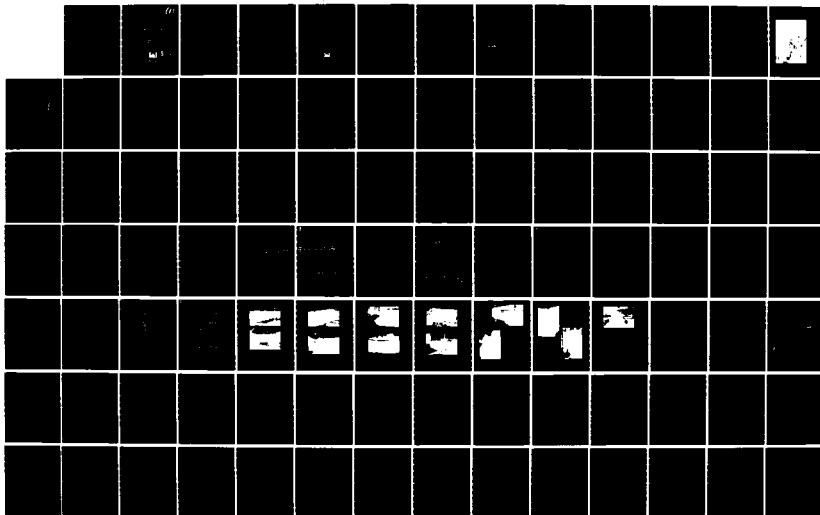NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
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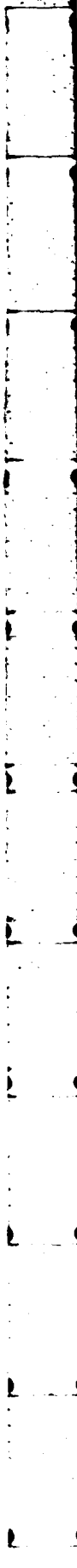
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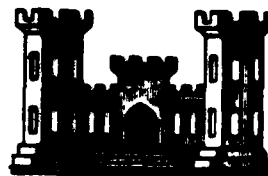MICROCOPY RESOLUTION TEST CHART
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QUINEBAUG RIVER BASIN

KILLINGLY, CONNECTICUT

# ACME POND DAM
# CT 00172

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

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

MARCH 1981

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| 1. REPORT NUMBER | 2. GOVT ACCESSION NO. | 3. RECIPIENT'S CATALOG NUMBER |
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| CT 00172 | *A143310* | |

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|---|---|
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| NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS | 6. PERFORMING ORG. REPORT NUMBER |

| 7. AUTHOR(s) | 8. CONTRACT OR GRANT NUMBER(s) |
|---|---|
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| 9. PERFORMING ORGANIZATION NAME AND ADDRESS | 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS |
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18. SUPPLEMENTARY NOTES
Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)
DAMS, INSPECTION, DAM SAFETY,

Quinebaug River Basin
Killingly, Conn.
Acme Pond Dam

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
The dam at Acme Pond is an earth embankment structure with a vertical downstream stone masonry wall. Its maximum height above the trail race channel to the mill, at the spillway, is 18.7 ft. As a result of the visual inspection and hydraulic and gydrologic calculations, the dam is considered to be in FAIR comdition. The test flood for this dam, classified as SMALL and as having a HIGH hazard potential is half the Probable Maximum Flood.

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# DEPARTMENT OF THE ARMY
### NEW ENGLAND DIVISION. CORPS OF ENGINEERS
### 424 TRAPELO ROAD
### WALTHAM. MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

NEDED

JUN 1 0 1981

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

Dear Governor O'Neill:

Inclosed is a copy of the Acme Pond Dam (CT-00172) Phase I Inspection
Report, which was prepared under the National Program for Inspection of
Non-Federal Dams. This report is presented for your use and is based
upon a visual inspection, a review of the past performance and a brief
hydrological study of the dam.  A brief assessment is included at the
beginning of the report.  I have approved the report and support the
findings and recommendations described in Section 7 and ask that you
keep me informed of the actions taken to implement them. This follow-up
action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environ-
mental Protection, the cooperating agency for the State of Connecticut.
In addition, a copy of the report has also been furnished the owner,
National Patent Development Corporation, Acme-Chaston Division, 3
Huntington Quadrangle, Suite 2 and 11, Malvern, New York   11746.

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

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

Sincerely,

Incl
As stated

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

# QUINEBAUG RIVER BASIN

# KILLINGLY, CONNECTICUT

# ACME POND DAM
# CT 00172

## PHASE 1 INSPECTION REPORT
## NATIONAL DAM INSPECTION PROGRAM

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

## MARCH 1981

# NATIONAL DAM INSPECTION PROGRAM

## PHASE I - INSPECTION REPORT

| | |
|---|---|
| Identification No.: | CT 00172 |
| Name of Dam: | Acme Pond Dam |
| Town: | Killingly |
| County and State: | Windham, Connecticut |
| Stream: | Whetstone Brook |
| Owner: | Acme Chaston Division<br>National Patent Development Corp. |
| Date of Inspection: | 13 November 1980 |

## BRIEF ASSESSMENT

The dam at Acme Pond is an earth embankment structure
with a vertical downstream stone masonry wall. It is
12 feet wide at the crest, 570 feet long, and 10 feet
high above the roadway which runs along the entire toe
of the downstream side of the dam. Its maximum height
above the tail race channel to the mill, at the spill-
way, is 18.7 feet. This channel passes beneath the
roadway and the mill, and then exits into a small mill
pond about 200 feet downstream of Acme Pond Dam. The
stone masonry spillway, located near the right abutment
of the dam, is a broad crest weir 16 feet long and 3.2
feet high. On the upstream side of the dam is an in-
take structure for a 16 inch pipe which passes beneath
the dam and road. This pipe is laid within an older
4 foot diameter steel plate pipe and provides water for
a storage tank at the mill. The pipe has a valve be-
neath the mill building which can discharge into a
second channel passing beneath the mill, to join the one
previously mentioned. Older gate mechanisms may be
found near the spillway structure, but they are in a
state of disrepair and not considered functional.

The dam is located on Whetstone Brook and is at the out-
flow point of a 5.2 square mile watershed which contains
5 other reservoirs. Together, these reservoirs provide
substantial storage capacity to dampen the effect of
major flooding. The storage capacity of Acme Pond at the
top of the dam is 29 acre feet.

The dam was probably constructed in 1846 to provide mechanical power for a mill manufacturing cotton cloth products. Since that time only minor repairs have been instituted, and from local information, the dam appears not to have been overtopped.

As a result of the visual inspection and hydraulic and hydrologic calculations, the dam is considered to be in FAIR condition. To assure the long term performance of this structure, several items will require further attention. These items concern themselves with the downstream masonry wall, which has tilted and is bulging at many locations, indicating potential future instabi- lity; the crest of the dam, which has settled near the left abutment; and the capacity of the spillway and the downstream channel, which are inadequate to pass the test flood outflows, particularly beneath the mill structure.

The test flood for this dam, classified as SMALL and as having a HIGH hazard potential, is half the Probable Maximum Flood ($\frac{1}{2}$ PMF). This test flood has an inflow of 1,670 cfs and an outflow discharge of 1,660 cfs, and will overtop the dam by 1 foot. The maximum outflow capacity of the spillway at the top of the dam is 250 cfs, which represents approximately 15% of the test flood outflow.

It is recommended that the Owner retain the services of a registered professional engineer to perform the tasks outlined in Section 7 of this report, which include a structural analysis and a more in depth hydraulic and hydrologic study. These recommendations and any further remedial measures should be implemented within one year of the Owner's receipt of this report.

LENARD & DILAJ ENGINEERING, INC.
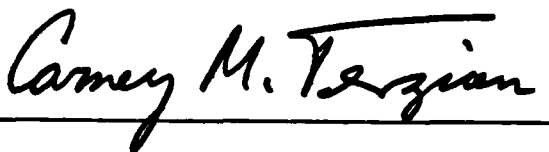
By: _John F. Lenard_

(John F. Lenard, P.E.
President
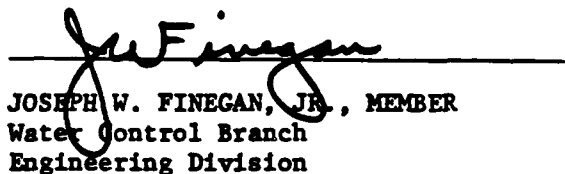
_Michael Dilaj_

Michael Dilaj, P.E., Vice President
Project Manager
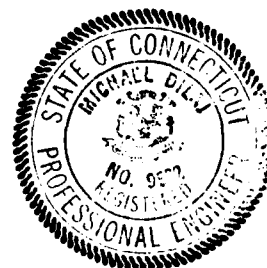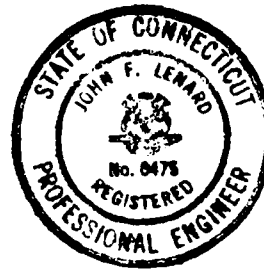
This Phase I Inspection Report on Acme Pond Dam
has been reviewed by the undersigned Review Board members. In our
opinion, the reported findings, conclusions, and recommendations are
consistent with the Recommended Guidelines for Safety Inspection of
Dams, and with good engineering judgement and practice, and is hereby
submitted for approval.


CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division


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


ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division


APPROVAL RECOMMENDED:


JOE B. FRYAR
Chief, Engineering Division

# PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation. However, the investigation is intended to identify any need for such studies.
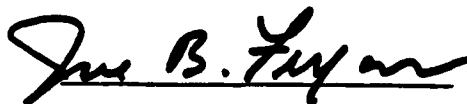
In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will 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 need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and 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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TAKEN 15 DEC. 1980

NATIONAL PROGRAM OF

INSPECTION OF

NON-FED. DAMS

ACME POND DAM
KILLINGLY, CONNECTICUT
CT 00172
JAN. 1981
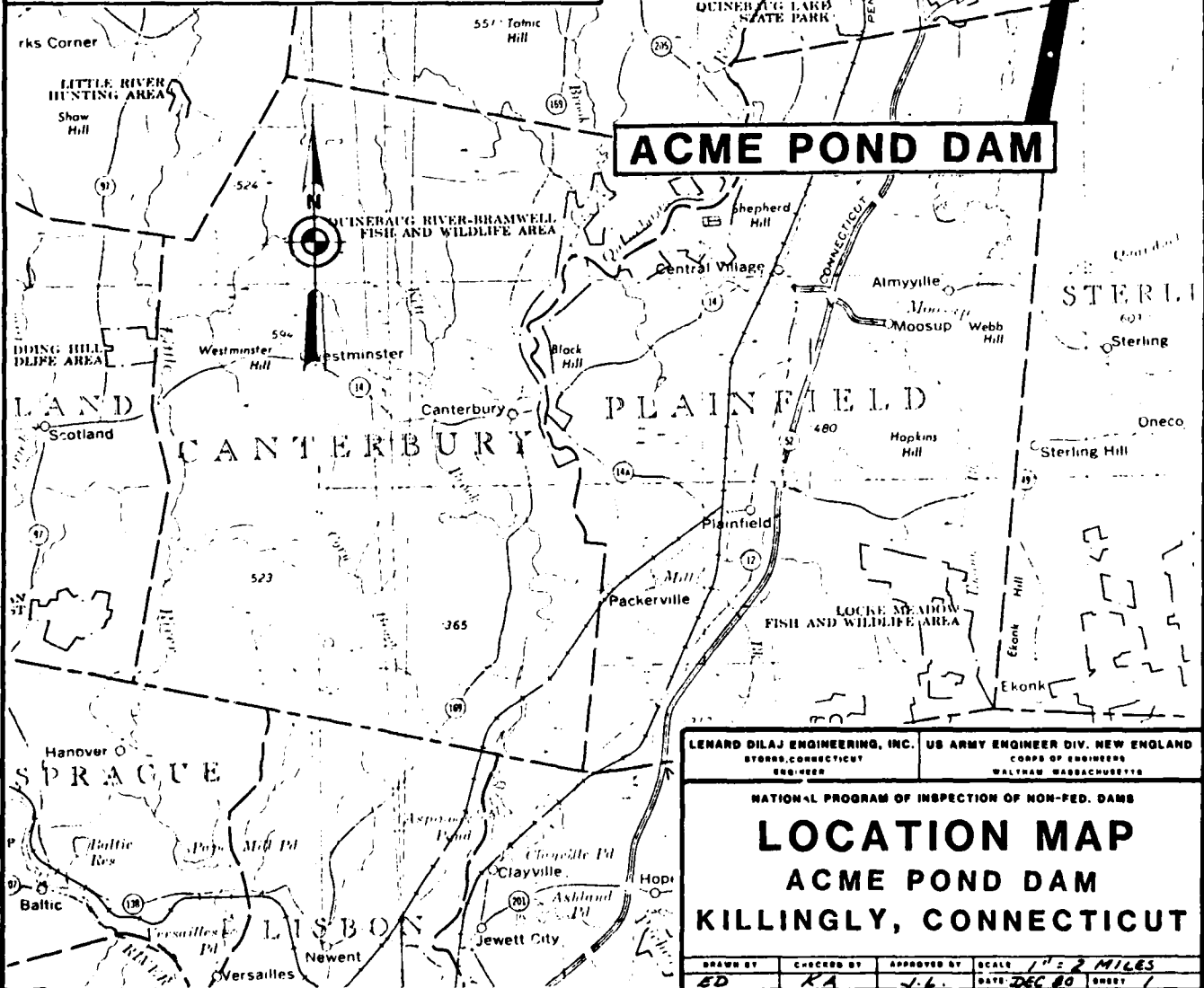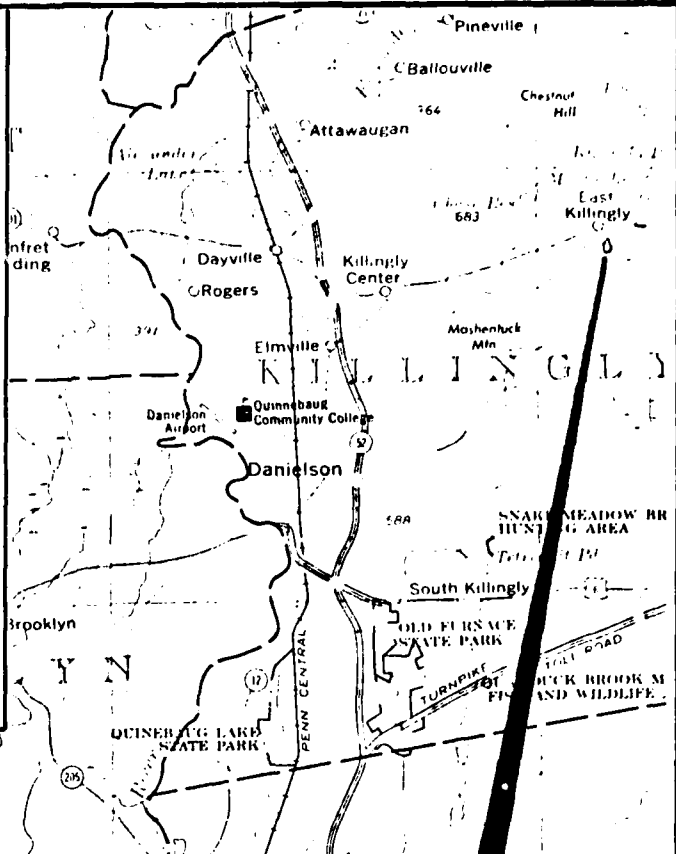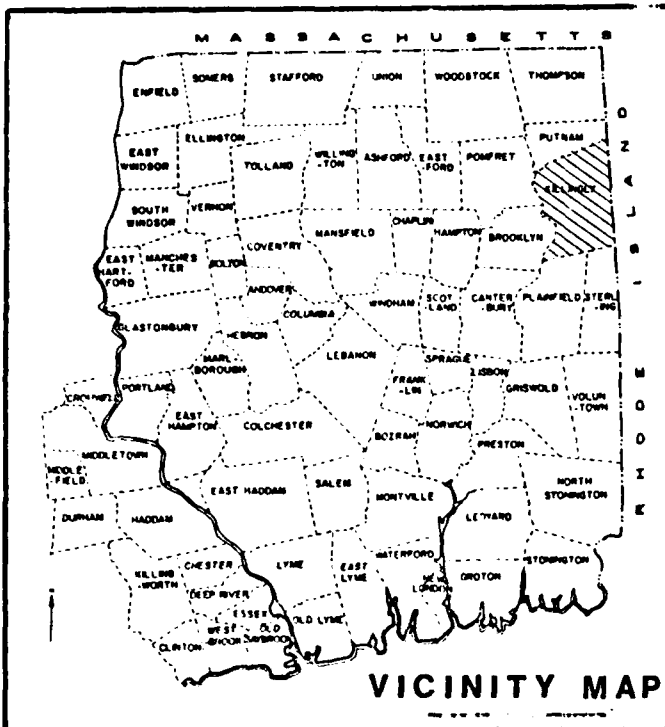
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**VICINITY MAP**

ACME POND DAM

**N**

| LENARD DILAJ ENGINEERING, INC. | US ARMY ENGINEER DIV. NEW ENGLAND |
|---|---|
| STORRS, CONNECTICUT | CORPS OF ENGINEERS |
| ENGINEER | WALTHAM, MASSACHUSETTS |

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

# LOCATION MAP
## ACME POND DAM
## KILLINGLY, CONNECTICUT

| DRAWN BY | CHECKED BY | APPROVED BY | SCALE 1" = 2 MILES |
|---|---|---|---|
| ED | KA | J.L. | DATE DEC 80 | SHEET 1 |

# PHASE I INSPECTION REPORT

## 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. Lenard & Dilaj Engineering, Inc. has been retained by the New England Division to inspect and report on selected dams in the States of Connecticut and Rhode Island. Authorization and notice to proceed were issued to Lenard & Dilaj Engineering, Inc. under a letter of 6 November, 1980 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0014 has been assigned by the Corps of Engineers for this work.

b. **Purpose of Inspection Program:** The purposes of the program are to:

   1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring correction in a timely manner by non-federal interest.

   2. Encourage and prepare the states to quickly initiate effective dam inspection programs for non-federal dams.

   3. To update, verify and complete the National Inventory of Dams.

c. **Scope of Inspection Program:** The scope of this Phase I inspection report includes:

   1. Gathering, reviewing and presenting all available data as can be obtained from the owners, previous owners, the state and other associated parties.

   2. A field inspection of the facility detailing the visual condition of the dam, embankments and appurtenant structures.

3. Computations concerning the hydraulics and hydrology of the facility and its relationship to the calculated flood through the existing spillway.

4. An assessment of the condition of the facility and corrective measures required.

It should be noted that this report does not pass judgment on the safety or stability of the dam other than on a visual basis. The inspection is to identify those features of the dam which need corrective action and/or further study.

## 1.2 Description of Project:

a. Location: The project is located on Whetstone Brook (a tributary to the Quinebaug River), in the Town of Killingly, County of Windham, and State of Connecticut. The dam is located approximately 1,000 feet south of State Route #101, and is shown on the East Killingly, Conn.-R.I. USGS quadrangle map, having coordinates $41^{\circ}$ 50' 48" (north latitude) and $71^{\circ}$ 49' 08" (west longitude).

b. Description of Dam and Appurtenances: Acme Pond Dam is an earth embankment dam with a downstream stone masonry wall. It is approximately 500 feet long and 10 feet high, with an average crest width of 12 feet. The downstream wall is the full height of the dam in the vicinity of the spillway and outlet structure, and it is about 7 feet lower than the dam elsewhere. The upstream slope of the dam is very irregular with an inclination of about 1.5H:1.0V. There is partial riprap protection consisting of large stones 1 to 2 feet in size. In many areas, however, there is no riprap at all. Near the right abutment, between the spillway and the outlet structure, there is an upstream stone wall which has collapsed in some areas.

The spillway is located near the right abutment and consists of a cut stone masonry wall with cut stone masonry training walls. The spillway flow passes under Bailey Hill Road through a rectangular stone culvert with an arch at the entrance and then continues beneath the mill to exit on the northwest side of the building.

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The outlet works consists of a concrete intake structure and a 16" cast iron pipe installed within a 4' diameter steel plate pipe culvert. The 16" pipe was installed to provide fire protection and limited process water (bleaching) for the plant. A centrifugal pump lifts the water into the water tower which in turn provides the pressure for the fire protection system. Water is withdrawn from the pond only at times when the storage tank needs refilling. Otherwise the flow passes over the spillway. The 16" line ends at a gate valve located beneath the mill, at which point it can discharge into a channel, also passing beneath the building, to join the channel previously mentioned. The flow discharges into a small pond named Mill Pond 50 feet downstream of the structure. This pond is created by a second dam immediately downstream of the mill.

An old outlet works is located at the present spillway structure. It is in a state of disrepair, however, and not considered functional. Its effect on additional future discharge capacity is considered negligible.

c.  Size Classification: SMALL - With the pool level at the top of the dam, the impoundment capacity is 29 acre feet. The dam's height above the road which runs along the toe is 10 feet. It is therefore classified as a SMALL structure, in accordance with the recommended guidelines of the Corps of Engineers.

d.  Hazard Classification: HIGH - The dam is classified as having a HIGH hazard potential because it is located in an area where the failure discharge could cause a possible loss of more than a few lives and appreciable damage to property. The breach of the dam could cause significant damage to Bailey Hill Road and to the manufacturing facilities located just opposite the dam, which include a large building and a water storage tank.

e.  Ownership: Acme Pond Dam is owned by the National Patent Development Corporation, Acme-Chaston Division, with executive offices at 3 Huntington Quadrangle, Suite 2 and 11, Malvern, New York 11746.

f.  Operator: The operating personnel of the above company are under the supervision of Joseph Skrypczak,

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Technical Supervisor, Lake Road, Box 419, Dayville, Connecticut 06241, telephone (203) 774-8541.

g. **Purpose of Dam:** The dam at Acme Pond was constructed for mechanical power generation. Since the discontinuation of mechanical power generation, the purpose of the dam is only to provide a water supply for fire protection at the mill.

h. **Design and Construction History:** Acme Pond Dam was probably built in 1846 at the same time the first manufacturing structure was erected across the street. A more detailed history of the mill and dam has been included in the Appendix. There were considerable alterations to the power generating equipment in 1872 when turbines were installed in place of the "wooden breast wheels". During 1945 the 16" discharge pipe and the fire protection system were installed.

i. **Normal Operating Procedures:** Water is normally maintained at spillway elevation and discharged through the spillway into the tailrace which passes beneath the mill and in turn discharges into Mill Pond. There are 2 centrifugal pumps in the basement of the mill building which draw from the 16" pipe installed into the old outlet works culvert. These pumps are regulated by the water level in the elevated storage tank. The only means of lowering the reservoir is through this 16" pipeline which is normally kept closed by a gate valve and opened only on an intermittent basis. This gate valve is located at the discharge point of the pipe (which is always under pressure). Water for the storage tank is drawn from the pressure section of the pipe before the gate valve. There is another old intake structure located immediately left of the spillway which discharges just downstream of the spillway wall. This old wooden gate structure is presently inoperable.

1.3 **Pertinent Data:**

a. **Drainage Area:** Acme Pond and its drainage area are located in Windham County in the northeastern portion of Connecticut. The basin is generally oval in shape with a longitudinal axis of approximately 3 miles and a width of 2 miles. The total drainage area is 5.16 square miles in size. The

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topography is generally hilly with elevations ranging from a low of 555 feet at the spillway of Acme Pond Dam to a high of 812 feet at the southeastern corner of the watershed. Basin slopes are moderate with grades ranging generally from 5% to 15%.

The dam at Acme Pond impounds water from a system of reservoirs originating approximately 2 miles north and east of the dam. Furthest upstream are the Eddy Pray Reservoir to the north and Killingly Pond to the east. Both of these reservoirs drain into Middle Reservoir. Alvia Chase Reservoir at the southeast portion of the watershed also discharges into Middle Reservoir. Middle Reservoir in turn drains into Bog Meadow Reservoir and then into Acme Pond. Because of the other reservoirs in the system, there is considerable storage available in the watershed. A schematic flow chart is shown in the Appendix. These storage areas will dampen and delay the peak of the surface runoff.

b.  <u>Discharge at Dam Site</u>:  No records of spillway or outlet works discharges are available. Listed below are calculated discharge data for the spillway and the 16" outlet pipe.

1.  Outlet works:
    Size:                       16 inch diameter pipe
    Invert Elev.                545.0 feet
    Discharge capacity:         26 cfs (at normal pool
                                   level)
2.  Maximum known flood at dam site: Discharge unknown.

3.  Ungated spillway capacity
    at top of dam:              250 cfs at Elev.558.2

4.  Ungated spillway capacity
    at test flood elevation:    400 cfs at Elev.559.1

5.  Gated outlet works capacity
    at normal pool elevation:   26 cfs at Elev. 555.0

6.  Gated outlet works capacity
    at test flood elevation:    36 cfs at Elev. 559.1

7.  Total discharge capacity at
    test flood elevation:       440 cfs at Elev.559.1

8. Total project discharge at
   top of dam:                     280 cfs at Elev.558.2

9. Total project discharge at
   test flood elevation:           1,600 cfs at Elev.559.1

c. Elevation (Feet above National Geodetic Vertical Datum):

   1. Streambed at toe of dam:     539.5

   2. Bottom of cutoff:            Unknown

   3. Maximum tail water:          Unknown

   4. Normal pool:                 555.0

   5. Full flood control pool:     N/A

   6. Spillway crest:              555.0

   7. Design surcharge
      (original design):           Unknown

   8. Top of dam:                  558.2

   9. Test flood surcharge:        559.1

d. Reservoir (Length in feet):

   1. Normal pool:                 600

   2. Flood control pool:          N/A

   3. Spillway crest pool:         600

   4. Top of dam:                  600

   5. Test flood pool:             600

e. Storage (acre-feet):

   1. Normal pool:                 16

   2. Flood control pool:          N/A

   3. Spillway crest pool:         16

   4. Top of dam:                  29

   5. Test flood pool:             34

f. <u>Reservoir Surface (acres)</u>:

    1.   Normal pool:              3

    2.   Flood control pool:    N/A

    3.   Spillway crest:       3

    4.   Test flood pool:      6

    5.   Top of dam:          5

g. <u>Dam</u>:

    1.   Type:                Earth embankment vertical downstream masonry walls

    2.   Length:            570 feet

    3.   Height:            10 feet

    4.   Top width:        12 feet

    5.   Side slopes:      1.5H:1V upstream vertical and 1.5H:1V downstream

    6.   Zoning:            Unknown

    7.   Impervious core:      Unknown

    8.   Cutoff:           Unknown

    9.   Grout curtain:       Unknown

h. <u>Diversion and Regulating Tunnel</u>: N/A

i. <u>Spillway</u>:

    1.   Type:                Stone masonry broad crest weir

    2.   Length of weir:       16 feet

    3.   Crest elevation (without flashboards):   555.0 feet

    4.   Gates:              None

    5.   U/S channel        Natural bed

    6.   D/S channel        Natural bed

j. **Regulating Outlets:**

1. Invert:                   545.0 feet

2. Size:                     16 inch diameter

3. Description:              Cast iron pipe

4. Control mechanism:        Manually operated gate
                             valve beneath mill
                             building.

5. Other                     The gate valve is
                             approachable only
                             through a manhole in
                             the basement floor of
                             the building.

## SECTION 2

### ENGINEERING DATA

2.1  <u>Design</u>:  There is very little known about the design of
the dam.  It was constructed for power generation pur-
poses probably during 1846.  Plans for the original con-
struction were not available.  Mechanical power was
generated in the adjacent building which is presently
occupied by the Acme Cotton Company.  Power generation
was discontinued in 1945 and at that time an elevated
water storage tank was erected for fire protection pur-
poses.  Water from the reservoir is pumped into this
storage tank for fire prevention.

2.2  <u>Construction</u>: Nothing is known about the construction
of the dam.  Indications are that it was constructed
during 1846, but there is no information available.
Judging from the bedrock outcroppings and from the pitch
of the bedrock, indications are that the dam was con-
structed on bedrock.

2.3  <u>Operation</u>:  The dam was originally constructed for me-
chanical power generation.  As indicated above, water is
presently used for fire protection purposes only.  The
Acme Company, which owns the property, maintains the
facilities, but keeps no formal records of operation.
There are no records available indicating that the dam
was ever overtopped.

2.4  <u>Evaluation</u>:

a.  <u>Availability</u>: The facilities were made available
for visual inspection.  All accessible operating
parts of the facility were inspected.  No plans or
other design information were found to be available.

b.  <u>Adequacy</u>: The limited amount of data available was
inadequate to perform an in-depth assessment of the
dam and appurtenant facilities.  Therefore, the final
assessment of this dam must be based primarily on
visual inspection, performance history, and hydraulic
and hydrologic computations of spillway and outlet
capacity.

c.  <u>Validity</u>:  Due to the lack of available data, the
conclusions and recommendations found in this report
are based on the visual inspection and hydraulic/
hydrologic computations.

# SECTION 3

## VISUAL INSPECTION

3.1 **Findings:**

a.  **General:** An inspection of Acme Pond Dam was performed
    on November 13, 1980 by Lenard & Dilaj Engineering, Inc.
    with the assistance of Geotechnical Engineers, Inc.
    The weather was cloudy and the temperature was about
    30°F.  At the time of inspection the water level in the
    pond was about 2 inches higher than the spillway crest
    elevation.

    As a result of the visual inspection, the dam at Acme
    Pond and its appurtenances are judged to be in fair con-
    dition. Saplings up to 3 inches in diameter and bushes
    are growing on the earth embankments. Riprap is sparse
    along the upstream slope and portions of a masonry wall
    on the upstream side have also collapsed. Various portions
    of the downstream stone masonry wall are bulging and out
    of alignment.

b.  **Dam:**  The dam is an earth embankment dam with a down-
    stream stone masonry wall.  No construction drawings
    are available, nor are the details of design known.
    Indications are that the dam was built during 1846 at
    the time the original factory was erected.

    1.  **Crest:**  The crest of the dam is covered with grass
        and it has a footpath along the center.  Fifty
        feet from the left abutment there is a low area,
        approximately 20 feet long, in the crest of the
        dam, probably a result of past erosion or settle-
        ment (See Site Plan).  There are a number of sap-
        lings growing on the crest, particularly near the
        spillway.  Some of the saplings are 3 inches in
        diameter.

    2.  **Upstream slope:**  The upstream slope of the dam is
        irregular with an inclination of about 1.5H:1.0V.
        Partial riprap protection is provided.  The rip-
        rap consists of large 1 to 2 foot diameter stones
        (Photo 1).  At the left abutment there is a short
        section of a dry masonry stone wall which changes
        into riprap protection (Photo 2).  Between the in-
        take structure and the spillway structure, the up-
        stream stone wall has collapsed (Photo 9).  There
        is also a heavy growth of bushes and saplings in
        this area of the upstream slope (Photo 9).  There

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are the remnants of a concrete wall on the upstream slope between the intake structure and spillway, but its purpose could not be ascertained. At the spillway, the joints of the upstream training walls have been cemented (Photos 7 and 8).

3. Downstream slope: The downstream stone masonry wall is the full height of the dam in the vicinity of the spillway and outlet structure and is about 7 feet lower than the dam elsewhere (Photos 3 and 4). The downstream stone wall has tilted in several areas, particularly near the right abutment (Photos 5 and 6). Because of the excessive tilting, the joints opened up as shown in Photo 6. It should be noted that the bulging of the downstream walls was first observed some time ago, as noted in the inspection report of William W. Pike in 1954. Apparently because of this report, a section of the downstream wall was repaired with a concrete wall left of the spillway (Photo 3). The concrete wall has no drainage holes. The remaining downstream slope above the wall is irregular and its inclination ranges from 1.5H:1.0V to 2.0H:1.0V. The slope has some growth of bushes and saplings. No seepage was observed on the downstream slope nor at the toe. A masonry stairway is built into the stone wall just south of the intake structure (See Site Plan and Photo 10). Immediately south of the stairway, the stone wall bulges as shown in Photo 10. Towards the left abutment several bedrock outcroppings were observed at the toe of the stone masonry wall. Indications are that this section of the dam is resting on bedrock. No seepage was noted on the left side of the dam.

c. Appurtenant Structures: The appurtenant structures for this dam are the spillway, the intake structure for a pipeline, and a gate structure at the left training wall of the spillway.

1. Spillway: The spillway is located near the right abutment and is constructed of cut stone masonry, with an approximately vertical downstream wall. Training walls are also constructed of stone masonry. On top of the left training wall there is an old inoperable gate structure (Photo 8), whose construction and dimensions could not be ascertained. It appears to have discharged through an opening visible just downstream of the spillway in the

vertical masonry wall. The training walls are in
fair condition with some indication of longitudinal
distortion (Photo 7). There are signs, however,
that soil may be washing into the culvert, as shown
by the cavities between stones of the training walls.
The spillway flow passes beneath Bailey Hill Road
and the mill building through a rectangular stone
culvert with an arch at the entrance (Photo 3).
There is a depression at the ground surface near the
edge of the road at the upstream end of the culvert.
The cause and extent of this depression could not
be ascertained, but its implications should be studied
along with the stability analysis. The culvert ex-
tends through the basement of the mill building and
exits about 150 feet downstream of the dam. The
spillway is in generally fair condition. Clear
seepage exiting out of the downstream face of the
spillway could be observed at the left end (Photo
11 and closeup, Photo 12). The quantity of seepage
here and elsewhere on the downstream face could not
be ascertained because of water flowing over the
spillway. The spillway is a broad-crested weir
and is 16 feet long at an elevation of 555 feet.
The training walls extend 3 feet above the spillway
crest on both sides. The approach channel was clear
of obstructions, but showed signs of minor siltation.

2.  Outlet works: The outlet works include a concrete
    intake structure which is in good condition (Photo
    9) and two upstream stone wingwalls which could be
    observed under water. There is a 16 inch pipe which
    passes beneath the road, installed inside an exist-
    ing 4 foot diameter steel plate pipe which shows
    signs of corrosion and whose condition should be
    assessed along with a stability analysis. A brick
    arch could be observed over the downstream end of
    this pipe where it entered the basement of the mill
    building. The outlet continues through the building
    as a culvert. The bottom of the culvert was cut
    into bedrock with masonry of different types above.
    The outlet joins the spillway culvert immediately
    upstream of the point where the flow exits out of
    the building into an open channel (See Site Plan).

    There is another outlet, as shown on Photo 8, with
    a wooden sluice gate on the left training wall.
    This outlet discharges immediately downstream of
    the spillway, but is not presently operable. The
    intake end of this outlet could not be observed
    because it was under water.

d.   Reservoir area:  The reservoir edge slopes gently in
the vicinity of the dam.  Near the left abutment of
the dam and on the south shore of the reservoir, bed-
rock is exposed.  Indications are that bedrock is
sloping from the south shore towards the mill building.

e.   Downstream channel:  The channel downstream of the
mill building carries the spillway and outlet flow.
It is an open channel, with stone walls adjacent to
the mill building, and irregularly sloped banks down-
stream.  The channel does not contain any significant
obstructions to the flow.

3.2   Evaluation:  On the basis of the visual inspection, the dam
is judged to be in fair condition.  The integrity of the
dam could be affected in the future by the continued tilt-
ing of the downstream wall at several locations along the
dam, by the corrosion of the 4 foot diameter pipe beneath
the dam and road, and by the distortion of the spillway
training walls.  There are also indications of soil wash-
ing into the stone culvert below the spillway, as shown by
the cavities between stones of the training walls.  If
the culvert were to deteriorate and eventually collapse,
the water would flow along the road and cause flooding of
the mill structure.

There is depression on the dam crest near the left abut-
ment.  The partial collapse and irregularity of riprap on
the upstream slope may further erode if not repaired and
could cause deterioration of the dam.  There is extensive
growth of saplings and small bushes, in particular, near
the spillway.  This growth should be checked and regularly
cleared.

Although some discharge capacity is available through the
16 inch outlet pipe, the valve is opened only on an inter-
mittent basis and because of its location beneath the build-
ing, it may not be accessible in an emergency situation.
Because the old outlet works near the spillway is inoperable,
it is possible that there may not be any functioning out-
let during an emergency.

# SECTION 4

## OPERATIONAL AND MAINTENANCE PROCEDURES

4.1  Operational Procedures:

    a.  General:  The Acme Cotton Company operates the dam and appurtenant facilities.  The operation of this facility is for fire protection purposes only.  Pumping equipment installed in the basement of the factory draws on the 16 inch discharge pipe and delivers water into the elevated storage tank.  There are no operational procedures at the dam.  Water level is at spillway elevation, and according to reports, the dam has never been overtopped.

    b.  Description of any Warning System in Effect:  Emergency action and/or warning is coordinated through the operations department of the Acme Company.  No formal emergency or contingency plan is in effect.

4.2  Maintenance Procedures:

    a.  General:  Maintenance is carried out as the need arises; no set procedure is in effect.  Trees and other material have been removed from the dam and it is maintained in fair condition.

    b.  Operating Facilities:  The outlet gate is in disrepair and not operational.  The fire protection equipment utilizing discharge from the pond is maintained within the mill building.  The valve controlling the 16 inch discharge pipe is opened only on an intermittent basis to check its operation.

4.3  Evaluation:  Maintenance of the dam and appurtenant facilities is inadequate.  A formal program of operational maintenance procedures should be implemented including documentation to provide complete records for future reference.  Also, a downstream warning system should be developed and implemented.

# SECTION 5

## EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1   General:  Acme Pond Dam is an earth embankment dam with
a vertical stone masonry face along part of the downstream
side.  The dam is approximately 570 feet long and 10 feet
high.  Its spillway has a length of 16 feet and the crest
is 3.2 feet below the top of the dam. For purposes of hy-
draulic calculations the spillway weir was considered to
be broad crested.  A 16-inch discharge pipe passes through
the dam and is controlled by a gate valve which is oper-
ated on an intermittent basis.

The downstream channel passes beneath the road and mill
building and is restricted at its narrowest point to an
opening of 3 feet by 4 feet.  Once it exits from the
building, the flow passes through another pond and dam
and then into a steep wooded channel.

The watershed encompasses an area of 5.16 square miles.
Its upper reaches are basically undeveloped while the
lower portion has some residential areas.

At spillway elevation, Acme Pond has a storage capacity
of approximately 16 acre-feet; this increases to 29 acre-
feet at the top of the dam.

5.2   Design Data:  No design data was found to be available
for this dam.

5.3   Experience Data:  According to long-term personnel at
the site, the dam has never been overtopped.

5.4   Test Flood Analysis:  Based on the "Recommended Guidelines
for Safety Inspection of Dams", the dam is classified as
SMALL in size with a HIGH hazard potential.  The test flood
for these conditions ranges from half the Probable Maximum
Flood to the Probable Maximum Flood ($\frac{1}{2}$ PMF to PMF).  Be-
cause of the size of the dam, the potential downstream
damage, and the possible loss of life involved with fail-
ure, the $\frac{1}{2}$ PMF was chosen as the test flood for this dam.

Using the HEC-1 Flood Hydrograph Computer program developed
by the Army Corps of Engineers for dam safety investigations,

the inflow and outflow for the test flood were found to be 1,670 cfs and 1,660 cfs, respectively. As a basis of comparison, the PMF resulted in an inflow and outflow of 9,160 cfs. The spillway capacity of 250 cfs represents 15% of the test flood outflow. One foot of overtopping would be associated with this outflow.

In development of the inflow hydrograph to Acme Pond, several upstream reservoirs were considered in the calculations. Because of the storage available at these sites, the effect of the test flood is considerably dampened.

5.5   Dam Failure Analysis:   A dam failure analysis was performed using the "Rule of Thumb" method for estimating downstream dam failure hydrographs established by the Corps of Engineers. Failure was assumed to occur when the water level in the pond was at the level of the top of the dam.

The calculated dam failure discharge is 10,600 cfs and will produce a depth of flow of approximately 10 feet at the mill immediately downstream of the dam, where there was no flow prior to failure since the spillway discharge passes beneath the mill. The failure analysis covered a distance of approximately 1,400 feet downstream, as shown by the calculations in Appendix D. The depth of flow at that point was calculated to be approximately 2.6 feet for the dam failure, indicating an increase in depth of 2 feet over the pre-failure flow of 250 cfs from the spillway.

The dam breach would cause appreciable damage and the possible loss of more than a few lives at the mill downstream of the dam. As shown above, the level of the water at the mill in the event of a failure would be 10 feet, high enough to inundate the basement level and first two floors.

# SECTION 6

## EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations: The visual inspection showed evidence of instability in several areas of the dam. The downstream wall has tilted locally at several points, particularly near the right abutment. Stones dislodged from these tilted walls could lead to an unstable situation in this area of the dam. At the upstream end of the culvert passing the spillway discharge beneath the mill building, there is evidence of a depression. Because it could lead to a collapse and blockage of the discharge channel, the cause and extent of this depression should be further investigated. The 4 foot diameter steel plate pipe passing beneath the dam and road is corroded. Because it houses the only discharge pipe from the dam (the 16" diameter pipe), its condition should be further assessed and evaluated. Failure of this pipe casing would mean the loss of the only means of drawing down the water from the pond behind the dam, and it could also lead to a partial collapse of the dam over the section of pipe passing beneath it. The longitudinal distortion of the spillway walls could lead to the collapse of the spillway channel or a blockage of the opening. Along with the cavities between the stones of these walls, which may indicate a wash out of soil particles, this distortion should be assessed and repairs instituted. It is recommended that an in-depth stability analysis of the dam be conducted, particularly with respect to the above mentioned items of concern.

6.2 Design and Construction Data: There was no design and construction data available at the time of inspection.

6.3 Post-Construction Changes: There are no known structural post-construction changes except for the construction of a downstream concrete wall left of the spillway and the installation of the 16-inch pipe into the 4 foot diameter penstock.

6.4 Seismic Stability: The dam is located near the boundary between seismic zones 1 and 2 and in accordance with the Phase I inspection guidelines does not warrant seismic stability analysis.

## SECTION 7

## ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment:

a. Condition: The visual inspection indicates that Acme Pond Dam is in FAIR condition. The major concerns regarding the long term performance of this dam include:

1. Continued tilting and bulging of the downstream stone masonry wall at several locations along the dam.

2. Overtopping of the dam by test flood flows as well as storms of lesser magnitude.

3. Lack of complete riprap coverage on the upstream slope.

4. Vegetation and sapling growth on the upstream and downstream slope of the embankment.

5. A depression on the crest of the dam near the left abutment and a depression at the upstream end of the culvert at the spillway.

6. The corrosion of the 4 foot diameter steel plate pipe passing beneath the dam and the road.

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

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

7.2 Recommendations: The Owner should engage the services of a qualified registered engineer to accomplish the following:

a.  Conduct an in-depth hydraulic and hydrologic study
    to determine what alternative measures are necessary
    to significantly improve discharge capabilities of
    the dam, spillway and discharge channel, to reduce
    the overtopping potential, and to provide adequate
    freeboard allowances.  Alternatives may include an
    emergency spillway, independent of the existing appur-
    tenances.

b.  Restore riprap protection on the upstream slope in
    unprotected areas.

c.  Analyze the stability of the dam and the downstream
    stone wall in particular.  Stabilization measures
    should include appropriate drainage features.  Also,
    analyze and assess the depression  at the culvert spill-
    way and the condition of the 4' diameter outlet pipe
    casing.

d.  Restore the crest elevation of the dam to a uniform
    height.

e.  Investigate the condition of the right spillway wall,
    which shows signs of longitudinal distortion.

7.3  Remedial Measures:

a.  Operating and Maintenance Procedures:

    1.  Saplings and brush on the dam should be removed
        and any excavations resulting therefrom should be
        backfilled with suitable material.  Grass should
        be planted in these disturbed areas to protect
        the embankment from erosion.

    2.  Emergency procedures, consisting of an operations
        and warning system for downstream residents and
        downstream manufacturing, should be developed and
        implemented.

    3.  Technical inspections of this facility should be
        continued on an annual basis.  A system should be
        developed for the recording of data with regard
        to items such as: water levels, discharges, time
        and drawdown to assist those responsible for the
        monitoring and operation of the structure.  The
        dam should be monitored particularly during and
        after periods of intense rainfall.

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4. Implement and intensify a program of diligent and periodic maintenance including, but not limited to: mowing brush on slopes; backfilling animal burrows or tire ruts with suitable well tamped material; cleaning debris from spillways and slopes.

7.4 <u>Alternatives</u>: There are no practical alternatives to the recommendations of Sections 7.2 and 7.3.

# APPENDIX A

INSPECTION CHECKLIST

## VISUAL INSPECTION CHECKLIST
## PARTY ORGANIZATION

PROJECT _ACME POND DAM_

DATE _NOVEMBER 13, 1980_

TIME _9 am_

WEATHER _Cloudy_

W.S. ELEV. _2" >_ _spillway_ U.S. _____ DN.S. _____

PARTY:

1. _John Lenard, L.D.E.I._
2. _Michael Dilaj, L.D.E.I._
3. _Karl Acimovic, L.D.E.I._
4. _Kent Healy, L.D.E.I._
5. _Gonzalo Castro, GEI_

6. _____
7. _____
8. _____
9. _____
10. _____

| PROJECT FEATURE | INSPECTED BY | REMARKS |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 10. | | |

A-1

## PERIODIC INSPECTION CHECKLIST

PROJECT  _ACME POND DAM_  DATE _NOVEMBER 13, 1980_

PROJECT FEATURE  _____  NAME  _____

DISCIPLINE  _____  NAME  _____

| AREA EVALUATED | CONDITION |
|---|---|
| **DAM EMBANKMENT** | |
| Crest Elevation | |
| Current Pool Elevation | |
| Maximum Impoundment to Date | _Reportedly never overtopped._ |
| Surface Cracks | _None observed._ |
| Pavement Condition | _Not applicable._ |
| Movement or Settlement of Crest | _None observed._ |
| Lateral Movement | _Downstream wall tilted along most of length._ |
| Vertical Alignment | _Too irregular to judge._ |
| Horizontal Alignment | _Downstream wall bulged at several locations._ |
| Condition at Abutment and at Concrete Structures | _Good._ |
| Indications of Movement of Structural Items on Slopes | _Not applicable._ |
| Trespassing on Slopes | _Footpath on downstream slope and along crest._ |
| Sloughing or Erosion of Slopes or Abutments | _None observed._ |
| Rock Slope Protection - Riprap Failures | _Randomly distributed._ |
| Unusual Movement or Cracking at or Near Toe | _None, except for wall movement._ |
| Unusual Embankment or Downstream Seepage | _None observed._ |
| Piping or Boils | _None observed._ |
| Foundation Drainage Features | _None known._ |
| Toe Drains | _None known._ |
| Instrumentation System | _None known._ |
| Vegetation | _Grass, bushes, saplings._ |

A-2

## PERIODIC INSPECTION CHECKLIST

PROJECT _ACME POND DAM_                    DATE _NOVEMBER 13, 1980_

PROJECT FEATURE_____            NAME _____

DISCIPLINE_____             NAME _____

| AREA EVALUATED | CONDITION |
|---|---|
| **DIKE EMBANKMENT** | *There is no dike at this location.* |
| 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 | |

A-3

# PERIODIC INSPECTION CHECKLIST

PROJECT *ACME POND DAM*                    DATE *NOVEMBER 13, 1980*

PROJECT FEATURE_____        NAME _____

DISCIPLINE_____             NAME _____

| AREA EVALUATED | CONDITION |
|---|---|
| OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE | |
| a.  Approach Channel | *Not observable, under water.* |
| 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 | *Good, some spalling at water level.* |
| Stop Logs and Slots | *None.* |

*A-4*

## PERIODIC INSPECTION CHECKLIST

PROJECT _ACME POND DAM_   DATE _NOVEMBER 13, 1980_

PROJECT FEATURE _____   NAME _____

DISCIPLINE _____   NAME _____

| AREA EVALUATED | CONDITION |
|---|---|
| OUTLET WORKS - CONTROL TOWER | |
| a. Concrete and Structural | _There is no control tower at this location._ |
|    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 | |

## PERIODIC INSPECTION CHECKLIST

PROJECT _ACME POND DAM_        DATE _NOVEMBER 13, 1980_

PROJECT FEATURE _____      NAME _____

DISCIPLINE _____        NAME _____

| AREA EVALUATED | CONDITION |
|---|---|
| OUTLET WORKS - TRANSITION AND CONDUIT | |
| General Condition of Concrete | |
| Rust or Staining on Concrete | |
| Spalling | |
| Erosion or Cavitation | |
| Cracking | |
| Alignment of Monoliths | |
| Alignment of Joints | |
| Numbering of Monoliths | |

A-6

# PERIODIC INSPECTION CHECKLIST

PROJECT _ACME POND DAM_  DATE _NOVEMBER 13, 1980_

PROJECT FEATURE _____  NAME _____

DISCIPLINE _____  NAME _____

| AREA EVALUATED | CONDITION |
|---|---|
| OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL | _Outlet channel is a 4-ft. pipe with an inside 16-in. pipe and a brick arch culvert under building. Both culvert inverts are in bedrock._ |
| General Condition of Concrete | _Brick arch culvert in good condition. 4-ft. pipe in fair condition, but inside 16-in. pipe in good condition. Upstream end of stone culvert in good condition._ |
| Rust or Staining | _Not applicable._ |
| Spalling | _Not applicable._ |
| Erosion or Cavitation | _Not applicable._ |
| Visible Reinforcing | _Not applicable._ |
| Any Seepage or Efflorescence | _Not applicable._ |
| Condition at Joints | _Not applicable._ |
| Drain holes | _Not applicable._ |
| Channel | _Natural stream channel._ |
| Loose Rock or Trees Overhanging Channel | _Several trees overhanging channel._ |
| Condition of Discharge Channel | _Good._ |

# PERIODIC INSPECTION CHECKLIST

PROJECT _ACME POND DAM_      DATE _NOVEMBER 13, 1980_

PROJECT FEATURE _____      NAME _____

DISCIPLINE _____      NAME _____

| AREA EVALUATED | CONDITION |
|---|---|
| **OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS** | |
| a. Approach Channel | _Reservoir._ |
|     General Condition | |
|     Loose Rock Overhanging Channel | |
|     Trees Overhanging Channel | |
|     Floor of Approach Channel | |
| b. Weir and Training Walls | _Cut stone dry masonry._ |
|     General Condition | _Good, some settling or lost stones in right wall._ |
|     Rust or Staining | _Not applicable._ |
|     Spalling | _Not applicable._ |
|     Any Visible Reinforcing | _Not applicable._ |
|     Any Seepage or Efflorescence | _Leakage out of left side of downstream face of spillway._ |
|     Drain Holes | _Not applicable._ |
| c. Discharge Channel | _Square stone culvert, arches at transitions._ |
|     General Condition | _Good._ |
|     Loose Rock Overhanging Channel | _Not applicable._ |
|     Trees Overhanging Channel | _Not applicable._ |
|     Floor of Channel | _Bedrock._ |
|     Other Obstructions | _Columns towards downstream end of culvert._ |
|     Other Comments | |

## PERIODIC INSPECTION CHECKLIST

PROJECT _ACME POND DAM_      DATE _NOVEMBER 13, 1980_

PROJECT FEATURE _____      NAME _____

DISCIPLINE _____      NAME _____

| AREA EVALUATED | CONDITION |
|---|---|
| <u>OUTLET WORKS - SERVICE BRIDGE</u><br><br>a.  Super Structure<br><br>    Bearings<br><br>    Anchor Bolts<br><br>    Bridge Seat<br><br>    Longitudinal Members<br><br>    Underside of Deck<br><br>    Secondary Bracing<br><br>    Deck<br><br>    Drainage System<br><br>    Railings<br><br>    Expansion Joints<br><br>    Paint<br><br>b.  Abutment & Piers<br><br>    General Condition of Concrete<br><br>    Alignment of Abutment<br><br>    Approach to Bridge<br><br>    Condition of Seat & Backwall | _There is no service bridge at this location._ |

# APPENDIX B

ENGINEERING DATA

B.M. 555.0
SPILLWAY ELEV.
OLD GATE MECHANISM
INTAKE STRUCTURE
INV. ELEV. 545.0

x 557.3

TILTING WALL

552.7 x    x 557.1

DEFORMATIONS AND SEEPAGE
IN SPILLWAY WALLS

557.8 x        558.1
550.3 x

557.8        558.0 x

557.8 x 553.0        551.7 x
548.3

BAILEY        548.3        548.0        BULGES IN WALL        5

555.4

DEPRESSION        PENSTOCK        WATER
TOWER

16" DIA. C.I. PIPE WITHIN
4' DIA. STEEL PLATE PIPE

COLLAPSED SECTION OF WALL

MILL
BLDG.

MILL POND

ACME POND

LOW AREA OF DAM

× 559.9

558.2 ×          558.2 ×          557.1 ×          × 559.7

55L5 ×                   × 551.8          × 558.3

547.7   HILL   548.2 ×        548.7                ROAD        556.3
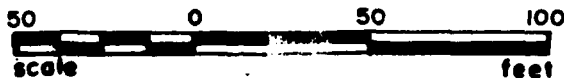
50          0          50          100

scale                              feet

# SITE PLAN
## ACME POND DAM
## KILLINGLY, CONN

| DRAWN BY | CHECKED BY | APPROVED BY | SCALE 1"= 50' |
|---|---|---|---|
| E,O | R.A. | J. | DATE DEC 80  SHEET B- |

2

# HISTORY OF ACME POND DAM

The Acme Pond Dam is located across the street from the Acme-Chasten Warehouse.  This warehouse is a conglomerate of much older buildings.  The oldest portion of the warehouse dates back to 1846. This section measures 36'x 100' and is 4 stories high.  It was built by Westcott and Pray, probably as a cotton cloth mill.

The major source of water for the mill was supplied by the Middle and Bog Meadow Reservoirs.  In 1832 Ebenezer Young built the dam at the Middle Reservoir.  The Bog Meadow Reservoir was raised 2 feet in 1849 by Westcott and Pray to increase storage to operate their mill.  Five years later Eddy Pray Reservoir Dam was constructed by the Chestnut Hill Reservoir Company.  This dam failed in May 1865, but it was promptly rebuilt and has stood since that time.

After the mill was built in 1846, it changed hands at least seven times until 1981, when Acme purchased the property.  The chronological order of owners includes:

| | |
|---|---|
| John D. Burgess | 1849-1856 |
| Mayhew Miller | 1856-1869 |
| Thomas Pray | 1869-1874 |
| John L. Ross | 1874-1899 |
| A.G.Bishop | 1899-  ? |
| United Tool Co. | 1907-1910 |
| Walter Guile | 1910-1918 |

In 1872 the "old fashioned wooden breast wheels" were replaced by the "modern" turbines in the mill.  At this time steam furnaces were installed to complement the available waterpower.  According to James Minges and Associates of Farmington, "Up until the 1920's the plant used water as a source of power which created the need for the storage of water ...".  In 1945, a 16" cast iron pipe equipped with gate valves was slid into the much older 4' diameter steel pipe for use as an intake pipe.  Water was only used for bleaching operations, so the 4' diameter pipe was too large.  The condition of the 4' pipe is not known.

William W. Pike  inspected all of the Chestnut Hill Reservoir dams in 1946, 1949 and again in 1954.  The Acme Pond Dam was only mentioned in the 1954 inspection, when he recommended retaining wall improvements on the Acme Pond Dam's south side. (See Photo

In January 1954 C.H. Knox recommended seasonal adjustments for the system of dams to adjust the reservoir levels.  However, the Minges report notes that in 1972, "the dams are presently kept at fixed high water levels and the gates are only opened for inspection or for gate maintenance."

**CHESTNUT HILL**
**or EAST KILLINGLY.**

Scale of Rods

80 rods

ACME POND DAM

Cemetery

T. Bartlett
W. Bartlett
Shoe Shop
A. Paine
Mrs. Bartlett
A. Bartlett & Co. Store
Apothecary Store
Bapt. Ch.
John Russell
T. Burden
J. Oatley
W. Oatley
E. Young

Paul Prey
Mathew Tuft
Thos. I. French
Mathew Miller
W. Doyle
J. Bartlett
S. Simmons
E. S. Young Store

Young's Tenements

Rev. Dan'l Williams
Robert Lewis
Dr. E. A. Hill
Clark Lewis
Harness Shop
Hotel
Bush
John Watts
J. Smith

Cotton Mill
E. S. Young

YOUNGS

MILLER'S
Cotton Mill

Edwin Miller

Mathew Miller

Aden Angell

E. Shippee

Mrs. Short

Wm. Lewis

M. Miller

Geo. I. Thacker

Millers Tenements
Miss Mitchell & Lewis Est
Elisa I. Thacker
C. Small
I. Bowen

Whetstone Brook

---

I S L A N D

Pond
Chestnut

Chestnut
Hill

Jas. Law

Jas. Hopkins

A. Irish

G. C. Chase T.H.
S. C. Chase
S. Draper

Thos. Pray

D. E. A. Pray

XII

**CHESTNUT HILL**
S. H.

ACME POND DAM

A. Carroll
S. H. Sessions

EDDY PRAY RESERVOIR

1854 DAM WAS BUILT ...
DAM GAVE WAY 1865
REBUILT AND HASN'T
BROKEN SINCE

KILLINGLY
POND

"LAKE CHAUBAUMAUG"
"THE LAKE"
"OLD POND"

MIDDLE
RESERVOIR

1832 DAM BUILT
BY YOUNG

1872 DAM
CONSTRUCTED

ALVIN CHASE
RESERVOIR

BOG MEADOW
RESERVOIR

ACME POND DAM

1849 BOG MEADOW
RESERVOIR
RAISED 2 FEET

Layout of

ACME POND RESERVOIR SYSTEM

For Historical References
Not To Scale

WOOD GATE

2'-3"

2'-0"

3"-3½"
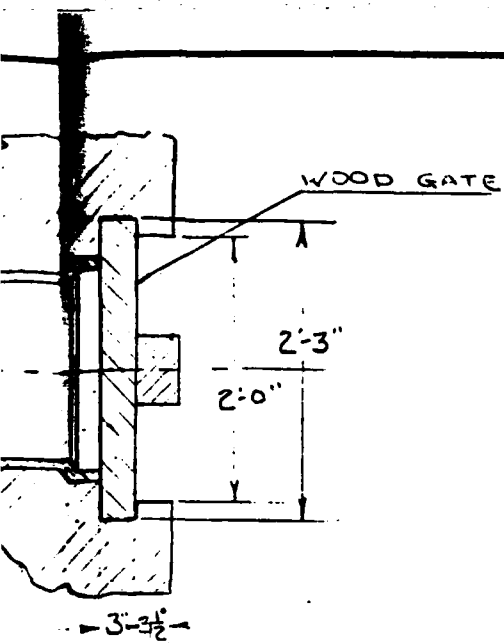
SECTION "A-A"
SCALE = 1" = 1'-0"

16"

11'-4"

16"

5'-7"

16"

CONCRETE

ST IRON PIPE, CLASS "C"
SSURE - AVERAGE WEIGHT
PER FOOT IN 16' LENGTHS
PIGOT JOINTS, CAULKED WITH
BY THE CRYSTAL WATER CO.

STEEL PIPE

4'-0"

3'-8"

9'-6"
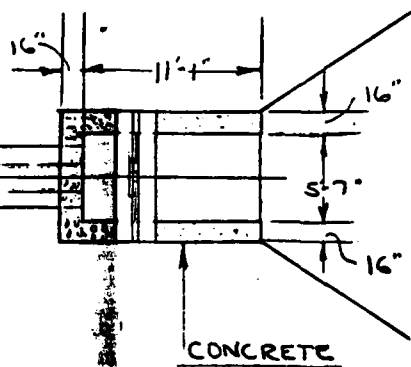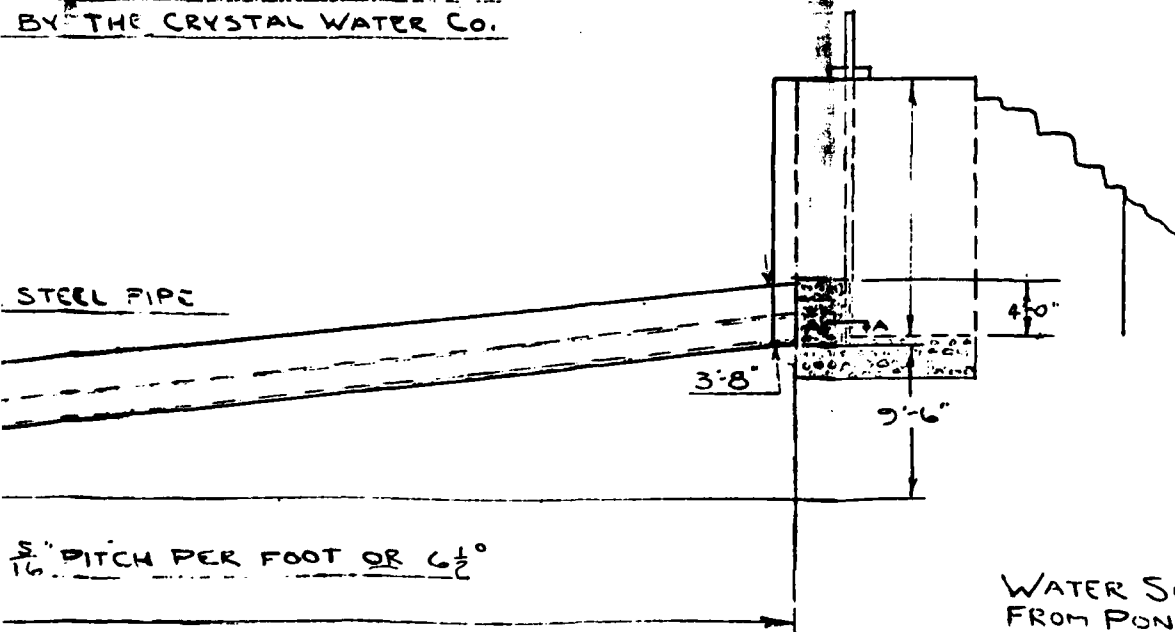
$\frac{5}{16}$" PITCH PER FOOT OR $6\frac{1}{2}°$

WATER SUPPLY PIPE LINE
FROM POND INTO MILL
11-13-45   CHK
$\frac{1}{8}$" = 1'-0"
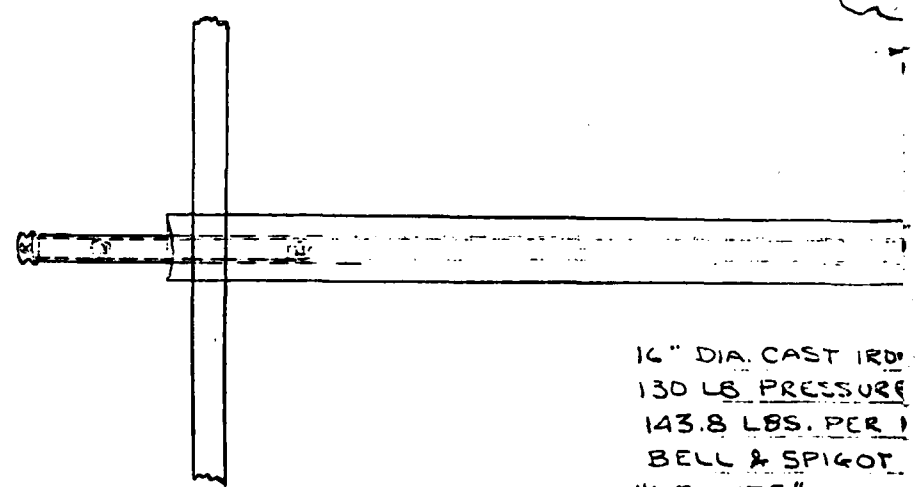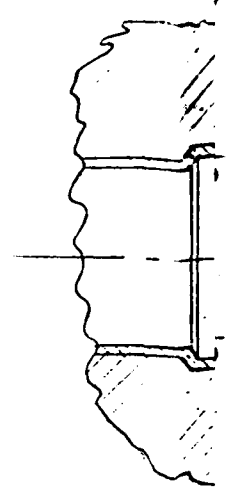
16" DIA. CAST IRO
130 LB PRESSURE
143.8 LBS. PER I
BELL & SPIGOT
"LEADITE" BY T
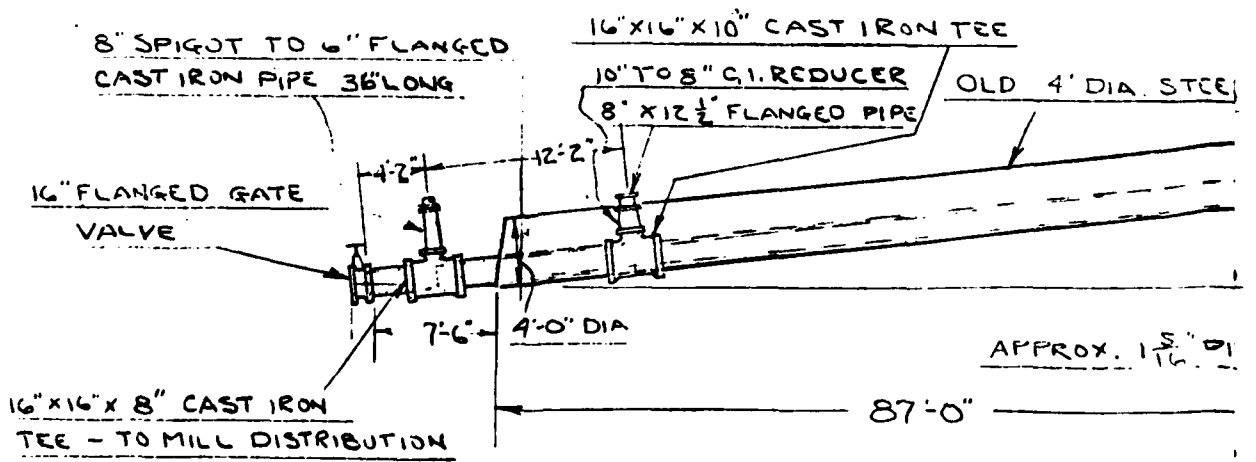
8" SPIGOT TO 6" FLANGED
CAST IRON PIPE 36"LONG

16"X16"X10" CAST IRON TEE

10" TO 8" G.I. REDUCER

8" X12½" FLANGED PIPE

OLD 4' DIA. STEE

16" FLANGED GATE
VALVE

12'-2"

4'-2"

7'-6"

4'-0" DIA

APPROX. 1 5/16" PI

16"X16"X 8" CAST IRON
TEE — TO MILL DISTRIBUTION

87'-0"

1

# CHESTNUT HILL RESERVOIR CO.

## EAST KILLINGLY, CONN.

### DANIELSON 4-5541

May 3rd, 1954

Mr. William W. Pike
22 Hutchins Street
Danielson, Connecticut

Dear Mr. Pike:

      Mr. Buckman has asked me to request you
to make an inspection of the dams and other prop-
erties of the Chestnut Hill Reservoir Company, as
you have in years past.

      Please send us a written report stating
the condition in which you find the various dams,
etc.

      Thanking you we remain

          Yours very truly

          CHESTNUT HILL RESERVOIR CO.

          C. H. Knox,

CHK/dw

September 4, 1954

## WORK NEEDED TO BE DONE ON THE DAMS
### OF
## THE CHESTNUT HILL RESERVOIR CO.

There are three items of work that apply to all of the dams,
namely:
1. Trees should be cut and the brush should be kept cut
   from all of the dams.
2. Leaks should be stopped, driving plank priming where
   necessary.
3. Woodchuck holes should be stopped up.

The following conditions were found at the different dams and
should be given attention:

ACME RESERVOIR
1. The stone wall on the lower side of the dam (South
   end) is being pushed out by the earth of the dam and
   this wall is leaning to the degree where it is no
   longer very stable.
2. The stone wall on the lower side of the dam at the
   transformer station is also leaning considerably.

BOG MEADOW RESERVOIR
1. Vegetation is clogging the channel just above the
   gates. This vegetation appears not to be securely
   rooted and thus likely to move about and could foul
   the gates.

ALVIA CHASE RESERVOIR
1. Water is leaking through the stonework at the gates.
   There appears to be more water going through the
   stonework than is going through the gates. At the
   present time there is no indication of undermining,
   the undermining that was evident two years ago has
   been filled in and does not show. However, such a
   volume of water going through the stonework is very
   likely taking away some of the earth which backs up
   said stonework.

OLD KILLINGLY POND
1. Earth fill has been placed on the lower side of the
   dam at its westerly end and this has backed up the
   leaning wall and should prevent its falling. A
   section of the top of this leaning wall near the
   easterly end of the dam has to led down now. This
   earth backing should extend the entire length of the
   dam.

September 4, 1954

WORK NEEDED TO BE DONE ON THE DAMS
OF
THE CHESTNUT HILL RESERVOIR CO.
(continued)


EDDY PRAY RESERVOIR
1. This reservoir is not now in use.
   The leaks in said dam which have persisted for many
   years are still there even though the water is not
   high enough to run through said leaks.
2. The ditch at the foot of the dam should be cleaned
   out and opened up to let the water at the foot of
   the dam drain off so that the soil at the foot of
   the dam would not be so soft.


Respectfully submitted,
September 4, 1954,


William W. Pike

4 June 1973


Acme Catton Products Company, Inc.
147 South Franklin Avenue
Valley Stream, New York

*K - 10*

Re:  Acme Pond
     Killingly, CT


Gentlemen:


    Members of our staff recently inspected the above named
dam on Whetstone Brook, which our records indicate belongs to
you.


    In general, the structure appears safe.  I would, how-
ever, like to point out two areas of concern:


    1.  Determining and repairing the source of
        seepage in the south corner of the spill-
        way would prevent further deterioration and
        possibly a much more expensive repair job
        in the future.

    2.  Brush which is growing on the upstream side
        of the dam should be removed.


    Please consider the above as suggestions and not as a
formal order by this department.


                        Very truly yours,




                        Victor F. Galgowski
                        Supt. of Dam Maintenance
                        Water & Related Resources


VFG:ljg

# APPENDIX C

PHOTOGRAPHS
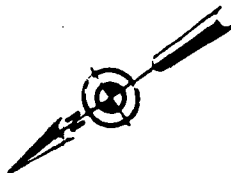
B.M. 555.0
SPILLWAY ELEV.

OLD GATE MECHANISM

INTAKE STRUCTURE
INV. ELEV. 545.0

x 557.3

552.7 x   x 557.1

TILTING WALL

x 557.8        558.0 x

557.8   x 553.0    551.7 x

550.3 x

558.1

548.3

BAILEY

548.3        548.0

x 548.3

BULGES IN WALL        54

PENSTOCK

WATER
TOWER

DEFORMATIONS AND SEEPAGE
IN SPILLWAY WALLS

DEPRESSION

16" DIA. C.I. PIPE WITHIN
4' DIA. STEEL PLATE PIPE

COLLAPSED SECTION OF WALL

MILL
BLDG.

MILL POND

ACME POND

① 

② 

LOW AREA OF DAM ⫟ × 559.9

558.2 ×          558.2 ×          557.1 ×          × 559.7

55L5 ×          × 551.8

× 558.3

847.7    HILL    548.2 ×    548.7                    ROAD

④

50          0          50          100

scale                              feet

# PHOTO INDEX
## ACME POND DAM
## KILLINGLY, CONN

| DRAWN BY | CHECKED BY | APPROVED BY | SCALE | 1" = 50' |
|---|---|---|---|---|
| E.J.O | K.A | J.L | DATE DEC 80 | SHEET C-1 |

2

Photos 1 & 2.  View of upstream side of dam as seen
from left abutment. Note stone wall
near left abutment and large riprap
to the right of the dam. Spillway is
at far right.

| US ARMY ENGINEER DIV. NEW ENGLAND<br>CORPS OF ENGINEERS<br>WALTHAM, MASSACHUSETTS | NATIONAL PROGRAM OF | ACME POND DAM<br>KILLINGLY, CONNECTICUT |
|---|---|---|
| | INSPECTION OF | CT 00172 |
| LENARD-DILAJ ENGINEERING, INC.<br>STORRS, CONNECTICUT<br>ENGINEER | NON-FED. DAMS | JAN. 1981 |
| | | C- 2 |

Photo 3.   Downstream wall of dam and spillway. Note reinforced concrete wall installed to the left of the spillway.



Photo 4.   Overall view of downstream wall and slope.

Photo 5.   Tilted downstream wall near right abutment.
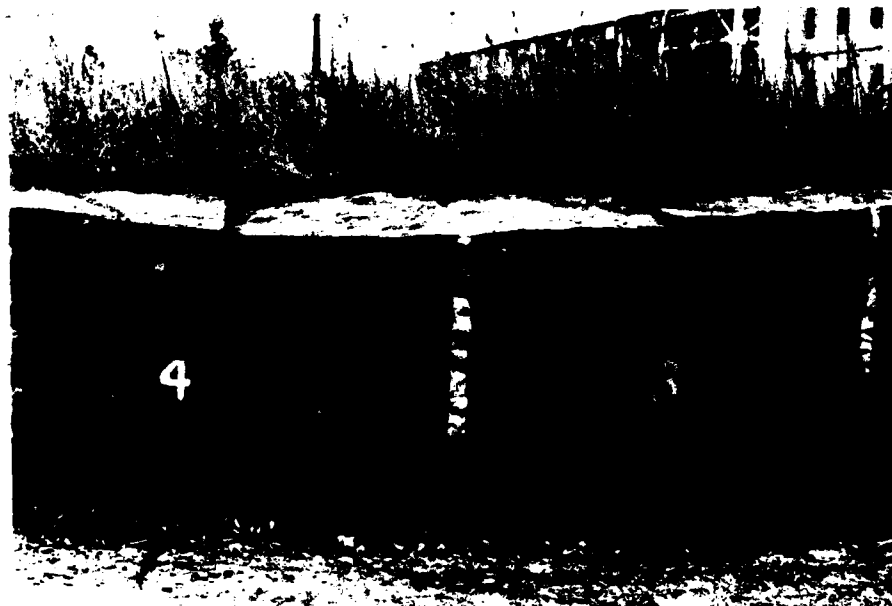


Photo 6.   Closeup of tilted downstream wall at right
           abutment.  Note voids between stones as a
           result of tilting of wall.  Markings on
           wall are for parking purposes.

| US ARMY ENGINEER DIV. NEW ENGLAND<br>CORPS OF ENGINEERS<br>WALTHAM, MASSACHUSETTS | NATIONAL PROGRAM OF<br>INSPECTION OF<br>NON-FED. DAMS | ACME POND DAM<br>KILLINGLY, CONNECTICUT<br>CT 00172 |
|---|---|---|
| LENARD-DILAJ ENGINEERING, INC.<br>STORRS, CONNECTICUT<br>ENGINEER | | JAN. 1981<br>C-4 |

Photo 7.    Right wall of spillway.   Note apparent
            deformation of wall.



Photo 8.    Left training wall of spillway.   Note
            remains of gate mechanism. Discharge
            from gate mechanism is apparently down-
            stream of spillway wall.

Photo 9

Upstream wall between inlet structure and spillway.



Photo 10

Downstream wall of dam at stairs left of spillway. Note bulging of wall at about third point from bottom.
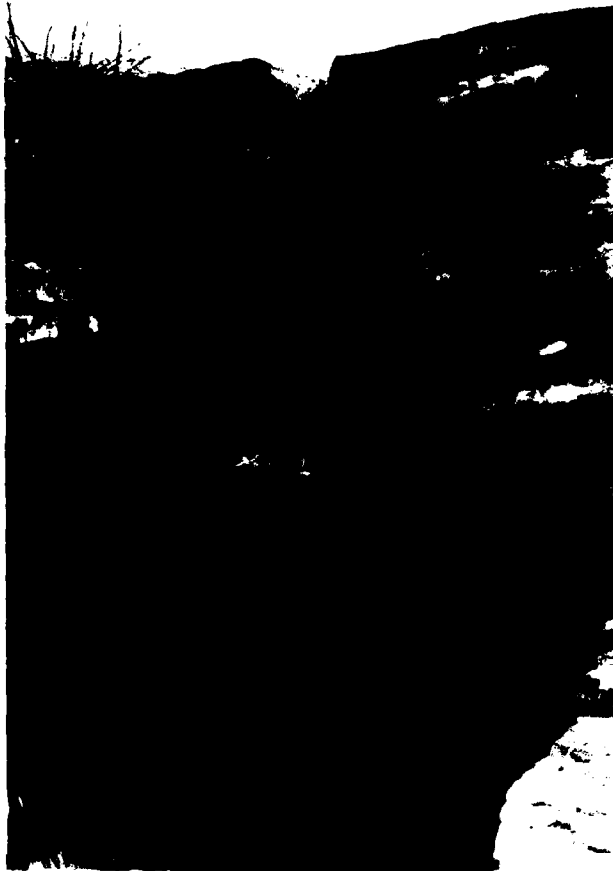
Photo 11

Left wall of spillway. Note leakage at corner of wall and downstream face of spillway.

Photo 12

Closeup of leakage of left wall.

Photo 13.   Outlet side of spillway discharge
channel below mill building.

# APPENDIX D

HYDROLOGIC AND HYDRAULIC

COMPUTATIONS

**LENARD & DILAJ ENGINEERING, INC.**
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB *ACME POND DAM*

SHEET NO _____ OF _____

CALCULATED BY *K.A.* DATE _____

CHECKED BY _____ DATE _____

SCALE _____

## DETERMINATION OF SPILLWAY TEST FLOOD*

### A. SIZE CLASSIFICATION

Based on either storage or height

THIS DAM:

| | | | |
|---|---|---|---|
| (Small) | Storage | 50-999 Ac.-Ft. | *29 Ac.Ft.* |
| | Height | 25-39 Ft. | *10 Ft.* |
| Intermediate | Storage | 1,000-50,000 Ac.Ft. | _____ |
| | Height | 40-100 Ft. | _____ |
| Large | Storage | More than 50,000 Ac.-Ft. | _____ |
| | Height | Greater than 100 Ft. | _____ |

### B. HAZARD POTENTIAL CLASSIFICATION

| Category | Loss of Life | Economic Loss |
|---|---|---|
| Low | None expected | Minimal |
| Significant | Few | (Appreciable) |
| (High) | (More than few) | Excessive |

Hazard Classification *HIGH*

### C. HYDROLOGIC EVALUATION GUIDELINES

| Hazard | Size | Spillway Test Flood |
|---|---|---|
| Low | Small | 50 to 100-Year Frequency |
| | Intermediate | 100-Year Frequency to ½ PMF |
| | Large | ½ PMF to PMF |
| Significant | Small | 100-Year Frequency to ½ PMF |
| | Intermediate | ½ PMF to PMF |
| | Large | PMF |
| (High) | (Small) | (½ PMF to PMF) |
| | Intermediate | PMF |
| | Large | PMF |

Spillway Test Flood *½ PMF*

* Based upon "Recommended Guidelines for Safety Inspection of
Dams" Department of the Army, Office of the Chief of Engineers,
November 1976.
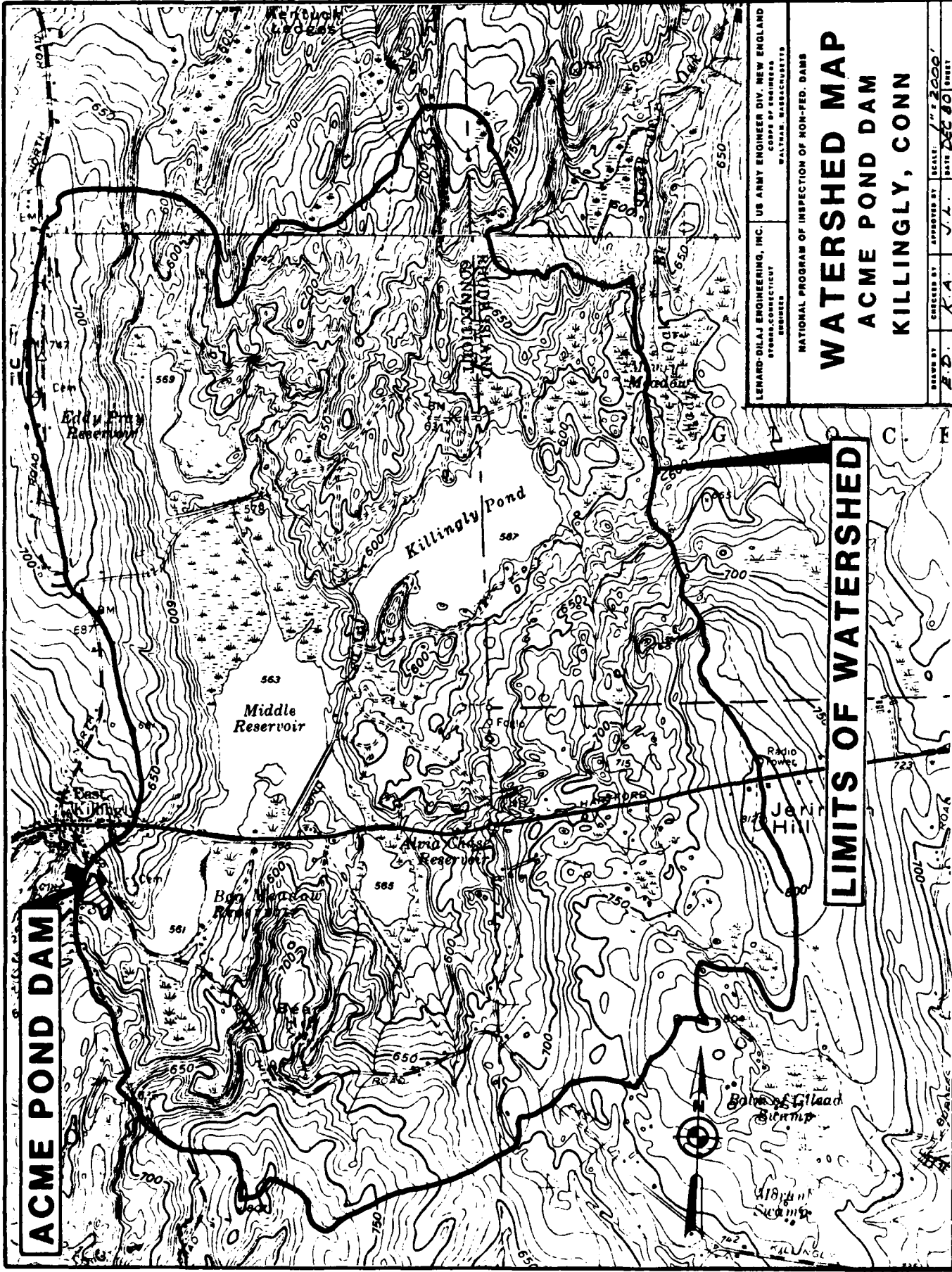
# ACME POND DAM

# LIMITS OF WATERSHED

**NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS**

## WATERSHED MAP
### ACME POND DAM
### KILLINGLY, CONN

LENARD-DILLAJ ENGINEERING, INC. | US ARMY ENGINEER DIV. NEW ENGLAND
STORRS, CONNECTICUT | CORPS OF ENGINEERS
| WALTHAM, MASSACHUSETTS

| DRAWN BY | CHECKED BY | APPROVED BY | SCALE: 1"= 2,000' |
| E.D. | | J.L. | DATE: DEC 80 | SHEET |

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

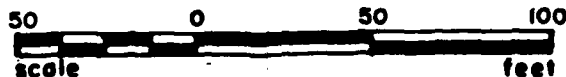| | |
|---|---|
| RUNOFF HYDROGRAPH AT | 1 |
| ROUTE HYDROGRAPH TO | 2 |
| RUNOFF HYDROGRAPH AT | 3 |
| ROUTE HYDROGRAPH TO | 4 |
| COMBINE 2 HYDROGRAPHS AT | 5 |
| RUNOFF HYDROGRAPH AT | 6 |
| COMBINE 2 HYDROGRAPHS AT | 7 |
| ROUTE HYDROGRAPH TO | 8 |
| RUNOFF HYDROGRAPH AT | 9 |
| COMBINE 2 HYDROGRAPHS AT | 10 |
| ROUTE HYDROGRAPH TO | 11 |
| END OF NETWORK | |

# WATERSHED ANALYSIS

# ACME POND DAM

```
***********************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION   JULY 1978
   LAST MODIFICATION 26 FEB 79
***********************

RUN  DATE0 01/07/81.
     TIME0 08.33.48.


              ACME POND DAM   EAST KILLINGLY   CONNECTICUT
              80-27-1
              NOVEMBER 1980-DESIGN STORM- 1/2 PMF
```

( handwritten: ½ PMF )

```
                            JOB SPECIFICATION
       NQ   NHR  NMIN  IDAY   IHR  IMIN  METHC   IPLT   IPRT  NSTAN
      150    8    30     0     0     0     0       0      4     0
                        JOPER  NWT  LROPT TRACE
                          5     0     0     0

                  MULTI-PLAN ANALYSES TO BE PERFORMED
                     NPLAN= 1 NRATIO= 6 LRTIO= 1
      RTIOS=   .10   .20   .30   .50   .80  1.00


***********************                            ***********************

              SUB-AREA RUNOFF COMPUTATION

      CALCULATION OF INFLOW HYDROGRAPH TO EDDY PRAY RESERVOIR

       ISTAQ  ICOMP IECON ITAPE  IPLT  JPLT  JPRT  INAME ISTAGE IAUTO
         1      0     0     0      1     1     0      1     0      0

                         HYDROGRAPH DATA
       IHYDG IUHG TAREA  SNAP THSDA TRSPC  RATIO  ISNOW ISAME LOCAL
         1    1   .82   0.00  .82  0.00   0.000    0     0     0

                          PRECIP DATA
        SPFE   PMS    R6     R12    R24    R48    R72    R96
        0.00 24.40 100.00 111.00 120.00 127.00  0.00   0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

                             LOSS DATA
      LROPT STRKR DLTKR RTIOL ERAIN STRKS RTIOK STRTL CNSTL ALSMX RTIMP
        0   0.00  0.60  1.00  0.00  0.00  1.00  1.00   .20  0.00  0.00

                      UNIT HYDROGRAPH DATA
                    TP= 1.82  CP= .63  NTA= 0

                         RECESSION DATA
              STRTQ= -1.80    QRCSN= -.05    RTIOR= 1.00

      UNIT HYDROGRAPH 21 END-OF-PERIOD ORDINATES, LAG= 1.83 HOURS, CP= .63  VOL= 1.00
        23.   81.  145.  178.  161.  121.   90.   67.   50.   37.
        27.   20.   15.   11.    8.    6.    5.    3.    3.    2.
         1.

                      END-OF-PERIOD FLOW
      MO.DA HR.MN PERIOD  RAIN  EXCS  LOSS  COMP Q   MO.DA HR.MN PERIOD  RAIN  EXCS

       0
      MO.DA HR.MN PERIOD, RAIN, EXCS, LOSS
```

SUM 24.79 19.28 5.51 -25793.
( 630.)( 490.)( 140.)( 730.38)

\*\*\*\*\*\*\*\*\*\*

## HYDROGRAPH ROUTING

ROUTED FLOW THROUGH EDDY PRAY RESERVOIR

| ISTAQ | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME | ISTAGE | IAUTO |
|---|---|---|---|---|---|---|---|---|
| 2 | -1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

ROUTING DATA

| IRES | ISAME | IOPT | X | AMSKK | IPMP | LSTR |
|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 0.000 | | 0 | 0 |

| QLOSS | CLOSS | AVG | LAG | AMSKK | X | TSK | STORA | ISPRAT |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.000 | 0.00 | 305.00 | 387.00 | 0.000 | -0.000 | 0. | 0 |

| NSTPS | NSTDL |
|---|---|
| 1 | 0 |

| STORAGE | 0.00 | 229.00 | 266.00 | 305.00 | 387.00 |
|---|---|---|---|---|---|
| OUTFLOW | 0.00 | 100.00 | 238.00 | 2062.00 | 8456.00 |
| STAGE | 569.00 | -573.50 | -574.00 | -574.50 | -575.50 |
| FLOW | 0.00 | 100.00 | 238.00 | 2062.00 | 8456.00 |

MAXIMUM STAGE IS 570.3
MAXIMUM STAGE IS 571.7
MAXIMUM STAGE IS 573.8
MAXIMUM STAGE IS 574.1
MAXIMUM STAGE IS 574.4
MAXIMUM STAGE IS 574.5

\*\*\*\*\*\*\*\*\*\*

## SUB-AREA RUNOFF COMPUTATION

CALCULATION OF INFLOW HYDROGRAGH TO KILLINGLY POND

| ISTAQ | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME | ISTAGE | IAUTO |
|---|---|---|---|---|---|---|---|---|
| 3 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |

HYDROGRAPH DATA

| IHYDG | IUHG | TAREA | SNAP | THSDA | TRSPC | RATIO | ISMON | ISAME | LOCAL |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1 | 1.39 | 0.00 | 1.39 | 0.00 | 0.000 | 0 | 0 | 0 |

PRECIP DATA

| SPFE | PMS | R6 | R12 | R24 | R48 | R72 | R96 |
|---|---|---|---|---|---|---|---|
| 0.00 | 24.40 | 100.00 | 111.00 | 120.00 | 127.00 | 0.00 | 0.00 |

LOSS DATA

| LROPT | STRKR | DLTKR | RTIOL | ERAIN | STRKS | RTIOK | STRTL | CNSTL | ALSMX | RTIMP |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.00 | 0.80 | 1.00 | 0.00 | 0.0U | 1.00 | 1.00 | .20 | 0.00 | 0.00 |

TRSPC COMPUTED BY THE PROGRAM IS .800

UNIT HYDROGRAPH DATA

```
                                RECESSION DATA
                    STRTQ=  -1.80    QRCSN=  -.05    RTIOR= 1.00

              UNIT HYDROGRAPH 25 END-OF-PERIOD ORDINATES, LAG= 2.21 HOURS, CP= .62  VOL=1.00
                 24.    85.   164.   227.   251.   251.   226.   178.   139.   109.   85.
                 67.    52.    41.    32.    25.    20.    15.    12.     9.     7.
                  6.     4.     4.     3.     2.

                                 END-OF-PERIOD FLOW
    0
 MO.DA  HR.MN  PERIOD  RAIN  EXCS  LOSS  COMP Q      MO.DA  HR.MN  PERIOD  RAIN  EXCS  LOSS  COMP Q

                                        SUM   24.79  19.28   5.51   42350.
                                             ( 630.)( 490.)( 140.)( 1199.22)

 **********

                         HYDROGRAPH ROUTING

              ROUTED FLOW THROUGH KILLINGLY POND

               ISTAQ  ICOMP  IECON  ITAPE  JPLT  JPRT  INAME  ISTAGE  --IAUTO--
                 4      1      0      0      1     0      1       0        0
                               ROUTING DATA
               NSTPS  NSTDL  IHES  ISAME  IOPT  IPMP  LSTR
                 1      1      1     1      0     0     0
               QLOSS  CLOSS  AVG   LAG   AMSKK   X    TSK   STORA  ISPRAT
               0.    0.000  0.00    0    0.000  0.000 0.000   0.     0

 STORAGE    0.00   251.00   396.00   647.00   1059.00
 OUTFLOW    0.00    54.00   580.00  5069.00  17723.00
 STAGE    587.00   589.00   590.00   591.60    594.00
 FLOW       0.00    54.00   580.00  5069.00  17723.00

 MAXIMUM STAGE IS   588.0

 MAXIMUM STAGE IS   589.0

 MAXIMUM STAGE IS   589.5

 MAXIMUM STAGE IS   590.2

 MAXIMUM STAGE IS   590.6

 MAXIMUM STAGE IS   590.8

 **********

                         COMBINE HYDROGRAPHS

              COMBINE HYDROGRAPHS FROM ABOVE SUBBASINS 2 AND 4

               ISTAQ  ICOMP  IECON  ITAPE  JPLT  JPRT  INAME  ISTAGE  IAUTO
                 5      2      0      0      1     0      1       0       0
```

SUB-AREA RUNOFF COMPUTATION

CALCULATION OF INFLOW HYDROGRAPH TO MIDDLE RESERVOIR

| ISTAQ | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME | ISTAGE | IAUTO |
|---|---|---|---|---|---|---|---|---|
| 6 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |

HYDROGRAPH DATA

| IHYDG | IUHG | TAREA | SNAP | THSDA | TRSPC | RATIO | ISNOW | ISAME | LOCAL |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2.57 | 0.00 | 2.57 | 0.00 | 0.000 | 0 | 0 | 0 |

PRECIP DATA

| SPFE | PMS | R6 | R12 | R24 | R48 | R72 | R96 |
|---|---|---|---|---|---|---|---|
| 0.00 | 24.40 | 100.00 | 111.00 | 120.00 | 127.00 | 0.00 | 0.00 |

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

| LROPT | STRKR | DLTKR | RTIOL | ERAIN | STRKS | RTIOK | STRTL | CNSTL | ALSMX | RTIMP |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.00 | 0.80 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | .20 | 0.00 | 0.00 |

UNIT HYDROGRAPH DATA

TP= 2.38   CP= .63   NTA= 0

RECESSION DATA

STRTQ= -1.80   QRCSN= -.05   RTIOR= 1.00

UNIT HYDROGRAPH 26 END-OF-PERIOD ORDINATES, LAG= 2.38 HOURS, CP= .63   VOL=1.00

```
 38.  267.  380.  436.  413.  339.  269.  214.  170.
135.  107.   85.   67.   53.   42.   34.   27.   21.   17.
 13.   11.    8.    7.    5.    4.
```

END-OF-PERIOD FLOW

| MO.DA | HR.MN | PERIOD | RAIN | EXCS | LOSS | COMP Q | MO.DA | HR.MN | PERIOD | RAIN | EXCS | LOSS | COMP Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | | |

SUM   24.79   19.28   5.51   77476.
      ( 630.)( 490.)( 140.)( 2193.88)

**********

COMBINE HYDROGRAPHS

COMBINE ABOVE TWO HYDROGRAPHS 6 AND 7

| ISTAQ | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME | ISTAGE | IAUTO |
|---|---|---|---|---|---|---|---|---|
| 7 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |

**********

HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH MIDDLE RESERVOIR DAM

| ISTAQ | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME | ISTAGE | IAUTO |
|---|---|---|---|---|---|---|---|---|
| 8 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |

ROUTING DATA

| CLOSS | AVG | IRES | ISAME | IOPT | IPMP | LSTR |
|---|---|---|---|---|---|---|
| 0.000 | 0.00 | 1 | 1 | 0 | 0 | 0 |

| QLOSS | CLOSS |
|---|---|
| 0.0 | 0.000 |

```
STAGE        562.00   563.00   564.00   564.30   566.00   566.00   0.000   0.000   -562.    -1
FLOW           0.00    36.70   111.20   139.60   402.40   492.60  568.80  570.00

SURFACE AREA=   60.     126.     170.     204.     227.     246.     262.    275.    288.
CAPACITY=        0.      91.     238.     425.     640.     876.    1130.   1399.   1680.
ELEVATION=     562.     563.     564.     565.     566.     567.     568.    569.    570.

                CREL    SPWID    COQW     EXPW     ELEVL    COQL    CAREA    EXPL
                562.0    0.0      0.0      0.0      0.0      0.0      0.0     0.0

                                      DAM DATA
                            TOPEL    COQD    EXPD    DAMWID
                            568.0    2.6     1.5      986.

PEAK OUTFLOW IS   108. AT TIME 48.50 HOURS

PEAK OUTFLOW IS   263. AT TIME 47.50 HOURS

PEAK OUTFLOW IS   420. AT TIME 48.50 HOURS

PEAK OUTFLOW IS  1611. AT TIME 46.00 HOURS

PEAK OUTFLOW IS  5968. AT TIME 44.00 HOURS

PEAK OUTFLOW IS  8600. AT TIME 43.50 HOURS

***********      ***********      ***********      ***********      ***********

                        SUB-AREA RUNOFF COMPUTATION

        CALCULATION OF INFLOW HYDROGRAPH TO ACME POND

           ISTAQ  ICOMP  ITAPE  IECON  ITAPE  JPLT  JPRT  INAME  ISTAGE  IAUTO
             9      0      0      0      0      0     1      1       0       0

                          HYDROGRAPH DATA
           IMYDG  IUHG  TAREA  SNAP  TRSDA  TRSPC  RATIO  ISNOW  ISAME  LOCAL
             1     1    .39    0.00   .39    0.00   0.000    0      0      0

                          PRECIP DATA
             SPFE    PMS     R6     R12     R24     R48     R72     R96
             0.00   24.40  100.00  111.00  120.00  127.00   0.00    0.00

                          LOSS DATA
      LROPT  STRKR  DLTKR  RTIOL  ERAIN  STRKS  RTIOK  STRTL  CNSTL  ALSMX  RTIMP
        0    0.00   0.00   1.00   0.00   0.00   1.00   1.00   .20    0.00   0.00

                      UNIT HYDROGRAPH DATA
               TP= 1.70     CP= .63     NTA= 0

TRSPC COMPUTED BY THE PROGRAM IS  .800
```

RECESSION DATA

STRTQ= -1.80    QRCSN= -.05    RTIOR= 1.00

UNIT HYDROGRAPH 19 END-OF-PERIOD ORDINATES, LAG= 1.70 HOURS, CP= .63 VOL= 1.00

```
12.   44.   77.   90.   77.   56.   40.   29.   21.   15.
11.    8.    6.    4.    3.    2.    1.
```

END-OF-PERIOD FLOW
MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q

0

MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q

SUM  24.79  19.28   5.51   12426.
     ( 630.)( 490.)( 140.)( 351.87)

COMBINE HYDROGRAPHS

COMBINE ABOVE TWO HYDROGRAPHS 8 AND 9

| ISTAQ | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME | ISTAGE | IAUTO |
|-------|-------|-------|-------|------|------|-------|--------|-------|
| 10    | 2     | 0     | 0     | 1    | 0    | 1     | 0      | 0     |

HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH ACME POND DAM

| ISTAQ | ICOMP | IECON | ITAPE | JPLT | JPRT | INAME | ISTAGE | IAUTO |
|-------|-------|-------|-------|------|------|-------|--------|-------|
| 11    | 1     | 0     | 0     | 1    | 0    | 1     | 0      | 0     |

ROUTING DATA

| NSTPS | NSTDL | IRES | ISAME | IOPT | X | IPMP | IPMP | LSTR |
|-------|-------|------|-------|------|---|------|------|------|
| 1     | 0     | 1    | 1     | 0    | 0.000 | 0 | 0 | 0 |

| QLOSS | CLOSS | AVG  |
|-------|-------|------|
| 0.0   | 0.000 | 0.00 |

| NSTPS | NSTDL | LAG | AMSKK | X     | TSK   | STORA | ISPRAT |
|-------|-------|-----|-------|-------|-------|-------|--------|
| 1     | 0     | 0   | 0.000 | 0.000 | 0.000 | -555. | -1     |

| STAGE     | 555.00 | 556.80 | 557.00 | 558.00 | 558.20 | 560.00 | 562.00 |
|-----------|--------|--------|--------|--------|--------|--------|--------|
| FLOW      | 0.00   | -42.90 | -119.90 | 221.20 | 244.50 | 499.10 | 889.00 |

| SURFACE AREA= | 3. | 4. | 5. | 6. | 7. | 8. | 10. | 12. |
|---------------|----|----|----|----|----|----|-----|-----|

| CAPACITY= | 0. | 3. | 12. | 17. | 22. | 40. | 62. | 80. | 102. |
|-----------|----|----|-----|-----|-----|-----|-----|-----|------|

| ELEVATION= | 555. | 556. | 557. | 558. | 559. | 560. | 563. | 566. | 568. | 570. |
|------------|------|------|------|------|------|------|------|------|------|------|

DAM DATA

| TOPEL | COQD | EXPU | DAMWID |
|-------|------|------|--------|
| 558.2 | 2.6  | 1.5  | 554.   |

| CREL  | SPWID | COQW | EXPW | ELEVL | COQL | CAREA | EXPL |
|-------|-------|------|------|-------|------|-------|------|
| 555.0 | 0.0   | 0.0  | 0.0  | 0.0   | 0.0  | 0.0   | 0.0  |

PEAK OUTFLOW IS  141. AT TIME 43.00 HOURS

PEAK OUTFLOW IS  311. AT TIME 42.00 HOURS

PEAK OUTFLOW IS     488. AT TIME 43.00 HOURS

PEAK OUTFLOW IS    1664. AT TIME 46.00 HOURS

PEAK OUTFLOW IS    6291. AT TIME 44.00 HOURS

PEAK OUTFLOW IS    9161. AT TIME 43.50 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

| | | | | RATIOS APPLIED TO FLOWS | | | | | |
| OPERATION | STATION | AREA | PLAN | RATIO 1 .10 | RATIO 2 .20 | RATIO 3 .30 | RATIO 4 .50 | RATIO 5 .80 | RATIO 6 1.00 |
|---|---|---|---|---|---|---|---|---|---|
| HYDROGRAPH AT | 1 | .82 (2.12) | 1 | 204. (5.77) | 408. (11.55) | 612. (17.32) | 1019. (28.87) | 1631. (46.18) | 2039. (57.73) |
| ROUTED TO | 2 | .82 (2.12) | 1 | 30. (.85) | 60. (1.69) | 90. (2.54) | 666. (18.86) | 1585. (44.48) | 1997. (56.54) |
| HYDROGRAPH AT | 3 | 1.39 (3.60) | 1 | 313. (8.86) | 626. (17.73) | 939. (26.59) | 1565. (44.31) | 2504. (70.90) | 3130. (88.63) |
| ROUTED TO | 4 | 1.39 (3.60) | 1 | 27. (.76) | 54. (1.52) | 306. (8.66) | 1017. (28.81) | 2175. (61.59) | 2813. (79.65) |
| 2 COMBINED | 5 | 2.21 (5.72) | 1 | 56. (1.60) | 113. (3.19) | 395. (11.20) | 1647. (46.65) | 3549. (100.49) | 4641. (131.42) |
| HYDROGRAPH AT | 6 | 2.57 (6.66) | 1 | 559. (15.82) | 1117. (31.64) | 1676. (47.46) | 2793. (79.10) | 4469. (126.56) | 5587. (158.20) |
| 2 COMBINED | 7 | 4.78 (12.38) | 1 | 592. (16.76) | 1184. (33.53) | 1776. (50.29) | 3818. (108.12) | 7920. (224.28) | 10105. (286.16) |
| ROUTED TO | 8 | 4.78 (12.38) | 1 | 108. (3.05) | 263. (7.45) | 420. (11.89) | 1611. (45.62) | 5968. (168.99) | 8600. (243.52) |
| HYDROGRAPH AT | 9 | .39 (1.01) | 1 | 101. (2.85) | 201. (5.70) | 302. (8.54) | 503. (14.24) | 805. (22.78) | 1006. (28.48) |
| 2 COMBINED | 10 | 5.17 (13.39) | 1 | 144. (4.08) | 296. (8.37) | 485. (13.73) | 1666. (47.19) | 6290. (178.12) | 914?. (258.84) |
| ROUTED TO | 11 | 5.17 (13.39) | 1 | 141. (4.01) | 311. (8.81) | 488. (13.80) | 1664. (47.13) | 6291. (178.15) | 9161. (259.40) |

PLAN 1   STATION   2

| RATIO | MAXIMUM FLOW,CFS | MAXIMUM STAGE,FT | TIME HOURS |
|---|---|---|---|
| .10 | 30. | 570.3 | 46.00 |
| .20 | 60. | 571.7 | 46.00 |
| .30 | 90. | 573.0 | 46.00 |
| .50 | 666. | 574.1 | 43.50 |
| .80 | 1585. | 574.4 | 42.00 |
| 1.00 | 1997. | 574.5 | 42.00 |

PLAN 1   STATION   4

| MAXIMUM | MAXIMUM | TIME |
|---|---|---|

# EDDY PRAY RESERVOIR DAM

# KILLINGLY POND DAM

| RATIO | FLOWS | STORAGE | HOURS |
|-------|-------|---------|-------|
| .10 | 27. | 588.0 | 48.00 |
| .20 | 54. | 589.0 | 48.00 |
| .30 | 306. | 589.5 | 45.50 |
| .50 | 1017. | 590.2 | 44.00 |
| .80 | 2175. | 590.6 | 43.00 |
| 1.00 | 2813. | 590.8 | 43.00 |

# MIDDLE RESERVOIR DAM

### SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .............

|  | INITIAL VALUE | SPILLWAY CREST | TOP OF DAM |
|---|---|---|---|
| ELEVATION | 562.00 | 562.00 | 568.00 |
| STORAGE | 0. | 0. | 1130. |
| OUTFLOW | 0. | 0. | 493. |

| RATIO OF PMF | MAXIMUM RESERVOIR W.S.ELEV | MAXIMUM DEPTH OVER DAM | MAXIMUM STORAGE AC-FT | MAXIMUM OUTFLOW CFS | DURATION OVER TOP HOURS | TIME OF MAX OUTFLOW HOURS | TIME OF FAILURE HOURS |
|---|---|---|---|---|---|---|---|
| .10 | 563.95 | 0.00 | 230. | 108. | 0.00 | 48.50 | 0.00 |
| .20 | 565.10 | 0.00 | 445. | 263. | 0.00 | 47.50 | 0.00 |
| .30 | 566.39 | 0.00 | 729. | 420. | 0.00 | 48.50 | 0.00 |
| .50 | 568.57 | .57 | 1281. | 1611. | 10.00 | 46.00 | 0.00 |
| .80 | 569.65 | 1.65 | 1579. | 5968. | 18.50 | 44.00 | 0.00 |
| 1.00 | 570.14 | 2.14 | 1721. | 8600. | 33.50 | 43.50 | 0.00 |

# ACME POND DAM

## SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ...............

|  | ELEVATION | STORAGE | OUTFLOW |
|---|---|---|---|
| INITIAL VALUE | 555.00 | 0. | 0. |
| SPILLWAY CREST | 555.00 | 0. | 0. |
| TOP OF DAM | 558.20 | 13. | 245. |

| RATIO OF PMF | MAXIMUM RESERVOIR W.S.ELEV | MAXIMUM DEPTH OVER DAM | MAXIMUM STORAGE AC-FT | MAXIMUM OUTFLOW CFS | DURATION OVER TOP HOURS | TIME OF MAX OUTFLOW HOURS | TIME OF FAILURE HOURS |
|---|---|---|---|---|---|---|---|
| .10 | 557.21 | 0.00 | 8. | 141. | 0.00 | 43.00 | 0.00 |
| .20 | 558.31 | .11 | 13. | 311. | 13.00 | 42.00 | 0.00 |
| .30 | 558.48 | .28 | 14. | 448. | 34.50 | 43.00 | 0.00 |
| .50 | 559.14 | .94 | 17. | 1664. | 36.00 | 46.00 | 0.00 |
| .80 | 560.72 | 2.52 | 26. | 6241. | 36.50 | 44.00 | 0.00 |
| 1.00 | 561.48 | 3.28 | 31. | 9161. | 37.00 | 43.50 | 0.00 |

**LENARD & DILAJ ENGINEERING, INC.**
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB _ACME POND DAM_

SHEET NO. _1_ OF _15_

CALCULATED BY _M.D._ DATE _12/29/80_

CHECKED BY _E.A._ DATE _12/30/80_

SCALE _____

_SCHEMATIC_
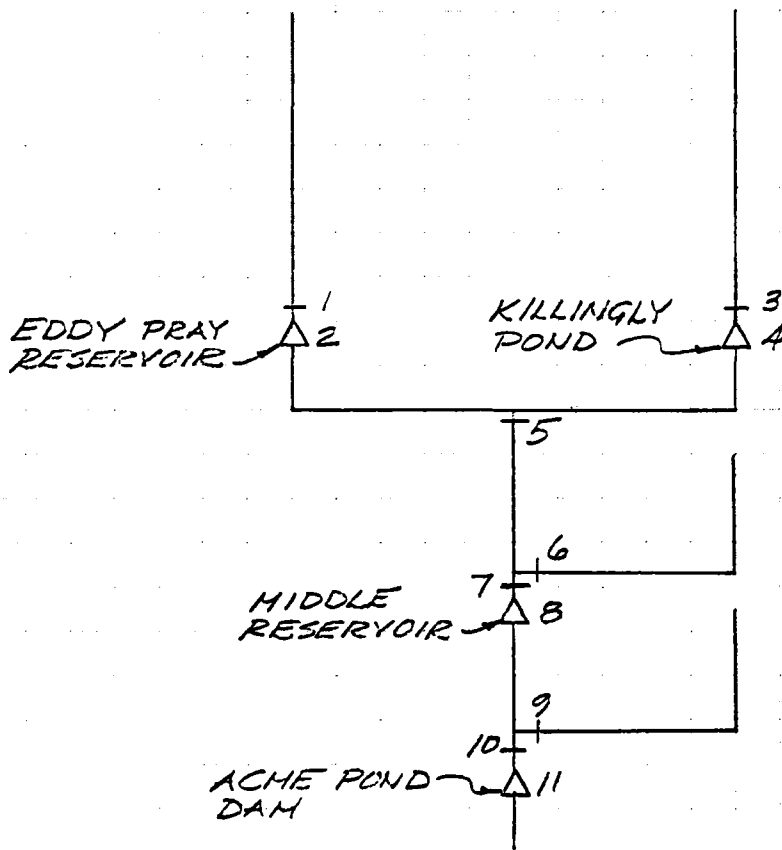


1 — RUNOFF EDDY PRAY WATERSHED
2 — ROUTED INFLOW THROUGH EDDY PRAY RESERVOIR
3 — RUNOFF KILLINGLY POND
4 — ROUTED INFLOW THROUGH KILLINGLY POND
5 — COMBINE ABOVE TWO FLOWS
6 — RUNOFF MIDDLE RESERVOIR WATERSHED
7 — COMBINE FLOWS 5 & 6
8 — ROUTED INFLOW 7 THROUGH MIDDLE RESERVOIR
9 — RUNOFF ACME POND WATERSHED
10 — COMBINE FLOWS 8 & 9
11 — ROUTED INFLOW 10 THROUGH ACME POND DAM

**LENARD & DILAJ ENGINEERING, INC.**
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308
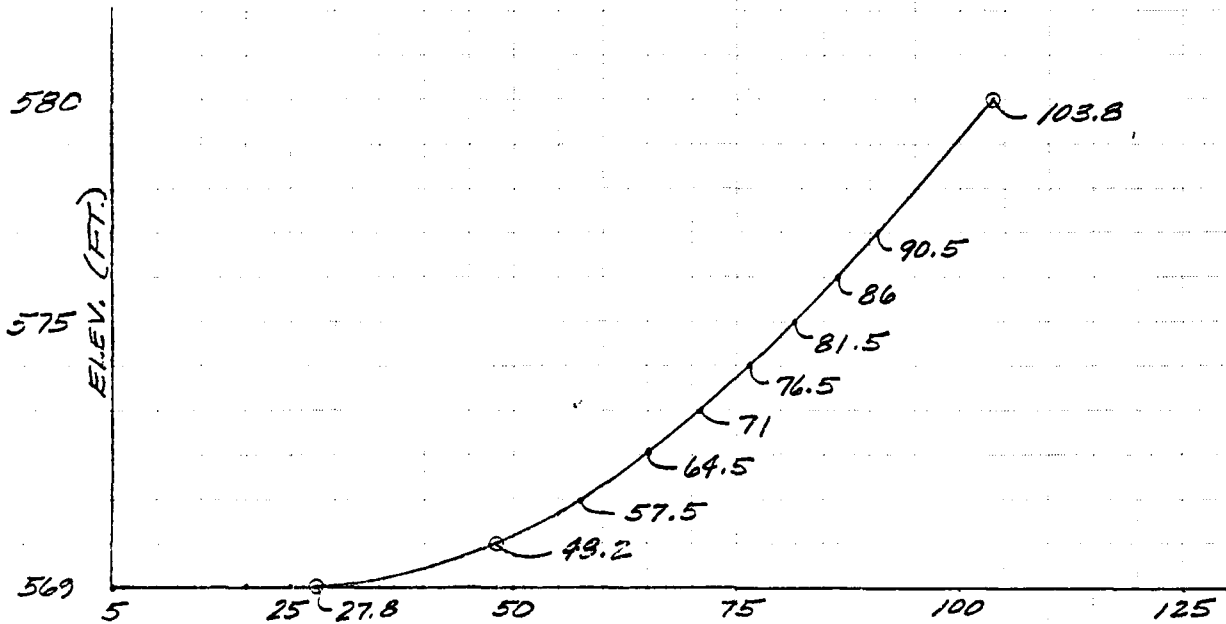
JOB _CORPS - ACME POND_

SHEET NO. _2_ OF _15_

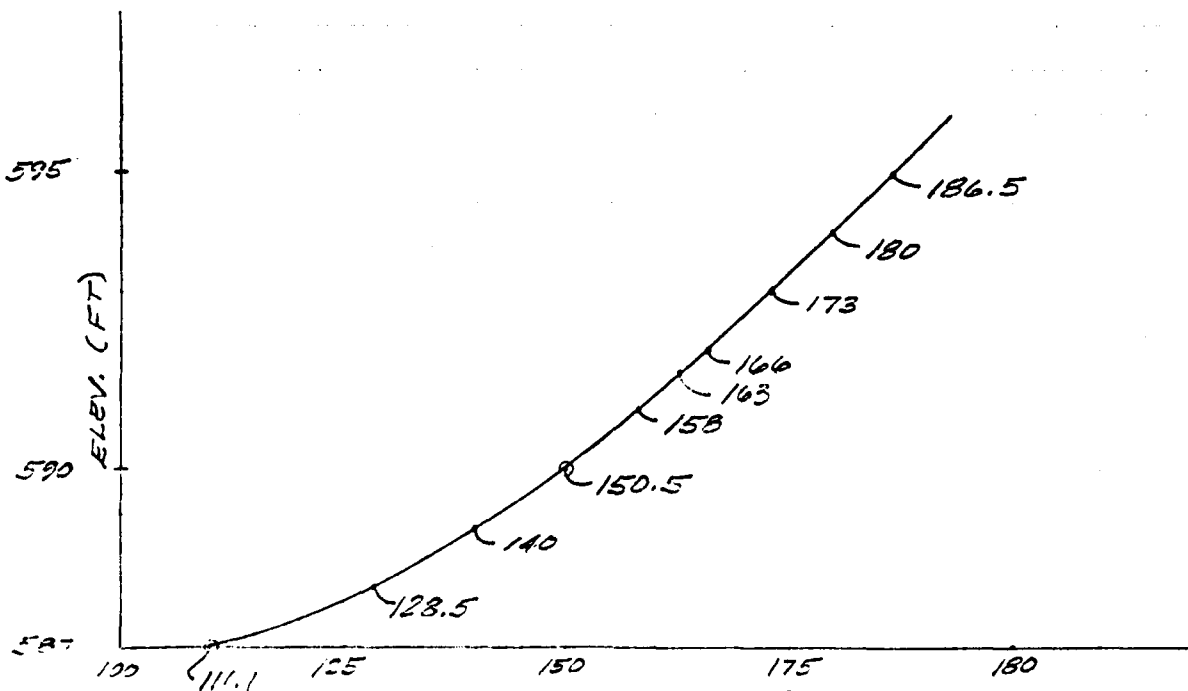CALCULATED BY _MD_ DATE _12/29/80_

CHECKED BY _K.A._ DATE _12/30/80_

SCALE _____

⊙ CALC. POINTS
OFF USGS
QUAD. SHEETS



EDDY PRAY RESERVOIR
SURFACE AREA (AC)



KILLINGLY POND
SURFACE AREA (AC)

**LENARD & DILAJ ENGINEERING, INC.**
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB _ACME POND DAM_
SHEET NO. _3_ OF _15_
CALCULATED BY _MD_ DATE _12/29/80_
CHECKED BY _K.A._ DATE _12/30/80_
SCALE _____

## LAG TIME CALC. (SNYDER'S METHOD)

### KILLINGLY POND:

$L = 10,650$ FT. $= 2.02$ MI.
$L_{CA} = 3,650$ FT. $= 0.69$ MI.
$C_t = 2.0$

$$t_p = C_t (L L_{CA})^{0.3}$$
$$t_p = 2.21 \text{ HRS.}$$

### EDDY PRAY RESERVOIR:

$L = 7,100$ FT. $= 1.34$ MI.
$L_{CA} = 2,900$ FT. $= 0.55$ MI.
$C_t = 2.0$

$$t_p = C_t (L L_{CA})^{0.3}$$
$$t_p = 1.82 \text{ HRS.}$$

### MIDDLE RESERVOIR:

$L = 12,850$ FT. $= 2.43$ MI.
$L_{CA} = 3,900$ FT. $= 0.74$ MI.
$C_t = 2.0$

$$t_p = C_t (L L_{CA})^{0.3}$$
$$t_p = 2.38$$

## DRAINAGE AREAS:

### KILLINGLY POND:

$$\begin{matrix} 5142 & 557 & \\ 4585 & & 558 = 1.27 \text{ S.M.} \\ 5144 & 559 & \end{matrix}$$

$$\begin{matrix} 5120 \cdot & 53 & \\ 5173 & & 52 = 0.12 \text{ S.M.} \\ 5224 & 51 & \end{matrix}$$

$$\text{TOTAL} = \underline{1.39 \text{ S.M.}}$$

**LENARD & DILAJ ENGINEERING, INC.**
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB _ACME POND DAM_

SHEET NO. _4_ OF _15_

CALCULATED BY _MD_ DATE _12/29/80_

CHECKED BY _K. A._ DATE _12/30/80_

SCALE _____

## DRAINAGE AREAS CONT'D

EDDY PRAY RESERVOIR :

$$
\left.\begin{array}{ll}
\begin{array}{l}
5392 \quad 322 \\
5070 \quad 326 \quad 324 \\
5396
\end{array} \\
\\
\begin{array}{l}
5224 \quad 9 \\
5215 \quad 11 \quad 10 \\
5226
\end{array} \\
\\
\begin{array}{l}
5087 \\
5062 \quad 25 \\
5088 \quad 26 \quad 25.5
\end{array}
\end{array}\right\} 359.5 = \underline{0.82\ S.M.}
$$

MIDDLE RESERVOIR :

$$
\left.\begin{array}{l}
6216 \quad 1128 \\
7344 \quad 1120 \quad 1124 \\
8464
\end{array}\right. = \underline{2.57\ S.H.}
$$

**LENARD & DILAJ ENGINEERING, INC.**
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB _Acme Pond Dam_
SHEET NO. _5_ OF _15_
CALCULATED BY _Hoskins_ DATE _Dec 31 85_
CHECKED BY _K.A._ DATE _1/2/8?_

## DISCHARGE – EDDY PKWY RES.   SCALE _____

| ELEV. | C | L | $\Delta L$ | $h_n$ | $h_n^{1.5}$ | $\Sigma h_n^{1.5}$ | $Q = C \alpha L \Sigma h_n^{1.5}$ |
|---|---|---|---|---|---|---|---|
| 574.0 | 2.6 | 1315' | 1040 | 0.16 | 0.064 | | 173.06 |
| | | | 90 | 0.20 | 0.089 | | 20.83 |
| | | | 85 | 0.26 | 0.132 | | 29.4 |
| | | | 100 | 0.15 | 0.053 | | 15.1 |
| | | | | | | | $\Sigma Q = 238.4$ |
| 574.5 | 2.6 | 1525' | 1040 | 0.64 | 0.536 | | 1449.3 |
| | | | 90 | 0.70 | 0.586 | | 157.1 |
| | | | 85 | 0.76 | 0.663 | | 146.5 |
| | | | 100 | 0.65 | 0.524 | | 136.2 |
| | | | 210 | 0.50 | 0.354 | | 193.0 |
| | | | | | | | $\Sigma Q = 2062.1$ |
| 575.5 | 2.6 | 1550 | 1050 | 1.66 | 2.14 | | 5342.2 |
| | | | 90 | 1.70 | 2.22 | | 519.5 |
| | | | 85 | 1.76 | 2.33 | | 514.9 |
| | | | 100 | 1.65 | 2.12 | | 551.2 |
| | | | 215 | 1.50 | 1.84 | | 1028.6 |
| | | | | | | | $\Sigma Q = 8456.4$ |

KILLINGLY POND - DISCHARGE   SCALE _____

| ELEV. | C | L | ΔL | $h_n$ | $h_n^{1.5}$ | $\Sigma h_n^{1.5}$ | $\Delta Q = C_d L \Sigma h_n^{1.5}$ |
|---|---|---|---|---|---|---|---|
| 590 (DAM) | 3.5 | 230 | 73 | 0.3 | 0.164 | | 5.1 |
| | | | 88 | 0.8 | 0.716 | | 12.15 |
| | | | 28 | 0.9 | 0.854 | | 59.8 |
| | | | 41 | 0.3 | 0.164 | | 16.8 |
| | | | | | | | ΣQ = 76110.0 |
| 590 (DIKE) | 2.5 | 395 | 40 | 0.4 | 0.752 | | 73.2 |
| | | | 111 | 3.6 | 0.465 | | 171.0 |
| | | | 131 | 0.4 | 0.252 | | 92.5 |
| | | | 113 | 0.2 | 0.089 | | 75.1 |
| | | | | | | | ΣQ = 761.8 |
| 591.6 (DAM) | 2.5 | 210 | 7 | 0.7 | 0.586 | | 10.2 |
| | | | 57 | 1.9 | 2.415 | | 344.1 |
| | | | 78 | 2.4 | 3.718 | | 260.2 |
| | | | 88 | 2.5 | 3.952 | | 861.7 |
| | | | 13 | 2.0 | 2.838 | | 517.9 |
| | | | 21 | 1.4 | 1.657 | | 129.4 |
| | | | 6 | .6 | 0.465 | | 8.0 |
| | | | | | | | ΣQ = 2138.7 |
| 591.6 (DIKE) | 2.5 | 432 | 121 | 1.2 | 1.315 | | 397.9 |
| | | | 111 | 2.2 | 3.263 | | 905.5 |
| | | | 132 | 2.0 | 2.978 | | 933.2 |
| | | | 113 | 1.9 | 2.6115 | | 697.2 |
| | | | 8 | 0.7 | 0.585 | | 11.7 |
| | | | | | | | ΣQ = 2934.4 |

LENARD & DILAJ ENGINEERING, INC.
1066 Storrs Road
STORRS, CONNECTICUT 06268
(203) 429-7308

JOB _ACME POND DAM_
SHEET NO. _7_ OF _15_
CALCULATED BY _C_ DATE _1-5-9_
CHECKED BY _K.A._ DATE _1/6/81_
SCALE _____

## KILLINGLY POND - DISCHARGE

| ELEV. | C | L | ΔL | $h_n$ | $h_n^{1.5}$ | $\Sigma h_n^{1.5}$ | $Q = C_d L \Sigma h_n^{1.5}$ |
|---|---|---|---|---|---|---|---|
| 514 | 1.5 | 313 | 19 | 70 | 7.879 | | 135.7 |
| | | | 57 | 4.2 | 8.537 | | 1275.5 |
| | | | 73 | 4.9 | 2.172 | | 765.6 |
| | | | 89 | 4.9 | 10.847 | | 2491.5 |
| | | | 73 | 4.4 | 9.230 | | 1751.8 |
| | | | 30 | 3.7 | 1.117 | | 557.1 |
| | | | 13 | 1.8 | 2.115 | | (13.) |
| | | | | | | | $\Sigma Q = 7082.5$ |
| 594 (DIKE) | 1.6 | 5.5 | 16 | 1.4 | 7.319 | | 68.9 |
| | | | 17 | 3.6 | 6.831 | | 2444.3 |
| | | | 110 | 4.5 | 2.546 | | 2730.2 |
| | | | 134 | 4.3 | 8.17 | | 3050.3 |
| | | | 112 | 4.1 | 8.302 | | 2417.5 |
| | | | 23 | 70 | 7.878 | | 16.1 |
| | | | | | | | $\Sigma Q = 10512.8$ |

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(203) 429-7308

JOB _ACME POND DAM_
SHEET NO. _8_ OF _15_
CALCULATED BY _GP_ DATE _1-5-81_
CHECKED BY _K. A._ DATE _1/6/81_
SCALE _____

## KILLINGLY POND · DISCHARGE

| INV. | ELEV. | HW | HW/D | Q/PIPE | Q |
|------|-------|-----|------|--------|------|
| 2-12" | | | | | |
| 586.7 | 587 | 0.3 | 0.2 | 1.2 | 2.4 |
| | 588 | 1.3 | 0.9 | 5.8 | 11.6 |
| | 589 | 2.3 | 1.7 | 12.5 | 25.0 |
| | | | | | |
| 3-18" | | | | | |
| 587.0 | 587 | 0 | 0 | 0 | 0 |
| | 588 | 1.0 | .7 | 3.8 | 11.4 |
| | 589 | 2.0 | 1.3 | 9.5 | 28.5 |
| | | | | | |
| 1-30" | | | | | |
| 571.1 | 587 | 15.9 | 6.4 | 110 | 110 |
| | 588 | 16.9 | 6.8 | 115 | 115 |
| | 589 | 17.9 | 7.2 | 120 | 120 |

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JOB _ACME POND DAM_
SHEET NO. _9_ OF _15_
CALCULATED BY _K. A._ DATE _12/29/80_
CHECKED BY _M. D._ DATE _12/29/80_
SCALE _____

_STORAGE_

## _BULL PEN_

| Elev. | AREA | Aave. | ΔH | ΔS | S total (AC. FT.) |
|-------|------|-------|-----|-----|---------|
| 569 | 27.8 | | | | 0 |
| | | 50.9 | 4.5 | 229 | |
| 573.5 | 74.0 | | | | 229 |
| | | 75.3 | 0.5 | 37.7 | |
| 574.0 | 76.5 | | | | 266 |
| | | 77.8 | 0.5 | 38.9 | |
| 574.5 | 79.0 | | | | 305 |
| | | 81.5 | 1.0 | 81.5 | |
| 575.5 | 84.0 | | | | 387 |

## _KILLINGLY POND_

| Elev. | Area | Aave. | ΔH | ΔS | S total (AC. FT.) |
|-------|------|-------|-----|-----|---------|
| 587 | 111.1 | | | | 0 |
| | | 125.6 | 2 | 251.2 | |
| 589 | 140 | | | | 251 |
| | | 145.3 | 1 | 145.3 | |
| 590 | 150.5 | | | | 396 |
| | | 156.8 | 1.6 | 250.9 | |
| 591.6 | 163 | | | | 647 |
| | | 171.5 | 2.4 | 411.6 | |
| 594.0 | 180 | | | | 1059 |

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**(203) 429-7308**

JOB _____ Storrs—Acme Pond

SHEET NO. _____ 10 _____ OF _____ 15

CALCULATED BY _____ MR _____ DATE _____ 11/20/80

CHECKED BY _____ MD _____ DATE _____ 11/25/80

SCALE _____

STORAGE ABOVE SPILLWAY FOR MIDDLE RESERVOIR

WATER SURFACE AREA @ EL 550

READINGS 6826   87

6913   85.5    AVE 86 × 63,654 ÷ 43560

DEUC 7084     = 125.7 AC.

AREA @ EL. 565

READINGS 7084   140

7224   139    AVE 139.3 × 63,654 ÷ 43560

DEUC 7502     = 203.6 AC.

AREA @ EL 570

READINGS 7502   198

7700   197    AVE 197.3 × 63,654 ÷ 43560

8084     = 283.3 AC.

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JOB _CORES — ACME ___

SHEET NO. _11_ OF _15_

CALCULATED BY _MD_ DATE _11/20/80_

CHECKED BY _MD_ DATE _11/25/80_

SCALE _____
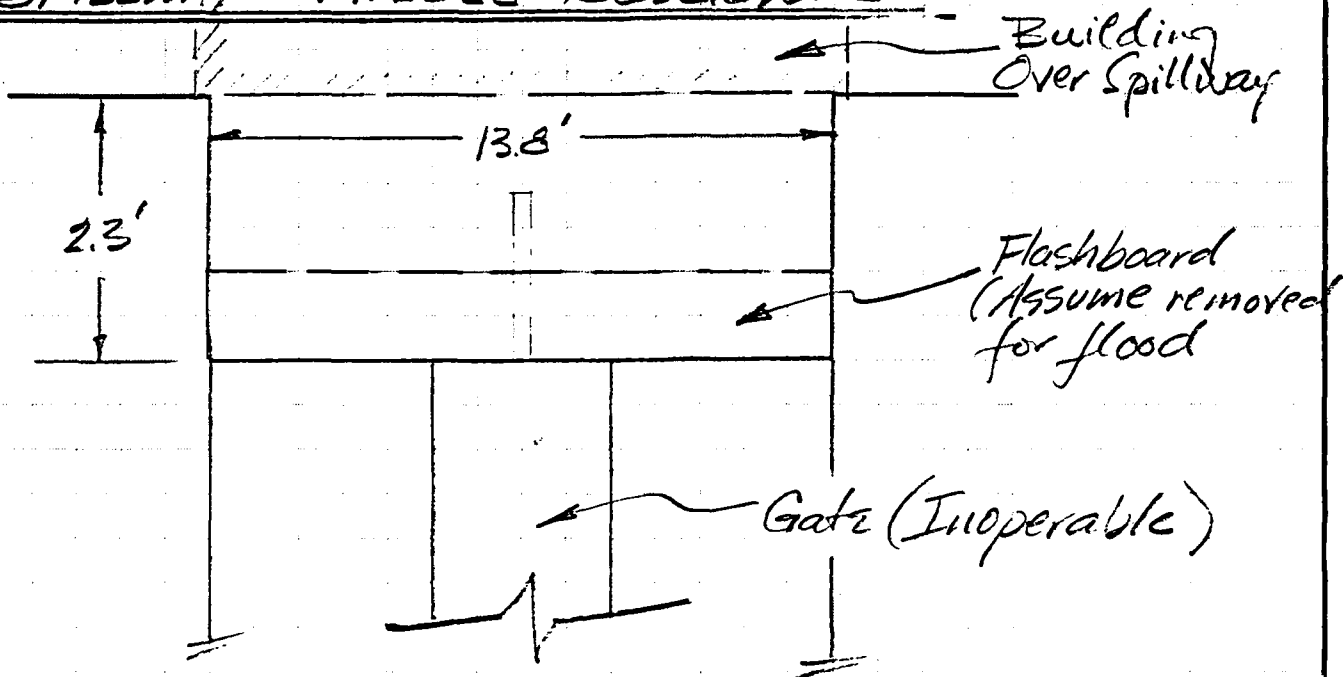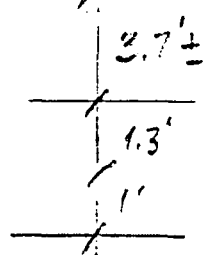
⊙ CALC. POINTS
OFF USGS QUAD.
SHEETS.

- 288.3
- 281
- 275
- 269
- 262
- 255
- 246
- 237
- 227
- 216
- 203.6
- 185
- 170
- 150
- 125.7

**ELEVATION / FEET**

570, 569, 568, 567, 566, 565, 564, 563
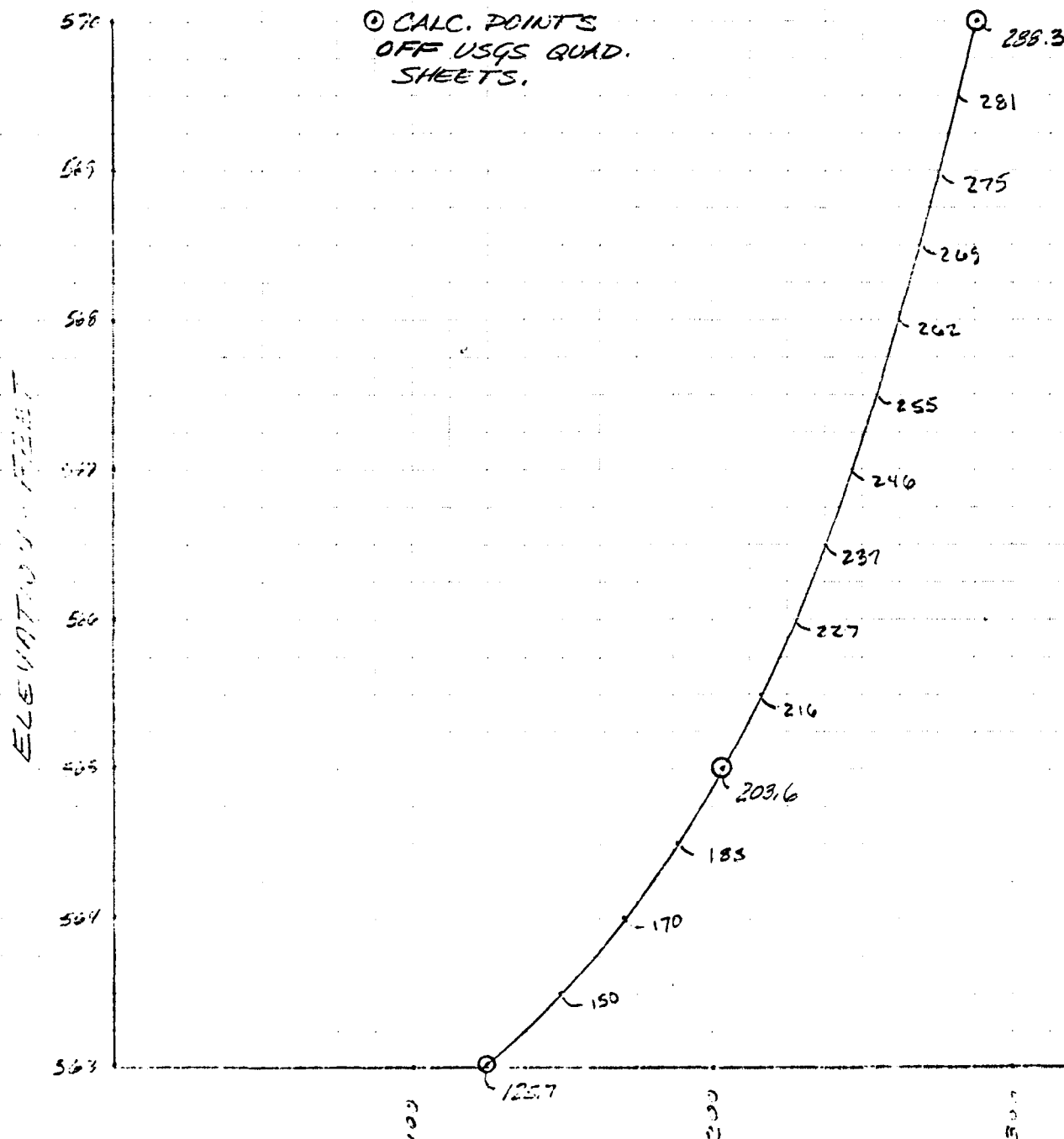
**MIDDLE RESER. DAM**
**SURFACE AREA — ACRES**

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JOB _ACME POND DAM_
SHEET NO. _12_ OF _15_
CALCULATED BY _KA_ DATE _11-20-80_
CHECKED BY _MD_ DATE _11-25-80_
SCALE _____

## SPILLWAY - MIDDLE RESERVOIR

← Building Over Spillway

13.8'

2.3'

Flashboard (Assume removed for flood

Gate (Inoperable)

Road

2.7'±

1.3'

1'

El. 568'

$$Q = A(2gH/K)^{1/2}$$

$$K = 1.6$$

El. 563'

El. 562'

Broad Crested Weir (2' Width)

Length of run = L = Total - Spillway
= 1000± - 14
L = 986'

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JOB _ACME POND DAM_
SHEET NO. _13_ OF _15_
CALCULATED BY _KA_ DATE _11-20-80_
CHECKED BY _MD_ DATE _11-25-80_
SCALE ___

## SPILLWAY — ACME POND DAM



El. 558.2'

16'

3.2'

El. 555.0'

— Broad Crested Weir
(5' Width)
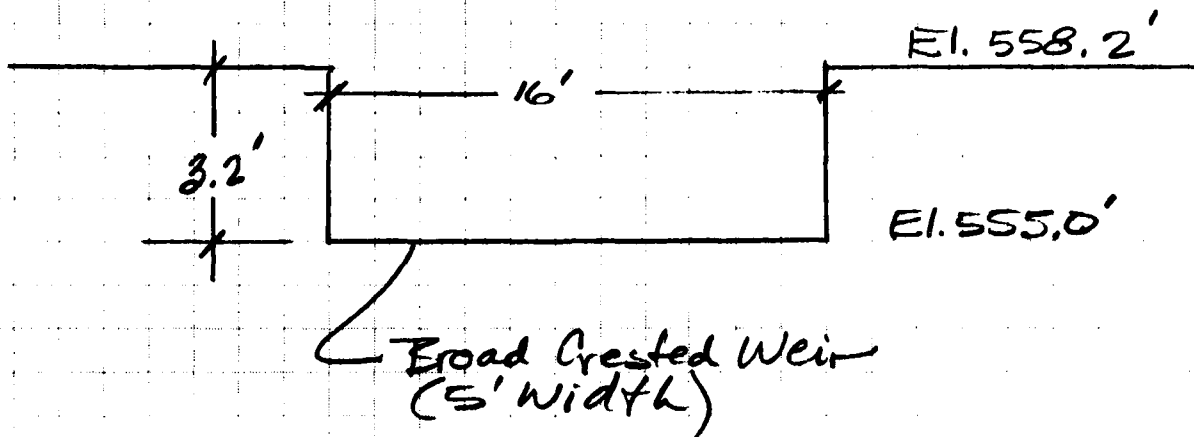
### MIDDLE RESERVOIR — SPILLWAY CAPACITY *

| Elev. | C | L | H | $Q = CLH^{1.5}$ (c/s) |
|---|---|---|---|---|
| 562 | 2.5 | 13.8 | 0 | 0 |
| 563 | 2.66 | " | 1 | 36.7 |
| 564 | 2.85 | " | 2 | 111.2 |
| 564.3 | 2.9 | " | 2.3 | 139.6 |

| Elev. | K | A | H | $Q = A(2gH/K)^{1/2}$ |
|---|---|---|---|---|
| 566 | 1.6 | 31.7 | 1.7 | 262.2 |
| 568 | 1.6 | " | 3.7 | 386.9 |
| 570 | 1.6 | " | 5.7 | 480.2 |

**\* ASSUME GATE IS CLOSED.**

### ACME POND — SPILLWAY CAPACITY

| Elev. | C | L | H | $Q = CLH^{1.5}$ (c/s) |
|---|---|---|---|---|
| 555.0 | 2.34 | 16' | 0 | 0 |
| 556.0 | 2.68 | " | 1 | 42.9 |
| 557.0 | 2.65 | " | 2 | 119.9 |
| 558.0 | 2.66 | " | 3 | 221.2 |
| 558.2 | 2.67 | " | 3.2 | 244.5 |
| 560.0 | 2.79 | " | 5 | 499.1 |
| 562.0 | 3.0 | " | 7 | 889.0 |
| ½ PMF 559.1 | 3.0 | 16 | 4.1 | 398.5 |

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JOB _ACME POND DAM_

SHEET NO. _14_ OF _15_

CALCULATED BY _K.A._ DATE _11/12/80_

CHECKED BY _MD_ DATE _11/25/80_

SCALE _____

## PMP 6-HOUR PRECIPITATION

### 24.4 INCHES

FROM WEATHER BUREAU
TECH. PAPER NO. 40

## ACME POND — WATERSHED AREA

$$168 \text{ grads} \atop 170 \text{ grads} \Bigg\} \Rightarrow 0.386 \text{ S.M.}$$

$$\underline{0.39 \text{ S.M.}}$$

## ACME POND — LAG TIME (SNYDER'S)

$$L = 6300 \text{ ft.} = 1.19 \text{ MI.}$$

$$L_{CA} = 2600 \text{ ft.} = 0.49 \text{ MI.}$$

$$C_t = 2.0$$

$$t_p = C_t (L L_{CA})^{0.3}$$

$$= 2.0 (1.19 \times 0.49)^{0.3}$$

$$\underline{t_p = 1.70 \text{ HRS.}}$$

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JOB _ACME POND DAM_
SHEET NO. _15_ OF _15_
CALCULATED BY _K. A._ DATE _11-24-80_
CHECKED BY _M. D._ DATE _11-25-80_
SCALE _____

ACME POND
SURFACE AREA

Elevation (Ft.) vs Area (Ac.)

Data points: 12.0, 9.6, 8.3, 6.6, 5.5, 5.2, 4.6, 4.3, 3.6, 3.2
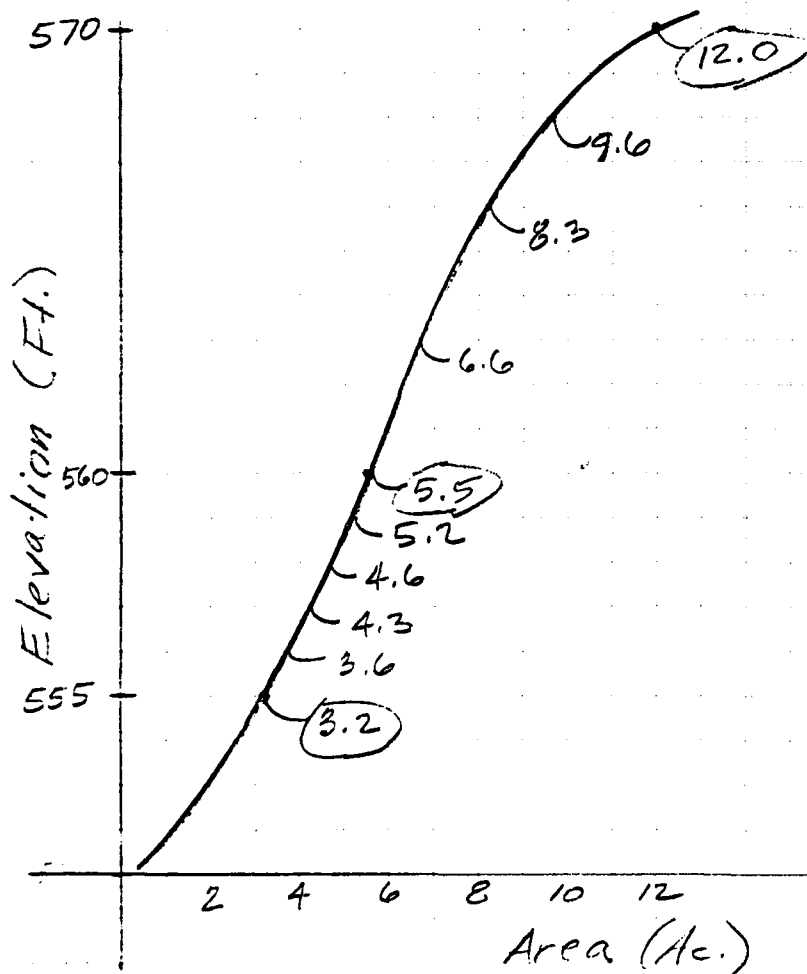
ACME POND DAM: Length = Total – Spillway
$$L = 570 - 16$$
$$L = 554'$$

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JOB _Acme Pond Dam_

SHEET NO. _1_ OF _9_

CALCULATED BY _MLh_ DATE _1/6/81_

CHECKED BY _M.D._ DATE _1/7/81_

SCALE _____

## ACME POND DAM — DAM BREACH

$S$ = STORAGE AT TIME OF FAILURE

= 23 ac. ft.

$Q_p$ = PEAK FAILURE OUTFLOW

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

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

= (0.40)(500) = 200'

$Y_o$ = TOTAL HEIGHT FROM RIVER BED TO POOL
LEVEL AT TIME OF FAILURE

= 10.0 ft.

$Q_p$ = $\frac{8}{27}$ (200)($\sqrt{32.2}$)(10.0)$^{3/2}$

= 10,400 c.f.s.
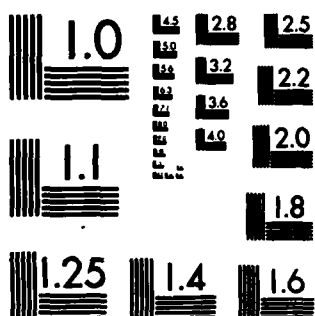
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

**LENARD & DILAJ ENGINEERING, INC.**
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STORRS, CONNECTICUT 06268
(203) 429-7308
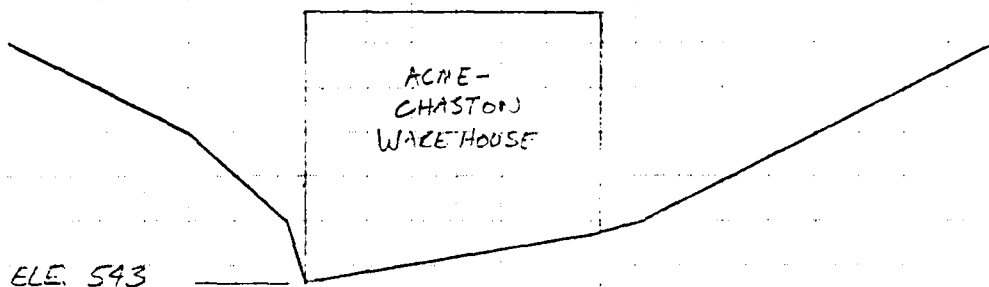
JOB _ACME POND X-SECTIONS_
SHEET NO. _2_ OF _9_
CALCULATED BY _M.H._ DATE _12-31-90_
CHECKED BY _M.Z_ DATE _1/7/31_
SCALE _____

SECTION #1

HOR: 1" = 200'
VERT: 1" = 20'



ACME-
CHASTON
WAREHOUSE

ELE. 543

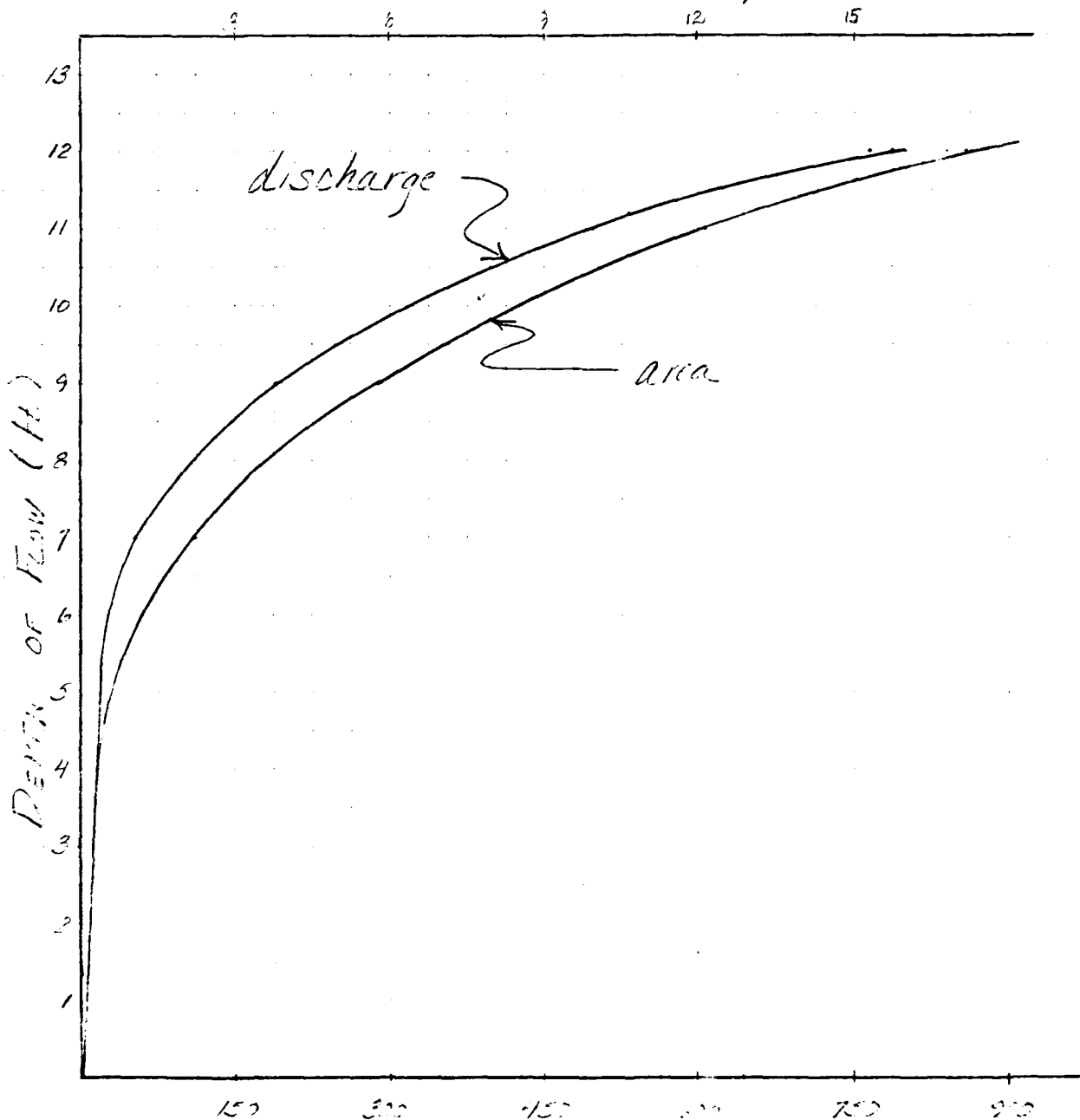| H | A | WP | R | V | Q |
|----|------|-----|-----|-------|---------|
| 7 | 108 | 78 | 1.4 | 10.35 | 1118 |
| 9 | 290 | 142 | 2.0 | 13.13 | 3808 |
| 11 | 605 | 213 | 2.8 | 16.43 | 9940 — |
| 12 | 858 | 263 | 3.3 | 18.34 | 15,736 — |
| 13 | 1160 | 340 | 3.4 | 18.71 | 21,704 |

n = 0.053
S = 0.017
L = 45'

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JOB _ACME PND DAM_

SHEET NO. _3_ OF _9_

CALCULATED BY _MH_ DATE _1/4/91_

CHECKED BY _ML_ DATE _1/2/91_

SCALE _____

ACME POND DAM - SECTION 1

DISCHARGE (1000 cfs)

discharge

area

DEPTH OF FLOW (ft.)

AREA (Sq. ft.)

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JOB _Acme Pond Dam_

SHEET NO ___4___ OF ___9___

CALCULATED BY ___Mch___ DATE _1/6/91_

CHECKED BY ___M.C.___ DATE _1/7/91_

SCALE _____

## FLOOD ROUTING SECTION 1

$n_1$ = MANNING COEFFICIENT = 0.050

$S$ = STORAGE AT TIME OF FAILURE = 23 ac.ft

$L_1$ = LENTH OF REACH = 65 ft

$Q_{P1}$ = INFLOW INTO REACH = 10,600 cfs

$H_1$ = DEPTH OF FLOW = 11.2 ft.

$A_1$ = CROSS SECTIONAL AREA = 445 sq.ft

$V_1$ = STORAGE IN REACH = .96 ac.ft.

$Q_{P2}$ (TRIAL) = TRIAL REACH OUTFLOW = 10,160 c/s

$H_1$ (TRIAL) = TRIAL DEPTH OF FLOW = 1.5 ft

$A_1$ (TRIAL) = TRIAL CROSS SECTIONAL AREA = 410

$V_1$ (TRIAL) = TRIAL STORAGE IN REACH = .9 ac

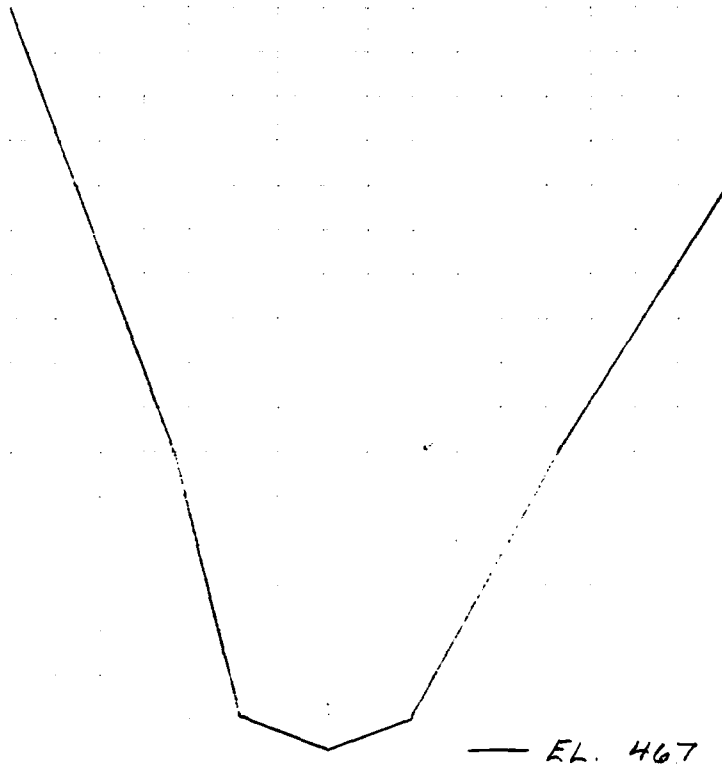$Q_{P2}$ = REACH OUTFLOW = 10,5 cfs

$H_2$ = DEPTH OF FLOW = 11.1 ft

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JOB _ACME POND    X-SECTION_
SHEET NO. _5_ OF _9_
CALCULATED BY _GB_ DATE _1-5-81_
CHECKED BY _MR_ DATE _/-  81_
SCALE _____

SECTION # 2 - ACME POND



HOR. 1" = 200'
VERT 1" = 20'

— EL. 467

| h | A | WP | R | V | Q |
|---|---|----|---|---|---|
| 3 | 270 | 180 | 1.5 | 13.53 | 3653 |
| - | 450 | 170 | 2.4 | 18.51 | 8515 |
| 5 | 672 | 200 | 3.4 | 23.35 | 15,671 |
| 6 | 732 | 210 | 3.7 | 24.71 | 17,323 |
| 7 | 1072 | 220 | 4.9 | 21.90 | 32,542 |

n = 0.030
S = 0.01
n = 15

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JOB _Acme Pond Dam_

SHEET NO. _6_ OF _9_

CALCULATED BY _MH_ DATE _1/6/31_

CHECKED BY _M.Z_ DATE _1/7/31_

SCALE _____

Acme Pond Dam - Section 2
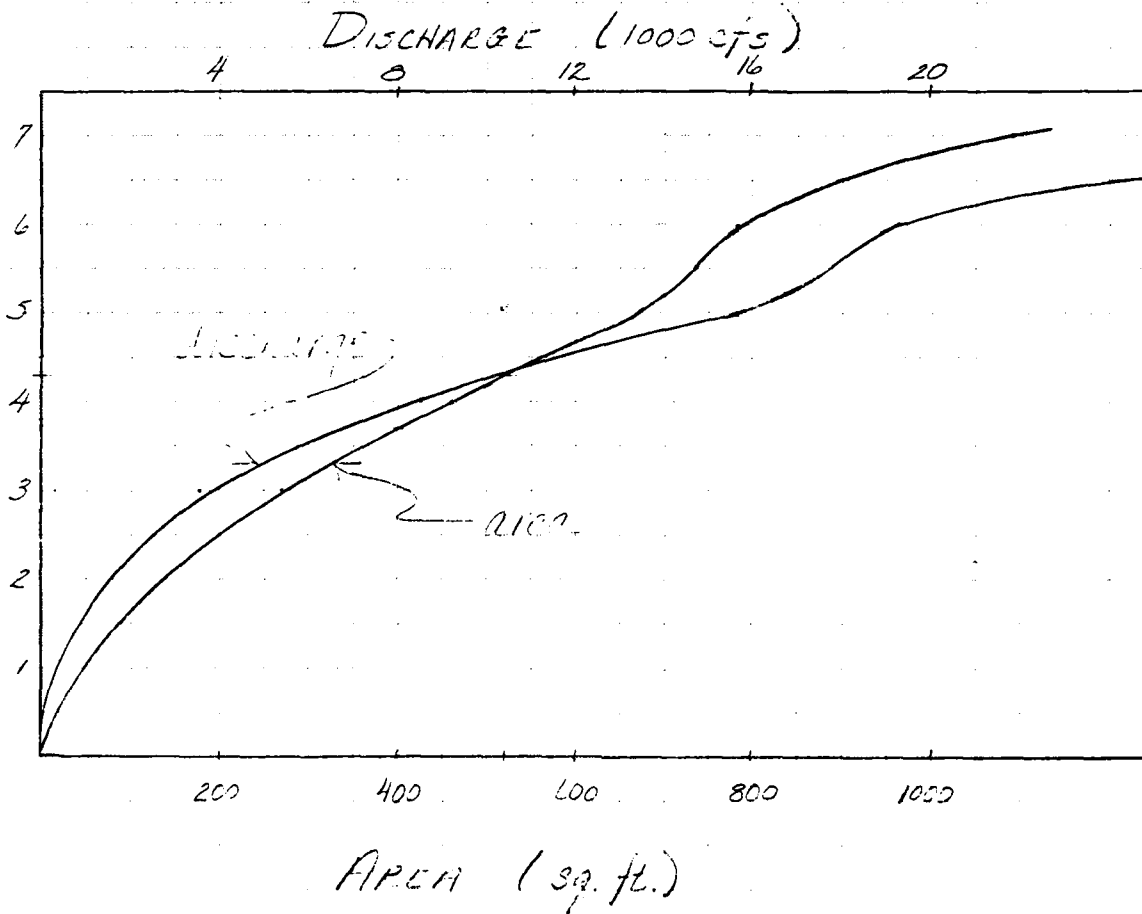


DISCHARGE (1000 cfs)

AREA (sq. ft.)

**LENARD & DILAJ ENGINEERING, INC.**
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(203) 429-7308

JOB _____

SHEET NO _____ 7 _____ OF _____ 9 _____

CALCULATED BY _____ MCL _____ DATE _____ 1/4/81 _____

CHECKED BY _____ MD _____ DATE _____ 1/2/91 _____

SCALE _____

# FLOOD ROUTING SECTION 2

$n_2$ = MANNING COEFFICIENT = $\quad$

$S$ = STORAGE AT TIME OF FAILURE = 23 ac.ft.

$L_2$ = LENTH OF REACH = 600 ft.

$Q_{P2}$ = INFLOW INTO REACH = 10,200 cfs

$H_2$ = DEPTH OF FLOW = 4.3 ft.

$A_2$ = CROSS SECTIONAL AREA = 520 sq.ft.

$V_2$ = STORAGE IN REACH = 7.8 ac.ft.


$Q_{P3}$ (TRIAL) = TRIAL REACH OUTFLOW = 6,800 cfs.

$H_7$ (TRIAL) = TRIAL DEPTH OF FLOW = 3.7 ft.

$A_2$ (TRIAL) = TRIAL CROSS SECTIONAL AREA = 400 sq.ft

$V_2$ (TRIAL) = TRIAL STORAGE IN REACH = 6.0 ac.ft.


$Q_{P3}$ = REACH OUTFLOW = 7,100 cfs

$H_3$ = DEPTH OF FLOW = 3.8 ft.

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JOB _Acme Pond Dam_

SHEET NO. _8_ OF _9_

CALCULATED BY _McH_ DATE _1/6/81_

CHECKED BY _mL_ DATE _1/7/81_

SCALE _____

_Acme Pond Dam - Section 3_



Hor. 1" = 100'
Vert. 1" = 10'

| H | A | WP | R | V | Q |
|---|------|-----|------|-----|-------|
| 1 | 310  | 220 | .75  | 3.4 | 725   |
| 2 | 440  | 240 | 1.83 | 5.3 | 2352  |
| 3 | 670  | 260 | 2.65 | 6.8 | 4726  |
| 4 | 960  | 280 | 3.43 | 8.1 | 7687  |
| 5 | 1250 | 301 | 4.15 | 9.2 | 11556 |



_Discharge_ (1000 cfs)

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(203) 429-7308

JOB _Ent Pond Dam_
SHEET NO _9_ OF _9_
CALCULATED BY _Meh_ DATE _1/6/81_
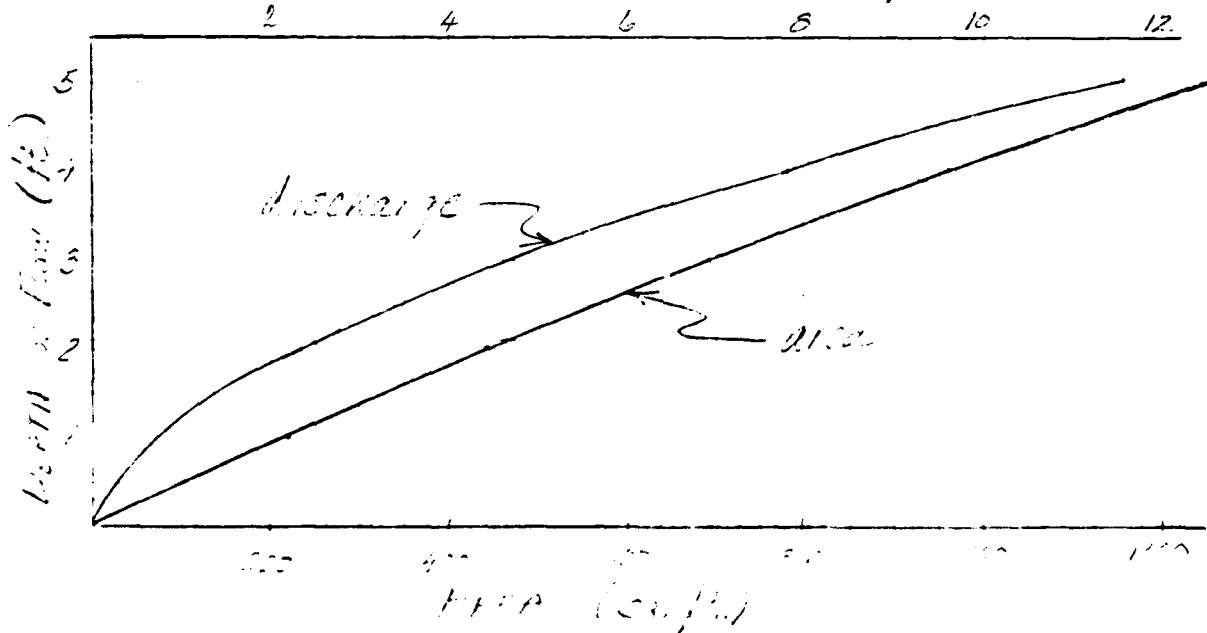CHECKED BY _me_ DATE _1/7/81_
SCALE _____

# FLOOD ROUTING SECTION 3

$n_3$ = MANNING COEFFICIENT = 0.050

S = STORAGE AT TIME OF FAILURE = 23 ac.ft.

$L_3$ = LENGTH OF REACH = 700 ft

$Q_{P_3}$ = INFLOW INTO REACH = 7160 cfs

$H_3$ = DEPTH OF FLOW = 3.9 ft

$P_3$ = CROSS SECTIONAL AREA = 920 sq ft

$V_3$ = STORAGE IN REACH = 14.3 ac ft

$Q_{P4}$ (TRIAL) - TRIAL REACH OUTFLOW = 2560 cfs

$H_3$ (TRIAL) - TRIAL DEPTH OF FLOW = 2.1

$P_3$ (TRIAL) - TRIAL CROSS SECTIONAL AREA = 465 sq ft

$V_3$ (TRIAL) - TRIAL STORAGE IN REACH = 7.5 ac ft.

$Q_{P4}$ REACH OUTFLOW = 5700

$H_4$ DEPTH OF FLOW = 3.6

LIMIT OF IMPACT AREA

ACME POND

LENARD-DILAJ ENGINEERING, INC.
STORRS, CONNECTICUT
ENGINEER

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

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

POTENTIAL FLOOD AREA

ACME POND

KILLINGLY, CONN

| DRAWN BY | CHECKED BY | APPROVED BY | SCALE: 1"=2000' |
| Mch | KA | JL | DATE: 1/81 | SHEET |

# APPENDIX E

INFORMATION AS CONTAINED IN THE

NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

FILMED

9-84

DTIC