

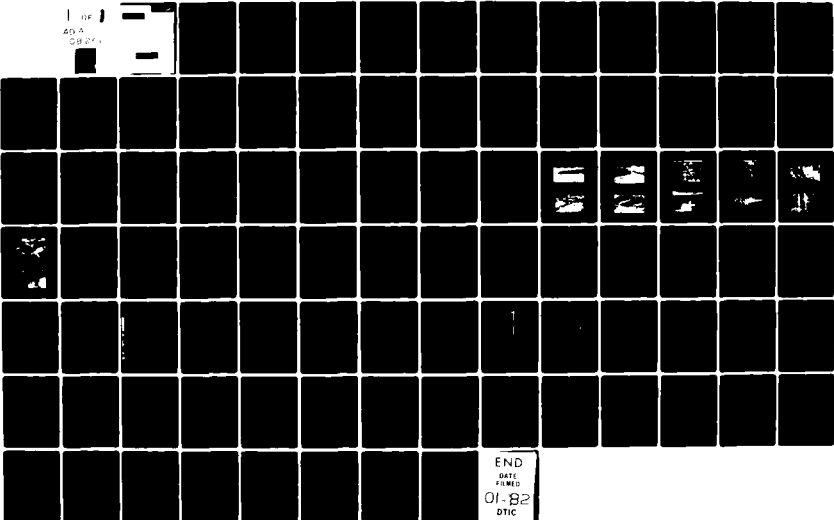
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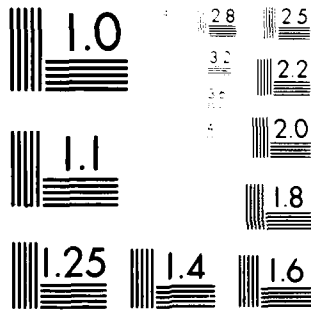
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NATIONAL PROGRAM OF INSPECTION OF NON-FEDERAL DAMS, TENNESSEE, --ETC(U)
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		6. PERFORMING ORG. REPORT NUMBER
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Dams Dam Safety National Dam Safety Program Marys Creek Dam No. 9, TN Cross Roads, TN	Shelby County, TN Embankments Visual Inspection Structural Analysis	
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)		
The dam is a linear earthen structure 678 feet long and 23.7 feet high with a crest width of 10 feet. The upstream and downstream slopes are 1V:3.1H and 1V:3.0H respectively. The structure impounds a 10.5 acre lake at normal pool with 42 acre-feet of storage. At the top of the dam the pool area increases to 18 acres with an impoundage of 148 acre-feet. The drainage area is predominantly farmland, pasture, and woods. It has an average ground slope of approximately 5.7%. The embankment is well grassed and virtually free of undesirable vegetation. It has a relatively uniform cross-section with well		

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defined boundaries. Only minor erosion was observed on the embankment, along the upstream slope at the water surface and along the cattle trail traversing the dam. No rilling or significant loss of cover accompanies the condition. The embankment exhibits no signs of seepage or instability; no surface cracks, heaving, or localized slope failures. The principal spillway consists of a reinforced concrete riser and a 30 inch reinforced concrete pressure pipe. The riser appears in excellent condition with no noticeable weathering or spalling. The pipe outlet would indicate a similar condition for the conduit. The emergency spillway is an uncontrolled saddle type with a trapezoidal cross-section, located at the right end of the dam. It is well grassed with a uniform cross-section. No significant erosion was observed in the channel. OCE guidelines recommend that small, high hazard dams safely pass the one-half Probable Maximum Flood (1/2 PMF) to full PMF. Hydraulic and hydrologic analyses reveal that the PMF overtops the dam by a maximum of 2.0 feet for 3.5 hours. The 1/2 PMF overtops the dam by a maximum of 0.2 feet for 1.7 hours. The dam is given a condition classification of "deficient" due to marginal spillway inadequacy and minor erosion. It is recommended that cattle grazing on the dam be controlled to prevent excessive erosion and that a system be devised to warn downstream residents in the event a major problem develops with the structure.

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DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1070
NASHVILLE, TENNESSEE 37202

21 SEP 1981

IN REPLY REFER TO

ORND-G

Honorable Lamar Alexander
Governor of Tennessee
Nashville, TN 37219

Dear Governor Alexander:

Furnished herewith is the Phase I Investigation Report on Marys Creek Watershed Dam No. 9 near Crossroads, Tennessee. The report was prepared under the authority and provisions of PL 92-367, the National Dam Inspection Act, dated 8 August 1972.

The report presents details of the field inspection, background information, technical analyses, findings, and recommendations for improving the condition of the dam.

Based upon the inspection and subsequent evaluation, Marys Creek Watershed Dam No. 9 is classified as deficient due to insufficient storage and spillway capacity to pass the one-half probable maximum flood.

We do not consider this an emergency situation at this time, but the recommendation concerning project modifications to allow safe passage of the design flood and others contained in this report should be undertaken in the near future.

Public release of the report and initiation of public statements fall within your prerogative. However, under provisions of the Freedom of Information Act, the Corps of Engineers is required to respond fully to inquiries on information contained in the report and to make it accessible for review on request.

Your assistance in keeping me informed of any further developments will be appreciated.

Sincerely,

Kenneth W. Ashley, LTC
FOR LEE W. TUCKER
Colonel, Corps of Engineers
Commander

1 Incl
As stated

CF:
Mr. Robert A. Hunt, Director
Division of Water Resources
4721 Trousdale Drive
Nashville, TN 37220

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
TENNESSEE

Name of Dam Mary's Creek Watershed Dam No. 9
County Shelby
Stream Unnamed Tributary of Mary's Creek
Date of Inspection March 11, 1981

This investigation and evaluation was prepared by the
Tennessee Department of Conservation, Division of Water
Resources.

PREPARED BY:

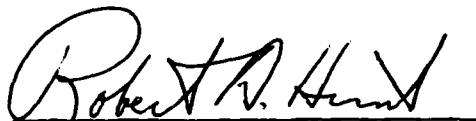


William Culbert, Jr.
Water Resources Engineer

APPROVED BY:



Edmond O'Neill
Chief Engineer
Safe Dams Section



Robert A. Hunt, P.E.
Director
Division of Water Resources
Tennessee Department of Conservation

PREFACE

This report is prepared under guidance contained in the Department of the Army, Office of the Chief of Engineers, Recommended Guidelines for Safety Inspection of Dams, for a Phase I investigation. The purpose of the Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In the review of 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. Additional data or data furnished containing incorrect information could alter the findings of this report. 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 structures and may obscure certain conditions which might be detectable if inspected under the normal operating environment of the structure.

The analyses and recommendations included in this report are related to the hazard classification of the structure at the time of the report. Changes in conditions downstream of the dam may change the hazard classification of the structure. A change in hazard classification may in turn change the design flood on which the hydraulic and hydrologic analyses are based and may have a significant impact on the assessment of the safety 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 conditions of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspections can there be any chance that unsafe conditions will be detected.

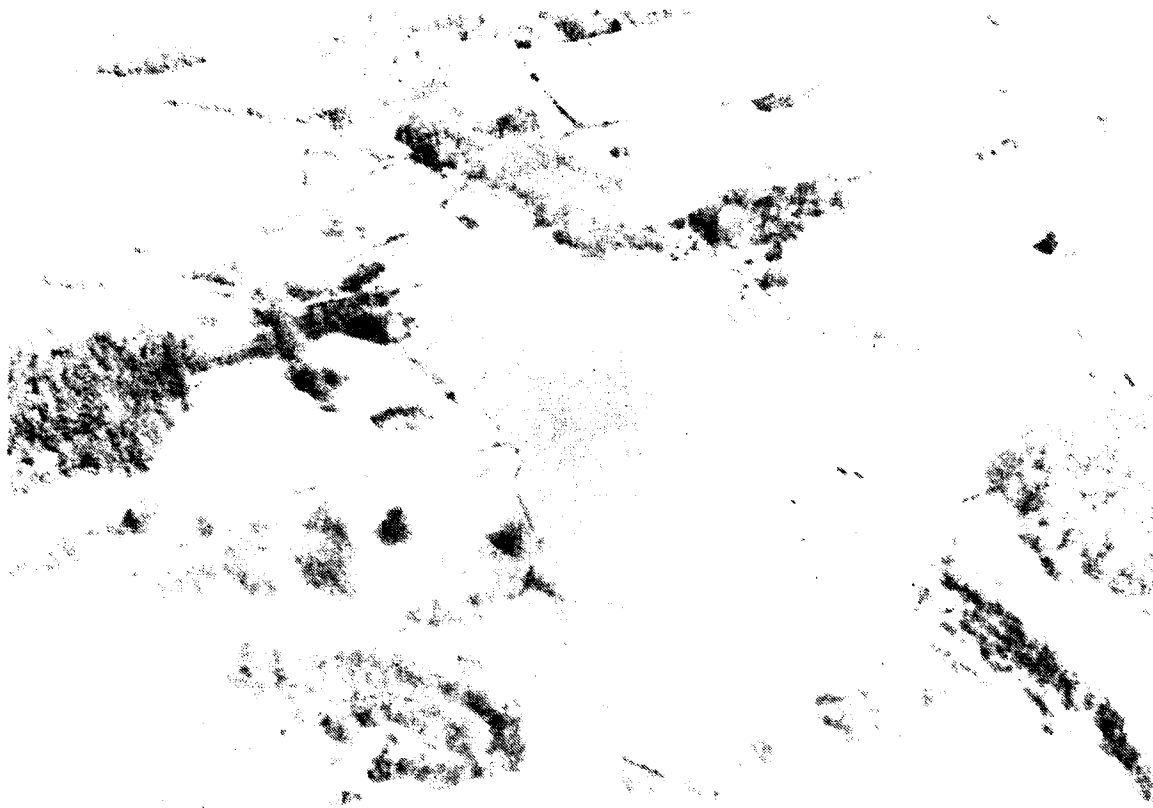
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- F HYDRAULIC AND HYDROLOGIC DATA
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Mary's Creek Watershed Dam No. 9
Shelby County
March 27, 1981

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
TENNESSEE

Name of Dam Mary's Creek Watershed Dam No. 9
County Shelby
Stream Unnamed Tributary of Mary's Creek
Date of Inspection March 11, 1981

ABSTRACT

The dam is a linear earthen structure 678 feet long and 23.7 feet high with a crest width of 10 feet. The upstream and downstream slopes are 1V:3.1H and 1V:3.0H respectively. The structure impounds a 10.5 acre lake at normal pool with 42 acre-feet of storage. At the top of the dam the pool area increases to 18 acres with an impoundage of 148 acre-feet. The drainage area is predominantly farmland, pasture, and woods. It has an average ground slope of approximately 5.7%.

The embankment is well grassed and virtually free of undesirable vegetation. It has a relatively uniform cross-section with well defined boundaries. Only minor erosion was observed on the embankment, along the upstream slope at the water surface and along the cattle trail traversing the dam. No rilling or significant loss of cover accompanies the condition.

The embankment exhibits no signs of seepage or instability; no surface cracks, heaving, or localized slope failures.

The principal spillway consists of a reinforced concrete riser and a 30 inch reinforced concrete pressure pipe. The riser appears in excellent condition with no noticeable weathering or spalling. The pipe outlet would indicate a similar condition for the conduit.

The emergency spillway is an uncontrolled saddle type with a trapezoidal cross-section, located at the right end of the dam. It is well grassed with a uniform cross-section. No significant erosion was observed in the channel.

OCE guidelines recommend that small, high hazard dams safely pass the one-half Probable Maximum Flood ($\frac{1}{2}$ PMF) to full PMF. Hydraulic and hydrologic analyses reveal that the PMF overtops the dam by a maximum of 2.0 feet for 3.5 hours. The $\frac{1}{2}$ PMF overtops the dam by a maximum of 0.2 feet for 1.7 hours.

The dam is given a condition classification of "deficient" due to marginal spillway inadequacy and minor erosion. It is recommended that cattle grazing on the dam be controlled to prevent excessive erosion and that a system be devised to warn downstream residents in the event a major problem develops with the structure.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

SECTION 1 - GENERAL

- 1.1 Authority - The Phase I inspection of this dam was carried out under the authority of Tennessee Code Annotated, Sections 70-2501 to 70-2530, The Safe Dams Act of 1973, and in cooperation with the U. S. Army Corps of Engineers under the authority of Public Law 92-367, The National Dam Inspection Act.
- 1.2 Purpose and Scope - The purpose of a Phase I investigation is to develop an engineering assessment of the general condition of a dam with respect to safety and stability. This is accomplished by conducting a visual inspection, reviewing any available design and construction data, and performing appropriate hydraulic, hydrologic, and other analyses. A comprehensive description of the Phase I investigation program is given in Recommended Guidelines for Safety Inspection of Dams, Department of the Army, Chief of Engineers, Washington, D. C. 20314.
- 1.3 Past Inspections - The dam was originally surveyed by State personnel as part of the 1973 inventory.
- 1.4 Details of Inspection - Mary's Creek Dam #9 was surveyed and photographed by State personnel as part of the Phase I inspection on March 11, 1981. The weather was sunny and breezy with a temperature of approximately 70°F.
- 1.5 Inspection Team Members - The field inspection was conducted by the following State personnel:

Edmond O'Neill, Chief Engineer
George Moore, Regional Engineer
William Culbert, Regional Engineer

SECTION 2 - PROJECT DESCRIPTION

- 2.1 Location - The dam is located in Shelby County, Tennessee, 4,600 feet southeast of the town of Fisherville at mile 1 of an unnamed tributary of Mary's Creek, 4.8 miles upstream of its confluence with Gray's Creek. It can be found on the USGS Eads Quadrangle map at latitude $35^{\circ}08'54''$ and longitude $89^{\circ}39'18''$ (location maps are provided in Appendix B of this report.)
- 2.2 History of Project - The dam was built as a flood retarding structure in 1962 under authority of the pilot watershed program (an act predating the Watershed Protection and Flood Prevention Act - PL 566). Land encompassing the dam site was purchased by Dr. R. E. Patterson in 1968 from the L. E. Bryan properties. The remaining property bordering the lake is held by Cedar Hill Farms. The dam was designed by the SCS and construction was probably performed by McComic of Covington, Tennessee (no longer in existence) or by Mr. Tolly Murff (principal shareholder in Cedar Hill Farms). Dr. Patterson has had no contact with representatives of the Shelby County Soil Conservation District concerning operation and maintenance of the dam, but he reports that he does mow the embankment regularly. He uses the lake for stock watering.
- 2.3 Size and Hazard Classification - Based on a structural height of 23.7 feet and a maximum storage capacity of 148 acre-feet, the dam is given a size classification of "small". A federal hazard potential classification of "high" was chosen for the dam because a sudden failure of the structure could result in the loss of life of an estimated 10 persons occupying 2 homes and working at a large horse stable and track 4,000 feet downstream.
- 2.4 Description of Dam and Appurtenances
- 2.4.1 Geology - The West Tennessee regional geologic map and geologic quadrangle maps indicate that the area is overlain predominantly with Memphis and Grenada soils derived from deep Loess brown loam. Collins and Falayia are the principal bottom soils. (Loess soils consist of clayey and sandy silt, gray to brown, with a maximum thickness of from 20 to 35 feet in the Wolf River tributaries area). Being

wind blown material, the Loess lays in about equal thickness through extensive changes in elevation, so deeper formations cannot be identified without borings.

2.4.2 Embankment - The dam is a linear earthen structure 678 feet long and 23.7 feet high with a 10 foot crest width. The upstream and downstream slopes are 1V:3.1H and 1V:3.0H respectively. The upstream slope is broken by a 5 to 10 foot wave berm at the water surface. The elevation of the dam crest varies between 363.7 and 365.

A cutoff trench with a 10 foot base width and 1V:1.5H side slopes is located along the centerline of the dam, excavated to a maximum depth of 338 feet msl. A 260' X 4' X 4' foundation drain is located approximately 44 feet upstream of the toe and extends to normal pool elevation at its ends. The intercepted water is drained from the embankment by two 8 inch diameter CMP's.

Analysis of a soil sample taken from the embankment at about 1 foot of depth indicates that the fill is an inorganic clay of low to medium plasticity, slightly sandy and silty; a typical CL material (see Appendix D).

2.4.3 Service Spillway and Drawdown Facilities - The service spillway consists of a rectangular reinforced concrete riser 12 feet tall from drawdown invert to high stage inlet with inside dimensions of 2.5' X 7.5'. The riser feeds a 30 inch reinforced concrete pressure pipe 138 feet long on a 5.4% slope. The culvert is surrounded by four anti-seep collars on 20 foot centers. The spillway discharges into an impact basin 28 feet long and 6 feet deep.

2.4.4 Emergency Spillway - The emergency spillway is an uncontrolled saddle type channel with a trapezoidal cross-section. It has a base width of 26 feet and side slopes of 1V:6.7H and 1V:2.8H at the control section. It has a crest elevation of 361.5 with the control section located along the dam centerline. The entrance and exit channels are sloped at 1.9% and 3.8% respectively.

- 2.5 Downstream Channel - The downstream channel is excavated with a trapezoidal cross-section on a 1% slope. It has a 30 foot top width, 4 foot base width, and 1V:1.3H side slopes.
- 2.6 Reservoir and Drainage Area - At normal pool elevation 356, the 10.5 acre lake impounds 42 acre-feet of water. The pool area increased to 18 acres at the top of the dam with an impoundage of 148 acre-feet. The drainage area for the lake is 212 acres. It is predominantly occupied in row crops, hay, pasture, and woods. The top soils are Memphis, Grenada, and Loring silt loams. The average ground slope is approximately 5.7%.

SECTION 3 - FINDINGS

3.1 Visual Inspection

3.1.1 Embankment - The dam is well grassed and virtually free of undesirable vegetation. It has a uniform cross-section and well defined boundaries. There were no indications of seepage or structural instabilities observed; no cracking, heaving, or slides. Erosion is minor with some loss of cover along the principal cattle trail traversing the dam.

3.1.2 Service Spillway - The spillway riser appears to be in excellent condition with no notable weathering or spalling. The pipe outlet would indicate that the culvert is also in good condition. It exhibits no indication of seepage around the outlet.

3.1.3 Emergency Spillway - The emergency spillway has a uniform cross-section and a full grass cover. It exhibits no signs of serious erosion or other problems.

3.1.4 Downstream Channel - The downstream channel has an adequate natural grass cover and it hosts a loose sprawl of trees along its banks for at least 500 feet downstream of the dam. Its cross-section then flattens as it emerges into clear, well grassed pastureland.

3.1.5 Other Features - At the upstream end of Mary's Creek Lake # 9 is a smaller reservoir impounded by the fill of Bryant Road. It empties into the main lake through a 66 inch corrugated metal pipe (see Appendix A for reservoir statistics and Appendix B for a sketch of the road embankment cross-section).

3.2 Review of Data - The data available for review includes a copy of the dam design drawings, a sheet of hydrology calculations, and a copy of the Wolf River Tributaries Watershed Work Plan. "As Built" drawings are available at the SCS field office in Memphis.

- 3.3 Static and Seismic Stability Assessment - Determination of the actual margin of safety for static or dynamic stability is beyond the scope of the Phase I investigation, but an assessment of the embankment stability based on visual evidence and engineering judgment would indicate a stable structure.

The dam is located in Seismic Zone 3, indicating that major structural damage could be expected in the event of seismic activity.

- 3.4 Hydraulic and Hydrologic Analysis - According to OCE guidelines, it is recommended that small, high hazard dams safely pass a design storm of the one-half Probable Maximum Flood ($\frac{1}{2}$ PMF) to the full PMF. Hydraulic and hydrologic analyses reveal that runoff from the PMF overtops the dam by a maximum of 2.0 feet for 3.5 hours. The $\frac{1}{2}$ PMF overtops the dam by a maximum of 0.2 feet for 1.7 hours.

3.5 Conclusions and Recommendations

3.5.1 Conclusions - The dam is in Seismic Zone 3, indicating that there is a risk of major damage in the event of seismic activity.

There appears to be no seepage, erosion, or stability problems with the dam.

Hydraulic and hydrologic analyses of the dam and drainage area indicate that the structure will be marginally overtopped by the minimum design storm. This overtopping will probably not cause failure of the dam.

Mary's Creek # 9 is given a condition classification of "deficient" because of the minor erosion accompanying the cattle traffic and because the spillway cannot pass the $\frac{1}{2}$ PMF without overtopping the dam.

3.5.2 Recommendations - The Shelby County Soil Conservation District should:

- 1) engage the services of a qualified engineer to assess the stability of the embankment under seismic loading conditions, and to make recommendations for allowing safe passage of the design storm.

2) develop an emergency action plan to warn downstream residents in the event a serious problem develops with the dam.

3) control cattle grazing to minimize damage to the embankment.

SECTION 4 REVIEW BOARD FINDINGS

The Interagency Review Board for the National Program of Inspection of Non-Federal Dams met in Nashville on 27 August 1981 to examine the technical data contained in the Phase I investigation report on Mary's Creek Watershed Dam No. 9. The Review Board considered the information and recommended that (1) the conclusions should state that the marginal **overtopping** of the dam will not cause failure, (2) cattle grazing should be controlled to minimize the damage to the embankment, and (3) all references and recommendations should be made to the Shelby County Soil Conservation Service. They agreed with other report conclusions and recommendations. A copy of the letter report presented by the Review Board is included in Appendix G.

APPENDIX A
DATA SUMMARY

APPENDIX A
DATA SUMMARY

A.1 Dam

A.1.1 Type - Earthfill

A.1.2 Dimensions and Elevations

a. Crest length - 678 feet

b. Crest width - 10 feet

c. Height - 23.7 feet

d. Crest elevation (low point) - 363.7' msl

e. Upstream slope (above normal pool) - 1V:3.1H

f. Downstream slope - 1V:3.0H

g. Size classification - Small

A.1.3 Zones, Cutoffs, Grout Curtains - The "as built" drawings specify a cutoff trench with a 10 foot base width and 1V:1.5H side slopes to run along the centerline of the dam and reach a maximum depth at elevation 338' msl.

A.1.4 Instrumentation - None

A.2 Reservoir and Drainage Area

A.2.1 Reservoir

a. Normal Pool

- 1) Elevation - Main lake - 356' msl
Small lake - 363.2' msl
- 2) Surface area - Main lake - 10.5 acres
Small lake - 2.3 acres
- 3) Capacity - Main lake - 42 acre-feet
Small lake - 8 acre-feet
- 4) Length of reservoir - Main lake - 1,250'
Small lake - 450'

b. Maximum Pool (Top of Dam)

- 1) Elevation - Main lake - 363.7' msl
Small lake - 369.6' msl
- 2) Surface area - Main lake - 18 acres
Small lake - 7.2 acres
- 3) Capacity - Main lake - 148 acre-feet
Small lake - 38 acre-feet

A.2.2 Drainage Area

- a. Size - 212 acres (main lake - 83 acres,
small lake - 129 acres)
- b. Average ground slope - Approximately 5.7%
- c. Soils - Memphis, Grenada, and Loring silt loams
- d. Land use - Predominantly row crops, hay,
pasture, and woods.
- e. Runoff (AMC II)
 - 1) PMF - 26 inches
 - 2) $\frac{1}{2}$ PMF - 13 inches
 - 3) 100 year - 2.9 inches

A.3 Outlet Structures

A.3.1 Service Spillway

- a. Type - Reinforced concrete with steel ring joints
- b. Size - 30 inch inside diameter
- c. Pipe gradient - 5.4%
- d. Drawdown - 24 inches formed opening controlled
by 24 inch sliding headgate
- e. Capacity - 99 cfs

A.3.2 Emergency Spillway

- a. Type - Uncontrolled saddle, trapezoidal cross-
section
- b. Crest elevation - 361.5' msl

c. Size - Base - 26'; right side slope - 2.8H:1V;
left side slope - 6.7H:1V; head - 2.2'

d. Maximum capacity - 265 cfs

A.4 Historical Data

A.4.1 Construction Date - 1962

A.4.2 Design - SCS

A.4.3 Builder - Believed to be McComic of Covington
(no longer in existence) or Cedar Hill Farms
(owner of adjacent property)

A.4.4 Owner - Dr. R. E. Patterson (owner of actual
dam site); Cedar Hill Farms owns most of
eastern lake front property

A.4.5 Previous Inspection - The dam was originally
surveyed by State personnel as part of the
1973 inventory

A.4.6 Seismic Zone - 3

A.4.7 Operation and Maintenance - The Shelby County
Soil Conservation District is responsible
for operation and maintenance of the struc-
ture by open market purchase with limited
funds provided by Shelby and Fayette County
courts.

A.5 Downstream Hazard Data

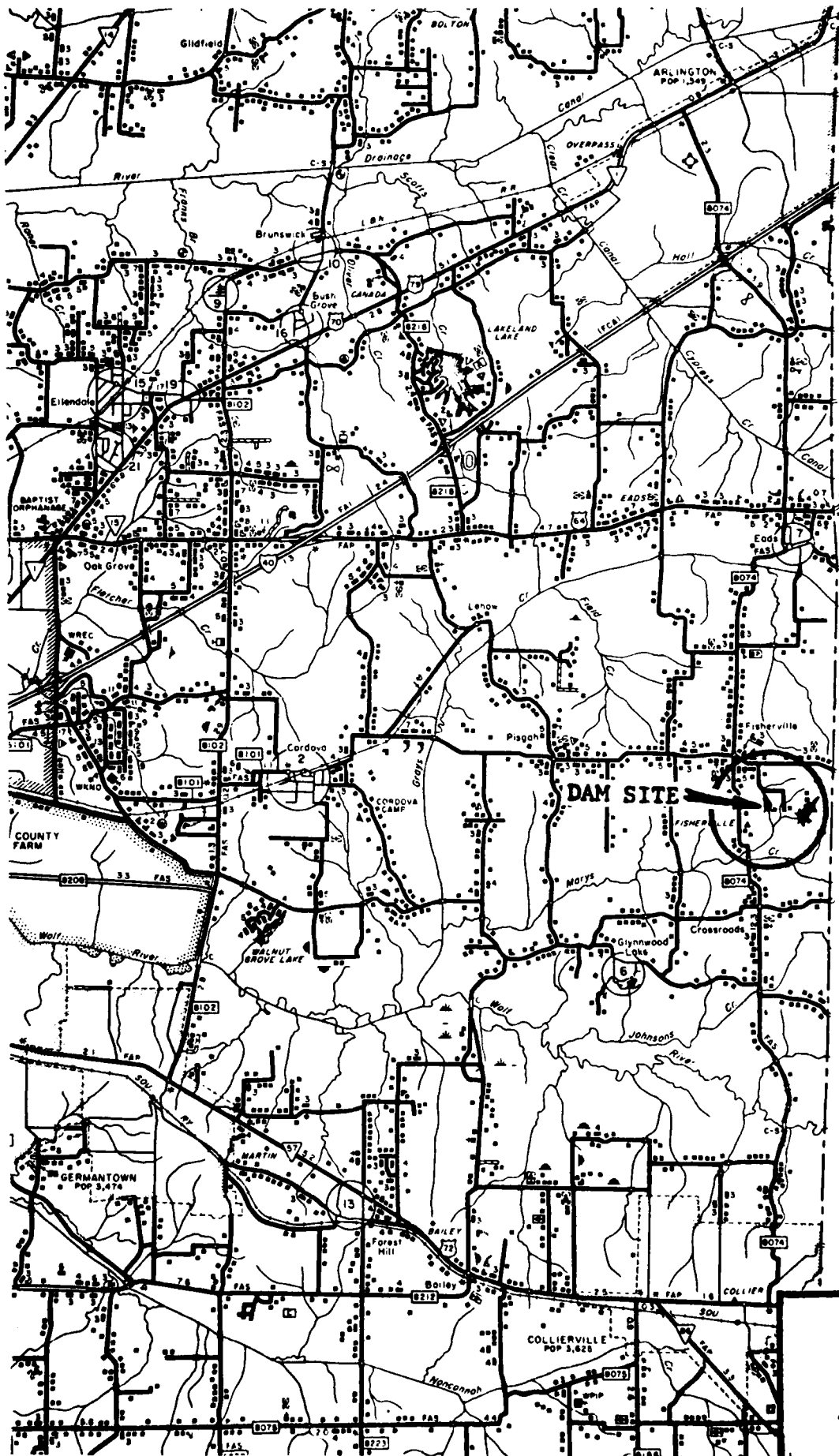
A.5.1 Downstream Hazard Classification - High

A.5.2 Persons in Likely Flood Path - 10 (est.)

A.5.3 Downstream Property - 2 homes, 1 large horse
stable and track approximately 4,000 feet
downstream, and several county roads.

A.5.4 Warning Systems - None

APPENDIX B
SKETCHES AND LOCATION MAPS



COUNTY

FAYETTE

35°15'

35°10'

35°05'

TO NASHVILLE

TO OAKLAND

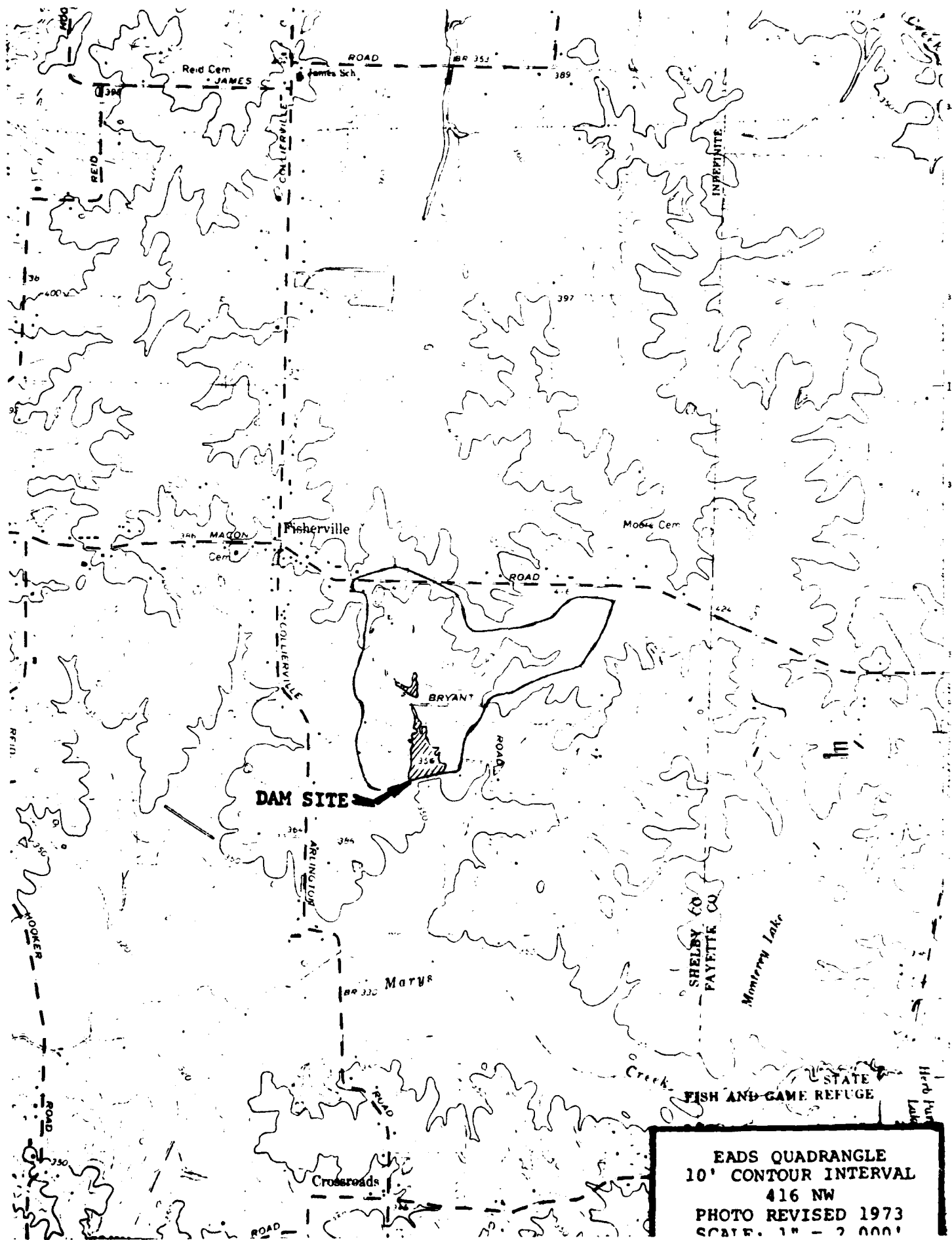
DAM SITE

SHELBY COUNTY

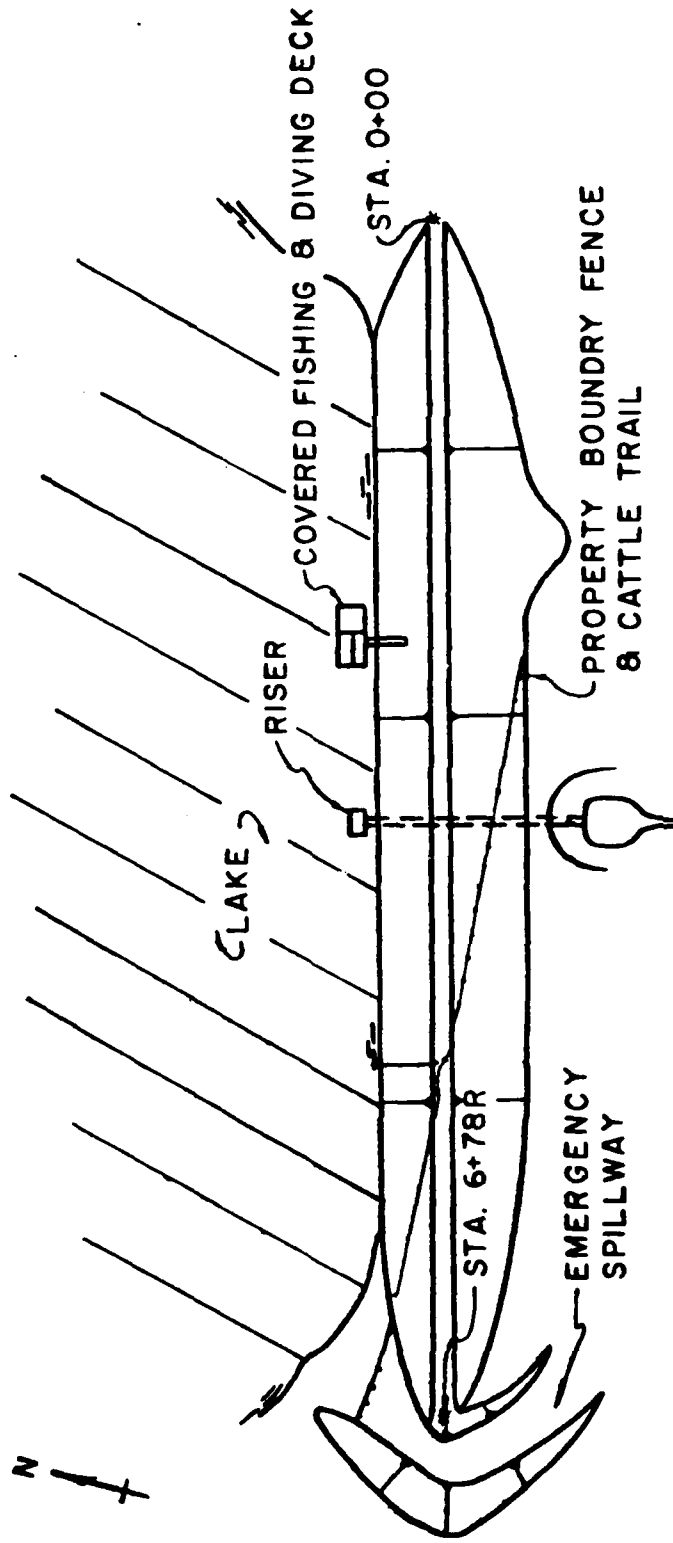


SCALE



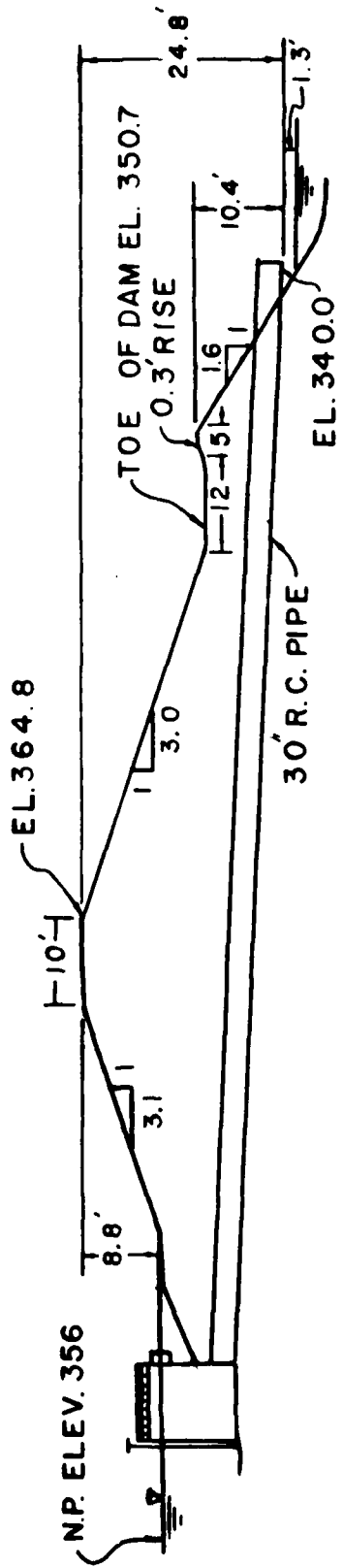


EADS QUADRANGLE
10' CONTOUR INTERVAL
416 NW
PHOTO REVISED 1973
SCALE. 1" = 2 000'



GENERAL PLAN
SCALE: 1" = 100'

MARYS CREEK #9
DRAWN BY: W.C.
DATE: 6-11-81
SHEET: 1 OF 5

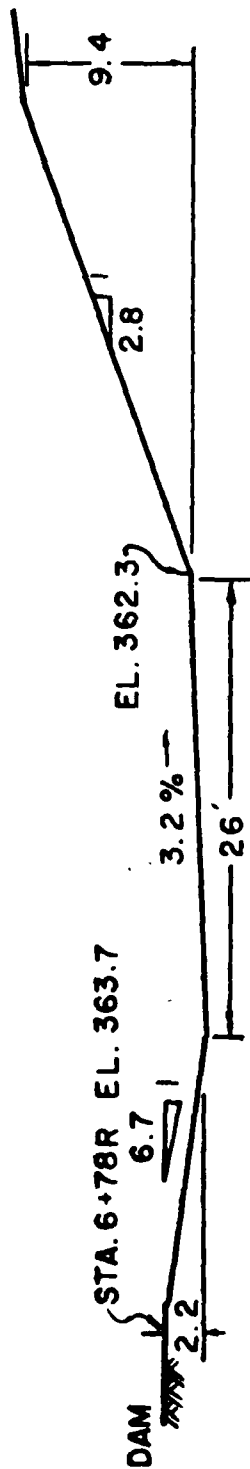


MAXIMUM SECTION AT STA. 3+35R

SCALE: 1" = 20'

NOTE: ALL ELEVATIONS ARE REFERENCED
 TO APPROX. NORMAL POOL. EL. 356 MSL
 ON U.S. G.S. QUADRANGLE

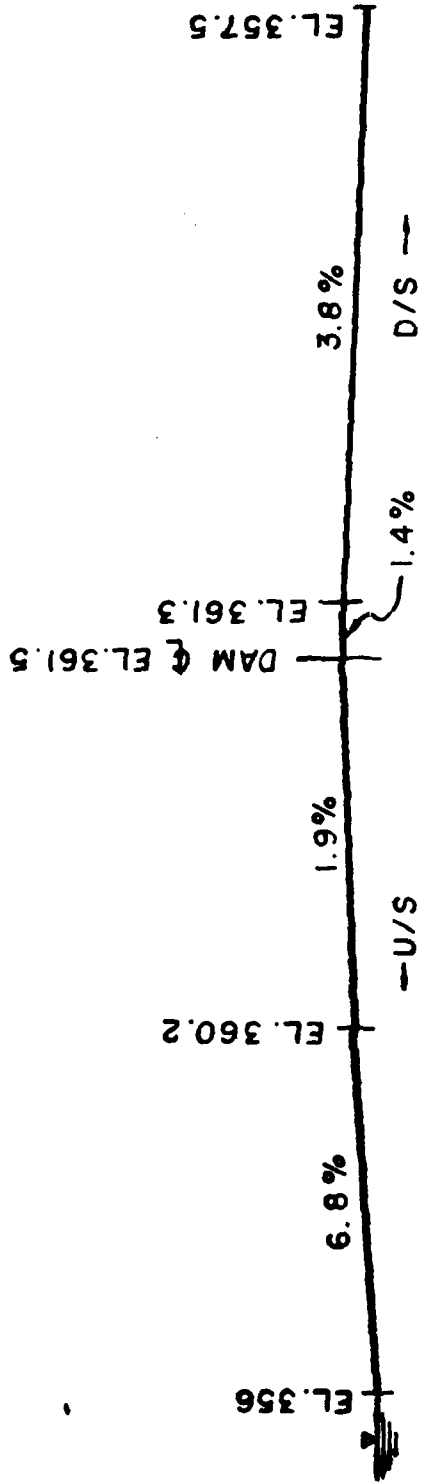
MARYS CREEK #9
DRAWN BY: W.C.
DATE: 6-11-81
SHEET: 2 OF 5



EMERGENCY SPILLWAY CONTROL SECT.
 SCALE: 1"=10'

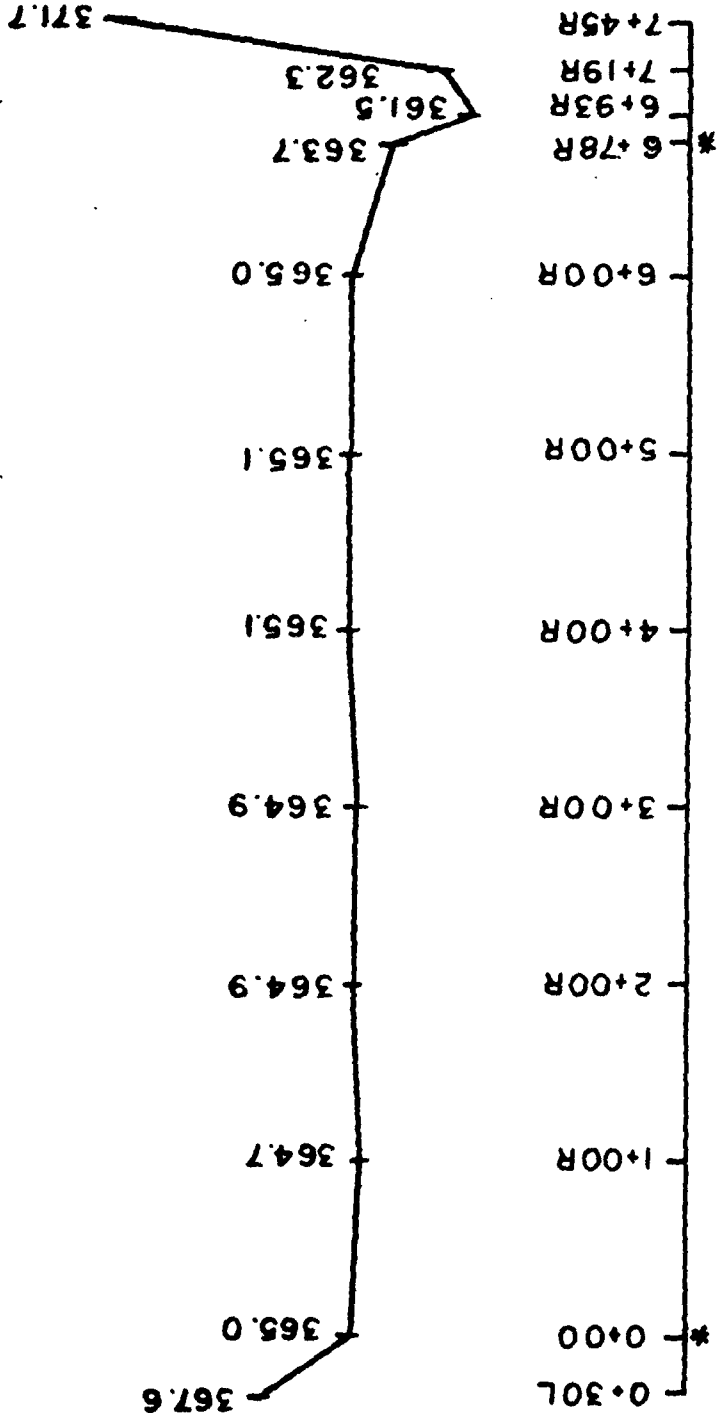
MARYS CREEK #9
DRAWN BY: W.C.
DATE: 6-11-81
SHEET: 3 OF 5

MARYS CREEK #9
DRAWN BY: W.C.
DATE: 6-11-81
SHEET: 4 OF 5



EMERGENCY SPILLWAY PROFILE
SCALE: 1" = 30'

MARYS CREEK # 9
DRAWN BY: W.C.
DATE: 6-11-81
SHEET: 5 OF 5

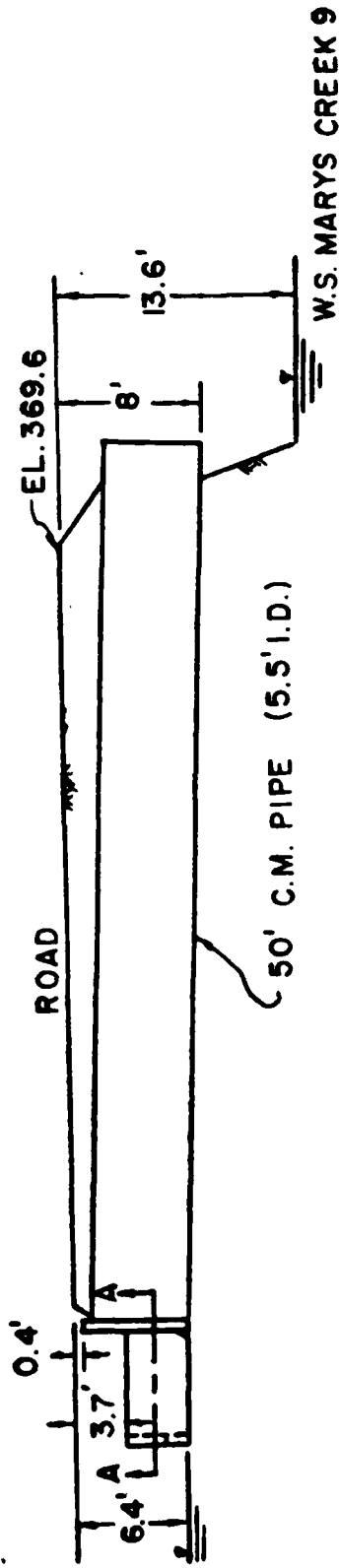


DAM CREST & PROFILE

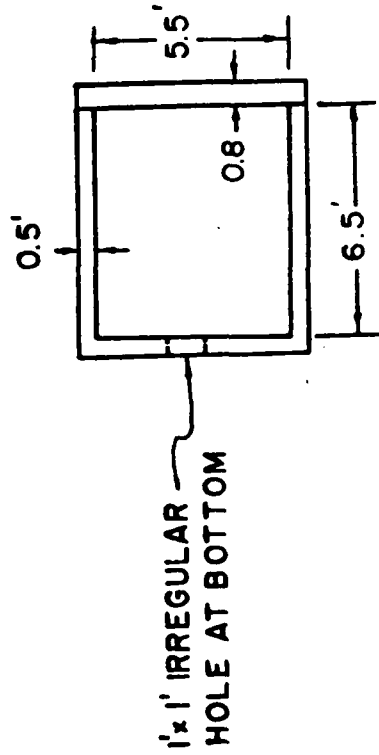
H. SCALE: 1" = 100'

V. SCALE: 1" = 5'

* END OF DAM



SPILLWAY PROFILE SECTIONAL VIEW
SCALE: 1" = 10'



SECT. A-A
CONC. INLET STRUCTURE
SCALE: 1" = 5'

ROAD EMBANKMENT UPSTREAM MARYS CREEK DAM #9	DRAWN BY: ADP DATE: 23 JUNE 81
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APPENDIX C
PHOTOGRAPHIC RECORD

Photographic Record

- Photo No. 1 - Lake and dam from upstream left.
- Photo No. 2 - Upstream slope of dam left of center.
- Photo No. 3 - Upstream slope from right end of dam.
- Photo No. 4 - Downstream slope of dam from emergency spillway exit channel.
- Photo No. 5 - Minor erosion along upstream slope of dam right of center.
- Photo No. 6 - Riser from dam crest.
- Photo No. 7 - Emergency spillway entrance channel from dam centerline.
- Photo No. 8 - Principal spillway outlet.
- Photo No. 9 - Downstream channel and plunge pool.
- Photo No. 10 - Dam crest showing location of soil sample hole and emergency spillway in background.
- Photo No. 11 - Aerial view of lake and dam showing small upstream lake.
- Photo No. 12 - Aerial view of dam showing cattle on embankment.

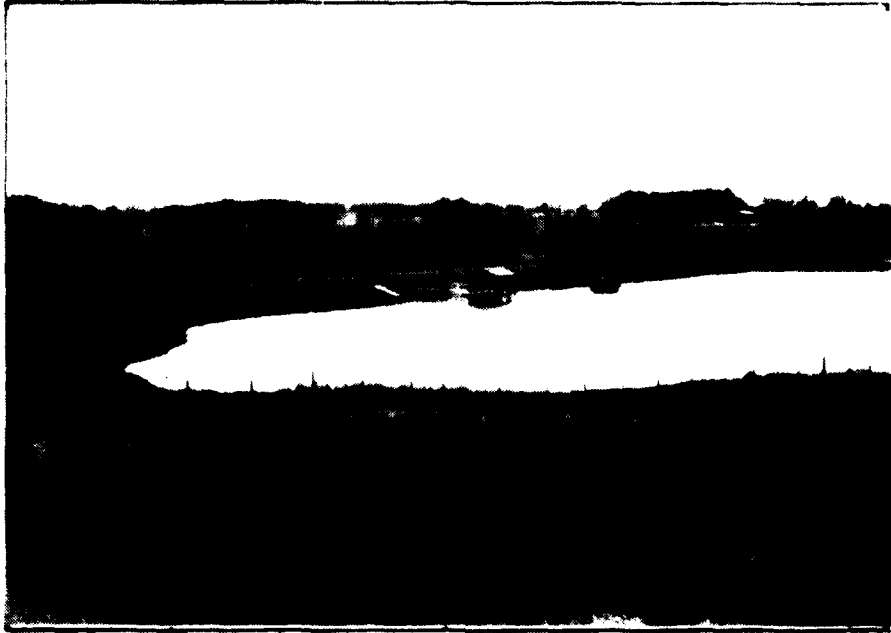


PHOTO NO. 1

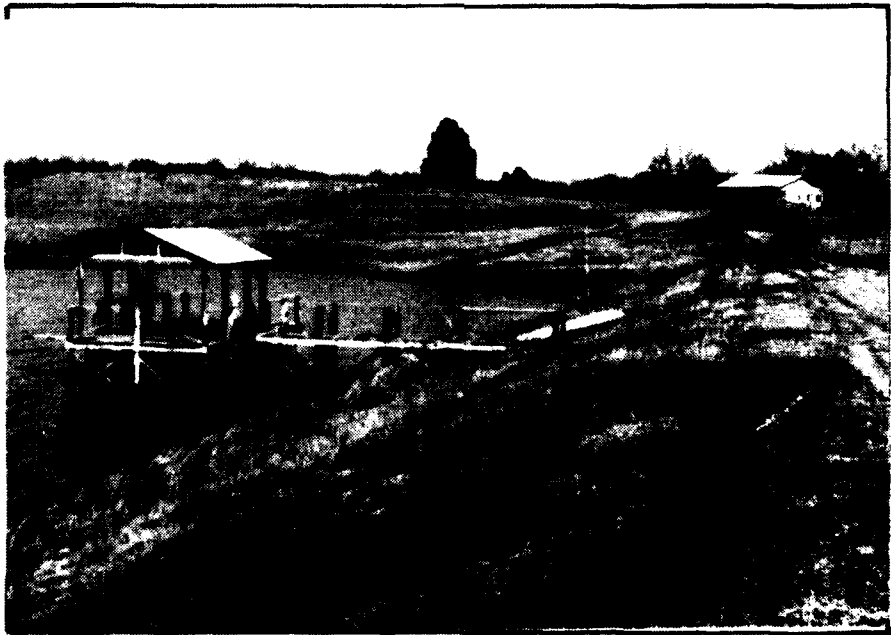


PHOTO NO. 2



PHOTO NO. 3

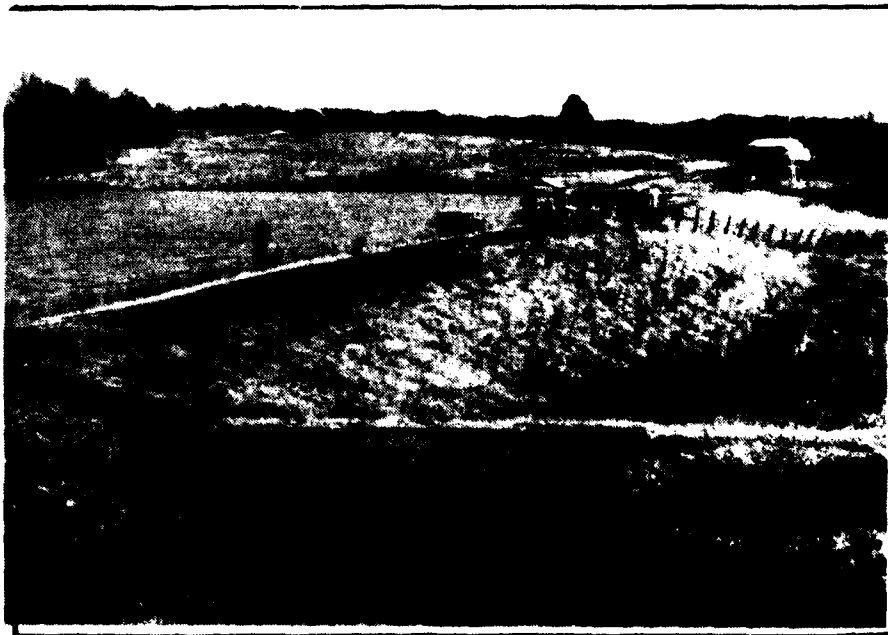


PHOTO NO. 4

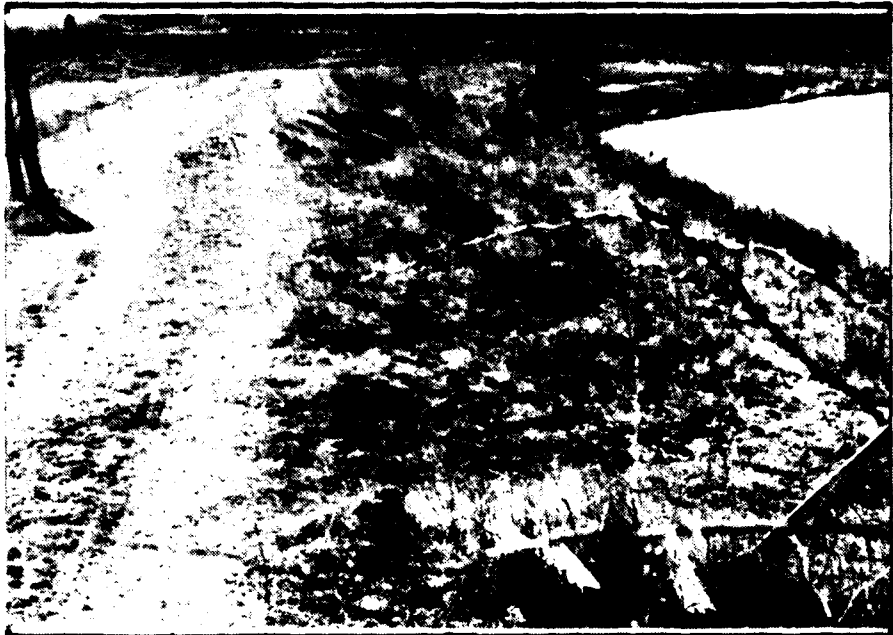


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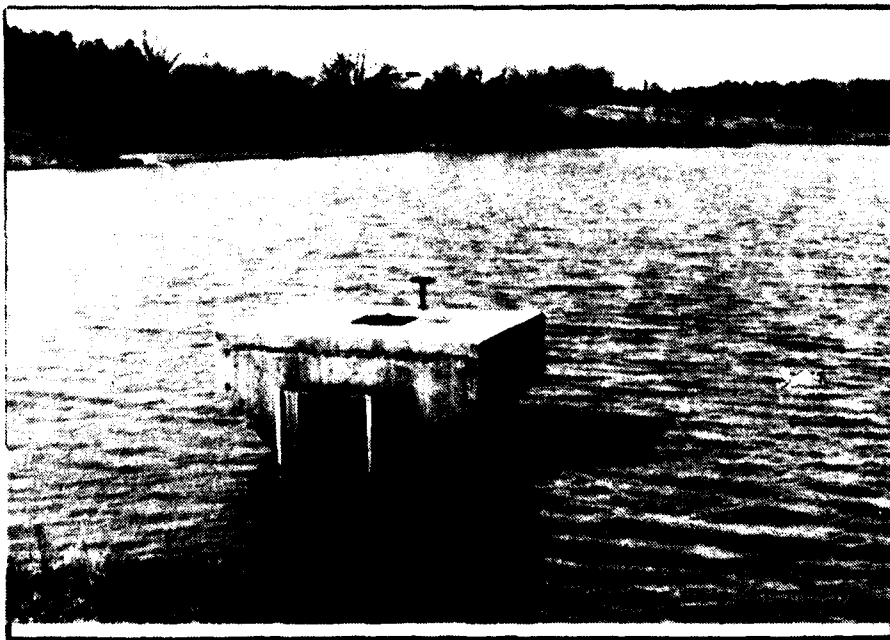


PHOTO NO. 6



PHOTO NO. 7



PHOTO NO. 8



PHOTO NO. 9



PHOTO NO. 10



PHOTO NO . 11

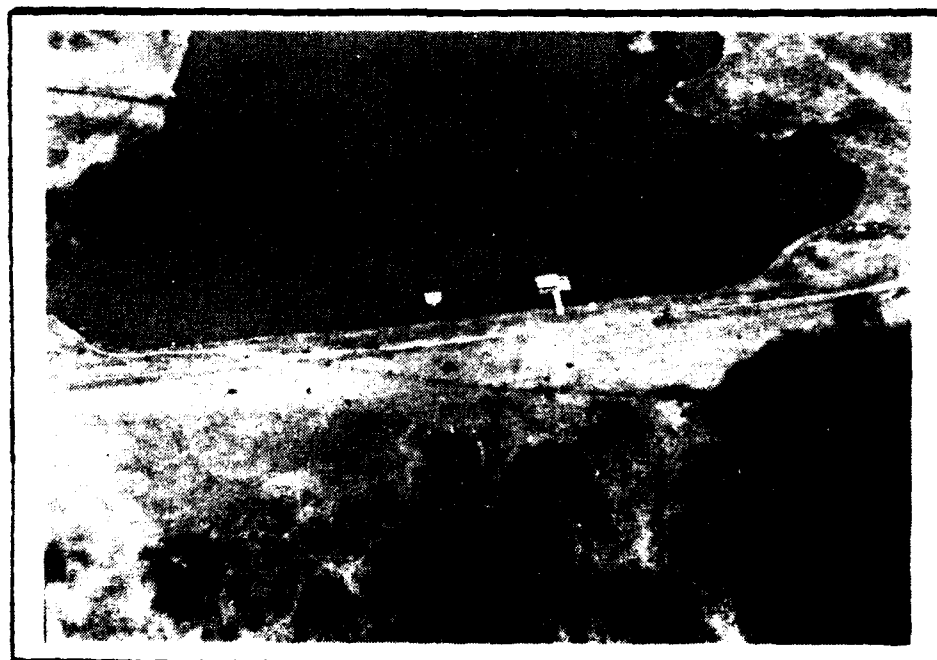


PHOTO NO . 12

APPENDIX D
TECHNICAL CRITIQUE
CHECKLISTS FOR VISUAL INSPECTION
ENGINEERING DATA
SOIL TESTS

Check List
Visual Inspection of Earth Dams
Department of Conservation
Division of Water Resources

Name of Dam Mary's Creek Watershed Dam No. 9

County Shelby Date of Inspection March 11, 1981

ID # - State 79-7039 Federal TN 15739

Type of Dam Earth

Hazard Category-Federal 1 State High

Weather Sunny, breezy Temperature 70° F

Pool at Time of Inspection App. NPL (distance from crest)

Tailwater at Time of Inspection 0 (distance from stream bed)

Design/As Built Drawings Available: Yes X No

Location: SCS Engineering Office - Nashville

Copy Obtained: Yes X No

Reviewed: Yes X No

Construction History Available: Yes No X

Location:

Copy Obtained: Yes No

Reviewed: Yes No

Other Records and Reports Available: Yes X No

Location: Wolf River Tributaries Watershed Work Plan

Copy Obtained: Yes X No

Reviewed: Yes X No

Prior Incidents or Failures: Yes No X

Inspection Personnel and Affiliation:

Ed O'Neill - TDWR

George Moore - TDWR

Bill Culbert - TDWR

I. Embankment

A. Crest

Description (1st inspection) Straight, well grassed,
reasonably flat.

1. Longitudinal Alignment Straight

2. Longitudinal Surface Cracks None seen

3. Transverse Surface Cracks None seen

4. General Condition of Surface Good, minor erosion
near fence at center.

5. Miscellaneous _____

B. Upstream Slope

1. Undesirable Growth or Debris None seen

2. Sloughing, Subsidence, or Depressions Minor erosion
at watersurface and along cow paths. Possibly vehicular
traffic on upstream slope.

3. Slope Protection Grass only.

a. Condition of Riprap None

b. Durability of Individual Stones N/A

c. Adequacy of Slope Protection Against Waves
and Runoff Adequate

d. Gradation of Slope Protection - Localized Areas
of Fine Material N/A

4. Surface Cracks None seen

C. Downstream Slope

1. Undesirable Growth or Debris NONE

2. Sloughing, Subsidence, or Depressions; Abnormal
Bulges or Non-Uniformity Minor erosion - cattle
paths.
3. Surface Cracks on Face of Slope None seen
4. Surface Cracks or Evidence of Heaving at
Embankment Toe None seen
5. Wet or Saturated Areas or Other Evidence of Seepage
on Face of Slope; Evidence of "Piping" or "Boils"
None seen
6. Drainage System Okay. No flow.
7. Fill Contact with Outlet Structure Good
8. Condition of Grass Slope Protection Good.

D. Abutments

1. Erosion of Contact of Embankment with Abutment from
Surface Water Runoff, Upstream or Downstream _____

Insignificant.

2. Springs or Indications of Seepage Along Contact of
Embankment with the Abutments None seen.

3. Springs or Indications of Seepage in Areas a Short
Distance Downstream of Embankment - Abutment Tie-in

None seen

II. Area Downstream of Embankment, Including Channel

A. Localized Subsidence, Depressions, Sinkholes, Etc. _____

None seen.

B. Evidence of "Piping", "Boils", or "Seepage" None seen.

C. Unusual Presence of Lush Growth, such as Swamp
Grass, etc. None.

D. Unusual Muddy Water in Downstream Channel No.

E. Sloughing or Erosion Insignificant.

F. Surface Cracks or Evidence of Heaving Beyond
Embankment Toe None seen.

G. Stability of Channel Sideslopes Okay.

H. Condition of Channel Slope Protection Okay. Natural
cover only.

I. Adequacy of Slope Protection Against Waves, Currents,
and Surface Runoff Good.

J. Miscellaneous None seen.

K. Condition of Relief Wells, Drains, and Other
Appurtenances N/A

L. Unusual Increase or Decrease in Discharge from
Relief Wells _____

III. Instrumentation None seen.

A. Monumentation/Surveys _____

B. Observation Wells _____

C. Weirs _____

D. Piezometers _____

E. Other _____

IV. Spillways

A. Service Spillway (Service/Emergency Combination Yes No)

1. Intake Structure Condition Good as observed from
water edge.

2. Outlet Structure Condition Good, some loss of fill
material beneath pipe, but nothing significant.

3. Pipe Condition Good at outlet.

4. Evidence of Leakage or Piping None seen.

5. General Remarks _____

B. Emergency Spillway

1. General Condition Good. Uniform cross-section.
Well grassed.

2. Entrance Channel Same. Crossed by fence. Some
minor debris.

3. Control Section Good.

3. Exit Channel Good.

4. Vegetative/Woody Cover Good. Grass only.

5. Other Observations Has apparently never carried flow
other than its own surface runoff.

V. Emergency Drawdown Facilities (if part of service spillway
so state) Valve on service spillway riser. Hand wheel in place.

Are Facilities Operable: Yes _____ No _____

Were Facilities Operated During Inspection: Yes _____ No X

Date Facilities Were Last Used Unknown.

VI. Reservoir

A. Slopes Good. Gradual.

B. Sedimentation Low to moderate.

C. Turbidity Greenish brown. Approximately 1 foot
visibility.

VII. Drainage Area

Description (for hydrologic analysis) _____

Farmland, pasture, and woods.

A. Changes in Land Use Some increase in residential.

VIII. Downstream Area (Stream)

A. Condition (obstructions, debris, etc.) Good. Spattering
of trees along channel banks for several hundred feet
downstream, then open pasture.

B. Slopes Approximately 1% channel. Good condition. Well
grassed.

C. Approximate No. Homes, Population, and Distance D/S
2 homes approximately 4,000 feet downstream.

D. Other Hazards 1 large horse stable and track 4,000
feet downstream

IX. Miscellaneous

Incidents/Failures None

Observed Geology of Area See geology section 2.4.1 of report.

X. Conclusions

The dam is in good condition with no indication of seepage or instability.

Hydraulic and hydrologic analysis impending.

XI. Recommendations

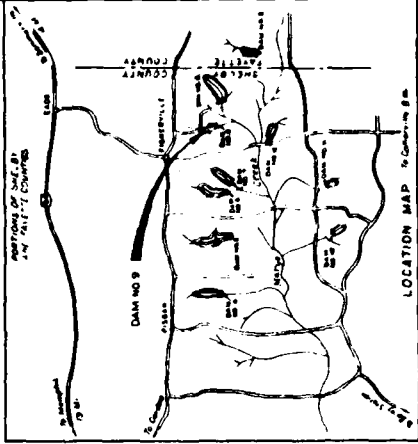
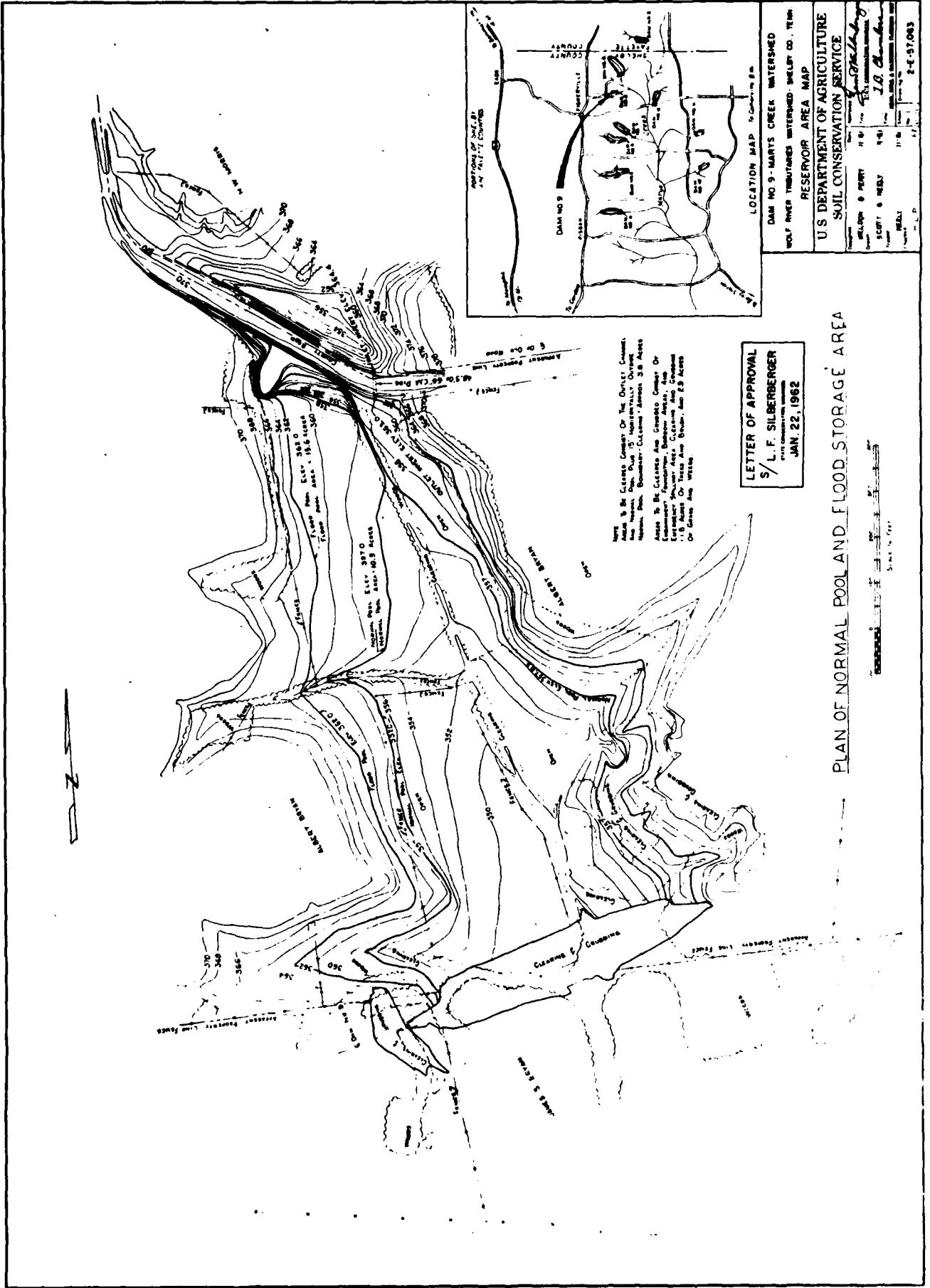
1) Prevent cattle from walking on embankment.

2) Develop an emergency action plan to warn downstream residents in the event a serious problem develops with the dam.

Regional Engineer

Chief Engineer

APPENDIX E
DESIGN DRAWINGS



LOCATION MAP To Contour in 5 ft.

DAM NO 9 - MARTY'S CREEK WATERSHED
 WOLF RIVER WATERSHED - SHELBY CO., TENN.
 RESERVOIR AREA MAP

U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

DATE	11/8	BY	J.B. [Signature]
SCALE	1" = 1/4 MI.	APP. NO.	10
PROJECT	WOLF RIVER WATERSHED	SECTION	10
DATE	11/8	BY	J.B. [Signature]
SCALE	1" = 1/4 MI.	APP. NO.	10
PROJECT	WOLF RIVER WATERSHED	SECTION	10
DATE	11/8	BY	J.B. [Signature]
SCALE	1" = 1/4 MI.	APP. NO.	10
PROJECT	WOLF RIVER WATERSHED	SECTION	10

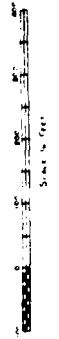
LETTER OF APPROVAL
 S/ L. F. SILBERBERGER
 DISTRICT ENGINEER
 JAN. 22, 1962

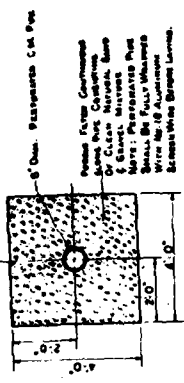
Area to be Covered by the Outlet Channel
 and Reservoir, Plus 15' Horizontal Overlap
 Between Reservoir and Outlet Channel, Approx. 3.8 Acres

Area to be Covered by the Outlet Channel, Or
 Equivalent Reservoir, Between Area and
 Reservoir, Plus 15' Horizontal Overlap, Approx. 2.8 Acres

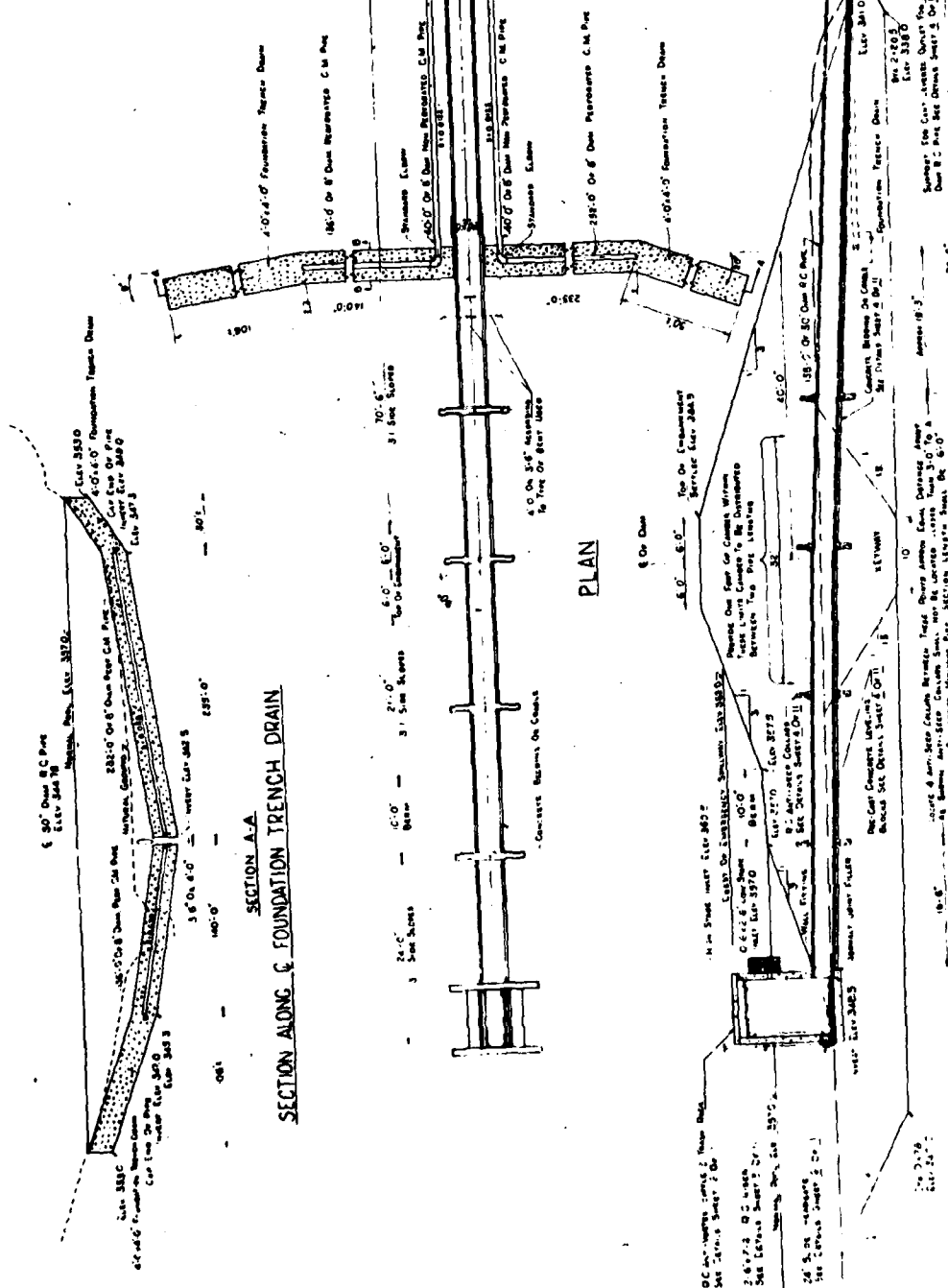
Or
 Equivalent Reservoir, Between Area and
 Reservoir, Plus 15' Horizontal Overlap, Approx. 2.8 Acres

PLAN OF NORMAL POOL AND FLOOD STORAGE AREA





SECTION B-B



SECTION A-A

SECTION ALONG C FOUNDATION TRENCH DRAIN

PLAN

DAM NO. 8 - MARYS CREEK WATERBED	
WOLF RIVER TRIBUTARIES WATERBED, SHELBY CO., TENN.	
2'-6" x 7'-6" RISER - 30" DIAM. R.C. PIPE	
U.S. DEPARTMENT OF AGRICULTURE	
SOIL CONSERVATION SERVICE	
PROJECT NO.	10-40
DATE	12/18/50
BY	W. B. BERRY
CHECKED BY	W. B. BERRY
SCALE	AS SHOWN
PROJECT NO.	10-40
DATE	12/18/50
BY	W. B. BERRY
CHECKED BY	W. B. BERRY
SCALE	AS SHOWN
PROJECT NO.	10-40
DATE	12/18/50
BY	W. B. BERRY
CHECKED BY	W. B. BERRY
SCALE	AS SHOWN

SECTION ALONG CENTERLINE OF 30" DIAM REINFORCED CONCRETE PIPE
STA 3+60 C DAM

CONCRETE REINFORCE TO CONSTRUCTION SPECIFICATIONS...
 ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED...
 ALL REINFORCEMENT TO BE PLACED AS SHOWN...
 ALL REINFORCEMENT TO BE PLACED AS SHOWN...
 ALL REINFORCEMENT TO BE PLACED AS SHOWN...

STEEL SCHEDULE FOR BENT - ALTERNATE NO. 1

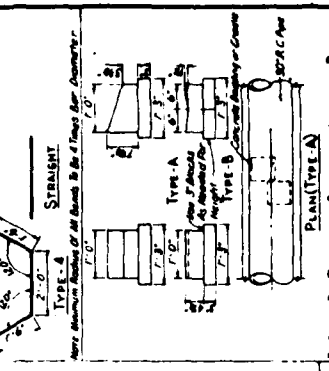
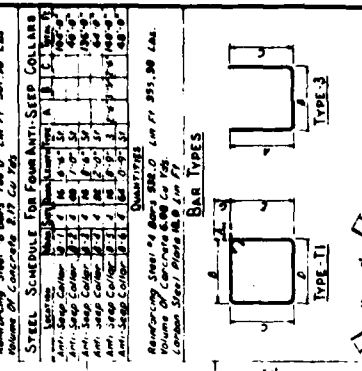
ITEM	DESCRIPTION	QUANTITY	UNIT	WEIGHT (LBS)
1	Structural Steel	100	LB	100
2	Reinforcing Steel	200	LB	200
3	Concrete	100	CU YD	100
4	Formwork	100	SQ YD	100
5	Other	100	LB	100

STEEL SCHEDULE FOR BENT - ALTERNATE NO. 2

ITEM	DESCRIPTION	QUANTITY	UNIT	WEIGHT (LBS)
1	Structural Steel	100	LB	100
2	Reinforcing Steel	200	LB	200
3	Concrete	100	CU YD	100
4	Formwork	100	SQ YD	100
5	Other	100	LB	100

STEEL SCHEDULE FOR FOUNDATION-SEEP COLLARS

ITEM	DESCRIPTION	QUANTITY	UNIT	WEIGHT (LBS)
1	Structural Steel	100	LB	100
2	Reinforcing Steel	200	LB	200
3	Concrete	100	CU YD	100
4	Formwork	100	SQ YD	100
5	Other	100	LB	100



DETAILS OF BENT AND PIPE OUTLET FOR 16'-0" PIPE SECTIONS LESS THAN 16'-0"

ALTERNATE NO. 1

Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT

ALTERNATE NO. 2

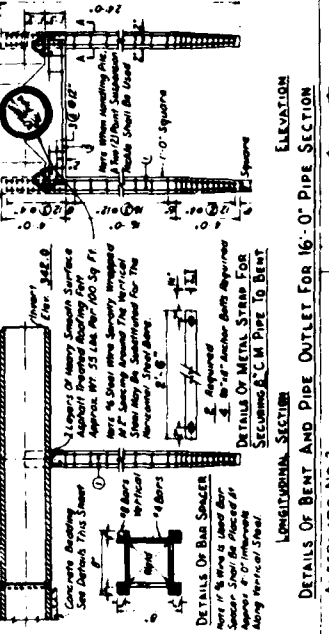
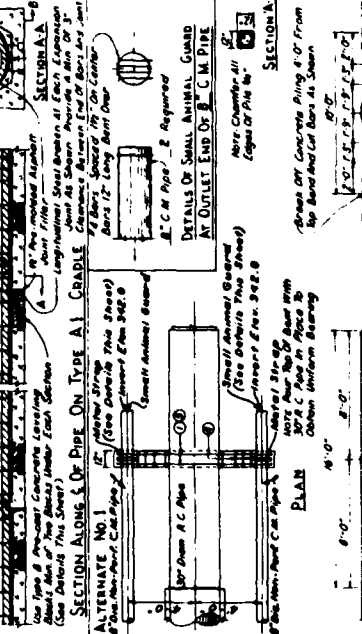
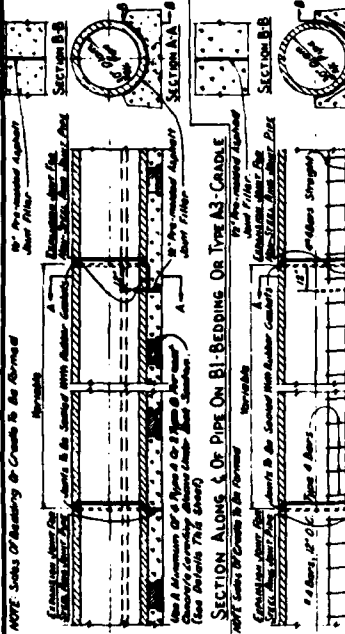
Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT

ALTERNATE NO. 3

Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT

ALTERNATE NO. 4

Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT



DETAILS OF BENT AND PIPE OUTLET FOR 16'-0" PIPE SECTIONS LESS THAN 16'-0"

ALTERNATE NO. 1

Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT

ALTERNATE NO. 2

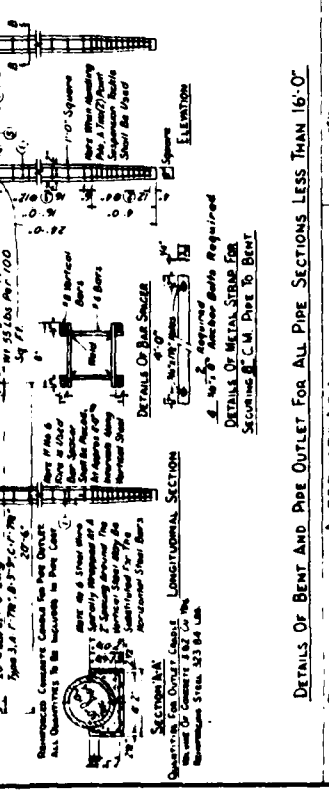
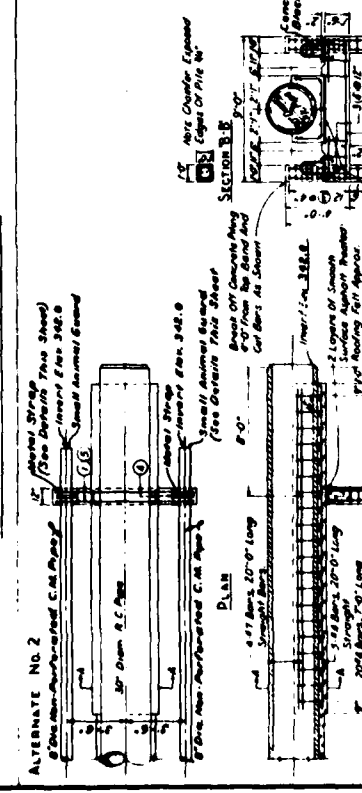
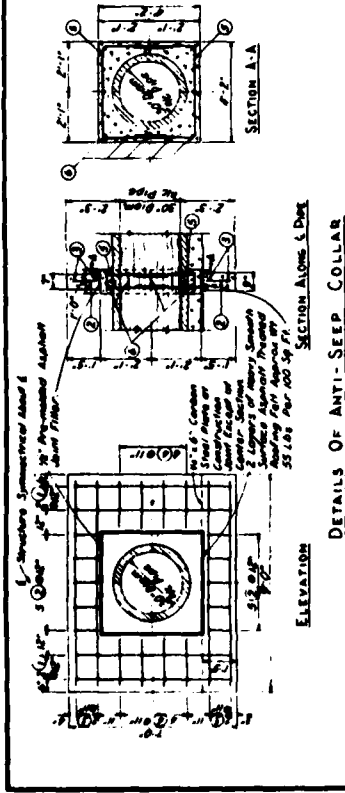
Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT

ALTERNATE NO. 3

Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT

ALTERNATE NO. 4

Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT



DETAILS OF BENT AND PIPE OUTLET FOR 16'-0" PIPE SECTIONS LESS THAN 16'-0"

ALTERNATE NO. 1

Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT

ALTERNATE NO. 2

Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT

ALTERNATE NO. 3

Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT

ALTERNATE NO. 4

Maximum Test Load Bearing Test Strength Load
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT
 2000 LBS PER LINEAL FOOT

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

W. M. Taylor, Jr.
 District Engineer
 1-4-42

D. W. Hill
 District Engineer
 1-4-42

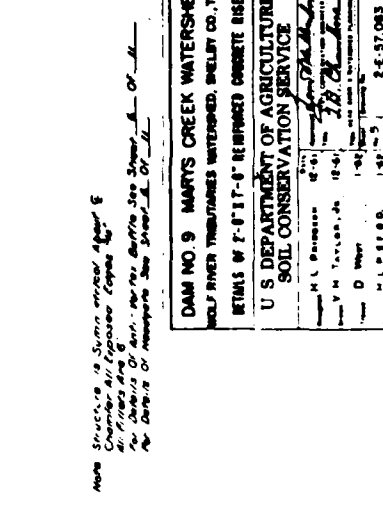
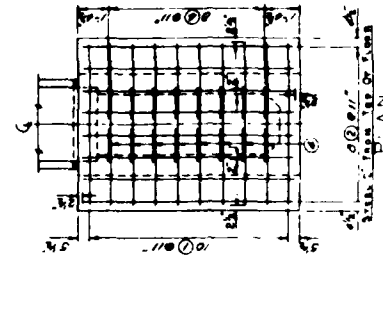
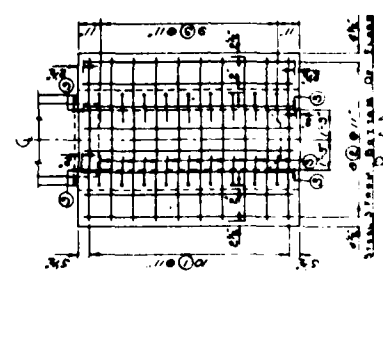
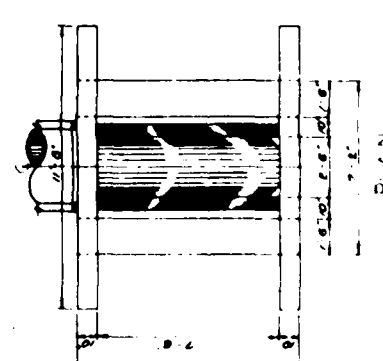
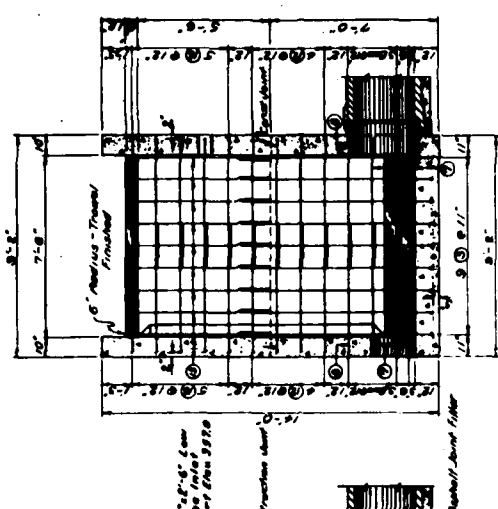
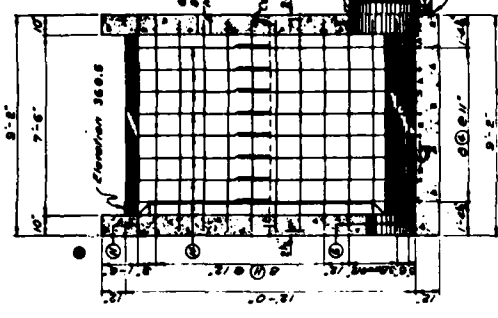
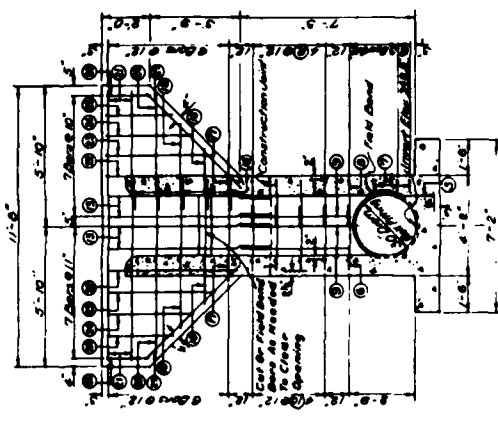
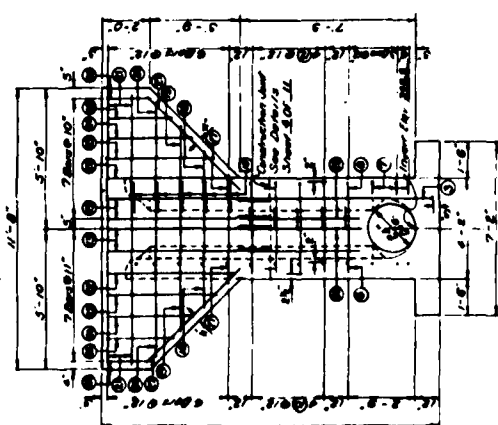
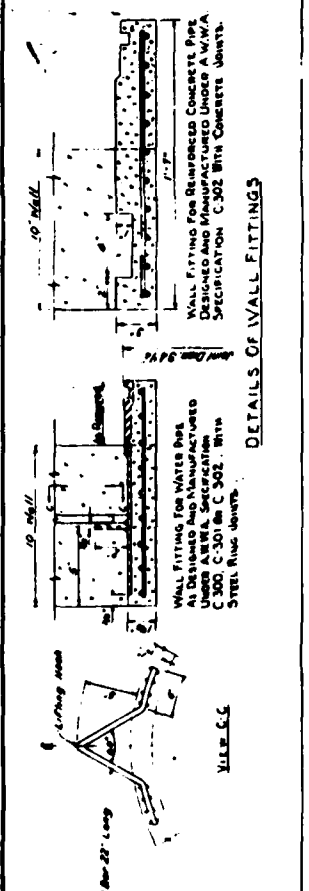
H. P. Reed
 District Engineer
 1-4-42

STEEL SCHEDULE

LOCATION	MARK SIZE	QUANTITY	TYPE	A	B	TOTAL FEET	LOCATION	MARK SIZE	QUANTITY	TYPE	A	B	TOTAL FEET
PIER	C-1	10	WT 10	10	10	20	RAILING WALL	C-1	4	WT 10	10	10	20
PIER	C-2	10	WT 10	10	10	20	RAILING WALL	C-2	4	WT 10	10	10	20
PIER	C-3	10	WT 10	10	10	20	RAILING WALL	C-3	4	WT 10	10	10	20
PIER	C-4	10	WT 10	10	10	20	RAILING WALL	C-4	4	WT 10	10	10	20
PIER	C-5	10	WT 10	10	10	20	RAILING WALL	C-5	4	WT 10	10	10	20
PIER	C-6	10	WT 10	10	10	20	RAILING WALL	C-6	4	WT 10	10	10	20
PIER	C-7	10	WT 10	10	10	20	RAILING WALL	C-7	4	WT 10	10	10	20
PIER	C-8	10	WT 10	10	10	20	RAILING WALL	C-8	4	WT 10	10	10	20
PIER	C-9	10	WT 10	10	10	20	RAILING WALL	C-9	4	WT 10	10	10	20
PIER	C-10	10	WT 10	10	10	20	RAILING WALL	C-10	4	WT 10	10	10	20
PIER	C-11	10	WT 10	10	10	20	RAILING WALL	C-11	4	WT 10	10	10	20
PIER	C-12	10	WT 10	10	10	20	RAILING WALL	C-12	4	WT 10	10	10	20
PIER	C-13	10	WT 10	10	10	20	RAILING WALL	C-13	4	WT 10	10	10	20
PIER	C-14	10	WT 10	10	10	20	RAILING WALL	C-14	4	WT 10	10	10	20
PIER	C-15	10	WT 10	10	10	20	RAILING WALL	C-15	4	WT 10	10	10	20
PIER	C-16	10	WT 10	10	10	20	RAILING WALL	C-16	4	WT 10	10	10	20
PIER	C-17	10	WT 10	10	10	20	RAILING WALL	C-17	4	WT 10	10	10	20
PIER	C-18	10	WT 10	10	10	20	RAILING WALL	C-18	4	WT 10	10	10	20
PIER	C-19	10	WT 10	10	10	20	RAILING WALL	C-19	4	WT 10	10	10	20
PIER	C-20	10	WT 10	10	10	20	RAILING WALL	C-20	4	WT 10	10	10	20

QUANTITIES
 Reinforcing Steel - 8 Bars 100.00 Lbs
 Reinforcing Steel - 6 Bars 111.00 Lbs
 Volume of Concrete 1337 Cu Yds
 1337 Cu Yds
 1337 Cu Yds

BAR TYPES
 1 - 1/2" x 1/4" x 1/4" x 1/4"
 2 - 1/2" x 1/4" x 1/4" x 1/4"
 3 - 1/2" x 1/4" x 1/4" x 1/4"
 4 - 1/2" x 1/4" x 1/4" x 1/4"
 5 - 1/2" x 1/4" x 1/4" x 1/4"
 6 - 1/2" x 1/4" x 1/4" x 1/4"
 7 - 1/2" x 1/4" x 1/4" x 1/4"
 8 - 1/2" x 1/4" x 1/4" x 1/4"
 9 - 1/2" x 1/4" x 1/4" x 1/4"
 10 - 1/2" x 1/4" x 1/4" x 1/4"
 11 - 1/2" x 1/4" x 1/4" x 1/4"
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 13 - 1/2" x 1/4" x 1/4" x 1/4"
 14 - 1/2" x 1/4" x 1/4" x 1/4"
 15 - 1/2" x 1/4" x 1/4" x 1/4"
 16 - 1/2" x 1/4" x 1/4" x 1/4"
 17 - 1/2" x 1/4" x 1/4" x 1/4"
 18 - 1/2" x 1/4" x 1/4" x 1/4"
 19 - 1/2" x 1/4" x 1/4" x 1/4"
 20 - 1/2" x 1/4" x 1/4" x 1/4"



DAM NO. 9 MARTYS CREEK WATERSHED
 HOLY RIVER TRIBUTARIES WATERSHED, SHELBY CO., TENN.
 RETAIN BY 2'-0" REINFORCED CONCRETE BIER
 U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

Project No. 11-11-100
 Date: 11-11-100
 Drawn: [Signature]
 Checked: [Signature]
 Scale: 1/4" = 1'-0"

APPENDIX F

HYDRAULIC AND HYDROLOGIC DATA

HYDRAULIC AND HYDROLOGIC ANALYSIS

According to OCE guidelines, Mary's Creek Dam No. 9 must be able to safely pass a minimum of the one-half Probable Maximum Flood ($\frac{1}{2}$ PMF). Six hour rainfall depths for the Probable Maximum Precipitation and the 100 year rainfall were obtained from the U. S. Weather Service's Technical Paper 40. Flood routings were performed using the HEC-1-CB computer program. The program uses the dimensionless hydrograph technique described in Section 4 of the Soil Conservation Service National Engineering Handbook and the modified Puls method of reservoir routing.

The peak outflow from the PMF (AMC II) is 2614 cfs. This flood overtops the dam by a maximum of 2.0 feet for 3.5 hours.

HYDRAULIC AND HYDROLOGIC ANALYSIS

CONTENTS: Following are stage vs. storage curves for both reservoirs, plus rating curves and calculations for the spillway structures of the dam and road fill upstream of the dam.

PROCEDURE: The assessment of spillway adequacy for Mary's Creek Dam # 9 was accomplished on the basis of two separate routings for each antecedent moisture condition. An inflow hydrograph from the area upstream of Bryant Road was routed through the 66 inch culvert under the road. A separate inflow hydrograph was generated for the remainder of the drainage area downstream of Bryant Road. This later hydrograph was combined with the outflow hydrograph generated from the first routing (through the upstream dam) and the composite hydrograph was routed through Mary's Creek Dam # 9.

SUMMARY OF ROUTINGS

EVENT	ANTECEDENT MOISTURE CONDITION	
	II	III
PMF	Dam overtops 2.0 feet for 3.5 hours	Dam overtops 2.2 feet for 3.7 hours
$\frac{1}{2}$ PMF	Dam overtops 0.2 feet for 1.7 hours	Dam overtops 0.6 feet for 2.2 hours
100 - YEAR	Dam maintains 4.6 feet of freeboard	Dam maintains 3.2 feet of freeboard

MARYS CREEK #9
 STAGE VS. STORAGE
 ('MSL VS. AC-FT.)

○ - SMALL U/S LAKE
 * - MAIN LAKE

EL.
 'MSL

370 -

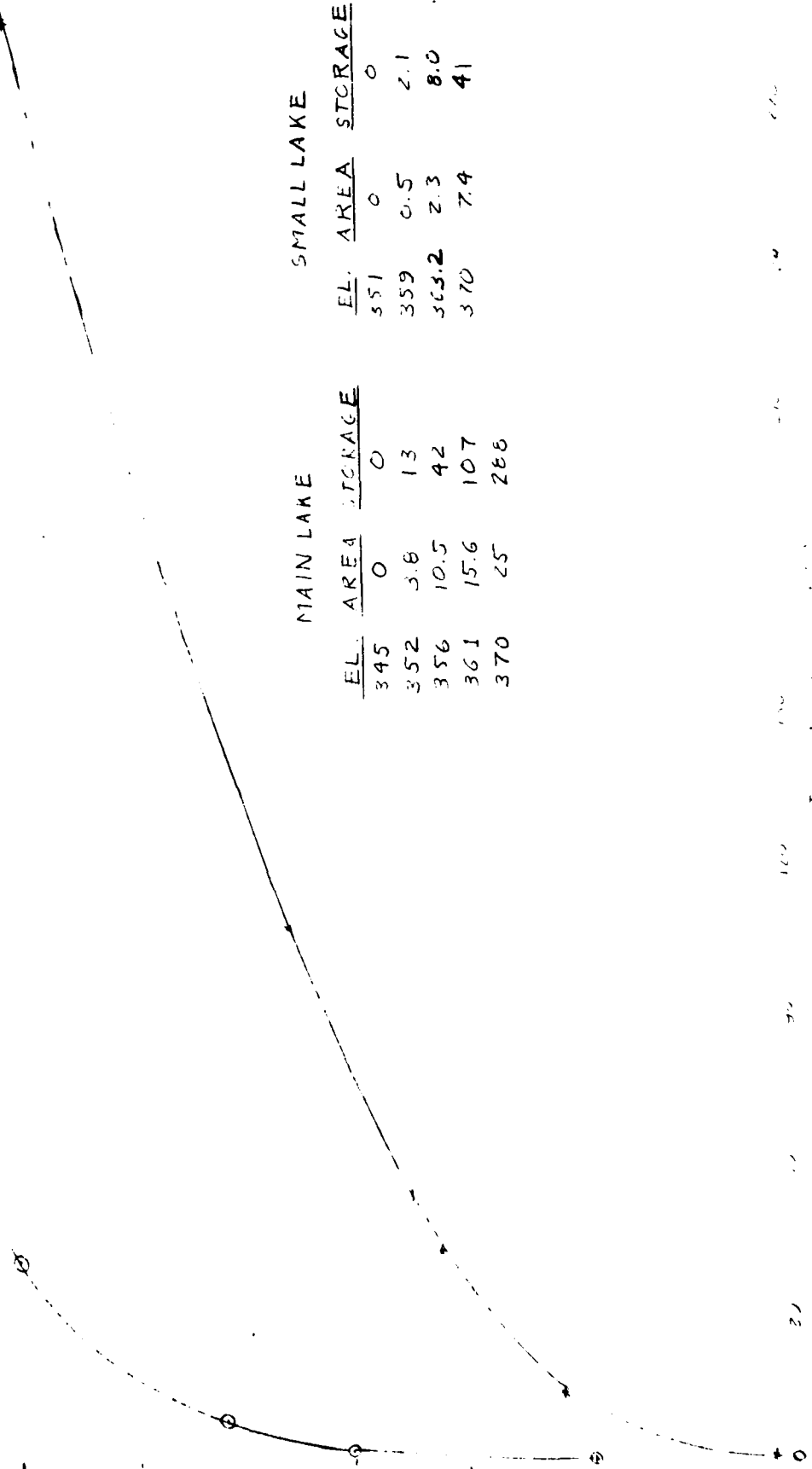
365

360

355

350

345



MAIN LAKE		SMALL LAKE	
EL.	AREA STORAGE	EL.	AREA STORAGE
345	0	351	0
352	3.8	359	0.5
356	10.5	363.2	2.3
361	15.6	370	7.4
370	25		41

368-

MARYS CREEK #9
PRINCIPAL SPILLWAY RATING
LAKE EL. (MSL) VS. Q (CFS)

365-

○ - LOW STAGE ORIFICE
★ - HIGH STAGE WEIR
□ - HIGH STAGE ORIFICE
* - PIPE FLOW

CHANGE FROM WEIR
TO ORIFICE FLOW

362 -

LK EL.
(MSL)

359 -

356 -

352 -

350 -

240

40

45

50

60

70

80

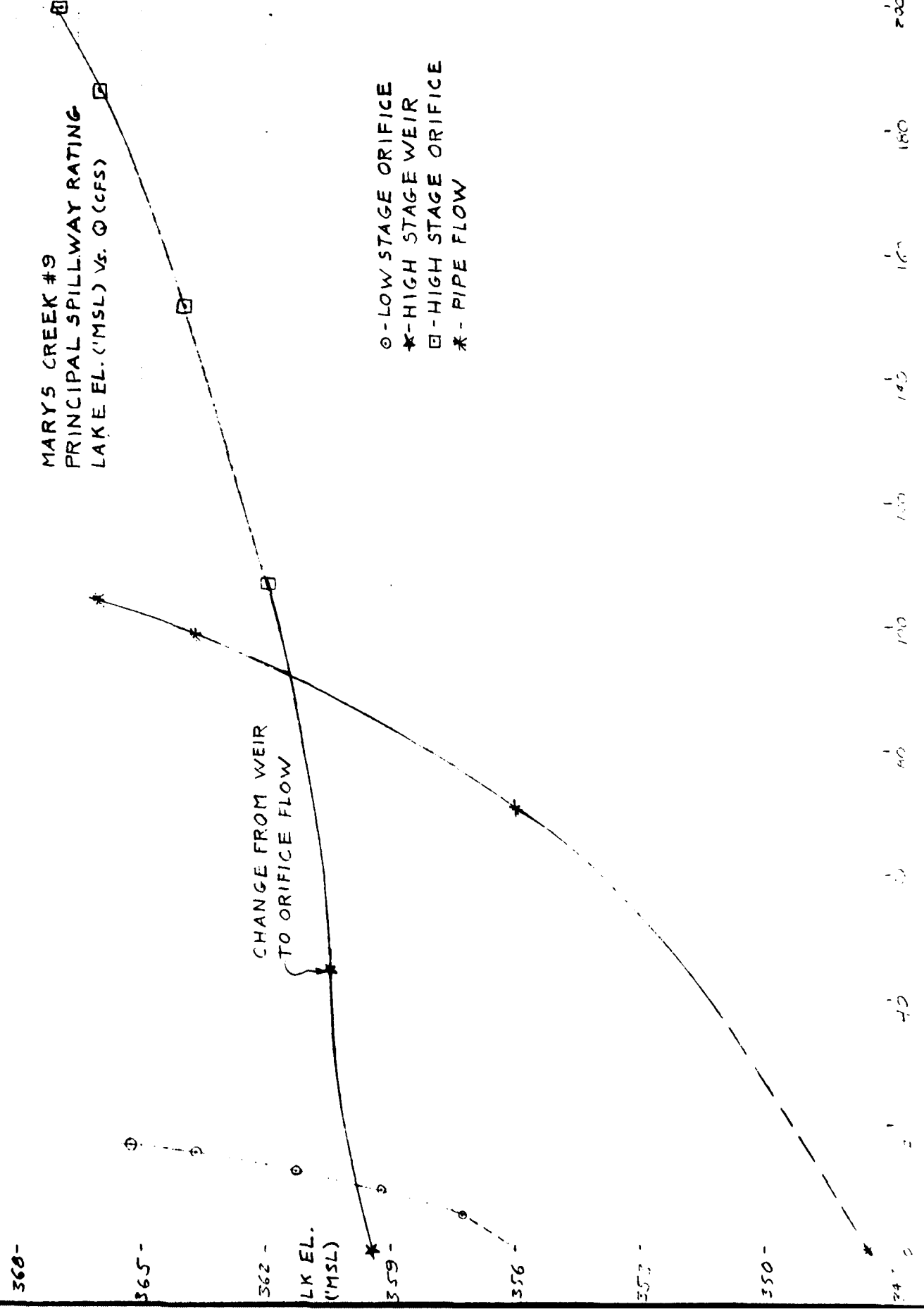
90

100

110

120

Q (CFS)



368 -

365 -

362 -

359 -

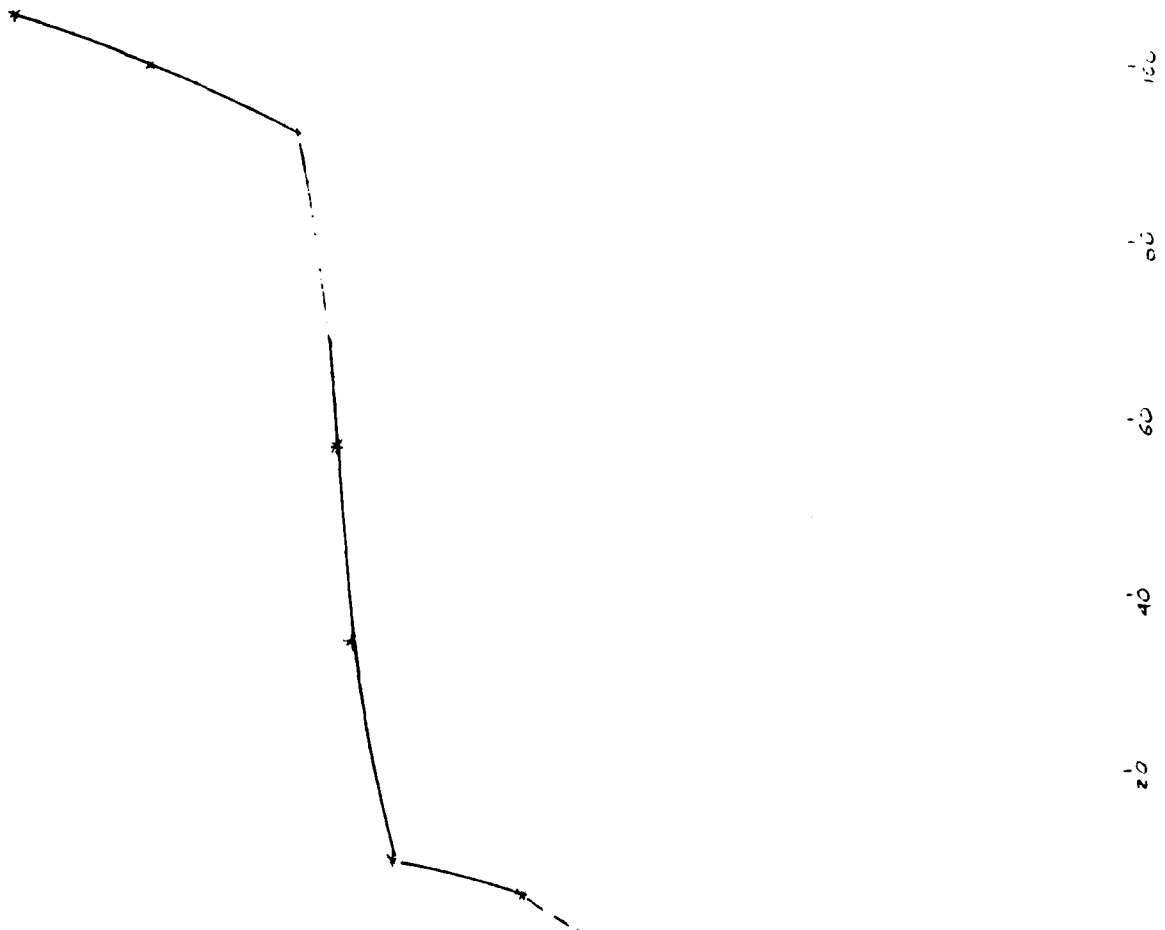
356 -

353 -

350 -

347

MARYS CREEK #9
 COMPOSITE PRIN. SPIL. RATING
 LAKE EL. ('MSL) Vs. Q (CFS)



LAKE EL.

Q (CFS)

356
 357.3
 359.5
 360.2
 360.5
 361.2
 363.7
 366.0

0
 6
 10
 36
 56
 92
 99
 105

347 20 40 60 80 100 120 140 160 180 200

MARYS CREEK #9
 EMER. SPIL. RATING
 LAKE EL. ('MSL) VS. Q (CFS)

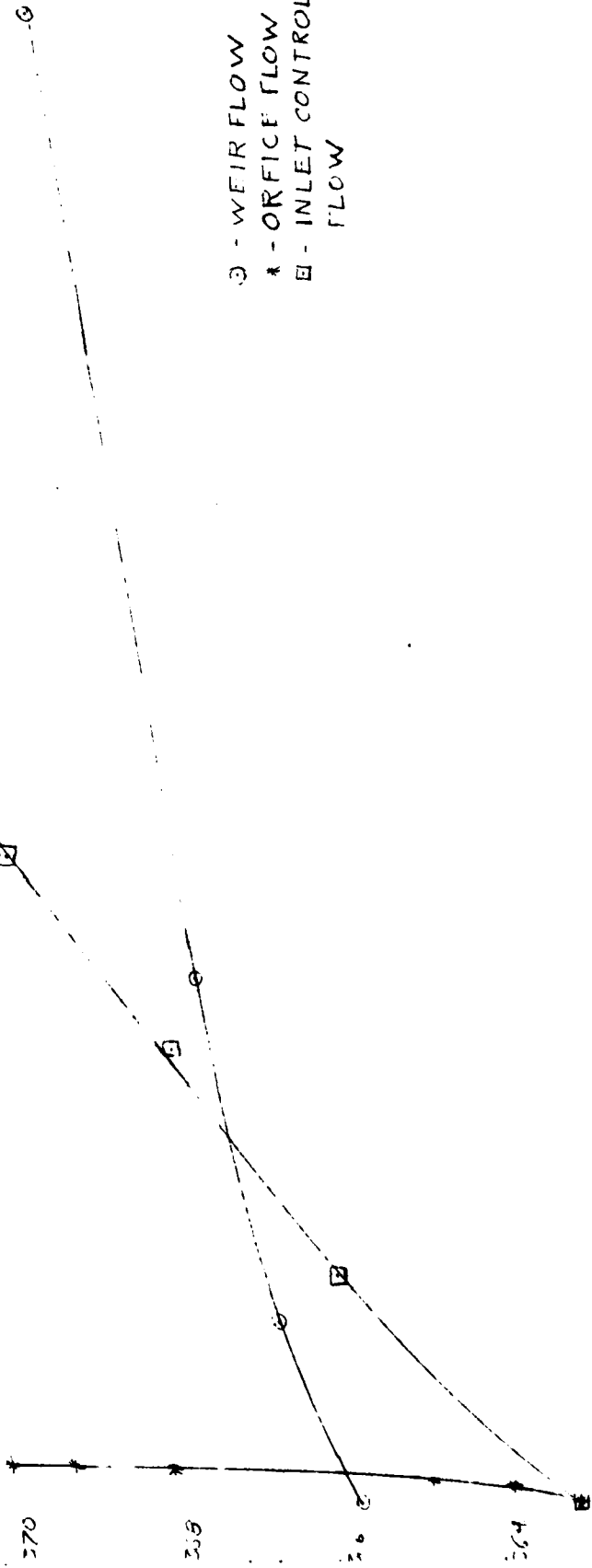
LAKE EL.	Q (CFS)
361.5	0
362.5	45
364.4	453
365.6	859
367.0	1490



7-
 6-
 5-
 4-
 3-
 2-

RATING CURVE FOR CULVERT
 U/S OF MARYS CK. #9
 LAKE EL. ('MSL) VS. Q (CFS)

372
 LAKE EL.
 ('MSL)



○ - WEIR FLOW
 * - ORFICE FLOW
 □ - INLET CONTROLLED PIPE FLOW

Q (CFS)

LAKE EL.
(MSL)

72

70

68

66

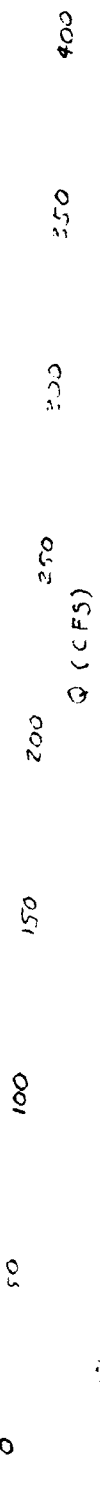
64

62

60

COMPOSITE RATING CURVE
FOR CULVERT U/S OF MARYS
CK. #9.
LAKE EL. (MSL) VS. Q (CFS)

LAKE EL. (MSL)	FLOW (CFS)
363.2	0
364.2	5
365.9	8
366.9	66
367.4	110
368.2	140
370.2	200
373.2	300



CURVE NUMBER & LAG TIME DETERMINATION:

CN: THE CURVE # DETERMINED BY THE SCS WAS ADJUSTED DOWNWARD FROM 72 TO 75 CONSIDERING A SLIGHT INCREASE IN DEVELOPMENT OF THE DRAINAGE AREA SINCE CONSTRUCTION OF THE DAM + CONSIDERING THE POOL AREA AS HAVING 100% RUNOFF. THE LAG WAS NOT CONSIDERED AS A PERCENTAGE OF THE DRAINAGE AREA IN THE ORIGINAL CALCULATIONS.

LAG TIME: THE SCS CURVE # METHOD WAS USED IN LIEU OF THE ORIGINAL AREA VELOCITY METHOD SINCE IT IS CONSIDERED MORE ACCURATE (ALTHOUGH TYPICALLY GIVING A LARGER VALUE). IT WAS NECESSARY TO RECALCULATE THE LAG TIME BECAUSE THE DRAINAGE AREA IS CONSIDERED AS 2 SQUARES IN THE ANALYSIS AS OPPOSED TO THE ORIGINAL AREA OF THE ORIGINAL DESIGN.

$$\begin{aligned}
 \text{AMC II} \quad L &= \frac{1000^{0.7} (S+1)^{0.7}}{1900 \sqrt{S}} & S &= \frac{1000}{CN} = 10 = 3.73 \\
 &= \frac{1000^{0.7} (3.73+1)^{0.7}}{1900 (3.73)^{0.5}} \\
 &= 0.45 \text{ hrs. FOR BOTH SQUARES}
 \end{aligned}$$

$$\begin{aligned}
 \text{AMC II} \quad L &= \frac{2000^{0.8} (1.5S+1)^{0.8}}{1900 (S)^{0.8}} & S &= \frac{1000}{CN} = 10 = 3.73 \\
 &= 0.3 \text{ hrs. FOR BOTH SQUARES}
 \end{aligned}$$

MARYS CREEK #9

SPILLWAY RATING CALCULATIONS:

PRINCIPAL SPILLWAY -

① LOW STAGE ORIFICE:

APPROX. ORIFICE DIMENSIONS $L = 2.3'$

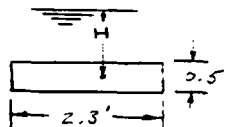
$H = 6''$

$A = 1.15 \text{ sq}'$

DISCHARGE COEFFICIENT $C \approx 0.61$

$$Q = C V_T A$$

$$= 0.7 V_T$$



<u>H</u>	<u>LAKE EL.</u>	<u>V_T (FPS)</u>	<u>Q (CFS)</u>
1	357.3	8.0	5.6
3	359.3	13.9	9.7
5	361.3	17.9	12.6
7.7	363.7	22.3	15.6
9	365.3	24.1	16.8

② HIGH STAGE WEIR:

WEIR DIMENSIONS - $2 \times 7.5'$

$$Q = CLH^{3/2}$$

$C \approx 3.1$ (SINCE IT APPROACHES SHARP-CRESTED WEIR, WE MAY NOT CORRECT C)

$$Q = 46.5 H^{3/2}$$

<u>H</u>	<u>LAKE FL.</u>	<u>Q (CFS)</u>
0	359.5	0
1	360.5	46

③ HIGH STAGE ORIFICE

ORIFICE DIMENSIONS: $L = 2 \times 7.5'$

$H = 1'$

$C \approx 0.63$

$$Q = CA V_T$$

$$= 9.45 V_T$$

<u>H</u>	<u>LAKE ELEV.</u>	<u>V_T (FPS)</u>	<u>Q (CFS)</u>
2	362.0	11.3	107
4	364.0	16.0	152
6	366.0	19.6	186
7	367.0	21.2	200

MARYS CREEK #9
SPILLWAY RATING (CONTINUED)

④ PIPE FLOW:

USING BERNOULLI EQU.

$$Q = A \sqrt{\frac{2gH}{1+K_e+K_b+K_{pL}}} \quad K_p = \frac{5100 n^2}{D^{4/3}} = \frac{5100 (0.012)^2}{30^{4/3}} = 7.87(10)^{-3}$$

$$= 4.91 \sqrt{\frac{64.4 H}{1+0.5+0+7.9(10)^{-3} 138'}}$$

$$= 24.5 \sqrt{H}$$

H'	WATER SURFACE EL.	Q (CFS)
0	347.5	0
8.5	356	71
16.2	363.7	99
18.5	366	105

RATING CALCULATIONS FOR CULVERT U/S OF MARYS CK. #9:
ORIFICE FLOW FOR THE IRREGULAR OPENING IN THE DROP INLET BOX.

$$Q = CA \sqrt{2gH} \quad C \approx 0.61$$

$$= 4.89 \sqrt{H} \quad A \approx 1 \text{ C}'$$

H'	LAKE EL.	Q (CFS)
0	363.2	0
1	364.2	5
2	365.2	7
5	368.2	11
6	369.2	12
7	370.2	13

INLET CONTROL PIPE FLOW FROM
NOMOGRAPHS IN LDBX OF CULV. PIPE TYPE.

H'	LAKE EL.	H/D	Q (CFS)
0	363.2	0	0
3	366.2	0.55	70
5	368.2	0.91	140
7	370.2	1.27	200
10	373.2	1.82	300

WEIR FLOW OVER INLET STRUCTURE:

$$Q = CLH^{3/2} \quad \text{USE MAX. BROAD CRESTED WEIR COEFF. OF 3.1}$$

$$Q = 3.1 (18.5) H^{3/2}$$

$$Q = 57.35 H^{3/2}$$

H'	LAKE EL.	Q (CFS)
0	365.9	0
1	366.9	57
2	367.9	162
4	369.9	459
5	370.9	641

MARYS CREEK WATERSHED DAM #9
SHELBY COUNTY
AMC II
6

41 105
42 1
43 0.112
B1 1
B2 0.112
C1 1
K1 1
M 1
P 1
T 1
U2 0
X 1
Y 1
Z 1

INFLU HYDROGRAPH COMPUTATIONS FOR U/S LAKE

0.202 101 102
100 101 102

-1 -75

ROUTING THROUGH SMALL U/S LAKE

364.2 365.9 366.9 367.4 368.2 369.2 370.2 371.2
5.1 8.0 22.5 41 363.2 370.2 373.2
359 363.2 367.5 370 200 300

INFLU HYDROGRAPH COMPUTATIONS FOR MARYS CREEK #9

0.130 101 102
100 101 102

-1 -75

HYDROGRAPHS COMBINED AT THIS POINT
ROUTING THROUGH MARYS CREEK #9

357.3 359.5 360.2 360.5 361.5 362.5 363.5 364.4 365.6 367
6 10 36 56 93 140 554 963 1598
9 12 42 107 288
350.5 352 356 361 370
3.1 1.5 678
80 320 430 678
364.7 364.9 365.0 365.1

101.
102.

1

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT 1
ROUTE HYDROGRAPH TO 2
RUNOFF HYDROGRAPH AT 3
COMBINE 2 HYDROGRAPHS AT 4
ROUTE HYDROGRAPH TO 5
END OF NETWORK

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 01 APR 88

RUN DATE: 81/07/15.
TIME: 09.20.54.

MARYS CREEK WATERSHED DAM #3
SHELBY COUNTY
AMC II

NO	NHR	NMIN	IDAY	IHR	ININ	METRIC	IPLT	IPRT	NSTAN
100	0	6	0	0	0	0	0	4	0

JOPER 5
NUT 0
LROPT 0
TRADE 0

JOB SPECIFICATION

MULTI-PLAN ANALYSES TO BE PERFORMED

PLAN- 1 RATIO- 3 LRTIO- 1

RTIOS- .11 .50 1.00

***** SUB-AREA RUNOFF COMPUTATION *****

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH COMPUTATIONS FOR U/S LAKE

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

IHYDQ	IUMQ	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOU	ISAME	LOCAL
1	2	.20	0.00	.20	1.00	0.000	0	1	0

HYDROGRAPH DATA

PRECIP DATA
SFFE 0.00 PHS 89.70 R6 100.00 R12 101.00 R24 102.00
R48 103.00 R72 104.00 R96 105.00

PEAK OUTFLOW IS 844. AT TIME 16.10 HOURS
 PEAK OUTFLOW IS 1766. AT TIME 16.00 HOURS

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH COMPUTATIONS FOR MARYS CREEK #9

IHYDG	IUNG	TAREA	SNAP	HYDROGRAPH DATA	RATIO	ISNOW	ISAME	LOCAL
1	2	.13	0.00	TRSDA	0.000	0	1	0
				TRSDA	0.000	0	1	0
				TRSDA	0.000	0	1	0

PRECIP DATA	R48	R72	R96
R12	0.00	0.00	0.00
R24	0.00	0.00	0.00
R48	0.00	0.00	0.00
R72	0.00	0.00	0.00
R96	0.00	0.00	0.00

LROPT	STAKR	DLTKR	RTIOL	ERAIN	STRSK	RTIOK	STRTL	CNSTL	ALSHX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	-1.00	-75.00	0.00	0.00

CURVE NO = -75.00 WETNESS = -1.00 EFFECT CN = 75.00

UNIT HYDROGRAPH DATA
 TC = 0.00
 LAG = .45

RECESSION DATA
 STRTO = 0.00
 QRCSN = 1.00
 RTIOR = 1.50

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW	NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
SUM													30.29
SUM													26.93
SUM													3.86
SUM													(769.)(678.)(93.)(631.52)

COMBINE HYDROGRAPHS

HYDROGRAPHS COMBINED AT THE JOINT

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO

:STAG 4 :COMP 2 IECON 3 JPLT 1 JPRT 0 IMAE 1 IASTG 0 IAUTO 0
 ITAPE 0

HYDROGRAPH ROUTING

ROUTING THROUGH MARYS CREEK 89

ISTAG 5	:COMP 1	IECON 0	ITAPE 0	JPLT 1	JPRT 0	IMAE 1	IASTG 0	IAUTO 0
GLOSS 0.0	AUG 0.00	IRRES 1	ROUTING DATA ISAME 1	IOPT 0	IPMP 0	LSTR 0		
4STPS 1	NSTD: 0	LAG 0	AMSKK 0.000	X 0.000	TSK 0.000	STORA -355.	ISPRAT -1	
356.00	357.30	359.50	360.20	360.50	361.50	362.50	364.40	365.00
FLOW 0.00	6.00	10.00	36.00	56.00	93.00	140.00	554.00	963.00

CAPACITY= 0. 9. 13. 42. 107. 288.

ELEVATION= 345. 351. 352. 356. 361. 370.

CREL 356.0	SPLID 0.0	COOL 0.0	EXPU 0.0	ELEVL 0.0	COOL 0.0	CAREA 0.0	EXPL 0.0
------------	-----------	----------	----------	-----------	----------	-----------	----------

DAM DATA
 TOPEL 363.7
 COOD 3.1
 EXPD 1.5
 DAMUID 678.

CREST LENGTH AT OR BELOW ELEVATION	0.	80.	320.	430.	678.
	363.7	364.7	364.9	365.0	365.1

PEAK OUTFLOW IS 9. AT TIME 20.00 HOURS

PEAK OUTFLOW IS 454. AT TIME 17.30 HOURS

PEAK OUTFLOW IS 2614. AT TIME 16.20 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS

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)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS		
				RATIO 1	RATIO 2	RATIO 3
HYDROGRAPH AT	1	.20	1	.53	862.	1725.
	(	.52)	(	5.47)	(24.42)	(48.84)
ROUTED TO	2	.20	1	.15	844.	1706.
	(	.52)	(	3.26)	(23.91)	(48.29)
HYDROGRAPH AT	3	.13	1	.124	555.	1110.
	(	.34)	(	3.52)	(15.72)	(31.43)
2 COMBINED	4	.33	1	2.8	1398.	2816.
	(	.86)	(	6.18)	(39.59)	(79.73)
ROUTED TO	5	.33	1	9.	454.	2614.
	(	.86)	(	.26)	(12.86)	(74.02)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	ELEVATION STORAGE	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM	DURATION OVER TOP	MAXIMUM	MAXIMUM	TIME OF
RATIO OF PMF	RESERVOIR U.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	MAXIMUM OUTFLOW CFS	MAXIMUM STORAGE AC-FT	MAXIMUM DEPTH OVER DAM	MAX OUTFLOW HOURS
.11	367.54	0.00	23.	115.	115.	23.	0.00	16.40
.50	370.16	.56	42.	844.	844.	42.	8.78	16.10
1.00	370.58	.98	45.	1706.	1706.	45.	4.00	16.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	ELEVATION STORAGE	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM	DURATION OVER TOP	MAXIMUM	MAXIMUM	TIME OF
RATIO OF PMF	RESERVOIR U.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	MAXIMUM OUTFLOW CFS	MAXIMUM STORAGE AC-FT	MAXIMUM DEPTH OVER DAM	MAX OUTFLOW HOURS
.11	359.11	0.00	82.	9.	9.	82.	0.00	20.00
.50	363.33	.23	166.	454.	454.	166.	1.70	17.30
1.00	365.57	.97	201.	2614.	2614.	201.	3.50	16.00

 FLOOD HYDROGRAPH PACKAGE (REC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 01 APR 80

 ECI.
 ECI

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1
 RATIO OF PMF .15
 .50
 1.00

ELEVATION STORAGE OUTFLOW	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
368.30	363.20	363.20	369.60	28.	143.	0.00	16.30	0.00
370.27	8.	8.	38.	43.	1057.	3.00	15.90	0.00
370.75	3.	0.	182.	47.	2128.	4.70	15.90	0.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1
 RATIO OF PMF .15
 .50
 1.00

ELEVATION STORAGE OUTFLOW	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
360.53	356.00	356.00	363.70	101.	57.	0.00	18.70	0.00
364.26	42.	42.	161.	173.	545.	2.20	16.60	0.00
365.86	0.	0.	401.	205.	3279.	3.70	16.60	0.00

 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 01 APR 80
 #####
 E01.
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APPENDIX G
CORRESPONDENCE



TENNESSEE DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES
4721 TROUSDALE DRIVE, NASHVILLE 37220
615/741-6860

Certified

December 1, 1980

Dr. Rushton E. Patterson
61 Cherokee Drive
Memphis, TN 38118

Dear Dam Owner:

As provided by the State Safe Dams Act, Tennessee Code Annotated, Sections 70-2501 to 70-2530, non-federal dams in Tennessee must be inspected and certified for safety by our agency. According to our records, you are identified as the owner of Mary's Creek Dam, located in Shelby County, Tennessee. Enclosed for your information and review is a copy of our inventory record on the structure along with a copy of the Act and adopted rules and regulations.

Tentative plans are to schedule a safety inspection of your dam within the next few months. A staff engineer will very shortly be in further communication with you to discuss the pending inspection and your responsibilities under the Safe Dams Act. Your immediate attention, however, is called to the matter of maintaining the earthen dam with a good grass cover and clear of all brush, undergrowth and tree growth. If these conditions do not presently exist, please make plans to remove the brush, undergrowth and all trees less than two inches in diameter as soon as possible. Larger trees may have to be removed at a later date but must be done so under the direction of an experienced engineer.

Please let me, or our Chief Engineer, Mr. Ed O'Neill, know of any assistance we might be.

Very truly yours,

Robert A. Hunt, P.E.
Director, Division of Water Resources

RAH:lt

Enclosures

ORNED-G


NON-FEDERAL DAM INSPECTION REVIEW BOARD
PO BOX 1070
NASHVILLE, TENNESSEE 37202

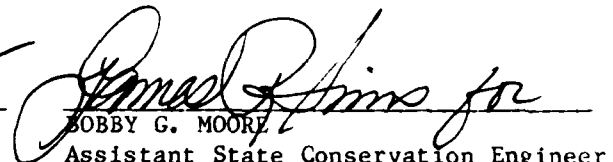
Commander, Nashville District
US Army Corps of Engineers
PO Box 1070
Nashville, TN 37202


1. The Interagency Review Board, appointed by the Commander on 19 June 1981, presents the following recommendations after meeting on 27 August 1981, to consider the Phase I investigation report on Mary's Creek Watershed Dam No. 9, inspected by the Tennessee Department of Conservation.
2. The conclusions should state that the marginal overtopping of the dam will not cause failure.
3. It should not be recommended to prohibit cattle from the dam; however, the cattle grazing should be controlled to minimize the damage to the embankment.
4. The operation and maintenance of the dam is with the Shelby County Soil Conservation Service. All references and recommendations should be made to this agency.
5. A qualified engineer should be engaged to recommend project modifications to allow safe passage of the design storm.

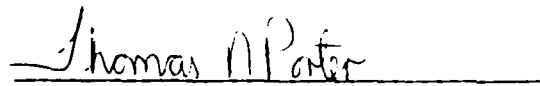
ORNED-G
Commander, Nashville District
US Army Corps of Engineers


6. The Board is in agreement with other report conclusions and recommendations following minor revisions.

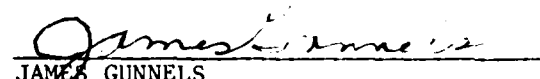

FRANK B. COUCH, JR.
Chief, Geotechnical Branch
Chairman


BOBBY G. MOORE
Assistant State Conservation Engineer
Alternate, Soil Conservation Service


EDMOND B. O'NEILL
Alternate, Division of Water Resources
State of Tennessee


THOMAS N. PORTER
Hydraulic Engineer
Alternate, Hydrology and Hydraulics
Branch


EDWARD B. BOYD
Hydrologic Technician
Alternate, US Geological Survey


JAMES GUNNELS
Structural Engineer
Alternate, Design Branch

END

DATE
FILMED

1-82

DTIC