AD-A155 321 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 1/2
PINE ISLAND LAKE DAM A.. (U) CORPS OF ENGINEERS WALTHAM
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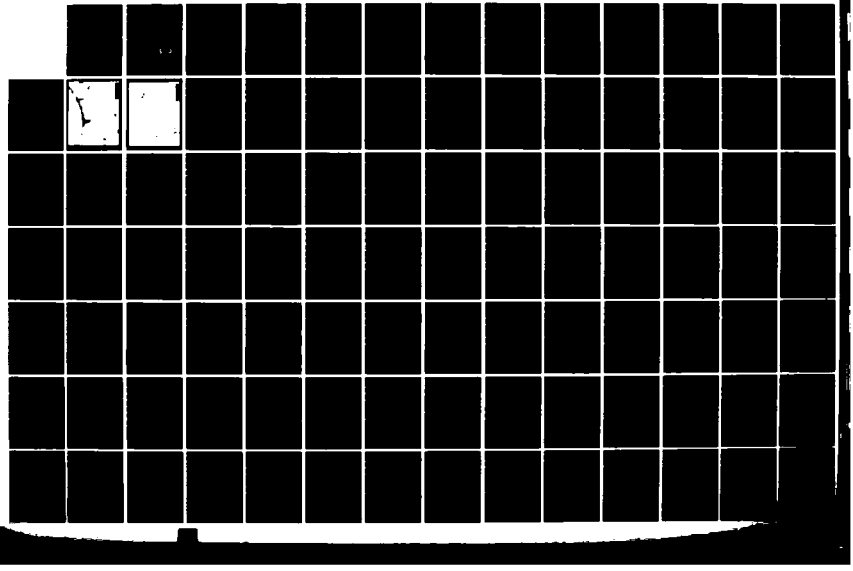
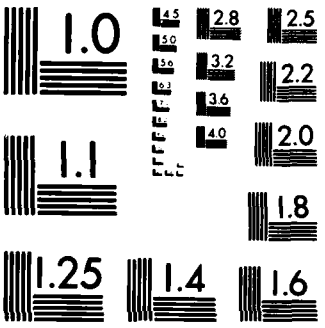
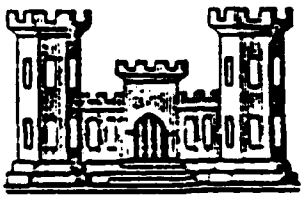




CONNECTICUT RIVER BASIN
WESTHAMPTON, MASSACHUSETTS

PINE ISLAND LAKE DAM and DIKE
DAM MA 00595
DIKE MA 00596

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS. 02154

AUGUST 1981

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

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

DAMS, INSPECTION, DAM SAFETY,

Connecticut River Basin,
Westhampton, Massachusetts,
North Branch Manhan River.

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

The dam is a 25 ft. high, 90 ft. long earth and stone dam with an ungated twin 36 inch pipe spillway and two manually operated drains. The dam was found to be generally in poor condition and the dike to be in fair condition. Indications of seepage were observed at the dam and dike. Both have a size classification of intermediate. The dam hazard potential is high and the dikes is significant. There are various remedial measures that the owner should engage in.

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

REPLY TO
ATTENTION OF:

NEDED

SEP 23 1981

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

Dear Governor King:

Inclosed is a copy of the Pine Island Lake Dam & Dike (MA-00595 & MA-00596) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve 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 vitally important.

Copies of this report have been forwarded to the Department of Environmental Quality Engineering, and to the owner, Pine Island Lake Recreational Corp., Westhampton, MA. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Quality Engineering for your cooperation in this program.

Sincerely,

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

Incl
As stated

A-1123

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

DAM IDENTIFICATION NO.:	MA 00595
DIKE IDENTIFICATION NO.:	MA 00596
NAME OF DAM:	Pine Island Lake Dam and Dike
TOWN:	Westhampton
COUNTY AND STATE:	Hampshire County, Massachusetts
STREAM:	North Branch Manhan River
DATE OF INSPECTION:	July 8, 1981

The dam is a 25 foot high, 90 foot long earth and stone dam with an ungated twin 36 inch pipe spillway and two manually operated drains. There is also a separate 270 foot long, 15 foot high earth and stone dike. Construction of the dam and dike is believed to have occured in 1920. The dam and dike are owned and operated by the Pine Island Lake Recreational Corporation of Westhampton.

There was no indepth engineering data available for review. Therefore, the adequacy of the project was primarily evaluated by visual inspection, past performance history and sound engineering judgement. The visual inspection indicated the dam to be in generally poor conditon and the dike to be in generally fair condition. Indications of seepage were observed at the dam and dike. Trees were observed near the crest of the dam and on the downstream slope of the dam and dike The riprap on the upstream face of the dike has experienced sloughing.

The dam and dike have a size classification of intermediate. The dam hazard potential classification is high and the dike is significant. Based upon Corps Guidelines, the test flood would be the full PMF. The test flood inflow would be 2,400 cfs, from the 0.8 square mile drainage area. The routed test flood outflow is 1345 cfs and the corresponding surcharge elevation would be 1003.8. The top of dam and dike, elevation 1002.5, are overtopped by 1.3 feet. The spillway has a capacity of 115± cfs or 10± percent of the routed test flood outflow.

It is recommended that the Owner engage a qualified registered professional engineer to investigate and design required remedial measures for: the source of seepage found at the dam and dike; repair of the riprap on the upstream slope of the dike; means of removing trees and roots at the dam and dike and modification of the dam to prevent discharge of water onto the downstream slope. The Owner should also engage a qualified registered professional engineer to perform a detailed hydraulic/hydrologic study and evaluate the adequacy of the spillway and the potential for overtopping.

The Owner should institute remedial measures which include: maintenance of brush growth on the slopes; removal of debris from the dam discharge channel and removal of overhanging trees and limbs; replacement of stones missing from the vertical portion of the downstream face of the dike; instituting of an annual technical inspection program and development of a formal warning system for the downstream impact area.

The recommendations and remedial measures should be implemented by the Owner within one year after receipt of this Phase I Inspection Report.

Ronald H. Cheney, P.E.
Vice President

Hayden, Harding & Buchanan, Inc.
Boston, Massachusetts

This Phase I Inspection Report on Pine Island Lake Dam and Dike (MA-00595 & 00596 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.

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

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

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRIAR
Chief, Engineering Division

PREFACE

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

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

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to

represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

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

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

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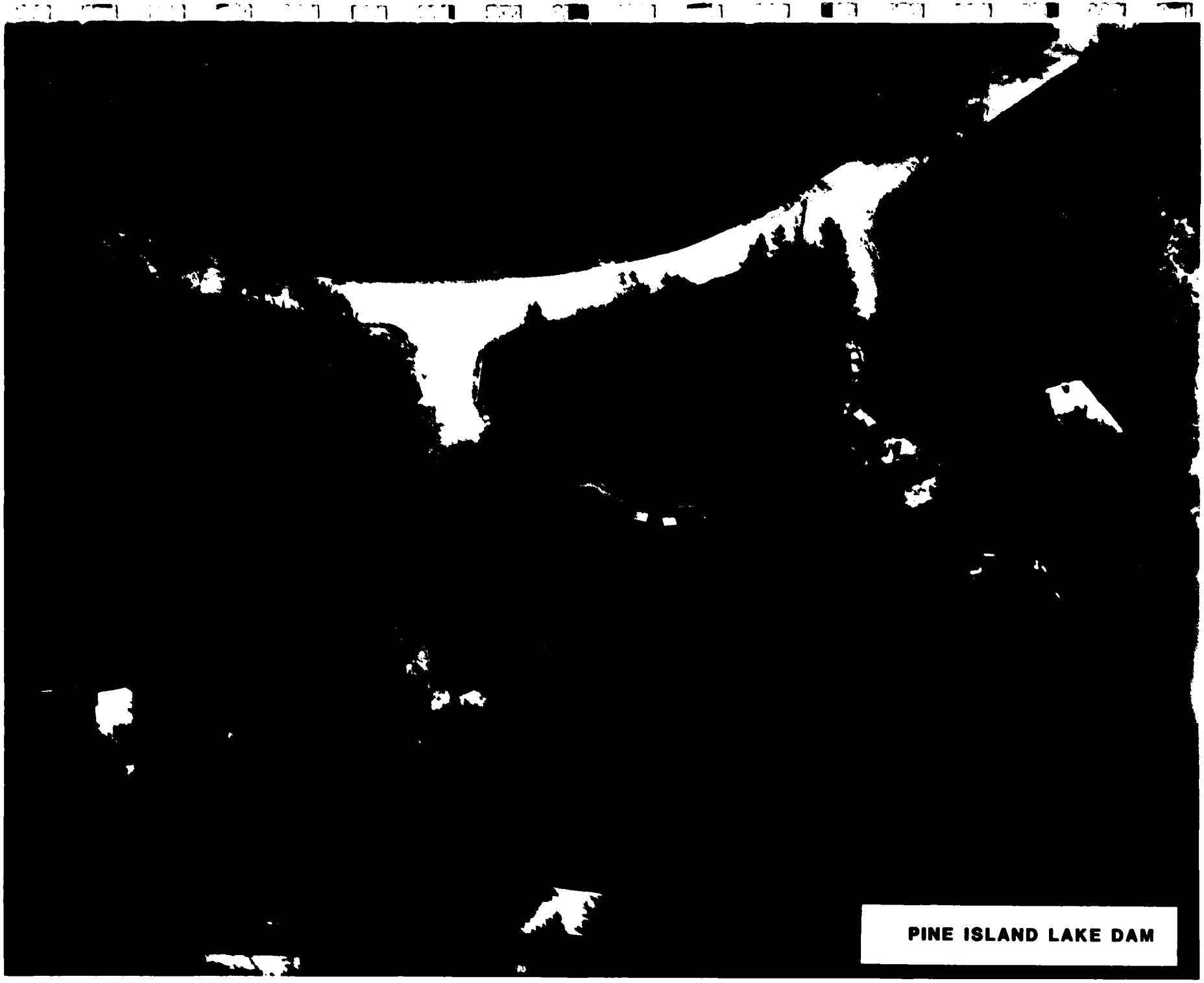
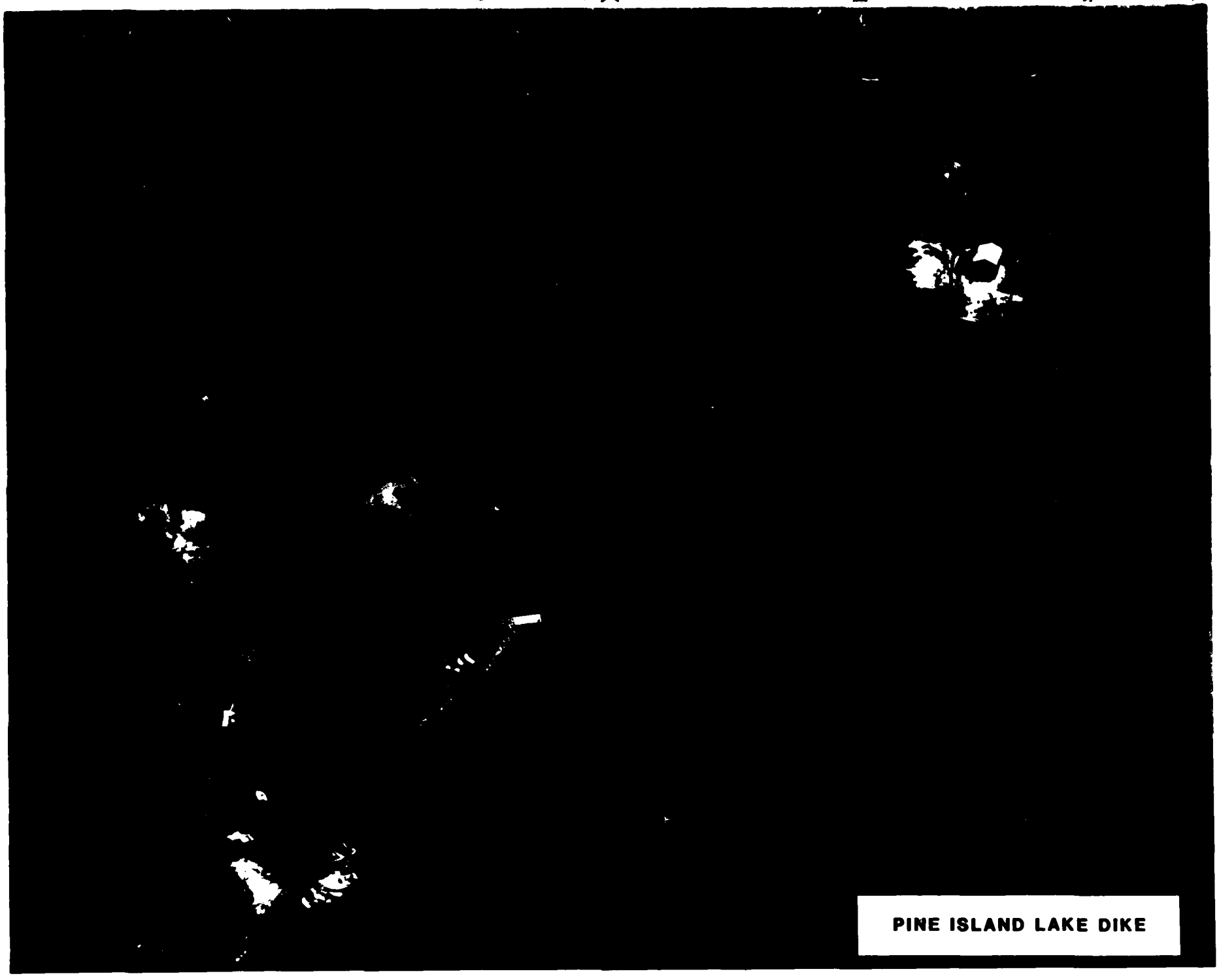


PINE ISLAND LAKE DAM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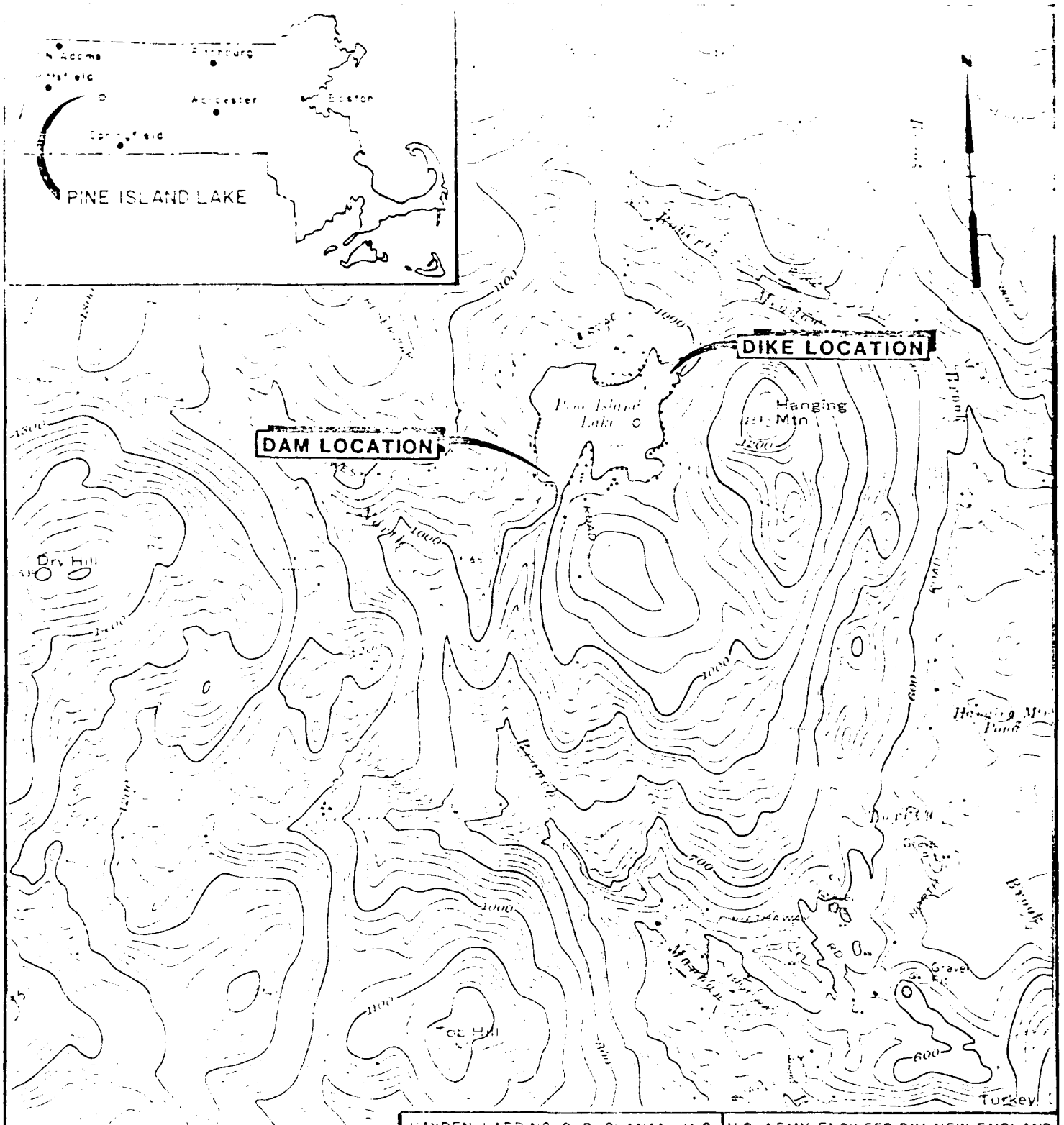


HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

U.S. ARMY ENGINEER DIV NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

PINE ISLAND LAKE DAM & DIKE
LOCATION PLAN

WESTHAMPTON MASSACHUSETTS

SCALE AS NOTED

DATE AUGUST, 1981

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 to Hayden, Harding & Buchanan, Inc. on 26 June 1981 by William E. Hodgson Jr., Colonel, Corps of Engineers. Contract No. DACW 33-80-C-0006 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) Perform technical inspection and evaluation of nonFederal dams to identify conditions which threaten the public safety 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

Pine Island Lake is located in the Town of Westhampton, Hampshire County, Massachusetts. Pine Island Lake Dam is located on the southwestern shore of the lake, off of Reservoir Road, approximately 900 feet southeast from the Northwest Road - Reservoir Road intersection. Pine Island Lake Dike is located on the northeast shore, 3/4 miles from Reservoir Road on a private road that services cottages on the eastern shore. Pine Island Lake is shown on the Westhampton, Massachusetts U.S.G.S. Quandrangle. The dam has the approximate coordinates of North 42° 20' 14", West 72° 46' 37". The dike has the approximate coordinates of North 42° 20' 30", West 72° 46' 15". The outlet stream is the North Branch of the Manhan River which flows about 8 miles southeast to meet the Manhan River at Easthampton.

b. Description of Dam and Appurtenances

The dam is a 90± foot long, 25± foot high, earth and stone embankment structure with 2 gate structures and two ungated metal, 36 inch diameter pipes which act as a spillway.

The crest of the dam is of irregular shape, approximately 22 feet wide and is paved as snown by photograph 2. The downstream face is comprised primarily of boulder fill inclined at approximately 1 1/2H:1V, (photograph 5). The upstream face is lined with stone and earth witn some sections paved with bituminous concrete. It is inclined at about 1 1/2H:1V, (photographs 1 and 2).

There is a spillway structure located at the center of the embankment. It is comprised of a concrete headwall and two, 36 inch diameter ungated corrugated metal pipes, (see photographs 4 and 7). The pipes outlet at the downstream face. The downstream invert is approximately 5 1/2 feet below the crest of dam at about elevation 997.

There are two gate structures located on the upstream face, as shown by photographs 1 and 3. The one nearest to the spillway is a 5 foot square concrete structure which serves as the low level intake. It inlets approximately 23 feet upstream of the gate structure at approximately elevation 982. The gate structure contains a manually operated gate valve which controls a 10 inch intake line. Plans dated August 31, 1970 indicate that approximately 3 feet downstream of the gate structure, the outlet pipe changes to a 21 inch pipe which discharges on the downstream slope. This pipe discharges approximately 21.5 feet below the crest at invert elevation 981.0.

There is a second intake structure located approximately 6 feet to the left of the one described above. This structure serves as the upper level drain. The 24 inch diameter intake for the upper drain is located approximately 6 feet upstream of the gate structure at invert elevation 994. There is a manually operated gate within the structure which regulates flow. The outlet pipe discharges at the downstream slope approximately 10 feet below the crest, at about invert elevation 992.5.

There is a roadway embankment (Reservoir Road) located approximately 20 feet downstream from the toe of the dam. A 5 foot diameter corrugated metal pipe carries spillway outflow below the embankment (photograph 8). The top of the embankment is approximately 6 feet above the crest of the dam.

The dike located on the northeast shore of the lake, is about 2500 feet from the dam. It is approximately 270 feet long, 15 feet high and has a 12 foot wide crest. The upstream face is riprapped to within about 4 feet of the crest. It is turf lined above the riprap and inclined at approximately 2H:1V.

The crest of the dike shown in photograph 12 is grass covered. The elevation at the right abutment is about 1/2 foot lower than the rest of the crest for a length of about 10 feet. This area has been identified as a spillway in previous dam inspection reports.

The downstream face is comprised of a 5± foot high vertical dry stone masonry wall atop an earth and riprap sloped embankment which is inclined at about 1.25H:1V. There are no outlet works at the dike. The crest of the dike is turf lined (see photographs 9 thru 13).

c. Size Classification

The dam and dike size classification is intermediate based on their heights of 25 feet and 15 feet (respectively) and their storage capacity of 1096 acre-feet. The Corp Guideline for an intermediate size dam is a height of 40 to 100 feet and/or a storage capacity of 1,000 to 50,000 acre-feet.

d. Hazard Classification

The dam has a hazard potential classification of high. Seven homes could be inundated by about 2 to 4 feet of water. Seven roads could be washed out. There is a potential for loss of more than a few lives.

The dike has a hazard potential classification of significant. One structure could be damaged by flood failure. There is a potential for loss of a few lives.

e. Ownership

The dam and dike are owned by the Pine Island Lake Recreational Corporation of Westhampton, Massachusetts.

f. Operator

The dam and dike are maintained and operated by the Pine Island Lake Recreational Corporation. Mrs. Winfred Conway is the President of the Corporation. Her address is 190 Walnut Street, Holyoke, Massachusetts 01040. Her telephone number is (413) 533-7529.

g. Purpose of Dam

The purpose of the dam is recreation.

h. Design and Construction History

The dam is believed to have been built in 1920 by the Loudville Paper Company. In about 1970 the upper level intake was built, the spillway modified and some paving of the crest done. No additional information regarding the design and construction history of the dam was located.

i. Normal Operational Procedures

The upper and lower drains are normally closed. The twin 36 inch spillway pipes are not gated. The level of the reservoir is not normally regulated, however, the reservoir is drained every 5 years and lowered a couple of feet each fall.

1.3 Pertinent Data

a. Drainage Area

The 0.8 s.m. (512 acres) drainage area is rolling, wooded land. There are numerous summer cottages located along the shores of the lake and some development to the west of the dam along Northwest Road. The remainder of the drainage area is basically undeveloped. There are no major drainage paths or swamps located within the drainage area.

b. Discharge at Dam Site

1. Outlet Works

The outlet works at Pine Island Lake Dam consists of two ungated spillway pipes and upper and lower level drains.

The spillway is comprised of two 36 inch diameter corrugated metal pipes and a concrete headwall structure. The pipes inlet on the upstream face at about invert elevation 998 and outlet on the downstream face at about elevation 997.

The lower level drain is comprised of a 10 inch inlet pipe, a manually operated gate structure and a 21 inch outlet pipe. The lower level drain inlets on the

upstream face at about invert elevation 982 and outlets at the downstream face at about invert elevation 981. The capacity of the lower level drain is 5± cfs with the water level at top of dam, elevation 1002.5.

The upper level drain is comprised of a 24 inch diameter intake pipe, a manually operated gate and a 24 inch outlet pipe. The intake pipe inlets on the upstream face at about invert elevation 994 and outlets at the downstream face at invert elevation 992.5. The capacity of the 24 inch outlet is 55± cfs with the water level at top of dam, elevation 1002.5.

There are no outlet works at the dike.

2. Maximum Known Flood at Dam Site

There are no records of the maximum flood at the dam. The United States Weather Bureau records indicate that from September 17 to 22, 1938, about 10 to 11 inches of rainfall occurred in this area.

3. Ungated Spillway Capacity at Top of Dam

Under normal operating conditions, the spillway capacity is 95± cfs with the reservoir water level at the top of dam, elevation 1002.5.

4. Ungated Spillway Capacity at Test Flood Elevation

The test flood spillway discharge would be 115± cfs. Flow could overtop the dam and dike by 1.3 feet. The test flood surcharge elevation would be 1003.8.

5. Gated Spillway Capacity at Normal Pool Elevation

Not Applicable.

6. Gated Spillway Capacity at Test Flood Elevation

Not Applicable.

7. Total Spillway Capacity at Test Flood Elevation

The test flood spillway discharge would be 115± cfs. Flow could overtop the dam and dike by 1.3 feet. The test flood surcharge elevation would be 1003.8.

8. Total Project Discharge at Top of Dam

The total project discharge with the reservoir level at the top of dam, elevation 1002.5 and with the 21 and 24 inch drain pipes open is about 125± cfs.

9. Total Project Discharge at Test Flood Elevation

The total project discharge for the test flood condition with the 21 and 24 inch drain pipes closed would be approximately 1345 cfs, at elevation 1003.8.

c. Elevation (feet above NGVD, elevations are approximate)

(1)	Streambed at toe of dam	977±
(2)	Bottom of cutoff	Unknown
(3)	Maximum tailwater	Unknown
(4)	Recreation pool	998
(5)	Full flood control pool	N/A
(6)	Spillway crest	998
(7)	Design surcharge (Original Design)	Unknown
(8)	Top of Dam	1002.5
(9)	Test flood surcharge	1003.8

d. Reservoir (Length in feet)

(1)	Normal pool	2500'
(2)	Spillway crest pool	2500'

(3) Top of dam ---------- 2500'

(4) Test flood pool ---------- 2500'

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

e. Storage (acre-feet)

(1) Spillway crest pool ---------- 835

(2) Normal pool ---------- 835

(3) Top of dam ---------- 1096

(4) Test flood pool ---------- 1175

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

f. Reservoir Surface (acres)

(1) Spillway crest ---------- 56

(2) Normal pool ---------- 56

(3) Top of dam ---------- 60

(4) Test flood pool ---------- 60

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

g. Dam and Dike

		Dam	Dike
(1)	Type ------ stone, masonry, earth		
(2)	Length ----------	90'	270'
(3)	Height ----------	25'	15'
(4)	Top Width ----------	22'±	12'
(5)	Side Slopes(approx.)-U.S. --- 1-1/2H:1V		2H:1V
	-D.S. --- 1-1/2H:1V		1.25H:1V
(6)	Zoning ----------	Unknown for both	
(7)	Impervious Core ----------	Unknown for both	
(8)	Cutoff ----------	Unknown for both	
(9)	Grout curtain ----------	Unknown for both	

h. Diversion and Regulating Tunnel -- none at the project

i. Spillway

(1) Type ---------- Twin 36" A.C.C.M. outlet pipes

(2) Length of weir ---------- N/A

(3) Crest elevation ---------- 998

(4) Gates ---------- None

(5) U/S Channel - None ------ opens directly to lake

(6) D/S Channel ---------- riprap downstream face and riprap channel

(7) Other ------ outlet channel flows under roadway embankment 20' d.s. from toe through 5 foot diameter corrugated culvert

j. Regulating Outlets

The upper level drain has a diameter of 24 inches, the lower 10 inches. The intake invert elevation of the upper drain is about elevation 994, and the lower invert is at about elevation 982. The upper drain outlets on the downstream slope at about invert elevation 992.5. The lower drain outlets on the downstream slope at about invert elevation 981.0. The capacity of the upper drain is 25± cfs with the reservoir level at the top of dam, elevation 1002.5. The capacity of the lower drain is 5± cfs under these conditions. The upper and lower drains are regulated by manually operated gates. The drains are normally closed. There are no outlets at the dike.

SECTION 2

ENGINEERING DATA

2.1 Design Data

No information was located indicating when or by whom the dam and dike were designed. No design calculations were located. Plans dated 1970, prepared by Anthony Matthew Lipski, P.E., were located, which indicate modifications to the spillway and installation of an upper level drain.

2.2 Construction Data

The dam and dike are believed to have been constructed in 1920. No construction data was located for the dam and dike.

2.3 Operation Data

No operational manual exists for this facility.

2.4 Evaluation of Data

a. Availability

No engineering data was located regarding the dam and dike. Plans dated 1970 indicating modifications to the dam were made available by the Owner. State Inspection Reports for the years 1977, 1975 and 1972, and a County Inspection Report for 1970 were made available at the State Department of Environmental Quality Engineering, Division of Waterways, Boston Office.

b. Adequacy

The lack of indepth engineering data does not allow for a definitive review. Therefore, tne adequacy of the dam and dike, structurally and hydraulically, cannot 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 information supplied with the exception of the plan dated 1970, prepared by Anthony Lipski. Scaling from the plan indicates the low level drain to outlet at about 28 feet below tne crest. Measurements made in the field indicate the pipe to outlet about 21.5 feet below the crest.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General

The dam was inspected on July 8, 1981. A subsequent inspection was performed on July 31, 1981. At the time of the first inspection, the level of the water in the reservoir was at the level of the spillway pipe invert. During the second inspection, the water level was below the spillway invert.

b. Dam and Dike

Dam

The dam is an earth embankment about 25 feet high, 90 feet long, and about 22 feet wide at the crest. The dam dimensions are quite variable with irregular slopes and a non-uniform crest width.

1. Upstream Slope

Above the water surface the upstream face of the dam has a variable slope. Between about the center of the dam and the right abutment, the slope is paved with bituminous concrete, as shown in photograph 1. The left half of the upstream slope, photograph 1 is heavily overgrown with brush. Riprap is present to an elevation about 1 to 2 feet above the spillway crest.

2. Crest

The crest of the dam shown in photograph 2 is covered with bituminous concrete and has an irregular width and elevation. The asphalt is generally in good condition with a few cracks near the spillway headwall. Along the downstream edge of the crest, trees up to 4 inches in diameter are growing.

3. Downstream Slope

The downstream slope is very irregular. Between the spillway pipes and the right abutment, photograph 6, the downstream slope consists of a vertical stone wall founded on bedrock. The center section of the slope, photograph 5, is protected with large rounded stones which act as a splash area for the spillway and outlet pipes. Between this area and the left abutment, the slope is overgrown with brush.

At the time of the July 8, 1981 inspection, water was spilling out of the twin spillway pipes, wetting the entire central section of the downstream slope. Hence, evidence of seepage could not be observed.

On a subsequent site visit on July 31, 1981, the reservoir level was lower and no water was flowing out of the spillway pipes and only a trickle of water was coming out of one of the outlet pipes. Photograph 14 shows the seepage of clear water flowing out of a portion of the toe of the dam on the second site visit. The total flow

seeping through the dam was estimated to be about 175 gpm by measuring the flow channel and flow rate in the pipe downstream of the dam.

Dike

The dike is an earth embankment about 15 feet high, 270 feet long, and 12 feet wide at the crest.

1. Upstream Slope

The upstream face of the dike, photograph 9, has a slope above the reservoir level of about 2H:1V. Riprap is present at the reservoir level but has experienced some deterioration and minor sloughing of the slope has occurred in some areas. Small brush covers most of the slope.

2. Crest

The crest of the dike shown in photograph 12 is grass covered and generally well maintained. The elevation of the crest at the right abutment is about 1/2 foot lower than the rest of the crest for a length of about 10 feet. This area has been identified as a spillway in previous dam inspections.

3. Downstream Slope

The downstream face of the dike has an upper section consisting of a vertical masonry wall and a lower section which is sloped at about 1.25H:1V. A portion of this slope is shown in photograph 11. The vertical masonry wall is generally intact except for a section near the left abutment where several stones are missing, photograph 13.

The lower sloped section of the dike is overgrown with brush and trees up to several inches in diameter are present. Numerous large trees up to 14 inches in diameter are growing near the downstream toe.

A spongy area is present about 15 feet downstream of the toe at about the center of the dike. This area is about 15 feet in diameter.

c. Appurtenant Structures

1. Spillway

The spillway at the dam consists of two 36 inch diameter pipes located near the center of the dam.

Water flowing through the spillway pipes discharges on the downstream face of the dam as shown in photograph 5. The splash area is protected with large rounded riprap. The water flows down the downstream slope of the dam until reaching the toe where it enters the discharge channel.

2. Outlet

There are 2 gate structures located at the upstream face of the dam which control the upper and lower drains (photographs 1 and 3). It is reported that both gate structures are operable.

The high level and low level outlet pipes both terminate on the downstream face of the dam above the downstream toe as shown in photograph 5. The splash area and discharge channel are the same as for the spillway.

d. Reservoir Area

There are no indications of instability along the banks of the reservoir in the vicinity of the dam.

e. Downstream Channel

Both the spillway and outlet pipes discharge into a common channel which enters a 5 foot diameter pipe about 20 feet downstream of the toe of the dam. Some debris is present in the channel. The 5 foot diameter pipe carries the flow under Reservoir Road. The elevation of the road surface is about 6 feet above the crest of the dam.

3.2 Evaluation

Based on the visual inspection, the dam appears to be in poor condition and the dike appears to be in fair condition. The inspection disclosed the following items which require attention:

a. The seepage of about 175 gpm through the dam, if left uncontrolled, could lead to instability of the dam.

b. The roots of trees near the crest of the dam and on the downstream slope of the dam and dike could provide shortened seepage paths leading to instability of the dam. If these trees are uprooted, they could result in local sloughing and subsequent erosion leading to instability of the dam.

c. The discharge of water onto the downstream slope of the dam from the spillway and outlet pipes could lead to instability of the downstream slope.

d. The spongy area 15 feet downstream of the toe of the dike is indicative of seepage through the dike which, if left uncontrolled, could result in internal erosion and instability of the dike.

e. The riprap on the upstream face of the dike has experienced some minor sloughing. Continued deterioration of the riprap protection could eventually lead to instability of the upstream slope of the dike.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General

The purpose of the dam is for recreation. The gates at the intake structures are operated and maintained by the caretaker. There are no provisions for flashboards or stoplogs at the spillway.

b. Description of Warning System in Effect

There are no warning systems at this dam.

4.2 Maintenance Procedures

a. General

The dam is maintained by the Pine Island Lake Recreational Corporation. The Corporation regularly allocates funds for dam and dike maintenance. The dam is inspected about every 5 years by the engineering firm of Tighe and Bond, Easthampton, Massachusetts.

b. Operating Facilities

The dam is used for recreation. The reservoir is drained every 5 years and lowered by a couple of feet every year in the fall.

4.3 Evaluation

Some maintenance of the slopes is performed yearly. Major repairs to the dam had been made in about 1970. The Owner should institute a program of annual technical inspection and a downstream warning and evacuation plan.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Pine Island Lake is located in the north central section of the Town of Westhampton. It is approximately 1.7 miles west of the Northampton town line between the Connecticut and Westfield Rivers. Route 66 is located 3 miles to the south. The 0.8 s.m. (507 acres) drainage area is wooded, undeveloped land and is part of the watershed for the Connecticut River. The terrain is rolling with numerous brooks carrying run-off to the Manhan and Mill Rivers which discharge into the Connecticut River.

5.2 Design Data

The dam and dike are believed to have been constructed about 1920 by the Loudville Paper Company. Repairs were made in 1970. Design data was not located.

5.3 Experience Data

There were no records of rainfall or flood stage located for the dam.

5.4 Test Flood Analysis

The dam and dike have a size classification of intermediate. The dam has a high hazard potential classification and the dike has a significant classification. Based on Corps Guidelines, the test flood would be the full PMF. The test flood

inflow (using the Corps Guideline of 3000 cfs/s.m. from drainage areas less than 1 s.m.) from the 0.8 s.m. drainage area is 2,400 cfs. The routed test flood outflow is 1345 cfs at elevation 1003.8. The dam and dike are overtopped by 1.3 feet. Discharge through the two 36 inch spillway pipes is 115 cfs or about 10 percent of the test flood outflow.

The routed outflow for a 1/2 PMF would be 300± cfs. The spillway passes 95± cfs or about 33 percent of the 1/2 PMF outflow. A discharge of this magnitude will overtop the dam and dike by at least 0.1 feet, at elevation 1002.6.

5.5 Dam Failure Analysis

Dam

The dam was determined to have a high hazard potential due to the potential loss of more than a few lives from dam failure flooding. Dam failure was assumed to occur with water at the top of the dam, elevation 1002.5. The peak failure discharge of 5,950 cfs for the dam is developed by assuming a break length of 75 feet for the 25 foot high structure.

The outlet channel for the dam runs in a southerly direction to the North Branch of the Manhan River. The Manhan River discharges into the Connecticut River about 12 miles southeast of the lake. It is estimated that seven roads and seven structures will be impacted in the event of a dam failure. The roads are Reservoir Road, King's Highway, a side road off King's Highway 6,000± feet downstream of the dam, Southampton Road, North Road, Easthampton Road and Stage Road. The first impacted structure

is located approximately 9,000 feet downstream on Southampton Road. It is located on the banks of the Manhan River. The dam failure discharge flooding will be at least 2 feet (above first floor level).

The second impacted structure is located 13,000 feet downstream on Easthampton Road. Flooding at this site will be at least 2 feet.

The five structures in a reach 15,450± to 16,200± feet downstream are located along Easthampton Road. The structures could be damaged by 2 to 3± feet of floodwater (above first floor level). It is also possible that part of Easthampton Road could be inundated at this time.

Just prior to dam failure flooding, there would be base flow flooding from adjacent drainage areas and spillway discharge. However, damage to homes is not apparent.

Dike

The dike was determined to have a significant hazard potential due to the potential for the loss of a few lives due to failure flooding.

The dike was assumed to fail with the water level at the crest, elevation 1002.5. The peak failure discharge of 4,295 cfs is developed by assuming a breach length of 110 feet for the 15 foot high structure. Since the dike has no spillway, there is no base flow flooding condition from spillway discharge.

Within the reach studied (7,000 feet long), one structure, located 4,400± feet downstream of the dike, could be damaged by failure flooding. The building is located at the confluence of

Roberts Meadow Brook and Brewer Brook and failure flooding could inundate it to a depth of 3± feet (above first floor level). North Road crosses the discharge channel 7,000 feet downstream of the dike. The culvert size is unknown at this location, but overtopping of the road is likely.

The total drainage area discharging to a point of 8,500 feet downstream of the dike is 3,670 acres or 5.74 square miles. Cumulative flows from moderate storms plus a dam failure will slightly increase the flooding deptns at the areas described above.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

The visual inspection indicates the following potential structural problems:

a. The seepage through the dam of about 175 gpm could lead to internal erosion and failure of the dam.

b. Areas of erosion or seepage could be created by the uprooting or decaying of trees located on the downstream toe of the dam and dike and on the crest of the dam.

c. The discharge of water onto the downstream slope of the dam from the spillway and outlet pipes could lead to instability of the downstream slope.

d. The presence of a spongy area downstrem of the toe of the dike is indicative of seepage which could lead to instability of the dike.

e. The deterioration of the riprap protection on the upstream slope of the dike could lead to erosion and instability of the upstream slope.

6.2 Design and Construction Data

No original design and construction data were made available for the dam or dike.

6.3 Post Construction Changes

The available information indicates that in or about 1970 the twin spillway pipes were replaced and the upper 24 inch drain and gate structure were installed.

The stone fill forming the downstream embankment of the dam appears to be a modification from the original design.

6.4 Seismic Stability

The dam is located within Seismic Zone 2 and in accordance with the recommended Phase I guidelines does not require seismic stability analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

Based on the visual inspection, the dam appears to be in poor condition and the dike appears to be in fair condition.

b. Adequacy of Information

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

c. Urgency

The recommendations and remedial measures presented in Sections 7.2 and 7.3 should be implemented by the Owner within one year after receipt of this Phase I Inspection Report.

7.2 Recommendations

a. The Owner should engage a qualified registered professional engineer to investigate and design remedial measures for:

1. Seepage through the dam and dike.
2. Repair of the riprap on the upstream slope of the dike.
3. Means of removing trees and roots from the crest and downstream slope of the dam and the downstream slope of the dike and selecting acceptable backfill for the holes created by root removal.

4. Modifications to the dam to prevent discharge of water onto the downstream slope.

b. The Owner should engage a qualified registered professional engineer to perform a detailed hydraulic/hydrologic study and evaluate the adequacy of the spillway and overtopping potential.

The Owner should implement all the recommendations of the Engineer.

7.3 Remedial Measures

a. Operating and Maintenance Procedures

1. Brush growth on the slopes of the dam and dike should be cut as part of routine annual maintenance.
2. The debris in the dam discharge channel should be removed and overhanging trees and limbs removed.
3. The stones missing from the vertical portion of the downstream face of the dike should be replaced.
4. The Owner should institute a program of annual technical inspection.
5. The Owner should develop a formal warning system for downstream areas in case of emergency.

7.4 Alternatives

There are no practical alternatives for these recommendations and remedial measures.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT PINE ISLAND LAKE DAM AND DIKE

DATE July 8, 1981*

TIME 3:30 p.m.

WEATHER Sunny - 90°

W.S. ELEV. 998 U.S. ____ DN.S.

PARTY:

1. Ron Cheney - HHB
2. Dave Vine - HHB
3. Mike Angieri - HHB
4. Karl Dalenberg - GEI
5. ____
6. ____
7. ____
8. ____
9. ____
10. ____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam Embankment	R.C., D.V., M.A., K.D.	
2.	Dike	R.C., D.V., M.A., K.D	
3.	Outlet Works	R.C., D.V., M.A., K.D.	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

*Subsequent visit July 31, 1981 by D. LaGatta and K. Dalenberg of Geotechnical Engineers, Inc.

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE DATE July 8, 1981

PROJECT FEATURE Dam Embankment NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic NAME R.Cheney, M. Angieri

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	1002.5
Current Pool Elevation	998
Maximum Impoundment to Date	Unknown
Surface Cracks	Minor cracking of pavement.
Pavement Condition	Minor cracking of pavement.
Movement or Settlement of Crest	None observed.
Lateral Movement	None observed.
Vertical Alignment	Dam crest is not flat - slopes toward reservoir.
Horizontal Alignment	Dam crest has non-uniform width.
Condition at Abutment and at Concrete Structures	Paved at all structures - minor cracking near spillway headwall.
Indications of Movement of Structural Items on Slopes	None.
Trespassing on Slopes	None.
Sloughing or Erosion of Slopes or Abutments	Downstream slope irregular rock fill and heavy brush.
Rock Slope Protection - Riprap Failures	Random riprap of left half of upstream face - no failures observed.
Unusual Movement or Cracking at or Near Toe	None observed.
Unusual Embankment or Downstream Seepage	None observed - much of downstream slope wet from spillway flow. Hence, any seepage would be difficult to observe.*
Piping or Boils	None observed.
Foundation Drainage Features	None observed.
Toe Drains	None observed.
Instrumentation System	None known.

*July 31, 1981 inspection - water level lower, seepage estimated at 175 gpm.

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE DATE July 8, 1981

PROJECT FEATURE Dam Embankment NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
DAM EMBANKMENT (Con't.) Vegetation	1. Trees up to 20 in. at right abutment. 2. Three- to four-in. diameter trees on crest. 3. Brush on left half of upstream face. 4. Brush and trees on much of downstream face.

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE DATE July 8, 1981

PROJECT FEATURE Dam Embankment NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	
Crest Elevation	1002.5
Current Pool Elevation	998
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed.
Pavement Condition	No pavement.
Movement or Settlement of Crest	Collapse of few stones of rock wall on downstream side of crest - near left abutment.
Lateral Movement	None observed.
Vertical Alignment	Good.
Horizontal Alignment	Good.
Condition at Abutment and at Concrete Structures	Good.
Indications of Movement of Structural Items on Slopes	None observed.
Trespassing on Slopes	None observed.
Sloughing or Erosion of Slopes or Abutments	Minor erosion at waterline on upstream slope.
Rock Slope Protection - Riprap Failures	Riprap present but overgrown with small brush. Evidence of minor sloughing.
Unusual Movement or Cracking at or Near Toes	Heavily overgrown and covered with brush debris. None observed.
Unusual Embankment or Downstream Seepage	Wet area about 15 ft diameter, located 15 ft downstream of dike toe near center of dike.
Piping or Boils	None observed.
Foundation Drainage Features	None observed.
Toe Drains	None observed.
Instrumentation System	None.
Vegetation	1. Minor brush on upstream slope. 2. Trees up to 14-in. diameter on downstream slope and at toe.

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE DATE July 8, 1981

PROJECT FEATURE Dam Embankment NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical,Structural,Hydraulic NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	
Slope Conditions	Below water.
Bottom Conditions	Below water.
Rock Slides or Falls	Below water.
Log Boom	Below Water.
Debris	Below water.
Condition of Concrete Lining	Below water.
Drains or Weep Holes	None observed.
b. Intake Structure	
Condition of Concrete	Below water.
Stop Logs and Slots	Below water.

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE DATE July 8, 1981

PROJECT FEATURE Dam Embankment NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical,Structural,Hydraulic NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	None at this project.
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	Gates manual.
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 PINE ISLAND LAKE DAM AND DIKE DATE July 8, 1981

PROJECT FEATURE Outlet Works NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	None at this project.
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE DATE July 8, 1981

PROJECT FEATURE Outlet Structure NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	No outlet structure.
Rust or Staining	Outflow discharges through metal pipes on downstream slope.
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	None.
Channel	Same as spillway channel.
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE DATE July 8, 1981

PROJECT FEATURE Spillway NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Good - below water.
Loose Rock Overhanging Channel	None.
Trees Overhanging Channel	None.
Floor of Approach Channel	Paved - concrete and asphalt near twin spillway pipes.
b. Weir and Training Walls	Spillway is ungated 36" dia. twin pipes and concrete headwall.
General Condition of Concrete	Headwall good.
Rust or Staining	None observed.
Spalling	None observed.
Any Visible Reinforcing	None observed.
Any Seepage or Efflorescence	None observed.
Drain Holes	None observed.
c. Discharge Channel	
General Condition	Overgrown with trees - random rock base.
Loose Rock Overhanging Channel	None.
Trees Overhanging Channel	Several trees overhanging channel.
Floor of Channel	Random rock fill - some trees in channel.
Other Obstructions	Some debris in channel.
Other Comments	Five-ft diameter pipe downstream of dam toe to which all flow channeled. The road embankment above this pipe is higher than dam crest.

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE DATE July 8, 1981

PROJECT FEATURE Service Bridge NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	
a. Super Structure	None at this project.
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

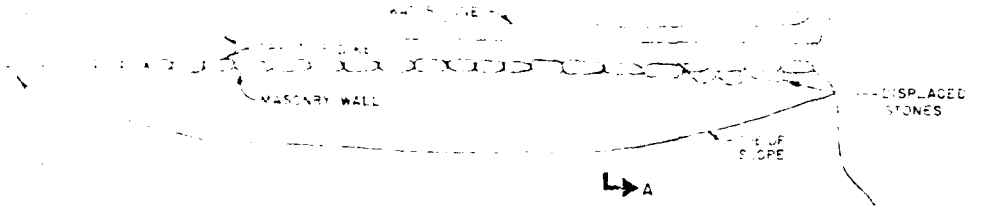
ENGINEERING DATA

List of Engineering Data

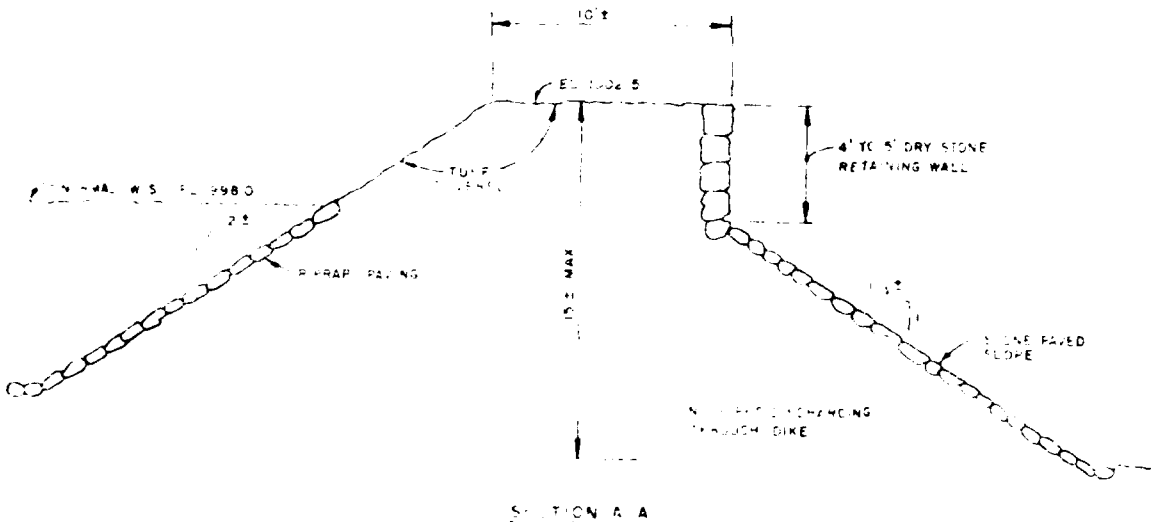
1. Plans dated 1970 outlining modifications to the spillway and installation of a new upper level drain were provided by Ms. Winfred Conway, 190 Walnut Street, Holyoke, Massachusetts 01040.

2. State Inspection Reports for the years 1977, 1975 and 1972, and a County Inspection Report for 1970 were made available at the State Department of Environmental Quality Engineering, Division of Waterways Office, 100 Nashua Street, Boston, Massachusetts 02114.

No additional engineering data was located.



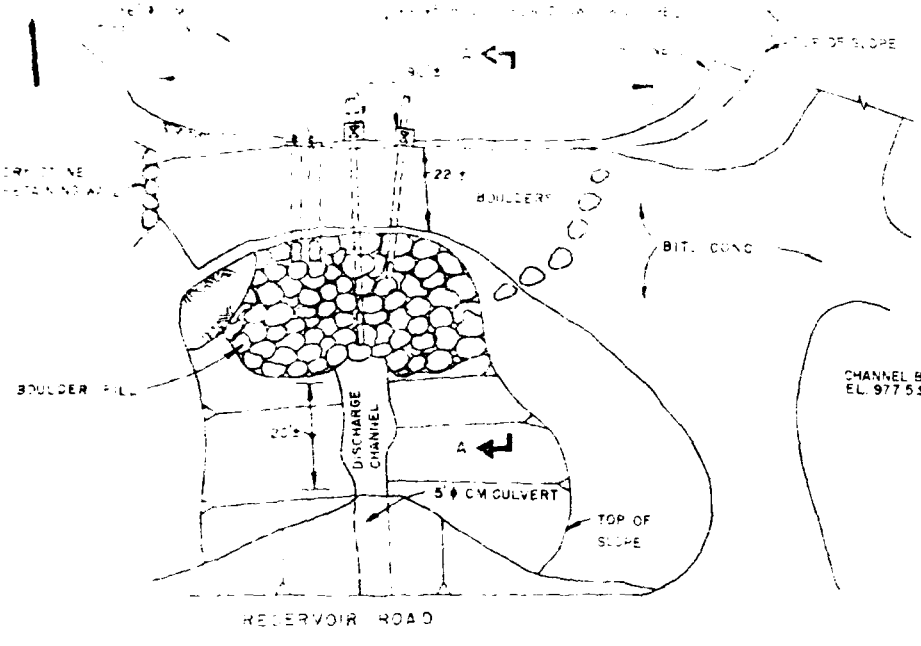
PLAN



SECTION A-A

PROGRAM OF INSPECTION OF NON-FED DAMS

PINE ISLAND LAKE DIKE
PLAN & SECTION



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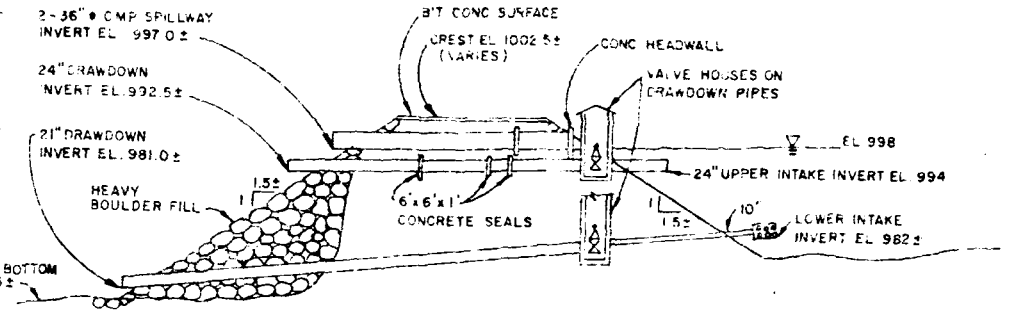


SECTION A - A

[illegible] CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

PINE ISLAND LAKE DAM & DIKE
PLAN AND SECTION

The Commonwealth of Massachusetts

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

100 Nashua Street, Boston 02114

January 11, 1978

Pine Island Lake Recreational Corp.
Westhampton, Mass.

RE: Insp. Dam #2-8-331-1
Pine Island Lake Dam
Westhampton

Dear Sir:

On April 12, 1977 , an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be Pine Island Lake Recreational Corp. . 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:

Brush and bramble should be removed. Small portion of bituminous concrete apron on westerly slope has unraveled-this should be corrected.
Minor seepage around gate seals should be corrected.

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

Alfs: bjm/
cc: Mr. William Boyk
H. Shumway, Dist. #2
F.J. Hoey, DHE

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

City/Town Westhampton. County Hampshire. Dam No. 2-9-331-1

Name of Dam Pine Island Lake Dam.

Topo Sheet No. 35. Coordinates: Mass. Rect. N 460,900, E 254,300.

Inspected by: Harold T. Shumway, On April 12, 1977. Date Last Inspection 4/12/75

2. OWNER/S: As of April 12, 1977

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

1. Pine Island Lake Recreational Corp., Westhampton, Mass.
Name St. & No. City/Town State Tel. No.

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

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

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

Mr. William Bosyk, Pres., 16 Conlee St., Holyoke, Mass. (Watershed)
Name St. & No. City/Town State Tel. No.

4. DATA:

No. of Pictures Taken None. Sketches See description of Dam.
Plans, Where In files of corporation.

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

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

Comments: Approximately 1½ miles of town highway - damage would be mostly to highway bridges and culverts downstream.

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

(6.) OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Approx. center of dam - twin 36" diam. ACCM pipe spillway.

Controls None, TYPE: _____

Automatic____. Manual____. Operative Yes____, No____.

Comments: _____

No. 2 Location and Type: Center of dam - 10" diam. pipe drawdown.

Controls yes, Type: Gate valve

Automatic____. Manual X. Operative Yes X, No____.

Comments: Pipe extended on downstream end with a 21" diam ACCM pipe.

No. 3 Location and Type: East of center of dam - 24" diam. pipe drawdown.

Controls yes, Type: Gate valve

Automatic____, Manual X. Operative Yes X, No____.

Comments: _____

Drawdown present Yes X, No____. Operative Yes X, No____.
Comments: See Items Nos. 2 and 3 above.

(7.) DAM UPSTREAM FACE: Slope 1½:1, Depth Water at Dam 5' to 6'.

Material: Turf X. Brush & Trees____. Rock fill X. Conc. Masonry X (spillway headwall), Wood____

Other Lake - bituminous concrete apron and concrete floor at intake opening.

Condition: 1. Good____. 3. Major Repairs____.

2. Minor Repairs X. 4. Urgent Repairs____.

Comments: A small portion of bituminous concrete apron on westerly slope has unraveled.

(8.) DAM DOWNSTREAM FACE: Slope 1½:1.

Material: Turf X. Brush & Trees____. Rock Fill X. Masonry____. Wood____

Other Massive boulder fill.

Condition: 1. Good____. 3. Major Repairs____.

2. Minor Repairs X. 4. Urgent Repairs____.

Comments: Minor [illegible] grout on slope - brush at toe of slope - minor seepage noted.

(9) EMERGENCY SPILLWAY: Available yes. Needed_____.

Height Above Normal Water 3± Ft.

Width 30± Ft. Height 1± Ft. Material Bit. conc. surface.

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

2. Minor Repairs_____. 4. Urgent Repairs_____.

Comments:_____

(10) WATER LEVEL AT TIME OF INSPECTION: 3/4 Ft. Above X. Below_____.

Top Dam_____ F.L. Principal Spillway X.

Other Invert of twin pipes.

Normal Freeboard 3± Ft. to invert of emergency spillway.

(11) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Minor brush and bramble growth.

Animal Burrows and Washouts None found

Damage to Slopes or Top of Dam None found

Cracked or Damaged Masonry Area 2'± wide by 5'± long of bituminous damage unraveled.

Evidence of Seepage Minor seepage around pipe seals of downstream pipes.

Evidence of Piping None found

Leaks None found

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_____.
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 dam appears to be sound and safe with only minor routine maintenance repairs needed.

[illegible]

The Commonwealth of Massachusetts

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

100 Nashua Street, Boston 02114

January 11, 1978

Pine Island Lake Recreation Corp.
Westhampton, Mass.

RE: Insp. Dam #2-8-331-2
Pine Island Lake Dike
Westhampton

Dear Sir:

On April 12, 1977, an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be Pine Island Lake Recreation Corp. 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 706 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:

Brush growth on upstream slope should be removed. Misplaced stones on downstream wall should be replaced-Path along top of dike should be reseeded. Seepage at toe of downstream slope should be corrected.

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

Alc: hjh
cc: Mr. William Bosyk
F.J. Hoey, DHD
H. Shumway, Dist. #2

INSPECTION REPORT - DAMS AND RESERVOIRS

1) LOCATION:

~~xxxx~~/Town Westhampton. County Hampshire. Dam No. 2-8-331-2.

Name of Dam Pine Island Lake Dike.

Topo Sheet No. 8D. Coordinates: Mass. Rect. N 491,300, E 256,400.

Inspected by: Harold T. Shumway, On April 12, 1977. Date Last Inspection 4-18-75.

2) OWNER/S: As of April 12, 1977

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

1. Pine Island Lake Recreation Corp., Westhampton, Mass.
Name | St. & No. | City/Town | State | Tel. No.

2. _____
Name | St. & No. | City/Town | State | Tel. No.

3. _____
Name | St. & No. | City/Town | State | Tel. No.

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

Mr. William Bosyk,
President of Corporation, 16 Donlee Street, Holyoke, Mass.
Name | St. & No. | City/Town | State | Tel. No.

3) 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____.
2. Moderate____.
3. Severe X.
4. Disastrous____.

Comments: Approx. 128 million gallons impoundment-flow would enter Roberts Meadow Brook-could overtop and/or cause failure of Roberts Meadow Reservoirs-Upper, Middle and Lower Dams Nos. 2-8-214-15, 14 and 16 in Northampton, just above village of Leeds.

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

(6.) OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: South end of dike-10' to 12'w. x ½'h. swale spillway

Controls None, TYPE: _____

Automatic_____. Manual_____. Operative Yes_____, No_____.

Comments: This is an emergency overflow spillway approx. 3½' above normal water level.

No. 2 Location and Type: _____

Controls_____, Type: _____

Automatic_____. Manual_____. Operative Yes_____. No_____.

Comments: _____

No. 3 Location and Type: _____

Controls_____, Type: _____

Automatic_____. Manual_____. Operative Yes_____, No_____.

Comments: _____

Drawdown present Yes X, No_____. Operative Yes_____, No_____.
Comments: See reports on dam No. 2-8-331-1

(7.) DAM UPSTREAM FACE: Slope 1½:1, Depth Water at Dam 10'±.

Material: Turf X. Brush & Trees_____. Rock Fill X. Masonry_____. Wood_____

Other Cobble paved slope.

Condition: 1. Good_____. 3. Major Repairs_____.

2. Minor Repairs X. 4. Urgent Repairs_____.

Comments: Minor brush growth along edge upstream slope-minor wear on pedestrian and motor bike path along top of dike.

(8.) DAM DOWNSTREAM FACE: Slope Vertical first 4' to 5' 1½:1 on rest of slope.

Material: Turf_____. Brush & Trees_____. Rock Fill X. Dry Stone Masonry X. Wood_____

Other Vertical wall of dry stone masonry - 1½:1 slope is stone paved.

Condition: 1. Good_____ 3. Major Repairs_____.

2. Minor Repairs X. 4. Urgent Repairs_____.

Comments: 33' to 35' of northwesterly end of stone masonry wall has deteriorated with most of stones displaced. Minor seepage area at toe of slope.

(9) EMERGENCY SPILLWAY: Available Yes. Needed ____.

Height Above Normal Water 3½ Ft.

Width 10' to 12 Ft. Height ½ Ft. Material Earth-swale type.

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

2. Minor Repairs X. 4. Urgent Repairs ____.

Comments: Sparse turf cover-could erode if overtopped.

(10) WATER LEVEL AT TIME OF INSPECTION: 3 Ft. Above ____. Below X.

Top Dam X F.L. Principal Spillway ____.

Other ____

Normal Freeboard 4 Ft. to top of dike.

(11) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Minor brush growth on upstream slope

Animal Burrows and Washouts None evident

Damage to Slopes or Top of Dam Slight wear evident on path along top of dike

Cracked or Damaged Masonry Several misplaced stones on downstream wall

Evidence of Seepage Minor damp area 15'± from toe downstream slope

Evidence of Piping None found

Leaks None found

Erosion None found

Trash and/or Debris Impeding Flow N/A

Clogged or Blocked Spillway N/A

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 is an earthen embankment 230'± in length, with a cobble paved upstream slope, a turf covered top 10'± wide, and a 1½:1 stone paved downstream slope with a vertical stone masonry wall on the top 4' to 5' of slope. The northwesterly end of this stone masonry wall, approximately 33' to 35' in length, has a great many displaced stones.

A minor growth of brush was noted along the upstream slope.

The seepage area noted in past reports appears to be abating. Only a small area of dampness was noted on this inspection.

May 19, 1975

William Bosyk, President
Pine Island Lake Recreational Corporation
16 Donlee Street
Holyoke, Massachusetts 01040

RE: Inspection-Dam #2-8-331-1 and 2
Westhampton
Pine Island Lake Dam and Dike

Dear Mr. Bosyk:

On April 13, 1975, an engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam and dike. Our records indicate that the Pine Island Lake Recreation Corporation is the owner. Will you please notify this office if this information is not current.

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

As a result of the inspections, the following information is provided:

Pine Island Lake - Dam #2-8-331-1

The results of the inspection indicate that this dam is safe. The repairs indicated in our letter dated August 21, 1972 have been tended to. The following minor conditions were noted:

1. Remove the light growth of brush and the 6 inch maple from the embankment.

2. There is slight seepage through the 21 and 24 inch diameter sluices which should be checked periodically and corrected when conditions warrant.

Pine Island Lake - Dike #2-8-331-2

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

1. emove the minor growth of brush from the upstream embankment.

2. There are a few missing stones from the top of the masonry wall on the northwesterly end of the dike on the downstream side. Repairs are recommended.

3. A wet area was observed about 15 ft. from the downstream toe of slope. This appears to be a condition of long standing. Frequent inspection of this area is recommended followed by the necessary corrective action if conditions warrant.

4. Develop a good growth of turf at the emergency spillway swale.

We call these conditions to your attention now, before they become serious and more expensive to correct. With any correspondence, please include the designated numbers above.

Very truly yours,

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

LLM:jmp
cc: F. J. Hoey
F. Salls

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

City/Town Westhampton. County Hampshire. Dam No. 2-8-331-1.

Name of Dam Pine Island Lake Dam.

Topo Sheet No. 8D. Mass. Rect. Coordinates: N 489,900, E 254,300.

Inspected by: Harold T. Shumway, On April 18, 1975. Date Last Inspection 8-4-72.

2. OWNER/S: As of 4-18-75

per: Assessors_____, Reg. of Deeds_____, Prev. Insp. X, Per. Contact X.

	Name	St. & No.	City/Town	State	Tel. No.
1.	Pine Island Lake Recreational Corporation,	Westhampton,	Mass.		
2.					
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.
William Bosyk President of Corp.,	16 Donlee St.,	Holyoke, Mass.		536-0749

3. DATA:

No. of Pictures Taken None. Sketches See description of Dam.
Plans, Where In files of corporation.

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

1. Minor_____.
2. Moderate X.
3. Severe_____.
4. Disastrous_____.

Comments: 128 million gallons impoundment - damage would be mostly to highway bridges and culverts along North Branch of Manhan River.

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

(6.) OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Approx. center of dam - twin 36' dia. A.C.C.M. pipe spillway.

Controls None, TYPE: _____.

Automatic____. Manual____. Operative Yes____, No____.

Comments: _____

No. 2 Location and Type: Center of dam - 10" dia. pipe drawdown

Controls Yes, Type: Gate valve

Automatic____. Manual X. Operative Yes X, No____.

Comments: _____

No. 3 Location and Type: East of center of dam - 24" dia. pipe drawdown.

Controls Yes, Type: Gate valve

Automatic____. Manual X. Operative Yes X, No____.

Comments: _____

Drawdown present Yes X, No____. Operative Yes X, No____.
Comments: See item No. 2 and No. 3 above.

(7.) DAM UPSTREAM FACE: Slope 1½:1, Depth Water at Dam 5' to 5'.

Material: Turf X. Brush & Trees____. Rock fill X. Masonry____. Wood____

Other Some ledge - also bit. conc. apron.

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

2. Minor Repairs____. 4. Urgent Repairs____.

Comments: _____

(8.) DAM DOWNSTREAM FACE: Slope 1½:1.

Material: Turf X. Brush & Trees____. Rock Fill X. Masonry____. Wood____

Other Boulder fill.

Condition: 1. Good____. 3. Major Repairs____.

2. Minor Repairs X. 4. Urgent Repairs____.

Comments: Some brush growth on slope, one 6" maple on westerly end of slope
slight seepage noted through 24" dia. and 21" dia. drawdown pipes.

(9.) EMERGENCY SPILLWAY: Available Yes. Needed _____.

Height Above Normal Water 3± Ft.

Width 30'± Ft. Height 1'± Ft. Material Bit. conc. surface.

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

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

Comments: _____

_____

(10.) WATER LEVEL AT TIME OF INSPECTION: 1/2 Ft. Above X. Below _____.

Top Dam _____ F.L. Principal Spillway X.

Other _____.

Normal Freeboard 3± Ft. to invert of emergency spillway.

(11.) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment One 6" maple on westerly end - light brush growth.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam None found.

Cracked or Damaged Masonry None found.

Evidence of Seepage Yes - slight seepage noted through 24" dia. end 21" dia. sluices.

Evidence of Piping None evident.

Leaks None evident.

Erosion None evident.

Trash and/or Debris Impeding Flow None found.

Clogged or Blocked Spillway None.

Other _____.

(12.) OVERALL CONDITION:

1. Safe___ X _____.
2. Minor repairs needed_____
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)

The last inspection of this dam on August 4, 1972, showed several needed repairs and dam was classified as condition #3, major repairs needed. Present inspection of April 18, 1975 found evidence that all these needed repairs have been satisfactorily completed. On the westerly end of dam a bituminous cover apron has been put down on the entire upstream slope see enclosed sketch. This, along with other repairs specified in a letter by owners to your Department, dated 11-15-72, seems to have effectively sealed off all leaks noted in previous inspection reports.

No leaks were found anywhere and only a minor seepage was noted coming from outlet ends of 24" dia. and 21" dia. drawdown sluice pipes. This seepage appears to be a normal condition. Some light brush growth was noted on downstream slope. One 6" dia. maple tree was noted growing on westerly end of dam on downstream slope. This tree could become a hazard to dam safety in future years if allowed to continue to grow.

Normal impoundment of this dam is approx. 128 million gallons. Maximum impoundment at point of overtopping would be approx. 192 million gallons.

Dam appears sound and is considered safe at time of inspection.

See also Inspection Report on Pine Island Lake Dike No. 2-8-331-2.

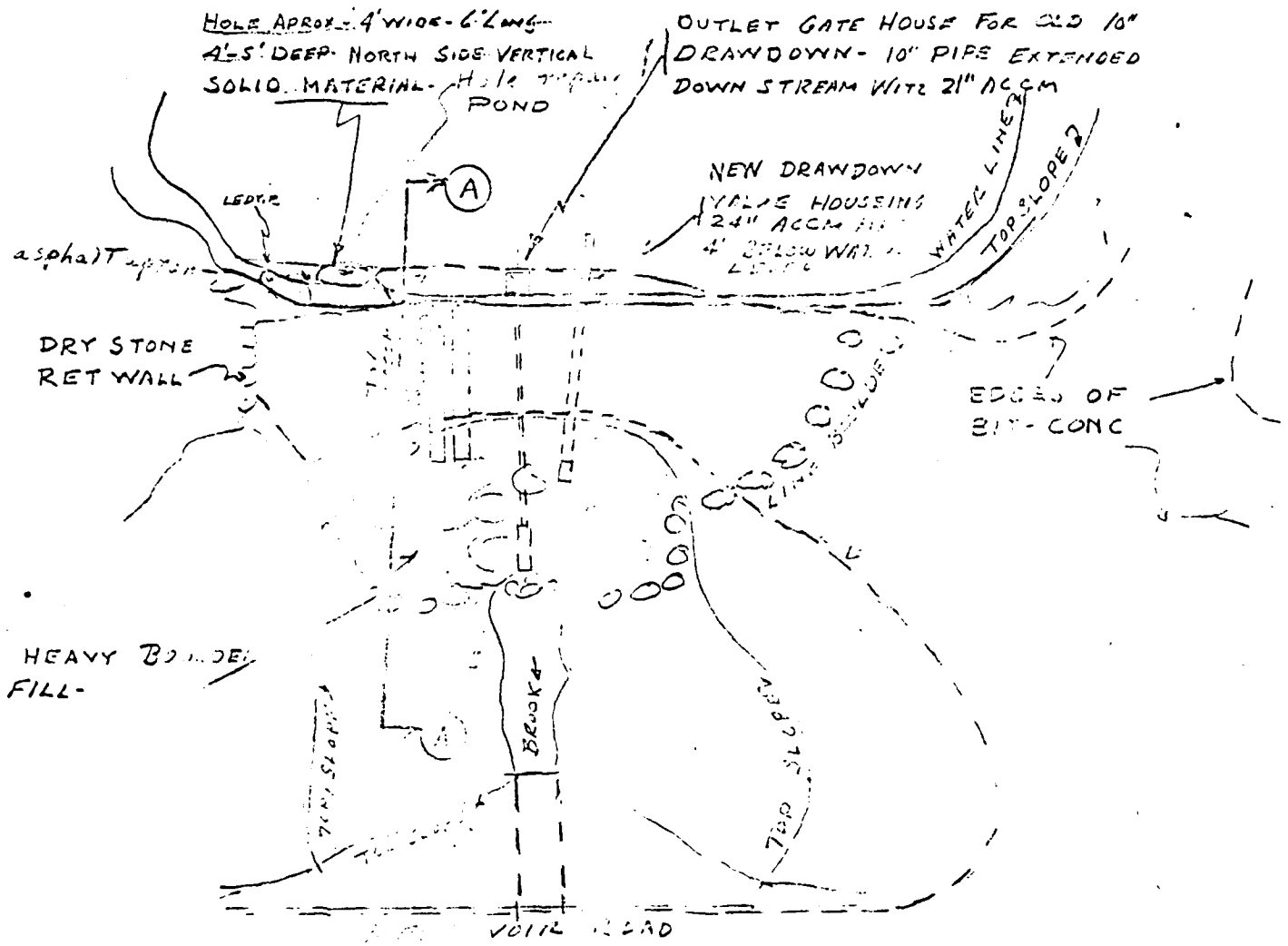
RCC/ja

UNLICHED

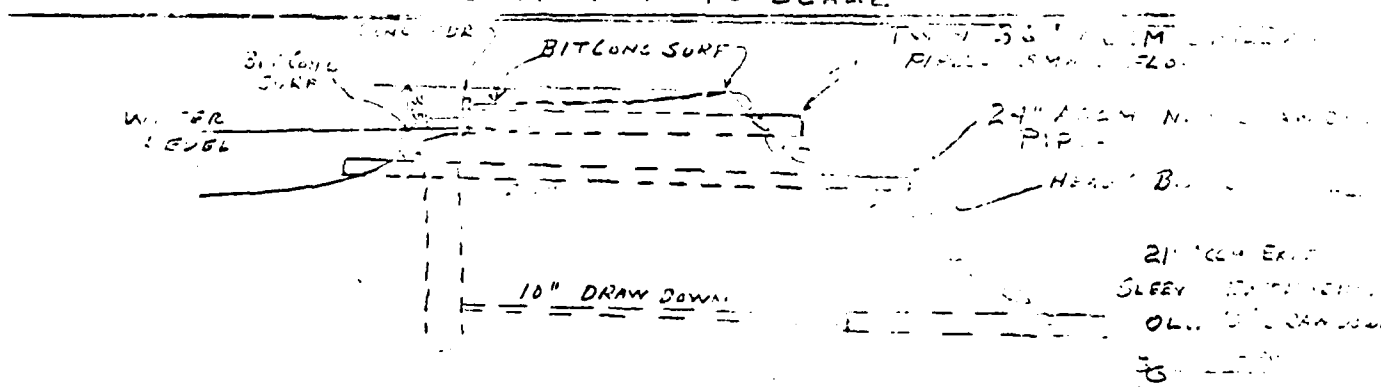
DAM NO. 2-8-331-1

PINE ISLAND LAKE DAM

Aug 9, 1972



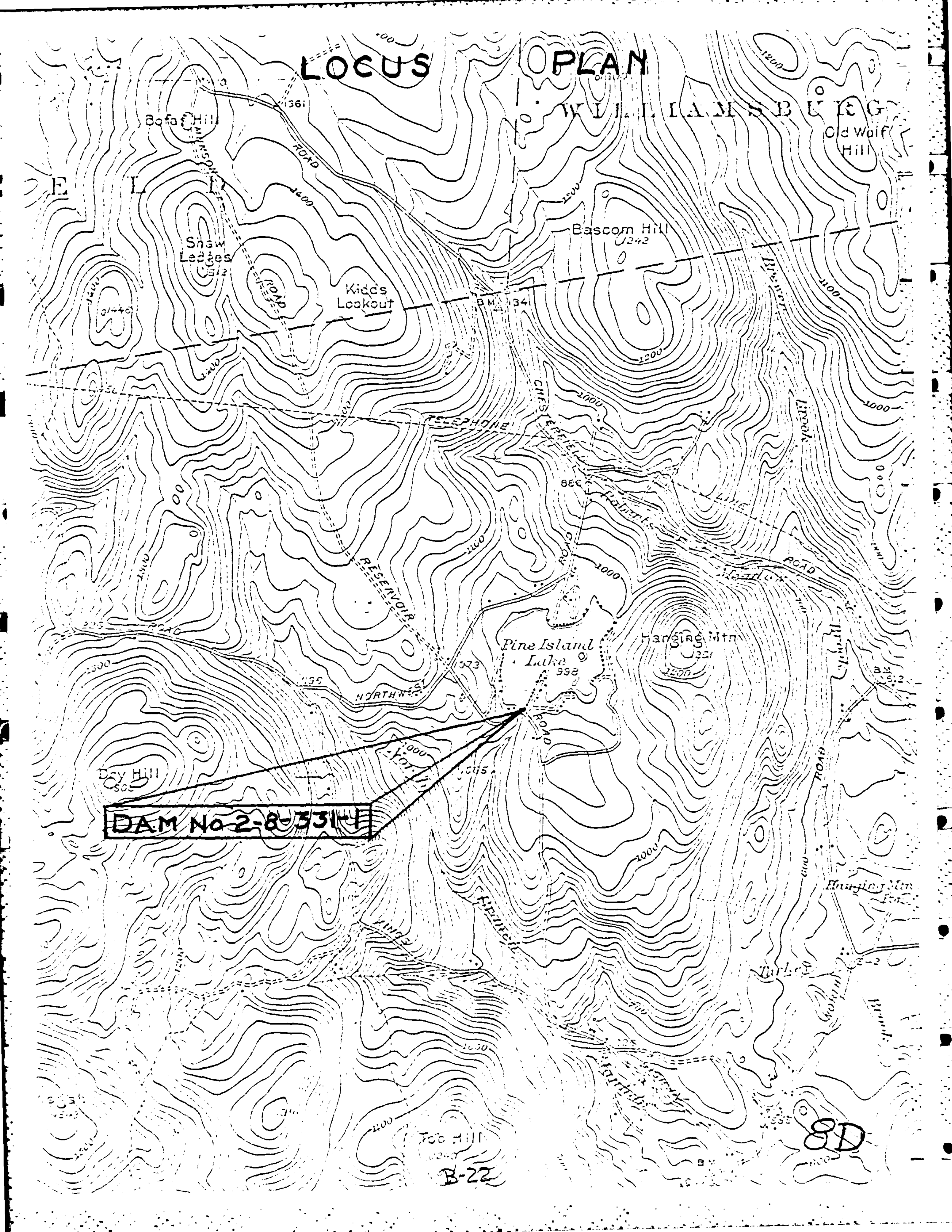
PLAN NOT TO SCALE



X SECTION "AA"

NOT TO SCALE

B-21


LOCUS PLAN
WILLIAMSBURG
Bofat Hill
Old Wolf Hill
Shaw Ledges
Kidds Lookout
Bascom Hill
TELEPHONE
CHESTERFIELD
ROAD
RESERVOIR
NORTHWEST
Pine Island Lake
Hanging Mtn
Dry Hill
DAM No 2-8-331-1
Job Hill
8D

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

~~City~~/Town Westhampton. County Hampshire. Dam No. 2-8-331-2.

Name of Dam Pine Island Lake Dike.

Topo Sheet No. 8D. Coordinates: Mass. Rect. N 491,300, E 256,400.

Inspected by: Harold T. Shumway, On April 18, 1975. Date Last Inspection August 8, 1972.

2. OWNER/S: As of April 18, 1975

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

	Name	St. & No.	City/Town	State	Tel. No.
1.	Pine Island Lake Recreation Corporation	Westhampton, Massachusetts		01027	
2.					
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. William Bosyk, President of Corporation	16 Donlee Street	Holyoke, Ma.	01040	536-0740

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

Comments: One hundred twenty-eight (128) million gallons impoundment - would flow into Roberts Meadow Brook, overtopping Roberts Meadow Reservoir, Upper Middle and Lower Dams Numbered 2-8-314-15, 14 and 16 in Northampton, just above Village of Leeds.

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

6. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: South end of dike - 10' to 12' W. x 1/2' H. swale spillway.

Controls None, TYPE: _____

Automatic____. Manual____. Operative Yes____, No____.

Comments: This is an emergency overflow spillway approximately 3½' above normal water level.

No. 2 Location and Type: _____

Controls____, Type: _____

Automatic____. Manual____. Operative Yes____, No____.

Comments: _____

No. 3 Location and Type: _____

Controls____, Type: _____

Automatic____. Manual____. Operative Yes____, No____.

Comments: _____

Drawdown present Yes X, No____. Operative Yes____, No____.
Comments: See Reports on Dam Number 2-8-331-1.

---

7. DAM UPSTREAM FACE: Slope 1½:1, Depth Water at Dam 10'±.

Material: Turf X. Brush & Trees____. Rock fill X. Masonry____. Wood____

Other Cobble paved slope.

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

2. Minor Repairs____. 4. Urgent Repairs____.

Comments: Minor light growth of brush on upstream slope. Foot path along top of dike slightly eroded from pedestrian traffic.

---

8. DAM DOWNSTREAM FACE: Slope Vertical first 4' to 5' 1½:1 on rest of slope.

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

Other Vertical wall of dry stone masonry - 1½:1 slope stone paved.

Condition: 1. Good____. 3. Major Repairs____.

2. Minor Repairs X. 4. Urgent Repairs____.

Comments: Three or four misplaced stones in retaining wall on northwesterly

(9.) EMERGENCY SPILLWAY: Available Yes. Needed ____.

Height Above Normal Water 3½ Ft.

Width 10' to 12' Ft. Height ½ Ft. Material Earth - swale type.

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

2. Minor Repairs X. 4. Urgent Repairs ____.

Comments: Poor turf cover on top or bed of spillway. It appears that some fill has been placed in spillway since last inspection raising elevation of invert 6"±.

(10.) WATER LEVEL AT TIME OF INSPECTION: 4 Ft. Above ____. Below X.

Top ~~Dam~~ Dike X F.L. Principal Spillway ____.

Other ____.

Normal Freeboard 4 Ft. to top of dike.

(11.) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Minor brush growth on upstream slope.

Animal Burrows and Washouts None Evident.

Damage to Slopes or Top of Dam Foot path along top of dike shows some wear from pedestrian traffic.

Cracked or Damaged Masonry 3 or 4 misplaced stones in top of downstream stone masonry retaining wall on northwesterly end.

Evidence of Seepage Yes. Wet area 15'± from toe downstream slope in old brook bed. No flow noted.

Evidence of Piping None Found.

Leaks None Found.

Erosion None Found.

Trash and/or Debris Impeding Flow N/A

Clogged or Blocked Spillway N/A

Other Swale spillway should have a more adequate turf cover to prevent erosion.

2. 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_____.

---

3. REMARKS AND RECOMMENDATIONS: (Fully Explain)

This is an earthen embankment about 230'± long with a cobble paved, upstream slope, a turf covered top 10'± wide, and a vertical dry stone masonry wall 4' to 5' high, with a 1½:1 stone paved slope base on downstream slope.

A minor growth of brush was noted on upstream slope which should be cut. Some pedestrian traffic wear on foot path along center of top of dike was noted but this presents no hazzard at present. A few misplaced stones were noted on top of stone masonry wall on northwesterly end of dike on downstream side. These should be replaced to prevent any further deterioration of wall and slope.

The seepage area noted in Item 11 appears to be an existing condition of many years. There was no evidence of any water flow or of any fines in area. Future inspections should closely check this area for any increase in size or indication of water flow.

The emergency overflow swale spillway should have a more adequate turf cover developed to prevent possible surface run-off erosion. The elevation of the invert of swale spillway appears to be the same as invert of emergency spillway of Pine Island Lake Dam, Number 2-8-331-1, on opposite end of Lake.

On April 25, 1975 a return visit was made to Pine Island Lake Dam and Dike with Mr. William Bosyk, President of Pine Island Lake Recreational Corporation, at his request. We went over all of conditions needing attention which are mentioned in this Report and in Inspection Report on Dam Number 2-8-331-1. He stated all of these repairs would be done as soon as possible.

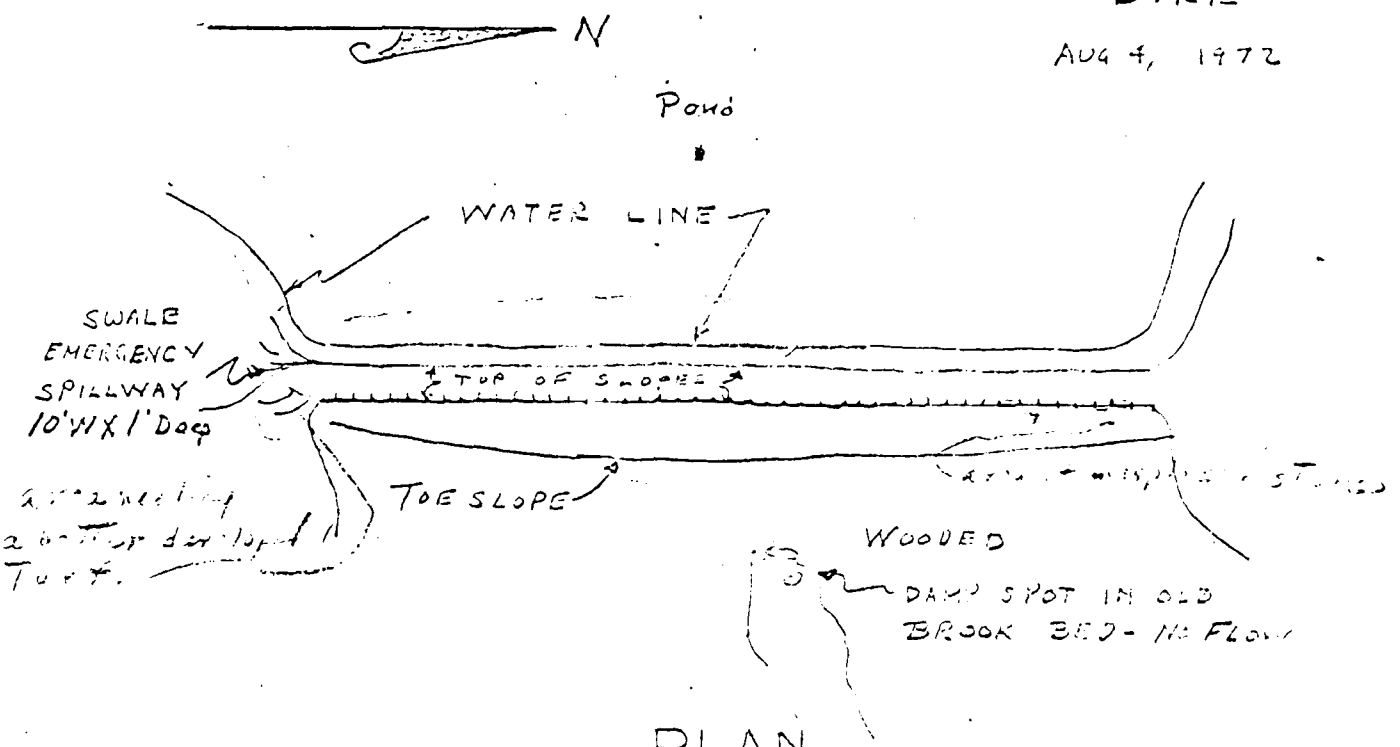
Mr. Bosyk also expressed a desire to have any and all correspondence concerning Dams Numbered 2-8-331-1 and 2-8-331-2 sent directly to him. He was assured that this request would be honored by your Department.

This dike appears to be stable and safe at time of inspection

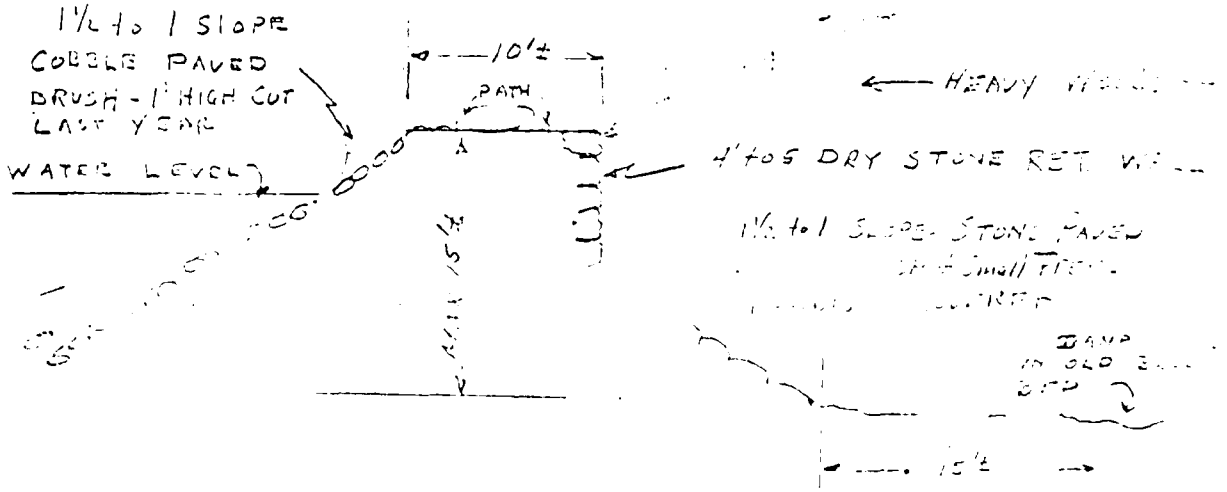
WTS/cd
Enclosure

SKETCH

DAM No 2-8-331-2
PINE ISLAND LAKE
DIKE
AUG 4, 1972



PLAN
NOT TO SCALE



X SECTION "AA"

NOT TO SCALE

66 Greves Street
So. Deerfield, Mass. 01373
November 15, 1972

Mr. Malcolm E. Graf, Assoc. Comm.
Division of Waterways
100 Nashua Street
Boston, Mass. 02114

Re: Inspection of Dam #2-8-331-1
Pine Island Lake
Westhampton, Mass.

Dear Mr. Graf:

We have delayed answering your letter of August 21, 1972 regarding the leak in our dam at Pine Island Lake as we wanted to have something definite to report. It is now possible to do just that.

We lowered the lake about 3½ feet and there is a leak in the earth fill about 15 feet west of the spillway. The blacktop apron, installed a number of years ago, had broken up allowing the water to filter through the fill and run along the ledge on the west side of the dam. This leak seems only to occur when the water level is within 3½ to 4 feet of normal height. The upstream part of the dam below the 4 ft. level seems to hold o.k.

We are in the process of lowering the lake another 2 feet. We will then have the leaky or porous fill removed on the downstream side between what is solid and the rock ledge. Concrete will then be poured to allow it to seep into whatever porous or honeycombed veins might have been caused by the leak. Then the earthen part will be refilled and a new blacktop apron installed up to the rock ledge. This, I am sure, will solve the problem and I hope this meets with your approval.

I had a meeting at the dam yesterday with Mr. Balls of the Northampton Division of your department. Mr. Balls had an associate of his with him and both seemed to be satisfied with our plans, and also with the contractor who will do the work. The work is scheduled to start this weekend and Mr. Balls plans to be on hand periodically to inspect our work and progress.

I did not fill in the form that accompanied your letter as this is only maintenance and repair work and does not constitute an alteration or change in the dam. You also mentioned work done since June, 1970. This work was the result of an order from the County in 1969 to replace our overflow pipes. Both pipes had rusted away on the bottom, allowing the water to run down over the face of the dam. Because of an exceedingly wet fall, we were unable to lower the lake enough to do the work. The County gave us permission to do the work the following year and to lower the lake earlier at their request. This we did and were able to install the new pipes. This also constituted a repair job and not an alteration or change in the dam.

I sincerely hope this all meets with your approval.

Very truly yours,

Norman [illegible], Clerk
Pine Island Recreation Corp.

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

August 21, 1972

Norman J. Bleakley, Clerk
Pine Island Lake Recreational Corp.
66 Graves Street
South Deerfield, Mass. 01373

Re: Inspection of Dam #2-8-331-1
Westhampton
Pine Island Lake Dam

Dear Mr. Bleakley:

An engineer from the Massachusetts Department of Public Works has inspected the above dam of which the Pine Island Lake Recreational Corp. is the owner.

The inspection was made in accordance with Chapter 253 of the Massachusetts General Laws, as amended by Chapter 595 of the Acts of 1970.

It is indicated that extensive work has been done at the dam since June of 1970, if this constitutes an alteration then the enclosed Department application must be completed and returned to this office for review.

The dam in its present condition appears unstable and poses a threat to life and property downstream for which you are responsible.

It is therefore imperative that the pond be drawn down gradually by whatever means possible and maintained at a safe level.

The following deficiencies were noted that require your immediate attention:

1. Locate the source and evaluate the large flow of water thru the stone fill at the downstream base of embankment.

2. Fill, compact and grade large cavity approximately 10 feet west of the spillway.

It is strongly suggested that you obtain the services of a Registered Professional Civil Engineer experienced in the construction and maintenance of Dams.

An early reply providing a schedule of operations is required. If any further assistance is necessary please contact Mr. Leo Andronico or Mr. John Piaseczny at 727 - 4793. Kindly refer to the number of the dam indicated above.

Very truly yours,

MALCOLM E. CRAF
ASSOCIATE COMMISSIONER

LRA:eh
Enclosure:
F. J. Hoey DME #2
R. Sells Dist. #2

DESCRIPTION OF DAM

DISTRICT 2

Submitted by Russell C. Salls, P. E. Dam No. 2-8-331-1

Date August 4, 1972 ~~City~~/Town WESTHAMPTON

Name of Dam Pine Island Lake Dam

1. Location: Topo Sheet No. 8 D Mass. Rect. Coordinates N 489,900 E 254,800

Provide 8½" x 11" in clear copy of topo map with location of Dam clearly indicated.
At head of a tributary to North Branch Manhan River just northerly of Reservoir Road about 2000 ft. southeasterly from Northwest Road.

2. Year built: Around 1920 by Loudville Paper Co. Year/s of subsequent repairs 1970

3. Purpose of Dam: Water Supply ____ Recreational x
Irrigation ____ Other ____

4. Drainage Area: 3/4 sq. mi. ____ acres.

5. Normal Ponding Area: 56 Acres; Ave. Depth 7 - 8 ft.
Impoundment: 128 million gals; 392 acre ft.

6. No. and type of dwellings located adjacent to pond or reservoir ____
i.e. summer homes etc. 60 summer cottages

7. Dimensions of Dam: Length 100 ft. ± Max. Height 25 ft. ±
Freeboard 3
Slopes: Upstream Face 1½ to 1
Downstream Face 1½ to 1
Width across top 35 ft. +

DAI NO. 2-c-331-1

8.

Classification of Dam by Material:

Earth x Conc. Masonry _____ Stone Masonry _____

Timber _____ Rockfill x Other _____

9.

A. Description of present land usage downstream of dam:

100 % rural; _____ % urban

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 1 no x

10.

Risk to life and property in event of complete failure.

No. of people None

No. of homes None

No. of businesses None

No. of industries None Type _____

No. of utilities None Type _____

Railroads None

Other dams On Manhan River

Other 5 or more highway bridges. Damage on North Branch of Manhan River.

11.

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

RCE/ad/gm

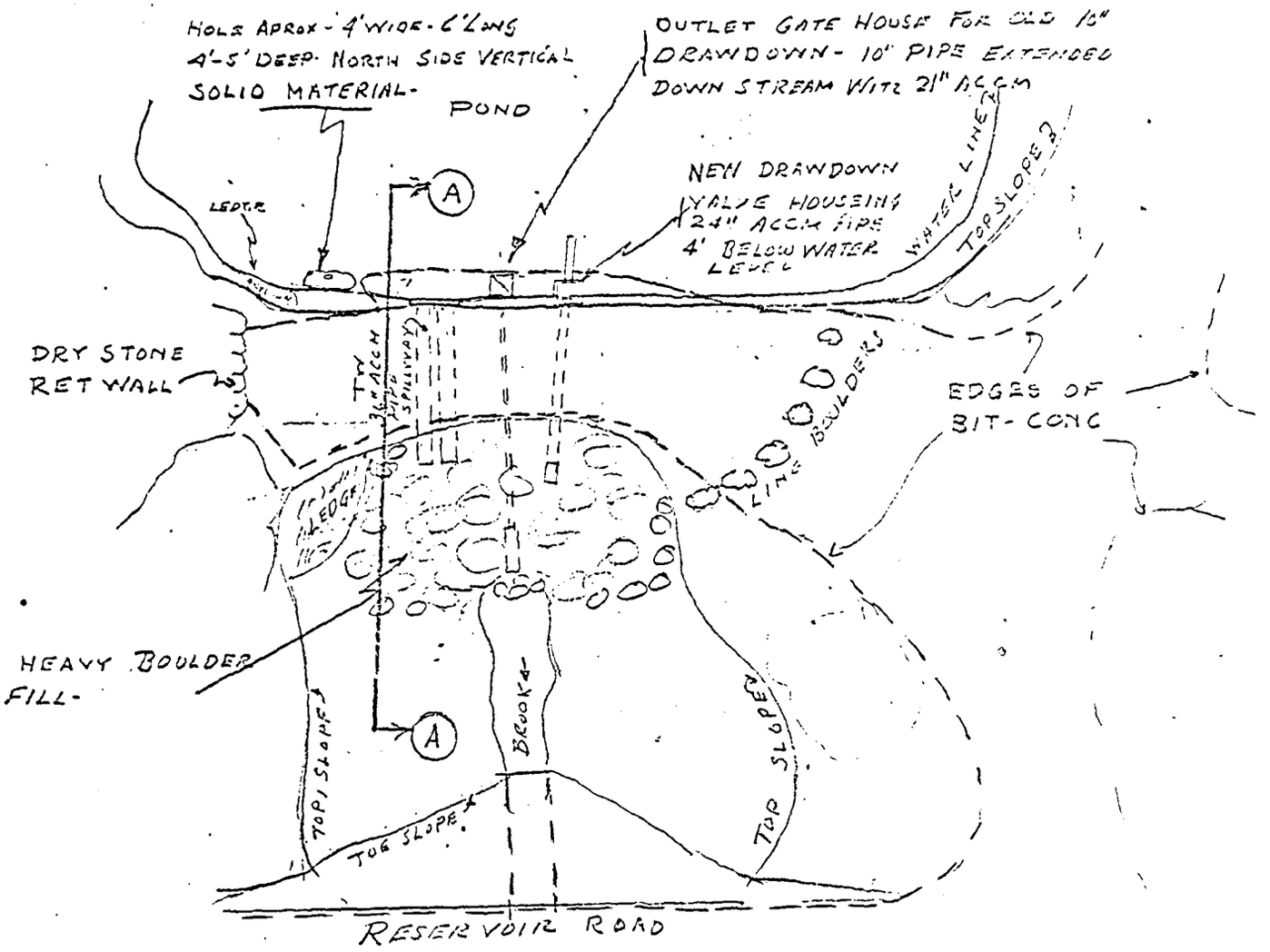
Encls.

SKETCHED

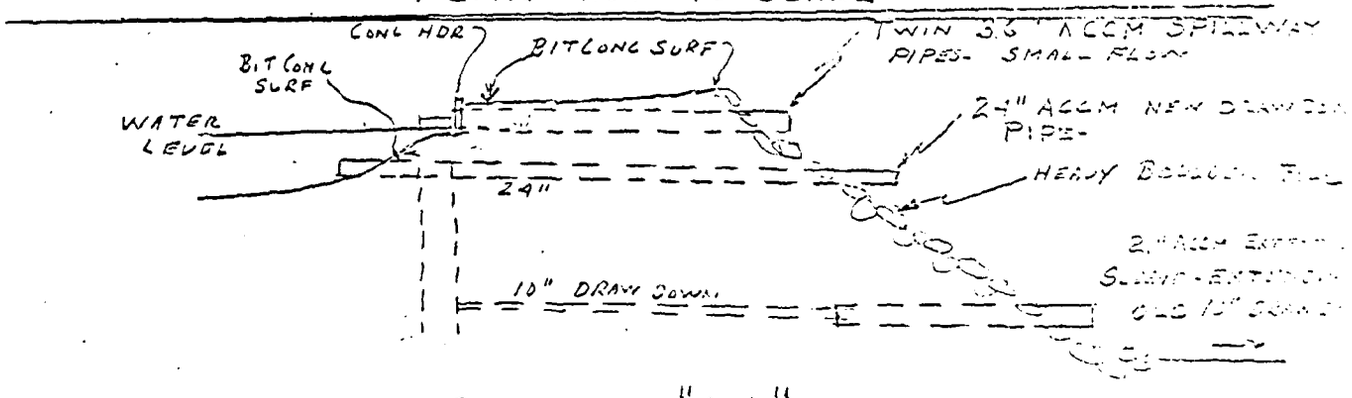
DAM NO. 2-8-331-

PINE ISLAND LAKE DAM

Aug 4, 1972



PLAN NOT TO SCALE



X SECTION "AA"

NOT TO SCALE

DAM INSPECTION REPORT

Inspected by Russell C. Salls, P.E. Date Aug. 4, 1972

Date Last Inspection June 1970

Town Westhampton County Hampshire Dam No. 2-8-331-1

Name of Dam Pine Island Lake Dam USGS ID# 8 D Mass. Rect. Coordinate N 489,900 E 254,800

Sketch See Description of Dam Picture Available ____ Plans, Where In Corporation Files

Owner Representative Notified Date Aug. 1, 1972 By Letter ____ Tel. x

Owner Representative Mr. Norman J. Bleakley, Clerk of Corporation Present Yes x No ____

Owner Pine Island Lake Recreational Corporation
Westhampton, Mass.
c/o Mr. Norman J. Bleakley
66 Graves Street
South Deerfield, Mass. 01373

Per Town Assessors ____ As of Aug. 4, 1972
Reg. of Deeds ____
Previous Insp. ____ ____
Personal Contact x

STRUCTURAL DATA

DAM TYPE: Gravity x Straight x Curved ____ Arched ____ Other ____

DAM MATERIAL: Earth x Conc.Mas. ____ Stone Mas. ____ Steel ____ Timber ____
Rock Fill x

DAM DIMENSIONS: Length 100± Ft. Height 25± Ft. Widths, Top 35± Ft.
Base Unk. Ft.

Slope Downstream Face 1½ to 1 Slope Upstream Face 1½ to 1

Freeboard (Min.) 3 Ft. Depth Water at Dam 5 - 6 Ft.

DAM FACE UPSTREAM: Turf ____ Brush & Trees x Rock Fill x Masonry ____

Wood ____ Other Portion ledge; some turf; bituminous concrete surface

Condition: 1. Good x 2. Needs Minor Repairs ____ See Comments
3. Needs Major Repairs ____
4. Urgent Needs Repairs for Safety ____

DAM FACE DOWNSTREAM: Turf ____ Brush & Trees ____ Rock Fill x Masonry ____

Wood ____ Other Portion ledge - Mostly heavy boulder fill placed during 1970 Reconstruction and repair

Condition: 1. Good x 2. Needs Minor Repairs ____
3. Needs Major Repairs ____
4. Urgent Needs Repairs for Safety

Twin 36" spillway just west of center;

OUTLETS: Locations 10" drawdown at center; 24" drawdown just east of center.

Spillway - Type Twin 36 inch AACM Pipes Controlled No

Width _____ Height _____ Material AACM Pipes

Emergency Spillway - Available x Needed No
Height above Normal Water 3-4 feet
Width 30 ft.± Height 1 ft. ± Material Bituminous concrete surface on gravel.

Penstock: Size 10" diam. pipe-Entry deep in pond. 24" diam. pipe-Entry 4-5 ft. below water.

Trickle Tube: Size _____

Outlet Controls Available Yes Condition Good Automatic No

Manual Yes Needed No - Valves or gates on both drawdowns.

Drawdown Device: Present Yes Needed _____ Condition Good

Trash Racks, Screens: Present x Condition Screen available for 24" Diam. drawdown. Placed when valve is opened.
Needed _____ No screen for spillway tubes.

AREA DATA

POND: Area 56 Acres Avg. Depth 7 - 8 Ft.

Acre Ft. 392
Water Impounded Gals. 128 million gallons

Silted Yes ___ No x Approx. Amount Pond _____

DRAINAGE AREA 3/4 Sq. M. TYPE: City, Bus. & Ind. _____

Suburban _____ Rural, Farm _____

Wood & Scrub Land x Slope: Steep ___ Med. x Slight ___

DOWNSTREAM AREA: Valley Character: Narrow x Wide _____

Developed _____ Rural x Urban _____

OBSERVATIONS NOTED:

Brush Trees and Brush on Embankment No

Dead Burrows and Washouts None found

DEFICIENCIES NOTED (Cont'd.) -3

Damage to Top or Slope due to Traffic None - Top bituminous concrete.

Cracked or Damaged Masonry None

Evidence of Piping Yes - See note under "Leaks".

Evidence of Seepage Yes - See note under "Leaks".

Erosion No - Dam newly reconstructed in 1970.

Leaks Yes - There is significantly more water flowing out from base and stone filled downstream slope than is passing thru the twin 30" spillway tubes

Missing or Inadequate Trash Screens & Rack Not needed.

Clogged or Blocked Spillways No

Inadequate Spillways No

Trash and/or Rubbish Available to Impede Flow No

Condition Favorable for Injury to Public, i.e., Unprotected Penstock Opening, etc. Deep ravine downstream has very steep sides and rock fill has very rough surface.

Other

OVERALL CONDITION: 1. Safe 2. Safe, Minor Repairs Needed

3. Conditional Safe, Need Urgent Repairs X 4. Unsafe

REMARKS and RECOMMENDATIONS

See attached sheet.

JC Ed./gm

REMARKS AND RECOMMENDATIONS

Since the inspection by the County's Consulting Engineer in June of 1970, considerable work has been done on the dam. A new twin 30 inch AACM pipe spillway and a 24 inch AACM pipe drawdown capable of lowering the water level about 5 feet. have been installed. A heavy boulder fill has been placed on the downstream face with a 21 inch AACM pipe sleeve extending the old 10 inch pipe drawdown thru the fill. The surface of the embankment and much of the upstream face has been surfaced with bituminous concrete shaped so as to drain water into the pond and to serve as an emergency spillway. A line of boulders prevents vehicles from driving on the embankment.

At the time of the inspection only a little water was passing thru the spillway tubes and both drawdowns were closed. There was a much larger flow in the brook immediately below than could be accounted for. Water was flowing out of the base of the stone fill but its exact source could not be determined. A cavity or hole about 4 ft. wide, 6 ft. long and 4 to 5 ft. deep is located about 10 feet west of the spillway just beyond the water line and adjacent to some exposed ledge. Probing with a pole showed that there was a firm vertical surface on the pond side of this hole, but no flow was observed.

Mr. Bleakley, the Clerk of the Corporation, was informed of the above and confirmed my finding. He was concerned over the loss of water and intended to immediately bring it to the attention of the Corporation Directors. He will investigate the hole with scuba diving equipment soon. The Corporation on or about October 12, 1972 intends to drawdown the pond to the level of the new upper drawdown, at which time further investigation of the leak can be made.

The District believes that this condition definitely should be investigated and an expert opinion on the possible effects of this leak on the structure be obtained so that appropriate action can be taken.

August 21, 1972

Norman J. Bleakley, Clerk
Pine Island Lake Recreation Corp.
66 Craves Street
South Deerfield, Mass. 01373

Re: Inspection of Dam #2-8-331-2
Westhampton
Pine Island Lake Dike

Dear Mr. Bleakley:

An engineer from the Massachusetts Department of Public Works has inspected the above dike of which the Pine Island Lake Recreation Corp. is the owner.

The inspection was conducted under the provisions of Chapter 253 of the Massachusetts General Laws, as amended by Chapter 595 of the Acts of 1970.

The result of the inspection indicates that no immediate maintenance or repairs are required; however, the following items were noted that will require your attention in the future:

1. Remove brush on upstream slope.
2. Repair small foot path.
3. Remove trees from downstream slope.

We are calling these items to your attention now before they become more serious and expensive to correct.

Very truly yours,

FRED. C. SCHNELL P.E.
Deputy Chief Engineer

LLM:eb
cc. M. J. Keey DCE #2
R. Dalla Dist. 2

DAM INSPECTION REPORT

Inspected by R. C. Salls, P.E. Date Aug. 8, 1972

Date Last Inspection June 1970

Town Westhampton County Hampshire Dam No. 2-8-331-2

Name of Dam Pine Island Lake Dike USGS ID# 8D Mass. Rect. Coordinate N 491,300 E 256,400

Sketch See Description of Dam Picture Available - Plans, Where -

Owner Representative Notified Date Aug. 4, 1971 By Letter ____ Tel. X

Owner Representative Norman J. Bleakley (CLERK OF CORPORATION) Present Yes X No ____

Owner Pine Island Lake Recreation Corp. Per Town Assessors ____ As of 8/4/72

Westhampton, Mass. Reg. of Deeds ____

Previous Insp. ____

Personal Contact X

STRUCTURAL DATA

DAM TYPE: Gravity ____ Straight X Curved ____ Arched ____ Other ____

DAM MATERIAL: Earth X Conc.Mas. ____ Stone Mas. X Steel ____ Timber ____

Rock Fill ____ See comments

DAM DIMENSIONS: Length 230± Ft. Height 15± Ft. Widths, Top 10 Ft.

Base UNK Ft.

Slope Downstream Face 4 to 5 vertical, then 1½ to 1 Slope Upstream Face 1½ to 1

Freeboard min. 4 Ft. Depth Water at Dam 10 Ft.

DAM FACE UPSTREAM: Turf ____ Brush & Trees ____ Rock Fill X Masonry ____

Wood ____ Other Cobble stone with brush cut last year

Condition: 1. Good X 2. Needs Minor Repairs ____

3. Needs Major Repairs ____

4. Urgent Needs Repairs for Safety ____

DAM FACE DOWNSTREAM: Turf ____ Brush & Trees ____ Rock Fill ____ Masonry dry stone

Wood ____ Other 4 to 5 ft. Vertical dry stone masonry then 1½ to 1 slope stone Paved - some brush growing.

Condition: 1. Good X 2. Needs Minor Repairs ____

3. Needs Major Repairs ____

4. Urgent Needs Repairs for Safety

OUTLETS: Location: Emergency spillway; earth at South End Dam. No other outlet.

Spillway - Type - Controlled -

Width - Height - Material -

Emergency Spillway - Available Yes Needed
Height above Normal Water 3 ft.
Width 10-12 ft. Height 1 ft. Material

Penstock: Size - Type -

Trickle Tube: Size -

Outlet Control Available - Condition - Automatic -

Manual - Needed -

Drawdown Device: Present - Needed - Condition -

Trash Racks, Screens: Present - Condition -

Needed -

See report on Dam No. 2-3-331-1

AREA DATA:

POND: Area 56 Acres Avg. Depth 7-8 Ft. 28 ft. max. depth

Acre Ft. 392

Water Shed Gals. 125 million

[illegible] No X Approx. Amount Pond

[illegible] 3/4 Sq. M. TYPE: City, Bus. & Ind.

[illegible] Rural, Farm

Wood & Scrub [illegible] X Slope: Steep Mod. X Flat

DOWNSTREAM AREA: Valley Characteristics: Narrow X Wide

Developed [illegible] Rural X Urban

IMPROVEMENTS MADE:

Improved Road and Bridge on Embankment No - brush cut last year.

[illegible] None observed.

DEFICIENCIES NOTED (Cont'd.) -3

Damage to Top or Slope due to Traffic: Foot path on top.

Cracked or Damaged Masonry: No

Evidence of Piping: None found

Evidence of Seepage: Wet area 15 ft. $\pm$ from toe down stream slope in old brook bed.

Erosion: None

Leaks: None found

Missing or Inadequate Trash Screens & Rack: -

Clogged or Blocked Spillways: -

Inadequate Spillways: No spillway. See report on Dam No. 2-8-331-1

Trash and/or Rubbish Available to Impede Flow: -

Condition Favorable for Injury to Public, i.e., Unprotected Penstock Opening, etc. ______

Other: -

OVERALL CONDITION: 1. Safe X 2. Safe, Minor Repairs Needed ______

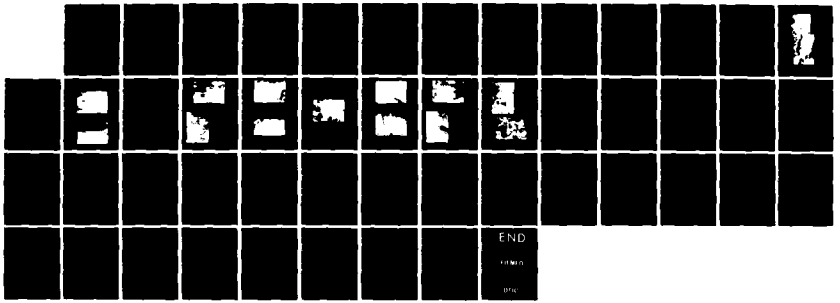
3. Conditional Safe, Major Repairs Needed ______ 4. Unsafe ______

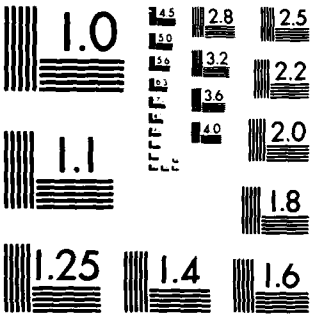
[illegible]

See attached sheet

AD-A155 321 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 2/2
PINE ISLAND LAKE DAM A.. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV AUG 81

UNCLASSIFIED F/G 13/13 NL





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

REMARKS & RECOMMENDATIONS

This structure was found in good condition. The grade of the top is level and the foot path has not caused any wear. The slope on the pond side is paved with cobbles, somewhat overgrown with weeds and brush. There is one small area where a path has been worn to the water's edge. On the downstream slope some rubbish has accumulated and a few small trees have become estaclished on the slope. During the next year, brush on the upstream slope should be cut, the small path repaired, the downstream slope cleaned and the trees cut before they become a problem. At present, this structure appears to be in satisfactory condition and stable.

DESCRIPTION OF DAM

Page No. 2

Submitted by R. C. Sallo, P. E. Dam No. 2-3-331-2

Date August 8, 1972 Stock/Town Westhampton

Name of Dam Pine Island Lake Dike

1. Location: Topo Sheet No. 8 D Mass. Rect. Coordinates N 49,300 E 216,400

Provide 3½" x 11" in clear copy of topo map with location of Dam clearly indicated.
3/10 mile from Reservoir Road on private road about 6/10 mile from Northwest Road on northeasterly portion of lake.

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

3. Purpose of Dam: Water Supply ____ Recreational X
Irrigation ____ Other Former paper mill reservoir.

4. Drainage Area: 3/4 sq. mi. ____ acres.

5. Normal Ponding Area: 56 Acres; Ave. Depth 7-8 ft.
Impoundment: 125 million gals; 392 acre ft.

6. No. and type of dwellings located adjacent to pond or reservoir ____
i.e. Summer homes etc. 50 summer cottages.

7. Dimensions of Dam: Length 270± ft. Max. Height 15± ft.
Freeboard 4 ft.
Slopes: Upstream Face ½ to 1
Downstream Face Vertical 4 to 5 ft. then ½ to 1
Width across top 10± ft.

Dam No. [illegible]

8. Classification of Dam by Materials:

Earth X Conc. Masonry ___ Stone Masonry X

Timber ___ Rockfill ___ Other ___

9.

a. Description of present land usage downstream of dam:
100 % rural, ___ % urban.

b. Is there a storage area or flood plain downstream of dam which would accommodate the impoundment in the event of a complete dam failure. Yes ___ No X

10.

Risk to life and property in event of complete failure.

No. of people Occasional [illegible] on [illegible] Road.

No. of homes None

No. of businesses None

No. of industries None Type ___

No. of utilities Electrical Type [illegible]

Railroads None

Other dams None

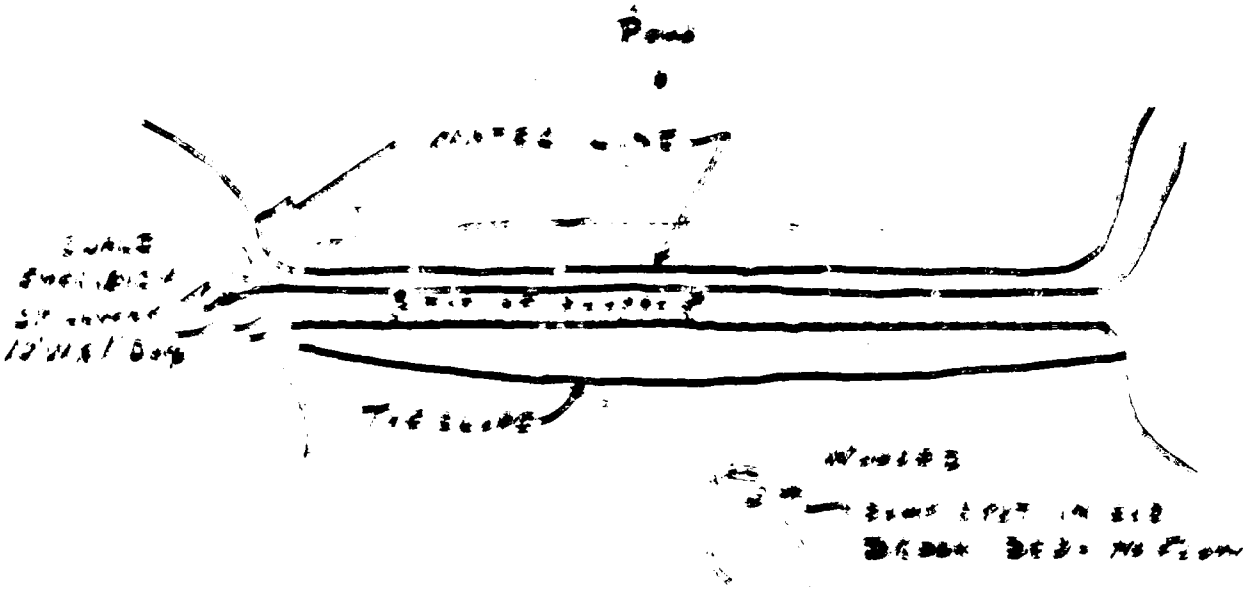
Other Would do damage after entering into north branch of [illegible] River.

11.

Attach Sketch of dam to this form showing section and plan on 8 1/2 x 11" sheet.

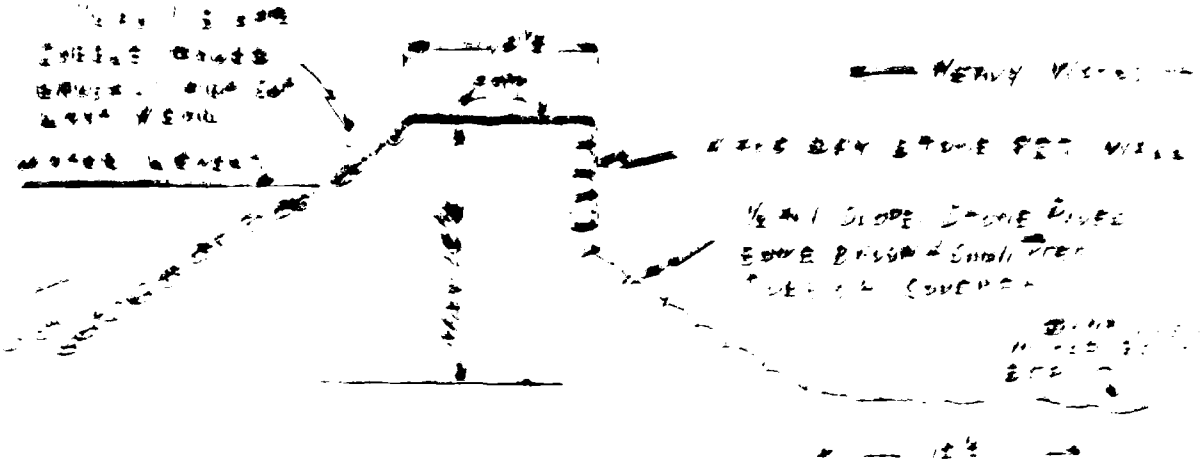
SKETCH

DAM No 2-5-33.-2
PINE ISLAND LAKE
DIKE
AUG 4, 1972



PLAN

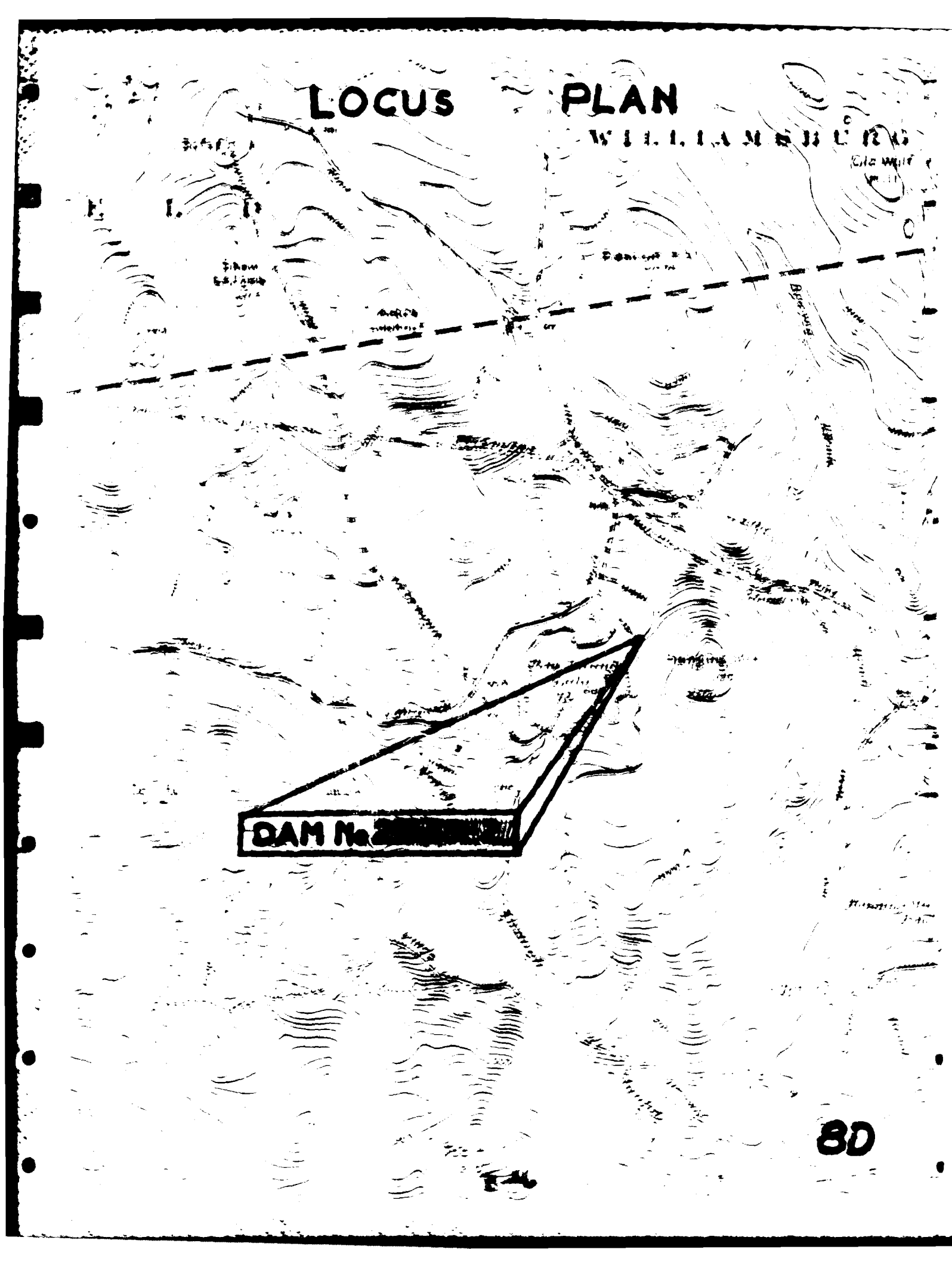
NOT TO SCALE



SECTION 'AA'

NOT TO SCALE

LOCUS PLAN



Mr. Hayes Tompkins

John T. Hansen, Engr. Chief Engr. November 23, 19

Re: [illegible]

Upon with Engr. Hansen and Asst. Engr. F. Gray with reference to furnishing an inspector for construction in progress at Pine Island Lake. Asst. Engr. said that at the present time he did not have the personnel to perform this duty or at least anyone that would care to lose for this purpose to them and reservoirs. I then contacted Mr. Holbrook of Engr & Const who said that he had seen and approved a plan made for repairs to this dam, and that he personally was there at construction also when the other hand was drawn down. He was also present when new gate and spillway pipes were installed. All work should have been completed by this week or at the latest early next week.

Respectfully submitted,

[illegible]
Assistant Civil Engineer

WJ/kh

[illegible]

197[illegible] INSPECTION REPORT ON
DAMS LOCATED IN
WESTHAMPTON, MASS.

A. [illegible] Dam

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

B. [illegible]

[illegible]

[illegible] The [illegible]

[illegible] growth along the base.

In the opinion of the undersigned [illegible] satisfactory and is safe.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

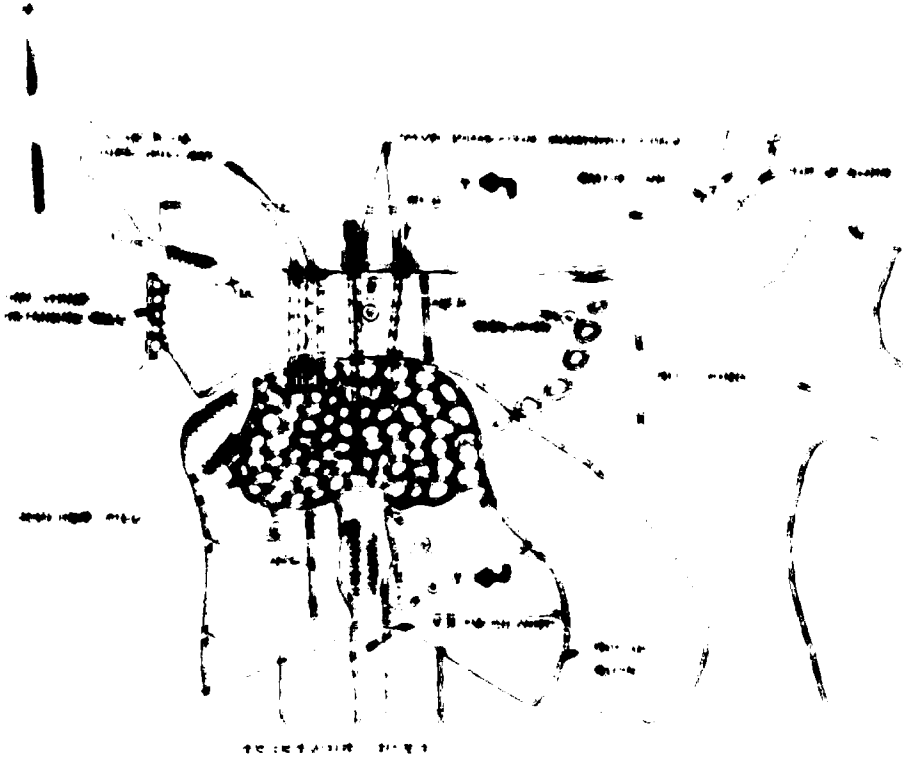


PHOTO NO. 1 - Upstream face of dam.

PHOTO NO. 2 - Crest from left abutment.

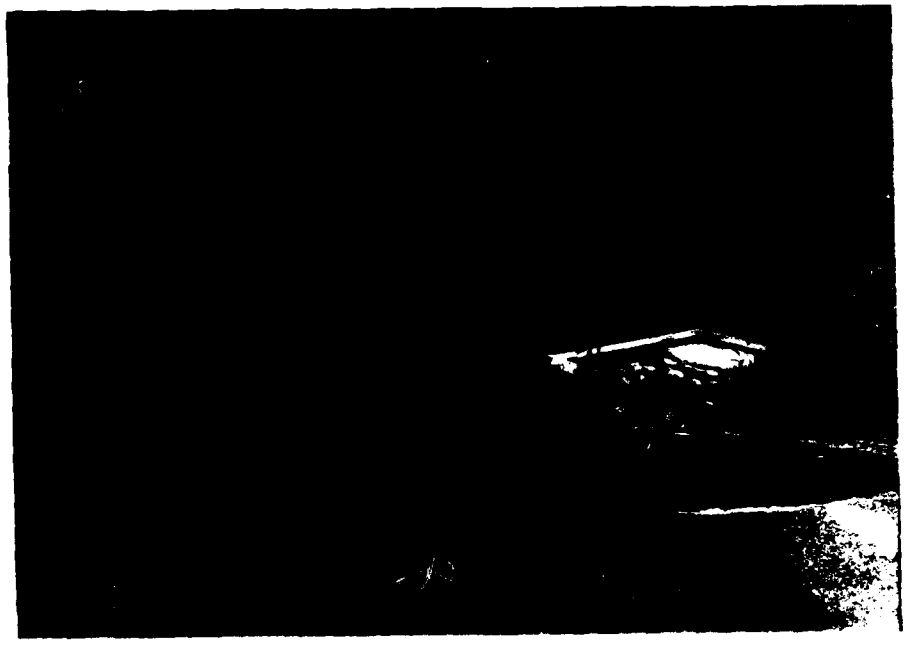


PHOTO NO. 3 - Gate structures with reservoir in background.

PHOTO NO. 4 - View of gate structure, spillway pipes and upstream face.

PHOTO NO. 5 - View of downstream slope showing twin spillway pipes and high and low level outlet pipes.

PHOTO NO. 6 - Masonry wall forming downstream side of dam.

PHOTO NO. 7 - Crack in pavement near headwall of twin spillway pipes.

PHOTO NO. 8 - Pipe under road downstream of dam, looking downstream.

FIGURE NO. 9 - [illegible]

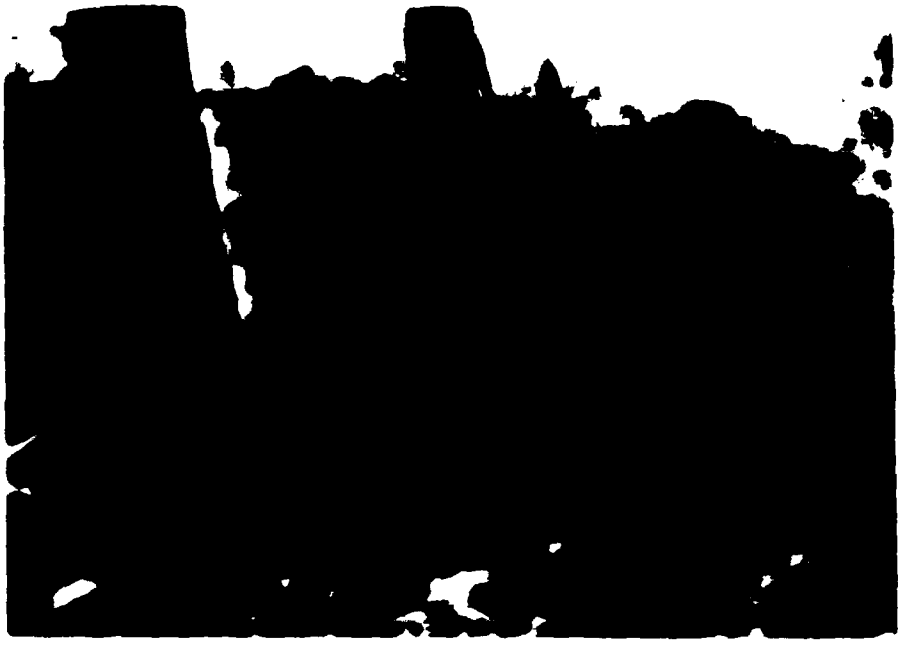
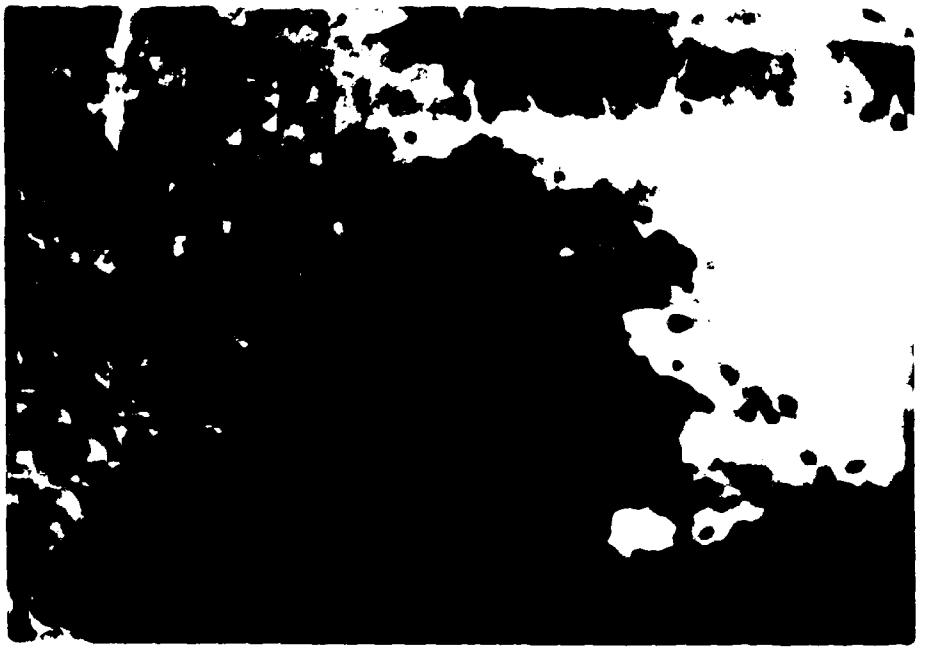
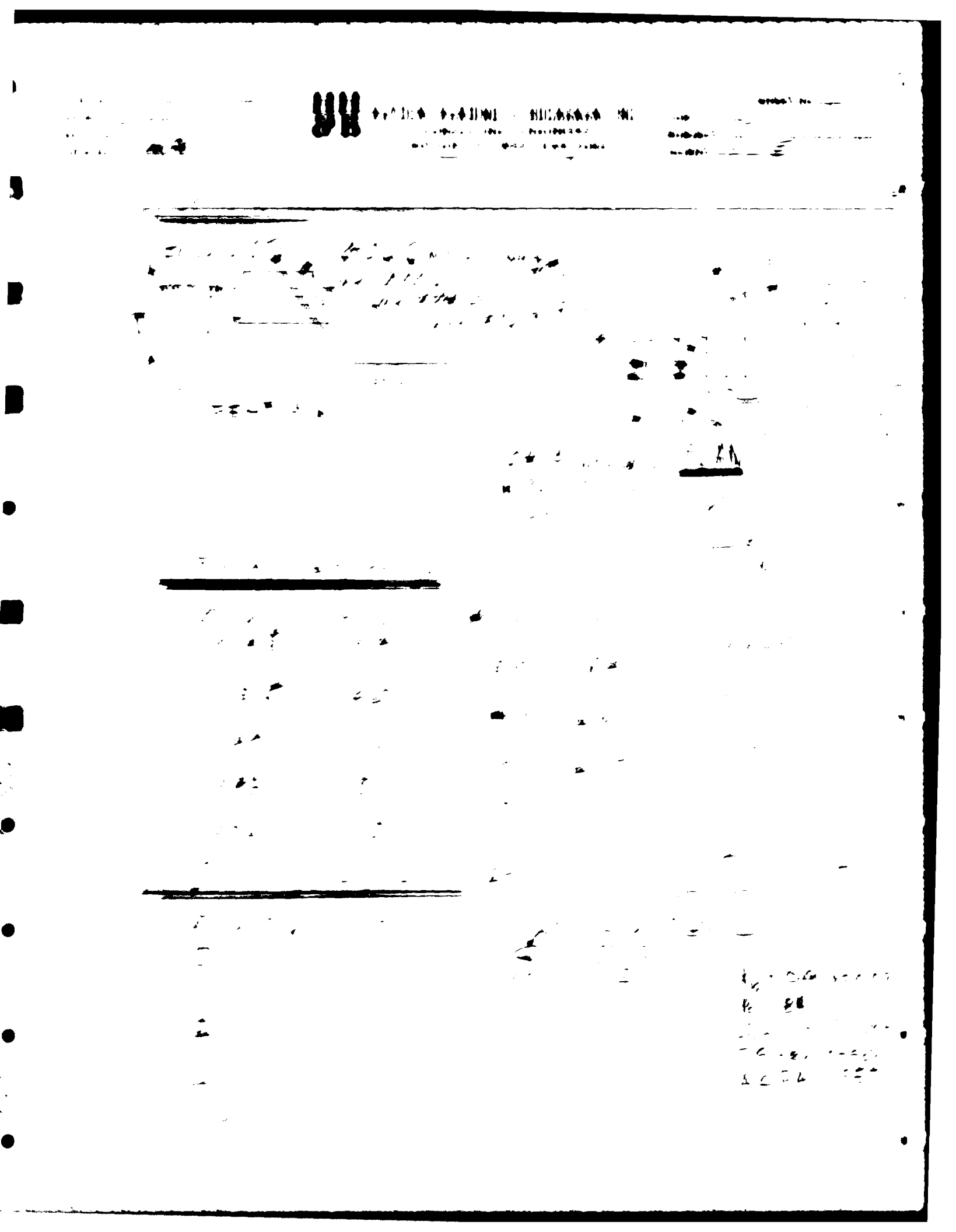


FIGURE NO. 11 - [illegible]



[redacted]



HAYDEN HARDING & BUCHANAN INC
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO. 5

Test Flood Analysis

$\frac{7.12}{}$ = 300

Dam & Dike are overtopped by 0.1 ft, el. 1002.6
Spillway Discharge = 96 cfs or 1/3 of 1/2 PMF Outf.

Test Flood Outflow

PMF Inflow = Q_{P1} = 2,400. cfs

D_1 = 1004.3 V_1 = 375 a.f or 8.79"

Q_{P2} = 2400 (1 − $\frac{8.79}{19}$) = 1290. cfs

D_2 = 1003.7 V_2 = 337 a.f or 7.9"

$V_a = \frac{7.9 + 8.79}{2}$ = 8.35"

Q_{P3} = 2400 (1 − $\frac{8.35}{19}$) = 1345 cfs

Elev = 1003.8 ft.

Spillway passes 115 cfs or 10%± of routed test flood outflow

Dam & Dike are overtopped

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO. E-6
JOB
SUBJECT
CLIENT

Dam Failure

$Q_{F\,Dam}$ (8/27)(.4)(75)($\sqrt{32.2}$ / 5.67)(24 / 1.5)$^{1.5}$

Q_{F_D} = 5,947 ✓

Dike Failure (8/27)(.4)(110)(5.67)(15 / 5.8)

$Q_{F\,Dike}$ = 4,294 ✓

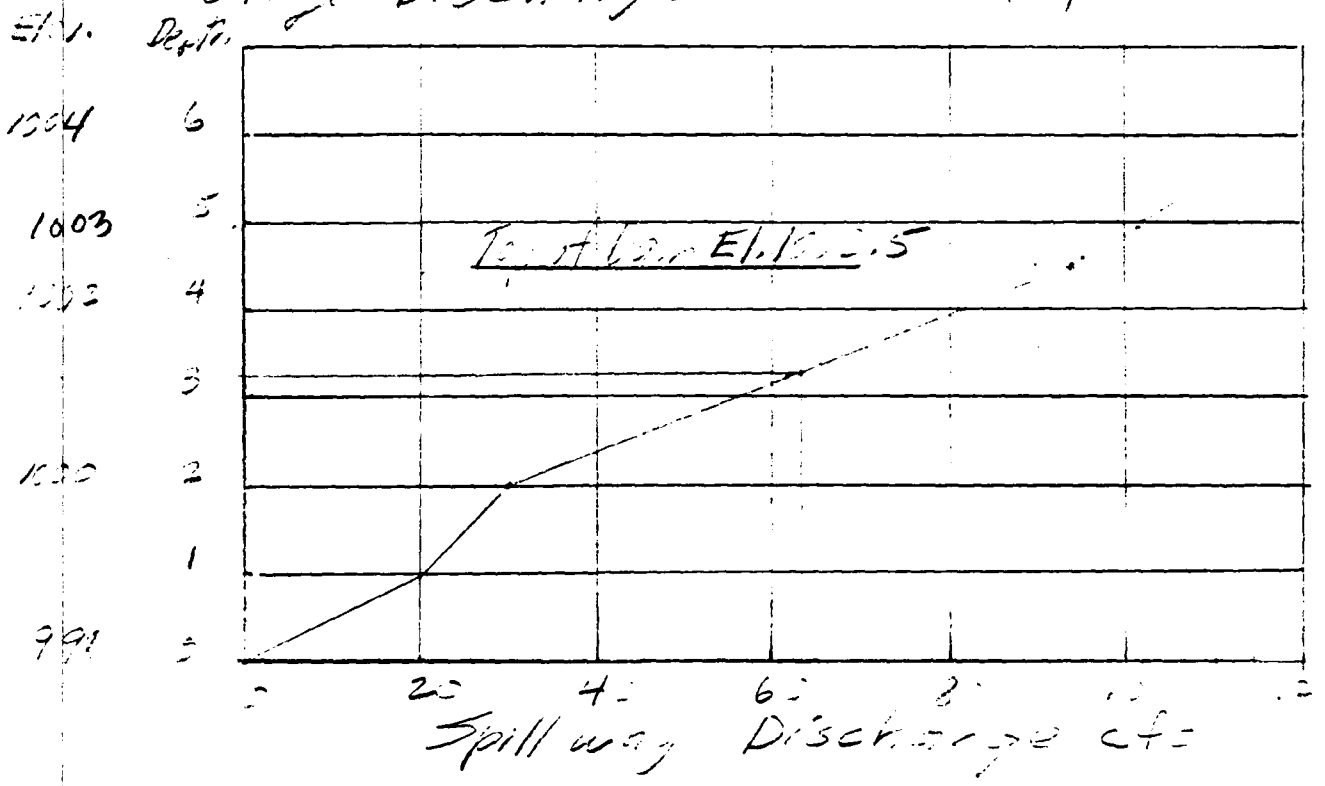
Dam : High Hazard, loss of more than a few lives

Dike : Significant Hazard loss of a few lives

JOB NO. [illegible]
DATE [illegible]
BY [illegible]
CH'D BY J. FERRISS

HH&B HAYDEN, HARDING & BUCHANAN, INC
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

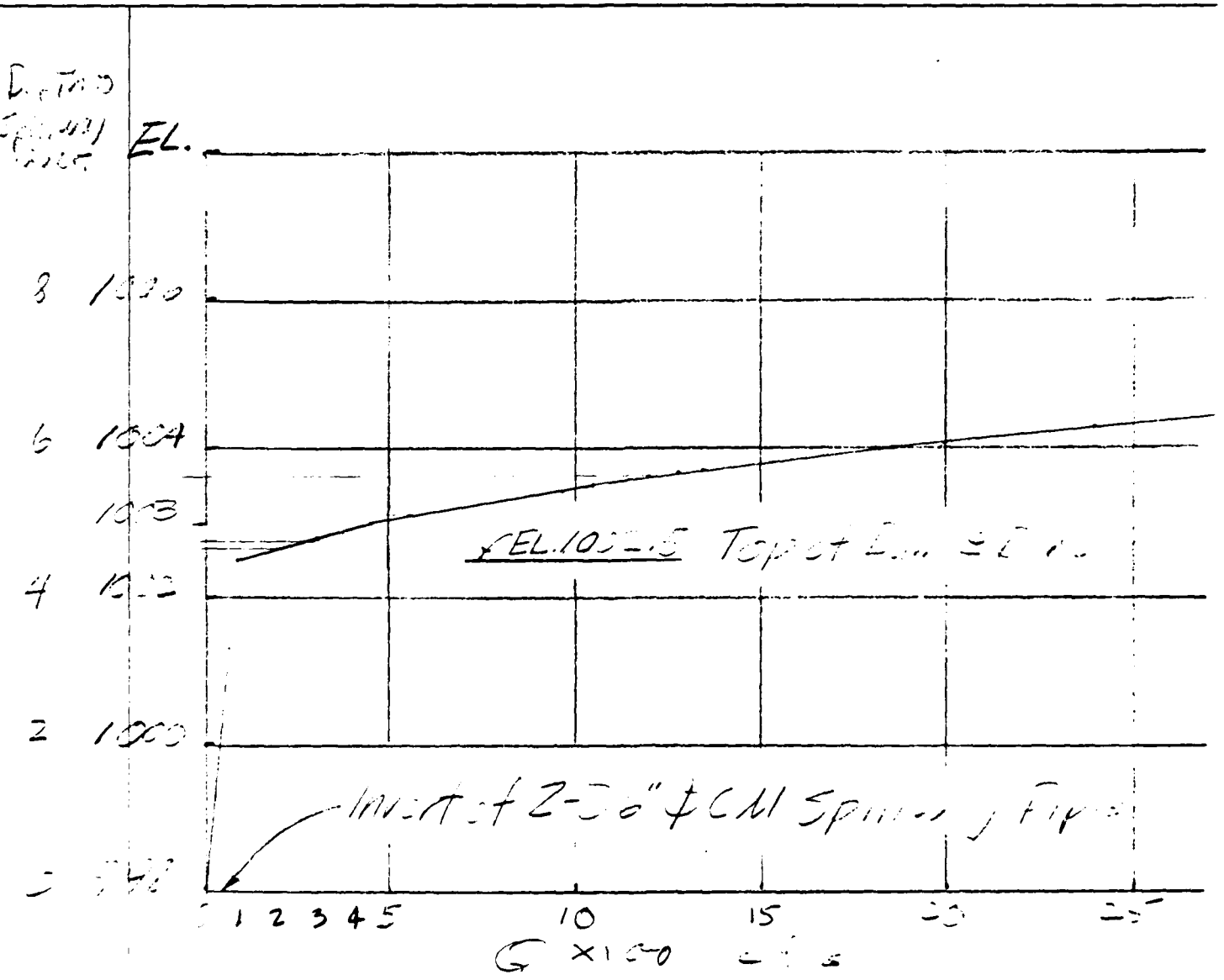
SHEET NO. [illegible]
JOB [illegible]
SUBJECT [illegible]
CLIENT [illegible]



JOB NO. [illegible]
DATE [illegible]
BY [illegible]
CH'D BY J. FERRISS

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO. 8
JOB [illegible]
SUBJECT [illegible]
CLIENT [illegible]



G x 100 c.f.s.

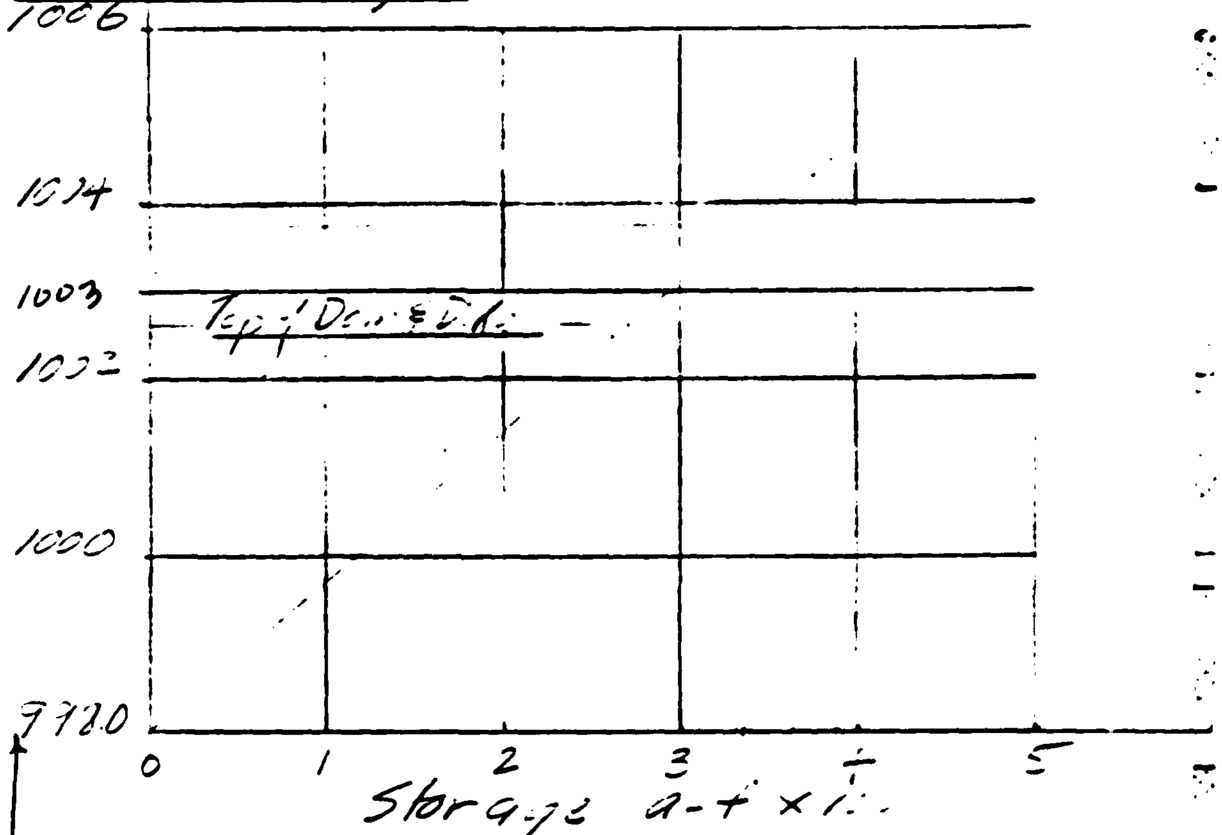
Combined Discharge-Spillway [illegible]

JOB NO [illegible]
DATE [illegible]
BY [illegible]
CH'D BY JV

HH&B HAYDEN HARDING & BUCHANAN INC
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO 9
JOB [illegible]
SUBJECT [illegible]
CLIENT [illegible]

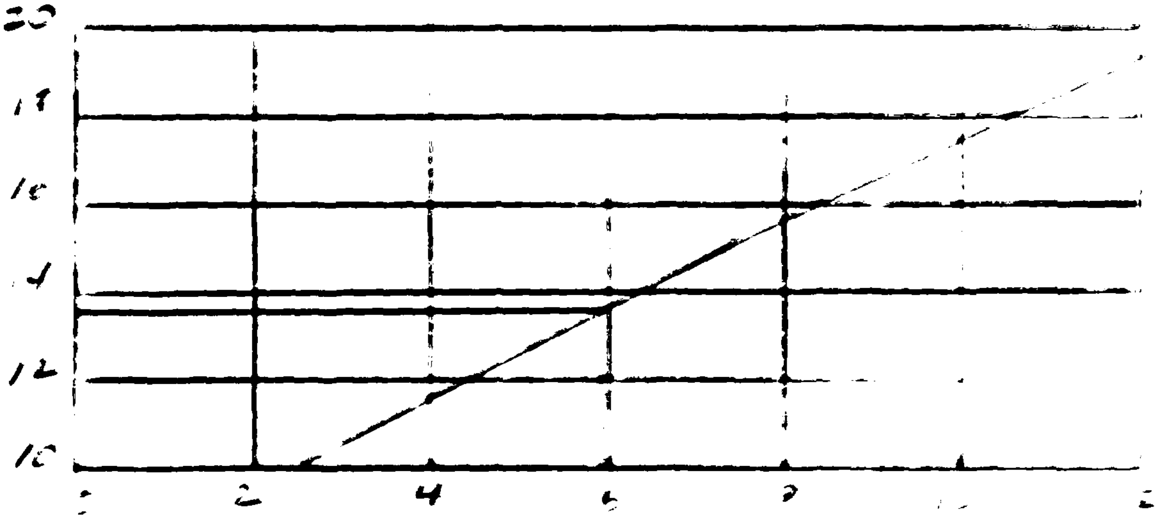
Stage Storage



Spillway El. Inv of 2-[illegible] CMP.
Storage @ Spillway [illegible] = [illegible]

[illegible]

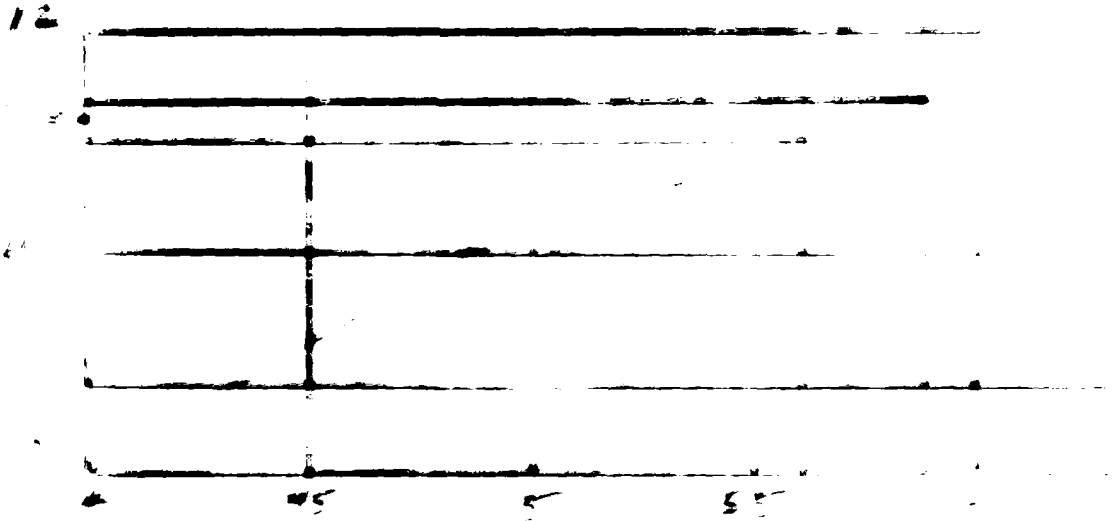
D	WP	A	$R^{2/3}$	V	Q
20	[illegible]	7[illegible]	4.25	[illegible]	[illegible]
10	42	213	2.44	123	2,57[illegible]
15	62	465	3.[illegible]	[illegible]	7,47[illegible]

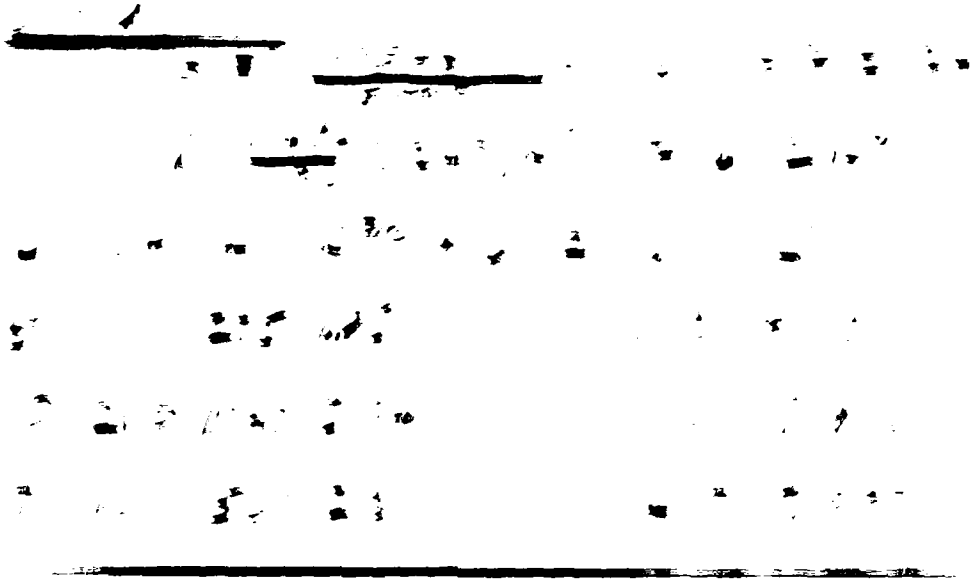


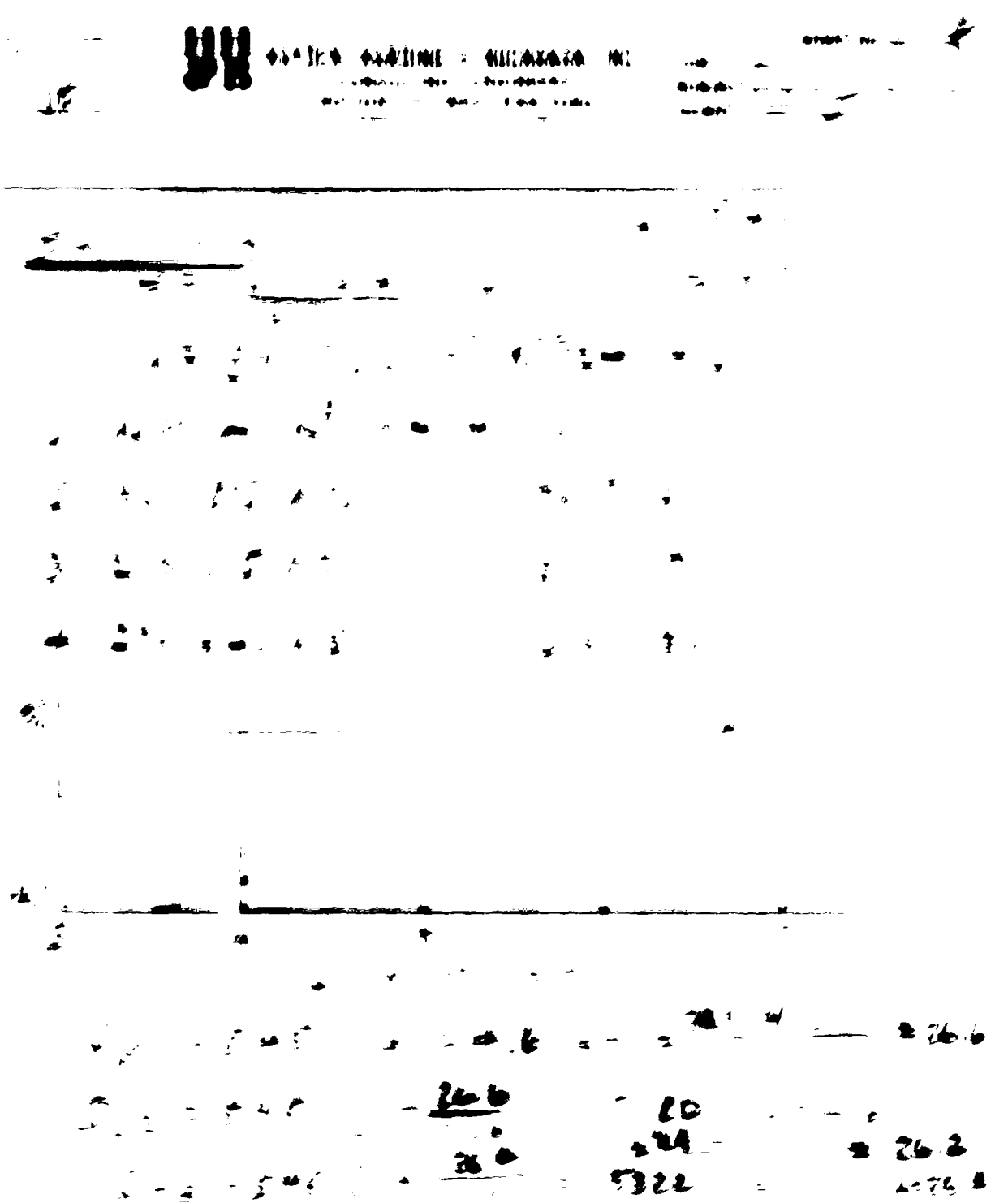
$G_{p} = 5747$, [illegible] 3.4 [illegible]

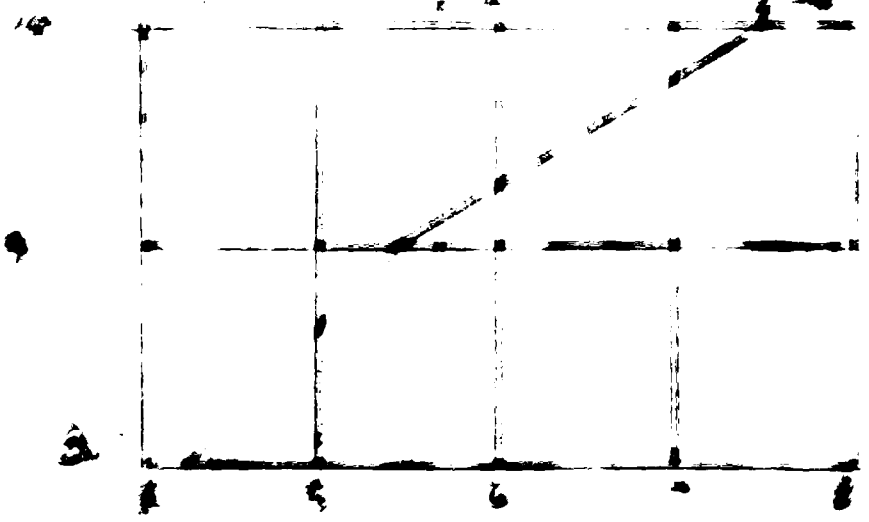
[illegible] $= 5747$ ([illegible]

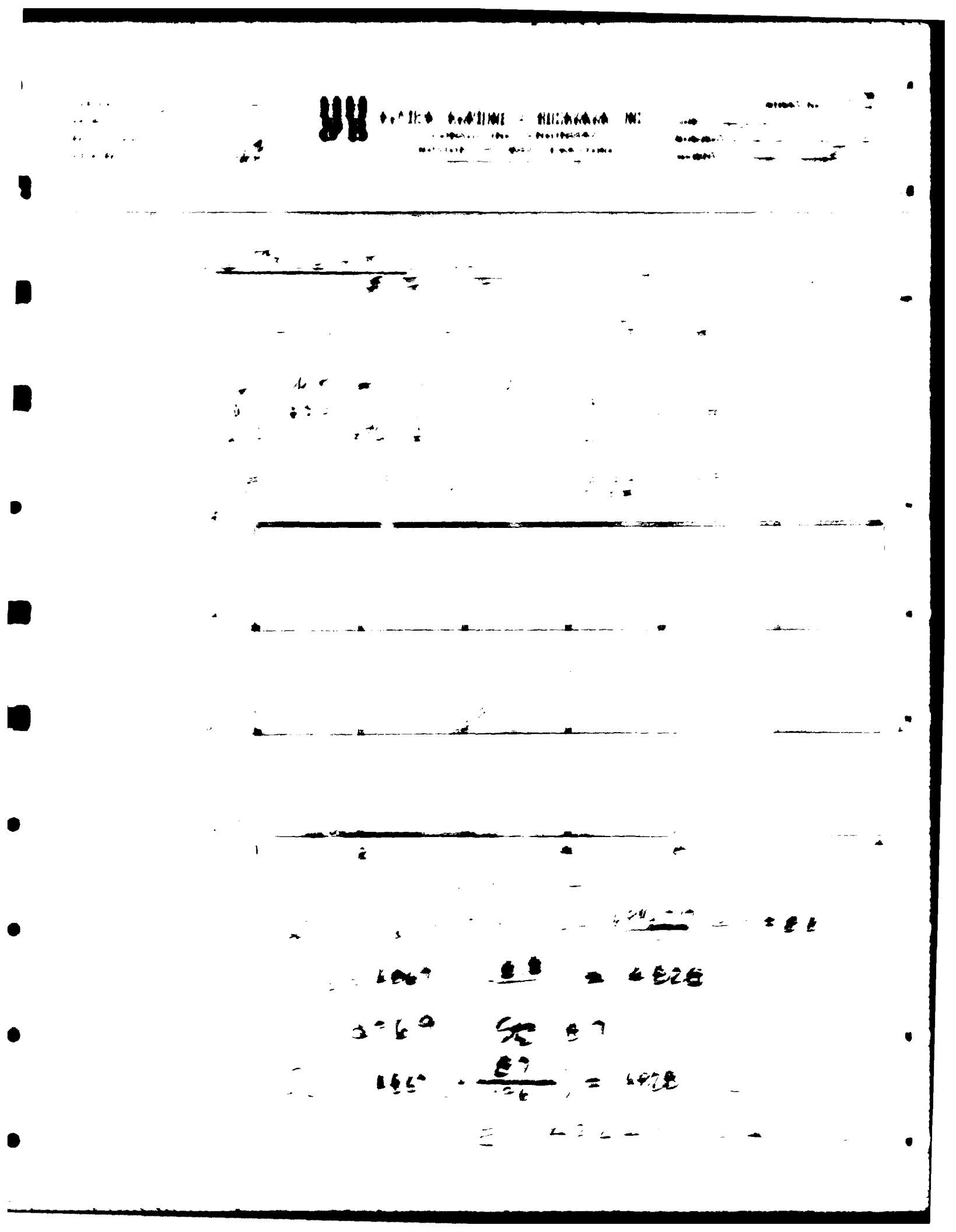
[illegible]











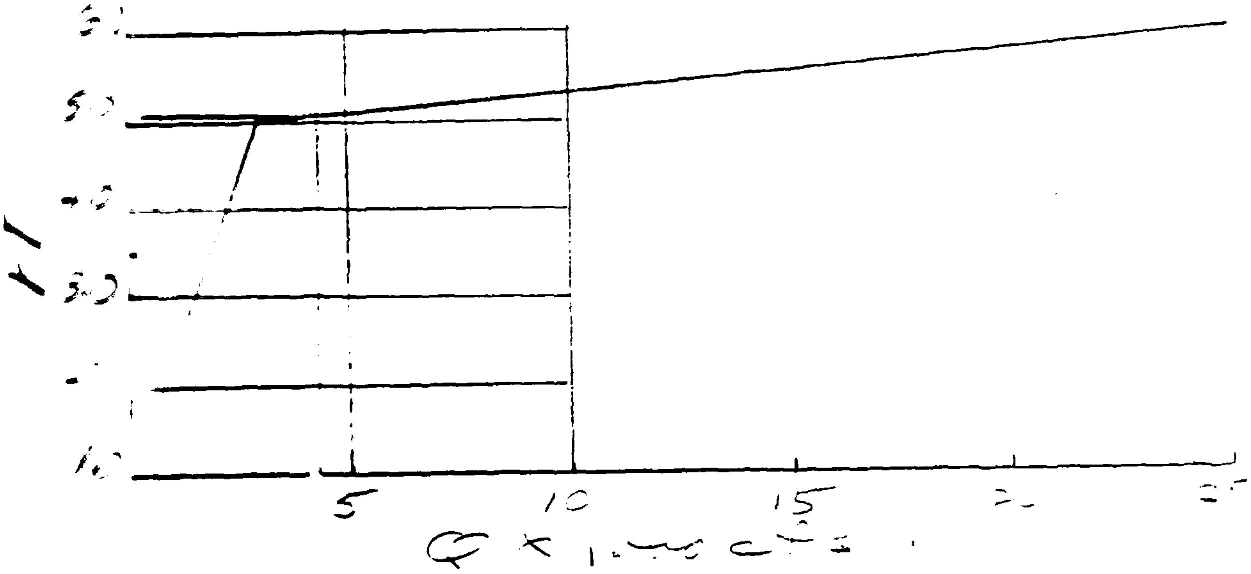
HH&B HAYDEN, HARDING & BUCHANAN, INC
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO. D 20
JOB
SUBJECT P.I.
CLIENT COE

Q - 4249

$S = \frac{345 - 375}{}$ $S^{1/2} = .261$

D	WP	A	$R^{2/3} \times 6.46$	V	Q
5		250	1.85	11.95	2,9??
	75	1700	1.73	11.8	19000.



Qp. 4249 $d_1 = 5.1$

$Q_p = - 4249 (1 - \frac{18.1}{1090}) = 4,179$

$d_2 = 5.0$

$\therefore Q_{p3} = 4,179$

El. =

JOB NO. 79206.1001
DATE 8-81
BY WF
CH'D BY JF

HH&B HAYDEN, HARDING & BUCHANAN, INC
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO D21
JOB Dams
SUBJECT P.I.
CLIENT CAE

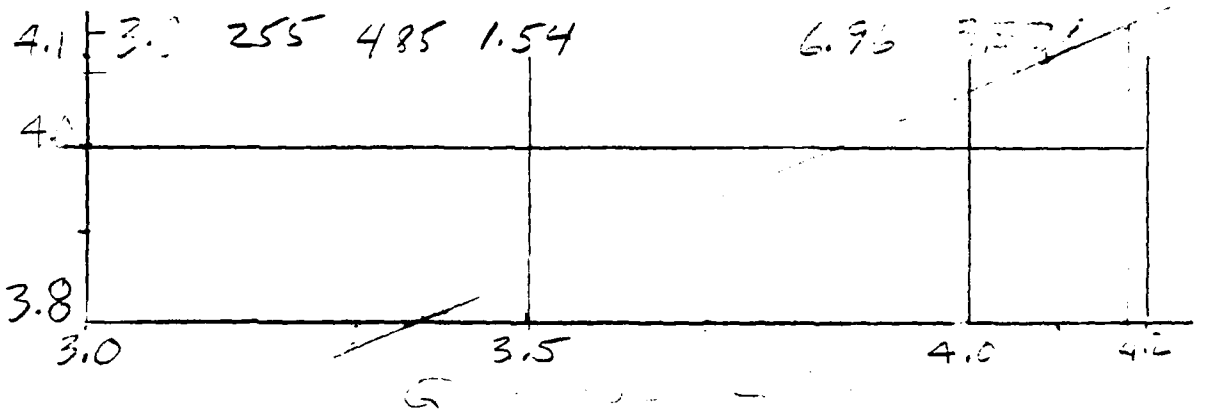
Q = 4,179

Str 79 ft

$S = \frac{575 - 573}{\quad} = .033$ $n = .183$

$V = 24.77 (.183) R^{2/3} = 4.53\ R^{2/3}$

D	WP	A	$R^{2/3}$	$\times 4.53 = V$	T
4.1	275	560	1.61	7.3	4,095
4	265	530	1.59	7.21	3820
3.[illegible]	255	485	1.54	6.96	[illegible]



$Q_{p1} = 4,179$ $d_1 = 4.13$ $ST = \frac{574.375}{\quad} = 55.2$

$Q_{p2} = 4,179 \left(1 - \frac{33.23}{1096}\right) = 4,052$

$d_2 = 4.08$ $ST = \frac{554.1375}{\quad} = 52.7$

$A = 32.95$

$Q_{p3} = 4,179 \left(1 - \frac{32.95}{1096}\right) = 4,057$

$El. = 575 + 4.1 = 579.1$

JOB NO 79-205.1001
DATE 8/11/81
BY WE
CH'D BY JF

HH&B HAYDEN, HARDING & BUCHANAN, INC
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO D 22
JOB Dams
SUBJECT P.I.
CLIENT COE

Main Dam Sections

Station	Elev.	Emergency Flow Elev.
3+00	970	983.6
10+00	966	976.3
30+00	875	883.1
80+00	570	576.2
100+00	514	515.2
120+00	479	483.7
156+50	432	440.2
162+00	422	429.2

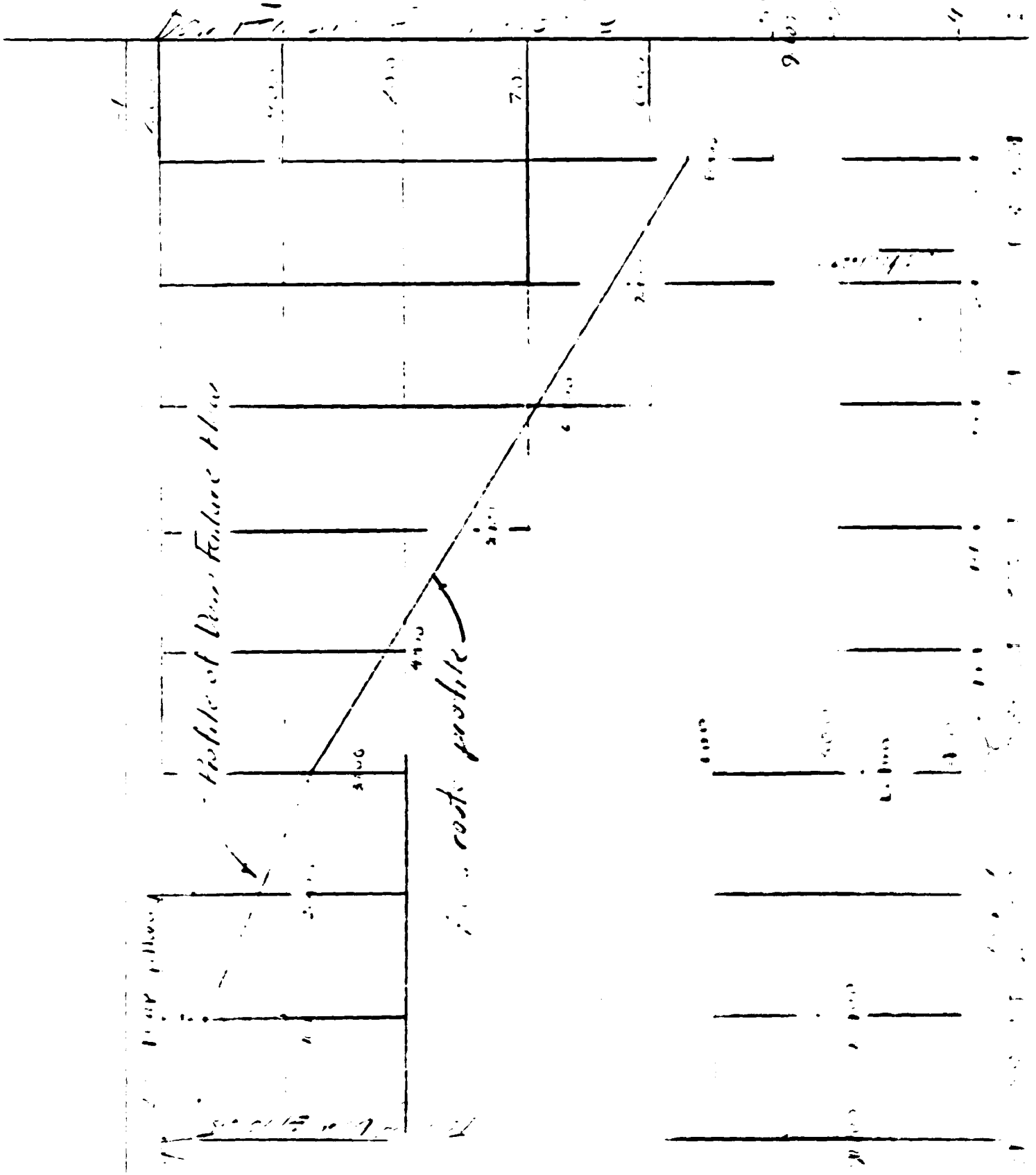
Dike Sections

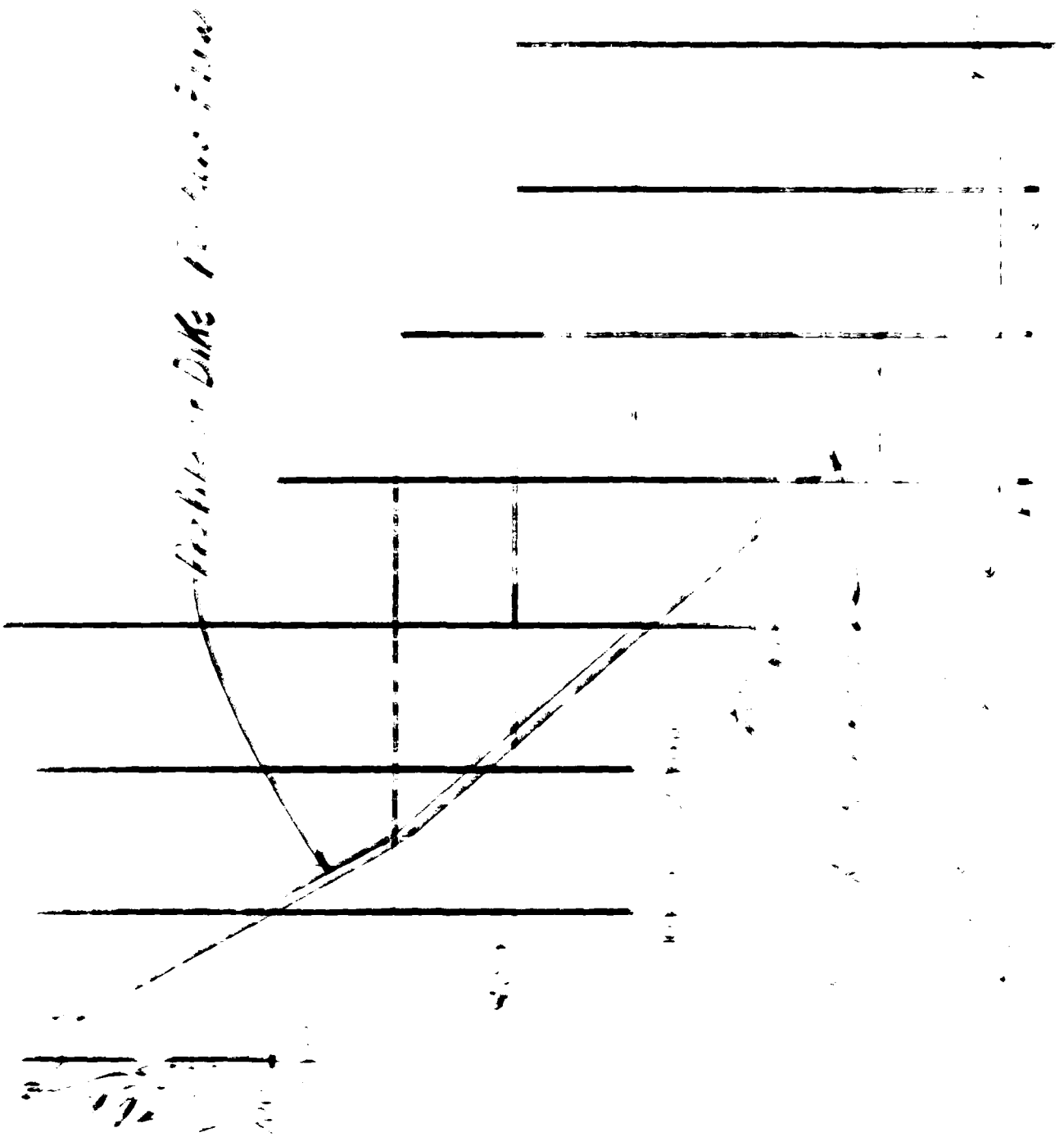
3+00	980	990.5
15+00	845	850.3
40+00	675	680.0
71+00	575	579.1

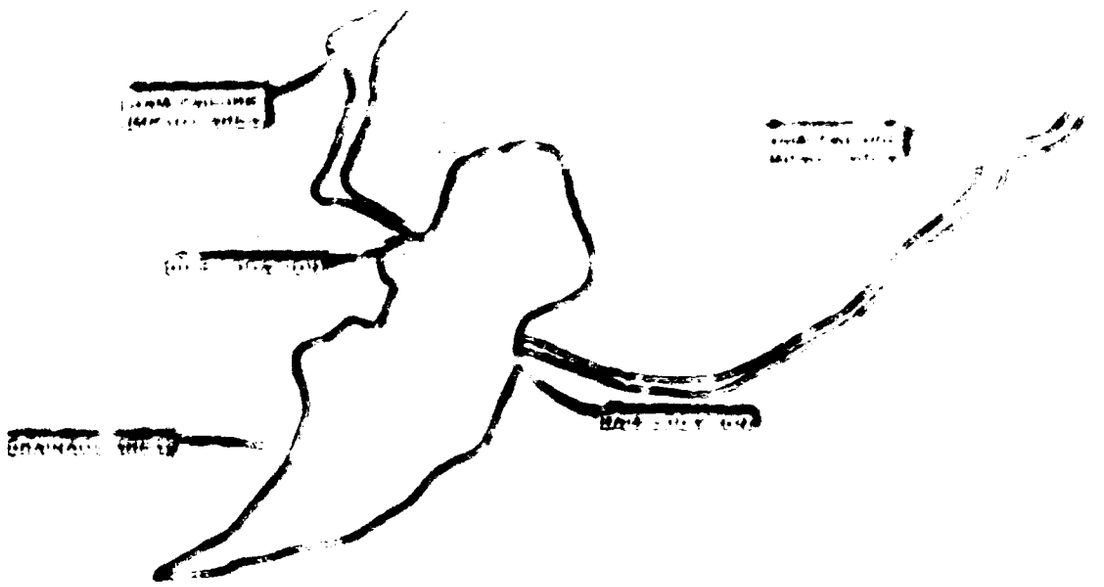
JOB NO 7126.1
DATE 21 11 11
BY
CH'D BY JF

HH&B HAYDEN, HARDING & BUCHANAN INC
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO 23
JOB
SUBJECT
CLIENT







[redacted]

END

FILMED

8-85

DTIC