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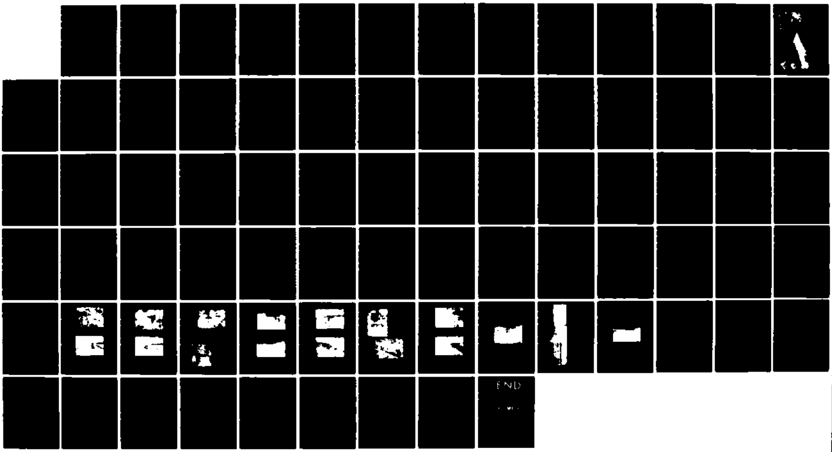

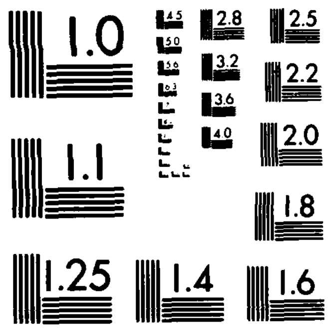

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

MERRIMACK RIVER BASIN
BURLINGTON, MASSACHUSETTS

MILL POND RESERVOIR NORTH DIKE
MA 01122

MILL POND RESERVOIR SOUTH DIKE
MA 01123

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS. 02154

JANUARY 1980

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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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,
Merrimack River Basin
Burlington, Massachusetts
Maple Meadow Brook

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

South Dike is about 39 ft. high and 400 ft. long. North Dike is about 20 ft. high and 370 ft. long.There are small brooks which drain into each dike. Generally the dikes are in good condition. Both are intermediate in size. The South dike has a high hazard classification and the North dike has a low.
It is recommended that the owner engage a qualified engineer to analyze the dikes for seismic stability.

NATIONAL DAM INSPECTION PROGRAM
PHASE I INVESTIGATION REPORT
BRIEF ASSESSMENT

Identification No.: MA 01122 and MA 01123

Name of Dam: Mill Pond Reservoir North and South Dikes

Town: Burlington

Stream: Maple Meadow Brook

Date of Inspection: November 2, 1979

Mill Pond Reservoir North and South Dikes are components of the Town of Burlingtons' Mill Pond Reservoir Pump Storage and Treatment Facility. On the opposite shore (to the east), of the dikes is the Mill Pond Reservoir Main Dam. This dam has a separate Phase I Report. See Mill Pond Reservoir Main Dam MA 01121.

The South Dike is approximately 39 feet high and 400 feet long. The North Dike is approximately 20 feet high and 370 feet long. Both dikes are earth embankments with 2H:1V upstream and downstream slopes and central concrete core walls. There are small brooks which drain toward each dike. The inflow enters an inlet structure at each dike and travels below the reservoir and main dam and outlets downstream into Maple Meadow Brook. There is no inflow from these brooks into the reservoir. The dikes have been owned and operated by the Town of Burlington since they were completed in 1973.

There was no indepth engineering data provided. Therefore, the adequacy of the dikes was primarily evaluated by the visual inspection, past performance history, the available as-built drawings and sound engineering judgement. The visual inspection indicated the dikes to be in generally good condition. There are no records of the dikes being overtopped by storm water runoff. Both dikes have an intermediate size classification. The South Dike has a high hazard classification and the North Dike has a low hazard classification. Based upon Corps Guidelines, the South Dike would have a full PMF test flood, while the North Dike has a ½ PMF test flood. The PMF inflow of 600 cfs from the reservoir drainage area would not overtop the dikes. The test flood inflow from the drainage areas forward of the dikes (not inletting into the reservoir) would not overtop the dike embankment even if the intake structures at each dike were closed.

Both dikes are in generally good condition. However, no records of seismic analysis, if performed, were made available. As the dikes are located near the boundry of seismic zones 2 and 3, a seismic analysis should be performed. As such, the dikes have an overall rating of fair. It is recommended that the Owner engage a qualified registered professional engineer to analyze the dikes for seismic stability.

Furthermore, the Owner should institute certain remedial measures including routine maintenance of grass on embankments; prevention of trespassing and re-establishment of vegetation in barren areas; monitoring of seepage below the South Dike and establishment of a formal downstream warning system.

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

COMMONWEALTH OF MASSACHUSETTS
RONALD
H.
CHENEY
No. 29103
REGISTERED
PROFESSIONAL ENGINEER

Ronald H Cheney

Ronald H. Cheney, P. E.
Vice President

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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 <u>not</u> 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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APPENDIXES

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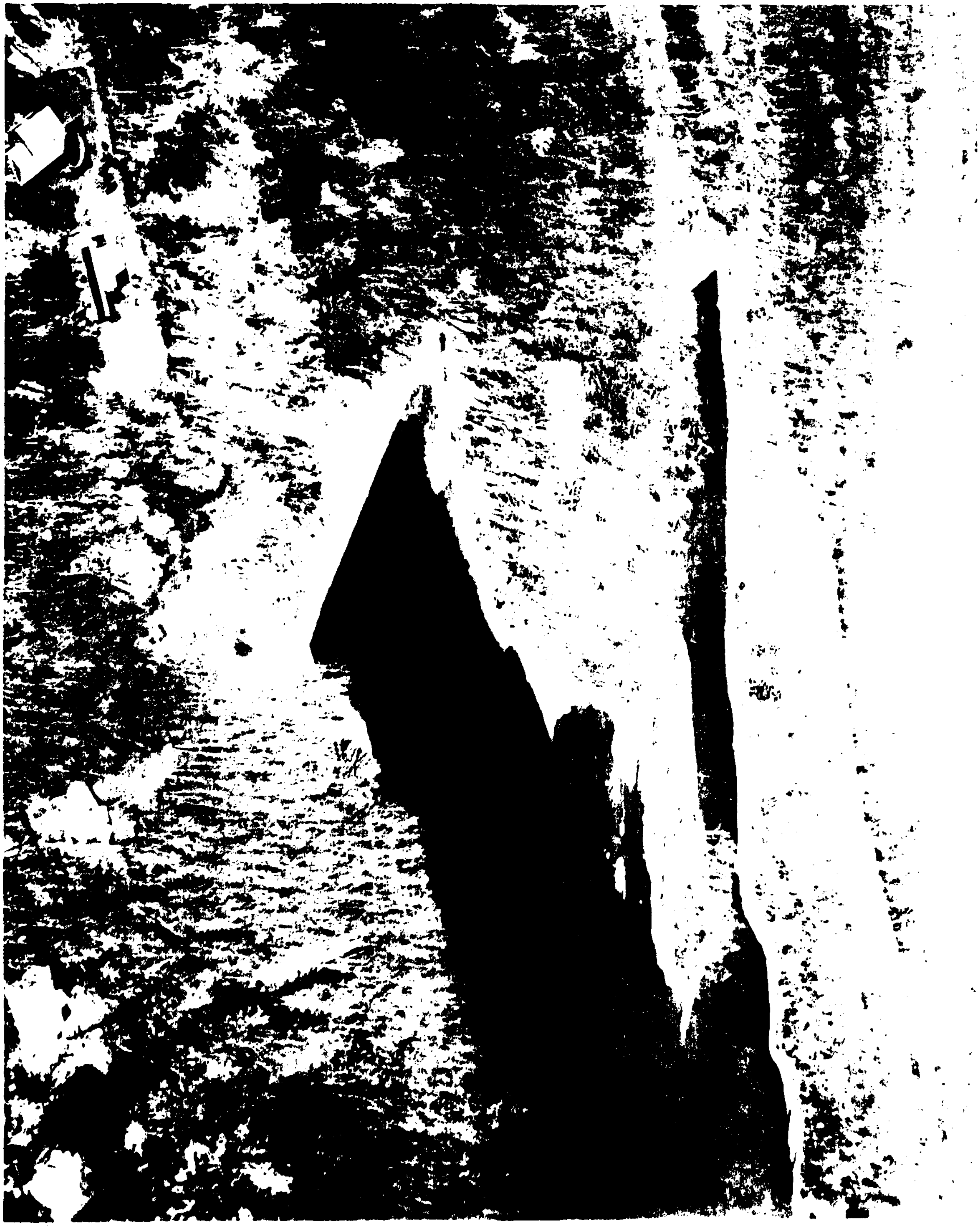
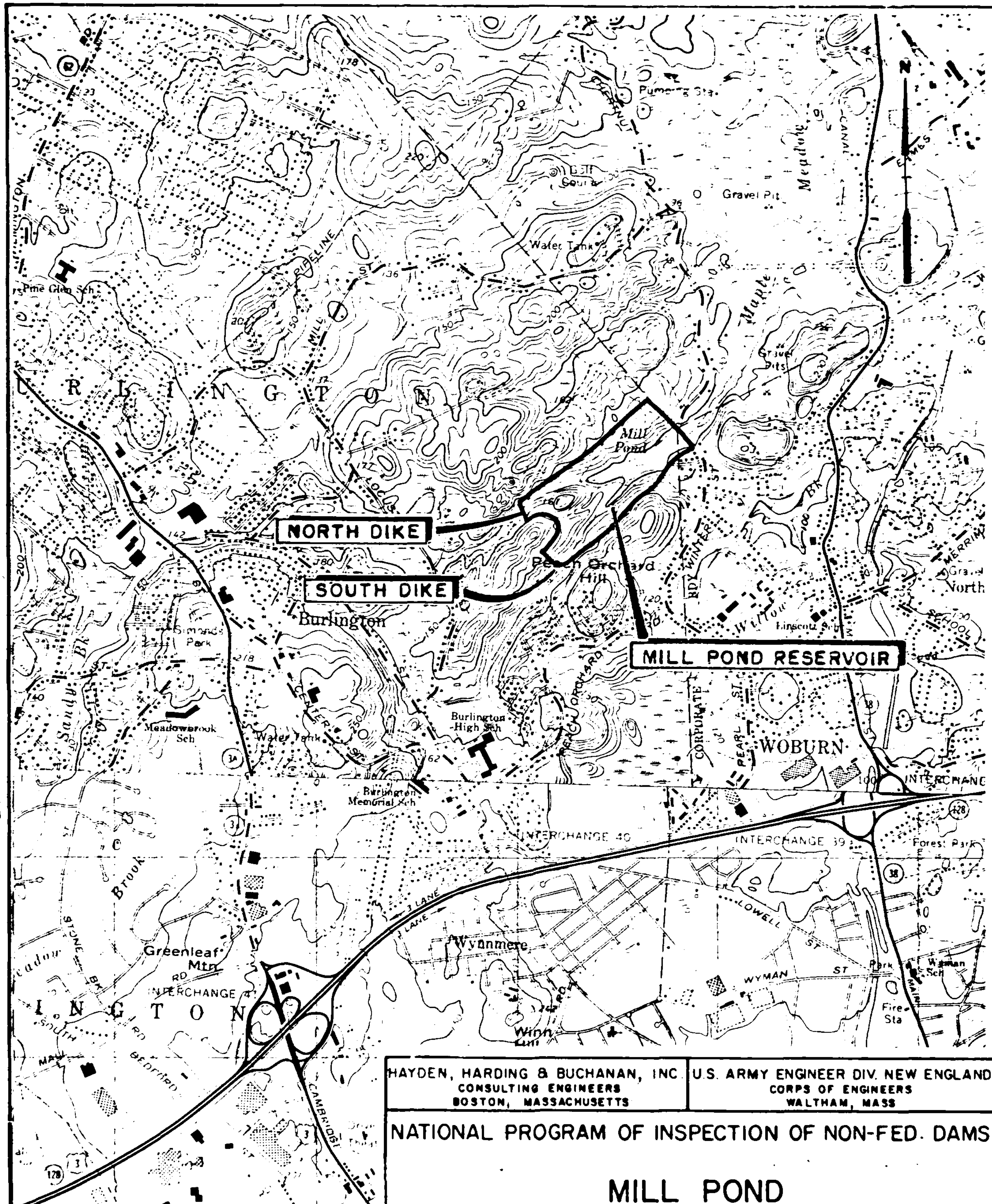




HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

MILL POND NORTH & SOUTH DIKE LOCATION PLAN

BURLINGTON MASSACHUSETTS

SCALE: 1:24000

DATE: DECEMBER 1979

PHASE I
NATIONAL DAM INSPECTION PROGRAM

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Hayden, Harding & Buchanan, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued Hayden, Harding & Buchanan, Inc. under a letter of 24 October 1979 from 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 non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and 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

Mill Pond Reservoir North and South Dikes are located in the Town of Burlington in Middlesex County, Massachusetts. The dikes are part of the Mill Pond Reservoir system which impounds water pumped from the Shawsheen River. The Mill Pond Reservoir and both dikes are shown on the Wilmington, Massachusetts, Quadrangle. The North and South Dikes are located along the Southwestern section of the reservoir and have the approximate coordinates of North 42°30'45", West 71°10'47" and North 42°30'30", West 71°10'12", respectively.

b. Description of Dam and Appurtenances

Since both dikes impound the waters of the Mill Pond Reservoir, the reservoir side will be referred to as the upstream side. Despite the fact that the remaining downstream side of each dike has a brook flowing toward it, this flow is diverted below the dikes and reservoir and is not retained by the dikes. Therefore, the embankment side facing the brook will be referred to as the downstream side within the following discussions. See "Section Through Dike" on Plate B-5 in Appendix B.

The Mill Pond South Dike (MA 01123) is 39 foot hydraulic height, 400 foot long earth embankment structure, containing a 1.25 foot wide concrete core wall. The upstream (reservoir side), side slope is riprapped and sloped at 2H:1V (photo 9) and the downstream side slope is turf lined and sloped at 2H:1V, photo 14. The crest width is 20 feet. The elevation at the top of the core wall is 145.0 and the elevation of the crest is 147.50.

There is a small brook which collects runoff from the drainage area to the west of the dike, photo 15. Water from this brook enters a 42 inch drainline through a concrete head wall and gate located at the downstream toe as shown by photo 11. The 42 inch drain line converges with a 24 inch line (from the North Dike) into a 48 inch line which continues under the Mill Pond Reservoir Dam embankment and exits into Maple Meadow Brook.

The dike contains a downstream drainage system, this system consists of a longitudinal 8 inch porous concrete drain (embedded in a washed gravel bed) located downstream of the core wall and a perpendicular 8 inch porous sub-drain pipe which exits into a riprap outlet pad located at the downstream toe.

There is a second, 20 foot hydraulic height, dike located to the north of the South Dike. This North Dike (MA 01122) is a 370 foot long earth embankment structure with a crest width of 20 feet. Upstream and downstream side slopes are at 2H:1V with the upstream slope riprapped. It also contains a concrete core wall and a downstream drainage system. See photos 1 and 4.

The level of the reservoir is maintained with water pumped from the Shawsheen River. Water from the Shawsheen River is diverted through a 24 inch diameter transmission line which outlets through a head wall structure located near the North Dike, photo 3.

On the opposite shore (to the East) of both dikes is the Mill Pond Reservoir Main Dam (see report MA 01121). This dam is a 1300 foot long, 50 foot hydraulic height, earth embankment structure containing a concrete core wall and a gated intake structure. Located at the central downstream toe area is the Town of Burlington Water Treatment Plant. Two 16 inch outlet pipes, from the intake structure, feed water to the treatment plant, where it is processed and eventually distributed to the town through a 12 inch distribution main.

c. Size Classification

This facility is classified as intermediate in size based upon its storage capacity of 1,746 acre feet.

d. Hazard Classification

The hazard classification for the North Dike is low. There is no development in the potential impact area of the North Dike below the top of the dike elevation of 147.5, except a power transmission line. Thus no impact upon habitable structures due to dike failure is apparent.

The South Dike has a high hazard potential classification. Failure of the South Dike would create a reservoir condition in the adjacent valley. About 24 houses, two improved roads, and school athletic fields would be damaged by 1 to 10 feet of flood water.

e. Ownership

The North and South Dikes have always been owned by the Town of Burlington.

f. Operator

The dikes are maintained and operated by the Town of Burlington Water Department. Mr. William Keene is the designated caretaker. The mailing address is Town of Burlington Water Treatment Plant, Winter St. Burlington, Massachusetts 01803 (telephone 617-272-3956).

g. Purpose of Dam

The purpose of the dikes has always been water supply.

h. Design and Construction History

The dam and dikes were designed by Whitman and Howard Inc. of Wellesly, Massachusetts in 1970. The construction contract for the project was sent out in October 1970. Construction began in 1971 and was completed in 1973. Van D. Lambert Excavating, Inc. was the contractor.

i. Normal Operational Procedures

There is no formal operational procedure for the dikes. The gates at the intake of the 24 inch and 42 inch drain lines are the only operational facilities. Each gate is normally left open so as to allow the waters from each brook to be diverted below the reservoir and eventually exit into an outlet channel downstream of the main dam.

1.3 Pertinent Data

a. Drainage Area

Mill Pond is located in an upland area. It was formed by constructing earth embankments across three valleys. Its drainage area is about 0.2 square miles (128 acres including reservoir area). The area around the reservoir is undeveloped wooded land.

To the southwest of the reservoir there are two swampy drainage areas which contribute runoff to the South Dike (.37 sm) and North Dike (.1 sm) intake structures. This run-off flows into pipes which pass beneath the two dikes and join together below the reservoir. A single pipe extends along the bottom of the reservoir and beneath the main dam. This pipe discharges into the outlet brook about 350 feet downstream of the main dam, at Winter Street. There is no outlet from these pipes into the reservoir. See the drainage area map in Appendix D and photographs in Appendix C.

b. Discharge at Damsite

1. Outlet Works

There are no outlet works at either of the dikes. Outlet works for the reservoir are located at the main dam and are as described in the Phase I Report "Mill Pond Reservoir Main Dam MA 01121".

2. Maximum Known Flood at Damsite

The dam was completed in 1973. There are no available records of maximum flood at the damsite. United States Weather Bureau records indicate that from August 17 to 20, 1955, ten to fourteen inches of rainfall occurred in the general location of the project.

3. Ungated Spillway Capacity

There is no spillway at either dike.

c. Elevation (ft. above NGVD - approximate only)

(1) Streambed at toe of dike North Dike: 127.5±
South Dike: 108.5±

(2) Bottom of cutoff------------------------------N/A

(3) Maximum tailwater---North Dike: 142 Assumes
South Dike: 140 inlet to
drain pipes
blocked.

(4) Recreation pool-------------------------------N/A

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

(6) Spillway crest (gated)--------------No spillway

(7) Design surcharge (Original Design)--------144.0

(8) Top of dikes--------------------------------147.5

(9) Test flood surcharge-----------------------147.3

d. Reservoir (Length in feet)

(1) Normal pool-----------------2300 (water supply)

(2) Top of dikes---------------------------------2325

(3) Test flood pool------------------------------2325

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

(5) Spillway crest pool-------------------------N/A

e. Storage (acre-feet)

(1) Normal pool-----------------1525 (water supply)

(2) Test flood pool------------------------------1710

(3) Top of dikes---------------------------------1746

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

(5) Spillway crest pool-------------------------N/A

f. Reservoir Surface (acres)

(1) Normal pool------------------53± (water supply)

(2) Test flood pool----------------------------74±

(3) Top of dikes-------------------------------74±

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

(5) Spillway crest-----------------------------N/A

g. Dike

(1) Type------------------Gravity, earth embankment

(2) Length-400 feet South Dike, 370 feet North Dike

(3) Height (hydraulic)----------North Dike: 20 feet
South Dike: 39 feet

(4) Top Width------------------20 feet (both dikes)

(5) Side Slopes 2H:IV turfed on downstream side, 2H:IV ripraped on upstream or reservoir side (both dikes)

(6) Zoning----------------------------not indicated

(7) Impervious Core----------1'3" concrete corewall

(8) Cutoff----------------concrete corewall to rock

(9) Grout curtain---------------------not indicated

h. Diversion and Regulating Tunnel - None at this project

i. Spillway - None at this project

j. Regulating Outlets

Each dike has a headwall and a manually operated valve (Photos 6,11) for a drain line to intercept runoff from small brooks which flow towards the dikes (Photos 5,8). The drain lines, a 24 inch pipe from the North Dike and a 42 inch pipe from the South Dike pass through the embankments and converge into a 48 inch pipe at approximately the center of the reservoir. The 48 inch line runs below the dam embankment and outlets into Maple Meadow Brook about 350 feet downstream of the dam. A gate valve to control the outflow for this line is located at the downstream toe of the main dam. All gate valves are normally left open to permit the discharge of all flow from the downstream brooks.

In addition, a 16 inch bypass line at the main dam runs from the water supply outlet pipes to the 48 inch drain line. Opening the bypass allows water to flow directly from the reservoir outlet to the drain line, and then discharge into the Maple Meadow Brook. In normal operation, the bypass line is closed.

SECTION 2

ENGINEERING DATA

2.1 Design Data

The dikes were designed by Whitman & Howard, Inc. Consulting Engineers, Wellesley, Massachusetts in 1970. Design calculations for this project were not made available. However, construction drawings and contract specifications were provided.

2.2 Construction Data

Construction for the facility was undertaken in 1971 and completed in 1973. The contractor was Van D. Lambert Excavating, Inc. Daily reports and or records of construction activity were not made available.

2.3 Operation Data

The facility is operated by the Town of Burlington Water Department. The drainlines through the dikes are used to divert flow from the brooks in front of the dikes with the flow exiting beyond the Main Dam. The gate valves are normally kept open. An operation manual for this project was not made available.

2.4 Evaluation of Data

a. Availability

As-built plans of the dam and dikes and associated structures were obtained from Whitman & Howard, Inc., Consulting Engineers, Wellesly MA, who were the designers of the facility. Additional engineering data pertaining to the design is not available for inclusion within this report. Some correspondence pertaining to the construction of the facility was obtained from the Department of Environmental Quality Engineering, Division of Waterways, Boston Office. Construction Correspondence or daily reports kept during construction were not made available.

b. Adequacy

In depth engineering data was not provided and does not allow for a definitive review. Therefore, the adequacy of this dam, structurally and hydraulically, can not be assessed from the standpoint of review of design calculations, but must be based primarily on the visual inspection, past performance history, the available as-built drawings, and sound engineering judgement.

c. Validity

The visual inspection of this facility showed no reason to question the validity of the information supplied on the as-built plans.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General

At the time of inspection the reservoir water elevation was about 137.5 ft which is about 10 ft below the top of the dikes. According to design drawings, full reservoir level is at elevation 144.0.

b. Dikes

General

Both dikes are earth embankments, the South Dike being about 39 ft in height and about 400 ft long and the North Dike being about 20 ft in height and about 370 ft long. Both dikes have a concrete core wall resting on bedrock. The majority of the embankment portion of the dikes rests on soil. A brook on the downstream side of the South Dike and flowing toward the dike is routed through the embankment by a 42-in. diameter ductile iron pipe. A brook flowing toward the North Dike is routed through the dike by a 24-in. diameter ductile iron pipe. The 42-in. and 24-in. iron pipes connect to a piping system which carries the water through the reservoir and main dam and into Maple Meadow Brook.

The core wall of both dikes consists of a 1 ft 3 in. wide reinforced concrete wall on a 3 ft 3 in. wide footing resting on bedrock. The footing is stepped to follow the contours of the bedrock surface. The core wall extends the entire length of the dikes and has a maximum structural height of about 52 feet for the South Dike and about 28 feet for the North Dike.

According to plan drawings, both dikes have an internal drainage system consisting of a line of 8 in. porous pipes next to the downstream edge of the core wall connected to one 8 in. porous pipe which exits the downstream slope on the left side of the ductile iron pipe. The invert elevations of the 8 in. porous pipes where they exit the downstream slopes of each dike are 113.1 for the South Dike and 131.9 for the North Dike.

The plan drawings indicate a pervious toe trench about 3 ft wide and 2 ft deep on the downstream side of both dikes.

South Dike

The upstream (reservoir side) slope is at an inclination of about 2H:1V and is covered with riprap in good condition as shown in Photo 9.

The crest of the dike is about 20 ft wide and is shown in Photo 14. The edges of the crest are grass covered and the middle is barren as a result of trespassing. Two observation wells were observed on the downstream side of the crest. One well was near the left abutment and could not be opened. The other was near the center of the dike and a sounding of this well indicated water at a depth of about 24.5 ft from the crest. Existing groundwater well data, if any, were not reviewed. No evidence of cracking or misalignment of the crest that could be attributed to embankment movement was observed.

The downstream slope is covered with long grass, as shown in Photo 10. The inlet structure for the 42-in. ductile iron pipe is shown in Photo 11. A path on the downstream slope from the toe to the crest was observed to the right of the inlet structure.

Standing water was observed, Photo 12, to the left of the inlet structure at about the same elevation as the top of the concrete wall supporting the trash racks (about El 114.6). The source of the standing water is unknown but may be due to flow of water out of the internal drainage system. The 8 in. porous pipe exiting the downstream slope and forming part of the internal drainage system could not be found, but its invert would have been about 1.5 ft lower than the standing water.

An area of standing water, about 70 ft by 30 ft, was observed downstream of the dike near the left abutment as shown in Photo 13. The standing water was within 8 ft of the toe of the dike and its furthest extension from the left wall of the intake structure was about 100 ft. Reeds and swamp growth were observed in the area of the standing water. The cause of the standing water may be seepage from the dike.

North Dike

The upstream slope (reservoir side) is at an inclination of about 2H:1V and is covered with riprap in good condition as shown in Photo 4.

The crest of the dike is about 20 ft wide and is shown in Photo 2. The edges of the crest are grass covered and the middle is barren as a result of trespassing.

The downstream slope is covered with long grass as shown in Photo 2. No evidence of seepage was observed through the downstream slope of the dike. A small amount of water was observed flowing from the drain pipe on the left side of the inlet structure on the downstream side of the dike, Photo 1. This water flowed into the inlet pipe.

c. Appurtenant Structures

No cracks or open joints were observed in the gate valve structures or trash rack inlet structures shown in Photos 6 and 11. Some trash and debris was observed at the South Dike inlet. The concrete outlet structure on the right abutment of the North Dike was in good condition.

d. Reservoir Area

There are no indications of instability along the banks of the reservoir in the vicinity of the dikes. The reservoir is shown in photos 7 and 17.

e. Downstream Channel

The downstream channels are the small brooks that flow toward the dikes. A further description of the area is given in Section 1.3.a.

3.2 Evaluation

A large area of standing water was observed near the left abutment of the South Dike which may be due to seepage from beneath the dike. If this is seepage, it does not represent an immediate problem, but it should be observed periodically as recommended in Section 7. All inlet and outlet structures were in good condition.

No record of seismic analysis made by conventional equivalent static load methods, if performed, was made available.

Because of the preceding along with the observed standing water at the South Dike, the overall rating of the dikes is fair.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General

The only operational features associated with the dikes, are the manually operated inlet structures to the drain pipes servicing the small brooks located in front of the dikes. These are normally left open to facilitate the passage of incoming flows. There are no other operational structures located at the dikes.

b. Description of Warning System

There are no warning systems associated with either of the dikes.

4.2 Maintenance Procedures

a. General

The Town of Burlington Water Department is responsible for the maintenance of the dikes. The designated caretaker is Mr. William Keene. The dikes and inlet structures are checked at least weekly by an employee of the Water Department to insure the openings to the drain pipes are free and clear of debris.

b. Operating Facilities

An employee of the Burlington Water Department tours the entire facility at least once a week. The dikes and inlet structures are checked visually, and any materials blocking the drain pipe opening are removed.

4.3 Evaluation

Although there are no formal operational or maintenance procedures for the facility, all facilities appeared to be well maintained. The dikes should be inspected every year by a qualified registered professional engineer who can identify conditions of concern which, if left unchecked, could jeopardize the safety of the structure.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Mill Pond Reservoir is located in Burlington, Massachusetts, near the Town of Wilmington and the City of Woburn. The dam and dikes are located in the Town of Burlington. The project is a pump storage water supply facility with a very small, natural drainage area of 0.2 s.m. (128 acres).

The dam (MA 01121) and two dikes (MA 01123 & MA 01122) which form the reservoir block off three valleys. The valley blocked by the South Dike has a drainage area of .37 s.m. and contains a brook draining a swampy area to the south. The North Dike cuts off a small valley and stream flowing from a swampy area. The drainage area to the North Dike is approximately 0.1 s.m. The two brooks from the swampy areas flow into inlets for culverts at the face of the dikes. The two culverts then join into one pipe below the reservoir. This single pipe passes beneath the dam (MA 01121) and into Maple Meadow Brook.

The dikes have no spillway. Water is discharged through an intake structure into two, 16 inch water supply pipes. These pipes are connected to the water treatment plant, at the downstream toe of the dam. See appendices B,C and D for engineering drawings, photographs and hydraulic calculations.

5.2 Design Data

Hydraulic/hydrologic criteria used for the design of this project was not available for review and inclusion in this report.

5.3 Experience Data

The project was completed in 1973. It is a pump storage water supply facility having a 128 acre drainage area. The normal high water level is at elevation 144. The normal operating water level is constantly changing and is kept at or below elevation 144. There are no records of past flooding experience or the occurance of overtopping of the dikes, if any, since it was constructed.

The United States Weather Bureau records indicate that 10 to 14 inches of rainfall occurred in the general location of the dam between August 17 to 20, 1955.

5.4 Test Flood Analysis

This facility has an intermediate size classification. The South and North Dikes have high and low hazard potentials, respectively. Based upon Corps Guidelines the test flood for the South Dike would be the full PMF, while that for the North Dike would be the ½ PMF.

A PMF inflow of 600 cfs from the 0.2 sm drainage area into the reservoir would not overtop the dikes (top elevation is 147.5) provided the reservoir was kept at elevation 144 (design high water) or less.

At the South Dike a PMF inflow of 1125 cfs, from the .37 sm swampy drainage area, would result in a forward elevation of 140 at the valley of the dike, assuming the gate for the 42 inch drain pipe to be closed. Eleven houses, two roads and school athletic fields would be flooded by 1 to 10 feet. If the inlet gate was open, the flood elevation would be decreased, and base flow flooding of structures somewhat reduced.

The ½ PMF inflow from the contributing 0.10 sm swampy drainage area of the North Dike would be 125 cfs. This inflow, assuming the 24" drain pipe was closed would result in a flood level in the valley at an elevation of about 142. No habitable structures would be inundated. The flood elevation would be lower if the gate for the 24" drain pipe was open.

5.5 Dam Failure Analysis

Failure of the North and South Dikes would result in the flooding of valleys in front of the dikes. There are no valley outlets which are below the elevation of the top of the dikes of 147.5. Essentially, all failure outflow would be stored. Thus, the Corps Guidelines for determining the failure discharge and routing would not be applicable.

Each dike was assumed to fail with a water level at the top of the structure, elevation 147.5. Outflow would continue until the forward valley and reservoir elevations were balanced, that is the additional storage in the valley was equivalent to that in the reservoir between the balanced elevation and the reservoir elevation at the time of failure.

For the North Dike, the only development in the valley below elevation 150 is a power transmission line. The failure of the dike would not impact any habitable structures regardless of whether there were base flow flooding (24 inch outlet blocked) or a dry weather condition existing just prior to failure.

For the South Dike, two failure conditions were investigated. For the "Dry" condition, no previous flood storage was assumed to occur in the valley forward of the dike. Computations were made to balance the elevation for the increasing valley storage with that for the decreasing reservoir storage as a result of the dike's failure and resulting discharge. Assuming the 42 inch drain pipe to be blocked, the valley would be flooded to an elevation of about 139.5 under "Dry" conditions. Eleven (11) houses, 2 roads, and school athletic fields would be inundated by 1 to 10 feet of water.

Under "Wet" conditions, it was assumed the 42 inch drain pipe was blocked and the runoff from a full PMF was stored in the valley. This storage would flood the valley to an elevation of about 140, and have approximately the same impact as the "Dry" condition failure. The dike was then assumed to fail and the changes in storage balanced. For "Wet" conditions the failure of the dike would result in a water level elevation of about 144 in the valley. The flooding of 12 houses above elevation 140 would occur as a result of this failure. Flooding depths would be between 1 to 4 feet. Those homes, roads and athletic fields below elevation 139.5 are also flooded during this "Wet" condition failure.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

The visual observations did not disclose any immediate stability problems. However, potential increases in seepage through the South Dike may lead to the instability of the dike.

6.2 Design and Construction Data

Information on the design and construction of the dikes can be obtained from "as-built" drawings dated November, 1973. Some information from these drawings are given in Section 3.1.b.

The drawings indicate that the dikes consist of "compacted glacial till and/or pervious fill" with a concrete core wall.

Logs of twelve borings made at the dike locations are available. These borings were made to refusal which varied from a depth of 1.5 ft to 6.5 ft at the South Dike and from 2.5 ft to 12.0 ft at the North Dike; rock coring was not performed.

6.3 Post Construction Changes

There is no record of post construction changes.

6.4 Seismic Stability

The dikes are located near the boundary of Seismic Zones 2 and 3 and in accordance with the recommended Phase I guidelines warrant seismic analysis. No record of seismic analyses made by conventional equivalent static load methods if performed, were made available.

SECTION 7

ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection and available records, the dikes are judged to be in generally good condition. However, due to the lack of seismic analysis and the potential seepage noted at the South Dike, the overall rating of the dikes is fair.

b. Adequacy of Information

The information made available and the visual inspection are adequate for a Phase I level of investigation.

c. Urgency

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

7.2 Recommendations

In accordance with recommended Phase I guidelines, the dikes should be analyzed for seismic stability. A qualified, registered professional engineer should perform the seismic stability analyses.

7.3 Remedial Measures

a. Operating and Maintenance Procedures

1. Grass on the crest and downstream slope of the dikes should be cut as part of routine maintenance.

2. Trespassing on the crest and downstream slope of the dikes should be prevented and grassy vegetation re-established in barren areas.

3. The inspection indicated in 5 below should include observation and documentation of the seepage area below the South Dike so that significant changes in seepage can be detected. This inspection should be performed at both a high and low reservoir level.

4. The Owner should develop a formal warning system for notifying downstream areas in the event of an emergency.

5. The dikes should be inspected every year by qualified registered professional engineers who can identify areas of concern which, if left unchecked could jeopardize the safety of the dam.

7.4 Alternatives

There are no practical alternatives for these dikes.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT MILL POND NORTH & SOUTH DIKES

DATE Nov. 2, 1979

TIME 10 am

WEATHER Clear 50's

W.S. ELEV. 137.5± U.S. ____ DN.S.

PARTY:

1. R. Cheney, HHB
2. D. Vine, HHB
3. D. LaGatta, GEI
4. T. Keller, GEI
5.
6.
7.
8.
9.
10.

PROJECT FEATURE	INSPECTED BY	REMARKS
1.		
2. Embankment	D. Lagatta, T. Keller	
3. Intake Structures	R. Cheney, D. Vine	
4.		
5.		
6.		
7.		
8.		
9.		
10.		

PERIODIC INSPECTION CHECKLIST

PROJECT MILL POND NORTH & SOUTH DIKES — DATE Nov. 2, 1979

PROJECT FEATURE Embankment — NAME D. LaGatta, T.Keller

DISCIPLINE Geotechnical Engineer — NAME R. Cheney
Structual Engineer

AREA EVALUATED	CONDITION
NORTH DIKE EMBANKMENT	Inlet structure on right side of dike.
Crest Elevation	127.5
Current Pool Elevation	137.5±
Maximum Impoundment to Date	Unknown
Surface Cracks	None of significance.
Pavement Condition	No pavement.
Movement or Settlement of Crest	None of significance.
Lateral Movement	None of significance.
Vertical Alignment	No vertical misalignment observed.
Horizontal Alignment	No horizontal misalignment observed.
Condition at Abutment and at Concrete Structures	Good.
Indications of Movement of Structural Items on Slopes	None.
Trespassing on Slopes	None observed.
Sloughing or Erosion of Slopes or Abutments	None of significance.
Rock Slope Protection - Riprap Failures	Riprap in good condition.
Unusual Movement or Cracking at or Near Toes	None observed.
Unusual Embankment or Downstream Seepage	None observed.
[illegible]	None.
Foundation Drainage Features	Drainpipe observed to left of inlet structure.
[illegible]	Not visible.
[illegible]	None found.
[illegible]	Tall grass on downstream slope, small trees on upstream slope.

PERIODIC INSPECTION CHECKLIST

PROJECT MILL POND NORTH & SOUTH DIKES — DATE Nov. 2, 1979

PROJECT FEATURE Embankment — NAME D. LaGatta, T. Keller

DISCIPLINE Geotechnical Engineer, Structual Engineer — NAME R. Cheney

AREA EVALUATED	CONDITION
SOUTH DIKE EMBANKMENT	
Crest Elevation	147.5
Current Pool Elevation	137.5±
Maximum Impoundment to Date	Unknown
Surface Cracks	None of significance.
Pavement Condition	No pavement.
Movement or Settlement of Crest	None of significance.
Lateral Movement	None of significance.
Vertical Alignment	No vertical misalignment observed.
Horizontal Alignment	No horizontal misalignment observed.
Condition at Abutment and at Concrete Structures	Good.
Indications of Movement of Structural Items on Slopes	None.
Trespassing on Slopes	Footpath on downstream slope on erosion of crest.
Sloughing or Erosion of Slopes or Abutments	None of significance.
Rock Slope Protection - Riprap Failures	Riprap in good condition.
Unusual Movement or Cracking at or Near Toes	None observed.
Unusual Embankment or Downstream Seepage	Swampy area (~70' x 30') downstream of toe near left abutment; standing water to left of inlet structure.
Piping or Boils	None.
Foundation Drainage Features	Not visible.
Toe Drains	Not visible.
Instrumentation System	Two groundwater wells observed on crest.
Vegetation	Grass on downstream slope is long.

PERIODIC INSPECTION CHECKLIST

PROJECT MILL POND NORTH & SOUTH DIKES — DATE November 2, 1979

PROJECT FEATURE Intake Structures — NAME D. LaGatta

DISCIPLINE Geotechnical Engineer — NAME R. Cheney

Structual Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	Intake structure on downstream slope controls flow of water of brook from downstream side, across the reservoir, through the main dam, and into Maple Meadow Brook.
a. Approach Channel	
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	
Condition of Concrete	Good
Stop Logs and Slots	Some debris in front of screen at South Dike

PERIODIC INSPECTION CHECKLIST

PROJECT MILL POND NORTH & SOUTH DIKES DATE November 2, 1979

PROJECT FEATURE Control Tower NAME D. LaGatta

DISCIPLINE Geotechnical Engineer NAME R. Cheney

Structual Engineer

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

PERIODIC INSPECTION CHECK LIST

PROJECT MILL POND NORTH & SOUTH DIKES DATE November 2, 1979

PROJECT FEATURE Transition and Conduit NAME D. LaGatta

DISCIPLINE Geotechnical Engineer NAME R. Cheney

Structual Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	No transition or conduit
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECKLIST

PROJECT: MILL POND NORTH & SOUTH DIKES — DATE: November 2, 1979

PROJECT FEATURE: Outlet Structure — NAME: D. LaGatta

DISCIPLINE: Geotechnical Engineer — NAME: R. Cheney

Structual Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Not applicable.
General Condition of Concrete	
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	
Channel	
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	

PERIODIC INSPECTION CHECKLIST

PROJECT MILL POND NORTH & SOUTH DIKES DATE November 2, 1979

PROJECT FEATURE Spillway NAME D. LaGatta

DISCIPLINE Geotechnical Engineer NAME R. Cheney

Structual Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	No spillway.
a. Approach Channel	
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	
General Condition of Concrete	
Rust or Staining	
Spalling	
Any Visible Reinforcing	
Any Seepage or Efflorescence	
Drain Holes	
c. Discharge Channel	
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Channel	
Other Obstructions	

PERIODIC INSPECTION CHECKLIST

PROJECT MILL POND NORTH & SOUTH DIKES DATE November 2, 1979

PROJECT FEATURE Service Bridge NAME D. LaGatta

DISCIPLINE Geotechnical Engineer NAME R. Cheney

Structual Engineer

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

APPENDIX B

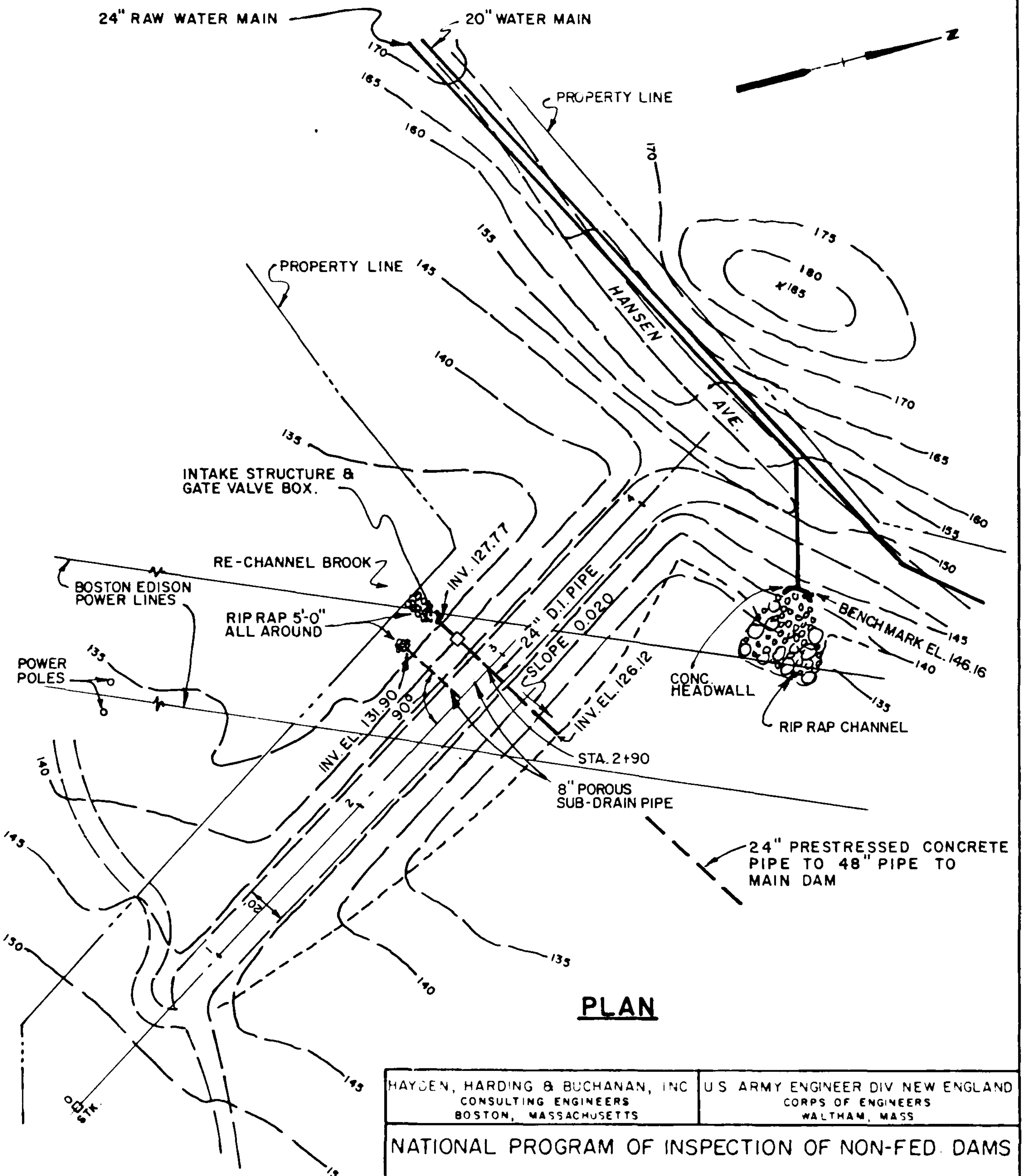
ENGINEERING DATA

LIST OF ENGINEERING DATA

1. As Built Plans
2. Construction Specifications & Test Boring Logs
3. Limited Pre-Construction Correspondence

Items 1 & 2 are available at Whitman & Howard, Inc., Wellesley, Massachusetts.

Item 3 is available at Department of Environmental Quality Engineering, Division of Waterways, 100 Nashua Street, Boston, Massachusetts.



NOTE:

TAKEN FROM PLANS BY WHITMAN & HOWARD INC. DATED OCT. 1970

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

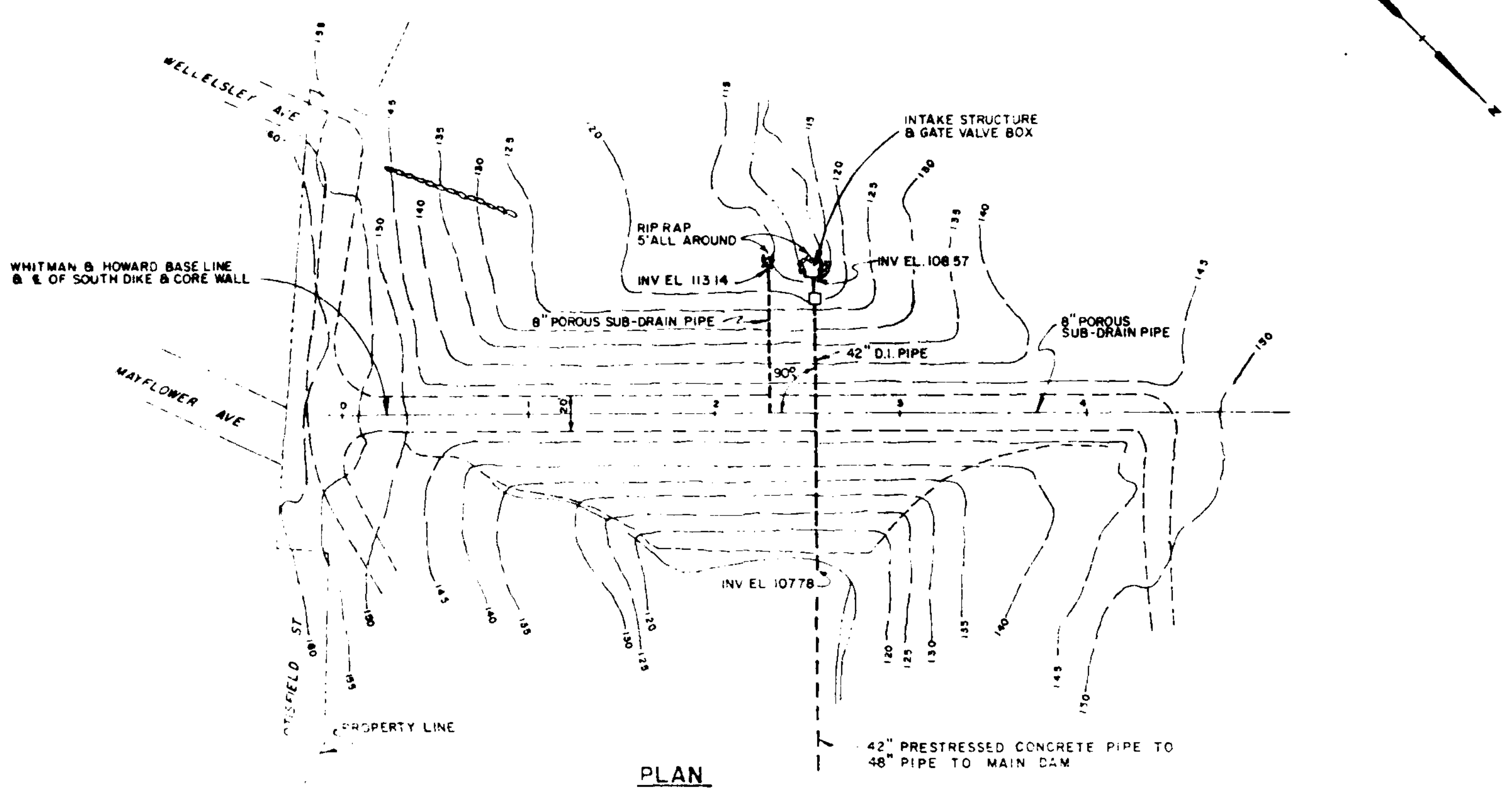
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

MILL POND NORTH DIKE PLAN VIEW

BURLINGTON MASSACHUSETTS

SCALE NOT TO SCALE

DATE DECEMBER 1979

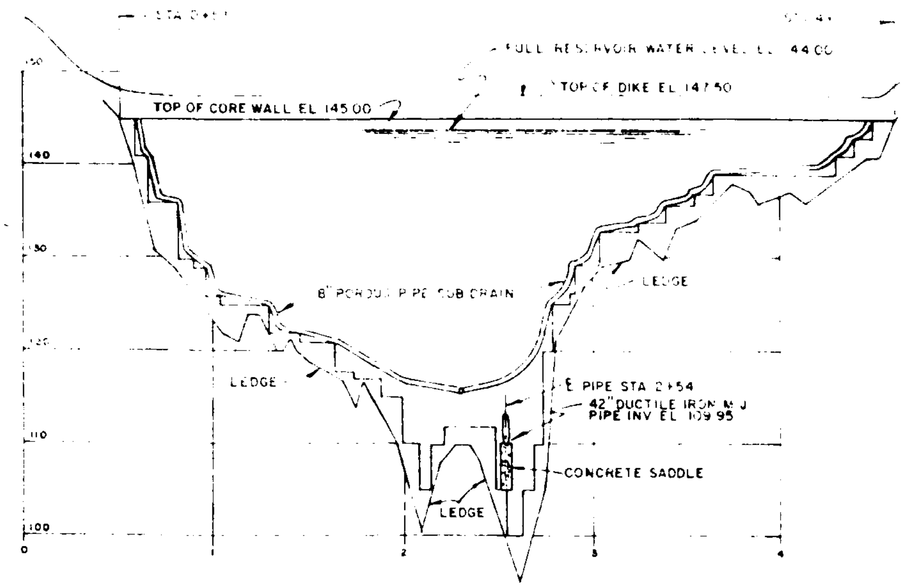


PLAN

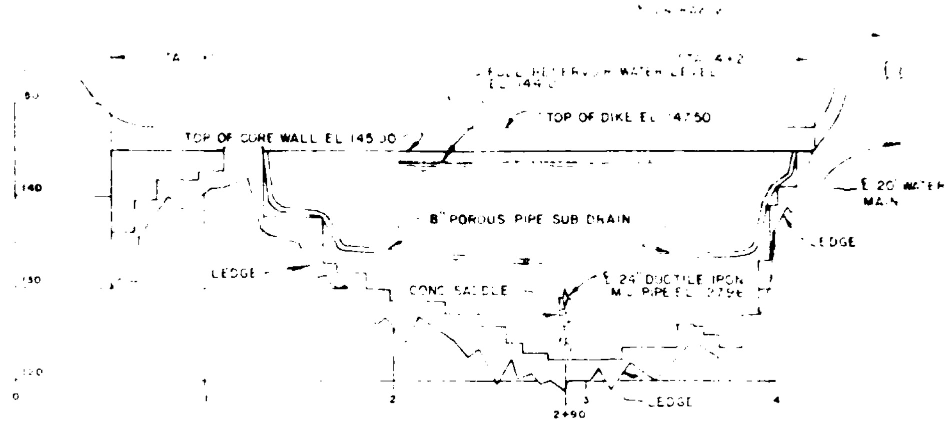
HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

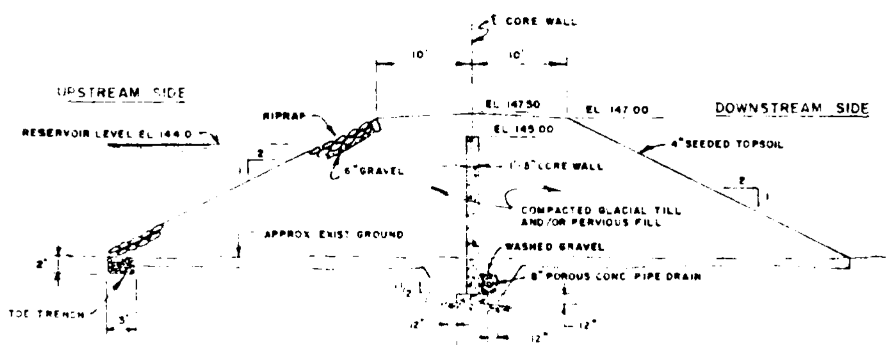
MILL POND
SOUTH DIKE
PLAN VIEW



PROFILE OF SOUTH DIKE



PROFILE OF NORTH DIKE



SECTION THROUGH DIKE

NOTE
TAKEN FROM PLANS BY WHITMAN & HOWARD, INC. DATED OCT 1970

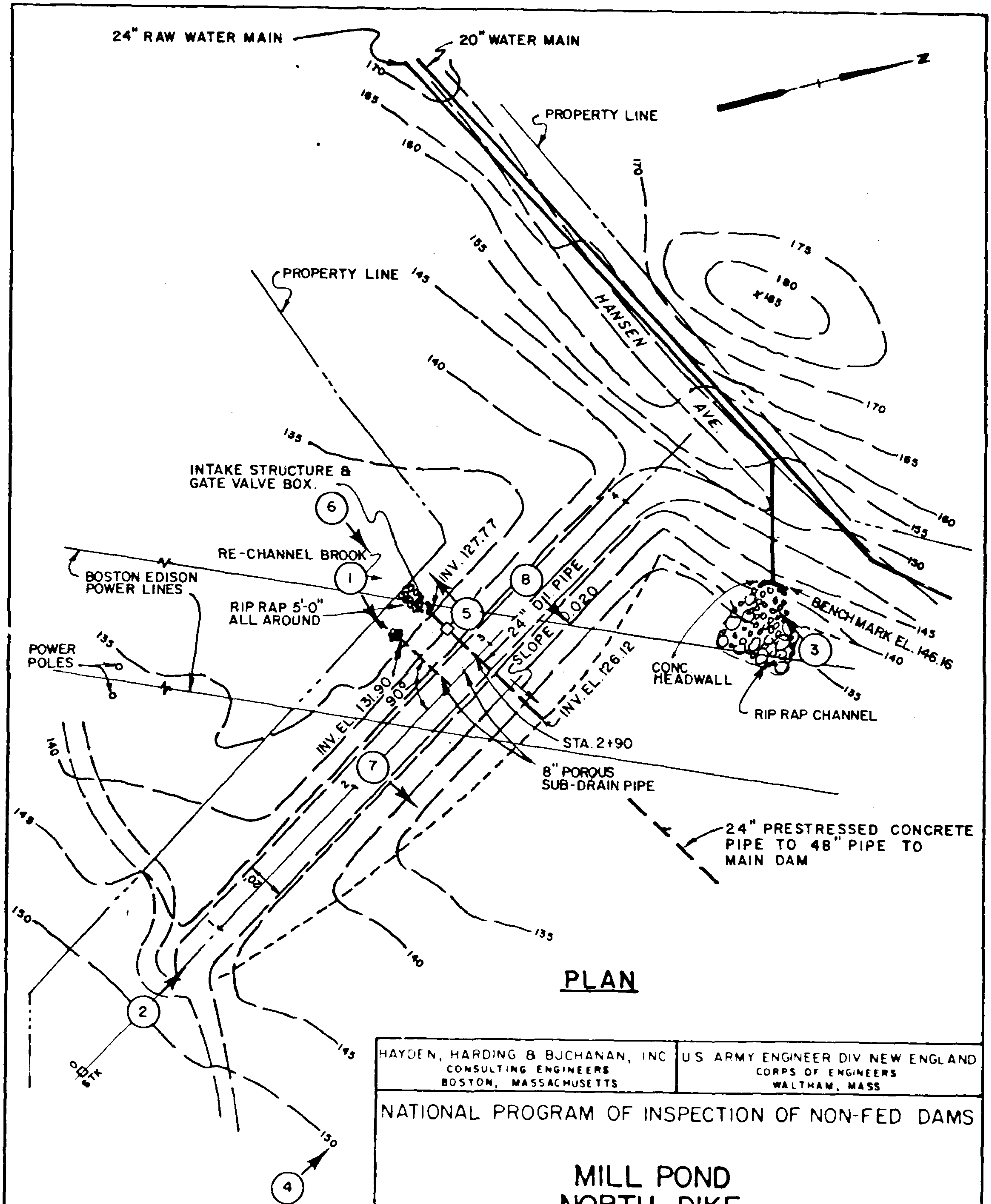
HALEY HARDING & BUCHANAN CONSULTING ENGINEERS BOSTON MASSACHUSETTS	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

MILL POND
PROFILES & SECTION
NORTH & SOUTH DIKE

APPENDIX C

PHOTOGRAPHS



NOTE:

TAKEN FROM PLANS BY WHITMAN & HOWARD INC. DATED OCT 1970

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

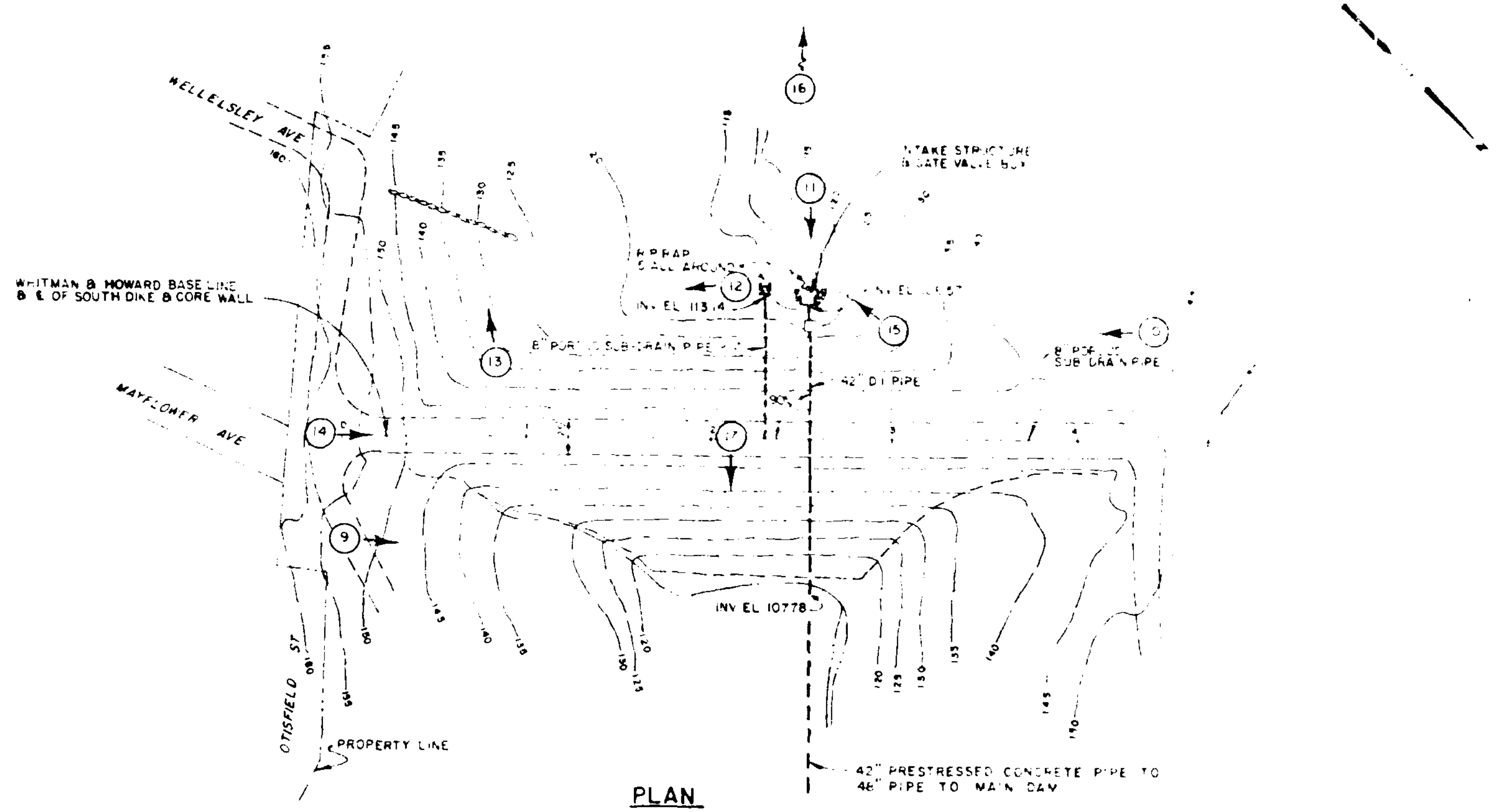
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

MILL POND
NORTH DIKE
PHOTO LOCATIONS

BURLINGTON MASSACHUSETTS

SCALE NOT TO SCALE

DATE DECEMBER 1979



PLAN

MILL POND
SOUTH DIKE
PHOTO LOCATIONS

C-3

PHOTO NO. 1 - Drainpipe at toe of downstream slope about 20 ft. left of intake structure. Small amount of water flowing out of pipe.

PHOTO NO. 2 - This view shows the crest of the dike and the upstream and downstream faces. Note the 24 inch pump storage outlet structure at the upper right side of the photo.

PHOTO NO. 3 - 24 inch pump storage outlet structure from Shawsheen River.

PHOTO NO. 4 - This photo shows the riprap slope protection on the reservoir side of the dike. The stain line on the water supply inlet structure corresponds to elev. 144± design high water level of the reservoir.

PHOTO NO. 5 - This photo shows downstream valley and brook to the 24 inch drainpipe. The inlet structure control valve handle can be seen in the lower left corner. There is no development within the downstream valley area. The valley is crossed by power transmissi lines.

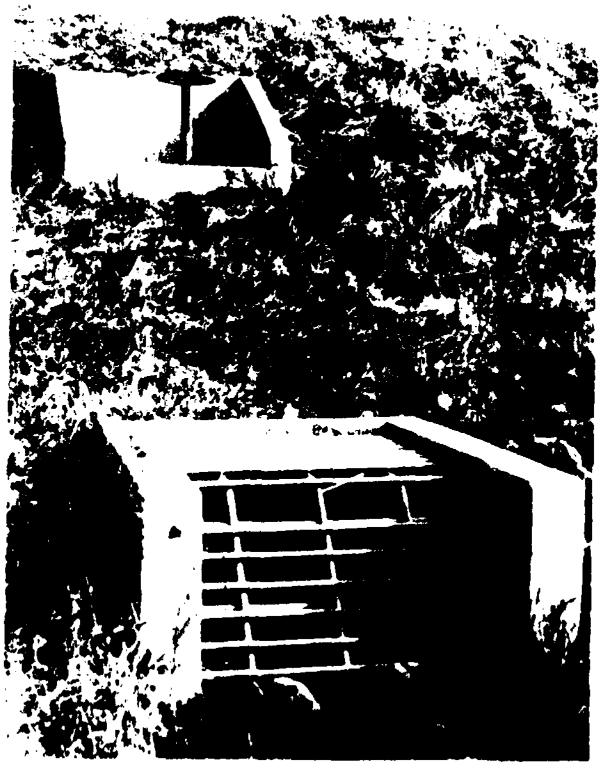


PHOTO NO. 6 - The inlet struct for the 24 inch drainpipe shown in this photo. It i located on the downstream side of the embankment.

PHOTO NO. 7 - This photo shows the reservoir area and the main dam.

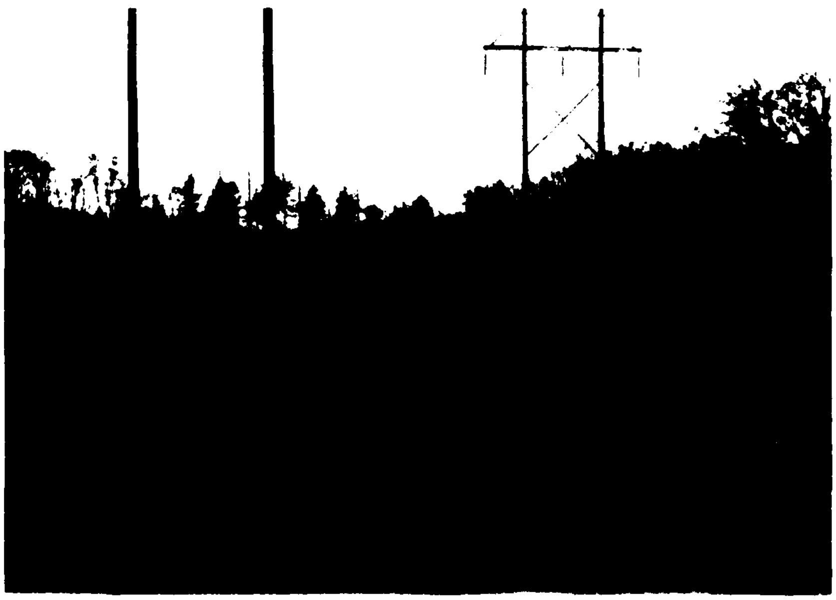


PHOTO NO. 8 - The only structures within the downstream valley are the power transmission lines. There are no residential or other structures. Development adjacent to the valley is at elev. 150±

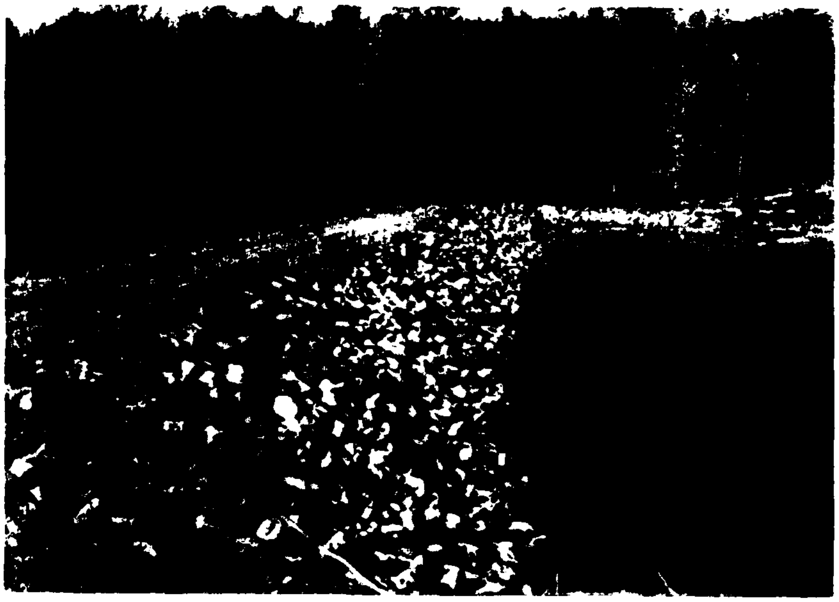


PHOTO NO. 9 - This view shows the riprap slope protection along the reservoir side of the embankment.

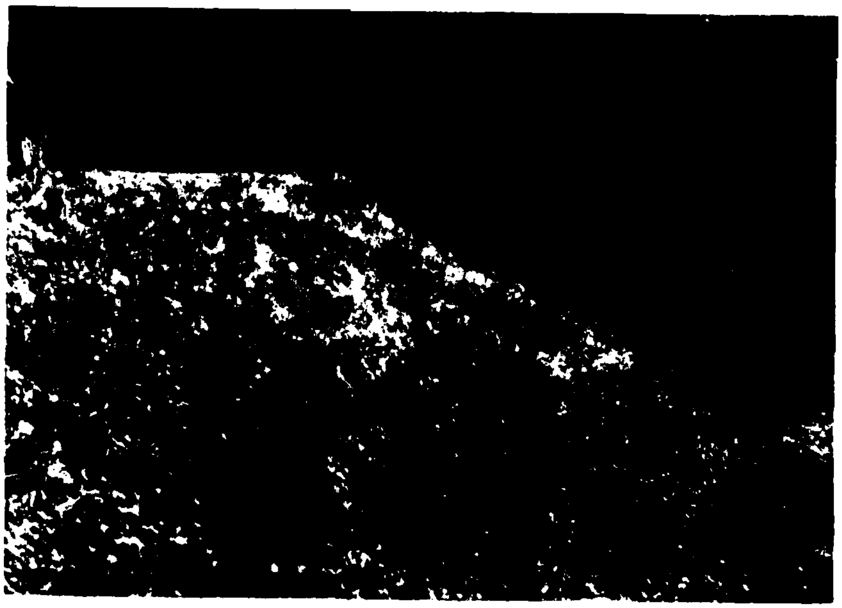


PHOTO NO. 10 - Downstream side slope of dike viewed from right abutment.

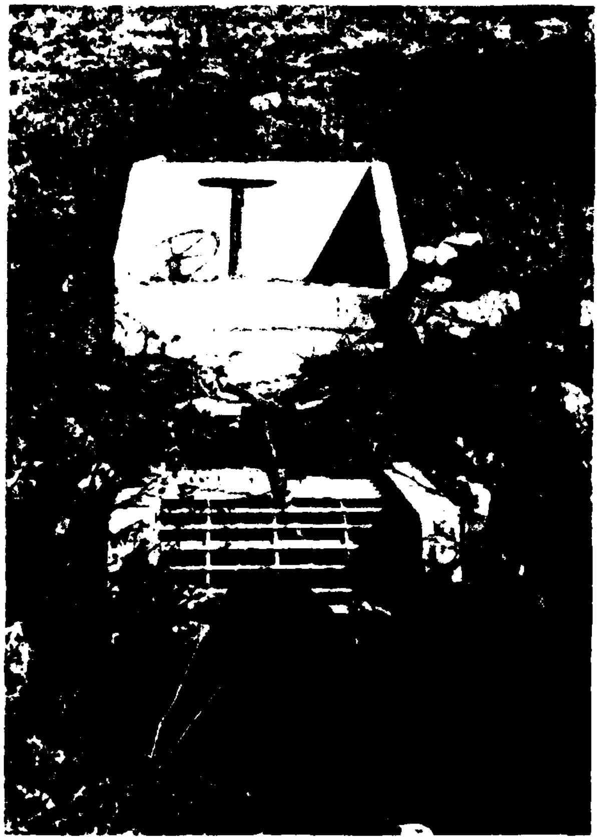


PHOTO NO. 11 - This photo shows the inlet structure for the 42 inch drainpipe, located on the downstream side of the embankment.

PHOTO NO. 12 - Standing water to the left of the inlet structure.

PHOTO NO. 13 - Area of standing water downstream of dike near the left abutment.

PHOTO NO. 14 - This view shows the top of dike and downstream face.

PHOTO NO. 15 - This photo shows the downstream just before the dike. In the lower right corner is the Inlet Brook from the 0.7 S.M. drainage area. These homes are about 500 ft. from the dike. About four homes in this area are between elevations 120 to 130. Fail flood stage will vary depending upon dry or wet weather base flow assumptions. Failure flooding damage will be at least 10 ft. depending upon exact house elevations.

PHOTO NO. 16 - This photo shows the downstream valley at the school playfield. The brook channel is at the left central portion of the photo. This area is about 2,500 ft. from the dike. Most homes are on the hillside, above the field, which is at elevation 140+. About twenty homes are also at elevation 140±. Dam failure flood stage would vary, depending on dry or wet weather base flow assumptions, thus affecting failure damage which varies from 1 to 4 feet.

PHOTO NO. 17 - This photo shows the reservoir area and main dam.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

JOB NO. 79.206.1
DATE 12/3/79
BY FLD
CH'D BY WP

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

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

Test Flood Analysis

South Dike: Area = 2.61 sq. in. = .375 sq. mi. = 240 ac.

I Q_{TEST} = PMF (Intermediate & High)

$$Vol_1 = 1 \times 19^{in} \times 240\,ac \times \frac{1\,ft}{12\,in} = 380\ ac\text{-}ft$$

$$Q = 1. \times 3000\ cfs/sm \times .375 = 1125\ cfs$$

from storage calc's - storage of 380 ac-ft
result in water elev of 140 ± - Elev,
5± houses, 2 roads, & school athletic fields flooded.

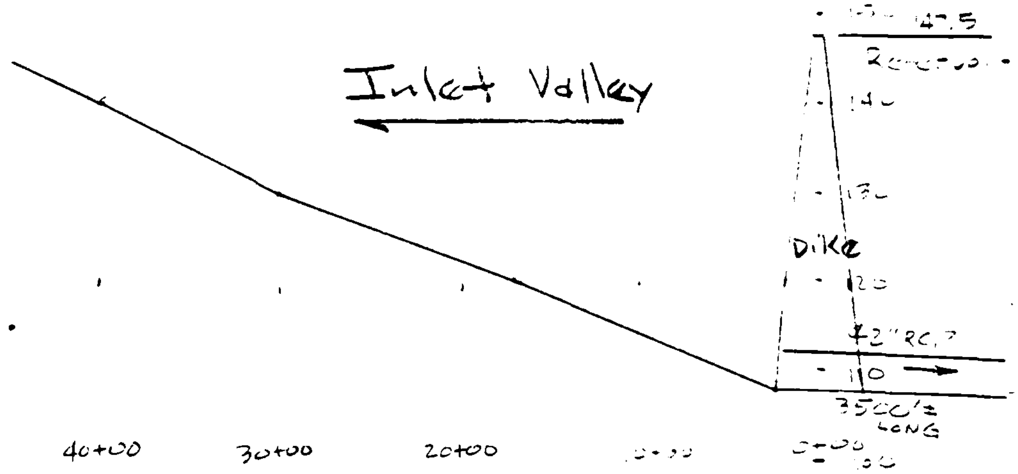
Note: if use 1/2 PMF Vol_1 = 190 ac-ft
$Elev_1$ = 140 ±

Above assuming no outflow. Have [illegible]" pipe to discharge runoff so flood elevations should be somewhat less than above.

JOB NO. 79.206	**HH&B** HAYDEN, HARDING & BUCHANAN, INC.	SHEET NO. D3
DATE 11-15-79	CONSULTING ENGINEERS	JOB Dams
BY WIA	BOSTON — WEST HARTFORD	SUBJECT M II Ponds - Dike
CH'D BY FDD		CLIENT COE

South Dike

Land drains towards dike to 42" RCP pipe which flows below the reservoir and Main Dam. Adjacent hills rise to 150'±.



Capacity of Valley

Elev	Area ac.	Area ave	D ft.	Stor	Accum Stor
150	337	197.5	2.5	494.	1224.
147.5	58	46.	7.5.	345.	730.
140.	34.	25.5.	10.	255.	385
130	17.	10.5.	10.	105.	130.
120	4	2.5.	10.	25.	25.
110.	1	—	—	—	—

JOB NO. 79.206.1
DATE 12/3/79
BY FDD
CH'D BY MA

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

SHEET NO. D 4
JOB Dams
SUBJECT Mill Pond Dike
CLIENT Corps

North Dike

Area swampy, relatively flat

I. Area draining directly to dike
$A = 0.58$ sq. in $= 0.083$ sm $= 53 \pm$ acres

$Q_{Test} = \frac{1}{2}$ PMF (Intermediate Flow)

$Vol_1 = \frac{1}{2} \times 19 \times 53 \times \frac{1}{12} = 42$ ac-ft

$Qp_1 = \frac{1}{2} \times 3000 \times 0.083 = 125$ cfs.

$Elev_1 = 142 \pm$ (No outflow) — less with outflow,
No structures - other than power line.

II. Remaining Drainage area: 164 ac $\pm$

$Vol_1 \quad \frac{1}{2} \times 19 \times 164 \times \frac{1}{12} = 130 \pm$ ac-ft

Area @ elev 150 - 34 ac. $\pm$
Area @ elev. 160 = 61 ac. $\pm$

Elev. = $152 \pm$ — area has 4 possible outlets for flow - 1 to dike, + 3 others - assume little or no additional flow to dike

III. Capacity of Valley - immediately upstream of dike

Elev.	Area ac	Area ave ac	D, ft	Stor ac-ft	Accum. stor. ac-ft
150	12.9				
		8.75	10	87.5	117 $\pm$
140	4.6				
		2.8	10	28	29.3
130	1.0				
		0.5	2.5	1.3	1.3
127.5	0				

JOB NO 79.206
DATE 11-15-79
BY MA
CH'D BY FDD

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

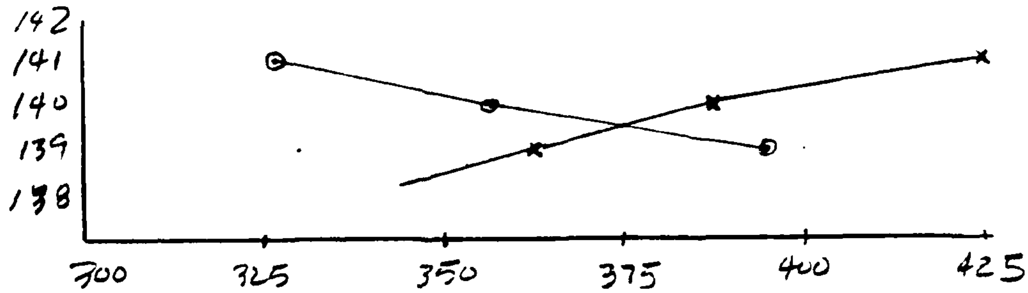
SHEET NO. D 5
JOB DAMS
SUBJECT Mill Pond - Dike
CLIENT COE

South Dike

Failure Analysis - Dry Condition

As dike fails, outflow will flow into the up-stream valley, which will act as a reservoir. The failure discharge will continue until the capacity of the valley equals that of the failure discharge. At which point, the water surface elevations in the valley & reservoir should be approx. equal & discharge from reservoir will stop. Assumes 42" ϕ pipe inlet grille is blocked.

Elev	Valley Cap ×	Res. Vol. Dis. ⊙
140	385 a-f	355 a-f
141	425	326 "
139	360	396



Maximum depth of water in So. dike inlet valley at elev 139.5± due to a failure of the So. dike.
Impact of failure: 11 homes, 2 roads school play field.

South Dike

Failure Analysis - Wet Condition

Assume 42" φ pipe blocked, some flooding in upstream valley due to PMF, & then dike fails

PMF Volume: $19^{in} \times 2\cancel{40}^{20}\ ac \times \frac{1\ ft}{12\ in} = 390\ ac\text{-}ft$

Flood Elevation = 140± (Before Failure)

Assume Failure occurs with water level at top of dike, 147.5.

Elev	Valley Cap.*	Res Vol Dis.*
142	92	269
146	276	85
144	184	192

* Above elevation 140.0

Wet Condition: Maximum Depth of water in So. dike valley at Elev 144± due to a failure of the So dike

Impact of failure: 12 homes, 3 roads school play field.

JOB NO. 79.206
DATE 11-15-79
BY MA
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HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO. D7
JOB Dam
SUBJECT Mill Pond Dike
CLIENT COE

North Dike

Inlet valley to North dike is much smaller than that of South Dike. No development, except power lines exist below elev 150± maximum water level must be below elev 147.5, top of dam, therefore, no impact from dike failure upon habitable structure is apparent.

Main Dam

Mill Pond dam - built 1973.
Designed by Whitman & Howard.

Height of Main Dam (141.5 to 98) = 49.5'±

Height of North Dike 20'±
South Dike 39'±

Water flows towards dikes to intake structures, enters pipe lines & flows below & out-of reservoir.

Storage Capacity of Dam 1,746 a-F

Size Class: Intermediate.

drainage area = 0.2± s.m 128± a.
"mountainous".

Hazard Potential: High.

Test Flood: PMF.

Inflow = 3000 csm × 1 × 0.2 = 600 cfs

Outflow = 0 (pump storage) no spillwd

Main Dam

Storage Capacity

ELEV	AREA acres	AVE A.	D ft.	Stor	Accum Stor
147.5	73.5	63.15	3.5	221.0	1745.6
147.0				189.5	
144.0	52.8	34.65	44	1524.6	1524.6
100.0	16.5	—	—	—	—

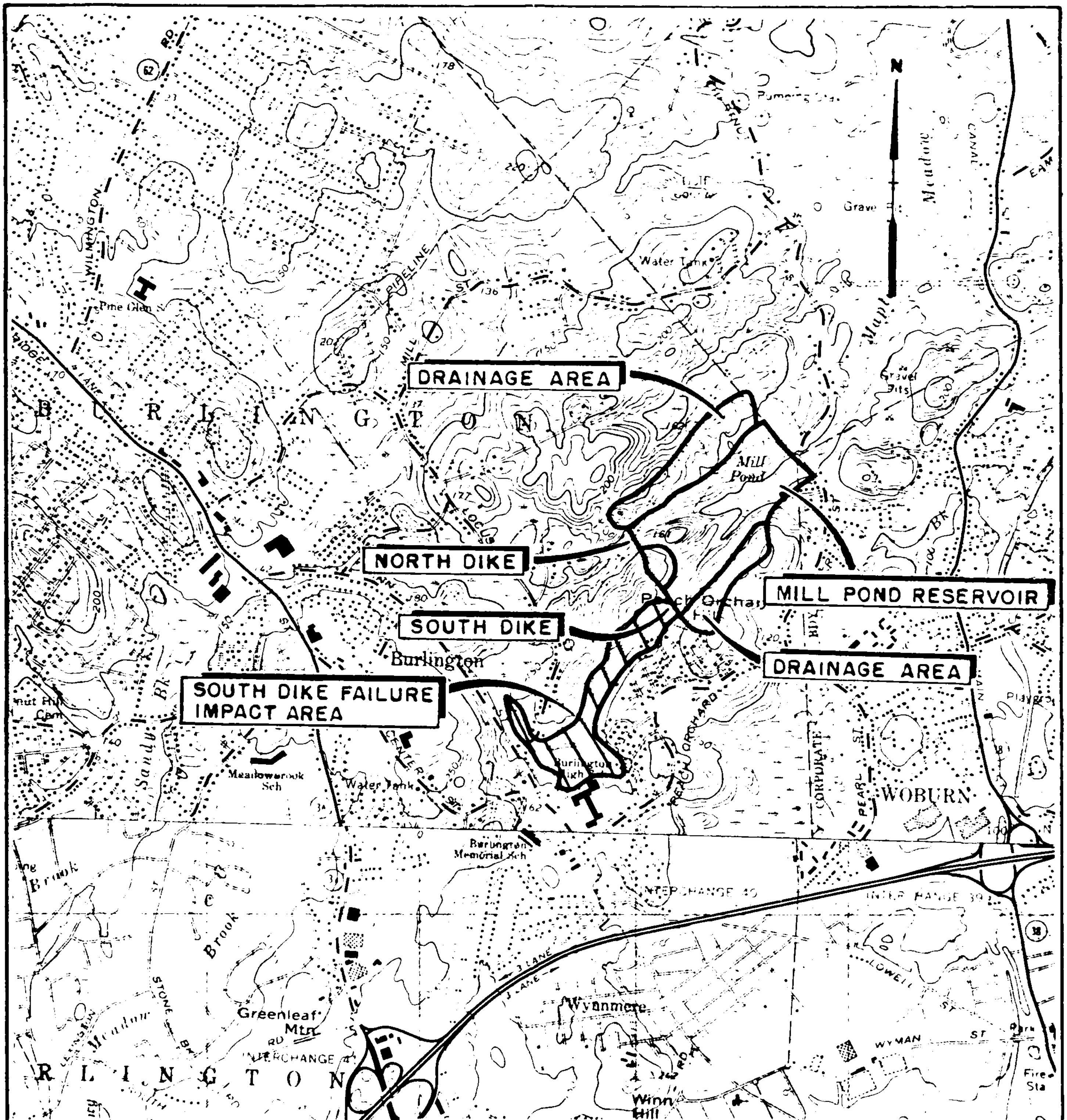
TEST FLOOD OUTFLOW

Main dam has no spillway, it is a pump-storage facility. There is NO "OUTFLOW". With reservoir level at elev. 144.0, determine the change in water level elev due to test flood. Will reservoir hold 19" of runoff from 128 acres?

$128. a \times \frac{19''}{12''/ft} = 203$ a-f which is less than 221 a-f of storage between elevs. 147.5 (top of dam) to 144. (design high water level).

PMF storm level is 147.25±.

½ PMF InFlow = 300 cfs Storage = 102 a-f
Elev = 145.5 dam is not overtopped.



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

MILL POND RESERVOIR
NORTH & SOUTH DIKE
DRAINAGE AREA & IMPACT MAP

BURLINGTON MASSACHUSETTS

SCALE: 1:24000

DATE DECEMBER 1979

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

END

FILMED

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