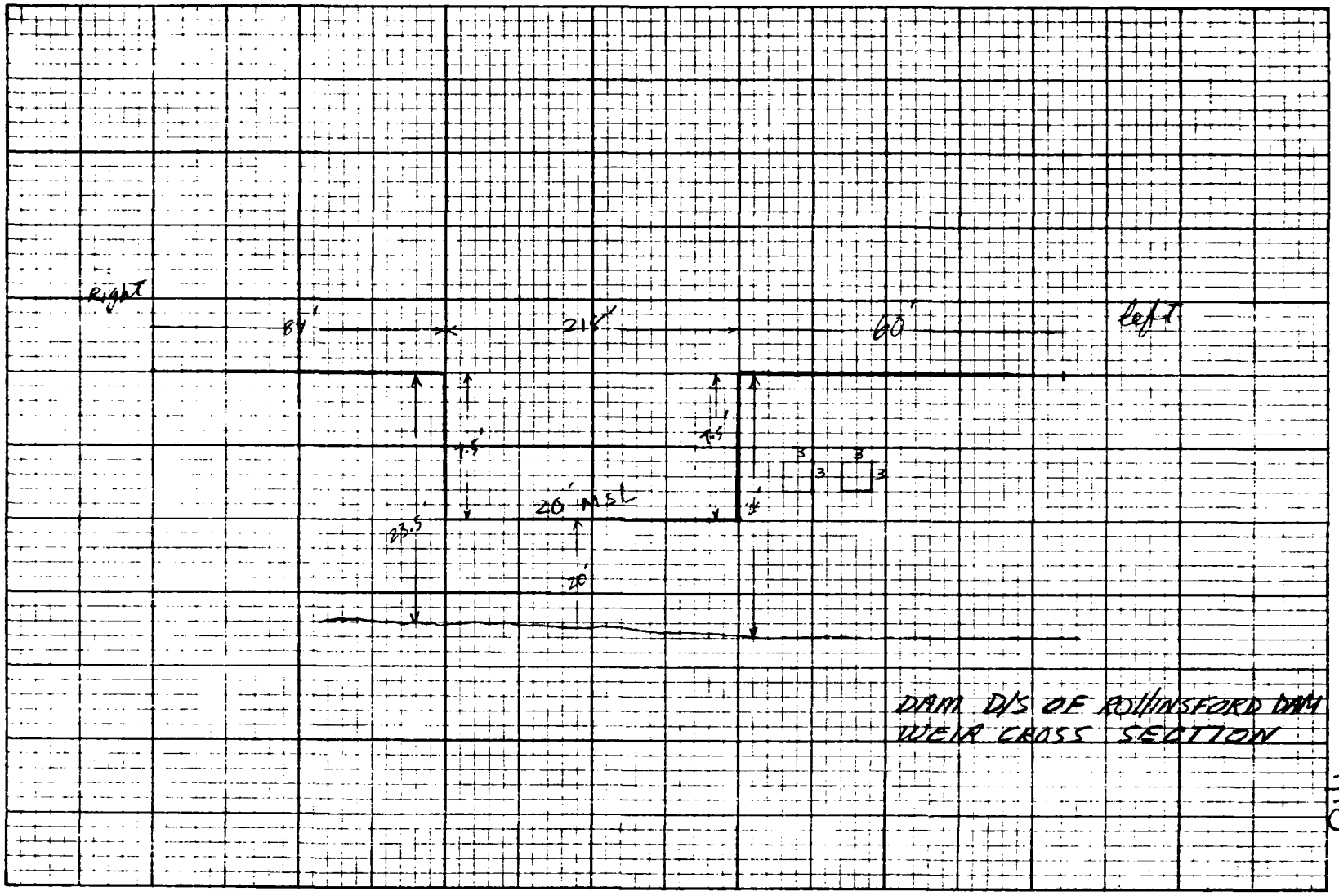
REFER TO RATING CURVE (P. 5)

AT 13925 CFS (BREACH Q) $\Rightarrow$ ELEV. = 27.8' MSL

ELEV. TOP OF DAM = 27.5' MSL

DEPTH OF WATER OVER SPILLWAY CREST = 7.8'

THE DAM WILL BE OVERTOPPED BY 0.3' OF WATER.



D-5

4/18

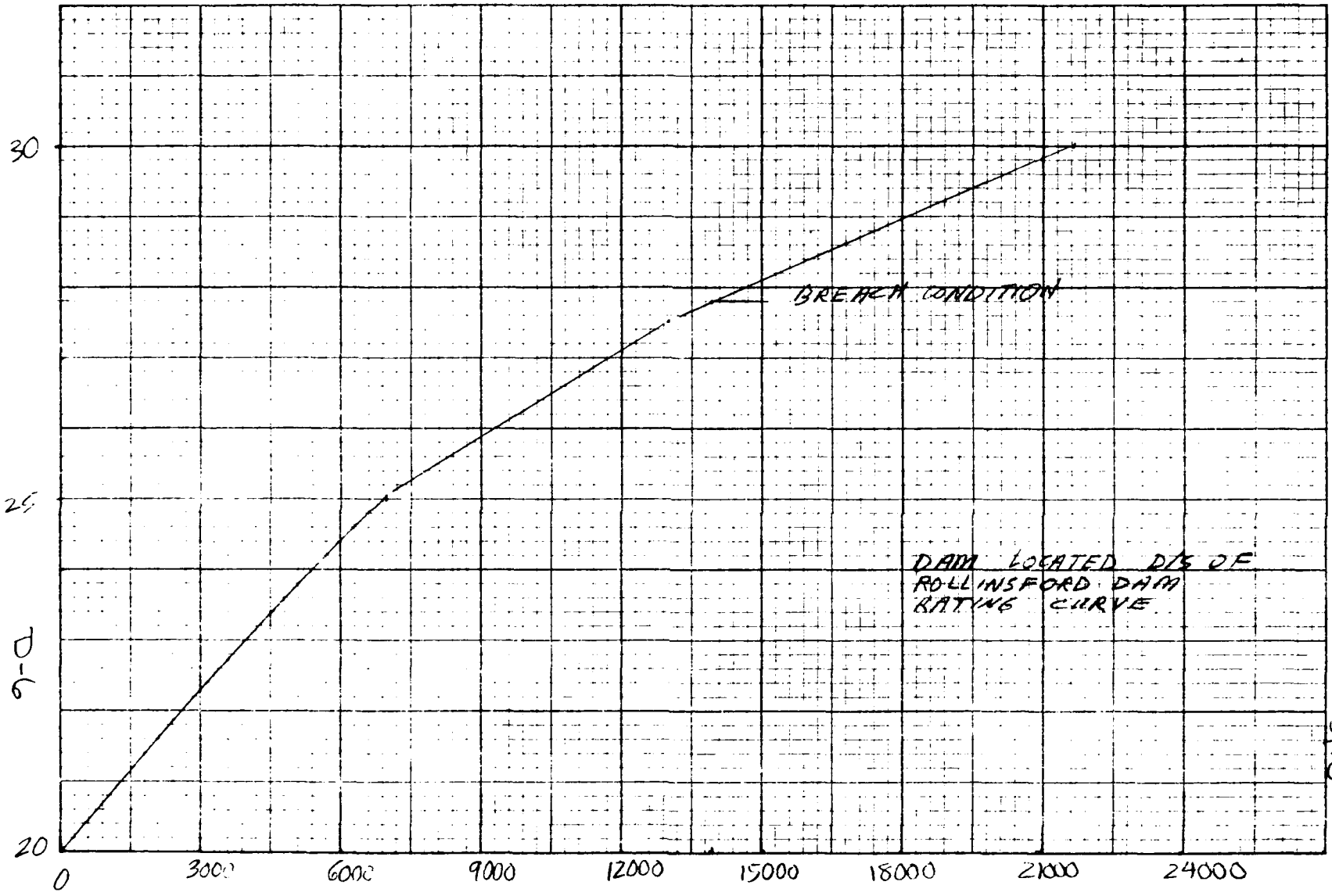


FIG F.1 HEC-2

D-9

5/18

NORMAL POOL ELEVATION = 20' MSL

SURFACE AREA AT NORMAL POOL = 40 ACRES

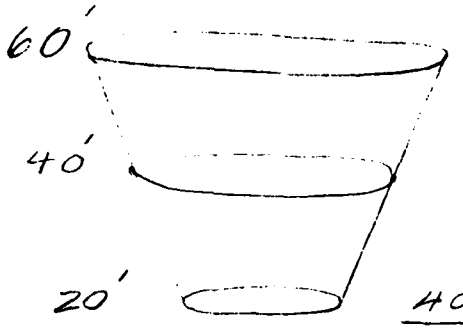
ASSUME CHANNEL DEPTH = 10'

NORMAL POOL STORAGE = 400 AC-FT

USING FRUSTRUM OF PYRAMID EQUATION

$$V = \frac{1}{3} h \left(b_1 + b_2 + \sqrt{b_1 b_2} \right)$$

WHERE h = ELEV. ABOVE NORMAL POOL (FT)
b_1 = NORMAL POOL SURFACE AREA (AC)
b_2 = ENLARGED SURFACE AREA (AC)



4130 AC-FT

1885 AC-FT

400 AC-FT

AT ELEV. 40' ⇒ *SURFACE AREA = 115 AC.

$$V = \frac{1}{3}(20)\left(40 + 115 + \sqrt{(40)(115)}\right) = 1485 \text{ AC-FT}$$

TOTAL STORAGE = 1485 + 400 = 1885 AC-FT

AT ELEV. 60' ⇒ SURFACE AREA = 160 AC.

$$V = \frac{1}{3}(20)\left(115 + 160 + \sqrt{(115)(160)}\right) = 2737 \text{ AC-FT}$$

TOTAL STORAGE 2737 + 400 = 4622 AC FT

USE ABOVE DATA TO DEVELOP STORAGE-ELEV. CURVE.

* SURFACE AREAS WERE PLANIMETERED OFF U.S.G.S. QUAD SHEET.

11-27-79
MNM

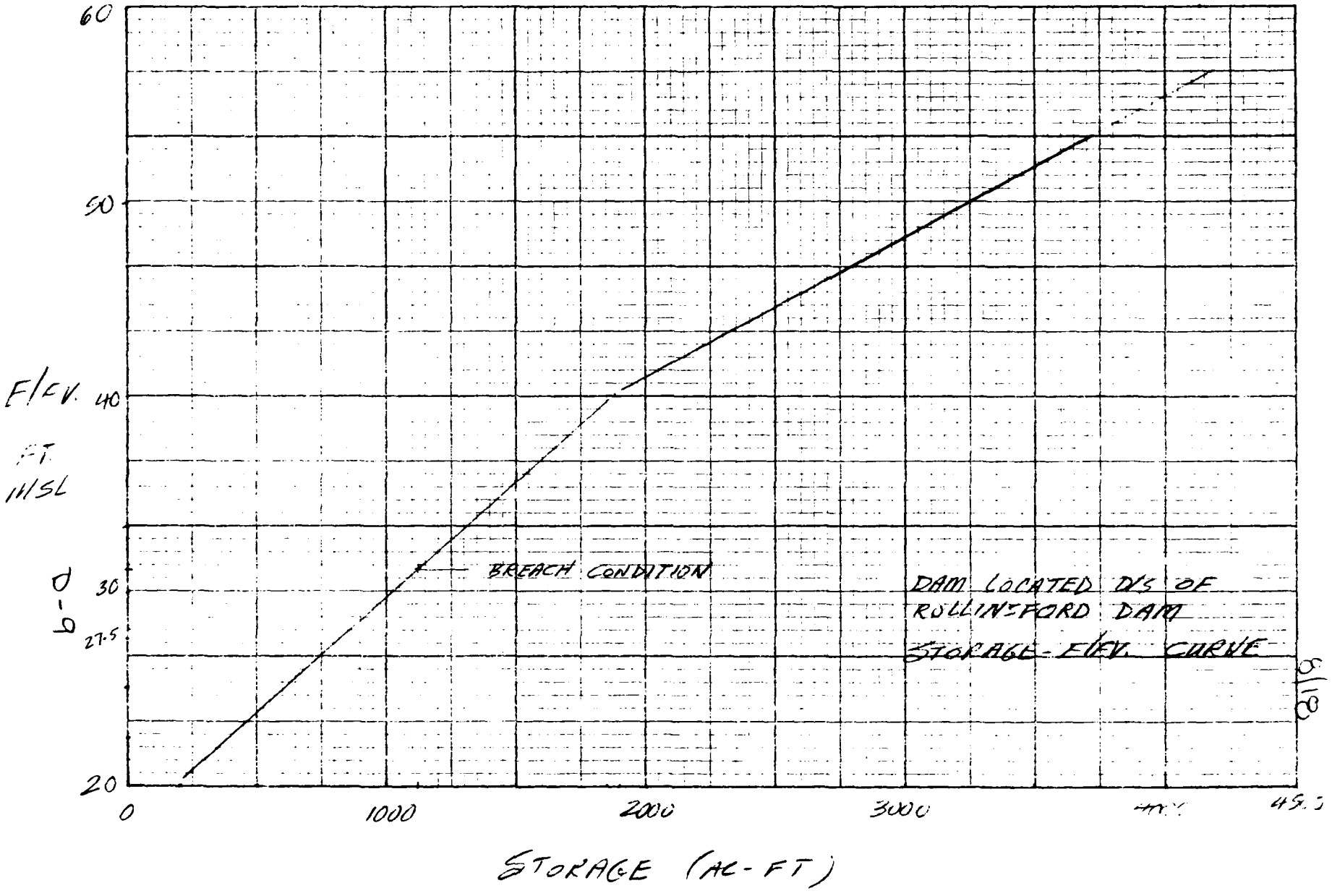
7/18

AT E/EV. 27.8' MSL (BREACH @ E(EV.)

STORAGE = 1125

NORMAL STORAGE = 400

SURCHARGE STORAGE = 1125-400 = 725 AC-FT



D/S HAZARD ANALYSIS:

A RAILROAD BRIDGE IS LOCATED JUST D/S OF THE DAM. THE BREACH DISCHARGE MIGHT DAMAGE THE PIERS OF THE RAILROAD BRIDGE.

AN ACTIVE MILL BUILDING IS LOCATED ABOUT 300' D/S OF THE DAM, AND IS PROTECTED BY A CONCRETE TRAINING WALL

AN ABANDONED MILL BUILDING IS LOCATED ABOUT 500' D/S OF THE DAM WHICH WOULD BE EFFECTED BY BREACH DISCHARGE.

SALMON FALLS RIVER DAM WHICH IS LOCATED ABOUT 1 MILE D/S OF ROLLINSFORD DAM PROVIDES A LARGE STORAGE AREA FOR BREACH DISCHARGE, RESULTING IN ATTENUATION OF THE BREACH WAVE. ROLLINSFORD DAM, BREACH COULD OVERTOP THIS DAM BY 0.3 OF WATER.

ROLLINSFORD DAM IS A PUBLIC UTILITY DAM (USED FOR FIRE PROTECTION FOR THE TOWN OF Rollinsford). THEREFORE THE LOSS OF PONDAGE DUE TO DAM FAILURE WOULD BE CONSIDERED A PUBLIC UTILITY LOSS. Rollinsford WAS THEREFORE classified - Significant Hazard.

Anderson-Nichols & Company, Inc.

Subject ROLLINSFORD DAM

Sheet No. 10 of 18
Date 11-27-79
Computed AAA
Checked

JOB NO.

SQUARES /4 IN. SCALE

DRAINAGE AREA = 230 mi^2
SIZE CLASSIFICATION = SMALL
HAZARD CLASSIFICATION = SIGNIFICANT
TEST FLOOD = ½ PMF

CALCULATE PMF USING "PRELIMINARY GUIDANCE FOR ESTIMATING MAXIMUM PROBABLE DISCHARGES IN PHASE I DAM SAFETY INSPECTION, MARCH, 1978"

USING FLAT & COASTAL CURVE TO DETERMINE PMF

$$PMF = 300 \frac{CFS}{mi^2} \times 230\ mi^2 = 69000\ CFS$$

PEAK INFLOW = ½ PMF = ½ 69000 = 34500 CFS

Anderson-Nichols & Company, Inc.

Subject KOLLINSFORD DAM
H & H

Sheet No. 11 of 18
Date 11-27-79
Computed AJA/MH
Checked

JOB NO.

DETERMINING RATING CURVE

USE WEIR EQUATION

$$Q = C L H^{3/2}$$

WHERE

*C = 2.9 FOR CONCRETE SECTION
C = 2.6 FOR WOODED EMBANKMENT

STAGE (FT)	DISCHARGE (CFS)
70	0
72	$Q = 2.9(245)(2)^{3/2} = 2010$
74.6	$Q = 2.9(245)(4.6)^{3/2} = 7010$
76	$Q = 2.9(245)(6)^{3/2} + (2.9)(15)(1.4)^{5/2} = 10515$
77	$Q = 2.9(245)(7)^{3/2} + (2.9)(15)(2.4)^{3/2} = 13320$
77.5	$Q = 2.9(245)(7.5)^{3/2} + 2.9(15)(2.9)^{3/2} + 2.6(50)(0.5)^{3/2} + \frac{1}{2}(2.6)(4.2)(0.5)^{3/2} = 14595 + 215 + 50 + 2 = 14860$
78.5	$Q = 2.6(71)(1)^{3/2} + 2.9(245)(8.5)^{3/2} + 2.9(15)(3.9)^{3/2} + 2.6(50)(1.5)^{3/2} + \frac{1}{2}(2.6)(12.5)(1.5) = 185 + 17610 + 335 + 239 + 30 = 18400$

*"C" VALUES WERE TAKEN FROM BRATER & KING "HANDBOOK OF HYDRAULICS"

SQUARES 1/4 IN. SCALE 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

STAGE (FT)	DISCHARGE (CFS)
81.1	$Q = 2.6(71)(3.6)^{3/2} + 2.9(4)(2.6)^{3/2} + 2.9(245)(11.1)^{3/2} + 2.9(15)(6.5)^{3/2} + 2.6(50)(4.1)^{3/2} + \frac{1}{2}(2.6)(34)(4.1)^{3/2}$ $= 1261 + 49 + 26275 + 721 + 1080 + 367$ $= 29750$
82	$Q = 2.6(71)(4.5)^{3/2} + 2.9(4)(3.5)^{3/2} + 2.9(245)(12)^{3/2} + 2.9(15)(7.4)^{3/2} + 2.6(50)(5)^{3/2} + \frac{1}{2}(2.6)(42)(5)^{3/2} + 2.6(45)(0.9)^{3/2} + \frac{1}{2}(2.6)(4.5)(0.9)^{3/2}$ $= 1762 + 76 + 29535 + 876 + 1453 + 610 + 100 + 5 = 34500$

TOTAL TEST FLOOD INFLOW = 34500 CFS
REFER TO CURVE ON PAGE
AT 34500 CFS ⟹ ELEV. = 82' MSL

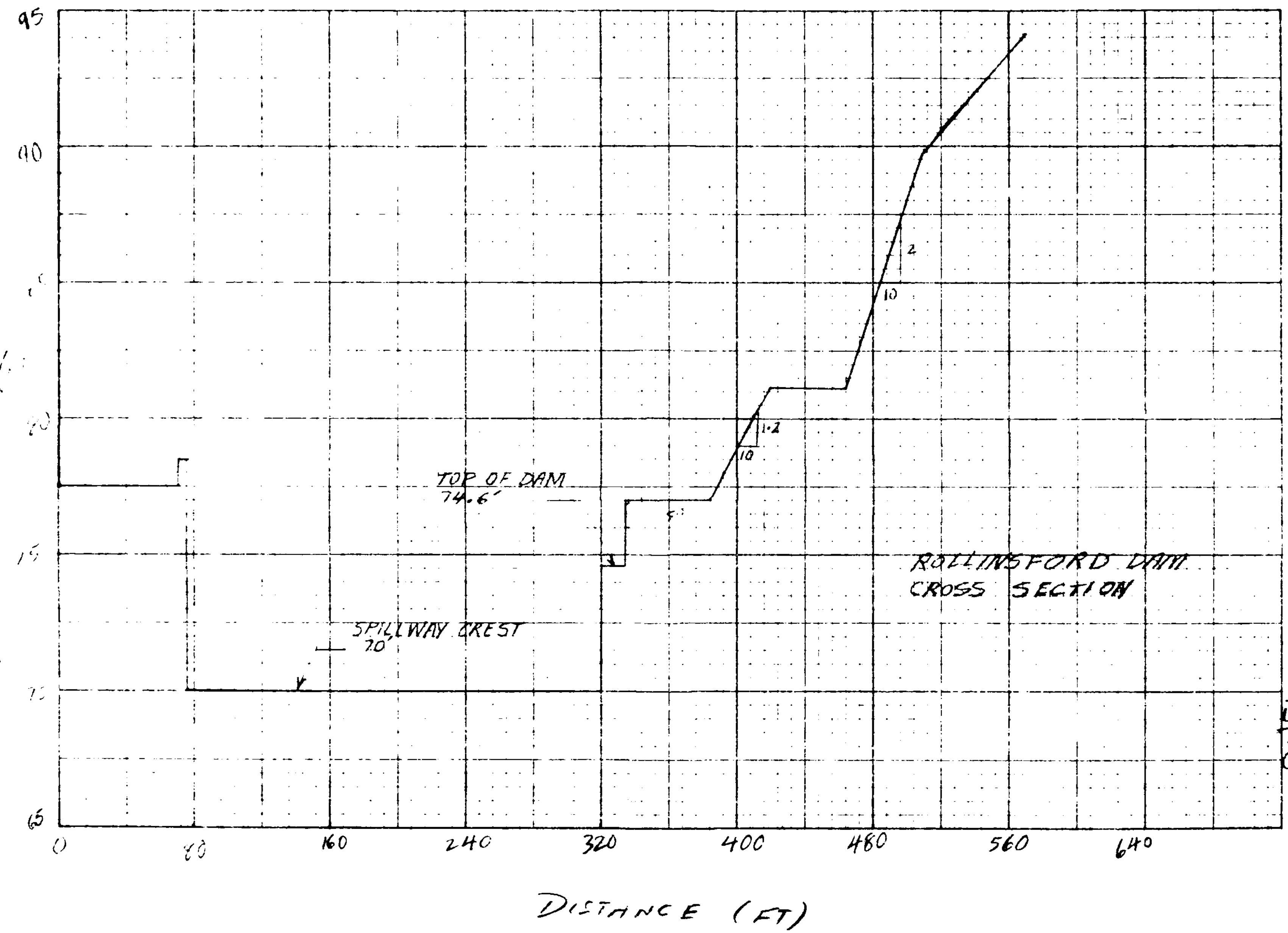
THE DEPTH OF WATER OVER SPILLWAY CREST DURING ½ PMF WILL APPROXIMATELY BE

$82' - 70 = 12'$

THE DAM WILL BE OVERTOPPED BY

$82' - 74.6' = 7.4'$

DURING ½ PMF



13/18

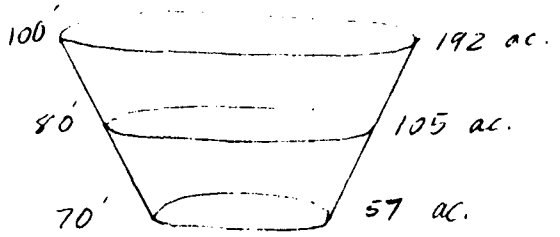
D-14

SURFACE AREA AT NORMAL POOL = 57 ac
ASSUME A DEPTH OF 8 FT.
NORMAL POOL STORAGE = 456 AC-FT.

USE FRUSTRUM OF PYRAMID EQUATION

$$V = \frac{1}{3} h \left(b_1 + b_2 + \sqrt{b_1 b_2} \right)$$

WHERE h = ELEV. ABOVE NORMAL POOL (FT)
b_1 = NORMAL POOL SURFACE AREA (ac)
b_2 = ENLARGED SURFACE AREA (ac)



AT ELEV. 80' MSL ⇒ *SURFACE AREA = 105 ac

$$V = \frac{1}{3}(10)\left(57 + 105 + \sqrt{(57)(105)}\right) = 800 \text{ ac-FT}$$

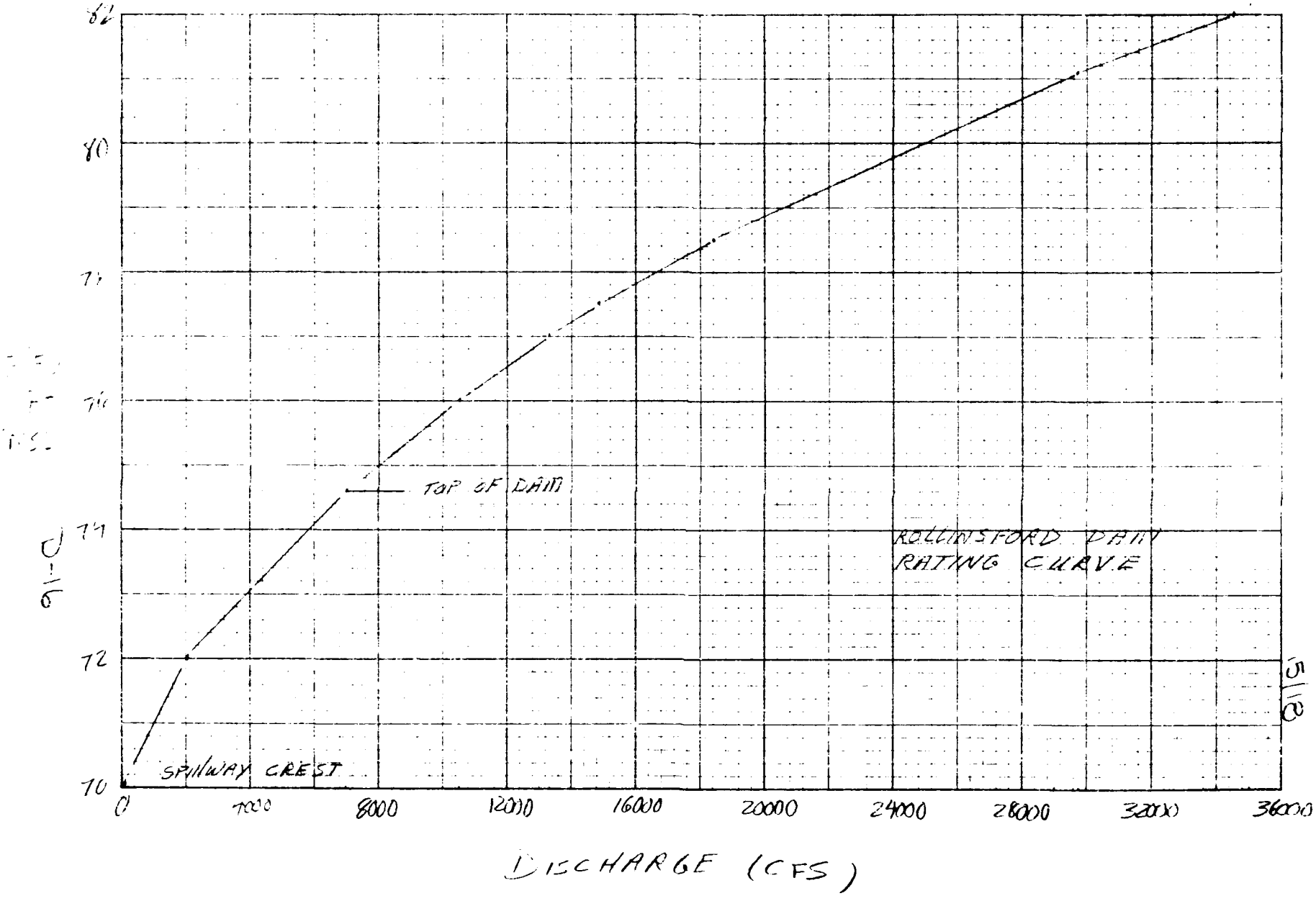
TOTAL STORAGE = 456 + 800 = 1256 ac. FT

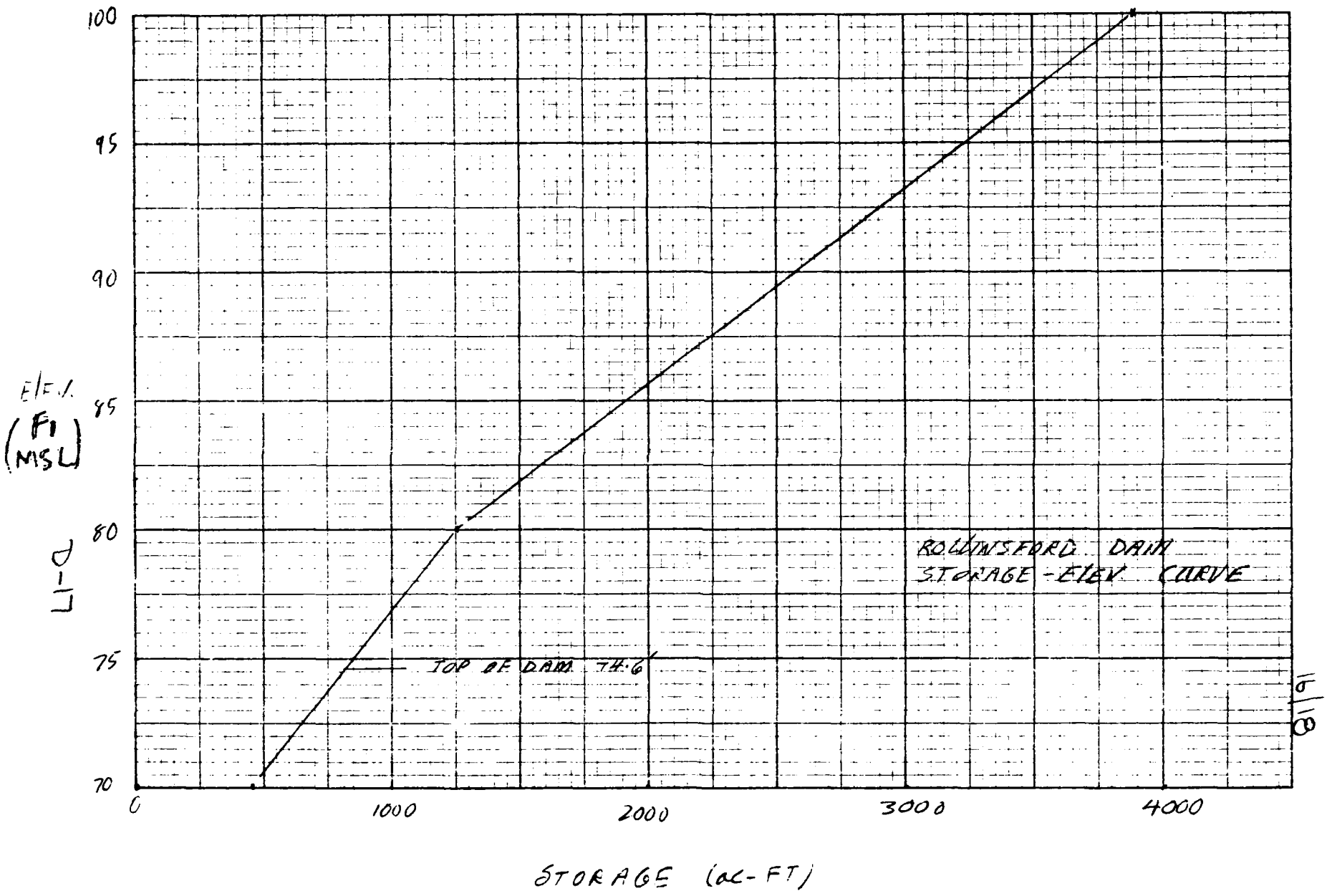
AT ELEV. 100' MSL ⇒ SURFACE AREA = 192 ac.

$$V = \frac{1}{3}(20)\left(105 + 192 + \sqrt{(105)(192)}\right) = 2635 \text{ ac-FT}$$

TOTAL STORAGE = 2635 + 1256 = 3891 ac-FT

* SURFACE AREAS WERE PLANIMETERED OFF USGS QUAD SHEETS.


ROLLINSFORD DAM
RATING CURVE
TOP OF DAM
SPILLWAY CREST
DISCHARGE (CFS)
0
4000
8000
12000
16000
20000
24000
28000
32000
36000
70
72
74
76
78
80
82



AT ELEV. 82' MSL (TEST FLOOD ELEV.):

STORAGE = 1525 AC-FT
NORMAL STORAGE = 456 AC-FT
SURCHARGE STORAGE = 1525 − 456 = 1069 AC-FT

$$1069 \text{ AC-FT} \times \frac{1}{230 \text{ mi}^2} \times \frac{1 \text{ mi}^2}{640 \text{ AC}} = 0.0072' = 0.087''$$

$$QP_2 = QP_1 \left(1 - \frac{STOR_1}{19''}\right)$$

$$QP_2 = 34500 \left(1 - \frac{0.087}{19}\right) = 34336 \text{ CFS}$$

DETERMINE SURCHARGE HEIGHT TO PASS QP_2 OF 34390 CFS.
REFER TO RATING CURVE (P. 15)

AT 34336 CFS → ELEV. = 81.9' MSL
REFER TO STORAGE - ELEV. CURVE (P. 16)

AT 81.9' MSL → STORAGE = 1510 AC-FT

$$(1510 - 456) \text{ AC-FT} \times \frac{1}{230 \text{ mi}^2} \times \frac{1 \text{ mi}^2}{640 \text{ AC}} = 0.007' = 0.086''$$

$STOR_1 = 0.087''$
$STOR_2 = 0.086''$
AVERAGE = 0.0865" = 0.0072'

$$(0.0072 \text{ FT})\left(\frac{230 \text{ mi}^2}{1}\right)\left(\frac{640 \text{ AC}}{1 \text{ mi}^2}\right) = 1060 \text{ AC-FT}$$

1060 + 456 = 1516 AC-FT

FROM STORAGE - ELEV. CURVE (P.), AT 1516 AC-FT
ELEV. = 81.9' MSL
FROM RATING CURVE (P. 15) →

AT ELEV. 81.9' MSL => DISCHARGE = 34200 CFS

NORMAL STORAGE = 456 AC-FT

MAXIMUM STORAGE = 820 AC-FT

Storage effects of dam will be negligible.

Test Flood discharge - 34,500 cfs
Test Flood elevation - 82' MSL

Dam will be overtopped by 7.4 feet (12 feet over spillway crest) during test flood of 1/2 PMF.

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

FILMED

8-85

DTIC