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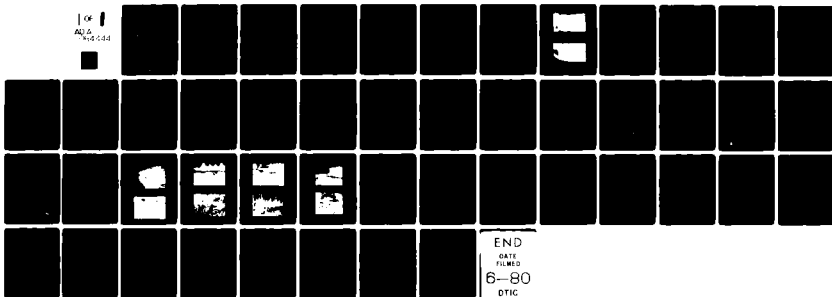
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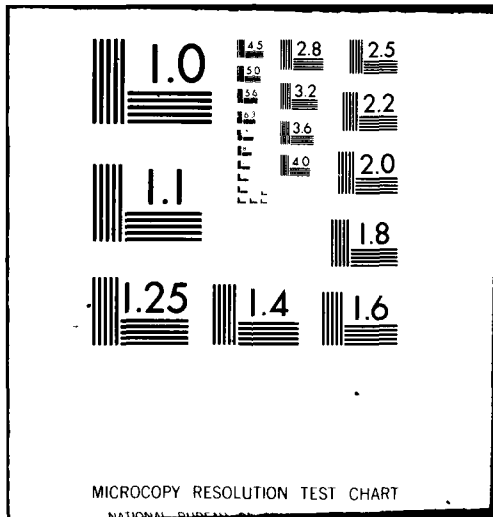
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ROANOKE RIVER BASIN

LEVEL

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Name Of Dam: LANIER
Location: HENRY COUNTY
Inventory Number: VA. 08910

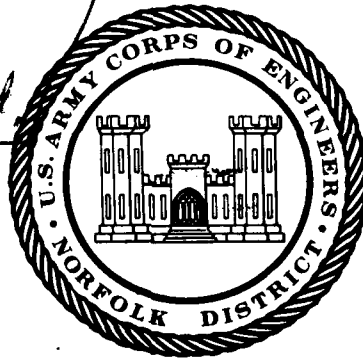
PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

Lanier Dam (VA-08910), Roanoke River Basin.

Henry County
Virginia, Phase I
Inspection Report

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MAY 21 1980

10 Boris G. Taran

PREPARED BY
NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK, VIRGINIA 23510

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20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by 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 and property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam and appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and as assessment including required remedial measures.

①

ROANOKE RIVER BASIN

NAME OF DAM: LANIER DAM
LOCATION: MARTINSVILLE CITY, VIRGINIA
INVENTORY NUMBER: VA 08910

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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ELECTE
MAY 21 1980

PREPARED BY
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NORFOLK, VIRGINIA 23510

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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 the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

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

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

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 (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the design flood should not be interpreted as necessarily posing a highly inadequate condition. The design flood provides a measure of relative spillway capacity and serves as an aide 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 REPORT
NATIONAL DAM SAFETY PROGRAM

BRIEF ASSESSMENT OF DAM

Name of Dam: Lanier
State: Virginia
Location: City of Martinsville
USGS Quad Sheet: Martinsville East
Stream: Tributary to the Smith River
Date of Inspection: 12 December 1979

The Lanier Dam is an earthfill structure 427 feet long and 39 feet high. The dam is owned and maintained by Lanier Farms, Inc. The dam is classified as a small dam with a significant hazard classification. The principal spillway is a concrete lined channel passing below a bridge on the left side of the dam. The emergency spillway is located on the left abutment and is an open channel earthen spillway. This reservoir is used for recreation.

Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) is the 1/2 PMF. The spillways will pass 33 percent of the PMF without overtopping the dam. The SDF will overtop the dam by a maximum 0.79 feet, reach an average critical velocity of 3.9 feet per second and flow over the dam for 1.5 hours. The spillways are adjudged as inadequate but not seriously inadequate.

The visual inspection revealed no apparent problems and there are no immediate needs for remedial measures. There is a regular maintenance operation program, but no warning system. It is recommended that a warning system be established and the maintenance items listed in Section 7.2 be accomplished as part of the regular maintenance program within the next 12 months.

Submitted By: signed by
Original
JAMES A. WALSH

JAMES A. WALSH, P. E.
Chief, Design Branch

Approved:
Original signed by:
Douglas L. Haller

DOUGLAS L. HALLER
Colonel Corps of Engineers
District Engineer

Recommended By
Original Signed by:
Ronald G. Vann

JACK G. STARR
Chief, Engineering Division

Date: MAR 24 1980



CREST



DOWNSTREAM SLOPE

**OVERALL VIEWS OF LANIER DAM
12 DECEMBER 1979**

SECTION 1

PROJECT INFORMATION

1.1 GENERAL:

1.1.1 Authority: Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers to initiate a national program of safety inspections of dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (Reference 1, Appendix IV). The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Project Description:

1.2.1 Dam and Appurtenances: Lanier Dam is an earthen embankment dam 427 feet long and 39 feet high. The crest of the dam is 34 feet wide with a crest elevation of 100.8 TBM*. A secondary road traverses the entire crest length. The upstream slope is 2 horizontal to 1 vertical (2H:1V) with a wooden bulkhead and riprapped at the normal pool elevation 94.8. The downstream slope is 2H:1V.

It is unknown if the dam is keyed into the foundation or whether or not there is a drainage system. There are no foundation drain outlets.

The principal spillway is a concrete lined channel passing below a bridge on the left end of the embankment with the crest at elevation 94.8. Two openings 10 feet wide and 56 inches high allow water to pass downstream. The approach channel is riprapped and the discharge channel is a concrete chute approximately 250 feet long.

The emergency spillway is an open channel earthen spillway located on the left abutment with the crest at elevation 98.8. Water passing through this spillway will discharge onto a golf course.

A 14-inch concrete drawdown pipe is located at low level through the dam. A tin shed located at the toe of the downstream slope is used to protect the valve that operates the drawdown pipe.

1.2.2 Location: Lanier Dam is located on Mulberry Creek in the City of Martinsville, Virginia, about one mile upstream of the Smith River at the Forest Parks Country Club.

1.2.3 Size Classification: The dam is classified as a small size structure.

*TBM based on bench mark noted on Plate II at elevation 100.0.

1.2.4 Hazard Classification: The dam is located upstream of one house and a golf course; therefore, a significant hazard classification is given for this structure according to guidelines contained in Section 2.1.2 of Reference 1, Appendix IV. The hazard classification used to categorize dams is a function of location only and has nothing to do with their stability or probability of failure.

1.2.5 Ownership: Lanier Farms, Inc.

1.2.6 Purpose: Recreation

1.2.7 Design and Construction History: The design engineer was William B. Sours who is no longer living. The dam was completed in 1958.

1.2.8 Normal Operational Procedures: Water passes automatically through the principal and emergency spillways as the reservoir rises above the spillways crests.

1.3 Pertinent Data:

1.3.1 Drainage Area: The dam controls a drainage area of 1.12 square miles.

1.3.2 Discharge at Dam Site: Maximum flood - approximately 100 cfs with the water a little more than a foot over the crest of the principal spillway.

Pool level at top of dam

Principal Spillway	1059 cfs
Emergency Spillway	1188 cfs

1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are shown in the following table:

TABLE 1.1 DAM AND RESERVOIR DATA

Item	Elevation feet TBM	Reservoir			
		Area, acres	Capacity		Length miles
Acre, feet	Watershed, inches				
Top of Dam	100.8	35.0	730	12.2	.7
Emergency Spill- way Crest	98.8	32.0	660	11.0	.65
Principal Spill- way Crest	94.8	26.5	532	8.9	.6
Streambed at Down- stream Toe of Dam	61.8+	--	--	--	--

SECTION 2

ENGINEERING DATA

- 2.1 Design: There is no known design information.*
- 2.2 Construction: There are no known construction records.
- 2.3 Evaluation: There is insufficient information to evaluate foundation conditions and embankment stability.

* The owner representatives provided design drawings of the dam. However, the drawings differentiate to what exists in the field and were not considered to be a fair representation of the dam. Copies of the drawings are provided in Appendix I, Plates III, IV, and V.

SECTION 3

VISUAL INSPECTION

3.1 Findings:

3.1.1 General: The results of the 12 December 1979 inspection are recorded in Appendix III. At the time of the inspection, the weather was sunny and clear. The temperature was 64° F and the ground conditions were moist. The pool elevation was approximately 92.9 T.B.M. or about 2 feet below normal pool elevation. The tailwater elevation was about 58.8 T.B.M. No flow was passing through the principal and emergency spillways. There are no known prior inspection reports.

3.1.2 Embankment: The embankment is in good condition. A sketch showing a plan view and cross section is provided on Plate II, Appendix I. Overall views of the crest and downstream slope are provided at the beginning of the report.

There are no signs of surface cracks, unusual movement, sloughing, misalignment, riprap failures, or seepage. However, there is surface erosion of the upstream right abutment probably due to pedestrian traffic and aggravated by surface runoff. Also, on the downstream right abutment there is a 36-inch CMP semicircular pipe serving as a liner for a drainage ditch. The pipe extends only 14.5 feet down the 41-foot long abutment. There is some erosion at the abutment contact as shown in Photo 3, Appendix II. Any flow through the ditch will encourage erosion along the unprotected abutment contact.

There is a wet spot in the downstream area at the toe of the embankment, a bare spot and an animal burrow on the downstream slope, all as located on Plate II. The wet spot is as shown in Photo 5 and the animal burrow in Photo 4.

There are trees along the upstream slope, as shown in Photo 1, and on portions of the downstream slope, as shown in the overview photos. The trees are generally coniferous and are as large as 18 inches in diameter.

There are no known drains. The available drawings indicate the twin box culvert has a french drain. There is no evidence in the field of the french drain.

3.1.3 Drawdown Outlet Works: No cracking or spalling of the 14-inch outlet conduit are noted. The intake structure is submerged and not observable. A reservoir drain structure covers the valve used to operate the outlet and is as shown in Photo 5. The valve appears to be in good condition. It is reported that the valve was operated very recently to lower the pool level. The outlet channel is two to four feet wide and one to two feet deep with trees and shrubs lining the entire channel.

3.1.4 Principal Spillway: The concrete weir is in good shape, as shown in Photo 2. A trash rack is wedged open by debris preventing effective usage. The discharge channel, as shown in Photo 7, is a concrete chute that allows rapid discharge, and channels flow approximately 250 feet to the downstream channel. The last 12 feet of the discharge channel is collapsed and a large hole 50 feet by 30 feet and 12 feet deep has developed, as shown in Photo 8. The chute has spalling and cracking that allows flows to seep and undermine the discharge channel. Trees and shrubs are growing in the downstream channel.

3.1.5 Emergency Spillway: The approach channel is a slight cut in natural ground on the left side of the dam. There are some planted shrubs in the channel. A paved secondary road traverses the length of the control section. The discharge channel is a sharp drop from the road onto a golf course. There are several trees in the channel. The growth should have little effect on flows since the channel is steep at the point.

3.1.6 Instrumentation: There is no instrumentation on the dam.

3.1.7 Reservoir Area: The reservoir slopes are gentle and the lake is surrounded by residential homes. There are no signs of reservoir slope failures or shoreline erosion.

3.1.8 Downstream Channel: The downstream area terrain varies from flat to steep slopes. There are some trees and shrubs in the channel immediately below the dam. One home is located about 200 yards below the right side of the dam, as shown in Photo 6. A golf course is located directly below the left side of the dam.

3.2 Evaluation: Overall, the dam appears to be in good condition. The inspection revealed certain preventive maintenance items which should be scheduled as part of an annual maintenance program. These are:

a. The trees on both slopes should be cut down and the root structures removed. Subsequent holes should be regraded, dressed with compacted fill, and seeded.

b. Trees and shrubs within 100 yards of the embankment in the channel downstream of the drawdown outlet works and in the channel downstream of the principal spillway, and vegetation in the approach channel of the emergency spillway should be cut to the ground.

c. A continuous program to control vegetative growth in the spillway channels and on the embankment should be instituted as part of a regular maintenance program.

d. The bare spot noted on Plate II should be reseeded.

e. The animal burrow, noted in Plate II, should be backfilled with compacted fill and seeded.

f. The wet spot noted on Plate II should be monitored for seepage or boils during a regular maintenance program. Should seepage occur, a professional geotechnical engineer should be consulted.

g. The eroded areas on the right upstream and downstream abutment contact should be dressed with compacted fill and seeded. The semicircular pipe should be extended all the way down the slope and 10 feet downstream away from the embankment toe to protect the slope from collected runoff.

h. The reservoir drain structure should be locked to discourage vandalism.

i. The debris wedged in the trash rack should be cleared.

j. Corrective measures should be taken to prevent further deterioration and collapse of the principal spillway discharge channel. All cracks, spalling, etc. should be repaired, and the end of the channel should be protected from further erosion and collapse.

k. A staff gage should be installed in the reservoir to extend above the top of the dam.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures: The normal storage pool is 94.8 TBM which is the crest of the principal spillway. The reservoir provides recreation for residents around the lake. Water passes automatically through the principal spillway as the water level rises above the principal spillway crest. Water will also pass automatically through the emergency spillway when the water level in the reservoir rises above 98.8 TBM. A 14-inch concrete pipe at a low level in the reservoir can be operated to lower the reservoir below normal pool.

4.2 Maintenance: A regular maintenance program performed by Lanier Farms Inc. includes cleaning debris from around the reservoir and cutting vegetation on and around the dam.

4.3 Warning System: At present time there is no warning system or evacuation plan for Lanier dam.

4.4 Evaluation: The dam does not require an elaborate operational and maintenance procedure. The regular maintenance operation program should be documented for future reference. An emergency operation and warning plan should be developed. It is recommended that a formal emergency procedure be prepared and furnished to all operating personnel. This should include:

- a. How to operate the dam during an emergency.
- b. Who to notify, including public officials, in case evacuation from the downstream area is necessary.

SECTION 5

HYDRAULIC/HYDROLOGIC DATA

5.1 Design: None were available.

5.2 Hydrologic Records: None were available.

5.3 Flood Experience: The maximum flow observed was a depth of approximately 1 foot in the principal spillway.

5.4 Flood Potential: The 100-Year Flood, 1/2 PMF, and PMF were developed and routed through the reservoir by use of the HEC-IDB computer program (Reference 2, Appendix IV) and appropriate unit hydrograph, precipitation and storage-outflow data. Clark's Tc and R coefficients for the local drainage area were estimated from basin characteristics. The rainfall applied to the developed unit hydrograph was obtained from the U. S. Weather Bureau Publications (Reference 3 and 4, Appendix IV).

5.5 Reservoir Regulation: Pertinent dam and reservoir data are shown in Table 1.1.

Water passes automatically through the principal and emergency spillways as the reservoir rises above the crests. The low level 14-inch concrete pipe is operated as needed to lower the reservoir from normal pool.

The storage curve was developed by use of a U. S. Geological Survey Quadrangle Map. Rating curves were developed for both spillways, 14-inch outlet, and the non-overflow section of the dam. In routing hydrographs through the reservoir, it was assumed that the initial pool level was at elevation 94.8 TBM.

5.6 Overtopping Potential: The probable rise in the reservoir and other pertinent information on reservoir performance is shown in the following table:

Table 5.1 RESERVOIR PERFORMANCE

<u>DAM PERFORMANCE</u>				
Item	Normal Flow	Hydrograph		
		2/ 100 Year	1/2 PMF	PMF 1/
Peak flow, c.f.s.				
Inflow	1	1431	4279	8557
Outflow	1	666	4055	8359
Maximum elevation ft, TBM	94.8	98.99	101.59	102.89
Non-overflow section (el. 100.8 TBM)				
Depth of flow, ft.	--	--	.79	2.09
Duration, hrs	--	--	1.5	3
Velocity, f.p.s. ^{3/}	--	--	3.9	6.5
Tailwater elevation ft., TBM	61.8	--	--	--

1/ The PMF is an estimate of flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

2/ The 100 Year Flood has one chance in 100 of being exceeded in any given year.

3/ Critical velocity.

5.7 Reservoir Emptying Potential: A 14-inch gated outlet at elevation 61.8 TBM is available for dewatering the reservoir. The low level opening through the intake structure will permit withdrawal of about 28 cfs with the reservoir at normal pool and essentially dewater the reservoir in about 25 days. This is equivalent to an approximate drawdown rate of 1.3 feet per day based on the hydraulic height measured from normal pool divided by the time to dewater the reservoir.

5.8 Evaluation: Based on the size (small) and hazard classification (significant) the recommended Spillway Design Flood is the 100 Year Flood to the 1/2 Probable Maximum Flood (1/2 PMF). Because of the risk involved the 1/2 PMF has been selected as the SDF. The spillways will pass 33 percent of the PMF without overtopping the dam. The SDF will overtop the dam by a maximum of .79 feet with a critical velocity of 3.9 fps and remain above the top of the dam about 1.5 hours.

Conclusions pertain to present day conditions. The effect of future development on the hydrology has not been considered.

SECTION 6

DAM STABILITY

6.1 Foundation and Abutment: There is no information available on the foundation conditions. The dam is located in the Piedmont geologic region of Virginia. A description of the area geology is presented in the Appendix III as part of the Field Observations. It is unknown if the dam is keyed into the foundation or whether or not there is a drainage system. There are no foundation drain outlets. The predominate foundation materials are relatively impervious, stable, fine grained alluvial soils.

6.2 Embankment:

6.2.1 Material: There is no information available on the nature of the embankment materials. The only known information is that the borrow area was located in the reservoir area. The area soils are alluvial, micaceous, high plastic silts.

6.2.2 Stability: There are no available stability calculations. The dam is 39 feet high and 34 feet wide. A paved secondary road traverses the crest of the dam. The upstream slope is 2H:1V with a wooden bulkhead and riprap at normal pool. The downstream slope is 2H:1V. The dam is subjected to a sudden drawdown because the approximate reservoir drawdown rate of 1.3 feet per day exceeds the critical rate of 0.5 feet per day for earth dams. The existing pool is approximately 2 feet below maximum control storage pool which is at the crest of the principal spillway. The dam has experienced the maximum control storage pool with no apparent side effects.

According to the guidelines presented in Design of Small Dams, U. S. Department of the Interior, Bureau of Reclamation for small homogeneous dams, with a stable foundation, subjected to a drawdown, and composed of high plastic fines (CH, MH), the recommended slopes are 4.5H:1V upstream and 2.5H:1V downstream. The recommended width is 18 feet. Based on these guidelines, the dam has inadequate slopes and a width nearly twice as wide as the recommended width.

6.2.3 Seismic Stability: The dam is located in Seismic Zone 2. Therefore, according to the Recommended Guidelines for Safety Inspection of Dams, the dam is considered to have no hazard from earthquakes provided static stability conditions are satisfactory and conventional safety margins exist.

6.3 Evaluation: There is insufficient information to adequately evaluate the stability of the dam. However, the visual inspection revealed no apparent instability. Based on the visual inspection, the foundation is considered sound. Based on the Bureau of Reclamation guidelines, the slopes are inadequate, but the width is nearly twice the recommended width. The embankment is considered stable during normal pool operations due to its massive width despite possible inadequate slopes. Also, the embankment is considered stable during maximum storage pool operations because it is the same as normal pool. In addition, overtopping is not a problem because flows are shallow, last 1.5 hours, and the velocity is less than 6 fps, the effective eroding velocity for a vegetated earth embankment. Stability calculations are not required, because of past performance apparent by the visual inspection and the stabilizing effect of the massive width.

SECTION 7

ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment: The available engineering data is inadequate. The visual inspection revealed no findings that proved the dam to be unsound. There is a regular maintenance operations program. However, there is no emergency operation and warning plan. Overall, the dam is in good condition and there is no immediate need for remedial measures. Corps guidelines indicate the appropriate Spillway Design Flood (SDF) for an small size and significant hazard dam is the 1/2 PMF. The spillway will pass 33 percent of the PMF without overtopping the dam. The combined capacity of the spillways is adjudged inadequate but not seriously inadequate. Flows overtopping the dam during the SDF are not considered detrimental to the embankment. A stability check of the dam is not required.

7.2 Recommended Remedial Measures: It is recommended that the regular maintenance operation program be documented for future reference. A formal emergency procedure should be prepared and furnished to all operating personnel. This should include how to operate the dam during an emergency, and who to notify including public officials, in case evacuation from the downstream area is necessary. Also, the inspection revealed the following maintenance items that should be scheduled by the owner during a regular maintenance period within the next 12 months:

a. The trees on both slopes should be cut down and have the root structures removed. Subsequent holes should be regraded, dressed with compacted fill, and seeded.

b. Trees and shrubs within 100 yards of the embankment in the channel downstream of the drawdown outlet works and in the channel downstream of the principal spillway, and vegetation in the approach channel of the emergency spillway should be cut to the ground.

c. A continuous program to control vegetative growth in the spillway channels and on the embankment should be instituted as part of a regular maintenance program.

d. The bare spot noted on Plate II should be reseeded.

e. The animal burrow, noted on Plate II, should be backfilled with compacted fill and seeded.

f. The wet spot noted on Plate II should be monitored for seepage or boils during a regular maintenance program. Should seepage occur, a professional geotechnical engineer should be consulted.

g. The eroded areas on the right upstream and downstream abutment contact should be dressed with compacted fill and seeded. The semicircular pipe should be extended all the way down the slope and 10 feet downstream away from the embankment toe to protect the slope from collected runoff.

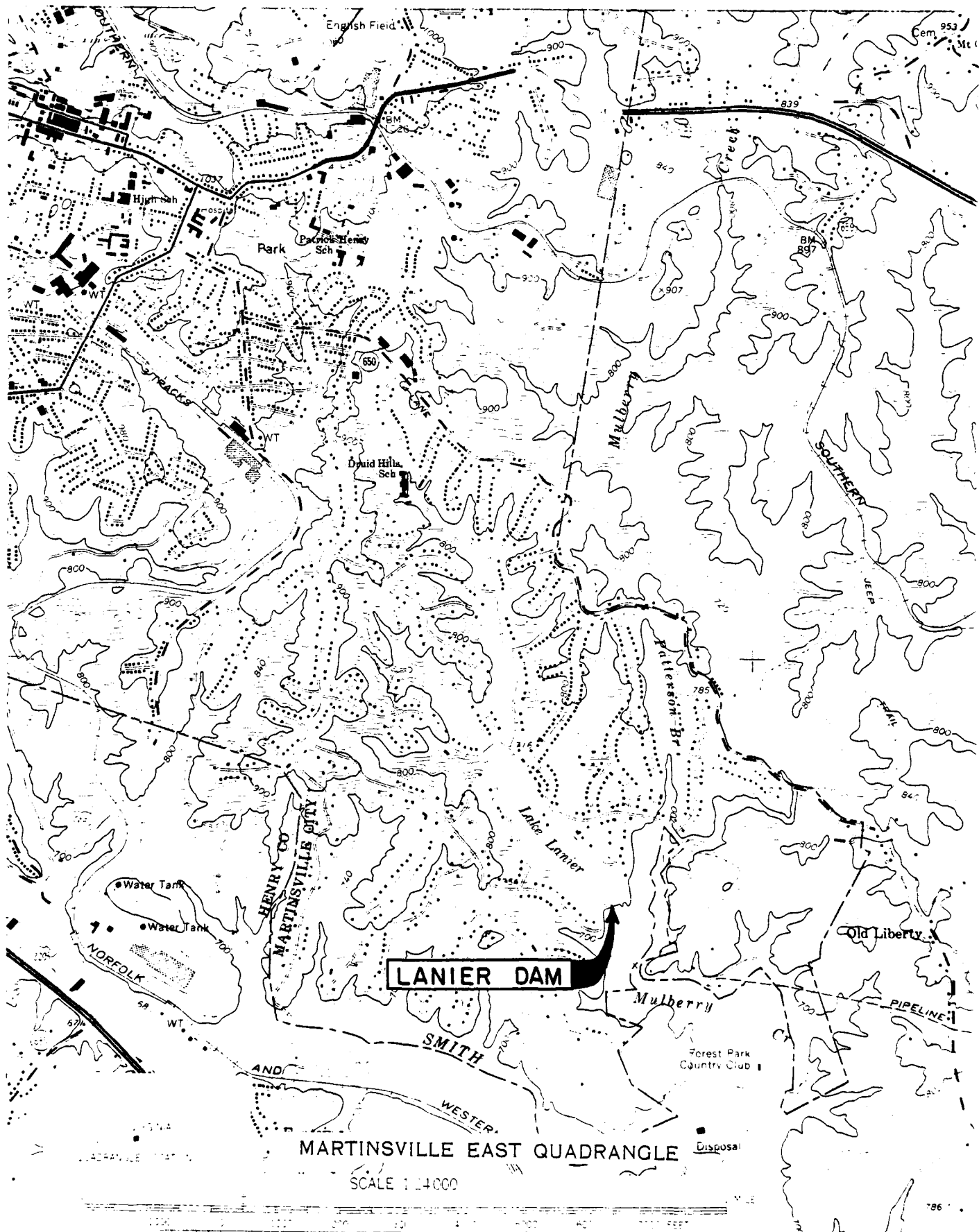
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k. A staff gage should be installed in the reservoir to extend above the top of the dam.

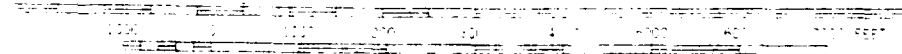
APPENDIX I
MAPS AND DRAWINGS



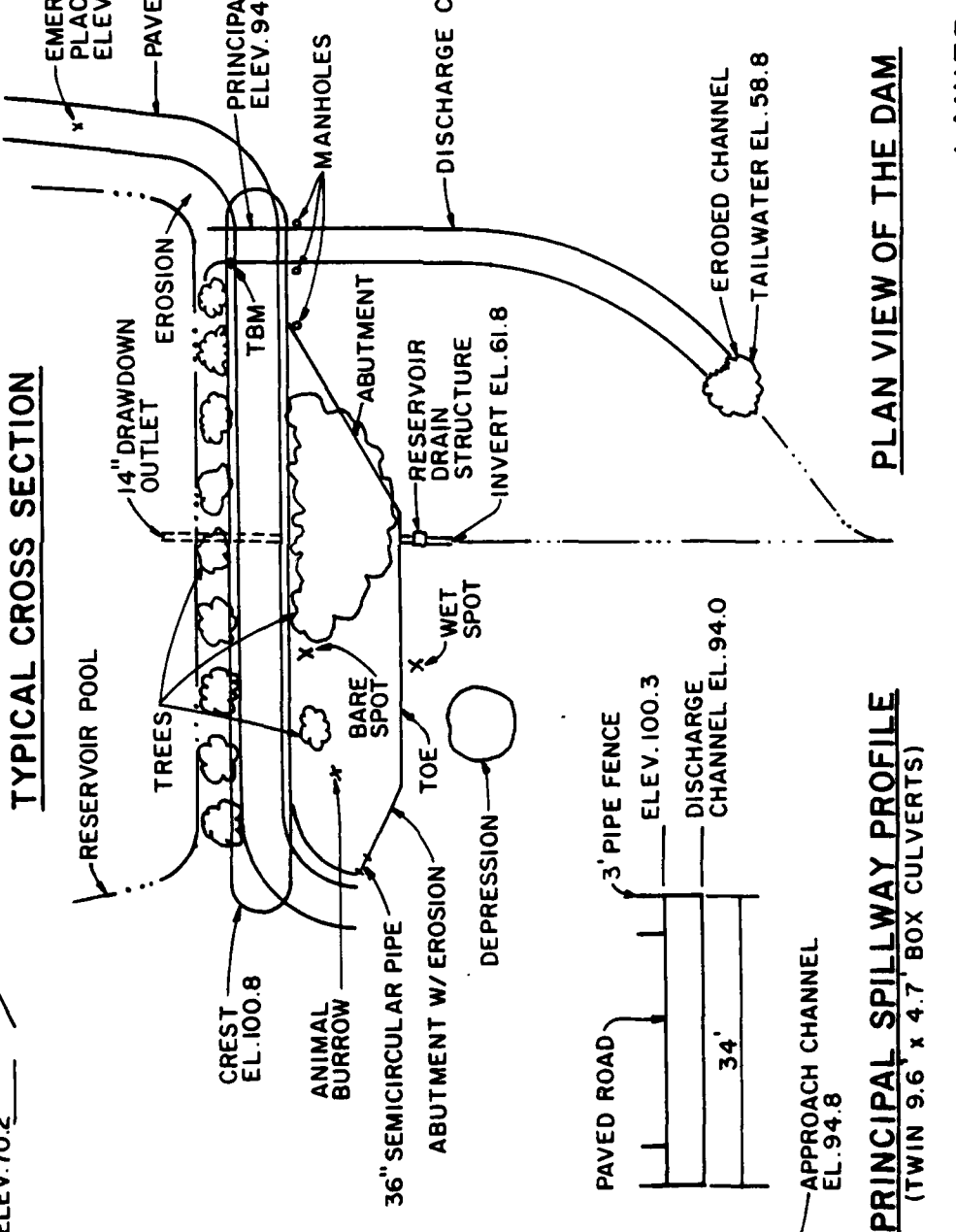
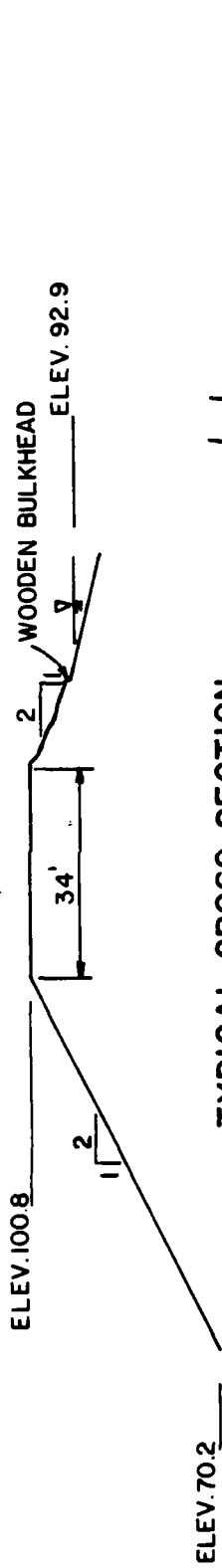
LANIER DAM

MARTINSVILLE EAST QUADRANGLE

SCALE 1:24,000



978



PRINCIPAL SPILLWAY PROFILE
(TWIN 9.6' x 4.7' BOX CULVERTS)

NOTES:
1. SKETCH MADE FROM FIELD NOTES.
2. ELEVATIONS BASED ON TBM AT 100.0 FT. TBM LOCATED AT EDGE OF CONCRETE AT SPOT NOTED ON THIS SKETCH

LANIER DAM
HENRY COUNTY, VA.
12 DEC. 1979
NOT TO SCALE
PLATE II

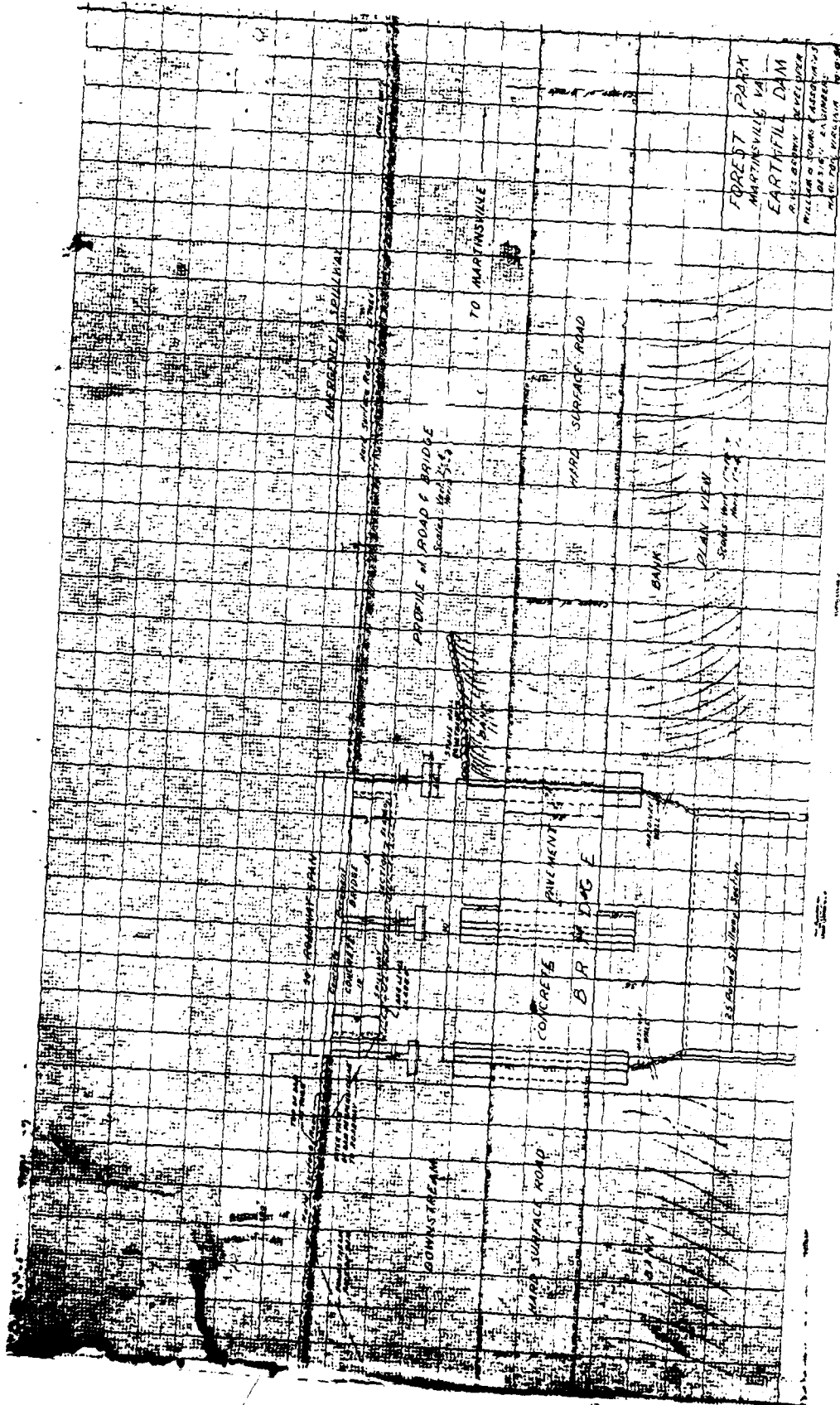


PLATE III

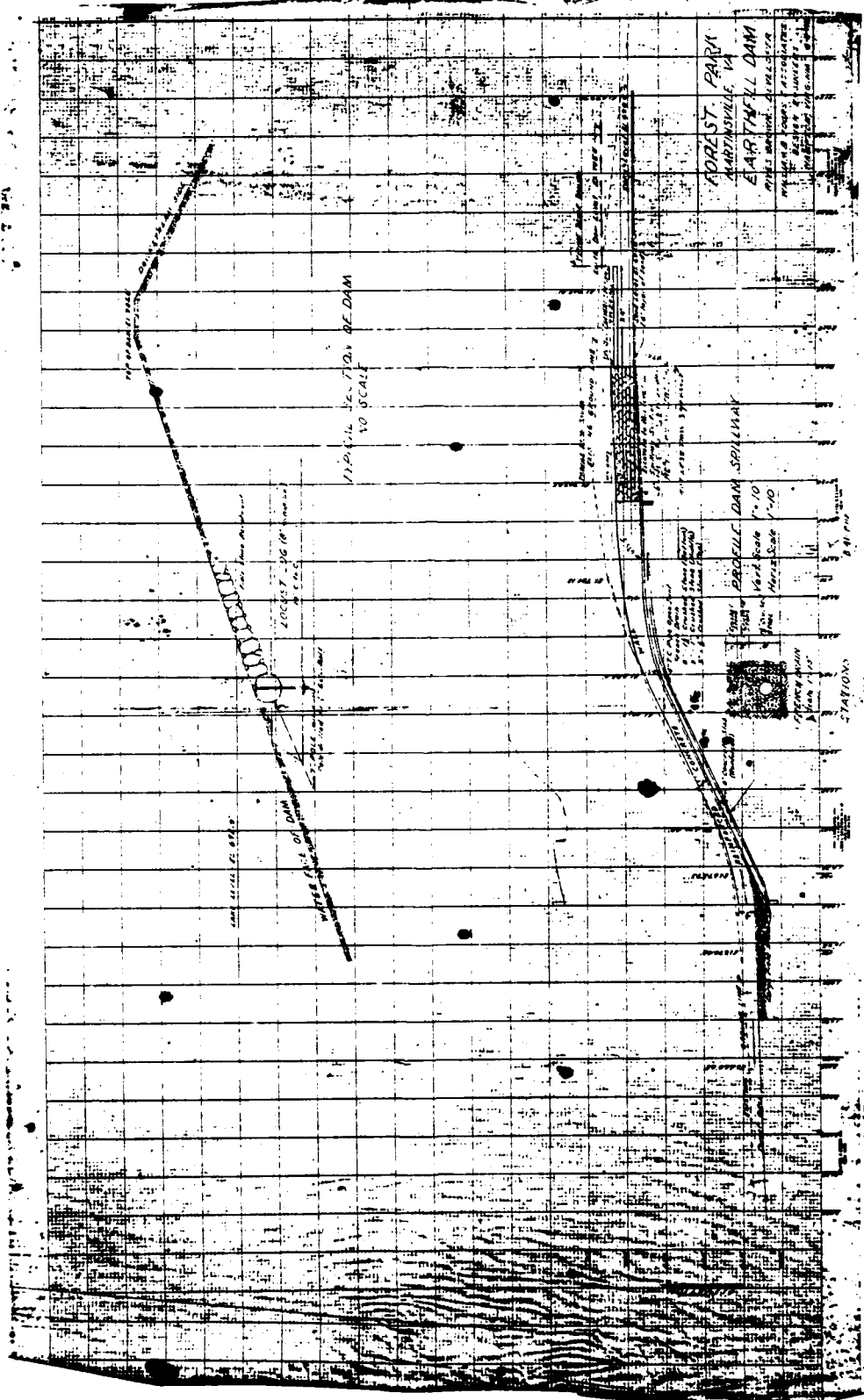


PLATE IV

APPENDIX II
PHOTOGRAPHS



PHOTO #1: VIEW OF UPSTREAM SLOPE

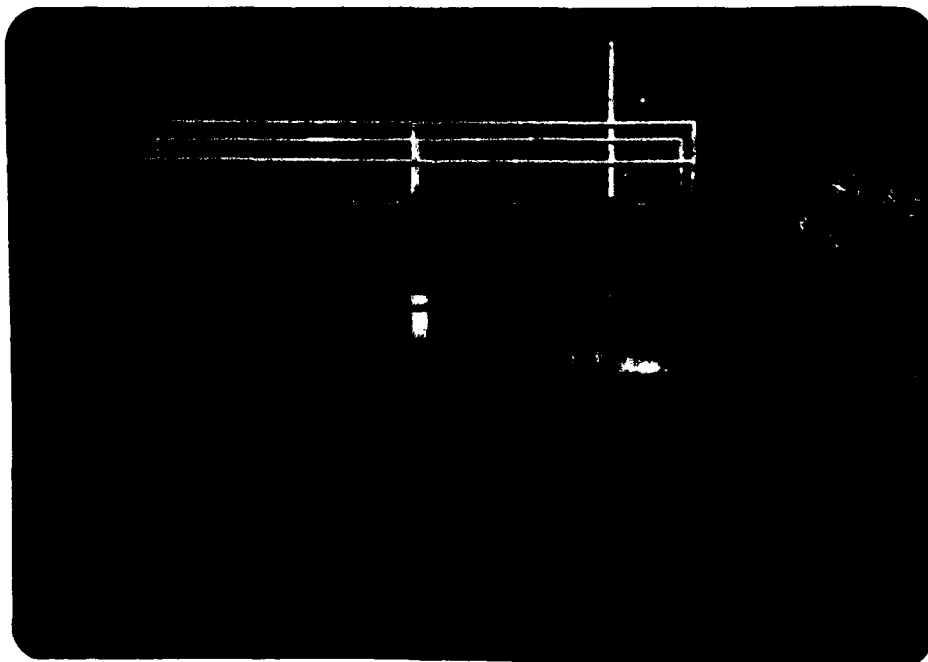


PHOTO #2: PRINCIPAL SPILLWAY



PHOTO #3: EROSION AT CONTACT OF RT.
ABUTMENT AND EMBANKMENT



PHOTO #4: ANIMAL BURROW ON DOWNSTREAM
SLOPE

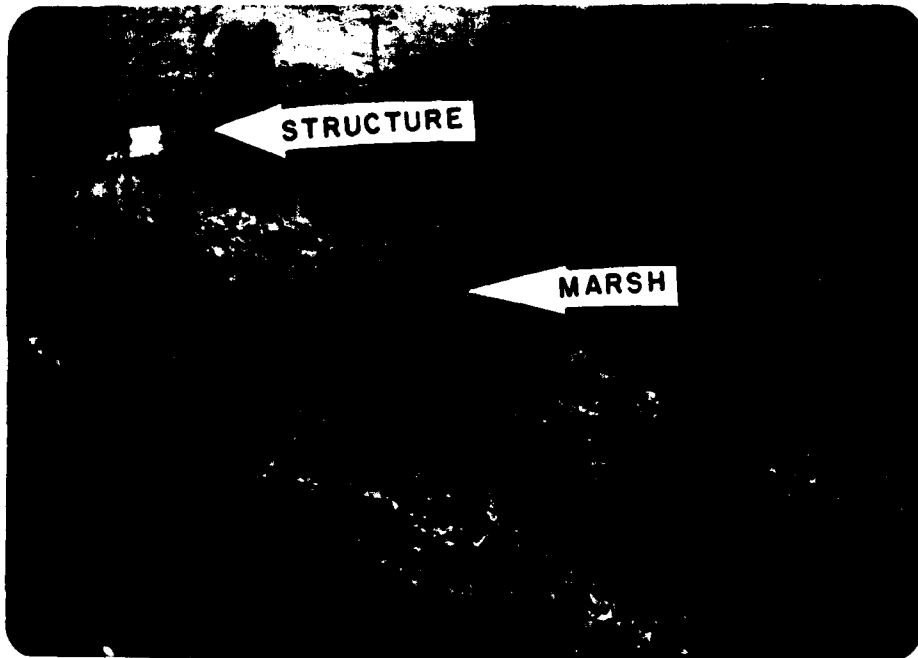


PHOTO # 5 : RESERVOIR DRAIN STRUCTURE
& WET MARSHY AREA AT TOE



PHOTO # 6 : HABITABLE STRUCTURE DOWNSTREAM
OF DAM



PHOTO # 7 : PRINCIPAL SPILLWAY
DISCHARGE CHANNEL

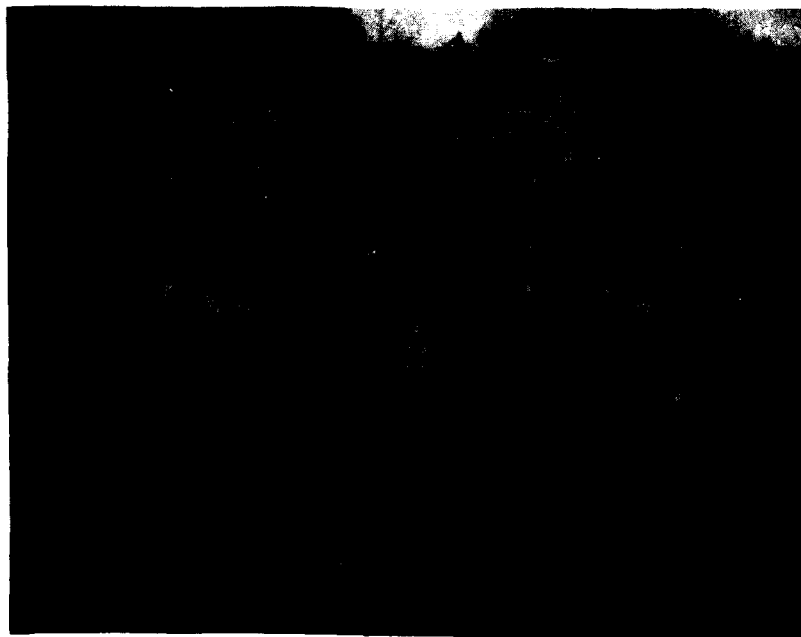


PHOTO # 8 : EXTENSIVE EROSION / DETERIORATION
OF D/S END OF PRINCIPAL SPILLWAY

APPENDIX III
FIELD OBSERVATIONS

Check List
Visual Inspection
Phase I

Name Dam: Lake Lanier County: Henry State: VA Coordinates: Lat 7950.4
Long 3639.4

Dates of Inspection: 12 Dec 79 Weather: Sunny & Clear Temperature: 64° F.

Pool Elevation at Time of Inspection: 92.9 T.B.M. Tailwater at Time of Inspection: 58.8 T.B.M.

Inspection Personnel:

J. Swean, COE
J. Robinson, COE
B. Taran, COE

D. Pezza, COE
H. Gildea, SWCB

D. Bushman, SWCB
H. Wall, Owner Rep.
J. C. Dodge, Owner Rep.

Pezza & Robinson Recorders

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	<p>There are no cracks on the dam. The crest of the dam serves as a paved secondary road. The one soils are generally classified as alluvial, micaceous, high plastic silts. There are trees on portions of the embankment. All along the upstream slope, there are planted white pine up to 18 inches in diameter. Portions of the downstream slope are vegetated with wild yellow pine and cedar up to 12 inches in diameter. Also there is a bare spot and an animal burrow on the downstream slope as located on the Plate II. The rest of the embankment is vegetated with grass or brush.</p>	<p>The trees on both slopes should be cut down and have the root structures removed. Subsequent holes should be regraded, dressed with compacted fill, and seeded. The bare spot should be reseeded. The animal burrow should be back-filled with compacted fill and seeded.</p>
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	<p>There is no unusual movement cracking at or beyond the toe. There is a wet spot in the downstream area at the toe of the embankment as located in Plate I. Also, about 50 feet downstream of the toe there is a 30' x 50' x 4' deep pit as located in Plate II. The pit appears to be an old excavation and serves as a sump for surface runoff. The area just downstream of the pit is very muddy and supports swamp like vegetation.</p>	<p>The wet spot should be monitored for seepage or boils during periodic inspections. Should seepage occur a professional geotechnical engineer should be consulted.</p>
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	<p>There is surface erosion of the upstream abutment probably due to pedestrian traffic and aggravated by surface runoff. Also, on the downstream right abutment there is a 36-inch CMP semicircular pipe serving as a liner for a drainage ditch. The pipe extends only 14.5 feet down the 41 foot long abutment. There is some erosion at the abutment contact. Any flow through the ditch will encourage erosion along the unprotected abutment contact.</p>	<p>The eroded areas in the right upstream and downstream abutment contact should be dressed with compacted fill and seeded. The semicircular pipe should be extended all the way down the slope and 10 feet downstream. away from the embankment toe to protect the slope from collected runoff.</p>

EMBANKMENT (Cont.)

VISUAL EXAMINATION OF VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
	There are no drawings with which to compare the alignment. However, the alignments show no signs of movement. The top of the dam serves as a paved secondary road.	None.
RIPRAP FAILURES	The upstream slope is protected with concrete rubble riprap. Also at normal pool elevation there is a deteriorated wooden bulkhead with an anchor system tied into the embankment.	None.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Aside from the erosion previously noted, there are no other problems associated with the embankment abutment junctions. See attached sheet for a description of the area geology.	None.
ANY NOTICEABLE SEEPAGE	There is no noticeable seepage.	None.
DRAINS	There are no known drains. The available drawings indicate the twin box culvert has a french drain. There is no evidence in the field of the french drain.	None.

AREA GEOLOGY

Lake Lanier Dam is located within the Piedmont physiographic province of Virginia which is underlain primarily by metamorphic and igneous rocks. The rocks range from Precambrian to Triassic in age. Specifically, the site occupies part of a wide valley surrounded by subdued ridges which is characteristic of the topography in the inner Piedmont physiographic province.

Two major geologic structures in the area of the dam are the Smith River allochthon, a large mass of rocks which has been moved from its site of origin by tectonic forces; and the Ridgeway Fault, a northeastward-trending, northwestward dipping, thrust fault. Lake Lanier is located within the allochthon and 2-3 miles northwest of Ridgeway Fault.

The bedrock in the area of the dam consists principally of norite diorite and gabbro (Rich Acres Formation of Precambrian Age). A small bedrock outcrop exposed in the downstream creek channel revealed the presence of a dark gray medium grained diorite. The bedrock is overlain by alluvium deposits consisting of red silt and sands containing cobbles at the base. The alluvium deposits are overlain by a shallow soil zone rich in organic material. Saprolite or soft, clay-rich thoroughly decomposed, but untransported rock found in place was observed at the end of the spillway. Geologic literature describes the presence of saprolite throughout the Martinsville region.

DRAWDOWN OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	No cracking or spalling are noted. The 14-inch diameter concrete outlet pipe has a 15-inch diameter extension about 2 feet long at the discharge end of the outlet.	None.
INTAKE STRUCTURE	The intake structure is submerged and not observable. The pool was about two feet below normal.	None.
OUTLET STRUCTURE	A tin shed, identified as a reservoir drain structure, covers the valve used to operate the 14-inch outlet. The valve appears to be in good condition. It is reported that the valve was operated very recently to lower the pool level. The valve is located about 15 feet upstream of the pipes outlet.	The shed is not locked, therefore, easy access for anyone. It should be locked and protected from vandals.
OUTLET CHANNEL	The outlet channel is two to four feet wide and one to two feet deep with trees and shrubs lining the entire channel. The immediate downstream area is flat and susceptible to flooding during discharges at the outlet.	The trees and shrubs in the channel should be cut during regular maintenance procedures.

EMERGENCY SPILLWAY

VISUAL EXAMINATION OF APPROACH CHANNEL	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
	<p>The approach channel is a slight cut in natural ground on the left side of the dam. There are some planted shrubs in the channel.</p>	<p>The shrubs would inhibit flow and should be cut down to the ground.</p>
<p>DISCHARGE CHANNEL</p>	<p>A paved secondary road traverses the length of the control section. The discharge channel is a sharp drop from the road onto a golf course. There are several trees in the channel. The growth should have little effect on flows since the channel is steep at this point.</p>	<p>None.</p>

PRINCIPAL SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The concrete weir is in good shape. A trash rack is wedged open by debris preventing effective usage. A secondary road and bridge traverse the spillway.	Clear the debris that is wedged in the trash rack.
APPROACH CHANNEL	The approach channel is comprised of riprap placed approximately 25 feet upstream of the spillway.	None.
DISCHARGE CHANNEL	The discharge channel is a concrete-chute that allows rapid discharges and channels the flows approximately 250 feet to the downstream channel. The last 12 feet of the discharge channel is collapsed and a large hole 50 feet by 30 feet and 12 feet deep has developed. The chute has spalling and cracking that allows flows to seep and undermine the discharge channel. Trees and shrubs are growing in the downstream channel.	Corrective measures should be taken to restore the discharge channel and prevent further deterioration. The concrete in the discharge channel should be restored to prevent further collapse of the channel. The trees and shrubs within 100 yards of the embankment should be cleared out by cutting them to the ground.
BRIDGE AND PIERS	The secondary road and bridge appear to be in good condition.	None.

INSTRUMENTATION

VISUAL EXAMINATION OF MONUMENTATION/SURVEYS	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
	There are no known monuments in the immediate area.	None.
OBSERVATION WELLS	There are no wells.	None.
WEIRS	There are no weirs.	None.
PIEZOMETERS	There are no piezometers.	None.
STAFFGAGES	There are no staffgages.	A staffgage should be installed in the reservoir.

RESERVOIR

<u>VISUAL EXAMINATION OF SLOPES</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
	<p>The reservoir slopes are mild with several homes and manicured lawns located around the perimeter of the pool. There are no signs of reservoir slope failures or shoreline erosion.</p>	<p>None.</p>
<p><u>SEDIMENTATION</u></p>	<p>Sedimentation has been a problem for years. The reservoir was dredged once before and plans are being made for another dredging. The pool level in the reservoir was recently lowered to observe sedimentation. There was some sediment noted at that time in the upper reach of the reservoir.</p>	<p>None.</p>

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
	Some trees and shrubs are growing in the channel immediately below the dam.	The trees and shrubs should be cut to the ground.
SLOPES	The slopes surrounding the downstream channel vary from mild to steep in some areas and flat in other areas.	None.
APPROXIMATE NO. OF HOMES AND POPULATION	One home is located about 200 yards below the right side of the dam. A golf course is located directly below the left side of the dam.	None.

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	The owner representatives provided design drawings of the dam. However, the drawings differentiate to what exists in the field and are not considered to be a fair representation of the site.
REGIONAL VICINITY MAP	There is no other regional vicinity map other than the USGS Martinville East Quadrangle map.
CONSTRUCTION HISTORY	There is no written record of the dam construction.
TYPICAL SECTIONS OF DAM	See the comment provided for the "Plan of Dam".
HYDROLOGIC/HYDRAULIC DATA	There are no data.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See the comment provided for the "Plan of Dam".
RAINFALL/RESERVOIR RECORDS	There are no records.
DESIGN REPORTS	There are no reports.
GEOLOGY REPORTS	There are no reports.

ITEM	REMARKS
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DATA DAM STABILITY SEEPAGE STUDIES	There are no computations or studies.
POST-CONSTRUCTION SURVEYS OF DAM	There are no known post-construction surveys.
MATERIAL INVESTIGATIONS BORING RECORDS LABORATORY TEST FIELD TEST	There are no investigation and boring records, or laboratory and field test results.
BORROW SOURCES	The only known information is that the borrow area was located in the reservoir area.
SPILLWAY PLAN SECTIONS DETAILS	See the comment provided for the "Plan of Dam".
OPERATING EQUIPMENT PLANS & DETAILS	See the comment provided for the "Plan of Dam".
MONITORING SYSTEMS	There is no information pertaining to monitoring systems.
MODIFICATIONS	There are no records pertaining to modifications.
HIGH POOL RECORDS	There are no high pool records.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	There are no known studies or reports.

ITEM

REMARKS

PRIOR ACCIDENTS OR
FAILURE OF DAM
DESCRIPTION
REPORTS

There are no known past accidents or failures.

MAINTENANCE OPERATION
RECORDS

There are no maintenance-operation records.

APPENDIX IV

REFERENCES

APPENDIX IV

REFERENCES

1. Recommended Guidelines for Safety Inspection of Dams, Office of the Chief of Engineers, Department of the Army, Washington, D. C.
2. HEC-1DB Flood Hydrograph Package, (Hydrologic Engineering Center, U. S. Army Corps of Engineers, September 1978.)
3. "Probable Maximum Precipitation Estimates, United States East of the 105th Meridian," Hydrometeorological Report No. 51, (U. S. Weather Bureau, June 1978).
4. "Rainfall Frequency Atlas of the United States", Technical Paper No. 40, (U.S. Weather Bureau, May 1961).