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PHASE I INSPECTION REPORT. NATIONAL DAM SAFETY PROGRAM. ROUND V--ETC(U)
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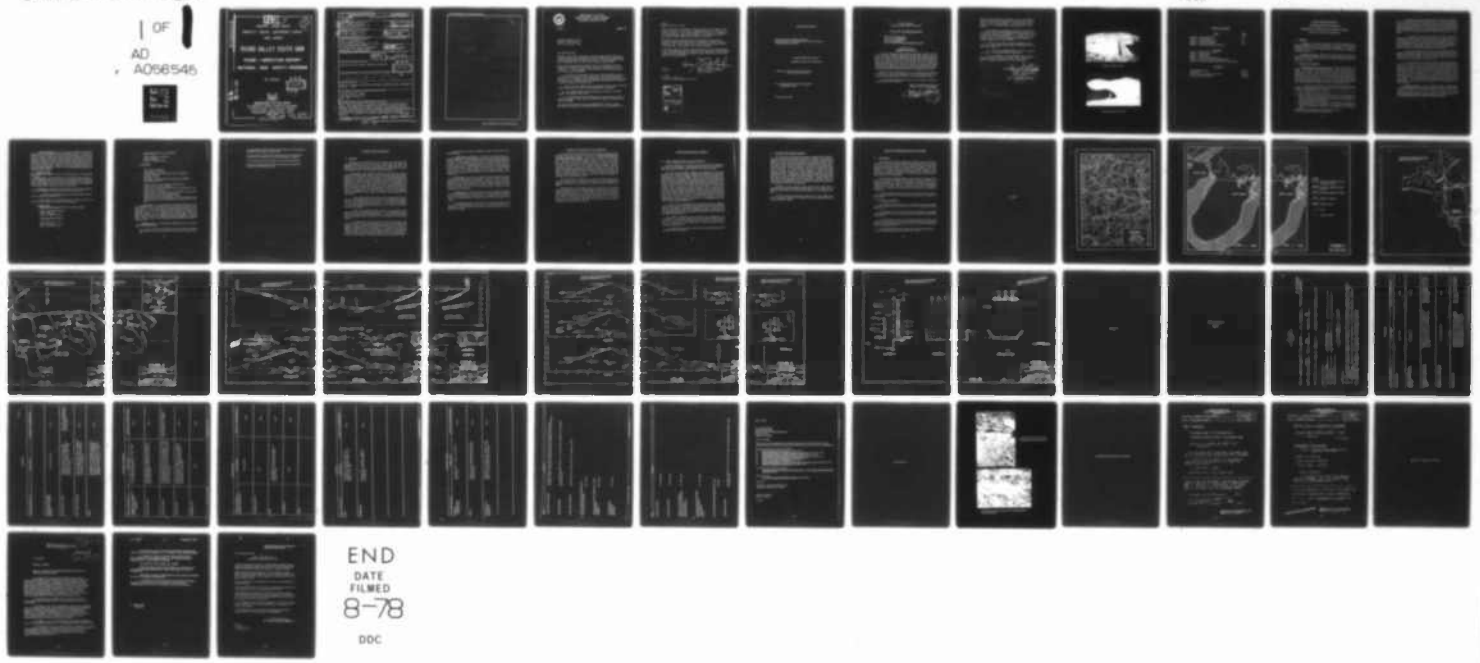

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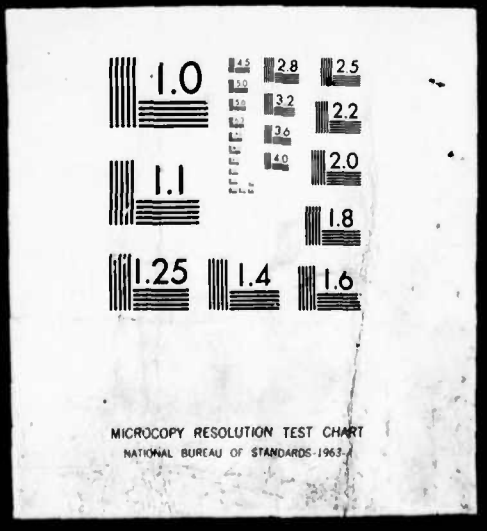

LEVEL II

RARITAN RIVER BASIN

PRESCOTT BROOK, HUNTERDON COUNTY

NEW JERSEY

# ROUND VALLEY SOUTH DAM

## PHASE I INSPECTION REPORT

## NATIONAL DAM SAFETY PROGRAM

NJ 00015





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

MAY 1978

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# REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER (6)
NJ00015

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle) (4)
Phase I Inspection Report,
National Dam Safety Program,
Round Valley South Dam,
Hunterdon County, New Jersey

5. TYPE OF REPORT & PERIOD COVERED (9)
FINAL rept.

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s) (10)
John J. Williams, P.E. (10)

8. CONTRACT OR GRANT NUMBER(s) (15)
DACW61-78-C-0052

9. PERFORMING ORGANIZATION NAME AND ADDRESS
O'Brien & Gere Engineers, Inc.
Justin & Courtney Division
1617 J.F.Kennedy Blvd., Phila., PA 19103

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS (11)
U.S. Army Engineer District, Philadelphia
Custom House, 2d & Chestnut Streets
Philadelphia, Pennsylvania 19106

12. REPORT DATE
MAY 1978

13. NUMBER OF PAGES
45

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) (12) 53 p.

15. SECURITY CLASS. (of this report)
Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

DDC RECEIVED JUL 19 1978 E

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

O'Brien and Gere Engineers, Inc. Philadelphia, PA. Justin and Courtney Div.

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)

National Dam Safety Program
Dam Inspection Report Phase I
Round Valley South Dam, N.J.
Dams - 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 adequacy. 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.

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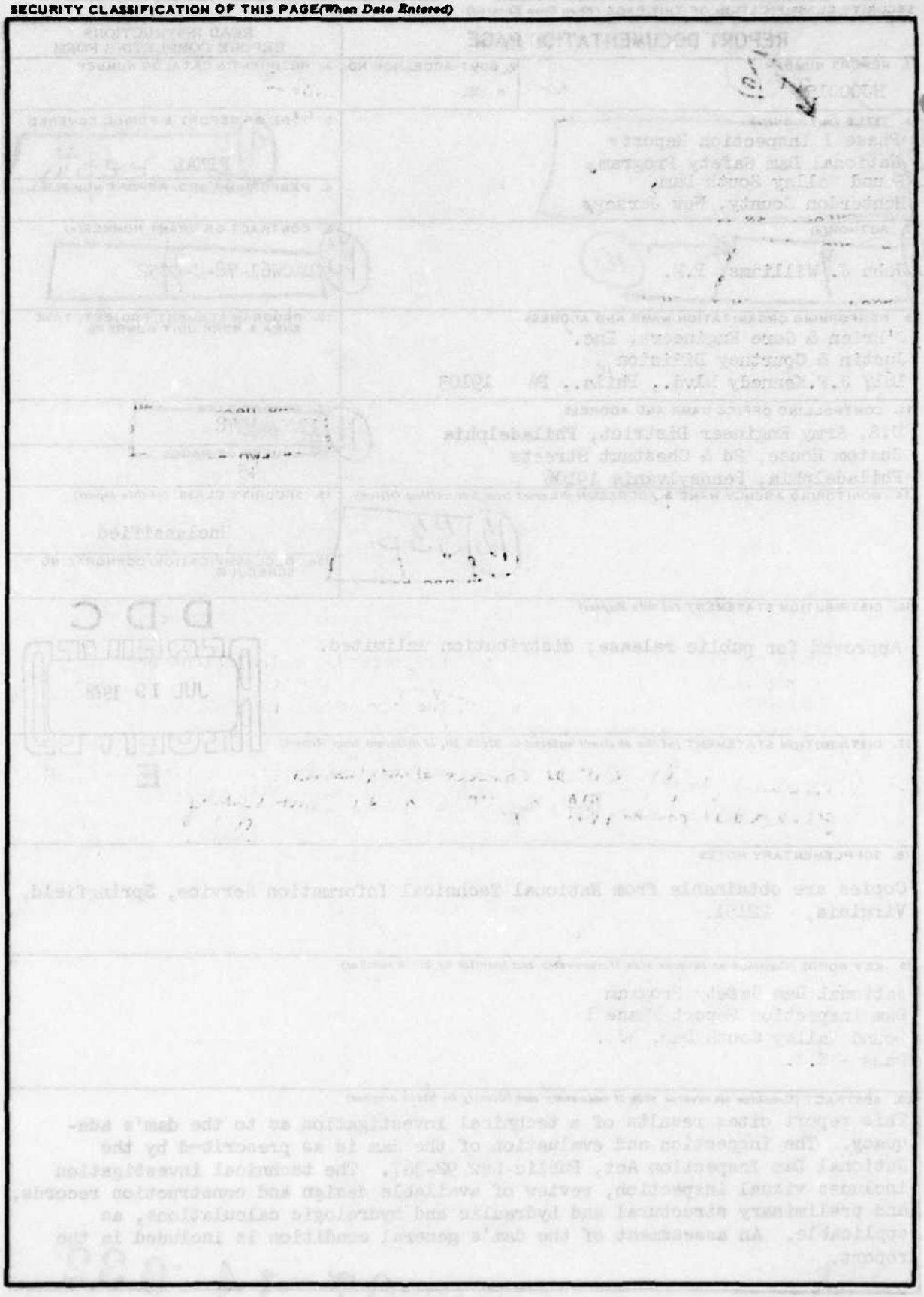


DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-D

8 JUL 1978

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

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Round Valley South Dam in Hunterdon 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 on the first two pages of the report.

Based on visual inspection, available records, calculations and past operational performance, Round Valley South Dam is judged to be in fair condition. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. Installation of piezometers should be initiated within one month from the date of approval of this report and a new stability analysis performed if the readings differ significantly from the design assumptions. In addition, the embankment should be monitored continuously for signs of increased seepage and/or turbid water.

b. Within one year from the date of approval of this report, the below noted actions should be initiated and substantially completed:

(1) The upstream slope protection should be repaired to provide a suitable well graded riprap layer.

(2) The sloughing of the embankment near the east abutment should be filled and graded. After repairs, it should be regularly monitored for further movement.

Two copies of the report are being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State

NAPEN-D
Honorable Brendan T. Byrne

Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congresswoman Helen S. Meyner of the Thirteenth District. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, thirty 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 yours,

Harry V. Dutchyshyn

1 Incl
As stated

HARRY V. DUTCHYSHYN
Colonel, Corps of Engineers
District Engineer

Cy Furn:
Mr. Dirk C. Hofman, P.E.
Department of Environmental Protection

RARITAN RIVER BASIN

Name of Dam: Round Valley South Dam
County and State: Hunterdon County, State of New Jersey
Inventory Number: NJ 00015

# PHASE I INSPECTION REPORT

# NATIONAL DAM SAFETY PROGRAM

Prepared by: O'Brien and Gere Engineers, Inc.
Justin and Courtney Division

For: United States Army Corps of Engineers
Philadelphia District

Date: May 24, 1978

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam Round Valley South Dam

State Located New Jersey
County Located Hunterdon
Stream Prescott Brook
Dates of Inspections April 19 and April 24, 1978

## ASSESSMENT OF GENERAL CONDITIONS

The Round Valley South Dam appears to be stable. However, areas of surface wetness, standing water, and seepage were observed on the downstream slope of the embankment, and were most evident along the berms and the lower third of the downstream slope near the east abutment. These observations indicate that the phreatic line may intersect the downstream slope above the filter blanket and rock toe. Piezometers should immediately be installed to monitor pore pressures throughout the embankment, and the resulting data evaluated and compared with design assumptions to determine the need for further analysis of embankment stability.

Inspection of the rock riprap, used for the upstream slope protection, revealed signs of rock size segregation and material deterioration. The riprap should be supplemented to provide a well graded, protective layer.

The appurtenant structures associated with the South Dam appear to be sound and are well maintained.

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

John J. Williams, P.E.
Vice President

Based on visual inspection, available records, calculations and past operational performance, Round Valley South Dam is judged to be in fair condition. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. Installation of piezometers should be initiated within one month from the date of approval of this report and a new stability analysis performed if the readings differ significantly from the design assumptions. In addition, the embankment should be monitored continuously for signs of increased seepage and/or turbid water.

b. Within one year from the date of approval of this report, the below noted actions should be initiated and substantially completed:

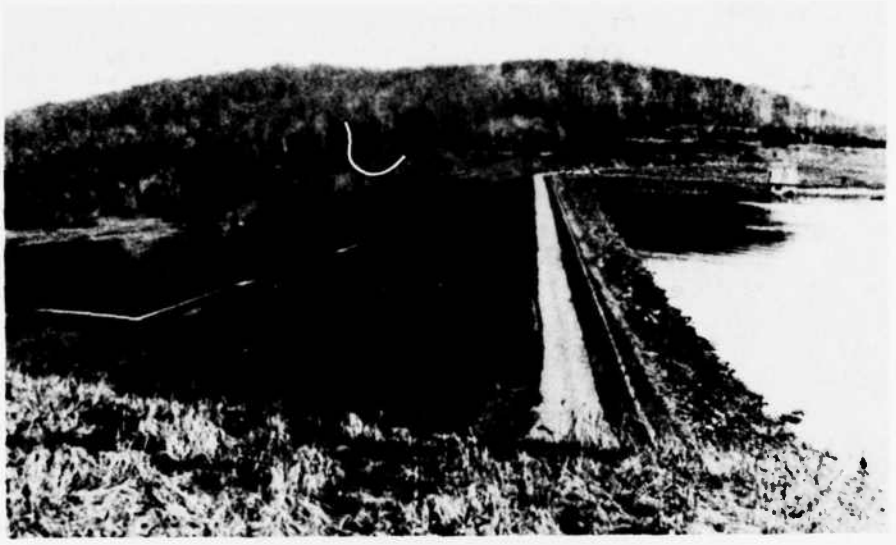
(1) The upstream slope protection should be repaired to provide a suitable well graded riprap layer.

(2) The sloughing of the embankment near the east abutment should be filled and graded. After repairs, it should be regularly monitored for further movement.

APPROVED: Harry V. Dutchyshyn

HARRY V. DUTCHYSHYN
Colonel, Corps of Engineers
District Engineer

DATE: 3 July 1978



OVERALL VIEW OF DAM

UPSTREAM FACE OF DAM

## TABLE OF CONTENTS

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

NAME OF DAM ROUND VALLY SOUTH DAM ID# 00015

SECTION I - 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 #DACW61-78-C-0052 between O'Brien and Gere Engineers, Inc., Justin and 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 conditions of Round Valley South Dam and appurtenant structures, and to determine if the dam constitutes a hazard to human life or property.

## 1.2 PROJECT DESCRIPTION

a. Description of Dam and Appurtenances - Round Valley Reservoir is located in the foothills of Hunterdon County, about one mile south of Lebanon, New Jersey. The impoundment area was formed by the construction of two dams (North and South) and a dike. The North Dam is constructed across a tributary of the South Branch Rockaway Creek, which drains to the North Branch Raritan River. The Dike, which is about one-half mile west of the North Dam is constructed across a swale which drains toward the South Branch of Rockaway Creek. The South Dam is constructed across Prescott Brook which drains to the South Branch Raritan River.

According to the design drawings, by Porter, Urquhart, McCreary and O'Brien Round Valley South Dam is a rolled earth embankment which consists of the following types of materials:

1) Zone 1 Impervious Fill forms the core of the embankment and the backfill of the impervious core trench.
2) Zone 2 Fill forms a portion of the outer shells of the embankment. Specified compaction requirements are similar to those required for Zone 1, but the specified gradation requirements are suitable to a more pervious material than Zone 1.
3) Zone 3 Random Fill forms the remainder of the shell of the embankment. Specified compaction requirements vary depending on the degree of earth or rock fragments contained in the excavation from the borrow areas.
4) Downstream filter blanket and slope protection filter.
5) Rock toe and dumped rock slope protection.

The dam has a maximum height of about 178 feet and is approxmately 1,395 feet long. The top width of the dam is 30 feet, and consists of an 11 foot wide bituminous surfaced roadway with 9.5 foot wide, grass covered shoulders on each side. The upstream slope is 3:1 (horizontal:vertical);the downstream slope is 2.5:1 and is provided with three gutter berms and a wide, Random Fill toe berm sloped at approximately 5 per cent (20:1). Refer to Figure 5 for details concerning transverse sections of the embankment.

A rectangular concrete Intake Tower (35 feet by 29 feet) is located at the west abutment. Water is pumped from the Raritan River and transported through a 10 foot diameter conduit to the intake tower. The tower contains a common intake shaft with three sluice gates located side by side at Elevation 340.0. Separate shafts are provided for each gate with outlet portals at four elevations and guides for trash racks and stop logs. Refer to Figure 6 for details concerning the intake tower plan.

The dam and appurtenant structures are owned and operated by the New Jersey Department of Environmental Protection, Division of Water Resources.The primary purpose of the structures is impoundment of water to supplement the water supply or north central New Jersey. The reservoir area has also been developed as a recreation area.

The structures for Round Valley Reservoir project were designed by Porter, Urquhart, McCreary, and O'Brien, Consulting Engineers, of Newark, New Jersey. The construction application was submitted to the State of New Jersey, Department of Conservation, Division of Water Policy and Supply, on March 1, 1961, and approval was granted on May 31, 1961. On March 30, 1961 the construction contract for the North Dam, the South Dam, and the Dike was awarded to C.J. Langenfelder and Son, Inc., of Baltimore, Maryland. Specifications and design drawings for the project were available for review, but details concerning the construction history were limited. The original design for the gutter berms was found to be unacceptable. In 1970, the stone rubble gutter berms were replaced with concrete gutters.

b. Size Classification - The Round Valley Reservoir was designed for a storage volume of 55 billion gallons (168,000 acre-feet) at the maximum operating pool elevation of 385 feet mean sea level (MSL). The maximum height of the South Dam is 178 feet. Since the normal storage volume exceeds 50,000 acre-feet, the dam is in the large size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

c. Hazard Classification - The South Dam, together with the North Dam and the North Dike, creates an impoundment with a capacity of 168,000 acre-feet. Failure of the South Dam could release a flood wave of extreme magnitude and duration, and could cause serious damage to homes, highways, railroads, and public utilities located downstream of the dam. Although the valleys of Prescott Brook and South Branch Raritan River are sparsely populated for several miles below the dam, the potential for loss of life can be considered high. Therefore, the Round Valley South Dam is in the high hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.

1.3 PERTINENT DATA

(from information supplied by New Jersey Department of Environmental Protection).

a. Drainage Area - The drainage area of the Round Valley Reservoir is about 5.4 square miles, as determined by use of United States Geological Survey, quadrangle sheets (7.5 minute) for Flemington, New Jersey, and Califon, New Jersey. The surface area of the reservoir at the maximum operating pool (Elevation 385.0) is about 3.6 square miles.

b. Discharges - Discharge from the reservoir is accomplished through operation of sluice gates located in the North Dam Outlet Tower.

A statutory conservation discharge of .83 million gallons per day must be maintained to Prescott Brook.

Round Valley is a pumped-storage water supply reservoir and construction of a spillway was not considered necessary.

c. Reservoir Data

Maximum Operating Pool (Reservoir at Elevation 385.0)

Length - 8,000 feet (maximum)
Area - 2,300 acres
Volume - 168,000 acre-feet

Top of Dam (Elevation 395.5)

Length - 8,000 feet (maximum)
Area - 2,400 acres
Volume - 193,000 acre-feet

Maximum Pool (PMF - Elevation 388.0)

Length - 8,000 feet (maximum)
Area - 2,300 acres
Volume - 175,000 acre-feet

d. Dam Data

Type - earth embankment
Top Elevation - 395.5 feet
Streambed elevation at centerline of dam - 218.0 feet
Length - 1,395 feet
Top width - 30 feet
Side slopes - upstream slope 3:1 (horizontal to vertical); downstream slope 2.5:1

Zoning - Three zones as explained in Section 1.2.a.
Impervious core - Zone 1 material
Cutoff - A 4-foot thick concrete cutoff from the bottom of the core trench to sound rock
Grout curtain - Grouting of the rock foundation was specified along the centerline axis of the South Dam. Specified grout holes were spaced at 10-foot centers along the axis, and staggered 1.5 feet about the axis. The specified depth of zoned grouting varied from 30 feet to 60 feet.

e. Outlet Works - A 36 inch diameter steel pipe is constructed under the reservoir from the upstream toe to a valve vault located at the downstream toe. In the vault, a series of reducers and valves connect the 36 inch pipe to a 12 inch pipe with a 12 inch hydraulic valve operated by reservoir pressure. At the upstream end of the 36 inch pipe is an electrically operated valve controlled from the intake tower. The valve vault is used to assure the minimum conservation discharge to Prescott Brook. All other outlet works associated with the reservoir are located at the North Dam.

f. Engineering Data - The information available for review of Round Valley South Dam included:

1) A set of forty-two drawings for the Round Valley Reservoir Project, South Dam, Tunnel, and Appurtenant Structure (Contract RV-1).

2) Special Report 15, State of New Jersey, Department of Conservation and Economic Development, August 1958.

3) Contract RV-1, State of New Jersey Department of Conservation and Economic Development, Division of Water Policy and Supply.

4) Correspondence, Inspection Reports, and Miscellaneous Reports.

5) Documents supplied by the Bureau of Water Facility Operations, Clinton, New Jersey (See page A10).

## SECTION 2 VISUAL INSPECTION

### 2.1 FINDINGS

a. General - The field inspection of the embankment of the South Dam took place on April 24, 1978. The tunnel, intake tower, and valve vault associated with the South Dam were inspected on April 19, 1978. The reservoir water surface elevation was about 381 feet Mean Sea Level during both inspection visits. No underwater areas were inspected.

b. South Dam The riprap on the upstream face of the dam is poorly graded mix of large angular rocks (2 to 4 feet in diameter) and small rocks (6 inches or less in diameter). There is little uniformity in the distribution and placement of the rock. The upper portion of the embankment appears to differ from the design drawings. The drawings indicate a 3:1 slope for the upstream face with no benches. The visible portion of the upstream face appeared to have a steeper slope (about 2:1) and a 10 to 15-foot bench just below the water surface. Where the west abutment riprap terminates into the earth material, some minor undercutting of the abutment has occurred. However, the shoreline at the abutment appears to be in good condition. Several depressions of about 6 inches were observed on the roadway at the top of dam.

On the downstream slope, minor seepage was observed 100 feet from the west abutment along the top berm. According to Mr. Gregory Chase, Supervising Engineer, at the Bureau of Water Facilities Operations, in Clinton, New Jersey, the seepage dries up in late summer. A wet area was also noted approximately 6 feet above the top berm and about 200 feet from the east abutment.

There is a perceptible raised surface in the downstream slope between the top berm and the second berm. The rise appeared to be about 18 inches high for a length of 200 to 300 feet. A number of animal burrow holes were observed near the junction of the second berm and the east abutment.

Standing water was noted along the third or lower berm and in tracks or furrows that were, according to Mr. Gregory Chase, made by the equipment used to cut the grass on the downstream slope. The amount of seepage or standing water was significant at the east end of the embankment; below the third or lower berm, the condition of the grass and topsoil indicated a very moist or wet condition. Below the riprap, observed at the base of the random fill, water is discharging from the embankment or foundation. The discharge is estimated at about one cubic foot per second.

A rectangular weir with a removable 'V' notch is constructed across Prescott Brook.

c. Intake Tower and Tunnel - The Intake Tower appears to be in excellent condition. The gates could not be operated during the inspection, but Mr. Chase stated that no problems have been encountered during gate operations. The assemblies and motors show no signs of deterioration or excessive wear. A mobile gasoline operator is available for use, in case of an electrical failure. The inspection team walked the 10-foot diameter intake tunnel from the manhole on the downstream side of the embankment to the tower. The tunnel appears to be in good condition. Some insignificant seepage through the tower wall was noted at the base of the intake tower.

d. Valve Vault - The valve vault located at the downstream toe of the embankment also appears to be in excellent condition. A 36 inch diameter steel pipe from the reservoir terminates at the valve vault. A 12 inch diameter pipe is connected to the 36 inch pipe through a series of reducers and valves. The 12 inch pipe rests on concrete saddles and is shimmed with cinder blocks and wood. A 12 inch hydraulic valve is used to control discharges to Prescott Brook.

e. Reservoir Area - The natural valley walls surrounding the reservoir have moderate slopes and are well covered with trees and brush. A dike has been constructed across a narrow portion of the reservoir in the northwest corner. The dike separates a swimming area from the main body of the reservoir.

f. Downstream Channel - Prescott Brook originates at the toe of the South Dam. The valley of Prescott Brook is relatively uninhabited. The confluence of Prescott Brook with the South Branch Raritan River is about 4 miles below the dam.

## SECTION 3 - HYDROLOGY AND HYDRAULICS

The design flood used for the Round Valley Reservoir structures is the Probable Maximum Flood (PMF), according to the Recommended Guidelines for Safety Inspection of Dams. The reservoir surface at the maximum operating level (Elevation 385.0), comprises about two-thirds of the drainage area. Spillways were not considered necessary in any of the project structures, since the freeboard included allowance for storage of the PMF. The PMF was derived from the adjusted 48 hour Probable Maximum Precipitation (PMP). The volume of rainfall (PMP) that falls on the land portion of the basin was added to storage after adjustment for losses. The volume of rainfall (PMP) that falls on the reservoir portion of the basin was added to storage assuming no losses. The 48 hour PMP would raise the reservoir water surface about 3 feet. The minimum allowable freeboard at maximum pool is estimated at 4.4 feet .

The embankment is provided with 10.5 feet of freeboard above the maximum operating pool. Therefore, no difficulty is to be anticipated in adequately storing the rainfall excess of a storm less than or equal to the PMP.

According to Mr. Chase, water releases are restricted to a maximum of 600 million gallons per day (mgd) through the release works on the North Branch Rockaway Creek and 20 mgd through a bypass line in the pump station on the Raritan River. Mr. Chase added that the maximum discharge into Rockaway Creek could cause severe downstream erosion. Therefore, the reservoir can be drawn down about one foot per day. If a large drawdown were immediately necessary, the pumps at the Raritan River pump station would have to be removed.

## SECTION 4 STRUCTURAL STABILITY

### 4.1 VISUAL OBSERVATIONS AND DATA REVIEWS

Design calculations for the South Dam were provided by personnel of the New Jersey Department of Environmental Protection, Division of Water Resources, Bureau of Water Facility Operations, Clinton, New Jersey.

The flow net and stability analyses were performed by the design engineering firm (Porter, Urquhart, McCreary and O'Brien) for the maximum operating pool condition (Elevation 385.0) and for rapid drawdown from Elevation 385.0 to Elevation 300.0. Sliding circles with various radii were analyzed for both the upstream and downstream slopes, with the downstream slope analyzed for horizontal to vertical permeability ratios ($K_h$:$K_v$) of 2.25 and 9.0. Determination of the most critical circle was made by assuming friction angles of 15, 20 and 25 degrees for circle groups of various radii. Cohesion values necessary to give a constant factor of safety were computed using an abbreviated method of slices for the stability analyses. For a given friction angle, the maximum required cohesion value indicated the radius of the most critical circle. The conventional method of slices was then applied to the critical circle. For the downstream slope, the factor of safety was computed as 1.62 with the ratio of horizontal to vertical permeabilities ($K_h$:$K_v$) assumed to be 9.0. For the upstream slope, the factor of safety was computed as 1.53.

The flow net for the South Dam was constructed using a graphical method, assuming the embankment to be homogenous and the filter blanket drains to be operable. The design discharge for the drain was three times the calculated seepage (.002 cfs or .9 gallons per/minute). However, during the inspection, the flow appeared to be about 1cfs, which is well in excess of the filter drain design flow.

The design calculations for the Intake Tower appeared to be satisfactory. The structural loadings used in the design of the tower were for the reservoir at Elevation 300.0 and a wind velocity of 70 miles per hour, and for the maximum ultimate water level of 410.0 feet based on future expansion. (See Figure 4).

A comprehensive review of the structural design calculations is beyond the scope of this investigation.

## 4.2 GEOLOGY AND SEISMIC STABILITY

The South Dam is located in the Piedmont physiographic province, a lowland containing gently rounded hills and wide valleys. The reservoir is essentially formed by Cushetunk Mountain, a horseshoe shaped Triassic diabase intrusion bounded on the west by Triassic, Paleozoic and older rocks. The dam is located across Prescott Brook in a gap which was carved out of the faulted contact between a diabase to the east and much older gneissic rocks to the west. The east abutment is formed by the diabase; the valley section foundation by faulted, crushed, diabase and gneiss with some indurated Triassic shales; and the right abutment by gneiss and other metamorphic rocks. Investigations made during the design of this structure indicated that the materials were weathered deeply and interstices filled with clay, forming a relatively tight foundation. Springs, which were reported in the investigations, were treated during construction. However, at the time of the inspection, water was observed flowing from the rock toe or foundations in excess of the design flow.

Although the area contains several faults, which were noted in geologic reports prepared during the design phase, they are considered to be very old and inactive, and should pose no problem to the stability of the dam.

The dam is located within Seismic Risk Zone 1 of the Seismic Zone Map of Contiguous States, and it appears that static stability calculations are satisfactory for design.

## SECTION 5 -ASSESSMENT/REMEDIAL MEASURES

### 5.1 ASSESSMENT

The South Dam embankment appears to be stable. However, the signs of moisture and wetness on the downstream slope, especially at the lower third of the east side, indicate that the phreatic line may intersect the embankment slope at a point well above the filter blanket or rock toe. However, it is possible that the rainfall that occurred previous to the inspection may have been partially responsible for this condition. Since there are no piezometers installed in the embankment, the magnitude of pore pressures cannot be assessed.

The riprap on the upstream slope is poorly graded and inadequate to provide the necessary protection against erosion due to wave action. The riprap stone appears to have been susceptible to stress release or frost-wedging against fracture planes. According to Mr. Chase, considerable deterioration of the rock has occurred since its placement at the time of construction. Subsequent wave action has left portions of the embankment unprotected.

The appurtenant structures associated with the South Dam appear to be in excellent condition and should not adversely affect the safety of the embankment.

### 5.2 REMEDIAL MEASURES

The upstream slope proection for the South Dam should be supplemented with large and medium sized rock to provide a suitable well graded riprap layer.

The embankment of the South Dam should immediately be equipped with piezometers to monitor the pore pressure development throughout the embankment.

If pore pressures shown by the piezometers differ significantly from those assumed in the design flow nets and stability studies, new embankment stability analyses should be performed using the pore pressure distribution based on the piezometer data.

The embankment of the South Dam should be monitored continuously for signs of increased seepage rates and/or turbid water.

FIGURES

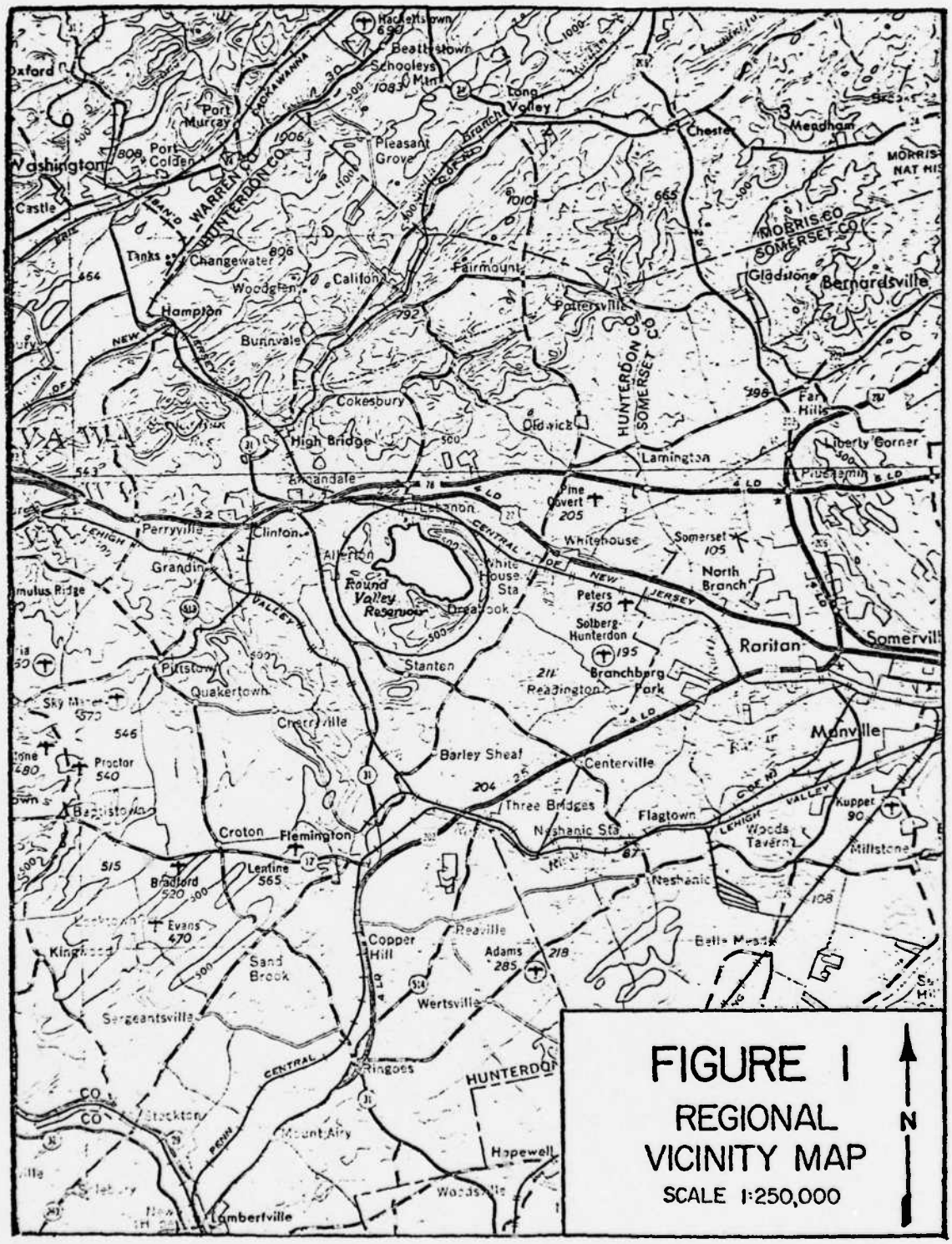

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FIGURE 1
REGIONAL
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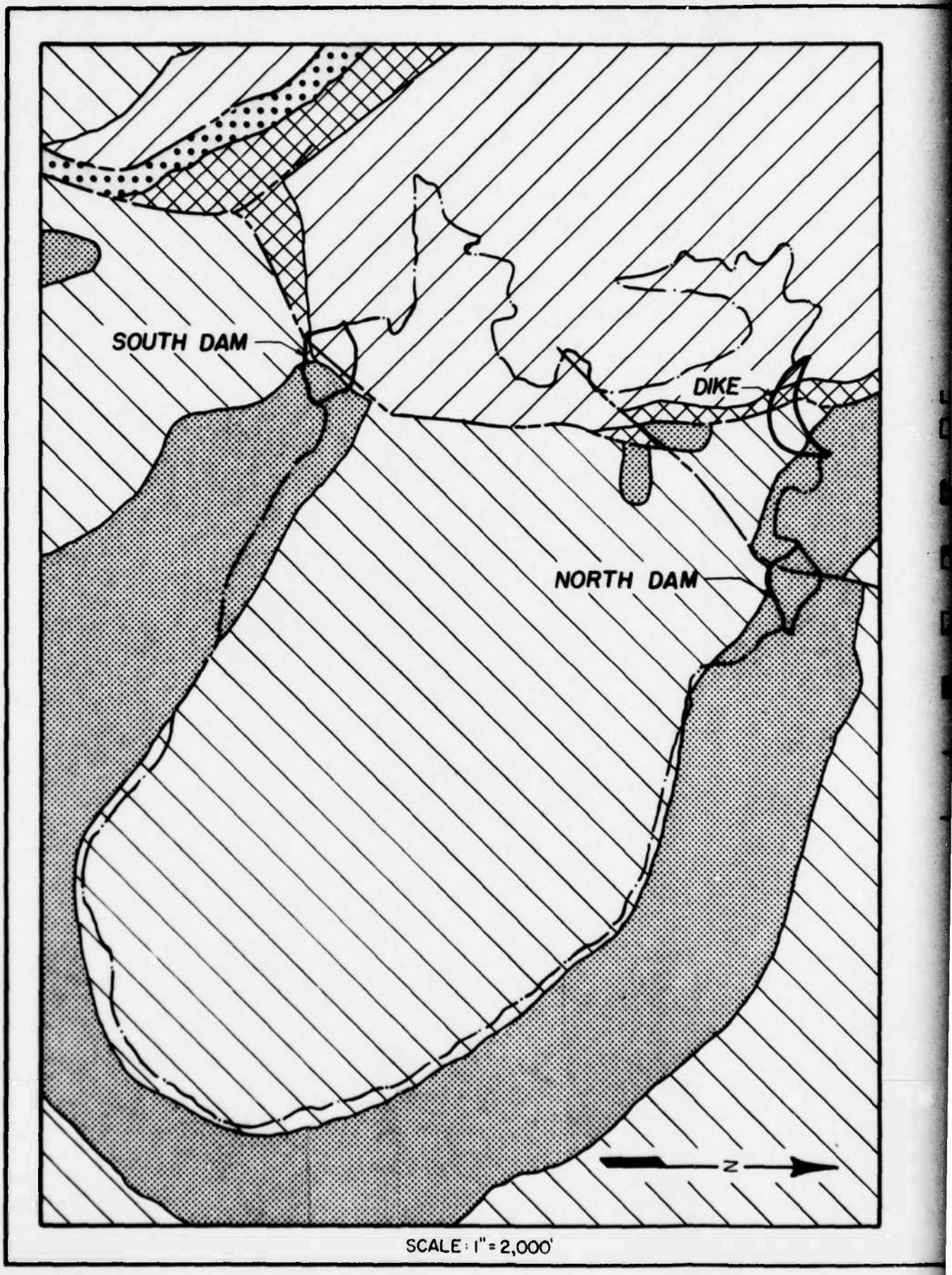
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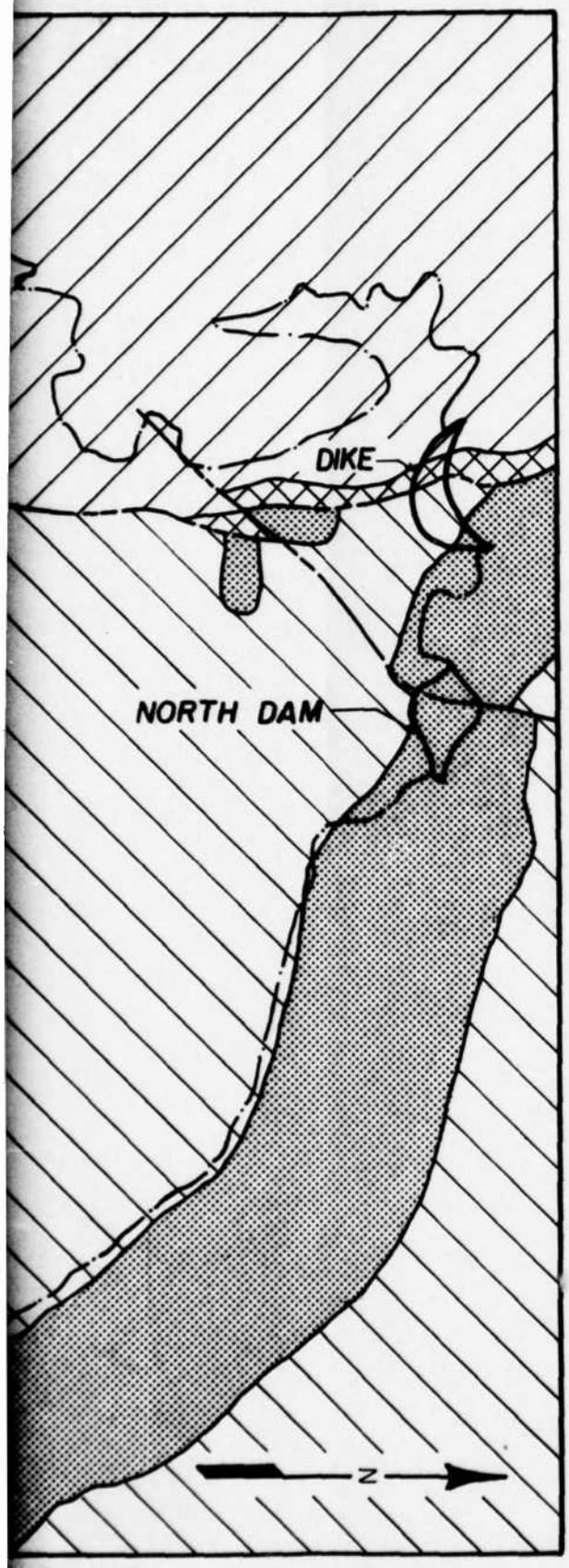
NORTH DAM
N
SCALE: 1" = 2,000'

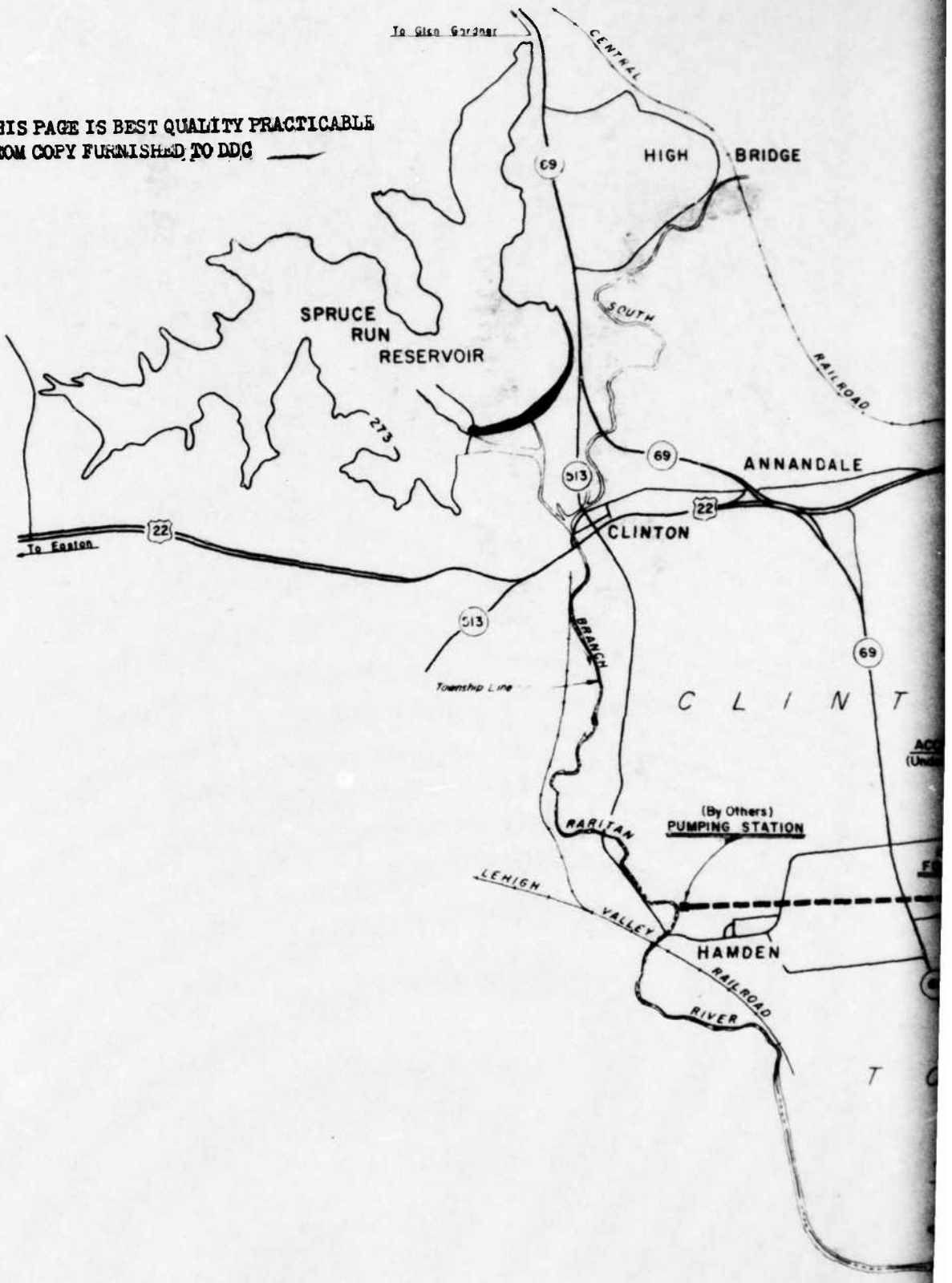


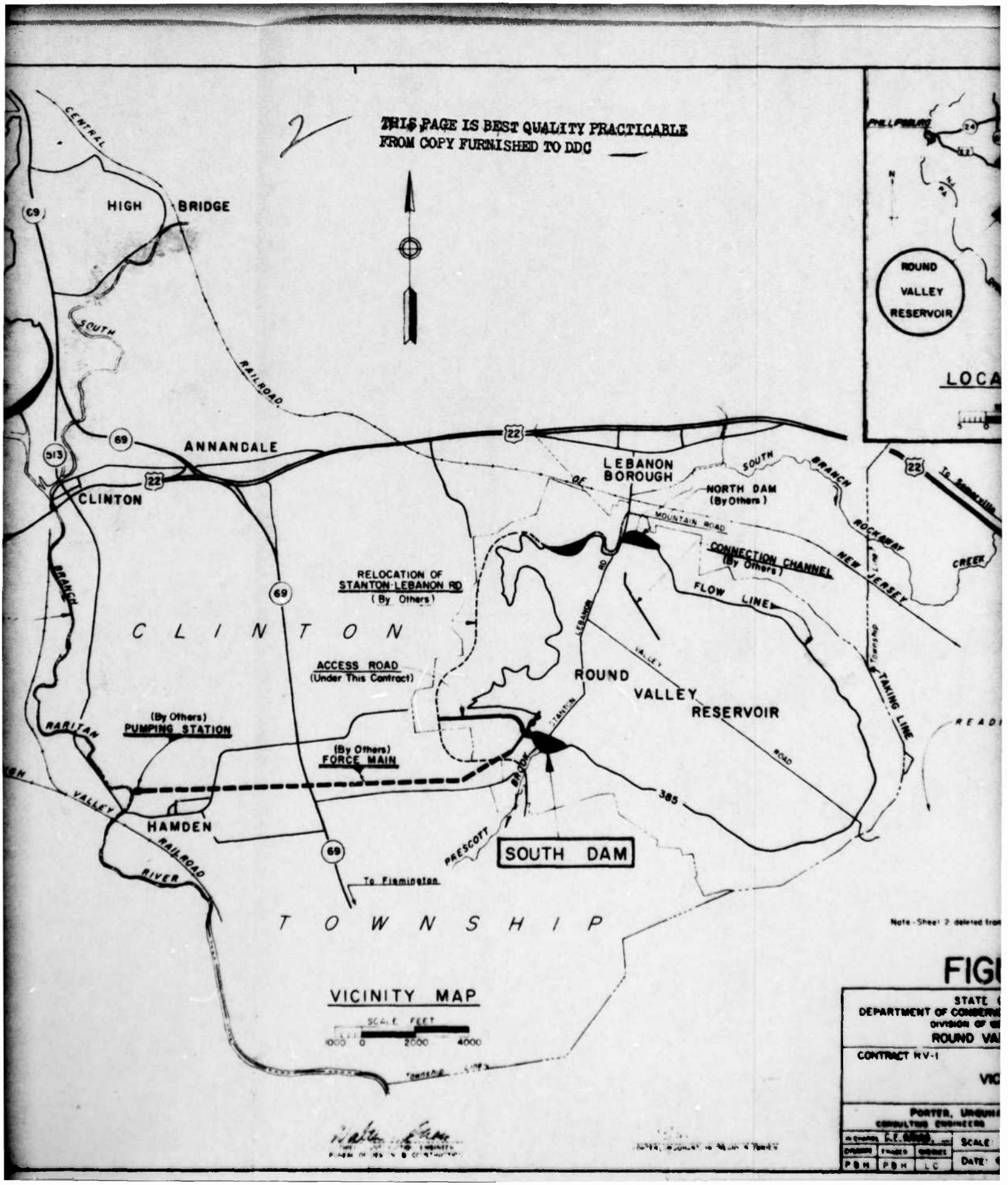

LEGEND:

- BRUNSWICK FORMATION-Red Shale and Sandstone, Triassic
- KITTATINNY LIMESTONE- Cambro-Ordovician
- HARDYSTON QUARTZITE-Cambrian
- GNEISS - Pre-Cambrian
- DIABASE - Triassic
- FAULT
- DESIGN FLOW LINE

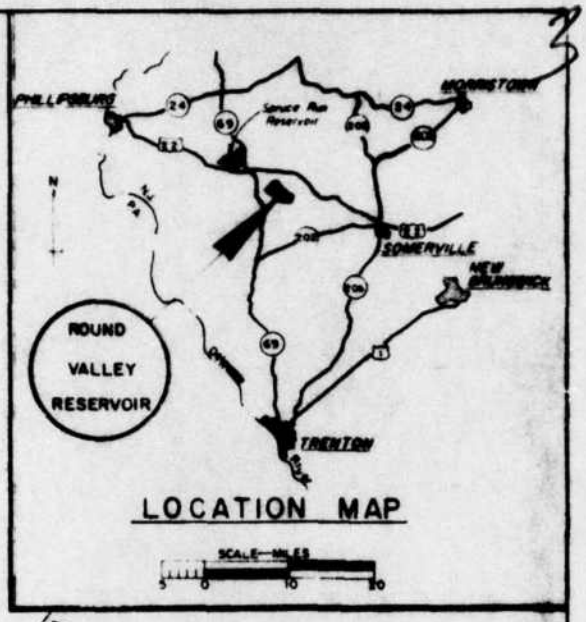
# FIGURE 2
## GEOLOGIC MAP

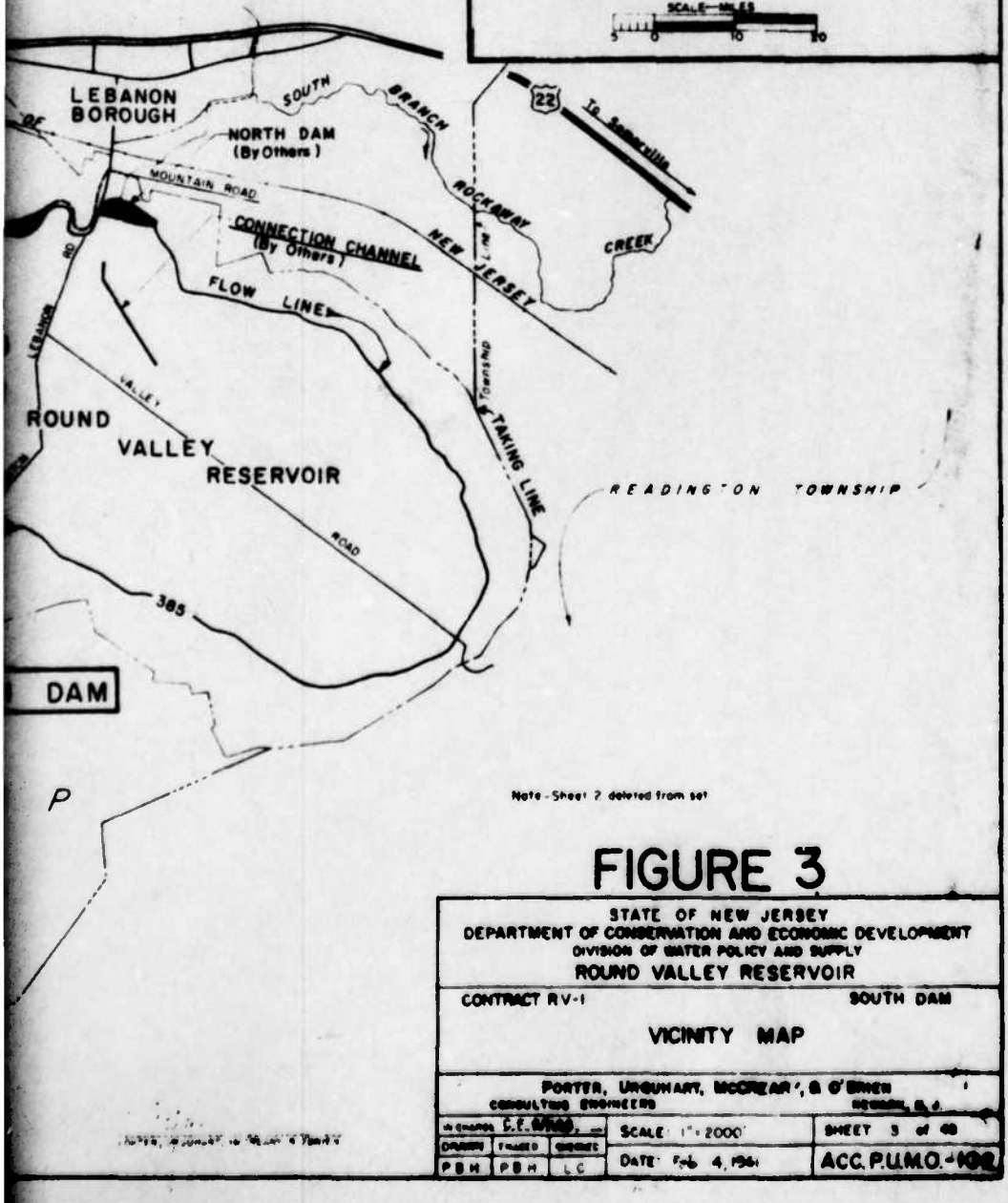
1" = 2,000'





TY PRACTICABLE
DDC




Note - Sheet 7 deleted from set

# FIGURE 3

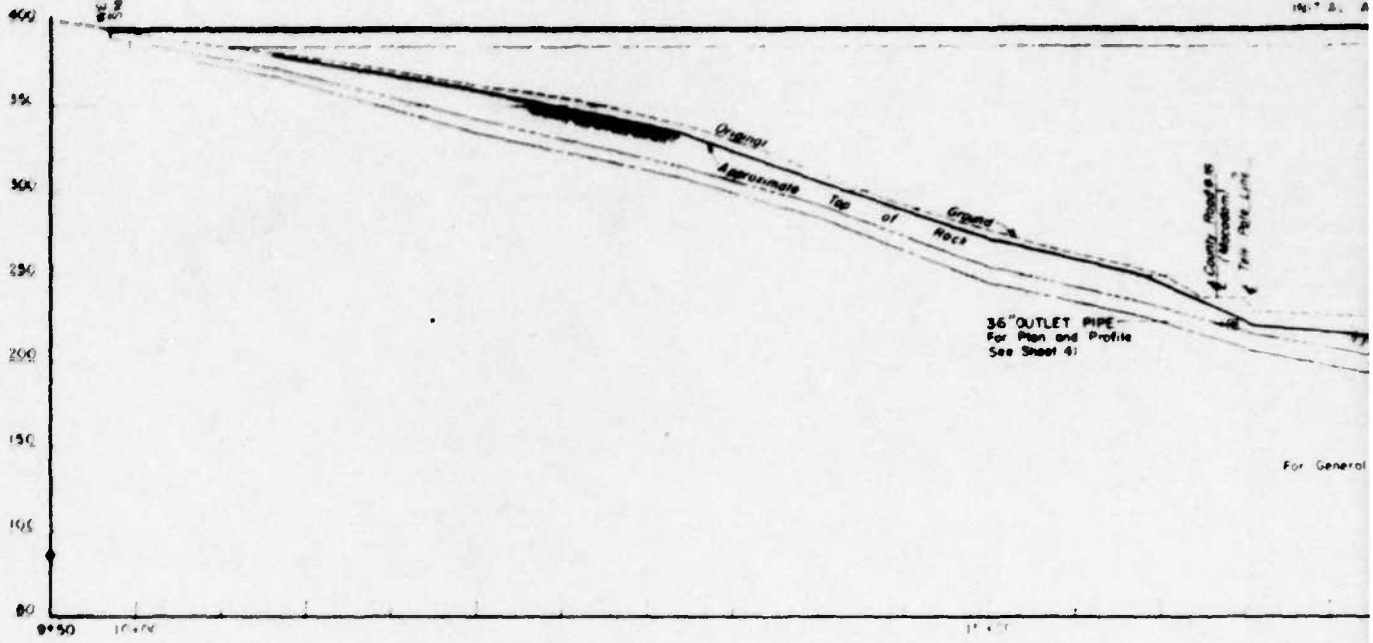
STATE OF NEW JERSEY
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
DIVISION OF WATER POLICY AND SUPPLY
ROUND VALLEY RESERVOIR

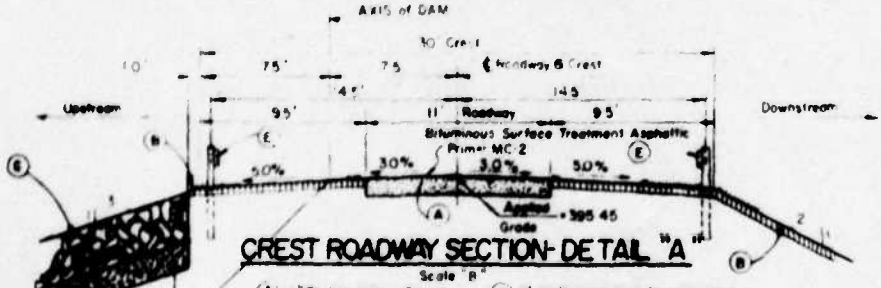
CONTRACT RV-1 — SOUTH DAM

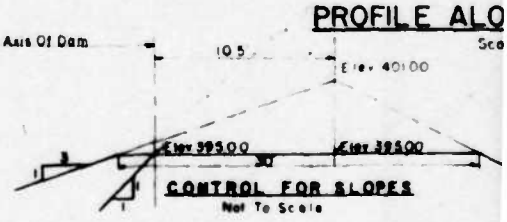
VICINITY MAP

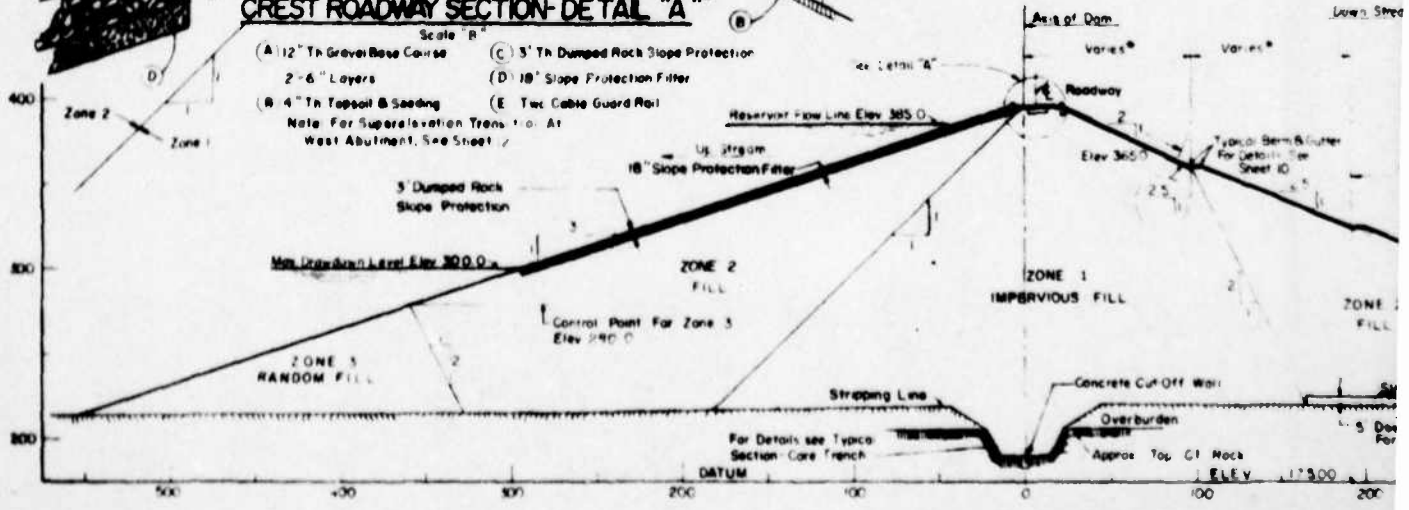
PORTER, URQUHART, McCREAR, & O'BRIEN
CONSULTING ENGINEERS

| DESIGN | TRACED | CHECKED | SCALE 1" = 2000' | SHEET 3 of 48 |
|---|---|---|---|---|
| PBH | PBH | LC | DATE Feb 4, 1961 | ACC. P.U.M.O. - 102 |




TYPICAL SECTION
Scale "A"

TICABLE

Ultimate Axis of Dam Elev 420.00

INITIAL AXIS OF DAM ELEV 345.27

Ultimate Flow Line Elev 410.00

END OF IMPROVEMENT Sta 11+73.73

INITIAL FLOW LINE 385.00

Ground

Rock

County Roadway (Macadam)

Twin Pipe Line

N.J.P.&L. Co. 33 kv Trans.

Prescott Brook

Original Ground

36" OUTLET PIPE — For Plan and Profile See Sheet 41

Overburden

Approximate Bottom Conc Cut-off Trench

Approximate Bottom of Core Trench



For General Plan of Dam See Sheet 7

NOTE Field Investigations Show That Generally The Upper Portion Of The Rock Formation Is Decomposed, Seamed, & Fractured With These Characteristics Lessening With Increased Depth

## PROFILE ALONG DAM AXIS

Scale "A"

Elev 401.00

Elev 395.00

Elev 395.00

## CONTROL FOR SLOPES

Not To Scale

Slope Break As Ordered By The Engineer

Axis of Dam

Stripping

Original Ground

Stripping Depth Varies

Overburden

Rock Surface Protection As Ordered By The Engineer

Approx Top Of Rock

Approx Bottom of Core Trench

Excavate to Sound Rock as directed by the Engineer

Bottom of Conc Cut-off Trench

Concrete Cut off Wall

ESTIMATED C

| STATIONS | |
|---|---|
| 9+87.3 | 10+80 |
| 10+80 | 20+77 |
| 20+77 | 21+97 |
| 21+97 | 23+8 |

NOTE Depths of Core T... Depths Shown As ... Increased, Payme... The Specificatio...

Axis of Dam

Down Stream

Varies*

Roadway

Elev 365.0

Typical Berm & Gutter For Details See Sheet 10

* See Sheet 10

## TYPICAL SECTION-CORE TRENCH

Not to Scale

Note Limit Of Payment For Rock Excavation In Cut-Off Trench And Poured Concrete To Be Neat Lines As Shown Above Or As Ordered By The Engineer Limit Of Payment For Excavation And Zone 1 Impervious Fill (In Core Trench) To Be Neat Lines As Shown Above Or As Ordered By The Engineer

ZONE 1 IMPERVIOUS FILL

ZONE 2 FILL

4" Topsoil & Seeding

Horizontal Line

Varies

ZONE 3 RANDOM FILL

Concrete Cut Off Wall

Preliminary Grading Slope Varies See Sheet 6

Overburden

Approx Top Of Rock

ELEV 173.00

5' Down Stream Filter Blanket For Limits See Sheet 10

Rock Toe & Toe Ditch For Details See Section GG Sheet 10

400

300

200

0 100 200 300 400 500 600

## YPICAL SECTION

Scale "A"

FIGU

STATE DEPARTMENT OF CONSERV... DIVISION OF W... ROUND V...

CONTRACT RV-1

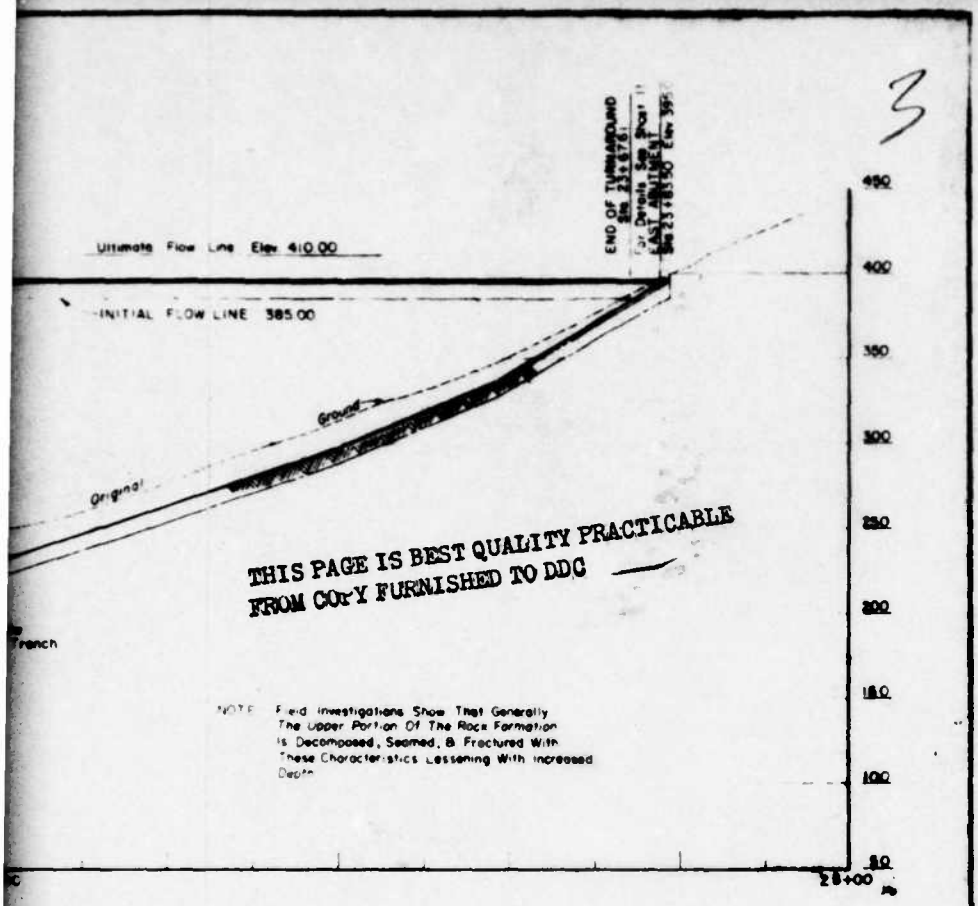
PROFILE ...

PORTER URQUH... CONSULTING ENGINEERS

| | | | |
|---|---|---|---|
| DESIGNED C.F. GREEN | | | SCALE |
| DRAWN | TRACED | CHECKED | |
| B.J.J. | B.J.J. | L.C. | DATE |

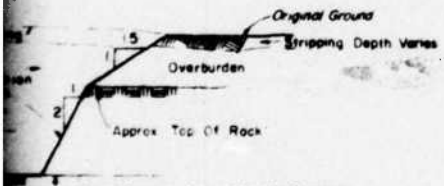
Walter J. Mason
CHIEF CONSTRUCTION ENGINEER
BUREAU OF DESIGN & CONSTRUCTION

PORTER URQUHART MCCREARY & O'BRIEN





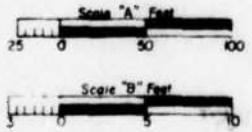

NOTE Field Investigations Show That Generally The Upper Portion Of The Rock Formation Is Decomposed, Seamed, & Fractured With These Characteristics Lessening With Increased Depth

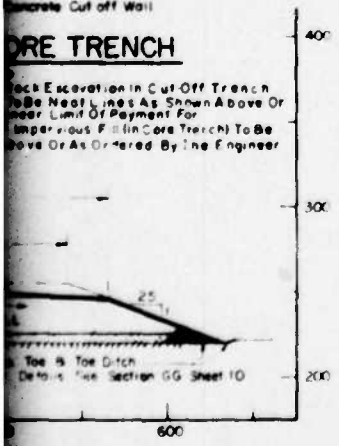



## ESTIMATED CORE TRENCH EXCAVATION LIMITS

| STATIONS | ESTIMATED DEPTH (After Stripping) |
|---|---|
| 9+87.3 — 10+80 | 10' |
| 10+80 — 20+77 | 25' |
| 20+77 — 21+97 | 20' |
| 21+97 — 23+83.50 | 10' |

NOTE Depths of Core Trench Shall Be Increased Or Decreased From Depths Shown As Directed By The Engineer If The Depths Are Increased, Payment Will Be As Specified In Section 3.3.1 Of The Specifications




# FIGURE 4

STATE OF NEW JERSEY
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
DIVISION OF WATER POLICY AND SUPPLY
ROUND VALLEY RESERVOIR

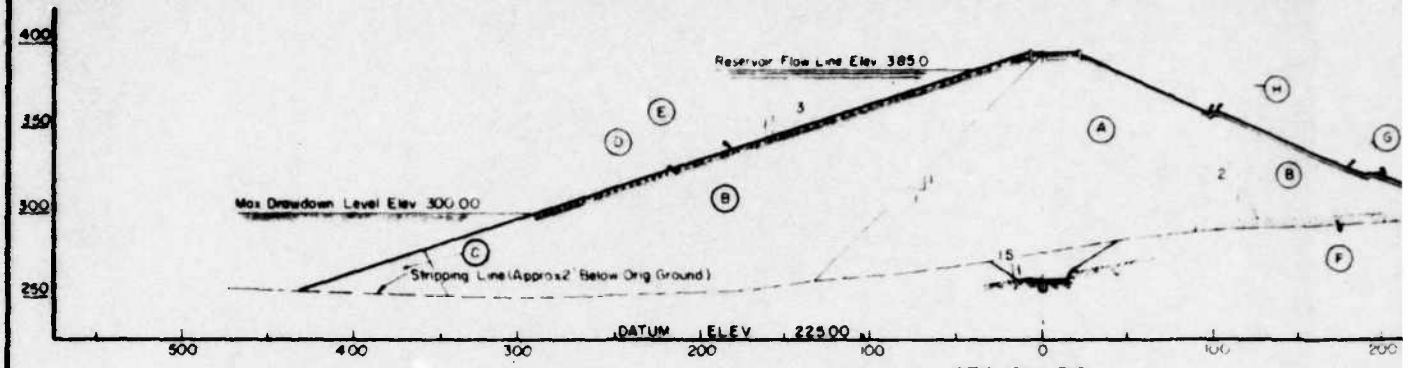
CONTRACT RV-1 SOUTH DAM

PROFILE & TYPICAL SECTION

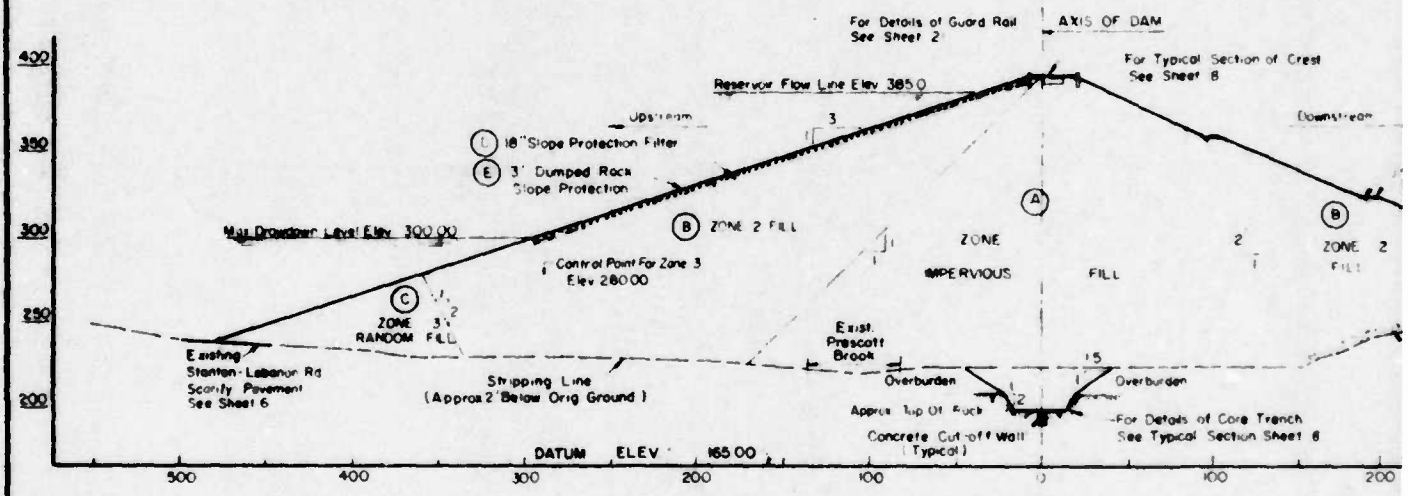
PORTER, URQUHART, McCREARY, & O'BRIEN
CONSULTING ENGINEERS NEWARK, N.J.

| In charge C.F. GRIGG | | | SCALE AS SHOWN | SHEET 8 of 40 |
|---|---|---|---|---|
| DRAWN | TRACED | CHECKED | | |
| B.J.J. | B.J.J. | L.C. | DATE Feb 14, 1961 | ACC. P.U.M.O. |

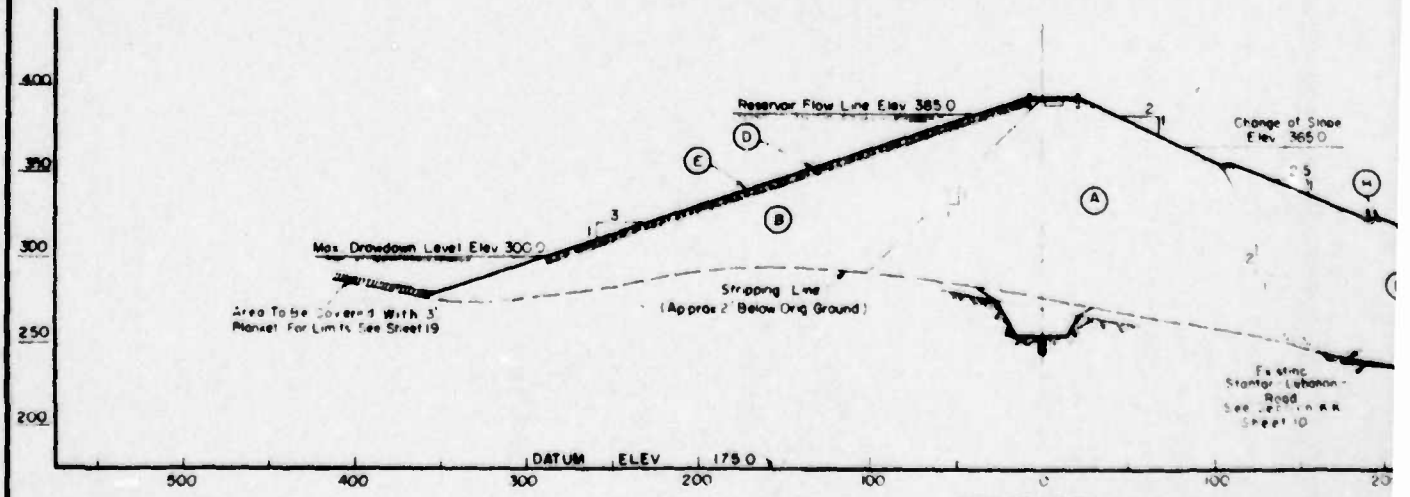
PORTER, URQUHART, McCREARY & O'BRIEN



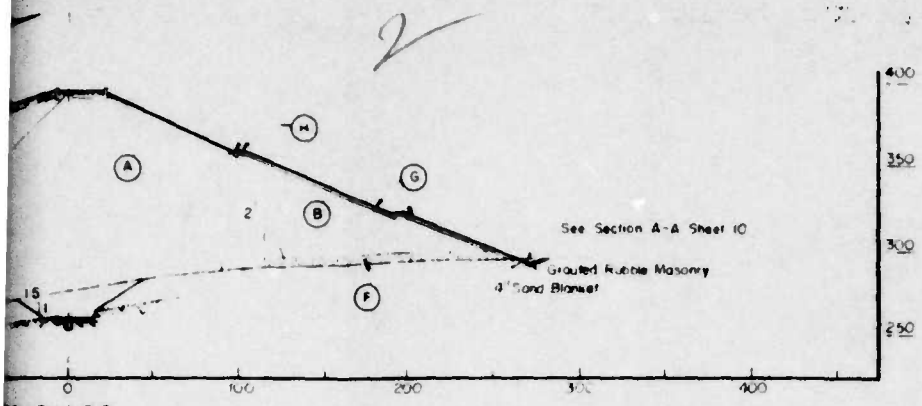

STA 21+00




STA 18+50




STA 15+00

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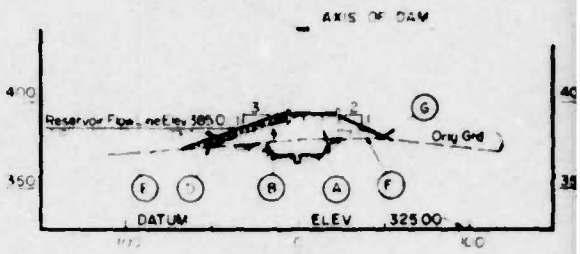


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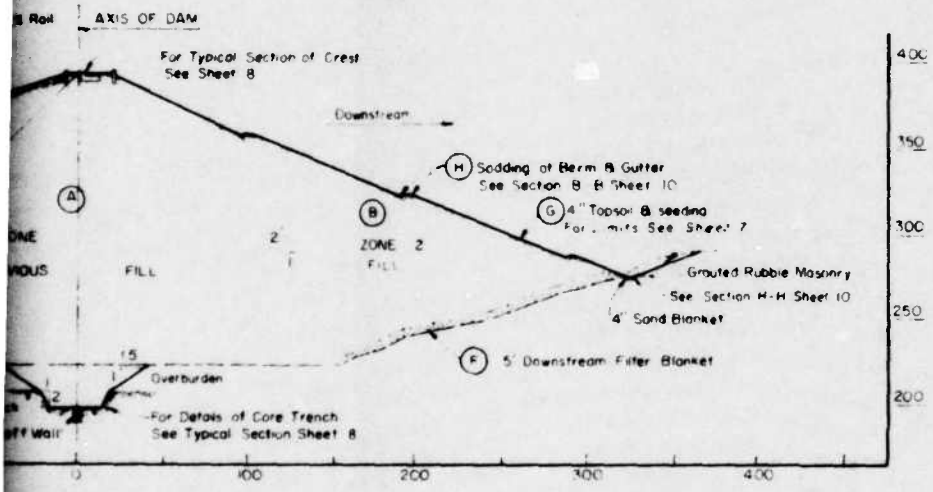


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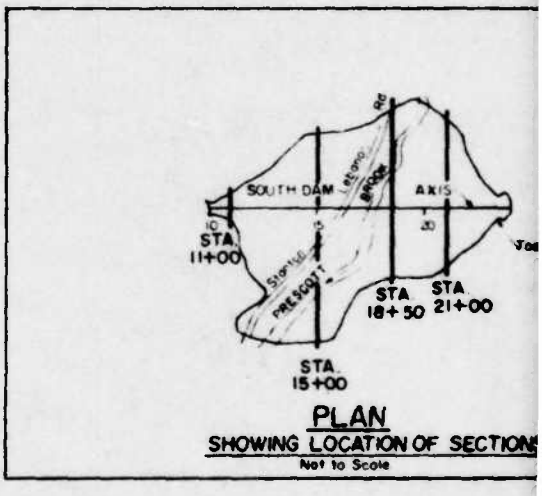
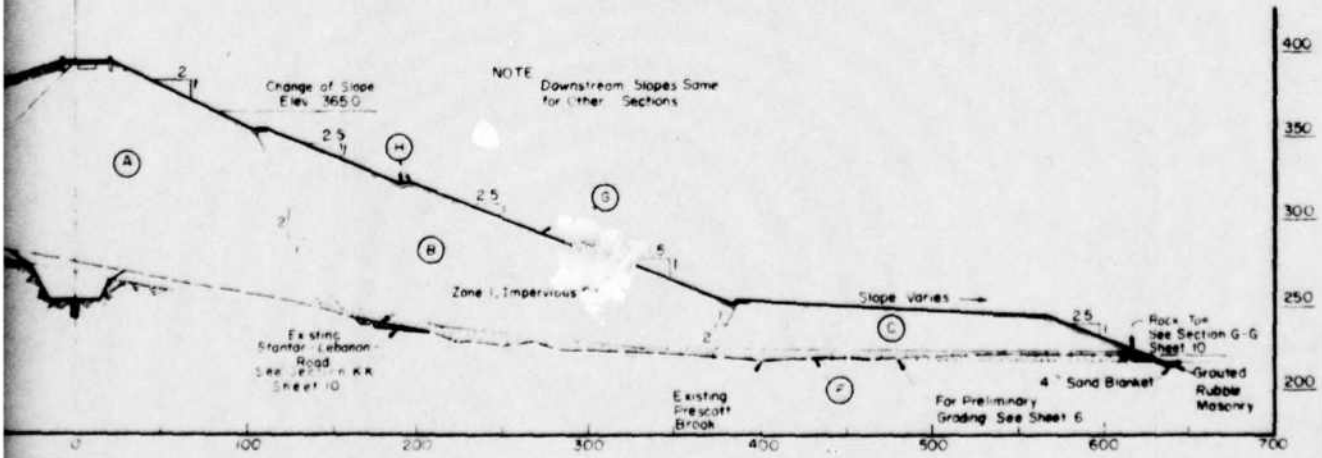



PLAN
SHOWING LOCATION OF SECTIONS
Not to Scale




STA 15+00

FIGU

STATE
DEPARTMENT OF CONSERVA
DIVISION OF W
ROUND V

CONTRACT RV-1

TRANSVER
FOR

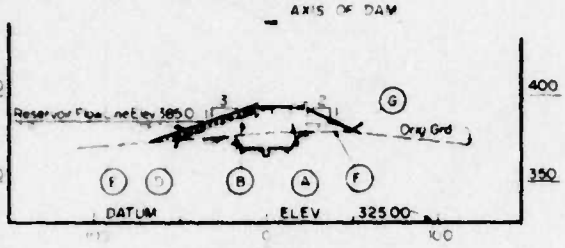
PORTER, URQUHA
CONSULTING ENGINEERS

| IN CHARGE C.F. GRIGG | | | SCALE: |
|---|---|---|---|
| DRAWN | TRACED | CHECKED | |
| L.A. | L.A. | L.C. | DATE: |

Walter J. Sean
CHIEF CONSTRUCTION ENGINEER
BUREAU OF DESIGN & CONSTRUCTION

PORTER, URQUHART, McCREARY & O'BRIEN

3

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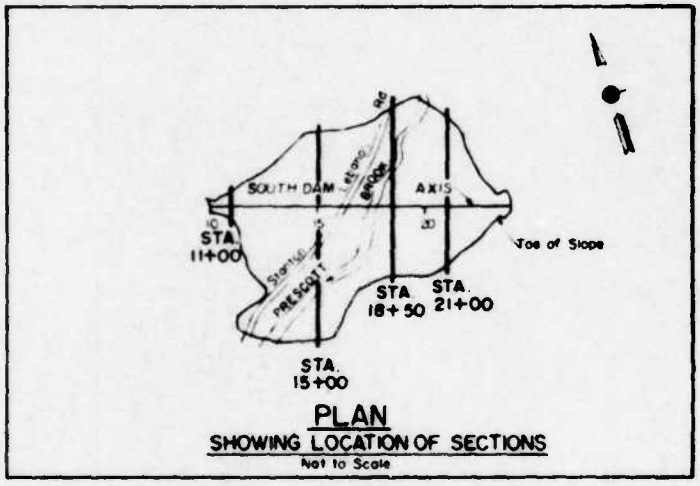
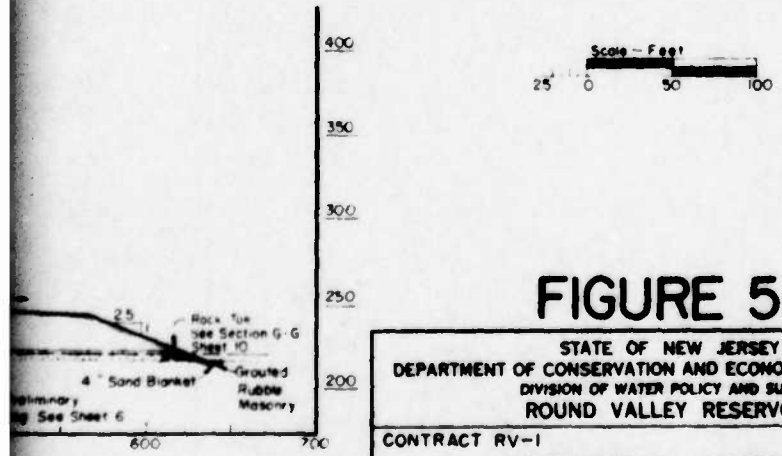



PLAN
SHOWING LOCATION OF SECTIONS
Not to Scale




# FIGURE 5

STATE OF NEW JERSEY
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
DIVISION OF WATER POLICY AND SUPPLY
ROUND VALLEY RESERVOIR

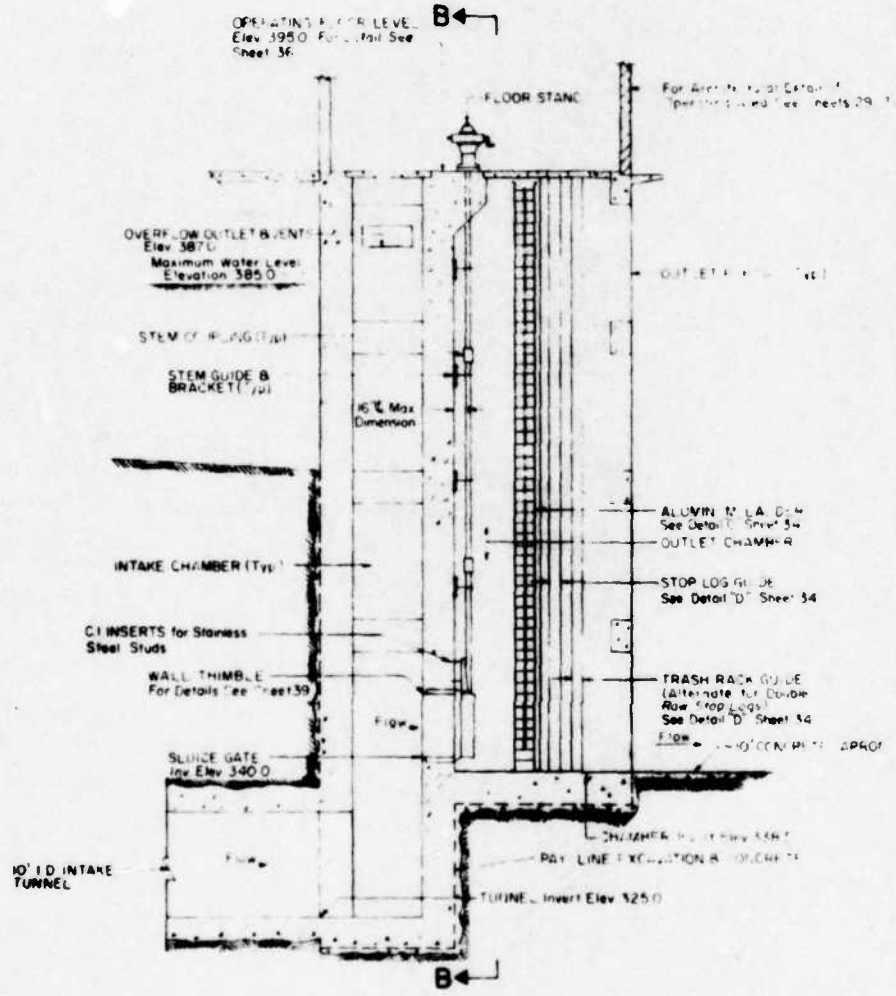
CONTRACT RV-1 — SOUTH DAM

TRANSVERSE SECTIONS
FOR EMBANKMENT

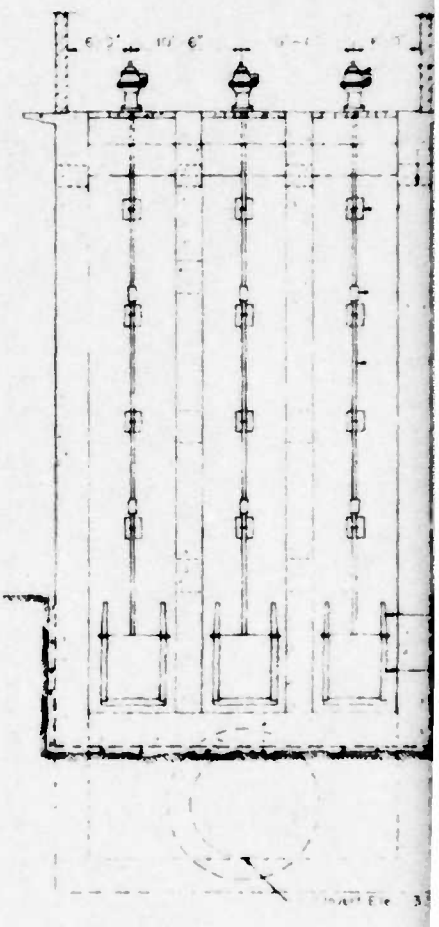
PORTER, URQUHART, McCREARY, & O'BRIEN
CONSULTING ENGINEERS — NEWARK, N.J.

| IN CHARGE C.F. GRIGG | | | SCALE: 1" = 50' | SHEET 9 of 48 |
|---|---|---|---|---|
| DRAWN | TRACED | CHECKED | DATE: Feb 14, 1961 | ACC P.U.M.O.-108 |
| L.A. | L.A. | L.C. | | |

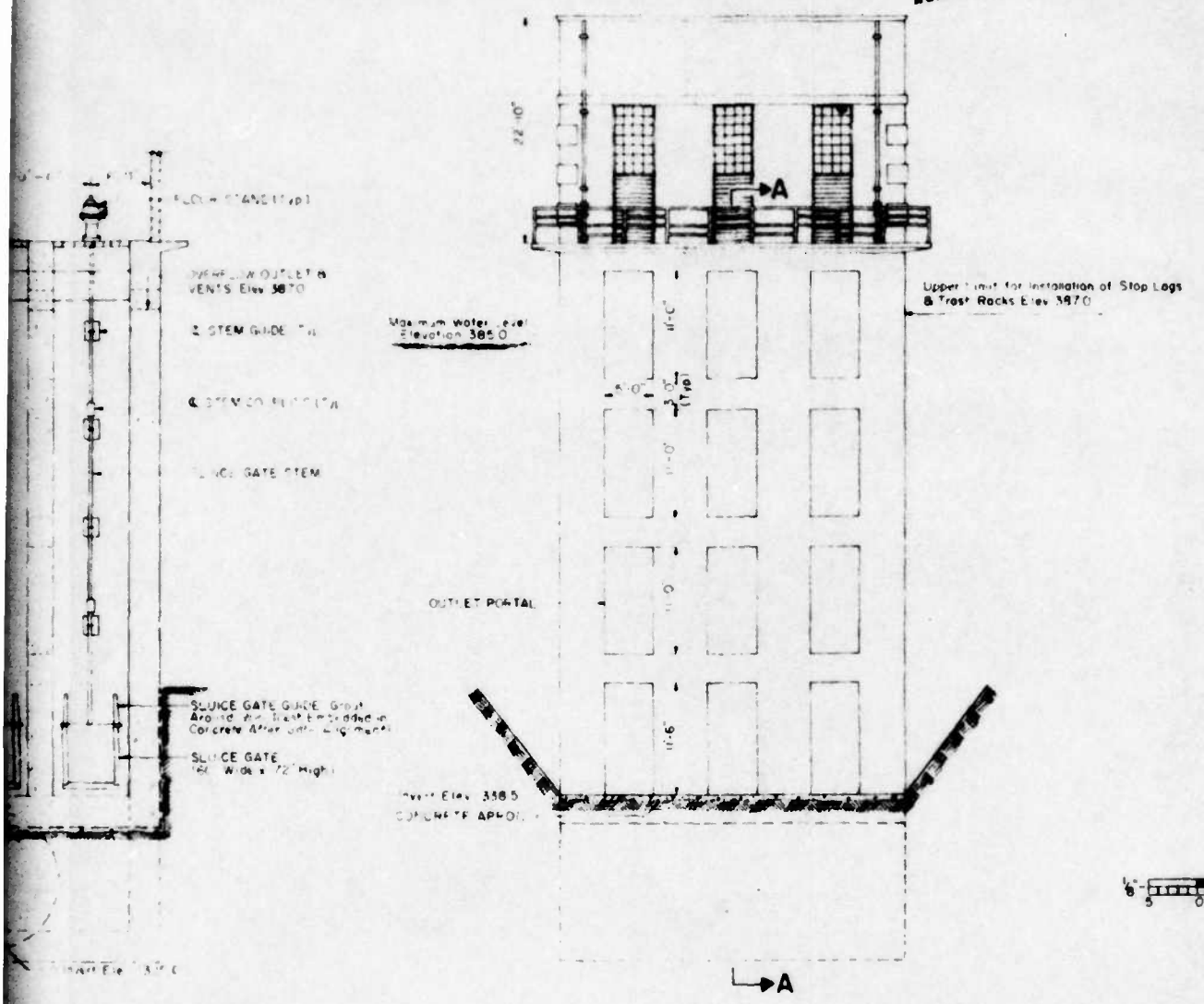
PORTER URQUHART McCREARY & O'BRIEN




SECTION A-A



SECTION B-B




B-B

NORTH ELEVATION
SCALE "A"

# FIGURE 6

STATE OF NEW JERSEY
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
DIVISION OF WATER POLICY AND SUPPLY
ROUND VALLEY RESERVOIR

CONTRACT RV-1 — SOUTH DAM

INTAKE TOWER
MECHANICAL SECTIONS & ELEVATION

PORTER, URQUHART, McCREARY, & O'BRIEN
CONSULTING ENGINEERS — NEWARK, N.J.

| IN CHARGE C.F. GRIGG | | | SCALE: AS SHOWN | SHEET 35 of 48 |
|---|---|---|---|---|
| DRAWN | TRACED | CHECKED | | |
| M.DV | M.DV | J.E.C. | DATE: Feb 14, 1961 | ACC. PU.M.O.-1 |

Walter D. Green
CHIEF CONSTRUCTION ENGINEER
BUREAU OF DESIGN & CONSTRUCTION

PORTER, URQUHART, McCREARY & O'BRIEN

# APPENDIX

# FIELD INSPECTION

# REPORT

Check List
Visual Inspection
Phase 1

Name Dam Round Valley South Dam County Hunterdon State New Jersey Coordinators Mr. Larry Woscyna, Mr. John Garofalo, New Jersey DEP

Date(s) Inspection 4/19/78, 4/24/78 Weather Rainy, Clear Temperature 45°, 55°

Pool Elevation at Time of Inspection 381 M.S.L. Tailwater at Time of Inspection --- M.S.L.

Inspection Personnel:

Mr. John J. Williams
Mr. George Elias
Mr. Anthony Geiss
Mr. Albert Depman
Mr. David Campbell

Mr. David Campbell Recorder

Accompanied by:

Mr. Albert DePhilippe, Chief of Foundations and Materials Branch, US Army Corps of Engineers, Phila. District.
Mr. A. Gregory Chase, Supervising Engineer, New Jersey Dept. of Environmental Protection, Division of Water Resources.
Mr. Walter O'Rourke, Supervisor of Reservoirs, New Jersey Dept. of Environmental Protection, Division of Water Resources.
Mr. John Garofalo, Civil Engineer, New Jersey Dept. of Environmental Protection.
Mr. Larry Woscyna, Civil Engineer, New Jersey Dept. of Environmental Protection.

## EMBANKMENT

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| SURFACE CRACKS | None noted. | None. |
| UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE | None noted. | None. |
| SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES | Minor erosion of the reservoir shoreline near the east abutment. Sloughing of embankment near the junction with the east abutment below the third berm from the top. | Area of sloughing should be filled and graded. The area should be monitored for further movement. |
| VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST | No problems noted. | None. |
| RIPRAP FAILURES | Gradation of the riprap is poor. Large angular stone (2 to 4 feet in diameter) is mixed with small stone and gravel (6inches or less), with very little intermediate sized stone. The stone sizes are segregated in some areas. | The rip-rap should be graded more evenly, and supplemented as necessary. |

## EMBANKMENT

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM | No problems noted. | None. |
| ANY NOTICEABLE SEEPAGE | Seepage was noted at several locations, and much of the embankment was moist or saturated. The seepage appeared to be most prevalent near the east abutment. | The cause of seepage and areas of saturation should be determined. |
| STAFF GAGE AND RECORDER | The North Dam outlet tower is equipped with a Stevens paper chart recorder. The paper chart was not operating at the time of inspection. | None. |
| DRAINS | According to the drawings, the dam is equipped with a filter blanket drain. The drain is beneath the embankment, and could not be observed. However, seepage flow noted at the toe of the embankment is estimated at 1 cfs. | None. |

## APPURTENANT STRUCTURES

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| CRACKING AND SPALLING OF CONCRETE SURFACES IN CONDUIT | The 10 foot diameter concrete-lined tunnel is in excellent condition. | None. |
| INTAKE STRUCTURE | The intake tower is in excellent condition. Some insignificant seepage was noted at the base of the tower. | None. |
| OUTLET STRUCTURE | A valve vault for a 36" outlet pipe is located at the downstream toe of the embankment. It is in excellent condition, and supplements flow to Prescott Brook to provide for the minimum conservation discharge. | The conservation discharge to Prescott Brook is .83 mgd. |
| OUTLET CHANNEL | Prescott Brook originates at the toe drain of the South Dam. About 100 feet below the toe of the dam is a calibrated weir for measurement of discharges. | None. |
| EMERGENCY GATE | None. | None. |

INSTRUMENTATION

| VISUAL EXAMINATION | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| MONUMENTATION/SURVEYS | None observed. | None. |
| OBSERVATION WELLS | None. | None. |
| WEIRS | A rectangular weir with a removable 'V' notch section is constructed across Prescott Brook. | None. |
| PIEZOMETERS | None. | None. |
| OTHER | | |

RESERVOIR

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| SLOPES | The slopes are moderate and well covered with trees and brush. The slopes do not appear to affect the safety of the dam. | None. |
| SEDIMENTATION | The reservoir is pumped storage, so sedimentation would not appear to be a problem. | None. |

DOWNSTREAM CHANNEL

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| CONDITION (OBSTRUCTIONS, DEBRIS, ETC.) | No obstructions or unusual conditions were noted. | None. |
| SLOPES | Slopes along the downstream channel are generally mild, and are well covered with trees and brush. | None. |
| APPROXIMATE NO. OF HOMES AND POPULATION | Approximately 50 homes are located in the proximity of Prescott Brook from the South Dam to the South Branch Raritan River. | None. |

| ITEM | REMARKS |
|---|---|
| MONITORING SYSTEMS | Personnel from the New Jersey Department of Environmental Protection, Division of Water Resources, operate and monitor operation of the reservoir. |
| MODIFICATIONS | Stone rubble drainage gutters in the berms were replaced with concrete gutters in 1970. |
| HIGH POOL RECORDS | Maximum pool of record was 385.0 in August of 1975. |
| POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS | None noted. |
| PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS | None noted. |
| MAINTENANCE OPERATION RECORDS | None noted. |

| ITEM | REMARKS |
|---|---|
| DESIGN REPORTS | See next page. |
| GEOLOGY REPORTS | See next page. |
| DESIGN COMPUTATIONS<br>HYDROLOGY & HYDRAULICS<br>DAM STABILITY<br>SEEPAGE STUDIES | See next page. |
| MATERIALS INVESTIGATIONS<br>BORING RECORDS<br>LABORATORY<br>FIELD | See next page. |
| POST-CONSTRUCTION SURVEYS OF DAM | Unknown. |
| BORROW SOURCES. | Impervious material from the valley floor, and semipervious material from the valley rim. |

May 4, 1978

Mr. Gregory Chase
Supervising Engineer
Bureau of Water Facility Operations
P.O. Box 5196
Clinton, NJ 08809

Dear Mr. Chase:

Thank you for your cooperation in the Phase I Inspection of the Round Valley Reservoir structures. Below is a list of the documents on loan from your office for this investigation:

By Porter, Urquhart, McCreary & O'Brien:

1) Report on Experimental Grouting, March, 1960.
2) Round Valley Reservoir, Design Analysis for South Dam, December, 1959.
3) Round Valley Reservoir, Design Analysis for Dike, December, 1959.
4) Round Valley Reservoir, Design Analysis for North Dam, December, 1959.
5) Outlet Tower, Design Calculations, December, 1959.
6) Intake Tower, Design Calculations, June, 1960.
7) Engineering Geology of the Round Valley Reservoir, Books 1 & 2, September, 1960.
8) Report of Laborctory Test Results, December, 1959.

By Whitman, Requardt & Associates:

Appendices to the Engineering Report, Spruce Run - Round Valley Reservoir Project, September, 1958.

By Fred L. Fox:

Final Report, Soils Operations & Control, January, 1963.

Sincerely,

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

David B. Campbell
Design Engineer

DBC/pc

PHOTOGRAPHS

VIEW OF RIP RAPPED SLOPE
SHOWING POOR GRADATION

STANDING WATER ABOVE BOTTOM BERM NEAR
EAST ABUTMENT

# HYDROLOGIC AND HYDRAULIC CALCULATIONS

JUSTIN & COURTNEY, INC.
Division of O'Brien & Gere Engineers, Inc.
PHILADELPHIA, PA

SHEET NO. 1 OF
DATE 3/13/78
COMP. BY DBC
CHECKED BY LW

NAME OF CLIENT CORPS OF ENGINEERS
PROJECT ROUND VALLEY

# PMP HYDROLOGY

DRAINAGE AREA ≈ 5.4 SQUARE MILES

RESERVOIR SURFACE AREA ≈ 3.6 SQUARE MILES

6-HOUR 10 SQUARE MILE PMP = 26"
ZONE = 6

THE DRAINAGE AREA IS LESS THAN 10 SQUARE MILES, SO NO REDUCTION REFLECTING BASIN SIZE IS INCLUDED.

A REDUCTION OF 20% IS INCLUDED TO ACCOUNT FOR IMPERFECT FIT OF BASIN AND STORM ISOHYETALS.

∴ 6-HOUR PMP = 20.8"

48 HOUR PMP = 1.26 × 20.8 = 26"

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SINCE 2/3 OF THE BASIN IS RESERVOIR SURFACE, AND NO OUTFLOW IS CONSIDERED, IS 48 HOUR PMP IS APPLIED TO THE RESERVOIR WITH LOSSES CONSIDERED ONLY FOR THE OVERBANK AREA.

| | |
|---|---|
| RAINFALL ON THE RESERVOIR | 26" |
| RAINFALL ON THE OVERBANKS | 26" |
| LOSSES (CN=60) | 6.5" |
| RUNOFF FROM OVERBANKS | 19.5" |

## TOTAL RISE IN RESERVOIR ELEVATION

$$\frac{3.6 \text{ S.M.} \times 26'' + 1.8 \text{ S.M.} \times 19.5''}{36 \text{ S.M.}} = 36''$$

$\simeq$ 3 FEET

## FREEBOARD CALCULATION

FROM DESIGN OF SMALL DAMS, P. 273.

FETCH $\simeq$ 1.5 MILES

WIND VELOCITY 50 MPH

$\therefore$ WAVE HEIGHT = 2.9 FEET

WAVES & RUNUP

$1.5 \times 2.9' = 4.4'$ ABOVE THE MAXIMUM WATER SURFACE, OR 7.4' ABOVE THE MAXIMUM OPERATING POOL.

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THE EMBANKMENT IS PROVIDED WITH 10.5' OF FREEBOARD ABOVE THE MAXIMUM OPERATING POOL, SO THE FREEBOARD ALLOWANCE IS ADEQUATE.

PREVIOUS INSPECTION REPORTS

February 5, 1970

H. W. Acken

Michael J. Galley

Summary - Force Main and Tunnel Inspection and Status of Weir Construction Program.

On December 16, 1969, Robert M. Munger, Haig Kasabach, Fergus Lynch and the writer inspected the South Dam intake tunnel and a portion of the force main. What appeared to be leakage into the force main was observed, from a distance, upstream near the Prescott Brook take-off line. Several small pin-hole leaks of apparent ground water leakage into the tunnel were noted at the bottom of the butt lap joint of the steel liner with the concrete tunnel. Numerous hair line cracks were noted in the concrete tunnel portion of the tunnel with considerable signs of efflorescense. One pin hole leak was also noted in the tower bay wall near the tunnel outlet.

For safety reasons, further close-up inspection of the force main leakage was delayed until the next upstream manhole cover was removed.

On January 7, 1970, after considerable difficulty in removing the cover bolts to the lower access manhole, an inspection of the force main at the Prescott Brook take-off line was made and disclosed no leakage. It was later determined that, due to valve operation by pump station personnel, water slipping past an improperly closed valve was allowing water from the 36" diameter South Dam drain line to enter the force main at the Prescott Brook take-off.

On January 9, 1970, R. M. Munger and Evan Savidge inspected the pin hole seepage reported above to determine if repairs were feasible.

On January 15, 1970, in conference with Mr. Chanklin, H. W. Acken, Haig Kasabach, and Robert L. Hardman, a report was made concerning the impracticality of repairing the above noted pin-hole seeps and Mr. Shanklin gave his approval to reseal the force main and resume pumping when water was available.

On January 28, 1970, the South Dam temporary measuring weir records to date were submitted to R. L. Hardman. Copy of memo attached.

On January 29, 1970, the writer instructed Ted Frank to start preparation of preliminary plans for the proposed permanent measuring weir. Copy of memo is attached.

On January 30, 1970, pumping was resumed.

South Dam seepage flows will continue to be monitored over the temporary wooded measuring weir until construction of the new concrete weir.

Attached are copies of memorandums by Haig Kasabach concerning his end of the seepage investigation.

A composite map of the South Dam area showing the measured location of the toe drain seeps was given to Haig Kasabach. Unfortunately for us, it is the only copy with that information.

CC Bureau file
Ted Frank

Dam Inspection Report

Round Valley Reservoir
South Dam - Application No. 546

A joint inspection was made by Michael Galley, Chief, Bureau of Water Supply; three Supervising Engineers of that Bureau; Haig Kasabach, Geologist; and by the writer on October 30, 1970.

Before inspection of the dam, Mr. Galley presented a graph indicating water surface elevation in the reservoir from August 1969 to October 1970 and also seepage flow measurements for the same period of time.

He also apprised of the downstream erosion of the embankment by surface run-off.

The writer pointed out the need for clearing brush downstream of the embankment and for proper maintenance thereof.

The inspection disclosed that the berms do not have a proper slope to drain off rain water, and by examining the eroded area, the writer found loose and not well compacted soil which gives an impression of poor construction.

It is recommended that the dam embankment be kept clear of brush at all times and that the dam be maintained, if possible, on a day to day basis.

It was agreed that the dam should be inspected again after removal of brush from the face of the embankment.

S. A. Aziz, Principal Engineer

SAA/jmb
Trenton, NJ
November 5, 1970


EN
DAT
FILM

VISUAL EXAMINATION OF

CONDITION
(OBSTRUCTIONS,
DEBRIS, ETC.)

SLOPES

APPROXIMATE NO.
OF HOMES AND
POPULATION

| ITEM |
| --- |
| MONITORING SYST |
| MODIFICATIONS |
| HIGH POOL RECO |
| POST CONSTRUCT<br>STUDIES AND REP |
| PRIOR ACCIDENTS<br>DESCRIPTION<br>REPORTS |
| MAINTENANCE<br>OPERATION<br>RECORDS |

| ITEM |
| --- |
| DESIGN REPORTS |
| GEOLOGY REPORTS |
| DESIGN COMPUTA |
| HYDROLOGY & HY |
| DAM STABILITY |
| SEEPAGE STUDIES |
| MATERIALS INVEST |
| BORING RECORDS |
| LABORATORY |
| FIELD |
| POST-CONSTRUC |
| BORROW SOURCE |

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