

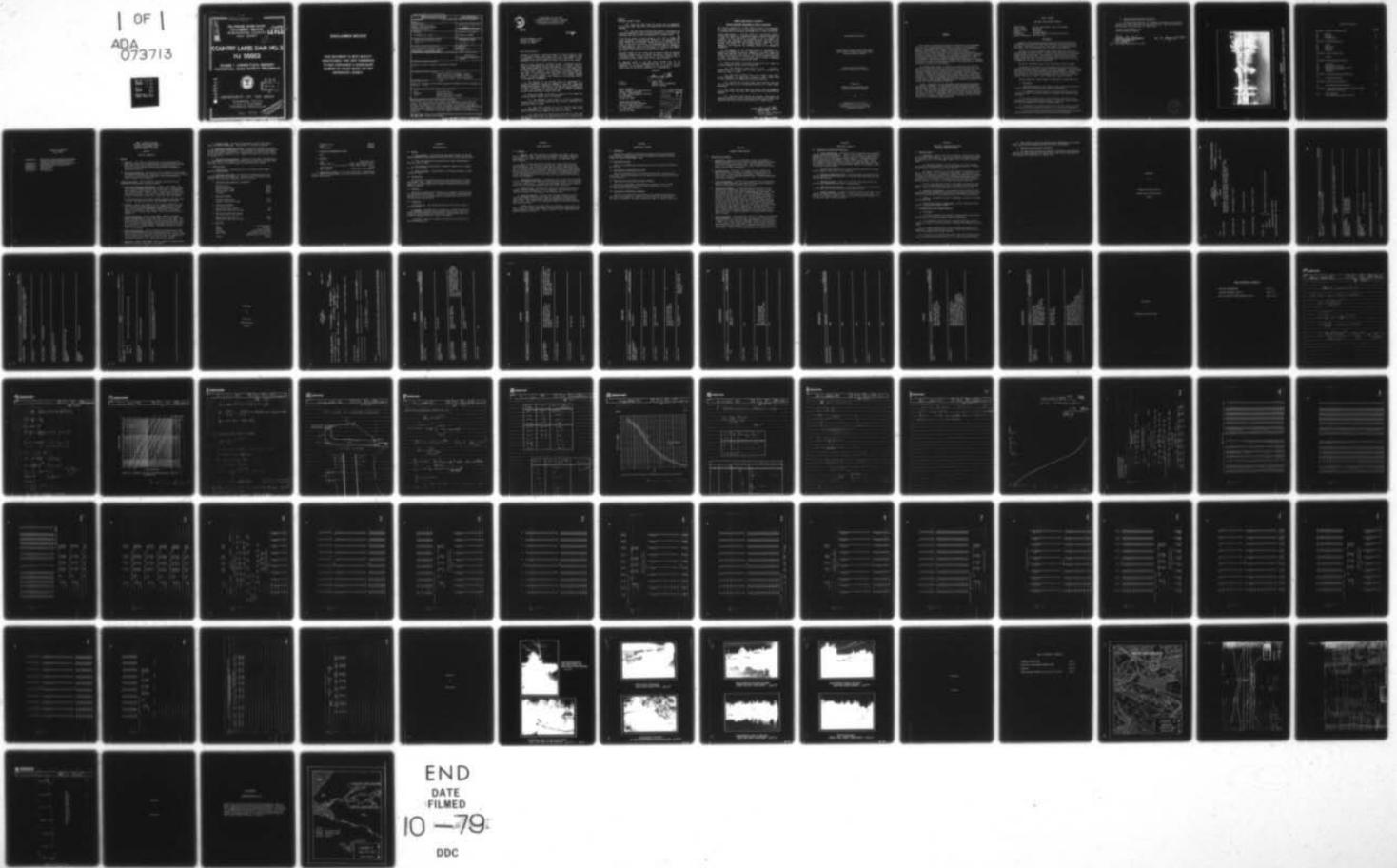
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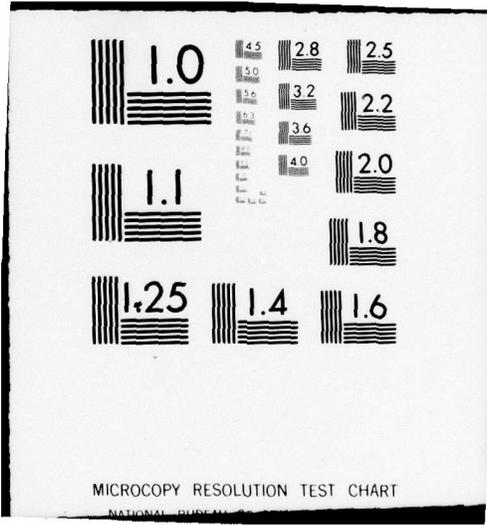
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NATIONAL DAM SAFETY PROGRAM. COUNTRY LAKES DAM NUMBER 3 (NJ-000--ETC(U)  
MAY 79 J J WILLIAMS DACW61-78-C-0052

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NATIONAL BUREAU OF STANDARDS

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DELAWARE RIVER BASIN  
CRANBERRY BROOK,  
BURLINGTON COUNTY  
NEW JERSEY

LEVEL

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# COUNTRY LAKES DAM NO. 3 NJ 00052

## PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM

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DEPARTMENT OF THE ARMY  
Philadelphia District  
Corps of Engineers  
Philadelphia, Pennsylvania

May, 1979

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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4. TITLE (and Subtitle) Phase I Inspection Report National Dam Safety Program Country Lakes Dam No. 3 Burlington County, N.J.		5. TYPE OF REPORT & PERIOD COVERED 9 FINAL report
7. AUTHOR(s) Williams, John J. E.E. / williams		6. PERFORMING ORG. REPORT NUMBER
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18. SUPPLEMENTARY NOTES Copies are obtainable from National Technical Information Service, Springfield, Virginia, 22151.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dams Visual Inspection Spillways Structural Analysis Safety National Dam Safety Act Report Country Lakes Dam No .3 N.J.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's ade- quacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report. 410 760		



DEPARTMENT OF THE ARMY  
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS  
CUSTOM HOUSE—2 D & CHESTNUT STREETS  
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO  
NAPEN-D

20 AUG 1979

Honorable Brendan T. Byrne  
Governor of New Jersey  
Trenton, NJ 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Country Lakes No. 3 Dam in Burlington County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Country Lakes Dam No. 3, initially listed as a high hazard potential structure but reduced to a significant hazard potential structure, as a result of this inspection, is judged to be in overall fair condition. The spillway is considered inadequate since 33% of the Spillway Design Flood (SDF) would overtop the dam. (The SDF, in this instance, is one-half of the Probable Maximum Flood). To insure adequacy of the structure, the following actions, as a minimum are recommended:

a. The adequacy of the spillway should be determined by a qualified professional consultant, engaged by the owner, using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980.

b. Within six months of the date of approval of this report the following remedial actions should be completed:

(1). The embankment slopes should be filled and regraded to provide slopes of at least 2H:1V and they should be protected with vegetative cover or riprap.

(2). The outlet wingwalls are in poor condition and erosion of the embankment is taking place behind the walls. These areas should be backfilled and compacted with suitable material.

(3). Mud and silt should be kept clear from the slide gate and the slide gate should be operated periodically to insure proper maintenance.

NAPEN-D

Honorable Brendan T. Byrne

(4). Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.

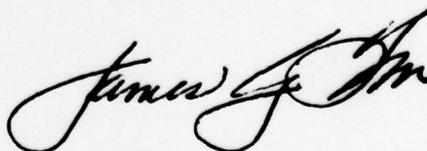
(5). The Owner should develop and implement a maintenance and inspection checklist to insure that the slide gate and all other items associated with the structure are maintained on a regular basis.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Edwin B. Forsythe of the Sixth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,



JAMES G. TON  
Colonel, Corps of Engineers  
District Engineer

2 Incl  
As stated

Copies furnished:  
Dirk C. Hofman, P.E., Deputy Director  
Division of Water Resources  
N.J. Dept. of Environmental Protection  
P.O. Box CNO29  
Trenton, NJ 08625

John O'Dowd, Acting Chief  
Bureau of Flood Plain Management  
Division of Water Resources  
N.J. Dept. of Environmental Protection  
P.O. Box CNO29  
Trenton, NJ 08625

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COUNTRY LAKES DAM NO. 3 (NJ00052)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 12 April 1979 by O'Brien & Gere Engineers, Inc., under contract to the U.S. Army Engineer District, Philadelphia, in accordance with the National Dam Inspection Act, Public Law 92-367.

Country Lakes Dam No. 3, initially listed as a high hazard potential structure but reduced to a significant hazard potential structure, as a result of this inspection, is judged to be in overall fair condition. The spillway is considered inadequate since 33% of the Spillway Design Flood (SDF) would overtop the dam. (The SDF, in this instance, is one-half of the Probable Maximum Flood). To insure adequacy of the structure, the following actions, as a minimum are recommended:

a. The adequacy of the spillway should be determined by a qualified professional consultant, engaged by the owner, using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980.

b. Within six months of the date of approval of this report the following remedial actions should be completed:

(1). The embankment slopes should be filled and regraded to provide slopes of at least 2H:1V and they should be protected with vegetative cover or riprap.

(2). The outlet wingwalls are in poor condition and erosion of the embankment is taking place behind the walls. These areas should be backfilled and compacted with suitable material.

(3). Mud and silt should be kept clear from the slide gate and the slide gate should be operated periodically to insure proper maintenance.

(4). Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.

(5). The Owner should develop and implement a maintenance and inspection checklist to insure that the slide gate and all other items associated with the structure are maintained on a regular basis.

APPROVED: 

JAMES G. TON

Colonel, Corps of Engineers  
District Engineer

DATE: 27 April 1979

DELAWARE RIVER BASIN

Name of Dam: Country Lakes Number 3 Dam  
County & State: Burlington County, New Jersey  
Inventory Number: NJ 00052

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM

Prepared by:

O'BRIEN & GERE ENGINEERS, INC  
JUSTIN & COURTNEY DIVISION

For

DEPARTMENT OF THE ARMY  
Philadelphia District, Corps of Engineers  
Custom House-2nd & Chestnut Streets  
Philadelphia, PA 19106

## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE 1 REPORT  
NATIONAL DAM INVENTORY PROGRAM

Name of Dam: Country Lakes Number 3 Dam ID #NJ 00052  
State Located: New Jersey  
County Located: Burlington  
Stream: Cranberry Brook  
Coordinates: Latitude 39° 57'30" Longitude 74° 32'30"  
Date of Inspection: April 12, 1979

ASSESSMENT

Based on visual observations made during the field investigation, information made available by the New Jersey DEP and conversations with the Owner's representative, Country Lakes Number 3 Dam (owned by Friendship Lakes, Inc.) is considered to be in overall fair condition.

The dam is an earth embankment approximately 300 feet long with a maximum height of about 13 feet. A 28-foot wide paved road is constructed along the crest of the dam. The spillway is a drop inlet system with a timber inlet structure and a 6-foot diameter steel pipe outlet which is located under the road. The 44.0 acre normal pool is used for recreation by members of the Country Lakes development.

The dam is considered to be in the "Significant" hazard category.

Examination of the results of the hydrologic and hydraulic analyses indicate that the spillway is capable of passing 32 percent of the Spillway Design Flood (SDF) without overtopping the earth embankment. The SDF chosen for use on this site is 50 percent of the Probable Maximum Flood (PMF). The spillway is classified as "Inadequate" but not "Seriously Inadequate" because the dam is a "Small" size, "Significant" hazard structure.

Several conditions require further investigation or maintenance soon.

a. Facilities.

1. A detailed hydrologic and hydraulic study should be made and the need and type of mitigating measures should be determined.

2. The embankment slopes should be filled and regraded to provide slopes of at least 2:1 and they should be protected with vegetative cover or riprap.

3. The outlet wingwalls are in poor condition and erosion of the embankment is taking place behind the walls. These areas should be back-filled and compacted with suitable compacted material.

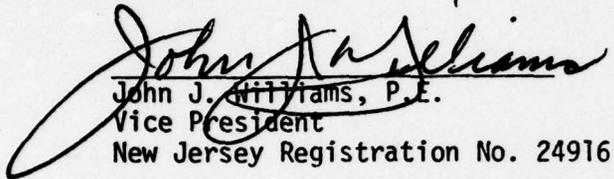
4. The mud and silt should be kept clear from the slide gate and the slide gate should be operated periodically to insure proper maintenance.

5. Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.

b. Operation and Maintenance Procedures .

1. The Owner should develop and implement a maintenance and inspection checklist to insure that the slide gate and all other items associated with the structure are maintained on a regular basis.

O'BRIEN & GERE ENGINEERS, INC.  
JUSTIN & COURTNEY DIVISION

  
John J. Williams, P.E.  
Vice President  
New Jersey Registration No. 24916

Date: 3 August 1979





*OVERVIEW  
COUNTRY LAKES DAM NO. 3, BURLINGTON COUNTY, NEW JERSEY*

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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION REPORT  
COUNTRY LAKES NUMBER 3 DAM  
INVENTORY NUMBER - NJ 00052

SECTION 1

PROJECT INFORMATION

1.1 General

- a. Authority. This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with contract #DACW 61-78-C-0052 between O'Brien & Gere Engineers, Justin & Courtney Division and the United States Army Corps of Engineers, Philadelphia District.
- b. Purpose of Inspection. The purpose of this inspection is to evaluate the structural and hydraulic condition of the Country Lakes No. 3 Dam and appurtenant structures and to determine if the dam constitutes a hazard to human life or property.

1.2 Project Description. (From information obtained from the New Jersey Department of Environmental Protection (DEP)).

- a. Description of Dam and Appurtenances. Country Lakes Number 3 Dam is an earth embankment approximately 300 feet long. A 28-foot wide paved roadway is located on the crest of the dam. The embankment has a maximum height of about 13 feet. The spillway is a drop inlet constructed of timber. The outlet of the drop inlet consists of a concrete transition structure and a steel pipe 6 feet in diameter.

At the downstream end of the pipe, masonry wingwalls have been built to protect the downstream slope of the embankment from erosion.

- b. Location. Country Lakes Number 3 Dam is located in Pemberton Township, Burlington County, New Jersey, on Cranberry Brook. The dam site is shown on the USGS Quadrangle entitled "Browns Mills, New Jersey" at coordinates N 39° 57'30", W 74° 32'30". A regional location plan of Country Lakes Number 3 Dam is enclosed as Plate 1, Appendix E.
- c. Size Classification. Country Lakes Number 3 Dam has a maximum height of approximately 13 feet which places it in the "Small" size dam category for height because it is less than 40 feet high. The dam has a maximum storage volume of about 300 acre-feet which places it in the "Small size dam category for storage because it has less than 1,000 Ac. Ft. maximum storage. Therefore, the dam is in the "Small" size category.
- d. Hazard Classification. There are about 18 homes downstream of the dam which would experience some flood damage from water 1 to 2 feet deep in their first floors with a failure of the dam. However, there is little chance there would be any loss of life. Therefore, the dam should be placed in the "Significant" hazard category.
- e. Ownership. Country Lakes Number 3 Dam is owned by Friendship Lakes, Inc., P. O. Box #18, Brown Mills, NJ 08015.

f. Purpose of Dam. The dam was constructed as part of the Country Lakes real estate development. The reservoir is used for recreation.

g. Design and Construction History. The dam was originally constructed during 1955 without a legal permit. The dam appears to have been reconstructed in 1957-1959 based on the design of B. Harold Wills, 217 Hight Street, Mount Holly, New Jersey, License No. 178. Drawings available for review are listed in section 2.1.a.

h. Normal Operating Procedure. According to the Owner's representative, Mr. Steven Albano, the reservoir is normally maintained at the spillway crest elevation, and it is drained annually to reduce the algae problem.

### 1.3 Pertinent Data .

a. Drainage Area. The drainage area to the Country Lakes Number 3 Dam is 6.6 square miles.

b. Discharge at Dam Site. No high pool or discharge records were made available for this inspection. Discharge with the reservoir level at Elev. 82.70 (low point along dam crest) is 670 cfs.

c. Elevation (feet above MSL - estimated).

Spillway crest	78.70
Design top of Dam	83.30
Low Spot (top of dam)	82.70
Outlet conduit Invert	70.50
Tailwater	+72.0

d. Reservoir (miles).

Length of Normal Pool	0.53
Length of Pool (top of dam)	1.25

e. Storage (acre-feet).

Normal Pool (Elev. 78.70)	44
Design Top of Dam (Elev. 83.30)	380

f. Reservoir Surface Area (acres).

Normal Pool (Elev. 78.70)	18.5
Design Top of Dam (Elev. 83.30)	140

g. Dam Data .

Type	Earth Embankment
Length	300 feet +
Height	13 feet (maximum)
Top Width	Approximately 28 feet
Side Slopes	Both slopes variable from approximately 1H:1V to 3H:1V
Zoning	Unknown

Impervious Core  
Cutoff  
Grout Curtain

Unknown  
Unknown  
Unknown

h. Diversion and Regulating Tunnel.

None

i. Spillway.

Type	Timber drop inlet
Length of Weir	Three sided box with 10 ft., 11 ft., and 10 ft. sides, total length = 31 ft.
Crest Elevation	78.70
Outlet Conduit	Steel pipe 6 feet diameter

j. Regulating Facilities. A low level slide gate of undetermined size is located on the upstream face of the Spillway box, which is used to drain the reservoir.

SECTION 2  
ENGINEERING DATA

2.1 Design.

a. Data Available. The engineering data made available by the New Jersey Department of Environmental Protection (DEP) includes the following:

1. Plans and sections for reconstruction of dam, dated December 5, 1956 (Rev. May 13, 1957).
2. Miscellaneous correspondence, inspection reports, etc., between the State and the Owner.

b. Design Features. A description of the design features is given in Section 1.2.a.

2.2 Construction.

No information is available concerning the construction of Country Lakes Number 3 Dam. However, based on the field investigation, the dam appears to have been constructed in general conformance with the reconstruction drawings.

2.3 Operation.

Operational procedures are limited to the control of the slide gate for the reservoir drain system. According to the Owner's representative, residents in the vicinity of the dam are contacted when the reservoir is rising during a heavy rainfall.

2.4 Evaluation.

a. Availability. The engineering data utilized in this report is provided by DEP.

b. Adequacy. Although design information is minimal and there is no construction information, the conditions observed during the field inspection and discussions with the Owner's representative appear to provide an adequate basis for a Phase 1 evaluation.

c. Validity. There is no reason to question the validity of the data obtained from DEP.

## SECTION 3

### VISUAL INSPECTION

#### 3.1 Findings.

a. General. The field inspection of Country Lakes Number 3 Dam was made on April 12, 1979. At the time of inspection, the water surface was approximately two inches above the spillway crest. No underwater areas were inspected.

b. Dam. The upstream face of the dam has a sparse cover of grass, weeds and bushes. The slope of the upstream face varies from about 3H:1V to 1H:1V along the dam. A 28-foot wide road is located on the top of the dam. The visible portion of the downstream slope consists of sandy material and has virtually no slope protection. Several erosion channels are evident on the downstream slope due to the surface runoff. The downstream slope varies from approximately 3H:1V near the toe of the slope to 1H:1V near the top of the embankment.

c. Appurtenant Structures. The reservoir drain is difficult to operate since it is located at the upstream face of the box spillway. The slide gate is buried in mud and silt. The drop spillway appears to be in good condition except for the downstream wingwalls which are in poor condition.

d. Reservoir Area. The reservoir slopes are relatively flat (varying between 2 and 10 percent) and fairly well vegetated. No significant slope stability problems are anticipated in the reservoir area.

e. Downstream Channel. The drop inlet spillway discharges through its outlet conduit into a reservoir which is created by a dam (Country Lakes Number 2 Dam) located about 2,800 feet downstream of Country Lakes Number 3 Dam. The slopes of the downstream reservoir are heavily overgrown with trees and brush.

Eighteen homes are located around the reservoir downstream of the dam. Failure of Country Lakes Number 3 Dam would possibly cause appreciable property damage to these homes. However, there is little likelihood there would be any loss of life.

## SECTION 4

### OPERATIONAL FEATURES

#### 4.1 Procedures.

Based on the review of information provided by DEP and conversations with the Owner's representative, no formal operating procedures are established for Country Lakes Number 3 Dam.

#### 4.2 Maintenance of Dam.

There is no evidence that maintenance procedures have been established for this dam.

#### 4.3 Maintenance of Operating Facilities.

The only operating facility associated with the dam is the low level slide gate. The only maintenance of this gate consists of occasional testing of its operation.

#### 4.4 Description of any Warning Systems in Effect.

According to the Owner's representative, residents in the vicinity the dam are contacted personally by the Dam Tender when the reservoir is rising during a heavy rainfall.

#### 4.5 Evaluation of Operational Adequacy.

The drop inlet and slide gate appeared to be adequately maintained at the time of the inspection. However, the slide gate was not operated at the time of inspection. The dam is accessible under all weather conditions.

## SECTION 5

### HYDRAULIC AND HYDROLOGY

#### 5.1 Evaluation of Features

- a. Design Data. Based on our calculations, Country Lakes Number 3 Dam has a drainage area of 6.6 square miles and impounds a reservoir of 44 acre-feet at the spillway crest. The spillway facilities consists of a timber drop inlet with a three sided weir and a steel outlet conduit 6 feet in diameter.
- b. Experience Data. No records of reservoir level or rainfall are kept for this dam, according to the Owner's representative, Mr. Steven Albano. Also according to the Owner's representative, it takes about 3 days to draw the reservoir down. The dam is monitored during heavy rainfalls.
- c. Visual Observations. The state of the reservoir drain system could present a problem should a draw down of the reservoir be required, since the slide gate is buried in mud and silt.
- d. Overtopping Potential. The Spillway Design Flood (SDF) for this "Small" size, "Significant" hazard structure is given as a range from 100-year to one half of the Probable Maximum Flood (PMF). The SDF selected for use is 0.5 PMF. The SDF hydrograph was routed through the reservoir with the starting water surface elevation at the crest of the spillway, Elev. 78.7. The maximum water surface elevation in the reservoir resulting from the SDF routing would be 5.9 feet above the spillway crest and 1.9 feet above the low point of the top to the dam, Elev. 82.7. The low point of the dam crest was determined by a survey of the dam crest profile during the field investigations (See Sheet 4, Appendix E). The SDF routing has a peak inflow of 3040 cfs and a peak outflow of 2,960 cfs. The spillway is capable of discharging 32 percent of the SDF without overtopping of the dam. Refer to Appendix C for computations and computer printouts.
- e. Spillway Adequacy. Even through the spillway is capable of discharging only 32 percent of the SDF (0.5 PMF), the spillway is considered as "Inadequate" but not "Seriously Inadequate" because the structure is a "Small" size, "Significant" hazard dam. Failure of the dam would cause flooding in the approximately 18 homes downstream of the dam on the shores of Country Lake No. 2 to depths of 1 to 2 feet in their first floors. There is little chance there would be any loss of life.

## SECTION 6

### STRUCTURAL STABILITY

#### 6.1 Evaluation of Structural Stability.

a. Visual Observations. On the date of the inspection, the embankment appeared to be in fair condition. There was no evidence of slope stability problems or unusual settlements. However, both the upstream and the downstream slopes do not have adequate slope protection. The downstream face has no protection and is subject to erosion from surface runoff. There are a number of areas where surface runoff has eroded the downstream slope. The variation of the slopes of the embankment appears to be largely a result of erosion by surface runoff.

The spillway appeared to be in good condition except for the downstream wingwalls, which are in poor condition.

b. Design and Construction Data. Two reconstruction drawings are the only design data available from DEP. No data was found which describes the initial construction.

c. Operating Records. There are no official operating records kept for this dam, according to the Owner's representative.

d. Post-Construction Changes. The dam and spillway were reconstructed in 1957-1958, but no as-built drawings were made available.

e. Seismic Stability. The dam is located in Seismic Risk Zone 1 of the Seismic Zone Map of Contiguous States. A dam located in Seismic Zone 1 is generally considered to be safe under any expected earthquake loading, if it is safe under static loading condition.

## SECTION 7

### ASSESSMENT, RECOMMENDATIONS AND PROPOSED REMEDIAL MEASURES

#### 7.1 Dam Assessment.

a. Evaluation. Based on the visual inspection, the dam and spillway are in overall fair condition. The erosion channels and depressions along the downstream face of the embankment appear to be the result of surface runoff.

The downstream wingwalls of the spillway are in poor condition and erosion of the embankment is taking place behind the walls. The gate of the reservoir drain is buried in mud and silt.

As stated in Section 5.1.d, the SDF selected is 50 percent of the PMF for this "Small" size, "Significant" hazard dam. Examination of the results of the hydrologic and hydraulic analyses indicate that the spillway is capable of passing 32 percent of the SDF without overtopping the dam. The spillway is classified as "Inadequate" but not "Seriously Inadequate" because the dam is a "Small" size, "Significant" hazard structure.

Failure of the dam would affect approximately 18 homes with the possibility of causing damage from water 1 to 2 feet deep in their first floors. There is little likelihood there would be any loss of life.

b. Adequacy of Information. The information made available by DEP, conversations with the Owner's representative and observations made during the field investigation provided adequate data for a Phase 1 evaluation.

c. Urgency. The remedial measures recommended in Section 7.2 should be initiated soon.

d. Necessity for Further Investigation. Further hydrologic and hydraulic investigations should be made.

#### 7.2 Recommendations and Remedial Measures.

##### a. Facilities.

1. A detailed hydrologic and hydraulic study should be made and the need and type of mitigating measures should be determined.

2. The embankment slopes should be filled and regraded to provide slopes of at least 2:1 and they should be protected with vegetative cover or riprap.

3. The outlet wingwalls are in poor condition and erosion of the embankment is taking place behind the walls. These areas should be back-filled and compacted with suitable material.

4. The mud and silt should be kept clear from the slide gate and the slide gate should be operated periodically to insure proper maintenance.

5. Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.

b. Operation and Maintenance Procedures.

1. The Owner should develop and implement a maintenance and inspection checklist to insure that the slide gate and all other items associated with the structure are maintained on a regular basis.

APPENDIX

A

Check List Engineering Data  
Design, Construction, Operation

Phase I

NAME OF DAM Country Lake #3 Dam  
 ID # NJ 00052

CHECK LIST  
 ENGINEERING DATA  
 DESIGN, CONSTRUCTION, OPERATION  
 PHASE 1

Sheet 1 of 4

REMARKS  
 Not available. The only drawings in the DEP files are two from 1957 for "Reconstruction of Country Lakes Dam #3. These drawings are included in Appendix E as Plates 2 & 3.

ITEM  
 AS-BUILT DRAWINGS  
 REGIONAL VICINITY MAP

Refer to Appendix E, Plate 1.

CONSTRUCTION HISTORY

No information available

TYPICAL SECTIONS OF DAM

Refer to Appendix E, Plate 2.

OUTLETS - PLAIN

No information available for existing structure

DETAILS

CONSTRAINTS

DISCHARGE RATINGS None Available

RAINFALL/RESERVOIR RECORDS None Available

ITEM	REMARKS
DESIGN REPORTS	No design data available
GEOLOGY REPORTS	None provided in DEP files. Refer to Appendix F of this report.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	No data available. No data available. No data available. No data available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY } FIELD }	No information available
POST-CONSTRUCTION SURVEYS OF DAM	None
BORROW SOURCES	There is no record of where borrow material come from.

ITEM REMARKS

MONITORING SYSTEMS According to the Owner's representative an informal warning system is in effect during periods of heavy rainfall.

MODIFICATIONS None

HIGH POOL RECORDS None available.

POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS None

PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS None

MAINTENANCE OPERATION RECORDS None available.

ITEM	REMARKS
SPILLWAY PLAN SECTION DETAILS	There is no information on the existing spillway.
OPERATING EQUIPMENT PLANS & DETAILS	No information available
MISCELLANEOUS	Miscellaneous correspondence, inspection reports, etc., are also available in DEP files.

APPENDIX

B

Check List

Visual Inspection

Phase I

CHECK LIST  
VISUAL INSPECTION  
PHASE I

Sheet 1 of 8

Name Dam Country Lakes #3 Dam County Burlington State New Jersey National ID # NJ 00052  
Type of Dam Earth Hazard Category Significant  
Date(s) Inspection 04/12/78 Weather Clear Temperature 60° F

Pool Elevation at Time of Inspection 78.8 ± M.S.L. Tailwater at Time of Inspection 72 ± M.S.L.

Inspection Personnel:

Mr. Lee DeHeer \_\_\_\_\_ Mr. Stefan Manea \_\_\_\_\_ Mr. David B. Campbell \_\_\_\_\_  
\_\_\_\_\_ Mr. David B. Campbell Recorder \_\_\_\_\_

Remarks:

Mr. Steve Albano, President of Friendship Lakes, Inc. was present at the time of the inspection.

EMBANKMENT

Sheet 2 of 8

VISUAL EXAMINATION OF                      OBSERVATIONS                      REMARKS OR RECOMMENDATIONS

SURFACE CRACKS

None Observed

UNUSUAL MOVEMENT OR  
CRACKING AT OR BEYOND  
THE TOE

None Observed

SLOUGHING OR EROSION OF  
EMBANKMENT AND ABUTMENT  
SLOPES

Several erosion channels  
observed on the downstream  
slope.

The downstream embankment slope  
should be backfilled and compacted  
with suitable material where neces-  
sary. Vegetative or riprap cover  
should be established in these  
areas.

VERTICAL AND HORIZONTAL  
ALIGNMENT OF THE CREST

No apparent deformations  
observed.

RIPRAP FAILURES

N/A



OUTLET WORKS

Sheet 4 of 8

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

CRACKING AND SPALLING OF  
CONCRETE SURFACES IN  
OUTLET CONDUIT

None Observed

INTAKE STRUCTURE

Not observed beneath  
reservoir surface

OUTLET STRUCTURE

72-inch diameter steel  
pipe.

OUTLET CHANNEL

The spillway discharges  
through its 72-inch outlet  
pipe directly into Country  
Lake #2

EMERGENCY GATE

The slide gate is buried  
in sediment.

The sediment should be  
removed from around the  
slide gate.

UNGATED SPILLWAY

Sheet 5 of 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
WEIR	Timber box in good condition.	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A The drop inlet spillway has a 72-inch diameter steel pipe which outlets directly into Country Lakes #2.	
BRIDGE AND PIERS	None	

INSTRUMENTATION

Sheet 6 of 8

REMARKS OR RECOMMENDATIONS

VISUAL EXAMINATION

OBSERVATIONS

MONUMENTATION/SURVEYS

NONE

OBSERVATION WELLS

NONE

WEIRS

NONE

PIEZOMETERS

NONE

OTHER

NONE

RESERVOIR

Sheet 7 of 8

VISUAL EXAMINATION OF      OBSERVATIONS      REMARKS OR RECOMMENDATIONS

SLOPES

The slopes are relatively flat around the entire perimeter of the reservoir varying between 2 and 10 percent.

SEDIMENTATION

There does not appear to be any excessive accumulation of sediment in the reservoir. Because of the flat gradients around the entire perimeter of the reservoir there is little sediment accumulation even though there is poor vegetative cover around the entire reservoir.

DOWNSTREAM CHANNEL

Sheet 8 of 8

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

CONDITION  
(OBSTRUCTIONS,  
DEBRIS, ETC.)

The drop inlet spillway discharges through its outlet conduit in a Lake created by a dam (Country Lakes #2) located about 2,800 feet downstream. The Lake area is in good condition.

SLOPES

The Lake slopes are relatively flat and fairly well vegetated.

APPROXIMATE NO.  
OF HOMES AND  
POPULATION

There are about eighteen homes downstream of the dam which lie within the area that would be affected by a flood resulting from a dam failure. There would probably be flood waters 1 to 2 feet in the first floor of the homes, but there would be little chance for loss of life.

APPENDIX

C

Hydrologic & Hydraulic Data

TABLE OF CONTENTS - APPENDIX C

TIME LAG DETERMINATION	SHEET 1-4
SPELLWAY DISCHARGE CAPACITY	SHEET 5-12
HEC-I DAM SAFETY VERSION COMPUTER OUTPUT	SHEET 13-33



O'BRIEN & GERE

SUBJECT	Country Lakes #3	SHEET	1	BY	SM	DATE	4/12/79	JOB NO.	1500-005-111
					<del>SM</del>		5/21/79		

TLAG DETERMINATION:

I) SCS Curve Number Method

$$T = \frac{L^{0.8} (S+1)^{0.7}}{1900 Y^{0.5}}$$

$$L = 36000 \text{ ft}$$

$$S = \frac{1000}{CN} - 10 = \frac{1000}{80} - 10 = 2.5$$

$$Y = \frac{160 - 80}{36000} = 0.0022 = 0.22\%$$

$$T = \frac{36000^{0.8} (2.5+1)^{0.7}}{1900 \times 0.22^{0.5}} = \frac{4416 \times 2.4}{892} = \underline{\underline{11.9 \text{ hrs}}}$$



O'BRIEN & GERE

SUBJECT	COUNTRY LAKE NR. 3	SHEET	2	BY	SM	DATE	4/18/79	JOB NO.	1000-005-111
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VSB 5/21/79

II. SCS UPLAND METHOD

$$T_c = \frac{L_1}{V_1} + \frac{L_2}{V_2}$$

$$L_1 = 16000 \text{ ft}$$

$$S = \frac{\Delta H}{L} = \frac{160-110}{16000} = 0.003 = 0.3\%$$

$\therefore V_1 = 0.28 \text{ fps}$  (from Fig. 3-1)

$$L_2 = 15000 \text{ ft}$$

$$V_2 = C \sqrt{RS_2} \text{ (Chezy)}$$

$$C = \frac{1.49}{n} R^{1/6} \text{ (Manning)}$$

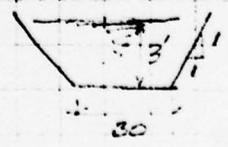
Assuming  $A = 79 \text{ ft}^2$

$$P \approx 39 \text{ ft} \quad R = \frac{A}{P} \approx 2.5$$

$$n = 0.05$$

$$C = \frac{1.49}{0.05} 2.5^{1/6} = 34.7$$

$$S_2 = \frac{\Delta H}{L} = \frac{110-80.0}{L} = 0.00166$$





O'BRIEN & GERE

SUBJECT

*Lower Lake #3*

SHEET  
3

BY  
SM

DATE  
4/18/60

JOB NO  
1500-005-111

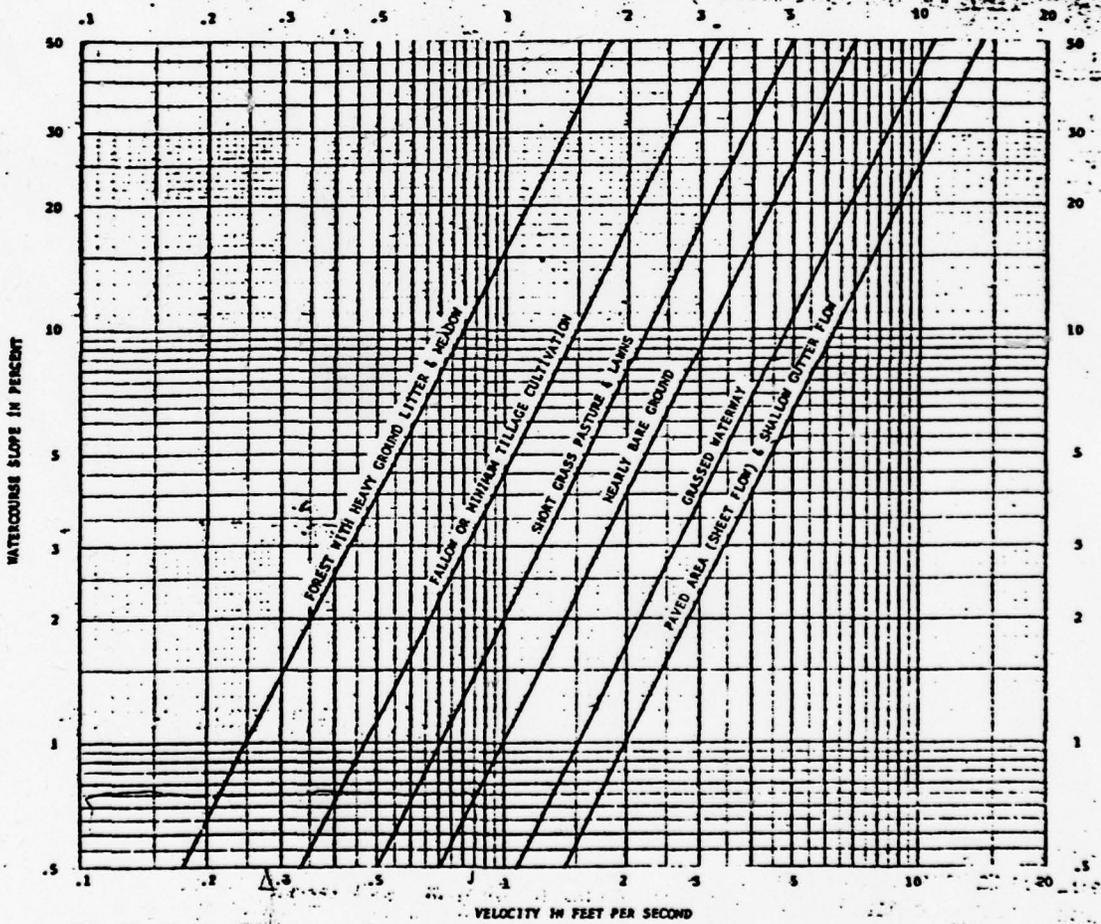


Figure 3-1.--Average velocities for estimating travel time for overland flow.

*From SCS  
1305 Eng. Notes 4, Chap 15*

PROJECT	CONCRETE LOTS # 3	SHEET	4	BY	SM	DATE	4/18/79	JOB NO.	1600-005-111
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✓ 5/21/79

$$V_2 = 34.7 \sqrt{2.5 \times 0.00166} = 2.2 \frac{ft}{sec}$$

$$T_c = \frac{16000}{2.28} + \frac{18000}{2.2} = 65325 \text{ sec} \approx 18.15 \text{ HRS}$$

$$T_e = 0.6 T_c = 10.9 \text{ HRS}$$

T<sup>1</sup> BUREAU OF PUBLIC ROADS

$$T_c = \left( \frac{11.9 \times L^3}{H} \right)^{0.385}$$

L = hydraulic length of water shed, miles.

$$L = 36,000 \text{ ft} = 6.8 \text{ mile}$$

H = basin relief (ft)

$$H = 160 - 80 = 80 \text{ ft}$$

$$T_c = \left( \frac{11.9 \times 6.8^3}{80} \right)^{0.385} = 4.47 \text{ HRS.}$$

$$T_e = 0.6 T_c = 2.7 \text{ HRS.}$$

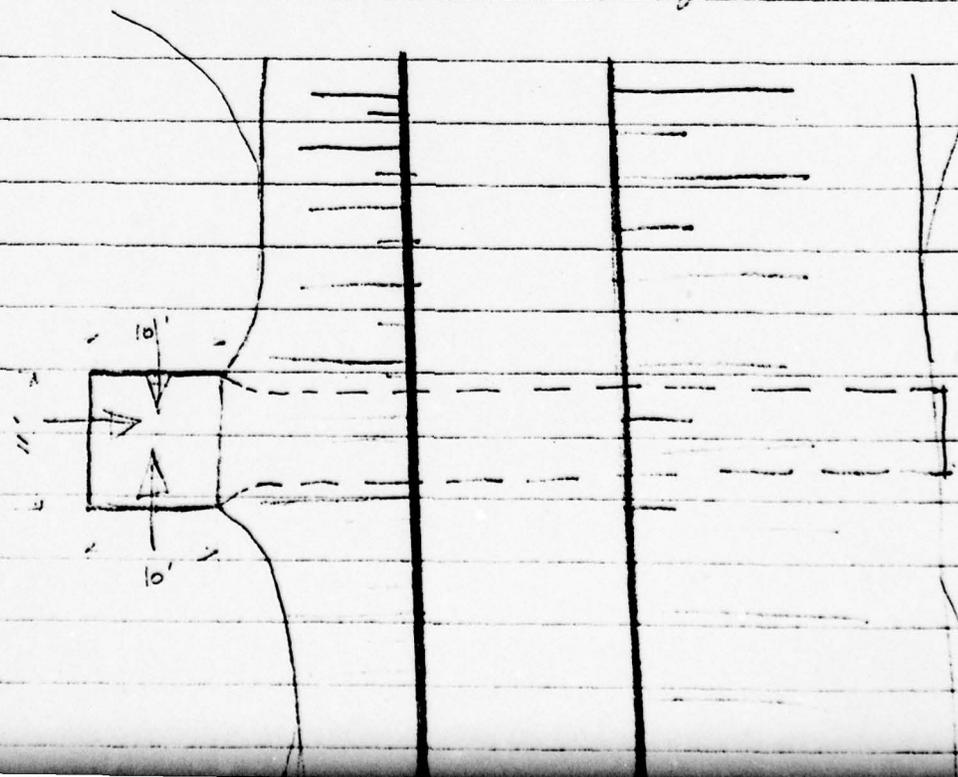
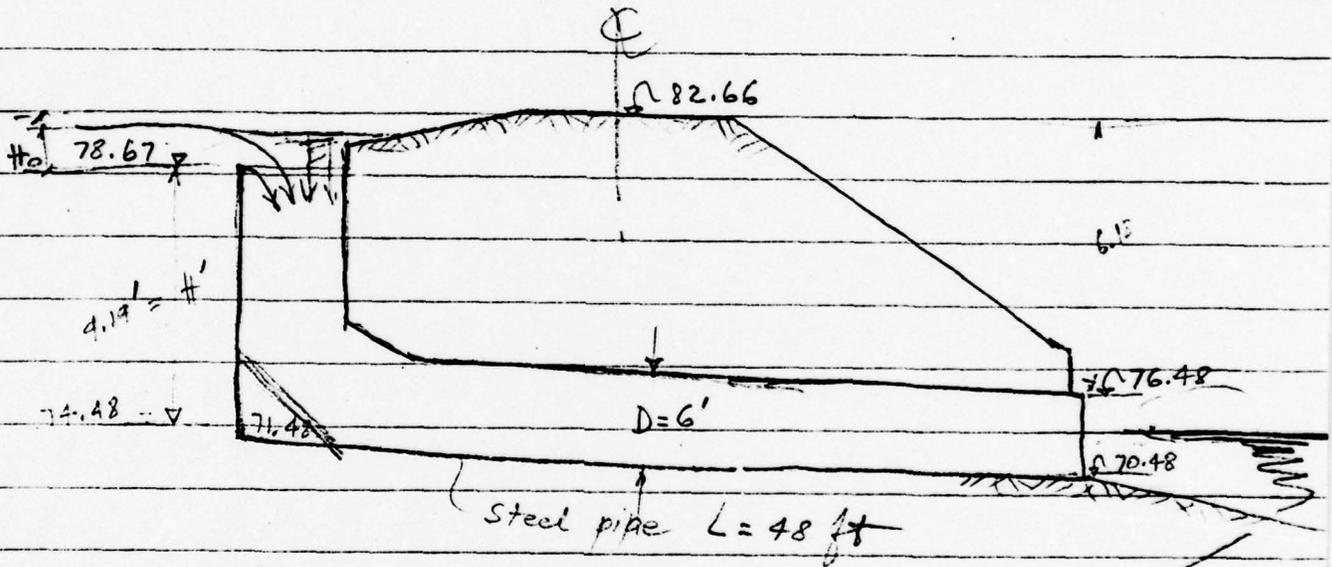
(Really not applicable for larger basins)

The two SCS approaches for computing  $T_e$  give results of 11 hr and 10.9 hr.  
 • USF  $T_e = 11 \text{ HRS}$



SUBJECT	Country Lakes #3	SHEET	5	BY	SM	DATE	4/19/79 1/5/21/79	JOB NO	1800-005-111
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SPILLWAY DISCHARGE CAPACITY



SUBJECT	SHEET	BY	DATE	JOB NO
Country Lakes #3	6	SM	4/19/79	1500-205-111

*SM*  
*4/21/79*

I) CREST DISCHARGE (CONDITION 1)

$$Q = C L H_o^{3/2}$$

$$10 \times 11 = 110 \text{ ft}^2$$



$$Q = C_o (2\pi R_s) H_o^{3/2} \quad \left( \text{only for coeff. of disch estimation} \right)$$

$$C_o = \frac{Q}{2\pi R_s H_o^{3/2}}$$

$\frac{H_o}{R_s} = 0.45$  the limit up to which weir control governs.

$$H_o = 0.45 R_s = 0.45 \times 6 = \underline{\underline{2.7 \text{ ft}}}$$

$$\frac{P}{R_s} = \frac{2}{6} = 0.3$$

From fig. 2.52 Page 417 - Design of Small Dams - US-ERD  
will accord:

SUBJECT Concrete Lanes #3 SHEET 7 BY SM DATE 4/19/79 JOB NO. 1500-005-111  
5/22/79

$H_0/R_s$	$H_0$	$C_0 = \frac{Q}{2\pi R_s H_0^{3/2}}$
0.1	0.6	≈ 4.0
0.2	1.2	3.95
0.3	1.8	3.8
0.4	2.4	3.65
0.5	3.0	3.45
0.6	3.6	3.15
0.7	4.2	2.9
0.8		2.6
0.9		2.3
1.0		2.1

$H_0 \approx H$	$Q = C_0 L H^{3/2}$	Remarks
0.6	57.6	L = 31 ft
1.2	161	
1.8	284.5	
2.4	420.7	
3.0	555.7	
3.6	667	
	727.0	

1/4" 5/22/73

pillways

417

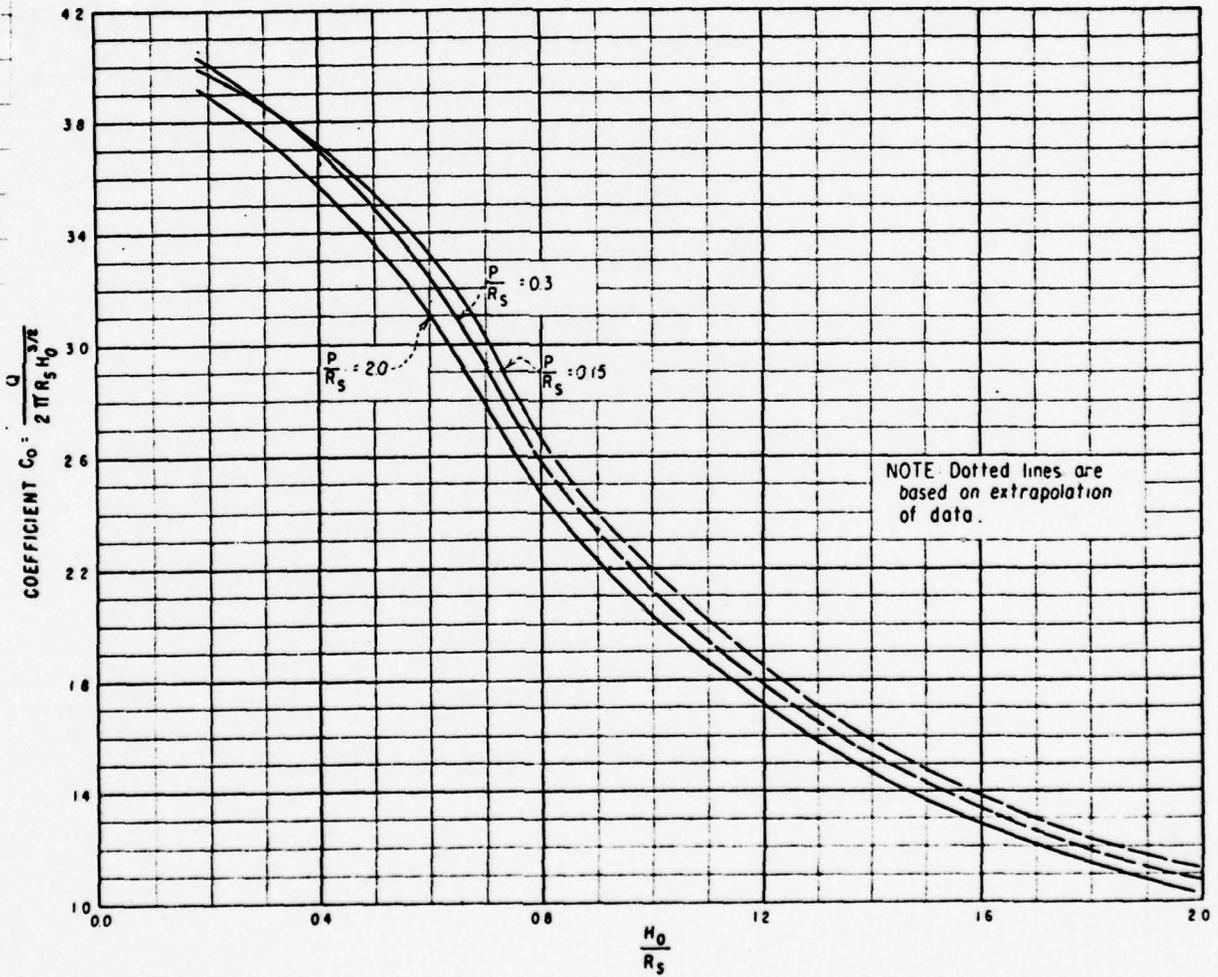


Figure 283. Relationship of circular crest coefficient  $C_0$  to  $\frac{H_0}{R_s}$  for different approach depths (aerated nappe). 288-D-2441.

From B. of Reclamation - Design of Small Dams



SUBJECT Country Lakes #3 SHEET 9 BY SM DATE 4/19/79 JOB NO. 1870-005-111

5/22/79

II ORIFICE CONTROL (THROAT CONTROL)

$$Q = \left( \frac{R}{0.204} \right)^2 H_a^{1/2}$$

$R \approx 3.5$

$H_o \approx H$ (ft)	$H_a$	$Q = \left( \frac{R}{0.204} \right)^2 H_a^{1/2}$ (cfs)
3	4.0	$294 \times 2 = 588$
3.6	4.6	$294 \times 2.144 = 630$
4.2	5.2	$294 \times 2.28 = 670$

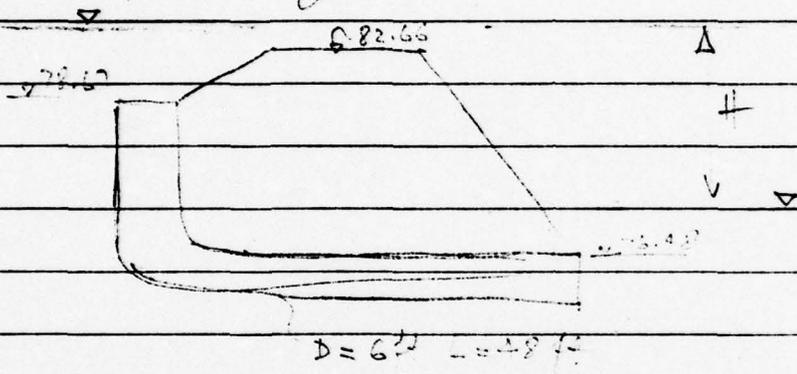
HEAD-DISCHARGE RATING CURVE

$H_o$	ELEVATION	DISCHARGE	REMARKS
0.0	20.00	58	} CREST CONTROL
1.2	20.50	161	
2.4	21.00	252	
3.0	21.60	421	
3.6	22.20	556	} FROM CONTROL
4.2	22.80	630	
4.2	23.50	670	

PROJECT	Cocumby Lakes #3	SHEET	10	BY	SM	DATE	4/19/79	JOB NO	1520-02-111
							5/22/79		

**III FULL PIPE FLOW**

$$h_f = \frac{f L V^2}{D 2g}$$



$$h_f = f \frac{L V^2}{D 2g} = H$$

1)  $H = 82.87 - 81.00 = 1.87$

Assume a value for  $f$ , say,  $f = 0.02$

$$0.02 \frac{48}{6} \frac{V^2}{64.4} = 1.87 \quad | \quad V = 27.4 \text{ fps}$$

$$f = \frac{VD}{D} = \frac{27.4 \times 6}{2.33 \times 10^7} = 1.35 \times 10^{-7} \quad \left( \frac{f}{\rho} = 0.001 \right)$$

$\Rightarrow f = 0.0195$  Moreover,  
 Check the flow is in the turbulent  
transition zone where  $f = f \left( \frac{Re}{5} \right)$

So,  $V = 27.4 \text{ fps}$

$$Q = 27.4 \pi \frac{6^2}{4} = 775 \text{ cfs}$$

PROJECT	COLUMBIAN LAKES # 3	SHEET	11	BY	SM	DATE	4/19/79	JOB NO.	1600-212 #11
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1/13 2/22/79

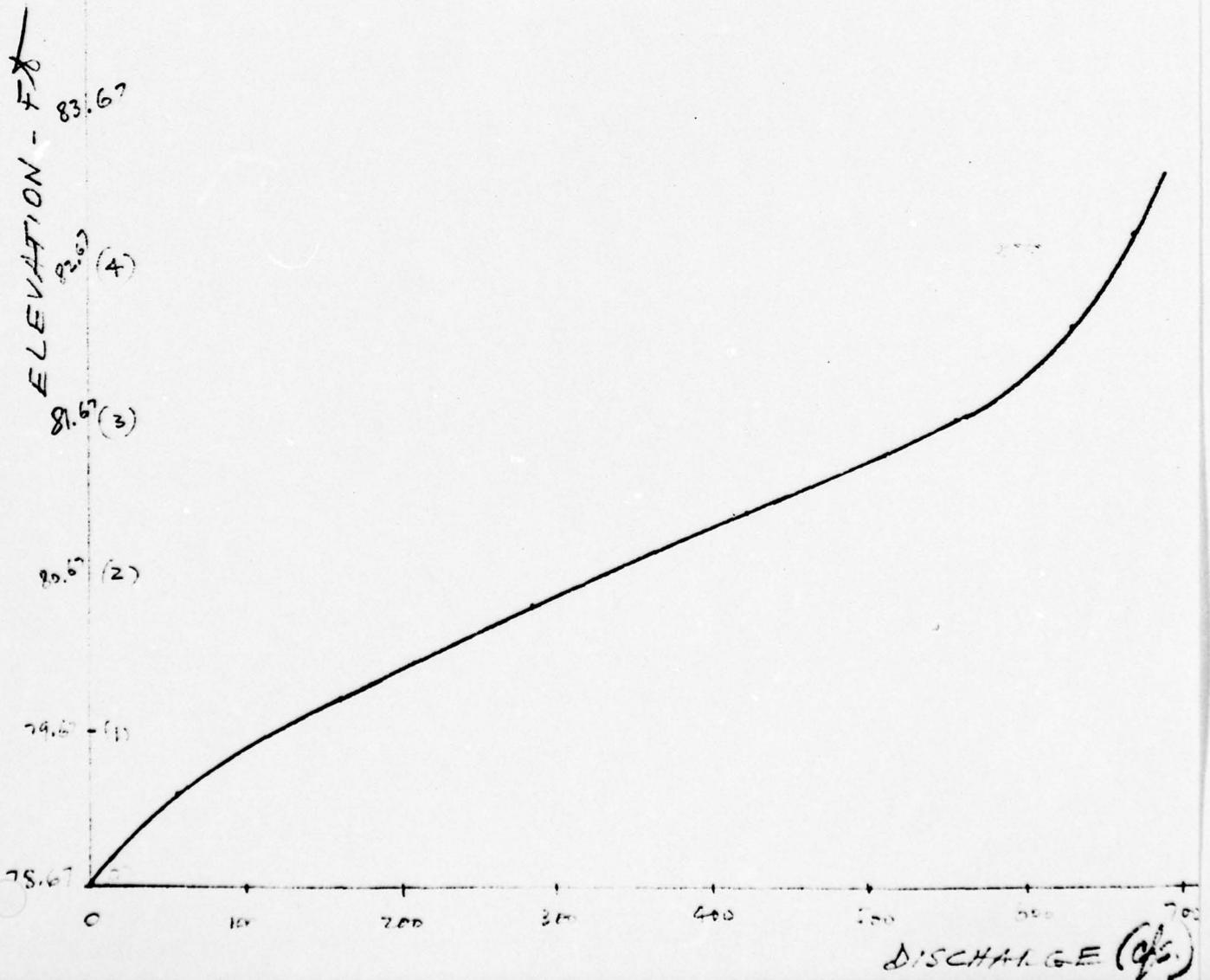
Since the d/s WSEL has to be assumed, the rating curve of the spillway could be extrapolated beyond 700 cfs, as shown on the SPILLWAY DISCHARGE CAPACITY CURVE

COUNTRY-LAKE #3 Sh 12

SPILLWAY DISCHARGE CAPACITY

SM #5/22/79

4/19/79



\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (HEC-1)  
 NAME SAFETY VERSION JULY 1974  
 LAST MODIFICATION 26 FEB 79  
 \*\*\*\*\*

QWY DATE0 07/12/79  
 TIME0 14.55.34

NATIONAL DAM INSPECTION PROGRAM  
 COUNTRY LAKE NR.3  
 PHF HYDROGRAPH

NO	NHR	MAIN	IDAY	IHR	I4IN	METRC	IPLI	IPRT	NSTAN
300	1	0	0	0	0	0	0	3	0
		JOPER	NWT	LROPT	TRACE				
		5	0	0	0				

MULTI-PLAN ANALYSES TO BE PERFORMED

ATIOS= .05 .10 .15 .20 .30 .40 .50  
 NPLANE= 1 NRATIO= 7 LRATIO= 1

\*\*\*\*\*

SUR-AREA RUNOFF COMPUTATION  
 RUNOFF TO COUNTRY LAKE NR.3

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRI	INAME	ISTAGE	IAUTO
INFLW	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHY2G	IUMG	TAPEA	SNAP	TMSDA	T-SPC	RATIO	ISNOW	ISAME	LOCAL
1	2	6.63	0.00	6.63	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PM5	R6	R12	R24	R48	R72	R96
0.00	23.50	113.00	123.00	132.00	142.00	0.00	0.00

TRAPC COMPUTED BY THE PROGRAM IS .000

LOSS DATA

LRUPT	STRKR	DLTKR	RTIO	ERAIN	STPKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG= 11.00

STATUS= -1.50 ORCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 57 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= 11.00 VOL= 1.00	1HR.	2HR.	3HR.	4HR.	5HR.	6HR.	7HR.	8HR.	9HR.	10HR.
7.	23.	43.	69.	102.	142.	188.	226.	253.	270.	270.
104.	177.	270.	255.	238.	219.	195.	167.	141.	120.	120.
26.	22.	19.	17.	14.	13.	11.	10.	8.	7.	7.
9.	5.	4.	4.	3.	3.	3.	3.	2.	2.	2.

94 13

MO,DA	HR,MIN	PERIOD	RAIN	EXCS	LOSS	COMP 0	1.	0.	HR,MIN	PERIOD	RAIN	EXCS	LOSS	COMP 0
1.01	1.00	1	.01	0.00	.01	9.	1.07	7.00	151	0.00	0.00	0.00	0.00	2.
1.01	2.00	2	.01	0.00	.01	9.	1.07	8.00	152	0.00	0.00	0.00	0.00	1.
1.01	3.00	3	.01	0.00	.01	8.	1.07	9.00	153	0.00	0.00	0.00	0.00	1.
1.01	4.00	4	.01	0.00	.01	8.	1.07	10.00	154	0.00	0.00	0.00	0.00	1.
1.01	5.00	5	.01	0.00	.01	7.	1.07	11.00	155	0.00	0.00	0.00	0.00	1.
1.01	6.00	6	.01	0.00	.01	7.	1.07	12.00	156	0.00	0.00	0.00	0.00	1.
1.01	7.00	7	.02	0.00	.02	6.	1.07	13.00	157	0.00	0.00	0.00	0.00	1.
1.01	8.00	8	.02	0.00	.02	6.	1.07	14.00	158	0.00	0.00	0.00	0.00	1.
1.01	9.00	9	.02	0.00	.02	5.	1.07	15.00	159	0.00	0.00	0.00	0.00	1.
1.01	10.00	10	.02	0.00	.02	5.	1.07	16.00	160	0.00	0.00	0.00	0.00	1.
1.01	11.00	11	.02	0.00	.02	5.	1.07	17.00	161	0.00	0.00	0.00	0.00	1.
1.01	12.00	12	.02	0.00	.02	4.	1.07	18.00	162	0.00	0.00	0.00	0.00	1.
1.01	13.00	13	.16	0.00	.16	4.	1.07	19.00	163	0.00	0.00	0.00	0.00	1.
1.01	14.00	14	.19	0.00	.19	4.	1.07	20.00	164	0.00	0.00	0.00	0.00	1.
1.01	15.00	15	.24	0.00	.24	4.	1.07	21.00	165	0.00	0.00	0.00	0.00	1.
1.01	16.00	16	.37	0.00	.37	6.	1.07	22.00	166	0.00	0.00	0.00	0.00	1.
1.01	17.00	17	.23	.18	.05	13.	1.07	23.00	167	0.00	0.00	0.00	0.00	1.
1.01	18.00	18	.18	.13	.05	24.	1.08	0.00	168	0.00	0.00	0.00	0.00	0.
1.01	19.00	19	.01	0.00	.01	38.	1.08	1.00	169	0.00	0.00	0.00	0.00	0.
1.01	20.00	20	.01	0.00	.01	57.	1.08	2.00	170	0.00	0.00	0.00	0.00	0.
1.01	21.00	21	.01	0.00	.01	61.	1.04	3.00	171	0.00	0.00	0.00	0.00	0.
1.01	22.00	22	.01	0.00	.01	109.	1.08	4.00	172	0.00	0.00	0.00	0.00	0.
1.01	23.00	23	.01	0.00	.01	136.	1.08	5.00	173	0.00	0.00	0.00	0.00	0.
1.02	0.00	24	.01	0.00	.01	153.	1.08	6.00	174	0.00	0.00	0.00	0.00	0.
1.02	1.00	25	.11	.06	.05	175.	1.08	7.00	175	0.00	0.00	0.00	0.00	0.
1.02	2.00	26	.11	.06	.05	185.	1.08	8.00	176	0.00	0.00	0.00	0.00	0.
1.02	3.00	27	.11	.06	.05	191.	1.08	9.00	177	0.00	0.00	0.00	0.00	0.
1.02	4.00	28	.11	.06	.05	194.	1.08	10.00	178	0.00	0.00	0.00	0.00	0.
1.02	5.00	29	.11	.06	.05	193.	1.08	11.00	179	0.00	0.00	0.00	0.00	0.
1.02	6.00	30	.11	.06	.05	192.	1.08	12.00	180	0.00	0.00	0.00	0.00	0.
1.02	7.00	31	.31	.26	.05	193.	1.08	13.00	181	0.00	0.00	0.00	0.00	0.
1.02	8.00	32	.31	.26	.05	198.	1.08	14.00	182	0.00	0.00	0.00	0.00	0.
1.02	9.00	33	.31	.26	.05	205.	1.08	15.00	183	0.00	0.00	0.00	0.00	0.
1.02	10.00	34	.31	.26	.05	219.	1.08	16.00	184	0.00	0.00	0.00	0.00	0.
1.02	11.00	35	.31	.26	.05	241.	1.08	17.00	185	0.00	0.00	0.00	0.00	0.
1.02	12.00	36	.31	.26	.05	274.	1.08	18.00	186	0.00	0.00	0.00	0.00	0.
1.02	13.00	37	2.12	2.07	.05	331.	1.08	19.00	187	0.00	0.00	0.00	0.00	0.
1.02	14.00	38	2.55	2.50	.05	427.	1.08	20.00	188	0.00	0.00	0.00	0.00	0.
1.02	15.00	39	3.19	3.14	.05	578.	1.08	21.00	189	0.00	0.00	0.00	0.00	0.
1.02	16.00	40	4.07	4.02	.05	633.	1.08	22.00	190	0.00	0.00	0.00	0.00	0.
1.02	17.00	41	2.47	2.42	.05	1210.	1.08	23.00	191	0.00	0.00	0.00	0.00	0.
1.02	18.00	42	2.34	2.29	.05	1706.	1.09	0.00	192	0.00	0.00	0.00	0.00	0.
1.02	19.00	43	.17	.12	.05	2316.	1.09	1.00	193	0.00	0.00	0.00	0.00	0.
1.02	20.00	44	.17	.12	.05	3020.	1.09	2.00	194	0.00	0.00	0.00	0.00	0.
1.02	21.00	45	.17	.12	.05	3785.	1.09	3.00	195	0.00	0.00	0.00	0.00	0.
1.02	22.00	46	.17	.12	.05	4550.	1.09	4.00	196	0.00	0.00	0.00	0.00	0.
1.02	23.00	47	.17	.12	.05	5208.	1.09	5.00	197	0.00	0.00	0.00	0.00	0.
1.03	0.00	48	.17	.12	.05	5643.	1.09	6.00	198	0.00	0.00	0.00	0.00	0.
1.03	1.00	49	0.00	0.00	0.00	5984.	1.09	7.00	199	0.00	0.00	0.00	0.00	0.
1.03	2.00	50	0.00	0.00	0.00	6065.	1.09	8.00	200	0.00	0.00	0.00	0.00	0.
1.03	3.00	51	0.00	0.00	0.00	6034.	1.09	9.00	201	0.00	0.00	0.00	0.00	0.
1.03	4.00	52	0.00	0.00	0.00	5851.	1.09	10.00	202	0.00	0.00	0.00	0.00	0.
1.03	5.00	53	0.00	0.00	0.00	5546.	1.09	11.00	203	0.00	0.00	0.00	0.00	0.
1.03	6.00	54	0.00	0.00	0.00	5154.	1.09	12.00	204	0.00	0.00	0.00	0.00	0.
1.03	7.00	55	0.00	0.00	0.00	4707.	1.09	13.00	205	0.00	0.00	0.00	0.00	0.
1.03	8.00	56	0.00	0.00	0.00	4206.	1.09	14.00	206	0.00	0.00	0.00	0.00	0.

9474





CMS	17.	11.	4.	301.
INCHES	.42	2.10	2.45	2.49
44	20.80	53.54	62.28	63.17
AC-FI	249.	74.	86.	87.
THOUS. CU. F	357.	615.	1069.	1064.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 3

CFS	913.	876.	501.	218.	15952.
CMS	24.	25.	15.	6.	452.
INCHES	1.23	3.15	3.68	3.73	
44	31.20	80.01	93.42	94.75	
AC-FI	434.	1113.	1300.	1314.	
THOUS. CU. F	536.	1373.	1603.	1626.	

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 4

CFS	1217.	1167.	740.	291.	21269.
CMS	34.	33.	21.	8.	602.
INCHES	1.64	4.20	4.90	4.97	
44	41.51	106.00	124.56	126.33	
AC-FI	579.	1444.	1733.	1754.	
THOUS. CU. F	714.	1431.	2138.	2164.	

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 5

CFS	1825.	1751.	1123.	437.	31904.
CMS	52.	50.	32.	12.	903.
INCHES	2.46	6.30	7.36	7.46	
44	62.41	160.42	186.85	189.50	
AC-FI	468.	2227.	2800.	2837.	
THOUS. CU. F	1071.	2746.	3207.	3252.	

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 6

CFS	2434.	2335.	1497.	583.	42539.
CMS	64.	66.	42.	16.	1205.
INCHES	3.28	8.40	9.81	9.95	
44	43.21	213.37	249.13	252.66	
AC-FI	1158.	2469.	3466.	3516.	
THOUS. CU. F	1428.	3062.	4276.	4336.	

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 7

CFS	3042.	2919.	1871.	728.	53173.
CMS	89.	83.	53.	21.	1506.
INCHES	4.10	10.50	12.26	12.43	





























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	RATIO 4	RATIO 5	RATIO 6	RATIO 7
HYDROGRAPH AT INFLOW		6.63 ( 17.17)	1	304. ( 9.61)	608. ( 17.23)	913. ( 25.84)	1217. ( 34.46)	1825. ( 51.69)	2434. ( 68.92)	3042. ( 86.15)
ROUTED TO	OUTFLO	6.63 ( 17.17)	1	279. ( 7.90)	542. ( 15.34)	691. ( 19.56)	1059. ( 29.99)	1736. ( 49.17)	2357. ( 66.73)	2959. ( 83.78)

SUMMARY OF DAM SAFETY ANALYSIS

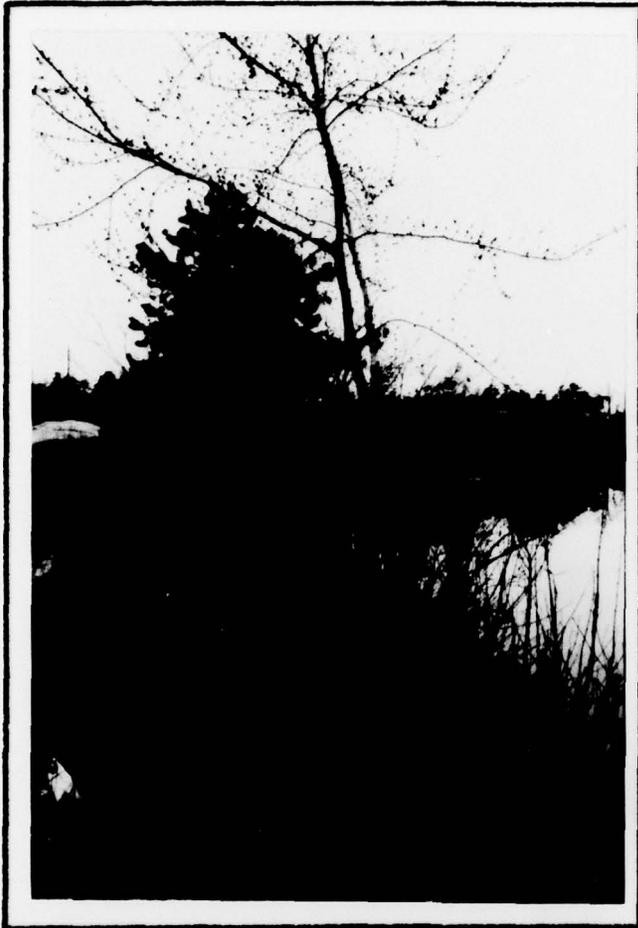
PLAN I ..... ELEVATION INITIAL VALUE SPILLWAY CREST TOP OF DAM  
 STORAGE 78.70 78.67 82.88  
 OUTFLOW 45. 44. 325.  
 3. 0. 702.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.05	80.43	0.00	105.	279.	0.00	53.00	0.00
.10	81.48	0.00	176.	542.	0.00	53.00	0.00
.15	82.67	0.00	298.	691.	0.00	55.00	0.00
.20	83.38	.50	397.	1059.	10.00	54.00	0.00
.30	84.42	1.04	464.	1736.	15.00	52.00	0.00
.40	84.30	1.42	556.	2357.	14.00	52.00	0.00
.50	84.64	1.76	623.	2959.	22.00	52.00	0.00

APPENDIX

D

Photographs



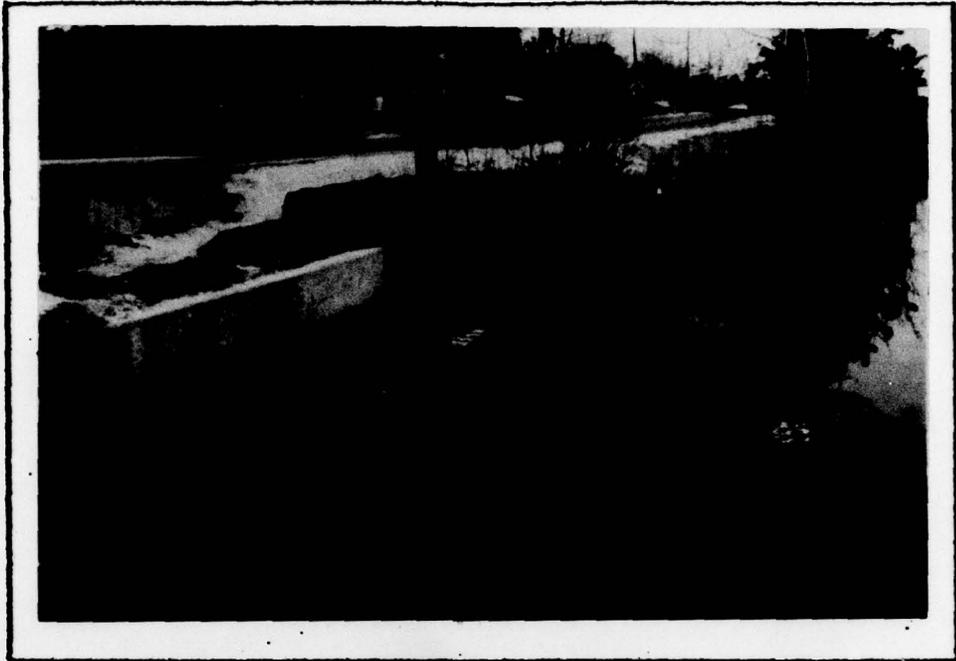
*UPSTREAM FACE OF  
THE DAM FROM THE  
RIGHT SIDE OF THE SPILLWAY*

*4/12/79*



*UPSTREAM FACE OF THE DAM FROM  
THE LEFT SIDE OF THE SPILLWAY 4/12/79*

*D-1*



*DROP INLET SPILLWAY  
AND SLUICE GATE HOIST 4/12/79*



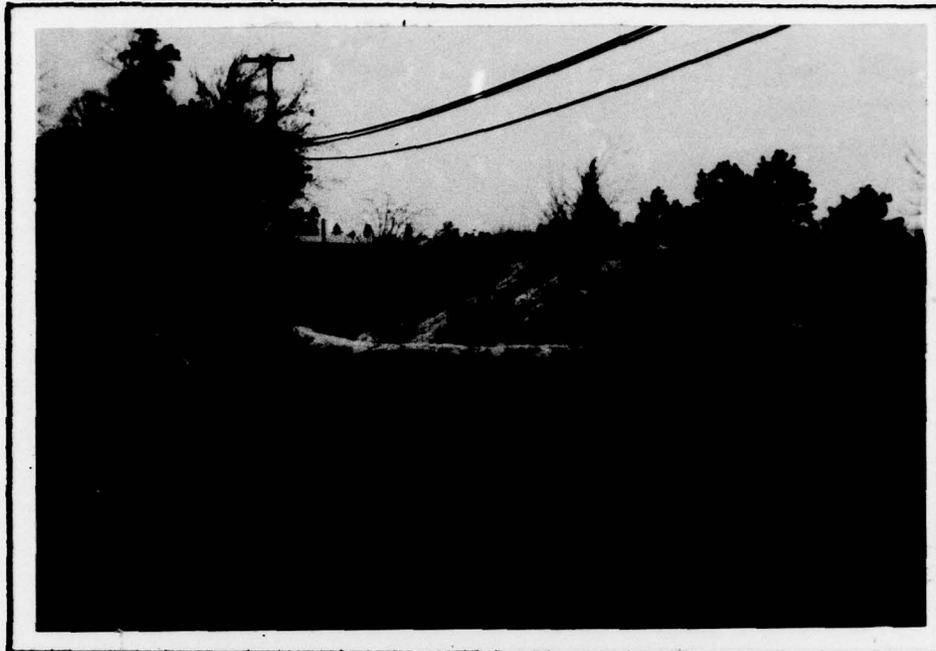
*DISCHARGE CULVERT  
AT THE DOWNSTREAM FACE OF THE DAM 4/12/79*



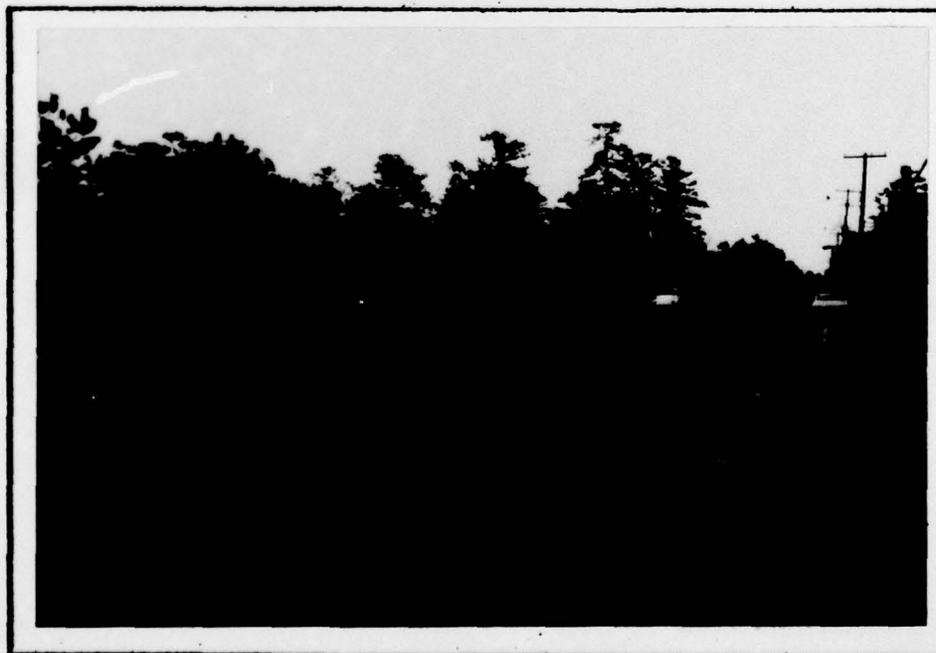
*DOWNSTREAM FACE OF THE DAM  
FROM THE LEFT ABUTMENT 4/12/79*



*DOWNSTREAM FACE OF THE DAM  
FROM THE RIGHT ABUTMENT 4/12/79*



*DOWNSTREAM FACE OF THE DAM  
SHOWING SLOPE EROSION 4/12/79*



*TOP OF THE DAM  
FROM THE RIGHT ABUTMENT 4/12/79*

APPENDIX

E

Drawings

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REGIONAL VICINITY MAP	PLATE 1
PLAN VIEW OF DAM SHOWING PROBLEM AREAS	PLATE 2
SPELLWAY	PLATE 3
PROFILE ALONG CENTERLINE OF THE TOP OF THE DAM	PLATE 4

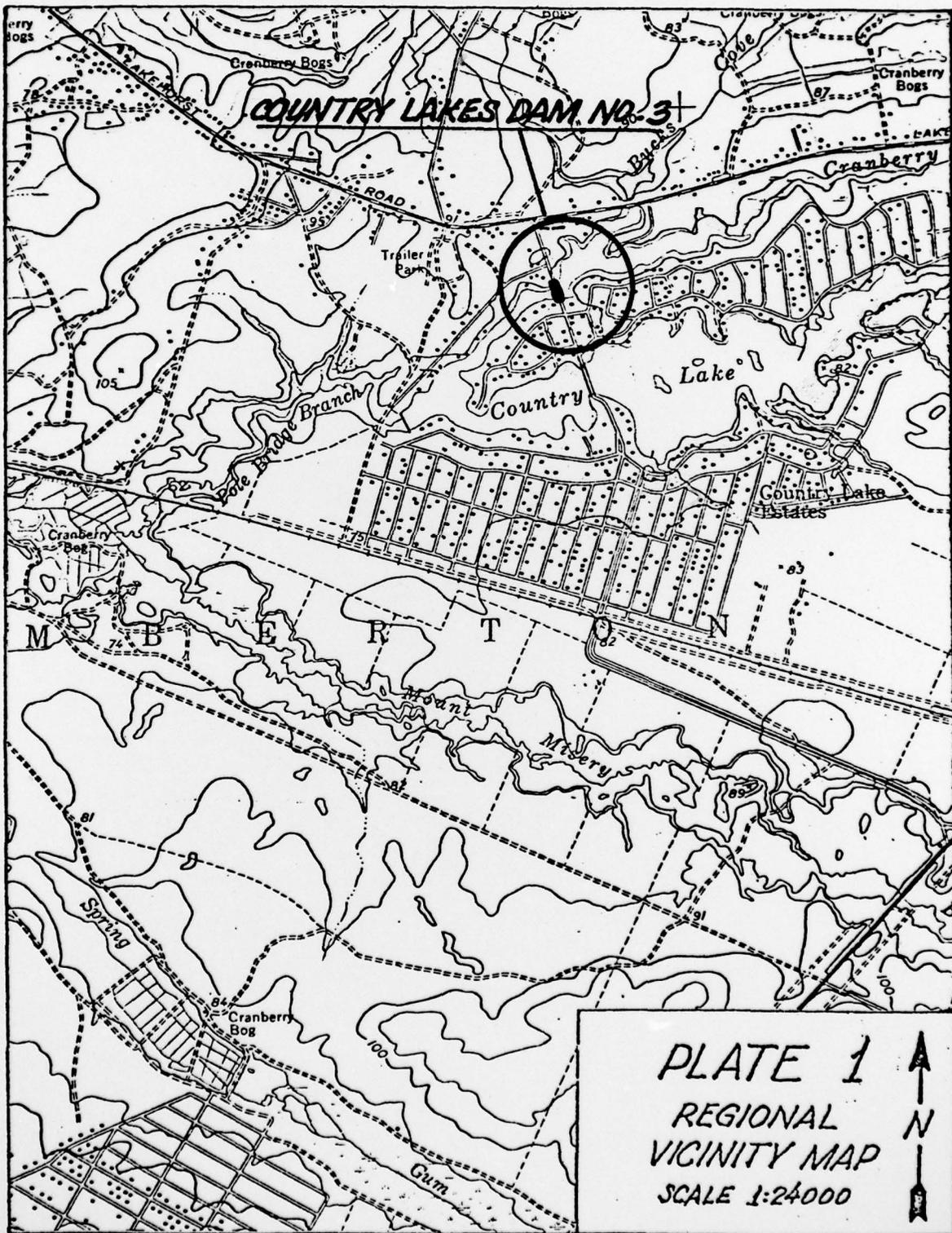
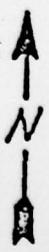
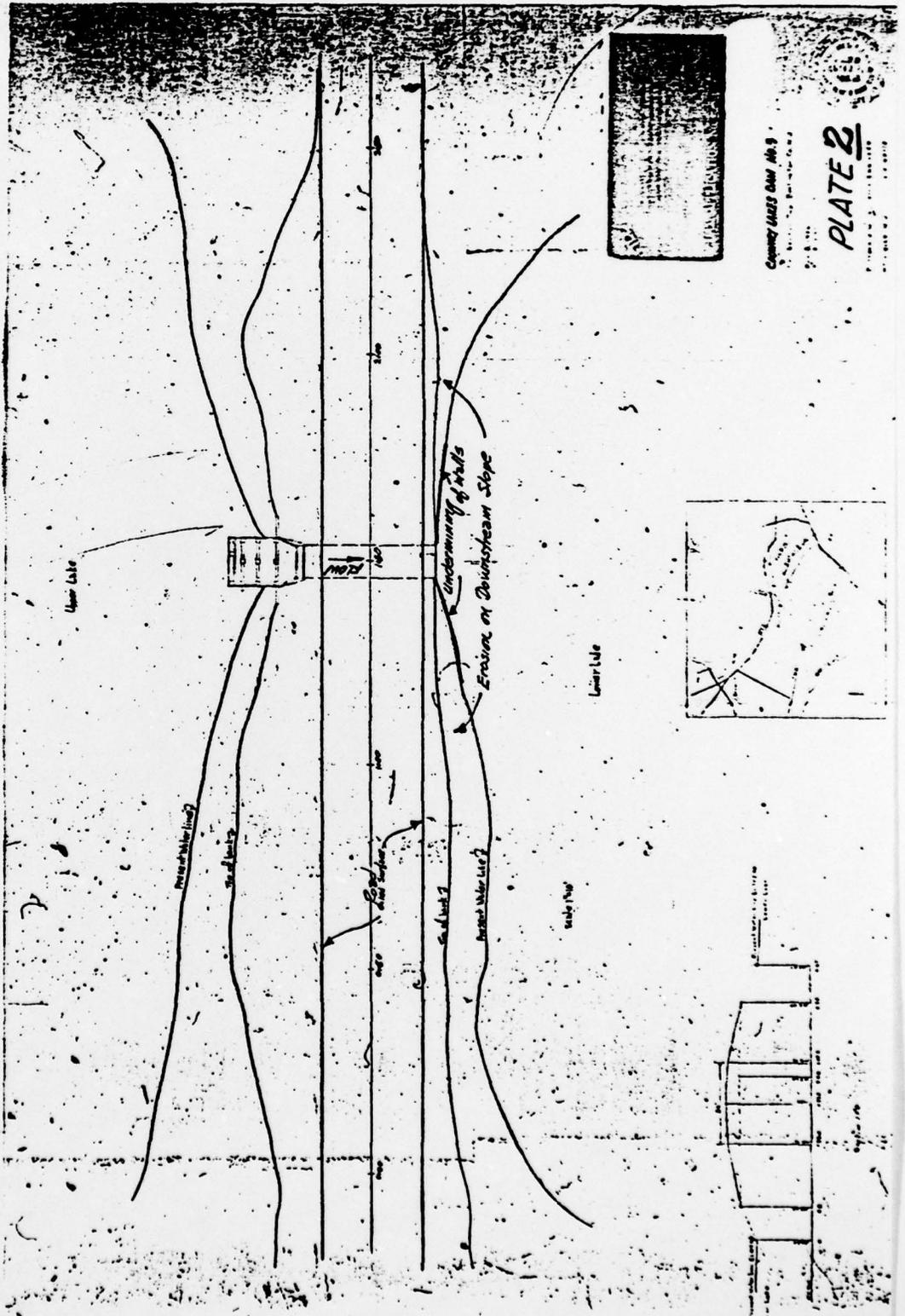


PLATE 1  
 REGIONAL  
 VICINITY MAP  
 SCALE 1:24000

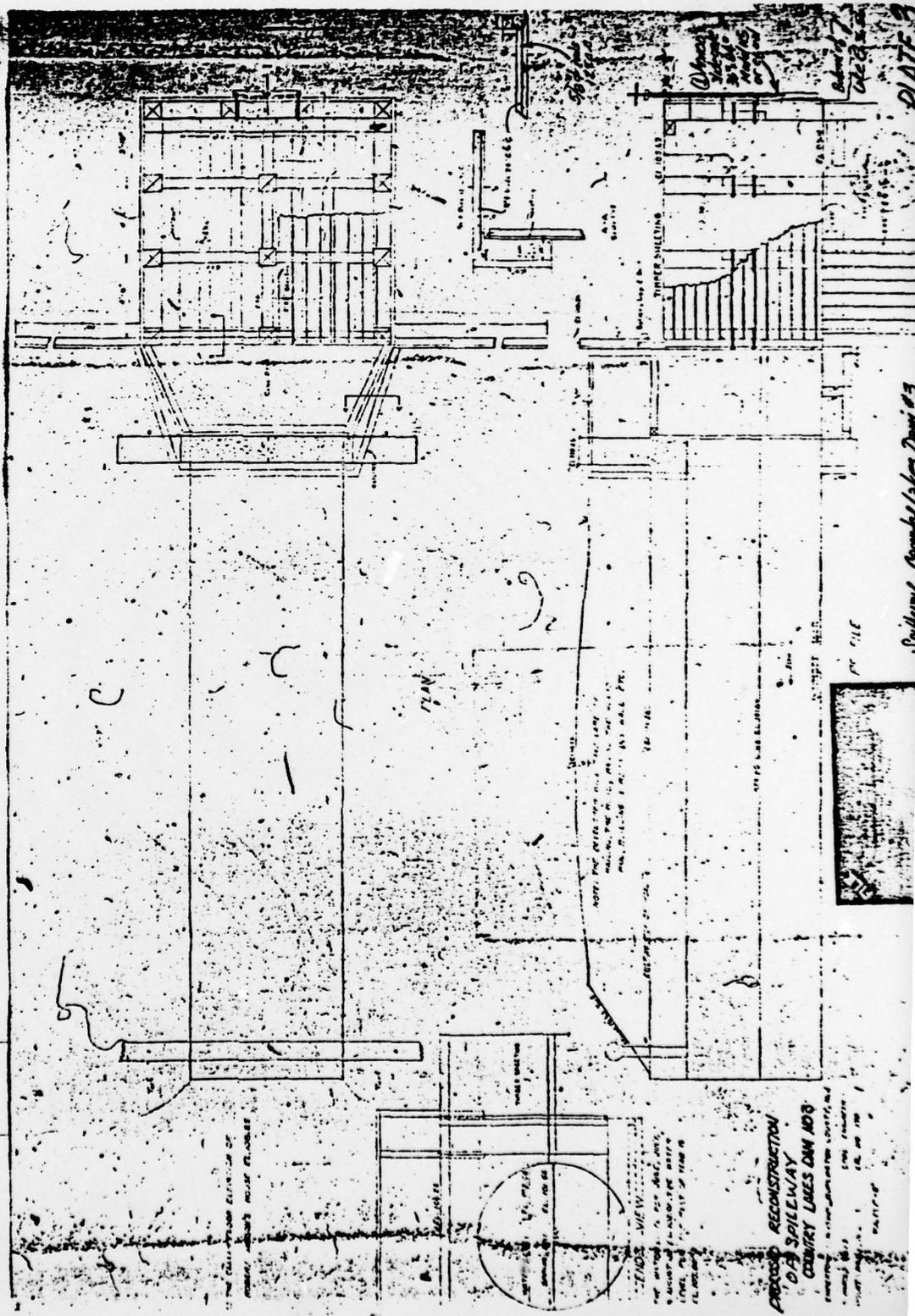




COMPANY LINES DAM No. 9  
 U.S. DEPARTMENT OF AGRICULTURE  
 BUREAU OF RECLAMATION

**PLATE 2**

U.S. GOVERNMENT PRINTING OFFICE  
 1917



DATE 3

Spokane Research Station Draw #3

**PROPOSED RECONSTRUCTION OF A SPILLWAY COUNTRY LINES DAM NO. 3**

**FIELD VIEW**  
 THE DRAWING ELEVATION OF THE SPILLWAY MUST BE MADE IN ACCORDANCE WITH THE FIELD VIEW.



THE DRAWING ELEVATION OF THE SPILLWAY MUST BE MADE IN ACCORDANCE WITH THE FIELD VIEW.

SUBJECT

COUNTRY LAKES NO. 3 DAM

SHEET

4

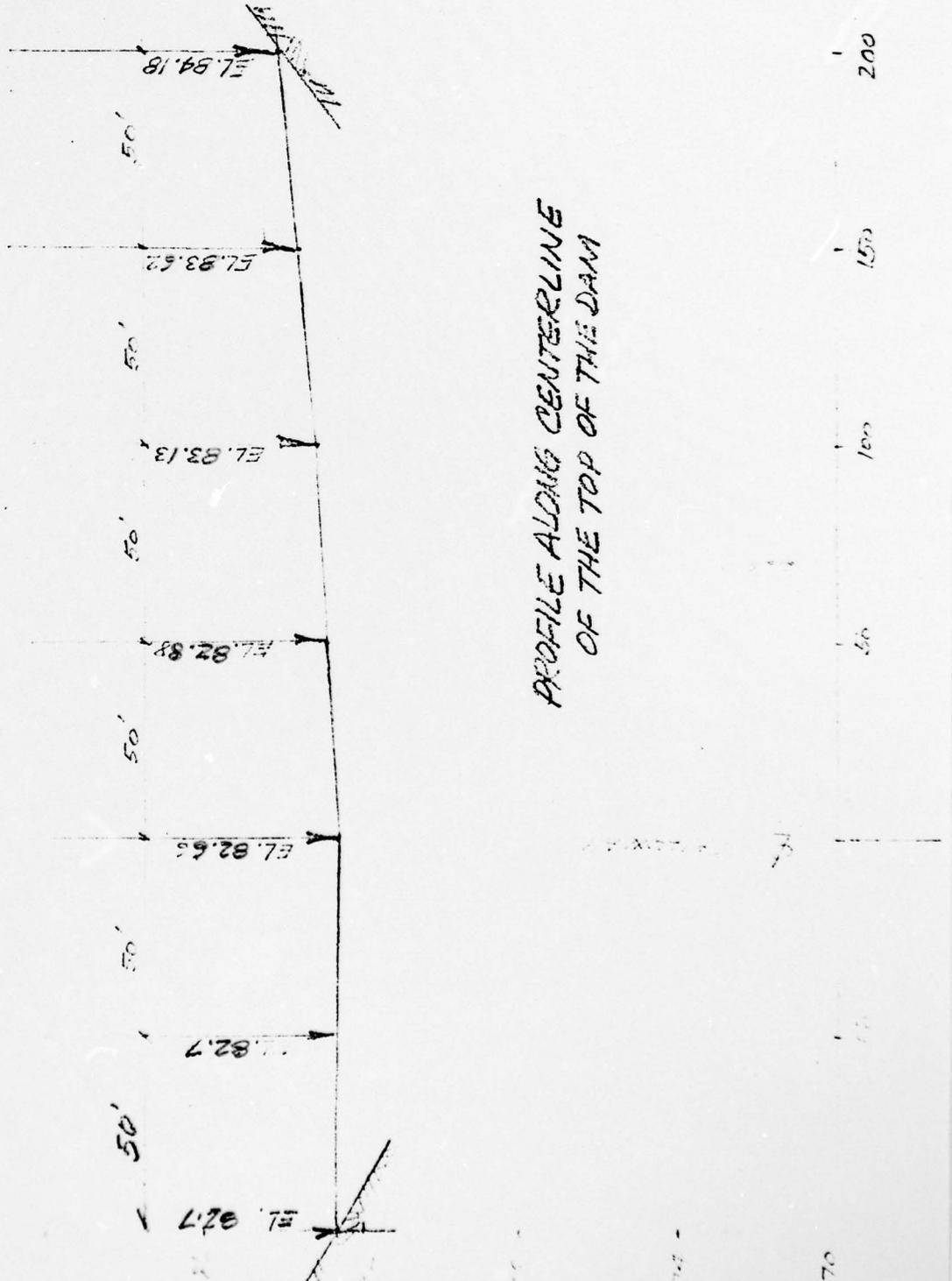
BY

SM

DATE

4/12/79

JOB NO



PROFILE ALONG CENTERLINE  
OF THE TOP OF THE DAM

Elev. (ft. Above MSL)

APPENDIX

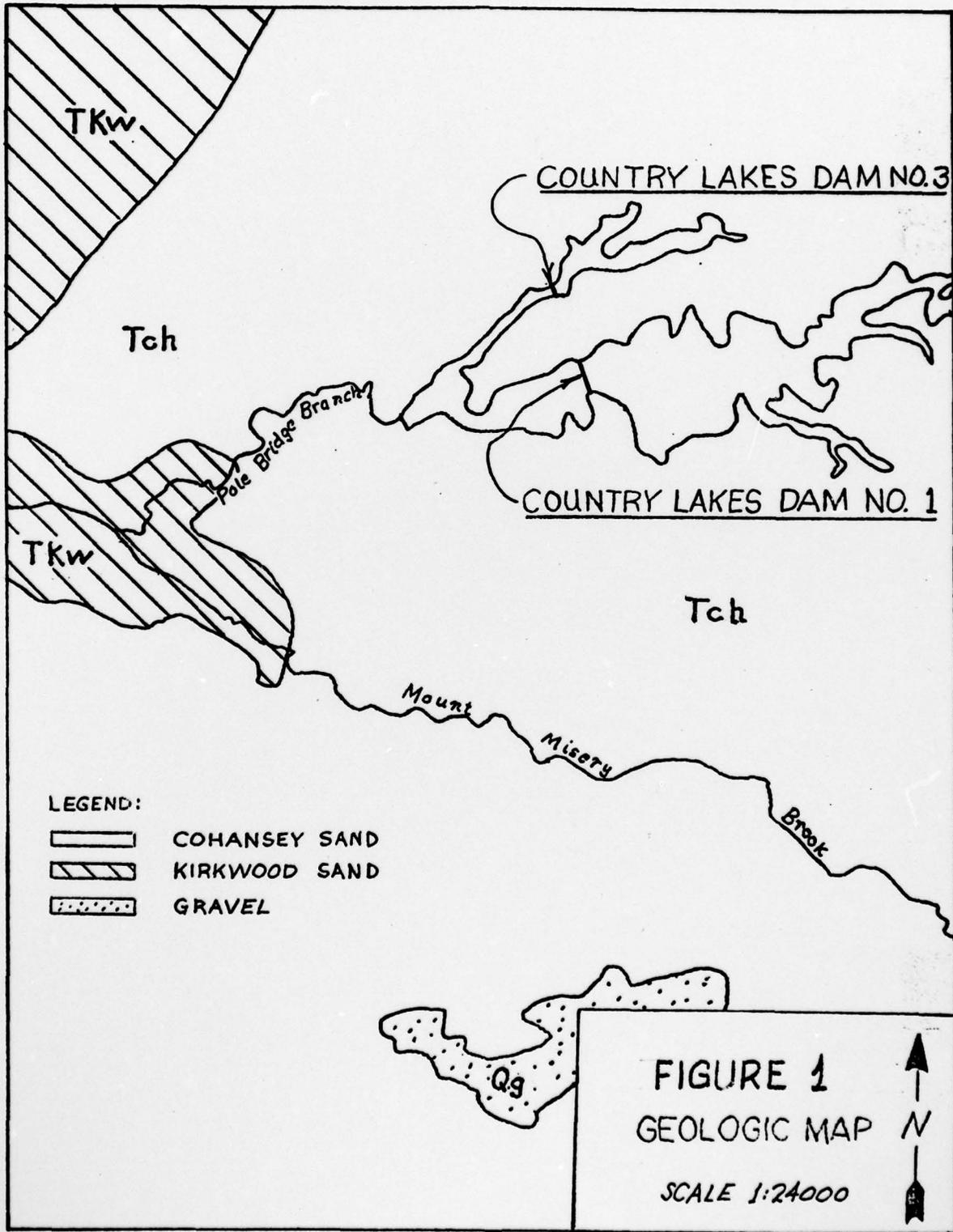
F

Site Geology

SITE GEOLOGY

COUNTRY LAKES DAM 1 & 3

Country Lake is located in the Coastal Plain physiographic province which is composed of unconsolidated sedimentary deposits. These beds form a wedge-shaped mass that is exposed at the Fall Line and thickens in a southeasterly direction towards the Atlantic Ocean. The surficial deposits at the dam site consist of a series of tertiary sands comprising the Cahansey formation. No faults or structural defects are noted in the vicinity of the dam or reservoir.



LEGEND:

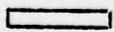
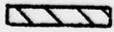
-  COHANSEY SAND
-  KIRKWOOD SAND
-  GRAVEL

FIGURE 1  
GEOLOGIC MAP

SCALE 1:24000

