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5 DELAWARE RIVER BASIN
UNNAMED TRIBUTARY OF BRODHEAD CREEK
6 PENNSYLVANIA

NDI ID PA 00627

PA DER 45-34

LEVEL II

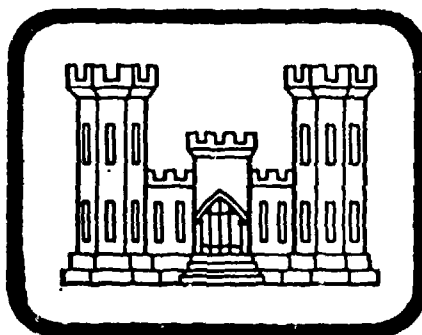
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2 BLUE MOUNTAIN LAKE DAM

OWNED BY

MRS. KARL HOPE

7 PHASE I INSPECTION REPORT
1 NATIONAL DAM INSPECTION PROGRAM



PREPARED FOR
DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT CORPS OF ENGINEERS
BALTIMORE, MARYLAND
21203

BY



O'BRIEN & GERE

PHILADELPHIA, PENNSYLVANIA

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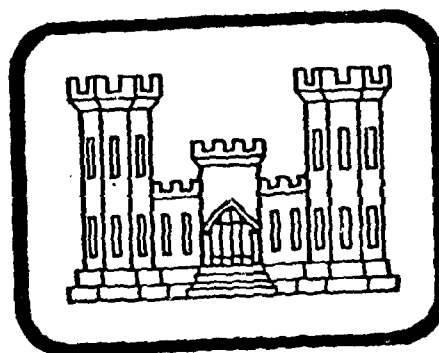
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BLUE MOUNTAIN LAKE DAM
PENNSYLVANIA

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



Prepared for:

DEPARTMENT OF ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

Prepared by:

O'BRIEN & GERE ENGINEERS, INC.
1617 JF Kennedy Boulevard - Suite 1760
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Contract DACW-31-81-C-0016
August 1981

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PREFACE

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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected, and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design 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 I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Name of Dam:	Blue Mountain Lake Dam
State Located:	Pennsylvania
County Located:	Monroe
Stream:	Branch of Ruliffs Run
Coordinates:	Latitude 41°02.4', Longitude 75°12.1'
Dates of Inspection:	May 5 and June 1, 1981

ASSESSMENT

Blue Mountain Lake Dam is an earth embankment dam, approximately 540 feet long with a maximum height of about seven feet.

The dam was originally constructed in 1908 by W. Plattenburg. During the 1920's, the dam was reconstructed when it became part of Camp Blue Mountain, Inc. The dam and reservoir are currently owned by Mrs. Karl Hope.

The maximum storage capacity of 104 acre-feet at the low point of the top of the dam and the maximum height of seven feet place the dam in the "Small" size category. One permanent residence is located about 2,800 feet downstream of the dam and about five feet above the streambed. Because of the probability of appreciable property damage to the one house and the possibility of the loss of a few lives in the event of a dam failure, the dam is classified as having a "Significant" hazard potential.

The recommended Spillway Design Flood (SDF) for a "Small" size, "Significant" hazard dam ranges from the 100 year flood to one-half of the Probable Maximum Flood (PMF). The (SDF) chosen is the 100 year flood. The spillway is not capable of passing the 100 year flood without the embankment being overtopped; therefore, the spillway is classified as "Inadequate".

Based on visual observations and a review of the information obtained from the Pennsylvania Department of Environmental Resources, and discussions with the Owner, Blue Mountain Lake Dam appears to be in fair condition.

Recommendations and Remedial Measures

The recommendations and remedial measures should be initiated immediately.

a. Facilities.

The Owner should retain the services of a licensed professional engineer experienced in the design and construction of dams to assist in complying with the following recommendations:

1. Measures should be taken to increase the spillway capacity to enable it to pass the 100 year flood.

Blue Mountain Lake Dam - ND110 PA 00627

2. The gate valve assembly for the reservoir drain should be restored to working condition.

The Owner should initiate the following remedial measures:

1. The seepage observed at the downstream toe of the embankment should be monitored.

2. The embankment should be cleared of all trees and brush and any resulting voids should be backfilled with suitable compacted material. A grass cover should be established and maintained on the affected portions of the dam.

3. Suitable slope protection should be installed on the upstream face of the dam to protect it against wave action.

4. The brush and forest debris in the spillway discharge channel should be removed.

b. Operations and Maintenance Procedures.

1. An operation and maintenance program should be developed and implemented. This program should include periodic operation of outlet works, routine maintenance tasks, and an annual inspection performed by a licensed professional engineer, experienced in the design and construction of dams.

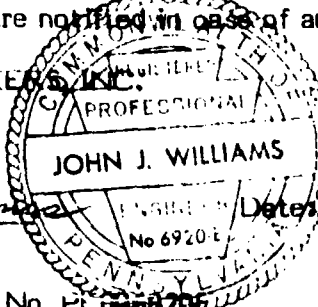
2. A monitoring and downstream warning plan should be developed and implemented during periods of extreme rainfall so that downstream residents and the appropriate agencies are notified in case of an impending dam failure.

O'BRIEN & GERE ENGINEERS, INC.

John J. Williams
John J. Williams, P.E.

Vice President

Pennsylvania Registration No. PE 000205



Date: *19 Aug. 1981*

Approved by: *James W. Peck*

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: *31 Aug 81*



UPSTREAM OVERVIEW FROM THE RIGHT SIDE OF THE DAM. (5/5/81)



DOWNSTREAM OVERVIEW FROM THE LEFT SIDE OF THE DAM. (5/5/81)

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM
BLUE MOUNTAIN LAKE DAM
NDI ID# PA 00627

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if Blue Mountain Lake Dam constitutes a hazard to human life or property.

1.2 Description of Project (This description is based on information obtained from the Pennsylvania Department of Environmental Resources (DER), Division of Dam Safety, Harrisburg, Pennsylvania, from the field inspections and discussions with the Owner, Mrs. Karl Hope.)

a. Dam and Appurtenances. Blue Mountain Lake Dam is an earth embankment approximately 540 feet long with a maximum height of about seven feet. The crest of the embankment is about 10 feet wide. The side slopes average about 1H:1V upstream and about 3H:1V downstream.

The spillway, which is constructed of stone masonry, is about 17 feet long with a crest width of about two feet. Two, 2-inch wide timber stoplogs are located on the spillway crest. Both stoplogs are about 8.5 feet long. The left stoplog is four inches high and the one on the right side of the spillway is 10 inches high. The spillway discharge channel is about five feet wide with 2H:1V side slopes lined with loose rock.

A 24-inch diameter concrete reservoir outlet pipe discharges into the spillway channel about 50 feet downstream of the embankment. The inlet gate, which is located in the impoundment at the upstream end of the pipe, is no longer operable.

b. Location. Blue Mountain Lake Dam is located on a branch of Ruliffs Run, about 2.5 miles north of East Stroudsburg, in Stroud Township, Monroe County, Pennsylvania. The dam site is shown on the USGS Quadrangle sheet entitled "East Stroudsburg, PA" at coordinates N41°02.4', W75°12.1'. A regional vicinity map is included as Figure 1, Appendix E of this report.

c. Size Classification. The maximum height of the dam is about seven feet and the reservoir storage at the low point of the top of the dam is approximately 104 acre-feet. The dam is therefore classified as a "Small" size structure (height less than 40 feet and storage less than 1,000 acre-feet).

d. Hazard Classification. One residence is located about 2,800 feet downstream of the dam and approximately five feet above the channel bed. The hazard potential of Blue Mountain Lake Dam, therefore, is considered to be "Significant" because of the probability of appreciable property damage and the possibility of the loss of a few lives in the event of a dam failure.

e. Ownership. The dam is owned by Mrs. Karl Hope, R.D. #2, East Stroudsburg, Pennsylvania (Phone 717-424-1757).

f. Purpose of Dam. The impoundment upstream of the dam is currently used for private recreational purposes. It was previously part of a children's summer camp.

g. Design and Construction History. No design or construction information relative to the dam is available. A review of the Pennsylvania DER files shows that the dam was initially built in 1908 for W. Plattenburg to provide an impoundment for ice harvesting and recreation. The original structure was reported to be 390 feet long with a maximum height of 6.7 feet, 12 feet wide at the base, and four feet wide at the crest. The dam was inspected in 1916, and again in 1919, by the Water Supply Commission of Pennsylvania. The latter inspection revealed that the dam was "in very poor condition and at the point of failure". The dam was reconstructed during the 1920's when it became part of Camp Blue Mountain, Inc.

The last recorded inspection was performed by the Commonwealth of Pennsylvania, Division of Dams and Encroachments, in 1966, at which time it was recommended that trees and brush be removed from the upstream face of the embankment.

h. Normal Operating Procedures. According to the Owner, no normal operating procedures currently exist for this dam. At the time of inspection, the low level outlet gate was inoperable and stoplogs were in place across the spillway crest.

1.3 Pertinent Data.

a. <u>Drainage Area.</u> (Square Miles)	1.10
b. <u>Discharge at Dam Site.</u> (cfs)	
Maximum Known Flood at Dam Site	Unknown
Maximum Spillway Capacity, Elevation 704 (stoplogs in place)	49
c. <u>Elevations.</u> (Feet above MSL estimated from USGS)	
Top of Dam (Low Point Top of Dam)	704.0
Top of 2x10 inch stoplog	703.3
Top of 2x4 inch stoplog	702.8
Spillway Crest (Normal Pool)	702.5
Streambed at Dam	697.0
Drain Pipe Invert at Outlet	696.4

d. Reservoir Length. (Feet)

Normal Pool, Elevation 702.5	2,300
Low Point Top of Dam, Elevation 704.0	2,500

e. Reservoir Surface. (Acres)

Normal Pool, Elevation 702.5	30
Low Point Top of Dam, Elevation 704.0	35

f. Reservoir Storage. (Acre-Feet)

Normal Pool, Elevation 702.5	55
Low Point Top of Dam, Elevation 704.0	104

g. Dam Data.

Type	Earth Embankment
Length	540 Feet
Height	7 Feet
Top Width	10 Feet
Side Slopes: Upstream	1H:1V
Downstream	3H:1V

h. Spillway.

Type	Ungated overflow
Length	17 Feet
Width	2 Feet
Downstream Channel	Natural Stream

i. Outlet Works.

A 24-inch diameter reinforced concrete pipe functions as the outlet works. Control is by means of a sluice gate operated by a valve wheel located in the impoundment. The sluice gate is no longer operable.

SECTION 2

ENGINEERING DATA

2.1 Design

- a. Data Available. No design data are available for this dam.
- b. Design Features. The design features are described in Section 1.2a and shown in Appendix E.

2.2 Construction

Construction data for the dam is limited to an inspection report written by the Water Supply Commission of Pennsylvania in 1917, nine years after the original construction was completed. The dam was reconstructed sometime during the 1920's; however, no information is available relative to this reconstruction.

2.3 Operation

According to the Owner, Mrs. Karl Hope, no operational procedures exist for the dam.

2.4 Evaluation

- a. Availability. The limited engineering data utilized in this report were provided by the Pennsylvania DER.
- b. Adequacy. The information provided by the Pennsylvania DER, visual observations and discussions with Mrs. Karl Hope, the Owner, are considered adequate for a Phase I investigation.
- c. Validity. There appears to be no reason to question the validity of the information obtained from the Pennsylvania DER and Mrs. Karl Hope.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The field inspections of Blue Mountain Lake Dam took place on May 5 and June 1, 1981. At the time of the inspections, the water surface was approximately 0.5 feet above the spillway crest and was discharging over the 2x4 inch stoplog. The observations and comments of the field inspection team are in the checklist which is Appendix A of this report. The dam and its appurtenances appear to be marginally maintained.

b. Dam. Many small trees (up to about seven inches in diameter) and brush were observed at random locations on the embankment. The ground about 70 feet to the left of the spillway, at the downstream toe of the embankment, was observed to be slightly spongy, although no standing water was encountered. Standing water was observed on the floor of an abandoned barn at the downstream toe of the embankment, near the right abutment.

The freeboard at the time of the inspection averaged about two feet. Some randomly placed loose rock was observed on the upstream face.

c. Appurtenant Structures. The stone masonry spillway appeared to be in poor condition and some forest debris was obstructing the overflow section. The spillway discharge channel is lined with loose rock and was obstructed with forest debris and brush at the time of the inspection.

The gate valve stem assembly and valve wheel were lying on the bottom of the reservoir. The 24-inch diameter reinforced concrete outlet pipe emerges in the spillway discharge channel about 50 feet downstream of the dam. The pipe appeared to be in satisfactory condition.

d. Reservoir. No evidence of excessive sedimentation was observed in the reservoir. The reservoir slopes vary between approximately five and 15 percent. The impoundment is bounded by woodland.

e. Downstream Channel. The downstream channel, which varies between five and 10 feet wide with side slopes averaging about 3H:1V, passes through a wooded valley on a steep grade.

One private residence is located downstream of the dam which would be affected by a failure on the dam. It is situated about five feet above the streambed, approximately 2,800 feet downstream from Blue Mountain Lake Dam.

3.2 Evaluation

The general condition of the dam is fair. Bushes and trees growing on the embankment create potential seepage paths through the dam and may endanger the integrity of the structure. The brush and forest debris in the spillway discharge channel reduce its capacity.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures

No operational procedures exist for this dam. According to the Owner, Mrs. Karl Hope, when Camp Blue Mountain was in operation, the reservoir was lowered occasionally to make repairs on the docks and the dam. This was last done in 1968. At present, no means of draining the reservoir exist. The gate valve on the 24-inch diameter concrete drain pipe must be repaired.

4.2 Maintenance of the Dam

According to the Owner, no regular maintenance program exists for the dam, but repairs are made as needed. It appears that no maintenance has been performed on the dam in recent years.

4.3 Maintenance of Operating Facilities

According to the Owner, no maintenance program for the operating facilities exists.

4.4 Warning System in Effect

According to the Owner, the dam is monitored during large storms. Also according to the Owner, in the event of an impending dam failure, the Civil Defense of Monroe County would be notified immediately.

4.5 Evaluation

The reservoir drain gate valve system should be repaired and maintained in working condition. Periodic inspection of the dam and operating equipment should be made by a qualified engineer. A maintenance program should be developed and implemented. Records of maintenance performed should be maintained by the Owner.

A formal warning system should be developed and implemented during times of excessive rainfall or impending dam failure.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features

a. Design Data. No information relative to the hydrologic and/or hydraulic design of the dam is available.

The watershed has a maximum width of about 1.1 miles and a maximum length of about 1.4 miles. Elevations range from approximately Elevation 1,020 at the outermost reaches of the basin to normal pool Elevation 702.5. The drainage area is approximately 1.1 square miles and is essentially undeveloped and forested. Another reservoir is located about 1,700 feet upstream of Blue Mountain Lake. The effect of this reservoir on the inflow to Blue Mountain Lake was considered in the hydrologic analysis.

b. Experience Data. According to the Owner, no rainfall records or spillway discharge records are maintained.

c. Visual Observations. Forest debris has collected on the spillway crest and forest debris and brush obstruct the spillway discharge channel. These conditions will limit the spillway discharge capacity.

d. Overtopping Potential. Blue Mountain Lake Dam is classified as a "Small" size, "Significant" hazard dam. Accordingly, the recommended Spillway Design Flood (SDF) ranges from the 100 year flood to 50 percent of the Probable Maximum Flood (PMF). The SDF selected for the analysis of the dam is the 100 year flood because of the potential for appreciable property damage to only one house at the damage site in the event of a dam failure. The loss of a few lives would be expected in the event of a dam failure.

The peak SDF flow is 833 cfs and the maximum spillway discharge at the low point of the top of the dam is 49 cfs.

e. Spillway Adequacy. The spillway is classified as "Inadequate" since it is not capable of passing the SDF.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. The overall appearance of the dam at the time of the inspection was fair. The roots of trees growing on the embankment create potential seepage paths through the dam and may endanger the integrity of the structure. The stone masonry in the spillway appeared to be in poor condition.

Judging from visual observations, the dam appears to be structurally stable for normal loading conditions.

b. Design and Construction Data. No design data are available for the dam. Construction data are limited to an inspection report written by the Water Supply Commission of Pennsylvania, in 1917, pertaining to the original structure.

c. Operating Records. According to the Owner, no operating records are maintained for the dam.

d. Post-Construction Changes. The dam was reconstructed during the 1920's, but no information is available relative to the reconstruction.

e. Seismic Stability. Blue Mountain Lake Dam is located in Seismic Zone 1, as shown on the Seismic Zone Map of Contiguous States. A dam located in Seismic Zone 1 is considered structurally adequate for Zone 1 earthquake loading if it is structurally stable for potential static loadings. The dam appears to be structurally stable for potential static loading conditions.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Evaluation. Based on visual observations, the dam is considered to be in fair condition. Many small trees were observed at random locations on the embankment. The roots of these trees create potential seepage paths through the dam and may endanger the integrity of the structure. The ground about 70 feet to the left of the spillway, at the downstream toe of the embankment, was spongy, although no standing water was encountered. Standing water was observed below the floor of an abandoned barn at the downstream toe of the embankment, near the right abutment. Lack of riprap on the upstream face of the dam could lead to wave action induced erosion of the upstream embankment face.

The stone masonry in the spillway appeared to be in poor condition. The overflow section and discharge channel were partially obstructed with forest debris and brush, which reduces the spillway discharge capacity.

The gate valve stem assembly and valve wheel to the 24-inch diameter concrete pipe reservoir drain were overturned and lying on the bottom of the Lake. At present, no means exist to drain the reservoir in an emergency.

Blue Mountain Lake Dam is a "Small" size, "Significant" hazard structure. The SDF selected is the 100 year flood. The peak SDF flow is 833 cfs. The maximum spillway discharge at the low point of the top of the dam is 49 cfs. The spillway is, therefore, classified as "Inadequate".

b. Adequacy of Information. The information provided by the Pennsylvania DER, conversations with the Owner and observations made during the field inspection provided adequate data for a Phase I evaluation.

c. Urgency. The remedial measures recommended in Section 7.2 should be effected immediately.

d. Necessity for Further Investigation. Further investigation should be implemented as discussed in Section 7.2a.

7.2 Recommendations and Remedial Measures

The recommendations and remedial measures should be initiated immediately.

a. Facilities.

The Owner should retain the services of a licensed professional engineer, experienced in the design and construction of dams, to assist in complying with the following recommendations:

1. Measures should be taken to increase the spillway capacity to enable it to pass the 100 year flood.

2. The gate valve assembly for the reservoir drain should be restored to working condition.

The Owner should initiate the following remedial measures:

1. The seepage observed at the downstream toe of the embankment should be monitored.

2. The embankment should be cleared of all trees and brush and any resulting voids should be backfilled with suitable compacted material. A grass cover should be established and maintained on the affected portions of the dam.

3. Suitable slope protection should be installed on the upstream face of the dam to protect it against wave action.

4. The brush and forest debris in the spillway discharge channel should be removed.

b. Operations and Maintenance Procedures.

1. An operation and maintenance program should be developed and implemented. This program should include periodic operation of outlet works, routine maintenance tasks, and an annual inspection performed by a licensed professional engineer, experienced in the design and construction of dams.

2. A monitoring and downstream warning plan should be developed and implemented during periods of extreme rainfall so that downstream residents and the appropriate agencies are notified in case of an impending dam failure.

APPENDIX A
INSPECTION CHECKLIST

CHECK LIST
VISUAL INSPECTION
PHASE I

Sheet 1 of 11

Name Dam Blue Mountain Lake County Monroe State Pennsylvania National ID # PA 00627
Type of Dam Earth Hazard Category Significant
Date(s) Inspection May 5, 1981 Weather Sunny Temperature 75°
& June 1, 1981 (May 5, 1981) (May 5, 1981)
Pool Elevation at Time of Inspection ± 703 M.S.L. Tailwater at Time of Inspection ± 697 M.S.L.
(May 5, 1981) (May 5, 1981)

Inspection Personnel:

Len Beck

Dick Horvath

Jon Rauschkolb

Lee DeHeer (June 1, 1981)

Dick Horvath

Recorder

Remarks:

The Owner, Mrs. Karl Hope accompanied us during the inspection. (May 5, 1981)

Sheet 1 of 11

CONCRETE/MASONRY DAMS

Sheet 2 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	N/A	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

CONCRETE/MASONRY DAMS

Sheet 3 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL AND HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	

EMBANKMENT

Sheet 4 of 11

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	None observed.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Satisfactory.	
RIPRAP FAILURES	Some loose rock on upstream face. Does not appear to be formally placed riprap.	

EMBANKMENT

Sheet 5 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
EMBANKMENT IN GENERAL	Crest width is about 10 feet. Slopes average about 1H:1V upstream and 3H:1V downstream. Small trees and brush on crest and both slopes of the embankment on both sides of spillway. Trees up to 8" diameter.	Trees and brush should be removed and the resulting voids backfilled with a suitable compacted material.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Satisfactory.	
ANY NOTICEABLE SEEPAGE	Standing water was observed on the floor of an old barn at downstream toe near the right abutment of the embankment. Ground at downstream toe, about 70 feet to left of spillway is slightly spongy.	Investigate the source and nature of the seepage.
STAFF GAGE AND RECORDER	None on Site.	
DRAINS	None observed.	

OUTLET WORKS

Sheet 6 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed.	
INTAKE STRUCTURE	Remains of the gate stem support and wheel could be seen lying in the Lake near shore. Intake was submerged.	The reservoir drain system should be made operable.
OUTLET STRUCTURE	24-inch diameter concrete pipe empties into spillway discharge channel about 50 feet downstream of the dam.	
OUTLET CHANNEL	Spillway discharge channel is about 5 feet wide with 2H:1V side slopes.	
EMERGENCY GATE	None on Site.	

UNIGATED SPILLWAY

Sheet 7 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Spillway is 17 feet long with a 2-foot crest width and 2.5 feet deep. Two 8.5-foot long stoplogs were observed; one 2x4" timber on the left side and one 2x10" timber on the right. Water was flowing over the left stoplogs.	
APPROACH CHANNEL	The approach to the spillway is about 10 feet long and is formed by the embankment.	
DISCHARGE CHANNEL	The discharge channel is an estimated 10 feet wide narrowing to 5 feet wide about 20 feet downstream of the dam with about 2:1 side slopes. The channel is littered with brush and forest debris.	Should be cleared of any obstructions to flow.
BRIDGE AND PIERS	N/A	

GATED SPILLWAY

Sheet 8 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE AND PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

INSTRUMENTATION

Sheet 9 of 11

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed.	
OBSERVATION WELLS	None observed.	
WEIRS	None observed.	
PIEZOMETERS	None observed.	
OTHER		

RESERVOIR

Sheet 10 of 11

VISUAL EXAMINATION OF

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

SLOPES

The average bank slopes along the perimeter of the reservoir vary from about 5 to 15 percent. Nearly the entire perimeter of the reservoir is forested.

SEDIMENTATION

No evidence of excessive sedimentation was observed.

DOWNSTREAM CHANNEL

Sheet 11 of 11

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

CONDITION
(OBSTRUCTIONS,
DEBRIS, ETC.)

The stream varies between 5 & 10 feet wide and flows through a forested valley. The stream channel is obstructed by forest litter and brush.

SLOPES

The side slopes of the stream average about 3H:1V. The invert gradient averages about 6 percent.

APPROXIMATE NO.
OF HOMES AND
POPULATION

One residence is located about 2,800 feet downstream of the dam and about 5 feet above the streambed. An 18 feet wide by 10 feet high semi-circular culvert is located immediately downstream of the residence. This may cause a backwater affect during high discharges.

SUBJECT

BLUE MTN. LAKE DAM

SHEET

11A

BY

JFR

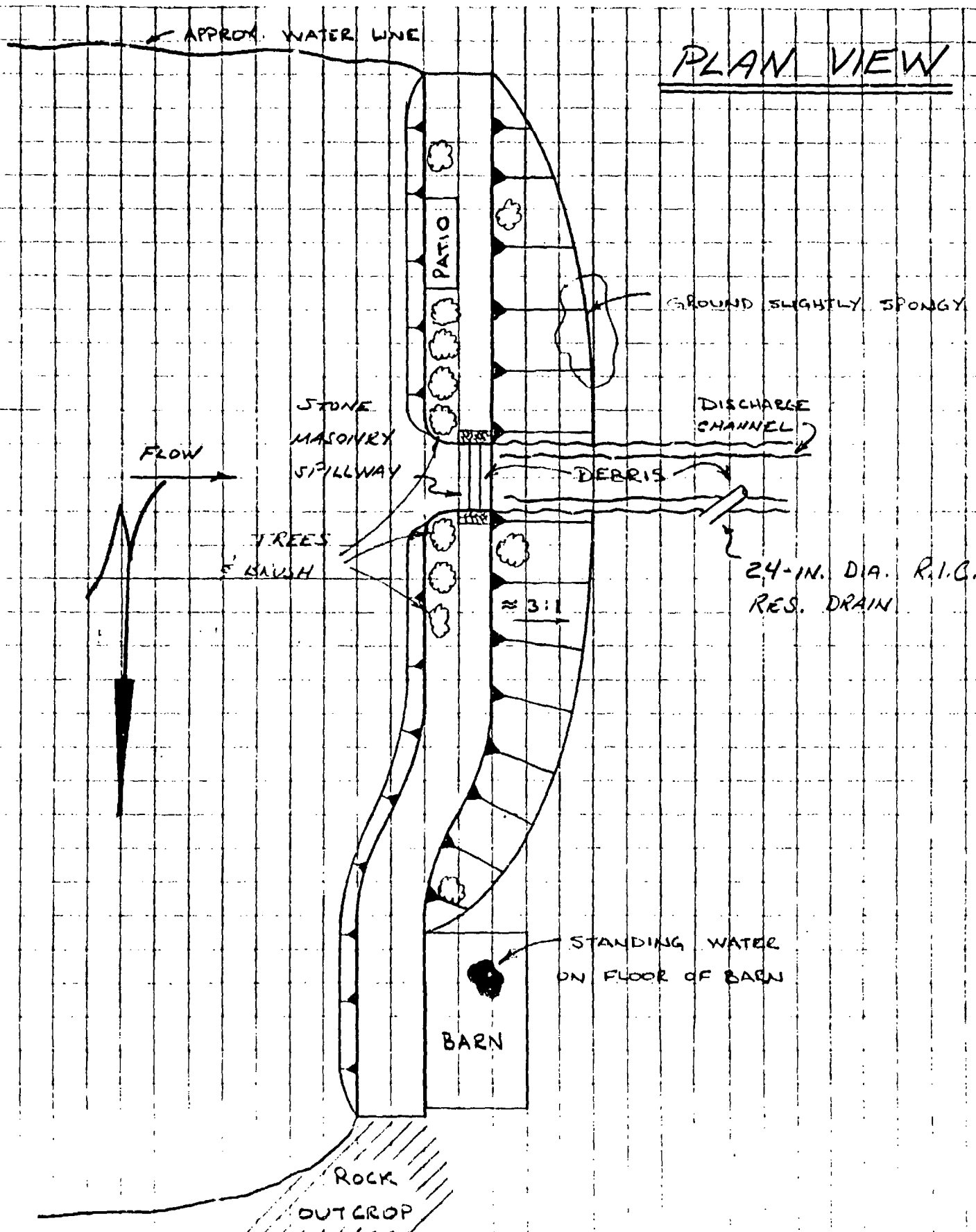
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5-22-81

JOB NO

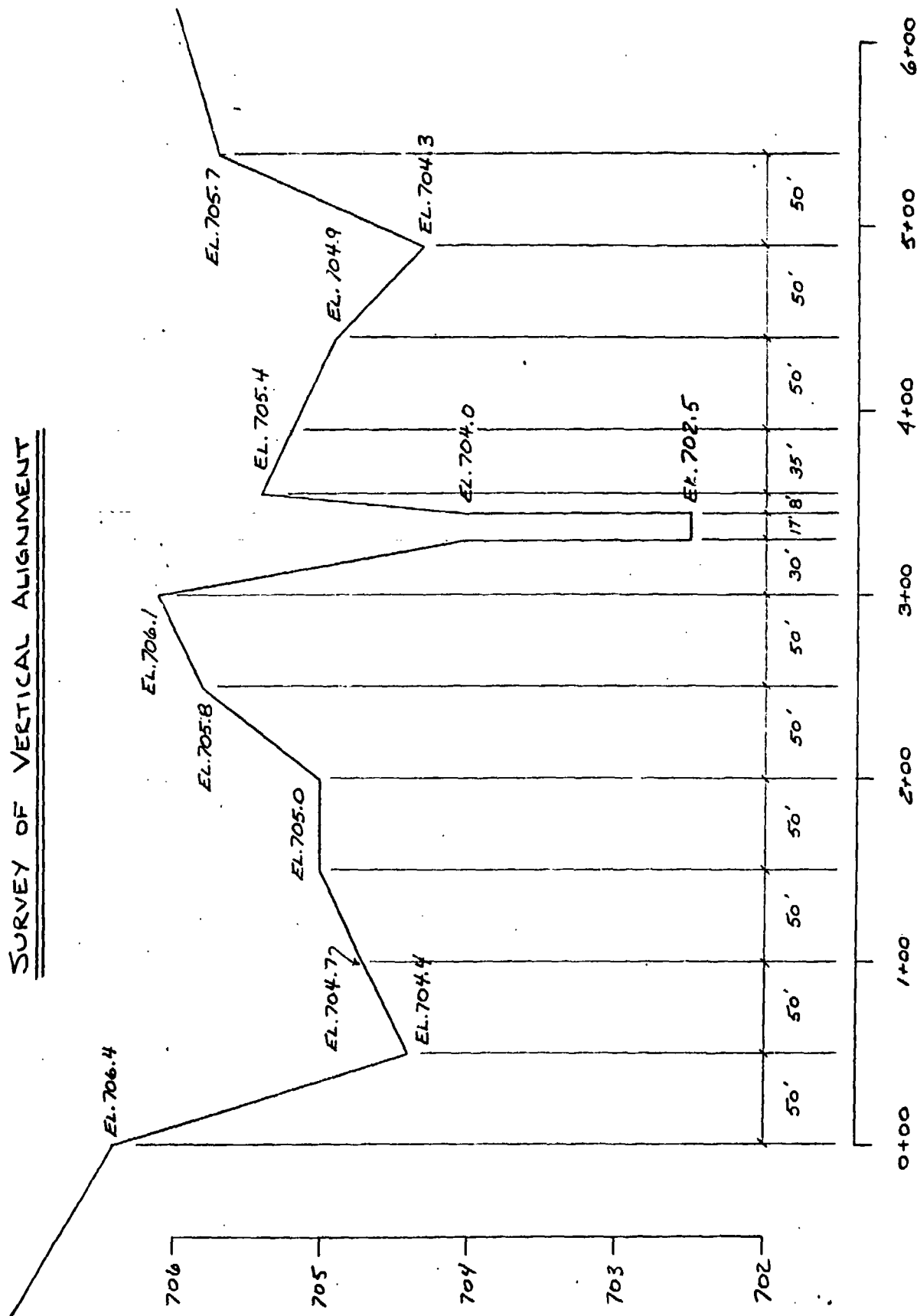
1841-014

PLAN VIEW



SUBJECT	SHEET	BY	DATE	JOB NO.
BLUE MTN. LAKE DAM	118	JFR	5-8-81	1800-0006

SURVEY OF VERTICAL ALIGNMENT



APPENDIX B
CHECKLIST
ENGINEERING DATA

O'BRIEN & GERE

NAME OF DAM Blue Mountain Lake
 ID # PA 00627

Sheet 1 of 4

CHECK LIST
 ENGINEERING DATA
 DESIGN, CONSTRUCTION, OPERATION
 PHASE I

REMARKS

ITEM

AS-BUILT DRAWINGS None Available.

REGIONAL VICINITY MAP Refer to Appendix E.

CONSTRUCTION HISTORY Refer to Section 1.2.9 of this report.

TYPICAL SECTIONS OF DAM Refer to Appendix E.

OUTLETS - PLAN

DETAILS

CONSTRAINTS

Refer to Appendix E.

DISCHARGE RATINGS Not available.

RAINFALL/RESERVOIR RECORDS Not available.

ITEM	REMARKS
DESIGN REPORTS	None available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Not available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	No data available.
POST-CONSTRUCTION SURVEYS OF DAM	No data available.
BORROW SOURCES	Material excavated from the impoundment was used in the embankment.

Sheet 3 of 4

ITEM	REMARKS
MONITORING SYSTEMS	None observed.
MODIFICATIONS	See Section 1.2.g of this report.
HIGH POOL RECORDS	No data available.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	See Section 1.2.g of this report.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None known of.
MAINTENANCE OPERATION RECORDS	None available.

Sheet 4 of 4

ITEM	REMARKS
SPILLWAY PLAN	Refer to Appendix E.
SECTIONS	
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	None available.
MISCELLANEOUS	

APPENDIX C
PHOTOGRAPHS

APPENDIX C

PHOTOGRAPH TABLE OF CONTENTS

	<u>Page No.</u>
1. View along the centerline from the left side of the dam. (5/5/81)	1
2. Overview of the impoundment. (5/5/81)	1
3. Stone masonry spillway and discharge channel. (5/5/81)	2
4. Close up of stone masonry spillway. (5/5/81)	2
5. Typical size of trees growing on the dam. (5/5/81)	3
6. Typical size of random riprap on the upstream face of the dam. (5/5/81)	3
7. Outlet of 24-inch diameter reinforced concrete reservoir drain pipe. (5/5/81)	4
8. Typical downstream channel conditions. (5/5/81)	4
9. Potential damage area looking downstream. (5/5/81)	5
10. Culvert under state highway immediately downstream of the potential damage area. (5/5/81)	5



SUBJECT

BLUE MTN. LAKE DAM

SMILEY

A

19

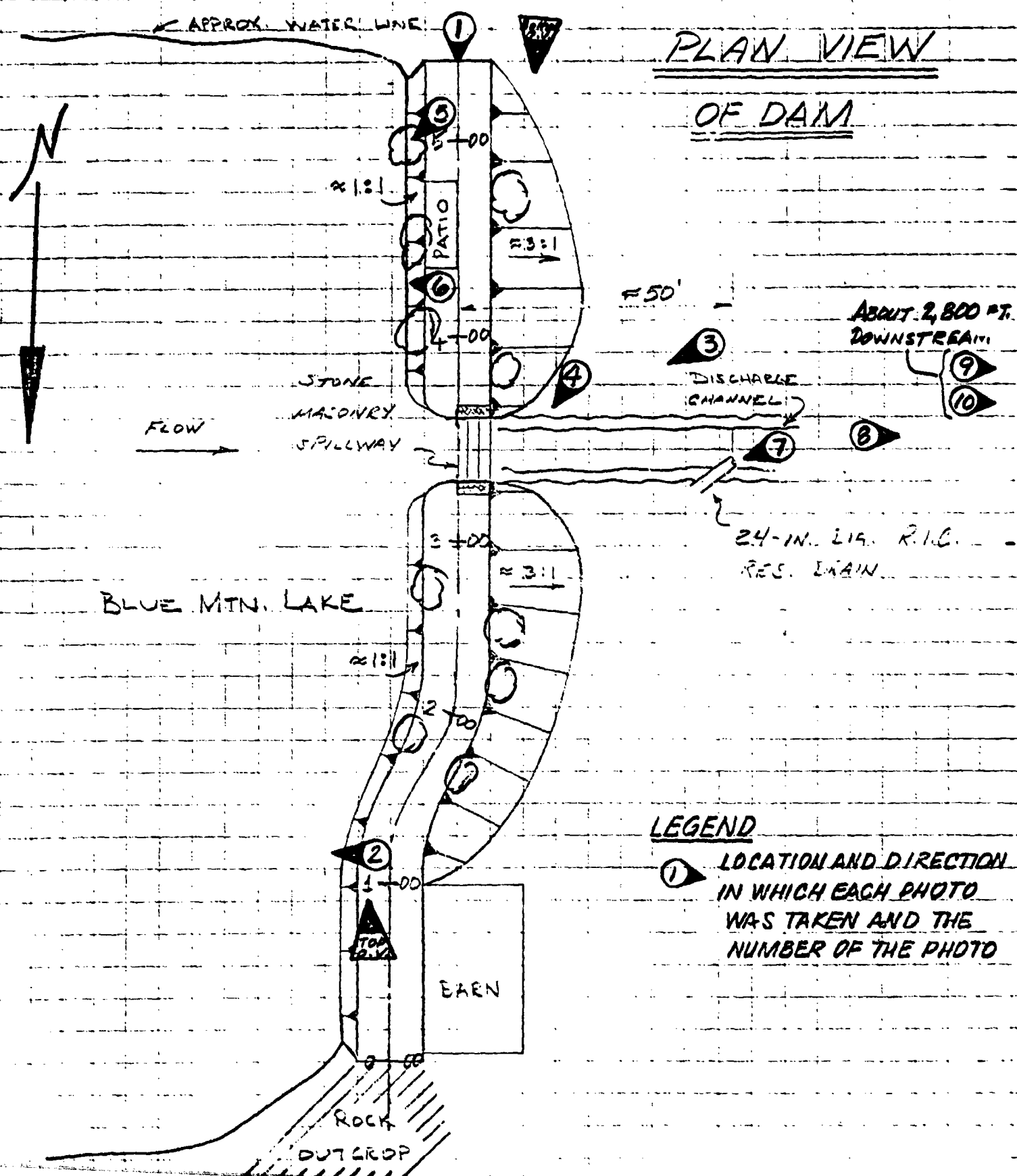
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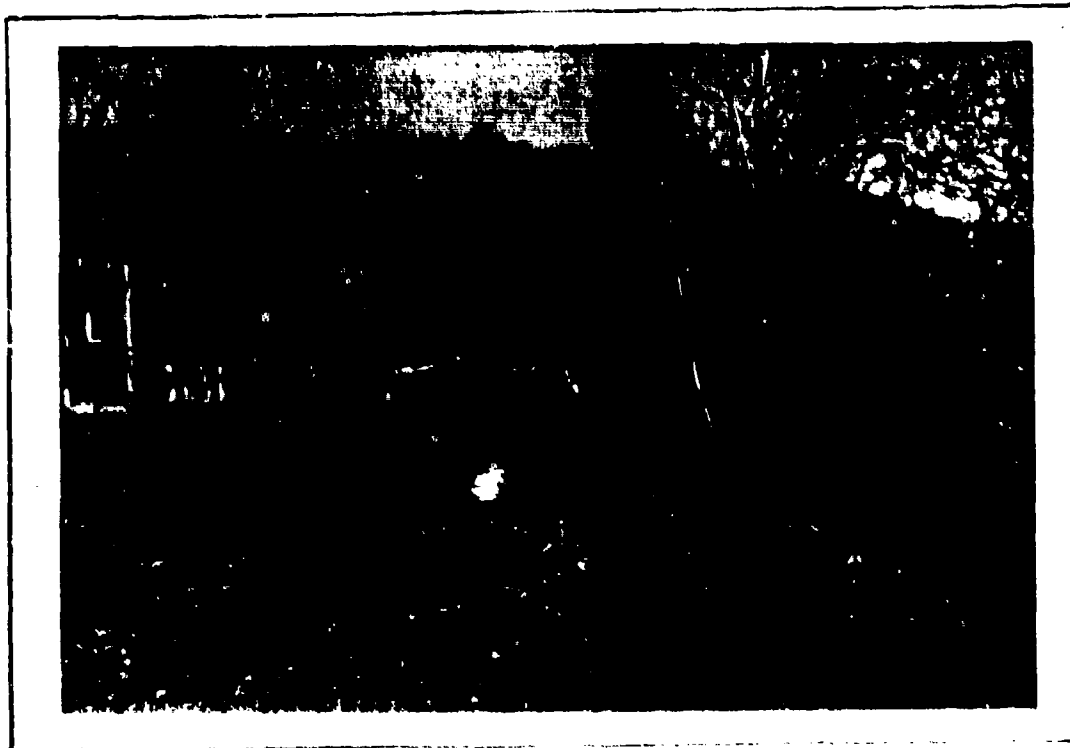
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1. VIEW ALONG THE CENTERLINE FROM THE LEFT SIDE OF THE DAM.
(5/5/81)



2. OVERVIEW OF THE IMPOUNDMENT. (5/5/81)



3. STONE MASONRY SPILLWAY AND DISCHARGE CHANNEL. (5/5/81)



4. CLOSE UP OF STONE MASONRY SPILLWAY. (5/5/81)



5. TYPICAL SIZE OF TREES GROWING ON THE DAM. (5/5/81)



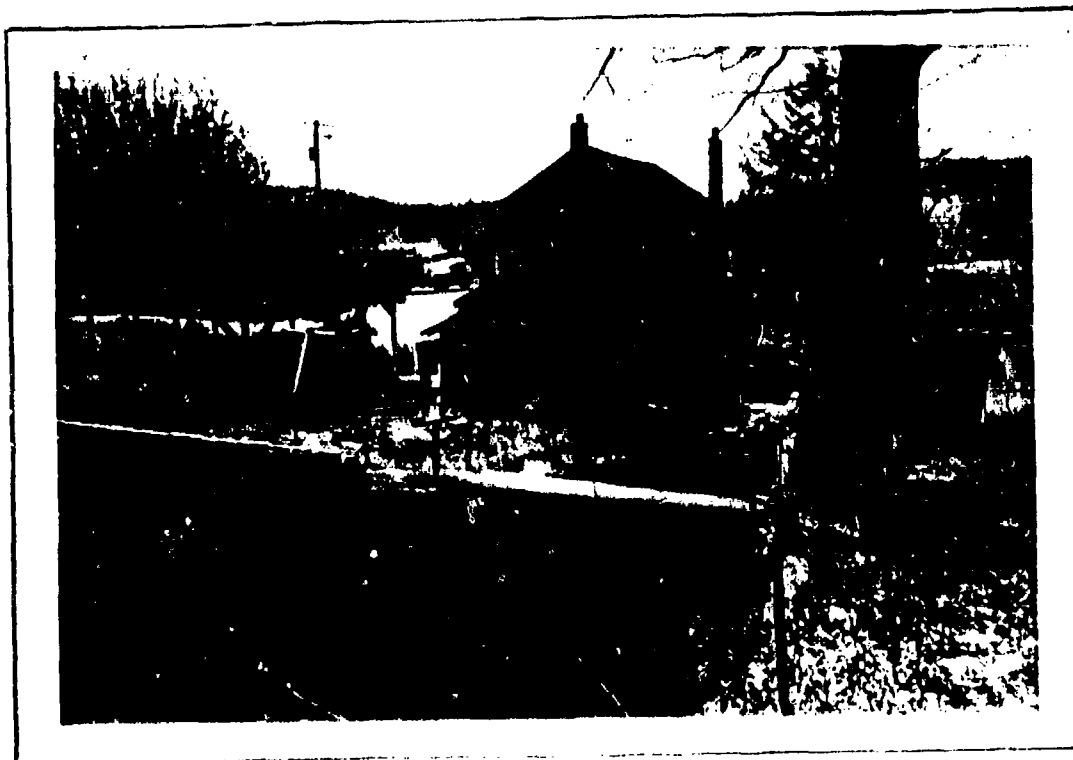
6. TYPICAL SIZE OF RANDOM RIPRAP ON THE UPSTREAM FACE OF THE DAM. (5/5/81)



7. OUTLET OF 24-INCH DIAMETER REINFORCED CONCRETE RESERVOIR
DRAIN PIPE. (5/5/81)



8. TYPICAL DOWNSTREAM CHANNEL CONDITIONS. (5/5/81)



9. POTENTIAL DAMAGE AREA LOOKING DOWNSTREAM. (5/5/81)



10. CULVERT UNDER STATE HIGHWAY IMMEDIATELY DOWNSTREAM OF THE POTENTIAL DAMAGE AREA. (5/5/81)

APPENDIX D
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

O'BRIEN & GERE

BLUE MOUNTAIN LAKE DAM
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

TABLE OF CONTENTS

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Check List Hydrologic and Hydraulic Engineering Data.	1
Drainage Area, Stage-Area, Stage-Storage and Spillway Discharge Calculations.	2
Peak Inflow Determination, 100yr. Flood.	3

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Hilly & forested
ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): EI. 702.5 (55 A.F.)
ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N/A
ELEVATION MAXIMUM DESIGN POOL: N/A
ELEVATION TOP DAM: (Low Point EI. 704.0)

SPILLWAY

a. Elevation 702.5
b. Type Ungated Overflow
c. Width 2 Ft.
d. Length 17 Ft.
e. Location Spillover Near Mid Point of Dam
f. Number and Type of Gates None

OUTLET WORKS:

a. Type 24" diameter R.C. pipe
b. Location Adjacent to Spillway (Rt. side)
c. Entrance invert Unknown
d. Exit invert EI. 696.4
e. Emergency draindown facilities 24" diameter gate
(inoperable)

HYDROMETEOROLOGICAL GAGES:

a. Type None on site
b. Location N/A
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: 49 cfs. (Low Point Top of Dam
EI. 704.0)

SUBJECT	Blue Mountain Lake Dam	SHEET	2	BY	EB	DATE	8/13/81	JOB NO.	1841-014
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Drainage Area (Planimetered from USGS Quad. S/L) = 1.1 mi²

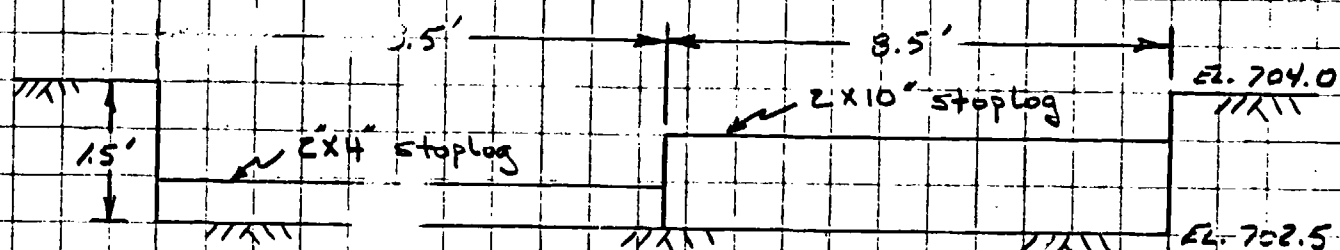
Stage-Area & Stage-Storage Calculations

El. (Feet Above MSL)	Area (Acres)	Total Volume (A.F.)
697.0	0	
702.5 (Normal Pool)	30	55
704.0 (Low Pt. Top of Dam)	35	104
720.0	73	952

1/ Computed using $V = H/3 (A_1 + A_2 + \sqrt{A_1 A_2})$

Spillway Discharge:

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



$C = 3.0$ --- sharp crested weir

$L_1 = 3.5$ feet, $L_2 = 8.5$ feet

$H_1 =$ depth of flow above 2x4

$H_2 =$ " " " " 2x10

$$Q = 3(8.5)(H_1^{3/2} + H_2^{3/2}) = 25.5 (H_1^{3/2} + H_2^{3/2})$$

At Low Pt. Top of Dam, El. 704.0

$$Q = 25.5 (1.2^2 + 0.7^2)$$

$Q \approx 49$ cfs < 833 cfs Peak Infl. Q_{100} (Refer to S/L 3)

∴ The spillway is "Inadequate" because it can't pass the 100 yr. flood.

SUBJECT

Blue Mountain Lake Dam

SHEET

3

BY

JZ

DATE

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Peak Inflow, Q_{100} , For 100 yr. Flood
Appendix I
Reference : Water Resources Bulletin No. 13
 "Floods in Pennsylvania", Oct 1977

Drainage Basin is in Region 5

Model 5 : The regression equations are based on records for 128 gaging stations in flood-frequency region 5 : they are of the form :

$$Q_T = C A^x P^y P$$

$$C = 42.2$$

$$A = 1.01 \text{ mi}^2$$

$$Q_{100} = 42.2 \times 1.1^{0.751} \times 50^{0.744} P_z = 50 \text{ inches precip. per year.}$$

(Plate 2, Bulletin No. 13)

$$Q_{100} = 533 \text{ cfs.}$$

$$P = 0.744$$

Appendix II
Reference : Regional Frequency Study, Upper Delaware and Hudson River Basins, New York Dist. COE, 11/74

$$\log(Q_m) = C_m + 0.37 \log(A)$$

$$S = C_s - 0.05 \log(A)$$

$$C_m = 1.7 \text{ (Fig 2)}$$

$$C_s = 0.365 \text{ (Fig 3)}$$

$$g = +0.8 \text{ (Fig 5)} \therefore k = 2.89 \text{ (Introduction to Hydrology, Table C-2, Appendix C, pg 653)}$$

$$\log(Q_m) = 1.7 + 0.87 \log(1.1)$$

$$\log(Q_m) = 1.74$$

$$S = 0.365 - 0.05 \log(1.1)$$

$$S = 0.363$$

$$\log(Q(P)) = \log(Q_m) + k(P_z) S$$

$$= 1.74 + 2.89(0.363)$$

$$Q_{100} = 615 \text{ cfs} < 833 \text{ cfs (Model 5)}$$

 USE 833 cfs as peak inflow Q_m
 $\log(Q_m)$ = mean logarithm of annual flood peaks.

 $\log(Q(P))$ = log of the annual flood peaks for a given extreme freq. (P)

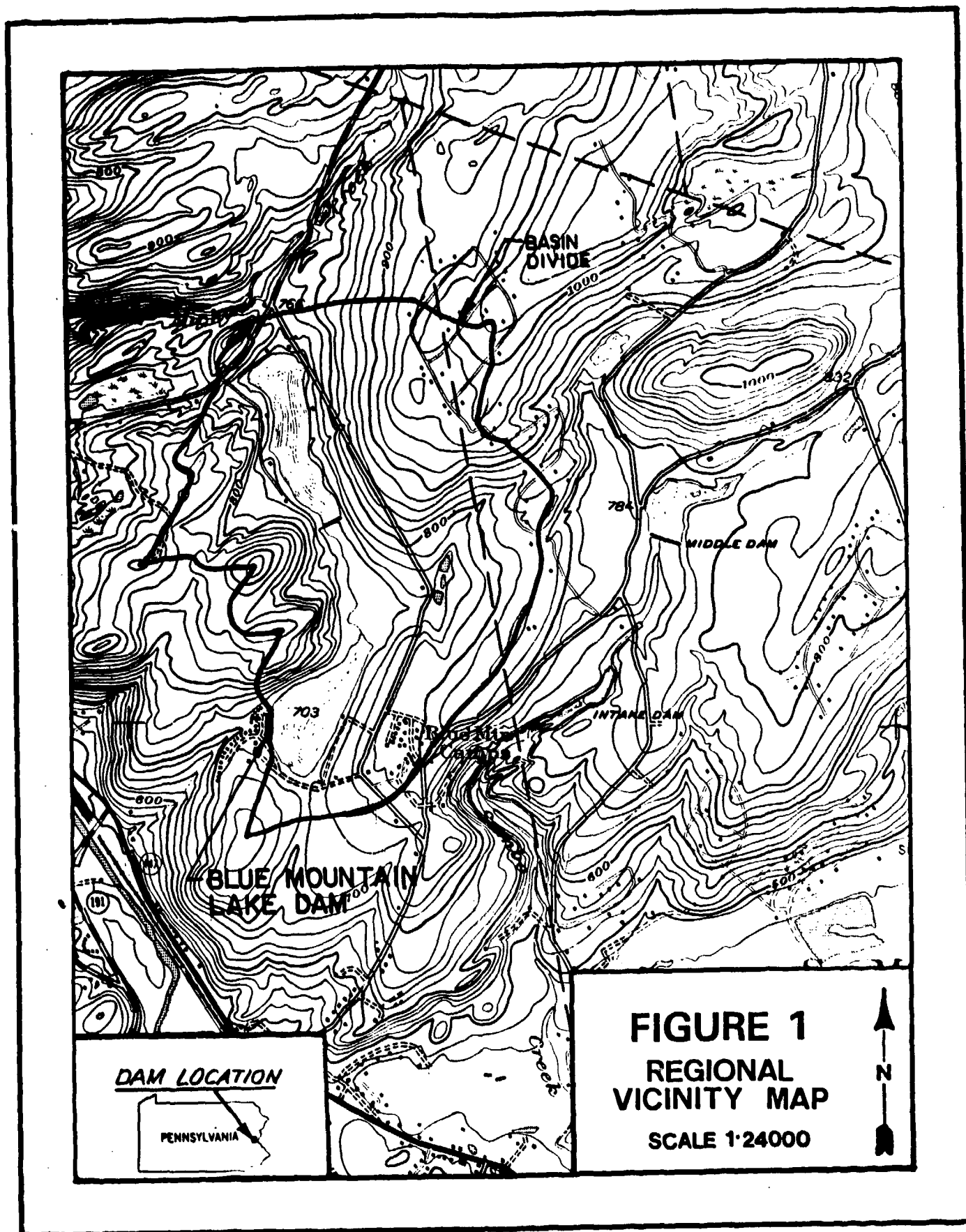
APPENDIX E
REGIONAL VICINITY MAP
&
DRAWINGS

BLUE MOUNTAIN LAKE DAM

DRAWINGS

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	<u>Sheet No.</u>
Regional Vicinity Map, Figure 1	1
Plan View of Dam	2
Survey of Vertical Alignment	3
Typical Dam Section	4
Typical Spillway Section	4



SUBJECT

BLUE MTN. LAKE DAM

SHEET

2

BY

JFR

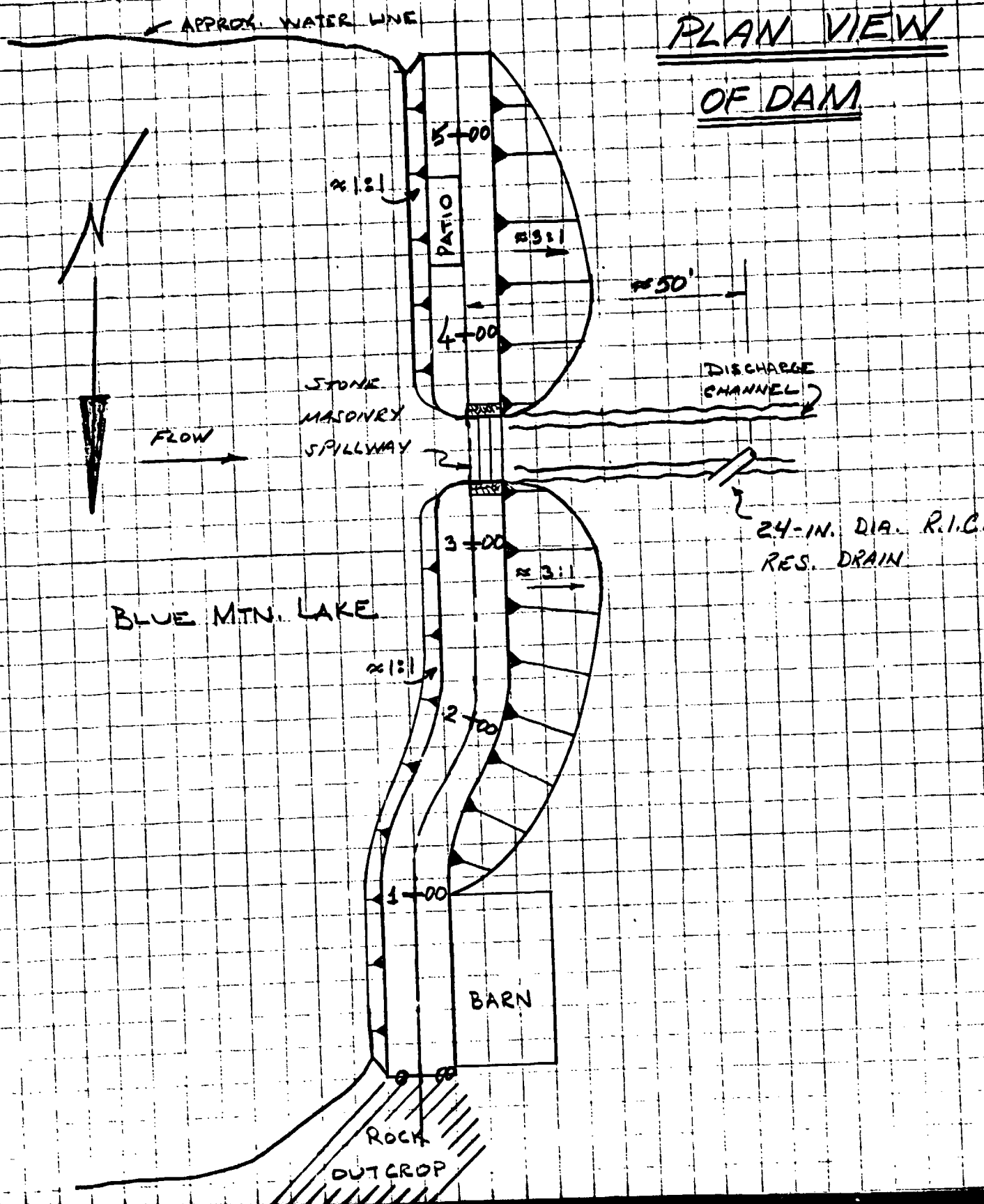
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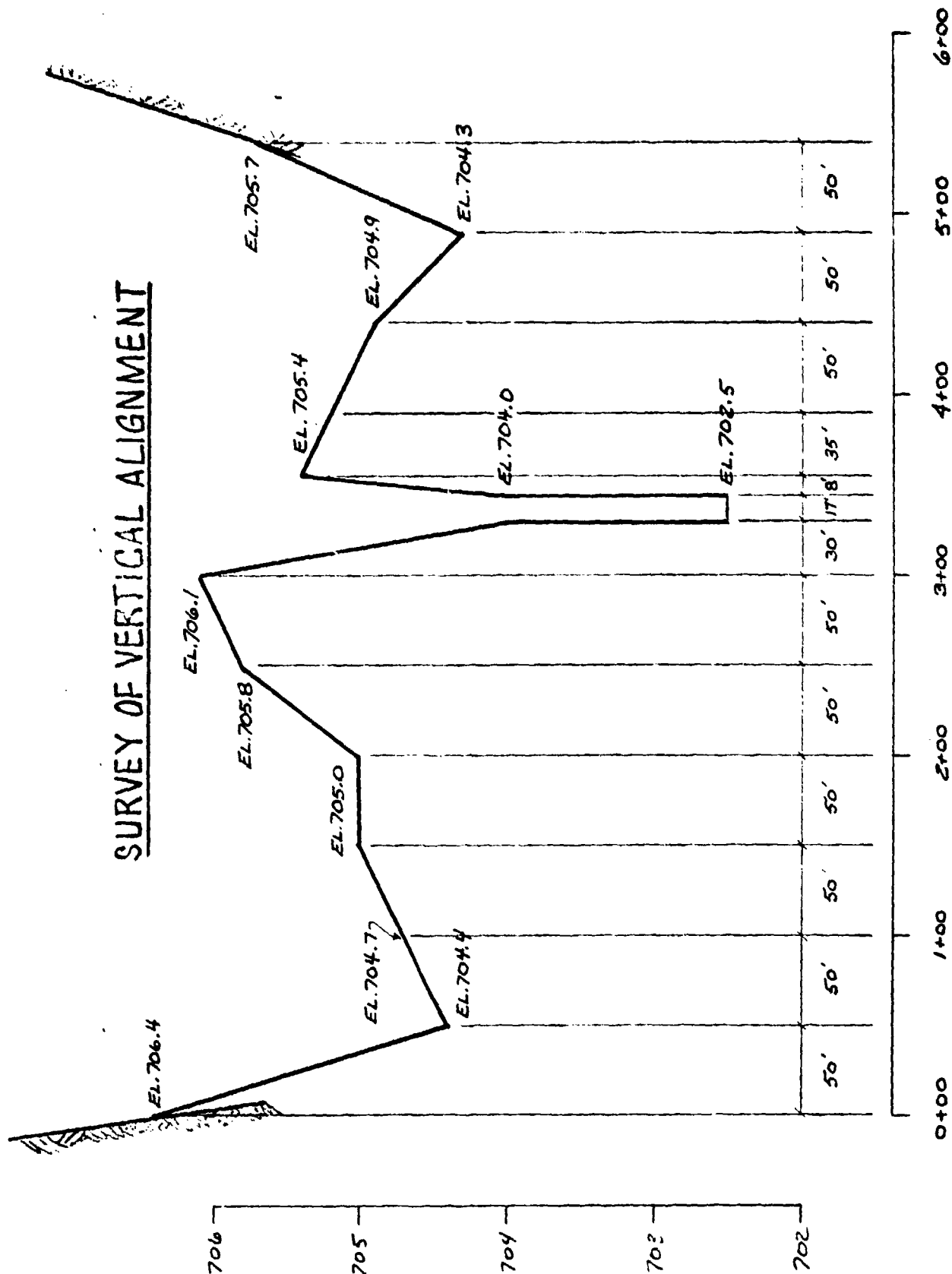
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PLAN VIEW
OF DAM



SUBJECT	BLUE MTN. LAKE DAM	SHEET	3	BY	JFR	DATE	5-8-81	JOB NO	1800-006
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O'BRIEN & GERE

SUBJECT

BLUE MTN. LAKE DAM

SHEET

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BY

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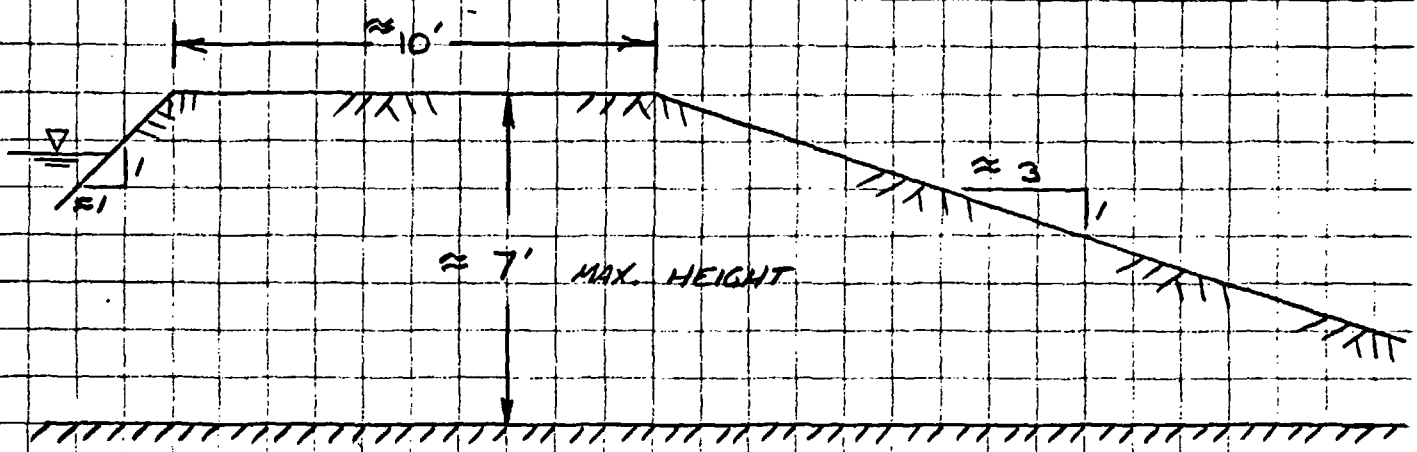
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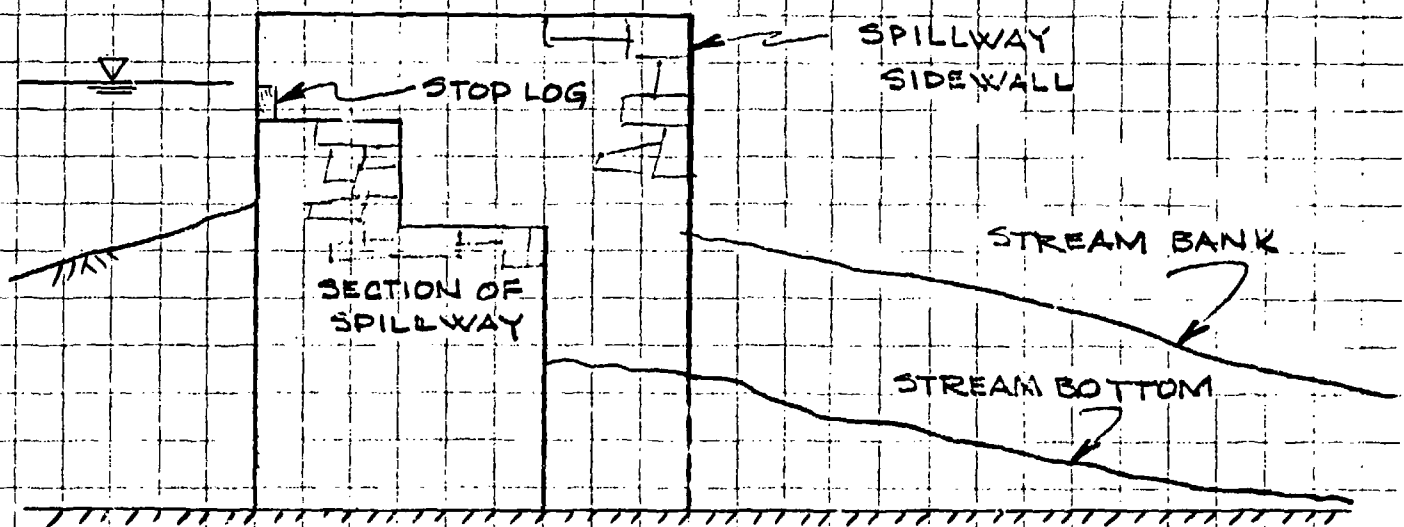
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1841-014

TYPICAL DAM SECTION



TYPICAL SPILLWAY SECTION



APPENDIX F
GEOLOGY

O'BRIEN & GERE

SITE GEOLOGY

BLUE MOUNTAIN LAKE DAM

Blue Mountain Lake Dam is located in Monroe County, within the Pocono Plateau section of the Appalachian Plateaus physiographic province and underlain by Devonian marine units of the Mahantango formation. Capping the bedrock in valleys and side slopes are glacial drift deposits of both Wisconsin and older Illinoian epochs. Thickness of this mantle varies appreciably as does its character, ranging from clays and fine sands to boulder sizes. Dip of the bedrock is about 20°-25° NW and strike approximately NE-SW.

Bedrock is predominantly a gray fissile shale and fine grained sandstone and in places is highly fossiliferous. Where exposed, the shale disintegrates rapidly into elongated and blocky pieces collecting as talus at the base of slopes or cuts.

Jointing and fracturing is well developed in the sandstone zones of the Mahantango.

No major structural weaknesses are known in the immediate vicinity of the dam and lake.

Permeability and porosity of the glacial deposits is considered high; however, where clay forms a matrix with sand and cobbles, the effect is lessened.

