

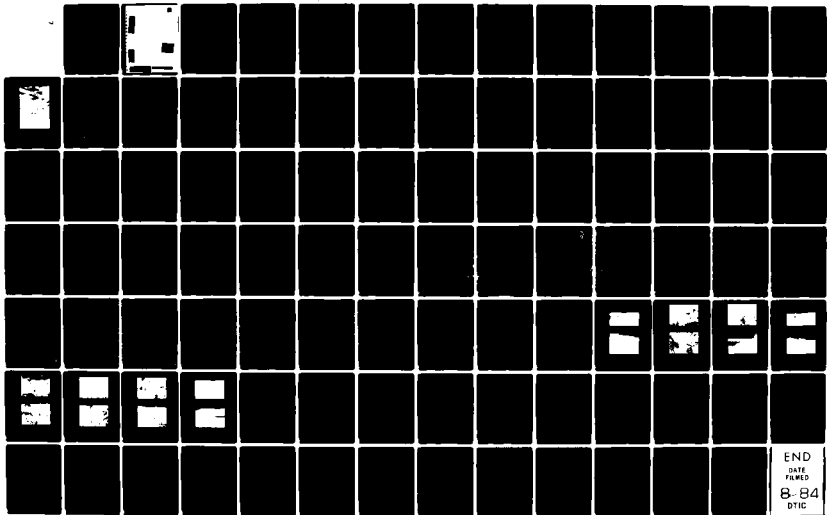
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(CT 00038) CONNECTI..(U) CORPS OF ENGINEERS WALTHAM MA
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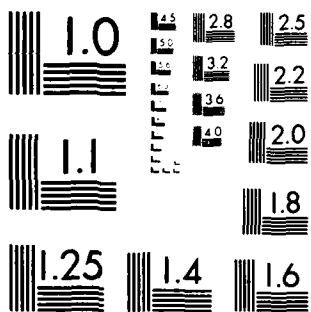
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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Ulbrich Reservoir Dam, also shown as Spring Brook Reservoir Dam, is an earthfill dam, about 2000 ft. long and 17 ft. high, with a minimum crest width of 16 ft. A 20 ft. long concrete ogee spillway with steel flashboards is located 350 ft. from the right abutment. The storage at top of dam is 4090 acre-feet. There is a valve extension operating stem controlling a 12-inch diameter outflow pipe located about 700 ft. from the left abutment. The purpose of the reservoir is to provide water supply storage discharges to Ulbrich Reservoir. A 16-inch force main leaves Ulbrich Reservoir sending water to Pistapaug Pond, which directs water into Wallingford Water System.		



DEPARTMENT OF THE ARMY
 NEW ENGLAND DIVISION CORPS OF ENGINEERS
 424 BRATTLE STREET
 WALTHAM, MASSACHUSETTS 01981

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JUL 01 1981

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

RECEIVED
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Dear Governor O'Neill:

Inclosed is a copy of the Ulbrich Reservoir Dam (CT-00038) 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, City of Wallingford, Wallingford, 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

Incl
 As stated

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ULBRICH RESERVOIR DAM
CT 00038

CONNECTICUT COASTAL
WALLINGFORD, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.	CT 00038
Name of Dam	Ulbrich Reservoir Dam
Town	Wallingford
County and State	New Haven County, Connecticut
Stream	Spring Brook
Date of Inspection	November 24, 1980

BRIEF ASSESSMENT

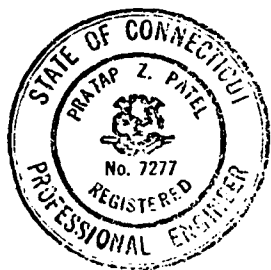
Ulbrich Reservoir Dam, also shown as Spring Brook Reservoir Dam, is an earthfill dam, about 2000 feet long and 17 feet high, with a minimum crest width of 16 feet. A 20 foot long concrete ogee spillway with steel flashboards is located 350 feet from the right abutment. The storage at top of dam is 4090 acre-feet. There is a valve extension operating stem controlling a 12-inch diameter outflow pipe located about 700 feet from the left abutment. The purpose of the reservoir is to provide water supply storage capacity. In relation to this, a 16-inch force main from Mackenzie Reservoir discharges to Ulbrich Reservoir. A 16-inch force main leaves Ulbrich Reservoir sending water to Pistapaug Pond, which directs water into the Wallingford Water System.

The dam was found to be in good condition. Growth of brush and trees on the upstream slope, crest, downstream slope and downstream toe in the spillway and outlet channels was noted. Evidence was found of a stream channel on the downstream slope and toe of the dam near the left abutment. The inspection also revealed minor cracks and spalling of the spillway apron.

The maximum storage at Ulbrich Reservoir dam is 4090 acre-feet with water at top of dam, which according to Corps guidelines classifies it as intermediate size. Based upon the high hazard potential to downstream property owners, the test flood was the Probable Maximum Flood. Using a drainage area of 0.95 square miles and "rolling terrain", it was estimated that the test flood inflow at this dam would be 2040 cfs, and after routing the flood through the reservoir a peak outflow of 75 cfs. The spillway with water at the top of the dam and with the flashboards in place will pass 1220 cfs or 1625% of the test flood outflow.

In accordance with the results of the visual inspection along with the hydrologic and hydraulic analysis of Ulbrich Reservoir Dam, additional engineering analysis and design are needed. Specifically, this would include removing brush and trees from the crest, slopes, and toe of the dam and replacing with compacted soil. Vegetation should also be cleared from the toe drain. Animal burrows should be backfilled. Trees and brush should be cleared from the spillway and outlet channels and riprap provided within 50 feet of the downstream toe. The stream channel near the left abutment should be repaired and runoff diverted from it in the future. Cracking and spalling of the spillway apron should be repaired. The dam should also be inspected for seepage at higher reservoir levels.

The recommendations and remedial measures are described in Section 7 and should be addressed within 2 years after receipt of this Phase I Inspection Report by the owner, except as noted in the report.



Pratap Z. Patel, P.E.
Project Manager

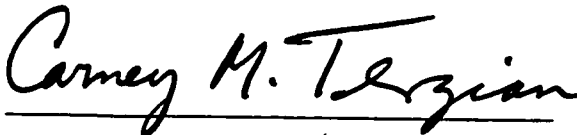
Pratap Z. Patel

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

This Phase I Inspection Report on Ulbrich Reservoir Dam (CT-00038) 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

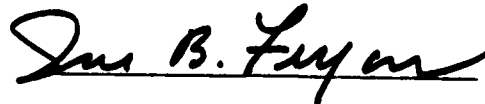


CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division



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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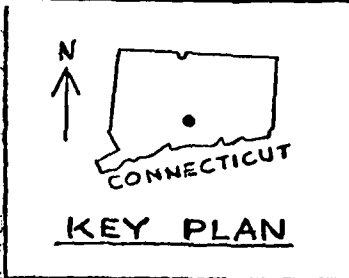
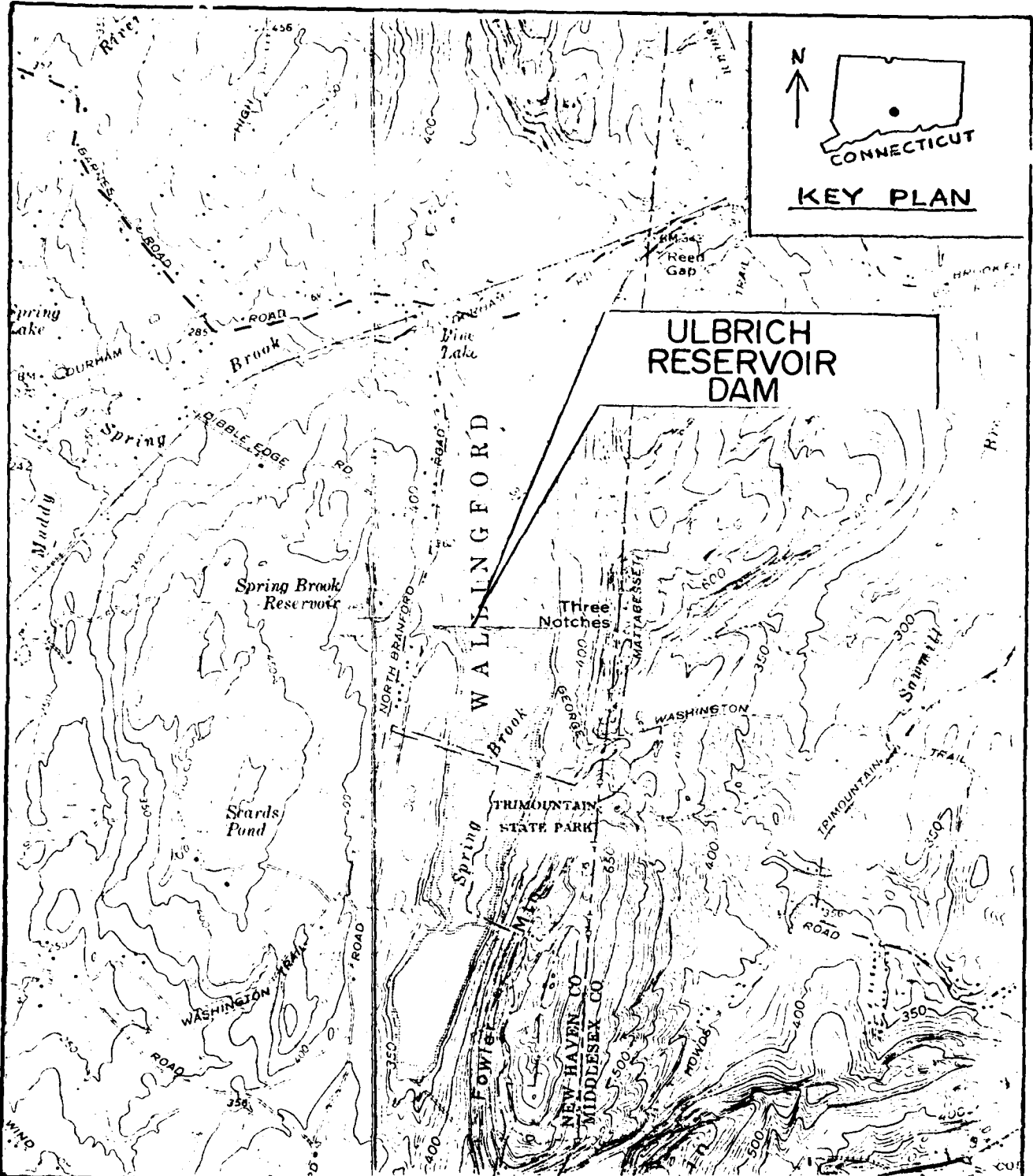


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NEW ENGLAND
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WALTHAM, MASS.

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

NATIONAL
PROGRAM
OF
INSPECTION
OF
NON-FED
DAMS

OVERVIEW PHOTO
DECEMBER, 1980
ULBRICH RESERVOIR DAM
SPRING BROOK
WALLINGFORD, CONNECTICUT



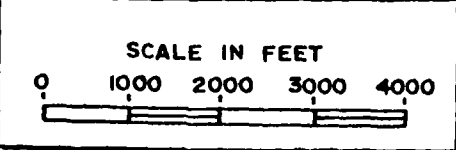
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DURHAM, CT.**



**PHILIP W. GENOVESE AND
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ENGINEERS-HAMDEN, CT.**

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



**NATIONAL PROGRAM OF INSPECTION OF
NON - FED DAMS
LOCATION MAP**

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
ULBRICH RESERVOIR DAM - CT 00038

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 and 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 and 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

Ulbrich Reservoir Dam is located in the Town of Wallingford in New Haven County, Connecticut. The reservoir is located east of North Branford Road in the Town of Wallingford. The dam impounds the waters of Spring Brook, and is shown on the Durham, Connecticut Quadrangle with the approximate coordinates of North $41^{\circ} 27.5'$; West $72^{\circ} 44.7'$. Spring Brook joins the Muddy River approximately 2.1 miles downstream of the dam site.

b. Description of Dam and Appurtenances

Ulbrich Reservoir Dam is a 2000 foot long earthfill dam with a concrete cut-off wall. It has a maximum height of 17 feet. The crest width varies between a minimum of 16 feet and a maximum of 75 feet. The upstream slope of the dam is riprapped to within 4 feet of the crest and has a slope of 3:1. The downstream slope varies between 1.5:1 and 2.5:1 and has a 10-inch toe drain. There is a 20 foot long ogee type concrete spillway with steel flashboards located 350 feet from the right abutment. There are concrete wingwalls upstream of the spillway and concrete training walls along the 35 foot long downstream concrete apron. The channel is riprapped for a distance of 75 feet beyond the apron. There is a 12-inch outlet pipe passing through the dam approximately 700 feet from the left abutment. This is controlled by a gate valve with an extended stem protruding through the upstream slope of the dam. There are two 16-inch force mains entering and leaving the reservoir which control water levels and these are explained in more detail in Section 1.2 i. There is an unpaved service road which runs parallel to the dam downstream of the toe.

c. Size Classification

The dam's maximum impoundment of 4090 acre-feet places it in the INTERMEDIATE size category, using as a reference the size classification table in the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams. Table 1 of these guidelines classifies dams as intermediate size when they contain between 1,000 and 50,000 acre-feet of storage.

d. Hazard Classification

The hazard potential classification for this dam is HIGH, using the Corps Guidelines. There are at least two homes in the area which might be affected by a dam breach with the resultant loss of more than a few lives. Other factors to be considered in the classification are proximity of the dam to North Branford Road and Connecticut Highway Route #68, plus a railroad line and bridge. See pre-failure and post-failure elevations in table on Page 5-2, Section 5.5.

e. Ownership

The dam is owned by the City of Wallingford, Connecticut. The address is:

City of Wallingford
c/o Engineering Department
Town Farms Road
Wallingford, Connecticut 06492

Telephone 203-269-8708

f. Operator

The operation of the dam is controlled by the Water and Sewer Department of the City of Wallingford, Towns Farms Road, Wallingford, Connecticut. The Water and Sewer Authority Manager is Alfred Bruno, and the Authority's telephone number is 202-269-8795.

g. Purpose of the Dam

The purpose of the dam is for water supply for the City of Wallingford, Connecticut.

h. Design and Construction History

The dam was constructed in 1965-1966. Copies of construction plans were obtained and reviewed for this inspection, and pertinent sheets are included in Appendix B. The construction plans were originally dated November 20, 1964, with revisions shown on February 1, 1965. They are sealed by Laird Newell (CT. P.E. No. 62) and the consulting firm was the Henry Souther Engineering Company of 11 Laurel Street, Hartford, Connecticut.

i. Normal Operational Procedures

Ulbrich Reservoir is used as a water storage impoundment, water entering via a 16-inch force main from Mackenzie Reservoir and leaving a pump station at the southern end of Ulbrich Reservoir by another 16-inch force main which carries it to a high point between Ulbrich and Pistapaug Pond Reservoir. From this high point the water flows through an open channel to Pistapaug Pond, which is also owned by the Wallingford Water Company. From Pistapaug Pond the water enters directly into the water supply system. (Refer to the sketch of the Interbasin Transfer System in Appendix B, Sheet B-10).

The normal operating water level at Ulbrich Reservoir is 330.0 NGVD, which is five feet below the spillway crest with flashboards in place.

1.3 Pertinent Data

a. Drainage Area

The drainage area for this dam covers 0.95 square miles or 608 acres. Much of this land is owned by the Wallingford Water Company and 159 acres of it is the normal surface area of the reservoir. There are only a few houses in the entire watershed. Elevations range from 740 NGVD to 335 NGVD, and the terrain can best be described as hilly to mountainous.

b. Discharge at Damsite

1. The outlet works consists of a 12-inch pipe at invert elevation 310.0 which has a discharge capacity of 30 cfs.

2. The maximum reported water level of the dam is 333.0, indicating no flow over the spillway.

3. The ungated spillway capacity at top of dam elevation 342 is 1250 cfs.

4. The ungated spillway capacity at test flood elevation of 336.0 is 75 cfs.

5. The gated spillway capacity at normal pool elevation of 330 is not applicable.

6. The gated spillway capacity at test flood elevation of 339.4 is not applicable.

7. The total spillway capacity at test flood elevation of 336.0 is 75 cfs.

8. The total project discharge at top of dam elevation of 342.0 is 1250 cfs.

9. The total project discharge at test flood elevation of 336.0 is 75 cfs.

c. Elevation (feet above NGVD)

1. Streambed at toe of dam ... 325.0
2. Bottom of cutoff ... Varies
3. Maximum tailwater...N/A
4. Normal pool... 330.0
5. Full flood control pool...N/A
6. Spillway crest ... 335.0 at top of flashboards
333.0 without flashboards
7. Design surcharge (Original Design)...N/A
8. Top of dam... 342.0
9. Test flood surcharge... 339.4

d. Reservoir (Length in feet)

1. Normal pool... 6650
2. Flood control pool...N/A
3. Spillway crest pool... 6650
4. Top of dam... 6850
5. Test flood pool... 6800

e. Storage (acre-feet)

1. Normal pool...2980
2. Flood control pool...N/A
3. Spillway crest pool...2980
4. Top of dam...4090
5. Test flood pool...3655

f. Reservoir Surface (acres)

1. Normal pool...159
2. Flood-control pool...N/A
3. Spillway crest...159
4. Test flood pool...160
5. Top of dam...161

g. Dam

1. Type...Earthfill
2. Length...2000 feet
3. Height...17 feet
4. Top Width...16 feet
5. Side Slopes... upstream-3:1...downstream-varies -
2.5:1 to 1.5:1
6. Zoning...Not Known
7. Impervious Core...Reinforced concrete core wall
8. Cutoff...Concrete cutoff
9. Grout curtain...Unknown
10. Other...Unknown

h. Diversion and Regulating Tunnel

1. Type...16-inch force main which discharges to a riprapped channel.
2. Length...A pump station takes water from the reservoir and pumps it 1000 feet to elevation 440 where it discharges to an open channel and flows 1500 feet by gravity into Pistapaug Pond.
3. Closure...Locked Gate
4. Access...Private Service Road
5. Regulating Facilities...Controlled by pump station

i. Spillway

1. Type...Ogee
2. Length of weir...20 feet
3. Crest Elevation (with and without flashboards)... 335.0...
333.0

i. Spillway (Continued)

4. Gates...None
5. Upstream Channel...Natural
6. Downstream Channel...Concrete apron for 35 feet,
riprap following for 75 feet
7. General...Upstream-Concrete wing walls...Downstream-
Concrete training walls

j. Regulating Outlets

1. Invert...310.0
2. Size...12-inch
3. Description...This outlet pipe passes through the dam
near station 7 + 45 and discharges to an
outlet channel on the downstream slope of
the dam.
4. Control Mechanism...An extended gate valve stem is
located on the upstream slope.

SECTION 2
ENGINEERING DATA

2.1 Design Data

This dam was constructed in 1965-1966 for water supply storage purposes. Construction plans for the dam were prepared by The Henry Souther Engineering Company of 11 Laurel Street, Hartford, Connecticut and are dated November 20, 1964 with revisions dated February 1, 1965. Copies of pertinent sheets are included in Appendix B.

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

The construction plans used in the design of the dam were made available for this inspection.

b. Adequacy

The lack of in-depth engineering data did not allow for a complete review. Therefore, the condition of this dam could only be assessed from the standpoint of reviewing design plans and assessing it with respect to the visual inspection, past performance history and sound engineering judgment.

c. Validity

The results of our visual inspection indicate that the dam is basically in agreement with the construction plans. The major change noted was the addition of steel flashboards on the spillway crest, and the crest width between stations 6 + 75 and 13 + 75 which was measured in the field as 16 feet instead of a variable width up to 200 feet as shown on the construction plans (see pages B3, B4).

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General

The field inspection of Ulbrich Reservoir Dam was made on November 24, 1980. The inspection team consisted of personnel from Philip W. Genovese & Associates, Inc. and Geotechnical Engineers, Inc. Inspection checklists, completed during the visual inspection, are included in Appendix A. At the time of inspection, the water level was approximately 8 feet below the spillway elevation with flashboards in place. The upstream face of the dam could only be inspected above this water level.

b. Dam

The dam is an earthfill dam about 2000 feet long and 17 feet high with a minimum crest width of 16 feet. A stationing system as shown on pages B1 through B5 was adopted for this report. The junction of the crest of the dam and the left abutment correspond to Sta 0 + 45 and the station numbers increase to the right. From Sta 0 + 45 to Sta 6 + 45 the dam has a crest width of 75 feet. From Sta 6 + 45 to Sta 11 + 45 and from Sta 15 + 45 to Sta 20 + 45 the crest width is 16 feet. From Sta 11 + 45 to Sta 15 + 45 the portion of the dam downstream from the crest consists of a hill of natural ground. (Photos No. 7, 15, 16).

A 20 foot wide concrete overflow spillway is located between Sta 16 + 75 and Sta 16 + 95 on the dam. A valve extension operating stem controlling flow in the 12-inch-diameter low-level outlet pipe at the base of the dam is located on the upstream slope about 20 feet below the crest at Sta 7 + 45.

The upstream slope of the dam contains riprap protection extending to an elevation about four feet below the crest. Low brush and occasional small trees are growing between stones in the upper 5 to 10 feet of the riprap left of the spillway (Photo No. 16) and in the upper 10 to 15 feet of the riprap right of the spillway (Photo No. 6). Low brush and small trees were also observed between stones in riprap protection on the left abutment (foreground, Photo No. 16). The riprap stones are generally 1 to 3 feet in size and in satisfactory condition. The upstream slope above the riprap is grass-covered with numerous small trees (Photo No. 15).

The downstream slope and toe are covered with brush and small trees up to 3 inches in diameter, obscuring much of the ground surface from close inspection (Photo Nos. 8 & 10). Portions of the slope that were observable showed no indications of movement. Several animal burrows extending at least one foot beneath the surface of the slope and 5 inches in diameter were observed on the downstream slope (see, for example, Photo No. 13). A small stream channel 12 to 20 inches deep, which collects surface runoff from the left abutment and downstream slope of the dam, extends from the left abutment (Sta 0+45) down the downstream slope to the downstream toe at Sta 3+45. The ground downstream from the toe of the dam from Sta 15+45 to Sta 20+45 and Sta 6+45 to Sta 11+45 was mushy, and standing water was observed at the toe drain outlet at Sta 7+45 (Photo No. 12).

No flow was observed from the 10-inch toe drains, which extend from Sta 16+45 to Sta 20+45 and from Sta 7+45 to Sta 11+45 (Photos Nos. 4, 5, and 12), and no flowing seepage was observed on the downstream slope or toe of the dam. At the time of inspection the reservoir elevation was 5 feet below the spillway crest, 2 feet above the toe drain elevation between Sta 16+45 and Sta 20+45, and about 8 feet above the toe drain elevation between Sta 7+45 and Sta 11+45.

c. Appurtenant Structures

The spillway consists of a concrete weir and training walls with steel flashboards, as shown in Photo No. 9. A concrete apron extends about 30 feet downstream from the weir and is in good condition with the exception of two minor cracks and some spalling. Three vertical hairline cracks extending beneath the water surface were observed on the upstream right training wall. Portions of the downstream training walls have been resurfaced with a slush coat of cement. A crack was observed through the spillway at Sta 16+87. This has been repaired and no leakage was observed through this crack. Slight lateral deflection was observed on the upstream left training wall. There were no indications of seepage adjacent to or through the downstream training walls.

The discharge channel of the spillway is paved with 6 to 12 inch riprap stone from the concrete apron to at least 75 feet downstream from the apron. Grass, brush and small trees grow from between the riprap stones in the floor of the channel. (Photo No. 3).

There is a 12-inch outlet pipe passing through the dam at Sta 7+45. It is controlled by a gate stem valve on the upstream slope of the dam which appears to be in good condition. The downstream outlet channel is overgrown with weeds (Photo 11).

d. Reservoir Area

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

e. Downstream Channel

The downstream channel consists of a natural stream bed and is the outlet channel for the 12-inch-diameter low-level outlet at Sta 7 + 45. This channel joins the discharge channel of the spillway about 350 feet downstream from the dam. The downstream channel is overgrown with brush and trees, and there was no observable riprap protection in the channel at the toe of the dam (Photo No. 11).

3.2 Evaluation

On the basis of the visual inspection, Ulbrich Reservoir Dam is judged to be in good condition. The following conditions, which may affect the long-term performance of the embankment, should be studied:

a. Growth of brush and trees on the upstream slope, crest, downstream slope and downstream toe of the dam which may: dislodge stones in riprap slope protection, prevent close inspection of the surface of the dam and obscure seepage, provide paths of seepage into the embankment, and plug outlets for the toe drains.

b. The formation of a stream channel on the downstream slope and toe of the dam between Stations 0 + 45 and 3 + 45, which may enlarge and cause significant erosion on the downstream slope.

c. Growth of brush and trees in the spillway discharge channel, which could obstruct flow in the channel.

d. The growth of brush and trees in the downstream channel at Sta 7 + 45 and the lack of riprap protection in the channel at the toe of the dam, which could obstruct flow and allow erosion at the toe of the dam when the low-level outlet is opened.

The dam should be re-inspected during higher reservoir levels to observe any evidence of seepage at the downstream toe or collection of seepage by the toe drains. Hairline cracks in the spillway training walls and the extent of the wet area at the downstream toe of the dam should be monitored periodically.

SECTION 4
OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General

The dam creates an impoundment of the water which is used for water supply purposes. An owner's representative visits the project at intervals of approximately once per week. According to Mr. Bruno of the Wallingford Water and Sewer Department, it is their general policy to keep the pool level three feet below the concrete spillway crest (elevation 330 NGVD).

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 work on the dam is not done as needed, and there is no regular work or inspection schedule.

b. Operating Facilities

Maintenance on the operating facilities is done as needed with no regular schedule of inspections. Current needs for maintenance work are evident in Photos Nos. 3, 4, 5, 7, 12, and 13.

4.3 Evaluation

The current operating procedures for the dam are adequate, but a formal downstream warning system should be developed and put into effect in case of an emergency at the dam. The maintenance procedures are not adequate due to the lack of work schedules and periodic inspections, which should be established. Also, a program of biennial technical inspections by qualified registered engineers should be instituted.

SECTION 5
EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Ulbrich Reservoir Dam is an earthfill dam approximately 2000 feet long and 17 feet high with a minimum crest width of 16 feet. The drainage area associated with this dam is 0.95 square miles, of which the reservoir proper occupies 0.25 square miles. The remainder of the drainage area is sparsely populated and best described as hilly to mountainous woodlands.

The dam has a maximum storage capacity of 4090 acre-feet with water at the top of dam and therefore, is classified as intermediate in size based on storage capacity. The Corps defines intermediate impoundments as those having between 1,000 and 50,000 acre-feet of storage.

Ulbrich Reservoir is used as a water supply storage impoundment. Excess water from Mackenzie Reservoir, a town reservoir located west of Ulbrich, is pumped to it to be held as storage. Water leaves Ulbrich via a 16-inch force main and is pumped to a high point located between it and Pistapaug Pond (another town reservoir located south of Ulbrich) from which point it flows by gravity along an open channel into Pistapaug Pond. Pistapaug Pond supplies water directly to the town water supply system. A schematic of this system is included in Appendix B.

The dam has a 20 foot long concrete ogee type spillway located between Station 16+75 and Station 16+95. There are concrete training walls upstream and downstream of the spillway with a 35 foot long concrete apron located on the downstream side. The spillway crest elevation is 333.0 NGVD with steel beam flashboards raising the overflow elevation to 335.0. A 12-inch outlet with a control valve on the upstream dam slope passes through the dam at elevation 310.0 NGVD near Station 7+45.

5.2 Design Data

The Wallingford Water Company supplied hydrologic and hydraulic design data with respect to reservoir storage capacity, surface area and drainage area. This information was used in this report and is included in Appendix B.

5.3 Experience Data

The maximum discharge at this dam site is unknown. However,

the owner reports the maximum observed water level is 333.0 indicating no flow over the spillway with flashboards in place.

5.4 Test Flood Analysis

As no detailed design and operational information are available, hydrologic evaluation was performed using dam information gathered by field inspection, watershed size and an estimated test flood equal to the Probable Maximum Flood (PMF) as determined by guide curves issued by the Corps of Engineers. Based on a drainage area of 0.95 square miles and rolling terrain, it was estimated that the test flood inflow at this dam would be 2,040 cfs. Following the guidance for Estimating Effect of Surcharge Storage on Maximum Probable Discharges, and assuming water at normal pool elevation 330.0, results in a test flood discharge of 75 cfs. The maximum spillway capacity with the reservoir at the top of the dam and the flashboards in place is 1222 cfs or 1625% of the test flood discharge. A full test flood would raise the reservoir level to 336.0 NGVD or 6 feet below the top of dam.

5.5 Dam Failure Analysis

The impact of failure of the dam at maximum pool was assessed using the "Rule of Thumb" Guidance for Estimating Downstream Dam Failure Hydrographs issued by the Corps of Engineers.

A major breach of the dam with water at elevation 336.0 would result in a breach width of 560 feet and a peak discharge of 34,350 cfs. The spillway flow would add an additional 75 cfs, for a total of 34,425 cfs. The total storage at this elevation is 3140 acre-feet. The impact of this failure is summarized in the following table:

Section*	Reach Feet downstream of Dam	Pre-Failure Elevation NGVD	Post-Failure Elevation NGVD	Structures Affected-Elevation
	Dam			0
A-A	28 + 50	310.2	318.6	0
B-B	43 + 50	310.2	319.3	House/320-Rt 68/315-320
C-C	65 + 50	291.0	307.1	RR/300
D-D	85 + 50	270.3	277.2	House/278 House/278
E-E	111 + 50	240.5	249.6	

*See page D-1 for location of cross sections

Because there is a potential for 1 to 3 feet of water in 2 houses downstream there could be a loss of more than a few lives. There could also be disruption and damage to a major state road (Route 68) and railroad. In view of these factors, a high hazard rating is justified.

SECTION 6
EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

The visual observations did not disclose any immediate stability problems. However, brush and trees on the slopes of the dam could dislodge riprap protection and provide paths of seepage into the embankment. Growth of vegetation at the toe drain outlets could plug the drains, and roots from brush and trees growing over the toe drains could damage the toe drain filter and permit seepage to bypass the drain. Lack of riprap protection in the downstream channel at the toe of the dam at Sta 7 + 45 and continued development of the stream channel on the downstream slope between Stations 0 + 45 and 3 + 45 could result in significant erosion of the downstream slope and toe of the dam.

6.2 Design and Construction Data

Design and construction plans of the dam prepared by the Henry Souther Engineering Company and dated February 1, 1965 indicate the dam is a zoned embankment dam with a downstream pervious zone, a central impervious core and a concrete core wall keyed into bedrock beneath the dam. The plans indicate that the embankment fill materials were compacted when placed, but the degree of compaction is not noted.

The design drawings did not disclose any evidence of potential stability problems.

6.3 Post-Construction Changes

There are no records of post-construction changes.

6.4 Seismic Stability

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

SECTION 7
ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection and examination of design plans, Ulbrich Reservoir Dam is judged to be in good condition.

b. Adequacy of Information

The assessment of the condition of the dam is based upon the results of the visual inspection and examination of the design and construction plans prepared by the Henry Souther Engineering Company and dated February 1, 1965.

c. Urgency

The recommendations and remedial measures presented in Sections 7.2 and 7.3 should be implemented by the Owner within two years after receipt of the Phase I Inspection Report, except as noted in Sections 7.2 and 7.3.

7.2 Recommendations

The Owner should retain the services of a registered professional engineer qualified in the design and inspection of dams to accomplish the following:

1. Place riprap protection in the downstream channel within 50 feet of the downstream toe of the dam.
2. Intercept surface runoff from the left abutment and channel runoff away from the downstream slope. Backfill stream channel on downstream slope between Stations 0+45 and 3+45 with appropriate compacted soil.
3. Inspect the dam for evidence of seepage when there is additional water in the reservoir.

7.3 Remedial Measures

- a. Operating and Maintenance Procedures. The Owner should:

1. Clear grass and brush growing on downstream slope and from top of riprap on upstream slope and cut grass on crest, upstream and downstream slopes and downstream toe at least annually.

2. Institute a program of biennial technical inspection by a registered professional engineer.

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

4. Repair cracking and spalling of spillway apron.

5. Within one year, remove trees, brush and root systems from the crest, slopes, and within 20 feet of the downstream toe of the dam and backfill with appropriate compacted soil.

6. Within one year, remove vegetation in the vicinity of the toe drain outlets to prevent blockage of the outlets.

7. Within one year, backfill animal burrows in the downstream slope with appropriate compacted soil.

8. Within one year, cut brush and trees growing in the spillway discharge channel and downstream channel at Station 7+45 within 100 feet of the downstream toe of the dam.

9. Within one year, establish a protective growth of grass over all bare spots.

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 Ulbrich Reservoir Dam

DATE: November 24, 1980

TIME 2:00 p.m.

WEATHER Light rain, 45°F

W.S. ELEV. 5.9 ft U.S. DN.S.
below spillway crest

PARTY:

- | | |
|---|-----------|
| 1. <u>P. Patel - Genovese</u> | 6. _____ |
| 2. <u>W. Gancarz - Genovese</u> | 7. _____ |
| 3. <u>R. Murdock - Geotechnical Engineers</u> | 8. _____ |
| 4. <u>R. Stetkar - Geotechnical Engineers</u> | 9. _____ |
| 5. _____ | 10. _____ |

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

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam

DATE November 24, 1980

PROJECT FEATURE Dam Embankment

NAME _____

DISCIPLINE Geotechnical

NAME Murdock/Stetkar

AREA EVALUATED	CONDITIONS
<p><u>DAM EMBANKMENT</u></p> <p>Crest Elevation</p> <p>Current Pool Elevation</p> <p>Maximum Impoundment to Date</p> <p>Surface Cracks</p> <p>Pavement Condition</p> <p>Movement or Settlement of Crest</p> <p>Lateral Movement</p> <p>Vertical Alignment</p> <p>Horizontal Alignment</p> <p>Condition at Abutment and at Concrete structures</p> <p>Indications of Movement of Structural Items on Slopes</p> <p>Trespassing on Slopes</p> <p>Sloughing or Erosion of Slopes or Abutments</p>	<p>Stationing for visual inspection: Sta 0+45 corresponds to left abutment-station-numbers increase to right.</p> <p>333.0 -Without flashboards 335.0 -With flashboards</p> <p>327.1</p> <p>Elevation 333.0</p> <p>None Observed</p> <p>Gravel roadway on crest left of spillway - satisfactory</p> <p>None Observed</p> <p>None Observed</p> <p>Good</p> <p>Good</p> <p>Satisfactory</p> <p>N/A</p> <p>Free access to crest and slopes, Gravel roadway on crest; tire ruts on upstream edge of crest at Sta 1+30 Service road on downstream slope from Sta 14+45 to Sta 17+45 Small animal burrows on downstream slope.</p> <p>Small stream channel 12 to 20 inches deep eroded in downstream slope between Sta 0+45 and Sta 3+45</p>

PERIODIC INSPECTION CHECKLIST

PROJECT Ulbrich Reservoir Dam

DATE November 24, 1980

PROJECT FEATURE Dam Embankment

NAME _____

DISCIPLINE Geotechnical

NAME Murdock/Stetkar

AREA EVALUATED	CONDITION
Rock Slope Protection - Riprap Failures	Riprap slope protection on upstream slope is in satisfactory condition.
Unusual Movement or Cracking at or Near Toe	None observed.
Unusual Embankment or Downstream seepage	None observed. Area downstream from dam is generally mushy; source of water unknown.
Piping or Boils	None observed.
Foundation Drainage Features	None
Toe Drains	Toe drain with 10 inch diameter concrete pipe from Sta 7+45 to Sta 11+45 and Sta 16+45 to Sta 20+45.
Instrumentation System	None
Vegetation	Heavy growth of brush and trees on downstream slope and on crest and upstream slope right of spillway. Upstream slope left of spillway grass-covered with occasional trees up to 3 inches in diameter. Some small brush growing in upstream riprap.

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam DATE November 24, 1980

PROJECT FEATURE Dike Embankment NAME _____

DISCIPLINE Geotechnical NAME Murdock/Stetkar

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

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam DATE November 24, 1980
 PROJECT FEATURE Outlet Works - Control Tower NAME _____
 DISCIPLINE Structural NAME P. Patel

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	Only visible portion is the casing to an extended valve stem which controls a 12 inch outlet pipe. (Station 7+45) Good
A-6	

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam

DATE November 24, 1980

PROJECT FEATURE Outlet - Conduit

NAME _____

DISCIPLINE Geotechnical

NAME Murdock/Stetkar

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

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam

DATE November 24, 1980

PROJECT FEATURE Outlet - Outlet Structure & Channel NAME _____

DISCIPLINE Geotechnical/Structural

NAME Murdock/Stetkar/Patel

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Visible Reinforcing</p> <p>Any Seepage or Efflorescence</p> <p>Condition at Joints</p> <p>Drain holes</p> <p>Channel</p> <p>Loose Rock or Trees Overhanging Channel</p> <p>Condition of Discharge Channel</p>	<p>Only the outlet pipe was visible.</p> <p>Good</p> <p>N/A</p> <p>Natural stream channel at Sta 7+45</p> <p>Trees overhang both sides of channel about 250 feet downstream from dam.</p> <p>Poor. Channel overgrown with grass and brush.</p>
<p>A-8</p>	

PERIODIC INSPECTION CHECKLIST

PROJECT Ulbrich Reservoir Dam DATE November 24, 1980

PROJECT FEATURE Outlet - Spillway NAME _____

DISCIPLINE Geotechnical/Structural/Hydraulics NAME Murdock/Stetkar/Patel/
Gancarz

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	Approach channel under water and observable within 15 feet of spillway weir.
General Condition	Observable portion is satisfactory.
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Observable portion consists of riprap.
b. Weir and Training Walls	
General Condition of Concrete	Good
Rust or Staining	No
Spalling	No
Any Visible Reinforcing	No
Any Seepage or Efflorescence	
Drain Holes	Three 1 inch in diameter weep holes in training walls downstream from weir; two plugged with concrete and not functional.
c. Discharge Channel	
General Condition	Fair - Crack noted-spalling on apron
Loose Rock Overhanging Channel	None

PERIODIC INSPECTION CHECKLIST

PROJECT Ulbrich Reservoir Dam DATE November 24, 1980
 PROJECT FEATURE Outlet - Spillway NAME _____
 DISCIPLINE Goetechnical/Structural/Hydraulics NAME Murdock/Stetkar/Patel/
 Gancarz

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u></p> <p>Trees Overhanging Channel</p> <p>Floor of Channel</p> <p>Other Obstructions</p> <p>Other Comments</p>	<p>Small trees overhang both sides of channel about 100 feet downstream.</p> <p>Riprap with brush and grass growing between stones.</p> <p>None</p> <p>Wooden bridge spans channel 75 feet downstream from dam. 40 feet diameter stilling basin 5 feet deep about 50 feet downstream from bridge. Outlet channel continues downstream from basin approximately parallel to dam.</p>

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam

DATE November 24, 1980

PROJECT FEATURE Outlet Works - Service Bridge

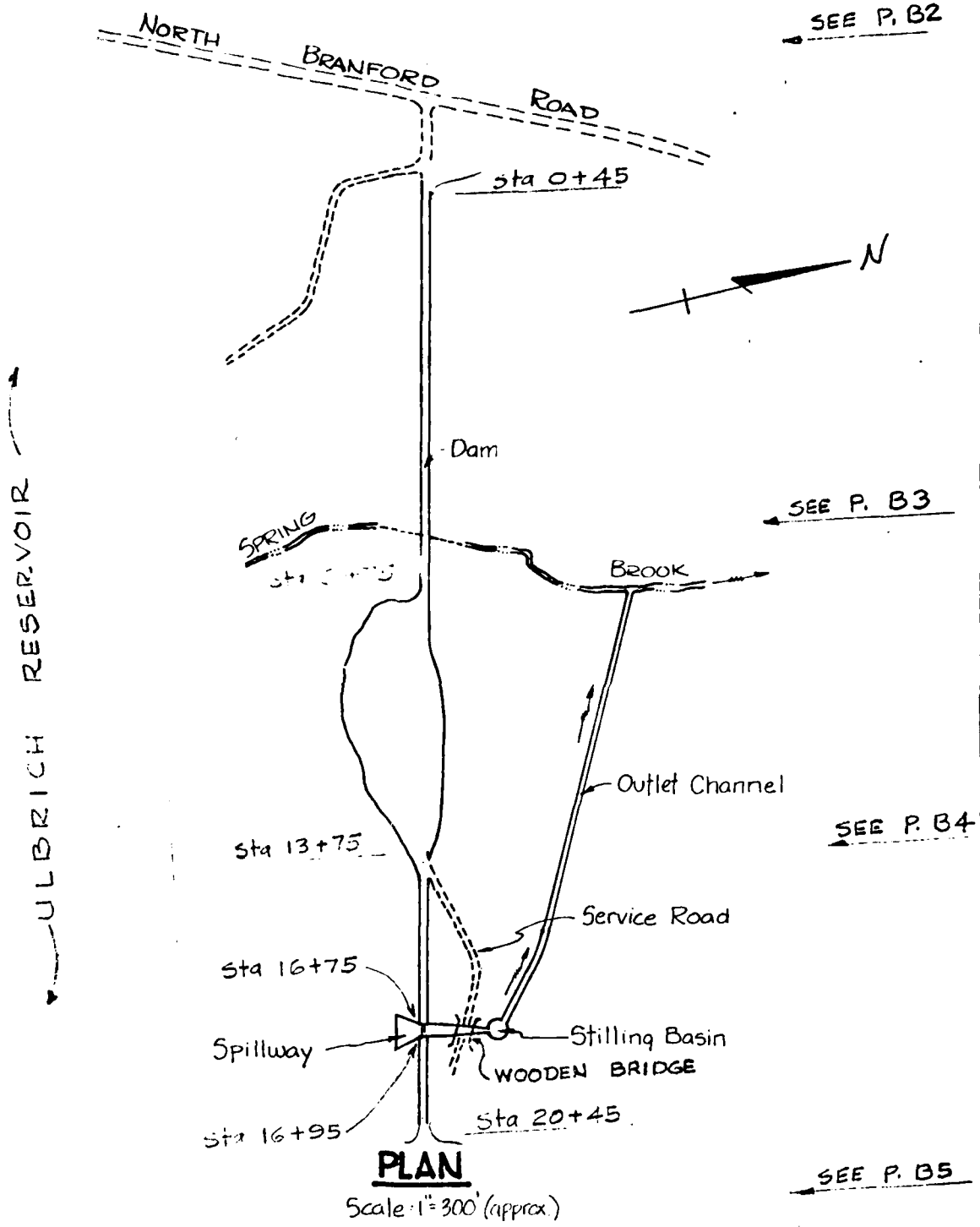
NAME _____

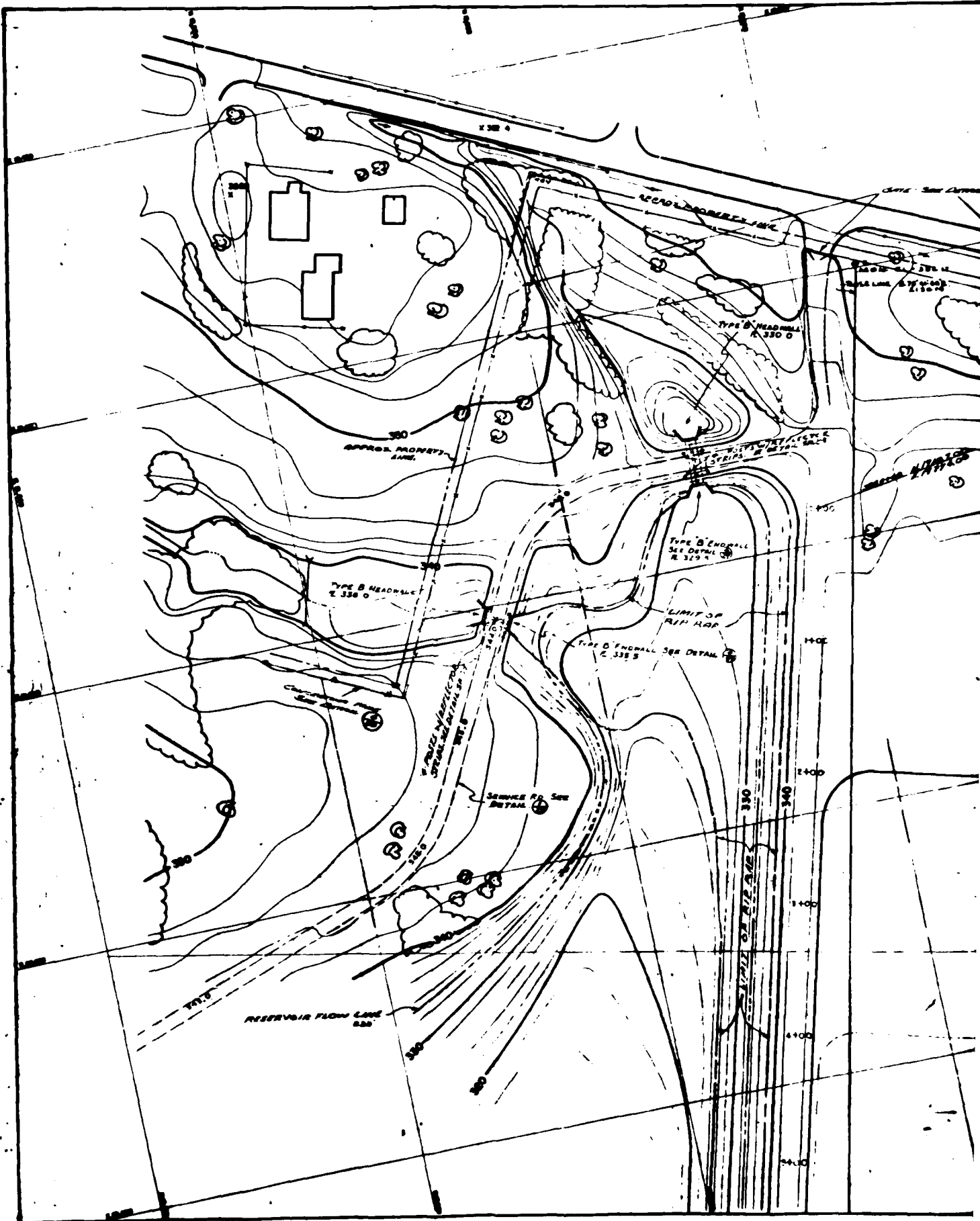
DISCIPLINE Geotechnical

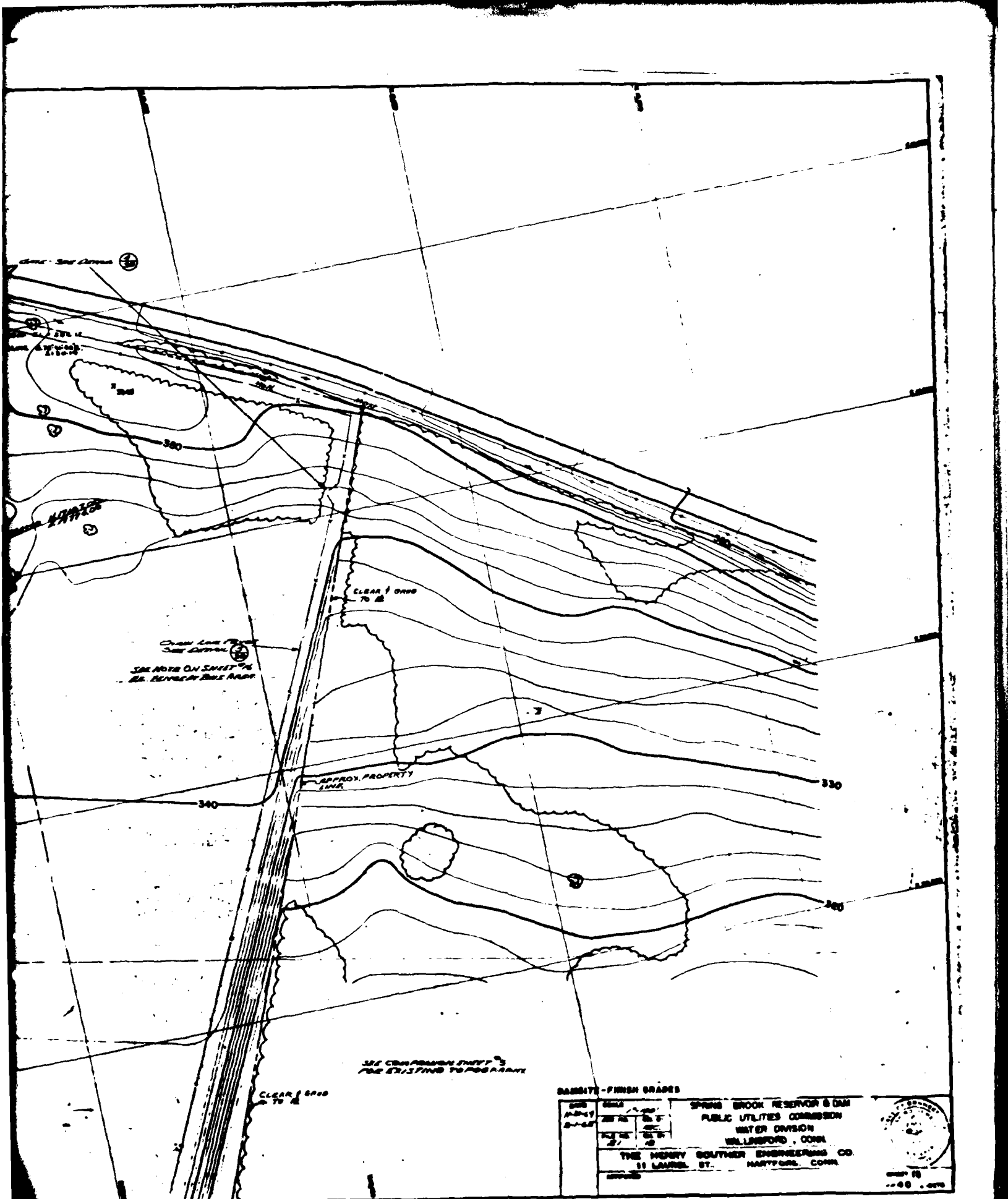
NAME Murdock/Stetkar

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - SERVICE BRIDGE</u></p> <p>a. Super Structure</p> <p style="padding-left: 40px;">Bearings</p> <p style="padding-left: 40px;">Anchor Bolts</p> <p style="padding-left: 40px;">Bridge Seat</p> <p style="padding-left: 40px;">Longitudinal Members</p> <p style="padding-left: 40px;">Under Side of Deck</p> <p style="padding-left: 40px;">Secondary Bracing</p> <p style="padding-left: 40px;">Deck</p> <p style="padding-left: 40px;">Drainage System</p> <p style="padding-left: 40px;">Railings</p> <p style="padding-left: 40px;">Expansion Joints</p> <p style="padding-left: 40px;">Paint</p> <p>b. Abutment & Piers</p> <p style="padding-left: 40px;">General Condition of Concrete</p> <p style="padding-left: 40px;">Alignment of Abutment</p> <p style="padding-left: 40px;">Approach to Bridge</p> <p style="padding-left: 40px;">Condition of Seat & Backwall</p>	<p>None</p>

APPENDIX B
ENGINEERING DATA







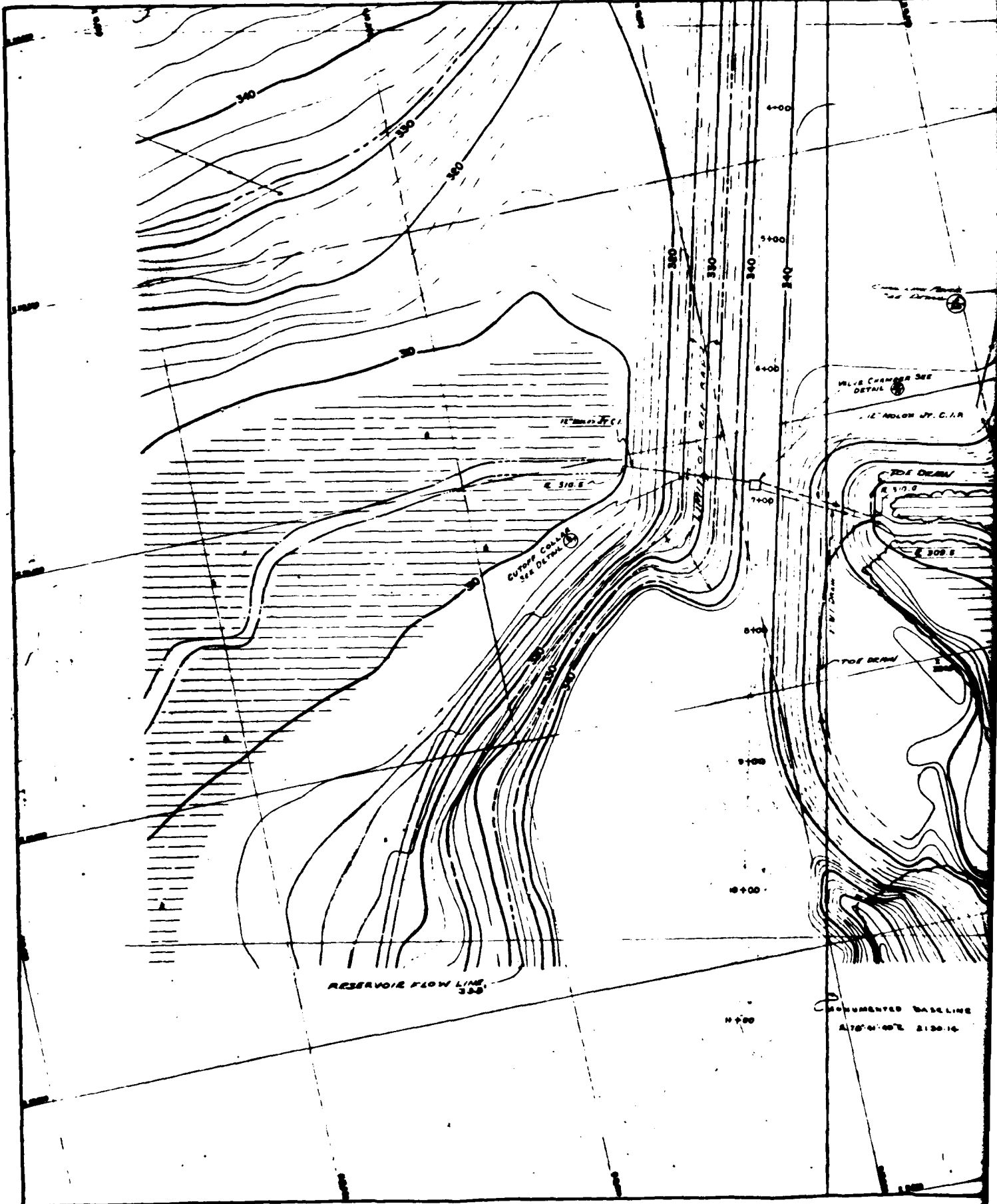
OVER LINE FROM
 SEE DETAIL
 SEE NOTE ON SHEET 74
 RE. ELEVATION THIS AREA

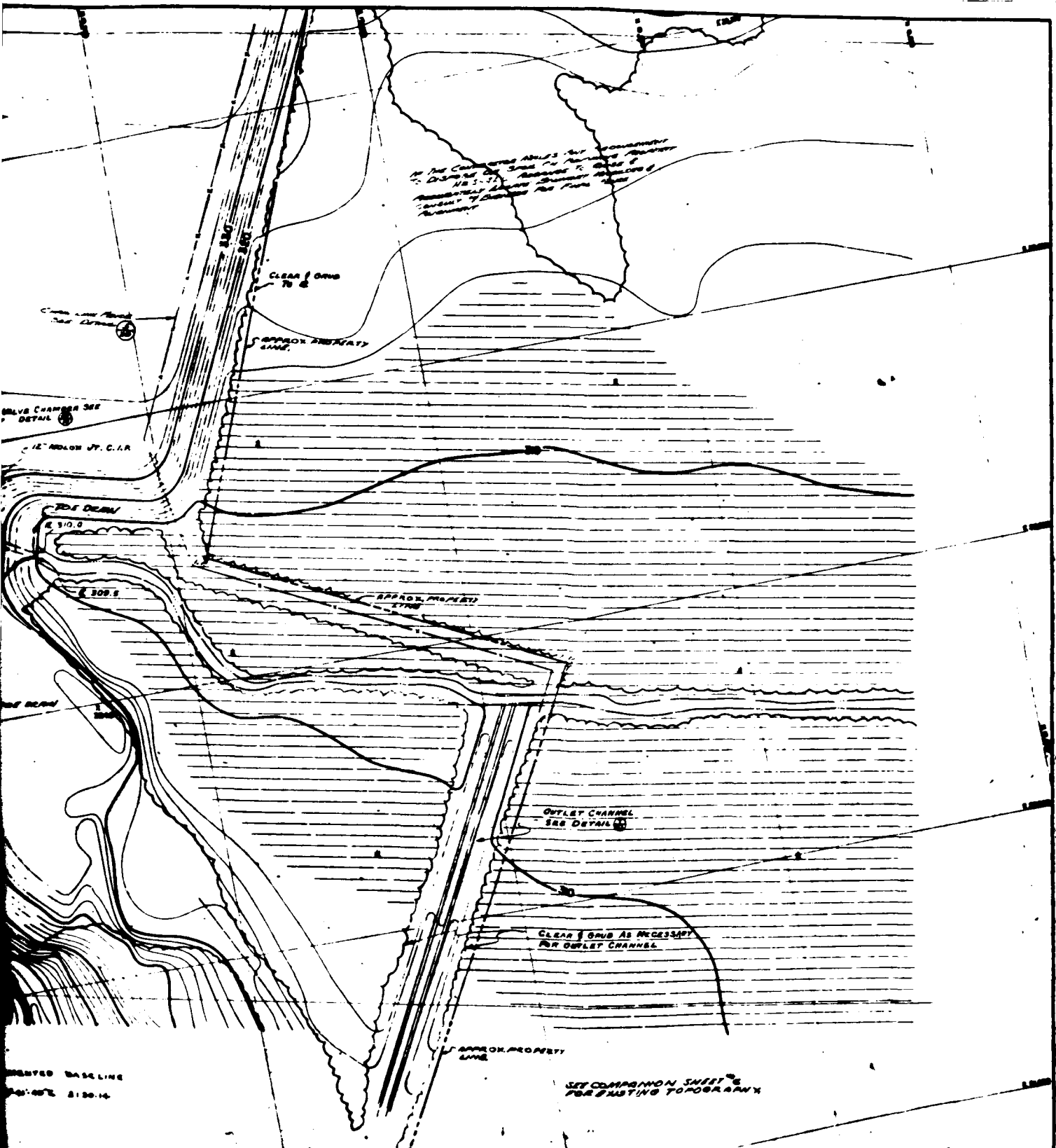
SEE COMPARISON SHEET 3
 FOR EXISTING TO PROPOSED

DAM SITE - FINISH GRADES

DATE	SCALE	PROJECT
APR 1954	1" = 40'	SPRING BROOK RESERVOIR & DAM
BY	DRAWN	PUBLIC UTILITIES COMMISSION
WJS	WJS	WATER DIVISION
CHKD	CHKD	WILLIAMSFOORD, CONN.
WJS	WJS	THE HENRY SOUTHER ENGINEERING CO.
APP'D	APP'D	11 LAUREL ST. HARTFORD, CONN.

SHEET 10
 OF 10





IN THE CASE OF ANY ABUSE OF THE PROPERTY
 TO DISPOSE OF THE SAME THE PROPERTY
 NO. 1-71. APPROVED BY THE BOARD OF
 SUPERVISORS OF THE TOWN OF WALLINGFORD
 COUNTY OF HARTFORD, CONN.

DAMMED-FINISH GRADES

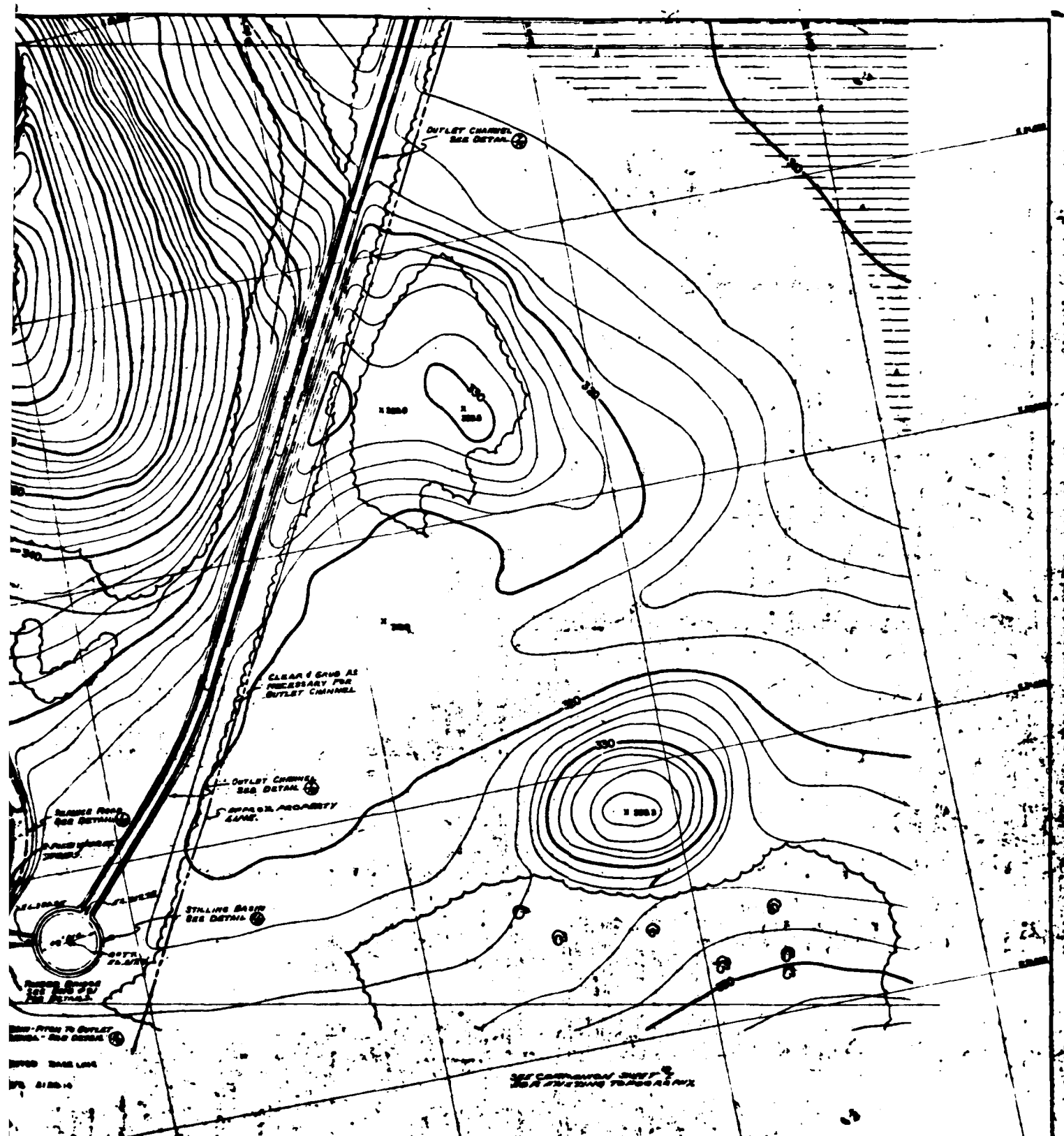
DATE	SCALE
1-2-41	AS SH.
2-1-41	AS SH.
	AS SH.
	AS SH.

SPRING BROOK RESERVOIR & DAM
 PUBLIC UTILITIES COMMISSION
 WATER DIVISION
 WALLINGFORD, CONN.
 THE HENRY SOUTHBY ENGINEERING CO.
 11 LAUREL ST. HARTFORD, CONN.



B-3

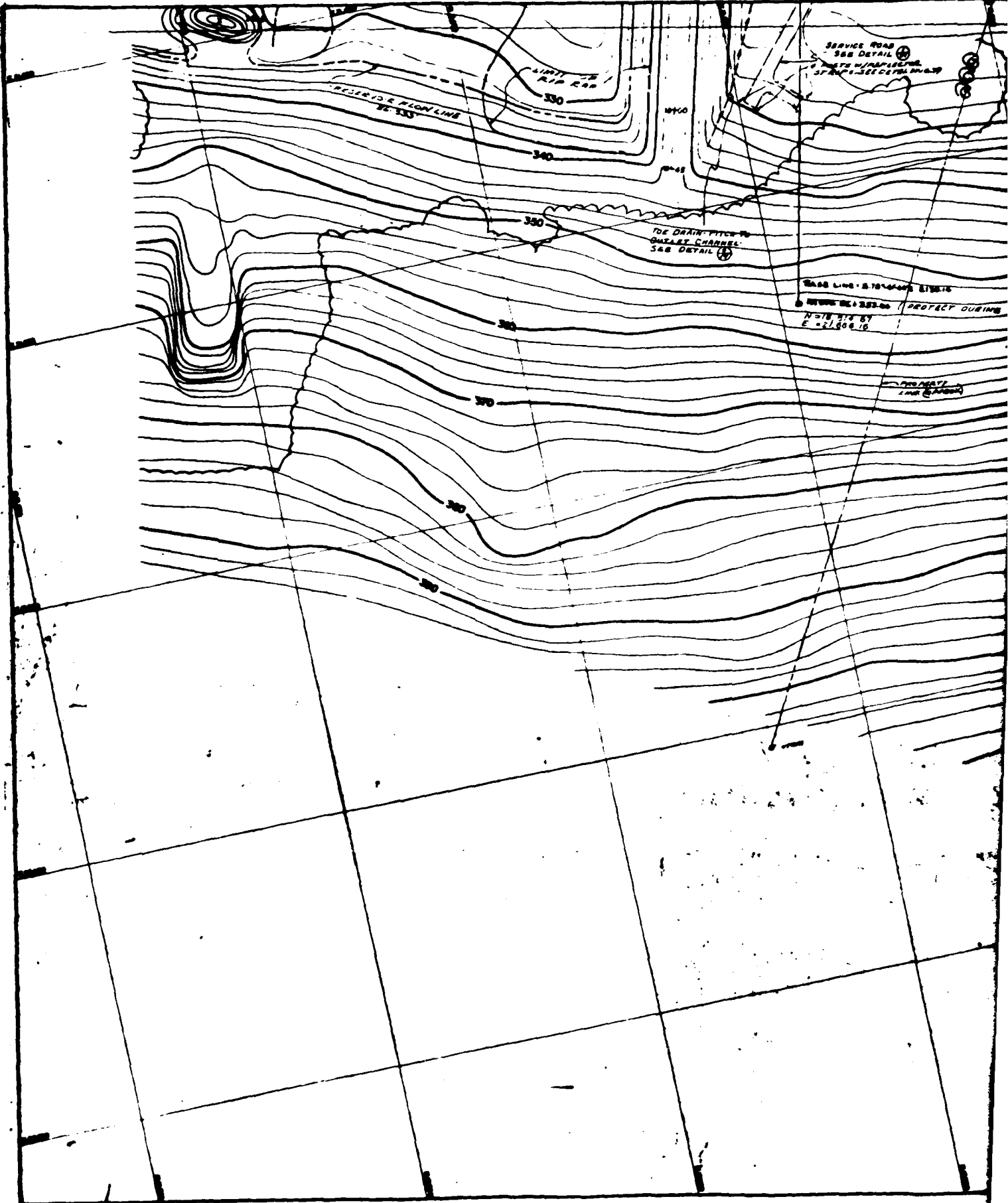




DAM SITE - FINISH GRADES

DATE	SCALE	SPRING BROOK RESERVOIR & DAM PUBLIC UTILITIES COMMISSION WATER DIVISION WILLSFORD, CONN.	
BY	BY		
FOR	BY	THE HERRICK ENGINEERING & SURVEYING CO. 11 LAUREL ST. HARTFORD, CONN.	

B4



SERVICE ROAD
S&B DETAIL

SIDE FLOW LINE

330

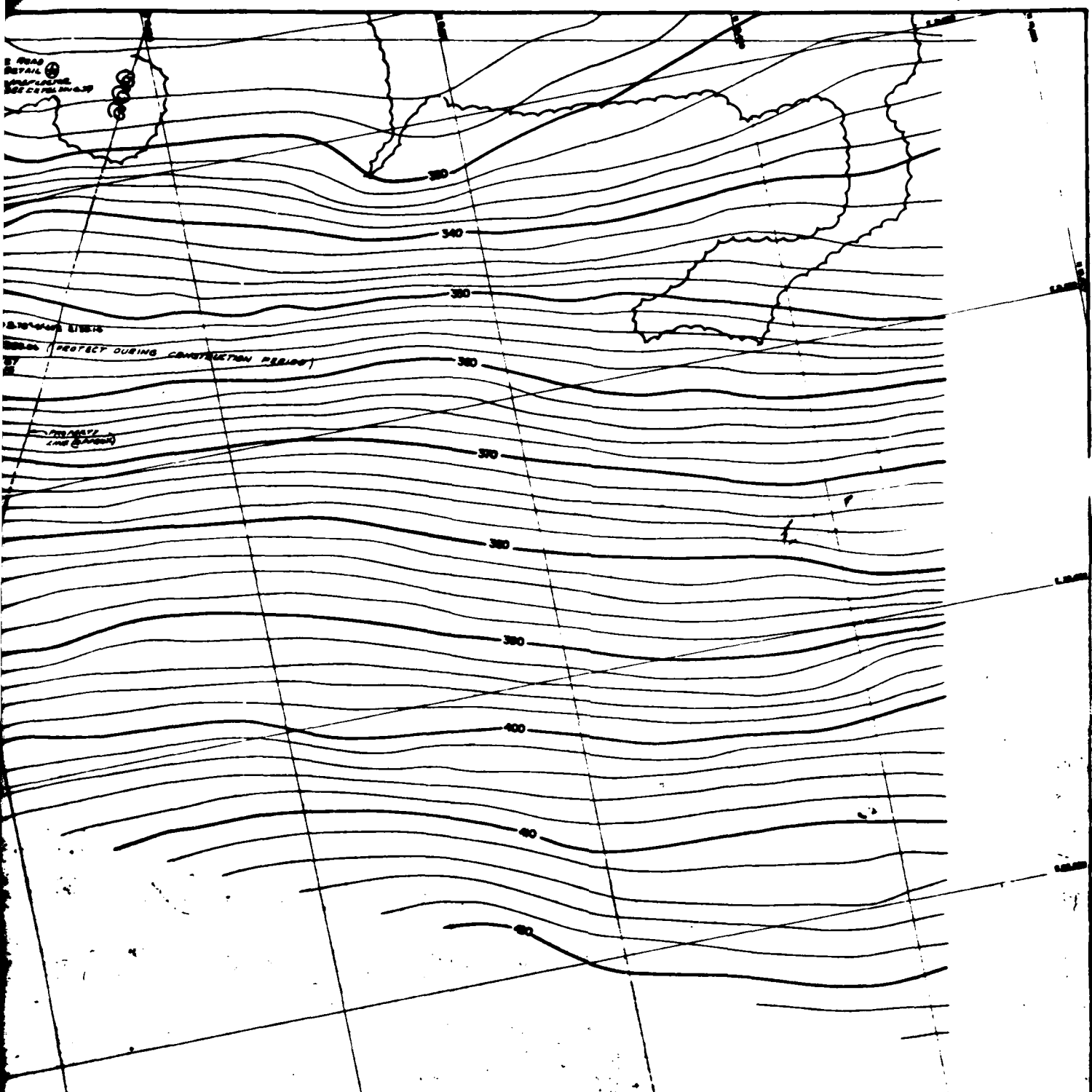
340

350

DRAIN PIT
S&B DETAIL

BASE LINE 5-10-60
NO. 11 BY
E-2160410

PROTECT DURING

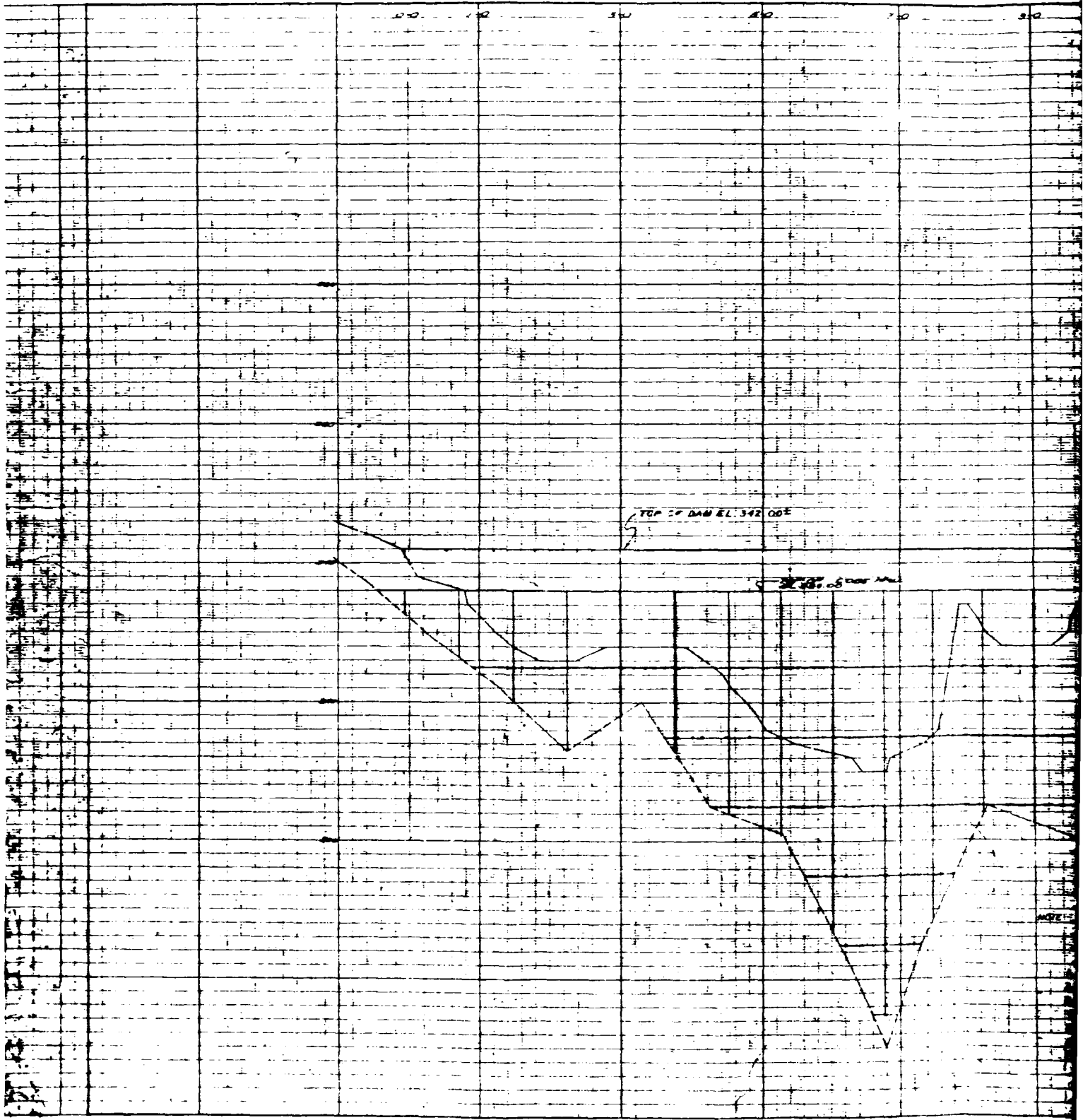


SEE COMPANION SHEET 9
FOR ENJOYING TO APRIL 1914

DAMITE-FINISH GRADES

DATE 8-2-55	SCALE 1" = 100'	PROJECT SPRING BROOK RESERVOIR & DAM	
DRAWN BY H.S.	CHECKED BY H.S.	PUBLIC UTILITIES COMMISSION WATER DIVISION WALLINGFORD, CONN. THE HENRY SEUTHER ENGINEERING CO. 11 LAUREL ST. HARTFORD, CONN.	

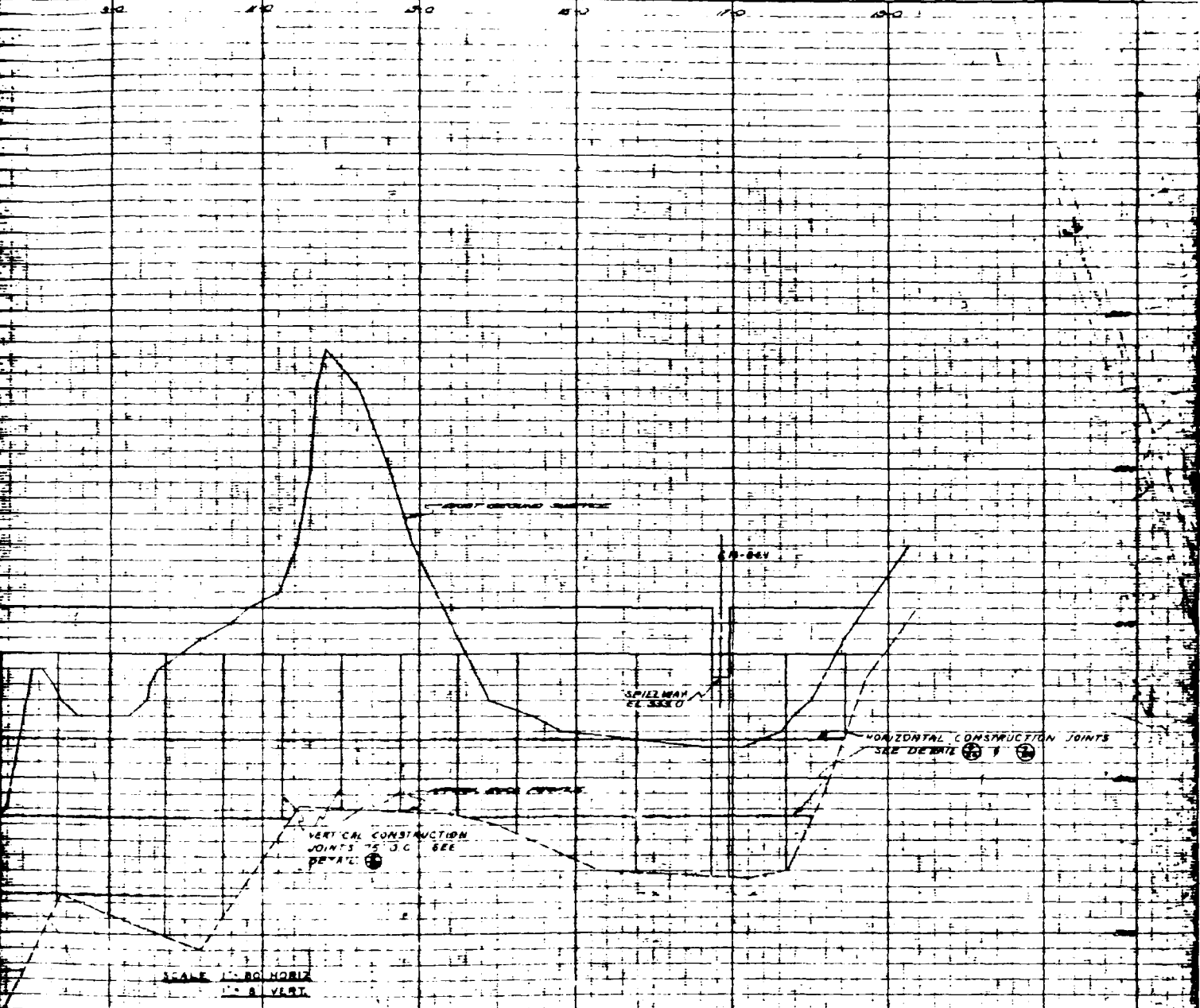
B-5



10/1/50

PURELL & CO.

10/1/50



SCALE 1" = 20' HORIZ
1" = 8' VERT

NOTE CONTRACTOR SHALL FURNISH ALL MATERIALS AND LABOR
NECESSARY FOR THE PROPOSED WORK AND FOR APPROVAL
THE FOLLOWING GENERAL REQUIREMENTS SHALL
BE FOLLOWED:

1. HORIZONTAL PILES TO BE 4" DIA'S SECTIONS
2. MINIMUM HEIGHT TA. PILE 15 FEET SECTIONS
3. MINIMUM VERTICAL PILE 10 FEET
4. MINIMUM FOR 5' DIA'S 6" DIA'S
5. MINIMUM DETAIL ADVISORY PILES 7 DAYS
6. PILES TO BE 8" DIA TO STEEL AREA 500MM PER FT.
7. PILES TO BE 8" DIA TO STEEL AREA 500MM PER FT.
8. PILES TO BE 8" DIA TO STEEL AREA 500MM PER FT.
9. PILES TO BE 8" DIA TO STEEL AREA 500MM PER FT.
10. PILES TO BE 8" DIA TO STEEL AREA 500MM PER FT.

USE PROFILE

DATE	SCALE	BY	CHK'D
11-15-50	AS SHOWN	W.S.	W.S.
11-15-50	AS SHOWN	W.S.	W.S.
11-15-50	AS SHOWN	W.S.	W.S.

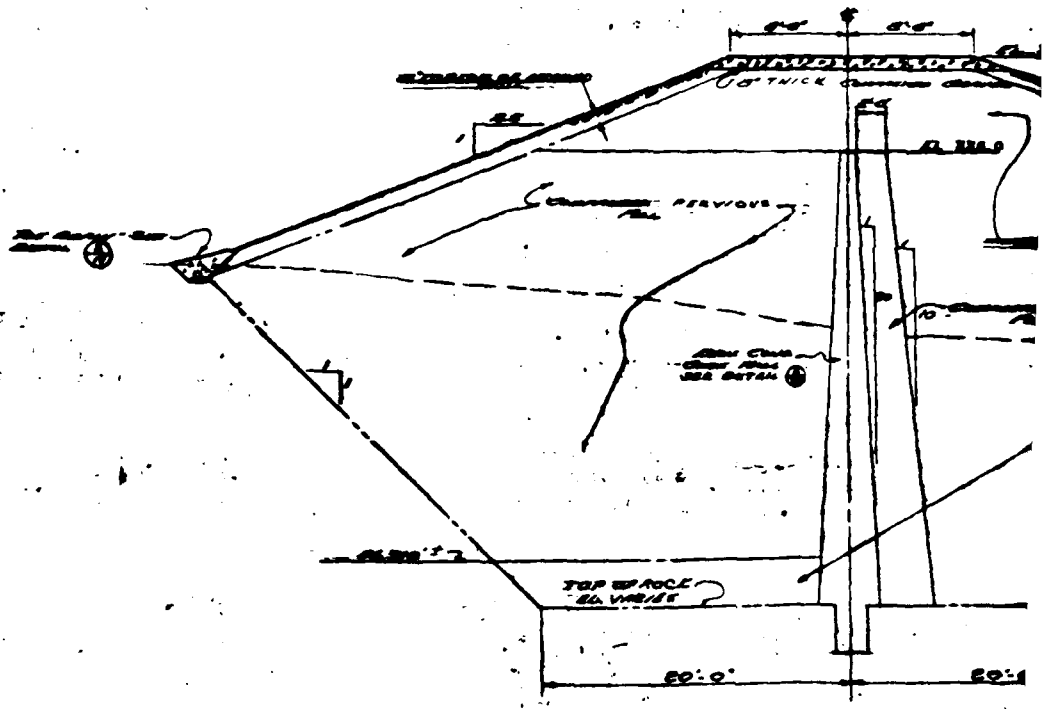
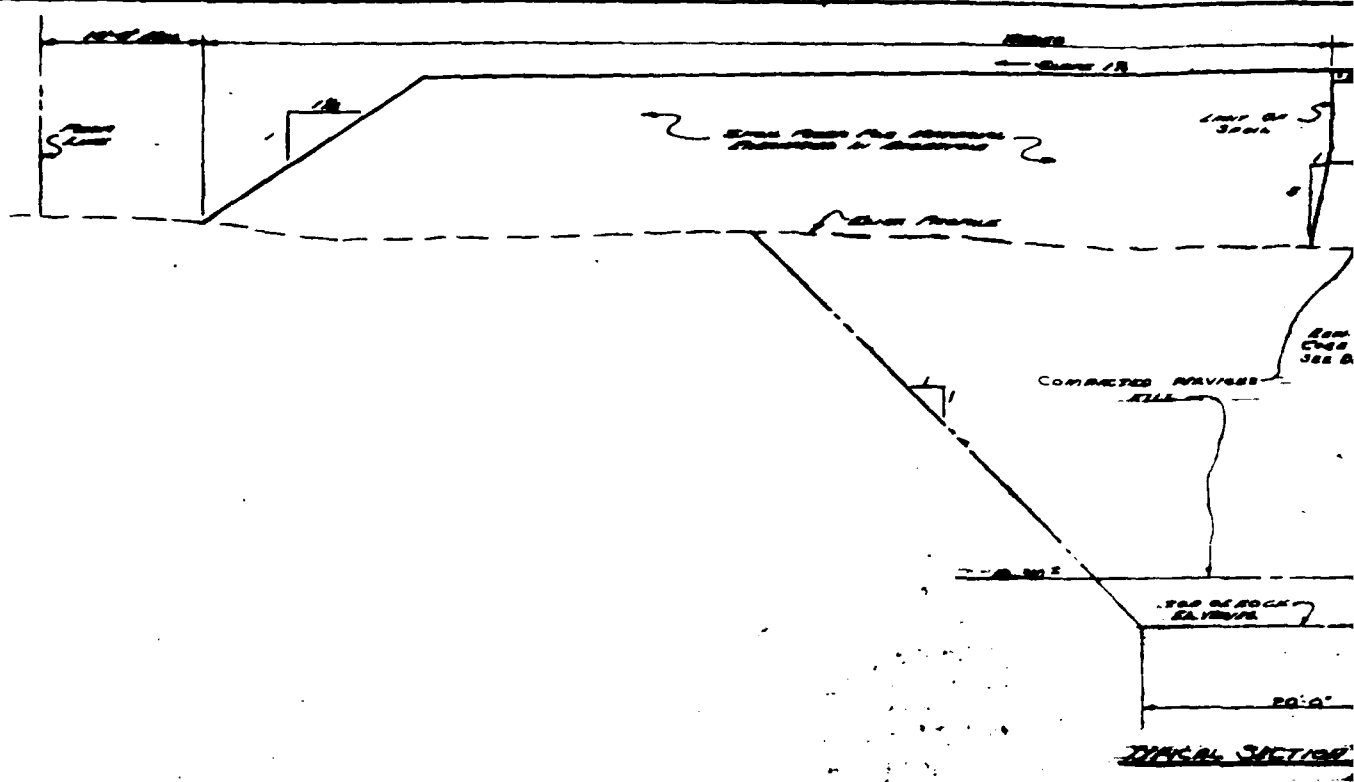
SPRING BROOK RESERVOIR & DAM
PUBLIC UTILITIES COMMISSION
WATER DIVISION
WALLINGFORD, CONN.



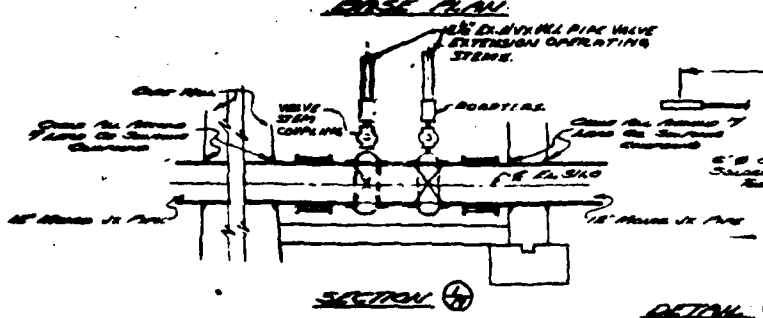
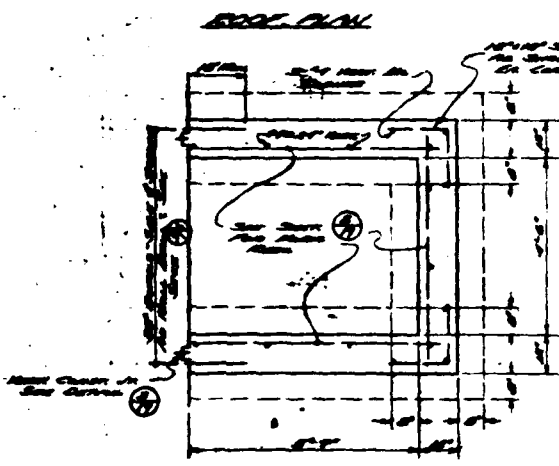
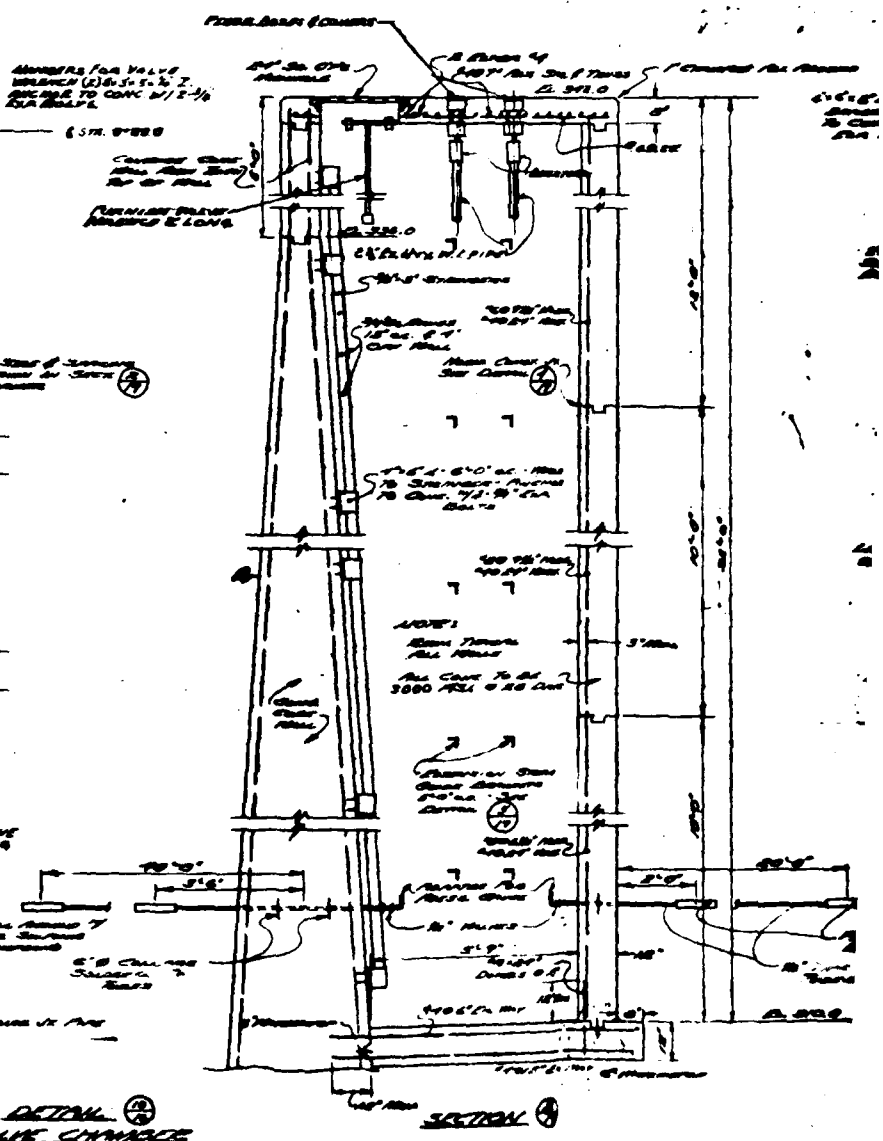
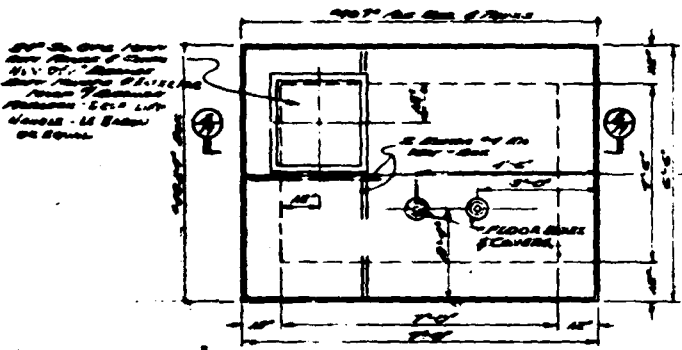
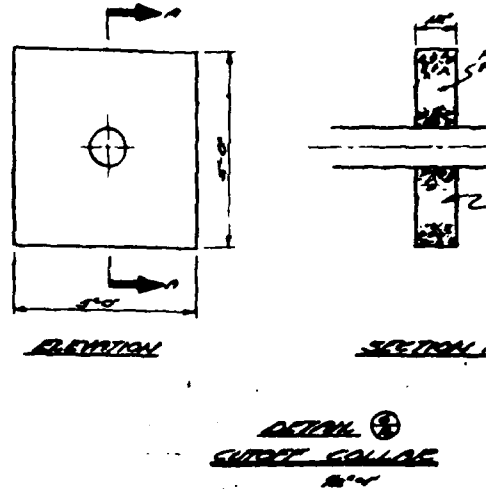
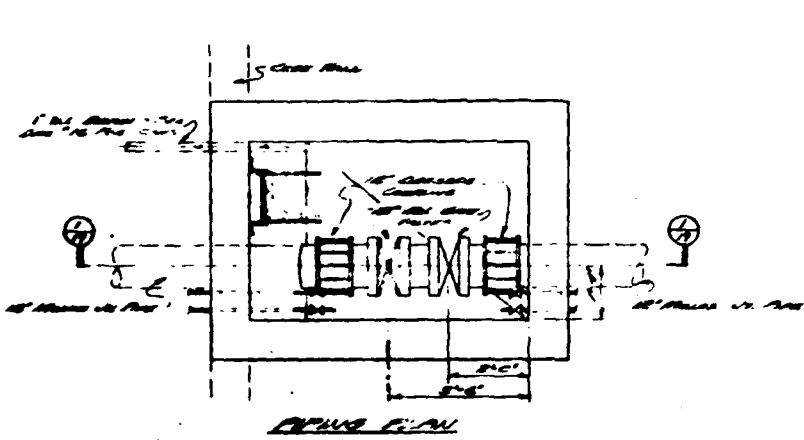
THE HENRY SOUTHER ENGINEERING CO.
11 LAUREL ST. HARTFORD, CONN.

SHEET 15
OF 10 SHEETS

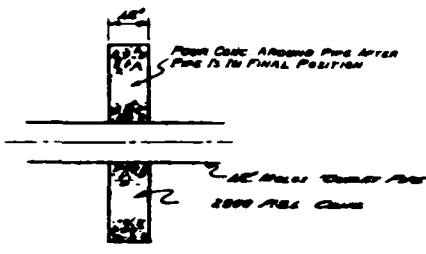
B-6



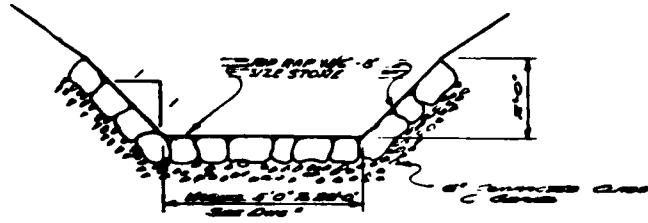
TYPICAL SECTION STA 7+00 TO 7+10



DETAIL



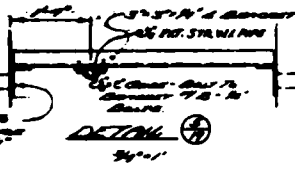
SECTION 79-71



DETAIL 79

TYPICAL OUTLET CHANNEL SECTION

DETAIL 78
CUTOFF COLLAR

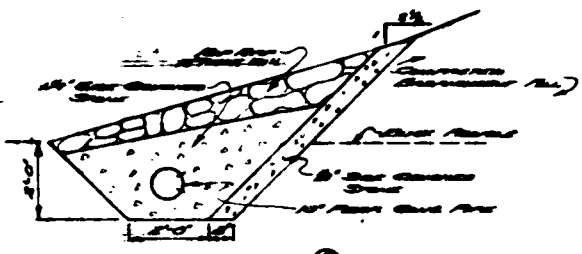


DETAIL 77



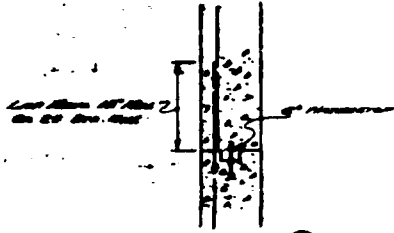
DETAIL 76

VERTICAL CONSTRUCTION DETAIL



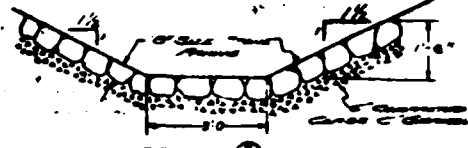
DETAIL 75

TYPICAL TOE DRAIN



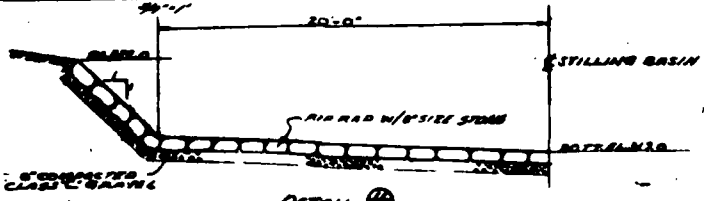
DETAIL 74

HORIZONTAL CONSTRUCTION DETAIL



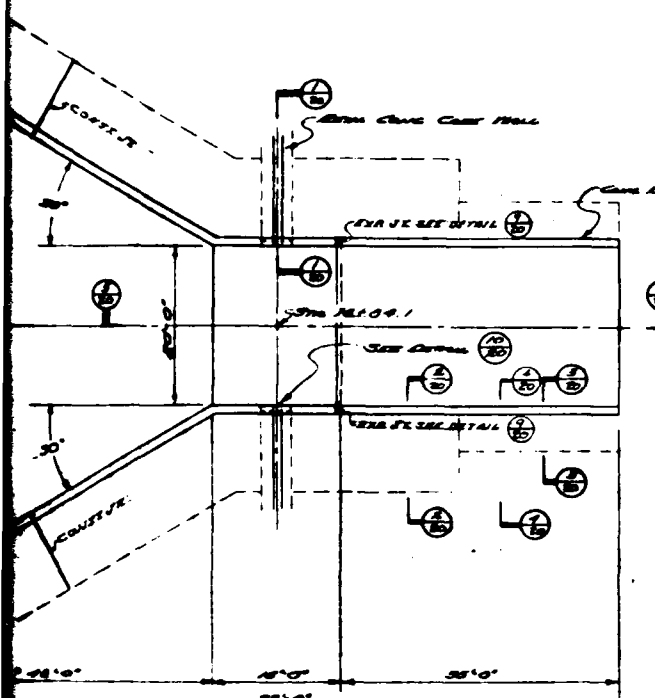
DETAIL 73

CHANNEL TO PAUG POND



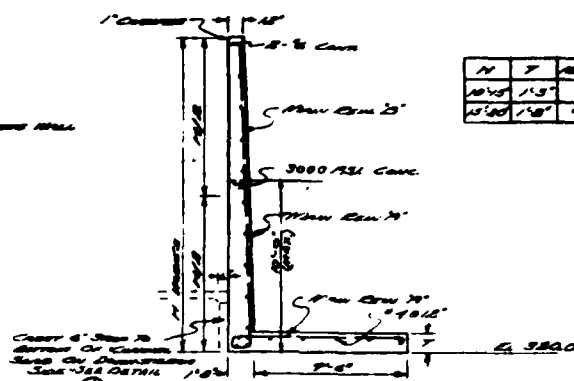
DETAIL 72
HALF SECTION THRU STILLING BASIN

VALVE CHAMBER, TOE DRAIN, CHANNEL & CUTOFF COLLAR DETAILS			
DATE 1-20-67	SCALE AS SHOWN	SPRING BROOK RESERVOIR & DAM PUBLIC UTILITIES COMMISSION WATER DIVISION WALLINGFORD, CONN.	
DESIGNED BY R.J.	CHECKED BY A.C.		
FILE NO. 10	DL BY AS		
APPROVED B-8		THE MERRY SOUTHER ENGINEERING CO. 11 LAUREL ST. HARTFORD, CONN.	
			SHEET 10 OF 40 SHEETS

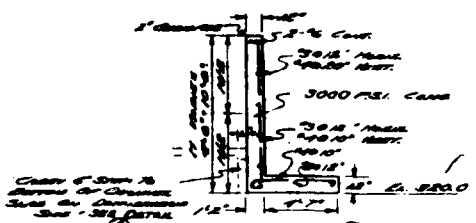


PLAN
RETAINING WALLS
1"=10'

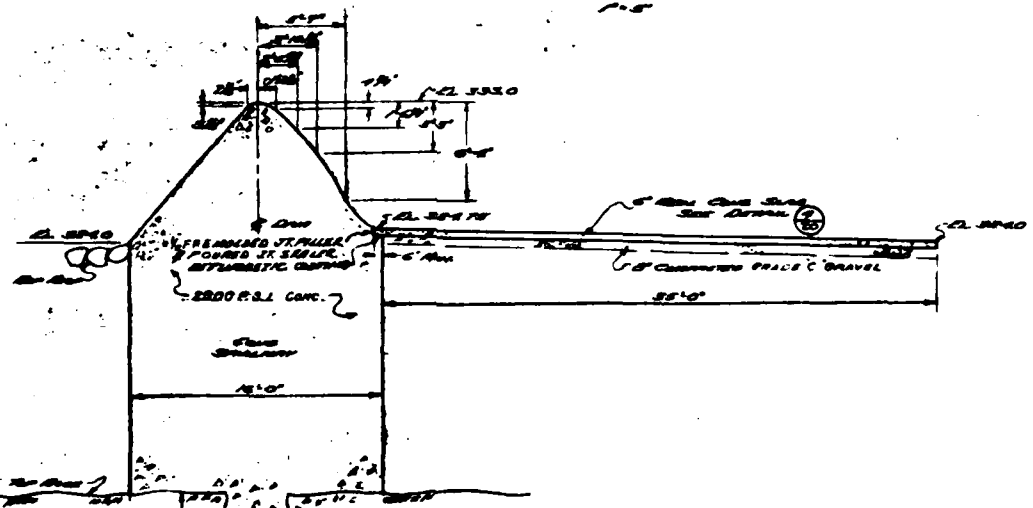
NOTE:
ALL RETAINING WALL REIN.
TO HAVE 3" MIN. COVER



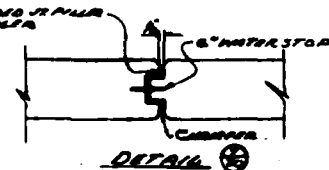
SECTION 15
RETAINING WALL TOP EL.
3860 TO 3710
1"=8'



SECTION 16
RETAINING WALL TOP EL.
3860 TO 3700
1"=8'



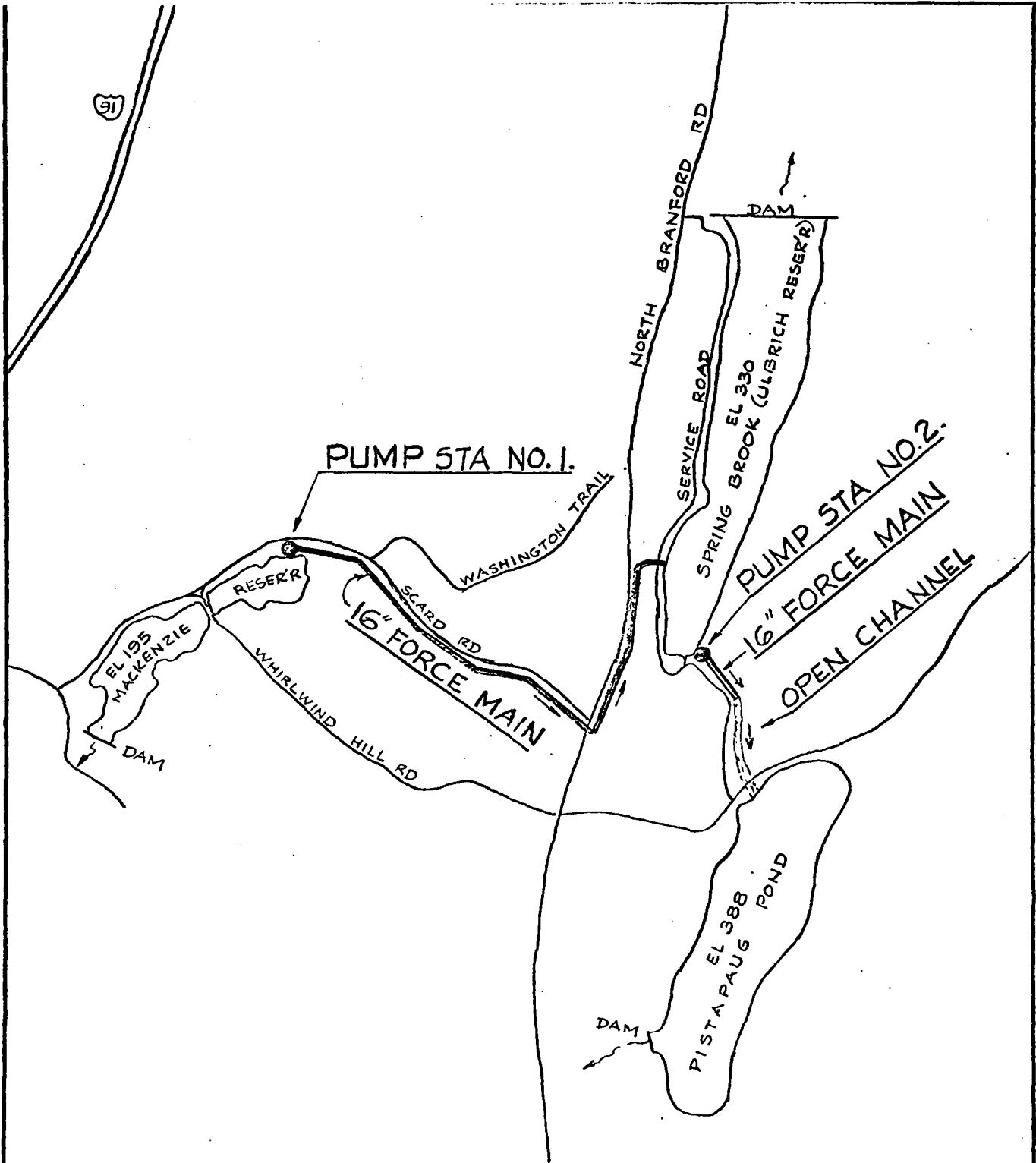
SECTION 17
RETAINING WALL
1"=8'



DETAIL 18
TYPICAL EXPANSION JOINT
NO SCALE

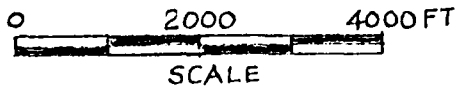
N	T	Area (sq. ft.)	Area (sq. ft.)
10.5	1.5	150.0	22.50
15.0	1.5	225.0	33.75

SPILLWAY & CORE WALL DETAILS DATE: 11-20-51 DRAWN BY: J.C. CHECKED BY: J.C.		SPRING BROOK RESERVOIR & DAM PUBLIC UTILITIES COMMISSION WATER DIVISION WALLINGFORD, CONN.		
THE HENRY SOUTHERN ENGINEERING CO. 11 LAUREL ST. HARTFORD, CONN.		APPROVED: B4 DATE: 12-20-51		



INTERBASIN TRANSFER SYSTEM

WALLINGFORD WATER CO.

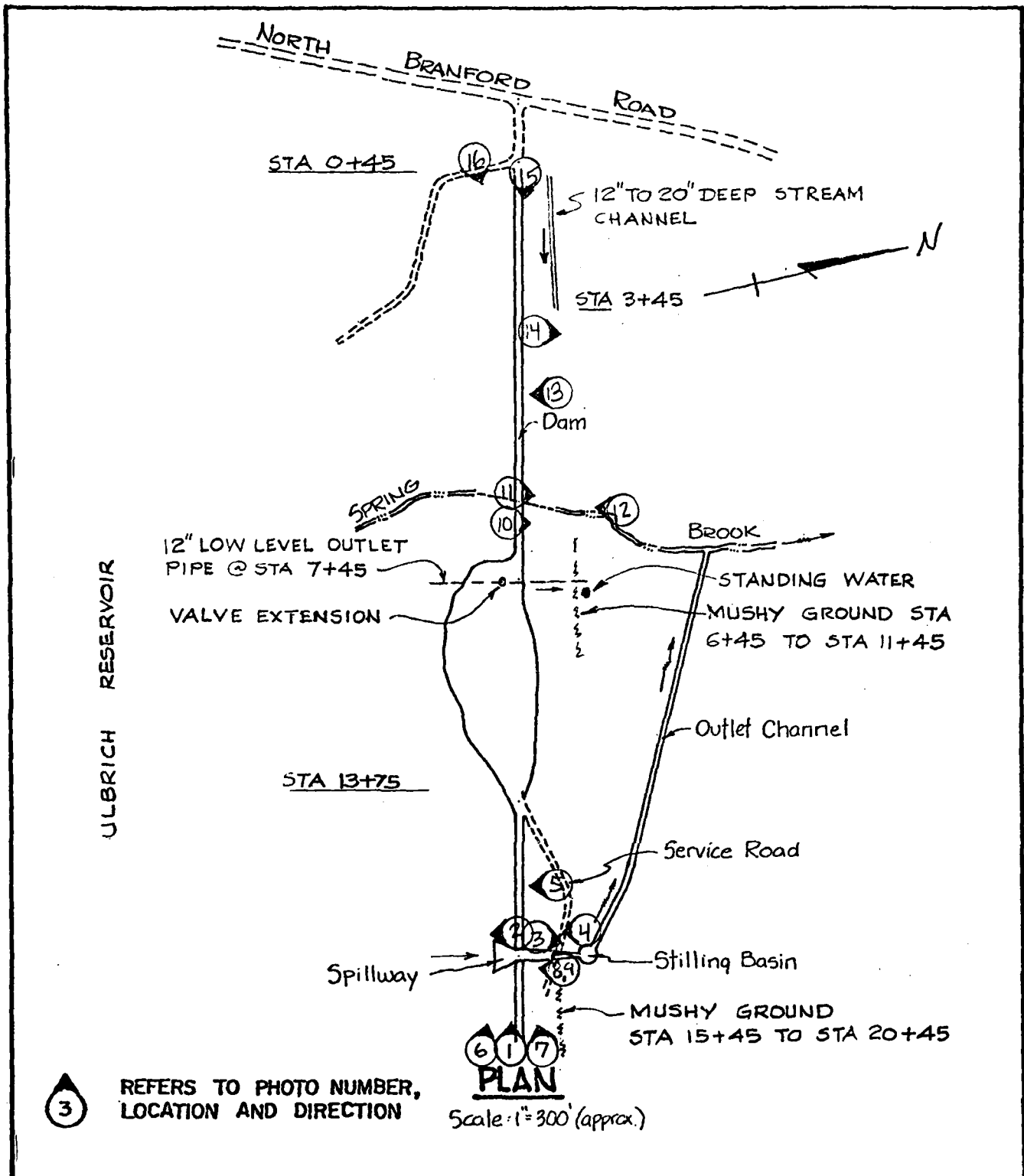



WALLINGFORD & DURHAM QUAD

PHILIP W. GENOVESE & ASSOCIATES, INC. ENGINEERS HAMDEN, CONNECTICUT	ULBRICH RESERVOIR DAM (CT00038)
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APPENDIX C

PHOTOGRAPHS



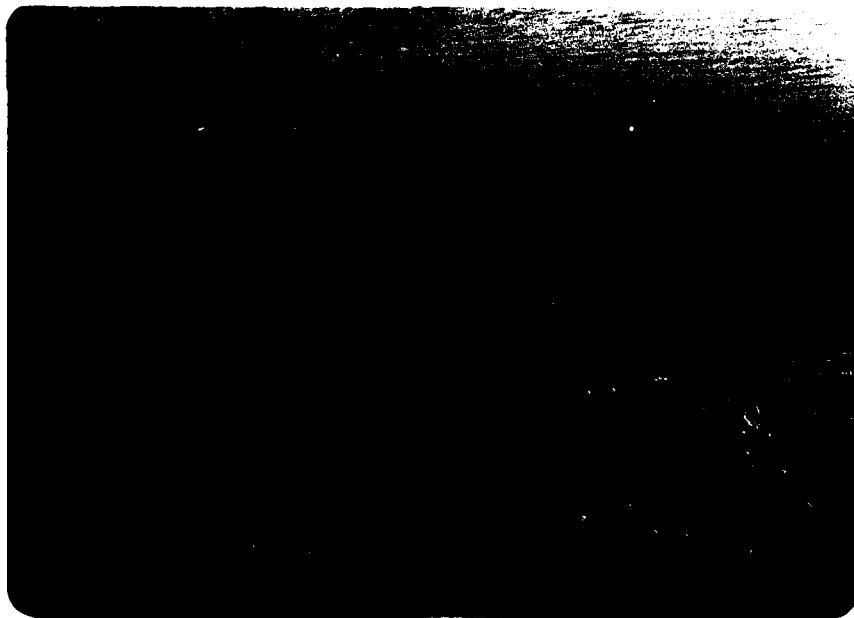

 REFERS TO PHOTO NUMBER, LOCATION AND DIRECTION

PLAN
 Scale: 1" = 300' (approx.)

U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	PHOTO LOCATION PLAN ULBRICH RESERVOIR DAM SPRING BROOK WALLINGFORD, CONNECTICUT
PHILIP W. GENOVESE AND ASSOCIATES, INC. ENGINEERS - HAMDEN, CT.		



1. Crest of dam left of spillway looking toward left abutment from Sta 17 + 45.



2. Upstream slope and riprap adjacent to left training wall of spillway.



3. Discharge channel of spillway and bridge spanning channel from left downstream training wall of spillway.



4. 10-inch-diameter concrete pipe in toe drain outlet on left side of spillway discharge channel.



5. View of riprap covering toe drain extending right of spillway at Sta 16 + 95.



6. View of grass and brush growing in riprap on upstream slope right of spillway at Sta 18 + 95.

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

ULBRICH RESERVOIR DAM (CT00038)



7. Crest of dam looking toward left abutment from right abutment.



8. Downstream slope and toe of dam left of spillway from bridge over spillway discharge channel.

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

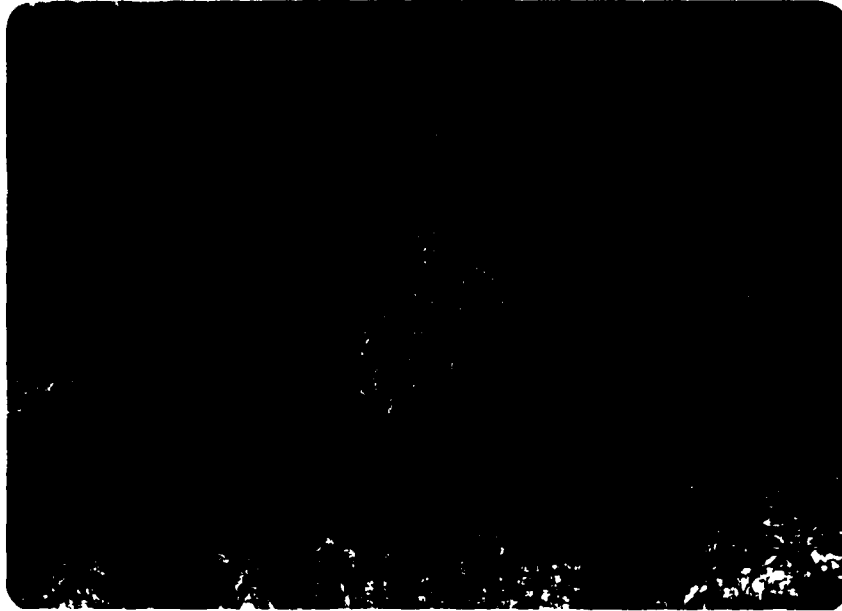
ULBRICH RESERVOIR DAM (CT00038)



9. Spillway and discharge channel from bridge over discharge channel.



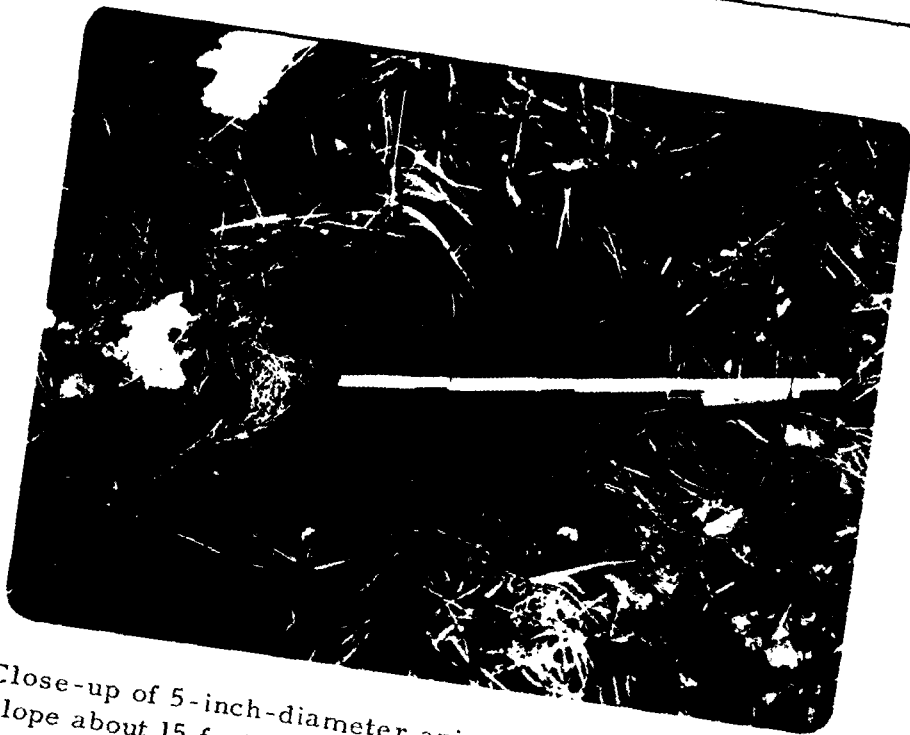
10. Close-up of 3-inch-diameter tree and brush growing on downstream slope at Sta 8 + 45.



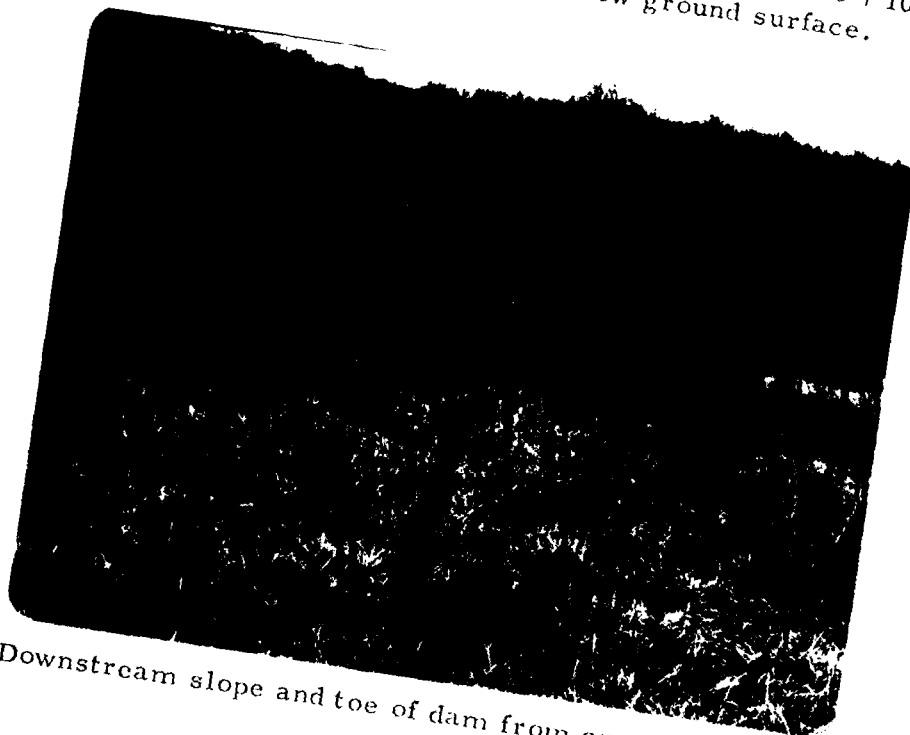
11. Natural stream bed forming outlet channel viewed from downstream slope at Sta 7 + 45.



12. Toe drain outlet into right side of outlet channel at toe of downstream slope at Sta 7 + 45.



13. Close-up of 5-inch-diameter animal burrow on downstream slope about 15 feet downstream from crest at Sta 6 + 10. Burrow extends at least 1 foot below ground surface.



14. Downstream slope and toe of dam from crest at Sta 4 + 45.

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

ULBRICH RESERVOIR DAM (CT00038)



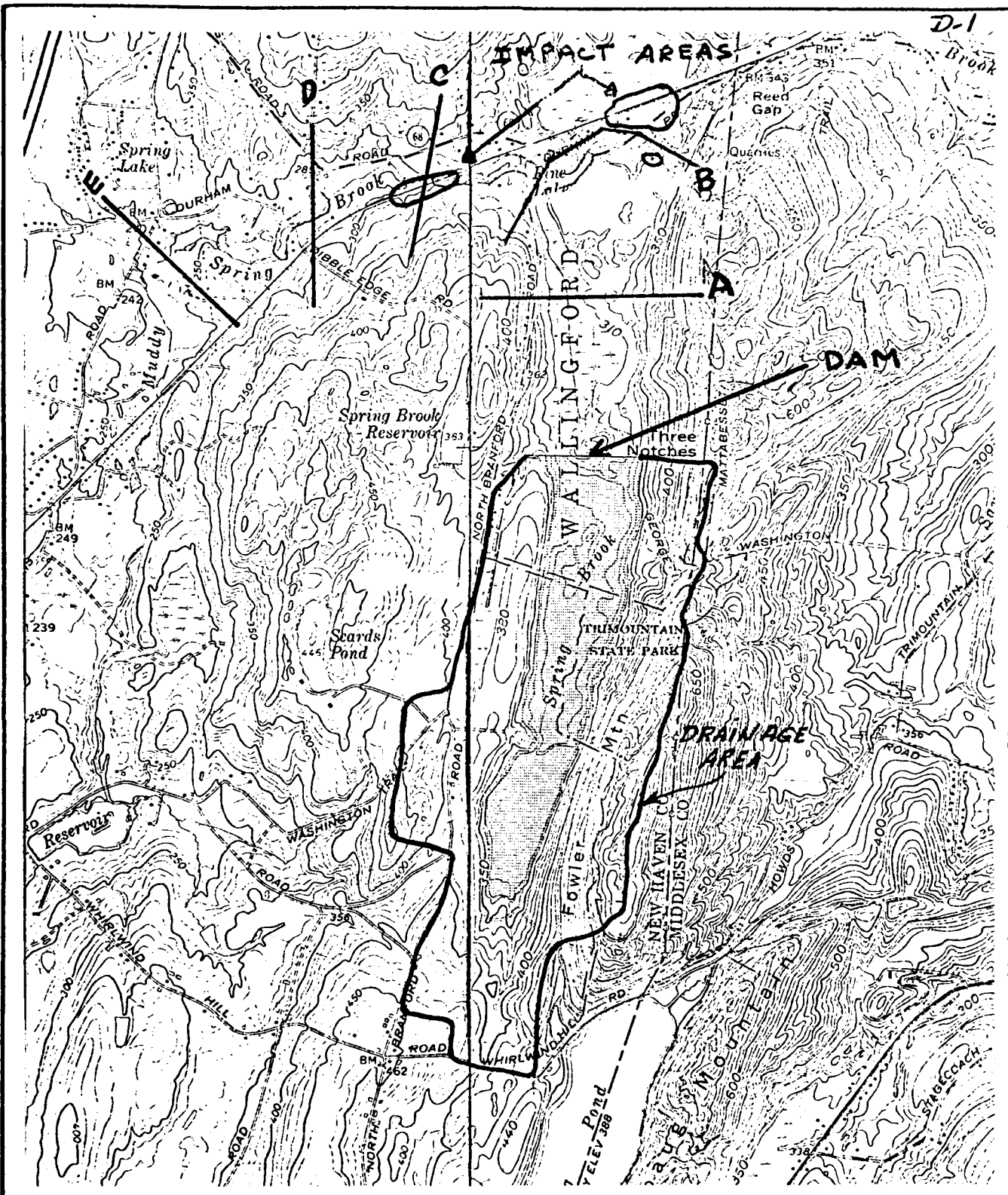
15. Crest of dam looking toward right abutment from Sta 3 + 45.



16. Upstream slope of dam from left abutment looking toward right abutment. Note portions of upstream slope in left foreground covered with wood chips.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



0 2000 4000 FT.

SCALE

DRAINAGE & IMPACT AREA
WALLINGFORD & DURHAM QUAD

DRAINAGE AREA=0.95 SQ. M.

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

ULBRICH RESERVOIR DAM (CT00038)

Hydrologic/Hydraulic Computations
Ulbrich Reservoir Dam

Size Classification;

Surface Area = 151.7 ac., Drainage Area = 0.95 mi.²

Top of Dam = elev. 342.0
Downstream L.P. = elev. 325.0
Height of Dam = 170 feet

Sec. engineering data supplied by rolling water in application & → Storage (S) = 2980 ac-ft (top of spillway)
→ S = 4091 ac-ft (top of dam)

∴ The size of the dam is INTERMEDIATE, but leaning towards small. There are several homes downstream that could potentially be affected by a dam break as well as a railroad bridge approx. 6400 ft. downstream. For these reasons a hazard potential classification of HIGH is chosen. A spillway design flood (SDF) equal to the probable maximum flood (PMF) is required for this combination of size and hazard potential.

In rolling terrain the PMF in elevation will be taken as 2150 (the min. value on the chart corresponds to a drainage area of 2 mi.²). Therefore the test flood will be:

$$SDF = PMF = (2150^{0.75/1.0}) (0.95 \text{ mi.}^2)$$

$$SDF = 2043$$

$$\text{Volume of SDF} = 53.3 \frac{\text{ac-ft}}{\text{ft}} (0.95 \text{ mi.}^2) (170)$$

$$V = 842.1 \text{ ac-ft}$$

Ulbrich Reservoir Dam

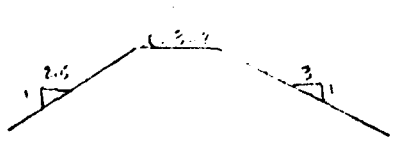
Using the weir formula ($Q = CLH^{3/2}$) with appropriate C values, stage-discharge data can be calculated.

With Flash Board

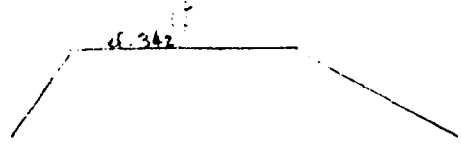
ELEV	H ₁	H ₂	H ₃	C=2.8	C=3.3	C=2.8	Q _{TOT}
				Q ₁	Q ₂	Q ₃	
335	-	-	-	-	-	-	-
337	-	2	-	-	186.7	-	186.7
339	-	4	-	-	528.0	-	528.0
341	-	6	-	-	970.0	-	970.0
343	1	8	1	3844.5	1493.4	1722.0	7059.9
342	-	7	-	-	1222.3	-	1222.3
340	-	5	-	-	737.9	-	737.9

Without Flash Board

ELEV	H ₁	H ₂	H ₃	C=2.8	C=4.0	C=2.8	Q _{TOT}
				Q ₁	Q ₂	Q ₃	
333	-	-	-	-	-	-	-
335	-	2	-	-	226.3	-	226.3
337	-	4	-	-	640	-	640.0
339	-	6	-	-	1175.8	-	1175.8
341	-	8	-	-	1810.2	-	1810.2
343	1	10	1	3122.5	2529.8	1722.0	8096.3
342	-	9	-	-	2160	-	2160
340	-	7	-	-	1491.6	-	1491.6



C = 2.75 - 3.5
 L = 1165 ft



C = 2.5
 L = 615 ft



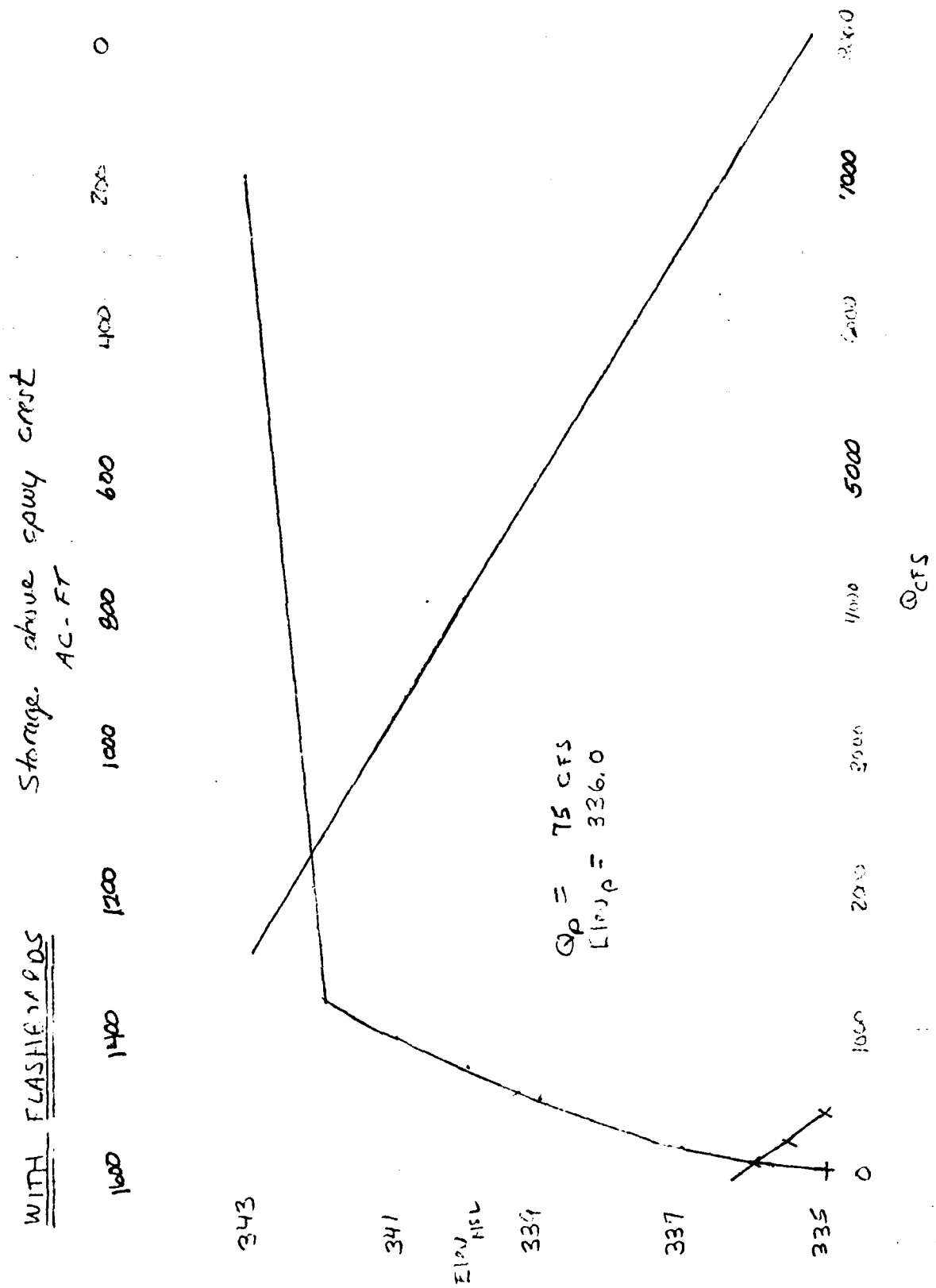
C = 3 - 4
 L = 20 ft

PROJ. NO. B04103
 DESCRIPTION Ulbrich Reservoir Dam
Wallingford Conn

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D4 OF 7
 BY WJB DATE 3-3-51
 CHKD. BY _____ DATE _____

Ulbrich Reservoir Dam

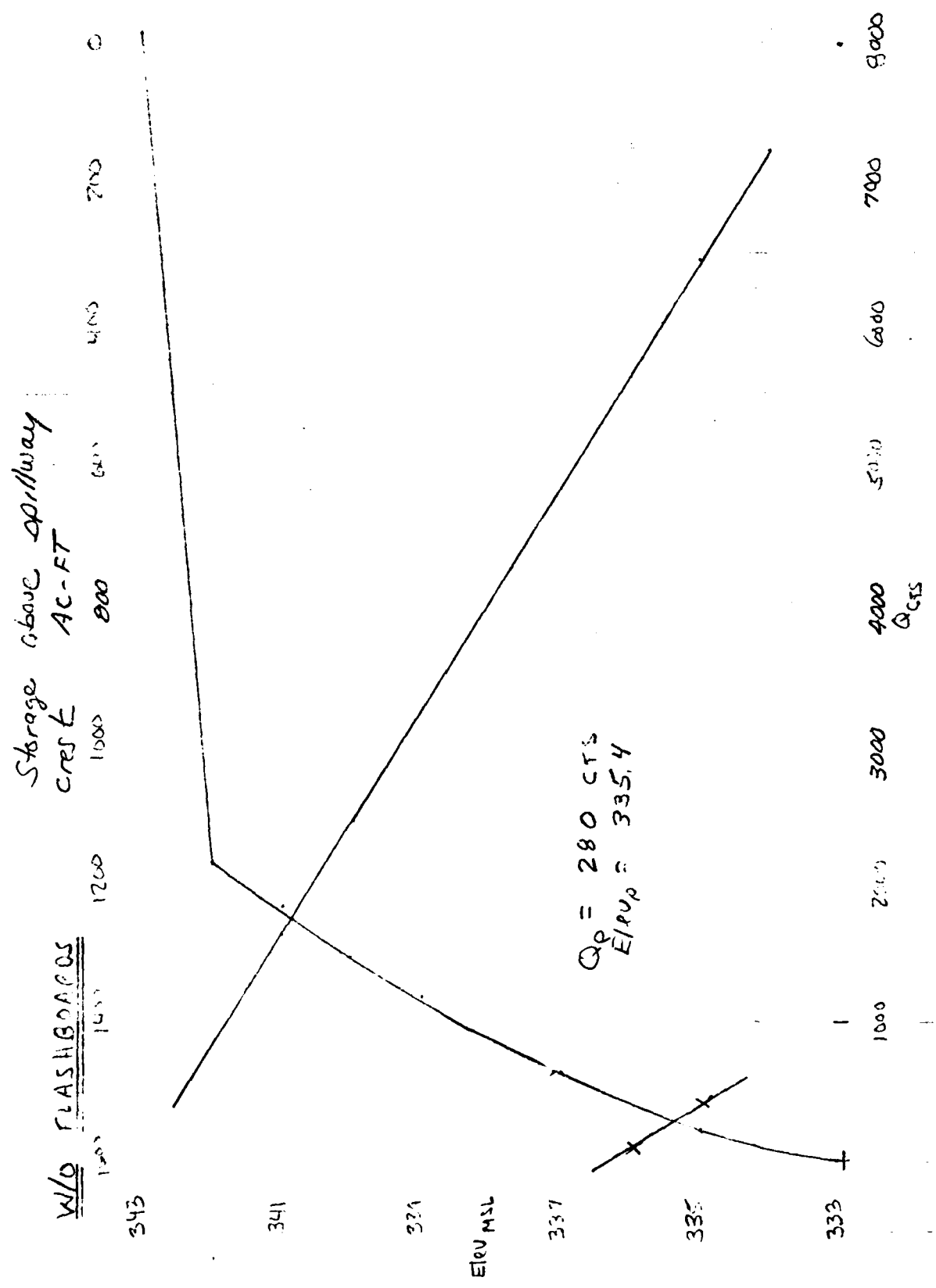


PROJ. NO. AD113
 DESCRIPTION Ulbrich Reservoir Dam
Walling Mt. Conn.

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. 05 OF 20
 BY WJB DATE 2-3-81
 CHKD. BY _____ DATE _____

Ulbrich Reservoir Dam



PROJ. NO. 804103
 DESCRIPTION Albion Reservoir Dam
Wallingford, Conn

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. 06 OF 20
 BY TLC DATE 12/1/50
 CHKD. BY WJH DATE 3-3-51

Albion Reservoir Dam

Dam Breaching Analysis

Stor = 3140 AC-FT
 Elev_p = 336.0
Flashboards In

$$Q_{P1} = \frac{8}{27} W_b \sqrt{g} Y_o^{3/2}$$

$$Q_{P1} = \left(\frac{8}{27}\right)(0.4)(1400)(\sqrt{32.2})(17.0)^{3/2}$$

$$Q_{P1} = 34,350 \text{ cfs (plus 75 cfs spillway flow)}$$

$$\text{TOTAL } Q_{P1} = 34,425 \text{ cfs}$$

Section A-A (2850' d/s of dam);

$$Q_{P1} = 34,425 \text{ cfs}$$

$$\text{elev}_1 = 319.1$$

$$A_1 = 6400 \text{ ft}^2$$

$$Q_{P2} = 75 \text{ cfs}$$

$$\text{elev}_2 = 310.2$$

$$A_2 = 100 \text{ ft}^2$$

$$V_{10} = \frac{(2850')(6400 - 100) \text{ ft}^2}{4.75 \text{ sec}^2}$$

$$V_{10} = 412 \text{ sec-ft}$$

$$Q_{20} = Q_{P1} \left(1 - \frac{V_{10}}{V_{10} + 3140}\right)$$

$$Q_{20} = 34,425 \left(1 - \frac{412}{3140}\right)$$

$$Q_{P2} = 29,808 \text{ cfs (trial)}$$

$$\text{elev}_2 = 318.5 \quad A_2 = 5,800 \text{ ft}^2 \quad V_{10} = 373 \text{ sec-ft}$$

$$Q_{P2} = 34,425 \left(1 - \frac{(412 + 373)/2}{3140}\right)$$

$$\boxed{Q_{P2} = 30,122 \text{ cfs}}$$

$$\boxed{\text{elev}_2 = 318.6}$$

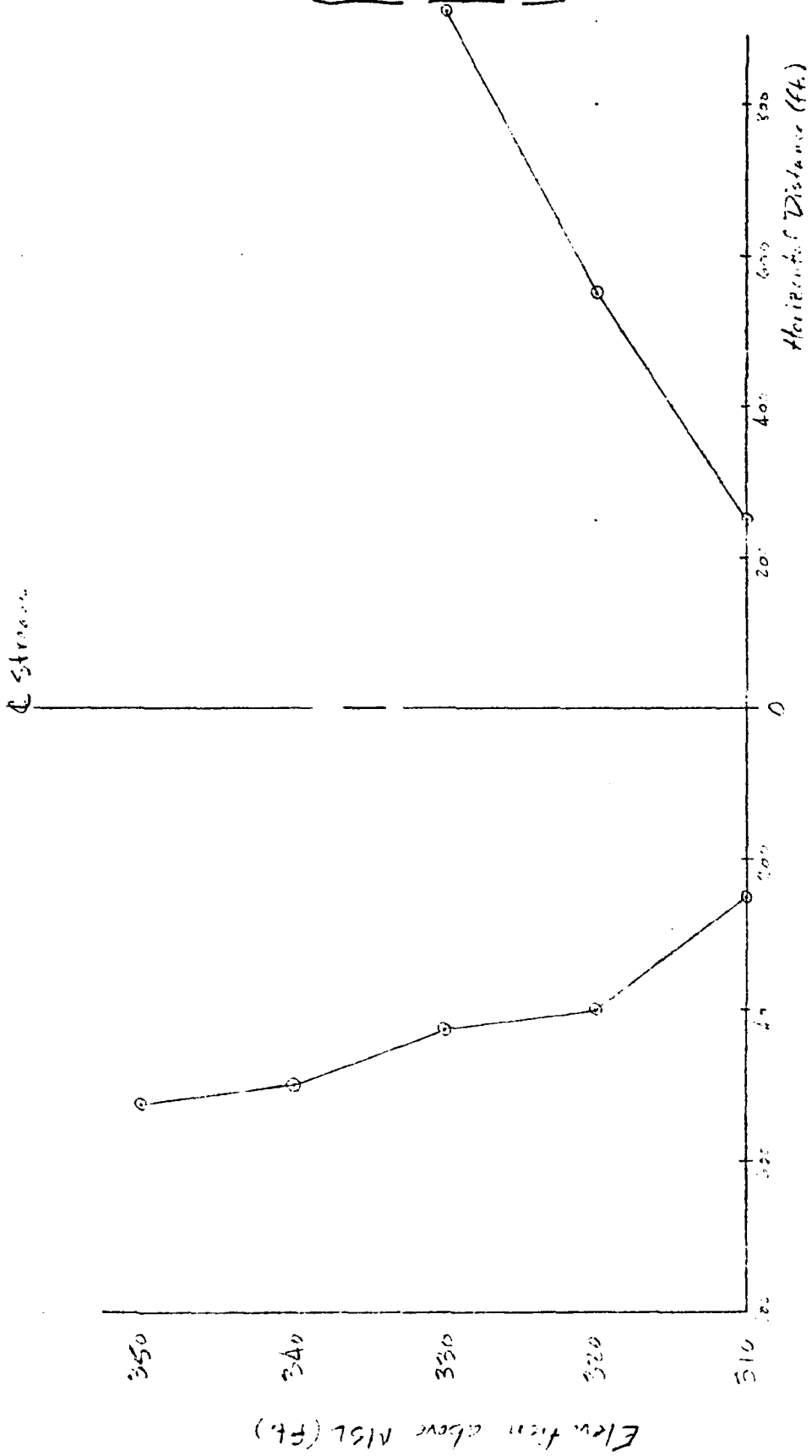
Final process using $Q_{P2} = 30,122 \text{ cfs}$

PROJ. NO. 50103
DESCRIPTION Ulbrich Reservoir Dam
WALLINGFORD, CT.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D 7 OF 20
BY TKC DATE 12/1/50
CHKD. BY WJB DATE 3-3-50

Ulbrich Reservoir Dam:



LOOKING DOWNSTREAM
SECTION A-A

250 ft. + downstream of Ulbrich Reservoir Dam

PROJ. NO. B04103
 DESCRIPTION Ulbrich Reservoir Dam
Water Control

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D3 OF 70
 BY WCB DATE 3-2-66
 CHKD. BY _____ DATE _____

STAGE - DISCHARGE
 STAGE - AREA
SECTION A-A

Area FT^2

14,000 12,000 10,000 8,000 6,000 4,000 2,000 0

326

322

ELEV
 MSL

319

314

310 +

0

10,000

20,000

30,000

40,000

50,000

60,000

70,000

80,000

90,000

Ulbrich Reservoir Dam

$Q = \frac{1.49}{n} S^{2/3} H^{5/2}$
 $n = .06$
 $C = .0035$

CFE

Urbain Reservoir Dam

Dam Breach Analysis (cont.)

Section B-B (1700' d/s of A-A)

$$\begin{aligned} Q_{p2} &= 30,122 \text{ cfs} & Q_{p2} &= 75 \text{ cfs} \\ \text{elev}_2 &= 319.8 & \text{elev}_0 &= 310.2 \\ A_2 &= 7,800 & A_0 &= 100 \end{aligned}$$

$$V_{2-3} = \frac{(1700)(7,800 - 100)}{43,560}$$

$$V_{23} = 300 \text{ AC-FT}$$

$$Q_{p3} = 30,122 \left(1 - \frac{300}{3140}\right)$$

$$Q_{p3} = 27,244 \text{ cfs}$$

$$\text{elev}_3 = 319.3 \quad V = 6,800 \quad V = 261$$

$$Q_{p3} = 30,122 \left(1 - \frac{300 + 261}{2(3140)}\right)$$

$$Q_{p3} = 27,431 \text{ cfs}$$

$$\text{elev} = 319.3$$

Section C-C (2000' d/s of B-B)

$$\begin{aligned} Q_{p4} &= 27,431 & Q_{p4} &= 75 \text{ cfs} \\ \text{elev}_4 &= 307.4 & \text{elev}_0 &= 291.0 \\ A_4 &= 3700 & A_0 &= 100 \end{aligned}$$

$$V_{3-4} = \frac{(2000)(3700 - 100)}{43,560} = 165 \text{ AC-FT}$$

$$Q_{p4} = 27,431 \left(1 - \frac{165}{3140}\right)$$

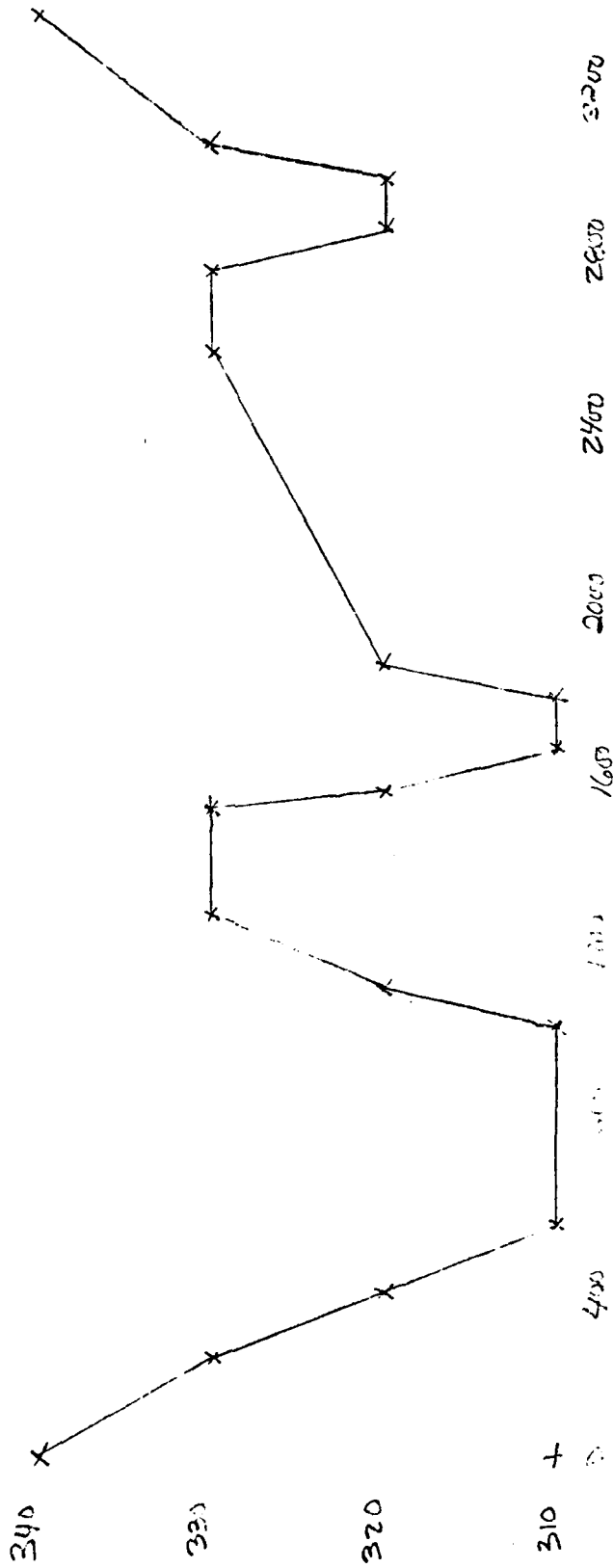
$$Q_{p4} = 25,990$$

$$\text{elev} = 307.1 \quad A_4 = 3650 \text{ ft}^2 \quad V = 163 \text{ AC-FT}$$

PROJ. NO. 804103
 DESCRIPTION Waste to Reservoir Dam
Wallingford, Conn

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D10 OF 20
 BY WGS DATE 3-3-51
 CHKD. BY _____ DATE _____



LOOKING D/S
 SECTION B-C
 1700' D/S OF A-A
 450' D/S OF DAM

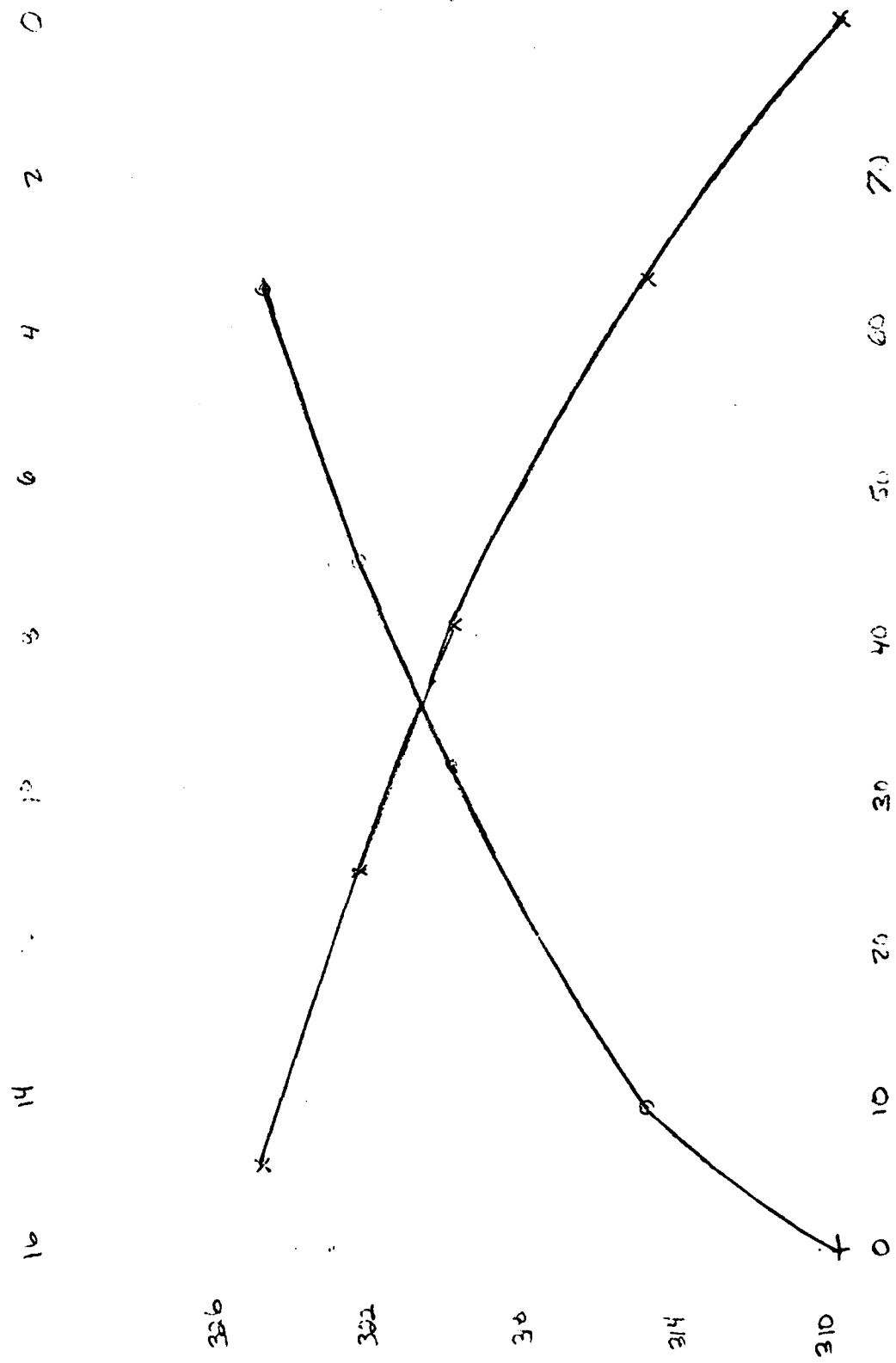
PROJ. NO. 804103
 DESCRIPTION Wright Reservoir Dam
Wallingford, Conn

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D11 OF 20
 BY ... DATE ...
 CHKD. BY ... DATE ...

STAGE - DISEMBARK
 STAGE - AREA
 SECTION B-B

Area (sq ft)



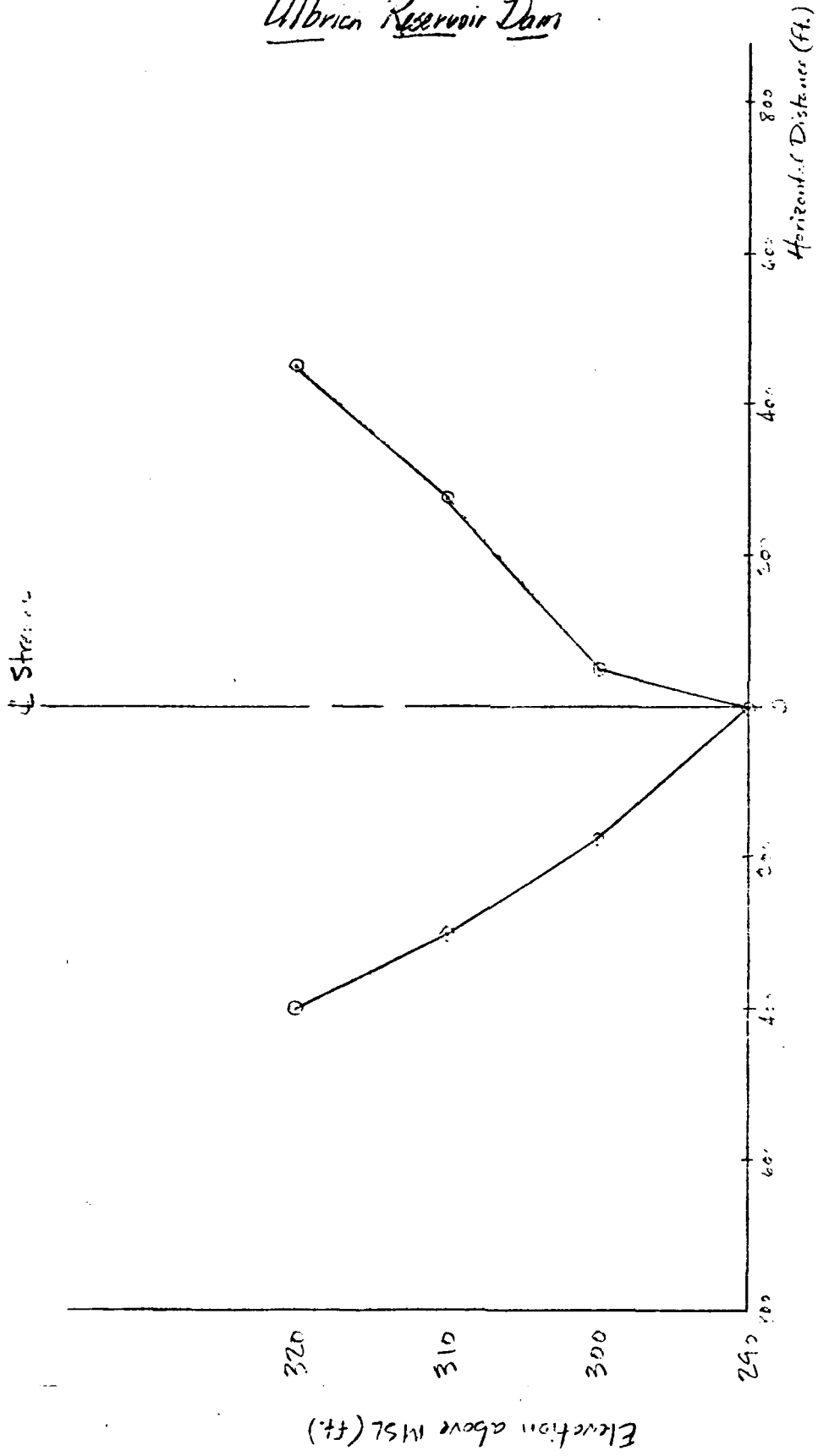
Qcfs (x 1000)

PROJ. NO. 5-11-60
 DESCRIPTION Ulbrich Reservoir Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D12 OF 20
 BY TRC DATE 12/1/60
 CHKD. BY WJA DATE 3-7-61

Ulbrich Reservoir Dam



LOOKING DOWNSTREAM
 SECTION C-C

2200 feet downstream of Section E3-E3
 6550 feet downstream of Ulbrich Reservoir Dam

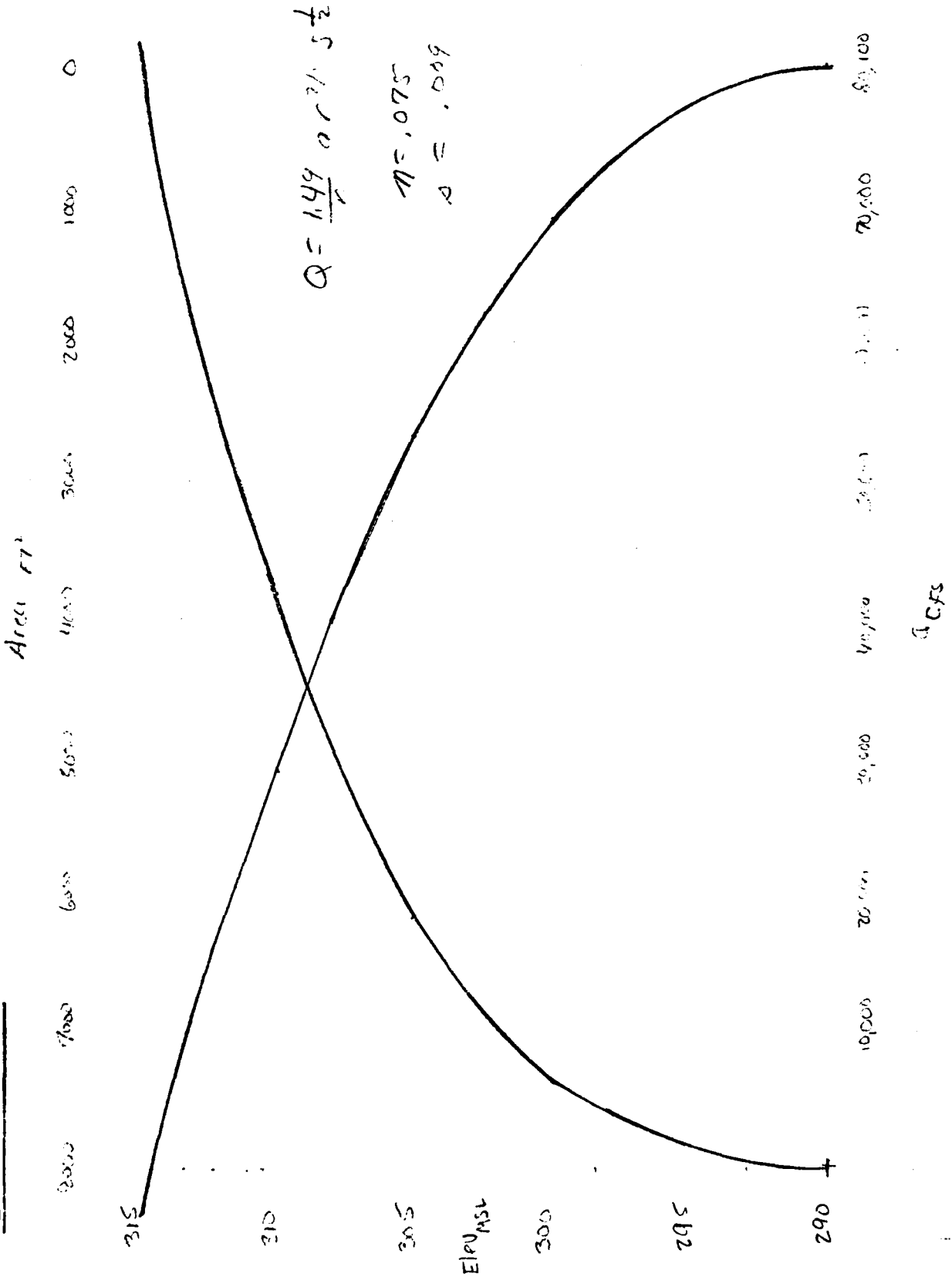
PROJ. NO. 824103
 DESCRIPTION Ulbrich Reservoir Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D17 OF 7
 BY W.S. DATE 3-3-81
 CHKD. BY _____ DATE _____

Ulbrich Reservoir Dam

STAGE - DISCHARGE
 STAGE - AREA
SECTION C-C



PROJ. NO. 804103
 DESCRIPTION Ulbrich Reservoir Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D14 OF 20
 BY TSS DATE 12/12/55
 CHKD. BY WTC DATE 2-3-61

Ulbrich Reservoir Dam

Dam Breach Analysis (cont.)

$$Q_{P4} = 27,431 \left(1 - \frac{(165 + 162)/2}{3140} \right)$$

$Q_{P4} = 25,998 \text{ cfs}$ $\text{elev.} = 307.1$

Section D-D 200' d/s of C-C

$$Q_{P4} = 25,998 \text{ cfs}$$

$$\text{elev.}_s = 277.4$$

$$A_s = 5,300 \text{ ft}^2$$

$$Q_{P0} = 75 \text{ cfs}$$

$$\text{elev.}_0 = 270.3$$

$$A_0 = 150 \text{ ft}^2$$

$$V_{45} = \frac{(2000)(5300 - 150)}{43,560}$$

$$V_{45} = 236 \text{ c-ft}$$

$$Q_{P5} = 25,998 \left(1 - \frac{236}{3140} \right)$$

$$Q_{P5} = 24,044 \text{ cfs} \quad (4/10/51)$$

$$\text{elev.}_s = 277.2 \quad A_s = 5200 \text{ ft}^2 \quad V_{45} = 232 \text{ c-ft}$$

$$Q_{P5} = 25,998 \left(1 - \frac{(236 + 232)/2}{3140} \right)$$

$Q_{P5} = 24,060 \text{ cfs}$ $\text{elev.}_s = 277.2$

Section E-E 100' d/s of C-C

$$Q_{P5} = 24,060 \text{ cfs}$$

$$\text{elev.}_s = 249.8$$

$$A_s = 2,750 \text{ ft}^2$$

$$Q_{P0} = 75 \text{ cfs}$$

$$\text{elev.}_0 = 240.5$$

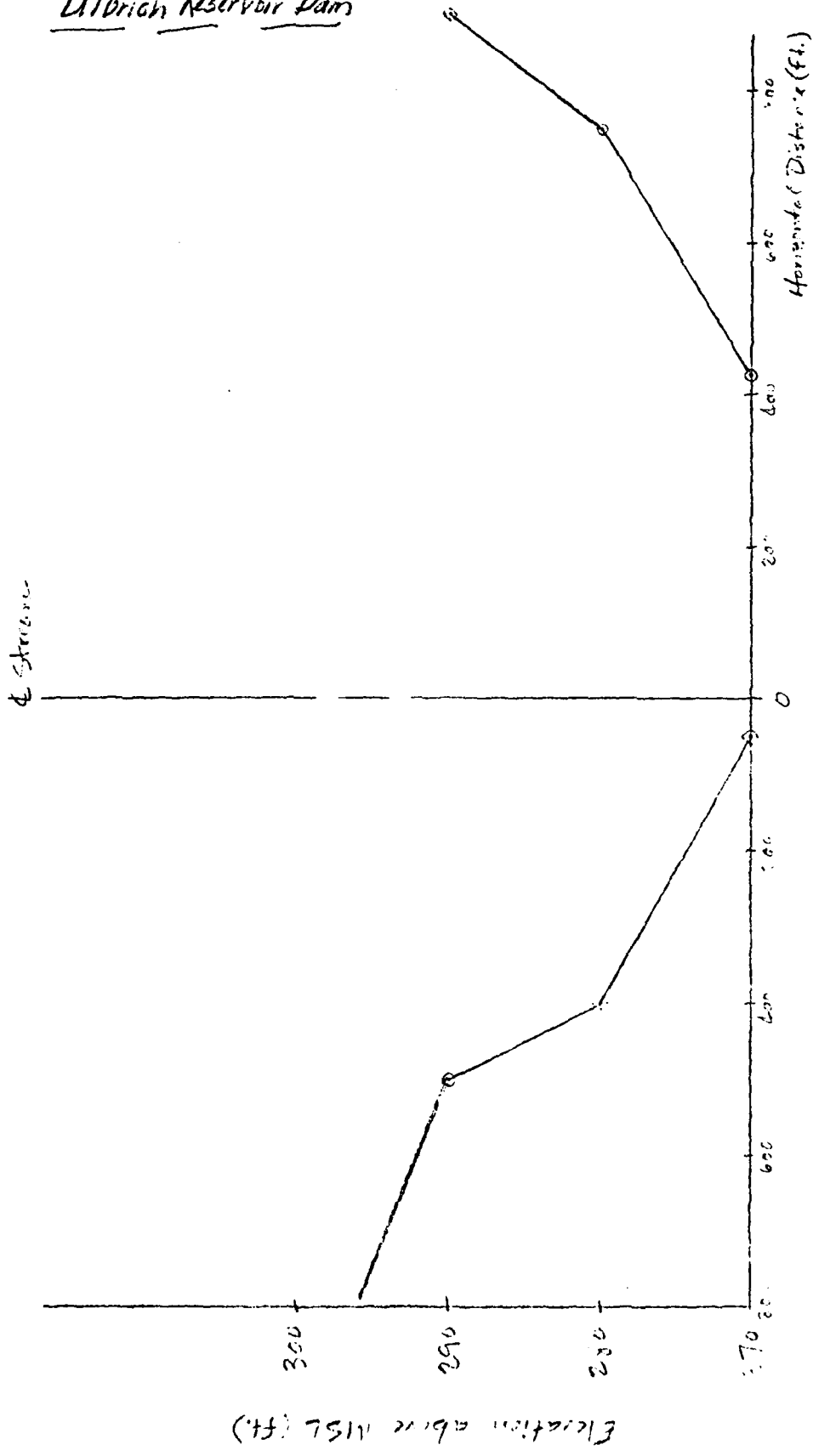
$$A_0 = 100 \text{ ft}^2$$

PROJ. NO. 4103
 DESCRIPTION Ulbrich Reservoir Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D15 OF 20
 BY TK DATE 12/1/80
 CHKD. BY UJG DATE 3-7-91

Ulbrich Reservoir Dam



LOOKING DOWNSTREAM
SECTION D-D

2000 feet downstream of section C-C
 2550 feet downstream of Ulbrich Reservoir Dam

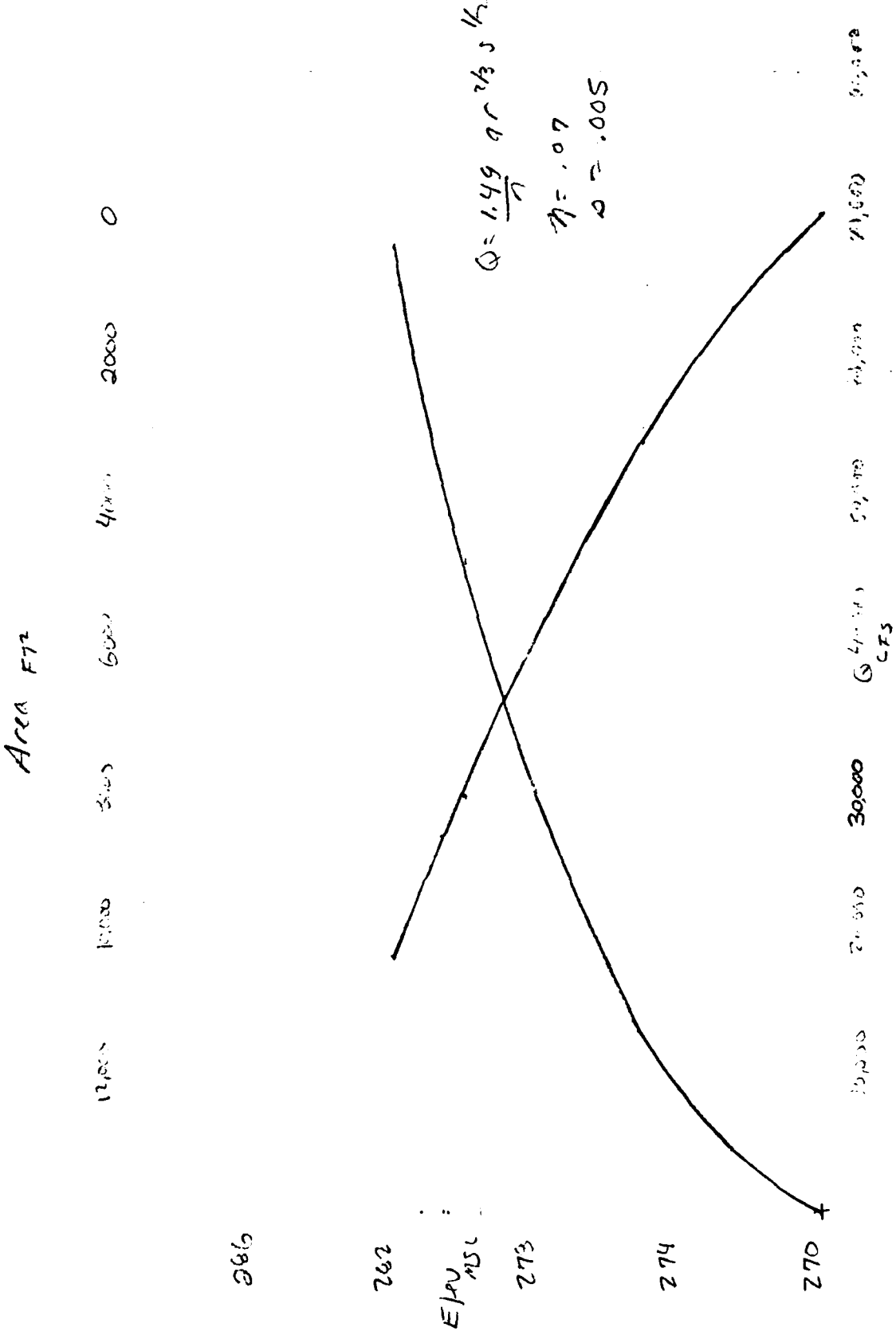
PROJ. NO. B04103
 DESCRIPTION Ulbrich Reservoir Dam
Waterbury, Conn.

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D16 OF 20
 BY J. L. DATE 2-1-48
 CHKD. BY _____ DATE _____

Ulbrich Reservoir Dam

STAGE - DISCHARGE
 STAGE AREA
 SECTION D-D



PROJ. NO. 804103
DESCRIPTION Ulbrich Reservoir Dam,
Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D17 OF 20
BY T.K.C. DATE 12/12/50
CHKD. BY W.T.G. DATE 2-2-51

Ulbrich Reservoir Dam

Dam Breach Analysis (cont.)

$$V_{SL} = \frac{(2600)(2,750 - 100)}{43,000}$$

$$V_{SL} = 158 \text{ ac-ft.}$$

$$Q_{P_0} = 24,060 \left(1 - \frac{158}{3140}\right)$$

$$Q_{P_0} = 22,849 \text{ fs (trial)}$$

$$\text{elev}_0 = 249.6 \quad A_0 = 2,650 \text{ ft}^2 \quad V_{SL} = 152 \text{ ft.}$$

$$Q_{P_0} = 24,060 \left(1 - \frac{(158 + 152)/2}{3140}\right)$$

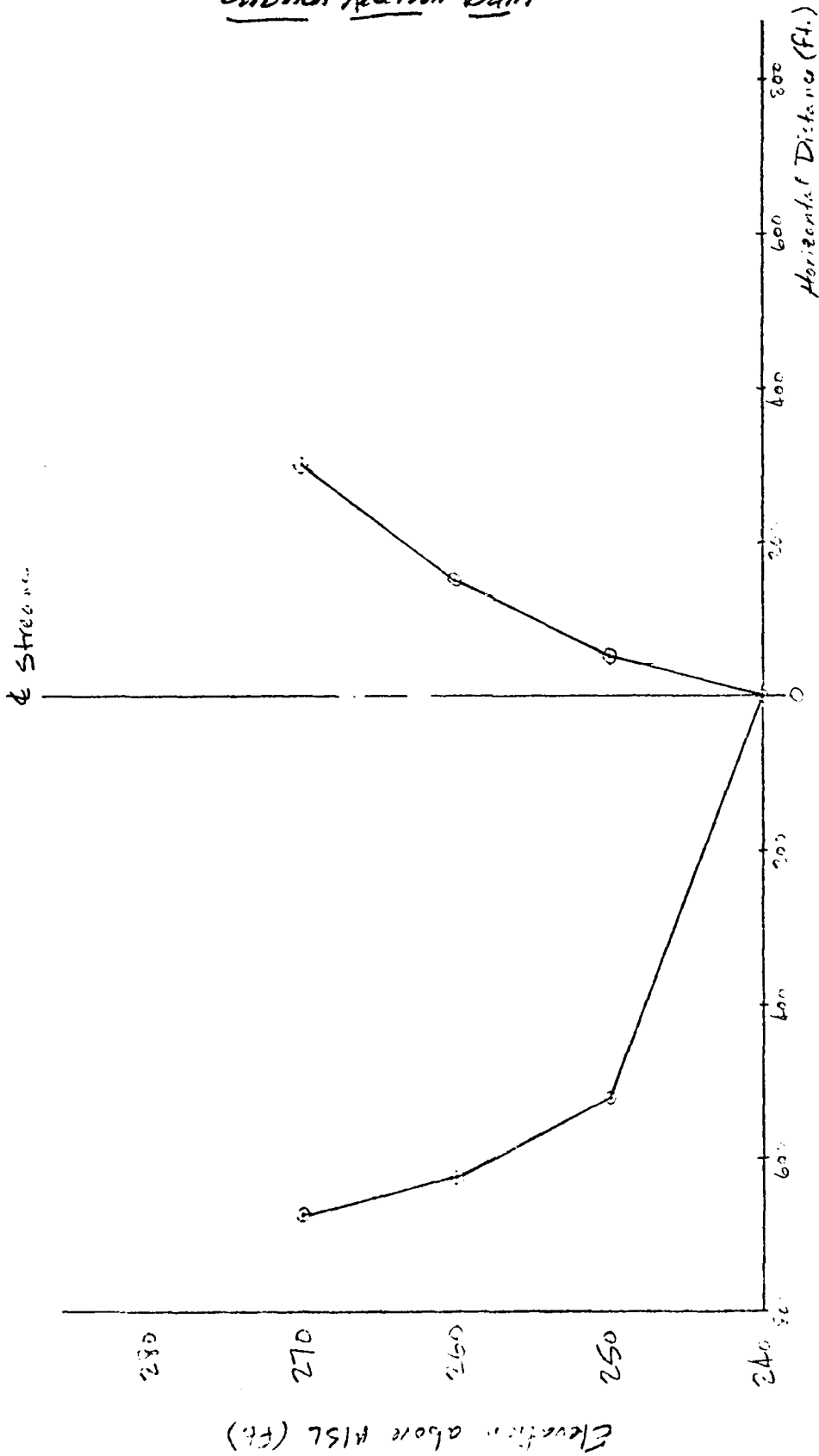
$Q_{P_0} = 22,872 \text{ fs}$
$\text{elev}_0 = 249.6$

PROJ. NO. 804103
 DESCRIPTION Ulbrich Reservoir Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D18 OF 20
 BY TWC DATE 12/1/80
 CHKD. BY WCB DATE 3-3-81

Ulbrich Reservoir Dam



LOOKING DOWNSTREAM
SECTION E-E

2600 feet downstream of section D-D
 11,150 feet downstream of Ulbrich Reservoir Dam

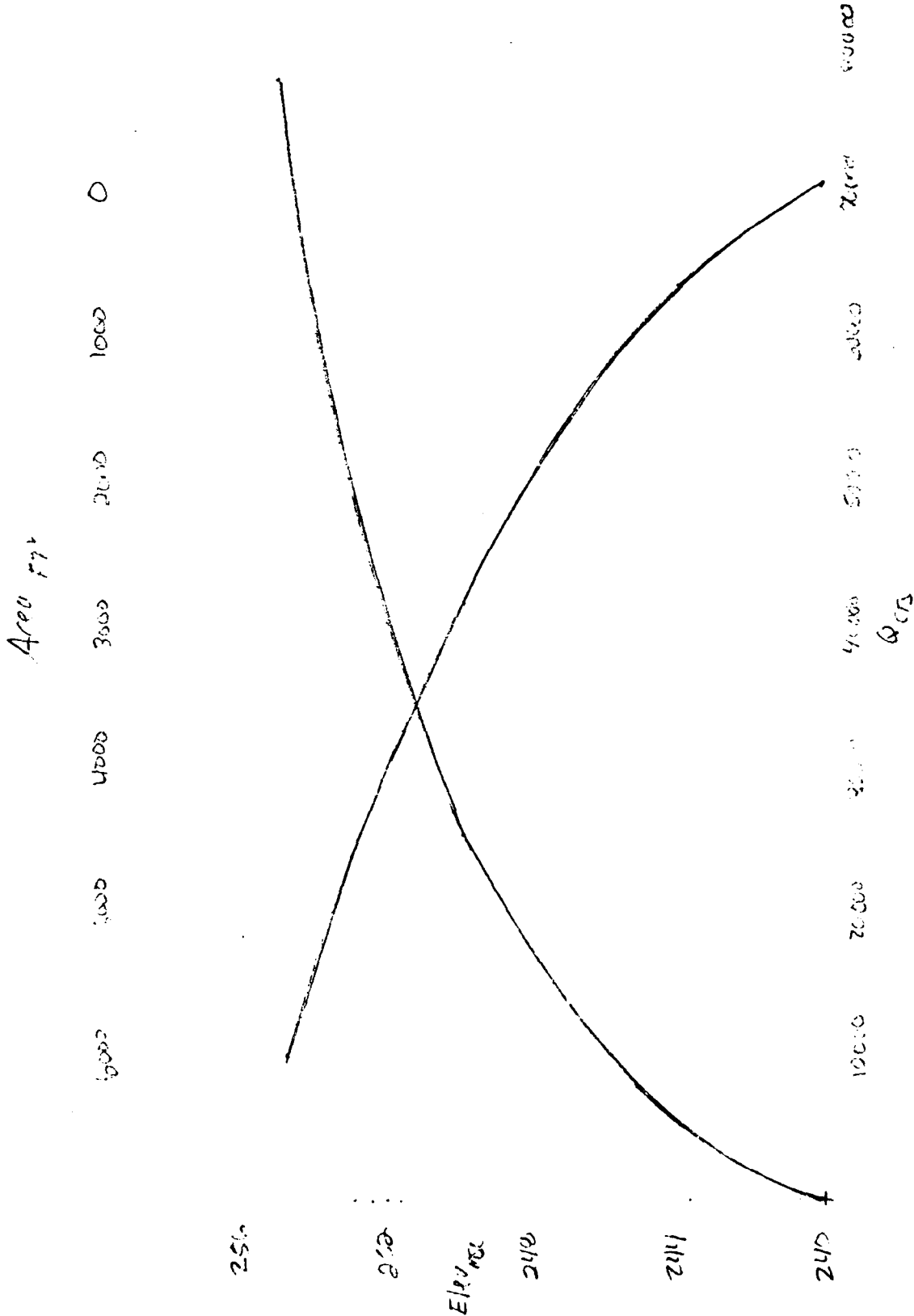
PROJ. NO. 804103
 DESCRIPTION Ulbrich Reservoir Dam
Wallingford Conn

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D19 OF 20
 BY WJB DATE 3-3
 CHKD. BY _____ DATE _____

Ulbrich Reservoir Dam

STAGE - DISCHARGE
 STAGE - AREA
 SECTION E-E



E-E

PROJ. NO. 804103
 DESCRIPTION Waltham Branch Dam
Waltham, Conn.

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. 1 OF 2
 BY JG DATE 11/1/81
 CHKD. BY _____ DATE _____

SUMMARY OF FLOOD ANALYSIS

<u>STA</u>	<u>Q</u> <u>cfs</u>	<u>ELV₀</u> <u>ft</u>	<u>ELV_{100%}</u> <u>ft</u>	<u>Home Affected</u>
<u>Lm.</u>	<u>34,425</u>	<u>-</u>	<u>-</u>	<u>0</u>
<u>25+50</u>	<u>30,122</u>	<u>310.2</u>	<u>318.6</u> (319.3)	<u>0</u>
<u>45+50</u>	<u>27,431</u>	<u>310.2</u>	<u>319.2</u>	<u>Howe = 318</u> <u>RR + Pt. 68 = 320</u>
<u>62+50</u>	<u>25,948</u>	<u>291.0</u>	<u>307.1</u>	<u>RR - 7' water</u>
<u>85+50</u>	<u>24,060</u>	<u>270.3</u>	<u>277.2</u>	<u>Basement Flooding</u>
<u>110+50</u>	<u>22,872</u>	<u>240.5</u>	<u>249.6</u>	

The conclusion of the analysis is that 1 home will receive more than 1' of water as a result of the run-off along another area causing 2' of flooding. In addition however both the railroad tracks and State Rt. 68 will be exposed to major flooding. A hazard classification of HIGH flood warranted.

APPENDIX E

INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME