AD-A144 247 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS SEYMOUR RESERVOIR NUM..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV FEB 80 1/2

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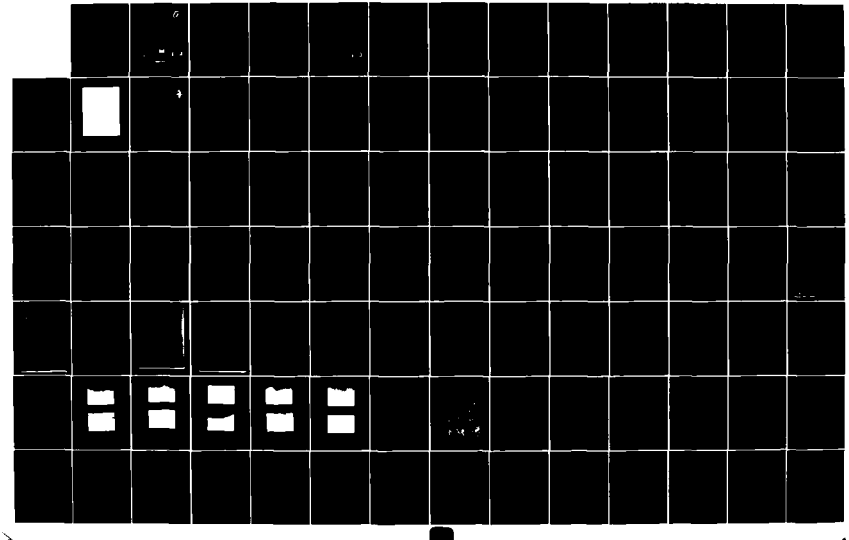

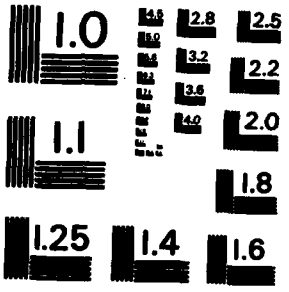

NAUGATUCK RIVER BASIN
OXFORD, CONNECTICUT

SEYMOUR RESERVOIR NO.4 DAM
CT 00325

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
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3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): Seymour Reservoir No.4 Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS	5. TYPE OF REPORT & PERIOD COVERED: INSPECTION REPORT
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18. SUPPLEMENTARY NOTES

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

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

DAMS, INSPECTION, DAM SAFETY,
Naugatuck River Basin
Oxford, Connecticut

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

Seymour Reservoir No.4 Dam, a storage reservoir for public water supply, is impounded by a main dam and two dikes. The main dam consists of an earth embankment approximately 425 feet long, with a top width of 20 feet, and a maximum height of 28 ft. Based on the visual inspection and a review of all available pertinent data, the dam is judged to be in poor condition. Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the dam is classified as "Small" in size with a "Significant" hazard potential.

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

REPLY TO
ATTENTION OF
NEDED

APR 23 1980

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

Inclosed is a copy of the Seymour Reservoir No. 4 Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, The Bridgeport Hydraulic Company, Bridgeport, 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,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

SEYMOUR RESERVOIR NO. 4 DAM
CT 00325

NAUGATUCK RIVER BASIN
OXFORD, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

FEBRUARY 1980

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

IDENTIFICATION NO: CT 00325

NAME OF DAM: Seymour Reservoir No. 4 Dam

TOWN: Oxford

COUNTY AND STATE: New Haven County, Connecticut

STREAM: Tributary to Hemp Swamp Brook

DATE OF INSPECTION: November 28 and 29, 1979

BRIEF ASSESSMENT

Seymour Reservoir No. 4, a storage reservoir for public water supply, is impounded by a main dam and two dikes. The main dam consists of an earth embankment approximately 425 feet long, with a top width of 20 feet, and a maximum height of 28 feet. The right dike begins approximately 100 feet to the right of the main dam, and consists of an earth embankment approximately 400 feet long, with a top width of 15 feet, and a maximum height of 22 feet. The left dike is located approximately 1,000 feet upstream of the main dam on the left bank of the reservoir, and consists of an earth embankment approximately 160 feet long, with a top width of 15 feet and a maximum height of 12 feet. The low level outlets or blowoffs consist of 10 and 8-inch cast iron pipes through the main dam embankment. The spillways consist of an 18-inch concrete overflow pipe through the right dike embankment, two 24-inch concrete overflow pipes through the main dam embankment, and an auxiliary earth spillway located at the left abutment of the left dike.

The dam impounds Seymour No. 4 Reservoir, a storage reservoir for public water supply for the Valley Division of the Bridgeport Hydraulic Company.

Based on the visual inspection and a review of all available pertinent data, the dam is judged to be in poor condition. Some features that could affect the integrity of the dam and dikes include the seepage and possible internal erosion at the toe of the main embankment, possible internal leakage from the blowoff and spillway pipes, and the lack of filter layers between the riprap and embankment materials.

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the dam is classified as "Small" in size, with a "Significant" hazard potential. A Test Flood equal to one-half the Probable Maximum Flood (1/2 PMF) was selected in accordance with the Corps of Engineers' Guidelines. The calculated Test Flood inflow of 570 cfs results in a routed outflow of 255 cfs. The spillway capacity is 260 cfs with the water level at the top of the dam. The spillway is capable of passing 102 percent of the routed Test Flood outflow without overtopping the dam.

It is recommended that the owner engage the services of a qualified, registered engineer to investigate the seepage and possible internal erosion at the main dam; to evaluate the condition and safety of the existing blowoff pipes; and to evaluate the the need for filter layers between riprap and embankment materials. A program for monitoring the seepage at the toe of the main dam should also be established and put into effect upon receipt of this Report.

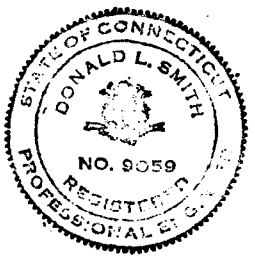
The owner should implement the recommendations as described herein, and in Section 7, within one year after receipt of this Phase I

Inspection Report, with the exception of the seepage monitoring program, which should be initiated upon receipt of this Report.

ROALD HAESTAD, INC.

Donald L. Smith, P.E.
Project Engineer

Roald Haestad
President



This Phase I Inspection Report on Seymour Reservoir No. 4 Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Richard J. DiBuono

RICHARD DIBUONO, MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering 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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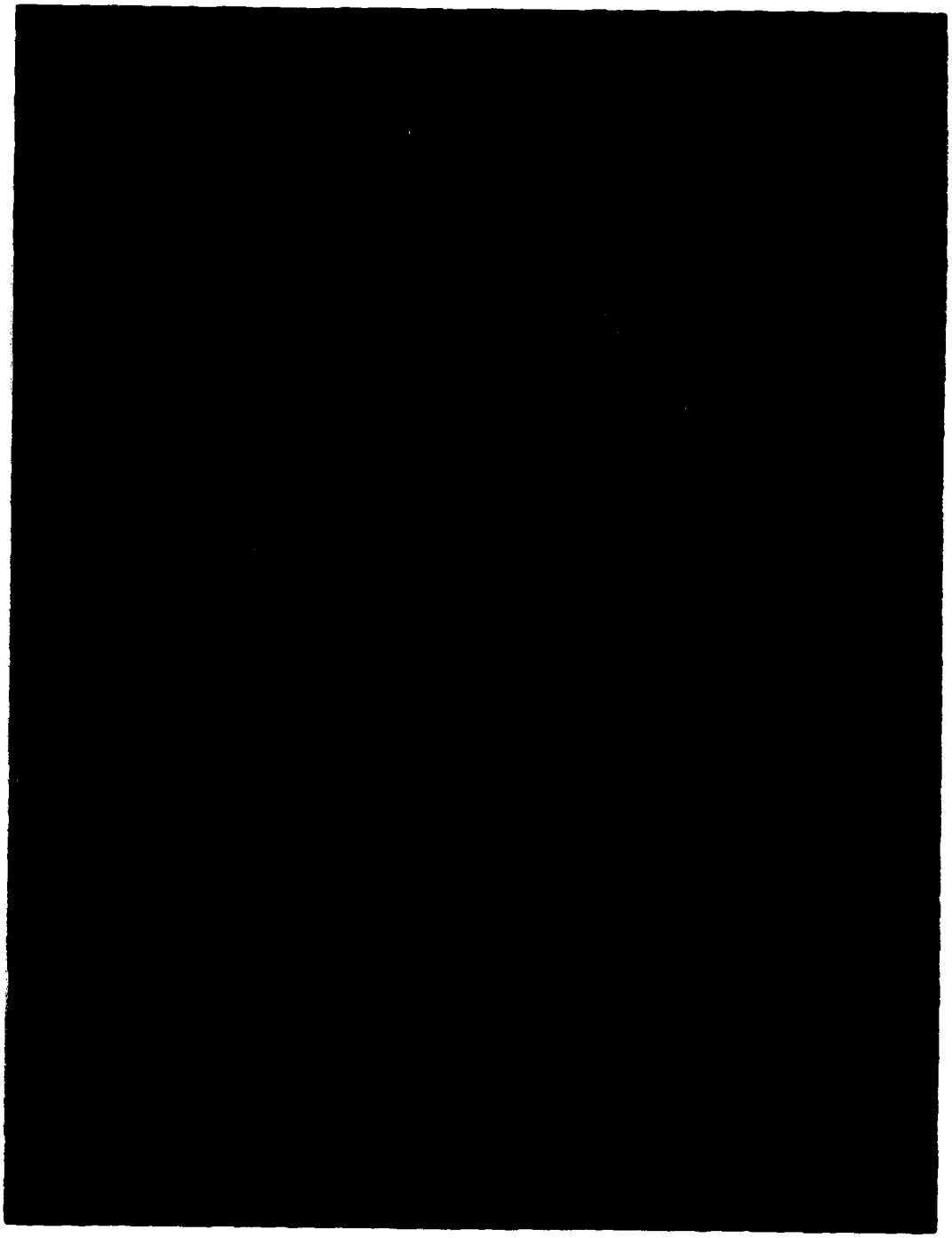
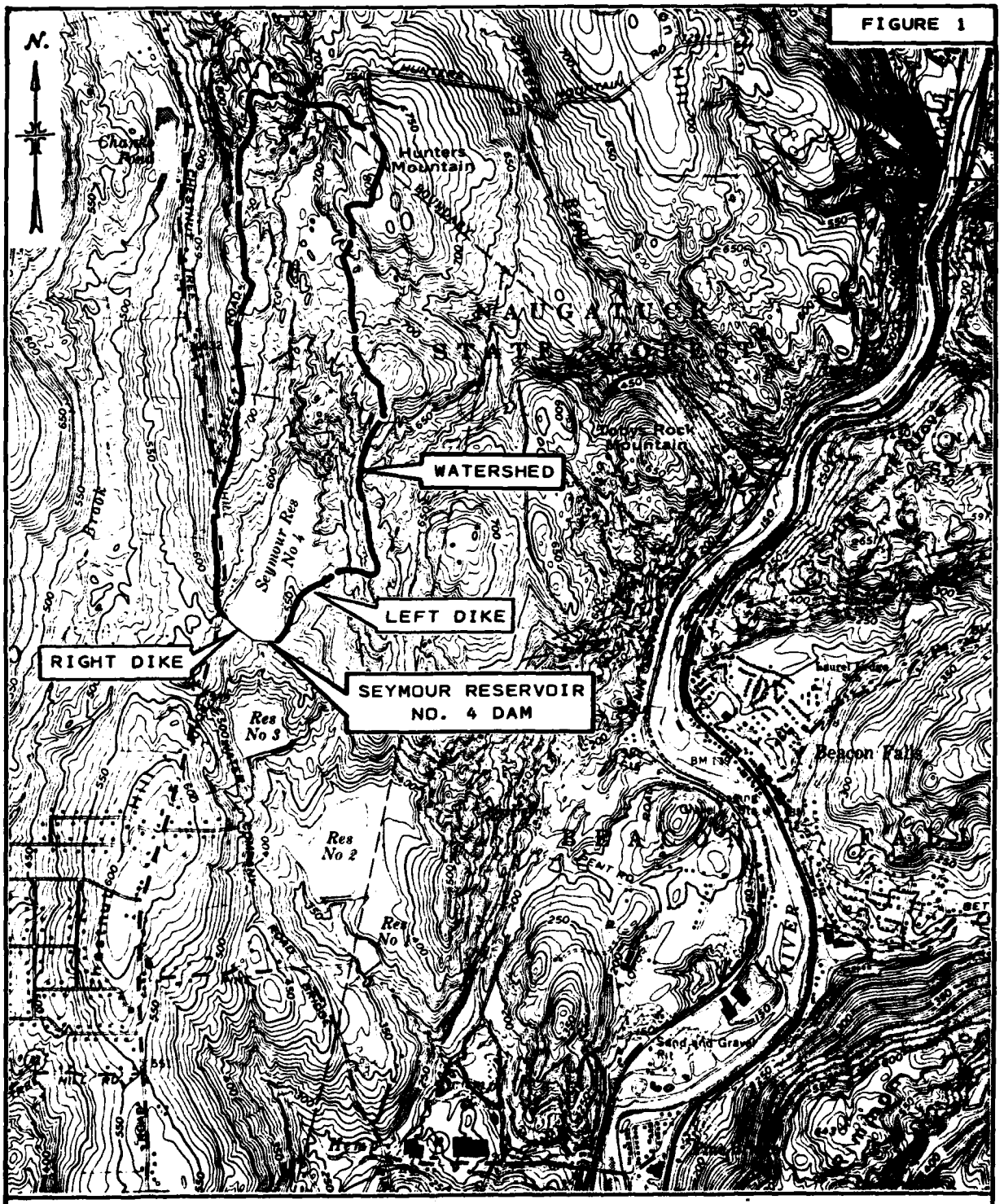


OVERVIEW PHOTO

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	SEYMOUR RES. NO. 4 DAM TR. TO HEMP SWAMP BROOK OXFORD, CONNECTICUT CT 00325 12 DEC '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

FIGURE 1



LOCATION PLAN

SEYMOUR RESERVOIR NO. 4 DAM
OXFORD, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC.

NAUGATUCK QUADRANGLE 1972

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

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 November 1, 1979, from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-80-C-0015 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 dam is located on an unnamed tributary to Hemp Swamp Brook in the Town of Oxford, Connecticut, between Chestnut Tree Hill Road and the Oxford-Beacon Falls Town Line. The dam is shown on the Naugatuck Quadrangle Map having coordinates of latitude N 41° 27.0' and longitude W 73° 05.4'.

b. Description of Dam and Appurtenant Structures

Seymour Reservoir No. 4 is impounded by a main dam and two dikes. The main dam consists of an earth embankment, approximately 425 feet long, with a top width of approximately 20 feet, a maximum height of 28 feet, an upstream slope of 2 horizontal to 1 vertical, and a downstream slope that varies from 2.5 to 3.5 horizontal to 1 vertical. The upstream slope is protected by a layer of heavy riprap and the downstream slope is grass covered. The low level outlets or blowoffs located near the center of the main embankment consist of an 8-inch cast iron pipe and a 10-inch cast iron pipe through the earth embankment controlled by downstream gate valves. The spillway at the main dam consists of two 24-inch concrete pipes through the earth embankment with inverts approximately 4 feet below the top of the dam. There are no provisions for keeping debris from obstructing the pipes.

The right dike begins approximately 100 feet to the right of the main dam. The dike consists of an earth embankment approximately 400 feet long, with a top width of 15 feet, a maximum height of 22 feet, an upstream slope of 2 horizontal to 1 vertical, and a downstream slope of 2.5 horizontal to 1 vertical. The upstream slope is protected by a layer of heavy riprap and the downstream slope is

covered with a moderate growth of brush. The spillway at the right dike consists of an 18-inch concrete pipe through the earth embankment with an invert approximately 4 feet below the top of the dam.

The left dike is located approximately 1,000 feet upstream of the main dam on the left bank of the reservoir. The dike consists of an earth embankment approximately 160 feet long, with a top width of 15 feet, a maximum height of 12 feet, an upstream slope of 2 horizontal to 1 vertical, and a downstream slope of 3 horizontal to 1 vertical. The upstream slope is protected by a layer of heavy riprap and the downstream slope is covered with heavy tree and brush growth. An auxiliary earth spillway is located at the left abutment of the left dike. The spillway consists of a trapezoidal section 8 feet wide on the bottom, with side slopes of 3.5 horizontal to 1 vertical. The spillway is partially lined with riprap, and heavily overgrown with brush. The left side of the spillway is ledge outcrop.

c. Size Classification - "Small"

According to the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, a dam is classified as "Small" in size if the height is between 25 feet and 40 feet, or the dam impounds between 50 Acre-Feet and 1,000 Acre-Feet. The dam has a maximum height of 28 feet and a maximum storage capacity of 725 Acre-Feet. Therefore, the dam is classified as "Small" in size.

d. Hazard Classification - "Significant"

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the Hazard Classification for the dam is "Significant". A dam failure analysis indicates that a breach of the Seymour Reservoir No. 4 Dam would result in overtopping of Seymour Reservoir Nos. 3, 2 and 1 Dams by 3.6 feet,

1.9 feet, and 5 feet respectively. For computation purposes the downstream dams were assumed not to fail. The depth of flow in the stream in the area of four downstream houses prior to dam breach is 2 feet, based on the maximum spillway capacity of 260 cfs. The peak flow in this area due to the dam breach is 9,300 cfs, which is equivalent to a depth of flow of 9 feet, or approximately 1.6 feet above the sill elevations. The dam failure could result in the loss of a few lives and an economic loss associated with the failure of the downstream dams.

e. Ownership

Former Owner: The Seymour Water Company

Present Owner: The Bridgeport Hydraulic Company
835 Main Street
Bridgeport, Connecticut 06609
(203) 367-6621

f. Operator

George Smith, Manager, Valley Division
The Bridgeport Hydraulic Company
70 New Haven Road
Seymour, Connecticut 06483
(203) 888-4511

g. Purpose of Dam

The dam impounds Seymour Reservoir No. 4, a storage reservoir for public water supply for the Bridgeport Hydraulic Company.

h. Design and Construction History

The only available information on the dam consists of a drawing dated August 1951, showing a plan view of the main dam and cross sections. Water Company personnel indicate that the dam was constructed in 1951 by C.W. Blakeslee and Sons. The reservoir was created by excavating an existing swamp and constructing the earth embankment.

i. Normal Operational Procedures

The dam impounds the uppermost reservoir in a series of four storage reservoirs used for public water supply. The low level outlet or blowoff is opened during the summer months to supplement flow to the downstream reservoirs.

1.3 Pertinent Data

a. Drainage Area

The drainage area consists of 0.54 square miles of rolling, wooded terrain, the majority of which is either State Forest or owned by the Bridgeport Hydraulic Company.

b. Discharge at Damsite

Three separate spillway facilities are present at the damsite. Two 24-inch concrete overflow pipes are located at the main dam, an 18-inch concrete overflow pipe is located at the right dike, and an auxiliary earth spillway is located at the left abutment of the left dike. The regulating outlets consist of an 8-inch cast iron pipe and a 10-inch cast iron pipe through the main dam controlled by downstream gate valves. One of these low level outlets or blowoffs is normally open during the summer months to supplement flow to downstream reservoirs.

1. Outlet Works (conduits) Size:	1 @ 10"	1 @ 8"
Invert Elevation:	508.0*	508.0*
Discharge Capacity:	8 cfs	5 cfs
2. Maximum Known Flood at Damsite:	Unknown	
3. Ungated Spillway Capacity at Top of Dam:	260 cfs	
Elevation:	536.0	
4. Ungated Spillway Capacity at Test Flood Elevation:	255 cfs	
Elevation:	535.9	
5. Gated Spillway Capacity at Normal Pool Elevation:	N/A	
Elevation:	N/A	
6. Gated Spillway Capacity at Test Flood Elevation:	N/A	
Elevation:	N/A	
7. Total Spillway Capacity at Test Flood Elevation:	255 cfs	
Elevation:	535.9	
8. Total Project Discharge at Top of Dam	260 cfs	
Elevation:	536	
9. Total Project Discharge at Test Flood Elevation:	255 cfs	
Elevation:	535.9	

*at Outlet

c. Elevation - Feet Above NGVD (formerly MSL datum of 1929)

1. Streambed at Toe of Dam:	508
2. Bottom of Cutoff:	N/A
3. Maximum Tailwater:	N/A
4. Recreation Pool:	N/A
5. Full Flood Control Pool:	N/A
6. Spillway Crest: 18-inch RCP	532
7. Design Surcharge - Original Design:	Unknown
8. Top of Dam:	536
9. Test Flood Surcharge:	535.9

d. Reservoir - Length in Feet

1. Normal Pool:	2,750 ft
2. Flood Control Pool:	N/A
3. Spillway Crest Pool:	2,750 ft
4. Top of Dam:	2,750 ft
5. Test Flood Pool:	2,750 ft

e. Storage - Acre-feet

1. Normal Pool:	558 Ac.-Ft.
2. Flood Control Pool:	N/A
3. Spillway Crest Pool:	558 Ac.-Ft.
4. Top of Dam:	725 Ac.-Ft.
5. Test Flood Pool:	725 Ac.-Ft.

f. Reservoir Surface - Acres

1. Normal Pool:	40 Acres
2. Flood-Control Pool:	N/A
3. Spillway Crest:	40 Acres
4. Test Flood Pool:	43 Acres
5. Top of Dam:	43 Acres

g. Dam

1.	Type:	Earth Embankment
2.	Length:	425 ft (Main Dam); 400 ft (Rt. Dike); 160 ft (Lt. Dike)
3.	Height:	28 ft (Main Dam); 22 ft (Rt. Dike); 12 ft (Lt. Dike)
4.	Top Width:	20 ft (Main Dam); 15 ft (Rt. & Lt. Dikes)
5.	Side Slopes:	U.S. - 2 Hor. to 1 Ver. (Main Dam, Rt. and Lt. Dikes) D.S. - Varies (Main Dam) D.S. - 2.5 Hor. to 1 Ver. (Rt. Dike) D.S. - 3 Hor. to 1 Ver. (Lt. Dike)
6.	Zoning:	Unknown
7.	Impervious Core:	Unknown
8.	Cutoff:	Unknown
9.	Grout Curtain:	N/A
10.	Other:	

h. Diversion and Regulating Tunnel

1.	Type:	N/A
2.	Length:	N/A
3.	Closure:	N/A
4.	Access:	N/A
5.	Regulating Facilities:	N/A

i. Spillway

1.	Type:	Two 24-inch overflow pipes, one 18-inch overflow pipe, and auxiliary earth spillway
2.	Length of Weir:	8 ft (auxiliary spillway)
3.	Crest Elevation with Flashboards: without Flashboards:	 N/A 532.2 (24" RCP's) 532.0 (18" RCP) 533.2 (auxiliary spillway)
4.	Gates:	N/A
5.	Upstream Channel:	N/A
6.	Downstream Channel:	Natural stream at 24" RCP's Not defined at 18" RCP and auxiliary spillway
7.	General:	Capacity 2-24" RCP - 56 cfs Capacity 18" RCP - 18 cfs Capacity Auxil. Spillway - 190 cfs

j. Regulating Outlets

1.	Invert:	508.0 @ outlets
2.	Size:	8-inch; 10-inch
3.	Description:	Cast iron pipes through embankment controlled by downstream valves
4.	Control Mechanism:	Manually operated gate valves
5.	Other:	Capacity 5 cfs (8-inch) Capacity 8 cfs (10-inch)

ENGINEERING DATA
SECTION 2

2.1 Design Data

There was no design data available for review. A drawing showing a plan of the dam and cross sections dated August 1951, and a topographic map of the reservoir below spillway level dated August 1963, are the only information available on the dam.

2.2 Construction Data

It is reported that the dam was constructed by C.W. Blakeslee and Sons in 1951. The reservoir was created by excavating an existing swamp and constructing the earth embankments. With the exception of the above noted drawing, no records or information concerning the construction of the dam were available.

2.3 Operation Data

The reservoir level is recorded daily. The reservoir is normally below spillway level between late summer and early spring.

2.4 Evaluation of Data

a. Availability

Existing data was provided by the Bridgeport Hydraulic Company. A list of available reference material is given in Appendix B.

b. Adequacy

The information that was available along with the visual inspection, past performance history, and hydraulic and hydrologic calculations were adequate to assess the condition of the facility.

c. Validity

The visual inspection and field surveys indicated that the dam was constructed substantially as shown on the plans.

VISUAL INSPECTION
SECTION 3

3.1 Findings

a. General

The visual inspection of the dam was conducted on November 28 and 29, 1979. At the time of the inspection the water level was approximately 8 feet below spillway elevation.

Seymour Reservoir No. 4 Dam is impounded by a main embankment and two dikes. The right dike is located approximately 100 feet to the right of the right abutment of the main dam embankment. The left dike is a saddle dike located approximately 1,000 feet upstream from the main embankment on the left bank of the reservoir.

b. Dam

Main Embankment

The main embankment at Seymour Reservoir No. 4 is an earth embankment with a riprap covered upstream slope. Two cast iron low level or blowoff pipes and two concrete overflow pipes pass through the embankment and are described in Section 3.1.c.

The riprap on the upstream slope is up to 3 feet to 4 feet in size as shown in Photo 1. No filter layer was observed between the riprap and the earth embankment.

Seepage with a total flow of 25 to 50 gpm was observed exiting from the toe of the downstream slope in the vicinity of the blowoff pipe outlets, as shown in Photo 2. This seepage was exiting around one of the blowoff pipes, and from the base of the stone masonry wall. The seeping water contained rust-colored floccules, but was not observed to be transporting soil particles.

The downstream slope is grass covered, Photo 3. Some irregularities were observed on the downstream slope of the dam. A large area of apparent depression was observed on the downstream slope, upstream of the blowoff pipe outlets.

Some newly planted evergreen trees were observed on the crest of the main embankment, Photo 1.

Right Dike

The right dike is an earth embankment with a riprap covered upstream slope. A single concrete, high level overflow pipe passes through the dike, as described in Section 3.1.c.

A moderate brush growth was observed on the downstream slope, as shown in Photo 5, and one animal hole was observed on the downstream slope.

The area at the downstream toe of the right dike was wet, however, this water appeared to be surface runoff from the right abutment of the dike rather than seepage through the dike.

The riprap on the upstream slope is up to 3 feet to 4 feet in size, Photo 6, and no filter layer was observed between the riprap and the earth embankment.

Many newly planted evergreen trees were observed on the crest of the dike, Photo 6.

Left Dike

The left dike is an earth embankment with a riprap covered upstream slope. An earthen auxiliary spillway is located at the left abutment of the left dike, as described in Section 3.1.c.

The riprap on the upstream slope varies in size up to 3 feet to 4 feet, Photo 9, and no filter layer was observed between the riprap and the earth embankment.

No seepage was observed downstream of the left dike, however, at the time of inspection, the water level in the reservoir was below the toe of the upstream slope.

Relatively heavy tree growth was observed on the top of the upstream slope and on the entire downstream slope. Heavy brush growth was also observed on the downstream slope.

c. Appurtenant Structures

Main Embankment

Two 24-inch diameter concrete overflow pipes pass through the main embankment. Some mortar was placed under the upstream ends of the overflow pipes, as shown in Photo 7.

One of the pipes appeared to bend down and toward the right as it passed through the embankment.

The downstream end of the left pipe was repaired by placing a larger diameter pipe outside of it and grouting between the two pipes. Upstream of the outlets for the overflow pipes, an area of depression and a hole were observed, Photo 4.

Two cast iron low level or blowoff pipes pass through the embankment and are controlled by downstream gates located near the toe of the embankment. The pipes exit the dam through a stone masonry wall at the toe of the downstream slope, Photo 2.

Right Dike

An 18-inch diameter concrete overflow pipe passed through the right dike, Photo 8.

Left Dike

An earthen auxiliary spillway is located at the left abutment of the left dike. Some riprap protection was observed on the right side of the spillway. The left side is a ledge outcrop. The earthen spillway floor had a relatively heavy growth of small trees, as shown in Photo 10.

d. Reservoir Area

There were no indications of instability along the edges of the reservoir in the vicinities of the main dam and the two dikes.

e. Downstream Channel

The two overflow pipes and the two low level or blowoff pipes discharge into the channel of a stream that flows to Seymour Reservoir No. 3. There were some overhanging trees and bushes along the stream channel.

Right Dike

The 18-inch overflow pipe discharges into a wooded area downstream of the right dike.

Left Dike

The auxiliary spillway discharges onto an access road and a wooded area downstream of the left dike and farther downstream into an intermittent stream that flows into Seymour Reservoir No. 2.

3.2 Evaluation

Main Embankment

On the basis of the visual inspection, the main embankment is judged to be in poor condition.

The amount of seepage exiting from the vicinity of the

Left Dike

An earthen auxiliary spillway is located at the left abutment of the left dike. Some riprap protection was observed on the right side of the spillway. The left side is a ledge outcrop. The earthen spillway floor had a relatively heavy growth of small trees, as shown in Photo 10.

d. Reservoir Area

There were no indications of instability along the edges of the reservoir in the vicinities of the main dam and the two dikes.

e. Downstream Channel

The two overflow pipes and the two low level or blowoff pipes discharge into the channel of a stream that flows to Seymour Reservoir No. 3. There were some overhanging trees and bushes along the stream channel.

Right Dike

The 18-inch overflow pipe discharges into a wooded area downstream of the right dike.

Left Dike

The auxiliary spillway discharges onto an access road and a wooded area downstream of the left dike and farther downstream into an intermittent stream that flows into Seymour Reservoir No. 2.

3.2 Evaluation

Main Embankment

On the basis of the visual inspection, the main embankment is judged to be in poor condition.

The amount of seepage exiting from the vicinity of the

discharge ends of the blowoff pipes, the rust-colored flocculants in the seepage water, and the irregularities in the downstream slope suggest that some internal erosion may have occurred in this location. The fact that the blowoff pipes are valved in the downstream end means that water pressures exist on these pipes where they pass through the dam. Any leaks in these pipes could produce additional internal erosion problems.

The depression above the discharge ends of the 24-inch overflow pipes may be the result of internal erosion due to leaks in the pipes.

The root systems of the newly planted trees on the crest of the embankment could in the future provide channels for the development of internal erosion during high groundwater conditions. More importantly when the trees mature, uprooting during a wind storm would take out a portion of the top of the embankment.

The lack of a filter layer between the riprap and the embankment on the upstream slope could lead to wave erosion of the upstream face.

Right Dike

On the basis of the visual inspection, the right dike is judged to be in good condition.

The root systems of the newly planted trees on the crest of the dike could in the future provide channels for the development of internal erosion during high water conditions. Toppling of large trees during a wind storm would cause damage to the crest of the dam.

The lack of a filter layer between the riprap and the embankment on the upstream slope could lead to wave erosion of the

upstream slope.

Left Dike

On the basis of the visual inspection, the left dike is judged to be in fair condition.

The presence of trees in the spillway floor constitutes obstructions to the flow through the spillway, which coupled with the lack of complete riprap protection, could produce erosion of the left dike during overflow conditions.

The root systems of the tree and brush growth on the left dike could in the future provide channels for the development of internal erosion during high water conditions. Toppling of large trees during a wind storm would cause damage to the crest of the dam.

The lack of a filter layer between the riprap and the embankment on the upstream slope could lead to wave erosion during high water conditions.

The lack of proper access to the left dike makes maintenance, inspection and monitoring of the dike very difficult.

OPERATIONAL AND MAINTENANCE PROCEDURES

SECTION 4

4.1 Operational Procedures

a. General

The low level outlet or blowoff is normally opened during the summer months to supplement flow to three downstream reservoirs (Seymour Reservoir Nos. 1, 2, and 3).

An inspection of the dam was made by Philip W. Genovese and Associates, Inc. in January 1979. A copy of the inspection report is included in Appendix B.

b. Description of Any Warning System in Effect

The dam is monitored during periods of heavy rainfall and if an emergency arose steps would be taken to notify the downstream residents.

4.2 Maintenance Procedures

a. General

Normal maintenance procedures consist of mowing the grass on the downstream slopes of the main dam and regrading the roadway across the top of the dam as required.

b. Operating Facilities

No formal maintenance procedures exist for the operating facilities.

4.3 Evaluation

Present operations and maintenance procedures are inadequate, as is evident by the tree and brush growth on the left and right dikes, in particular in the area of the auxiliary spillway, and the depressions present on the downstream slope of the main embankment. The current practice of having the dam inspected by a qual-

ified, registered engineer should continue, with the inspections being made every year. A maintenance and operations manual should be prepared for the dam and operating facilities.

The warning system which is currently in effect should be formalized and should include monitoring of the dam during extremely heavy rains and procedures for notifying downstream authorities in the event of an emergency.

Access to the left dike should be improved so that the auxiliary spillway can be properly maintained, inspected and monitored.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES
SECTION 5

5.1 General

Seymour Reservoir No. 4 Dam is the uppermost in a series of four reservoirs (See Figure 1, page xii). The dam has a tributary watershed of 0.54 square miles of wooded, "rolling" terrain. The watershed is essentially undeveloped, with most of it owned by the Bridgeport Hydraulic Company or designated as State Forest.

The spillways consist of an 18-inch reinforced concrete pipe (RCP) through the right dike at Elevation 532.0, two 24-inch RCP's through the main dam at Elevation 532.2, and an auxiliary spillway located at the left dike at Elevation 533.2. The spillway pipes do not have bar screens or any other protection against obstruction by debris. The auxiliary spillway is a trapezoidal section 8 feet wide on the bottom, with side slopes of approximately 3.5 horizontal to 1 vertical. The spillway is located at the left abutment of the left dike and is partially riprap lined. At the time of inspection, it was heavily overgrown with brush.

The crest of the dam is at approximate Elevation 536.0 with four feet of freeboard over the invert of the lowest spillway pipe and three feet over the auxiliary spillway. The combined spillways have a capacity of 260 cfs before overtopping of the dam occurs.

5.2 Design Data

No computations were found for the design of the spillways or the dam. An engineering report dated January 2, 1979 (See Appendix B) gives a spillway capacity of 216 cfs.

5.3 Experience Data

There is no known record of the dam ever overtopping.

5.4 Test Flood Analysis

Based on the dam failure analysis, the dam is classified as "Significant" hazard potential. The dam is "Small" in size.

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the Test Flood should be in the range of the 100-Year Flood to 1/2 the Probable Maximum Flood (1/2 PMF), depending on the involved risk.

A Test Flood equal to 1/2 PMF was selected as most closely relating to the involved risk.

An inflow flood peak was calculated for the 0.54 square mile watershed using the guide curves for "rolling" terrain supplied by the Corps of Engineers. The peak flow of 1060 cubic feet per second per square mile (csm) was derived from the curve using the minimum watershed given, 2.0 square miles. The peak inflow was then calculated as 570 cfs.

A triangular hydrograph was calculated using the methodology given in Design of Small Dams by the Bureau of Reclamation. The peak inflow rate of 570 cfs and a total runoff of 9.5 inches for the 1/2 PMF were used to calculate the inflow hydrograph.

The flood was routed through the reservoir. The arithmetical trial-and-error tabular method was used for the routing. The initial water level was assumed at the invert of the 18-inch pipe, Elevation 532.0

The Test Flood produced a maximum discharge of 255 cfs which is essentially equal to the spillway capacity of 260 cfs.

The spillway capacity of this dam is judged to be adequate. However, the nature of the pipe spillways makes them subject to obstruction by debris which could reduce spillway capacity during a flood.

5.5 Dam Failure Analysis

A dam failure analysis was made using the "Rule of Thumb" guidance provided by the Corps of Engineers. Failure was assumed with the water level at the top of the dam. Dam breach calculations for the main dam show a peak release of 18,000 cfs into the valley below the dam. The flood wave was routed through the three reservoirs and the downstream channel. The flood wave could overtop Seymour Reservoir No. 3 Dam by 3.6 feet, Seymour Reservoir No. 2 Dam by 1.9 feet, and Seymour Reservoir No. 1 Dam by 5 feet. For computation purposes the Seymour Reservoir No. 1, 2 and 3 Dams were assumed not to fail.

The depth of flow in the stream in the area of four downstream houses prior to dam breach is 2 feet, based on the maximum spillway capacity of 260 cfs. The peak flow in this area due to the dam breach is 9,300 cfs, which is equivalent to a depth of flow of 9 feet, or approximately 1.6 feet above the sill elevation of the four houses.

The dam is classified as "Significant" hazard potential. A dam failure could result in the loss of a few lives and an economic loss associated with the failure of the downstream dams.

The dam breach calculations and the flood areas are shown in Appendix D.

EVALUATION OF STRUCTURAL STABILITY
SECTION 6

6.1 Visual Observations

The visual inspection did not disclose any evidences of present structural instability, with the exception of possible internal erosion in the area of the blowoff and spillway pipes.

6.2 Design and Construction Data

Design and construction data consist of a drawing dated 1951 which shows a plan and sections of the dam. It is reported that the reservoir was constructed by excavating a swamp and constructing the embankments.

6.3 Post-Construction Changes

No known changes have been made since the construction of the main embankment and dikes.

6.4 Seismic Stability

The dam and dikes are located in Seismic Zone 1 and in accordance with the recommended Phase I Inspection 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, the main embankment is judged to be in poor condition. The left dike is judged to be in fair condition and the right dike is judged to be in good condition. The future integrity of the main embankment and of the dikes could be affected by the following conditions:

1. The seepage and possible internal erosion at the toe of the main embankment in the vicinity of the discharge ends of the blowoff pipes.
2. Possible leakage from the blowoff pipes in the main embankment which are constantly pressurized because of the locations of the control valves at the downstream ends.
3. Possible internal erosion above the discharge ends of the 24-inch overflow pipes.
4. The possible future development of internal erosion along the root systems of the newly planted trees on the crests of the main embankment and the right dike and of the tree and brush growth on the left dike, or damage to the embankment from uprooting of large trees.
5. Possible wave erosion of the upstream slopes of the main embankment and both dikes because of the lack of filter layers between the riprap and the embankments.
6. Possible erosion of the left dike during overflow because of (1) tree growth in the spillway and (2)

the lack of complete riprap protection in the spillway.

7. The absence of bar screens or other devices on the overflow pipes to prevent clogging during overflow conditions.

b. Adequacy of Information

The information available was adequate for performing a Phase I Inspection.

c. Urgency

The recommendations presented in Section 7.2 and 7.3 should be carried out by the owner within one year of receipt of this report, except the monitoring of the seepage, which should be started upon receipt of this report.

7.2 Recommendations

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

1. The seepage and possible internal erosion at the toe of the main embankment should be investigated and corrective measures should be designed and constructed. A program for monitoring the volume of seepage at the toe of the main dam should be established. A substantial increase or decrease of flow in a short period of time, unrelated to reservoir level, could indicate a potential problem. Monitoring should be done at least monthly for a period of two years and then the monitoring program should be adjusted based on the results of the observations made.

2. The safety of the existing blowoff pipes with downstream valves in the main embankment should be evaluated and corrective measures should be designed and constructed.

3. The depression above the outlets for the 24-inch overflow pipes should be investigated and corrective measures designed and constructed.

4. The new tree plantings on the main embankment and on the right dike and the tree and brush growth on the left and right dikes should be removed.

5. The need for filter layers between the riprap and the embankment material on the main embankment and on the dikes should be evaluated and filter layers designed and constructed, if necessary.

6. The tree growth in the spillway on the left dike should be removed by uprooting and the root zones should be carefully backfilled with selected soils. The need for additional riprap protection on the spillway should be evaluated and new protection designed and installed, if necessary.

7. Provisions for preventing debris from entering and obstructing the overflow pipes should be designed and installed.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

1. The present program of technical inspections by qual-

ified, registered engineers should continue with inspections being made annually.

2. Monitor periodically the reservoir level and the volume of seepage at the toe of the main embankment in accordance with Section 7.2.1.
3. An operations and maintenance manual should be prepared for the dam and operating facilities.
4. A formal warning system should be put into effect and include monitoring of the dam during extremely heavy rains (presently in effect) and procedures for notifying downstream authorities in the event of an emergency.
5. Access to the left dike should be improved so that the dike can be properly monitored during heavy rains.
6. Gates should be provided in the chain link fence for access to the 24-inch overflow pipes and the 18-inch overflow pipe.

7.4 Alternatives

There are no practical alternatives to the above recommendations.

APPENDIX A

VISUAL CHECK LIST WITH COMMENTS

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT: Seymour Reservoir No. 4 Dam

DATE: 11/28/79 and 11/29/79 TIME: 3:30 11:30 WEATHER: Cloudy - 50's Sunny - 40's

W.S. ELEVATION: 524 ± U.S. N/A DN.S

	PARTY	DISCIPLINE
1.	Donald L. Smith, P.E. - Roald Haestad, Inc.	Civil/Hydrologist
2.	Ronald G. Litke, P.E. - Roald Haestad, Inc.	Civil Engineer
3.	Gonzalo Castro, Ph.D., P.E. - Geotechnical Engineers, Inc.	Geotechnical Engineer
4.	John W. France, P.E. - Geotechnical Engineers, Inc.	Geotechnical Engineer
5.		
6.		

PROJECT FEATURE		INSPECTED BY	REMARKS
MAIN DAM			
Main Embankment		GC,JWF	Fair - seepage at toe
Outlet Works -	Intake Channel and Structure	GC,JWF, DLS,RGL	Concrete pad for overflow pipes cracked.
Outlet Works -	Transition and Conduit	DLS,RGL	24-inch overflow pipe joints displaced.
Outlet Works -	Outlet Structure and Channel	GC,JWF, DLS,RGL	Seepage at base of stone wall channel - Natural streambed
RIGHT DIKE			
Embankment		GC,JWF	Good
Outlet Works -	Intake Channel and Structure	GC,JWF, DLS,RGL	Good
Outlet Works -	Outlet Structure and Channel	GC,JWF, DLS,RGL	Outlets to wooded area
LEFT DIKE			
Embankment		GC,JWF	Heavy tree and brush growth
Outlet Works -	Spillway Weir, Appr. & Disch.	GC,JWF, DLS,RGL	Obstructed with trees and brush growth

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 4 Dam DATE: 11/28 & 29/79

PROJECT FEATURE: Main Dam Embankment NAME: GC

DISCIPLINE: Geotechnical Engineers NAME: JWF

AREA ELEVATION	CONDITIONS
DAM EMBANKMENT	
CREST ELEVATION	536
CURRENT POOL ELEVATION	524
MAXIMUM IMPOUNDMENT TO DATE	Unknown
SURFACE CRACKS	None observed
PAVEMENT CONDITION	N/A
MOVEMENT OR SETTLEMENT OF CREST	None observed
LATERAL MOVEMENT	None observed
VERTICAL ALIGNMENT	Good
HORIZONTAL ALIGNMENT	Too irregular to observe
CONDITION AT ABUTMENT AND AT CONCRETE STRUCTURES	Good
INDICATIONS OF MOVEMENT OF STRUCTURAL ITEMS ON SLOPES	None observed
TRESPASSING ON SLOPES	None observed
VEGETATION ON SLOPES	A few newly planted evergreen trees on the crest
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	One hole observed on downstream slope. Large area of apparent depression on downstream slope above overflow pipe outlets.
ROCK SLOPE PROTECTION - RIPRAP FAILURES	Large size riprap in good condition on upstream slope. No filter layer under riprap.
MOVEMENT OR CRACKING AT OR NEAR TOES	None observed
UNUSUAL EMBANKMENT OR DOWNSTREAM SEEPAGE	Rust colored seepage exiting from downstream toe in vicinity of blowoff pipe outlets. Total Flow: 25-50 gpm.
PIPING OR BOILS	None observed
FOUNDATION DRAINAGE FEATURES	None known or observed
TOE DRAINS	None known or observed
INSTRUMENTATION SYSTEM	None known

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 4 Dam DATE: 11/28 & 29/79

PROJECT FEATURE: Main Dam Intake Channel Outlet Works - and Structure NAME: GC,JWF

DISCIPLINE: Civil, Geotechnical NAME: DLS,RGL

AREA EVALUATED	CONDITIONS	
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	Overflow Pipes	Blowoff
A. APPROACH CHANNEL:	Approach channel is upstream slope of dam	Underwater and not observable
SLOPE CONDITIONS	N/A	
BOTTOM CONDITIONS	Covered with large riprap-no filter	
ROCK SLIDES OR FALLS	N/A	
LOG BOOM	N/A	
DEBRIS	N/A	
CONDITION OF CONCRETE LINING	N/A	
DRAINS OR WEEP HOLES	N/A	
B. INTAKE STRUCTURE:		None observed
CONDITION OF CONCRETE	Concrete pad cracked	
STOP LOGS AND SLOTS	N/A	

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 4 Dam DATE: 11/28 & 29/79

PROJECT FEATURE: Main Dam Outlet Works - Transition and Conduit NAME: RGL

DISCIPLINE: Civil Engineer NAME: DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - TRANSITION AND CONDUIT	
GENERAL CONDITION OF CONCRETE	Good
RUST OR STAINING ON CONCRETE	N/A
SPALLING	N/A
EROSION OR CAVITATION	N/A
CRACKING	N/A
ALIGNMENT OF MONOLITHS	N/A
ALIGNMENT OF JOINTS	Joints of 24-inch pipe appeared displaced or out of alignment
NUMBERING OF MONOLITHS	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 4 Dam DATE: 11/28 & 29/79

PROJECT FEATURE: Main Dam Outlet Works - Outlet Structure and Channel NAME: GC,JWF

DISCIPLINE: Civil, Geotechnical NAME: DLS,RGL

AREA EVALUATED	CONDITIONS	
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Overflow Pipes	Blowoff
GENERAL CONDITION OF CONCRETE	No outlet structure	Outlet structure consists of stone wall
RUST OR STAINING	N/A	Staining on channel due to seepage
SPALLING	N/A	N/A
EROSION OR CAVITATION	N/A	
VISIBLE REINFORCING	N/A	
ANY SEEPAGE OR EFFLORESCENCE	N/A	Seepage from base of wall & around pipes
CONDITION AT JOINTS	N/A	
DRAIN HOLES	N/A	
CHANNEL	Natural Streambed	Natural Streambed
LOOSE ROCK OR TREES OVERHANGING CHANNEL	Some overhanging trees	Some overhanging trees
CONDITION OF DISCHARGE CHANNEL	Good	Good

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 4 Dam DATE: 11/28 & 29/79

PROJECT FEATURE: Right Dike Embankment NAME: GC

DISCIPLINE: Geotechnical Engineer NAME: JWF

AREA EVALUATED	CONDITIONS
DIKE EMBANKMENT	
CREST ELEVATION	536
CURRENT POOL ELEVATION	524
MAXIMUM IMPOUNDMENT TO DATE	Unknown
SURFACE CRACKS	None observed
PAVEMENT CONDITION	N/A
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	No structural items on slope
TRESPASSING ON SLOPES	One animal hole observed on downstream slope
VEGETATION ON SLOPES	Many newly planted evergreens on crest. Moderate brush growth on downstream slope.
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	None observed
ROCK SLOPE PROTECTION - RIPRAP FAILURE	Large size riprap in good condition on upstream slope. No filter layer under riprap.
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	None known or observed
TOE DRAINS	None known or observed
INSTRUMENTATION SYSTEM	None known

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 4 Dam DATE: 11/28 & 29/79

PROJECT FEATURE: Right Dike Intake Channel Outlet Works - and Structure NAME: GC,JWF

DISCIPLINE: Civil, Geotechnical NAME: DLS,RGL

AREA EVALUATED		CONDITIONS
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE		Overflow Pipe
A.	APPROACH CHANNEL:	Approach channel is upstream slope of dike
	SLOPE CONDITIONS	N/A
	BOTTOM CONDITIONS	Covered with large riprap. No filter under riprap
c	ROCK SLIDES OR FALLS	N/A
	LOG BOOM	N/A
	DEBRIS	N/A
	CONDITION OF CONCRETE LINING	N/A
	DRAINS OR WEEP HOLES	N/A
B.	INTAKE STRUCTURE:	Concrete placed around overflow pipe
	CONDITION OF CONCRETE	Good
	STOP LOGS AND SLOTS	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 4 Dam DATE: November 28/29, 1979

PROJECT FEATURE: Right Dike - Outlet Structure Outlet Works - and Channel NAME: GC, JWF

DISCIPLINE: Geotechnical, Civil NAME: *RGL,DLS*

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Overflow Pipe
GENERAL CONDITION OF CONCRETE	Discharges into a wooded area downstream of right dike
RUST OR STAINING	N/A
SPALLING	N/A
EROSION OR CAVITATION	N/A
VISIBLE REINFORCING	N/A
ANY SEEPAGE OR EFFLORESCENCE	N/A
CONDITION AT JOINTS	N/A
DRAIN HOLES	N/A
CHANNEL	N/A
LOOSE ROCK OR TREES OVERHANGING CHANNEL	N/A
CONDITION OF DISCHARGE CHANNEL	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 4 Dam DATE: 11/28 & 29/79

PROJECT FEATURE: Left Dike Embankment NAME: GC

DISCIPLINE: Geotechnical Engineer NAME: JWF

AREA EVALUATED	CONDITIONS
DIKE EMBANKMENT	
CREST ELEVATION	536
CURRENT POOL ELEVATION	524
MAXIMUM IMPOUNDMENT TO DATE	Unknown
SURFACE CRACKS	None observed
PAVEMENT CONDITION	N/A
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	No structural items on slopes
TRESPASSING ON SLOPES	None observed
VEGETATION ON SLOPES	Heavy tree and brush growth on top of upstream slope, on crest & downstream slope
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	None observed
ROCK SLOPE PROTECTION - RIPRAP FAILURE	Large size riprap in good condition on upstream slope. No filter layer under riprap.
UNUSUAL MOVEMENT OR CRACKING AT OR NEAR TOES	None observed
UNUSUAL EMBANKMENT OR DOWNSTREAM SEEPAGE	None observed, but reservoir level was below toe of upstream slope
PIPING OR BOILS	None observed
FOUNDATION DRAINAGE FEATURES	None known or observed
TOE DRAINS	None known or observed
INSTRUMENTATION SYSTEM	None known

PERIODIC INSPECTION CHECK LIST

PROJECT: Seymour Reservoir No. 4 Dam — DATE: 11/28 & 29/79

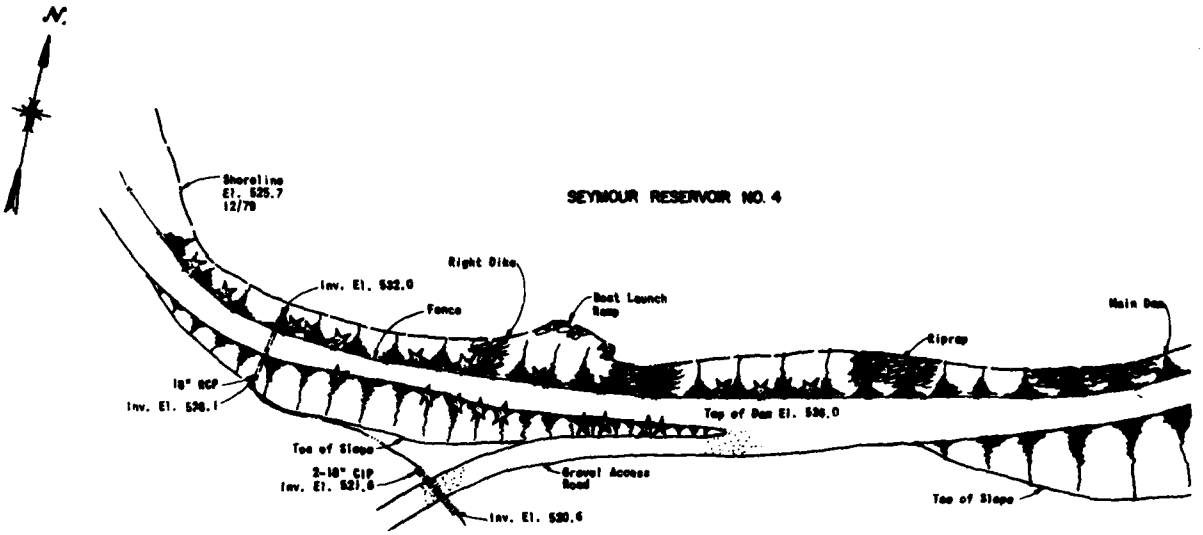
PROJECT FEATURE: Auxiliary Spillway - Left Dike - Outlet Works - Spillway Weir App. & Dis.Channel — NAME: GC,JWF

DISCIPLINE: Geotechnical, Civil Engineers — NAME: DLS,RGL

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
A. APPROACH CHANNEL:	
GENERAL CONDITION	Fair
LOOSE ROCK OVERHANGING CHANNEL	None observed
TREES OVERHANGING CHANNEL	Trees in spillway channel
FLOOR OF APPROACH CHANNEL	Section of reservoir bottom
B. WEIR AND TRAINING WALLS:	
GENERAL CONDITION OF CONCRETE	Right side of spillway appears to be protected with riprap, left side ledge
RUST OR STAINING	N/A
SPALLING	N/A
ANY VISIBLE REINFORCING	N/A
ANY SEEPAGE OR EFFLORESCENCE	N/A
DRAIN HOLES	N/A
C. DISCHARGE CHANNEL:	Discharges into wooded area downstream of left dike
GENERAL CONDITION	Fair
LOOSE ROCK OVERHANGING CHANNEL	N/A
TREES OVERHANGING CHANNEL	N/A
FLOOR OF CHANNEL	Floor of spillway partly covered with riprap
OTHER OBSTRUCTIONS	N/A

APPENDIX B

ENGINEERING DATA



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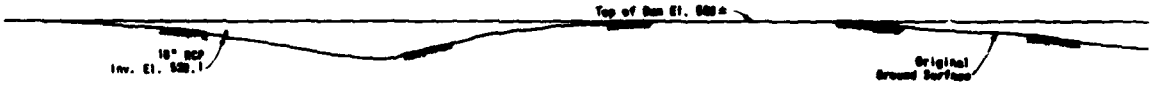

PROFILE
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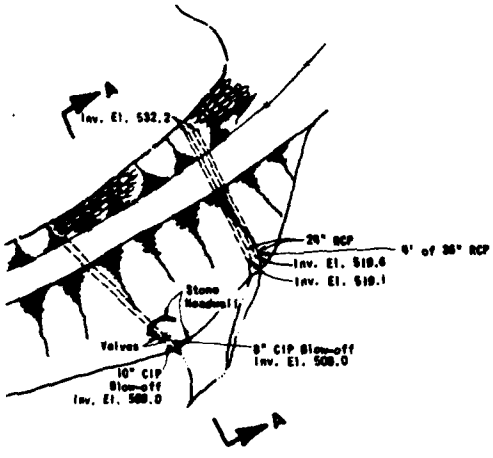
SECTION A-A
Scale 1"=10'

MAIN DAM AND RIGHT DIKE

FIGURE 2



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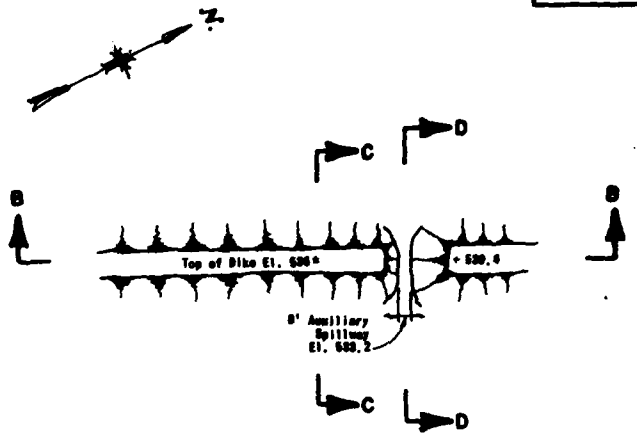

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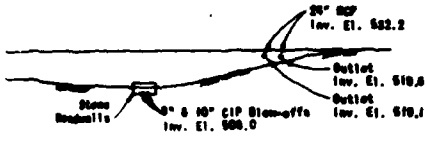


SECTIONS C-C, D-D
Scale 1"=10'

AUXILIARY SPILLWAY
LEFT DIKE

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

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

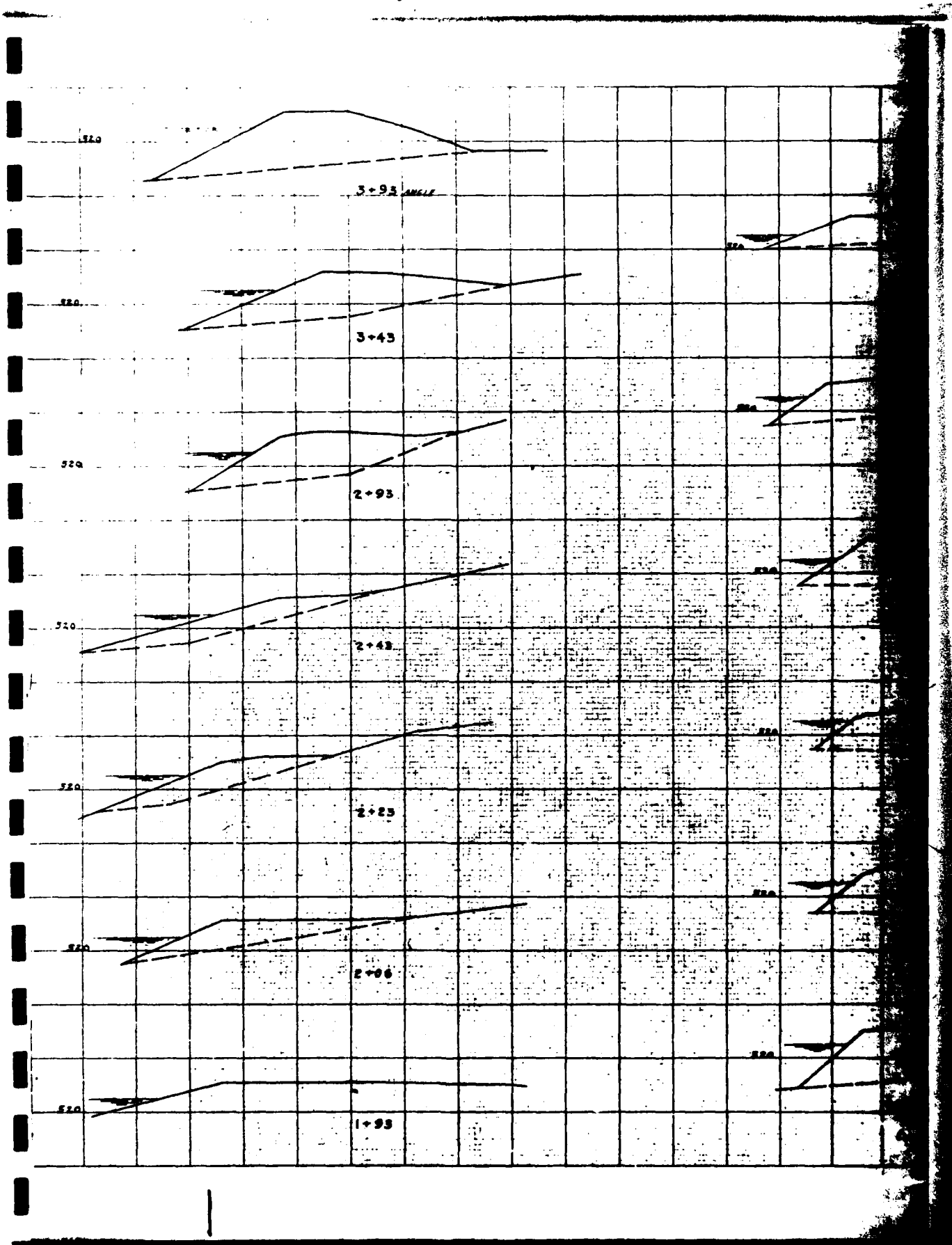
SEYMOUR RESERVOIR NO. 4 DAM

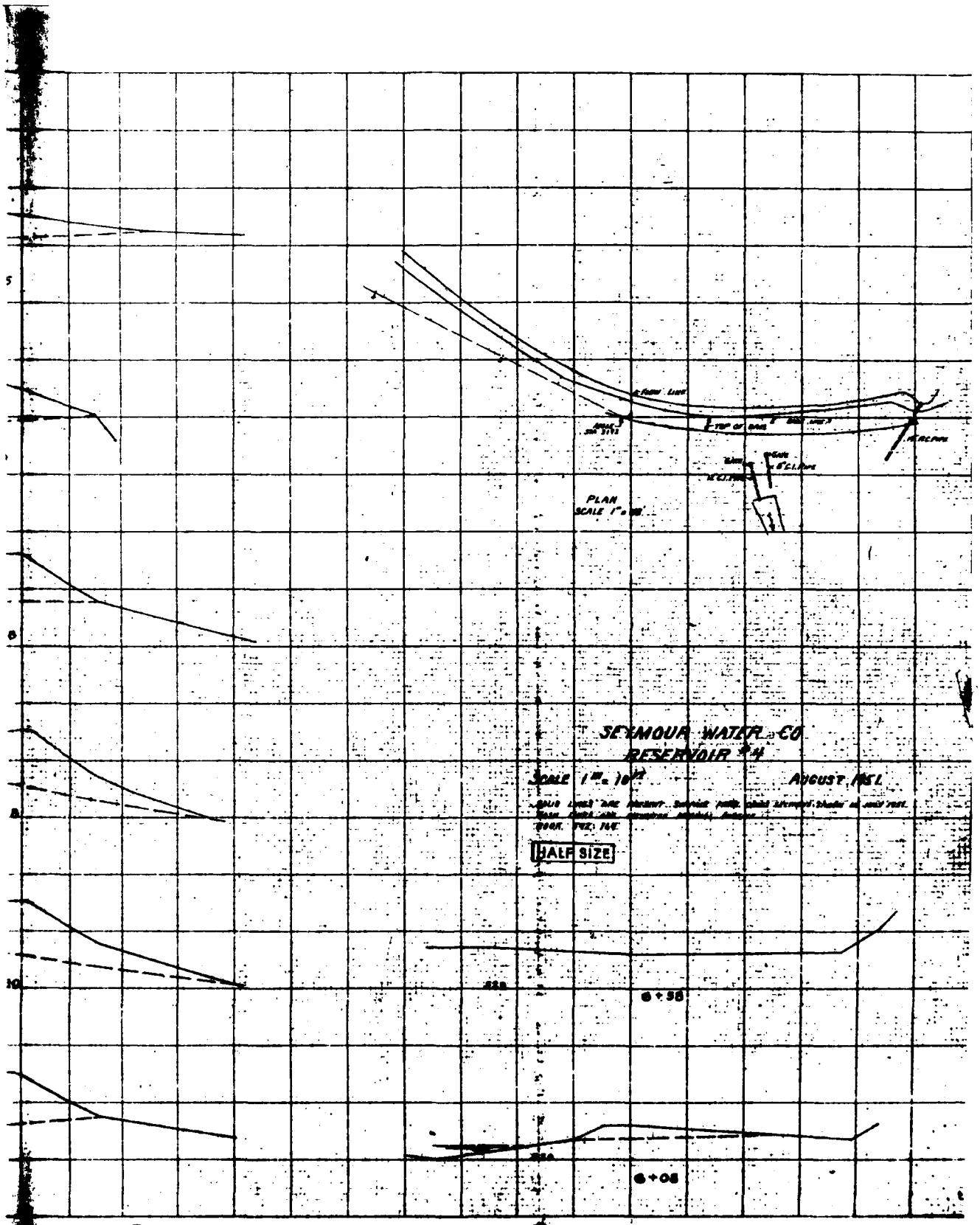
DRAWN	CHECKED	APPROVED	SCALES AS NOTED	
JRS	DLS		DATE FEB. 1980	PAGE B-1

LIST OF REFERENCES

The following references are all located at the Bridgeport Hydraulic Company, 835 Main Street, Bridgeport, Connecticut.

1. Plan and Sections "Seymour Water Company, Reservoir No. 4", August 1951.
2. Contour Map of Reservoir Below Spillway Level, "Seymour Reservoir No. 4, 181,713,368 Gallons", August 1963.
3. Engineering Report, "Seymour No. 4", by Philip W. Genovese and Associates, Inc., January 1979.


520
3+93 ANGLE
520
3+43
520
2+93
520
2+43
520
2+25
520
2+06
520
1+93


PLAN
SCALE 1" = 10'
SEYMOUR WATER CO
RESERVOIR #4
AUGUST 1951
HALF SIZE
6+38
6+08

2

Philip W. Genovese & Associates, Inc.
Consulting & Design Engineers
Hamden, Connecticut

G&A Project No. 786100
Date: January 2, 1979

DAM INSPECTION — Bridgeport Hydraulic Company Dams

Name of Dam: *Seymour Reservoir #4*

I. PROJECT INFORMATION:

A. AUTHORITY:

This inspection was authorized by a letter from Bridgeport Hydraulic Company dated October, 13, 1978 to Philip W. Genovese & Associates, Inc. Said letter was signed by Edward Stangl, whose title is Manager - Project Engineering. The letter was also signed by Robert Reinert, Vice President of Engineering and Planning.

B. PURPOSE:

The purpose of the study is to perform inspection and evaluation of various Bridgeport Hydraulic Dams in terms of their safety.

C. DESCRIPTION:

Seymour Reservoir #4 and the reservoir dam are located in the Town of Oxford, Connecticut. The reservoir impounds an unknown tributary which flows several thousand feet from the dam to its confluence with the Naugatuck River. The Seymour Reservoir Dam #4 is an earthen dam with no structures, and no apparent drainage systems.

Dam: Seymour Reservoir #4

D. PERTINENT DATA:

1.	Drainage Area:	0.54 square miles	346 acres
2.	Discharge at Dam:	Does not apply.	
3.	Elevation:	Drawn down at time of inspection.	
4.	Reservoir:	Length of maximum pool = 2,600 ft ±	
5.	Storage:	Does not apply.	
6.	Reservoir Surface:	Does not apply.	
7.	Dam:		
	Type:	Earthen	
	Length:	400 ft ±	
	Height:	22 ft ±	
	Top Width:	12 ft ±	
	Side Slopes:	Up Stream	Variable
		Down Stream	Variable
8.	Diversion and Regulating Controls:	Does not apply.	
9.	Spillway:	See Attached Sketch	
	Type:	Saddle	
	Length of Weir:	See Attached Sketch	
	Gates:	None	
	Up Stream Channel:	See Attached Sketch	
	Down Stream Channel:	See Attached Sketch	

Dam: Seymour Reservoir #4

II. ENGINEERING DATA (Existing):

Cross sections and Contours (Bridgeport Hydraulics); Cross sections were taken in July, 1951.

III. VISUAL INSPECTION:

A. FINDINGS:

The earth embankment appears to be stable in general with some minor settlement on the down stream side both east and west of service road. There is some seepage at the toe of slope on the west side. No evidence of seepage was observed on the east side. There are no apparent drainage systems. Slope protection of the embankment is in the form of armour stone on the up stream side and grass on the down stream side. There is no spillway structure other than the saddle. Two 24 inch concrete pipes are located 3.5 ft $\pm$ below the top of the dam. There is a cast iron pipe running through the east embankment.

B. EVALUATION:

The dam appears to be in good condition with the exception of the deficiencies noted under "FINDINGS".

Dam: Seymour Reservoir #4

IV. OPERATIONAL PROCEDURES:

Does not apply

V. HYDROLOGY AND HYDRAULIC ANALYSES:

The results of the analysis of the hydrology and hydraulics of the dam indicate that the dam would be overtopped at a flow of 216 cfs, which compares to a frequency of approximately 90 years. The two 24 inch reinforced concrete pipes are the only means of passing flow other than by overtopping the dam at the natural saddle spillway. The hydraulic control for this dam is:

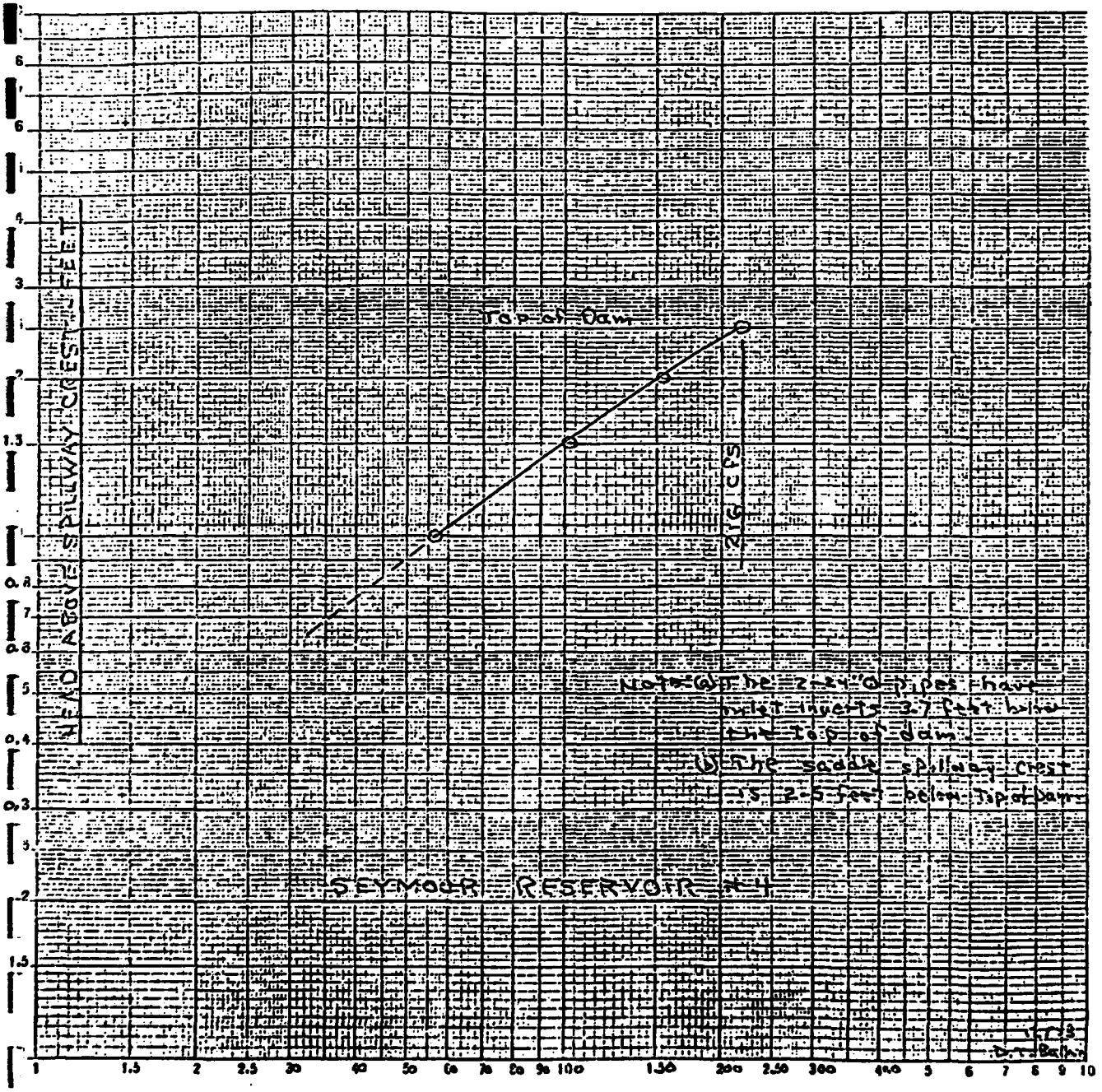
Control	Flow (cfs)	Frequency (years)
Top of Dam	216	90

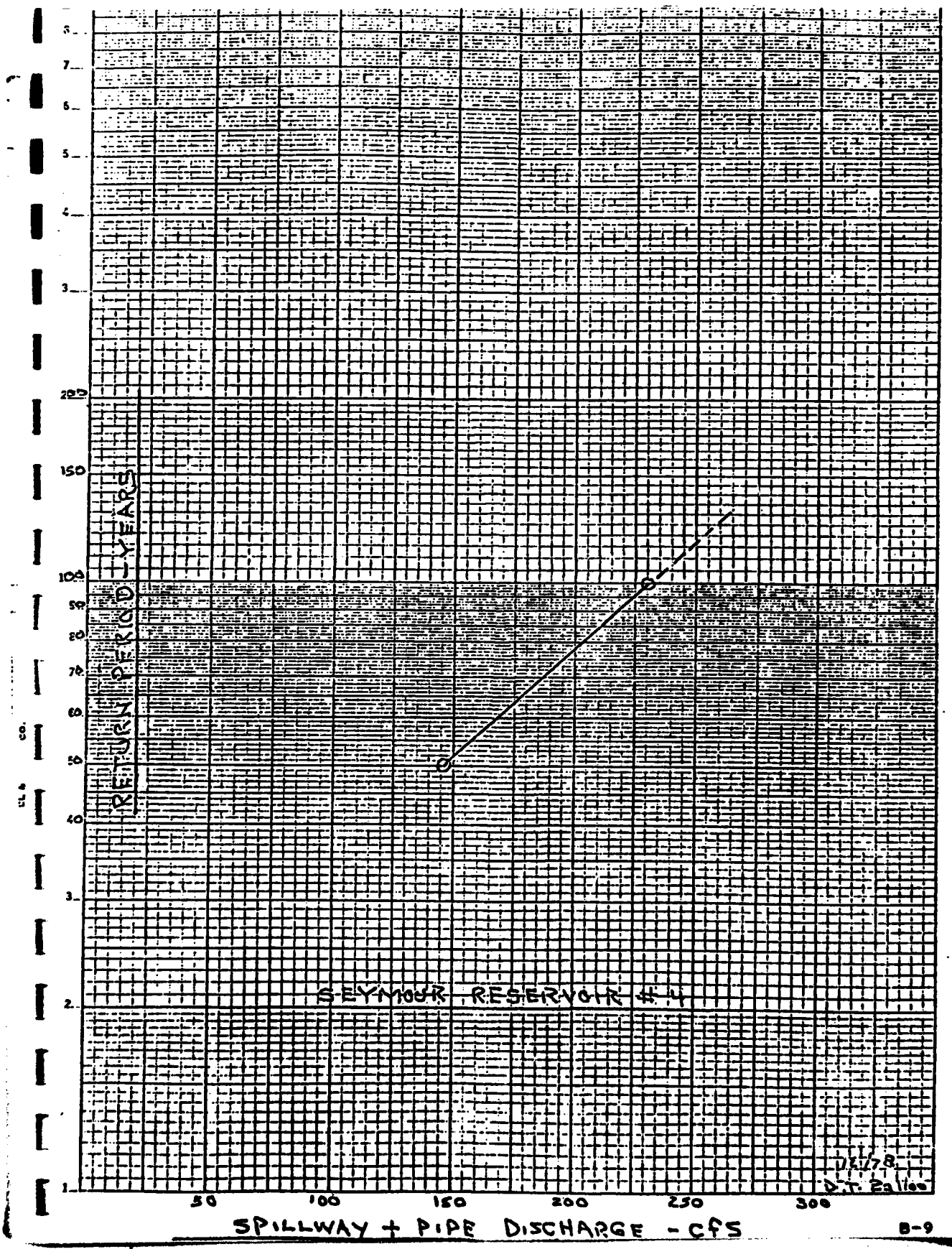
VI. STRUCTURAL STABILITY:

A. VISUAL OBSERVATION:

1. Embankment: Visual examination of the embankment indicates no serious structural problems. Minor seepage and some minimum settlement were observed.

2. Appurtenant Structures: Visual inspection reveals no evidence of instability.


HEAD ABOVE SPILLWAY CREST - FEET
Top of Dam
216 CFS
Note: (a) The 2-24"Ø pipes have inlet inverts 3.7 feet below the top of dam
(b) The saddle spillway crest is 2.5 feet below top of dam
SEYMOUR RESERVOIR #1
SPILLWAY + 2-24"Ø RCP DISCHARGE ~CFS


RETURN PERIOD IN YEARS
8
7
6
5
4
3
200
150
100
90
80
70
60
50
40
30
20
2
1
50
100
150
200
250
300
SEYMOUR RESERVOIR # 4
12/78
D.T. Pallen
SPILLWAY + PIPE DISCHARGE - CFS

Dam: Seymour Reservoir #4

B. DESIGN AND CONSTRUCTION DATA:

Does not apply

C. OPERATING RECORDS:

Does not apply

D. POST CONSTRUCTION CHANGES:

Does not apply

E. SEISMIC STABILITY:

The dam is located in seismic zone #1.

VII. DAM ASSESSMENT:

Visual inspection of the dam indicates generally good condition. This condition designation means the facility requires action within 2 to 3 years by the owner for the specific areas described.

Items that require action are: (1) Monitoring of seeps; (2) Raising of dam; (3) Further investigation of the entire series of Seymour dams in respect to breaching and potential downstream damage to relatively new development on Pine Bridge Road.

Seepage should be monitored on a monthly basis and records maintained on quantity, color and solids contents (photographs are recommended);

The dam should be raised to an elevation to prevent overtopping at a frequency less than the existing condition which indicates the dam would be overtopped at a return period of 90 years. This could be accomplished by increasing the elevation of the natural saddle spillway.

Prepared by: Robert L. Jones, P.E.

Project Engineer

11/25/78

DTB

Seymour Res #4

Orford Ck

Saddle NE of Dam

BS	FS	Elev	
	HI = 540.09		
14.75		525.34	water
	1.68	538.41	
	3.52	536.57	
	4.60	535.49	℄ borro. = 12
	4.60	535.49	
	2.61	537.48	
	2.15	537.94	
	2.11	537.98	
	2.03	538.06	

0 10 18 27 34.5 46 72 102

Looking DS

Assume Top of Dam @ Elev 538

Seymour Res #4

@ Dam

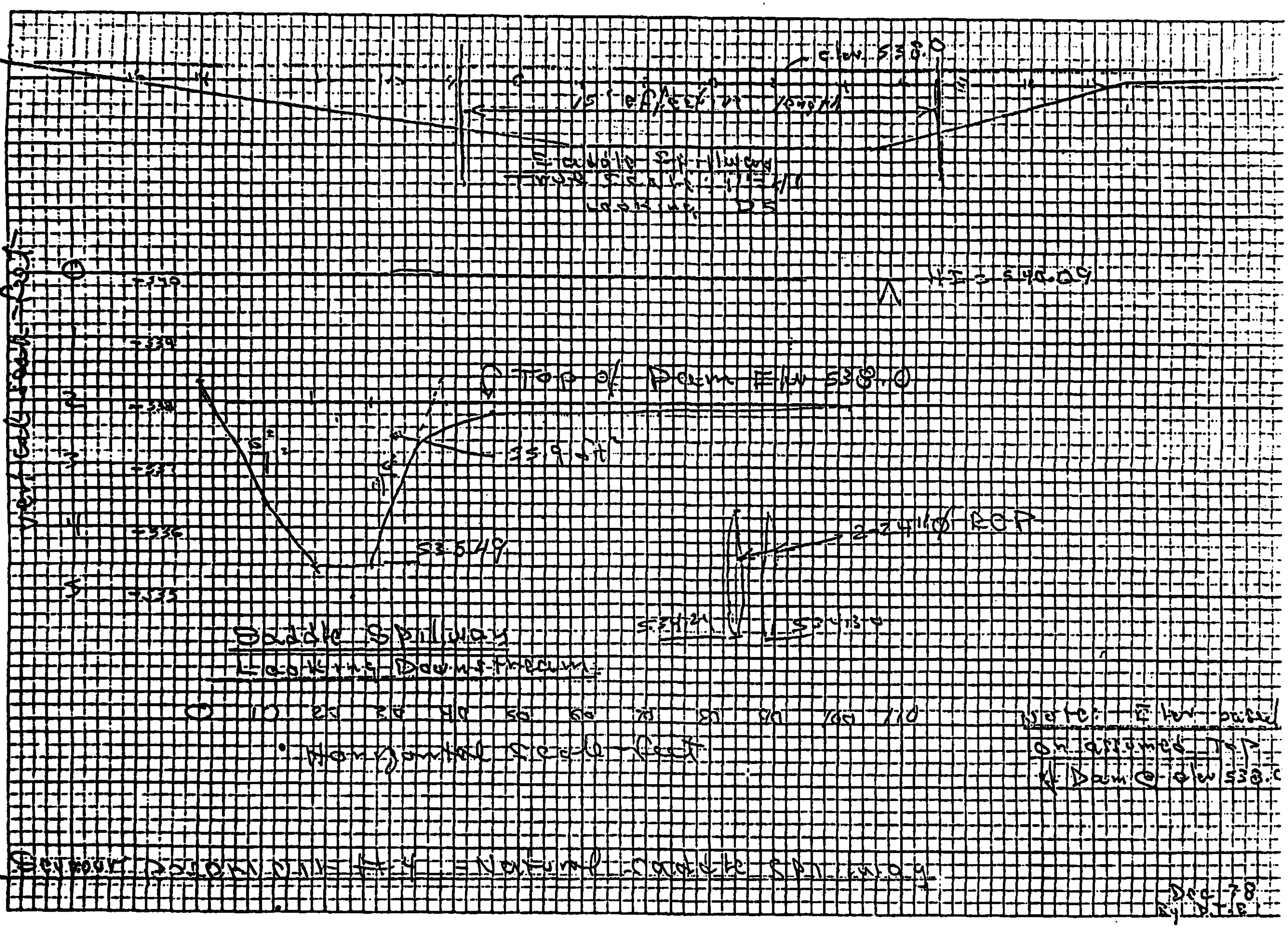
HI = 538.76

BS	FS	Elev	
13.42		525.34	water
	4.52	534.24	E. Pipe Inv (24"ØRCP)
	4.46	534.30	W. Pipe Inv. (24"ØRCP)
	0.76	538.0	Top of Dam (Assumed)

B-11

Note: At top of Dam there is only 2-24"Ø RCP near the left abutment as the only means of passing flow.

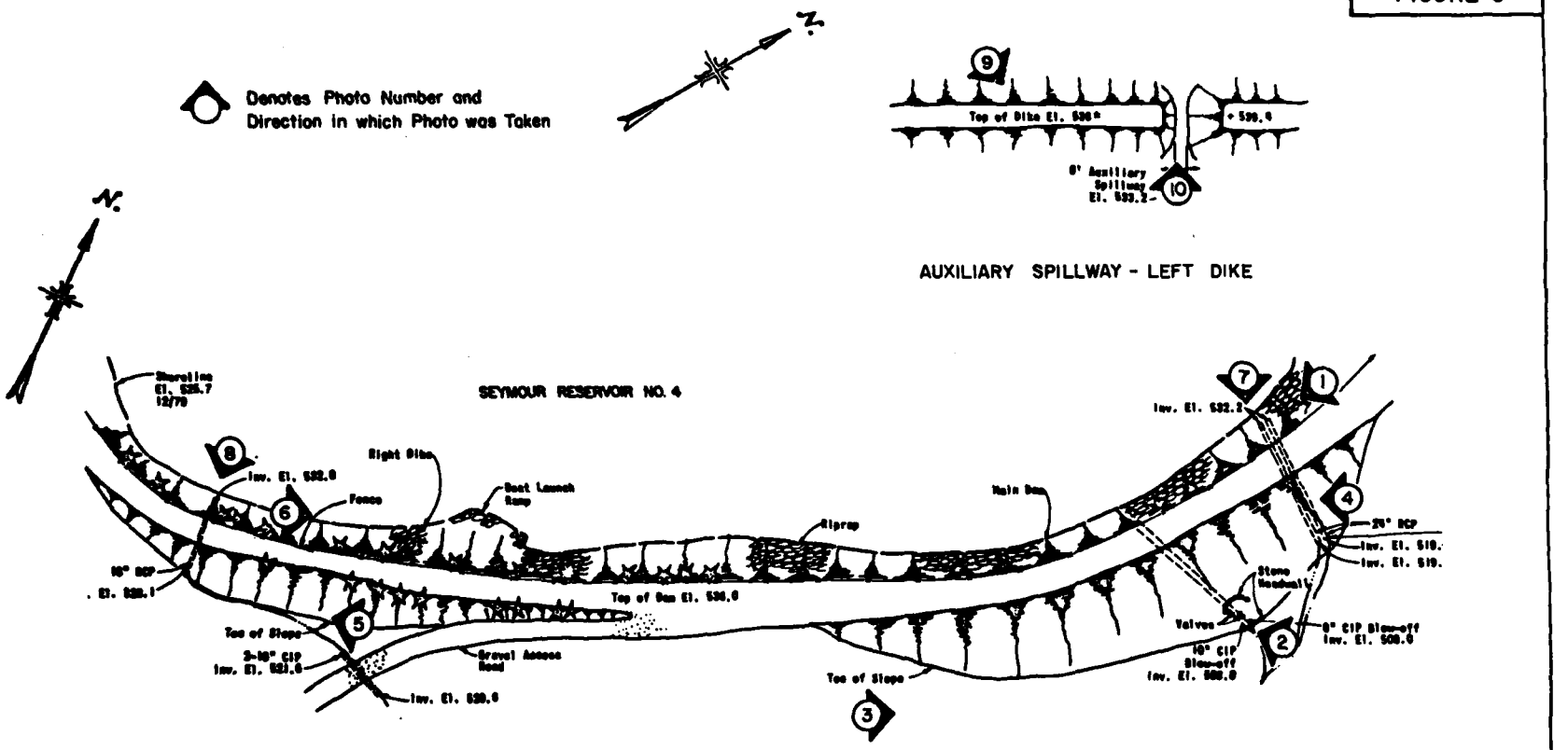
Note: Water level on this date was utilized in establishing the relationship between the top of Dam, 2-24"Ø's, saddle spillway @ area N.E. of Dam


elev 538.0
Saddle Spillway
Top of Dam Elev 538.0
535.49
2-24" Ø RCP
Saddle Spillway
Looking Downstream
Horizontal Scale - feet
Vertical Scale - feet

APPENDIX C

PHOTOGRAPHS

FIGURE 3



C-1

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

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

PHOTO LOCATION PLAN

SEYMOUR RESERVOIR NO. 4 DAM

OXFORD, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALES 1" = 80'
JRS	DLS		DATE FEB 1980 PAGE C-1

PHOTO NO. 1

UPSTREAM SLOPE OF MAIN EMBANKMENT
FROM LEFT ABUTMENT
NOTE TWO 24-INCH CONCRETE OVERFLOW PIPES

PHOTO NO. 2

OUTLET STRUCTURE FOR BLOWOFF PIPES
NOTE RUST-COLORED SEEPAGE EXITING FROM
AROUND PIPES AND FROM BASE OF STONE MASONRY WALL

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	SEYMOUR RES. NO. 4 DAM TR. TO HEMP SWAMP BROOK OXFORD, CONNECTICUT CT 00325 28/29 NOV '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 3

DOWNSTREAM SLOPE OF MAIN EMBANKMENT

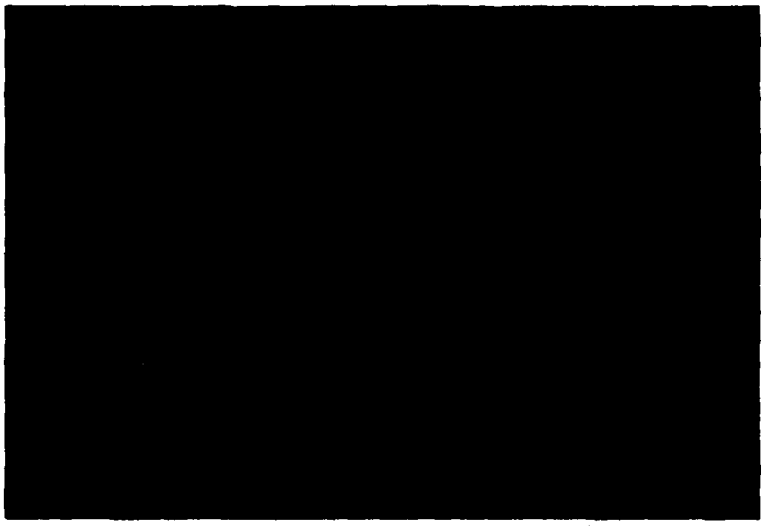


PHOTO NO. 4

HOLE IN DOWNSTREAM SLOPE OF MAIN EMBANKMENT
LOCATED ABOVE DISCHARGE ENDS OF OVERFLOW PIPES

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	SEYMOUR RES. NO. 4 DAM TR. TO HEMP SWAMP BROOK OXFORD, CONNECTICUT CT 00325 28/29 NOV '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

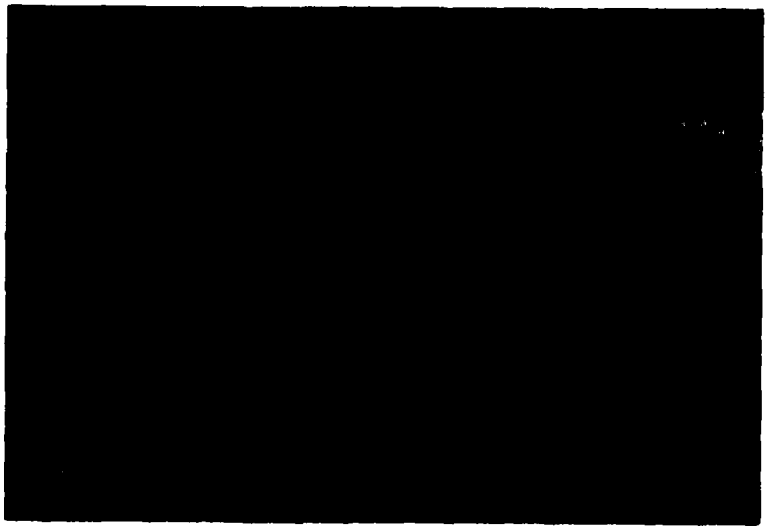


PHOTO NO. 5

DOWNSTREAM SLOPE OF RIGHT DIKE

PHOTO NO. 6

UPSTREAM SLOPE OF RIGHT DIKE
NOTE TREES AT TOP OF DIKE

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	SEYMOUR RES. NO. 4 DAM TR. TO HEMP SWAMP BROOK OXFORD, CONNECTICUT CT 00325 28/29 NOV '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

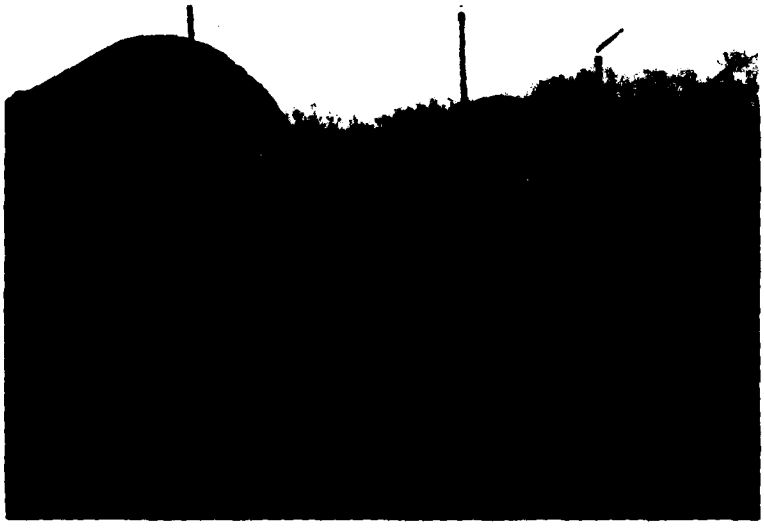


PHOTO NO. 7

UPSTREAM ENDS OF TWO 24-INCH OVERFLOW PIPES

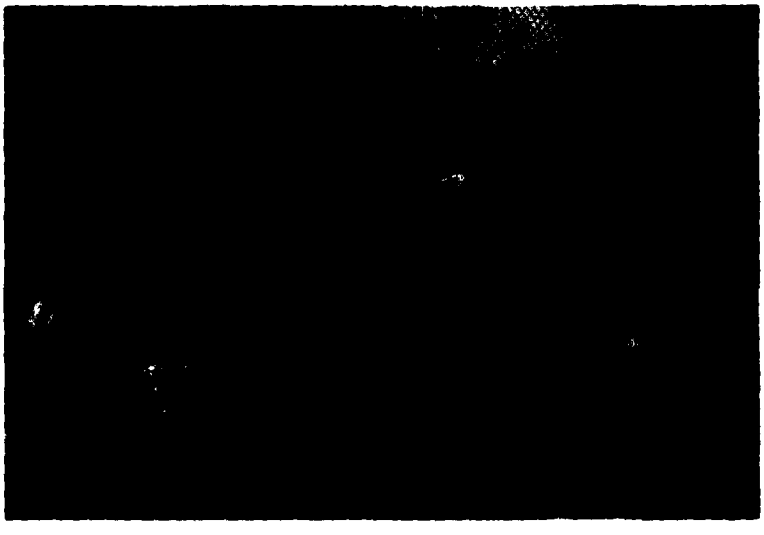


PHOTO NO. 8

18-INCH OVERFLOW PIPE AT RIGHT DIKE

U.S.ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	SEYMOUR RES. NO. 4 DAM TR. TO HEMP SWAMP BROOK OXFORD, CONNECTICUT CT 00325 28/29 NOV '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 9

UPSTREAM SLOPE OF LEFT DIKE

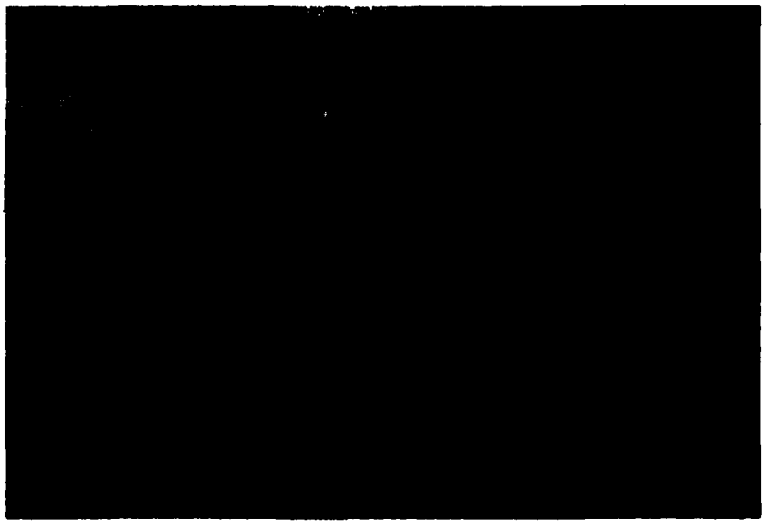


PHOTO NO. 10

AUXILIARY SPILLWAY AT LEFT ABUTMENT
OF LEFT DIKE

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	SEYMOUR RES. NO. 4 DAM TR. TO HEMP SWAMP BROOK OXFORD, CONNECTICUT CT 00325 28/29 NOV '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

FIGURE 4

WATERSHED MAP

SEYMOUR RESERVOIR NO. 4 DAM
OXFORD, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC.

NAUGATUCK QUADRANGLE 1972

BY DLS DATE 1/9/80 **ROALD HAESTAD, INC.** SHEET NO 1 OF 19

CONSULTING ENGINEERS

CKD BY SL DATE 1/15/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-12

SUBJECT SEYMOUR NO. 4 - SPILLWAY CAPACITY

SPILLWAY CONSISTS OF:

1 - 18" RCP @ El 532.0

2 - 24" RCP @ El 532.2

1 - 15' AUX. SPILL. @ El. 533.2 C = 2.7

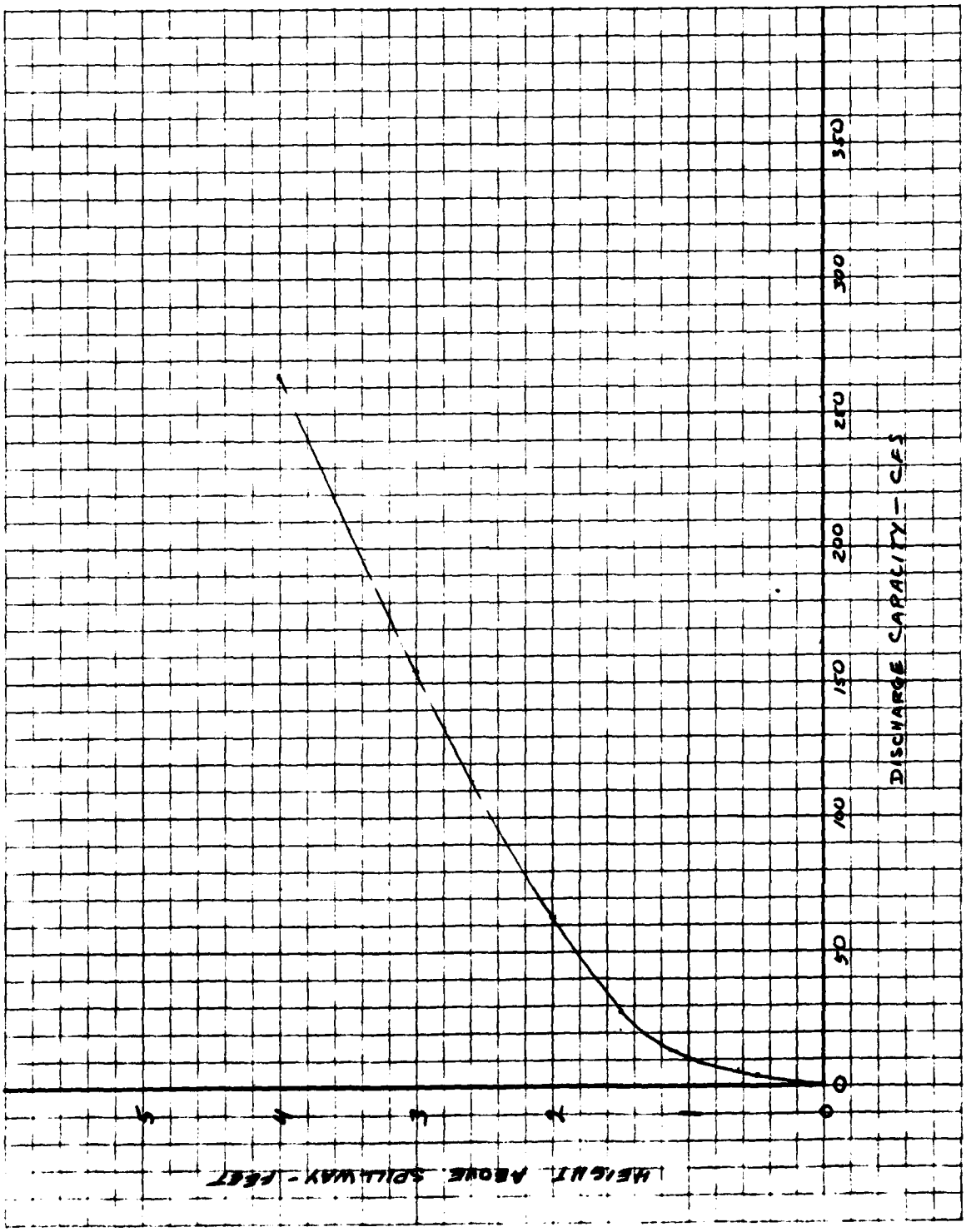
Elev.	HEIGHT ABOVE SPILL.	CAPACITY - CFS 18" RCP	24" RCP	AUX. SPILLWAY	TOTAL - CFS
532.0	0	0	0	0	0
532.5	0.5	2	2	0	4
533.0	1.0	4	6	0	10
533.5	1.5	7	14	7	28
534.0	2.0	10	24	29	63
535.0	3.0	14	42	98	154
536.0	4.0	18	56	190	264

BY ...RLS..... DATE ...1/7/80.. **ROALD HAESTAD, INC.** SHEET NO ....2.... OF ....19....

CONSULTING ENGINEERS

CKD BY ..SH.. DATE ..1/15/80.. 37 Brookside Road - Waterbury, Conn. 06708 JOB NO ...049-12.....

SUBJECT .....SEYMOUR NO. 4 - SPILLWAY CAPACITY.....



BY S.L. DATE 1/9/80 **ROALD HAESTAD, INC.** SHEET NO. 3 OF 19

CONSULTING ENGINEERS

CKD BY D.L.S. DATE 1/11/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 049-12

SUBJECT SEYMOUR NO. 4 - SURCHARGE STORAGE

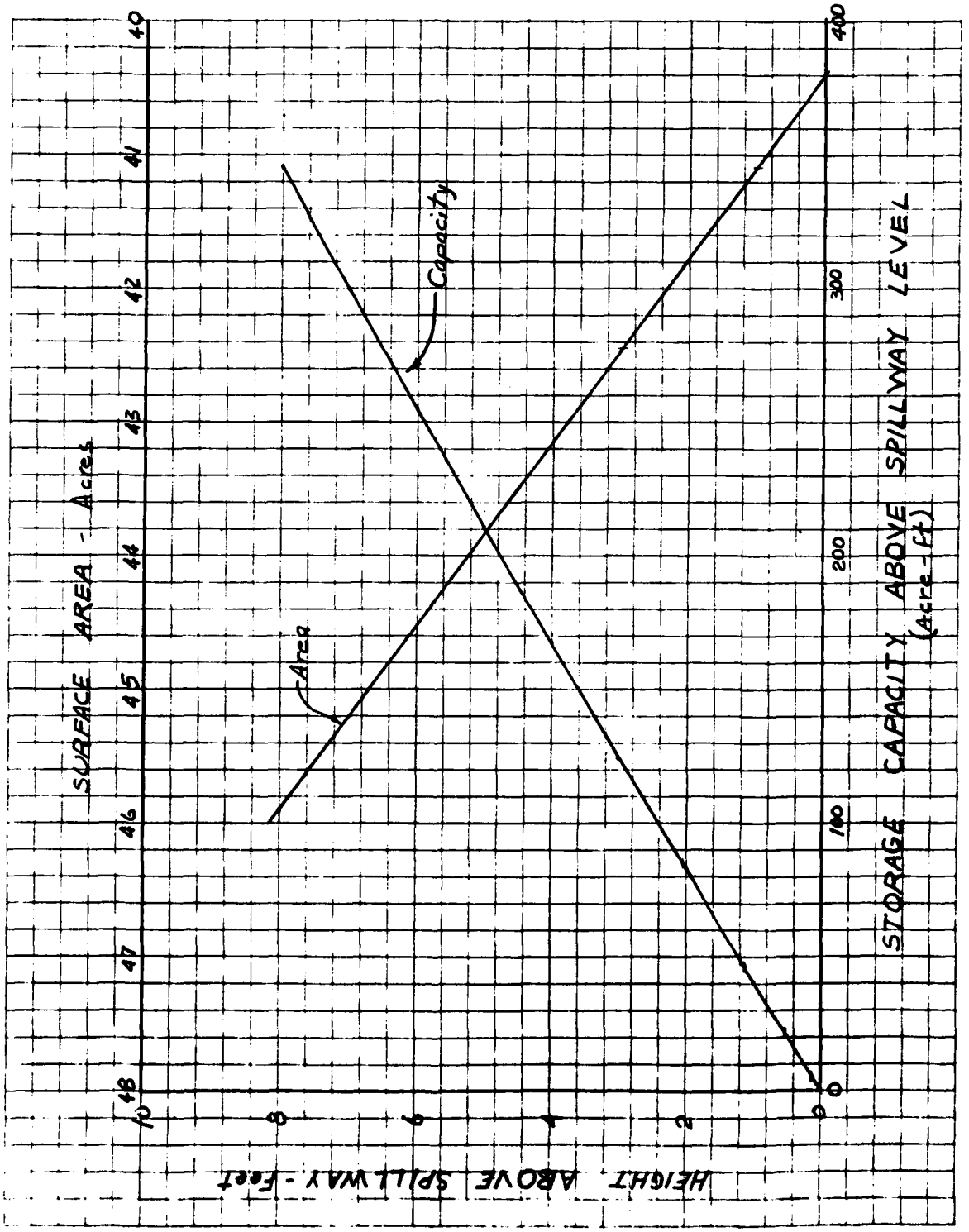
Height Above Spillway (feet)	Surface Area (Acres)	Average Surface Area (Acres)	Storage Capacity (Acre-Ft)
0	40.4		0
		40.8	
1	41.1		40.8
		41.5	
2	41.8		82.3
		42.1	
3	42.4		124.4
		42.8	
4	43.2		167.2
		43.5	
5	43.8		210.7
		44.2	
6	44.5		254.9
		44.9	
7	45.2		299.8
		45.6	
8	45.9		345.4

BY SL DATE 1/9/80 **ROALD HAESTAD, INC.** SHEET NO 4 OF 19

CONSULTING ENGINEERS

CKD BY RHS DATE 1/11/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-12

SUBJECT SEYMOUR NO.4 AREA - CAPACITY CURVE



BY DLS DATE 1/8/80 **ROALD HAESTAD, INC.** SHEET NO 5 OF 19

CONSULTING ENGINEERS

CKD BY SH DATE 1/15/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-12

SUBJECT SEYMOUR RES. NO.4 DAM - TEST FLOOD - ½ PMF

TEST FLOOD = ½ PMF

DRAINAGE AREA = 343 ACRES = 0.54 Sq. Mi.

FROM CORPS OF ENG. CHART FOR "ROLLING" TERRAIN

MPF = 2,125 cfs / Sq. Mi (2.0 Sq. Mi. MINIMUM)

PMF = 2,125 x 0.54 sq. mi. = 1148 CFS

½ PMF = ½ (1148) = 574 CFS

USE VOLUME OF RUNOFF = 9.5" = 274 Ac-Ft.

FROM DESIGN OF SMALL DAMS

$$q_p = \frac{484 A Q}{T_p} \qquad T_b = 2.67 T_p$$

q_p = PEAK RATE OF RUNOFF - CFS

A = DRAINAGE AREA - Sq. Mi.

Q = TOTAL RUNOFF IN INCHES

T_p = TIME IN HOURS FROM START OF RISE TO PEAK

T_b = TIME BASE OF HYDROGRAPH IN HOURS

$$574 = \frac{484 (0.54)(9.5)}{T_p}$$

T_p = 4.3 HOURS

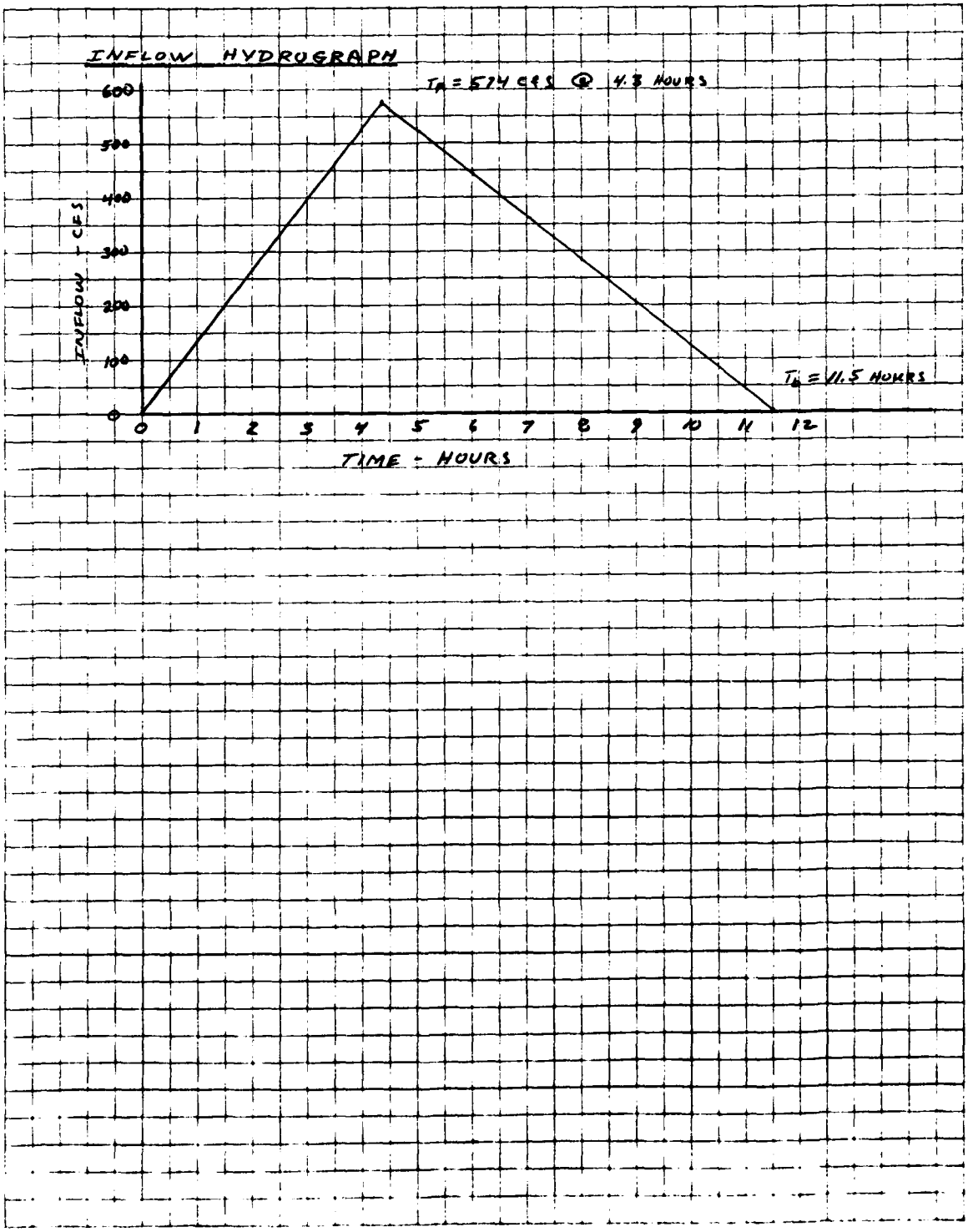
T_b = 2.67 (4.3) = 11.5 HOURS

BY DLS DATE 1/8/80 **ROALD HAESTAD, INC.** SHEET NO 6 OF 19

CONSULTING ENGINEERS

CKD BY SL DATE 1/14/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 042-12

SUBJECT SEYMOUR NO. 4 - TEST FLOOD - ½ PMF



BY SL DATE 1/9/80

CHKD. BY DLS DATE 1/11/80

ROALD HAESTAD, INC.
CONSULTING ENGINEERS

SHEET NO 7 OF 19

JOB NO 049-12

SUBJECT: SEYMOUR NO 4 - Flood Routing

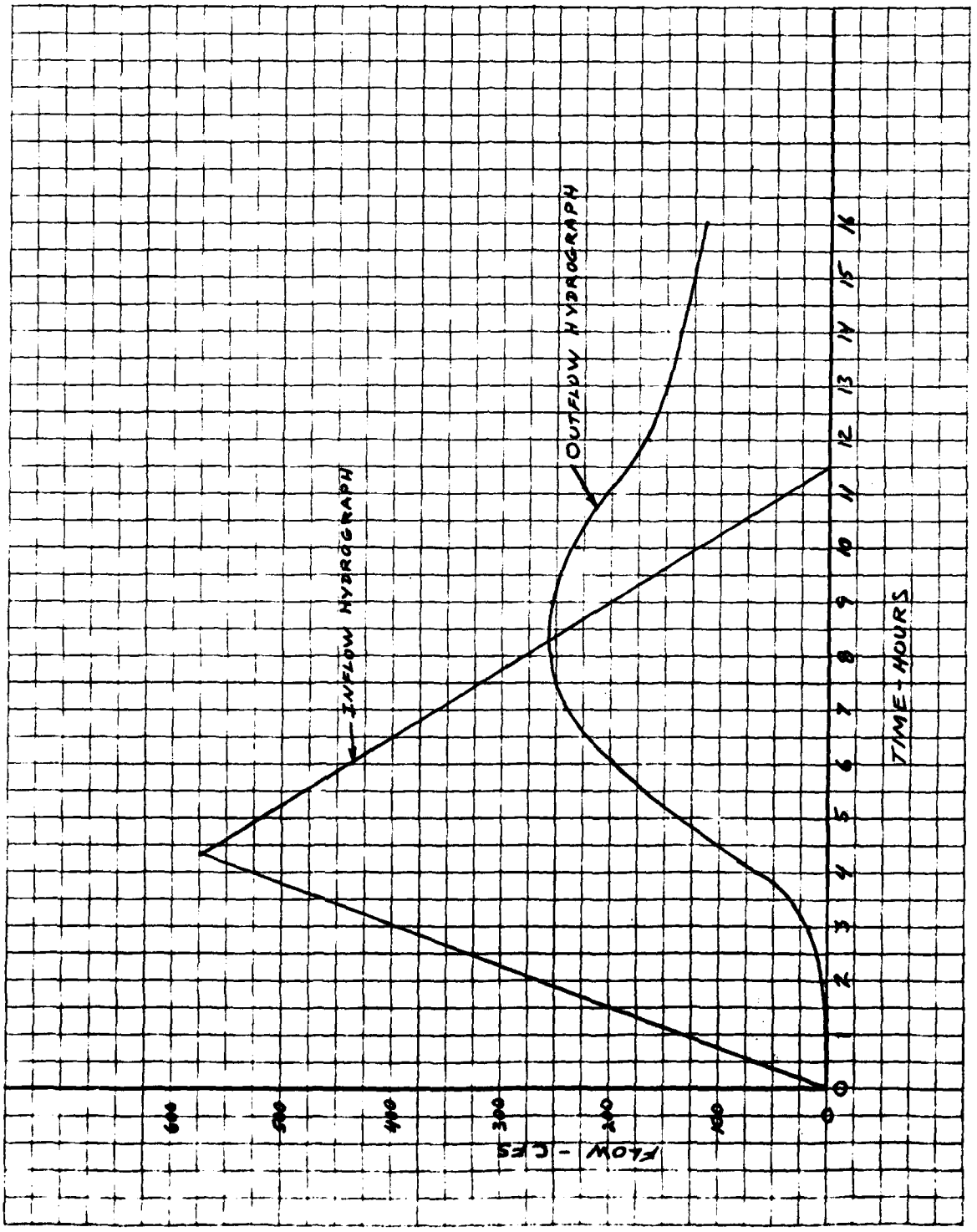
TIME	ΔT	AVERAGE RATE OF INFLOW Q1 AT BEG.	AVERAGE INFLOW ACRE-FEET	TRIAL RES. STORAGE EL. END OF Δt	AVERAGE RATE OF OUTFLOW Q2 AT END	AVERAGE OUTFLOW FOR Δt ACRE-FEET	INCREMENTAL STORAGE, ΔS ACRE-FEET	TOTAL STORAGE ACRE-FEET	RESERVOIR ELEVATION END Δt
HOURS	HOURS								
0		0			0			0	
	1	65	54	5322.2	1	0	54	54	5322.1
1				5321.1	1	0	54	54	5322.1
	1	200	165	5325.5	3	0	165	219	5325.5
2						1	267	486	5333.2
	1	335	277	5330	7	1	267	486	5333.2
3				5333.2	9	1	267	486	5333.2
	1	463	383	5335.5	21	2	363	849	5340.0
4				5340.0	38	3	353	839	5340.0
	1	540	446	5340.9	109	9	353	1192.5	5349.9
5				5349	104	9	356	1195	5349
	1	485	401	5346.9	205	17	231	1426	5354.4
6				5354.4	170	14	261	1456	5354.4
	1	405	335	5355.5	201	17	165	1621	5355.9
7				5358.8	218	18	155	1597	5358.8
	1	320	264	5357.7	235	20	64	1655	5359.9
8				5359.9	247	21	54	1645	5359.9
	1	240	198	5359.9	247	21	-12	1623	5359.9
9				5359.9	253	21	-12	1633	5359.9
	1	160	132	5359.9	247	21	-78	1555	5357.7
10				5357.7	242	20	-68	1565	5357.7
	1	85	70	5356.6	234	19	-120	1445	5355.5
11				5355.5	219	18	-110	1465	5355.5
	1	112	110	5355.0	181	15	-140	1325	5351.1
12				5351.1	186	16	-150	1305	5351
	2	0	0	5349.2	155	13	-130	1175	5349.8
14				5348.8	149	12	-120	1185	5348
	2	0	0	5347.5	119	10	-100	1085	5346.6
16				5346.6	124	10	-100	1085	5346.6

BY D.L.S. DATE 1/10/80 **ROALD HAESTAD, INC.** SHEET NO 8 OF 19

CONSULTING ENGINEERS

CKD BY S.L. DATE 1/11/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 042-12

SUBJECT SEYMOUR NO. 4 - FLOOD ROUTING



BY DLS DATE 1/10/80 **ROALD HAESTAD, INC.** SHEET NO 9 OF 17

CONSULTING ENGINEERS

CKD BY SL DATE 1/15/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-12

SUBJECT SEYMOUR NO. 4 - DAM FAILURE FLOOD ROUTING

STORAGE CAPACITY AT SPILLWAY = 558 Ac-FT.

STORAGE CAPACITY AT TOP OF DAM = 725 Ac-FT.

FROM CORPS OF ENG "RULE OF THUMB" GUIDANCE.

$$Q_{p1} = \frac{8}{27} W_b \sqrt{g}\, y_o^{3/2}$$

Q_{p1} = DAM BREACH PEAK FAILURE OUTFLOW - CFS

W_b = BREACH WIDTH = 40% OF DAM LENGTH AT MID HEIGHT

$W_b = 0.40(180) = 72'$

Y_o = HEIGHT FROM RIVER BED TO POOL LEVEL AT FAILURE

$Y_o = 28'$

$$Q_{p1} = \frac{8}{27}(72)\sqrt{32.2}\,(28)^{3/2}$$

$Q_{p1} = 17,936$ cfs

SECTION NO. 1 - SEYMOUR NO. 3 DAM

$Q_{p1} = 17,936$ cfs

$H_1 = 8.9'$ $Vol._1 = 127$ Ac-FT.

$$Q_{p2\ TRIAL} = Q_{p1}\left(1 - \frac{Vol_1}{S}\right) = 17,936\left(1 - \frac{127}{725}\right) = 14,795 \text{ cfs}$$

$H_{2\ TRIAL} = 8.4'$ $Vol._{2\ TRIAL} = 120$ Ac-Ft.

$$V_{AVE.} = \frac{127+120}{2} = 123.5 \text{ Ac-FT.}$$

$$Q_{p2} = 17,936\left(1 - \frac{123.5}{725}\right) = 14,880 \text{ cfs}$$

$H_2 = 8.4'$

OVERTOPS SEYMOUR NO. 3 BY 3.6 FEET

BY ...D.L.S..... DATE ..1/10/80.. **ROALD HAESTAD, INC.** SHEET NO ...10.... OF ...11....

CONSULTING ENGINEERS

CKD BY ..S.H.. DATE ..1/15/80.. 37 Brookside Road - Waterbury, Conn. 06708 JOB NO ...049-12.....

SUBJECT ...SEYMOUR NO. 4 ..... DAM FAILURE FLOOD ROUTING .....

SECTION NO. 2 - SEYMOUR NO. 2 DAM

$Q_{p2} = 14,880$ cfs

$H_2 = 8.4'$ $V_2 = 193'$ Ac-Ft.

$Q_{p3\ TRIAL} = 14,880 \left(1 - \frac{193}{725}\right) = 10,920$

$H_{3\ TRIAL} = 7.9'$ $V_{3\ TRIAL} = 182$ Ac-Ft.

$V_{AVE} = \frac{193+182}{2} = 187.5$ Ac-Ft.

$Q_{p3} = 14,880 \left(1 - \frac{187.5}{725}\right) = 11,030$ cfs $H_3 = 7.9'$

OVERTOPS SEYMOUR NO. 2 BY 1.9 FEET

SECTION NO. 3 SEYMOUR NO. 1 DAM

$Q_{p3} = 11,030$ cfs

$H_3 = 7.3'$ $V_3 = 60$ Ac-Ft.

$Q_{p4\ TRIAL} = 11,030 \left(1 - \frac{60}{725}\right) = 10,117$ cfs

$H_{4\ TRIAL} = 7.0'$ $V_{4\ TRIAL} = 56$ Ac-Ft.

$V_{AVE} = \frac{60+56}{2} = 58$ Ac-Ft.

$Q_{p4} = 11,030 \left(1 - \frac{58}{725}\right) = 10,150$ cfs

$H_4 = 7.0$ ft

OVERTOPS SEYMOUR NO. 1 BY 5.0 FEET

SECTION NO. 4 (SEE FIGURE NO. 5A) REACH LENGTH = 1050'

$Q_{p4} = 10,150$ cfs

$H_4 = 10.0'$ $A_4 = 625$ sq. ft.

$V_4 = 625 \times 1050 / 43560 = 15$ Ac-Ft.

$Q_{p5\ TRIAL} = 10,150 \left(1 - \frac{15}{725}\right) = 9,940$ cfs

$H_{5\ TRIAL} = 9.8'$ $A_{5\ TRIAL} = 600$ sq. ft.

$V_{5\ TRIAL} = 600 \times 1050 / 43560 = 14.5$ Ac-Ft.

$V_{AVE} = \frac{15+14.5}{2} = 14.75$ Ac-Ft.

$Q_{p5} = 10,150 \left(1 - \frac{14.75}{725}\right) = 9,945$ cfs

$H_5 = 9.8$ ft.

SECTION NO. 5 (FIELD SURVEYED) REACH LENGTH = 2600'

$Q_{p5} = 9,945$ cfs

$H_5 = 9.0'$ $A_5 = 725$ sq. ft.

$V_5 = 2600' \times 725 / 43560 = 43$ Ac-Ft.

$Q_{p6\ TRIAL} = 9,945 \left(1 - \frac{43}{725}\right) = 9355$ cfs

$H_{6\ TRIAL} = 9.0'$ $A_{6\ TRIAL} = 725$ sq. Ft.

$V_{6\ TRIAL} = 43$ Ac-Ft.

$V_{AVE} = 43$ Ac-Ft.

$Q_{p6} = 9,335$ cfs

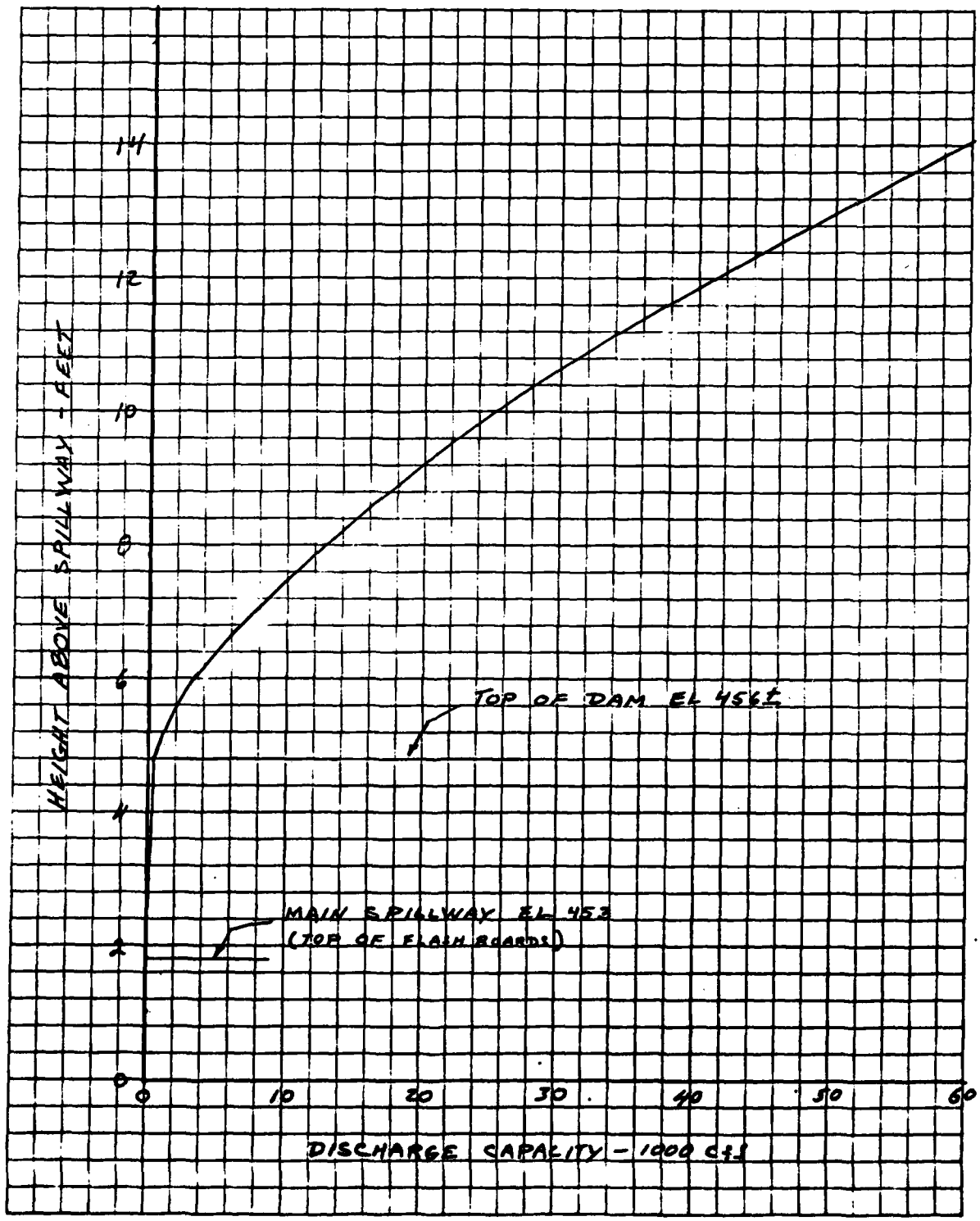
$H_6 = \underline{9.0'}$

BY DLS DATE 1/13/80 **ROALD HAESTAD, INC.** SHEET NO 12 OF 19

CONSULTING ENGINEERS

CKD BY SH DATE 1/15/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 047-07

SUBJECT SEYMOUR NO. 3 - SPILLWAY CAPACITY W/O Flashboards

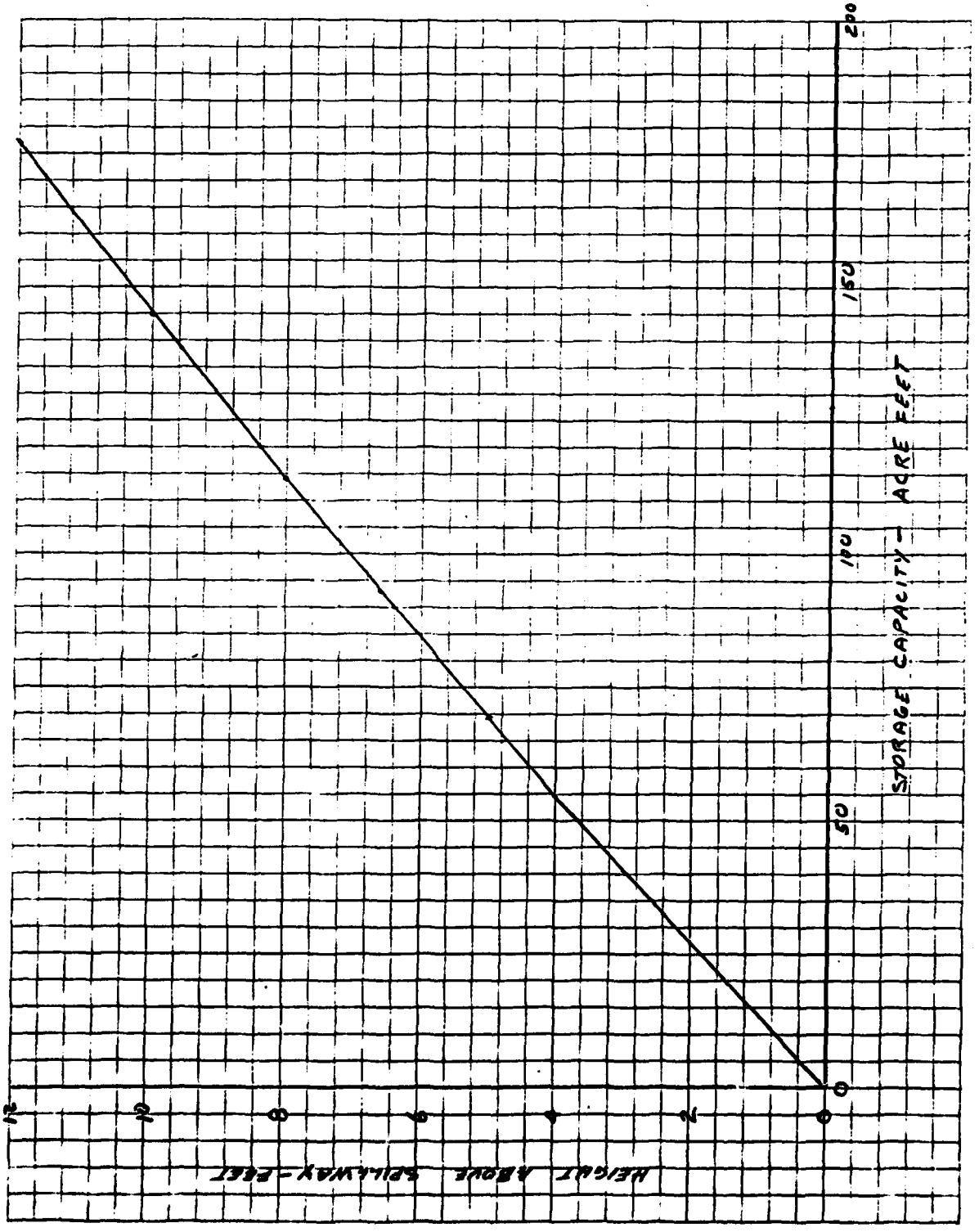


BY D.L.S. DATE 1/19/80 **ROALD HAESTAD, INC.** SHEET NO. 13 OF 19

CONSULTING ENGINEERS

CKD BY S.L. DATE 1/25/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 049-07

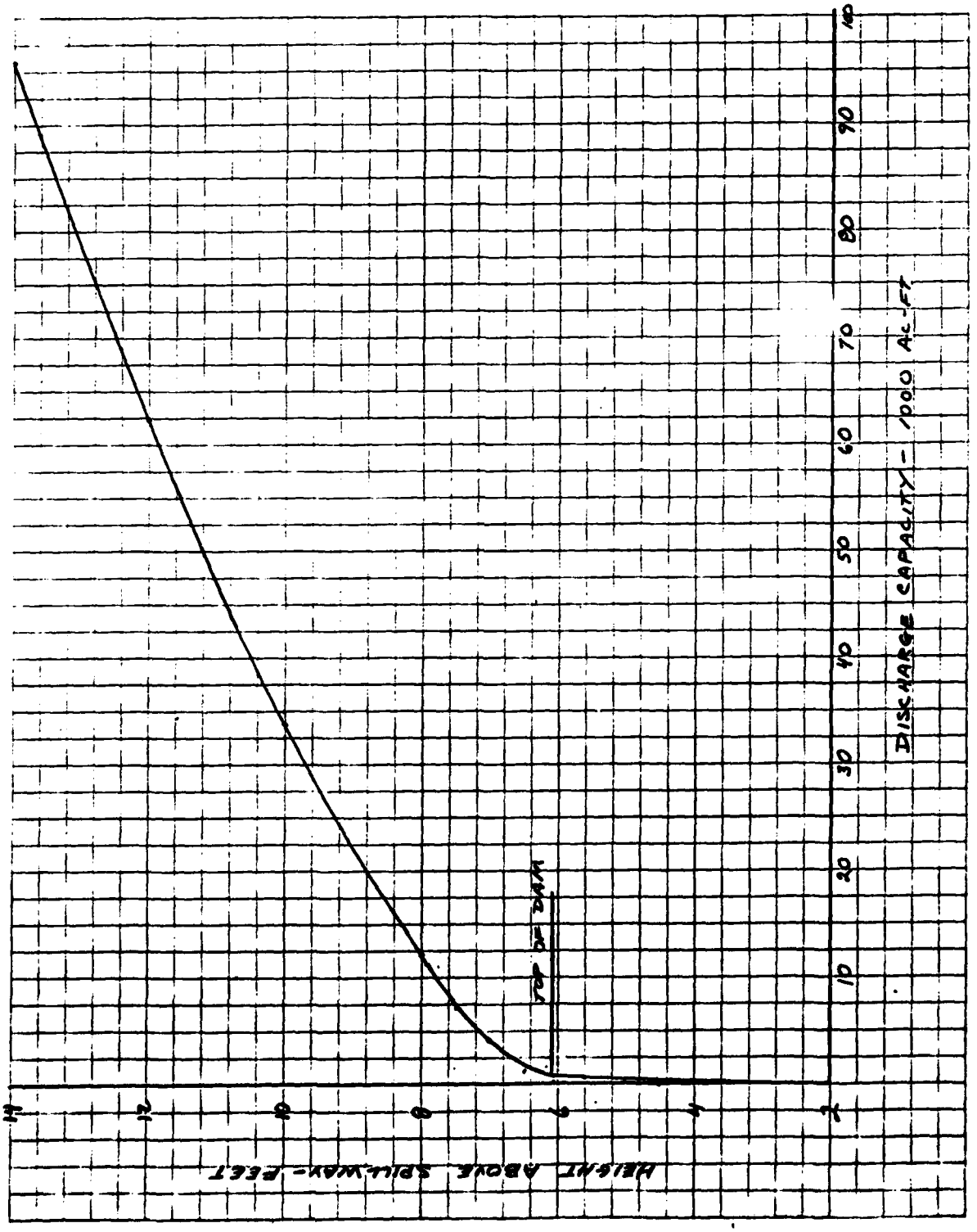
SUBJECT SEYMOUR NO. 3 STORAGE - CAPACITY CURVE



BY DLS DATE 1/10/80 **ROALD HAESTAD, INC.** SHEET NO 14 OF 19

CKD BY SL DATE 1/15/80 CONSULTING ENGINEERS 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-08

SUBJECT SEYMOUR NO. 2 - SPILLWAY CAPACITY



BY DLS DATE 1/7/80 **ROALD HAESTAD, INC.** SHEET NO 15 OF 19

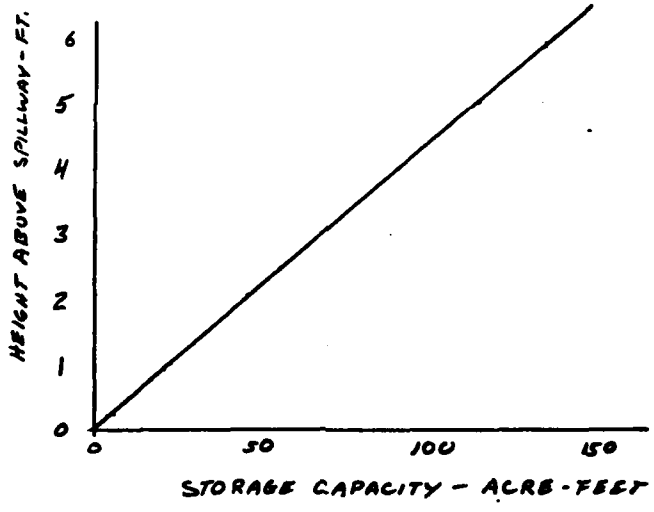
CONSULTING ENGINEERS

CKD BY SH DATE 1/14/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 042-08

SUBJECT SEYMOUR NO. 2 — STORAGE - CAPACITY

WATER SURFACE AREA ASSUMED CONSTANT AT 23.0 ACRES, DEPTH OF SURCHARGE STORAGE IS EXPECTED TO BE SMALL.

HEIGHT ABOVE SPILLWAY - FEET	STORAGE CAPACITY ACRE - FEET
1	23
2	46
3	69
4	92
5	115

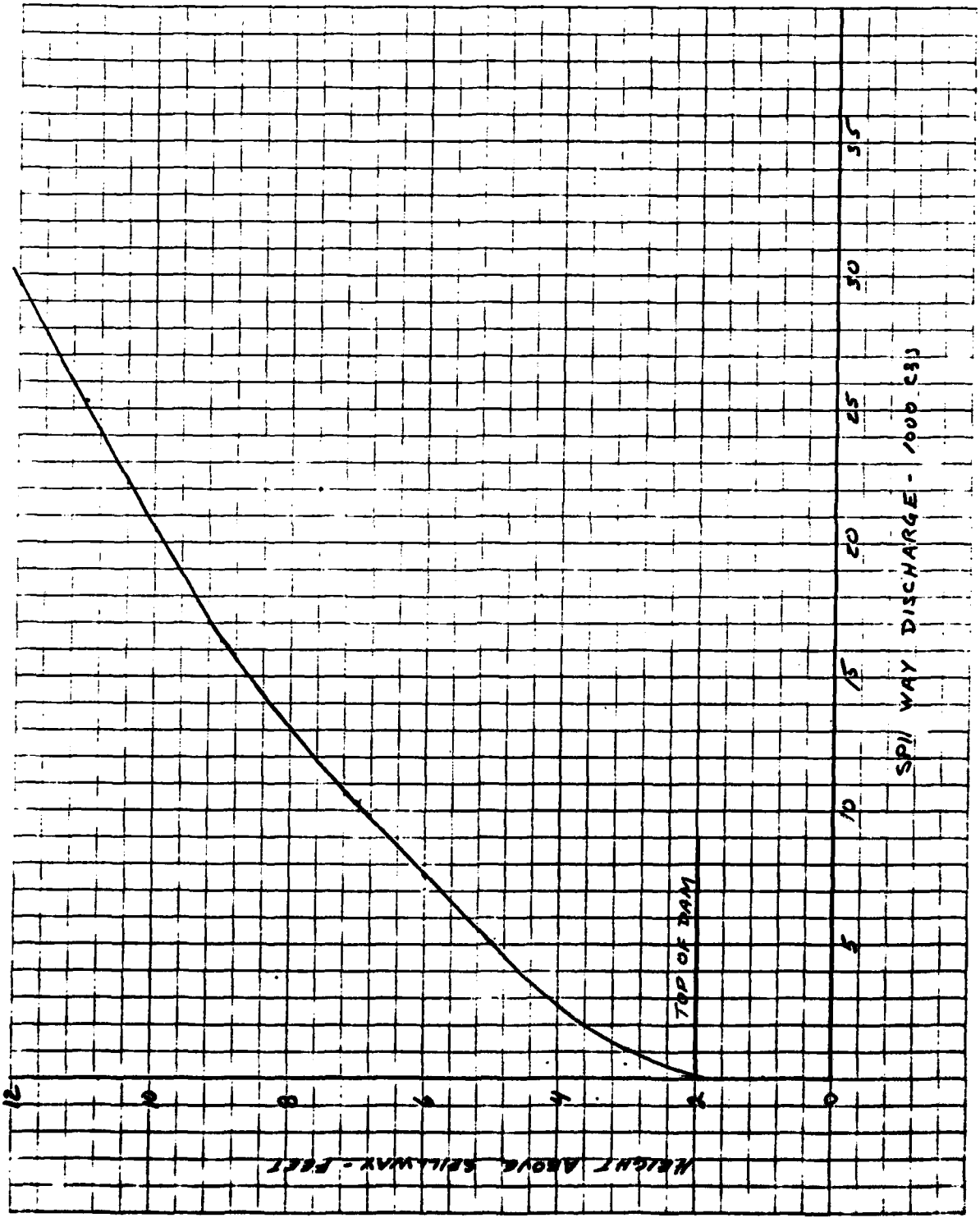


BY DLS DATE 1/7/80 **ROALD HAESTAD, INC.** SHEET NO 16 OF 19

CONSULTING ENGINEERS

CKD BY SH DATE 1/15/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-09

SUBJECT SEYMOUR NO. 1 SPILLWAY DISCHARGE CURVE



BY SL DATE 1/8/80

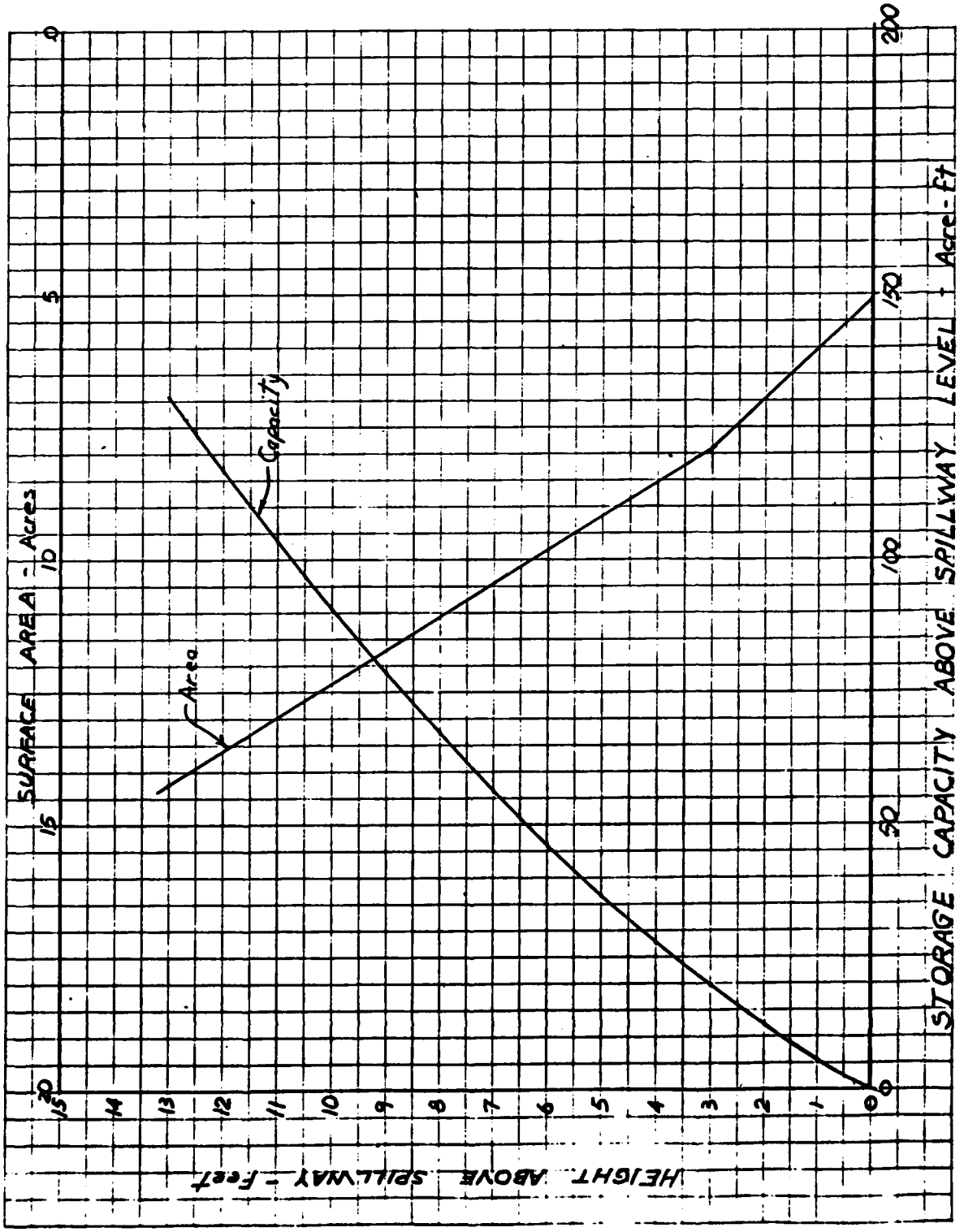
ROALD HAESTAD, INC.
CONSULTING ENGINEERS
37 Brookside Road - Waterbury, Conn. 06708

SHEET NO 17 OF 19

CKD BY DLS DATE 1/11/80

JOB NO 049-09

SUBJECT SEYMOUR NO. 1 - Area - Capacity Curve



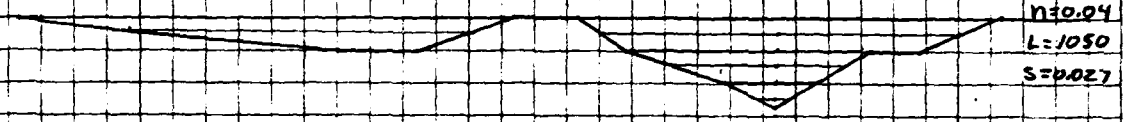
BY DLS DATE 1/10/80 **ROALD HAESTAD, INC.** SHEET NO 18 OF 19

CONSULTING ENGINEERS

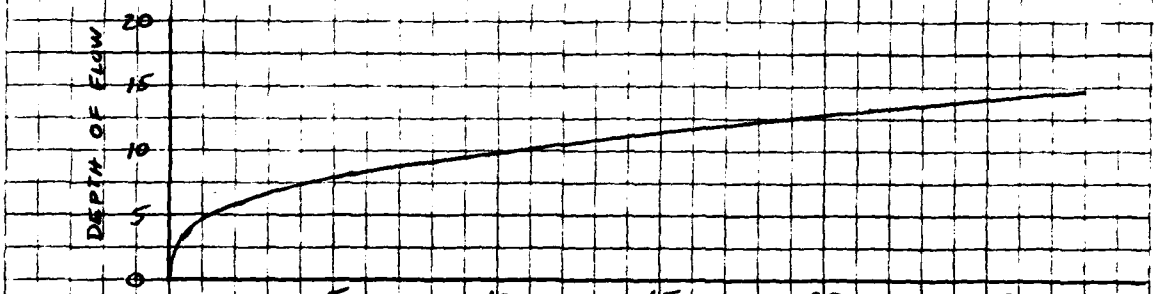
CKD BY SH DATE 1/15/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-12

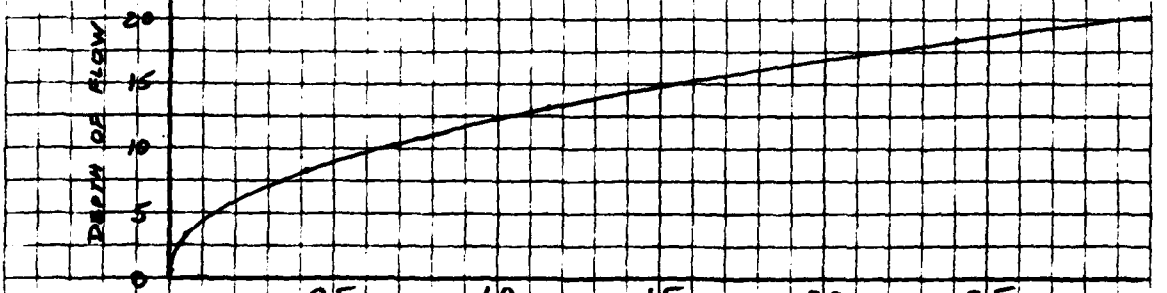
SUBJECT SEYMOUR NO 4 - FLOOD ROUTING

SECTION NO 4 (SEE FIGURE NO.5A) SCALE: 1"=200' HOR. 1"=20' VERT.



D	Wp	A	R	S	V	Q
3	40	53	1.33	0.027	7.4	392
8	130	416	3.20	0.027	13.3	5533
13	225	1166	5.18	0.027	18.3	21,338
18	335	2404	7.18	0.027	22.7	54,571
23	835	5527	6.62	0.027	21.5	118,874





BY DLS DATE 1/2/80 **ROALD HAESTAD, INC.** SHEET NO 19 OF 19

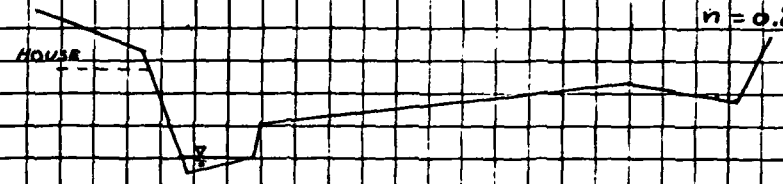
CONSULTING ENGINEERS

CKD BY SH DATE 1/15/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-12

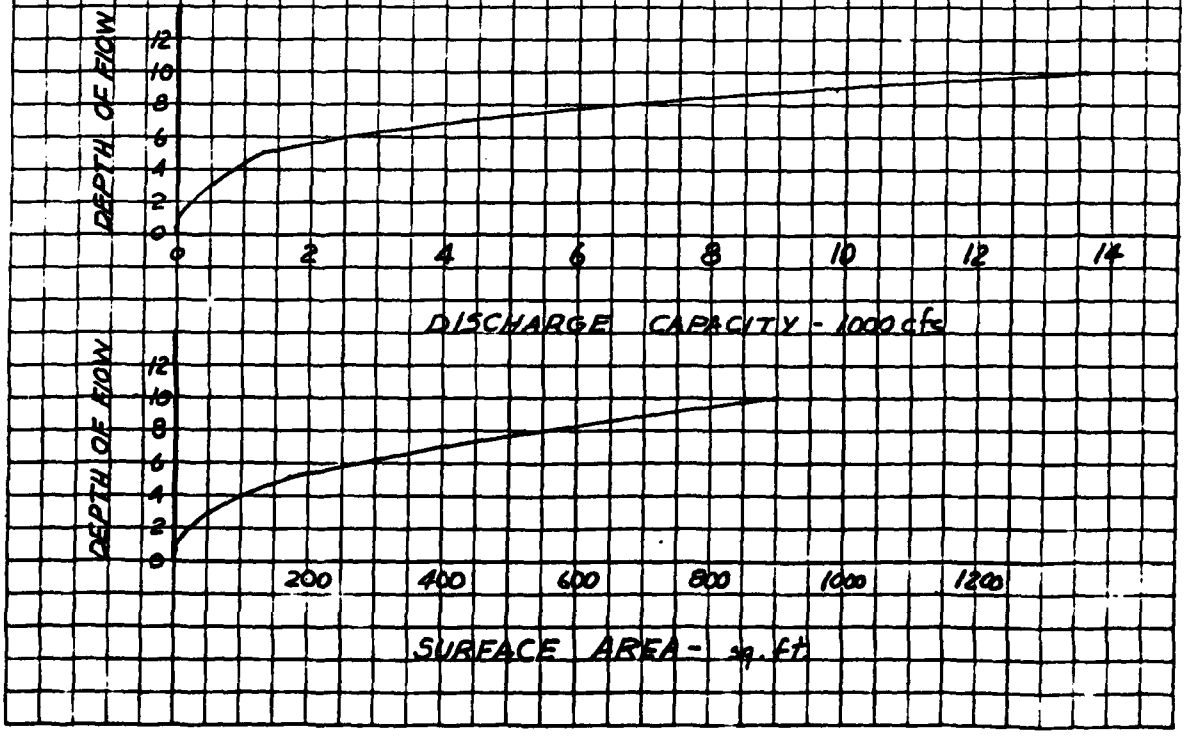
SUBJECT SEYMOUR NO. 4 FLOOD ROUTING

SECTION NO 5 (FIELD SURVEYED)

SCALE 1" = 40' HOR.
1" = 10' VERT.
S = 0.021
L = 2600'
n = 0.04



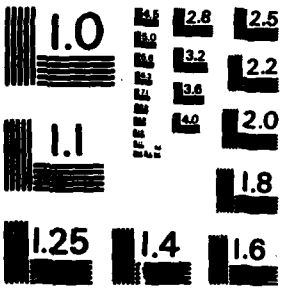
D	W_p	A	R	S	V	Q
1	18	9	0.50	0.021	3.4	31
3	23	49	2.13	0.021	8.9	436
5	100	169	1.69	0.021	7.7	1,301
7	150	411	2.74	0.021	10.6	4,357
10	190	897	4.72	0.021	15.2	13,634



MATCH TO FIGURE 5
Res No 2
Res No 1
500
400
350
450
SEYMOUR RESERVOIR NO. 2 DAM
ROAD
BRIDGE
SEYMOUR RE
NO. 1 DA
2
3

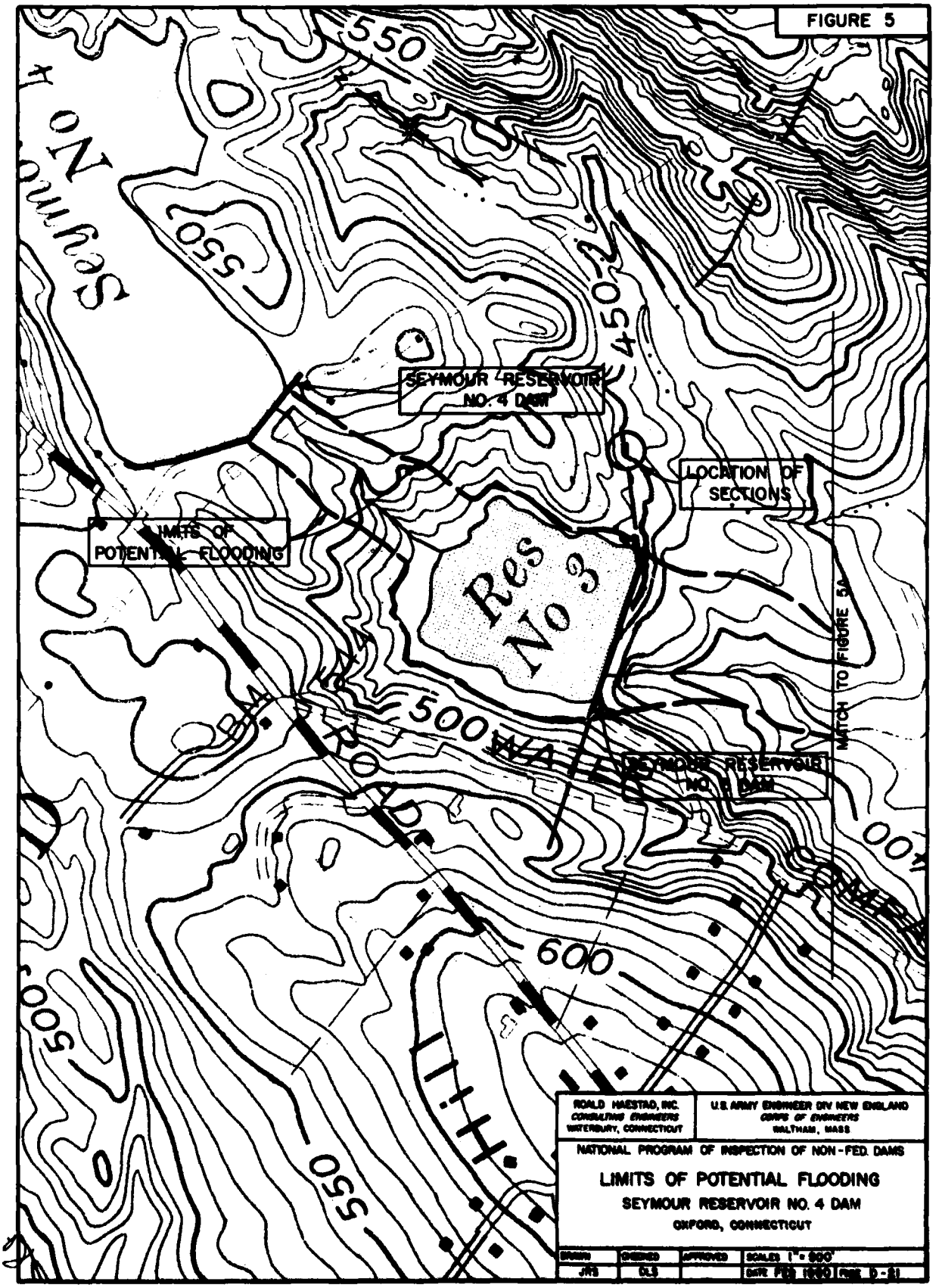
AD-A144 247 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS SEYMOUR RESERVOIR NUM..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV FEB 80 2/2

UNCLASSIFIED F/G 13/13 NL



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

FIGURE 5



ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

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

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

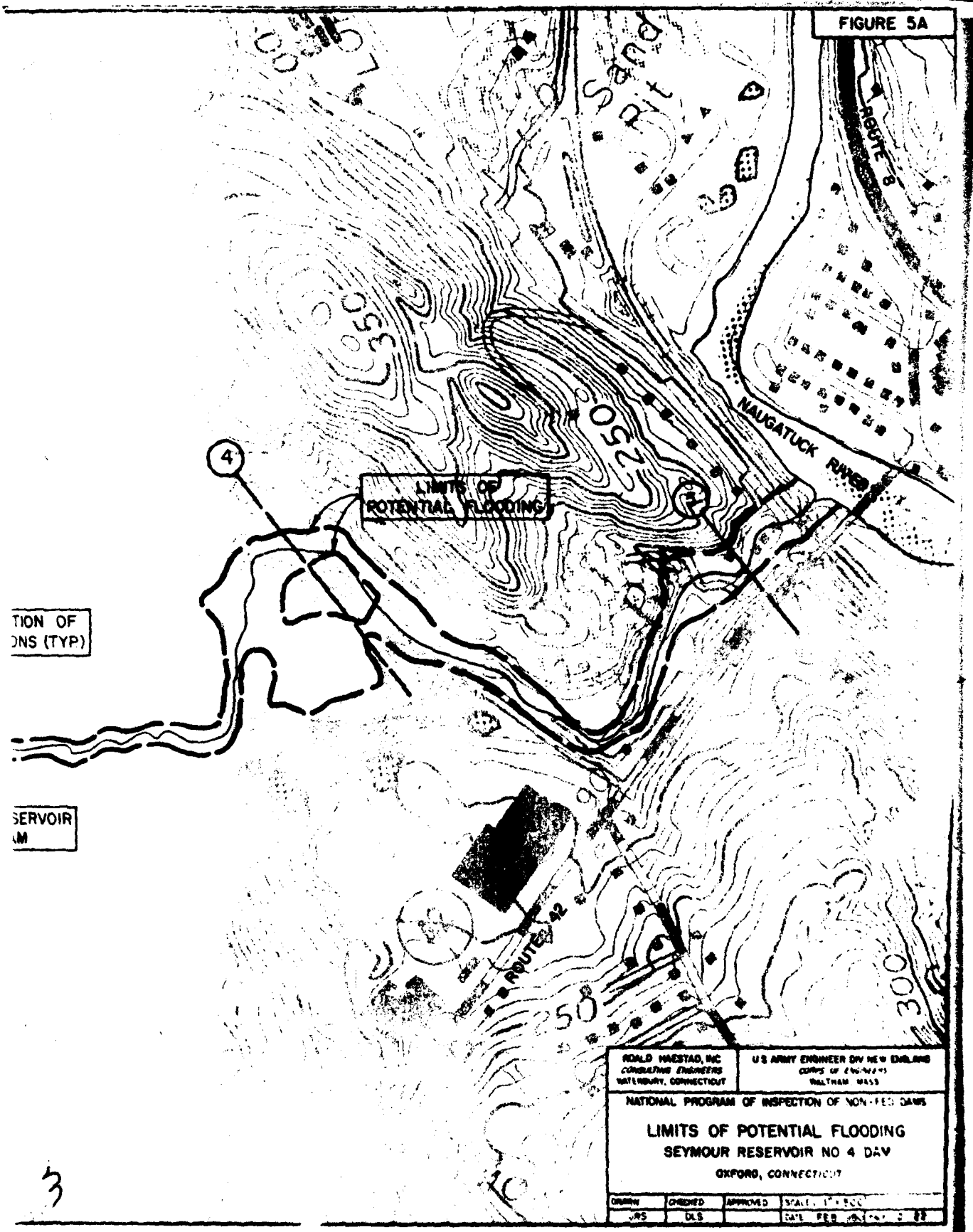
LIMITS OF POTENTIAL FLOODING

SEYMOUR RESERVOIR NO. 4 DAM

OXFORD, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALES 1" = 500'
JRS	DLS		DATE FEB 1980 FIGURE D-8

FIGURE 5A



RONALD HAESTAD, INC CONSULTING ENGINEERS WATERBURY, CONNECTICUT	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

LIMITS OF POTENTIAL FLOODING
SEYMOUR RESERVOIR NO 4 DAM
OXFORD, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALE: 1" = 500'
JRS	DLS		DATE: FEB [illegible]

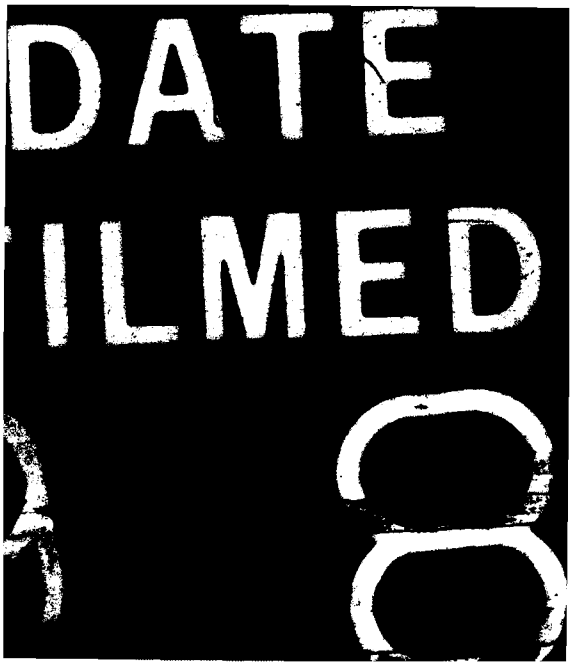
3

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME


DATE
ILMED