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NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
ROGERS POND DAM (CT 0. (U) CORPS OF ENGINEERS WALTHAM
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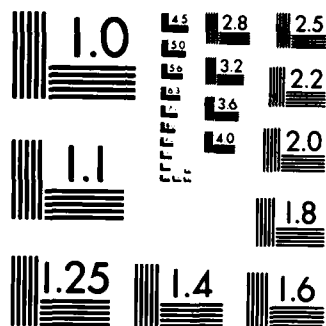
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CONNECTICUT RIVER BASIN
DEEP RIVER, CONNECTICUT



**ROGERS POND DAM
CT 00428**

**PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM**

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS. 02154

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Rogers Pond Dam is a 231 foot long earth and vertical stone masonry dam with a maximum height of 9 feet. There is a 50 foot long concrete spillway near the center of the dam. The width of the dam varies from a minimum of 6 feet at the right spillway edge to 21 feet at the left abutment. The visual inspection of Rogers Pond Dam indicated that the dam is in fair condition. Based on its small size and significant hazard classification and in accordance with the Corps Guidelines, the test flood is equal to $\frac{1}{4}$ the PMF.		



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAFLET ROAD
WALTHAM, MASSACHUSETTS 01981

ATTENTION: CIVIL

JUL 02 1981

NEDED

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

Dear Governor O'Neill:

Inclosed is a copy of the Rogers Pond Dam (CT-00428) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is vitally important.

Copies of this report have been forwarded to the Department of Environmental Protection, and to the owner, Donald R. Carlson, Deep River, CT. Copies will be available to the public in thirty days.

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

Sincerely,

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

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ROGERS POND DAM
CT 00428

CONNECTICUT RIVER BASIN
DEEP RIVER, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.: CT 00428
Name of Dam: Rogers Pond Dam
Town: Deep River
County and State: Middlesex County, Connecticut
Stream: Deep River
Date of Inspection: November 25, 1980

BRIEF ASSESSMENT

Rogers Pond Dam is a 231 foot long earth and vertical stone masonry dam with a maximum height of 9 feet. There is a 50 foot long concrete spillway near the center of the dam. The width of the dam varies from a minimum of 6 feet at the right spillway edge to 21 feet at the left abutment. The purpose of this dam is primarily recreational.

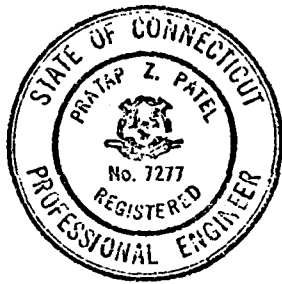
The visual inspection of Rogers Pond Dam indicated that the dam is in fair condition. The inspection revealed that portions of the upstream masonry wall have been displaced at several locations. Numerous trees are growing on the left upstream embankment. Seepage was noted along the stone wall on both sides of the spillway and the ground was wet and soggy 25 feet downstream of the left side of the dam, and a large depression was observed just downstream of the wall along the right side of the dam.

Based on its small size and significant hazard classification and in accordance with the Corps Guidelines, the test flood is equal to 1/4 the Probable Maximum Flood. The storage at top of dam is 60 acre-feet. The spillway will discharge 500 cfs or 42% of the test flood with the pool level at the top of the dam. The peak test flood inflow is 1195 cfs, with a peak test flood outflow of 1140 cfs, which will overtop the dam by 0.6 feet.

Based on the findings of the visual inspection and hydrologic and hydraulic analysis, there is need for additional engineering analysis and possibly design. This would include repairing the upstream vertical

masonry wall and clearing trees and their root systems from the dam and the area downstream of the toe of the dam and replacing with compacted fill. An investigation of the seepage through the wall on both sides of the spillway and the wet spots downstream of them should be completed with design and construction of remedial measures if needed. The depression to the right of the spillway wall should be investigated and appropriate remedial measures designed, if required. A detailed hydrologic and hydraulic analysis should be carried out to assess further the potential of overtopping the dam and the need for and means to increase project discharge capacity. In addition, the condition, operability and capacity of the outlet works should be assessed and a determination made of any need for modifications.

The recommendations and remedial measures are described in Section 7 and should be addressed within one year after receipt of this Phase I Inspection Report by the owner.



Pratap Z. Patel, P.E.
Project Manager

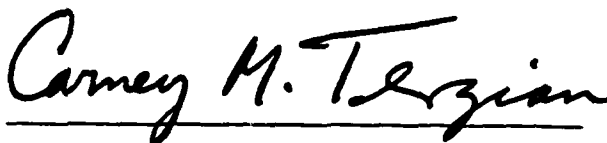
A handwritten signature in cursive script that reads "Pratap Z. Patel".

Philip W. Genovese & Associates, Inc.
Hamden, Connecticut

This Phase I Inspection Report on Rogers Pond Dam (CT-00428) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.



ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

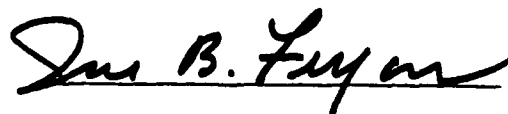


CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division



JOSEPH W. FINEGAN, JR., 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 normal operating environment of the structure.

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

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

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

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

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

PHILIP W. GENOVESE AND
ASSOCIATES, INC.
ENGINEERS - HAMDEN, CT.

NATIONAL
PROGRAM
OF
INSPECTION
OF
NON-FED
DAMS

OVERVIEW PHOTO

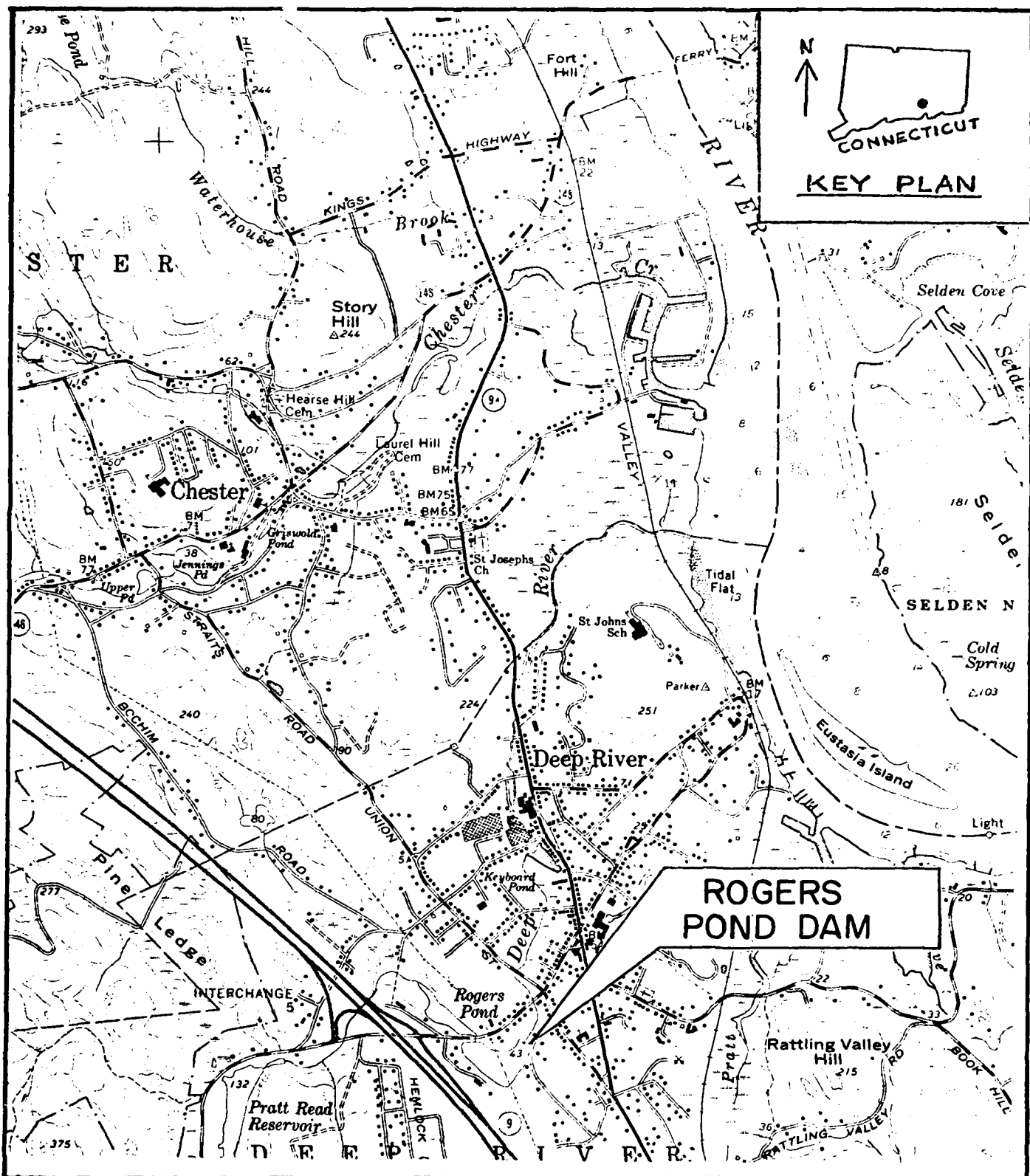
DECEMBER, 1980

ROGERS POND DAM

DEEP RIVER

DEEP RIVER,

CONNECTICUT



USGS QUAD
DEEP RIVER.CT.



PHILIP W. GENOVESE AND
ASSOCIATES, INC.

ENGINEERS - HAMDEN, CT.

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

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NATIONAL PROGRAM OF INSPECTION OF
NON - FED DAMS
LOCATION MAP

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
ROGERS POND DAM-CT00428

SECTION I
PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Philip W. Genovese & Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in South Central Connecticut. Authorization and notice to proceed were issued to Philip W. Genovese & Associates, Inc. under a letter of November 17, 1980 from Colonel William E. Hodgson Jr., Corps of Engineers. Contract No. DACW 33 81-C-0017 has been assigned by the Corps of Engineers for this work.

b. Purpose

1. Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.
2. Encourage and prepare the states to initiate quickly effective dam safety programs for non-federal dams.
3. Update, verify, and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

Rogers Pond Dam is located in the Town of Deep River in Middlesex County, Connecticut. The pond is located just south of Lord's Lane, a short distance west of the intersection of Lord's Lane and Union Street. The dam impounds the waters of Deep River, and is shown on the Deep River, Connecticut Quadrangle, with the approximate coordinates of

North $41^{\circ} 22.9'$; West $72^{\circ} 26.3'$. The dam is approximately 1.9 miles upstream of the confluence of Deep River with the Connecticut River.

b. Description of Dam and Appurtenances

Rogers Pond Dam is an earthen and dry rubble masonry dam with a maximum height of 9 feet and a length of 230 feet. There is a 50 foot long concrete spillway located near the center of the dam. The upstream face is earthen with a slope of 3 horizontal to 1 vertical. The downstream face is a vertical dry rubble wall. The width of the dam varies from 6 feet to 21 feet. There is an outlet works consisting of a headwall, conduit and outlet channel. The intake does not have a control mechanism but is presently blocked off. There is considerable tree growth near the bottom of the dam and outlet channel. Sheet B-1 shows the locations of these features.

c. Size Classification

The dam's maximum impoundment of 60 acre-feet and height of 9 feet places it in the SMALL size category, using as a reference the size classification table in the Corps of Engineer's Recommended Guidelines for Safety Inspection of Dams. Table 1 defines a small impoundment as having between 50 and 1000 acre-feet of storage.

d. Hazard Classification

The hazard potential classification for this dam is SIGNIFICANT, using the Corps Guidelines, because there are 3 houses downstream of the dam which would have flooding of less than 2 feet of water as a result of the dam failure. A breach could result in the loss of a few lives. There are also several streets nearby which would be subject to flood damage in the case of a dam break.

e. Ownership

The dam is owned by Donald R. Carlson, 38 Lord's Lane, Deep River, Connecticut 06417.

f. Operator

The operation of the dam is controlled by the owner, who may be reached by telephone at 203-526-2561.

g. Purpose of the Dam

The purpose of the dam is primarily recreational.

h. Design and Construction History

It appears that Rogers Pond Dam was constructed in or around 1850, but there is no design or construction information available.

i. Normal Operational Procedures

The dam is a run of the river type and is not regulated. There is an outlet works consisting of a headwall, conduit and outlet channel. The intake which has an invert of 38.7 NGVD is presently blocked off and the condition and size of the conduit is unknown.

1.3 Pertinent Data

a. Drainage Area

The drainage area for this dam cover 6.00 square miles, or 3840 acres, of very irregular topography. North and west of the dam there are a number of large swampy areas and small ponds which drain into Deep River but there are also numerous wooded hills and high ledge formations. The topography of the watershed ranges in elevation from 43 feet to 438 feet. The drainage area is sparsely populated, and includes part of Cockaponset State Forest. The pond is fed by the waters of Deep River, which outlets from the dam, flows through the village, and enters the Connecticut River.

b. Discharge at Damsite

1. The intake structure at invert elevation 38.7 is of unknown size and discharge capacity, because it could not be observed at the time of inspection.
2. The maximum flood at damsite is unknown. However, the owner has pictures of water at the top of dam indicating a discharge of 500 cfs.
3. The ungated spillway capacity at top of dam elevation of 44.1 is 500 cfs.

4. The ungated spillway capacity at test flood elevation of 44.8 is 1140 cfs.
5. The gated spillway capacity at normal pool elevation is not applicable.
6. The gated spillway capacity at test flood elevation is not applicable.
7. The total spillway capacity at test flood elevation of 44.8 is 1140 cfs.
8. The total project discharge at top of dam elevation of 44.1 is 500 cfs.
9. The total project discharge at test flood elevation of 44.8 is 1140 cfs.

c. Elevation (Feet above NGVD)

1. Streambed at centerline of dam	34.8
2. Bottom of cutoff	Unknown
3. Maximum tailwater	43.1 (appro.)
4. Normal pool	42.2
5. Full flood control pool	N/A
6. Spillway crest (ungated)	42.2
7. Design surcharge	Unknown
8. Top of dam	44.1
9. Test flood surcharge	45.6

d. Reservoir (Length in feet)

1. Maximum Pool	4000
2. Normal Pool	2100
3. Flood Control Pool	N/A

e. Storage (Acre-feet)

1. Normal Pool	30
2. Spillway crest pool	30
3. Flood control pool	N/A
4. Top of dam	60
5. Test flood pool	90

f. Reservoir Surface (Acres)

1. Normal Pool 12.4
2. Flood control pool N/A
3. Spillway crest pool 12.4
4. Test flood pool 23.5
5. Top of dam 18.5

g. Dam

1. Type Earthen with dry rubble masonry face
2. Length 231 feet
3. Height 9.3 feet
4. Top Width Varies from
6 feet to 21 feet
5. Sides Slopes Upstream 3 horizontal:1 vertical
Downstream Vertical
6. Zoning Unknown
7. Impervious core Unknown
8. Cutoff Unknown
9. Grout curtain Unknown

h. Diversion and Regulating Tunnel

None

i. Spillway

1. Type Rubble masonry with concrete cap
2. Length of weir 50 feet
3. Crest elevation 42.2
4. Gates N/A
5. Upstream channel Underwater
6. Downstream channel Tree & brush lined natural channel

j. Regulating Outlet

1. Inverts 38.7-Outlet intake
35.7-Outlet discharge
2. Size Unknown
3. Description The outlet works consists of a headwall,
conduit, and channel. The outlet conduit
is buried and its present operability is
unknown.
4. Control Mechanism None - the intake is presently
blocked off to prevent a discharge
through the outlet works.

SECTION 2 ENGINEERING DATA

2.1 Design Data

Rogers Pond Dam was constructed around 1850 for water power purposes. No engineering data were found for this dam.

2.2 Construction Data

No construction records were available for use in evaluating the dam.

2.3 Operation Data

No engineering operational data were disclosed.

2.4 Evaluation of Data

a. Availability

No engineering data was found to be available for this dam.

b. Adequacy

The lack of in-depth engineering data did not allow for a definitive review. Therefore, the condition of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgement.

c. Validity

Non-Applicable

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General

The field inspection of Rogers Pond Dam was made on November 25, 1980. The inspection team consisted of personnel from Philip W. Genovese & Associates, Inc. and Geotechnical Engineers, Inc. The dam owner, Mr. Donald Carlson was also present during portions of the inspection. Inspection checklists, completed during the visual inspection are included in Appendix A. At the time of the inspection, the water level was approximately 0.25 feet above the permanent spillway elevation. Water was passing over the spillway. The upstream face of the dam could only be inspected above this water level.

b. Dam

Rogers Pond Dam is an earth and vertical stone-masonry wall structure 9.3 feet high, 231 feet long, with a width which varies from 6 feet to 21 feet.

The upstream face to the right of the spillway consists of a vertical stone-masonry wall, as shown in Photo No. 10. The joints between the stone blocks in the vicinity of the spillway have been repointed while the remainder of the wall is dry stone-masonry construction. The upstream face to the left of the spillway is comprised of an earth berm which is situated on the upstream side of the vertical stone block masonry wall. The embankment gradually slopes from the stone wall toward the reservoir. Several trees up to 24 inches in diameter are located on the berm within ten feet of the wall near the left end of the embankment.

The downstream face of the dam consists of a vertical stone-masonry face to the left of the spillway and a combination vertical stone wall and a downstream earth embankment to the right of the spillway. No mortar was evident on the joint surfaces.

Along the left side of the wall, a rock berm, approximately 40 feet long and 5 feet wide, was constructed adjacent to the vertical wall as noted in Photo No. 12. A large depression, approximately 6 feet in diameter and 8 inches deep, was observed 60 feet to the right of the spillway channel downstream from the vertical downstream wall. The depression appeared

to be along the alignment of the buried outlet conduit which was last used approximately 5 years ago according to the owner. The surface of the ground is uneven and slightly undulating in the vicinity of this depression. (See Photo No. 4)

Standing water was observed along the base of most of the left wall. At several locations, a slight flow could be observed which was clear with no evidence of fines. No quantity of flow could be estimated. The area immediately downstream from the wall is wet and soggy with some standing water as noted in Photo No. 11.

c. Appurtenant Structures

The spillway consists of a stone-masonry wall with a concrete cap. At the time of the inspection, water was flowing over the spillway. A large 24 inch diameter tree is growing 12 feet downstream from the right edge of the spillway adjacent to the spillway channel. The bank is covered with large blocks of riprap up to 3 feet in diameter which suggests a portion of the channel bank has been washed out in the past as a result of periods of high flow over the spillway. Some water which was clear with no evidence of fines was observed seeping between the blocks adjacent to the right edge of the spillway as noted in Photo No. 2. No quantity of flow could be estimated. The outlet works consists of a headwall, conduit, and outlet channel. The intake is presently blocked off and the conduit is buried and could not be inspected.

d. Reservoir Area

The watershed area has flat and coastal to rolling terrain, partially wood covered. A more detailed description of the drainage area is included in Section 1.3 of this report. There is little development observed along the shoreline, although Elm Street cuts through the pond dividing it into two parts.

e. Downstream Channel

The downstream channel is bounded by brush and trees as noted in Photo No. 6. The channel floor appears to be comprised of a natural stream bed.

3.2 Evaluation

Based on the results of the visual inspection, the dam is judged to be in fair condition. The inspection disclosed the following items which require attention:

- a. Portions of the upstream masonry wall have been displaced at several locations.
- b. Numerous trees are growing on the embankment upstream of the vertical stone masonry wall to the left of the spillway.
- c. Seepage is evident along the base of the vertical stone-masonry wall to the left of the spillway.
- d. The ground is wet and soggy at one location approximately 25 feet downstream from the left side of the dam.
- e. Seepage is occurring through joints between the stones of the downstream vertical wall to the right of the spillway channel.
- f. A large depression was observed just downstream of the vertical masonry wall along the right side of the dam.

SECTION 4
OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General

The dam creates an impoundment of the water which is used for recreational purposes.

b. Description of any Warning System in Effect

There are no warning systems in effect at this facility.

4.2 Maintenance Procedures

a. General

Maintenance on the dam is done on an infrequent basis.

b. Operating Facilities

Maintenance on the operating facilities is done on an infrequent basis.

4.3 Evaluation

The current maintenance procedures for the dam are inadequate. A formal downstream warning system should be developed and put into effect in case of an emergency at the dam. Also, a program of annual technical inspections by qualified registered engineers should be instituted.

SECTION 5 EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Rogers Pond Dam is a 231 foot long earth and stone masonry wall dam with a maximum height of 9.3 feet and a varying width. Appurtenant structures other than the spillway include the spillway channel and outlet works. The spillway weir is located at elevation 42.2. There is an outlet works consisting of a headwall, conduit and outlet channel. The outlet intake is at elevation 38.7 with the discharge at elevation 35.7.

Rogers Pond Dam is classified as being small in size having a maximum storage of 60 acre-feet.

5.2 Design Data

No hydrologic or hydraulic design data were disclosed for this dam.

5.3 Experience Data

The maximum discharge at this dam site is unknown. Reportedly, the maximum observed water level, in January 1979, was at the top of the dam, indicating a discharge of 500 cfs.

5.4 Test Flood Analysis

As no detailed design and operational information is available, hydrologic evaluation was performed using dam information gathered by field inspection, watershed size and an estimated test flood equal to 1/4 the Probable Maximum Flood (PMF) as determined by guide curves issued by the Corps of Engineers. Based on a drainage area of 6.08 square miles, and using the Coastal PMF curve (785 cfs/mi^2) it was estimated that the peak test flood inflow at this dam would be 1195 cfs. Following the guidance for Estimating Effect of Surge Storage on Maximum Probable Discharges results in a test flood discharge of 1140 cfs at an elevation of 44.8 NGVD which is 0.7 feet over the top of the dam. The maximum spillway capacity with the reservoir at the top of the dam is 500 cfs or 42% of the test flood discharge.

5.5 Dam Failure Analysis

The impact of failure of the dam at maximum pool (top of dam) was assessed using the "Rule of Thumb" Guidance for Estimating Downstream Dam Failure Hydrographs issued by the Corps of Engineers. The analysis made use of detailed information from the Deep River Flood Insurance Study and accounted for the effect of a high downstream tailwater.

A major breach of the dam would result in a discharge into Deep River which flows approximately 1.9 miles through the village of Deep River before entering the Connecticut River. The dam breach was calculated using a width of 35 feet across the spillway. The breach discharge was determined to be 1860 cfs but after accounting for a high downstream tailwater was reduced to 995 cfs. The following table illustrates the effect of a dam breach at this site:

<u>Section</u>	<u>Sta</u>	<u>Elev.</u>	<u>Elev. (After)</u>	<u>Flooded Properties</u>	
				<u>Houses</u>	<u>Elev.</u>
D/S Dam	0+00	40.4	42.5	0	--
Elm Street	5+30	40.7	42.6	2	39.0 40.0
Union Street	9+50	39.6	41.8	2	40.0
Village Street	22+20	39.1	41.3	2	39.0 40.0

These results indicate that three houses will experience an increase of 1.3 to 1.8 feet of water following the dam breach, which would cause basement flooding. A hazard rating of SIGNIFICANT is warranted in this case.

SECTION 6 EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

The visual inspection did not disclose any immediate instability problems. However, there is continuing seepage along the base of the downstream vertical wall to the left of the spillway.

6.2 Design and Construction Data

No information was available concerning the type of soil in the earth portion of the structure and foundation conditions. Thus, the evaluation of stability is based on visual inspection.

6.3 Post-Construction Changes

No information is available regarding post-construction changes.

6.4 Seismic Stability

The dam is located in Seismic Zone 1 and, in accordance with the Corps of Engineers' Guidelines, does not warrant further seismic analysis at this time.

SECTION 7
ASSESSMENTS, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

Based on the visual inspection the Rogers Pond Dam appears to be in fair condition. The major concerns regarding the future performance of this dam include:

1. Portions of the upstream vertical masonry wall have been displaced and eroded at several locations.
2. Seepage is occurring along the toe of the downstream stone-masonry wall to the left of the spillway.
3. An area downstream from the vertical stone wall to the left of the spillway is wet and soggy.
4. Seepage is occurring through joints between the stones of the downstream vertical wall to the right of the spillway channel.

b. Adequacy of Information

The lack of in-depth engineering data did not allow for a definitive review. Therefore, the safety of the dam with respect to soils, geology and geotechnical engineering is based on visual inspection.

c. Urgency

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

7.2 Recommendations

The following recommendations should be carried out under the supervision of a qualified professional engineer experienced in the design and construction of earth dams:

1. Investigate paths of seepage through the joints of the stone-masonry forming the downstream face to the right of the spillway and oversee construction of remedial measures, if required.

2. Investigate the seepage along the toe of the downstream masonry wall to the left of the spillway and design and oversee construction of remedial measures, if needed.
3. Investigate the cause of soft, wet spot downstream of the left vertical masonry wall and design and oversee construction of remedial measures, if required.
4. Replace or reset all loose and displaced blocks in the stone wall forming the upstream masonry wall.
5. Design procedures for clearing trees and their root systems from the dam and the area up to 30 feet downstream of the toe of masonry wall and for properly back-filling the areas where the roots are removed.
6. Investigate the depressions on the dam near the right masonry downstream wall and design appropriate remedial measures, if required.
7. Determine the operability and capacity of the outlet works and assess any need for modifications.
8. Perform a detailed hydrologic and hydraulic investigation to assess further the potential of overtopping the dam and the need for and means to increase project discharge capacity.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

The Owner should:

1. Maintain clear of trees and brush the area within 30 feet of the downstream toe and a zone 25 feet on either side of the spillway channel for a distance of 100 feet downstream from the dam.
2. Engage a professional engineer qualified in the design and construction of dams to make a comprehensive technical inspection of the dam once each year.

3. Establish a monitoring program for use during and immediately after heavy rainfall and also a downstream warning program to follow in case of emergency.

7.4 Alternatives

There are no practical alternatives to the recommendations of Sections 7.2 and 7.3.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT ROGERS POND DAM

DATE November 25, 1980

TIME 1300

WEATHER Overcast, 45° F.

W.S. ELEV. _____ U.S. _____ DN.S. _____

PARTY:

- | | |
|---|-----------|
| 1. <u>Bob Chappell - Genovese</u> | 6. _____ |
| 2. <u>Walt Gancarz - Genovese</u> | 7. _____ |
| 3. <u>Richard F. Murdock - Geotechnical</u> | 8. _____ |
| <u>Engineers, Inc.</u> | 9. _____ |
| 4. _____ | 10. _____ |
| 5. _____ | |

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Structural</u>	<u>R. Chappell</u>	
2. <u>Hydraulics</u>	<u>W. Gancarz</u>	
3. <u>Geotechnical</u>	<u>R. Murdock</u>	
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		
9. _____		
10. _____		

PERIODIC INSPECTION CHECK LIST

PROJECT ROGERS POND DAM

DATE November 25, 1980

PROJECT FEATURE Dam Embankment

NAME _____

DISCIPLINE Geotechnical

NAME Murdock

AREA EVALUATED	CONDITIONS
<u>DAM EMBANKMENT</u>	Dry stone masonry construction. Up-stream & downstream on right side, only downstream on left side.
Crest Elevation	42.2
Current Pool Elevation	42.45
Maximum Impoundment to Date	Unknown
Surface Cracks	None
Pavement Condition	Grass Surface
Movement or Settlement of Crest	Several depressions along right side of dam, crest slopes toward reservoir on left side
Lateral Movement	None observed
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Settlement of soil adjacent to right spillway wingwall
Indications of Movement of Structural Items on Slopes	None observed
Trespassing on Slopes	Depressions on downstream slope, right side, may be over underground stone sluiceway
Sloughing or Erosion of Slopes or Abutments	Some erosion noted adjacent to spillway
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None
Unusual Embankment or Downstream Seepage	Seepage along toe of downstream wall on left side of dam
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None
Vegetation	Grass well maintained, trees on crest and downstream of dam

PERIODIC INSPECTION CHECK LIST

PROJECT ROGERS POND DAM

DATE November 25, 1980

PROJECT FEATURE Dike Embankment

NAME _____

DISCIPLINE Geotechnical

NAME Murdock

AREA EVALUATED	CONDITION
<u>DIKE EMBANKMENT</u> Crest Elevation. Current Pool Elevation Maximum Impoundment to Date Surface Cracks Pavement Condition Movement or Settlement of Crest Lateral Movement Vertical Alignment Horizontal Alignment Condition at Abutment and at Concrete Structures Indications of Movement of Structural Items on Slopes Trespassing on Slopes Sloughing or Erosion of Slopes or Abutments Rock Slope Protection - Riprap Failures Unusual Movement or Cracking at or near Toes Unusual Embankment or Downstream Seepage Piping or Boils Foundation Drainage Features Toe Drains Instrumentation System Vegetation	No dike embankment

PERIODIC INSPECTION CHECK LIST

PROJECT ROGERS POND DAM

DATE November 25, 1980

PROJECT FEATURE Outlet Works - Intake Channel NAME _____

DISCIPLINE Geotechnical/Hydraulic

NAME Murdock/Gancarz

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u> a. Approach Channel/ Slope Conditions Bottom Conditions Rock Slides or Falls Log Boom Debris Condition of Concrete Lining Drains or Weep Holes b. Intake Structure Condition of Concrete Stop Logs and Slots	Underwater

PERIODIC INSPECTION CHECK LIST

PROJECT ROGERS POND DAM

DATE November 25, 1980

PROJECT FEATURE Outlet Works - Control Tower NAME

DISCIPLINE Hydraulics

NAME Gancarz

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - CONTROL TOWER</u> a. Concrete and Structural General Condition Condition of Joints Spalling Visible Reinforcing Rusting or Staining of Concrete Any Seepage or Efflorescence Joint Alignment Unusual seepage or Leaks in Gate Chamber Cracks Rusting or Corrosion of Steel b. Mechanical and Electrical Air Vents Float Wells Crane Hoist Elevator Hydraulic System Service Gates Emergency Gates Lightning Protection System Emergency Power System Wiring and Lighting System	None

PERIODIC INSPECTION CHECK LIST

PROJECT ROGERS POND DAM

DATE November 25, 1980

PROJECT FEATURE Outlet Works - Conduit

NAME _____

DISCIPLINE Hydraulics/Structural

NAME Gancarz/Chappell

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - TRANSITION AND CONDUIT</u> General Condition of Concrete Rust or Staining on Concrete Spalling Erosion or Cavitation Cracking Alignment of Monoliths Alignment of Joints Numbering of Monoliths	Not Visible

PERIODIC INSPECTION CHECK LIST

PROJECT ROGERS POND DAM

DATE November 25, 1980

PROJECT FEATURE Outlet Works - Outlet Structure

NAME _____

DISCIPLINE Structural

NAME Chappell

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u>	Partially collapsed concrete structure
General Condition of Concrete	
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	Underground - merges with spillway channel 75 feet downstream
Channel	
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	

PERIODIC INSPECTION CHECK LIST

PROJECT ROGERS POND DAM

DATE November 25, 1980

PROJECT FEATURE Spillway Weir

NAME

DISCIPLINE Structural, Geotechnical, Hydraulics

NAME Chappell/Murdock/
Gancarz

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	
General Condition	Good
Loose Rock Overhanging Channel	
Trees Overhanging Channel	N/A
Floor of Approach Channel	Gravel
b. Weir and Training Walls	East Side only - 45° wingwall
General Condition of Masonry	Good
Rust or Staining	N/A
Spalling	No
Any Visible Reinforcing	No
Any Seepage or Efflorescence	No
Drain Holes	
c. Discharge Channel	
General Condition	Natural streambed
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Trees both in the channel and along the bank.
Floor of Channel	Sand and gravel, brush.
Other Obstructions	

PERIODIC INSPECTION CHECK LIST

PROJECT ROGERS POND DAM

DATE November 25, 1980

PROJECT FEATURE Outlet Works - Service Bridge

NAME _____

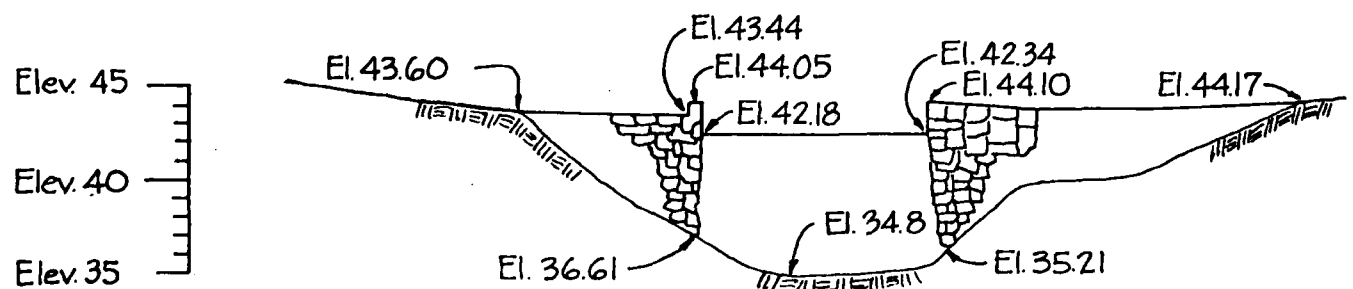
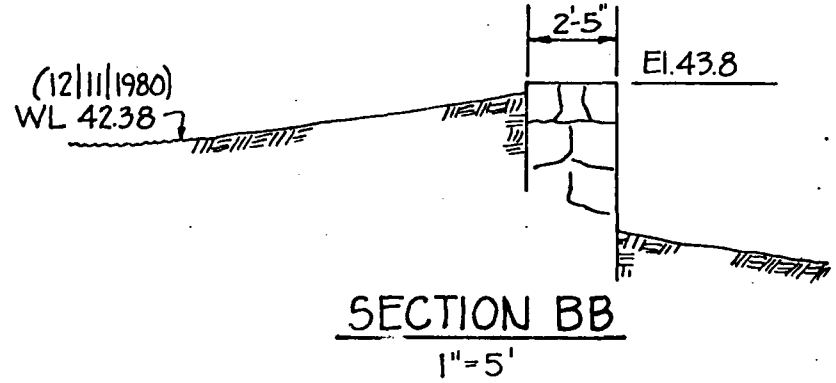
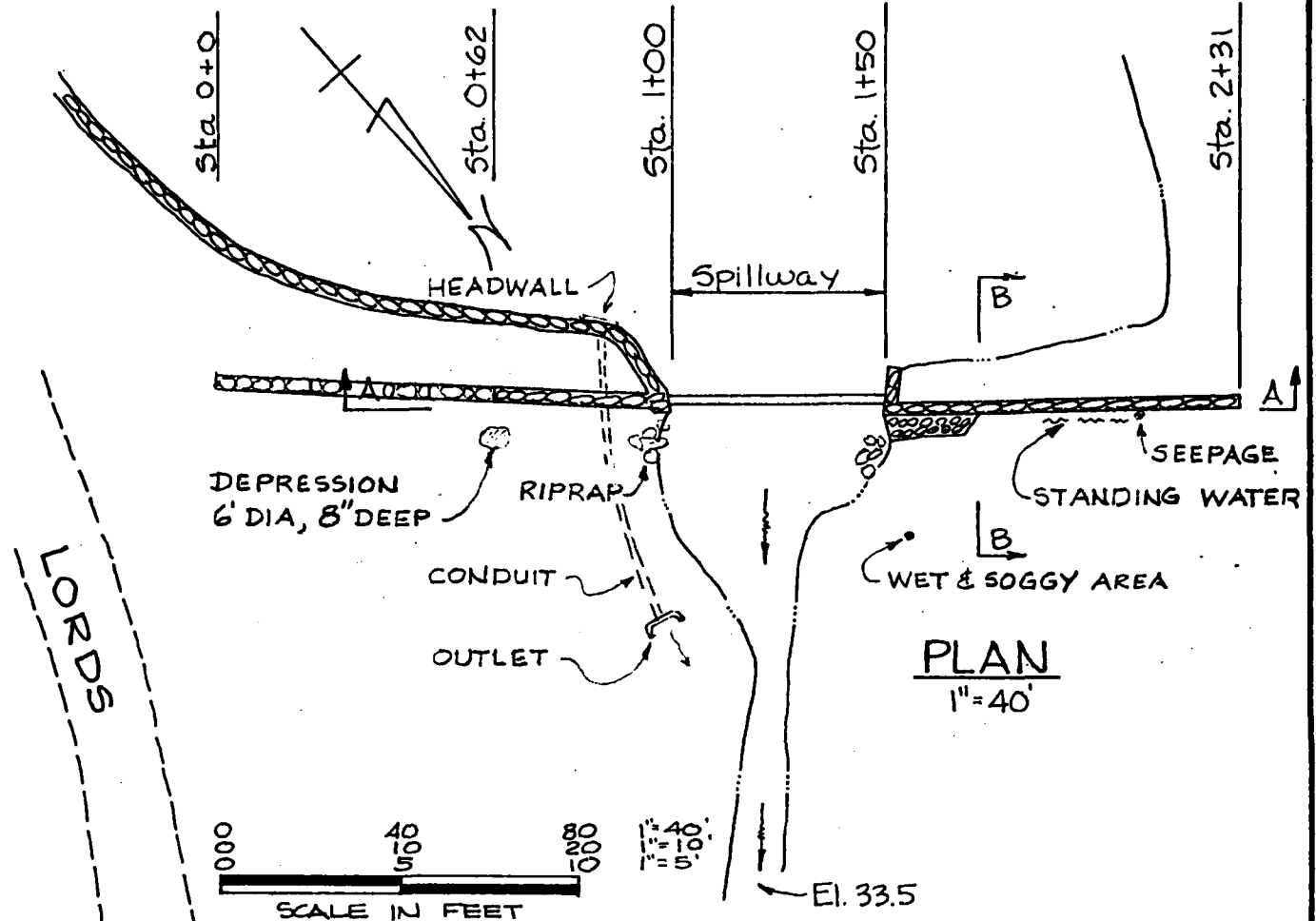
DISCIPLINE Structural

NAME Chappell

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SERVICE BRIDGE</u> a. Super Structure - Bearings - Anchor Bolts - Bridge Seat - Longitudinal Members - Under Side of Deck - Secondary Bracing - Deck - Drainage System - Railings - Expansion Joints - Paint b. Abutment & Piers - General Condition of Concrete - Alignment of Abutment - Approach to Bridge - Condition of Seat & Backwall	None

APPENDIX B

ENGINEERING DATA



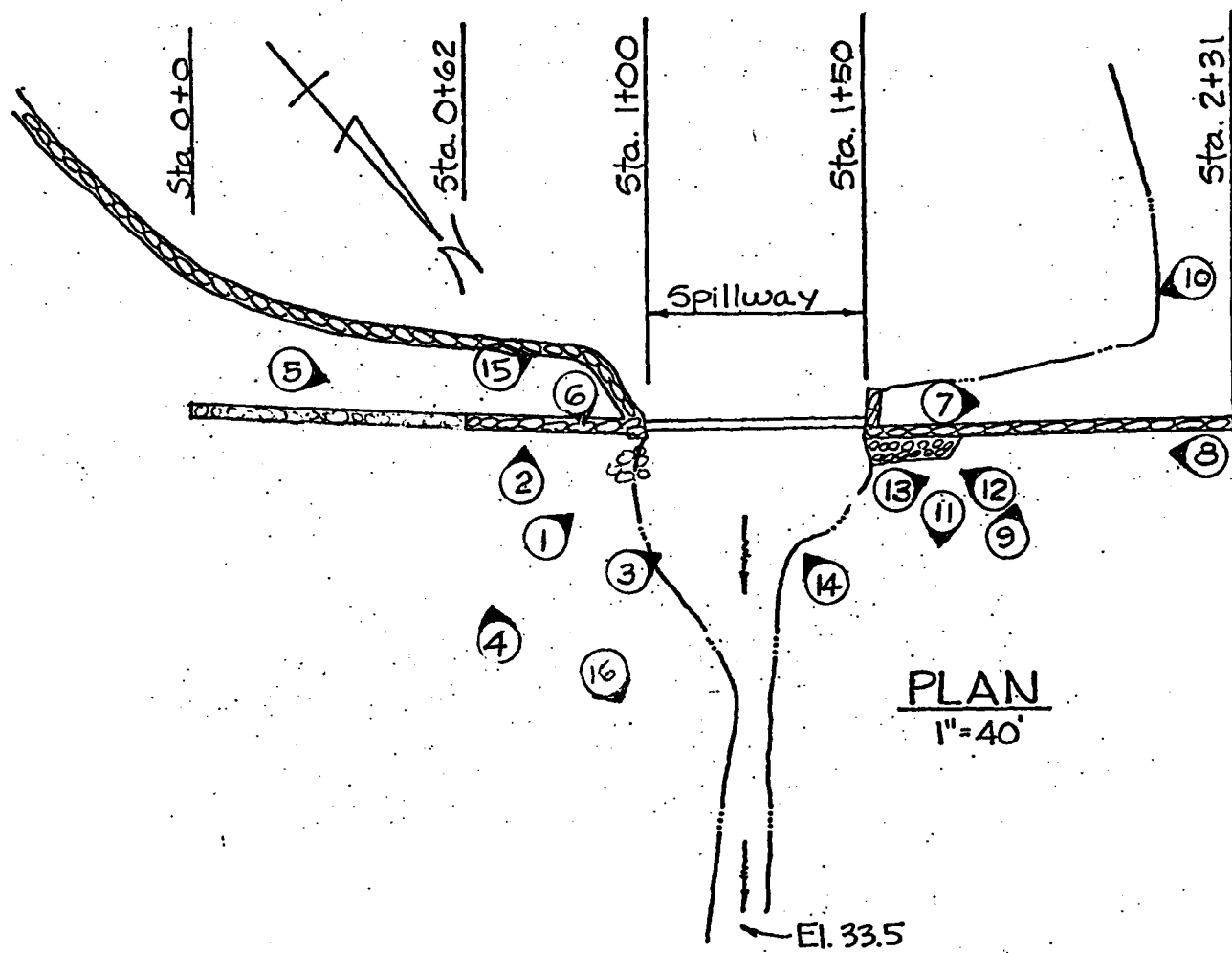
Drawing Prepared Using Field
Survey by G&A 12/11/1980

PHILIP W. GENOVESE & ASSOCIATES, INC.
ENGINEERS HAMDEN, CONNECTICUT

ROGERS POND DAM (CT00428)

APPENDIX C

PHOTOGRAPHS



3 REFERS TO PHOTO NUMBER,
LOCATION AND DIRECTION

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

PHILIP W. GENOVESE AND
ASSOCIATES, INC.
ENGINEERS—HAMDEN, CT.

NATIONAL
PROGRAM
OF
INSPECTION
OF
NON-FED
DAMS
C-1

PHOTO LOCATION PLAN

ROGERS POND DAM

DEEP RIVER

DEEP RIVER,

CONNECTICUT



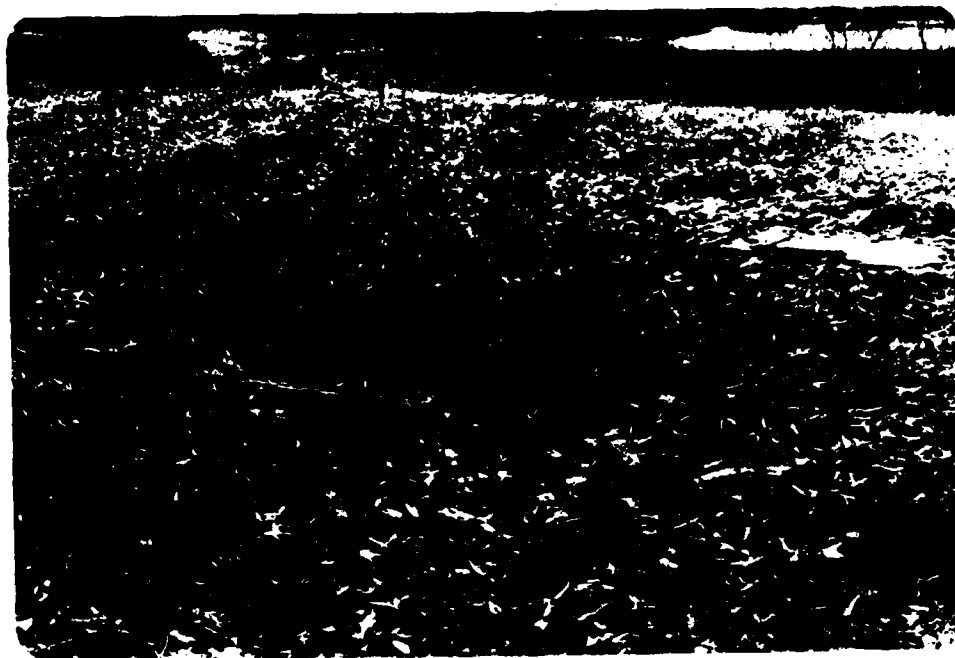
1. View of downstream face and spillway from point 100 feet to right of spillway.



2. Downstream face of dam to right of spillway, tape extended 5 feet.



3. Downstream face of dam to left of spillway.



4. 60 feet to right of spillway, depression downstream of wall, 6 feet across, 8 inches deep.



5. 100 feet from spillway looking along crest toward left abutment.



6. Downstream channel.



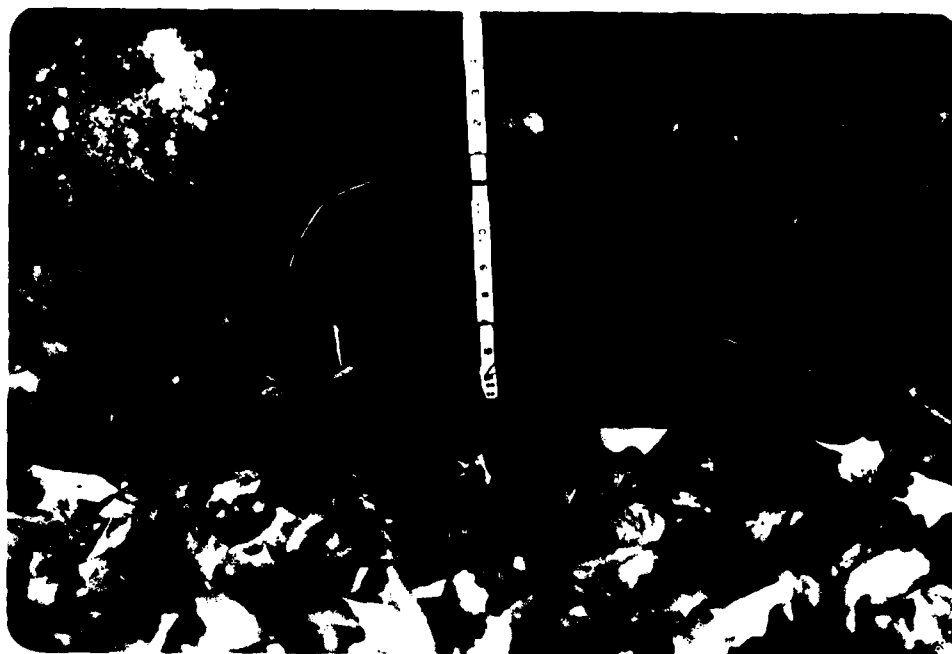
7. Edge of spillway looking toward left side of dam.



8. Wall 4 feet high; rule extended 5 feet at point 25 feet left of spillway; standing water along toe; slight flow noted at several locations.

PHILIP W. GENOVESE & ASSOCIATES, INC.
ENGINEERS HAMDEN, CONNECTICUT

ROGERS POND DAM (CT00428)



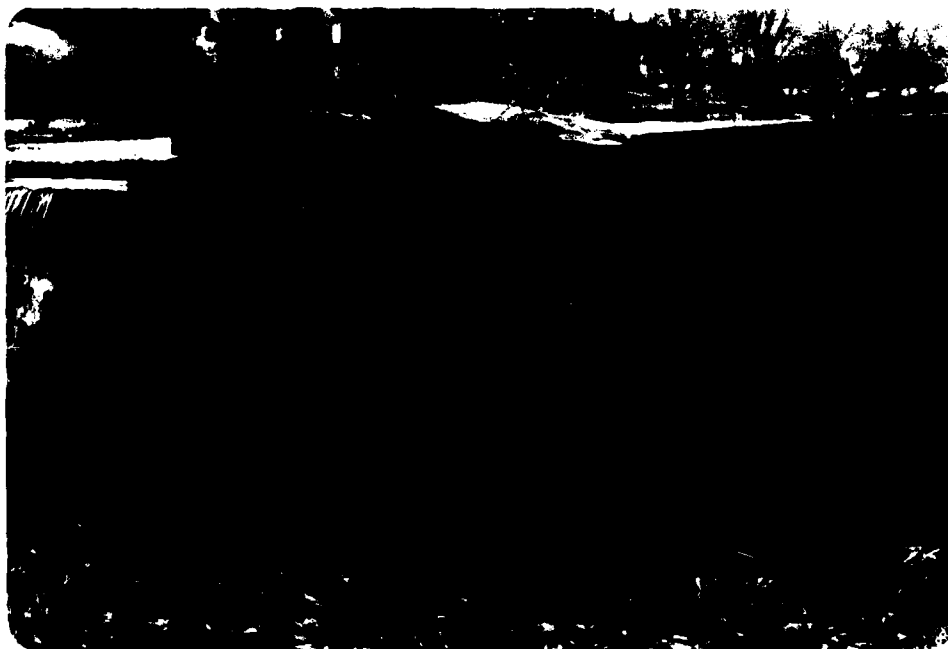
9. 60 feet to left of spillway, flow along toe, wall 3 feet high at this location.



10. Upstream face of dam from point 85 feet left of spillway.



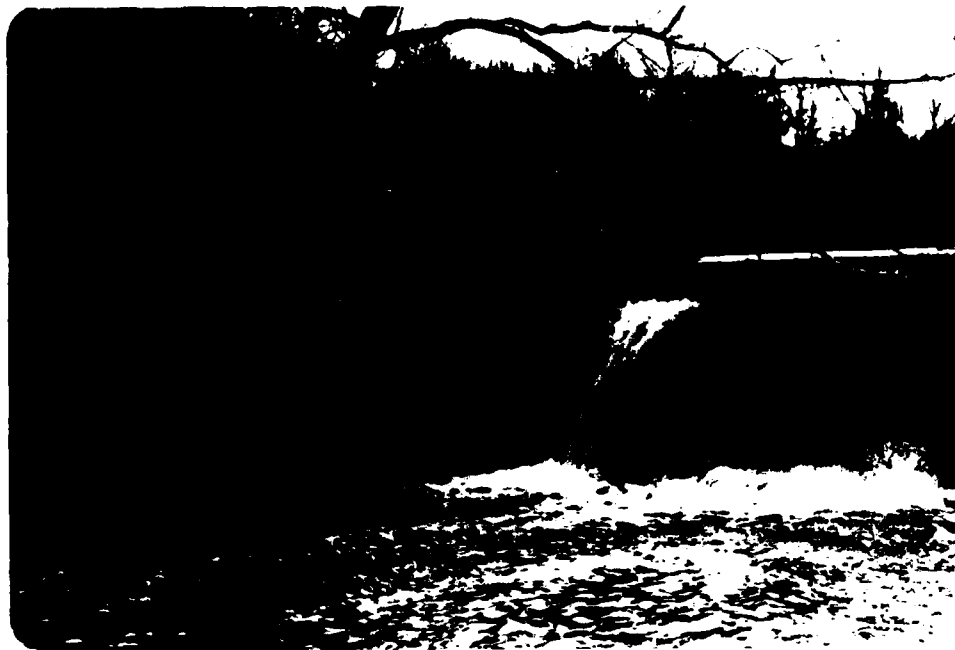
11. 25 feet to left of spillway, wet zone downstream of dam, approximately 35 feet wide from edge of spillway.



12. View of downstream wall to left of spillway channel.



13. View of downstream wall to left of spillway.



14. View of dam from wall to right of spillway and area just downstream from the dam.



15. View of headwall at inlet to outlet works.

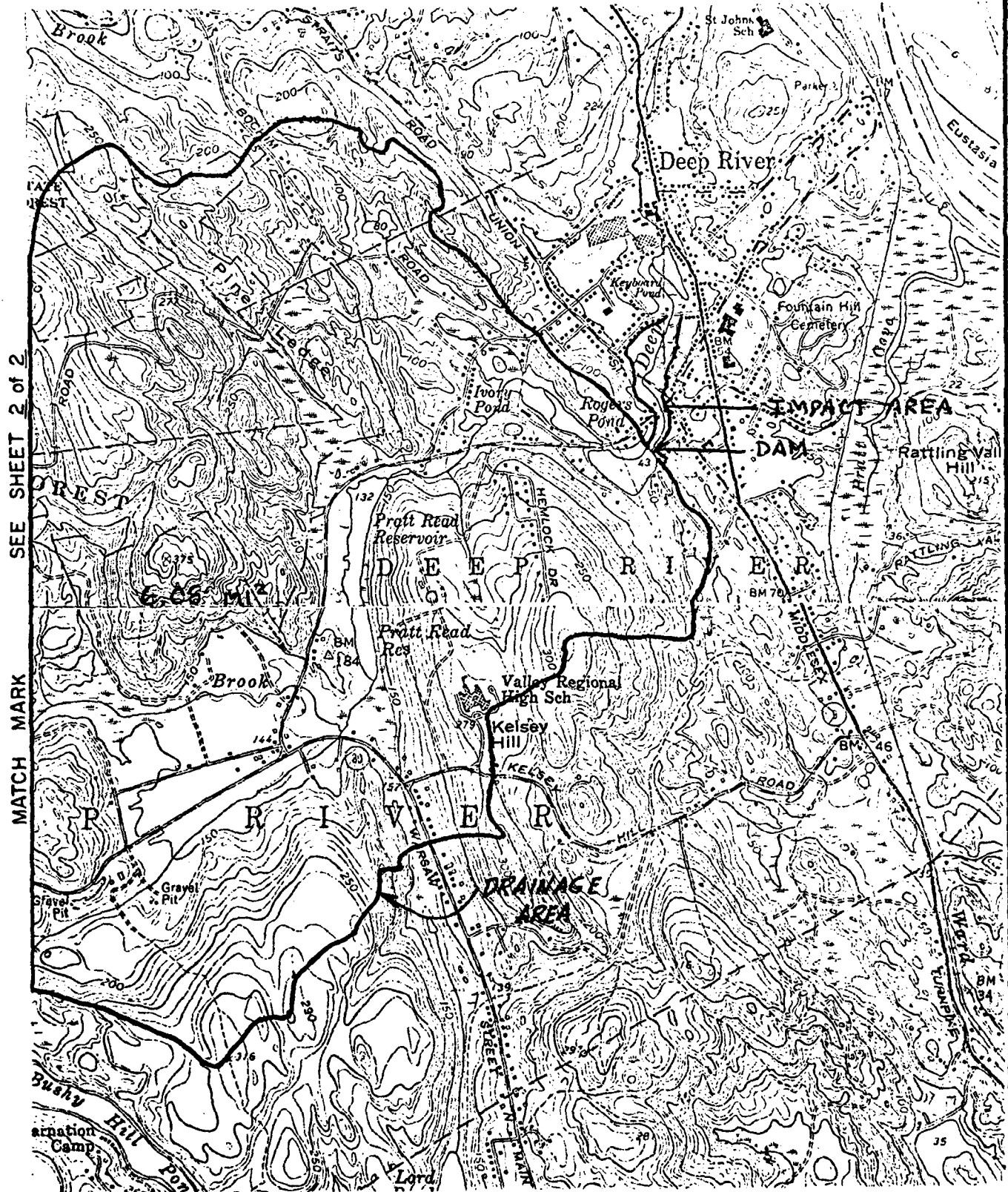


16. Outlet channel

C-9

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



0 2000 4000 FT.
SCALE

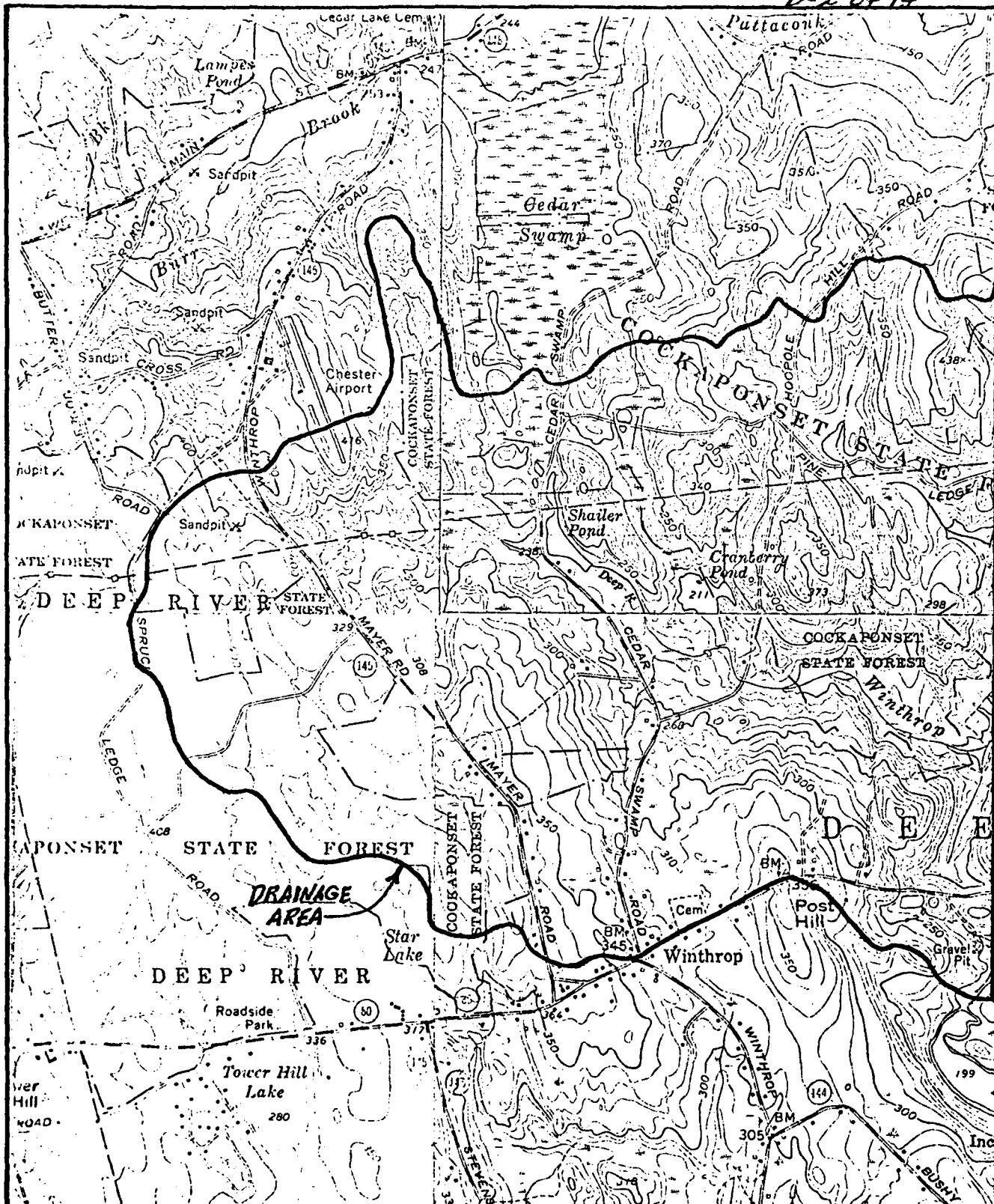
SHEET 1 of 2

DRAINAGE & IMPACT AREADEEP RIVER, ESSEX, CLINTON & HADDAM
QUADS

DRAINAGE AREA = 6.08 SQ. M.

PHILIP W. GENOVESE & ASSOCIATES, INC.
ENGINEERS
HAMDEN, CONNECTICUT

ROGERS POND DAM (CT00428)



SEE SHEET 1 of 2

MATCH MARK



0 2000 4000 FT.
SCALE

SHEET 2 of 2

DRAINAGE & IMPACT AREADEEP RIVER, ESSEX, CLINTON & HADDAM
QUADS

DRAINAGE AREA = 6.00 SQ. M.

PHILIP W. GENOVESE & ASSOCIATES, INC.

ENGINEERS

HAMDEN, CONNECTICUT

ROGERS POND DAM (CT00428)

ROGERS POND DAM -

Size Classification -

$$\begin{array}{l} \text{Top of Dam} = 44.1 \rightarrow (\text{Res. Area} = 18.5 \text{ AC}) \\ \text{O/S Invert} \quad \underline{34.8} \\ \quad \quad \quad 9.3' \end{array}$$

$$\begin{array}{l} \text{Spwy Elev} = 42.2 \\ \text{Res. Area @ Spwy} = 12.4 \text{ AC} \end{array}$$

Storage Volume -

$$\begin{aligned} \text{Below Spwy} &= \frac{1}{3} \times b \times h = \frac{1}{3} (12.4)(42.2 - 34.8) \\ &= 30.3 \text{ AC-FT} \end{aligned}$$

$$\begin{aligned} \text{Spwy} \rightarrow \text{Top of Dam} &= \left(\frac{b_1 + b_2}{2} \right) \times \Delta \text{elev} \\ &= \left(\frac{12.4 + 18.5}{2} \right) (44.1 - 42.2) \\ &= 29.4 \text{ AC-FT} \end{aligned}$$

According to COE guidelines - Table 1 - this is a SMALL dam Storage = 30.3 + 29.4 = 59.7 AC-FT which is between 50 & 1000 AC-FT.

Hazard Classification -

The dam outlets to Deep River which flows through the center of the Town of Deep River (est pop = 2500). Because this is a small town and due to the fact that there are several upstream ponds + a 1/2 mile to 1 mile to attenuate and dampen flows a Spillway Design Flood of 14 PMF (the minimum allowed) will be evaluated here.

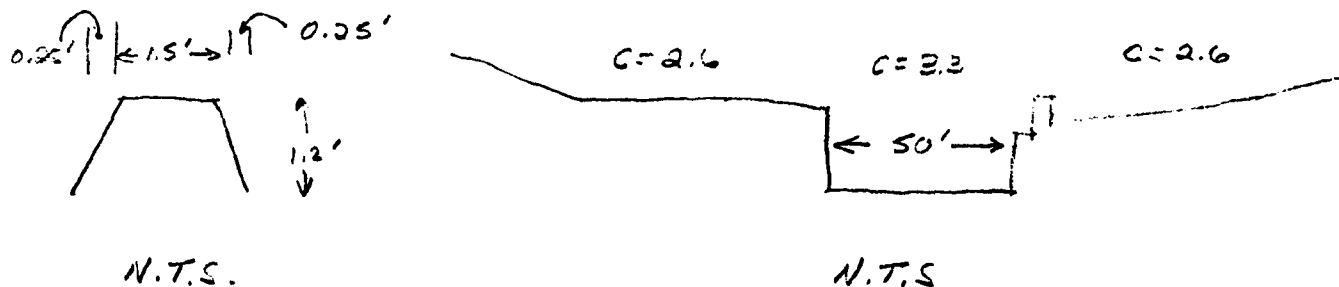
$$\text{COASTAL CURVE} = \frac{1}{4} (785 \frac{\text{CFS}}{\text{mi}^2}) (6.03 \text{ MI}^2) = 1193 \text{ CFS}$$

PROJ. NO. 824109
 DESCRIPTION Upper Pond Dam
Deep River Conn

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D-4 OF 14
 BY WJG DATE _____
 CHKD. BY _____ DATE _____

The Town of Deep River has had a Flood Insurance Study (FIS) completed for it which includes a detailed study of Deep River. This study has calculated a 100 year flood to have a peak discharge of 1214 cfs which is very close to our SDF of 1193 cfs. The spillway elevation associated with that discharge is 45.05 MSL. Based upon the rating curve developed from the information below we calculate a peak elevation of 44.85 MSL.

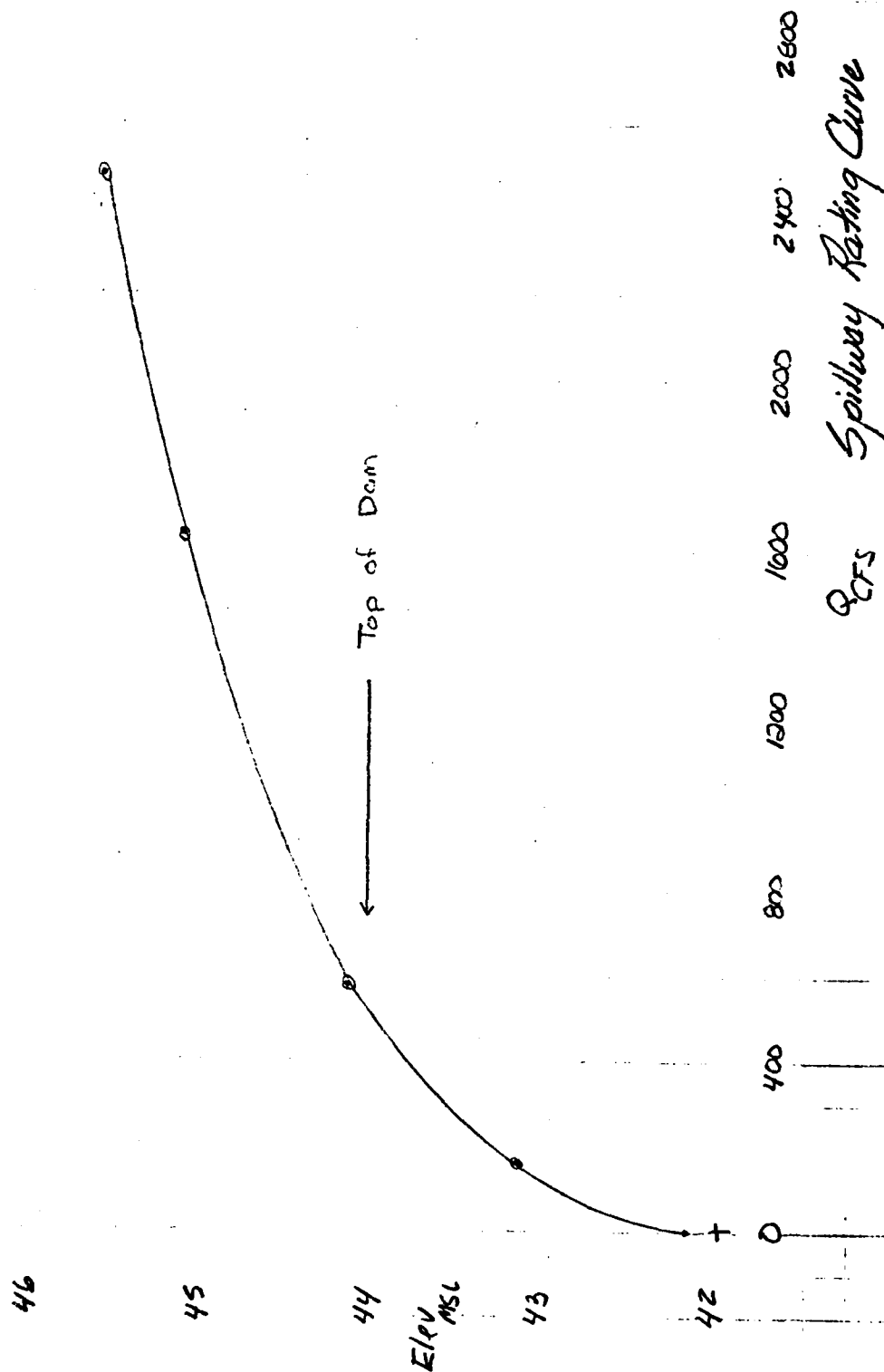


<u>Elev</u>	<u>H_L</u>	<u>H_{spill}</u>	<u>H_V</u>	<u>Q_L</u>	<u>Q_{SAWY}</u>	<u>Q_R</u>	<u>Q_{TOT}</u>
42.2	-	-	-	-	-	-	0
43.2	0	1.0	0	0	165	0	165
44.2	0.3	2.0	0.45	24	495	60	579
45.2	1.2	3.0	1.2	277	909	444	1630
45.7	1.65	3.5	1.65	551	1146	788	2485

PROJ. NO. 804109
DESCRIPTION Rogers Pond Dam
Deep River, Conn

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D-5 OF 14
BY WJS DATE _____
CHKD. BY _____ DATE _____



PROJ. NO. 804109
DESCRIPTION Boys Pond Dam
Deep River, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D-6 OF 14
BY WJG DATE _____
CHKD. BY _____ DATE _____

Short Cut Routing of SDF -

$$Q_{p1} = 1193 \text{ CFS}$$

$$\text{Elev}_1 = 44.85$$

$$\text{Stor} = 59.7 \text{ AC-FT (Below TOO)} + \frac{(18.5 + 20.4)(.65)}{2} \\ = 72.3 \text{ AC-FT}$$

$$\text{Stor}_1 = \frac{72.3 \text{ AC-FT}}{(6.08 \text{ MI}^2)(640 \text{ AC/MI}^2)} \times \frac{12''}{\text{FT}} = 0.22'' \text{ Runoff}$$

$$Q_{p2} = Q_{p1} \left(1 - \frac{\frac{\text{Stor}}{19''}}{4} \right)$$

$$Q_{p2} = 1193 \left(1 - \frac{0.22}{4.75} \right)$$

$$Q_{p2} = 1138 \text{ CFS}$$

$$\text{Elev}_2 = 44.80$$

$$\text{Stor} = 59.7 + \left(\frac{18.5 + 20.3}{2} \right) (.6)$$

$$\text{Stor} = 71.3 \text{ AC-FT}$$

$$\text{Stor}_2 = \frac{71.3}{(6.08)(640)} \times 12 = .22$$

$$Q_{p3} = 1193 \left(1 - \frac{\frac{(.22 + .22)}{2}}{4.75} \right)$$

$$Q_{p3} = 1138 \text{ CFS}$$

$$\text{Elev}_p = 44.3$$

DAM BREACH ANALYSES -

$$Q_p = \frac{8}{27} (0.4) W_b \sqrt{g} Y_o^{3/2}$$

$$Q_p = \frac{8}{27} (0.4) (188) (\sqrt{32.2}) (9.3)^{3/2}$$

$$Q_p = 1678 \text{ CFS} + Q \text{ from remaining dam (see D-9)}$$

$$1678 + 171 = 1859 \text{ CFS}$$

$$Q_o = \text{flow when water is @ top of dam} = 500 \text{ CFS}$$

(from p. 5)

$$\text{Storage @ top of dam elev.} = 59.7 \text{ AC-FT (p. 3)}$$

Now the Deep River FIS has already performed a detailed flood routing of the 10, 50, 100 & 500 year flood flows. (p. D-10). Coincidentally the 10 year flow for the reach covering ~ 0.1 mi. dls of the dam has a flow of 672 cfs and the 500 year flow is 1681 cfs. These flows closely approximate our breach flow of 1678 cfs and pre-failure flow of 500 cfs. These flows along with the 50 & 100 yr flood flows have been used to develop a tailwater rating curve for Rogers ^{Pond} Dam found on page B. This information indicates that there is a very high tailwater prior to dam failure ($\frac{T.W.}{Y_o} = \frac{44.4 - 34.8}{44.1 - 34.8} = \frac{6.6}{9.3} = .78$).

The CSE dam guidelines recommends that for $T.W. > 0.7 Y_o$, which this is, that the maximum failure discharge should be adjusted to account for this condition. We will look at the failure discharge using two different methods - 1) recalculating a Q_p with Y_o equal to the difference in elevation between the water behind the dam & the tailwater, 2) determining a Q_p based on adjusting the flow over the

SENILEGARY INC 194970
KEUFFEL & ESSER CO.

Sheet DB of 14
WJG 12/12/60

19000

Tailwater Rating Curve

Bottom
Bottom
Top River Channel

1000

1000

Elev. in Feet

15 14 13 12 11 10

spillway weir with a breach, accounting for submergence.

(1)

$$W_b = .4 (89) = 35.2'$$

$$TW = 40.4$$

$$\text{Reservoir elev} = 44.1$$

$$Q_p = \frac{Q}{27} (.4) (89) (\sqrt{32.2}) (44.1 - 40.4)^{3/2}$$

$$Q_p = 421 \text{ CFS}$$

Added to this value should be the Q for the remaining portion of the dam which is not subject to the breach.

$$Q_{\text{SPWY}} = 3.3 (15) (1.9)^{1.5} = 130 \text{ CFS}$$

$$Q_{\text{LOB}} = 2.6 (37) (.2)^{1.5} = 9$$

$$Q_{\text{RAG}} = 2.6 (59) (.35)^{1.5} = \frac{32}{171 \text{ CFS}}$$

$$Q_{\text{TOTAL}} = 421 + 171 = 593 \text{ CFS}$$

(2)

$$Q_{\text{SPWY}} = CLH^{3/2} (C_s)$$

$$Q_{\text{SPWY}} = 3.3 (35) (3.7)^{3/2}$$

$$Q_{\text{SPWY}} = 822 \text{ CFS}$$

$$C_s = \text{submergence factor}$$

$$C_s = 1 - 27.8 \left(\frac{h_1 - h_2}{h - h_b} - .67 \right)^3$$

$$C_s = 1 - 27.8 \left(\frac{41.4 - 34.8}{44.1 - 34.8} - .67 \right)^3$$

$$C_s = .999 \text{ (Negligible)}$$

To this number should be added the flow over the remainder of the dam which is 171 CFS as shown above.

$$Q_{\text{TOTAL}} = 822 + 171 = 993 \text{ CFS}$$

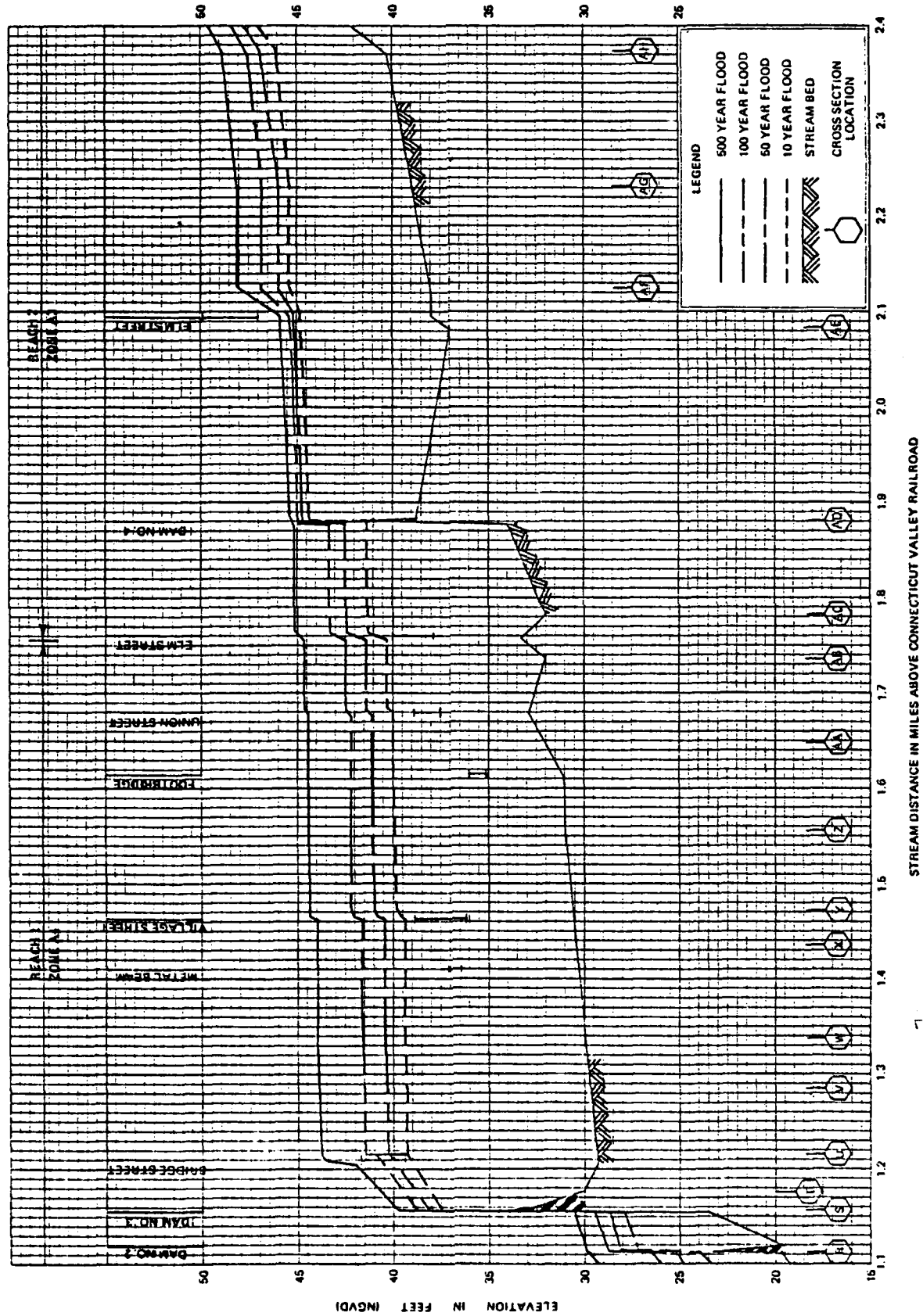
804107 Rogers Pond Dam, Deep River, Conn.

FLOOD PROFILES
DEEP RIVER

TOWN OF DEEP RIVER, CT
(MIDDLESEX CO.)

020

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION



ROGERS POND DAM
DEEP RIVER, CT.

This larger value of 993 cfs approximates the 50 yr storm value of 943 cfs found in the FIS. The differences in water surface elevations for the pre-failure & post failure flows are:

Section	Sta	Elev BEFORE	Elev AFTER	FLOODED PROP	
				Houses	Elev
d/s Dam	0+00	40.4	42.5	0	-
Elm Street	5+30	40.7	42.5	2	39.0; 40.0
Union Street	9+50	39.6	41.8	2	40.0
Village Street	22+30	39.1	41.2	2	39.0; 40.0

Since there is at most 1.9' of difference between pre. & post failure water elevations the COE guidelines recommends evaluating a "low flow failure" which occurs with water at the spillway crest. The peak discharge for that failure is:

$$Q_p = \frac{8}{27} (1.4) (75) \sqrt{2.5} (7.4)^{3/2}$$

$$Q_p = 1015 \text{ cfs}$$

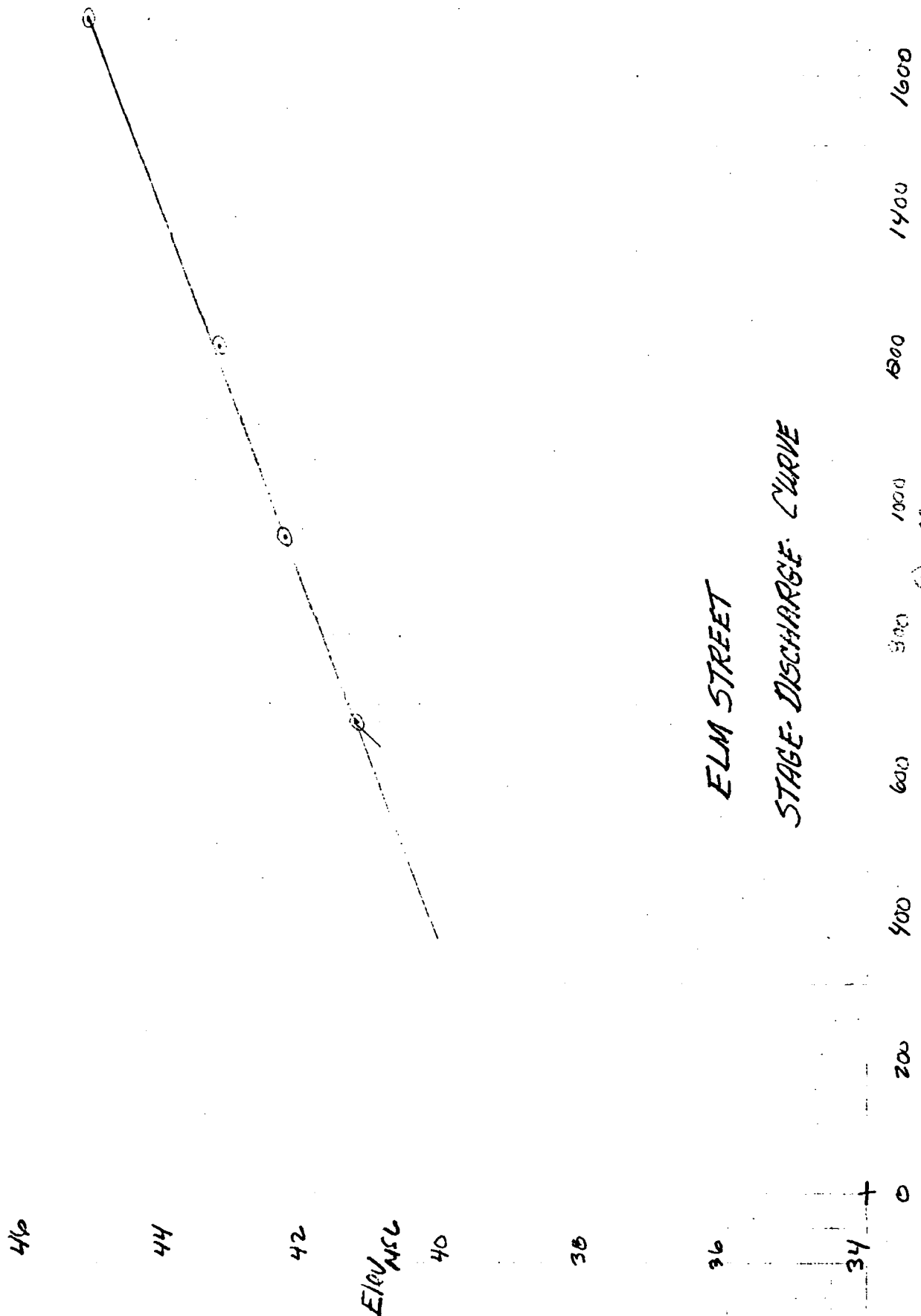
This figure closely approximates the peak discharge for the top of dam break ($Q = 993 \text{ cfs}$) summarized above. The flood wave would be attenuated as it passed d/s and thus would not cause any higher stages than estimated above.

The conclusion is that a dam break at this site would cause 1.3' - 1.8' of water to enter 3 houses which would not have been previously flooded. A significant hazard rating seems warranted here.

PROJ. NO. 804109
DESCRIPTION Bridge Pier 1 Dam
Deep River, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D-12 OF 14
BY WJG DATE _____
CHKD. BY _____ DATE _____

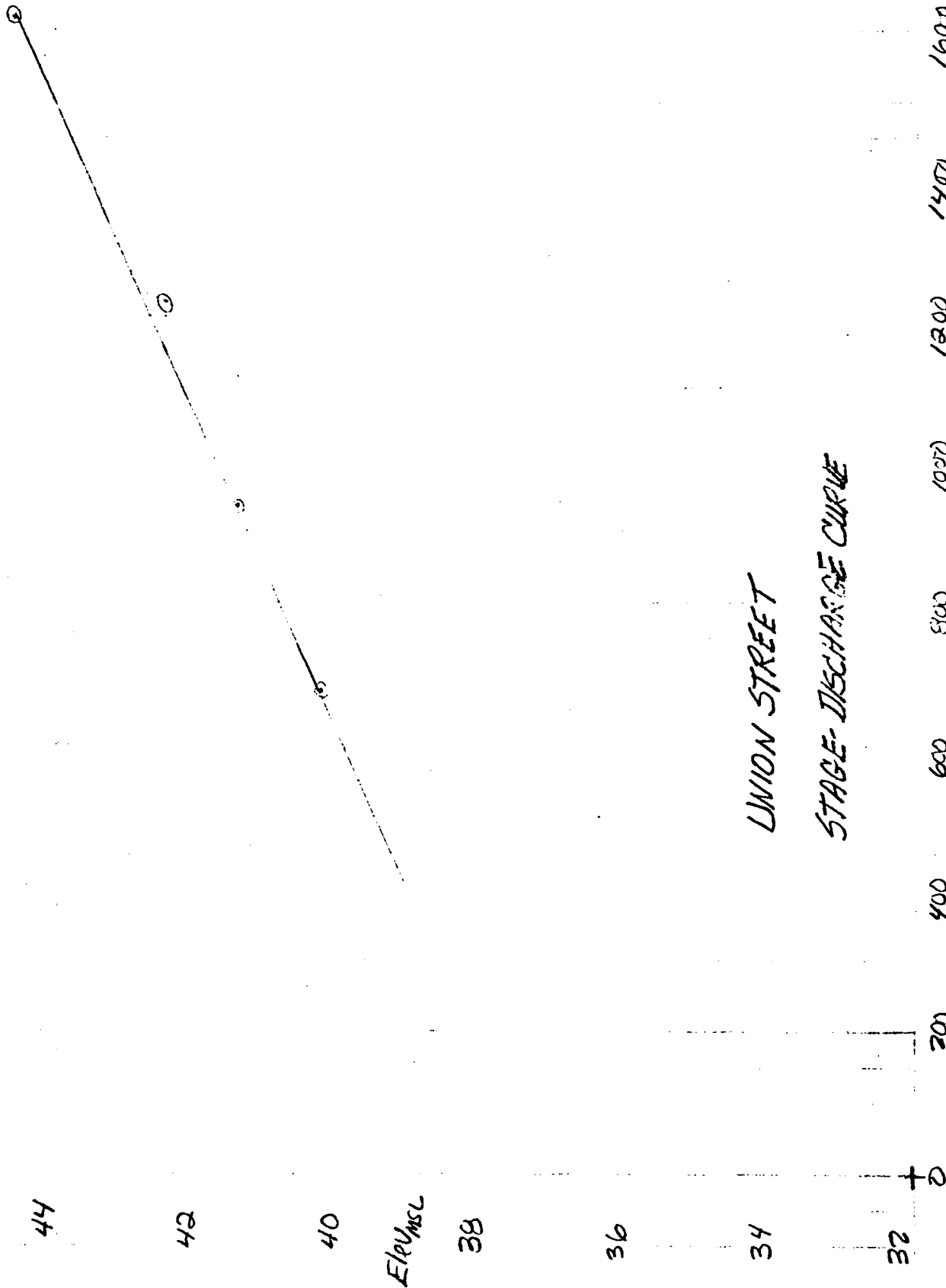


PROJ. NO. 804109
 DESCRIPTION Deep River, Conn.

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D-13 OF 14
 BY WJG DATE _____
 CHKD. BY _____ DATE _____

UNION STREET
 STAGE - DISCHARGE CURVE

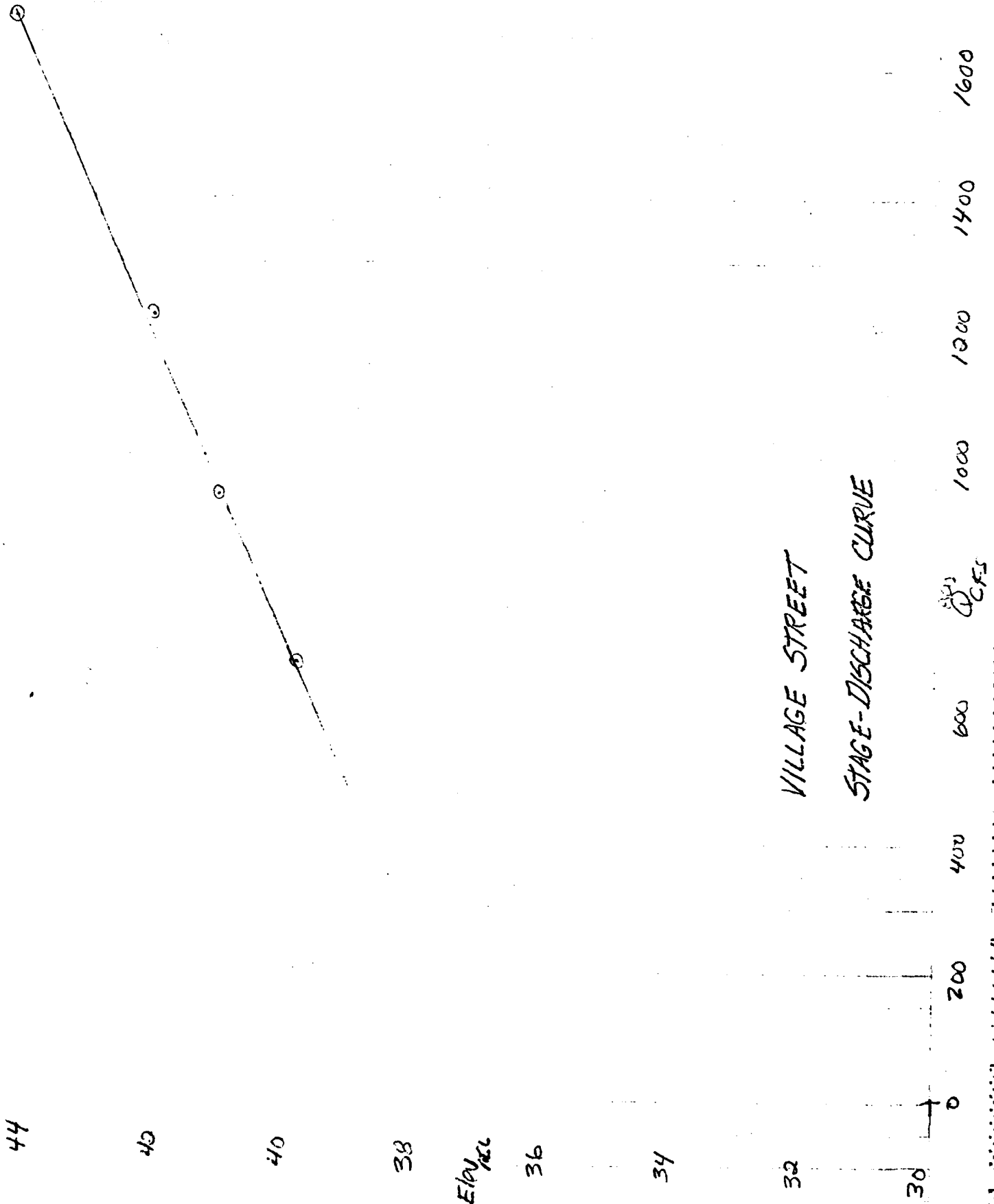


UNION STREET
 STAGE - DISCHARGE CURVE

PROJ. NO. B04109
DESCRIPTION Rosers Pond Dam
Deep River, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D-14 OF 14
BY WJB DATE _____
CHKD. BY _____ DATE _____



APPENDIX E

INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

FILMED

10-84

DTIC