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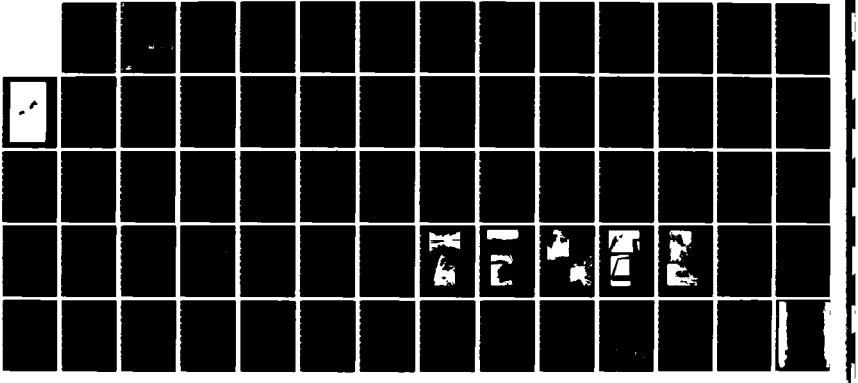

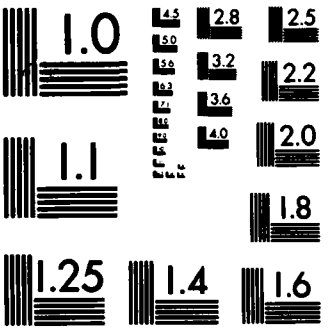

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AD-A142 854

FARMINGTON RIVER BASIN

TORRINGTON, CONNECTICUT

BURR POND DAM
CT 00099

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

JUNE 1980

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

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Farmington River Basin
Torrington, Conn.
Burr Pond Dam

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

The Burr Pond Dam consists of a stone masonry wall with an upstream earth embankment. The dam has a maximum height of 17 ft. and an overall length of 170 ft., including a 44.7 ft.long overflow spillway located near the center of the dam and auxiliary spillways located on each side of the main spillway with a total length of 50.5 ft. The outlet works consist of a 6 inch cast iron high level outlet and an 18-inch corrugated metal low level outlet or blowoff controlled by manually operated gates in a gate chamber at the left end of the main spillway. The dam impounds Burr Pond, a portion of Burr Pond State Park and is used for swimming, fishing and boating.

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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

OCT 20 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 Burr Pond 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, State of Connecticut, Dept. of Environmental Protection, Hartford, CT.

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.

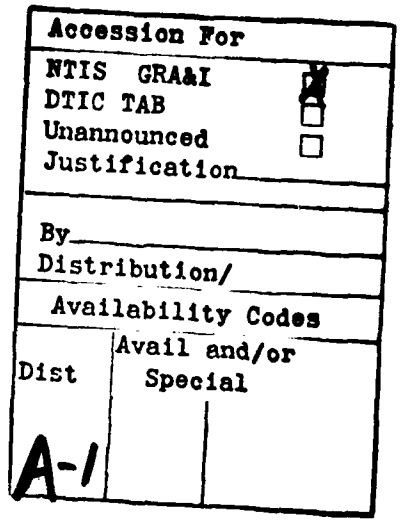
Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

BURR POND DAM
CT 00099

FARMINGTON RIVER BASIN
TORRINGTON, CONNECTICUT



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

IDENTIFICATION NO: CT 00099

NAME OF DAM: Burr Pond Dam

TOWN: Torrington

COUNTY AND STATE: Litchfield County, Connecticut

STREAM: Unnamed Tributary to Still River

DATE OF INSPECTION: May 2, 1980

BRIEF ASSESSMENT

The Burr Pond Dam consists of a stone masonry wall with an upstream earth embankment. The dam has a maximum height of 17 feet and an overall length of 170 feet, including a 44.7 foot long overflow spillway located near the center of the dam and auxiliary spillways located on each side of the main spillway with a total length of 50.5 feet. The outlet works consist of a 6-inch cast iron high level outlet and an 18-inch corrugated metal low level outlet or blowoff controlled by manually operated gates in a gate chamber at the left end of the main spillway.

The dam impounds Burr Pond, a portion of Burr Pond State Park and is used for swimming, fishing and boating.

Based on the visual inspection, the dam is judged to be in fair condition. Features that can affect the integrity of the dam are the seepage through the left side of the dam, erosion of the upstream slope of the dam, possible development of internal erosion along the root systems of trees near the downstream toe of the dam, and the poor condition of the low level outlet or blowoff pipe.

The dam is classified as "Small" in size, with a "High" 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' Recommended Guidelines for Safety Inspection of Dams. The Test Flood inflow is 1,425 cfs and the routed outflow of 720 cfs results in a freeboard from water surface to the top of the dam of 1.2 feet.

The spillway capacity with the water level at the top of the dam is 1,415 cfs and is equal to 197 percent of the routed Test Flood outflow.

It is recommended that a qualified, registered engineer be retained to investigate the seepage on the downstream face of the dam; the erosion on the upstream slope of the dam; the removal of trees adjacent to the downstream toe; the condition and adequacy of the low level outlet or blowoff pipe; and to perform annual technical inspections of the dam. An operations and maintenance manual should also be prepared and a formal warning system should be put into effect.

The owner should implement these recommendations as described herein and in greater detail in Section 7 of the Report, within one year after receipt of this Phase I Inspection Report.

Ronald G. Litke, P.E.
Project Engineer

Roald Haestad
President

This Phase I Inspection Report on Burr Pond 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.

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

RICHARD DIBUONO, CHAIRMAN
Water Control 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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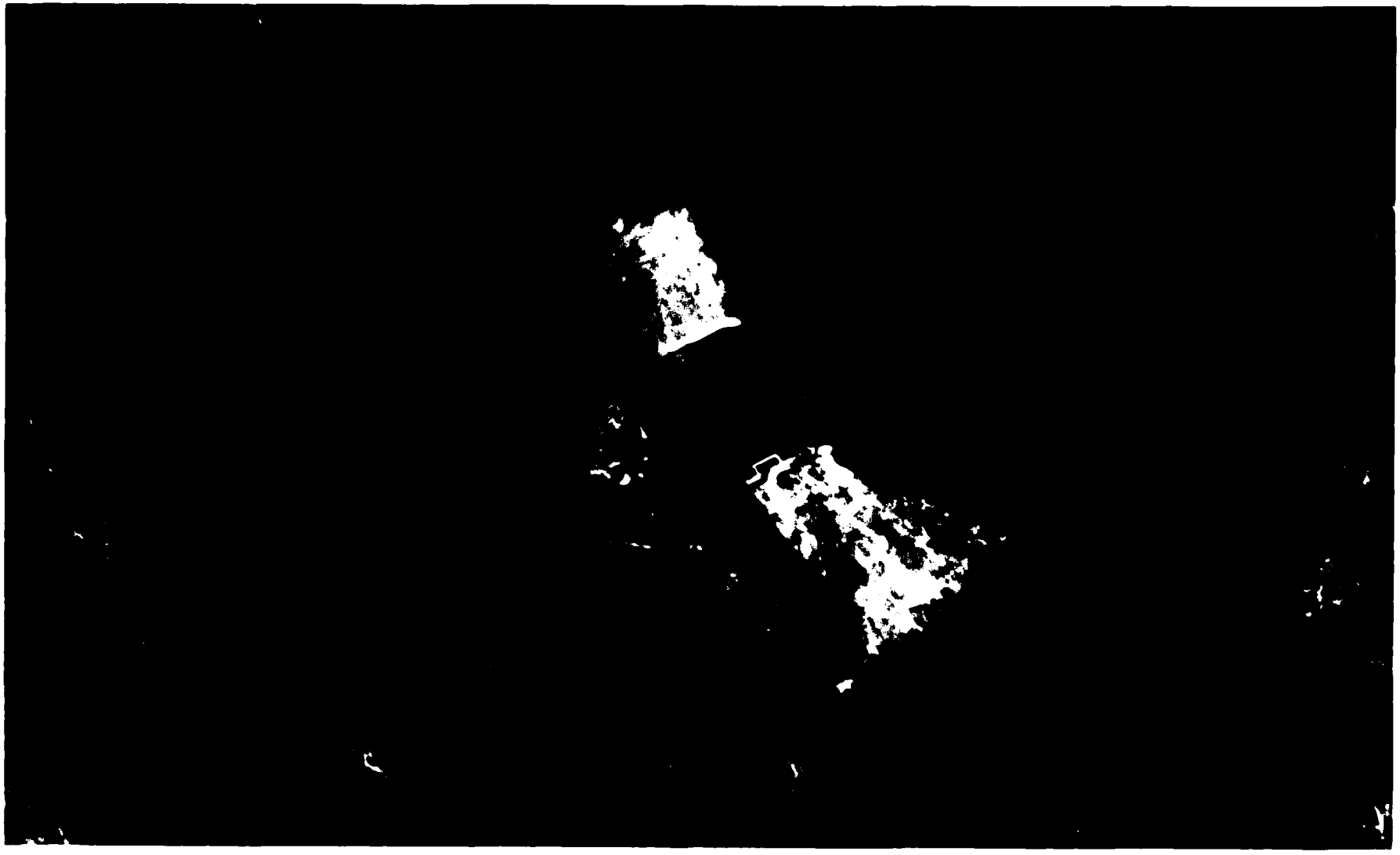


OVERVIEW PHOTO

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

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

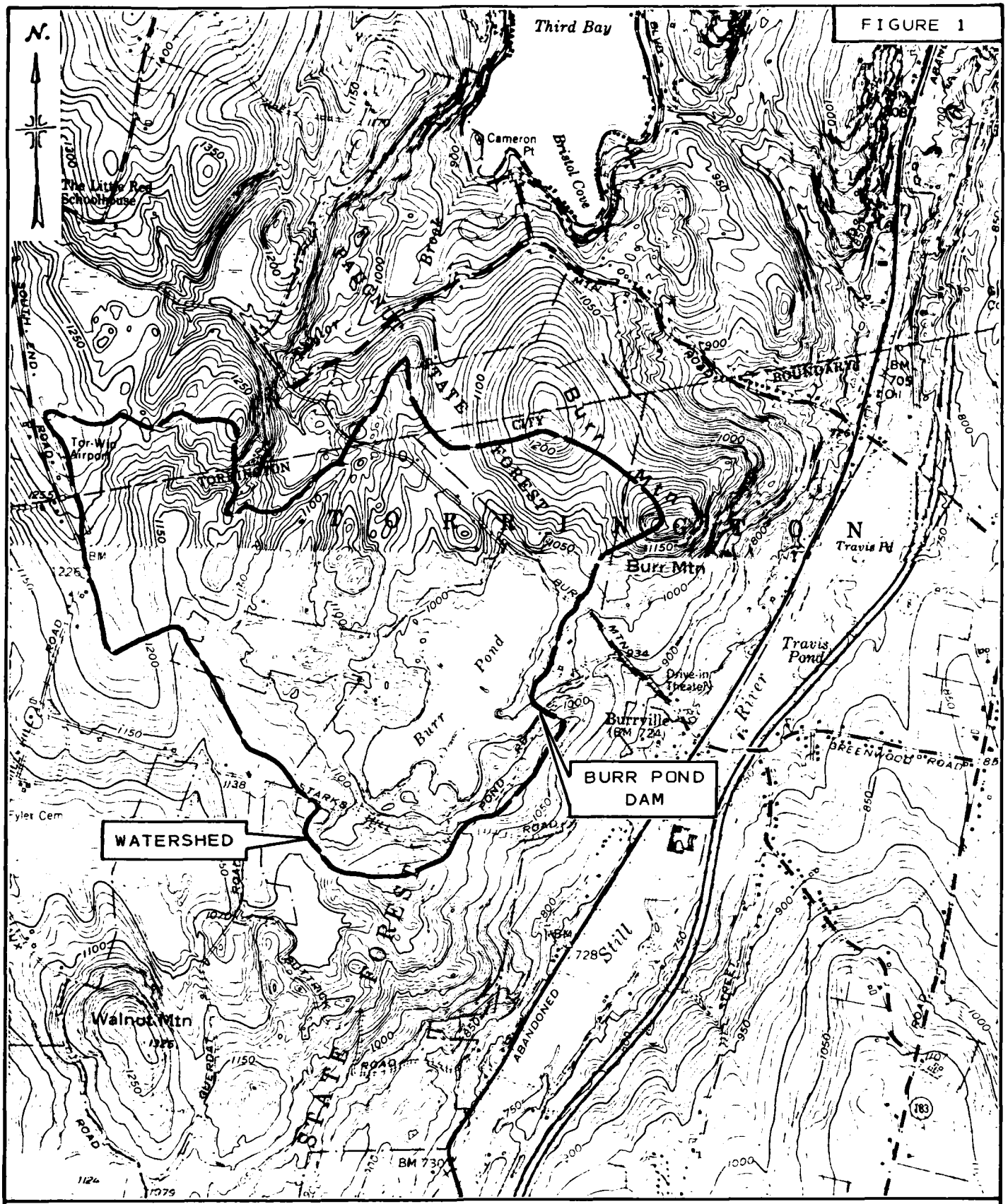
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

BURR POND DAM - CT 00099

TRIBUTARY TO STILL RIVER

TORRINGTON, CONNECTICUT DATE: 19 APRIL '80

FIGURE 1



LOCATION PLAN

BURR POND DAM
TORRINGTON, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC.

TORRINGTON 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 April 14, 1980, from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-80-C-0048 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 the Still River, approximately 3,500 feet west of Connecticut Route 8 in the Burrville section of Torrington, Connecticut. The dam is shown on the Torrington Quadrangle Map having coordinates of latitude N 41° 52.1' and longitude W 73° 05.6'.

b. Description of Dam and Appurtenant Structures

The Burr Pond Dam consists of a mortared stone masonry wall with an upstream earth embankment. The mortared stone masonry wall has a top width of 6 feet, a maximum height of 17 feet, a batter on the downstream face of 1 inch per foot, and an unknown cross-section. The earth embankment has a top width of 15 feet and an upstream slope of 2 horizontal to 1 vertical. The dam has an overall length of 170 feet, including a 44.7 foot long overflow spillway located near the center of the dam and auxiliary spillways 25 feet long to the left and 25.5 feet long to the right of the main spillway. The main spillway consists of an 8 inch thick concrete slab between stone masonry training walls. The distance from the main spillway crest to the top of the dam is 4.4 feet and the distance from the auxiliary spillway crest to the top of the dam is 1.4 feet. The top of the earth embankment is protected by stone riprap in the areas of the auxiliary spillway. The upstream slope of the earth embankment is protected by riprap only in the areas of the main and auxiliary spillways. The outlet works consist of a 6-inch cast iron high level outlet and an 18-inch corrugated metal low level outlet or blowoff controlled by manually

operated gates in a gate chamber located at the left end of the main spillway. The high level outlet discharges through the spillway face and the low level outlet or blowoff discharges below a downstream stone apron.

c. Size Classification - "Small"

According to the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, a dam is classified as "Small" 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 17 feet and a maximum storage capacity of 855 Acre-Feet. Therefore, the dam is classified as "Small" in size based upon its maximum storage capacity of 855 Acre-Feet.

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 three houses and three commercial establishments located downstream of the dam would be effected in the event of a dam breach, possibly resulting in the loss of more than a few lives. The depth of flow in the area of the commercial establishments would be 2.0 feet based on a dam breach with water level at spillway crest. A dam breach with the water level at the Test Flood elevation would not add substantially to the downstream hazard.

e. Ownership

Former Owner: Unknown

Present Owner: The State of Connecticut
Department of Environmental Protection
William Miller, Chief, Parks and Recreation
165 Capitol Avenue
Hartford, Connecticut 06115
(203) 566-2304

f. Operator Warren Whitney
Burr Pond State Park
Burr Mountain Road
Torrington, Connecticut 06790
(203) 482-1817

g. Purpose of Dam

The dam impounds Burr Pond which is used for swimming, fishing and boating.

h. Design and Construction History

There is no information available on the design and construction of the dam. It was reported that the dam was built during the 1930's by the Civilian Conservation Corps. Minor repairs have been made since the completion of the dam.

i. Normal Operational Procedures

There are no operational procedures for the dam. The low level outlet or blowoff is normally opened once a month during the summer to insure its operation.

1.3 Pertinent Data

a. Drainage Area

The drainage area consists of 1.34 square miles of "rolling" wooded terrain with very little development. Much of the drainage area is within the Paugnut State Forest.

b. Discharge at Damsite

The discharge at the damsite is normally over the 44.7' long overflow spillway. An additional 50.5' auxiliary spillway is 3' higher in elevation. Outlet works consist of a 6-inch high level outlet and an 18-inch low level outlet or blowoff controlled by manually operated upstream gates.

1.	Outlet Works (conduits) Size:	6-inch high level 18-inch low level (blowoff)
	Invert Elevation:	high level - 986.3 low level - 975.8
	Discharge Capacity:	high level - 4 cfs low level - 41 cfs
2.	Maximum Known Flood at Damsite:	Unknown
3.	Ungated Spillway Capacity at Top of Dam:	1,415 cfs*
	Elevation:	992.4
4.	Ungated Spillway Capacity at Test Flood Elevation:	720 cfs
	Elevation:	991.2
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:	720 cfs
	Elevation:	991.2
8.	Total Project Discharge at Top of Dam:	1,415 cfs*
	Elevation:	992.4
9.	Total Project Discharge at Test Flood Elevation:	720 cfs
	Elevation:	991.2

*Including Main and Auxiliary Spillways.

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

1. Streambed at Toe of Dam:	975.8
2. Bottom of Cutoff:	Unknown
3. Maximum Tailwater:	N/A
4. Recreation Pool:	988
5. Full Flood Control Pool:	N/A
6. Spillway Crest:	988
7. Design Surcharge - Original Design:	Unknown
8. Top of Dam:	992.4
9. Test Flood Surcharge:	991.2

d. Reservoir - Length in Feet

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

e. Storage - Acre-feet

1. Normal Pool:	428 Acre-Feet
2. Flood Control Pool:	N/A
3. Spillway Crest Pool:	428 Acre-Feet
4. Top of Dam:	855 Acre-Feet
5. Test Flood Pool:	750 Acre-Feet

f. Reservoir Surface - Acres

1. Normal Pool:	84 Acres
2. Flood-Control Pool:	N/A
3. Spillway Crest:	84 Acres
4. Test Flood Pool:	107 Acres
5. Top of Dam:	111 Acres

g. Dam

1. Type:	Mortared Stone Masonry with upstream earth embankment
2. Length:	170±
3. Height:	17'
4. Top Width:	6' - Stone Masonry 15' - Earth Embankment
5. Side Slopes:	Downstream - Stone Masonry 1 Horizontal to 12 Vertical Upstream - Earth Embankment 2 Horizontal to 1 Vertical
6. Zoning:	N/A
7. Impervious Core:	N/A
8. Cutoff:	Unknown
9. Grout Curtain:	Unknown
10. Other:	

h. Diversion and Regulating Tunnel — N/A

i. Spillway	Main Spillway	Auxiliary Spillway
1. Type:	Overflow spillway, concrete slab over stone masonry wall and earthen embankment	Crest and upstream slope of earth embankment protected by stone riprap
2. Length of Weir:	44.7	50.5
3. Crest Elevation with Flash Boards:	N/A	N/A
without Flash Boards:	988	991
4. Gates:	N/A	N/A
5. Upstream Channel:	Riprap on upstream slope	Riprap on upstream slope
6. Downstream Channel:	Natural streambed Mortared stone apron	Natural streambed Stone apron
7. General:	Capacity with water level at crest of auxiliary spillway 640 cfs	

j. Regulating Outlets	High Level	Low Level (blowoff)
1. Invert @ Outlet:	986.3	975.8
2. Size:	6-inch	18-inch
3. Description:	Cast iron pipe	Corrugated metal pipe
4. Control Mechanism:	Manually operated upstream gate	Manually operated upstream gate
5. Other:	Capacity - 4 cfs	Capacity - 41 cfs

ENGINEERING DATA
SECTION 2

2.1 Design Data

There was no design data available for review.

2.2 Construction Data

The dam was reported to have been constructed by the Civilian Conservation Corps in the 1930's. There was no construction data available for review. Repairs were made to the gate chamber two years ago.

2.3 Operation Data

There was no operational data available on the dam. It was reported that the blowoff gate was opened during the August 1955 Flood, but the depth of flow over the spillway was unknown. The maximum known depth over the spillway in recent years was reported to be 2 - 4 inches. It was also reported that it took approximately one month to lower the lake 5 feet in order to make repairs to the gate chamber two years ago.

2.4 Evaluation of Data

a. Availability

There was no design or construction data available from the State of Connecticut, Department of Environmental Protection, owner of the dam.

b. Adequacy

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

VISUAL INSPECTION

SECTION 3

3.1 Findings

a. General

The visual inspection of the dam was conducted on May 2, 1980. At the time of inspection the water level was approximately 0.1 feet above spillway crest. The general condition of the dam at the time of inspection was fair.

The dam consists of a mortared stone masonry wall with an upstream earth embankment, an overflow spillway at approximately the center of the dam and outlet works located at the left end of the spillway section.

b. Dam

The crest of the dam in the vicinity of the spillway for a distance of 25± feet on either side of the training walls is approximtaely 1.4 feet lower than the remainder of the dam, Photo 1. The crest of this section of the dam has been armored with large stone riprap up to 2 feet in size. The riprap is missing or displaced in several areas, Photo 2. It appears this section of the dam acts as an auxiliary overflow spillway during periods of high flow. The remainder of the crest is covered with grass and small brush. An erosion path has developed near the junction of the dam with the left abutment, Photo 3.

Riprap is present on the upstream slope of the dam in the areas of the main and auxiliary spillways. Some minor slumping and erosion of the upstream slope has occurred in those areas which are not protected by riprap. The dam crest and upstream slope are generally covered with grass and small brush as noted in Photo 4.

The section of the downstream masonry wall to the left of the spillway was observed to be in fair condition. The mortar in the joints was generally tight with some mortar missing in random joints. Some seepage through this section of the wall was observed immediately to the left of the spillway. The flow was clear with no visible evidence of turbidity. A 6 inch high by 2 foot deep section of the wall was missing approximately 3 feet above the toe and 7 feet to the left of the spillway. Seepage was observed at this location, Photo 5.

The section of the downstream masonry wall to the right of the spillway has moss growing on the surface of the wall, Photo 6. The mortar in the joints was generally tight with some mortar missing in random joints. No seepage was observed on this section of wall.

Several evergreen and hardwood trees with trunk diameters up to 6 inches were observed within 10 feet of the downstream toe on the right side of the spillway, Photo 6, and on the left side of the spillway near the left abutment.

c. Appurtenant Structures

The appurtenant structures consist of the spillway, auxiliary spillway and outlet works. The concrete spillway slab appears to be in good condition with one crack noted near the gate chamber, Photo 7. Stone steps and the gate chamber for the outlet works are located within the spillway training walls. The stone masonry training walls also appeared to be in good condition, Photo 4. There is a stone apron downstream of the spillway sections of the dam. The stone apron in the area of the main spillway has been mortared. The concrete top of the gate chamber has been recently

repaired and is in excellent condition, Photo 8. As the chamber is normally full of water, the gates were not observed, but were reported to be operable. The low level outlet or blowoff is an 18-inch corrugated metal pipe discharging downstream of the stone masonry apron. The pipe is in poor condition with numerous holes rusted through, Photo 9. It appears that portions of the pipe are surrounded with concrete.

d. Reservoir Area

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

e. Downstream Channel

The downstream channel consisted of a meandering natural streambed in a wooded area. Some rock and wood debris were observed in the streambed, particularly near the base of the spillway, Photo 10.

3.2 Evaluation

Based on the results of the visual inspection the dam is judged to be in fair condition. The following conditions could affect the integrity of the dam:

1. Continued seepage through the dam to the left of the spillway could lead to internal erosion.

2. Continued erosion and sloughing of the upstream slope could lead to losses of crest width in those areas lacking riprap.

3. Areas in the auxiliary overflow spillway section where stone riprap paving has been displaced could lead to erosion of the dam during periods of peak flow.

4. The root systems of the trees located near the downstream toe could provide pathways for seepage and internal erosion and could cause damage to the dam should they uproot during a storm.

5. The deterioration of the low level outlet or blowoff pipe could lead to deterioration of the stone masonry wall.

OPERATIONAL AND MAINTENANCE PROCEDURES

SECTION 4

4.1 Operational Procedures

a. General

The Burr Pond Dam impounds Burr Pond, which is used for recreation. There are no operational procedures for the dam. The low level outlet or blowoff gate is normally opened once a month during the summer to insure its operation.

b. Description of Any Warning System in Effect

There is no formal warning system in effect. The dam is checked during extremely heavy rains.

4.2 Maintenance Procedures

a. General

Minor repairs are made as they are required. Portions of the stone masonry have been repointed, and portions of the gate chamber have been rebuilt.

b. Operating Facilities

Debris is removed from the spillway, intake channel and gate chamber as required. The low level outlet or blowoff gate is normally opened once a month during the summer to insure its operation.

4.3 Evaluation

The present operational and maintenance procedures are adequate, but should be formalized. An operations and maintenance manual for the dam and operating facilities should be prepared. A formal warning system should be put into effect and should include monitoring the dam during heavy rains, and procedures for notifying downstream authorities. In addition, the dam should be inspected annually by a qualified, registered engineer.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

SECTION 5

5.1 General

The main spillway for Burr Pond Dam is a 44.7 foot long overflow section located approximately at the center of the dam. Auxiliary spillways adjoin the main spillway on each side with a total length of 50.5 feet. See Figure 2, page B-1. The main spillway consists of a concrete slab with a vertical downstream masonry face. The auxiliary spillways are 3 feet higher than the main spillway and consist of upstream aprons of heavy riprap and a 6 foot wide stone masonry wall downstream with a batter of 1 inch per foot. Both the main spillway and the auxiliary spillways have downstream aprons of riprap. The crest of the dam is 1.4 feet above the auxiliary spillways.

A gate chamber is located at the left end of the spillway and contains valves for a 6-inch cast iron high level outlet which discharges through the downstream face of the spillway, and an 18-inch corrugated metal low level outlet or blowoff which discharges below the downstream stone masonry apron. The outlets have a combined capacity of 45 cfs with the water level at the top of the dam.

The dam has a tributary watershed of 1.34 square miles of "rolling" wooded terrain with very little development. Much of the watershed is within the Paugnut State Forest. Elevations within the watershed range from 1,290 feet at the western end to 988 feet at the spillway.

5.2 Design Data

No design data on the dam or spillway could be found.

5.3 Experience Data

During the August 1955 Flood the water was reported to have been about 1 foot above the auxiliary spillways with the dam vibrating severely. That depth would produce a flow over the spillway of 1,225 cfs or 170 percent of the Test Flood.

5.4 Test Flood Analysis

Based on the dam failure analysis, the dam is classified as "High" hazard potential. The size of the dam is "Small", based on the height of 17 feet and storage capacity of 855 Acre- Feet. According to the Recommended Guidelines for Safety Inspection of Dams, by the Corps of Engineers, the Test Flood should be in the range of 1/2 the Probable Maximum Flood (1/2 PMF) and the Probable Maximum Flood (PMF). A Test Flood equal to 1/2 PMF was selected because the height of the dam was on the low range for a "Small" dam. The Test Flood was calculated using a peak flow of 2,125 cubic feet per second per square mile (csm), for the minimum 2 square mile drainage area shown on the guide curves supplied by the Corps of Engineers for the PMF, and the 1.34 square mile watershed of Burr Pond Dam. The 1/2 PMF peak inflow was calculated to be 1,425 cfs and the routed outflow 720 cfs. The flood routing through the reservoir was done in accordance with "Estimating Effect of Surcharge Storage on Maximum Probable Discharges" provided by the Corps of Engineers.

The capacity of the main spillway plus auxiliary spillways was calculated to be 1,415 cfs or 197% of the routed Test Flood outflow. The Test Flood would not overtop the dam.

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 when the water level reached the top of the dam.

A dam breach with water level at the peak of the Test Flood (1/2 PMF) would release up to 3,910 cfs into the stream below the dam. The flood wave would travel downstream through a narrow, steep gorge at a depth of approximately 5.5 feet for a distance of 2,600 feet. Upon leaving the gorge, the flood waters would fan out, flooding a larger area and decreasing in depth. The flood waters would cross the Old Connecticut Route 8 at a depth of approximately 3.2 feet before entering Still River, where ample storage is available to dissipate the flood wave.

The residential housing upstream of Old Route 8 would incur damage mostly due to cellar flooding with water reaching the sill level of three houses. At three commercial establishments downstream of Old Route 8 the water level would be about 3 feet above the sills. The depth of flow in this area prior to dam breach would be approximately 1.7 feet based on the maximum spillway capacity of 1,415 cfs. Dam failure at the Test Flood level would not substantially increase the downstream hazard. The areas of potential flooding are shown on Figure 5, in Appendix D.

A dam breach at spillway level with no previous downstream flooding would release up to 1,785 cfs and would produce flood flows 2 feet deep at the commercial establishments.

The dam was classified as "High" potential hazard because of the possible loss of more than a few lives should the dam fail at spillway level.

EVALUATION OF STRUCTURAL STABILITY

SECTION 6

6.1 Visual Observations

The visual inspection did not disclose any evidence of dam instability.

6.2 Design and Construction Data

There was no design and construction data available for review. Therefore, the assessment of stability is based solely on the visual inspection.

6.3 Post-Construction Changes

No known post-construction changes have been made which might jeopardize the integrity of the dam.

6.4 Seismic Stability

The dam is located in Seismic Zone 1, and in accordance with the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams does not warrant seismic analysis.

ASSESSMENT, RECOMMENDATIONS, & REMEDIAL MEASURES
SECTION 7

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection, the dam is judged to be in fair condition. The future integrity of the dam could be affected by continued seepage through the left side of the dam; continued erosion of the upstream slope of the dam; possible development of internal erosion along the root systems of the trees near the downstream toe of the dam and possible damage to the dam should the trees uproot during a storm; and deterioration of the stone masonry as a result of the poor condition of the corrugated metal low level outlet or blowoff pipe.

b. Adequacy of Information

There was no design or construction information available, and thus, the assessment of the condition of the dam is based solely on the visual inspection.

c. Urgency

The recommendations presented in Sections 7.2 and 7.3 should be carried out within one year of receipt of this Report by the owner.

7.2 Recommendations

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

1. The seepage and wet areas on the downstream face of the dam should be investigated and seepage control systems designed and constructed, as required.

2. The erosion of the upstream slope of the dam should be investigated and repairs and restoration of the upstream slope, including appropriate erosion protection, should be designed and constructed.

3. The trees and their roots located within 15 feet of the downstream toe should be removed and the root zones should be carefully backfilled with selected soils placed as directed by the engineer.

4. The condition of the low level outlet or blowoff pipe should be investigated and repairs made as required. The adequacy of the blowoff discharge capacity should also be evaluated.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

1. Brush should be removed from the upstream slopes and crest of the dam.

2. Displaced riprap in the auxiliary spillways and along the upstream embankment should be replaced.

3. A program of annual technical inspections by a qualified, registered engineer should be instituted.

4. A formal operations and maintenance manual for the dam and operating facilities should be prepared.

5. A formal warning system should be put into effect and include monitoring of the dam during extremely heavy rains and procedures for notifying downstream authorities in the event of an emergency.

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: Burr Pond Dam

DATE: 5/2/80 TIME: 8:00 am 10:30 am WEATHER: Cloudy 55°

W.S. ELEVATION: 988.1 U.S. N/A DN.S
0.1 above spillway.

	PARTY	DISCIPLINE
1.	Ronald G. Litke, P.E. - Roald Haestad, Inc.	Civil Engineer
2.	Donald L. Smith, P.E. - Roald Haestad, Inc.	Civil/Hydrologist
3.	Richard Murdock, P.E. - Geotechnical Engineers, Inc.	Geotechnical Engineer
4.		
5.		
6.		

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam Embankment	RGL,DLS,RM	Good condition.
2.	Outlet Works - Intake Channel and Intake Structure	RGL,DLS,RM	Normally under water.
3.	Outlet Works - Control Tower	RGL,DLS	Normally full of water. Gates reported operable.
4.	Outlet Works - Transition and Conduit	RGL,DLS	Low level outlet corrugated metal pipe in poor condition.
5.	Outlet Works - Outlet Structure and Outlet Channel	RGL,DLS	Discharge to natural stream.
6.	Outlet Works - Spillway Weir, Approach and Disch. Channels	RGL,DLS,RM	Good condition.
7.			
8.			
9.			
10.			
11.			
12.			

PERIODIC INSPECTION CHECK LIST

PROJECT: Burr Pond Dam DATE: 5/2/80

PROJECT FEATURE: Dam Embankment NAME: RGL, DLS

DISCIPLINE: Civil and Geotechnical Engineers NAME: RM

AREA ELEVATION	CONDITIONS
DAM EMBANKMENT	
CREST ELEVATION	992.4
CURRENT POOL ELEVATION	988.1 (0.1' above spillway level)
MAXIMUM KNOWN IMPOUNDMENT TO DATE	988.3 (during recent years)
SURFACE CRACKS	None observed.
PAVEMENT CONDITION	Grass, stone paving in the auxiliary spillway section.
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	None.
TRESPASSING ON SLOPES	Some erosion near left abutment.
VEGETATION ON SLOPES	Several trees located within 10 ft. downstream of toe of dam.
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	Erosion and minor sloughing of upstream slope.
ROCK SLOPE PROTECTION - RIPRAP FAILURES	Riprap present only along overflow spillway section, both upstream and on crest, missing or displaced at some locations.
UNUSUAL MOVEMENT OR CRACKING AT OR NEAR TOES	None observed.
UNUSUAL EMBANKMENT OR DOWNSTREAM SEEPAGE	Seepage exiting downstream masonry wall to left of spillway.
PIPING OR BOILS	None observed.
FOUNDATION DRAINAGE FEATURES	None known or observed.
TOE DRAINS	None known or observed.
INSTRUMENTATION SYSTEM	None known or observed.

PERIODIC INSPECTION CHECK LIST

PROJECT: Burr Pond Dam DATE: 5/2/80

PROJECT FEATURE: Outlet Works - Intake Channel and Intake Structure NAME: RGL,DLS

DISCIPLINE: Civil and Geotechnical Engineers NAME: RM

AREA EVALUATED	CONDITIONS
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
A. APPROACH CHANNEL:	3 ft. wide channel at left side of spillway.
SLOPE CONDITIONS	N/A
BOTTOM CONDITIONS	Could not be observed.
ROCK SLIDES OR FALLS	N/A
LOG BOOM	N/A
DEBRIS	None
CONDITION OF CONCRETE LINING	Fair
DRAINS OR WEEP HOLES	N/A
B. INTAKE STRUCTURE:	
CONDITION OF CONCRETE	Good
STOP LOGS AND SLOTS	N/A

OTHER:

Bar screen over intake.

PERIODIC INSPECTION CHECK LIST

PROJECT: Burr Pond Dam DATE: 5/2/80

PROJECT FEATURE: Outlet Works - Control Tower NAME: RGL

DISCIPLINE: Civil Engineers NAME: DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - CONTROL TOWER	
A. CONCRETE AND STRUCTURAL:	
GENERAL CONDITION	Concrete at top fairly new. Excellent condition.
CONDITION OF JOINTS	N/A
SPALLING	None
VISIBLE REINFORCING	None
RUSTING OR STAINING OF CONCRETE	None
ANY SEEPAGE OR EFFLORESCENCE	None observed. Chamber normally full of water.
JOINT ALIGNMENT	N/A
UNUSUAL SEEPAGE OR LEAKS IN GATE CHAMBER	None observed. Chamber normally full of water.
CRACKS	Crack in spillway slab near chamber.
RUSTING OR CORROSION OF STEEL	Grate rusted.
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	Could not be observed. Reported to be operable.
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: Burr Pond Dam DATE: 5/2/80

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

DISCIPLINE: Civil Engineers NAME: DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - TRANSITION AND CONDUIT	Corrugated metal pipe badly deteriorated. Appears to be partially encased in concrete.
GENERAL CONDITION OF CONCRETE	
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	N/A
NUMBERING OF MONOLITHS	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: Burr Pond Dam DATE: 5/2/80

PROJECT FEATURE: Outlet Works - Outlet Structure and Outlet Channel NAME: RGL

DISCIPLINE: Civil Engineers NAME: DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	No outlet structure. Outlet pipes discharge to natural stream below dam.
GENERAL CONDITION OF CONCRETE	N/A
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	Natural stream.
LOOSE ROCK OR TREES OVERHANGING CHANNEL	Some loose rock and debris.
CONDITION OF DISCHARGE CHANNEL	Natural stream.

PERIODIC INSPECTION CHECK LIST

PROJECT: Burr Pond Dam DATE: 5/2/80

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

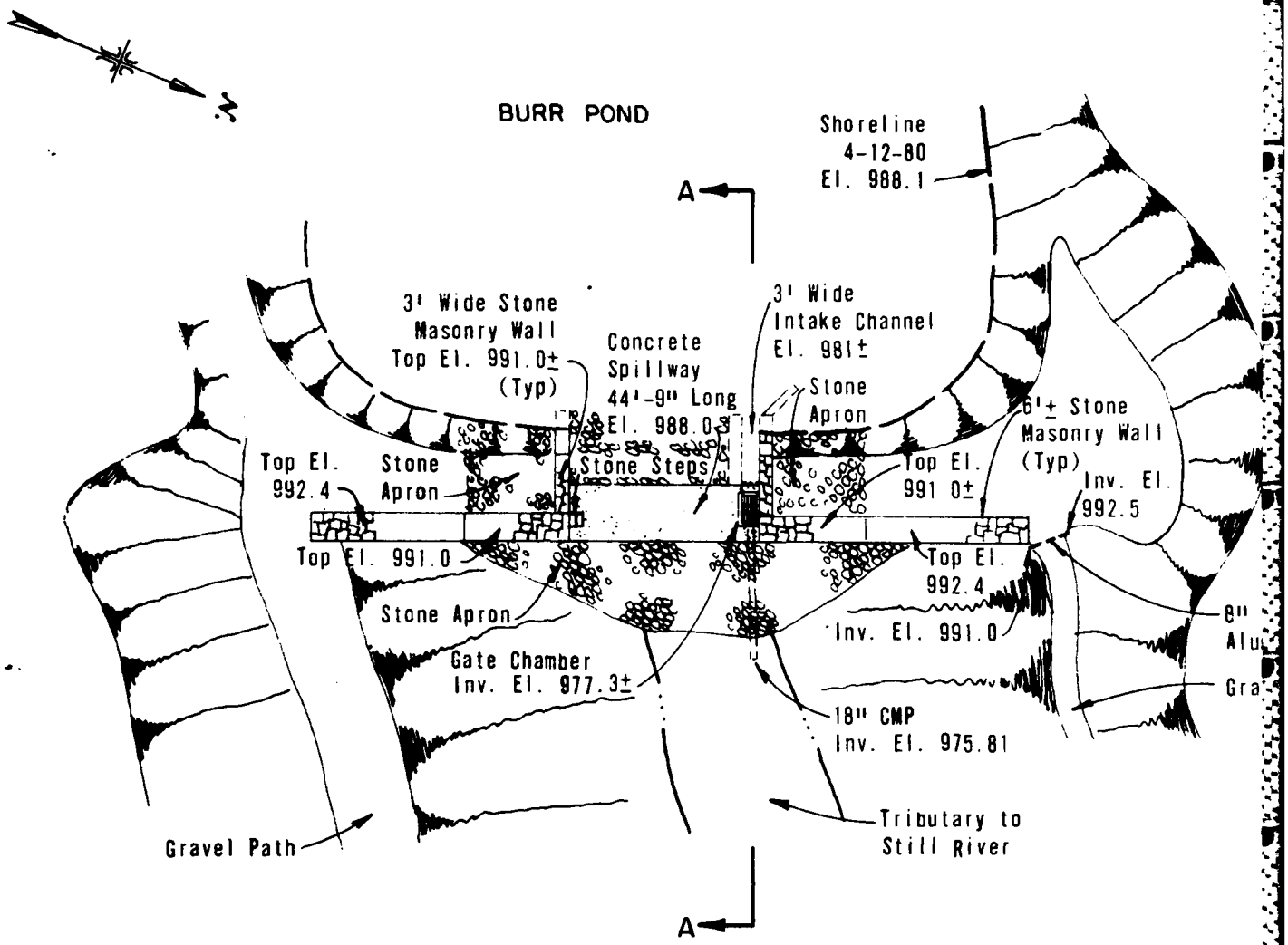
DISCIPLINE: Civil and Geotechnical Engineers NAME: RM

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
A. APPROACH CHANNEL:	Underwater - upstream face of dam.
GENERAL CONDITION	Good
LOOSE ROCK OVERHANGING CHANNEL	N/A
TREES OVERHANGING CHANNEL	N/A
FLOOR OF APPROACH CHANNEL	Riprap slope protection on upstream slope.
B. WEIR AND TRAINING WALLS:	
GENERAL CONDITION OF CONCRETE	Good
RUST OR STAINING	None observed
SPALLING	Minor deterioration. Crack in spillway slab at gate chamber.*
ANY VISIBLE REINFORCING	None observed.
ANY SEEPAGE OR EFFLORESCENCE	None observed.
DRAIN HOLES	None observed.
C. DISCHARGE CHANNEL:	
GENERAL CONDITION	Good
LOOSE ROCK OVERHANGING CHANNEL	Some large rocks adjacent to channel.
TREES OVERHANGING CHANNEL	Some trees growing in channel and on bank.
FLOOR OF CHANNEL	Stone apron downstream of dam. Natural streambed.
OTHER OBSTRUCTIONS	Some rock and wood debris in floor of channel.

***The crack extends from the downstream edge of the spillway to the right corner of the gate chamber. The crack appears to be open approximately 1/5" with the upper surface spalled from 1-1/2" to 4".**

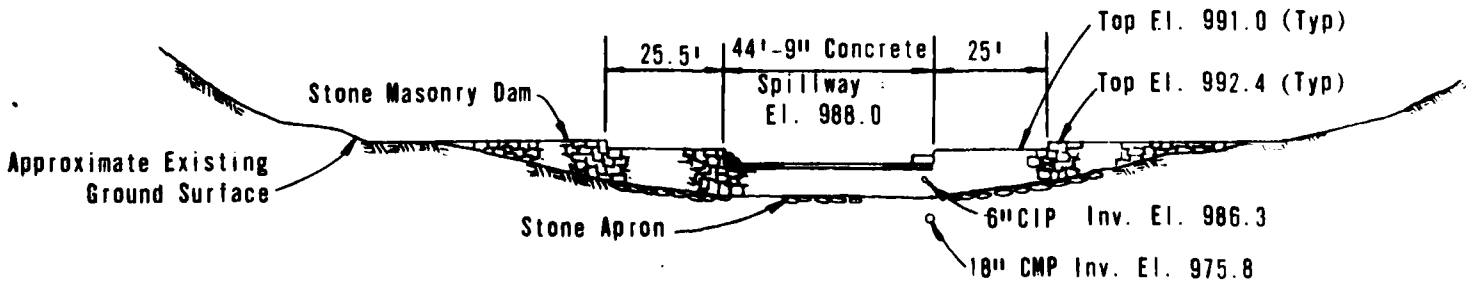
APPENDIX B

ENGINEERING DATA



PLAN

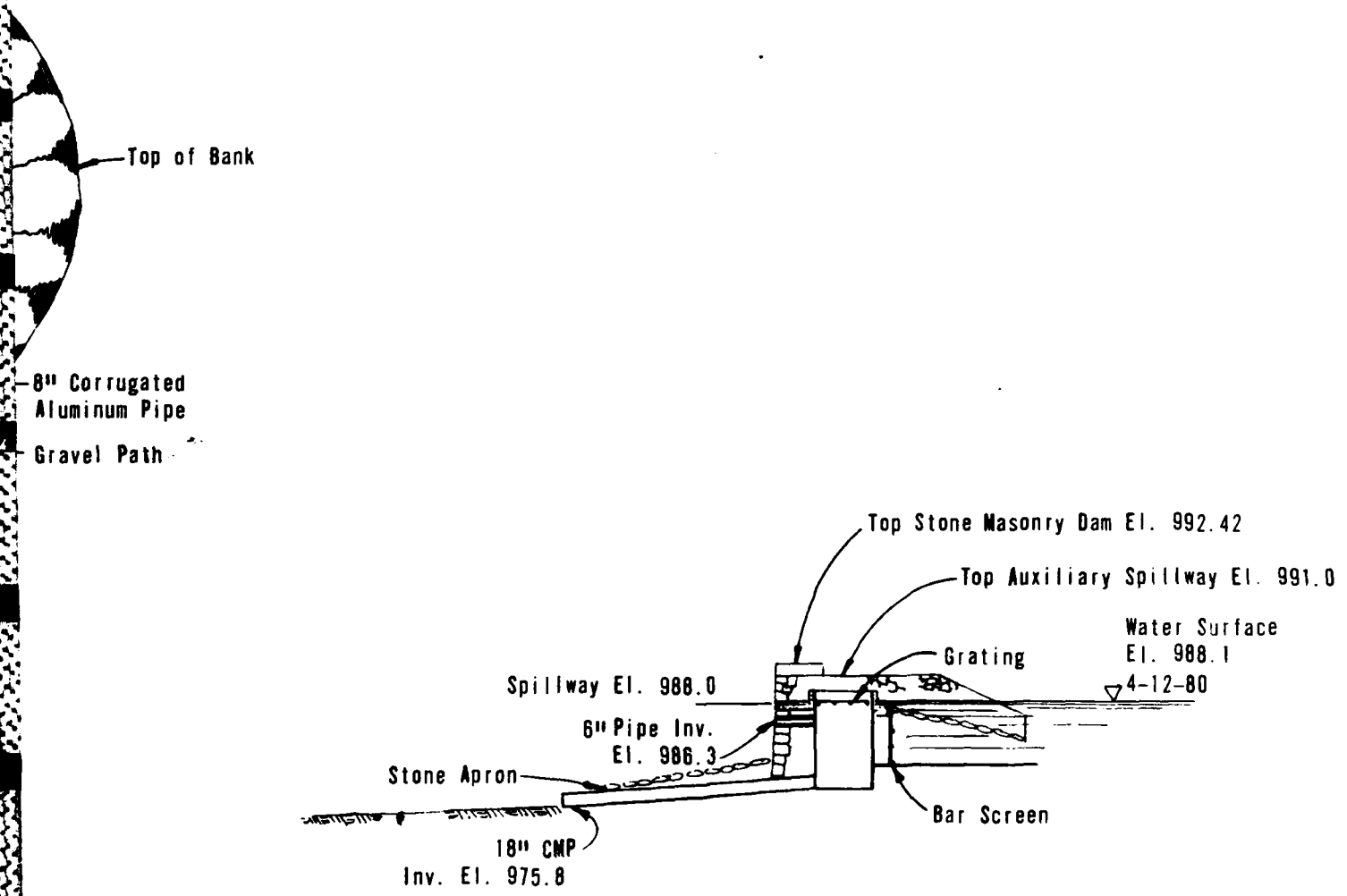
Scale: 1" = 40'



ELEVATION

Scale: 1" = 40'

FIGURE 2



SECTION A-A

Scale: 1" = 20'

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

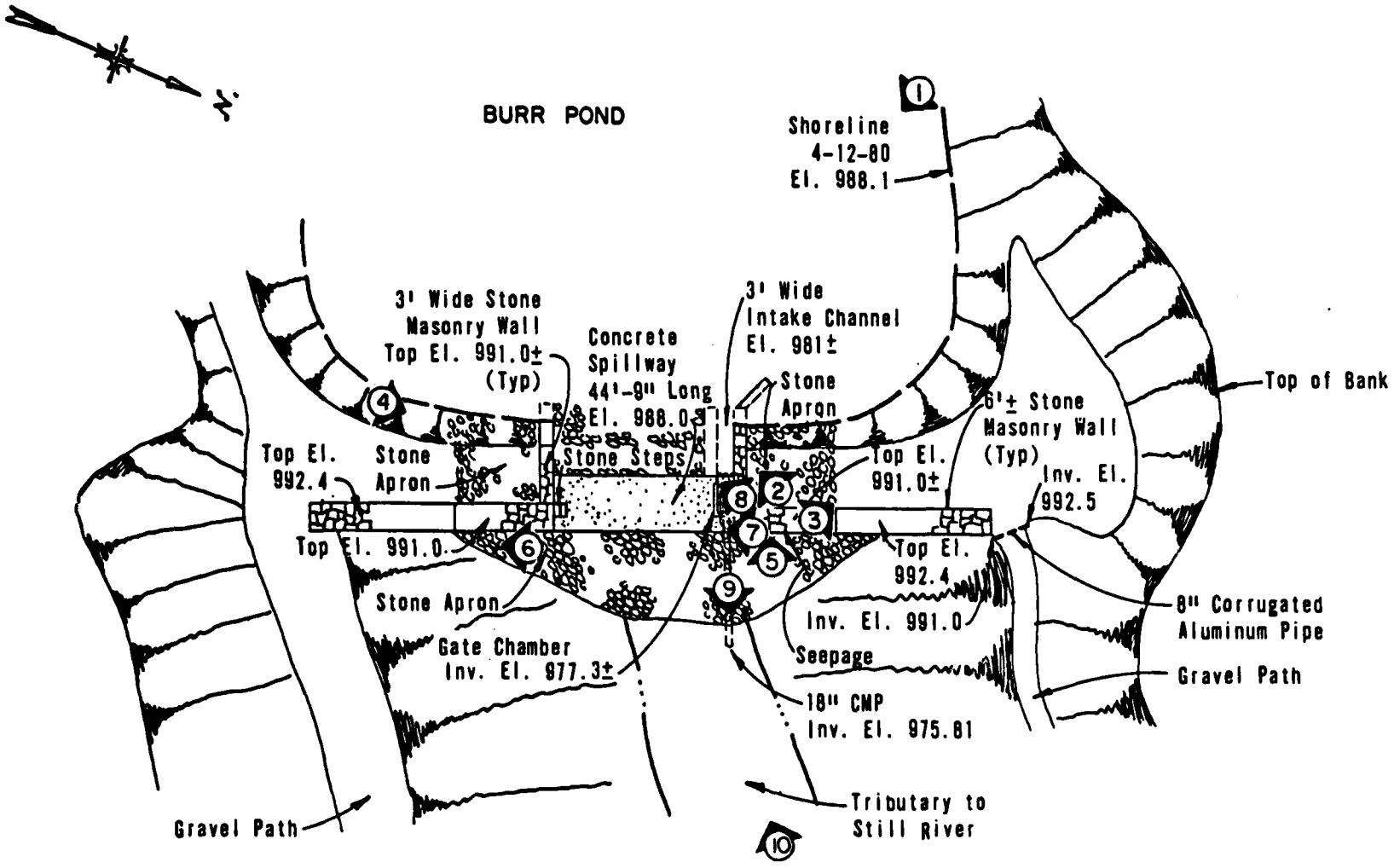
BURR POND DAM

DRAWN	CHECKED	APPROVED	SCALES AS NOTED
JRS	RGL	RH	DATE JUNE 1980 PAGE B-1

APPENDIX C

PHOTOGRAPHS

FIGURE 3



Denotes photo number and direction in which photo was taken

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

BURR POND DAM

TORRINGTON, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALES 1" = 40'
JRS	RGL	RH	DATE JUNE 1980 PAGE C-1

PHOTO NO. 1

DAM FROM UPSTREAM. NOTE MAIN SPILLWAY AND AUXILIARY SPILLWAYS

PHOTO NO. 2

MISSING SECTIONS OF RIPRAP ADJACENT TO LEFT SPILLWAY TRAINING WALL.

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	BURR POND DAM TR. TO STILL RIVER TORRINGTON, CONNECTICUT CT 00099 2 MAY '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 3

CREST FROM LEFT SPILLWAY TRAINING WALL. NOTE PATH NEAR LEFT ABUTMENT.

PHOTO NO. 4

UPSTREAM FACE FROM RIGHT ABUTMENT. NOTE GRASS COVER AND SMALL BRUSH.

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	BURR POND DAM TR. TO STILL RIVER TORRINGTON, CONNECTICUT CT 00099 2 MAY '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 5

SEEP IN STONE MASONRY WALL,
3' UP FROM TOE,
7' TO LEFT OF EDGE OF SPILLWAY

PHOTO NO. 6

DOWNSTREAM FACE
RIGHT SIDE OF DAM,
NOTE MOSS ON FACE AND
TREES DOWNSTREAM OF DAM

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	BURR POND DAM TR. TO STILL RIVER TORRINGTON, CONNECTICUT CT 00099 2 MAY '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 7

CRACK IN
SPILLWAY SLAB
AT GATE CHAMBER.

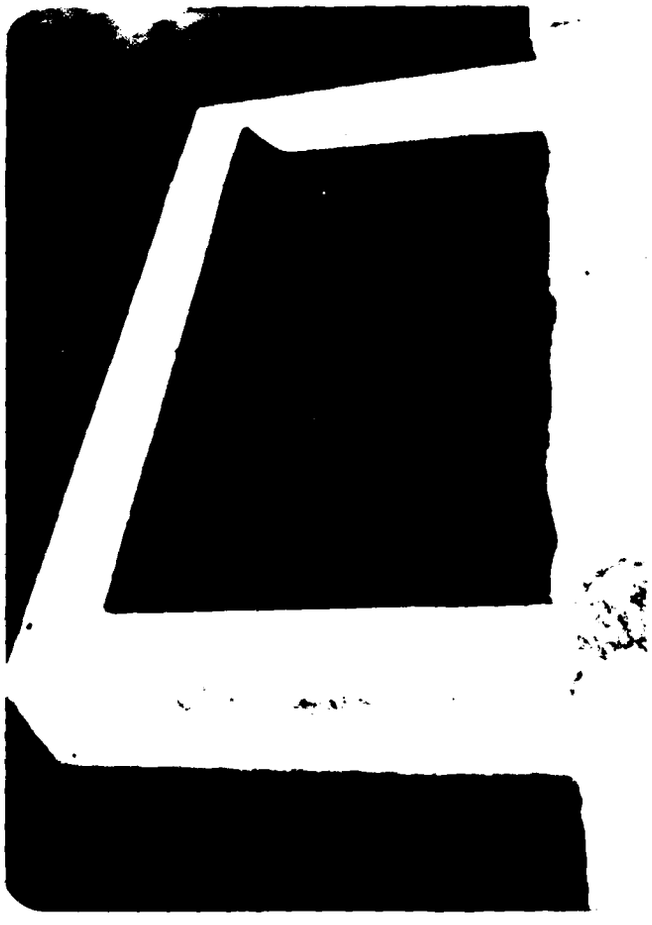


PHOTO NO. 8

GATE CHAMBER.
NOTE LOCATION WITHIN
SPILLWAY TRAINING WALLS.

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	BURR POND DAM TR. TO STILL RIVER TORRINGTON, CONNECTICUT CT 00099 2 MAY '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 9

18-INCH CORRUGATED METAL LOW LEVEL OUTLET OR BLOWOFF PIPE. NOTE DETERIORATION OF PIPE.

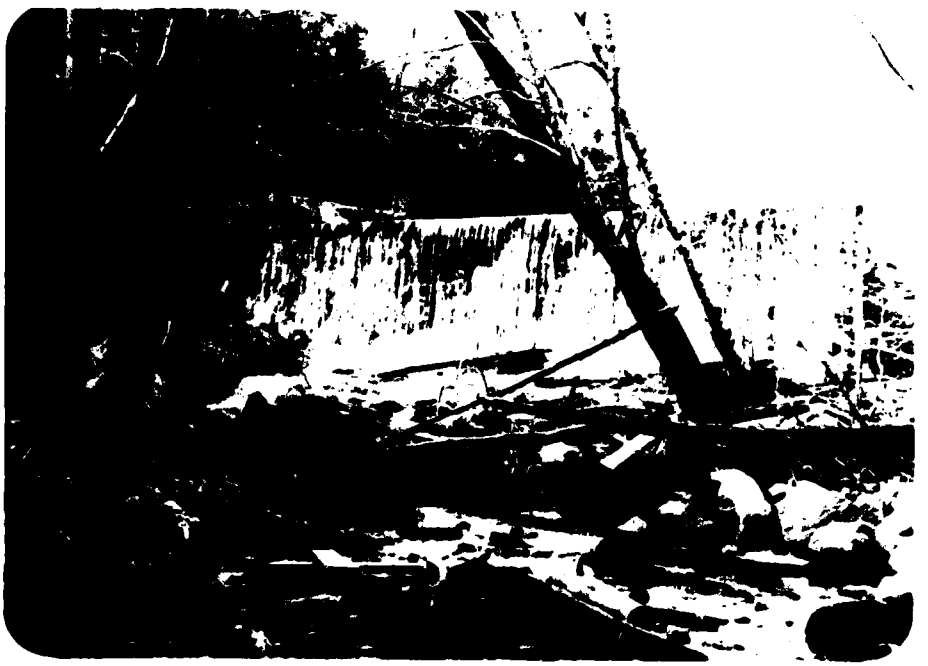


PHOTO NO. 10

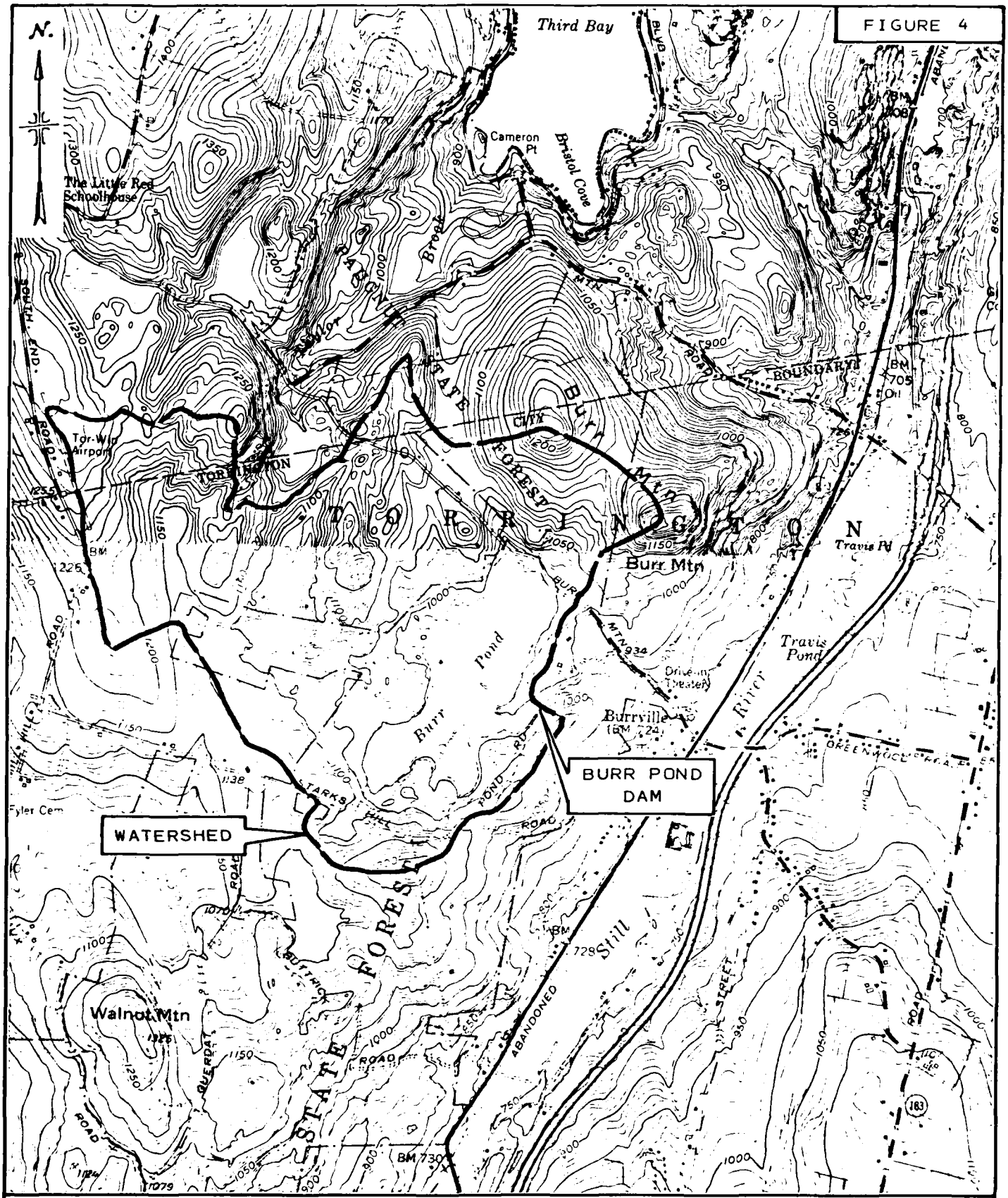
DOWNSTREAM CHANNEL. NOTE LOOSE ROCK AND DEBRIS.

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	BURR POND DAM TR. TO STILL RIVER TORRINGTON, CONNECTICUT CT 00099 2 MAY '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

FIGURE 4



WATERSHED MAP

BURR POND DAM
TORRINGTON, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC.

TORRINGTON QUADRANGLE 1972

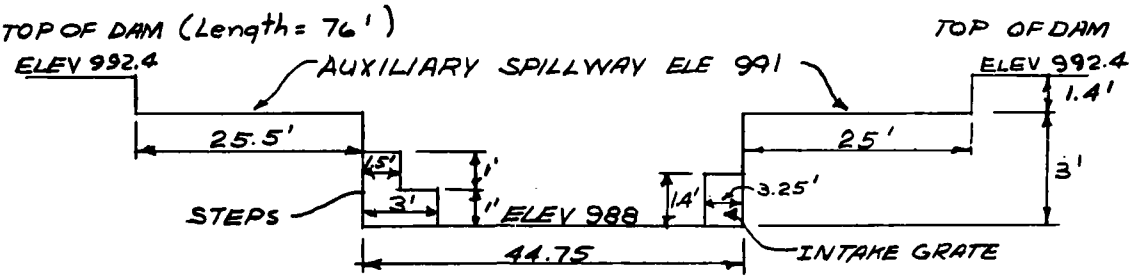
BY SAL DATE 5/7/80 **ROALD HAESTAD, INC.** SHEET NO 1 OF 10

CONSULTING ENGINEERS

CKD BY RHS DATE 5/29/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-017

SUBJECT BURR POND DAM - Discharge Capacity

Spillway Profile:



Spillway & Auxiliary Spillway Discharge Coeff = 3.0

Spillway Capacity (to auxiliary spillway level) $= CLH^{3/2} + CLH^{3/2} + CLH^{3/2} + CLH^{3/2}$

$= 3(38.5)(3)^{1.5} + 3(1.5)(2)^{1.5} + 3(1.5)(1)^{1.5} + 3(3.25)(1.4)^{1.5}$

$= 637$ cfs

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

$= 3(38.5)(4.4)^{1.5} + 3(1.5)(3.4)^{1.5} + 3(1.5)(2.4)^{1.5} + 3(3.25)(3)^{1.5} + 3(60.5)(1.4)^{1.5}$

$= 1,413$ cfs

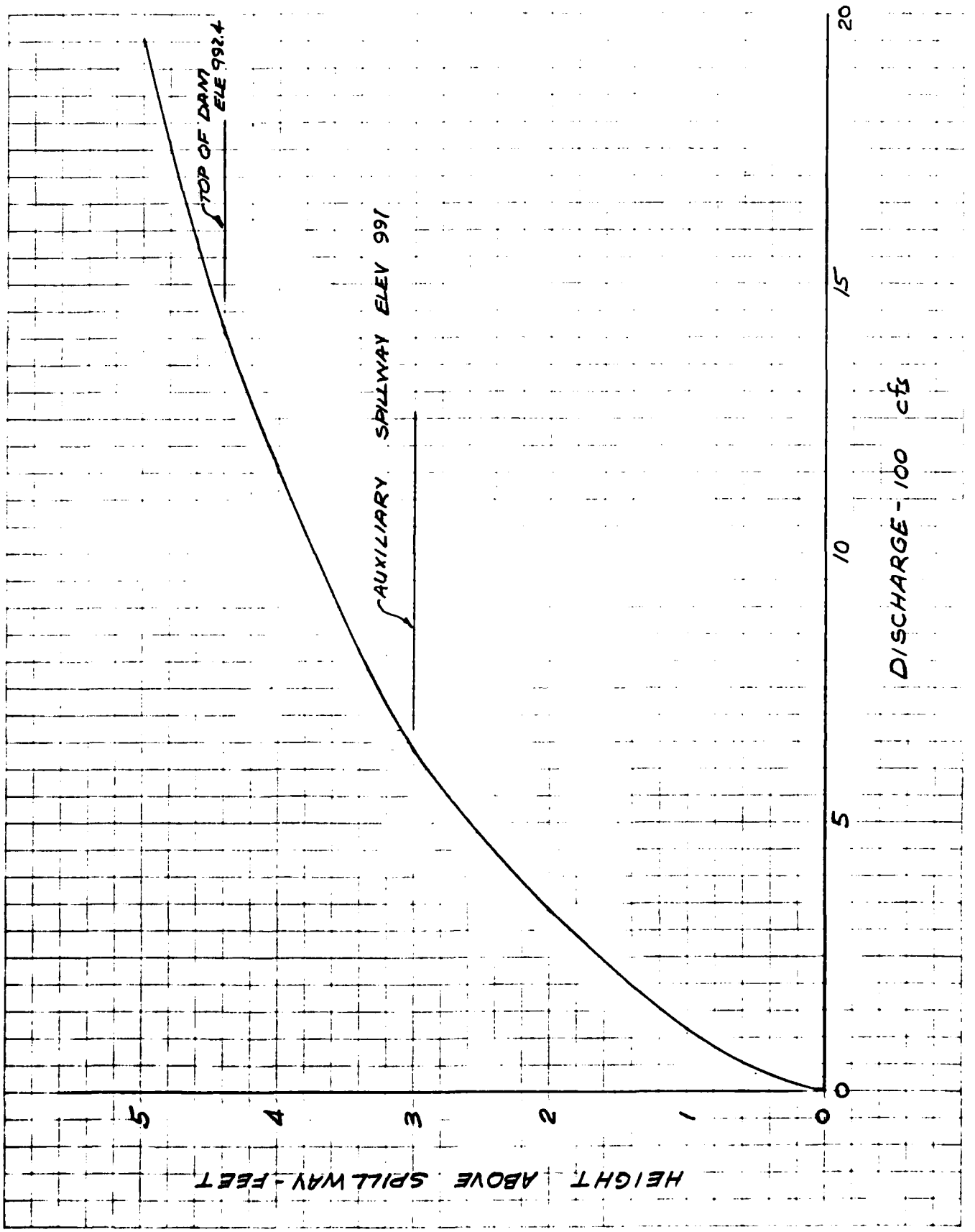
	MAIN SPILLWAY				AUXIUARY	TOP OF	TOTAL
ELEVATION (FEET)	SECT NO1 (cfs)	SECT NO2 (cfs)	SECT NO3 (cfs)	SECT NO4 (cfs)	SPILLWAY (cfs)	DAM (cfs)	DISC. CAP. (cfs)
988	0	0	0	0	0	0	0
989	116	0	0	0	0	0	116
990	327	5	5	0	0	0	337
991	600	13	20	5	0	0	638
992	924	23	41	13	151	0	1,152
992.4	1066	28	51	17	251	0	1,413
993	1,291	36	67	23	429	106	1,952

BY SAL DATE 5/7/80 **ROALD HAESTAD, INC.** SHEET NO 2 OF 10

CONSULTING ENGINEERS

CKD BY DLS DATE 5/9/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-17

SUBJECT BURR POND DAM - Discharge Capacity Curve



BY D.L.S. DATE 5/7/80 **ROALD HAESTAD, INC.** SHEET NO 3 OF 10

CONSULTING ENGINEERS

CKD BY SAL DATE 5/16/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-017

SUBJECT BURR POND DAM - STORAGE CAPACITY ABOVE SPILLWAY

ELEVATION	ACRES	ACRE-FEET	TOTAL ACRE-FEET
988	84*	0	0
990	104*	188	188
992	110	214	402
994	115	225	627
996	121	236	863
998	126	247	1110
1000	132*	258	1368

* Planimetered

BY SAL DATE 5/7/80

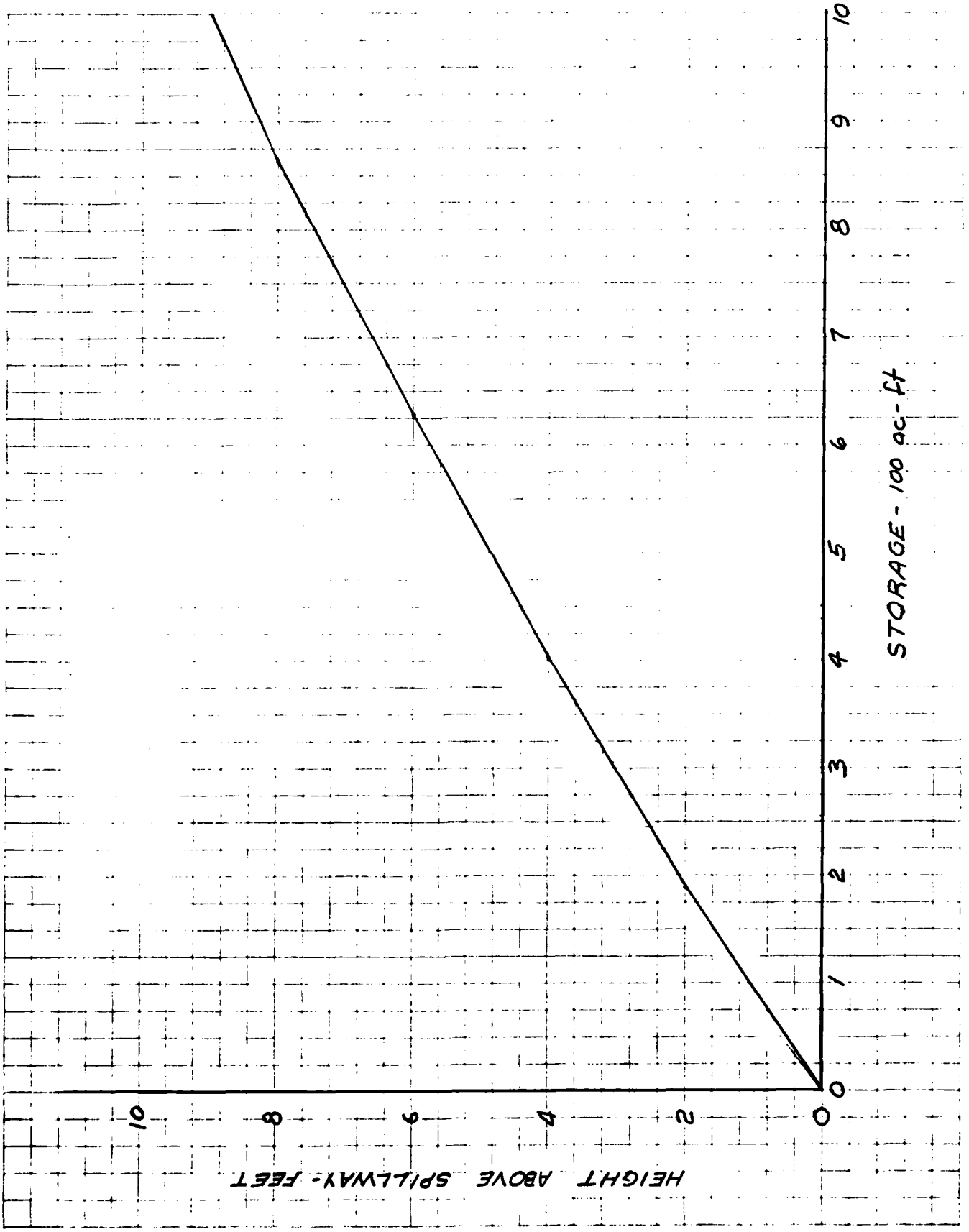
CKD BY DLS DATE 5/9/80

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

SHEET NO 4 OF 10

JOB NO 049-17

SUBJECT BURR POND DAM - Storage Capacity Above Spillway



TEST FLOOD = 1/2 PMF

Drainage Area = 857 acres = 1.34 sq. mi.

From CORPS OF ENG Chart for "Rolling" Terrain

MPF = 2,125 cfs/sq mi. (2.0 sq. mi. minimum)

PMF = 2,125 cfs/sq. mi. × 1.34 sq. mi. = 2,848 cfs

1/2 PMF = 1/2 (2848) = 1,424 cfs

Q_{P1} = 1,424 cfs

H_1 = 4.4' above spillway, from Discharge Curve

$STOR_1$ = 450 ac-ft from Storage Capacity Curve

= 6.3 inches of runoff from 1.34 sq. mi.

MPF runoff in New England equals approx 19" ∴ for 1/2 PMF runoff equals approx. 1/2 (19") = 9.5"

$Q_{P2} = Q_{P1} (1 - STOR_1/9.5) = 1,424 cfs (1 - 6.3/9.5) = 480$ cfs

H_2 = 2.5' $STOR_2$ = 245 ac-ft

$STOR_{AVG} = (STOR_1 + STOR_2)/2 = (480 + 245)/2 = 363$ ac-ft

= 5.0" of runoff

$Q_{P2} = Q_{P1} (1 - STOR_{AVG}/9.5) = 1,424 cfs (1 - 5.0/9.5) = 675$ cfs

H_3 = 3.1 ft $STOR_3$ = 305 ac-ft

$STOR_{AVG} = (STOR_{AVG} + STOR_3)/2 = (363 + 305)/2 = 334$ ac-ft

= 4.7" of runoff

$Q_{P3} = Q_{P1} (1 - STOR_{AVG}/9.5) = 1424 cfs (1 - 4.7/9.5) = 719$ cfs → H_3 = 3.2ft

Spillway Capacity (Top of dam) = 1,374 cfs (See Page D-2)

% of 1/2 PMF = (1,413/719) × 100 = 197% of 1/2 PMF

SUBJECT BURR POND DAM - Dam Breach Calculations

FAILURE AT 1/2 PMF LEVEL:

Q_P = 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(93) = 37.2 use 37'

Y_o = Total height from river bed to pool level at time of failure = 15.8'

$Q_{P1} = 8/27\ (37)(\sqrt{32.2})(15.8)^{3/2} = 3,906.9$ use 3,910 cfs

At Section No 2. the resulting depth of flow would be 3.2 Feet

FAILURE AT SPILLWAY LEVEL:

W_b = Breach Width = 0.4(60) = 24'

Y_o = Total height from river bed to pool level at time of failure = 12.5'

$Q_{P1} = 8/27\ (24)(\sqrt{32.2})(12.5)^{3/2} = 1,783.3$ use 1,785 cfs

At Section No. 2 the resulting depth of flow would be 2.0 Feet.

BY SAL DATE 5/16/80. **ROALD HAESTAD, INC.** SHEET NO 7 OF 10

CONSULTING ENGINEERS

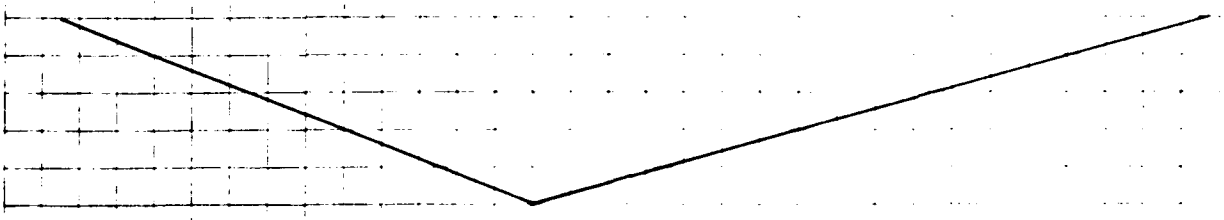
CKD BY DLS DATE 5/29/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-017

SUBJECT BURR POND DAM - Flood Routing

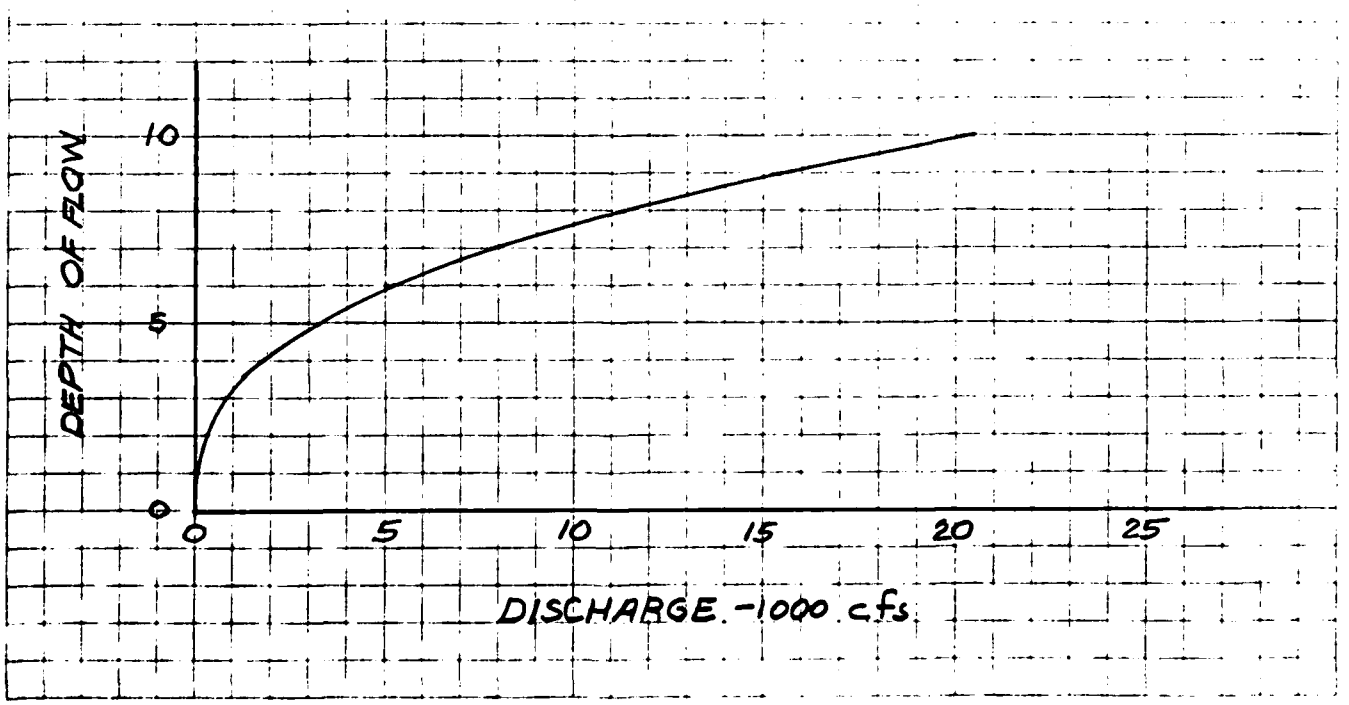
SECTION NO 1

Scale: 1" = 20' Horiz.
1" = 10' Vert.

n = 0.04 S = 0.10



H	Wp	A	R	S	V	Q
1	12	6	0.49	0.1	7.33	44
2	24	24	0.99	0.1	11.64	279
3	37	54	1.48	0.1	15.25	824
4	49	96	1.97	0.1	18.47	1,774
5	61	150	2.47	0.1	21.44	3,216
6	73	216	2.96	0.1	24.21	5,229
7	85	294	3.45	0.1	26.83	7,888
8	97	384	3.94	0.1	29.33	11,261
9	110	486	4.44	0.1	31.72	15,417
10	122	600	4.93	0.1	34.03	20,418



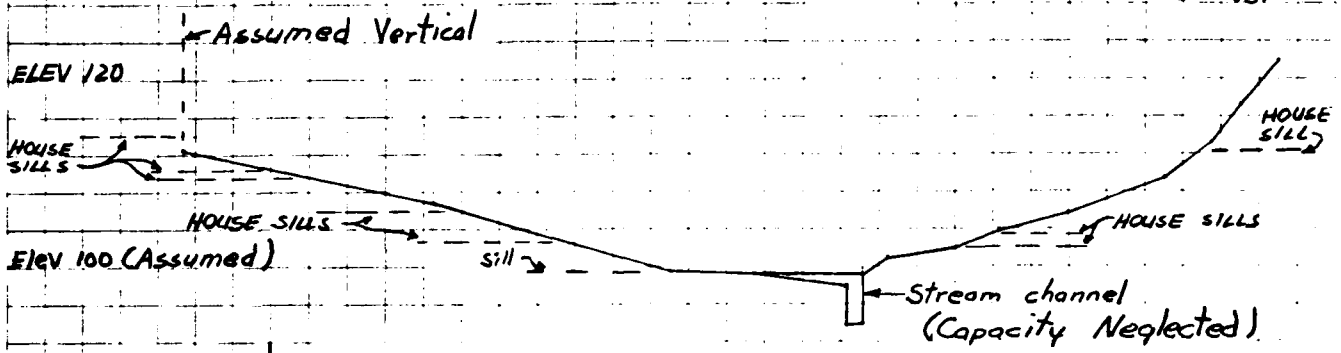
BY S.A.L. DATE 4/14/80 **ROALD HAESTAD, INC.** SHEET NO 8 OF 10

CKD BY D.L.S. DATE 5/9/80 CONSULTING ENGINEERS 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-17

SUBJECT BURR DAM - Flood Routing

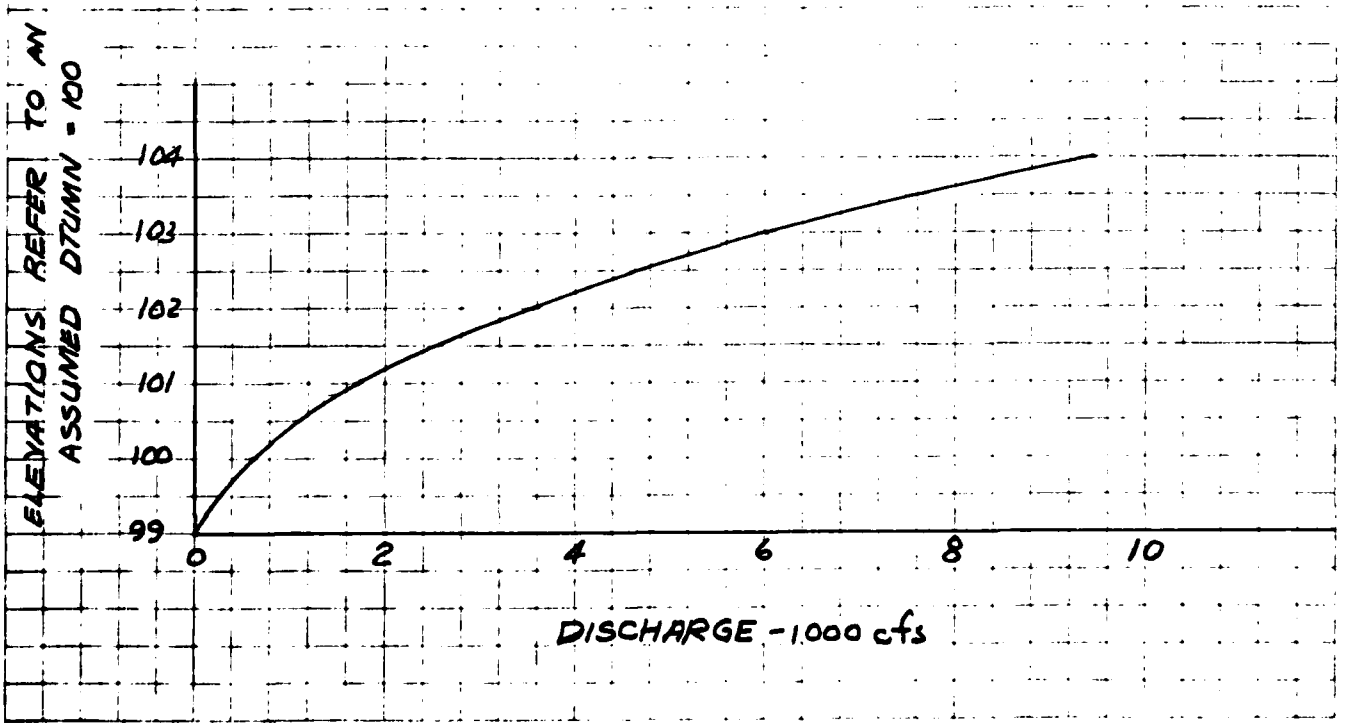
SECTION 2 (Burr Mtn. Rd., Old Route 8, & Starks Hill Rd.)

Scale: 1" = 200' Horiz
1" = 20' Vert



Elevation	$Q = CLH^{3/2}$
99	0
100	613
101	1,732
102	3,583
103	6,031
104	9,326

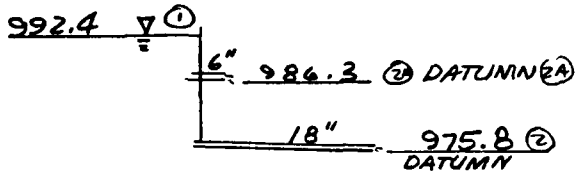
ASSUME C = 2.5



SUBJECT BURR POND DAM — Blowoff Capacity

Data: 1) Top of dam Elev. = 992.4
2) Inv. of blowoff Elev = 975.81
3) Inv. of High Level Outlet = 986.3

Head Losses: 1) In the pipe = $f(L/D)\,V_2^2/2g$
2) Gate Valve = $k(V_2^2/2g)$ $(K = 0.25)$



$$z_1 + \cancel{P_1}^{0} + \cancel{V_1^2/2g}^{0} = \cancel{z_2}^{0} + \cancel{P_2}^{0} + V_2^2/2g + H_L$$

$$z_1 = V_2^2/2g + (0.25 + f(\tfrac{32}{1.5}))\,V_2^2/2g$$

$$z_1 = (1 + 0.25 + f(\tfrac{32}{1.5}))\,V_2^2/2g$$

Trial & Error Solution

$z_1 = 16.6$ ft

V_2 (assumed) $= 10$ ft/sec $\rightarrow f = 0.0365 \rightarrow V_2 = 23$ ft/sec

$= 23$ ft/sec $\rightarrow f = 0.0350 \rightarrow V_2 = 23$ ft/sec

$\therefore Q_{TOP\,OF\,DAM} = V_2 \times A$

$= 23\ ft/sec\ (1.77\ ft^2) = 41$ cfs

6" High Level Outlet:

$$z_1 + \cancel{P_1}^{0} + \cancel{\frac{V_1^2}{2g}}^{0} = \cancel{z_{2A}}^{0} + \cancel{P_{2A}}^{0} + \frac{V_{2A}^2}{2g} + H_L$$

$$z_1 = V_{2A}^2/2g + (0.25)\,V_{2A}^2/2g$$

$$z_1 = (1 + 0.25)\,V_{2A}^2/2g$$

$$6.1 = 1.25\ V_{2A}^2/2g$$

$$V_{2A} = 17.7\ ft/sec$$

$\therefore Q_{TOP\,OF\,DAM} = V_{2A} \times A$

$= 17.7\ ft/sec \times 0.2\ ft^2$

$= 3.5$ cfs

Note: friction loss in pipe is neglected because pipe is 5 ft long.

Planimeter Readings:

1) Surface Area : Third = 4.42 sq in 0.91
ELEV 988 First = 2.62 sq in 0.92
Start = 1.70 sq in

$$0.91\,in^2 \times \frac{(2000\,ft)^2}{in^2} \times \frac{1\,acre}{43{,}560\,ft^2} = 83.6 \text{ use } 84 \text{ acres}$$

2) Watershed: Third = 29.14 sq in 9.33
First = 10.48 sq in 9.32
Start = 1.16 sq in

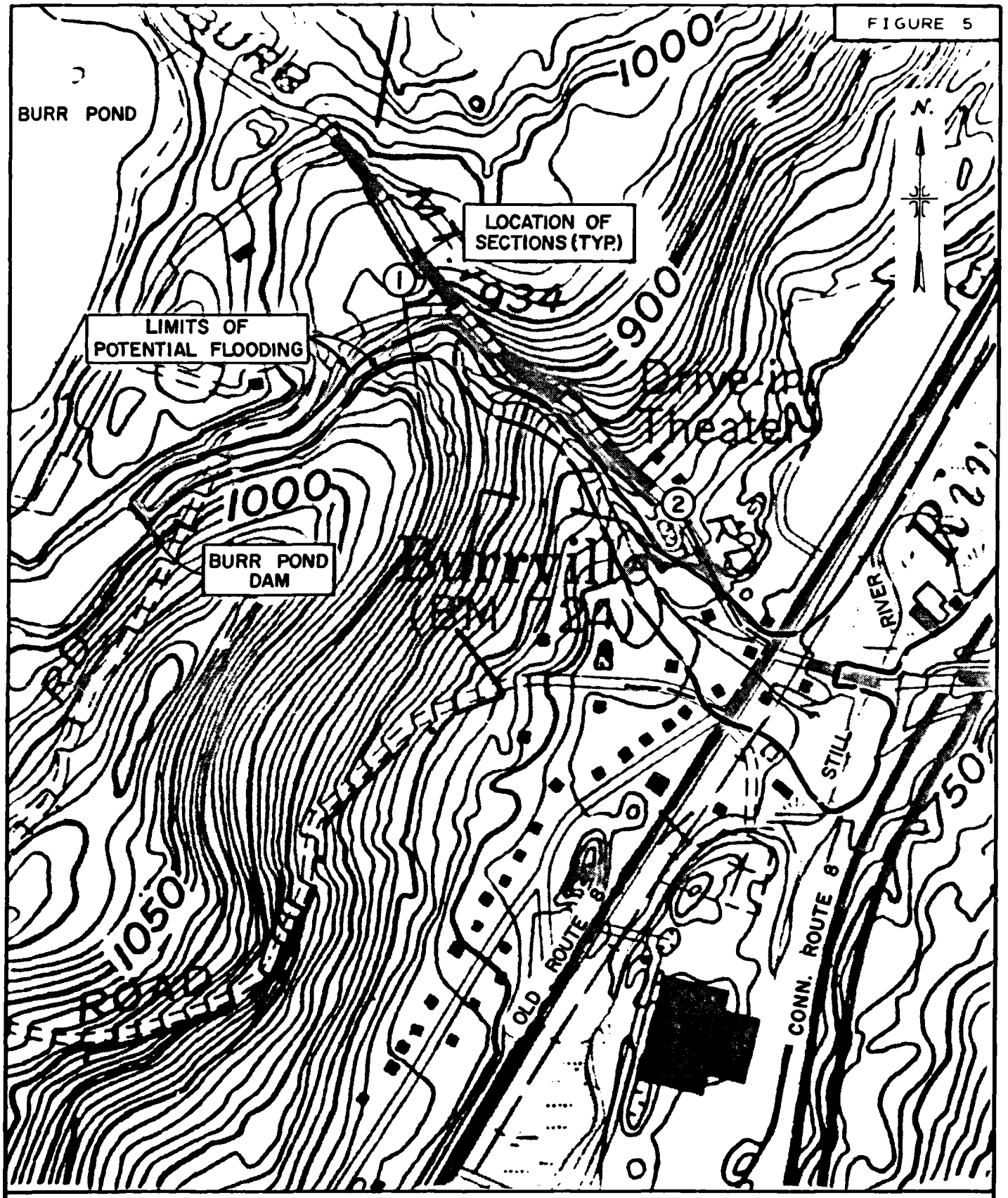
$$9.33\,in^2 \times \frac{(2000\,ft)^2}{in^2} \times \frac{1\,sq\,mi}{(5{,}280\,ft)^2} = 1.34 \text{ sq mi}$$

1a) SURFACE AREA ELEV. 990

THIRD	29.96	1.13	= 103.8 Acres
FIRST	27.70	1.12	
START	26.58		USE 104 Acres

1b) SURFACE AREA ELEV. 1000

THIRD	34.26	1.44	= 132.2 Acres
FIRST	31.37	1.44	
START	29.93		USE 132 Acres



LIMITS OF POTENTIAL FLOODING

BURR POND DAM
TORRINGTON, CONNECTICUT

SCALE: 1" = 500'

ROALD HAESTAD, INC.

TORRINGTON QUADRANGLE 1972

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

(1) STATE	(2) IDENTITY NUMBER	(3) DIVISION	(4) STATE	(5) COUNTY	(6) CONGR DIST.	(7) STATE	(8) COUNTY	(9) CONGR DIST.	(10) NAME	(11) LATITUDE (NORTH)	(12) LONGITUDE (WEST)	(13) REPORT DATE DAY	MO	YR
CT	99	NED	CT	005	06				HUPP POND DAM	4152.1	73[illegible]	02	JUN	80

(14) POPULAR NAME	(15) NAME OF IMPOUNDMENT
	HUPP POND

(16) REGION	(17) BASIN	(18) RIVER OR STREAM	(19) NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	(20) DIST FROM DAM (MI)	(21) POPULATION
01	CH	TRIBUTARY	HUPPVILLE	1	1200

(22) TYPE OF DAM	(23) YEAR COMPLETED	(24) PURPOSES	(25) STRUCTURAL HEIGHT (FT.)	(26) HYDRAULIC HEIGHT (FT.)	(27) IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	NORMAL (ACRE-FT.)
EARTH	1915	R	17	17	465	425

(28) REMARKS
22 ESTIMATE 22 ESTIMATE

(29) D/S HAS	(30) SPILLWAY LENGTH	TYPE	WIDTH (FT.)	(31) MAXIMUM DISCHARGE (FT.)	(32) VOLUME OF DAM (CY)	(33) POWER CAPACITY INSTALLED (MW)	PROPOSED (MW)	(34) NAVIGATION LOCKS NO	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
Y	170	U	95	1915	2500											

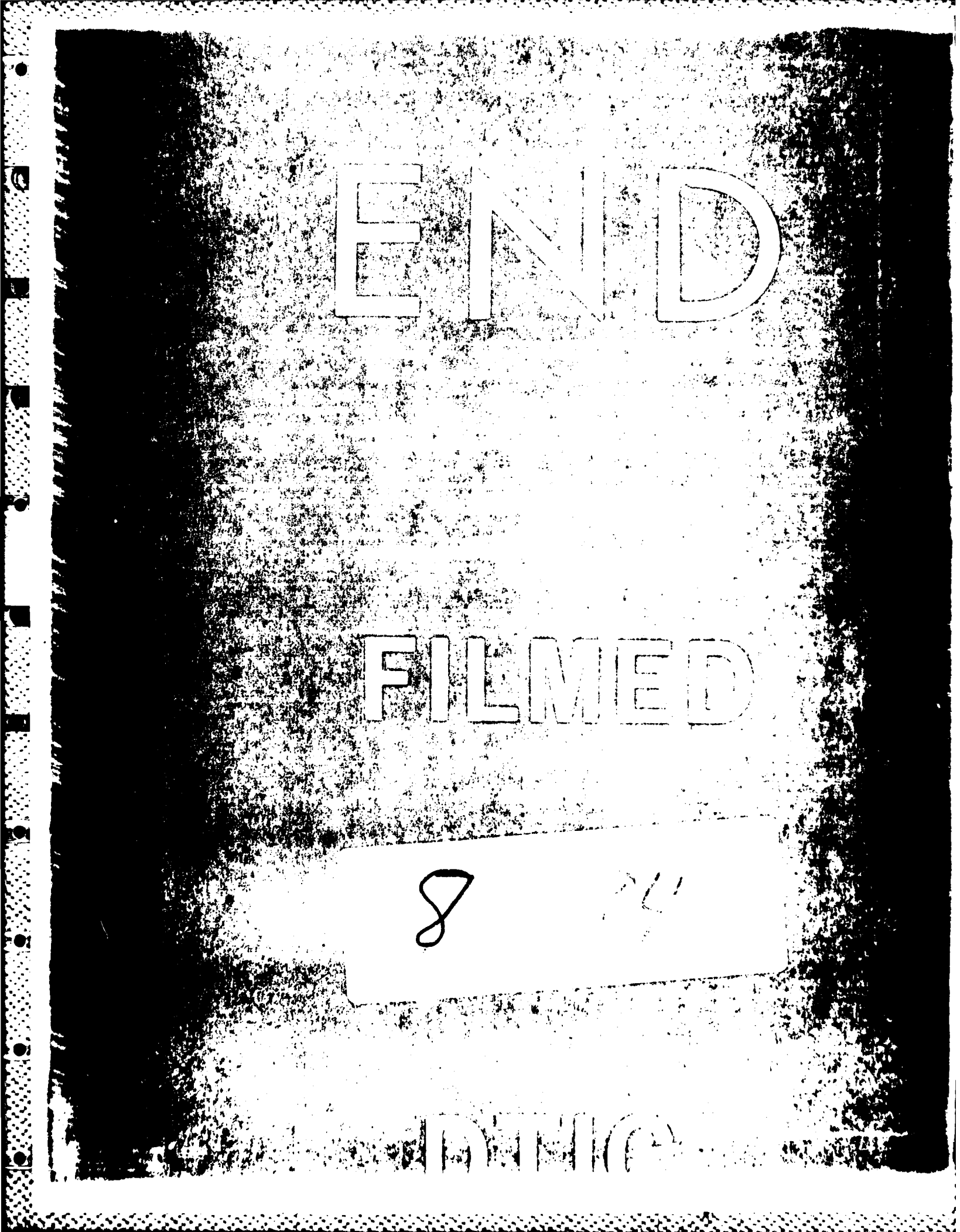
(35) OWNER	(36) ENGINEERING BY	(37) CONSTRUCTION BY
STATE OF CONNECTICUT DEP		CIVIL CONSERVATION CORPS

(38) REGULATORY AGENCY DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
CT DEP	CT DEP	CT DEP	CT DEP

(39) INSPECTION BY	(40) INSPECTION DATE DAY	MO	YR	(41) AUTHORITY FOR INSPECTION
HALEY HARSTAD INC	[illegible]			PL 92-367

(42) REMARKS

LIST	DAM	FED R	PRV/FED	SDS A	VER/DATE
NED	N	N	N	N	25JUN80


END
FILMED
8