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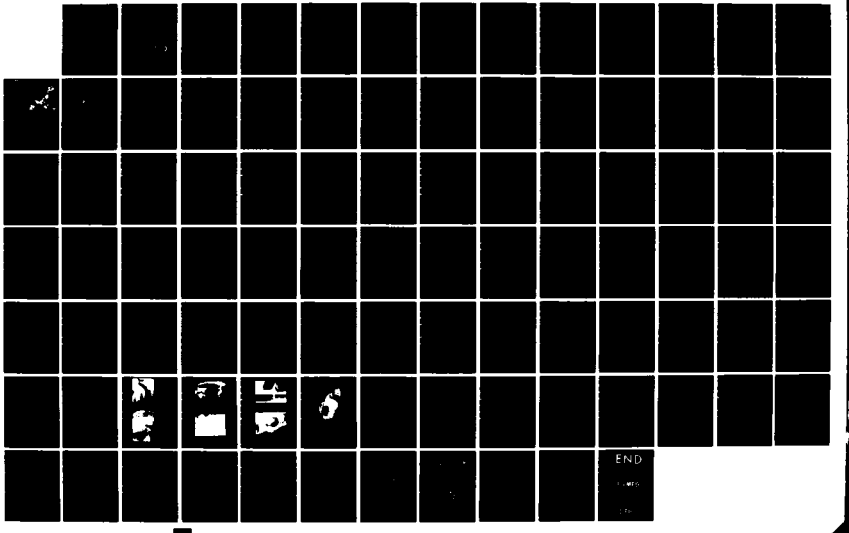

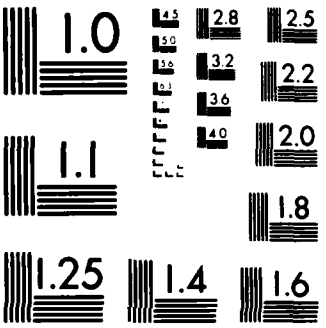

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CONNECTICUT RIVER BASIN

NORTHAMPTON, MASSACHUSETTS

AD-A155 534

COUNTRY CLUB
MA 00756

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

JUNE 1979

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Connecticut River Basin
Northampton, Massachusetts
Mill River

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

The dam is basically comprised of 2 stone masonry vertical faced spillways. The main spillway has a length of 69± ft. and a structural height of 32 ft. The secondary spillway has a length of 30 ft. and a height of about 9 ft. The visual inspection did not disclose any findings that indicate an immediate unsafe condition. The size classification is small with a hazard potential of significant.Due to the lack of draw down capabilities, the dam is considered in fair condition.

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

REPLY TO
ATTENTION OF:
NEDED

AUG 16 197

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

I am forwarding to you a copy of the Country Club 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 Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Look Memorial Park Association, Northampton, Massachusetts 01060.

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 Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
BRIEF ASSESSMENT

Identification No.: MA 00756

Name of Dam: Country Club Dam

City: Northampton

County and State: Hampshire County, Massachusetts

Stream: Mill River

Date of Inspection: December 4, 1978 and April 12, 1979

The dam is basically comprised of 2 stone masonry vertical faced spillways. The left and middle abutments are the abutments of two adjacent roadway bridges. The main spillway has a length of 69± feet and a structural height of 32 feet. The secondary spillway has a length of 30 feet and a height of about 9 feet. The dam contains a sealed 6 foot diameter penstock, a sealed sluicebox at the main spillway and an inoperable sluicebox at the secondary spillway. The dam is owned and maintained by the Look Memorial Park Association, of Northampton, Massachusetts. The actual date of construction for the dam could not be determined from the data found.

The visual inspection did not disclose any findings that indicate an immediate unsafe condition.

The dam has a size classification of small and a hazard classification of significant. Based on Corps guidelines, the test flood is within the range of the 100 year and one half Probable Maximum Flood. The test flood used is the U.S.G.S. 100 year storm. The outflow from this test flood is 6,300 cfs. The dam is a run-of-the-river type and provides no significant

storm runoff storage. The spillway crests would be overtopped by about 7 feet.

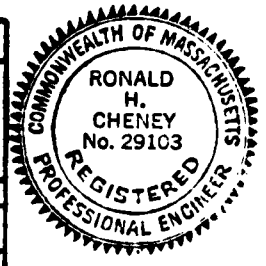
Due to the lack of draw down capabilities, the dam is considered in fair condition. Also certain items which are generally normal maintenance and operational procedures need attention. These include removal of trees and brush in close proximity of the dam; periodic observation for seepage at the sealed penstock and main spillway left abutment; and establishment of a formal warning system.

The dam in its present condition contains no draw down facility to allow for a thorough inspection and rapid dewatering in the event of an emergency. It is recommended that the owner engage a competent engineer to evaluate the potential of restoring the existing inoperable draw down facilities and/or the design of a new draw down facility. The above recommendations and remedial measures should be implemented by the owner within one year after receipt of this Phase I Report.

Ronald H. Cheney

Ronald H. Cheney, P.E.
Associate

Hayden, Harding & Buchanan, Inc.
Boston, Massachusetts



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

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

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Chief, Structural Section
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 Inspections. 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 or numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

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

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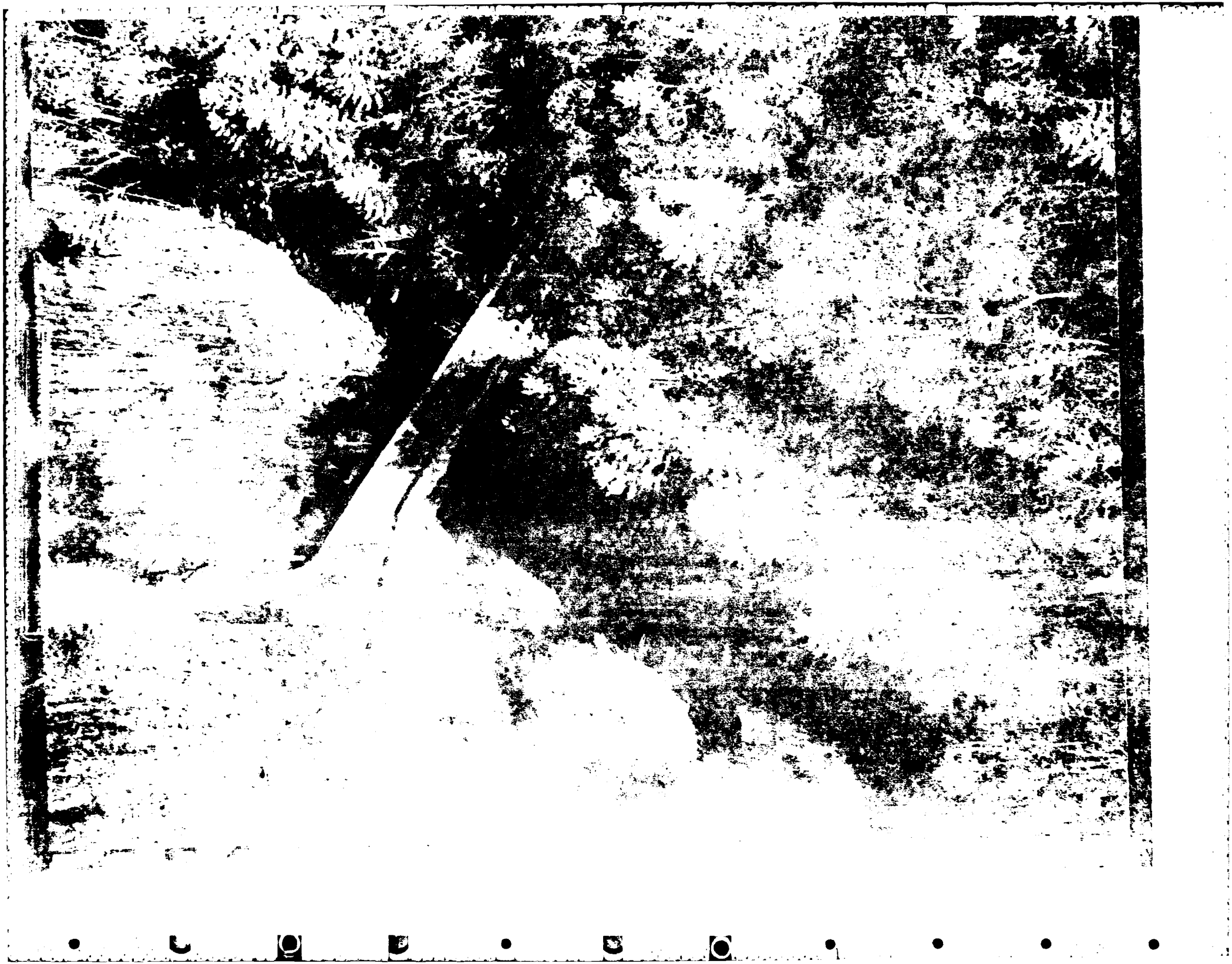
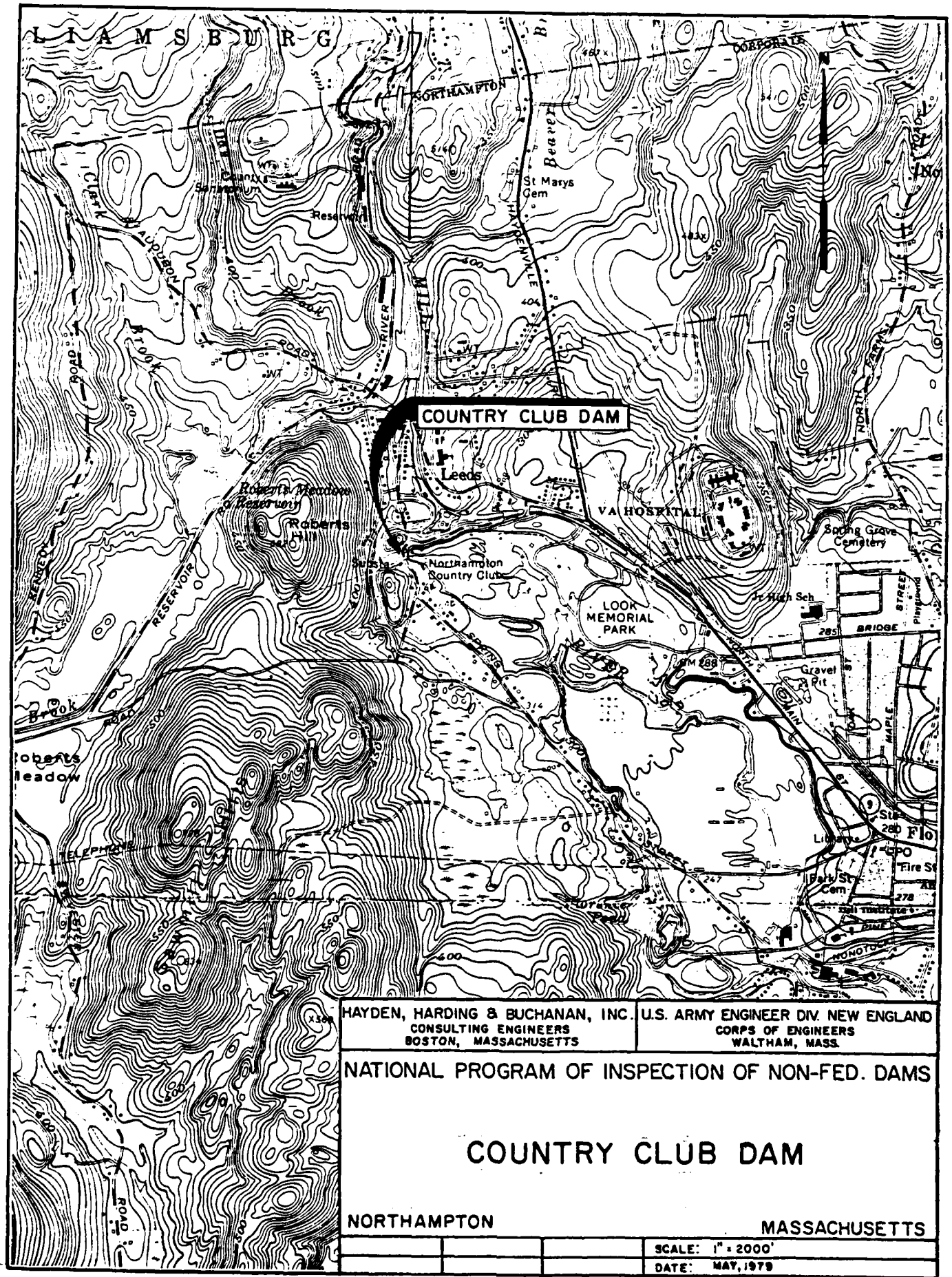




HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

COUNTRY CLUB DAM

NORTHAMPTON MASSACHUSETTS

			SCALE: 1" = 2000'
			DATE: MAY, 1979

PHASE I
NATIONAL DAM INSPECTION PROGRAM

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. Hayden, Harding & Buchanan, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued Hayden, Harding & Buchanan, Inc. under a letter of 28 November 1978 from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW 33-79-C-0012 has been assigned by the Corps of Engineers for this work.

b. Purpose

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

(2) Encourage and assist 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

Country Club Dam is located in the City of Northampton in Hampshire County, Massachusetts, just south of the Village of Leeds. The dam is located on the Mill River parallel to the Spring Street bridge overpass. The dam is shown on the Easthampton, Massachusetts Quadrangle and has the approximate coordinates of North 42^{o} 20' 52" , West 72^{0} 42' 5".

b. Dam and Appurtenances

The dam is comprised of 2 stone masonry vertical faced spillways. The main spillway, located on the left, is an arch spillway having a total crest length of about 69 feet, a plan width of 5.5 feet and a height of 32 feet. It originally contained a 2 foot square sluiceway located at the center of the arch, 24 feet below the crest. However, according to a 1968 County Inspection Report, the outlet was sealed with solid masonry at about that time. The secondary spillway is located at the right side of the dam. This spillway has a length of 30 feet, a plan width of 4½ feet and a height of about 9 feet.

This spillway also contains a 2 foot, square sluiceway located approximately 6 feet below the center of the crest. Both spillways have the same crest elevation. A bedrock high divides the two spillways. Immediately downstream of each spillway are roadway bridge structures spanning the outlet channels. The bedrock high between the spillways also serves as a foundation supporting abutments for the two bridge structures. Concrete and masonry retaining walls connect between the two bridge abutments. The area between these walls is infilled with soil and covered with a bituminous concrete roadway surface. The left abutment area of the main spillway is a bedrock outcrop which also serves as a foundation for one of the downstream bridge structures. A penstock which was earlier used in electric power generation and since blocked up, is located approximately 50 feet left of the left abutment of the main spillway. The drawing in Appendix B of this report shows the layout of the dam and roadway structures.

c. Size Classification

This dam is classified as small based on its hydraulic height of 32 feet and impounding capacity of about 100 acre feet.

d. Hazard Classification

This dam has a significant hazard potential due to the location downstream of "Look Park" and its picnic

areas adjacent to the river. River stage could reach depths of 10 to 13 feet, causing about 5 feet of flooding at the park buildings.

e. Ownership

The dam is presently owned by Look Memorial Park Association. Prior to 1933, the dam had been owned by the Corticelli Silk Company. In 1933, the dam was taken over by the Belding-Haminway Company. In 1942, the dam was taken over by the City of Northampton for back taxes. The City transferred the ownership to the Frank Newhall Look Memorial Park Association by a tax sale in 1963.

f. Operator

The dam is maintained by the Look Park Association, Northampton, Massachusetts 01060. Mr. Brian Elliot is the Park Superintendant and the designated caretaker of the dam. (Telephone 413-584-5457).

g. Purpose of Dam

The purpose of the dam is for recreation. An earlier usage was for power generation for the Northampton-Williamsburg Street Railroad.

h. Design and Construction History

There were no records located indicating when the dam was built. Plans dated 1924 for construction of the adjacent bridges indicates earth fill is placed over the old penstock and a brick wall blocks its outlet. The 1968 County Inspection Report indicates that the main spillway sluicebox was sealed in about 1968.

i. Normal Operating Procedure

There are no working outlets and no apparent formal operational procedures for this dam.

1.3 Pertinent Data

a. Drainage Area

The drainage area (31,872 acres - 49.8 square miles) consists of generally mountainous, rural land. A number of small villages are located throughout the area along Route 9. The major watercourse for the drainage area is the Mill River. This river joins the Connecticut River about 6 miles downstream.

Development on the flood plains below the dam is limited to undeveloped or recreational uses (Look Park and the Country Club golf course) for a distance of about 2 miles downstream. Beyond that point moderate to heavy urban development occurs in the Florence and Bay State sections of the City of Northampton.

b. Discharge at the Damsite

Two stone box sluice gates originally existed at this site, one each on the main and auxiliary spillways. According to the 1968 County Inspection Report the gate at the the main spillway has been sealed. The gate on the auxiliary spillway has no known controls and was observed to be covered with silt on the upstream side of the dam. The crest of the spillways are ungated.

No records of maximum impoundment or discharges at the site are known. However, a U.S.G.S. gaging station (No. 1-1715) is located on the Mill River about 4.5 miles downstream of the dam. The maximum discharge recorded at this gage was 6,300 cfs on August 19, 1955, for a drainage area of 52.8 s.m.

The ungated spillway capacity for this dam will vary since the entire top of dam acts as a spillway. For the 100 year frequency test flood (based on the Mill River U.S.G.S. gauging station No. 1-1175, August 19, 1955) the inflow would be 6300 cfs resulting in a stage elevation of 314.5± at the dam. Since this dam is a run-of-the-river project, it has no significant storage capacity. Therefore, outflow and inflow are considered the same.

c. Elevation (Ft. above MSL)

(1) Streambed at centerline of dam ---------- 277±

(2) Maximum tailwater---------- 287±

(3) Upstream portal invert diversion tunnel--- none

(4) Recreation pool----------307.5

(5) Full flood control pool---------- N/A

(6) Spillway crest--(both spillways)--ungated 307.5

(7) Design surcharge (Original Design)------unknown

(8) Top Dam -------(spillway crest elevation)- 307.5

(9) Test flood design surcharge----------314.5

d. Reservoir

(1) Length of maximum pool----------1000'±

(2) Length of recreation pool----------1000'±

(3) Length of flood control pool---------- N/A

e. Storage (acre-feet)

(1) Recreation pool---------- 100

(2) Flood control pool---------- N/A

(3) Top of dam---------- 100

(4) Spillway crest pool---------- 100

(5) Test flood pool---------- 147

f. Reservoir Surface (acres)

(1) Recreation pool---------- 3

(2) Flood control pool---------- N/A

(3) Spillway crest---------- 3

(4) Top dam---------- 3

(5) Test flood pool---------- 8

g. Dam

(1) Type----------stone masonry arch

(2) Length-----main splwy: 69±', auxiliary splwy:30±'

(3) Height---- main splwy: 32±', auxiliary splwy:14.5± '

(4) Top Width--main splwy: 5.5', auxiliary splwy: 4.5'

(5) Side Slopes-vertical downstream, upstream unknown

(6) Zoning----------none

(7) Impervious Core----------stone masonry dam

(8) Cutoff----------unknown

(9) Grout Curtain----------unknown

h. Diversion and Regulating Tunnel----------none

i. Spillway

(1) Type----------broad crested entire length of dam

(2) Length of weir----------main spillway 69+' auxiliary spillway 30±'

(3) Crest elevation----------307.5 both spillways

(4) Gates----------none

(5) U/S Channel----------river bed

(6) D/S Channel----------river bed

j. Regulating Outlets

There was a stone box sluice gate originally located within each of the spillways that comprise the Country Club Dam. The gate on the main spillway was sealed with masonry around the year 1968. The upstream side of the auxiliary spillway gate was observed to be buried in silt, and there are no known controls for operating the gate. The auxiliary spillway gate is located about 6 feet below the crest or at elevation 301.5±. It has a 2'x2' opening. There was originally a penstock located at the left side of the dam, which was used in power generation. This outlet has since been sealed. No other controls exist at this dam.

SECTION 2
ENGINEERING DATA

2.1 Design

No construction plans or design calculations for the dam were found. Drawings dated 1924 and 1925 for construction of the adjacent roadway structures were available. These drawings indicate that the present structures were built to replace the existing steel and/or iron truss type bridge structures. The available information does not indicate when the dam was constructed.

2.2 Construction

No construction data were found regarding this dam.

2.3 Operation

There are no formal records of operational procedures for this dam. There is no indication that the outlets have been operated for many years.

2.4 Evaluation

a. Availability

No plans or calculations regarding the construction of dam were discovered. Plans from 1924 and 1925 outlining construction of the adjacent roadway bridge were made available by the City of Northampton Public Works Department Engineering Office and County Inspection Reports for the years of 1968 and 1970, were made available at the Hampshire County Commissioners Office, Northampton, Massachusetts. State Inspection Reports for the years 1974 and 1976 were made available at the Department of Environmental Quality Engineering, Division of Waterways, Boston, Massachusetts.

b. Adequacy

The lack of indepth engineering data does not allow for a definitive review. Therefore the adequacy of this dam, structurally and hydraulically, can not be assessed from the standpoint of review of design calculations, but must be based primarily on the visual inspection, past performance history, and sound engineering judgment.

c. Validity

The visual inspection of this facility showed no reason to question the validity of the limited information available.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General

The Phase I Inspection of this dam was made on April 12, 1979. An earlier inspection was performed on December 4, 1978, however a snow cover at the site limited this inspection. During the April inspection, water was passing over the spillway approximately seven inches in depth. Therefore, the inspection of the upstream face, crest and downstream face was limited.

b. Dam

The dam consists of two curved stone masonry spillways abutting bedrock. According to design sketches, the spillway structures rest on bedrock. The main spillway is about 69 feet in length and about 32 feet in height, photo 1. The secondary spillway is to the right of the main spillway and is about 30 feet in length and about 9 feet in height. A bedrock high divides the two spillways, photo 2. Highway bridges span both spillways and are supported by concrete and/or stone masonry walls resting on bedrock.

At the time of inspection, water was flowing over both spillways, and it was not possible to inspect the upstream face, crest, or downstream face of either spillway. No vertical or horizontal misalignment of either spillway crest was evident.

Past inspection reports note leakage through the stone masonry abutment near the end of the spillway and slightly below the crest level of the main spillway. (Inspection reports dated September 11, 1974 and September 15, 1976). Photos 3 and 5 show the area described above. Large seeps were not evident through the abutment at the left end of the main spillway just below the crest level at the time of the April 12, 1979 inspection. Some evidence of seepage of water through a masonry joint in the left training wall approximately at the level of the dam crest was observed during the December 4, 1978 inspection. However, this condition was not evident during the April inspection. Photo 5 shows this area.

Minor brush growth and trees were present on the abutments but do not pose an immediate threat to the safety of the dam.

c. Appurtenant Structures

Previous State and County Inspection Reports indicate the secondary spillway to contain a 2 foot by 2 foot stone box sluice gate and the main spillway to have a similar gate which was sealed in about 1968. There are no records of operational controls for either gate. The high volume of water passing both spillways during both inspections prevented observation of these facilities.

The sealed 6 foot diameter penstock, which was earlier used in power generation, is shown by photo 6. A small leak was observed at the invert of the penstock, how-

ever, this leak poses no threat to the safety of the dam.

d. Reservoir Area

The immediate upstream area is the Mill River. The side slopes are steep, tree lined with frequent bedrock outcrops. A detailed description of the drainage area is included in Section 1.3 of this report. A heavy upstream build-up of silt was observed at both spillways.

e. Downstream Channel

The discharge channels of the main spillway and secondary spillway meet to form the river channel. The discharge channels of both spillways have rock bottoms and are in good condition. The downstream channel is shown by photos 3 and 4. The road bridges do not restrict test flood outflow in the downstream channel.

3.2 Evaluation

Water overflowing both spillways limited the visual inspection. The visual examination of the areas which could be observed indicate the dam is in generally good condition. Previous inspection reports have indicated minor seepage through the left abutment near the spillway crest; however, this seepage was not observed during the inspection. Minor leakage was observed at the base of the sealed penstock.

The lack of draw down capabilities does not allow for dewatering in the event of an emergency, or the lowering of the water level to allow for proper inspection. As such, the dam is considered in fair condition.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure

There is no formal operational procedure for this dam. The sluice box located in the main spillway has been sealed. The sluice box at the right spillway has no visual controls and has probably not been operated in many years. There are no provisions for flashboards. The composition of the spillways make them relatively maintenance free.

4.2 Maintenance of Dam

The dam is maintained by the Look Memorial Park Association. Little or no maintenance has been performed on this structure over the past several years.

4.3 Maintenance of Operating Facilities

There are no functional operational facilities and therefore no formal maintenance program. About the year 1968, the sluiceway in the main spillway was sealed by the City of Northampton.

4.4 Description of Warning Systems

There are no warning systems in effect at this facility.

4.5 Evaluation

There is no formal maintenance program for this dam. The composition of the dam results in its being a relatively maintenance free facility. The dam should be inspected every

2 years by a qualified engineer who can identify conditions of concern which if left unchecked could jeopardize the safety of the dam.

SECTION 5

HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General

The dam consists of 2 arched stone masonry spillways built on ledge at the location of a natural falls. It is basically a low storage - high spillage type structure, with much of the upstream pond silted in. A roadway bridge is located just downstream of the main spillway.

b. Design Data

No hydraulic computations were available for this dam.

c. Experience Data

Specific data on maximum impoundments and spillway flows for this dam are unknown. However discharge and stage information are available for the Mill River at a U.S.G.S gaging station (No. 1-1175) located about 4.5 miles downstream. Maximum discharges were recorded of 6,300 cfs on August 19, 1955, 5,010 cfs on October 15, 1955, and 3,840 cfs on March 31, 1951. The period of record at the gage extends from 1938 to the present. The gage station drainage area is 52.8 s.m..

d. Visual Observations

Visual observations of the drainage area and general vicinity of the dam show them to be in general agreement with the U.S.G.S maps of the area. A description

of the drainage area is given in Section 1.3 of this report. See Appendix B and C for drawings and photographs.

e. Test Flood Analysis

As the dam has a small size classification and a significant hazard potential, based on Corps guidelines, the test flood would be in the 100-year to ½ PMF range. The August 19, 1955 runoff of 6,300 cfs at the U.S.G.S. gage station is the actual U.S.G.S. 100 year storm runoff for 119.3 csm in this area. It was used as the test flood. The dam is a run-of-the-river project. It has no significant storage capacity and inflow and outflow are considered equal. The test flood outflow of 6,300 cfs can be passed by the spillways. It would overtop the spillways by about 7 feet to elevation 314.5.

For the test flood analysis, the effects of the highway bridge at the main spillway were considered to reduce the discharge capacity. The true length of the spillway is 69 feet. A length of 66 feet was used in the discharge calculations. The highway bridge near the secondary spillway does not restrict its discharge capacity.

f. Dam Failure Analysis

A potential failure at this dam was analyzed using Corps guidance information. A failure discharge of 4645 cfs was developed, (which is less than the 100 year flow). Water surface elevation at the time of failure is 307.5 (top of dam). Base flow is not significant when water is at elevation 307.5.

For failure analysis it was assumed that the silt layer behind the dam had been removed thus increasing the amount of stored water to 100 a-f. In its present silted condition approximately 10.5 a-f of water are stored behind the dam. This failure discharge would be of a lesser value.

The only developments within 2 miles below the dam are Look Park and the Northampton Country Club. A good portion of the Look Park could be inundated by up to 5 feet of water. River stage would reach 10 to 13 feet. Improvements such as recreational buildings, The Pavillion, and picnic areas could suffer heavy flood damages. Low land portions of the Country Club golf course fairways and pool area could also suffer damage from floodwater. Although no habitable structures are within the immediate impact area, the area is extensively used for recreation (picnicing, golf, fishing, etc.). As such, loss of life is a very viable potential. Beyond the Look Park area, the remaining 2,300± cfs flow will be dissapated within the river channel and flood plains. No further damage to roads and buildings is indicated.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Examination

The visual inspection did not disclose any immediate stability problems.

b. Design and Construction Data

A sketch of the dam, dated September 13, 1974, indicates the following cross sections for the main and secondary spillways:

1. Main Spillway - Stone masonry construction approximately 32 feet in height, 5.5 feet wide at top, and slightly wider than 5.5 feet at the bottom. The sketch indicates a bedrock foundation.
2. Secondary spillway - Stone masonry construction, approximately 9 feet in height, 4.5 feet wide at the top and bottom, and founded on bedrock.

c. Operating Records

No operating records were disclosed.

d. Post-Construction

A 1968 inspection report noted that a conduit through the dam was plugged and the portal sealed with what appeared to be solid masonry.

e. Seismic Stability

The dam is located in Seismic Zone 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

Due to the lack of draw down capabilities the dam is considered in fair condition.

b. Adequacy of Information

The information made available, along with the visual inspection, is adequate for a Phase I level of investigation.

c. Urgency

The items associated with the recommendations of Section 7.2 and remedial measures of Section 7.3 should be implemented within one year after receipt of the Phase I report by the owner.

d. Need for Additional Information

Water overflowing the spillways prevented an in-depth inspection. The spillways should be inspected during a period of no overflow.

7.2 Recommendations

The lack of a functioning draw down facility prevents the performing of a thorough inspection and rapid dewatering of the dam in the event of an emergency. This lack of draw down capabilities is considered a major dificiency. The owner should engage a competent engineer to evaluate the potential of restoring the existing inoperable draw down facility and/or design of a new draw down facility.

Also, with the water level lowered, the downstream faces of both spillways should be inspected.

7.3 Remedial Measures

a. Operating and Maintenance

1. The owner should remove brush and trees in close proximity to the dam.
2. The owner should periodically observe the left abutment near the spillway crest to determine if seepage is occurring and, if so, under what conditions.
3. The leak at the base of the sealed penstock should be periodically observed to determine if seepage is increasing.
4. The owner should establish a formal warning system to notify persons utilizing the downstream recrational facilities in the event of an emergency.
5. The dam should be inspected every two years by a qualified engineer who can identify areas of concern which, if left unchecked could jeopardize the the safety of the dam.

7.4 Alternatives

There are no practical alternatives for this dam.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Country Club Dam

DATE April 12, 1979*

TIME 11:30A.M.

WEATHER Sunny 60°

W.S. ELEV. 308± U.S. ____ DN.S.

PARTY:

1. Ron Cheney HHB
2. David Vine HHB
3. Mike Angieri HHB
4. Dan LaGatta GEI
5. Tom Keller GEI
6. ____
7. ____
8. ____
9. ____
10. ____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Abutments	Ron Cheney, Tom Keller	
2.	Main Spillway	Ron Cheney, Mike Angieri, Dave Vine	
3.	Auxilary Spillway	Ron Cheney, Mike Angieri, Dave Vine	
4.	Hydrologic/Hydrologic	Mike Angieri	
5.			
6.			
7.			
8.			
9.			
10.			

* A Proir Inspection was made on December 4, 1978, however a snow cover over the site limted this inspection

PERIODIC INSPECTION CHECKLIST

PROJECT Country Club Dam DATE April 12, 1979

PROJECT FEATURE Dam Ambankment NAME Ron Cheney

DISCIPLINE Structural Engineer
Geotechnical Engineer NAME Dan LaGatta

AREA EVALUATED	CONDITION
Dam EMBANKMENT	
Crest Elevation	
Current Pool Elevation	There is no dam embankment. Dam consists of two Run-of River Stone Masonry spillway.
Maximum Impoundment to Date	
Surface Cracks	
Pavement Condition	
Movement or Settlement of Crest	Water was spilling over spillways approximately 7 inches deep, Preventing close examination of Downstream face and foundation.
Lateral Movement	
Vertical Alignment	
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	No apparent vertical or horizontal misalignment or movement was observed.
Indications of Movement of Structural Items on Slopes	
Trespassing on Slopes	
Sloughing or Erosion of Slopes or Abutments	
Rock Slope Protection - Riprap Failures	
Unusual Movement or Cracking at or Near Toes	
Unusual Embankment or Downstream Seepage	
Piping or Boils	
Foundation Drainage Features	
Toe Drains	
Instrumentation System	
Vegetation	

PERIODIC INSPECTION CHECKLIST

PROJECT Country Club Dam DATE April 12, 1979

PROJECT FEATURE Intake Channel & Structure NAME Ron Cheney

DISCIPLINE Structural Engineer, Geotechnical Engineer NAME Dan LaGatta

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	There is no Intake Channel
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	The gate in the main spillway has been sealed. The gate in the auxilary spillway has no known control & was underwater during the Inspection. The old penstock used In electric power generation has been sealed with masonry.
Condition of Concrete	
Stop Logs and Slots	

PERIODIC INSPECTION CHECKLIST

PROJECT Country Club Dam DATE April 12, 1979

PROJECT FEATURE Control Tower NAME Ron Cheney

DISCIPLINE Structural Engineer / Geotechnical Engineer NAME Dan LaGatta

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	There is no control tower.
a. Concrete and Structural	
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	There are no Mechanical or Electrical Facilities.
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECKLIST

PROJECT Country Club Dam DATE April 12, 1979

PROJECT FEATURE Transition & Conduit NAME Ron Cheney

DISCIPLINE Structural Engineer, NAME Dan LaGatta
Geotechnical Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	There is no transition & conduit. A penstock located at the left side has been sealed with masonry.
General Condition of Concrete	
Rust or Staining on Concrete	Some minor leakage was observed at the base of the seal.
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECKLIST

PROJECT Country Club Dam DATE April 12, 1979

PROJECT FEATURE Spillway NAME Ron Cheney

DISCIPLINE Structural Engineer NAME Dan LaGatta
Geotechnial Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	The spillway approach channel is the Mill River.
a. Approach Channel	
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	Stone mosonry spillway. No apparent misalingment or movement observed.
General Condition of Concrete	No major spalling observed.
Rust or Staining	
Spalling	
Any Visible Reinforcing	
Any Seepage or Efflorescence	
Drain Holes	None observed
c. Discharge Channel	Discharge channel is the entire river channel.
General Condition	
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None of Significance
Floor of Channel	Boulder Strewn
Other Obstructions	None

PERIODIC INSPECTION CHECKLIST

PROJECT Country Club Dam DATE April 12, 1979

PROJECT FEATURE Service Bridge NAME Ron Cheney

DISCIPLINE Structural Engineer NAME Dan LaGatta
Geotechnical Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	There is no service bridge.
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Underside 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	

APPENDIX B

ENGINEERING DATA

LIST OF AVAILABLE ENGINEERING DATA

1. Plans for Cooks Dam Bridges dated 1924 and 1925 - provided by the City of Northampton Public Works Department, Engineering Office, Northampton, Massachusetts
2. County Inspection Reports for the years 1968 and 1970 - provided by the Hampshire County Commissioners Office, Northampton, Massachusetts
3. State Inspection Reports for the years 1974 and 1976 - provided by the Department of Environmental Quality Engineering, Division of Waterways, Boston, Massachusetts

The Commonwealth of Massachusetts

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.
DIVISION OF WATERWAYS

100 Nashua Street, Boston 02114

Look Park Associates
c/o Brian Elliott
300 North Main Street
Florence
Northampton, Ma.

March 8, 1977

Re: Inspection Dam #2-8-214-18
Country Club or Cooke's Dam
Northampton, Ma.

Dear Sir:

On September 15, 1976, an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be Looks Park Associates. If this information is incorrect will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams Safety Act). Chapter 705 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is safe; however, the following conditions were noted that require attention:

1. Growth: Minor brush growth in crevices and along northerly abutment wall of main spillway.
2. Damaged Masonry: Cracks and spalling of grout in northerly abutment.
3. Leaks: Small flow of water through stone masonry abutment wall on northerly end of main spillway.

We call these conditions to your attention before they become serious and more expensive to correct. With any correspondence please include the number of the Dam as indicated above.

Very truly yours,

John J. Hannon, P.E.
Chief Engineer

cc: Francis P. Ryan, City Engineer
Francis J. Hoey
Russell Salls
File/

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

City/~~Town~~ Northampton. County Hampshire. Dam No. 2-8-214-18.

Name of Dam Country Club Dam or Cooke's Dam.

Topo Sheet No. 11 C. Coordinates: Mass. Rect. N 494,200, E 275,300.

Inspected by: Harold T. Shumway, On Sept. 15, 1976. Date Last Inspection 9-11-74.

2. OWNER/S: As of Sept. 15, 1976

per: Assessors____, Reg. of Deeds____, Prev. Insp. X, Per. Contact X.

	Name	St. & No.	City/Town	State	Tel. No.
1.	City of Northampton % Trustees of Look Memorial Park	Look Park Association 300 North Main St.	Florence, Northampton	Mass.	
2.					
3.					

3. CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name	St. & No.	City/Town	State	Tel. No.
Mr. Brian R. Elliott Supt. of Look Memorial Park	Look Park Assoc., 300 North Main St.	Florence,	Mass.	

4. DATA:

No. of Pictures Taken None. Sketches See description of Dam.

Plans, Where None located.

5. DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor X.
2. Moderate____.
3. Severe____.
4. Disastrous____.

Comments: Approx. 3 million gallons impoundment, minor development on flood plain down stream.

*This rating may change as land use changes (future development).

(See also sheet - 2A-)

OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Main Dam-Arched stone masonry overflow spillway-66'± on cord. dist.-spring dist. 10'± - Dropwall 30' to 32' high.

Controls None, TYPE: _____

Automatic_____. Manual_____. Operative Yes_____, No_____.

Comments: Alignment and grade of crest capstones appeared good.

No. 2 Location and Type: Southerly end of dam-Auxillary stone masonry overflow spillway-30'± wide by 15' high-dropwall 9'± high.

Controls None, Type: _____

Automatic_____. Manual_____. Operative Yes_____, No_____.

Comments: Stone masonry dropwall built on ledge-alignment and grade good.

No. 3 Location and Type: Approx. center of main dam spillway-stone masonry sluice way 2'+ square-invert 24'± below crest of spillway.

Controls Unk., Type: Unknown

Automatic_____. Manual_____. Operative [illegible]

Comments: No controls visible at time of inspection.

Drawdown present Yes X, No_____. Operative Yes_____, No_____.
Comments: See No. 3 above-also see 2A-No. 4

Main Dam- See sheet 2A for auxillary spillway.

DAM UPSTREAM FACE: Slope Vertical, Depth Water at Dam 10'+

Material: Turf_____. Brush & Trees_____. Rock Fill_____. Cut stone Masonry X, Wood_____

Other _____

Condition: 1. Good X. 3. Major Repairs_____.

2. Minor Repairs_____. 4. Urgent Repairs_____.

Comments: Entire dam appears to set on ledge-water over flow prevented close inspection of dropwall face and toe of dam-crest was good. Minor brush growth on north end.

DAM DOWNSTREAM FACE: Slope Vertical.

Material: Turf_____. Brush & Trees_____. Rock Fill_____. Cut stone Masonry X. Wood_____

Other _____

Condition: 1. Good_____. 3. Major Repairs_____.

2. Minor Repairs X. 4. Urgent Repairs_____.

Comments: Small leak through north abutment masonry slightly below level of spill way crest- this leak existed at last inspection of 9-11-74- does not appear to have increased in size in past two years.

(6.) OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Approx. center auxiliary spillway dropwall-2' X 2' stone box sluice-invert is 6'± below crest of dam.

Controls Unk., TYPE: Unknown

Automatic____. Manual____. Operative Yes____, No Unk.

Comments: There were no visible controls at time of field inspection.

No. 2 Location and Type:____

Controls____, Type ____

Automatic____. Manual____. Operative Yes____, No____.

Comments:____

No. 3 Location and Type:____

Controls____, Type:____

Automatic____. Manual____. Operative ____.

Comments:____

Drawdown present Yes X, No____. Operative Yes____, No X.
Comments: See item 6-No. 4 above

(7.) DAM UPSTREAM FACE: Slope Auxiliary spillway Vertical, Depth Water at Dam 3' to 6'

Material: Turf____. Brush & Trees____. Rock fill____. Masonry Cut stone X, Wood____.

Other____

Condition: 1. Good X. 3. Major Repairs____.

2. Minor Repairs____. 4. Urgent Repairs____.

Comments: Grade and alignment of spillway crest appeared good-upstream face under water-no visible defects were evident.

(8.) DAM DOWNSTREAM FACE: Slope Vertical.

Material: Turf____. Brush & Trees____. Rock Fill____. Masonry Cut stone X, Wood____.

Other____

Condition: 1. Good X. 3. Major Repairs____.

2. Minor Repairs____. 4. Urgent Repairs____.

Comments: Alignment of dropwall and lip of crest capstones appeared good. Toe of dam under several feet of water.

9. EMERGENCY SPILLWAY: Available No . Needed No .

Height Above Normal Water _____ Ft.

Width _____ Ft. Height _____ Ft. Material _____.

Condition: 1. Good _____. 3. Major Repairs _____.

2. Minor Repairs _____. 4. Urgent Repairs _____.

Comments: There are 2 each over flow spillways for dam which have 15'± of free board.

10. WATER LEVEL AT TIME OF INSPECTION: ½ Ft. Above X . Below _____.

Top Dam _____ F.L. Principal Spillway X .

Other _____.

Normal Freeboard 15' to 16' Ft.

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Minor brush growth in crevices and along notherly abutment wall of main spillway.

Animal Burrows and Washouts None found .

Damage to Slopes or Top of Dam None found .

Cracked or Damaged Masonry Minor cracks and spalling of grouting in notherly abutment.

Evidence of Seepage None found .

Evidence of Piping None found .

Leaks Small flow of water through stone masonry abutment wall on notherly end of main spillway.

Erosion None found .

Trash and/or Debris Impeding Flow None found .

Clogged or Blocked Spillway None found .

Other _____.

(12.) OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed X .
3. Conditionally safe - major repairs needed_____.
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list_____.

(13.) REMARKS AND RECOMMENDATIONS: (Fully Explain)

Conditions found at this inspection are essentially the same as found on last [i]spection of 9-11-74. Minor brush growth on notherly abutment, small leakage through [n]herly abutment near spillway dropwall, and no visible controls of draw down sluices. [B]oth spillway crests and dropwalls appeared to have good grade and alignment. While this [d]am has had little, if any maintenance in past years, it still appears to be basically [so]nd and safe at time of this inspection.

It would appear that perhaps one reason for lack of any maintenance on this dam [is] that actual ownership of dam has been vague for a number of years. Dam structures as [su]ch are not taxed by the city of Northampton per Assessors Office, but an out dated [A]ssessors map showed the area adjacent to the dam as being owned by the Northampton [C]ountry Club,Inc.. For this reason it was reported on the last inspection report of [9]-11-74 that this dam was owned by the Northampton Country Club, Inc.. Also on this [a]ssumption, a notice of a scheduled inspection was sent to the Club on Sept. 2, 1976, and [o]n Sept. 15, 1976 an inspection was made of the dam. Mr. Thomas Scanlon, Treasurer of the [N]orthampton Country Club,Inc., was contacted concerning the inspection of the dam and stated [he] did not believe the Club owned the dam. On Sept. 20, 1976 the City of Northampton's [A]ssessors office was contacted and information was obtained that last known owner of this [d]am was the Corticelli Silk Company. A check at the Hampshire County Registry of Deeds [p]roduced a record of ownership in the following chronological order; No. 1-April 3, 1933 [q]uit claim deed to property from Corticelli Silk Company to Belding-Heminway Company, [B]ook 885-page 361; No. 2-August 18, 1942-property including Cooke's Dam and flowage [r]ights taken for back taxes by City of Northampton. Tax collector, Book 969-page 156; [N]o. 3-June 18, 1963-Tax sale-City of Northampton to Frank Newhall Look Memorial Park [A]ssociation-properties including Cooke's Dam and flowage rights, Book 1416-page 194. [R]eference is also made to Book 1351-page 194 and page 210. Page 194 is a record of fore-[c]losure affidavit on property, Page 210 gives a description of property including years [o]f back taxes and establishes validity of tax title.

A telephone call to Mr. Brian Elliott, Supt. of Look Memorial Park, verified [t]hat the Association was indeed responsible as a care taker of Cooke's Dam, although he [w]as unaware of this responsibility until the District brought it to his attention. [B]ecause the Look Memorial Park Association and the City of Northampton appear to jointly [c]ontrol all properties and the City Mayor is automatically a menber of the Board of [T]rustees-the District recommends that copies of all correspondence concerning Cooke's Dam

REMARKS AND RECOMMENDATIONS: (Fully Explain) CONTINUED

2-8-214-18 be sent to both the Look Park Association, % Mr. Brian Elliott, Supt.;
to the City of Northampton, % Mr. Francis P. Ryan, City Engineer, Public Works
t., City Yard, 125 Locust Street, Northampton, Mass.

/st

October 7, 1974

Thomas Scanlon, Treasurer
Northampton Country Club, Inc.
159 Main Street
Northampton (Leeds), Massachusetts

RE: Inspection-Dam #2-8-214-13
Northampton
Country Club (Cook) Dam

Dear Mr. Scanlon:

On September 11, 1974, an engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam, owned by Northampton Country Club, Inc.

The inspection was made in accordance with Chapter 253 of the Massachusetts General Laws, as amended by Chapter 595 of the Acts of 1970 (Dams-Safety Act).

The results of the inspection indicate that this dam is safe; however, the following conditions were noted that require attention:

1. Remove the minor growth of brush at the northerly abutment of the main spillway.

2. There are no controls for the drawdown sluiceway. Provisions should be made to install the controls.

3. There is leakage through the stone work on the northerly abutment which should be pointed.

We call these conditions to your attention now before they become serious and more expensive to correct.

Very truly yours,

NORMAN L. DIEGOLI, P.E.
Acting Deputy Chief Engineer

LDA:jmp
cc: F. J. Hoey
R. Salla

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

City/~~Town~~ Northampton. County Hampshire. Dam No. 2-8-214-18.

Name of Dam Country Club Dam. Also called Cook Dam.

Topo Sheet No. 11C. Coordinates: Mass. Rect. N 494,200, E 275,300.

Inspected by: Russell C. Salls, P.E., On Sept. 11, 1974. Date Last Inspection 1970.

---

2. OWNER/S: As of November, 1972

per: Assessors X, Reg. of Deeds ____, Prev. Insp. ____, Per. Contact ____.

	Name	St. & No.	City/Town	State	Tel. No.
1.	Northampton Country Club, Inc.	159 Main Street "Leeds"	Northampton,	Mass.	
2.					
3.					

---

3. CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Thomas Scanlon, Treasurer
Northampton Country Club, Inc., 159 Main Street "Leeds" Northampton, Mass.

Name	St. & No.	City/Town	State	Tel. No.

---

4. DATA:

No. of Pictures Taken None. Sketches See description of Dam.
Plans, Where None Found.

---

5. DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor X.
2. Moderate ____.
3. Severe ____.
4. Disastrous ____.

Comments: Small impoundment of water and existing flood plain below with very little development.

*This rating may change as land use changes (future development).

OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Main dam - arched stone masonry crest overflow spillway - 66'± on cord dist. with spring dist. of 10'± dropwall is 30' to 32'± in height.

Controls No, ~~XXXXXx~~

Automatic____. Manual____. Operative Yes____, No____.

Comments: Cap stones appear to be pinned to dropwall with iron pins.

No. 2 Location and Type: Auxiliary stone masonry crest overflow Rt. or southerly end - spillway - 30'± W. x 15' H. with a dropwall of 9'±.

Controls No, Type:

Automatic____. Manual____. Operative Yes____, No____.

Comments: This is a stone masonry structure on ledge.

No. 3 Location and Type: Stone sluiceway in excess of 2' Approx. center main dam - square - invert 24'± below crest.

Controls Unk., Type: Unknown.

Automatic____. Manual____. Operative Yes____, No____.

Comments: No controls visible at time of inspection.

Drawdown present Yes X, No____. Operative Yes____, No X.

Comments: See No. 3 above. Also Sheet No. 2A of Inspection Report.

Main dam - See Sheet 2A for auxiliary spillway.

DAM UPSTREAM FACE: Slope Vertical, Depth Water at Dam 10'+.

Material: Turf____. Brush & Trees____. Rock fill____. Stone Masonry X. Wood____.

Other

Condition: 1. Good X. 3. Major Repairs____.

2. Minor Repairs____. 4. Urgent Repairs____.

Comments: Entire dam appears to set on ledge. Alignment and grade of crest were good. Unable to make close inspection of dropwall due to water overflow.

DAM DOWNSTREAM FACE: Slope Vertical.

Material: Turf____. Brush & Trees____. Rock Fill____. Stone Masonry X. Wood____.

Other

Condition: 1. Good____. 3. Major Repairs____.

2. Minor Repairs X. 4. Urgent Repairs____.

Comments: A leak was noted coming through left abut. of spillway. Flow of water was slightly below level of crest of dam.

6. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 4 Location and Type: Approx. center auxiliary spillway - 2' x 2' stone box sluiceway - invert is 6'± below crest of dam.

Controls Unk., TYPE: Unknown

Automatic_____. Manual_____. Operative Yes_____, No_____.

Comments: No controls were visible at time of inspection.

~~No. 5~~ Location and Type:_____.

Controls_____, Type:_____.

Automatic_____. Manual_____. Operative Yes_____, No_____.

Comments:_____.

~~No. 6~~ Location and Type:_____.

Controls_____, Type:_____.

Automatic_____. Manual_____. Operative Yes_____, No_____.

Comments:_____.

Drawdown present Yes X, No_____. Operative Yes_____, No_____.
Comments: See Item 6 - No. 4 above.

7. DAM UPSTREAM FACE: Slope Vertical, Depth Water at Dam 3' of auxiliary spillway
Material: Turf_____. Brush & Trees_____. Rock fill_____. Stone Masonry X. Wood_____.

Other_____.

Condition: 1. Good X. 3. Major Repairs_____.

2. Minor Repairs_____. 4. Urgent Repairs_____.

Comments: Cap stones pinned to dropwall with iron pins.

8. DAM DOWNSTREAM FACE: Slope Vertical of auxiliary spillway
Material: Turf_____. Brush & Trees_____. Rock Fill_____. Stone Masonry X. Wood_____.

Other_____.

Condition: 1. Good X. 3. Major Repairs_____.

2. Minor Repairs_____. 4. Urgent Repairs_____.

Comments: Alignment and grade of crest appeared good. Water overflowing crest at time of inspection.

EMERGENCY SPILLWAY: Available No . Needed No .

Height Above Normal Water _____ Ft.

Width _____ Ft. Height _____ Ft. Material _____.

Condition: 1. Good _____. 3. Major Repairs _____.

2. Minor Repairs _____. 4. Urgent Repairs _____.

Comments: There are two overflow spillways for pond outlet which have 15'± of freeboard.

WATER LEVEL AT TIME OF INSPECTION: 1/6 Ft. Above X . Below _____.

Top Dam X F.L. Principal Spillway X .

Other _____.

Normal Freeboard 15' to 16' Ft.

SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Yes. Minor brush growth on left abut. of main spillway.

Animal Burrows and Washouts None Found.

Damage to Slopes or Top of Dam None Found.

Cracked or Damaged Masonry Minor cracks in left abut. of main spillway.

Evidence of Seepage None Found.

Evidence of Piping None Found.

Leaks Yes. A small flow of water was coming through stone masonry abutment near end of spillway and slightly below crest level of main spillway.

Erosion None Noted.

Trash and/or Debris Impeding Flow None Found.

Clogged or Blocked Spillway None Found.

Other _____.

(12.) OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed X.
3. Conditionally safe - major repairs needed_____.
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list_____.

(13.) REMARKS AND RECOMMENDATIONS: (Fully Explain)

This stone masonry arch dam on the Mill River just upstream of the Main Street "Leeds" Bridge formerly provided power for the Northampton - Williamsburg Street Railroad. While the old penstock could not be located and only rubble from the generating stations remains north of the river and east of Main Street the dam itself still appears to be a sound structure. It consists of two arched stone masonry walls founded on ledge with ledge abutment with stone masonry facing. At the north end of the main spillway a broad embankment with stone masonry sidewall 70'± long extends the length of the dam. This embankment is across the area where the old penstock used to be and from an examination of plans prepared in 1925 for rebuilding the bridge, it appears that the embankment is built on ledge which is above the normal water level in the pond for most of the distance. On either side of the roadway there are masonry walls about four feet high which are extensions of the side wall of the embankment and together with the bridge railing make the overall freeboard 15 to 16 feet.

While the main spillway wall could only be viewed from a distance, we were able to disrupt the flow in some areas using a stone on a rope so that it was possible to just make out a rectangular sluiceway at or just above the tail water elevation. No controls or gate works could be seen. The masonry facewall here appeared to be in reasonably good condition. The crest, of cut stone slabs was true and while some mortar was missing from the joint between the slabs no movement has occurred. Steel pins are visible in the slabs.

At the north or left abutment there is a flow of water through a joint in the abutment. Also in this area some brush was growing in the joints of the stone work of the abutment on the upstream face.

The Steward of the Northampton Country Club was contacted and shown the above minor deficiencies. He was not aware that the Club owned this dam.

RCS/js/sd

13. REMARKS AND RECOMMENDATIONS: (Continued)

The small spillway was also an arched stone masonry wall but much smaller. It is also founded on ledge with its southwesterly abutment of quarried stone slabs and appeared to be built on ledge. Both this abutment and the downstream face could be seen easily and the westerly end examined closely. No defective masonry was noted although some of the mortar in the joint between the cut stone crest slabs were gone. No displacement or settlement was seen. A 2' x 2' rectangular sluiceway could be easily seen with its invert at the same elevation as the tail water. Again there were no visible controls.

Downstream of both spillways there was some evidence of scouring of the ledge. Water is quite a bit deeper just downstream of the auxiliary spillway than it is further downstream. Downstream of the main spillway soundings from the bridge tended to show that the ledge elevation was about 1½ feet lower than that shown on the 1925 bridge plans.

In spite of the apparent lack of attention for quite some time, this dam appears to be in reasonably good shape. The only visible discrepancies were the lack of controls for the drawdown sluiceways and the leakage through the stone work on the left abutment.

RCS/sd

DESCRIPTION OF DAM

DISTRICT II .

Submitted by Russell C. Salls, P. E. Dam No. 2-8-21448

Date September 11, 1974 City/~~Town~~ Northampton

Name of Dam Country Club Dam
also Cook Dam

1. Location: Topo Sheet No. 11C Mass. Rect. Coordinates N 494,200 E 275,300

Provide 8½" x 11" in clear copy of topo map with location of Dam clearly indicated.

On Mill River near the Main Street "Leeds" Bridge Crossing - just south of Arch Street.

2. Year built Unknown Year/s of subsequent repairs Unknown

3. Purpose of Dam: Water Supply _____ Recreational X
Flood Control _____ Irrigation _____ Other Formerly an electri power generating supply.

4. Drainage Area: in excess of 35 sq. mi. _____ acres.
Type: City, Bus. & Ind. _____ Dense Res. 2% Suburban 3% Rural, Farm 20%
Wood & Scrub Land 75% Slope: Steep 30% Med. 55% Slight 15%

5. Normal Ponding Area: 3± Acres; Ave. Depth 3'
Impoundment: 3 Million ± gals.; 9 acre ft.
Silted in: Yes X No _____ Approx. Amount Storage Area 40%

6. No. and type of dwellings located adjacent to pond or reservoir A Mass. Electric
i.e. summer homes etc. Switch Yard Sta. - Country Club Golf Course just downstream.

7. Dimensions of Dam: Length Main dam cord length = 66'±, Spring = 10'±
Auxiliary spillway = 30'±, Spring = 3'± Max. Height 33.5' main spillway - bed to crest. Aux. = 9'± bed to cre
Freeboard 15' to 16' to top bridge railing
Slopes: Upstream Face Appears to be vertical
Downstream Face Vertical
Width across top Main dam = 5.5', aux. dam = 4.5'

Dam No. 2-8-214-18

Classification of Dam by Material:

Earth _____ Conc. Masonry _____ Stone Masonry X

Timber _____ Rockfill _____ Other _____

Dam Type: Gravity X Straight _____ Curved, Arched X Other Appears to be wall dams.

Overflow X Non-overflow _____

A. Description of present land usage downstream of dam:

75 % rural; 25 % developed

B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure? Yes X No _____

C. Character Downstream Valley: Narrow 30% Wide 70% Developed 25%

Rural 75% Urban _____

Risk to life and property in event of complete failure.

No. of people 1 - 2

No. of homes 1

No. of businesses Several

No. of industries 5 to 6 Type Diversified plants - some use river water for processing.

No. of utilities 5 Type Sewer, water, gas mains and telephone and electric trans. lines.

Railroads None

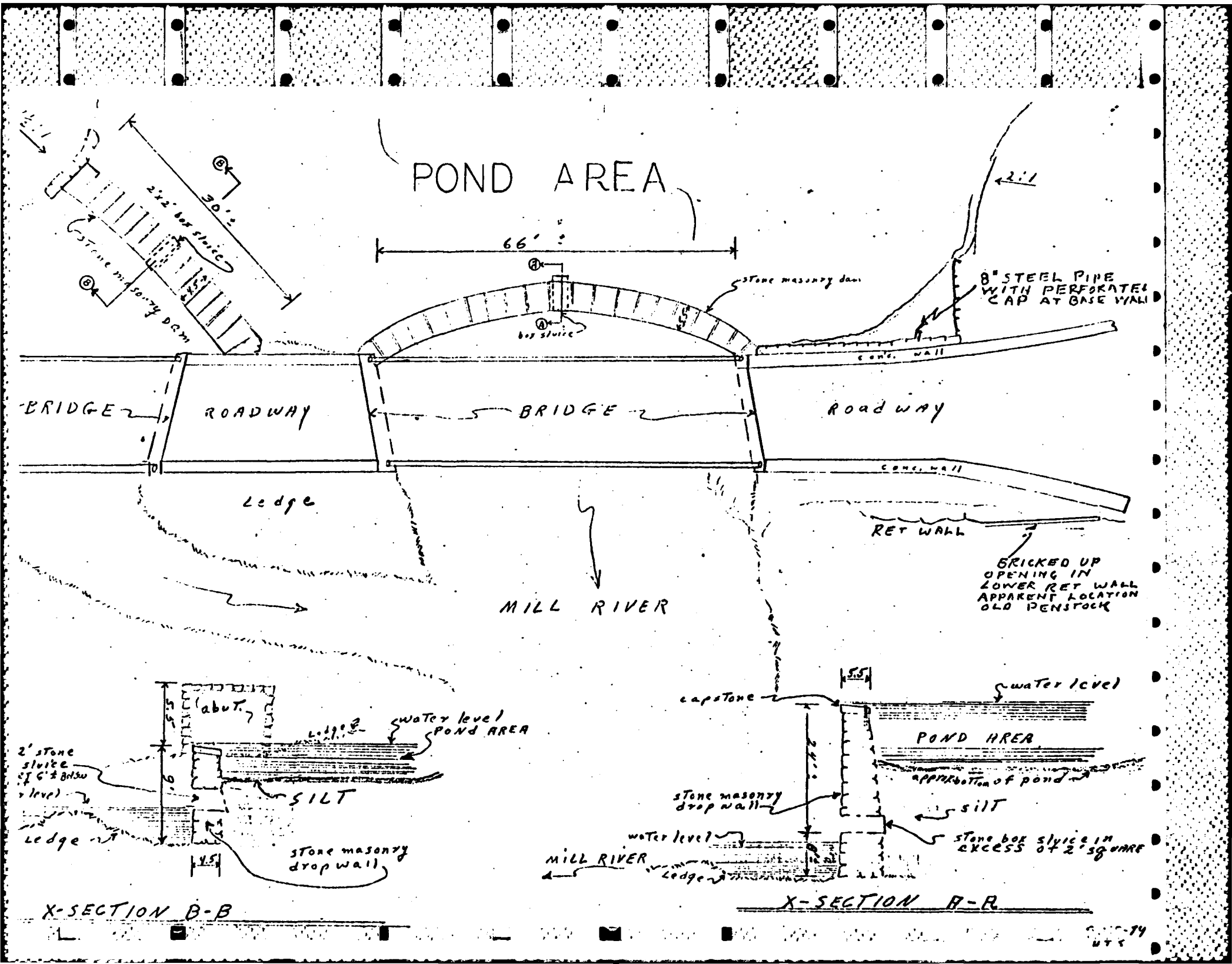
Other dams 3 Prophylactic Brush Co. Dam No. 2-8-214-6, Clement Mfg. Co. Dam No. 2-8-214-5 and Paradise Pond Dam No. 2-8-214-4.

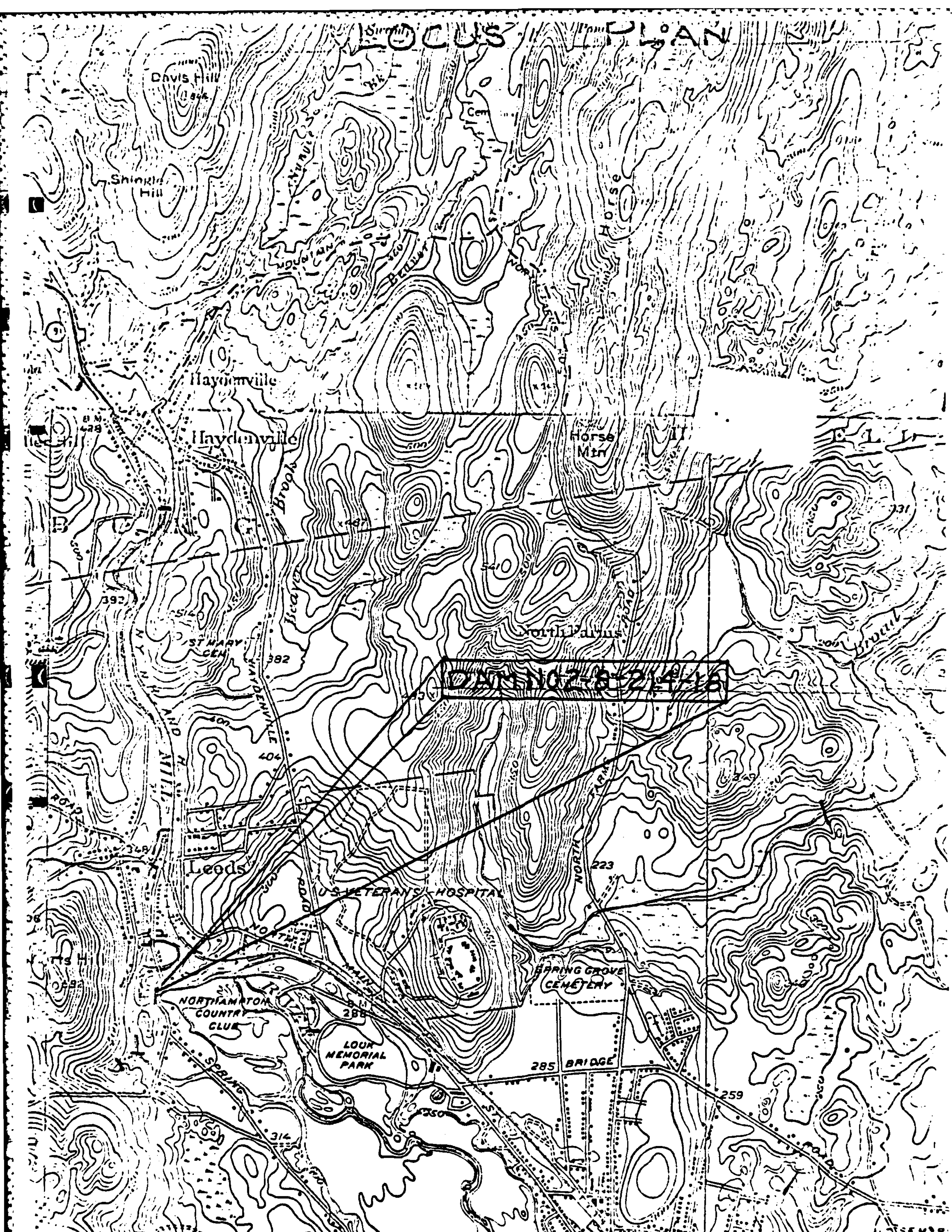
Other Northampton Country Club Buildings and Look Park.

Attach Sketch of dam to this form showing section and plan on 8½" x 11" sheet.

---

vk/sd
chments
ocus Plan
ketches


POND AREA
66'
30'±
2x2' box sluice
stone masonry dam
box sluice
stone masonry dam
8" STEEL PIPE WITH PERFORATED CAP AT BASE WALL
2:1
conc. wall
BRIDGE
ROADWAY
BRIDGE
ROADWAY
conc. wall
Ledge
RET WALL
BRICKED UP OPENING IN LOWER RET WALL APPARENT LOCATION OLD PENSTOCK
MILL RIVER
abut.
water level POND AREA
Ledge
2' stone sluice
SILT
Ledge
stone masonry drop wall
5.5
4.5
X-SECTION B-B
capstone
water level
POND AREA
approx bottom of pond
stone masonry drop wall
silt
water level
stone box sluice in excess of 2' square
MILL RIVER
Ledge
X-SECTION A-A



LOCUS PLAN
Davis Hill
Shingle Hill
Haydenville
Horse Mtn
North Farms
ST MARY CEM
Leeds
U S VETERANS HOSPITAL
SPRING GROVE CEMETERY
NORTHAMPTON COUNTRY CLUB
LOOK MEMORIAL PARK
BRIDGE

COUNTY INSPECTION REPORT

1970

Country Club Dam

The left spillway section was noted to be o. k. No flashboards were on the crest and the crest was on good grade and in good condition. Water was just overflowing the crest on the day of inspection. Some minor erosion of concrete was noted in the abutment areas but this erosion is shallow and of no importance.

The right spillway was in satisfactory condition. The crest was o. k. and abutments were satisfactory.

The toe area of each spillway section of the dam was noted to be satisfactory.

The road fill and the embankment section at the left side of the dam was found to be in satisfactory condition. There was no evidence of cracking or settlement on the embankment.

No changes or alterations have been made at this dam since the time of the last inspection and the structure was considered safe when checked.

COUNTY INSPECTION REPORT

1968

Country Club Dam

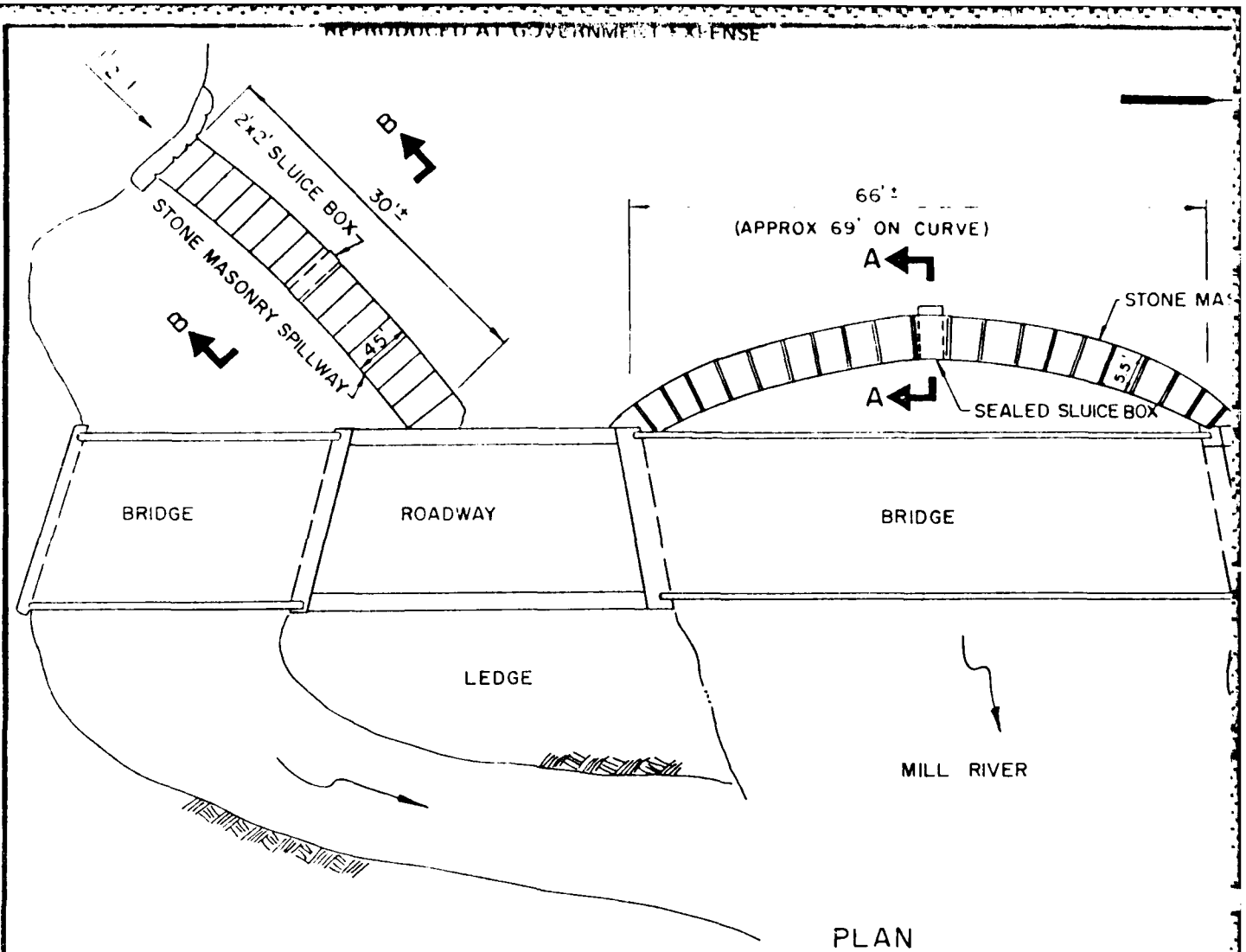
The left spillway section of this dam was noted to be o. k. The stone masonry work was good and the crest was in excellent condition as to line and grade. No flashboards were on the crest. Water was overflowing the crest on the day of inspection. Some erosion of concrete was noted at each abutment but this erosion is not very bad as of the present time.

The right hand spillway situated to the right side of the central rock abutment was noted to be in very good condition. The abutments themselves were very good. The toe areas of both spillways were o. k.

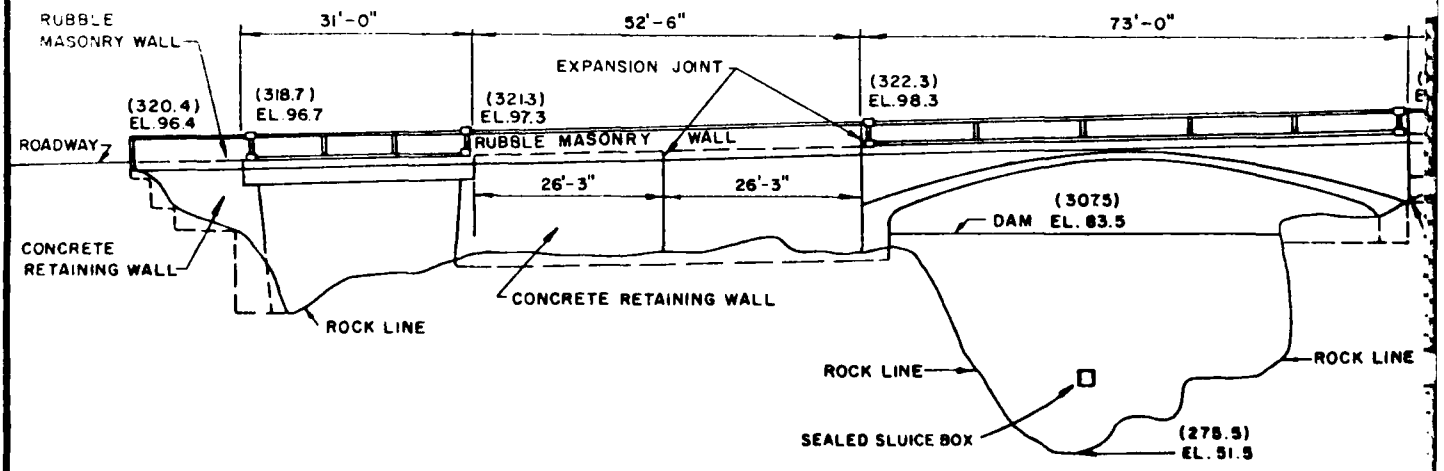
The road across the top of the dam was in good condition and no sign of cracking or settlement was noted.

The conduit through the dam has been plugged and the portal sealed with what appears to be solid masonry. Leakage as reported in previous years from this conduit has now been stopped.

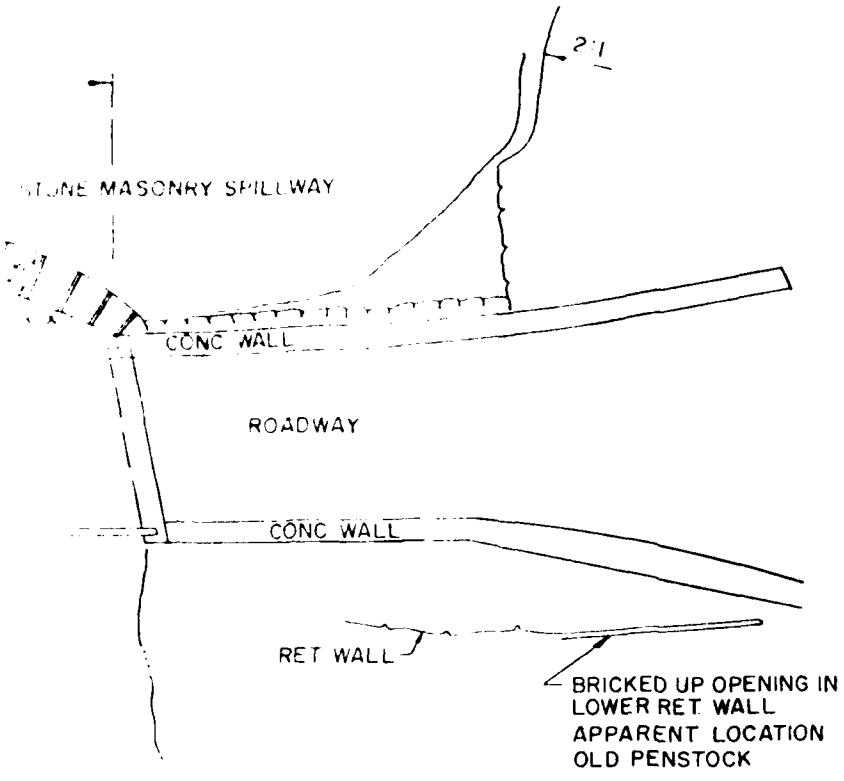
The only change made at this dam since the time of the last inspection is the sealing of the conduit through the dam downstream of the old gate. In the opinion of the undersigned, this dam was safe when inspected.

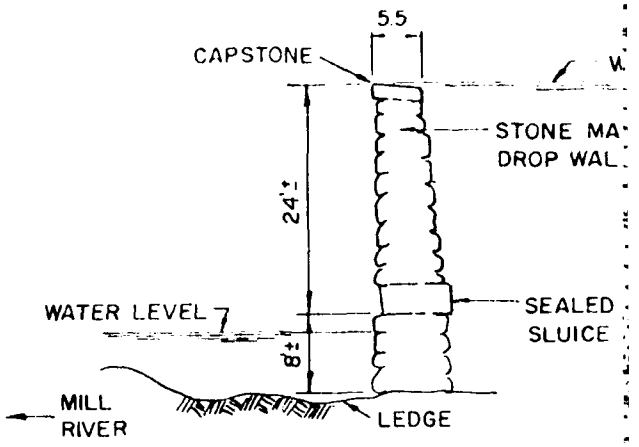


PLAN

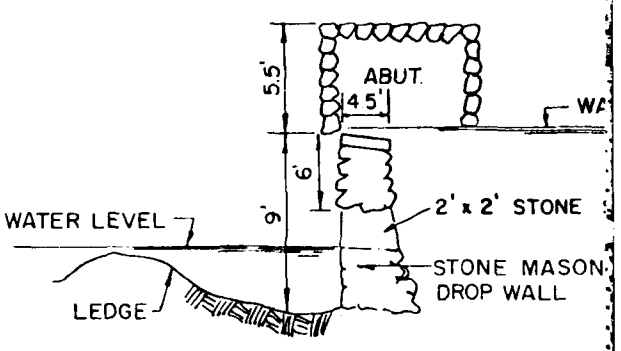


DOWNSTREAM ELEVATION

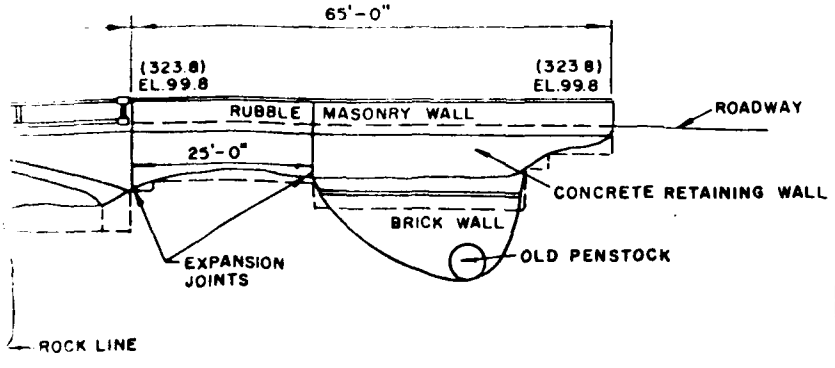




SECTION A A



SECTION B B



TAKEN FROM: 1974 STATE INSPECTION REPORT SKETCHES AND 1925 NORTHAMPTON BOARD OF PUBLIC WORKS, COOKS DAM BRIDGE PLANS.

EL. 320 (USGS) = EL. 96 (1925 PLANS)

ELEVATIONS SHOWN THUS (323.8) ARE CONVERTED TO U.S.G.S. DATUM

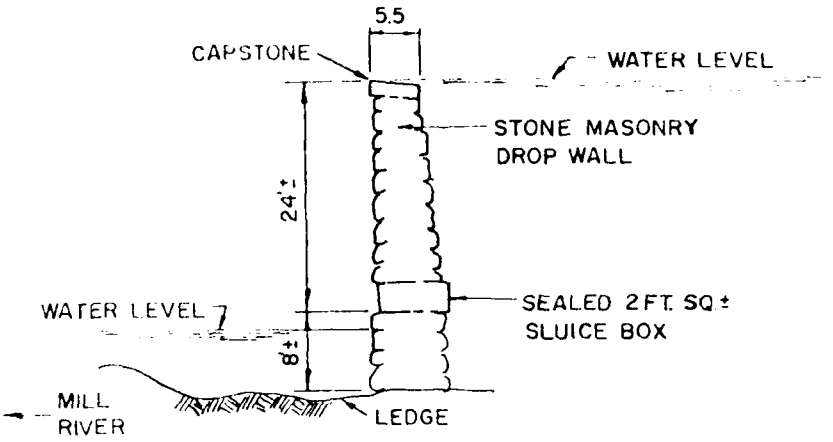
HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGIN CORPS WAL

NATIONAL PROGRAM OF INSPECTION OF

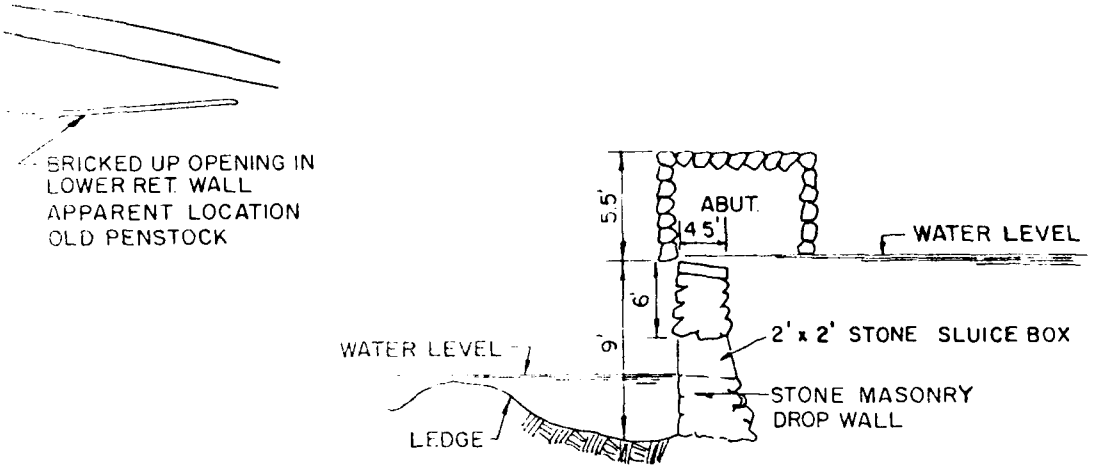
COUNTRY CLUB DAM

NORTHAMPTON

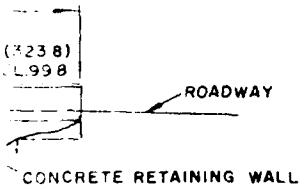
			SCALE NOT TO
			DATE MAY, 19



SECTION A A



SECTION B B



LD PENSTOCK

STATE INSPECTION
AND 1925
ARD OF PUBLIC WORKS,
PLANS

36 (1925 PLANS)

THUS (323 8) ARE
S DATUM

HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

COUNTRY CLUB DAM

NORTHAMPTON — MASSACHUSETTS

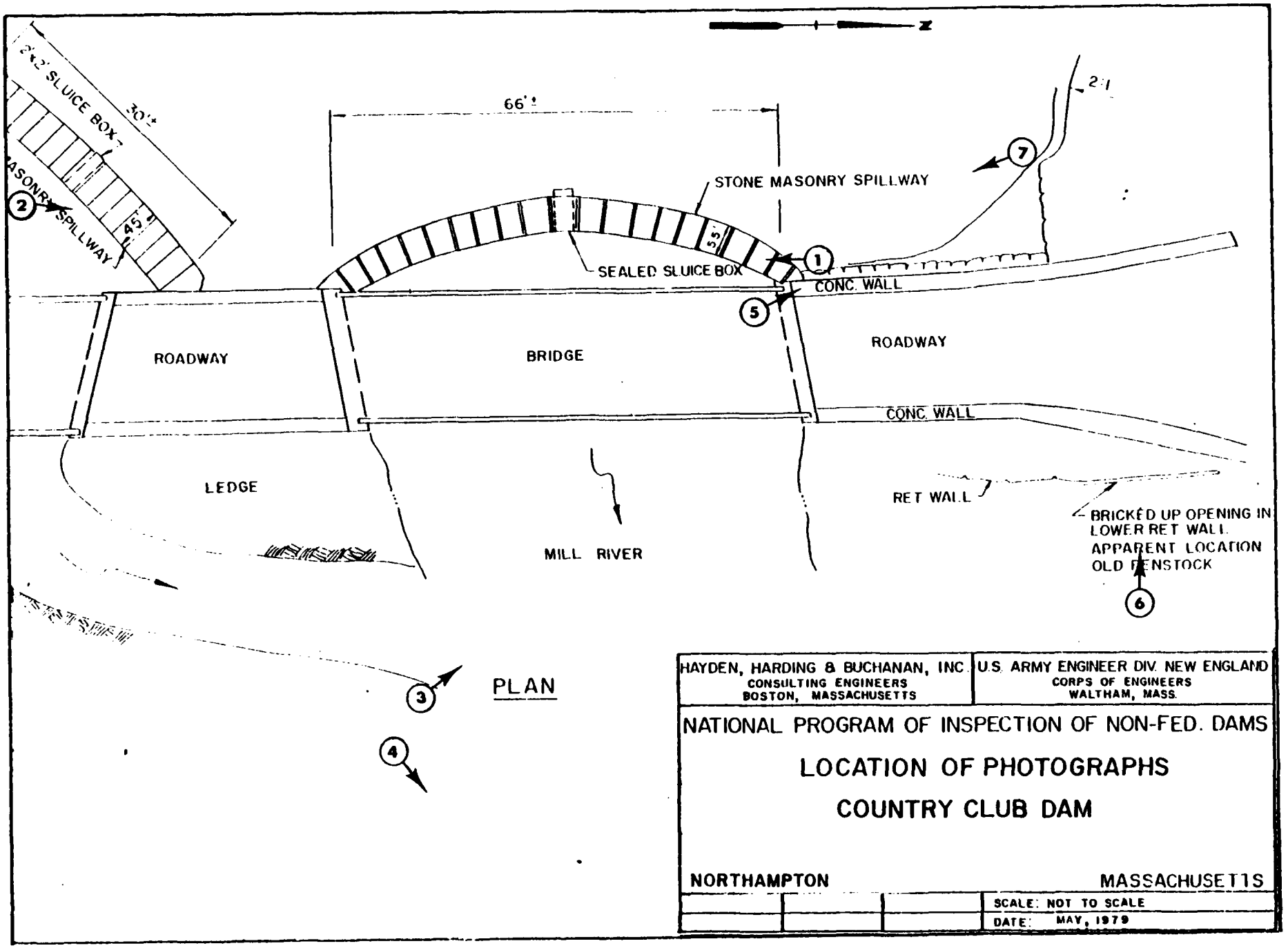
SCALE NOT TO SCALE

DATE MAY, 1979

3

APPENDIX C

PHOTOGRAPHS



PLAN

HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION OF PHOTOGRAPHS

COUNTRY CLUB DAM

NORTHAMPTON MASSACHUSETTS

SCALE: NOT TO SCALE

DATE: MAY, 1979

PHOTO NO. 1 - Crest of main spillway as viewed from the left abutment.

PHOTO NO. 2 - Main spillway in background and secondary spillway in foreground as viewed from right abutment.

PHOTO NO. 3 - Downstream face of main spillway as viewed from downstream channel.

PHOTO NO. 4 - View of downstream channel.

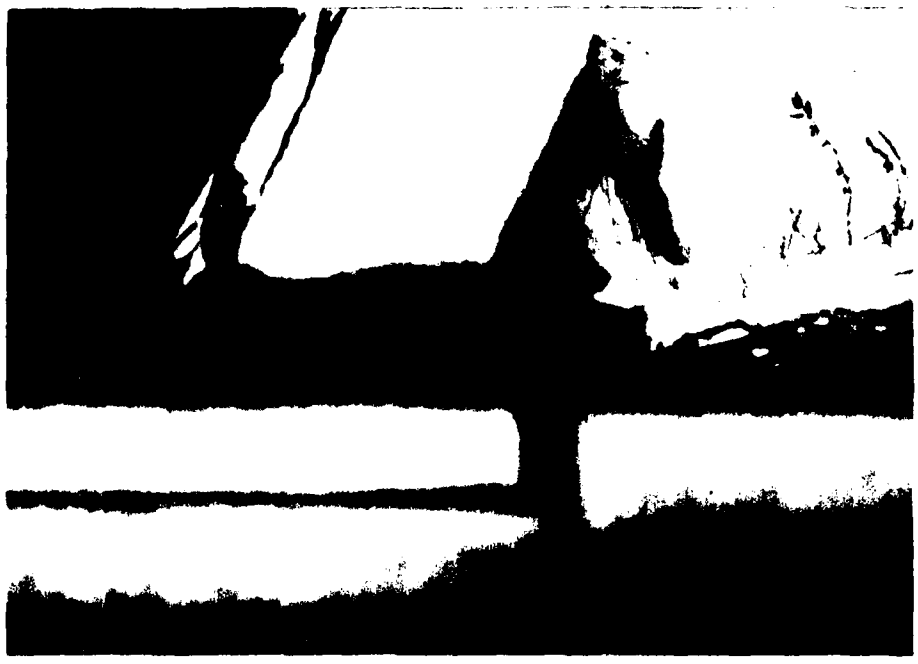


PHOTO NO. 5 - View of leakage through masonry joint at left abutment of main dam. Standing on bridge looking down.

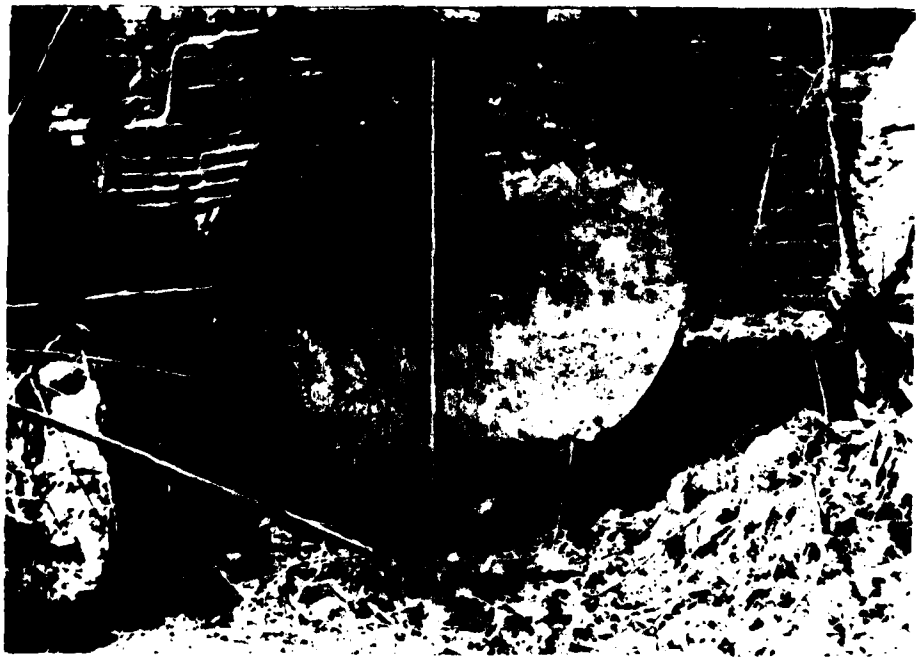


PHOTO NO. 6 - View of sealed penstock.

PHOTO NO. 7 - Main spillway crest viewed from left abutment area.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

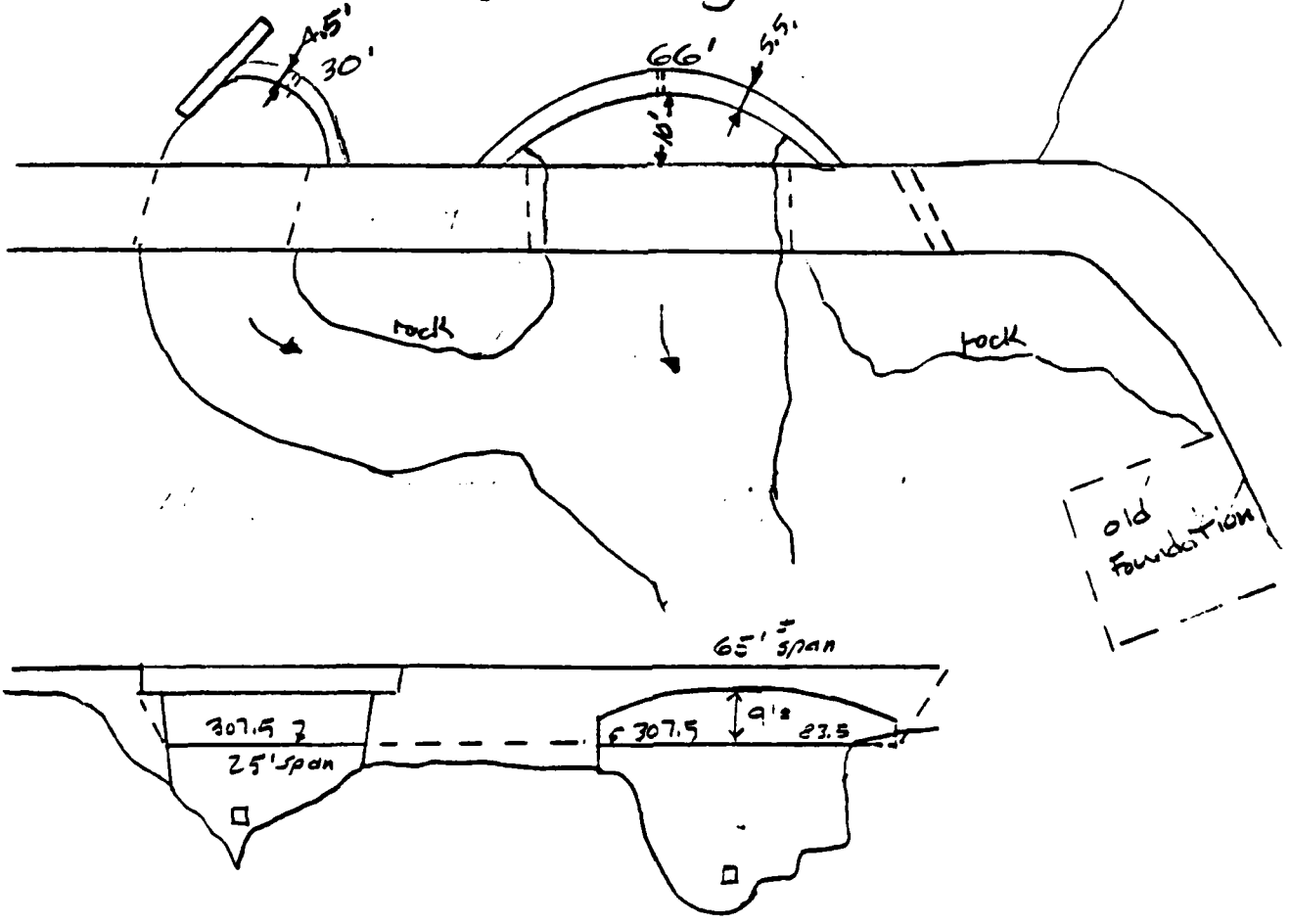
HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

Northampton

Built about 1910± for power generation by Northampton - Williamsberg Stn. Railroad

1925 roadway (Spring Str.) project - bridge improvement apparently seal-off penstock - no longer used for power generation.

Max flow Aug 19, 1955 Q = 6300 cfs at USGS gage station # 1715 about 4.5 miles d.s. (just above Smith College). Drainage Area 52.8 s.m. 100 yr. stor



Hydraulic Height ≈ 32'±.

Storage Capacity ≈ 100± a-f (due to heavy silt build-up, only 10.5 a-f active storage remains)
Size Class = Small.

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

Hazard Potential = Significant (Park Area)
Size Class = Small (Run-of-River)
Test Flood Range: 100 year to 1/2 PMF: Use 100 year Storm of Record 1955 6300. cfs (100yr flood-USGS For Area of 52.8 sm. At project site area is about 49.8 sm. Use 6300± cfs for project site as test flood.
Project is low storage, high spillage run of river design. Therefore, all flows over-top the spillways.

Discharge at Damsite

D	C	L	$H^{3/2}$	Q	C	L	$H^{3/2}$	Q	Q_T
1	2.68	66'	1.	177.	2.67	30'		80.	257.
2	2.65	"	2.83	495.	2.68	"		228.	723.
3	2.66	"	5.2	912.	2.73	"		426.	1338.
4	2.70	"	8	1426.	2.79	"		670.	2096.
5	2.79	"	11.18	2059.	3.07	"		1030.	3089.
5.5	2.88	"	12.9	2452.	3.32	"		1285.	3737.
6.	2.97	"	14.7	2881.	3.58	"		1579.	4460.
6.5	3.06	"	16.57	3347.	3.84	"		1909.	5256.
7	3.15	"	18.52	3850.	4.10	"		2278.	6128.

Depth ≃ 7'± elev ≃ 307.5 + 7 = 314±

JOB NO. 78.244.1
DATE 1/25/79
BY MA
CH'D BY FOD 2/9/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO. 3
JOB Dams
SUBJECT Country Club
CLIENT Corps

320 (USGS) ≃ 96 (1925 Plans) corr. 224

Elev Ft.	D ft.	Area a.	Ave. Area a.	Stor a-f	Accum Stor a-f
330	10	20.	16.	160.	273.0
320	10	12	9.	90.	113.0.
310	2.5	6	5.	12.5	23.0
307.5	Top Dam 3.5	4	3	10.5.	10.5.
304.	Bottom "Silt Layer"	2	0	0	0

(280 27.5 100 a-f)

Discharge at dam site

$Q_{100\ yr}$ = 6300± cfs
Depth of flow at dam ≅ 7± to Elev 314.5:

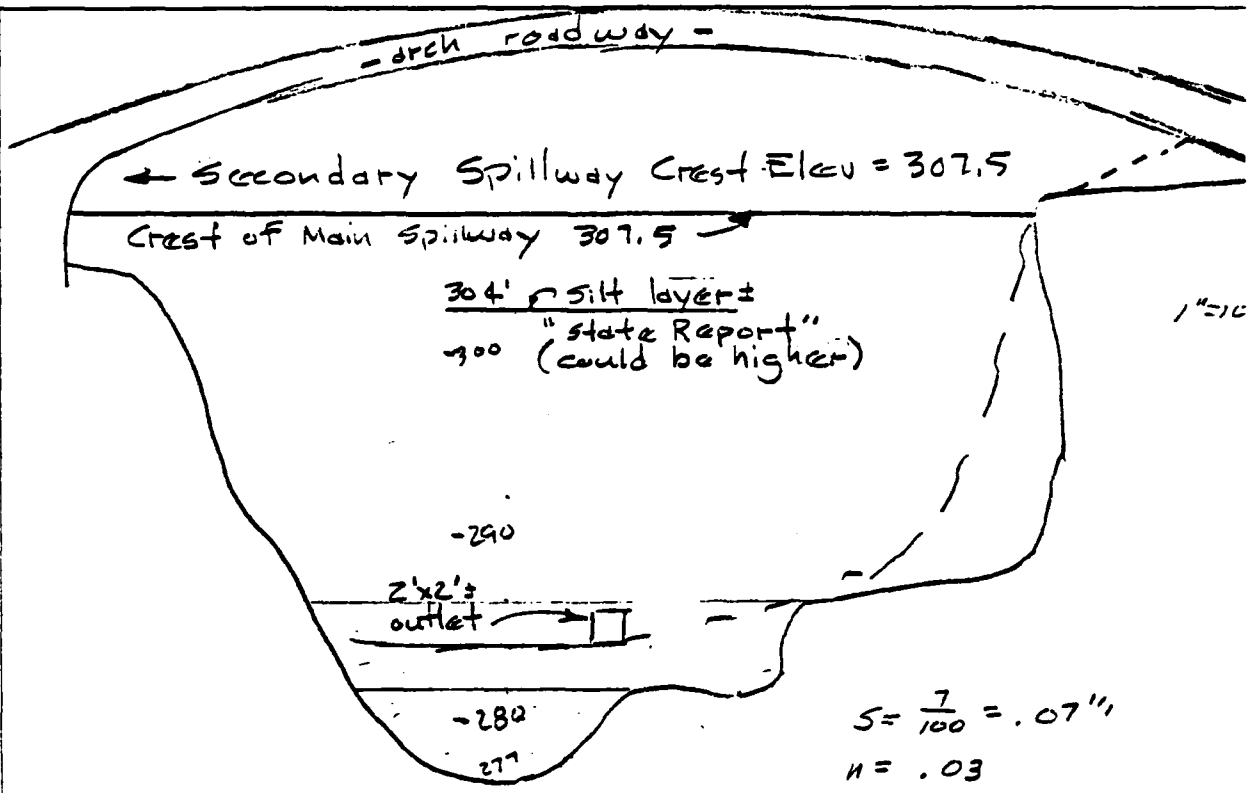
Stor = 57 a-f - 10 = 47± a-f this represents less than ½" of storm water storage therefore outflow = inflow. Dam has no flood retarding potential - was not designed for that purpose.

Stor from Elev 280± to 307.5± is 100± a-f if all silt removed.

NO. 78,244.1
E 1/31/79
MA
D BY FDD 2/8/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO. 4
JOB Dams
SUBJECT County Club
CLIENT Corps



Flow at Spillway ≃ 3700± cfs

6.25/

D	A	WP	$R^{2/3}$	$\frac{1.486}{.03}(.07)^{1/2}$	V	Q
10'	172	37'	2.8	13.11	36.7	6313
7.5	109	31	2.33	"	30.5	3326
5'	50	18'	1.98	"	27.5	1376

(see page 4 for side spillway)

Side spillway flow ≃ 2400± cfs

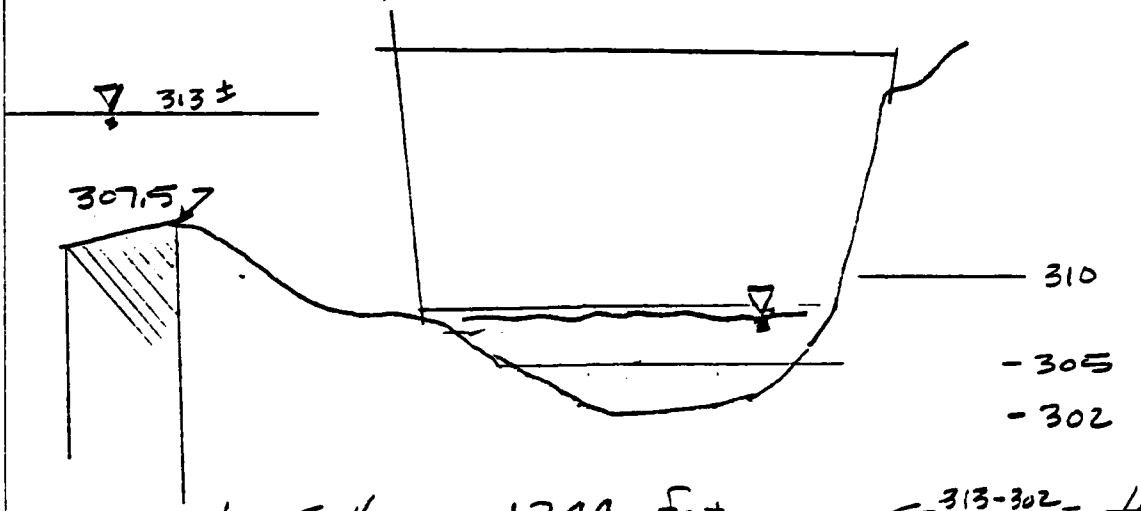
Tailwater ≃ 287 ± combined affects.

JOB NO. 78.2441
DATE 1/31/79
BY MA
CH'D BY FDD 2/8/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO. 5
JOB Dams
SUBJECT Country-Club
CLIENT Corps

Side Spillway



Flow at Spillway = 1744 cfs ±

$S = \frac{313-302}{100} = \frac{11}{100} = .1$

$n = .03$

D	A	WP	$B^{2/3}$	K	V	Q
6'	91	27	2.26	16.43	37	3374
5	42	23	1.5		24.6	1033
3'	28	9	1.3		21.4	600

D ≃ 5.5' ± or Elev = 307.5' ±

8.244.1
2/79
4
FDD 2/9/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 6
JOB Dams
SUBJECT Country-Club
CLIENT Corps

Dam Failure Analysis

Failure assumed at main spillway only, reports indicated dam silted-in to within 3± feet of top. But, assume no siltation here to determine most severe case.

$W_b = 40'(.4) = 16'$

$Q_F = {}^{8}/_{27}\,(16')\sqrt{32.2}\,(31)^{1.5} \cong 4645$ cfs

This flow is less than 100 yr flood outflow.

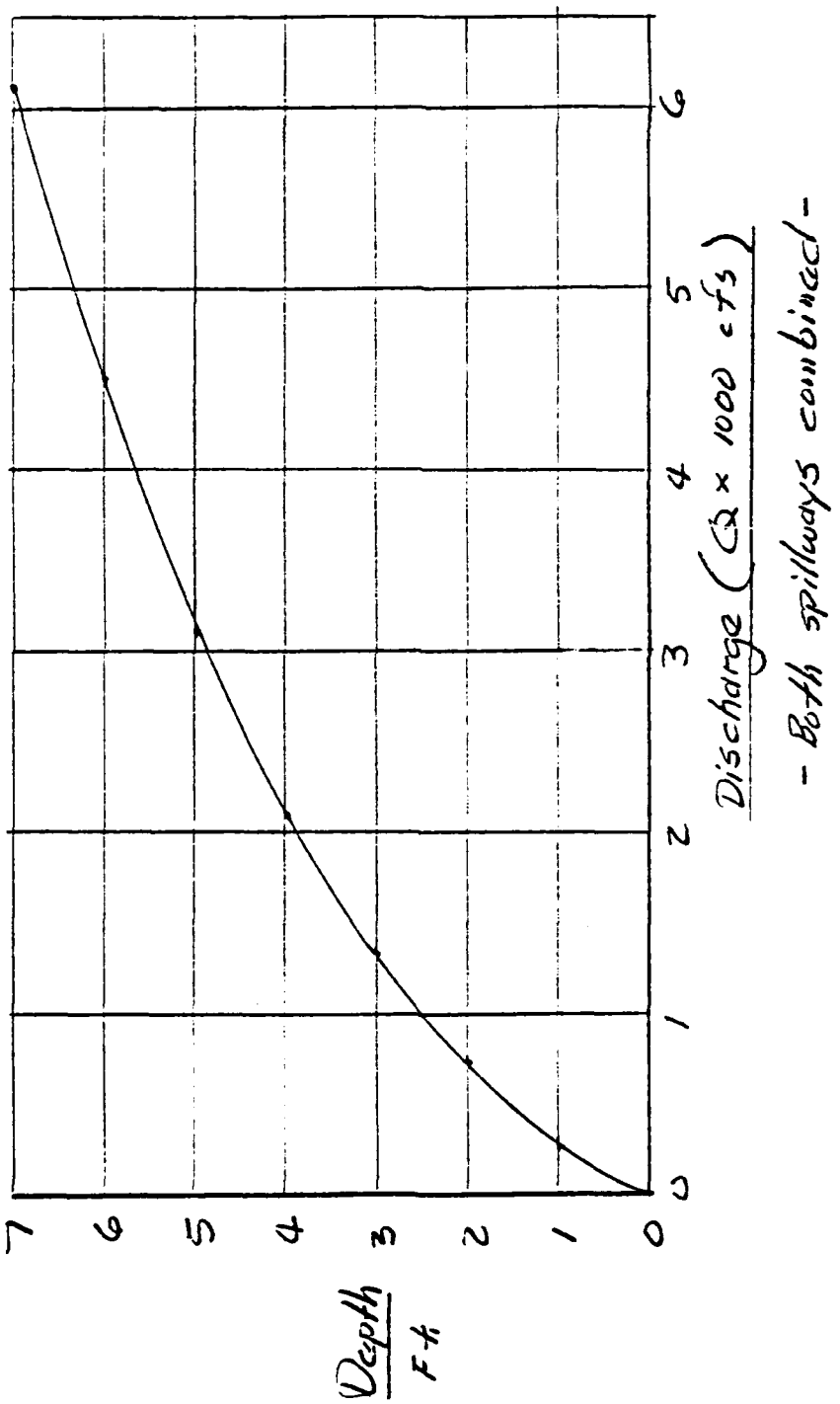
Flooding damage from dam failure will occur at "Look Park. The park is located on flood plains of the river. Improvements in the park will be flooded by about 5' of water near the pavillion. Picnic areas along the river bank could have heavy flood damage. Beyond the park there is a large flood plain area. Country Club Fairways & pool area could be flooded.

JOB NO 78.242.1
DATE 6-13-79
BY MA
CH'D BY DBV

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 7
JOB Dams
SUBJECT ECD
CLIENT Corps

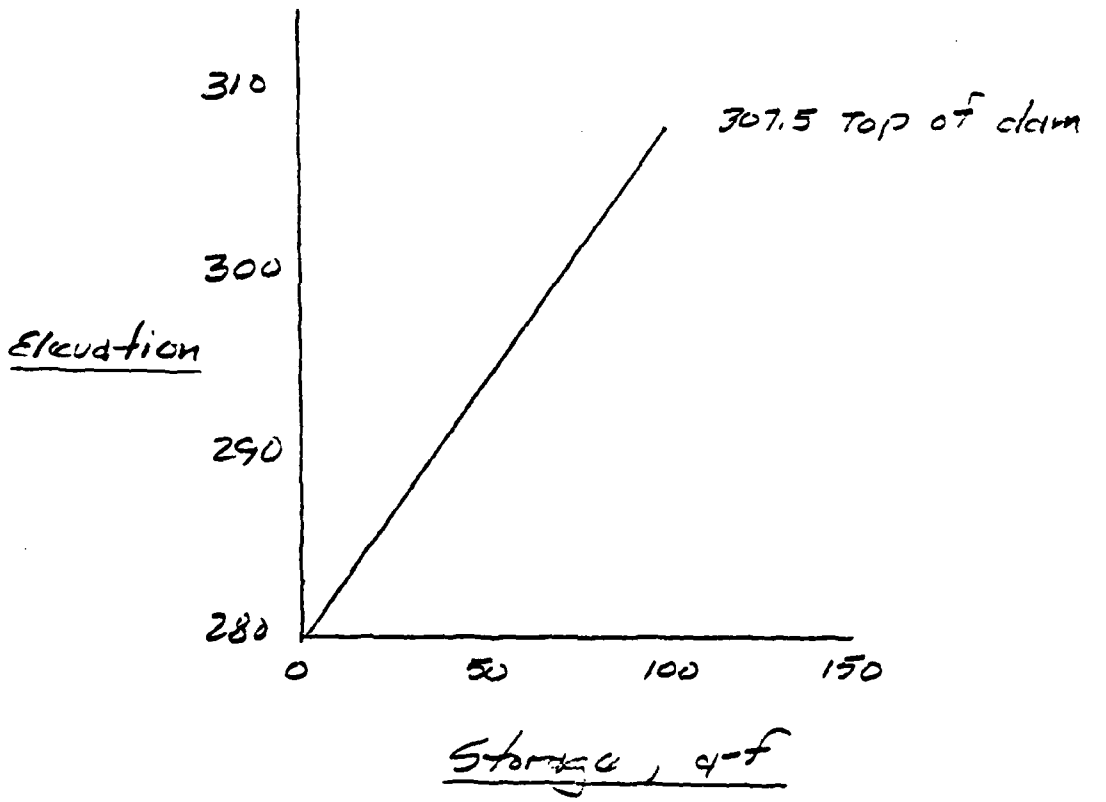
Stage - Discharge



NO. 78.294.1
E 6-13-79
MA
BY DBV

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

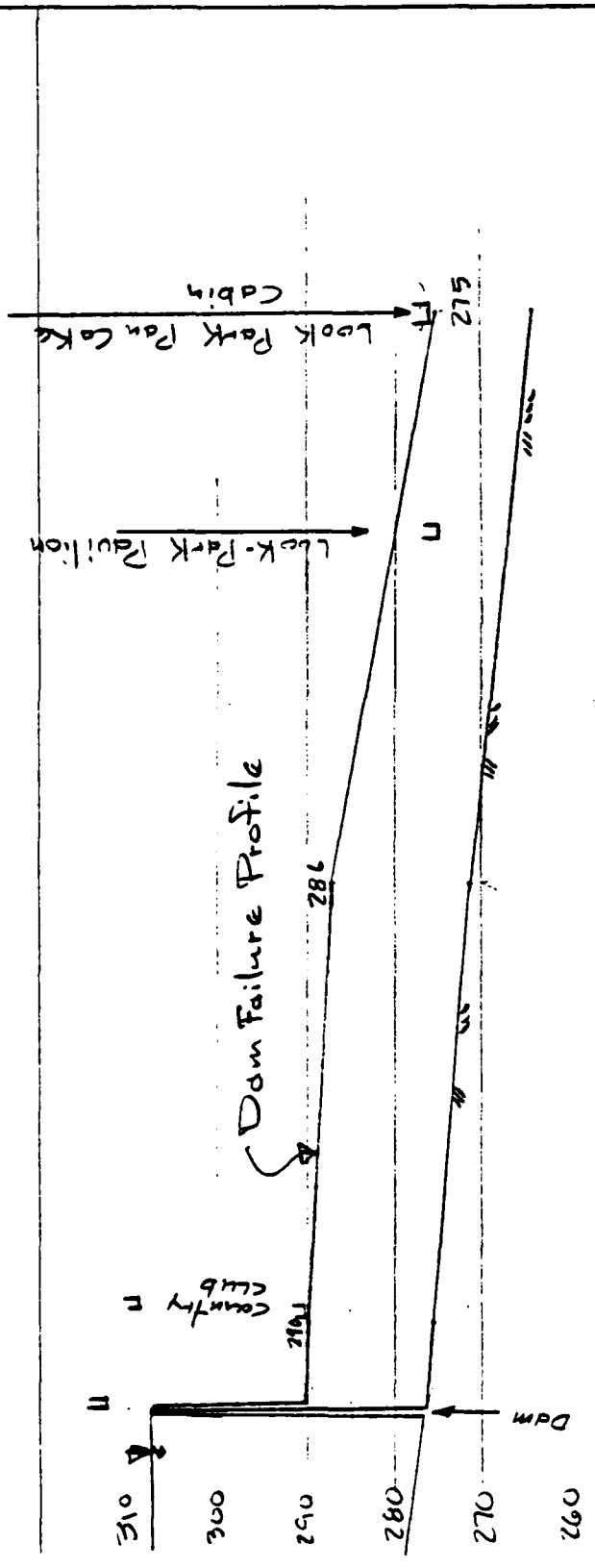
SHEET NO. 74
JOB Dams
SUBJECT CED
CLIENT Corps



JOB NO: 78.244.1
DATE 1/31/79
BY MA
CH'D BY PDA 2/19/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 8
JOB Dams
SUBJECT Country-Cl
CLIENT Corps



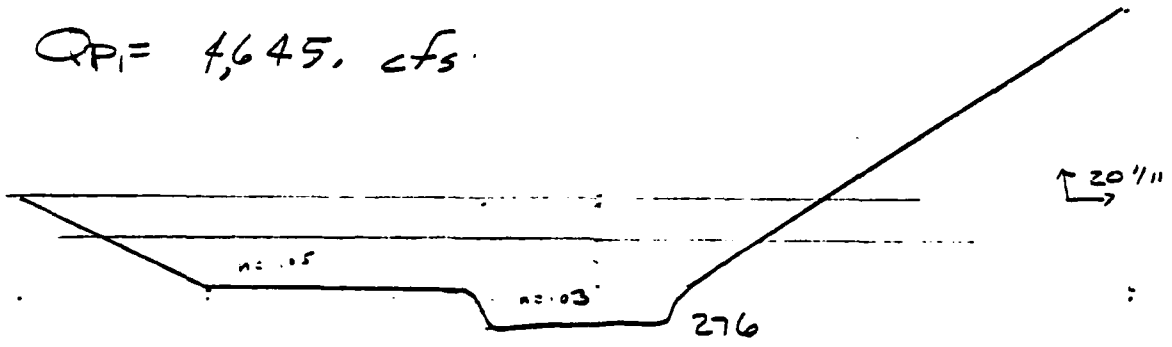
1955 Flood Flows would be higher than dam failure profile shown above.

Sta 12+00 $Stor_{Fail} \approx 100$ a-f (assumes no siltation)

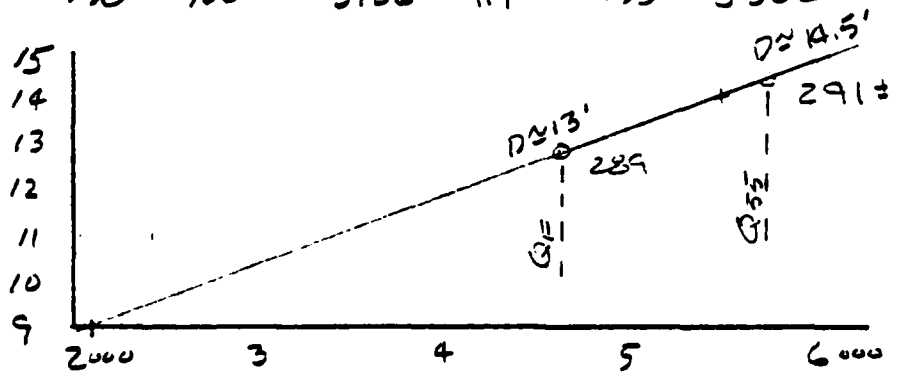
$S = \frac{7}{1700} = 0.0041$ $El_{Fail} = 276$

$n = 0.03$ $K = \frac{1.486}{.03}(.0041)^{1/2} = 3.172$

$Q_{P_1} = 4,645.$ cfs



D	A	WP	$R^{2/3}$	K	V	Q	
4	80	28	2.02	3.172	6.41	512.	(w/in banks)
9	385	80	2.87	1.9	5.4	2100.	
14	750	100	3.86	1.9	7.33	5500.	



$Q_{P_2} = 4645.$ $Stor = \frac{(665+109)\frac{1}{2} \times 200}{45360} = 1.78$ a-f

$Q_{P_2} = 4,645.\left(1 - \frac{1.78}{100}\right) = 4,562.$ $El_2 = 288.5$

$Stor_2 = \frac{(625+109)\frac{1}{2} \times 200}{43560} = 1.69.$

$Q_{P_3} = 4,645.\left(1 - \frac{1.73}{100}\right) = 4564$ cfs

JOB NO. 78.044.1
DATE 1/31/79
BY MA
CH'D BY FDD 2/6/79

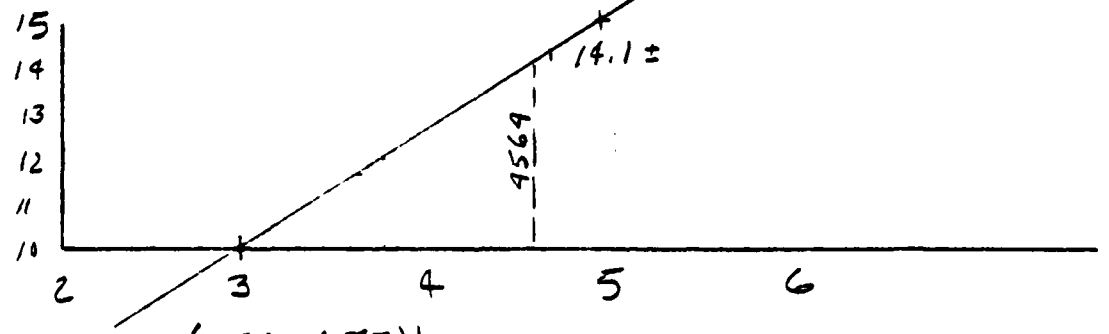
HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO. 11
JOB Dam
SUBJECT Emergency Cl.
CLIENT Corps

Sta. 12+00 c/ev 272.
S = .0041
n = 0.05

Q = 4564 cfs Elev 286±

D	A	WP	$R^{2/3}$	K	V	Q
8'	500.	120.	2.61	1.9	4.94	2472
10'	725.	230	2.16	"	4.10	2973
15	1175.	360	2.21	"	4.2	4937



$$S_{tot_1} = \frac{(1100+625)\frac{1}{2}\times 1000}{43560} = 20.3\text{ ac-ft}$$

$$Q_{P_2} = 4564\left(1-\frac{20.3}{100}\right) = 3639\text{ cfs}$$ $El_2 = 284$

$S_{tot-2} = 1E$

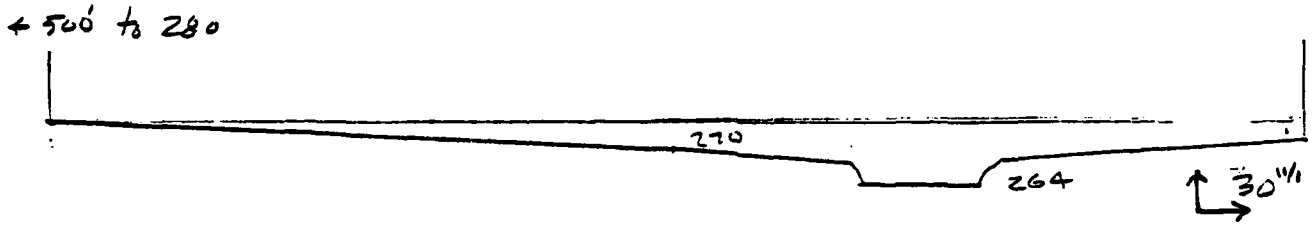
$$Q_{P_3} = 4564\left(1-\frac{19.1}{100}\right) = 3690\pm\text{ cfs}$$

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

Sta. 25+00 $\quad S = \frac{10}{1200} = 0.00833.$

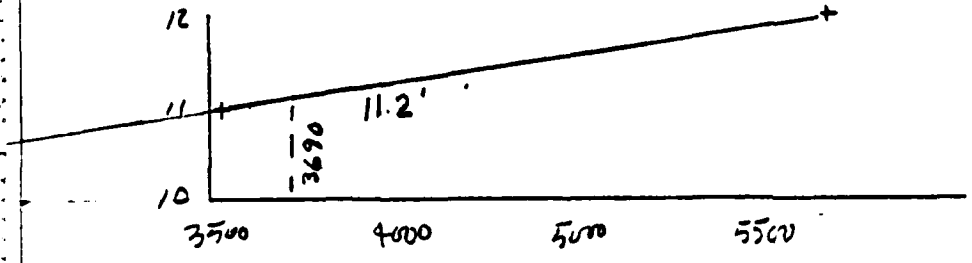
Elev = 264±

$K = \frac{1.486}{0.05}(.0083)^{1/2} =$



$Q = 3,690.$ cfs Elev 275±

D	A	WP	$R^{2/3}$	K	V	Q
11	670	250	1.94 ·	271 ·	5.26 ·	3520±
12	920	280	2.22 ·	" ·	6.01 ·	5532 ·



$Sto_1 = \frac{(700+1100)\frac{1}{2}(1300)}{43560} = 26.9$ ac-ft

$Q_{P2} = 3690\left(1 - \frac{26.9}{100}\right) = 2,697.$

$Sto_2 = \frac{(420+1100).5 \times 1300}{43560} = 22.7'$

$Q_{P3} = 3690\left(1 - \frac{24.8}{100}\right) = 2,775.\pm$ cfs

JOB NO. 78,244.1
DATE 6/13/79
BY mA
CH'D BY DBV

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 12
JOB Dams
SUBJECT CCD
CLIENT Corps

Std. 40+00

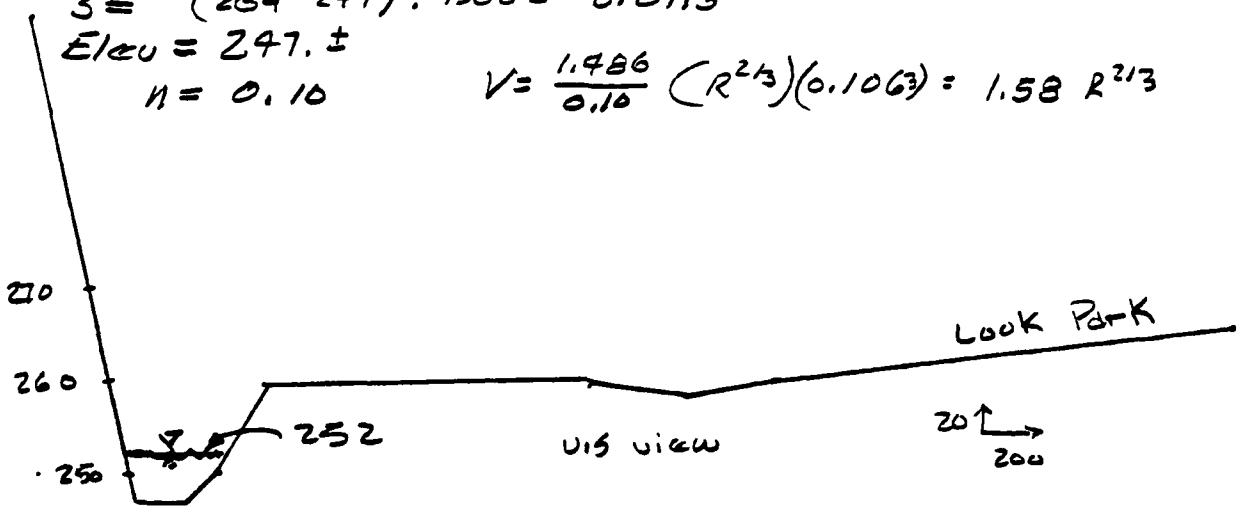
$Q_{P_1} = 2775$ cfs

$S = (264 - 247) \div 1500 = 0.0113$ ft/ft

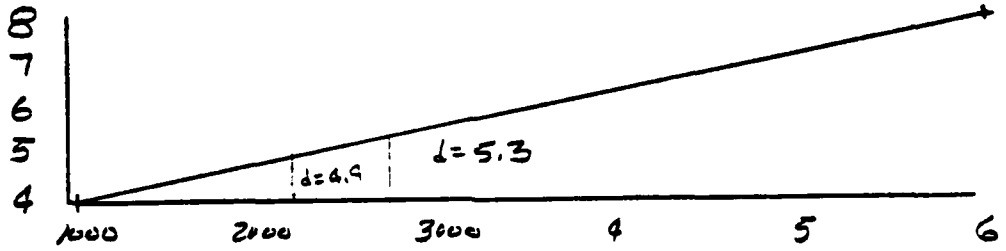
Elev = 247. ±

$n = 0.10$

$V = \frac{1.486}{0.10}(R^{2/3})(0.1063) = 1.58\ R^{2/3}$



D	WP	A	$R^{2/3}$	F'	V	Q
13	180	1495	4.13	1.58	6.53	9756 cfs
8	135	595	3.81	"	6.	5994
4	110	320	2.05	"	3.23	1034

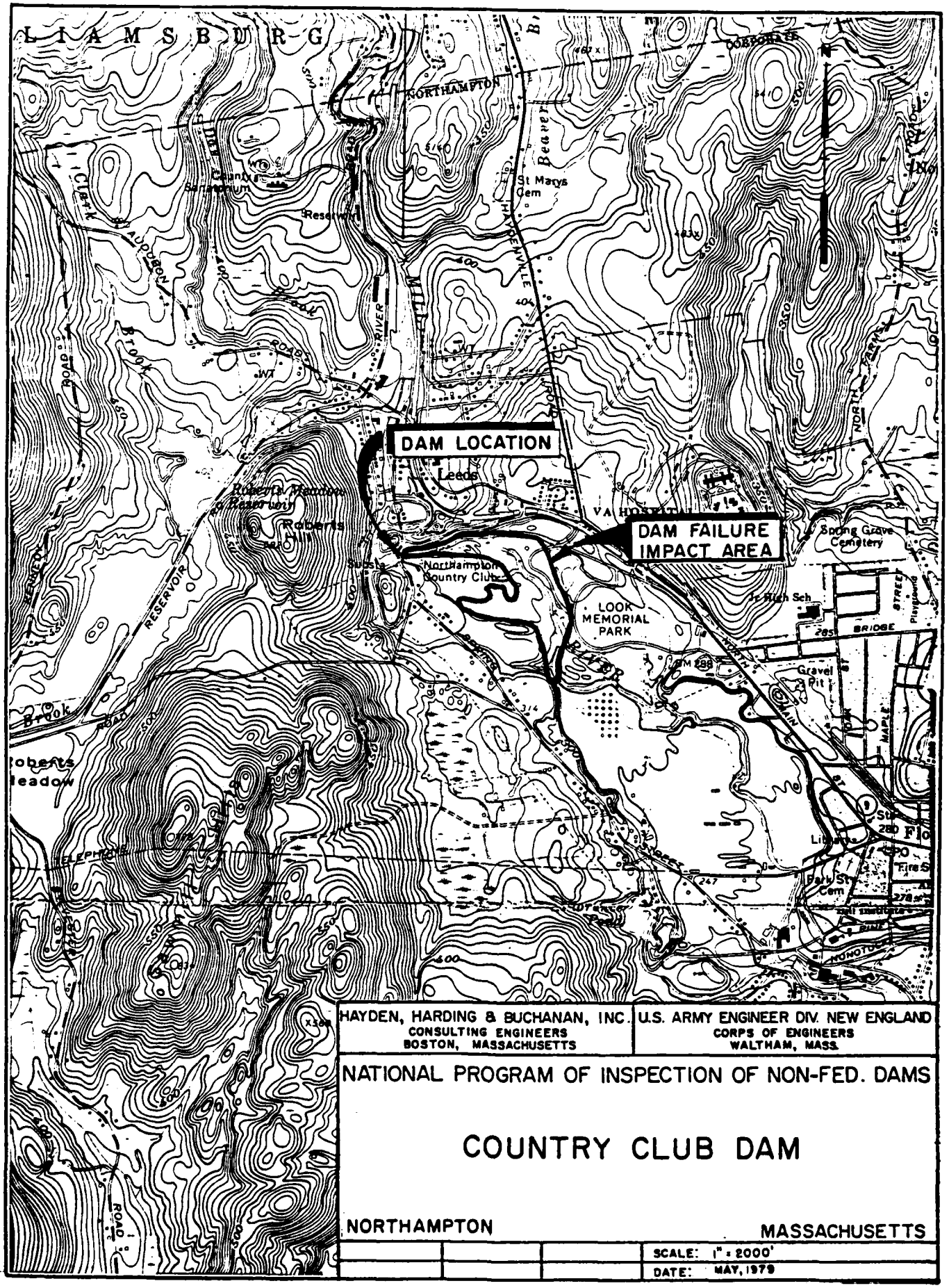


$Stor_1 = \frac{575 + 550}{2}\left(\frac{1500}{43560}\right) = 19.4$ a-f < 50 OK

$Q_{P_2} = 2775\left(1 - \frac{19.4}{100}\right) = 2237.$ cfs

$Stor_2 = \frac{388 + 550}{2} = 16.2$ ave Stor = 17.8

$Q_{P_3} = 2775\left(1 - \frac{17.8}{100}\right) = 2281.$ cfs Elev 25



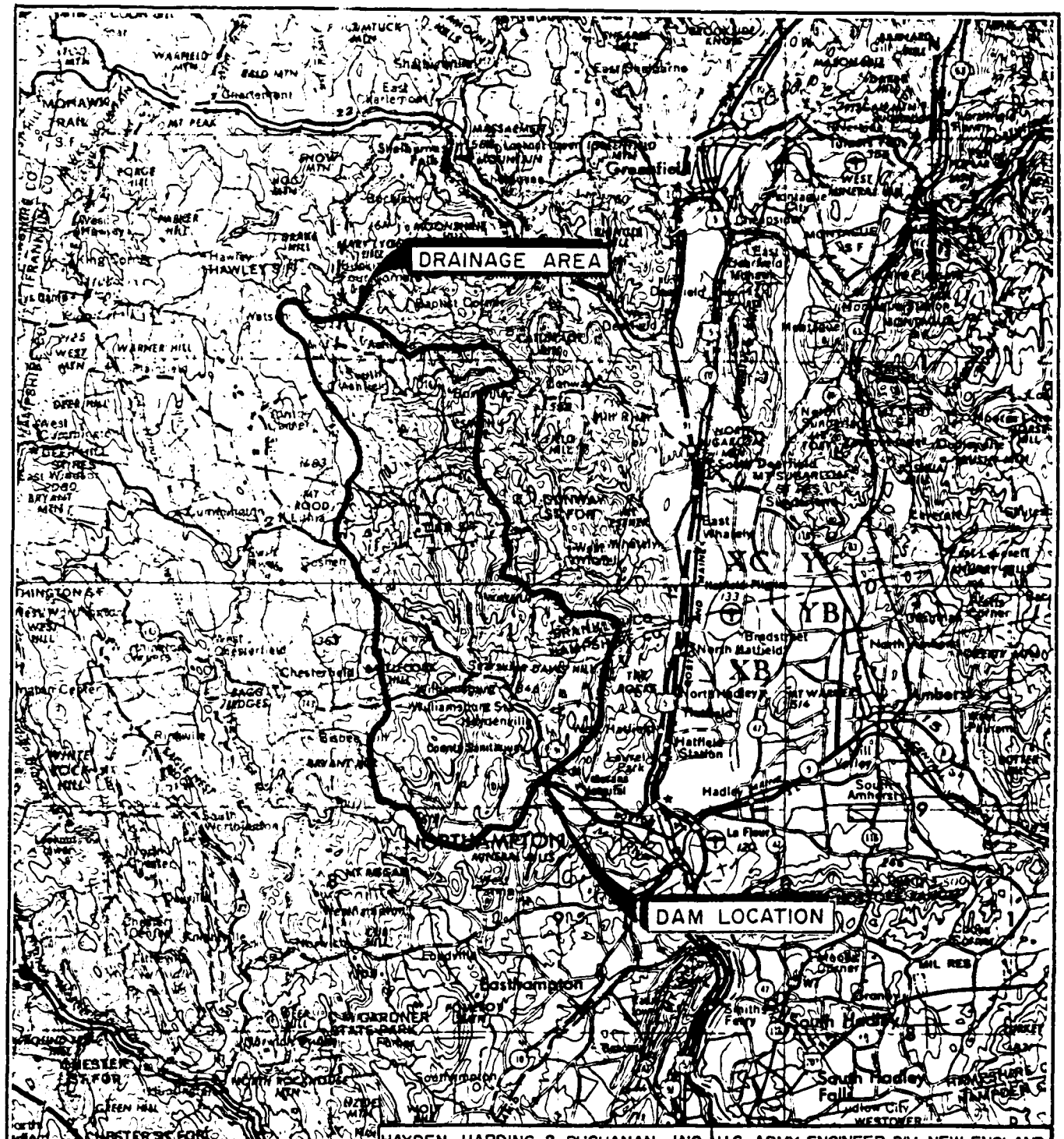
HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

COUNTRY CLUB DAM

NORTHAMPTON MASSACHUSETTS

			SCALE: 1" = 2000'
			DATE: MAY, 1979



HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

COUNTRY CLUB DAM

NORTHAMPTON MASSACHUSETTS

			SCALE: 1" = 250,000'
			DATE: MAY, 1979

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

(1) STATE	(2) IDENTITY NUMBER	(3) DIVISION	(4) STATE	(5) COUNTY	(6) CONGR DIST.	(7) STATE	(8) COUNTY	(9) CONGR DIST.	(9) NAME	(10) LATITUDE (NORTH)	(11) LONGITUDE (WEST)	(12) REPORT DATE DAY | MO | YR
MA	256	NED	MA	015	01				COUNTRY CLUB DAM	4220.9	7242.1	25MAY79

(13) POPULAR NAME	(14) NAME OF IMPOUNDMENT
CURRES DAM	MILL RIVER

(15) REGION	(16) BASIN	(17) RIVER OR STREAM	(18) NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	(19) DIST FROM DAM (MI.)	(20) POPULATION
01	08	MILL RIVER	NORTHAMPTON	0	29700

(21) TYPE OF DAM	(22) YEAR COMPLETED	(23) PURPOSES	(24) STRUCTURAL HEIGHT (FT.)	(25) HYDRAULIC HEIGHT (FT.)	(26) IMPOUNDING CAPACITIES MAXIMUM (ACRE–FT.)	(27) IMPOUNDING CAPACITIES NORMAL (ACRE–FT.)	DIST	UWN	FED R	PRV/FED	SCS A	VER/DATE
GMCTVA	1875	R	32	31	147	100	NED	N	N	N	N	25MAY79

(28) REMARKS
21 STONE + CONCRETE 22+24 APPROX 27 IMP CAP REDUCED BY SILTATION

(29) D/S HAS	(30) SPILLWAY CREST LENGTH	(31) SPILLWAY TYPE	(32) SPILLWAY WIDTH (FT.)	(33) MAXIMUM DISCHARGE (FT.)	(34) VOLUME OF DAM (CY)	(35) POWER CAPACITY INSTALLED (MW)	(36) POWER CAPACITY PROPOSED (MW)	(37) NAVIGATION LOCKS NO.	(38) LENGTH (FT.)	(39) WIDTH (FT.)	(40) LENGTH (FT.)	(41) WIDTH (FT.)	(42) LENGTH (FT.)	(43) WIDTH (FT.)	(44) LENGTH (FT.)	(45) WIDTH (FT.)
2	100	U														

(46) OWNER	(47) ENGINEERING BY	(48) CONSTRUCTION BY
LOOK MEMORIAL PARK ASSOC		

(49) REGULATORY AGENCY DESIGN	(50) CONSTRUCTION	(51) OPERATION	(52) MAINTENANCE
NONE	NONE	NONE	NONE

(53) INSPECTION BY	(54) INSPECTION DATE DAY | MO | YR	(55) AUTHORITY FOR INSPECTION
HAYDEN HARDING + BUCHANAN INC	12APR79	PL 92-367

(56) REMARKS:
32-DAM ACTS AS SPILLWAY OVER ENTIRE 100 FT. LENGTH

END

FILMED

8-85

DTIC