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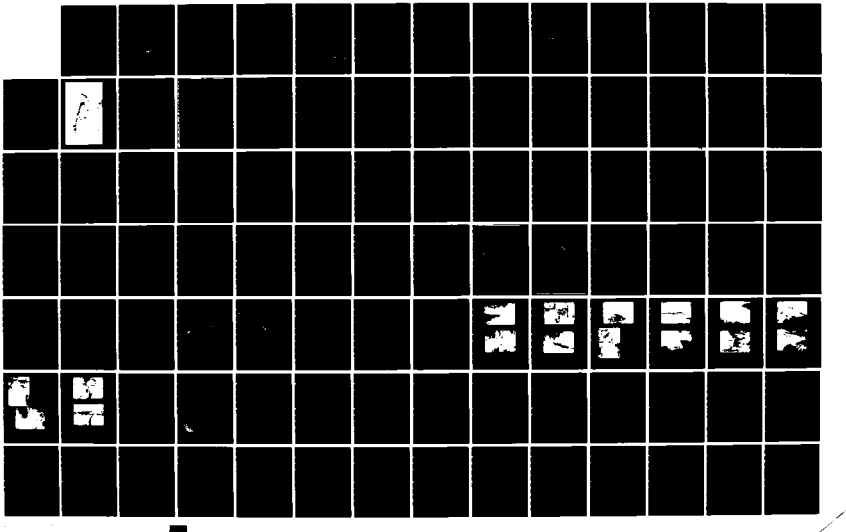

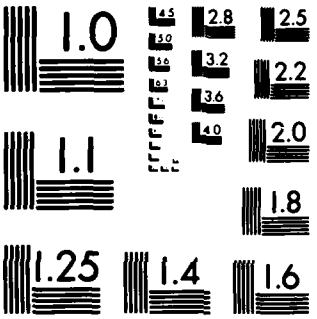

NAUGATUCK RIVER BASIN

WINCHESTER, CONNECTICUT

PARK POND
DAM - CT 00632
DIKE - CT 01708

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS. 02154

MARCH 1981

UNCLASSIFIED

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

DAMS, INSPECTION, DAM SAFETY,

Naugatuck River Basin
Winchester, Connecticut

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

Park Pond Dam consists of an earth embankment with a maximum height of 20 feet, a top width which varies from 8 feet to 15 feet, an upstream slope of 3 horizontal to 1 vertical and a downstream slope of 1.5 horizontal to 1 vertical. Based on the visual inspection, the dam is judged to be in poor condition and the dike in fair condition. The dam is classified as "Intermediate" in size with a "High" hazard potential. The dike is classified as "Low" hazard potential. A test flood equal to the PMF was used to evaluate the spillway capacity.

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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

MAY 08 1981

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Park Pond Dam (CT-00632) & Park Pond Dike (CT-01708) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the owner and cooperating agency for the State of Connecticut.

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

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely,

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

Incl
As stated

PARK POND
DAM: CT 00632
DIKE: CT 01708

NAUGATUCK RIVER BASIN
WINCHESTER, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

IDENTIFICATION NO: Dam - CT 00632; Dike - CT 01708

NAME OF DAM: Park Pond Dam and Dike

TOWN: Winchester

COUNTY AND STATE: Litchfield County, Connecticut

STREAM: East Branch of Naugatuck River

DATE OF INSPECTION: November 17, 1980

BRIEF ASSESSMENT

Park Pond Dam and Dike form an impoundment used for recreational purposes.

Park Pond Dam, located at the eastern end of the pond, consists of an earth embankment with a maximum height of 20 feet, a top width which varies from 8 feet to 15 feet, an upstream slope of 3 horizontal to 1 vertical and a downstream slope of 1.5 horizontal to 1 vertical. The dam is 420 feet long and has a 19.9 foot concrete spillway at the left end. A diversion channel from an adjacent watershed connects to the spillway approach channel. The impoundment has a maximum storage capacity of 1,100 Acre-Feet.

The dike, located at the northwestern end of the pond, consists of an earth embankment with a paved roadway along the crest. The dike has a maximum height of 7 feet, a top width of 21 feet, and a length of about 80 feet.

Based on the visual inspection, the dam is judged to be in poor condition and the dike in fair condition. Features which could affect the future integrity of the dam are trees and brush on the embankment; seepage through the embankment; erosion of the

downstream slope; deterioration of the spillway approach channel wall and the spillway weir; the accumulation of debris in the spillway and approach and discharge channels; the location of the low level control valve downstream of the dam and lack of erosion protection on the dike.

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the dam is classified as "Intermediate" in size with a "High" hazard potential. The dike is classified as "Low" hazard potential. A Test Flood equal to the Probable Maximum Flood (PMF) was used to evaluate the spillway capacity. The Test Flood inflow of 1,275 cubic feet per second (cfs) was routed through the impoundment and produced an outflow of 530 cfs. The spillway capacity with water level at the top of the dam and the dike is 310 cfs or 58 percent of the Test Flood routed outflow. The Test Flood would overtop the dam and dike by 0.3 feet.

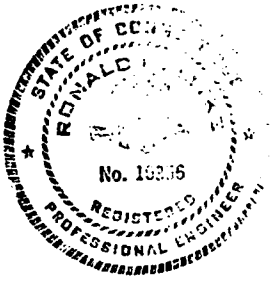
It is recommended that a qualified, registered engineer be retained to oversee removal of trees; to investigate the seepage through the embankment; to design slope protection and repairs for the embankments; to investigate the condition of the spillway approach channel wall and the spillway weir; to design an upstream control for the low level outlet at the dam; to investigate the repair or replacement of the outlet at the dike; and to investigate the need for and means to provide additional project discharge capacit

In addition, the owner should clear the spillway and approach and discharge channels of debris; institute a program of annual technical inspections by a qualified, registered engineer; prepare an Operations and Maintenance Manual; and put a formal warning system into effect.

The owner should implement the recommendations as described herein and in greater detail in Section 7 within one year after receipt of this Phase I Inspection Report, with the exception of clearing the spillway and approach and discharge channels which should be done immediately.

Ronald G. Litke, P.E.
Project Engineer

Roald Haestad
President



This Phase I Inspection Report on Park Pond Dam (CT-00632) & Park Pond Dike (CT-01708) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

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

ARAMAST MAHTESIAN, MEMBER
Geotechmical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

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

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

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

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

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

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 of the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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OVERVIEW PHOTO

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	PARK POND DAM - CT 00632
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		EAST BRANCH OF NAUGATUCK RIVER
		WINCHESTER, CONNECTICUT 13 NOVEMBER 1980

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

PARK POND DAM

PROJECT INFORMATION
SECTION 1

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. Roald Haestad, Inc., has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Roald Haestad, Inc. under a letter of October 28, 1980, from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-0005 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

The purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring correction in a timely manner by non-federal interest.
2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dams.
3. To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

The Park Pond Dam is located on the eastern end of Park Pond approximately 4,000 feet southwest of Winchester Center in the Town of Winchester, Connecticut. The Dike is located on the northwestern end of the Pond approximately 5,500 feet west of Winchester Center. Both the dam and the dike are shown on the Norfolk, Connecticut U.S.G.S Quadrangle map. The dam has coordinates of N41° 53.5' latitude and W73° 8.7' longitude. The dike has coordinates of N41° 54.0' latitude and W73° 9.3' longitude.

b. Description of Dam and Appurtenances

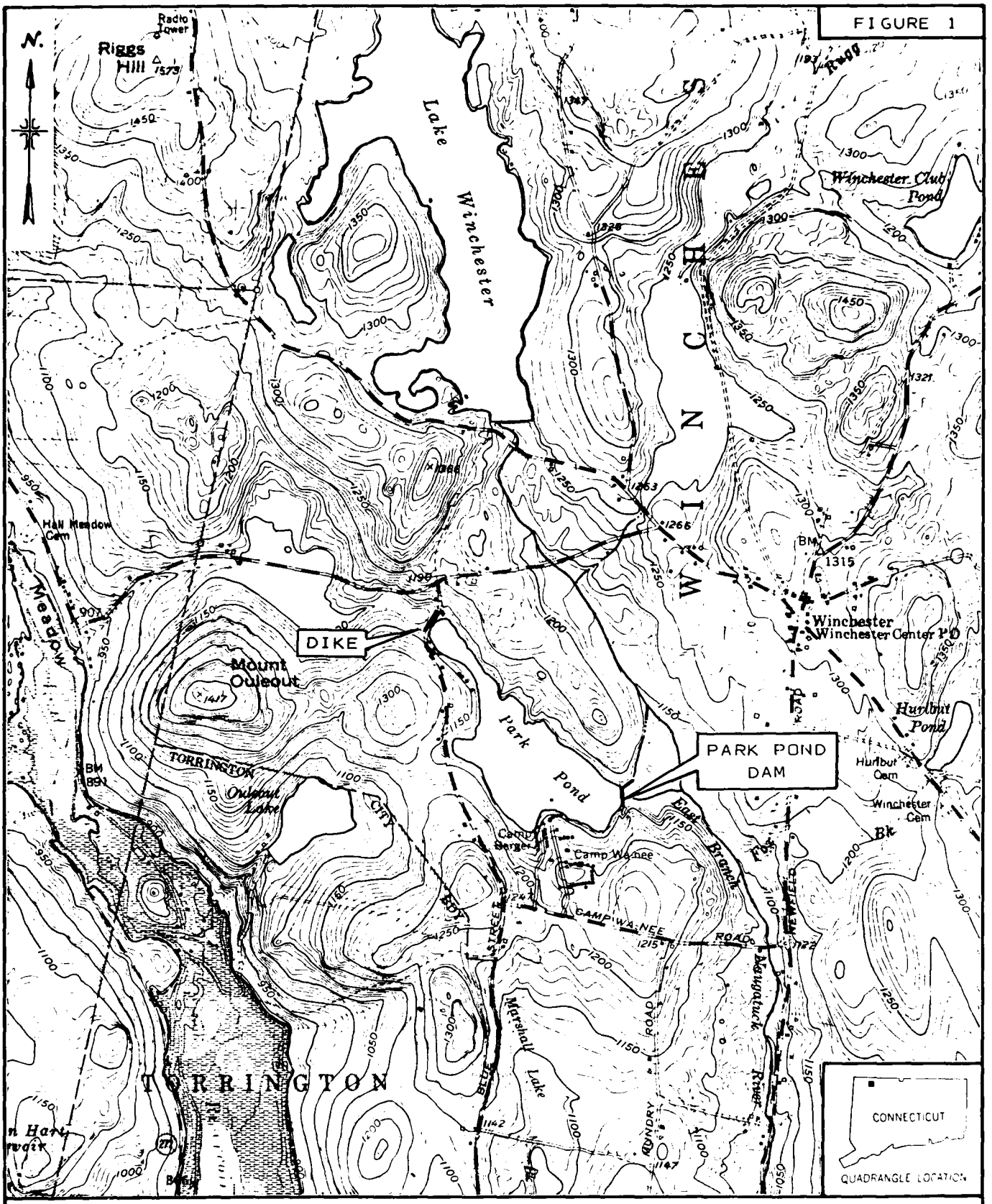
Park Pond is impounded by a dam located on the eastern end of the pond and a dike located on the northeastern end of the Pond.

The dam consists of a compacted earth embankment with a riprapped upstream slope and downstream stone masonry walls. The walls form terraces and give the impression that the dam has been raised over the years. The dam has a length of 420 feet, a maximum height of 20 feet, an upstream slope of 3 horizontal to 1 vertical and a downstream slope of 1.5 horizontal to 1 vertical. The main embankment has a top width of 15 feet and an elevation of 1140. The embankment along the spillway approach channel has a top width of 8 feet and an elevation of 1138. (See Figure 2, page B-1.) There are many large trees on the downstream slope.

The outlet at the dam consists of a 12-inch diameter cast iron pipe through the dam controlled by a gate valve on the downstream side of the dam. The location of the inlet pipe is unknown.

The spillway is located at the left end of the dam and is oriented at almost a right angle to the dam. The spillway consists of a concrete weir with stone masonry training walls. The

FIGURE 1



LOCATION PLAN

PARK POND DAM
WINCHESTER, CONNECTICUT

ROALD HAESTAD, INC. SCALE: 1" = 2000' NORFOLK QUADRANGLE 1969

spillway weir has a length of 19.9 feet and is 3 feet below the crest of the dam and the dike. A mortared stone masonry training wall forms the left end of the dam where it meets the spillway approach channel.

A diversion channel connects to the spillway approach channel at the spillway. The dike along the diversion channel has a height which varies from 1 to 3 feet above the spillway weir. The diversion watershed is 2.8 square miles compared to the Park Pond watershed of 0.5 square miles. The actual diversion structure is a low earth dike approximately 1,300 feet east of the dam.

The Park Pond dike, located at the northwestern end of the pond, is an earth embankment with a paved roadway across the crest. The crest of the dike is the same level as the lower portion of the crest of the dam, El. 1138. The dike has a maximum height of 7 feet, a top width of 21 feet, an upstream slope of 1.7 horizontal to 1 vertical and a downstream slope of 2.3 horizontal to 1 vertical. There is reported to be an outlet through the dike. The valve was visible below the water surface upstream of the dike but the outlet pipe was not observed.

c. Size Classification - "Intermediate"

According to the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the dam is classified as "Intermediate" in size if the height of the dam is between 40 feet and 100 feet or the dam impounds between 1,000 Acre-Feet and 50,000 Acre-Feet. The Park Pond Dam has a maximum height of 20 feet and a maximum storage capacity of 1,100 Acre-Feet. Therefore, the dam is classified as "Intermediate" in size based on storage capacity.

d. Hazard Classification - "High"

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the hazard classification for the dam is "High". A dam failure analysis indicates that a breach of the Park Pond Dam could result in the loss of more than a few lives and extensive property damage. The dike is classified as "Low" potential hazard.

The dam breach would release up to 13,300 cfs into the East Branch of the Naugatuck River. The flood waters would travel 3,500 feet downstream where a residential structure would be flooded up to a depth of 5 feet. The flood waters would continue downstream flooding portions of Newfield Road and flooding several residential homes up to 6 feet above sill level.

The maximum project discharge capacity prior to dam breach would be confined within the channel. The peak discharge from a failure of the dike would be about 1,000 cfs and would not flood any homes.

e. Ownership

Dam: Former Owners: Hartford Electric Light Company
Torrington Brass Company

Present Owners: The State of Connecticut
Department of Environmental Protection
Water and Related Resources
State Office Building
Hartford, Connecticut 06115

Benjamin Warner, Director of Water Resources

(203) 566-7220

Dike: Present Owners: The State of Connecticut
Department of Environmental Protection

and

The Town of Winchester

f. Operator

Anthony Cantele
P.O. Box 161
Pleasant Valley, Connecticut 06063
(203) 379-0771

g. Purpose of Dam

The dam impounds a lake used for recreational purposes. The lake was originally constructed for industrial water supply but it is no longer used for that purpose.

h. Design and Construction History

The dam was reportedly constructed by the Torrington Brass Company around 1860. The dam was raised to its present level around 1889. No other design or construction history was available for the dam.

i. Normal Operational Procedures

There are no operational procedures in effect for the dam.

1.3 Pertinent Data

a. Drainage Area

The drainage area consists of 0.5 square miles of "mountainous" wooded terrain with sparse residential development around the lake. Another 2.8 square miles of watershed is tributary via a diversion channel.

b. Discharge at Damsite

Discharge at the damsite is over a 19.9 foot broad crested concrete spillway. A 12-inch cast iron pipe through the dam serves as the low level outlet.

1.	Outlet Works (conduits) Size:	12-inch pipe
	Invert Elevation:	1118.3
	Discharge Capacity:	11 cfs
2.	Maximum Known Flood at Damsite:	Unknown
3.	Ungated Spillway Capacity at Top of Dam:	310 cfs
	Elevation:	1138.0
4.	Ungated Spillway Capacity at Test Flood Elevation:	360 cfs
	Elevation:	1138.3
5.	Gated Spillway Capacity at Normal Pool Elevation:	N/A
	Elevation:	
6.	Gated Spillway Capacity at Test Flood Elevation:	N/A
	Elevation:	
7.	Total Spillway Capacity at Test Flood Elevation:	360 cfs
	Elevation:	1138.3
8.	Total Project Discharge at Top of Dam:	310 cfs
	Elevation:	1138.0
9.	Total Project Discharge at Test Flood Elevation:	530 cfs
	Elevation:	1138.3

c. Elevation - Feet Above Mean Sea Level (NGVD)

1.	Streambed at Toe of Dam:	1118.3
2.	Bottom of Cutoff:	Unknown
3.	Maximum Tailwater:	N/A
4.	Normal Pool:	1135.0
5.	Full Flood Control Pool:	N/A
6.	Spillway Crest	1135.0
7.	Design Surcharge - Original Design:	Unknown
8.	Top of Dam:	Varies 1138.0 to 1140.0
9.	Top of Dike:	1138.0
10.	Test Flood Surcharge:	1138.3

d. Reservoir - Length in Feet

1.	Normal Pool:	4,000 feet
2.	Flood Control Pool:	N/A
3.	Spillway Crest Pool:	4,000 feet
4.	Top of Dam:	4,000 feet
5.	Test Flood Pool:	4,000 feet

e. Storage - Acre-feet

1.	Normal Pool:	850 Acre-Feet
2.	Flood Control Pool:	N/A
3.	Spillway Crest Pool:	850 Acre-Feet
4.	Top of Dam:	1,100 Acre-Feet
5.	Test Flood Pool:	1,125 Acre-Feet

f. Reservoir Surface - Acres

1.	Normal Pool:	80.6 Acres
2.	Flood-Control Pool:	N/A
3.	Spillway Crest:	80.6 Acres
4.	Test Flood Pool:	85.7 Acres
5.	Top of Dam:	85.2 Acres

g. Dam

	DAM	DIKE
1. Type:	Earth embankment with d.s. stone masonry training walls	Earth embankment with paved roadway along crest.
2. Length:	420 feet	80± feet
3. Height:	20 feet	7 feet
4. Top Width:	8 feet to 15 feet	21 feet
5. Side Slopes:	3 hor. to 1 ver.-u.s. 1.f hor. to 1 ver.-d.s.	1.7 hor. to 1 ver.-u.s. 2.3 hor. to 1 ver.-d.s.
6. Zoning:	Unknown	Unknown
7. Impervious Core:	Unknown	Unknown
8. Cutoff:	Unknown	Unknown
9. Grout Curtain:	Unknown	Unknown
10. Other:	U.S. slope is riprapped to El. 1138	N/A

h. Diversion and Regulating Tunnel - N/A

i. Spillway

1.	Type:	Broad crested concrete weir
2.	Length of Weir:	19.9 feet
3.	Crest Elevation with Flash Boards: without Flash Boards:	 N/A 1135.0
4.	Gates:	N/A
5.	Upstream Channel:	20' wide channel; mortared stone masonry wall on dam side
6.	Downstream Channel:	Natural channel; large trees in channel
7.	General:	

j. Regulating Outlets

1.	Invert:	1118.3
2.	Size:	12"
3.	Description:	Cast iron pipe through the earth embankment
4.	Control Mechanism:	Downstream gate valve
5.	Other:	Discharge capacity - 11 cfs

ENGINEERING DATA
SECTION 2

2.1 Design Data

There was no design data available for review.

2.2 Construction Data

The dam was constructed by the Torrington Brass Company about 1860 for industrial water supply and was raised to its present level around 1889. No other construction data was available.

2.3 Operational Data

No operational data could be found for the dam.

2.4 Evaluation of Data

a. Availability

Design, construction or operational data was not available from the State of Connecticut Department of Environmental Protection.

b. Adequacy

As no design or construction information was available, the assessment of the condition of the dam was based on the visual inspection, past performance history, and hydraulic and hydrologic calculations performed for this report.

VISUAL INSPECTION

SECTION 3

3.1 Findings

a. General

The visual inspection of the dam and dike at Park Pond was conducted on November 17, 1980. At the time of inspection the water level was 0.2 feet below the spillway elevation.

Park Pond is impounded by a main dam at the eastern end of the pond and a low dike at the northwestern end. The dam consists of an earthen embankment with outlet works located near the center of the dam and a spillway at the left end. A diversion channel enters the spillway approach channel from the left of the spillway. The dike is an earth embankment with a paved roadway along its crest. The general condition of the dam at the time of inspection was poor. The condition of the dike was fair.

b. Dam

The upstream slope of the dam is protected by riprap to 3 feet above spillway level. The riprap is in good condition. A heavy growth of brush obscures much of the upstream slope, Photo 1. The downstream slope is heavily overgrown with large trees up to 18-inches in diameter, Photos 2 and 3. The slope is also quite steep and has several erosion paths caused by trespassers. The downstream slope is interrupted in several places by stone masonry walls. The walls are generally in fair condition except where large trees have grown through them and displaced the stones.

The crest of the dam is mostly bare, the grass being worn away by trespassers, Photo 4. One significant trespass erosion

path was observed from the crest to the toe of the downstream slope, Photo 5.

There are several areas of seepage along the downstream toe, Photo 6. Total seepage flow from all areas is in the range of 5 - 10 gpm. At the time of inspection seepage from all areas was clear but did contain rust-colored floccules.

A mortared stone masonry wall forms the left end of the dam at the spillway approach channel. The wall is deteriorated at the waterline where significant loss of mortar and stones threatens the integrity of the wall, Photo 12.

c. Dike

The dike is a low earth embankment at the upper end of the pond. The upstream slope is grass-covered with no riprap erosion protection, Photo 7. The downstream slope has recently been cleared of brush but there are large trees at the toe, Photo 8. Erosion caused by highway drainage was noted on the downstream slope. The crest of the dike is a paved roadway. The pavement is in good condition with several longitudinal cracks, Photo 8.

A gate valve was observed in the pond about 15 feet off shore, Photo 9. This reportedly controls a pipeline through the dike. No outlet structure downstream of the dike could be found.

d. Appurtenant Structures

The appurtenant structures consist of the spillway, the outlet works and the diversion inlet channel. The spillway is located at the left end of the dam and has a broad crested concrete weir and mortared stone masonry training walls, Photo 10. The concrete weir is severely spalled. The spillway is obstructed by logs and stumps, Photo 11. The training walls are in fair

condition with some mortar missing. The spillway approach channel has a mortared stone masonry wall on the dam side (right) and natural ground on the left. The wall has significant loss of mortar and stones at the waterline, Photo 12. The channel is obstructed with an old boat, logs, stumps and miscellaneous debris, Photo 10. Trees overhang the channel from the left bank. The spillway discharge channel consists of large stone paving which gives way to ledge and boulders about 30 feet downstream. The channel is obstructed with debris and large trees, Photo 11.

The outlet works consist of a mortared stone masonry structure and brick valve box on the downstream side of the dam, and a 12-inch cast iron low level outlet. The brick and stone masonry appeared to be in fair condition, Photo 13 and 14. The gate is reported to be operable. Only the downstream end of the outlet pipe could be observed.

The diversion inlet channel connects to the left end of the spillway approach channel. The channel dike is riprapped and in good condition although there is very little freeboard, Photo 15. The diversion structure is a low earth and stone masonry dike which is so badly deteriorated as to be almost unrecognizable, Photo 16. There are several breaches in the dike and the amount of water it now diverts is minimal.

e. Reservoir Area

No indications of instability were observed along the edges of the reservoir in the vicinity of the dam.

f. Downstream Channel

The downstream channel is a swamp with many large trees and a poorly defined channel.

3.2 Evaluation

On the basis of the visual inspection the dam is judged to be in poor condition and the dike in fair condition. The following features could affect the future integrity of the dam:

1. The root systems of the trees and brush on the earth embankment could provide pathways for internal erosion of the dam. Additional growth of the trees will continue to displace the stone masonry walls and could lead to their collapse. Overturning of trees during a storm could tear away large portions of the embankment and lead to a breach of the dam.

2. Continued seepage through the earth embankment could lead to internal erosion of the dam.

3. Continued erosion of the downstream slope could eventually decrease the freeboard and cause a breach of the dam.

4. Continued deterioration of the base of the spillway approach channel wall could lead to its collapse.

5. Additional deterioration of the concrete spillway weir could lead to a failure of the spillway.

6. The accumulation of debris in the spillway, and approach and discharge channels, trees overhanging the approach channel and trees growing in the discharge channel could cause a blockage and overtopping of the dam.

7. The location of the gate valve on the downstream side of the dam could lead to piping and internal erosion of the dam.

8. The lack of riprap protection of the dike could lead to erosion of the upstream slope.

9. Continued erosion of the downstream slope of the dike could eventually lead to a breach of the dike.

OPERATIONAL AND MAINTENANCE PROCEDURES

SECTION 4

4.1 Operational Procedures

a. General

The impoundment is used for recreational purposes. An upstream gate was observed in the pond near the dike, but its condition and the size of the pipeline are unknown. A 12-inch cast iron low level outlet pipe and downstream gate were observed at the dam. The gate is reported to be exercised once a year.

An additional watershed was previously diverted into Park Pond by a diversion dike and channel. The dike is now in such poor condition that water diverted to the pond is minimal.

b. Description of Any Warning System in Effect

There is no formal warning system in effect for the dam.

4.2 Maintenance Procedures

a. General

There are no maintenance procedures in effect for the dam.

b. Operating Facilities

There are no maintenance procedures in effect for the operating facilities.

4.3 Evaluation

Present operational and maintenance procedures are inadequate, as is evident by the general condition of the dam. An operations and maintenance manual should be prepared for the dam and the operating facilities, and a program of annual technical inspections by qualified, registered engineers should be instituted. A formal downstream warning system should be developed and put into effect in case of an emergency at the dam.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

SECTION 5

5.1 General

The spillway for the Park Pond Dam consists of a 19.9 foot long broad-crested concrete weir with mortared stone masonry training walls located at the left end of the dam. The spillway is a side hill type spillway oriented at almost a right angle to the dam. A mortared stone masonry wall forms the left end of the dam and the right side of the spillway approach channel. A diversion channel enters from the left of the spillway and consists of an excavated channel and low earth dike.

The concrete spillway weir is badly spalled. The weir is about 3 feet below the crest of the dam but only one foot below the lowest portions of the diversion channel dike. The spillway, approach, and discharge channels are all obstructed with logs, stumps, and debris. In addition, there are large trees growing in the discharge channel and trees overhanging the approach channel.

The low level outlet is a 12-inch cast iron pipe through the center of the dam controlled by a downstream gate. The outlet has a capacity of 11 cfs.

Another outlet of unknown size is reported to discharge through the dike. A gate valve was observed upstream of the dike but no outlet pipe was found.

The watershed area consists of 0.47 square miles of steep, wooded terrain with sparse residential development and two summer camps around the pond. The diversion watershed is another 2.8 square miles. However, the diversion structure, a low earth dike,

is so deteriorated as to be almost unrecognizable, Photo 16, page C-9 in Appendix C. The diversion capacity of the structure is minimal in its present condition. Even with complete failure of the structure, the diversion channel would continue to divert 0.02 square miles of watershed to the pond.

Watershed elevations range from 1,340 on the west side to 1,135 at the spillway. The diversion watershed has a peak elevation of 1,500 at the north end.

5.2 Design Data

No design data were available for the dam or the dike.

5.3 Experience Data

No records of past flood experiences were available.

5.4 Test Flood Analysis

Based on the dam failure analysis, the dam is classified as "High" hazard potential. The dam is classified as "Intermediate" in size, based on a maximum height of 20 feet and a storage capacity of 1,100 Acre-Feet. According to the Recommended Guidelines for Safety Inspection of Dams, by the Corps of Engineers, the Test Flood should be the Probable Maximum Flood (PMF). The Test Flood was calculated using a peak flow of 2,550 cubic feet per second per square mile (csm) for the PMF from the minimum 2 square mile drainage area shown on the Corps of Engineers guide curves for "mountainous" terrain. Using a tributary watershed of 0.5 square miles (Park Pond Watershed plus the diversion channel watershed), the PMF peak inflow was calculated to be 1,275 cfs. The routed outflow, assuming no overtopping of the diversion channel dike, would be 530 cfs. The Test Flood would overtop the lower portion of the dam along the spillway approach channel, and the dike at the

northwest end of the pond, by 0.3 feet.

The flood routing through the reservoir was done in accordance with the Corps of Engineers' "Estimating Effect of Surcharge Storage on Maximum Probable Discharges". The existing spillway capacity was calculated to be about 310 cfs, or 58 percent of the Test Flood routed outflow.

The diversion channel dike is constructed on ledge, outcroppings of which were visible. Should the diversion dike overtop and fail, it would probably lower the water level in the pond about 1 to 2 feet below the existing spillway level. The spillway approach channel would control both the maximum discharge and the depth the pond would be lowered.

5.5 Dam Failure Analysis

A dam failure analysis was made using the Corps of Engineers' "Rule of Thumb" guidance. Failure was assumed when the water level reached the top of the dam, producing a maximum head of 20 feet.

The calculated dam breach, 20 feet high by 88 feet long, would release about 13,300 cfs into the East Branch of the Naugatuck River. Spillway discharge was insignficant in comparison to the dam breach flow and was not included in the flood routing. The flood waters would travel approximately 3,500 feet downstream at a depth of 12.5 feet before overtopping Camp Wa-Nee Road by 5 feet and flooding an adjacent home to the same depth. The flood waters would continue downstream at a depth of 10.5 feet before overtopping Newfield Road and flooding the next 4,000 feet of roadway. Approximately 3 homes adjacent to Newfield Road would be flooded from 2 feet to 6 feet deep. The flood waters would continue downstream

with an average depth of 10.5 feet and would overtop Sawmill Hill Road by 4 feet. (See Appendix D, Figure 5, Section 7.) Upstream of Sawmill Hill Road approximately 12 homes would suffer flooding from basement level up to 3 feet above sill level. Downstream of Sawmill Hill Road the flood waters would be dissipated in the East Branch Flood Control impoundment.

Pre-failure flow is confined within the streambed.

Failure of the dike would release a peak dicharge of about 1,000 cfs which would flow down a tributary of Hall Meadow Brook at a depth of about 4-1/2 feet. No homes would be affected and the flood would be dissipated in the Hall Meadow Brook Flood Control impoundment.

The dam is classified as "High" potential hazard because of the possible loss of more than a few lives and downstream property damage should the dam fail. The dike is classified as "Low" potential hazard.

EVALUATION OF STRUCTURAL STABILITY

SECTION 6

6.1 Visual Observations

The visual observations did not disclose any evidence of present structural instability. The future stability of the dam could be affected by:

1. Trees growing in the earth embankment;
2. Continued seepage through the earth embankment;
3. Continued erosion of the downstream slope;
4. Continued deterioration of the base of the spillway approach channel wall;
5. Additional deterioration of the concrete spillway weir;
6. Accumulation of debris in the spillway and approach and discharge channels and trees growing in the discharge channel;
7. Location of the gate valve on the downstream side of the dam;
8. Lack of riprap slope protection on the dike;
9. Continued erosion of the downstream slope of the dike.

6.2 Design and Construction Data

The dam was constructed by the Torrington Brass Company about 1860 for industrial water supply and was raised to its present height about 1889. No other design or construction data was available.

6.3 Post-Construction Changes

There are no known post-construction changes.

6.4 Seismic Stability

The dam is located in Seismic Zone 1 and in accordance with the recommended Phase I Guidelines does not warrant seismic stability analysis.

ASSESSMENT, RECOMMENDATIONS, & REMEDIAL MEASURES
SECTION 7

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection, Park Pond Dam is judged to be in poor condition. The dike is judged to be in fair condition. The future integrity of the dam and dike could be affected by the following conditions:

1. Trees growing on the earth embankment;
2. Continued seepage through the earth embankment;
3. Continued erosion of the downstream slope;
4. Continued deterioration of the base of a the spillway approach channel wall;
5. Additional deterioration of the concrete spillway weir;
6. Accumulation of debris in the spillway and the approach and discharge channels, and trees growing in the discharge channel;
7. Location of the gate valve on the downstream side of the dam;
8. Lack of riprap protection on the dike;
9. Continued erosion of the downstream slope of the dike.

An evaluation of the hydrologic and hydraulic features of the dam determined that the spillway is capable of passing 58 percent of the Test Flood routed outflow (PMF). The lower portion of the dam along the spillway approach channel and the dike at the northwest end of the impoundment would be overtopped by 0.3 feet.

b. Adequacy of Information

As no information was available on the dam, the assessment

of the condition of the dam is based on the visual inspection, past performance history, and hydraulic and hydrologic calculations made for this report.

c. Urgency

The recommendations presented in Sections 7.2 and 7.3 should be carried out within one year after receipt of this Report except as noted.

7.2 Recommendations

The following recommendations should be carried out under the direction of a qualified, registered engineer:

1. Remove trees, stumps and root systems from the crest and slopes and in the area within 20 feet of the toe of the dam and dike; and backfill the root zones with appropriate soils.

2. Investigate the seepage through the earth embankment and recommend measures for monitoring or controlling seepage.

3. Design and construct repairs to the eroded areas on the downstream slope of the dam.

4. Design and construct repairs to the spillway approach channel walls.

5. Design and construct repairs to the concrete spillway weir and apron.

6. Investigate the need for and means to provide additional project discharge capacity. Included in the investigation should be an evaluation of raising the diversion channel dike or providing additional spillway capacity in this area. The capacity of the spillway approach channel should also be evaluated.

7. Design an upstream control for the low level outlet in order to relieve full reservoir pressure in the pipe through the dam.

8. Design and construct riprap protection for the upstream slope of the dike.

9. Investigate the repair or replacement of the outlet at the dike.

The owner should implement all recommendations made by the engineer.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

1. The spillway and approach and discharge channels should be immediately cleared of debris.

2. Repairs should be made to the erosion on the downstream side of the dike.

3. Brush should be removed from the dam and the dike annually.

4. All bare areas should be seeded and a protective growth established.

5. A program of annual technical inspections by qualified, registered engineers should be instituted.

6. An Operations and Maintenance Manual should be prepared for the dam and operating facilities.

7. A downstream warning system should be developed in case of an emergency at the dam.

7.4 Alternatives

No practical alternatives to the above recommendations were identified.

APPENDIX A

VISUAL CHECK LIST WITH COMMENTS

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT: Park Pond Dam

DATE: 11/17/80 TIME: 9:00 am WEATHER: Sunny 20°

W.S. ELEVATION: 0.2' below spillway U.S. N/A DN.S

	PARTY	DISCIPLINE
1.	Roald Haestad, P.E. - Roald Haestad, Inc.	Civil/Geotechnical
2.	Donald L. Smith, P.E. - Roald Haestad, Inc.	Civil/Hydrologic
3.	Ronald G. Litke, P.E. - Roald Haestad, Inc.	Civil/Structural
4.	Robert F. Young, L.S. - Roald Haestad, Inc.	Land Surveyor
5.	Richard A. Doty - Roald Haestad, Inc.	Technician
6.		

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam Embankment	RH,DLS,RGL	Erosion; seepage; trees
2.	Dike Embankment	RH,DLS,RGL	Good condition
3.	Outlet Works - Intake Channel & Structure	RH,DLS,RGL	Under water; not observed
4.	Outlet Works - Control Tower	RH,DLS,RGL	Fair condition
5.	Outlet Works - Transition & Conduit	RH,DLS,RGL	12" cast iron pipe
6.	Outlet Works - Outlet Structure & Channel	RH,DLS,RGL	Structure fair; channel poor
7.	Outlet Works - Spill. Weir; Appr. & Disch.	RH,DLS,RGL	Weir fair; channels obstructed
8.			
9.			
10.			
11.			
12.			

PERIODIC INSPECTION CHECK LIST

PROJECT: Park Pond Dam DATE: 11/17/80

PROJECT FEATURE: Dam Embankment NAME: RH

DISCIPLINE: Civil Engineers NAME: DLS,RGL

AREA ELEVATION	CONDITIONS
DAM EMBANKMENT	
CREST ELEVATION	1140, 1138 near spillway
CURRENT POOL ELEVATION	1134.8
MAXIMUM IMPOUNDMENT TO DATE	Unknown
SURFACE CRACKS	None
PAVEMENT CONDITION	N/A
MOVEMENT OR SETTLEMENT OF CREST	None observed
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	Stone walls disturbed by tree roots
TRESPASSING ON SLOPES	Several paths
VEGETATION ON SLOPES	Brush upstream; large trees downstream
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	Erosion on downstream slope
ROCK SLOPE PROTECTION - RIPRAP FAILURES	Upstream riprap good condition
UNUSUAL MOVEMENT OR CRACKING AT OR NEAR TOES	None observed
UNUSUAL EMBANKMENT OR DOWNSTREAM SEEPAGE	Several seeps
PIPING OR BOILS	None observed
FOUNDATION DRAINAGE FEATURES	Unknown
TOE DRAINS	Unknown
INSTRUMENTATION SYSTEM	Unknown

PERIODIC INSPECTION CHECK LIST

PROJECT: Park Pond Dam DATE: 11/17/80

PROJECT FEATURE: Dike Embankment NAME: RH

DISCIPLINE: Civil Engineers NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
DIKE EMBANKMENT	
CREST ELEVATION	1138±
CURRENT POOL ELEVATION	1134.8
MAXIMUM IMPOUNDMENT TO DATE	Unknown
SURFACE CRACKS	In pavement surface
PAVEMENT CONDITION	Good; longitudinal cracks
MOVEMENT OR SETTLEMENT OF CREST	None observed
LATERAL MOVEMENT	None observed
VERTICAL ALIGNMENT	Good
HORIZONTAL ALIGNMENT	Good
CONDITIONS AT ABUTMENT AND AT CONCRETE STRUCTURES	Good
INDICATIONS OF MOVEMENT OF STRUCTURAL ITEMS ON SLOPES	N/A
TRESPASSING ON SLOPES	None observed
VEGETATION ON SLOPES	Grassed
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	Erosion channel downstream slope
ROCK SLOPE PROTECTION - RIPRAP FAILURE	No rock slope protection
UNUSUAL MOVEMENT OR CRACKING AT OR NEAR TOES	None observed
UNUSUAL EMBANKMENT OR DOWNSTREAM SEEPAGE	None observed
PIPING OR BOILS	None observed
FOUNDATION DRAINAGE FEATURES	Unknown
TOE DRAINS	Unknown
INSTRUMENTATION SYSTEM	Unknown

PERIODIC INSPECTION CHECK LIST

PROJECT: Park Pond Dam DATE: 11/17/80

PROJECT FEATURE: Outlet Works - Intake Channel & Intake Structure NAME: RH

DISCIPLINE: Civil Engineers NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
A. APPROACH CHANNEL:	Below water; could not be observed
SLOPE CONDITIONS	
BOTTOM CONDITIONS	
ROCK SLIDES OR FALLS	
LOG BOOM	
DEBRIS	
CONDITION OF CONCRETE LINING	
DRAINS OR WEEP HOLES	
B. INTAKE STRUCTURE:	
CONDITION OF CONCRETE	
STOP LOGS AND SLOTS	

PERIODIC INSPECTION CHECK LIST

PROJECT: Park Pond Dam DATE: 11/17/80

PROJECT FEATURE: Outlet Works - Control Tower NAME: RH

DISCIPLINE: Civil Engineers NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - CONTROL TOWER	
A. CONCRETE AND STRUCTURAL:	Brick valve box on stone masonry chamber
GENERAL CONDITION	Fair
CONDITION OF JOINTS	Good
SPALLING	N/A
VISIBLE REINFORCING	N/A
RUSTING OR STAINING OF CONCRETE	N/A
ANY SEEPAGE OR EFFLORESCENCE	Could not be observed
JOINT ALIGNMENT	N/A
UNUSUAL SEEPAGE OR LEAKS IN GATE CHAMBER	Could not be observed
CRACKS	None observed
RUSTING OR CORROSION OF STEEL	None observed
B. MECHANICAL AND ELECTRICAL:	
AIR VENTS	N/A
FLOAT WELLS	N/A
CRANE HOIST	N/A
ELEVATOR	N/A
HYDRAULIC SYSTEM	N/A
SERVICE GATES	Operator for 12-inch outlet in brick valve box
EMERGENCY GATES	N/A
LIGHTNING PROTECTION SYSTEM	N/A
EMERGENCY POWER SYSTEM	N/A
WIRING AND LIGHTING SYSTEM IN GATE CHAMBER	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: Park Pond Dam DATE: 11/17/80

PROJECT FEATURE: Outlet Works - Transition & Conduit NAME: RH

DISCIPLINE: Civil Engineers NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - TRANSITION AND CONDUIT	
GENERAL CONDITION OF CONCRETE	12-inch cast iron pipe through the dam
RUST OR STAINING ON CONCRETE	
SPALLING	
EROSION OR CAVITATION	
CRACKING	
ALIGNMENT OF MONOLITHS	
ALIGNMENT OF JOINTS	
NUMBERING OF MONOLITHS	

PERIODIC INSPECTION CHECK LIST

PROJECT: Park Pond Dam DATE: 11/17/80

PROJECT FEATURE: Outlet Works - Outlet Structure & Outlet Channel NAME: RH

DISCIPLINE: Civil Engineers NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Outlet Structure - mortared stone masonry walls; fair condition
GENERAL CONDITION OF CONCRETE	
RUST OR STAINING	N/A
SPALLING	N/A
EROSION OR CAVITATION	Mortar missing at toe of wall
VISIBLE REINFORCING	N/A
ANY SEEPAGE OR EFFLORESCENCE	Seepage at toe; clear with rust floccules
CONDITION AT JOINTS	N/A
DRAIN HOLES	None observed
CHANNEL	No defined channel
LOOSE ROCK OR TREES OVERHANGING CHANNEL	Discharges to swamp; many trees
CONDITION OF DISCHARGE CHANNEL	Poor

PERIODIC INSPECTION CHECK LIST

PROJECT: Park Pond Dam DATE: 11/17/80

PROJECT FEATURE: Outlet Works - Spillway Weir, Approach & Discharge Channels NAME: RH

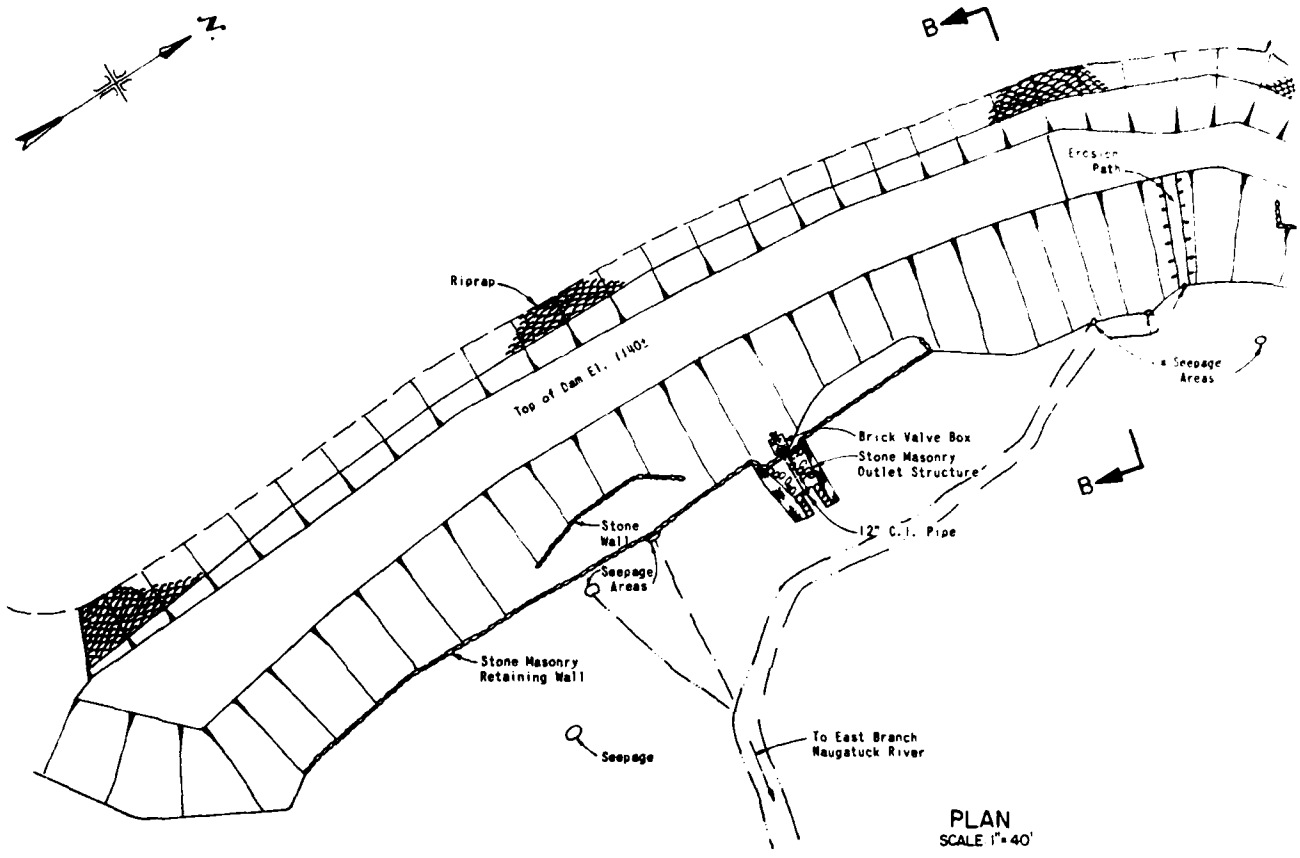
DISCIPLINE: Civil Engineers NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
A. APPROACH CHANNEL:	Stone masonry wall dam side
GENERAL CONDITION	Fair; obstructed with debris
LOOSE ROCK OVERHANGING CHANNEL	None observed
TREES OVERHANGING CHANNEL	A few
FLOOR OF APPROACH CHANNEL	Under water; not observed
B. WEIR AND TRAINING WALLS:	
GENERAL CONDITION OF CONCRETE	Poor; concrete weir spalled
RUST OR STAINING	N/A
SPALLING	Severe spalling
ANY VISIBLE REINFORCING	None observed
ANY SEEPAGE OR EFFLORESCENCE	None observed
DRAIN HOLES	None observed
C. DISCHARGE CHANNEL:	Obstructed with trees and debris
GENERAL CONDITION	Poor
LOOSE ROCK OVERHANGING CHANNEL	None observed
TREES OVERHANGING CHANNEL	Several
FLOOR OF CHANNEL	Ledge
OTHER OBSTRUCTIONS	Stumps and logs

APPENDIX B

ENGINEERING DATA

PARK POND



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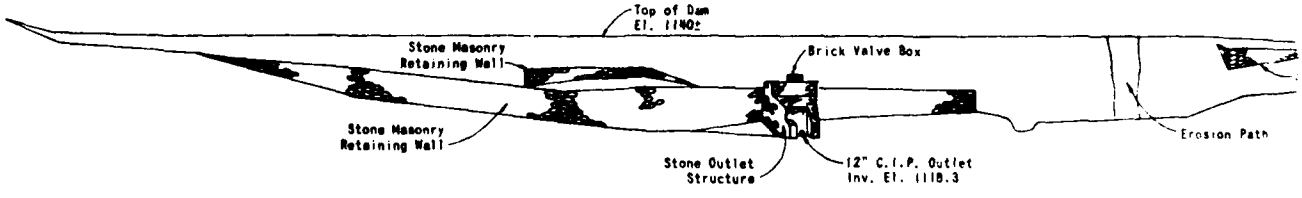

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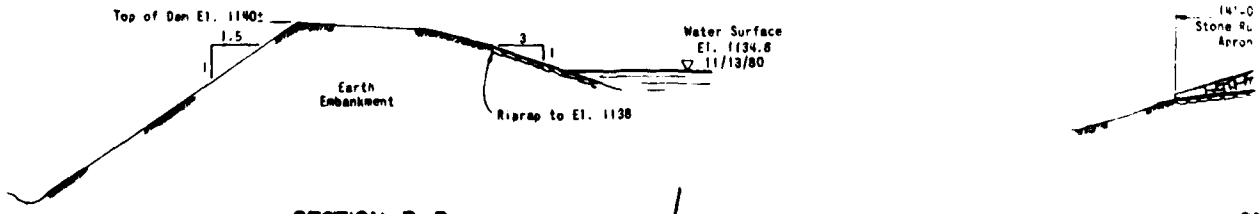
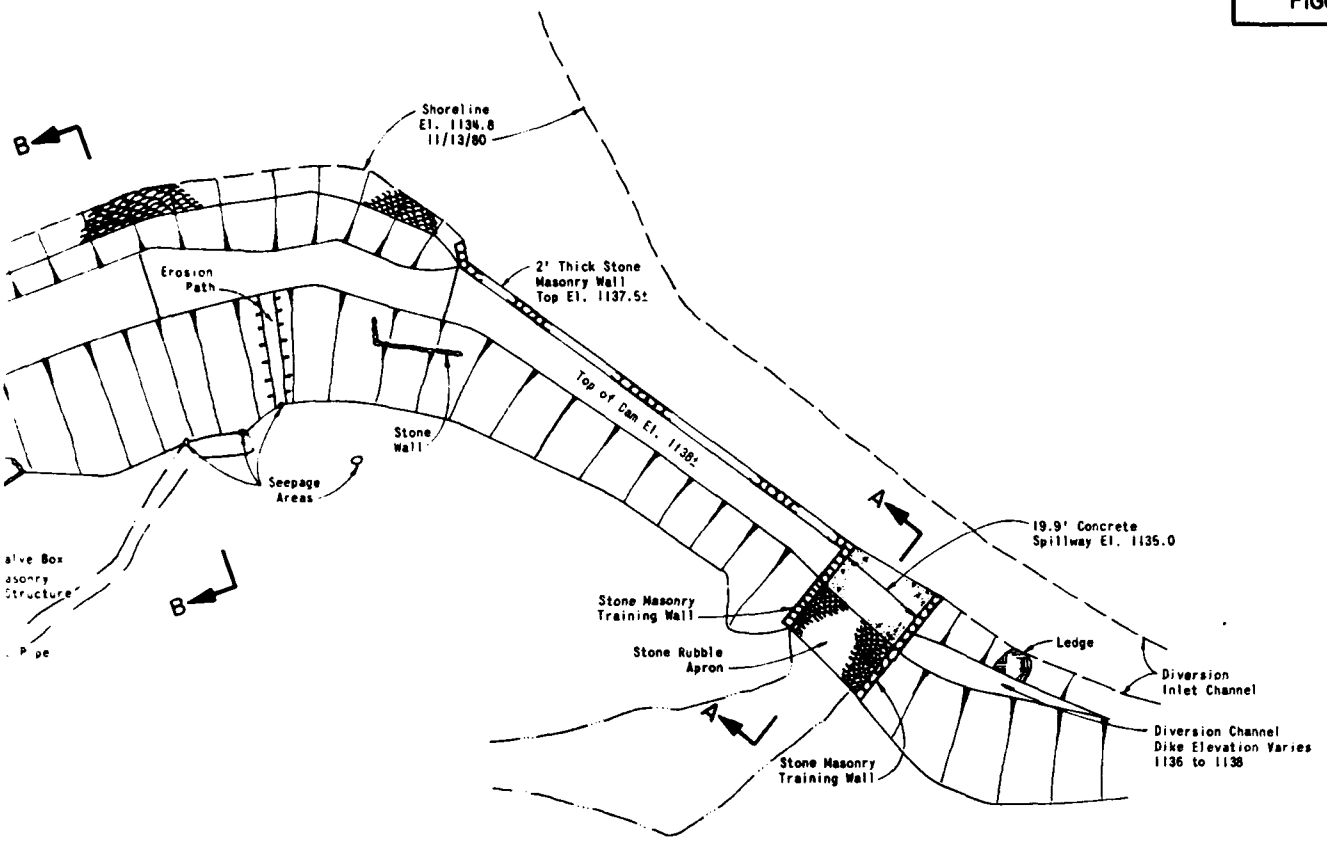


SECTION B-B
SCALE: 1"=20' HORIZ & VERT

SE
SCALE

FIGURE 2A



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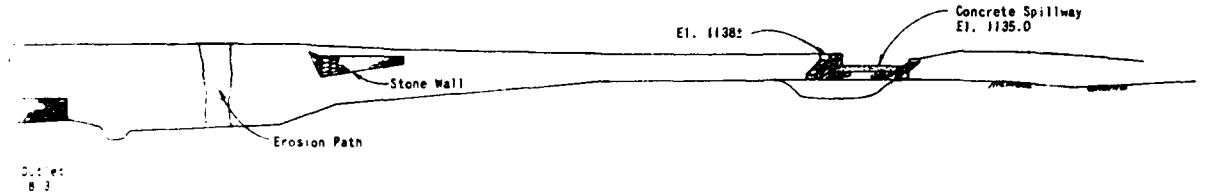

ELEVATION
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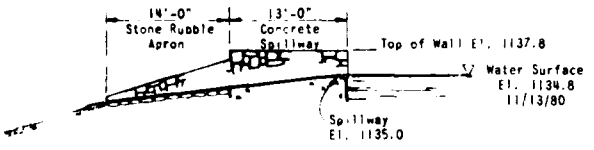

SECTION A-A
SCALE 1"=20 HORIZ & VERT

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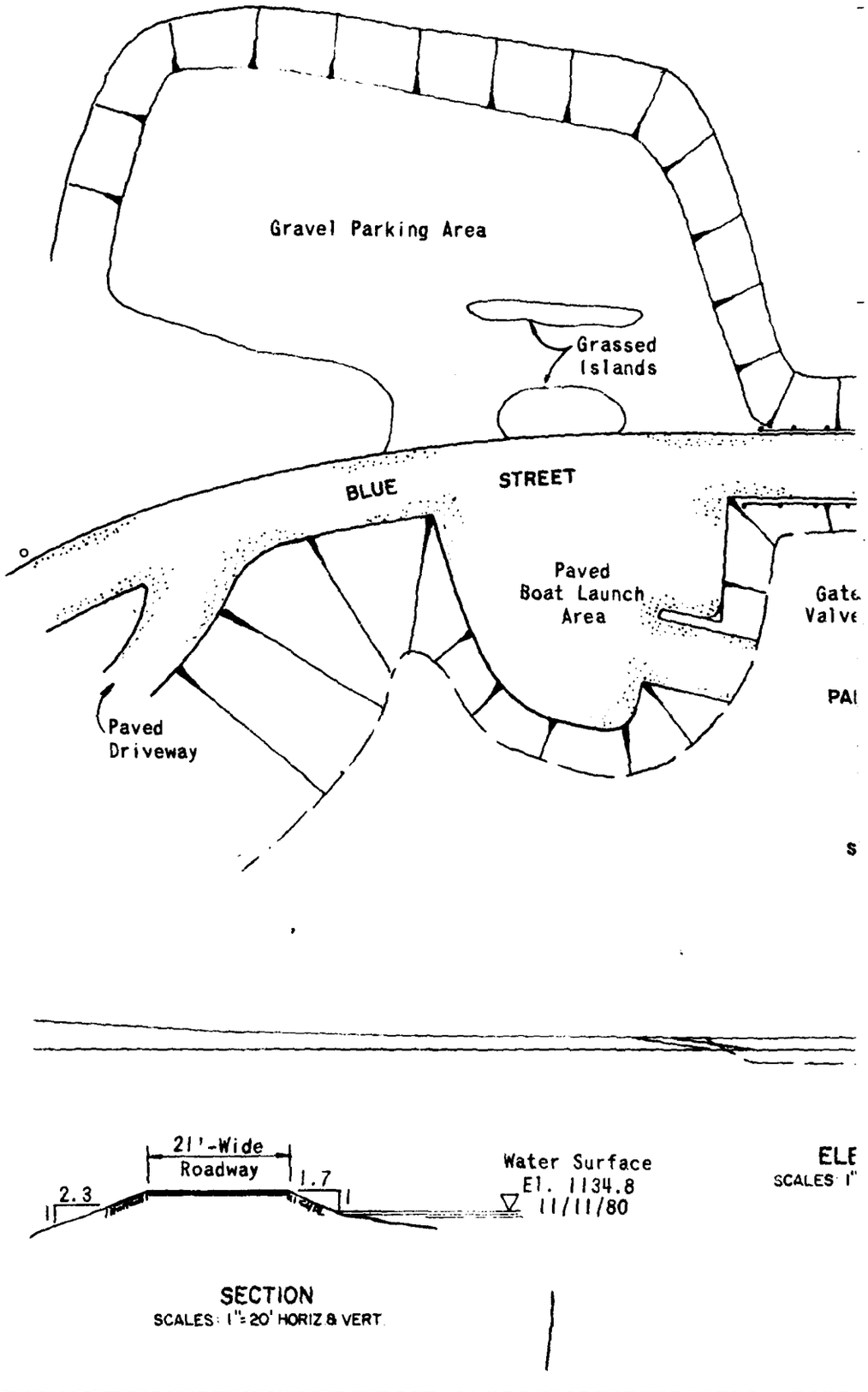
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

PARK POND DAM

DRAWN	CHECKED	APPROVED	SCALE AS NOTED
JRS	DLS	RH	DATE FEB 98



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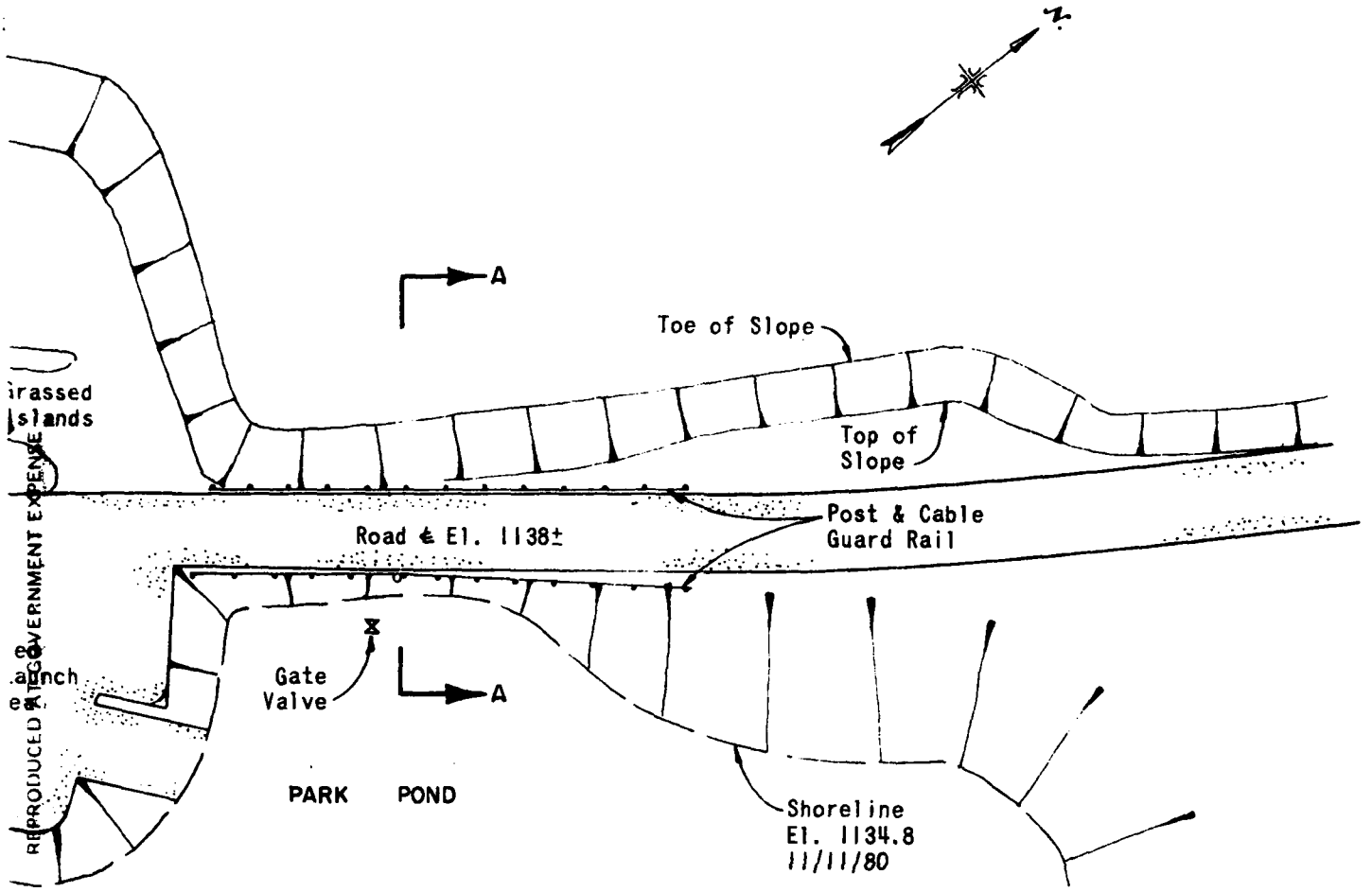

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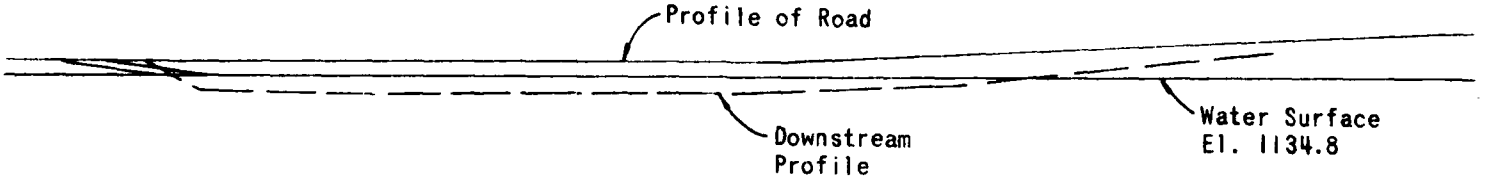

ELEVATION
SCALES: 1"=40' HORIZ. & VERT.

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CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

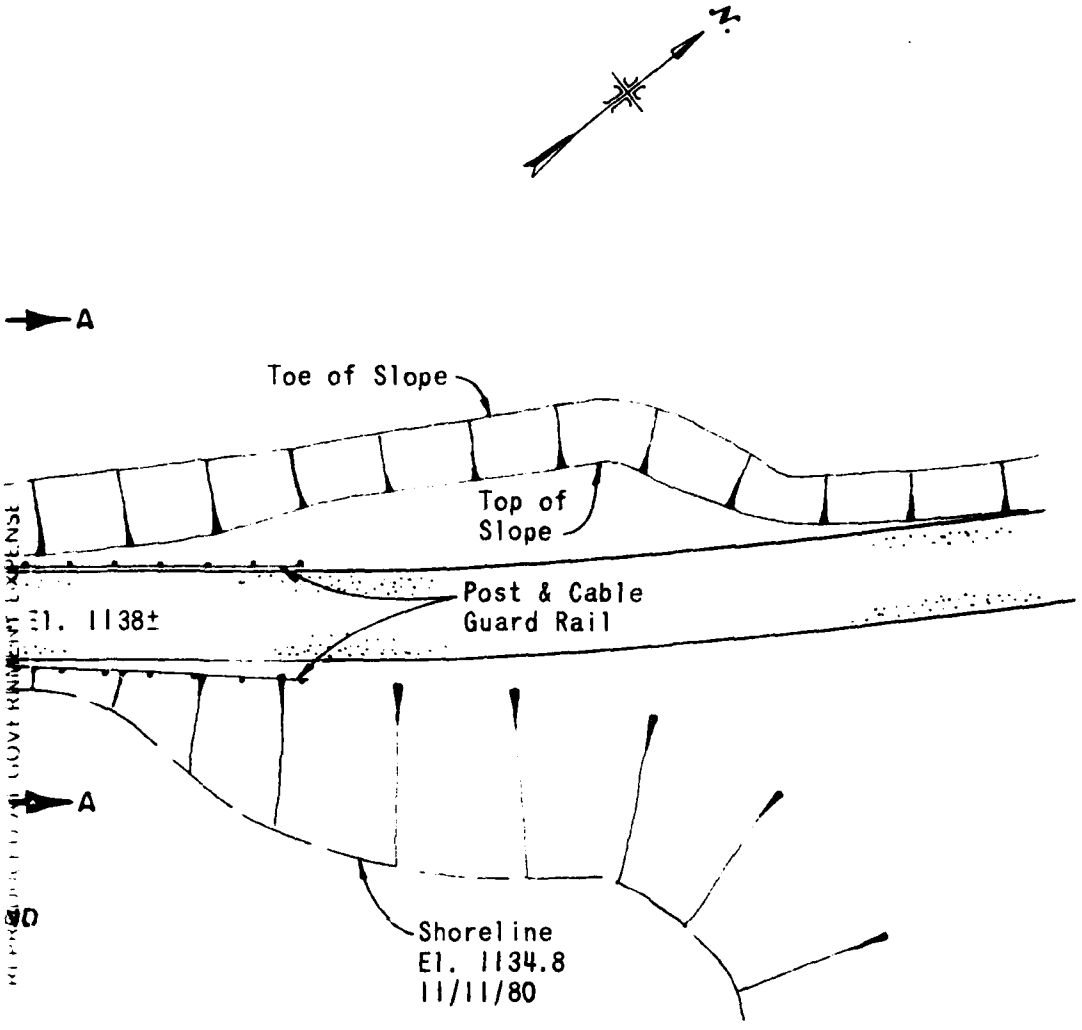
NATIONAL PROGRAM O

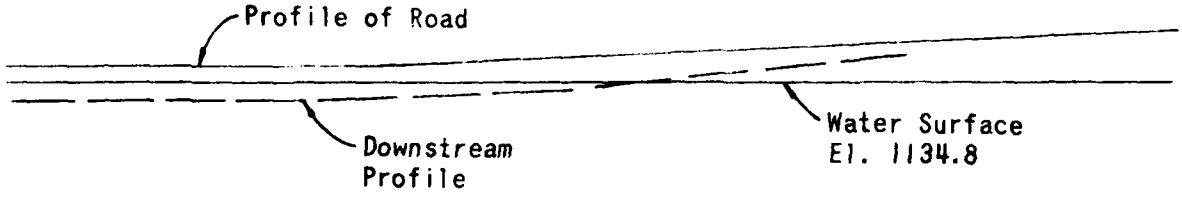
PARK

DRAWN	CHECKED	APPR
JRS	DLS	

2

FIGURE 28





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NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

PARK POND DIKE

DRAWN	CHECKED	APPROVED	SCALES
JRS	DLS	RII	DATE

3

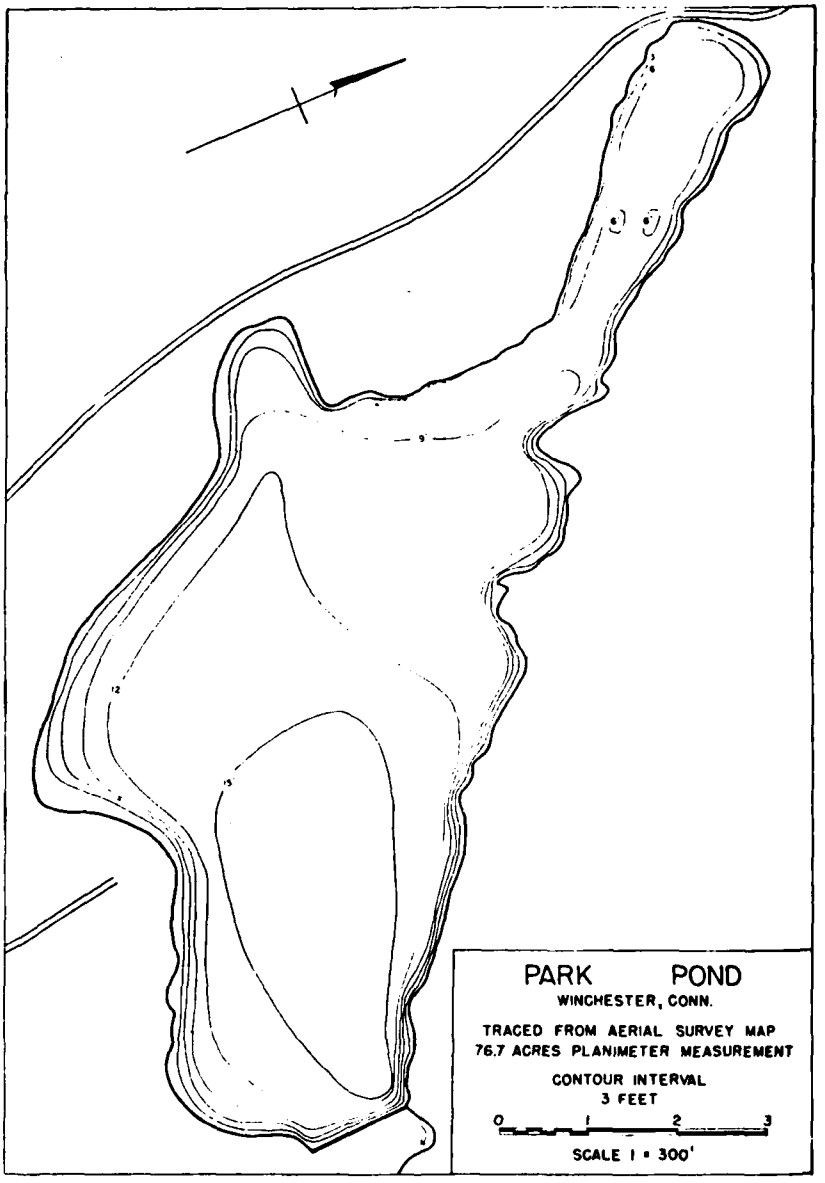
LIST OF REFERENCES

Reference No. 1 is available at the State of Connecticut Department of Environmental Protection, Fish and Waterlife Section, State Office Building, Hartford, Connecticut.

Reference No. 2 is available at the Property Management Section of the Department of Environmental Protection.

1. Map of Park Pond bottom contours and description of the impoundment, A Connecticut Fisheries Survey, 1959.

2. Survey of Park Pond and contiguous other property owned or controlled by The Hartford Electric Light Company, Winchester, Connecticut, April 8, 1963, January 28, 1964, by Douglas G. Little, Engineer and Surveyor.


PARK POND
WINCHESTER, CONN.
TRACED FROM AERIAL SURVEY MAP
76.7 ACRES PLANIMETER MEASUREMENT
CONTOUR INTERVAL
3 FEET
0 1 2 3
SCALE 1 = 300'

Park Pond

Park Pond is artificial in origin. It is located in Litchfield County in the township of Winchester. The dam is approximately 15 feet high, is of masonry construction and is in excellent condition. The pond can be completely drawn. Water from the impoundment is used for industrial purposes and the water level is subject to severe fluctuation. The impounded waters cover an area of 76.7 acres, have a maximum depth of 15 feet and an average depth of 10.6 feet. The bottom in the shoal areas is mostly of rock, sand and gravel. In the deeper portions, the bottom is of mud and swampy ooze. The shoreline is mostly wooded.

There are several cottages and camps on the shores of this pond but, in general, shoreline development is low. There is no public access to this pond at the present time.

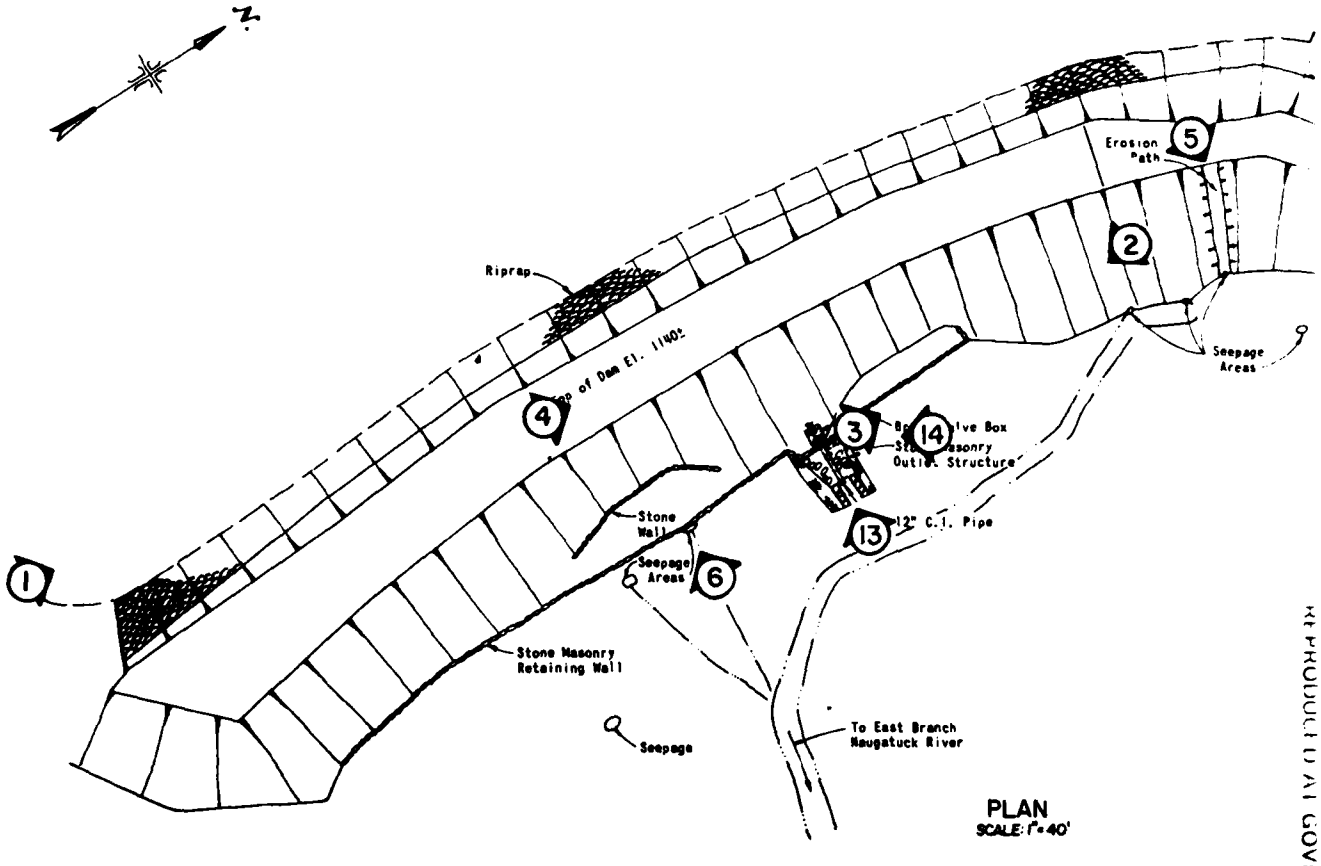
Park Pond has been stocked with smallmouth bass, yellow perch, catfish (probably bullheads) and largemouth bass.

At the time of the survey, the pond had been drawn down for an extended period. These waters will be rechecked when fish populations have become re-established and biological conditions become stabilized.

APPENDIX C

PHOTOGRAPHS

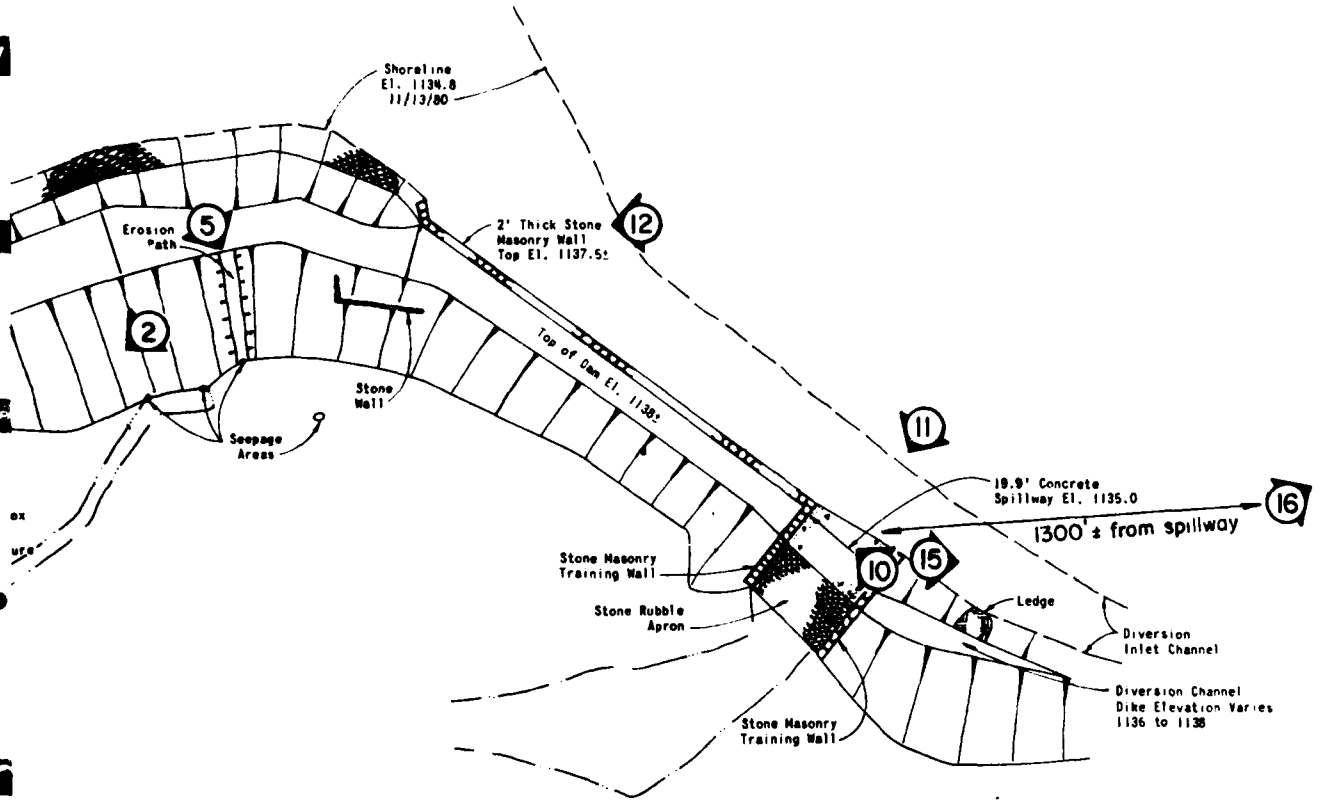
PARK POND



PLAN
SCALE: 1"=40'

Denotes photo number and direction in which photo was taken.

FIGURE 3



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ALE: 1"=40'

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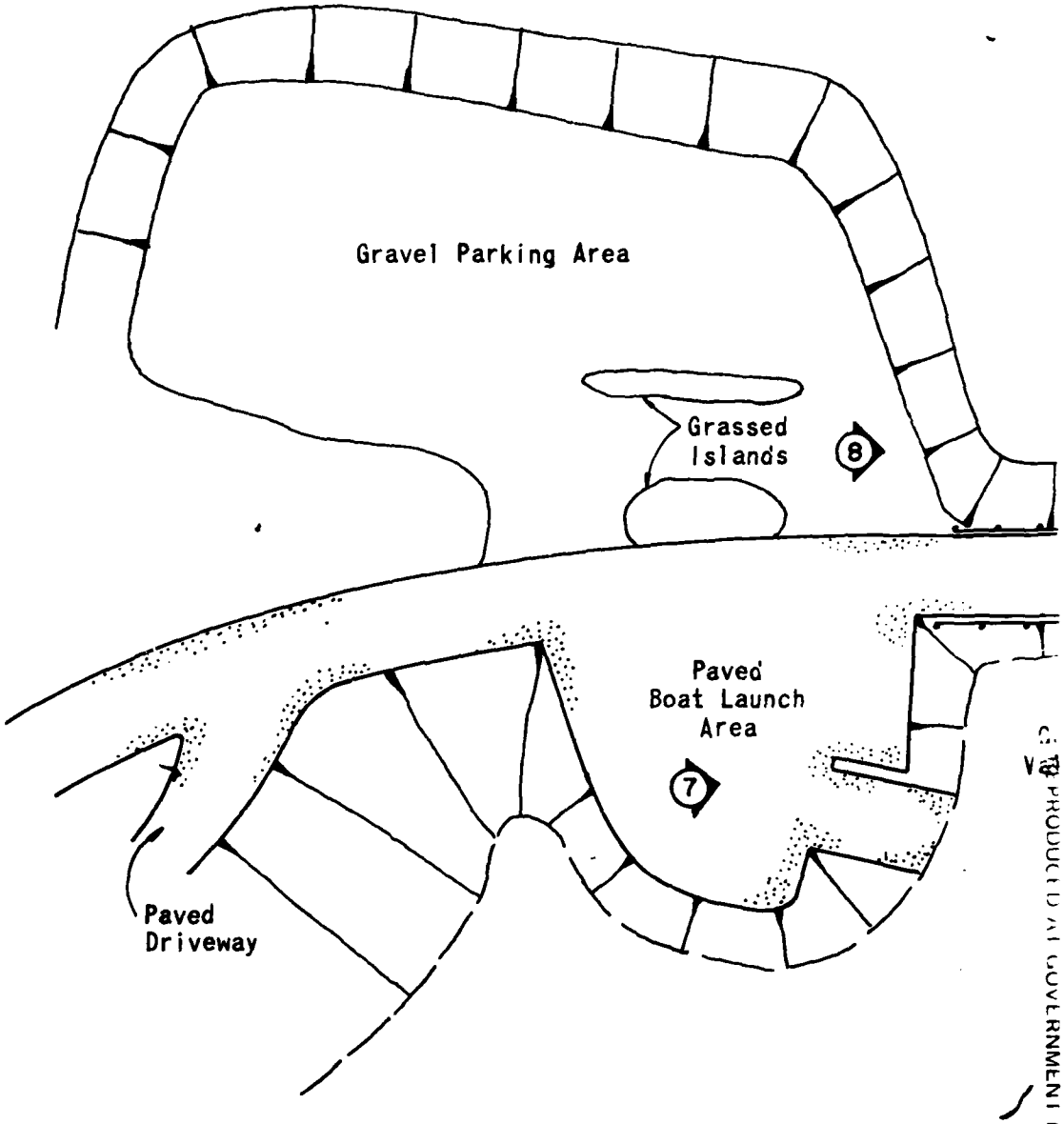
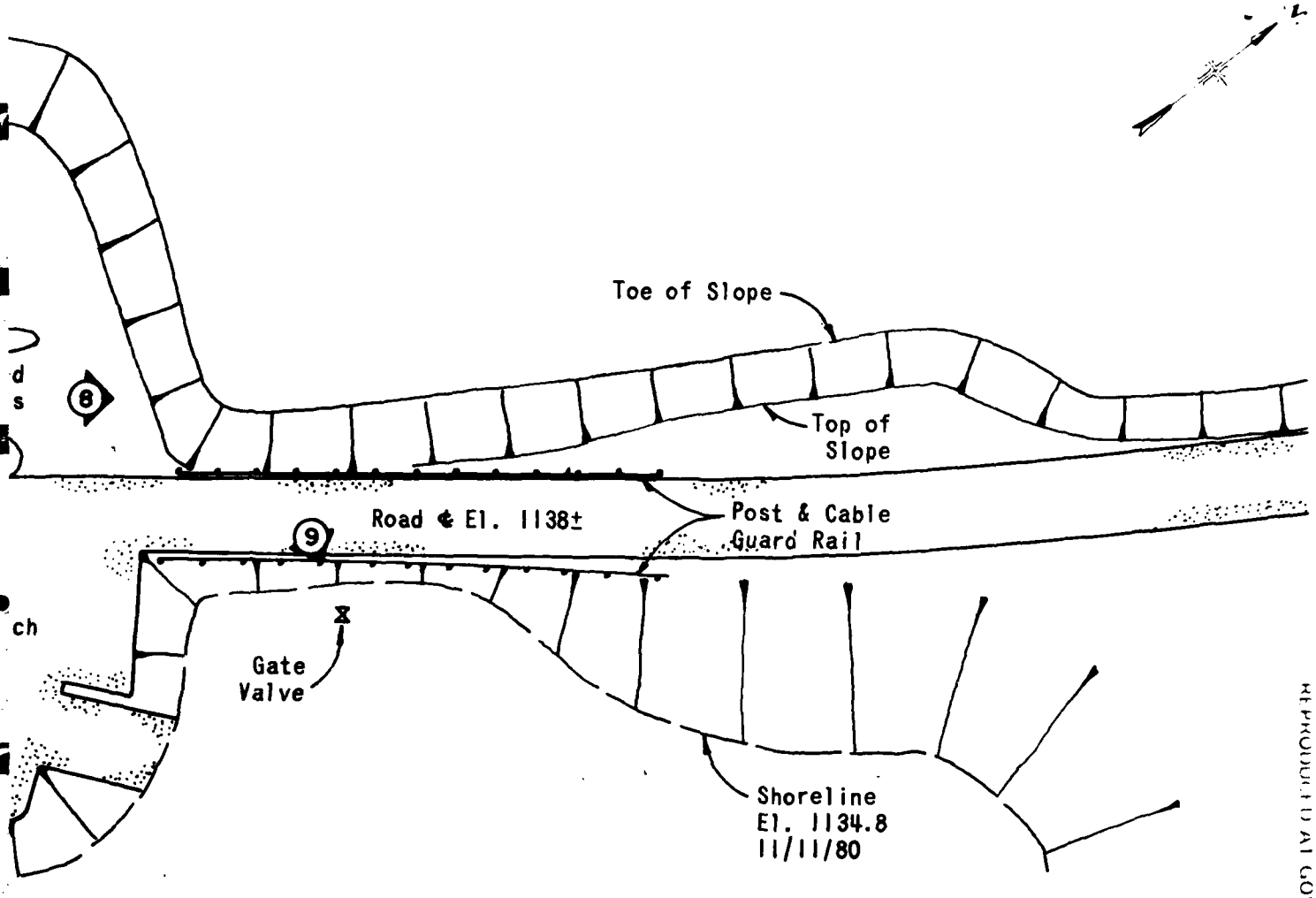
PHOTO LOCATION PLAN
PARK POND DAM
WINCHESTER, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALES	1" = 40'
JRS	DLS	RH	DATE 2/81	PAGE C-1

2



Denotes photo number and direction in which photo was taken.



REPRODUCED AT GOVERNMENT EXPENSE

ROALD HAESTA
CONSULTING ENG
WATERBURY, CONN

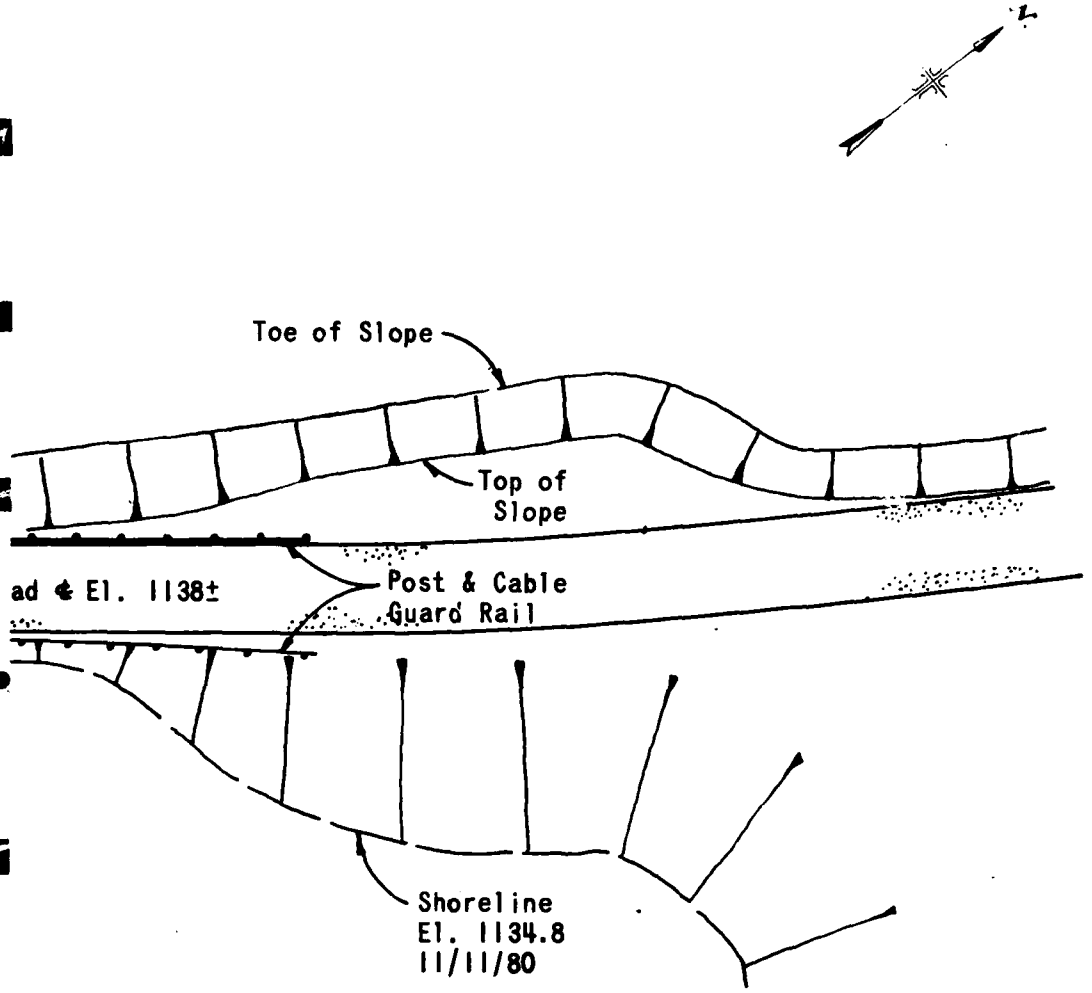
NATIONAL PR

PHC
F
WINCH

DRAWN	CHECKE
JRS	D

2

FIGURE 3A



ROALD HAESTAD, INC CONSULTING ENGINEERS WATERBURY, CONNECTICUT	US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

PHOTO LOCATION PLAN
PARK POND DIKE
WINCHESTER, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALES 1" = 40'
JRS	DLS	RH	DATE 2/81

PHOTO NO. 1

UPSTREAM SLOPE OF DAM. NOTE HEAVY GROWTH OF BRUSH,

PHOTO NO. 2

DOWNSTREAM SLOPE OF DAM IS OVERGROWN WITH LARGE TREES. NOTE BRICK GATE STRUCTURE IN REAR.

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	PARK POND DAM E. BRANCH NAUGATUCK RIVER WINCHESTER, CT CT 00632 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 3

DOWNSTREAM STONE MASONRY WALL
WITH LARGE TREES ON SLOPE.

PHOTO NO. 4

CREST OF DAM WITH VEGETATION WORN AWAY
BY TRESPASSERS. HEAVY BRUSH AND TREE GROWTH.

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	PARK POND DAM E. BRANCH NAUGATUCK RIVER WINCHESTER, CT CT 00632 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 5

EROSION PATH AT CREST.

PHOTO NO. 6

SEEPAGE AT TOE
OF STONE MASONRY WALL.

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	PARK POND DAM E. BRANCH NAUGATUCK RIVER WINCHESTER, CT CT 00632 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

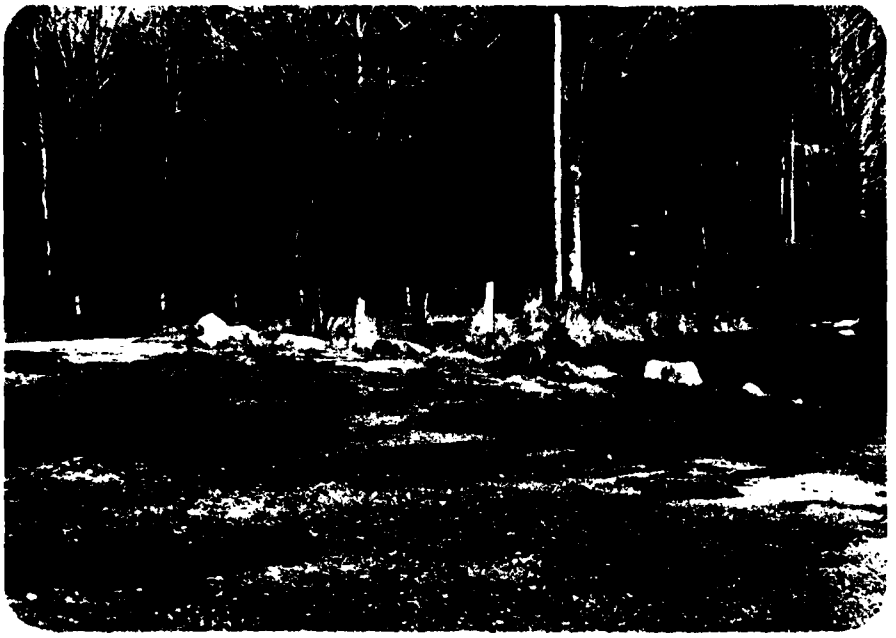


PHOTO NO. 7

UPSTREAM SLOPE OF DIKE LOOKING FROM STATE BOAT LAUNCH AREA. NO RIPRAP PROTECTION.

PHOTO NO. 8

DOWNSTREAM SLOPE OF DIKE. NOTE LARGE TREES AT TOE AND LONGITUDINAL CRACKS IN PAVEMENT.

U.S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	PARK POND DAM E. BRANCH NAUGATUCK RIVER WINCHESTER, CT CT 00632 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 9

GATE VALVE IN POND UPSTREAM OF DIKE.
NOTE VERY SHALLOW DEPTH OF WATER.

PHOTO NO. 10

SPILLWAY APPROACH CHANNEL WITH SPILLWAY AT LEFT.
NOTE OBSTRUCTIONS AND OVERHANGING TREES.

U.S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	PARK POND DAM E. BRANCH NAUGATUCK RIVER WINCHESTER, CT CT 00632 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 11

SPILLWAY OBSTRUCTED WITH LOGS AND DEBRIS.
LARGE TREES IN DISCHARGE CHANNEL.

PHOTO NO. 12

SPILLWAY APPROACH CHANNEL WALL.
NOTE DETERIORATION AT WATER LINE.

PHOTO NO. 13

STONE MASONRY STRUCTURE
WITH BRICK VALVE BOX.
12-INCH LOW LEVEL OUTLET.

PHOTO NO. 14

STONE MASONRY AND BRICK GATE STRUCTURE.

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	PARK POND DAM E. BRANCH NAUGATUCK RIVER WINCHESTER, CT CT 00332 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 15

DIVERSION INLET CHANNEL. NOTE LOW FREEBOARD.

PHOTO NO. 16*

DIVERSION STRUCTURE AT FAR END OF FALLEN TREE.
EXTENSIVELY ERODED WITH MANY BREACHES.

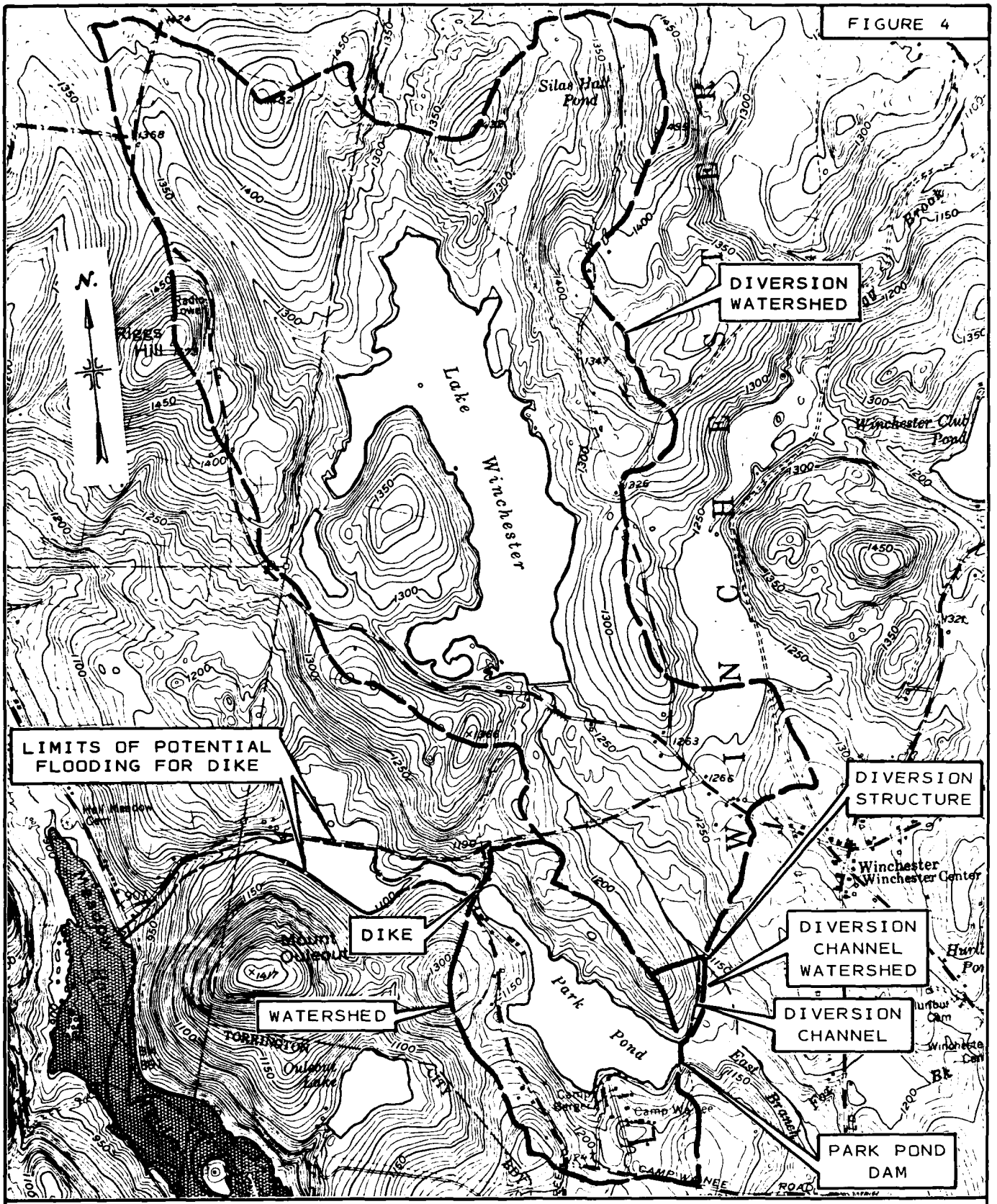
*3 FEBRUARY '81

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	PARK POND DAM E. BRANCH NAUGATUCK RIVER WINCHESTER, CT CT 00632 17 NOVEMBER '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

FIGURE 4



WATERSHED MAP

PARK POND DAM
WINCHESTER, CONNECTICUT

ROALD HAESTAD, INC. SCALE: 1" = 2000' NORFOLK QUADRANGLE 1969

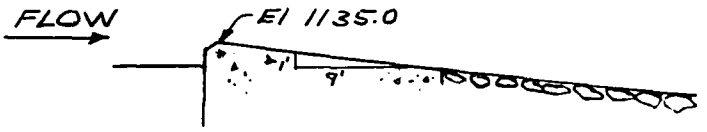
BY SAL DATE 11/21/80 **ROALD HAESTAD, INC.** SHEET NO 1 OF 40

CONSULTING ENGINEERS

CKD BY DLS DATE 2/16/81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-039

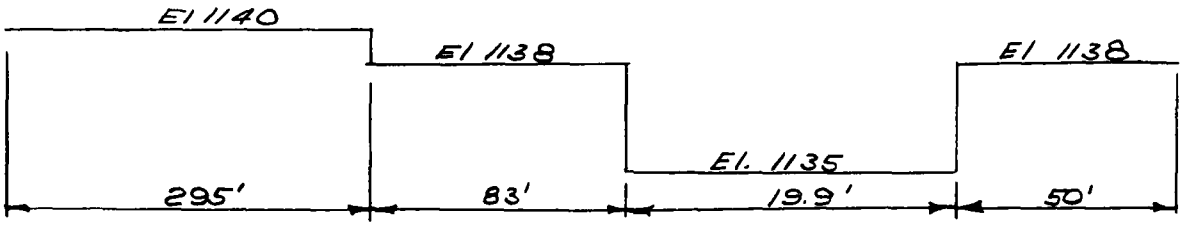
SUBJECT PARK POND DAM - Project discharge capacity

Spillway section: (Scale 1" = 10' V & H)



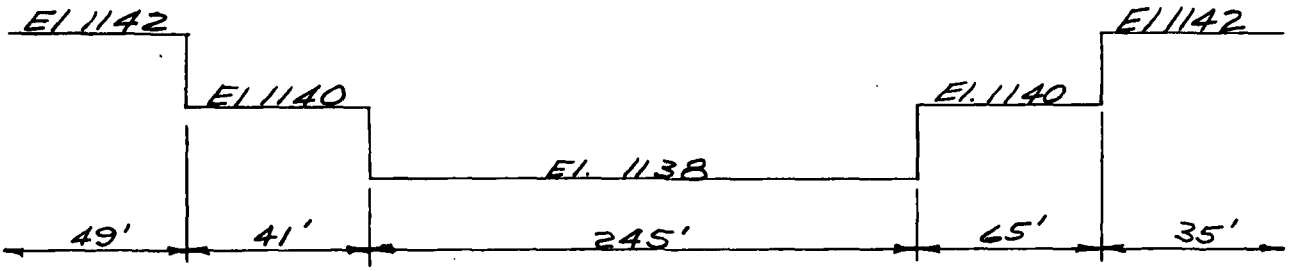
L = 19.9
C = 3.0

Dam profile: (Simplified for computations & Not to scale)



Embankment discharge coeff. = 2.7

North dike profile: (Simplified for computations & Not to scale)



Roadway discharge coeff. = 2.5

SUBJECT PARK POND DAM - Project discharge capacity

Continued:

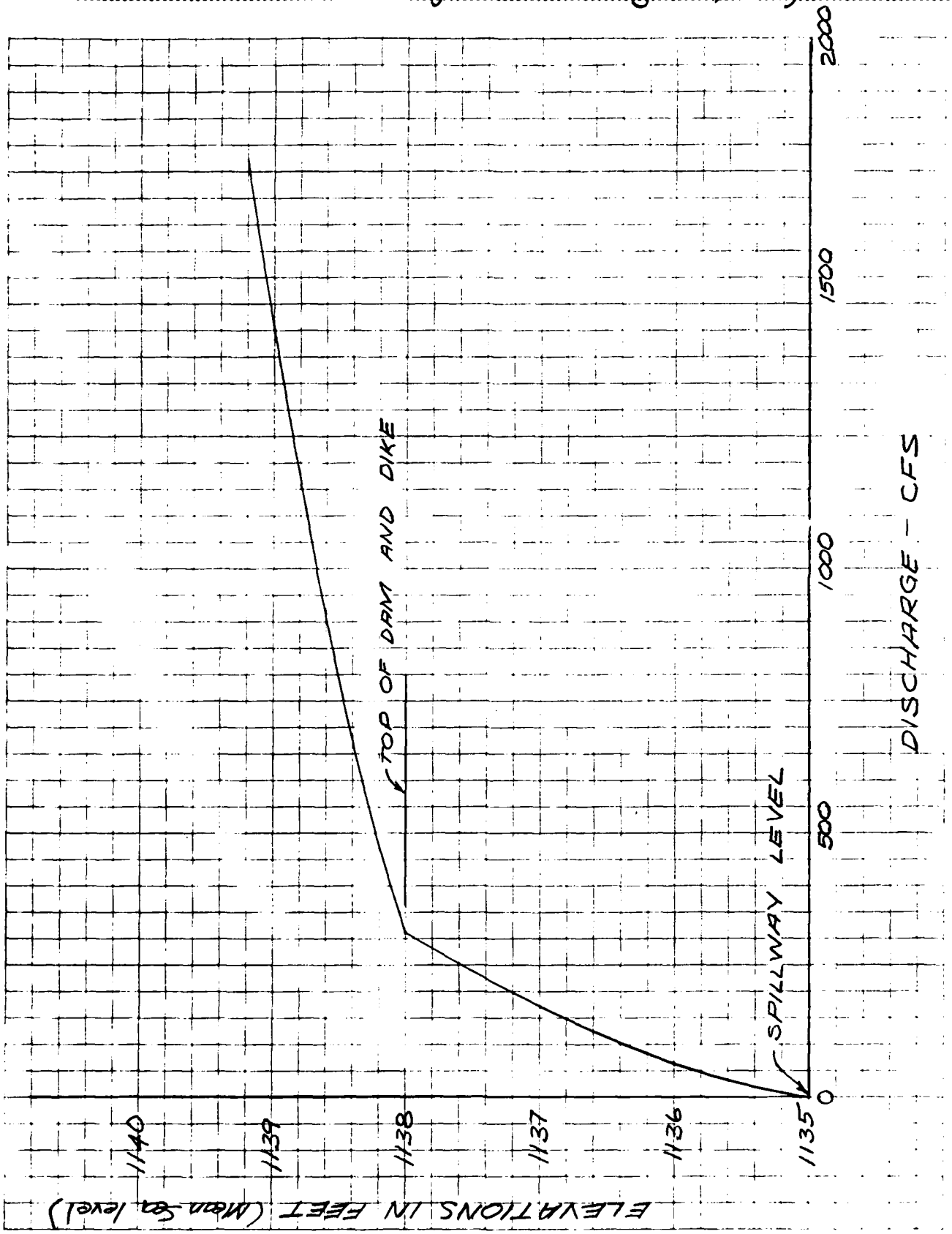
Elev. (feet)	Discharge Capacities: Spillway (cfs)	Dam (cfs)	Dike (cfs)	Total Discharge Capacity (cfs)
1135	0	0	0	0
1136	60	0	0	60
1137	169	0	0	169
1138	310	0	0	310
1139	478	359	613	1,450
1140	667	1,016	1,732	3,415
1141	877	2,662	3,448	6,987
1142	1,106	5,126	5,650	11,882

BY SAL DATE 2/3/81 **ROALD HAESTAD, INC.** SHEET NO 3 OF 40

CONSULTING ENGINEERS

CKD BY PLS DATE 2/16/81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-039

SUBJECT PARK POND DAM - Project discharge capacity curve



BY SAL DATE 11/20/80 **ROALD HAESTAD, INC.** SHEET NO 4 OF 40

CONSULTING ENGINEERS

CKD BY DJS DATE 2/16/81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-039

SUBJECT PARK POND DAM - Surcharge Storage Capacity

Elevation (feet)	Surface Area (Acres)	Average Surface Area (Acres)	Storage Capacity (Acre-Feet)
1135	80.6		0
		81.35	
1136	82.1		81.4
		82.85	
1137	83.6		164.2
		84.4	
1138	85.2		248.6
		85.95	
1139	86.7		334.6
		87.45	
1140	88.2		422.0

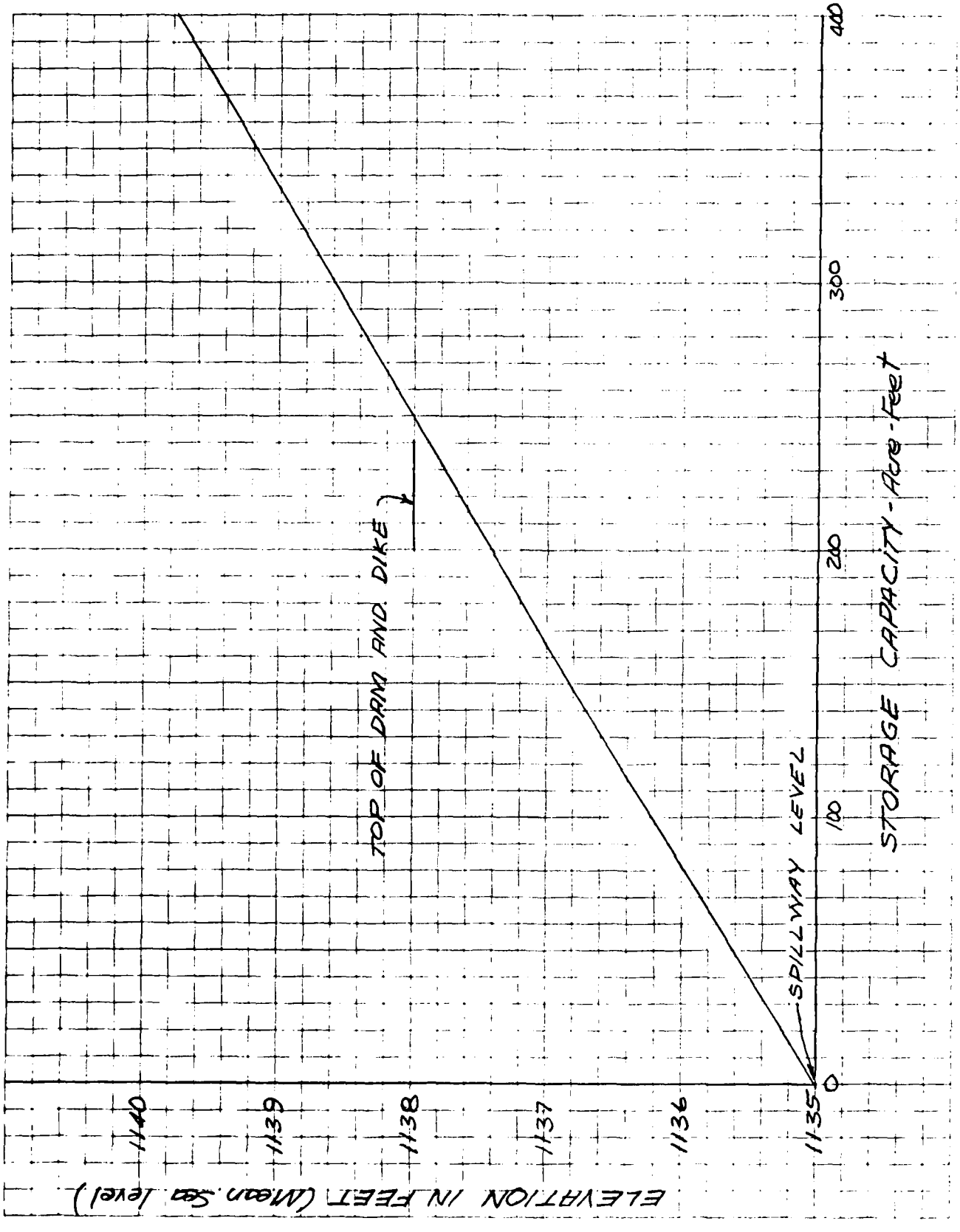
Note: The surface area at spillway level was taken from a "Survey of Park Pond" by Douglas G. Little, dated January 28, 1964. The surface area at elevation 1140 was planimetered from U.S.G.S. Norfolk Quadrangle, 1969.

BY SAL DATE 2/4/81 **ROALD HAESTAD, INC.** SHEET NO 5 OF 40

CONSULTING ENGINEERS

CKD BY DLS DATE 2/16/81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-039

SUBJECT PARK POND DAM - Surcharge Storage Capacity Curve



TEST FLOOD - PMF

Note: The PMF inflow is calculated using a drainage area that includes the dam watershed and the diversion channel watershed. It is assumed that the diversion dike would wash out in the event of a large storm thus eliminating any inflow to the dam from the diversion watershed.

Drainage Area = 302 Ac. + 12 Acres = 314 Ac. = 0.49
use 0.5 sq. mi.

From Corps of Eng. Chart for "Mountainous" Terrain

MPF = 2,550 cfs/sq mi (2.0 sq. mi. minimum)

PMF = 2,550 cfs/sq mi × 0.5 sq mi = 1,275 cfs

Q_{P1} = 1,275 cfs

H_1 = 3.9 ft above spillway, from Discharge Curve

$STOR_1$ = 326 Ac-Ft, from Storage Capacity Curve
= 12.2" of runoff from 0.5 sq mi

MPF runoff in New England equals approx. 19"

$Q_{P2} = Q_{P1}(1 - STOR/19) = 1,275 cfs (1 - 12.2/19) = 456.3$ use 460 cfs

H_2 = 3.2 ft $STOR_2$ = 266 Ac-Ft

$STOR_{AVE} = (STOR_1 + STOR_2)/2 = (326+266)/2 = 296$ Ac-Ft
= 11.1" of runoff

$Q_{P3} = Q_{P1}(1 - STOR_{AVE}/19) = 1,275 cfs (1 - 11.1/19) = 530.1$ use 530 cfs

H_3 = 3.3 feet

Spillway Capacity (Top of dam) = $CLH^{3/2} = 3(19.9)(3)^{3/2}$ = 310 cfs

% of Test Flood = (310/530) × 100 = 58% of PMF

S = Storage at time of failure with water level at top of dam

S = Storage at spillway level + Surcharge storage

S = (Surface area x Average depth) + Surcharge Storage

S = (80.6 Ac. x 10.6 feet) + 250 Ac-Ft (Surcharge Storage Curve)

S = 854.4 + 250 = 1104.4 use 1,100 Acre-Feet

Note: Average depth taken from "A Connecticut Fishery Survey", 1959.

Q_{pl} = Peak Failure Outflow = $8/27\ W_b \sqrt{g}\ Y_o^{3/2}$

W_b = Breach width - 40% of dam length across river at mid-height = 0.4(220) = 88'

Y_o = Total height from river bed to pool level at time of failure = 20'

$Q_{pl} = 8/27\ (88)\sqrt{32.2}\ (20)^{3/2}$

= 13,233.7 use 13,250 cfs

PARK POND DIKE:

W_b = Breach Width = 0.4(80) = 32 feet

Y_o = Total height at time of failure = 7 feet

$Q_{pl} = 8/27\ (32)\sqrt{32.2}\ (7)^{3/2}$

= 996 use 1,000 cfs

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 1

TOTAL SECTION
(STORAGE CAPACITY WITHIN REACH)

HEIGHT (FEET)	SURFACE AREA (ACRES)	STORAGE VOLUME (ACRE-FEET)
1.0	1.10	0.5
2.0	2.20	2.2
3.0	3.30	4.9
4.0	4.40	8.8
5.0	5.50	13.8
6.0	6.60	19.8
7.0	7.70	26.9
8.0	8.80	35.2
9.0	9.90	44.5
10.0	11.00	55.0
11.0	12.75	66.9
12.0	14.50	80.5
13.0	16.25	95.9
14.0	18.00	113.0
15.0	19.75	131.9

STORAGE CAPACITY CALCULATED FROM SURFACE AREAS AT KNOWN ELEVATIONS.

SECTION NUMBER 1A

MAIN CHANNEL

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
1.0	24	21	0.89	0.0087	2.56	55
2.0	27	45	1.71	0.0087	3.96	179
3.0	29	70	2.43	0.0087	5.01	352
4.0	31	96	3.15	0.0087	5.95	574
5.0	32	123	3.87	0.0087	6.84	844
6.0	33	151	4.57	0.0087	7.63	1153
7.0	33	179	5.42	0.0087	8.55	1531
8.0	33	207	6.26	0.0087	9.42	1950
9.0	33	235	7.11	0.0087	10.25	2410
10.0	33	263	7.96	0.0087	11.05	2907
11.0	33	291	8.80	0.0087	11.82	3440
12.0	33	319	9.65	0.0087	12.56	4009
13.0	33	347	10.50	0.0087	13.29	4613
14.0	33	375	11.34	0.0087	13.99	5250
15.0	33	403	12.19	0.0087	14.68	5919

MANNING COEFFICIENT=N=0.0500

SECTION NUMBER 1B

LEFT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
7.0	46	23	0.50	0.0087	0.87	20
8.0	93	93	1.00	0.0087	1.39	128
9.0	139	208	1.50	0.0087	1.82	378
10.0	185	370	2.00	0.0087	2.20	814
11.0	190	558	2.93	0.0087	2.84	1583
12.0	195	750	3.84	0.0087	3.40	2550
13.0	200	948	4.73	0.0087	3.91	3700
14.0	205	1150	5.60	0.0087	4.37	5025
15.0	211	1358	6.45	0.0087	4.80	6518

MANNING COEFFICIENT=N=0.1000

BY SAL DATE 2/23/81 ROALD HAESTAD, INC. SHEET NO 11 OF 40

CKD BY DLS DATE 2/24/81 CONSULTING ENGINEERS JOB NO. 049 039

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 1C

RIGHT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
4.0	12	3	0.25	0.0087	0.55	2
5.0	37	28	0.75	0.0087	1.14	32
6.0	62	78	1.25	0.0087	1.61	125
7.0	87	153	1.75	0.0087	2.01	307
8.0	112	252	2.25	0.0087	2.38	600
9.0	137	377	2.75	0.0087	2.72	1025
10.0	162	527	3.25	0.0087	3.04	1600
11.0	170	692	4.08	0.0087	3.54	2450
12.0	177	866	4.88	0.0087	3.99	3453
13.0	185	1046	5.66	0.0087	4.40	4606
14.0	192	1235	6.42	0.0087	4.79	5909
15.0	200	1430	7.15	0.0087	5.15	7359

MANNING COEFFICIENT=N=0.1000

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 1

TOTAL SECTION

	AREA (SQ.FT.)				DISCHARGE (CFS)			
H	A	B	C	TOTAL	A	B	C	TOTAL
1.0	21	0	0	21	55	0	0	55
2.0	45	0	0	45	179	0	0	179
3.0	70	0	0	70	352	0	0	352
4.0	96	0	3	100	574	0	2	576
5.0	123	0	28	151	844	0	32	876
6.0	151	0	78	229	1153	0	125	1278
7.0	179	23	153	355	1531	20	307	1858
8.0	207	93	252	552	1950	128	600	2679
9.0	235	208	377	820	2410	378	1025	3813
10.0	263	370	527	1160	2907	814	1600	5321
11.0	291	558	692	1541	3440	1583	2450	7473
12.0	319	750	866	1935	4009	2550	3453	10012
13.0	347	948	1046	2341	4613	3700	4606	12919
14.0	375	1150	1235	2760	5250	5025	5909	16183
15.0	403	1358	1430	3191	5919	6518	7359	19797

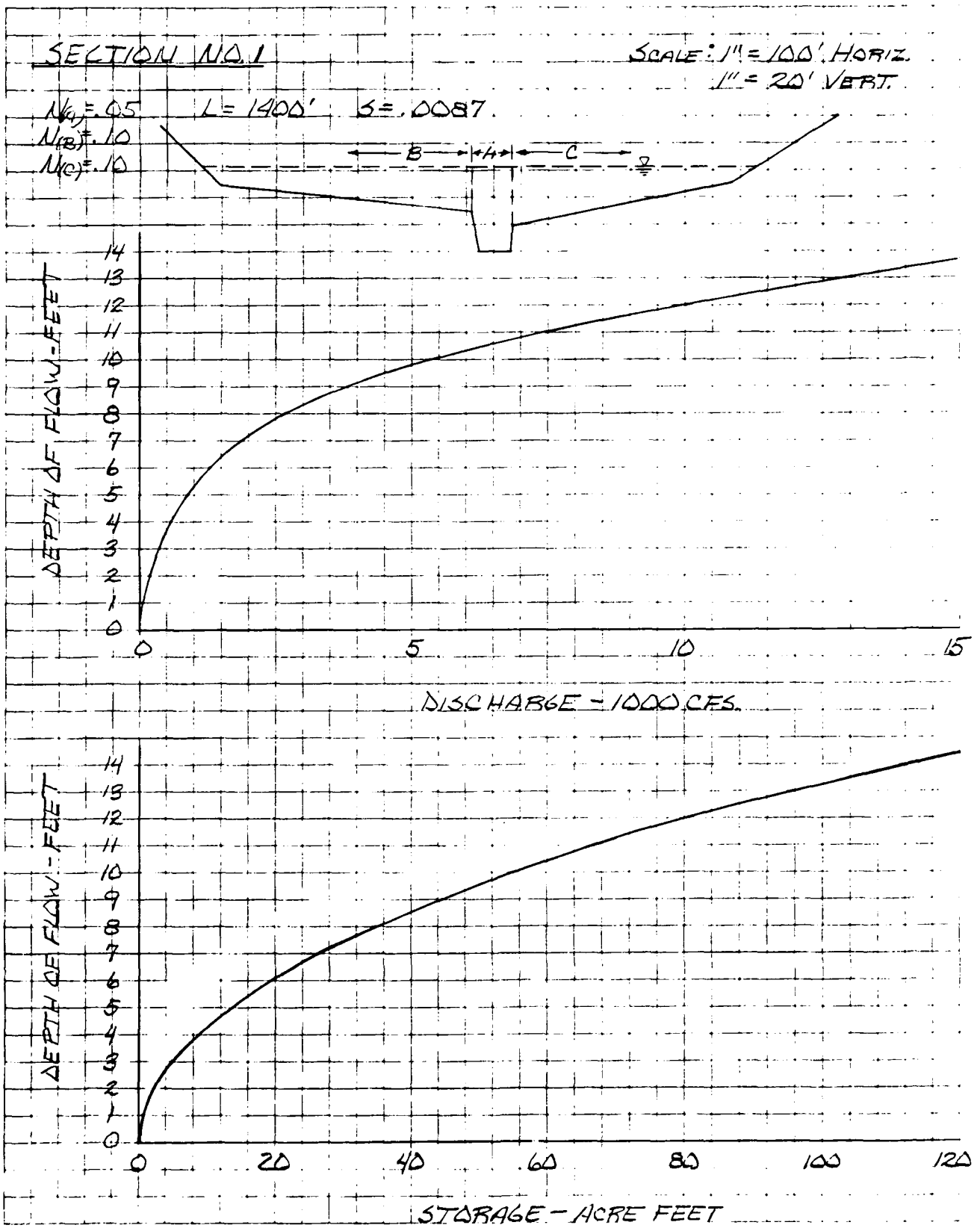
STORAGE AT TIME OF FAILURE=S= 1100 AC. FT.
LENGTH OF REACH=L= 1400 FT

INFLOW INTO REACH=QP1= 13250 CFS
DEPTH OF FLOW=H1= 13.1 FT.
CROSS SECTIONAL AREA=A1= 2383 SQ.FT.
STORAGE IN REACH=V1= 97.6 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 12074 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 12.7 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 2223 SQ.FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 91.4 AC. FT.

REACH OUTFLOW=QP2= 12112 CFS
DEPTH OF FLOW=H2= 12.7 FT.

SUBJECT PARK POND DAM - FLOOD ROUTING



BY SAL DATE 2/23/81 ROALD HAESTAD, INC. SHEET NO 14 OF 40

CKD BY DLS DATE 2/24/81 CONSULTING ENGINEERS JOB NO. 049 039

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 2A

MAIN CHANNEL

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
1.0	24	21	0.89	0.0087	2.56	55
2.0	27	45	1.71	0.0087	3.96	179
3.0	29	70	2.43	0.0087	5.01	352
4.0	31	96	3.15	0.0087	5.95	574
5.0	32	123	3.87	0.0087	6.84	844
6.0	33	151	4.57	0.0087	7.63	1153
7.0	33	179	5.42	0.0087	8.55	1531
8.0	33	207	6.26	0.0087	9.42	1950
9.0	33	235	7.11	0.0087	10.25	2410
10.0	33	263	7.96	0.0087	11.05	2907
11.0	33	291	8.80	0.0087	11.82	3440
12.0	33	319	9.65	0.0087	12.56	4009
13.0	33	347	10.50	0.0087	13.29	4613
14.0	33	375	11.34	0.0087	13.99	5250
15.0	33	403	12.19	0.0087	14.68	5919

MANNING COEFFICIENT=N=0.0500

SECTION NUMBER 2B

LEFT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
7.0	28	14	0.50	0.0087	0.87	12
8.0	55	55	1.00	0.0087	1.39	76
9.0	83	124	1.50	0.0087	1.82	225
10.0	110	220	2.00	0.0087	2.20	484
11.0	115	333	2.89	0.0087	2.81	934
12.0	120	450	3.74	0.0087	3.34	1503
13.0	125	573	4.57	0.0087	3.82	2184
14.0	130	700	5.37	0.0087	4.25	2974
15.0	136	833	6.14	0.0087	4.65	3870

MANNING COEFFICIENT=N=0.1000

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 2C

RIGHT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
4.0	18	5	0.25	0.0087	0.55	3
5.0	55	41	0.75	0.0087	1.14	47
6.0	91	114	1.25	0.0087	1.61	183
7.0	128	223	1.75	0.0087	2.01	449
8.0	164	369	2.25	0.0087	2.38	878
9.0	201	551	2.75	0.0087	2.72	1500
10.0	237	770	3.25	0.0087	3.04	2342
11.0	245	1011	4.13	0.0087	3.57	3609
12.0	252	1259	4.99	0.0087	4.05	5099
13.0	260	1515	5.83	0.0087	4.49	6803
14.0	267	1778	6.65	0.0087	4.90	8717
15.0	275	2049	7.45	0.0087	5.29	10836

MANNING COEFFICIENT=N=0.1000

SECTION NUMBER 2

TOTAL SECTION

	AREA (SQ.FT.)				DISCHARGE (CFS)			
H	A	B	C	TOTAL	A	B	C	TOTAL
1.0	21	0	0	21	55	0	0	55
2.0	45	0	0	45	179	0	0	179
3.0	70	0	0	70	352	0	0	352
4.0	96	0	5	101	574	0	3	577
5.0	123	0	41	164	844	0	47	891
6.0	151	0	114	265	1153	0	183	1336
7.0	179	14	223	416	1531	12	449	1992
8.0	207	55	369	631	1950	76	878	2905
9.0	235	124	551	910	2410	225	1500	4134
10.0	263	220	770	1253	2907	484	2342	5732
11.0	291	333	1011	1635	3440	934	3609	7983
12.0	319	450	1259	2028	4009	1503	5099	10611
13.0	347	573	1515	2435	4613	2184	6803	13600
14.0	375	700	1778	2853	5250	2974	8717	16941
15.0	403	833	2049	3285	5919	3870	10836	20625

STORAGE AT TIME OF FAILURE=S= 1100 AC. FT.
LENGTH OF REACH=L= 1300 FT

INFLOW INTO REACH=QP1= 12112 CFS
DEPTH OF FLOW=H1= 12.5 FT.
CROSS SECTIONAL AREA=A1= 2232 SQ.FT.
STORAGE IN REACH=V1= 66.6 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 11378 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 12.3 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 2133 SQ.FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 63.6 AC. FT.

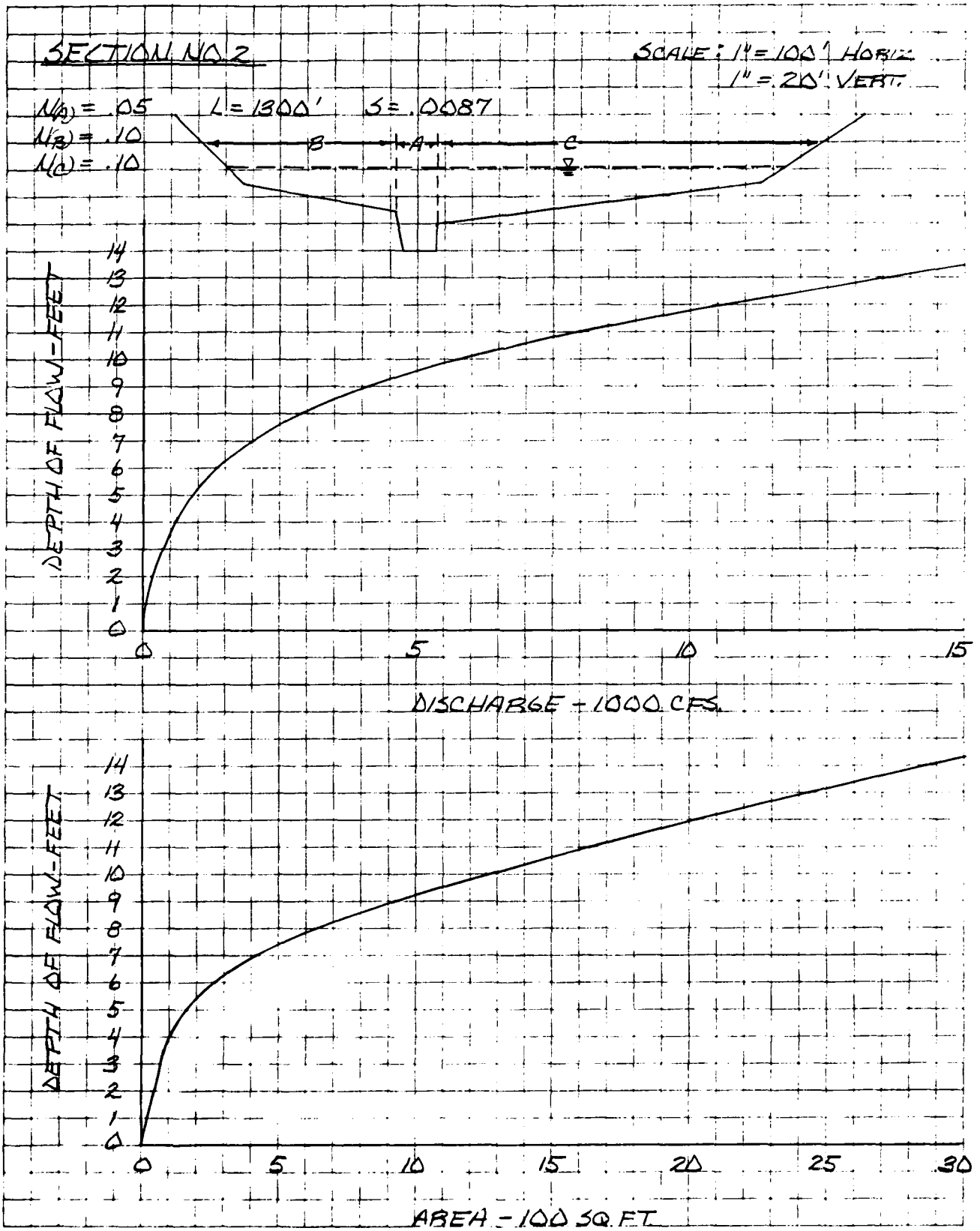
REACH OUTFLOW=QP2= 11394 CFS
DEPTH OF FLOW=H2= 12.3 FT.

BY L.E.G. DATE 2-24-81 **ROALD HAESTAD, INC.** SHEET NO. 18 OF 40

CONSULTING ENGINEERS

CKD BY S.A.H. DATE 2-24-81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 49-039

SUBJECT PARK POND DAM - FLOOD ROUTING



SECTION NUMBER 3

CAMP WA-NEE ROAD
(STORAGE CAPACITY WITHIN REACH)

HEIGHT (FEET)	SURFACE AREA (ACRES)	STORAGE VOLUME (ACRE-FEET)
1.0	0.18	0.1
2.0	0.36	0.4
3.0	0.54	0.8
4.0	0.72	1.4
5.0	0.90	2.3
6.0	1.73	3.6
7.0	2.56	5.7
8.0	3.39	8.7
9.0	4.22	12.5
10.0	5.05	17.1
11.0	5.88	22.6
12.0	6.71	28.9
13.0	7.54	36.0
14.0	8.37	44.0
15.0	9.20	52.7
16.0	9.66	62.2
17.0	10.12	72.1
18.0	10.58	82.4
19.0	11.04	93.2
20.0	11.50	104.5

STORAGE CAPACITY CALCULATED FROM SURFACE AREAS AT KNOWN ELEVATIONS.

SECTION NUMBER 3

CAMP WA-NEE ROAD

HEIGHT ABOVE INVERT (FEET)	DISCHARGE CAPACITY CONDUIT (CFS)	SPILLWAY (CFS)	TOTAL (CFS)
1.0	110	0	110
2.0	221	0	221
3.0	404	0	404
4.0	588	0	588
5.0	833	0	833
6.0	1078	0	1078
7.0	1348	0	1348
8.0	1617	0	1617
9.0	1862	0	1862
10.0	2107	0	2107
11.0	2315	675	2990
12.0	2524	1909	4433
13.0	2695	3507	6202
14.0	2867	5400	8266
15.0	3026	7972	10997
16.0	3185	11123	14308
17.0	3309	14710	18017
18.0	3430	18674	22104
19.0	3577	23377	26954
20.0	3724	28723	32447

STORAGE AT TIME OF FAILURE=S= 1100 AC. FT.
LENGTH OF REACH=L= 1000 FT

INFLOW INTO REACH=QP1= 11394 CFS
HEIGHT ABOVE CONDUIT INVERT=H1= 15.1 FT.
STORAGE IN REACH=V1= 53.9 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 10836 CFS
TRIAL HEIGHT ABOVE CONDUIT INVERT=H(TRIAL)= 14.9 FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 52.2 AC. FT.

REACH OUTFLOW=QP2= 10845 CFS
HEIGHT ABOVE CONDUIT INVERT=H2= 14.9 FT.

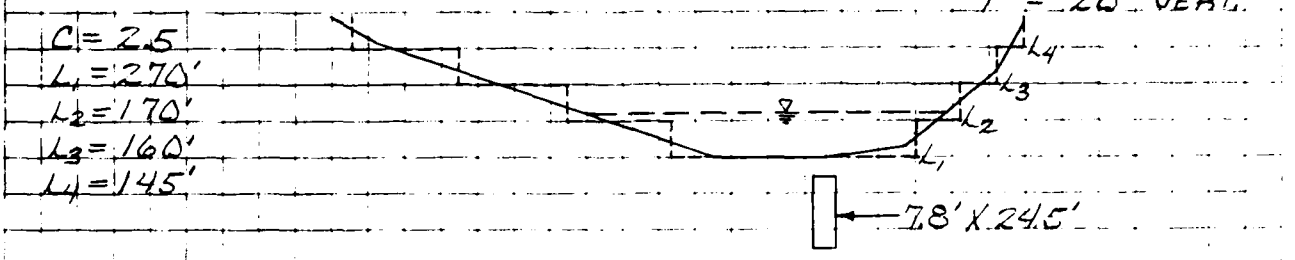
BY LRG DATE 2-24-81 **ROALD HAESTAD, INC.** SHEET NO 21 OF 40

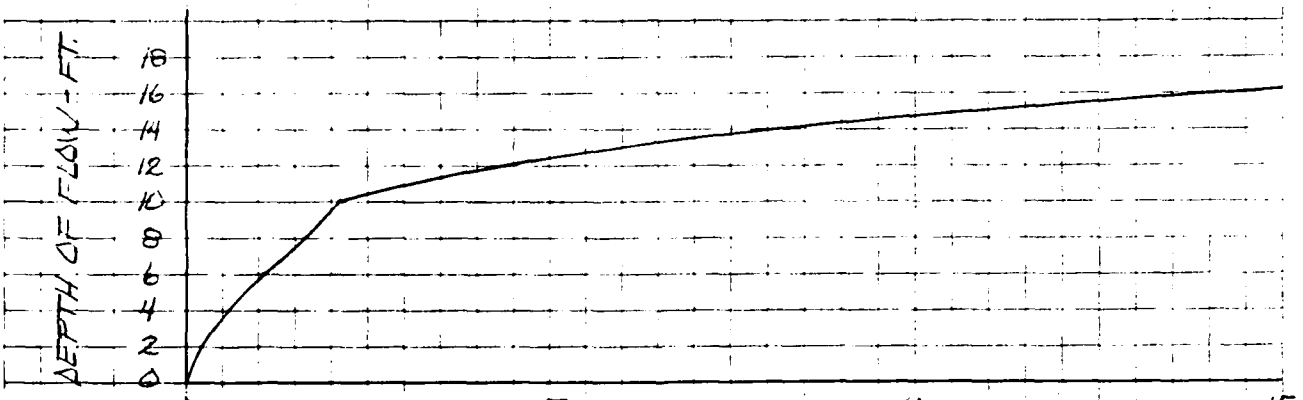
CKD BY SAL DATE 2-25-81 CONSULTING ENGINEERS 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-039

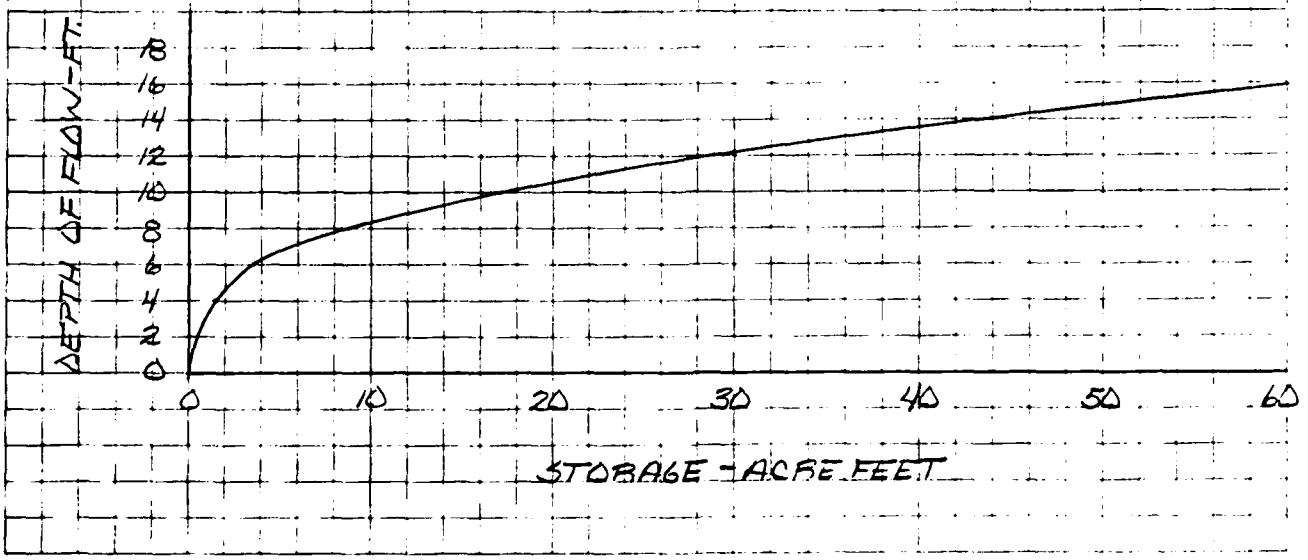
SUBJECT PARK POND DAM - FLOOD ROUTING

SECTION NO. 3 (CAMP WA-NEE ROAD) SCALE: 1" = 200' HORIZ. 1" = 20' VERT.

C = 2.5
L_1 = 270'
L_2 = 170'
L_3 = 160'
L_4 = 145'







BY SAL DATE 2/23/81 ROALD HAESTAD, INC. SHEET NO 22 OF 40

CKD BY DLS DATE 2/24/81 CONSULTING ENGINEERS JOB NO. 049 039

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 4A

MAIN CHANNEL

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
1.0	24	21	0.89	0.0250	4.34	93
2.0	27	45	1.71	0.0250	6.71	303
3.0	29	70	2.43	0.0250	8.50	597
4.0	31	96	3.15	0.0250	10.09	973
5.0	32	123	3.87	0.0250	11.59	1431
6.0	33	151	4.57	0.0250	12.94	1955
7.0	33	179	5.42	0.0250	14.49	2595
8.0	33	207	6.26	0.0250	15.96	3306
9.0	33	235	7.11	0.0250	17.37	4085
10.0	33	263	7.96	0.0250	18.73	4927
11.0	33	291	8.80	0.0250	20.03	5832
12.0	33	319	9.65	0.0250	21.30	6797
13.0	33	347	10.50	0.0250	22.53	7819
14.0	33	375	11.34	0.0250	23.72	8899
15.0	33	403	12.19	0.0250	24.89	10034

MANNING COEFFICIENT=N=0.0500

BY SAC DATE 2/23/81 ROALD HAESTAD, INC. SHEET NO 23 OF 40

CKD BY DLS DATE 2/24/81 CONSULTING ENGINEERS JOB NO. 049 039

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 4B

LEFT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
7.0	34	17	0.50	0.0250	1.48	25
8.0	68	68	1.00	0.0250	2.35	159
9.0	101	152	1.50	0.0250	3.08	467
10.0	135	270	2.00	0.0250	3.73	1007
11.0	145	410	2.83	0.0250	4.70	1925
12.0	155	560	3.61	0.0250	5.53	3096
13.0	165	720	4.36	0.0250	6.27	4514
14.0	175	890	5.08	0.0250	6.94	6178
15.0	185	1070	5.77	0.0250	7.56	8092

MANNING COEFFICIENT=N=0.1000

SECTION NUMBER 4C

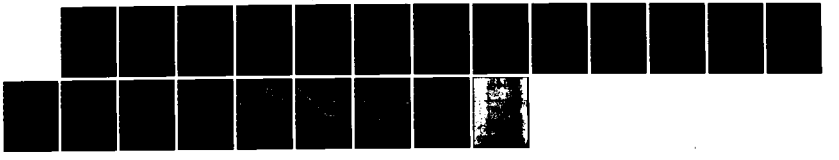
RIGHT OVERBANK

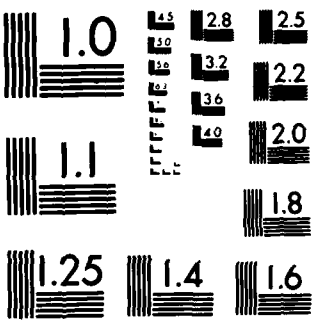
H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
4.0	11	3	0.25	0.0250	0.93	2
5.0	32	24	0.75	0.0250	1.94	46
6.0	53	66	1.25	0.0250	2.72	179
7.0	74	129	1.75	0.0250	3.41	440
8.0	95	213	2.25	0.0250	4.03	860
9.0	116	319	2.75	0.0250	4.61	1469
10.0	137	445	3.25	0.0250	5.15	2294
11.0	139	583	4.21	0.0250	6.12	3567
12.0	140	721	5.15	0.0250	7.01	5055
13.0	141	861	6.09	0.0250	7.83	6743
14.0	143	1001	7.01	0.0250	8.61	8618
15.0	144	1143	7.92	0.0250	9.34	10672

MANNING COEFFICIENT=N=0.1000

AD-A144 579 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 2/2
PARK POND DAM (CT 006..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV MAR 81

UNCLASSIFIED F/G 13/13 NL





SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 4

TOTAL SECTION

	AREA (SQ.FT.)				DISCHARGE (CFS)			
H	A	B	C	TOTAL	A	B	C	TOTAL
1.0	21	0	0	21	93	0	0	93
2.0	45	0	0	45	303	0	0	303
3.0	70	0	0	70	597	0	0	597
4.0	96	0	3	99	973	0	2	976
5.0	123	0	24	147	1431	0	46	1477
6.0	151	0	66	217	1955	0	179	2134
7.0	179	17	129	325	2595	25	440	3061
8.0	207	68	213	488	3306	159	860	4325
9.0	235	152	319	706	4085	467	1469	6021
10.0	263	270	445	978	4927	1007	2294	8228
11.0	291	410	583	1284	5832	1925	3567	11325
12.0	319	560	721	1600	6797	3096	5055	14948
13.0	347	720	861	1928	7819	4514	6743	19076
14.0	375	890	1001	2266	8899	6178	8618	23695
15.0	403	1070	1143	2616	10034	8092	10672	28797

STORAGE AT TIME OF FAILURE=S= 1100 AC. FT.
LENGTH OF REACH=L= 2800 FT

INFLOW INTO REACH=QP1= 10845 CFS
DEPTH OF FLOW=H1= 10.8 FT.
CROSS SECTIONAL AREA=A1= 1237 SQ.FT.
STORAGE IN REACH=V1= 79.5 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 10061 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 10.6 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 1159 SQ.FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 74.5 AC. FT.

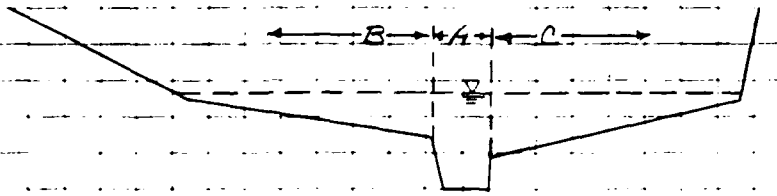
REACH OUTFLOW=QP2= 10086 CFS
DEPTH OF FLOW=H2= 10.6 FT.

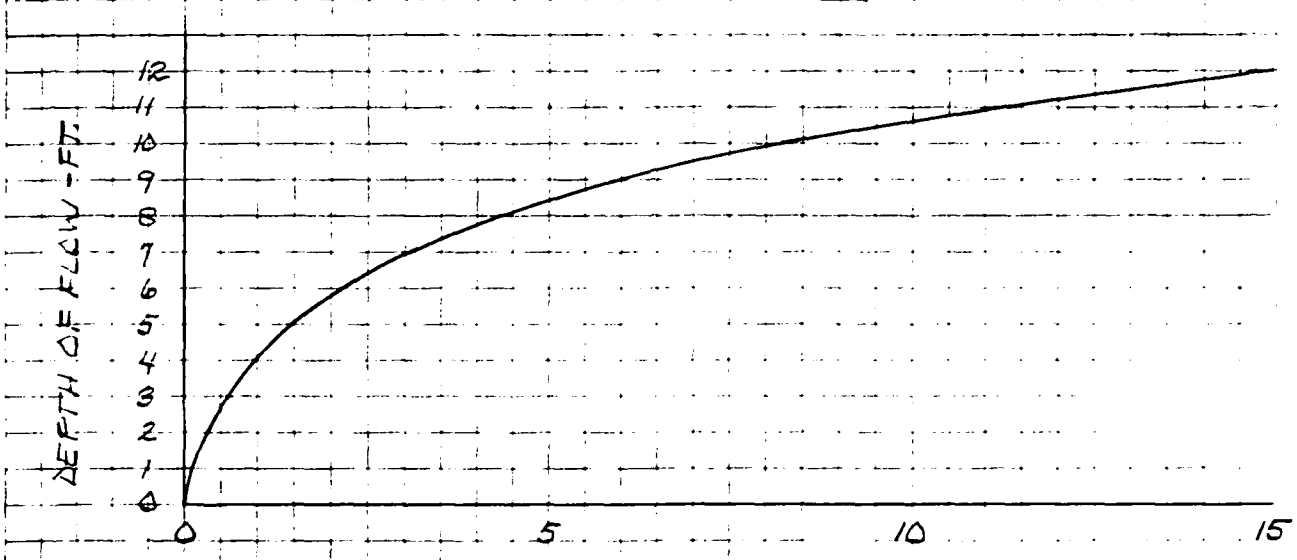
SUBJECT PARK POND DAM - FLOOD ROUTING

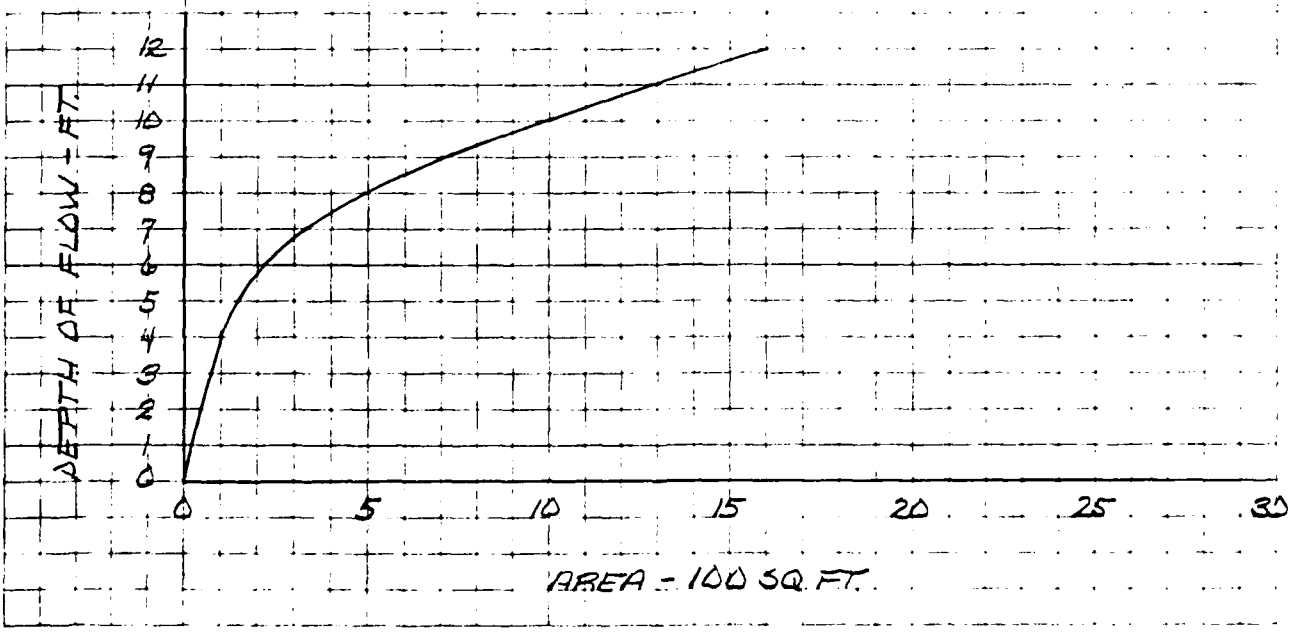
SECTION NO 4

SCALE: 1" = 100' HORIZ.
1" = 20' VERT.

L = 2800'
N(A) = .05
N(B) = .10
N(C) = .10
S = .025







BY SAL DATE 2/23/81 ROALD HAESTAD, INC. SHEET NO 27 OF 40

CKD BY DLS DATE 2/24/81 CONSULTING ENGINEERS JOB NO. 049 039

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 5A

MAIN CHANNEL

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
1.0	24	21	0.89	0.0250	4.34	93
2.0	27	45	1.71	0.0250	6.71	303
3.0	29	70	2.43	0.0250	8.50	597
4.0	31	96	3.15	0.0250	10.09	973
5.0	32	123	3.87	0.0250	11.59	1431
6.0	33	151	4.57	0.0250	12.94	1955
7.0	33	179	5.42	0.0250	14.49	2595
8.0	33	207	6.26	0.0250	15.96	3306
9.0	33	235	7.11	0.0250	17.37	4085
10.0	33	263	7.96	0.0250	18.73	4927
11.0	33	291	8.80	0.0250	20.03	5832
12.0	33	319	9.65	0.0250	21.30	6797
13.0	33	347	10.50	0.0250	22.53	7819
14.0	33	375	11.34	0.0250	23.72	8899
15.0	33	403	12.19	0.0250	24.89	10034

MANNING COEFFICIENT=N=0.0500

SECTION NUMBER 5B

LEFT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
7.0	40	20	0.50	0.0250	1.48	30
8.0	80	80	1.00	0.0250	2.35	188
9.0	120	180	1.50	0.0250	3.08	554
10.0	160	320	2.00	0.0250	3.73	1193
11.0	163	481	2.96	0.0250	4.84	2330
12.0	165	645	3.90	0.0250	5.82	3754
13.0	168	811	4.83	0.0250	6.71	5443
14.0	171	980	5.74	0.0250	7.53	7379
15.0	174	1151	6.64	0.0250	8.30	9551

MANNING COEFFICIENT=N=0.1000

SECTION NUMBER 5C

RIGHT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
4.0	3	1	0.25	0.0250	0.92	1
5.0	9	6	0.74	0.0250	1.92	12
6.0	14	18	1.23	0.0250	2.70	48
7.0	20	35	1.72	0.0250	3.38	118
8.0	26	58	2.22	0.0250	3.99	230
9.0	32	86	2.71	0.0250	4.57	393
10.0	38	120	3.20	0.0250	5.10	614
11.0	40	159	3.94	0.0250	5.86	929
12.0	43	199	4.64	0.0250	6.54	1302
13.0	46	243	5.31	0.0250	7.15	1735
14.0	48	288	5.96	0.0250	7.73	2227
15.0	51	337	6.59	0.0250	8.26	2781

MANNING COEFFICIENT=N=0.1000

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 5

TOTAL SECTION

	AREA (SQ.FT.)				DISCHARGE (CFS)			
H	A	B	C	TOTAL	A	B	C	TOTAL
1.0	21	0	0	21	93	0	0	93
2.0	45	0	0	45	303	0	0	303
3.0	70	0	0	70	597	0	0	597
4.0	96	0	1	97	973	0	1	974
5.0	123	0	6	130	1431	0	12	1443
6.0	151	0	18	169	1955	0	48	2003
7.0	179	20	35	234	2595	30	118	2743
8.0	207	80	58	345	3306	188	230	3724
9.0	235	180	86	501	4085	554	393	5032
10.0	263	320	120	703	4927	1193	614	6734
11.0	291	481	159	931	5832	2330	929	9090
12.0	319	645	199	1163	6797	3754	1302	11853
13.0	347	811	243	1401	7819	5443	1735	14997
14.0	375	980	288	1643	8899	7379	2227	18506
15.0	403	1151	337	1891	10034	9551	2781	22365

STORAGE AT TIME OF FAILURE=S= 1100 AC. FT.
LENGTH OF REACH=L= 3500 FT

INFLOW INTO REACH=QP1= 10086 CFS
DEPTH OF FLOW=H1= 11.4 FT.
CROSS SECTIONAL AREA=A1= 1015 SQ.FT.
STORAGE IN REACH=V1= 81.5 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 9338 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 11.1 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 952 SQ.FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 76.5 AC. FT.

REACH OUTFLOW=QP2= 9361 CFS
DEPTH OF FLOW=H2= 11.1 FT.

BY LFG DATE 2-24-81 **ROALD HAESTAD, INC.** SHEET NO 31 OF 40

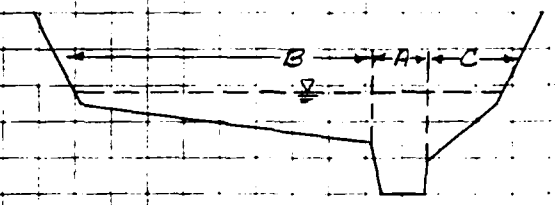
CKD BY SAL DATE 2-26-81 CONSULTING ENGINEERS 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 19-039

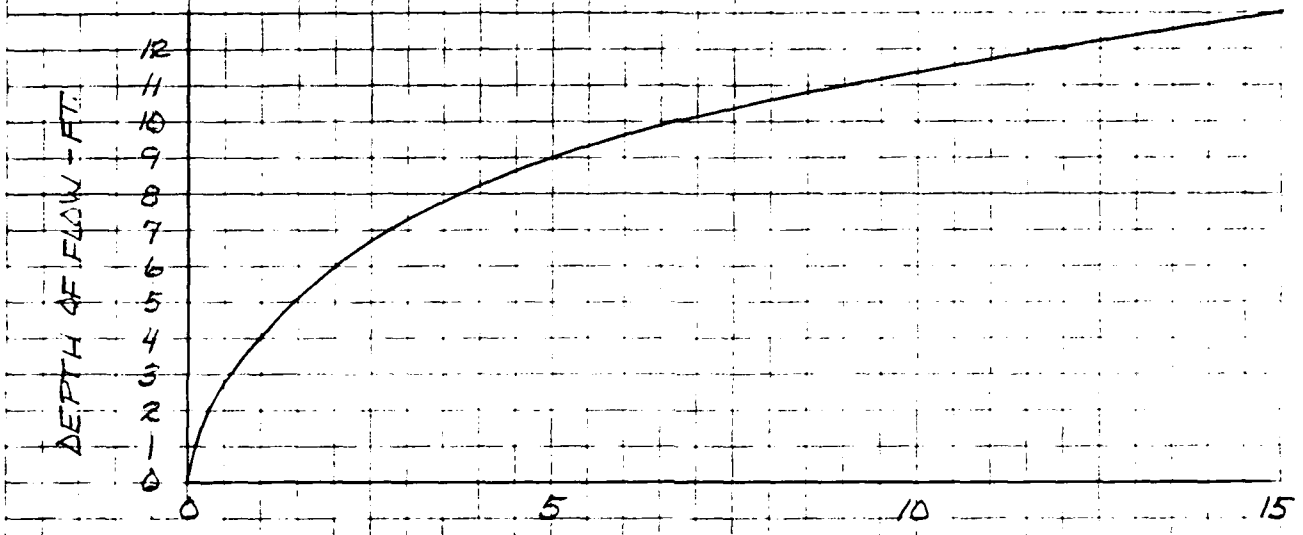
SUBJECT PARK POND DAM - FLOOD ROUTING

SECTION NO. 5

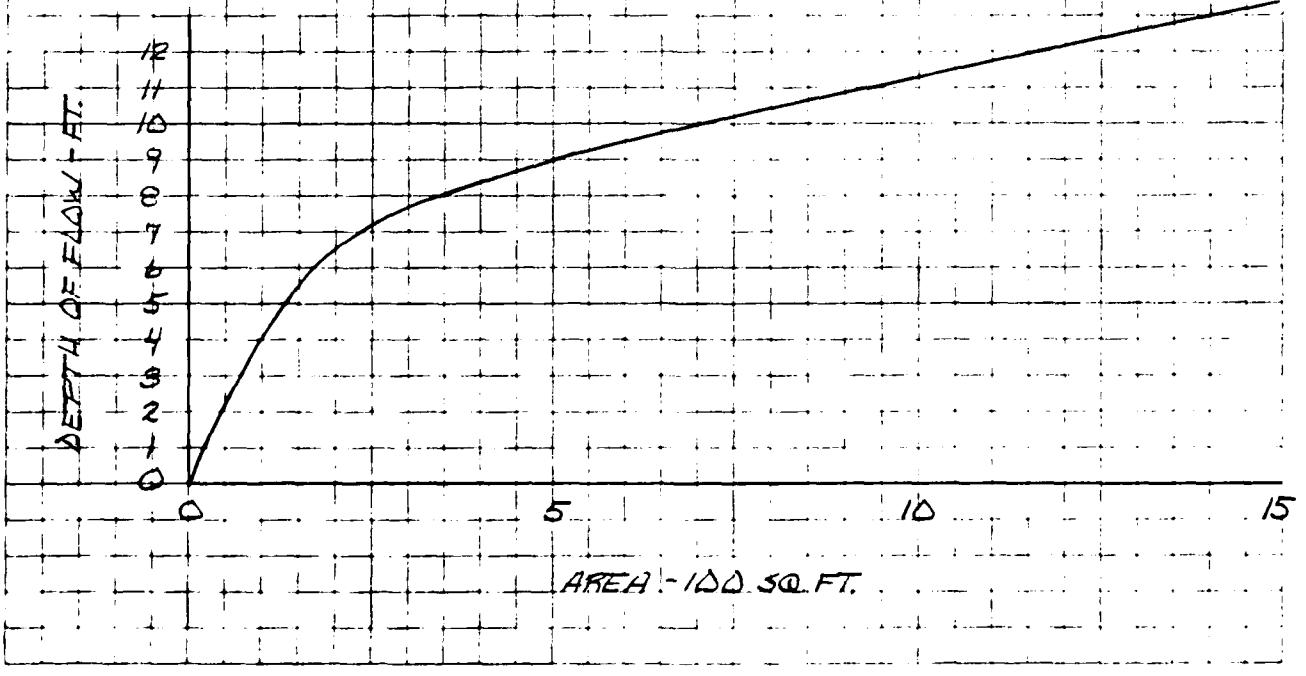
SCALE: 1" = 100' HORIZ.
1" = 20' VERT.

L = 3500'
$N_{(A)}$ = .05
$N_{(B)}$ = .10
$N_{(C)}$ = .10
S = .025





DISCHARGE - 1000 CFS.



AREA - 100 SQ. FT.

SECTION NUMBER 6A

MAIN CHANNEL

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
1.0	24	21	0.89	0.0179	3.67	79
2.0	27	45	1.71	0.0179	5.68	256
3.0	29	70	2.43	0.0179	7.19	505
4.0	31	96	3.15	0.0179	8.54	824
5.0	32	123	3.87	0.0179	9.81	1211
6.0	33	151	4.57	0.0179	10.95	1654
7.0	33	179	5.42	0.0179	12.26	2196
8.0	33	207	6.26	0.0179	13.51	2798
9.0	33	235	7.11	0.0179	14.70	3456
10.0	33	263	7.96	0.0179	15.85	4169
11.0	33	291	8.80	0.0179	16.95	4935
12.0	33	319	9.65	0.0179	18.02	5751
13.0	33	347	10.50	0.0179	19.06	6617
14.0	33	375	11.34	0.0179	20.07	7531
15.0	33	403	12.19	0.0179	21.06	8491

MANNING COEFFICIENT=N=0.0500

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 6B

LEFT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
7.0	59	29	0.50	0.0179	1.25	37
8.0	118	118	1.00	0.0179	1.99	234
9.0	176	264	1.50	0.0179	2.60	689
10.0	235	470	2.00	0.0179	3.16	1483
11.0	248	711	2.87	0.0179	4.02	2858
12.0	260	965	3.71	0.0179	4.76	4598
13.0	273	1231	4.52	0.0179	5.43	6688
14.0	285	1510	5.29	0.0179	6.04	9120
15.0	298	1801	6.05	0.0179	6.60	11890

MANNING COEFFICIENT=N=0.1000

BY SAL DATE 2/23/81 ROALD HAESTAD, INC. SHEET NO 34 OF 40

CKD BY DLS DATE 2/24/81 CONSULTING ENGINEERS JOB NO. 049 039

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 6C

RIGHT OVERBANK

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
4.0	7	2	0.25	0.0179	0.79	1
5.0	20	15	0.75	0.0179	1.64	25
6.0	34	42	1.25	0.0179	2.30	96
7.0	47	82	1.75	0.0179	2.88	236
8.0	60	136	2.24	0.0179	3.41	462
9.0	74	202	2.74	0.0179	3.90	789
10.0	87	283	3.24	0.0179	4.35	1231
11.0	105	379	3.60	0.0179	4.67	1768
12.0	123	493	4.00	0.0179	5.01	2467
13.0	141	625	4.42	0.0179	5.36	3346
14.0	159	775	4.86	0.0179	5.71	4421
15.0	177	943	5.31	0.0179	6.05	5708

MANNING COEFFICIENT=N=0.1000

SUBJECT PARK POND DAM-FLOOD ROUTING AT TOP OF DAM

SECTION NUMBER 6

TOTAL SECTION

	AREA (SQ.FT.)				DISCHARGE (CFS)			
H	A	B	C	TOTAL	A	B	C	TOTAL
1.0	21	0	0	21	79	0	0	79
2.0	45	0	0	45	256	0	0	256
3.0	70	0	0	70	505	0	0	505
4.0	96	0	2	98	824	0	1	825
5.0	123	0	15	138	1211	0	25	1235
6.0	151	0	42	193	1654	0	96	1751
7.0	179	29	82	290	2196	37	236	2469
8.0	207	118	136	460	2798	234	462	3493
9.0	235	264	202	702	3456	689	789	4934
10.0	263	470	283	1016	4169	1483	1231	6884
11.0	291	711	379	1381	4935	2858	1768	9561
12.0	319	965	493	1777	5751	4598	2467	12816
13.0	347	1231	625	2203	6617	6688	3346	16651
14.0	375	1510	775	2660	7531	9120	4421	21071
15.0	403	1801	943	3147	8491	11890	5708	6090

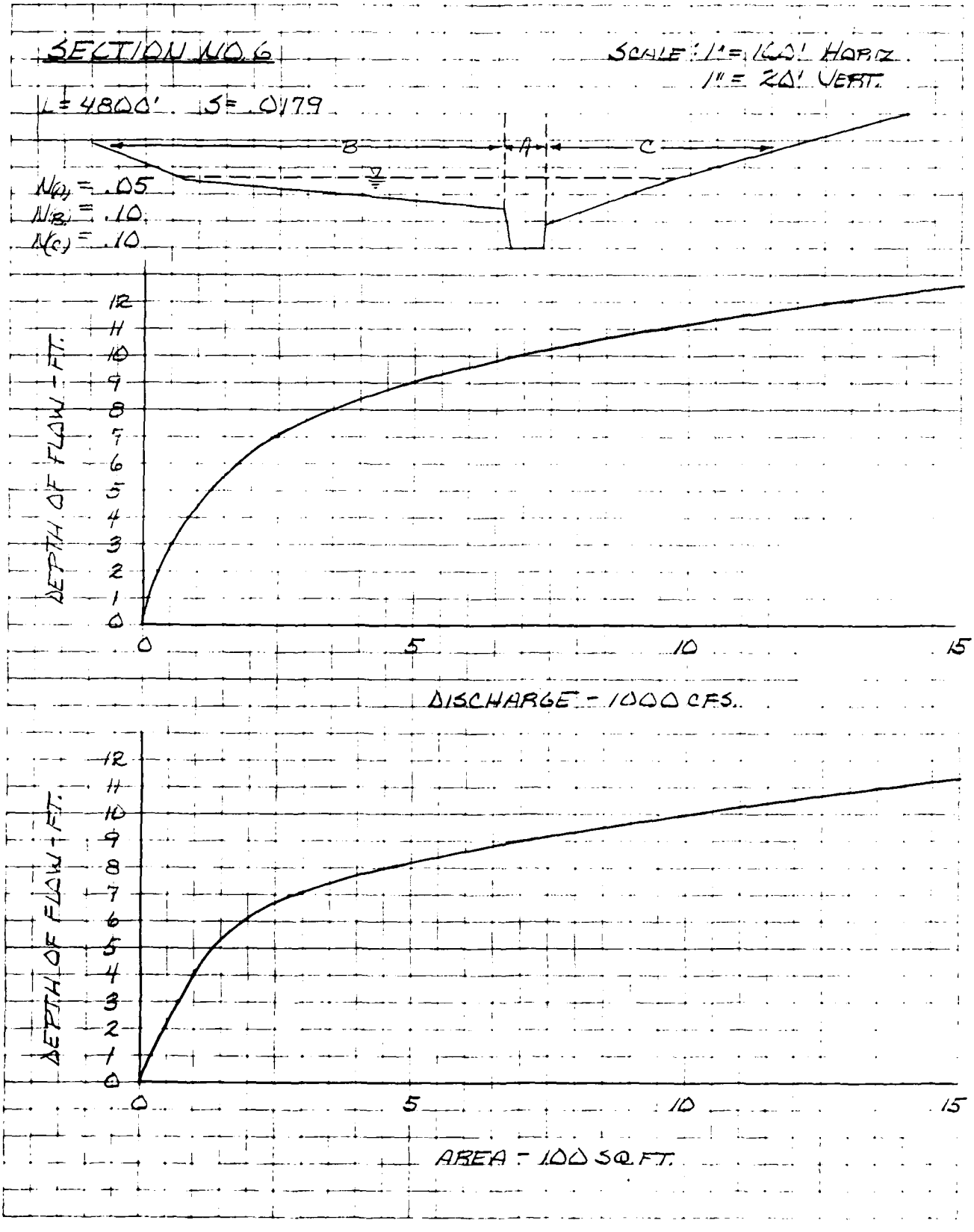
STORAGE AT TIME OF FAILURE=S= 1100 AC. FT.
LENGTH OF REACH=L= 4800 FT

INFLOW INTO REACH=QP1= 9361 CFS
DEPTH OF FLOW=H1= 10.9 FT.
CROSS SECTIONAL AREA=A1= 1354 SQ.FT.
STORAGE IN REACH=V1= 149.2 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 8092 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 10.5 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 1181 SQ.FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 130.1 AC. FT.

REACH OUTFLOW=QP2= 8173 CFS
DEPTH OF FLOW=H2= 10.5 FT.

SUBJECT PARK POND DAM - FLOOD ROUTING



SUBJECT PARK POND DAM-DEPTH OF FLOW

SECTION NUMBER 7

SAWMILL HILL ROAD

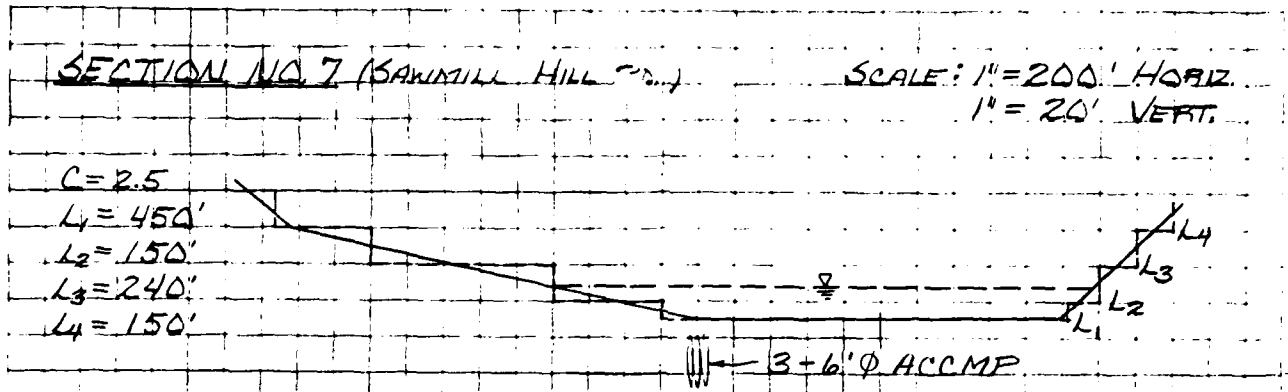
HEIGHT ABOVE INVERT (FEET)	D I S C H A R G E C A P A C I T Y CONDUIT (CFS)	SPILLWAY (CFS)	TOTAL (CFS)
1.0	13	0	13
2.0	27	0	27
3.0	40	0	40
4.0	68	0	68
5.0	96	0	96
6.0	125	0	125
7.0	138	0	138
8.0	150	398	548
9.0	183	2067	2249
10.0	215	4822	5037
11.0	233	8427	8660
12.0	250	12688	12938
13.0	265	17511	17776
14.0	280	23436	23716
15.0	295	30315	30610

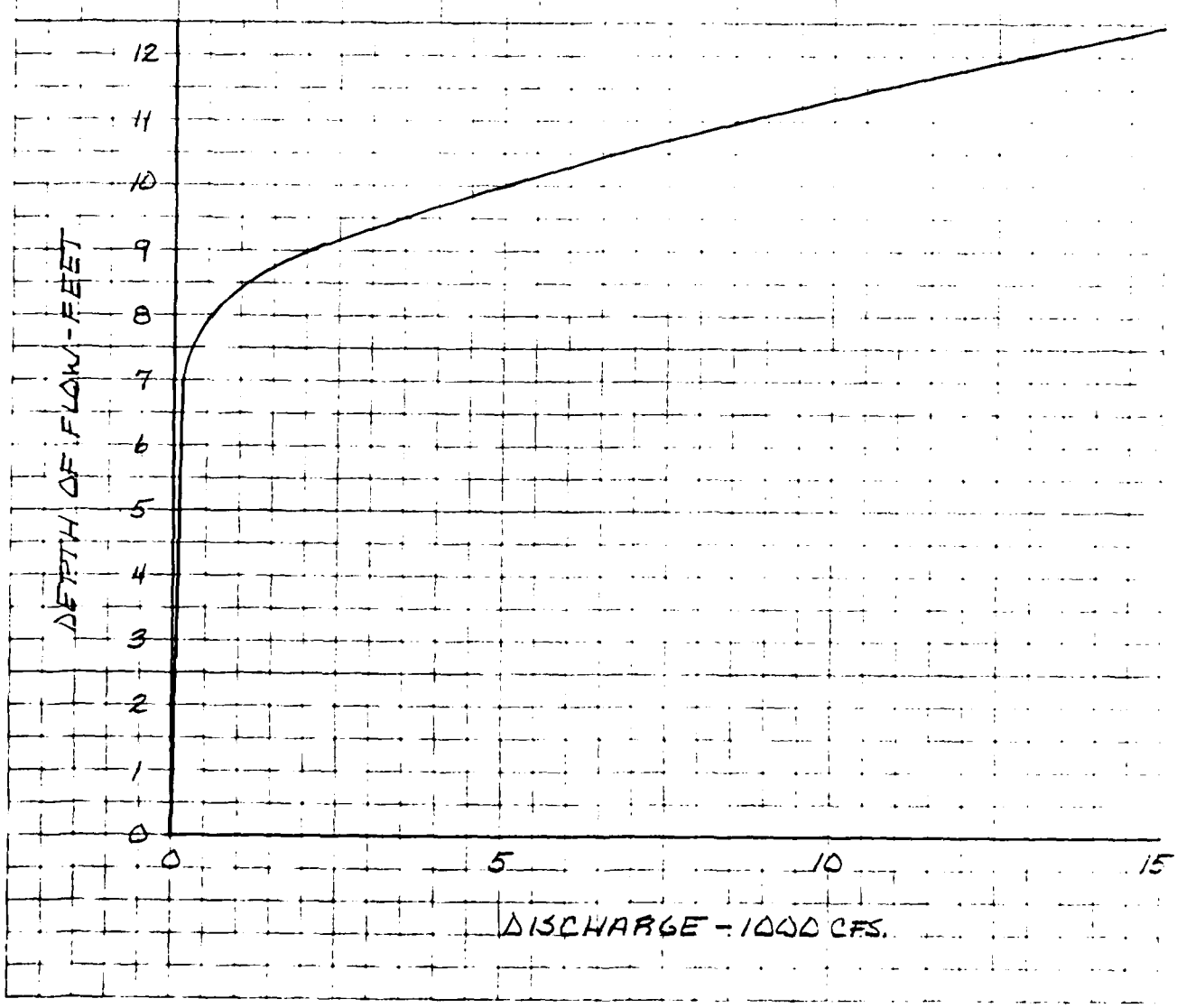
REACH OUTFLOW=QP2= 8173 CFS
HEIGHT ABOVE CONDUIT INVERT=H2= 10.9 FT.

SUBJECT PARK POND DAM - DEPTH OF FLOW

SECTION NO 7 (BANKHILL RD.) SCALE: 1" = 200' HORIZ.
1" = 20' VERT.

C = 2.5
L_1 = 450'
L_2 = 150'
L_3 = 240'
L_4 = 150'



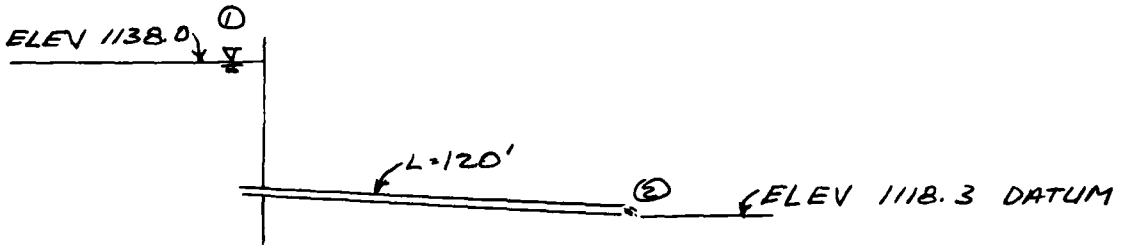


SUBJECT PARK POND DAM - Blowoff Discharge Capacity

Blowoff consists of a 12" CIP approximately 120' long

Top of dam & dike Elev. = 1138.0
Inv. of blowoff Elev. = 1118.3

Head losses: 1) Entrance - projecting $= k V^2/2g$ $(k=1)$
2) Friction Loss $= f L/D \, V^2/2g$
3) Gate Valve $= k V^2/2g$ $(k=0.25)$



$$P_1 + V_1^2/2g + Z_1 = P_2 + V_2^2/2g + Z_2 + H_{L1-2}$$

$$0 + 0 + 19.7' = 0 + V_2^2/2g + 0 + H_{L1-2}$$

$$19.7' = [1 + 1 + f\,120 + 0.25]\, V_2^2/2g$$

$$19.7' = (2.25 + 120f)\, V_2^2/2g$$

Solve Bernoulli Eq. by trial & error.

Assume $V_2 = 15$ ft/sec $\rightarrow$ $f = 0.0365$ $\therefore V_2 = 13.8$ ft/sec
" $V_2 = 14$ ft/sec $\rightarrow$ $f = 0.0367$ $\therefore V_2 = 13.8$ ft/sec

Blowoff Discharge Capacity at top of dam.

$$Q = V_2 A$$
$$= 13.8 \text{ ft/sec} \left(\pi (1)^2/4\right)$$
$$= 10.8 \quad \text{use } 11 \text{ cfs}$$

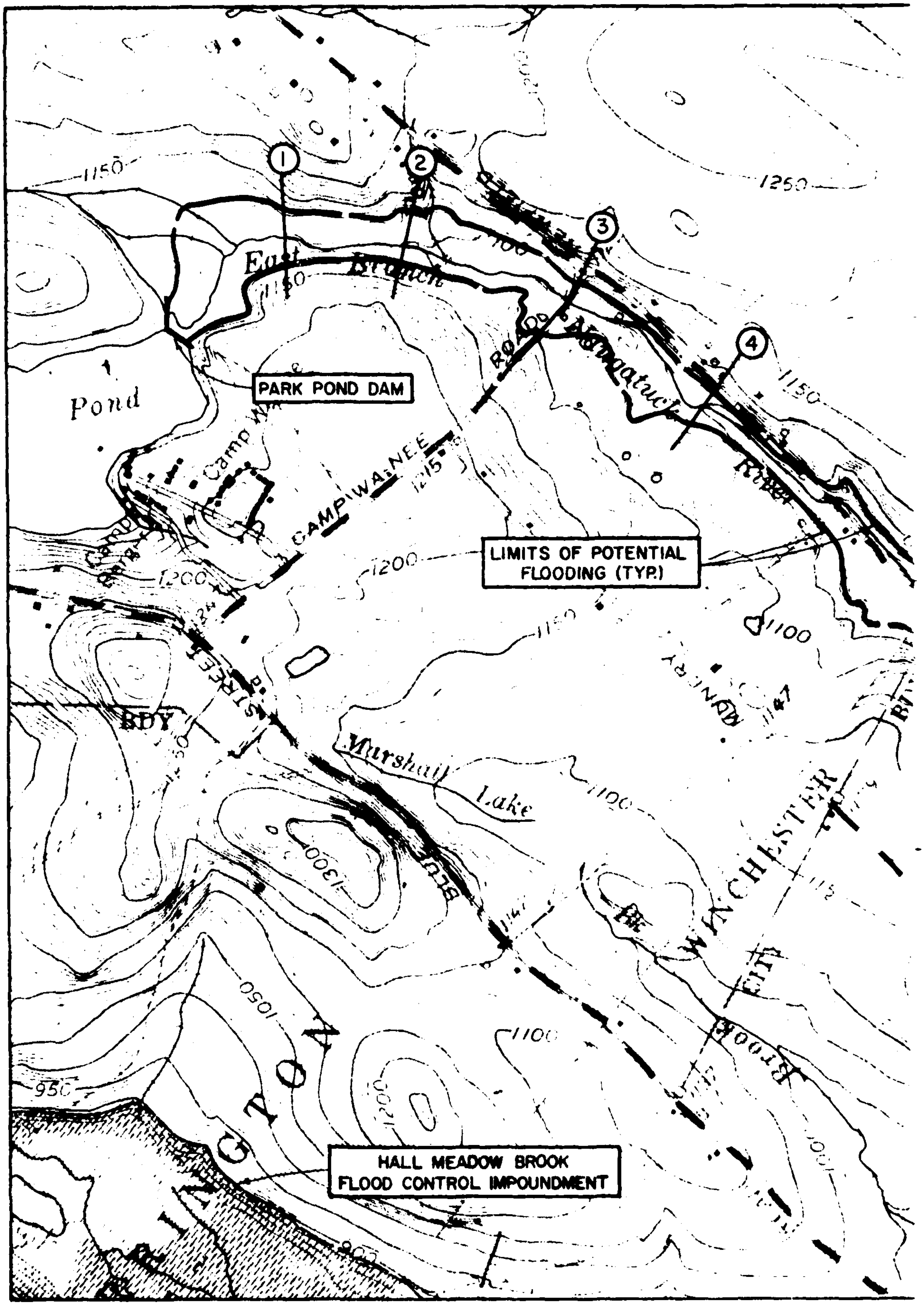
BY LRG DATE 2-23-81 **ROALD HAESTAD, INC.** SHEET NO 40 OF 40
CONSULTING ENGINEERS
CKD BY SAG DATE 2-23-81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-039

SUBJECT PARK POND DAM - SURFACE AREAS

PLAN. NO. 60-272

PLANIMETER READINGS:
(SCALE: 1" = 2000')

PARK POND WATERSHED	THIRD	62.02 SQ. IN.	3.29	302 ACRES
	FIRST	55.43 SQ. IN.	3.29	
	START	52.14 SQ. IN.		0.47 SQ. MI.
DIVERSION WATERSHED	THIRD	66.28 SQ. IN.	19.5	1790.6 ACRES
	FIRST	27.18 SQ. IN.	19.5	
	START	7.72 SQ. IN.		2.8 SQ. MI.
DIVERSION CHANNEL WATERSHED	THIRD	20.94 SQ. IN.	.13	12 ACRES
	FIRST	20.63 SQ. IN.	.14	
	START	20.54 SQ. IN.		0.02 SQ. MI.
CONTOUR 1140	THIRD	6.79 SQ. IN.	.96	88.2 ACRES
	FIRST	4.66 SQ. IN.	.96	
	START	3.70 SQ. IN.		



1 of 3

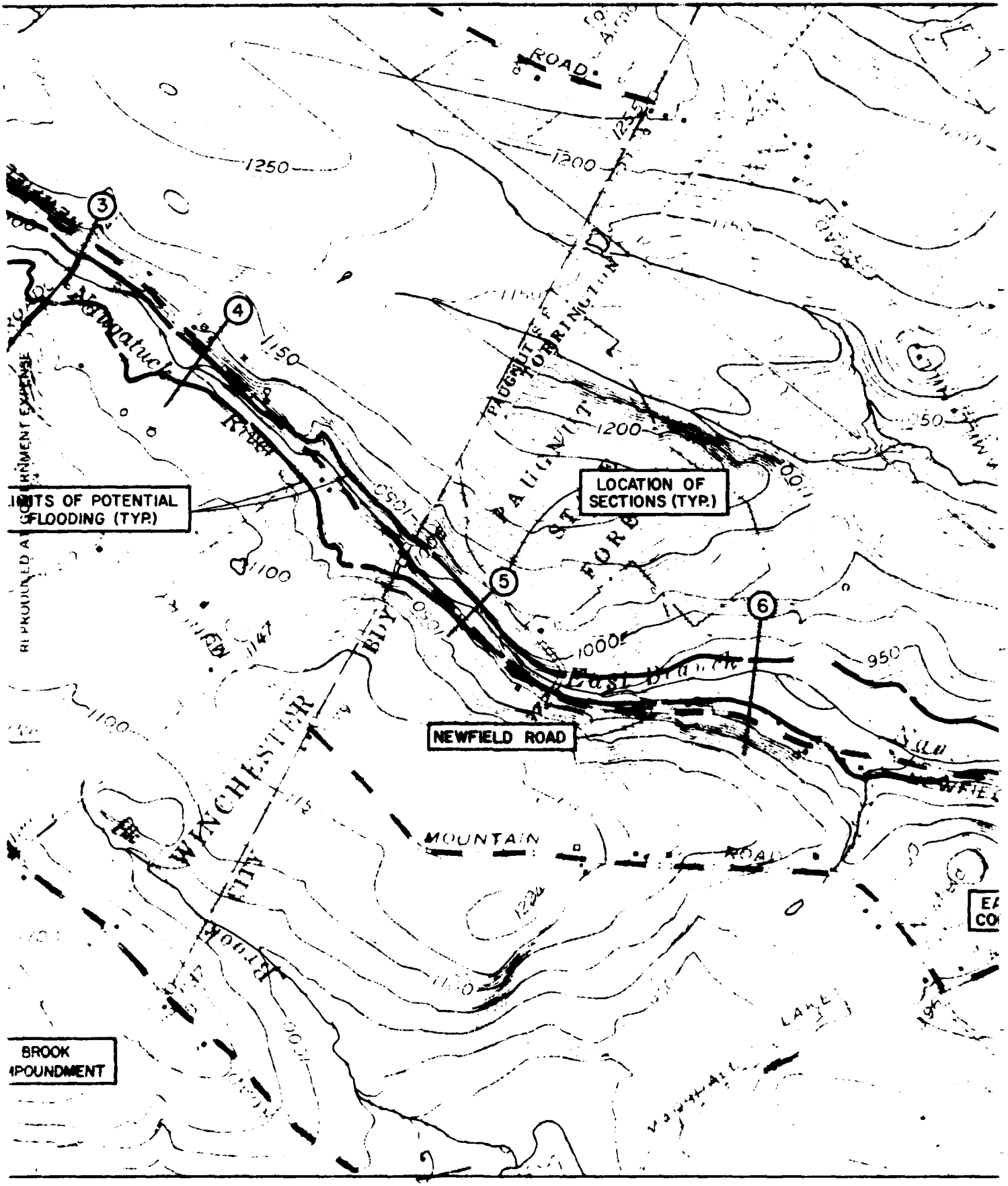
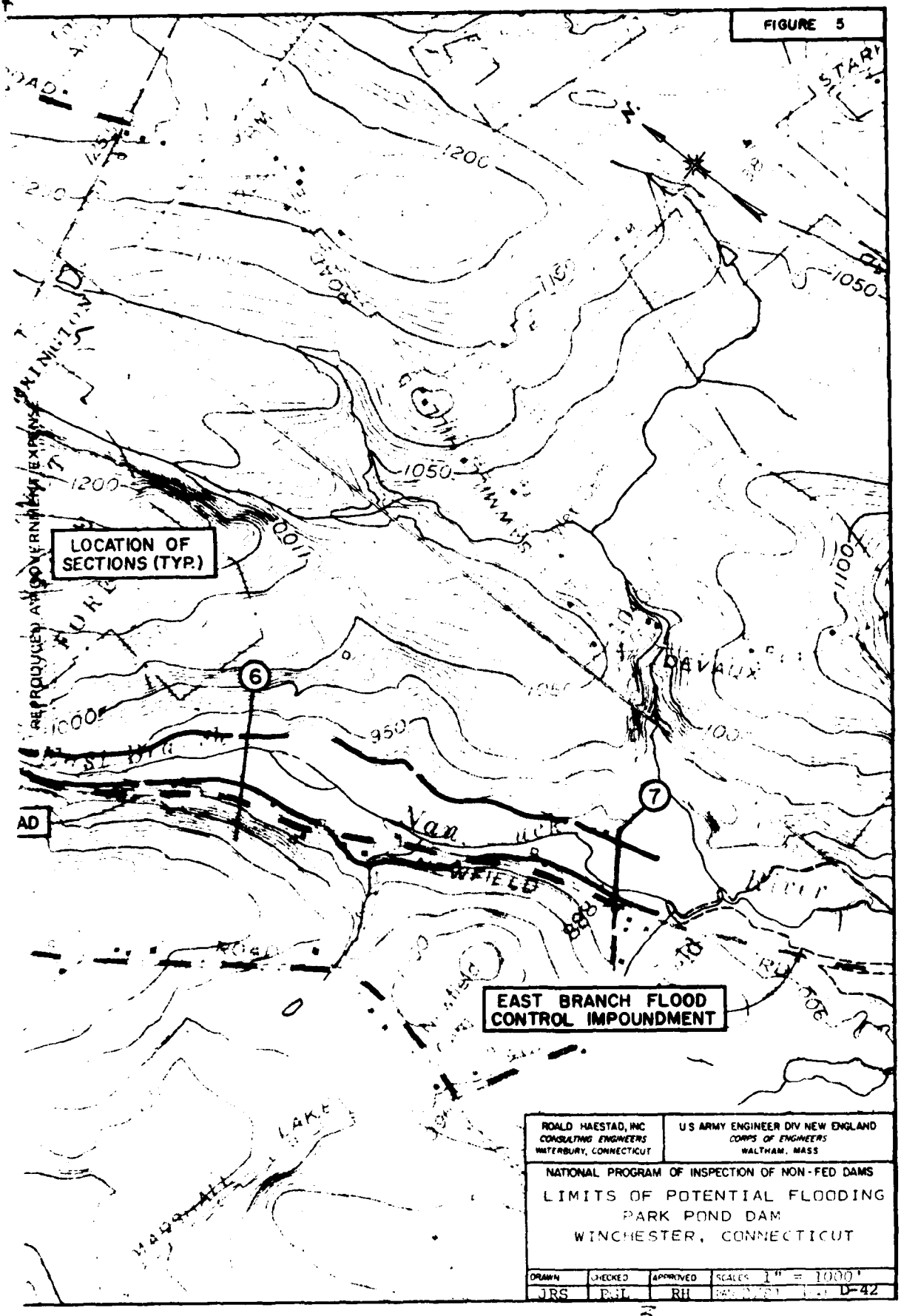

ROAD
1250
1200
1150
1100
1000
950
3
4
5
6
LOCATION OF SECTIONS (TYP.)
NEWFIELD ROAD
MOUNTAIN
ROAD
WINCHESTER
HOOD
BROOK
POUNDMENT

FIGURE 5



ROALD HAESTAD, INC CONSULTING ENGINEERS WATERBURY, CONNECTICUT	US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

LIMITS OF POTENTIAL FLOODING
PARK POND DAM
WINCHESTER, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALES	
JRS	EJL	RH	1" = 1000'	D-42

3 of 3

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

END

FILMED

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