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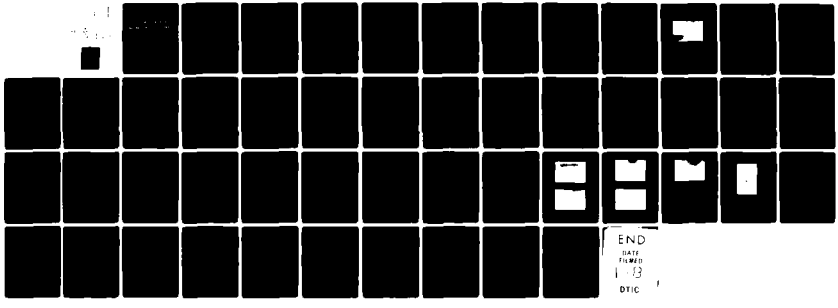

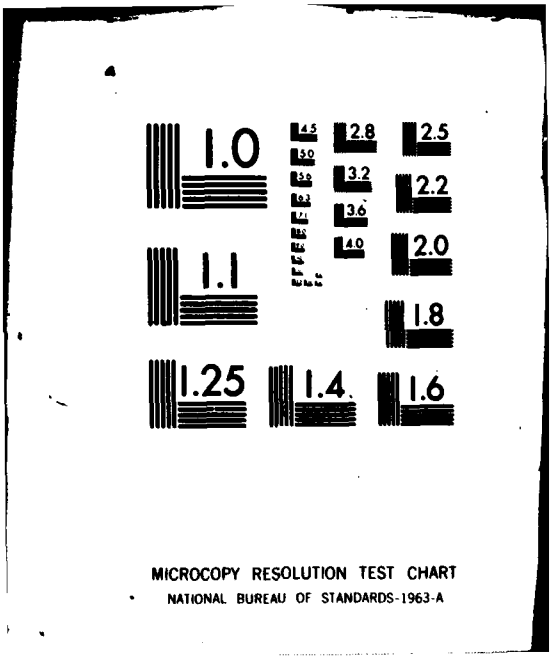
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POTOMAC RIVER BASIN

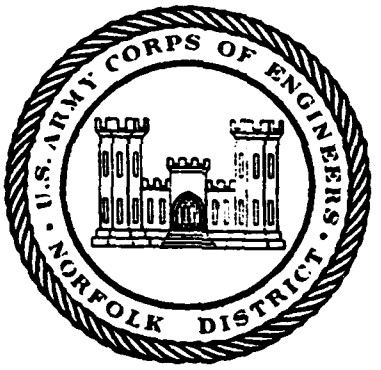
Name Of Dam: LOWER WALLACE DAM

Location: AUGUSTA COUNTY, VIRGINIA

Inventory Number: VA. NO. 01527

LEVEL II

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



PREPARED FOR

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

BY

SCHNABEL ENGINEERING ASSOCIATES, P.C./
J. K. TIMMONS AND ASSOCIATES, INC.

JULY 1980

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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 or 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 an assessment including required remedial measures.

POTOMAC RIVER BASIN

NAME OF DAM: LOWER WALLACE DAM
LOCATION: AUGUSTA COUNTY, VIRGINIA
INVENTORY NUMBER: VA. NO. 01527

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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

BY

SCHNABEL ENGINEERING ASSOCIATES, P.C./
J. K. TIMMONS AND ASSOCIATES, INC.

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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 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 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 Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test 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.

Name of Dam: Lower Wallace Dam
State: Virginia
County: Augusta
USGS Quad Sheet: Greenville
Coordinates: Lat 38° 0.3' Long 79° 08.2'
Stream: Poor Creek
Date of Inspection: April 16, 1980

BRIEF ASSESSMENT OF DAM

Lower Wallace Dam is a homogeneous earthfill structure about 450 ft long and 25 ft high. The principal spillway consists of a 15 inch diameter corrugated metal pipe (CMP) riser and outlet pipe which extends through the structure. A secondary spillway consists of a CMP and a square inlet box which is located at the right abutment approximately 0.5 feet above the crest of the riser inlet. A 43 ft wide emergency spillway is located at the left abutment approximately 4 ft above normal pool. The dam is located on Poor Creek approximately one mile east of Greenville, Virginia. The lake is for recreational purposes and is owned and maintained by Mr. Gregory Chandler.

Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the appropriate Spillway Design Flood (SDF) is the ½ PMF. The spillway will pass 15 percent of the Probable Maximum Flood (PMF) or 30 percent of the SDF. During the SDF the Dam will be overtopped by a maximum of 1.7 ft for a period of 5 hours at a maximum velocity of 5.8 fps. The spillway is judged inadequate but not seriously inadequate.

An evaluation of the stability condition could not be made since there is no design or construction data for this structure.

The visual inspection revealed the presence of widespread seepage along the downstream slope.

The following remedial measures should be implemented within one year of the date of this report:

1) The Owner should engage the services of a qualified Professional Geotechnical Engineer to perform the necessary subsurface investigation and stability analysis to evaluate the stability of the dam and modify as necessary. The effect of the seepage observed along the downstream slope should also be assessed.

2) An emergency action plan should be developed to warn downstream dwellings of any dangers which may be imminent.

The following routine maintenance and observation functions should be initiated:

1) The widespread seepage observed along the downstream slope should be monitored quarterly and after periods of high pool levels to detect any increase in flow rates which may cause piping within the embankment.

2) The debris rack on the principal spillway should be repaired.

3) Vegetation should be routinely controlled. The slopes and crest of the structure and the emergency spillway should be mowed at least once per year and all existing small trees or saplings cut to the ground.

(4) Bare areas in the emergency spillway and along the left spillway slope should be reseeded in order to minimize surface erosion.

(5) Groundhog burrowing in the embankment should be backfilled.

(6) A staff gage should be installed to monitor water levels.

Prepared by:

SCHNABEL ENGINEERING ASSOCIATES, P.C./
J. K. TIMMONS & ASSOCIATES, INC.

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for Jack G. Starr, P. E., R. A.
Chief, Engineering Division

Date: JUL 22 1980

OVERVIEW PHOTOGRAPH

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LOWER WALLACE DAM
VA. NO. 01527

SECTION I - 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 (see 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: Lower Wallace Dam is a homogeneous earthfill structure approximately 450 ft long and 25 ft high.* The top of the dam is 18 ft wide. Side slopes are approximately 1.5 horizontal to 1 vertical (1.5:1) on the upstream face and 1.5:1 on the downstream face of the dam. The top of the dam is at elevation 1560.5 msl. (See Plate No. 2, Appendix I).

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* Height is measured from the top of the dam to the downstream toe at centerline of the stream.

A shallow cutoff trench was constructed beneath the embankment; however, it is not known whether there is a drainage system. There are no foundation drain outlets. The embankment slopes are protected with a vegetative cover.

The principal spillway consists of a 15 inch diameter CMP riser inlet which is connected to a 15 inch diameter CMP outlet which runs through the dam. The riser crest is at elevation 1553 msl. The outlet pipe has an approximate length of 200 ft with an invert elevation at the outlet structure of 1537 msl. A 24 inch diameter CMP with a 38 inch square inlet box at a top elevation of 1553.5 msl is used as a secondary spillway. It is located at the right abutment and the outlet channel is cut into the right downstream slope.

An emergency spillway is located at the left abutment with a crest elevation of 1557 msl. The emergency spillway is a 43 ft wide, trapezoidal earthen channel and has 2H:1V side slopes.

1.2.2 Location: Lower Wallace Dam is located on Poor Creek approximately one mile east of Greenville, Virginia. (See Plate No. 1, Appendix I).

1.2.3 Size Classification: The dam is classified as a "small" size structure because of the height of the dam.

1.2.4 Hazard Classification: The dam is located in a rural area; however, based upon the downstream proximity of several homes located several miles downstream, the dam is assigned a "significant" hazard classification. The hazard classification used to catergorize a dam is a function of location only and has nothing to do with its stability or probability of failure.

1.2.5 Ownership: Mr. Gregory Chandler, Route 662, Greenville, Virginia, 24440 owns and operates the dam.

1.2.6 Purpose: Recreation.

1.2.7 Design and Construction History: The dam was designed and constructed under the supervision of the previous owner, Mr. Hal M. Wallace, Staunton, Virginia. The structure was constructed by Omen Construction Company and completed in either 1967 or 1968.

1.2.8 Normal Operational Procedures: The principal spillway is ungated; therefore, water rising above the crest of the riser inlet automatically is discharged downstream. Normal pool is maintained at elevation 1553 msl at the crest of the riser. Flood discharges which cannot be absorbed by storage and the 15 inch and 24 inch outlets will flow through the emergency spillway at pool elevations above 1557 msl.

1.3 Pertinent Data:

1.3.1 Drainage Areas: The drainage area is 3.84 square miles.

1.3.2 Discharge at Dam Site: Maximum known flood at the dam site occurred in April 1977. The pool elevation was not observed.

Principal Spillways Discharge:

Pool Elevation at Crest of Dam (elev 1560.5)	71 CFS

Emergency Spillway Discharge:

Pool Elevation at Crest of Dam (elev 1560.5)	1244 CFS

1.3.3 Dam and Reservoir Data: See Table 1.1, below:

Table 1.1 DAM AND RESERVOIR DATA

Item	Reservoir				
		Storage			
	Elevation feet msl	Area Acres	Volume Acre Feet	Watershed Inches	Length Miles
Crest of Dam	1560.5	13	200	.98	.35
Emergency Spillway Crest	1557	12	140	.68	.3
Principal Spillway Crests					
24" Pipe	1554	11.2	83	.41	.3
15" Pipe	1553	11	64	.31	.3
Streambed at Downstream Toe of Dam	1535.5				

SECTION 2 - ENGINEERING DATA

2.1 Design: There is no design data available.

2.2 Construction: No construction records are available. The dam was reportedly constructed in a 1 to 1½ day period in 1967 or 1968 under the full time direction of Mr. Hal M. Wallace, Jr. (former owner). The dam was constructed by Omen Construction Company, who was at that time working on the nearby Interstate 81 project. According to Mr. Wallace a core trench was excavated to a depth of 2 ft±. The dam was constructed as a homogeneous structure with clay materials. Fill was placed in 3 to 4 ft lifts and compacted with loaded pans. Compaction around concrete works was reportedly by "wetting" or water placement.

2.3 Evaluation: There is insufficient information to evaluate foundation conditions and embankment stability.

SECTION 3 - VISUAL INSPECTION

3.1 Findings: At the time of inspection, the dam was in fair condition. Field observations are outlined in Appendix III.

3.1.1 General: An inspection was made 16 April, 1980 and the weather was cloudy and windy, with a temperature of 39° F. The pool and tailwater levels at the time of inspection were 1553 and 1538 msl, respectively, which correspond to normal levels. Ground conditions were damp at the time of the inspection. No previous reports were available.

3.1.2 Dam and Spillway: Approximately the upper half to two-thirds of the downstream slope and most of the upstream slope were thickly vegetated with honeysuckle. The thick vegetative cover made the inspection difficult. Most of the emergency spillway was unvegetated, particularly the left side channel as shown on Photograph No. 5, Appendix II. Considerable seepage and heavy iron staining were observed along the downstream toe. The first seepage area was located 15 ft± left of the outlet pipe and consisted of a water saturated area approximately 100 ft long and 25 ft wide. The top of this area was 2 ft± above the top of the outlet pipe. The second area consisted of another water saturated area beginning 10 ft± right of the outfall pipe and extending 75 ft± toward the right abutment. This area was 25 to 30 ft wide and extended upslope approximately 3 ft above the top of pipe. No flow was observed in either of the seepage areas. The field sketch presented in Appendix III illustrates the areas described.

The extremely thick vegetative cover hindered visual inspection. The downstream slope (1.5H to 1.8H:1V) had a slightly undulating surface and included shallow erosion gullies usually less than 1 ft deep. No erosion was observed on the steep (1.5H:1V) upstream slope. One groundhog hole was encountered 10 ft± below the crest on the downstream slope, 90 ft± right of the emergency spillway.

No bedrock was observed at the site. Both abutments tie into alluvial/colluvial materials consisting of red to brown mixtures of sand, silt, and silty clayey sands with variable amounts of gravel (SM to SC). The emergency spillway (left abutment) appears to be cut into residual silty clay (CL). Local geology appears to consist of alluvial/colluvial soils overlying residual limestone clays and silty clays. No faults were encountered during the inspection.

The intake structure was submerged and not visible, however, the debris collector appeared to be dislocated. The 15 inch CMP outlet was submerged and the 24 inch CMP outlet showed no signs of deterioration. Riprap in the outlet pool was intact. There was no staff gage.

3.1.3 Reservoir Area: The reservoir area was free of debris and the perimeter was wooded. The reservoir is located in a valley with side slopes at approximately 2:1. No sediment buildup was observed.

3.1.4 Downstream Area: The downstream channel consists of a 3 ft wide channel located in a heavily vegetated valley approximately 250 ft wide. The downstream valley has side slopes of approximately 3:1 and broadens in width where it joins the South River approximately ½ mile downstream. Approximately two miles

downstream there are several homes about 15 ft above the streambed.

3.1.5 Instrumentation: No instrumentation (monuments, observation wells, piezometers, etc.) was encountered for the structure.

3.2 Evaluation:

3.2.1 Dam and Spillway: Overall, the dam was in fair condition at the time of inspection. It is recommended that a routine maintenance program be initiated. The embankment, including its crest and slopes should be mowed at least once a year, but more preferably twice a year. Small trees should not be allowed to grow on the embankment and should be cut to the ground as they appear.

The two iron-stained saturated areas encountered along the downstream slope represent seepage through the dam. No turbidity or flowing water was noted during the inspection. Although the seepage did not appear to hinder the normal functioning of the dam, it is of concern. It is recommended that the seepage along the downstream slope be monitored quarterly to detect any increase in flow rates which may cause piping within the embankment. If increased flows should occur, a Professional Engineer with expertise in Geotechnical Engineering should be contacted to evaluate the problem and make recommendations for required corrective measures.

The minor embankment erosion observed does not require any attention at this time. The groundhog hole does not presently create an unsafe condition, however, future burrowing can result in numerous voids in the embankment which could be potentially hazardous under certain conditions. It is recommended that the

existing burrow and any future burrowing be backfilled.
The outlet pipe and intake structure could not be observed. The secondary intake structure and the emergency spillway are in good condition. Bare areas in the emergency spillway and along the left slope should be reseeded in an attempt to minimize surface erosion.

A staff gage should be installed to monitor pool elevations.

3.2.2 Downstream Area: A breach in the Lower Wallace Dam during periods of peak flooding could present a hazard to the downstream dwelling.

SECTION 4 - OPERATIONS PROCEDURES

4.1 Procedures: Lower Wallace Lake is used for recreational purposes. The normal pool elevation (1553 msl) is maintained by a riser inlet acting as the principal spillway. Water automatically passes through the principal spillway as the pool level in the reservoir rises above the crest of the riser inlet. Water will likewise automatically pass the secondary and emergency spillways when the pool level exceeds their crests at elevations 1554 msl (secondary spillway) and 1557 msl (emergency spillway). There is no outlet available for draining down the lake below the riser inlet crest (elevation 1553 msl).

4.2 Maintenance of Dam and Appurtenances: Maintenance is the responsibility of the Owner. Maintenance consists of inspection, debris removal, mowing of the vegetative cover, and repair. There is no routine maintenance program. The operating appurtenances are reportedly in working order.

4.3 Warning System: No warning system exists.

4.4 Evaluation: The dam appurtenances are in good operating condition. Maintenance of the dam is inadequate. A routine maintenance program should be established and complete records of maintenance and inspections should be maintained 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 - HYDRAULICS/HYDROLOGIC DATA

5.1 Design: No hydraulic/hydrologic data is available.

5.2 Hydrologic Records: There are no records available.

5.3 Flood Experience: The maximum pool elevation occurred in April 1977.

5.4 Flood Potentials: 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. The Probable Maximum Flood (PMF), ½ PMF and 100 year flood hydrographs for areas below Upper Wallace Dam were developed by the SCS method (reference 4, Appendix IV). Precipitation amounts for the flood hydrographs of the PMF, and 100 year flood are taken from U. S. Weather Bureau Information (References 5 and 6, Appendix IV). Appropriate adjustments for basin size and shape were accounted for. Discharge data from Upper Wallace Dam was added to the local inflow hydrograph. These hydrographs were routed through the reservoir to determine maximum pool elevations.

5.5 Reservoir Regulations: For routing purposes, the pool at the beginning of flood was assumed to be at elevation 1553 msl. Reservoir stage - storage data and stage-discharge data were

determined from field measurements and USGS quadrangle sheets. Floods were routed through the reservoir using the principal spillway discharge up to a pool storage elevation of 1557 msl and a combined principal and emergency spillway discharge for pool elevations above 1557 msl.

5.6 Overtopping Potential: The predicted rise of the reservoir pool and other pertinent data were determined by routing the flood hydrographs through the reservoir as previously described. The results for the flood conditions (PMF, ½ PMF and 100 year flood) are shown in the following Table 5.1.

TABLE 5.1 RESERVOIR PERFORMANCE

		Hydrograph		
	Normal Flow	100 year	½ PMF	PMF
Peak Flow, CFS				
Inflow	3	199	5168	14,314
Outflow	3	84	5168	14,314
Maximum Pool Elevation Ft, msl	-	1557.1	1562.2	1564.9
Non-Overflow Section (Elev 1560.5 msl)				
Dept of Flow, Ft	-	-	1.7	4.4
Duration, Hours	-	-	5	8
Velocity, fps (a)	-	-	5.8	8.6
Emergency Spillway (Elev 1557 msl)				
Depthof Flow, Ft	-	-	5.2	7.9
Duration, Hours	-	-	27	27
Velocity, fps	-	-	14.7	16.5
Tailwater Elevation, Ft, msl	1536	1539	1541.5	1545.5

(a) Critical velocity at control section

5.7 Reservoir Emptying Potential: There is no way of lowering the lake below the riser inlet elevation.

5.8 Evaluation: The U. S. Army, Corps of Engineers, guidelines indicate the appropriate spillway design flood (SDF) for a small size significant hazard dam is the 100 year flood to ½ PMF. Because of the risk involved, the ½ PMF has been selected as the SDF. The spillway will pass 15 percent of the PMF (30% of the SDF). During the SDF the dam will be overtopped by a maximum of 1.7 ft for a period of 5 hours at a maximum velocity of 5.8 fps.

Hydrologic data used in the evaluation pertains to present day conditions with no consideration given to future development.

SECTION 6 - DAM STABILITY

6.1 Foundation and Abutments: The dam is located along the eastern edge of the Valley and Ridge Physiographic Province of Virginia. The impoundment and structure are underlain by the Conococheague Formation of upper Cambrian Age. This formation consists basically of bluish-gray limestone and light gray dolomite with interbedded thin sandstone. Overturned beds exposed west of the site, strike to the northeast and dip from 60 to 85 degrees to the southeast. No bedrock or faults were observed at the site. Alluvial or colluvial soils consisting of sands, silty sands and silty clayey sands (SM to SC) with variable amounts of gravel and boulders are exposed in the adjacent hillsides and abutments. Underlying residual silty clays (CL) are exposed in the emergency spillway.

Subsurface data is not available for the structure. A cutoff trench exists beneath the dam and is reported to be 2 ft deep. Based upon examination of surrounding hillsides and cuts, it would appear that the dam rests upon fine to coarse sands, silty sands and silty clayey sands with variable amounts of gravel and boulders ranging from low to medium permeability. These materials are alluvial and possibly colluvial in origin and their matrix would probably classify as SM to SC in accordance with the Unified Soils Classification System. Underlying residual soils probably consist of silty clays and clays possessing very low permeabilities.

Gradual consolidation of underlying soils would be expected during application of fill materials. The underlying soils probably had essentially fully consolidated under the applied load not long after completion of construction. Based upon the performance history of this dam, a stable foundation is assumed.

6.2. Embankment:

6.2.1 Materials: Other than verbal contact with Mr. Wallace there is no information available on the nature of the embankment materials. The dam was reportedly constructed as a homogeneous structure with clay materials. The surface of the embankment appears to be constructed with assorted combinations of sand, silt and silty clay ranging from SM to SC in composition and including an indeterminant amount of gravel and small boulders. Low to medium permeabilities are likely for these materials. The fill was reportedly placed in 3 to 4 ft thick lifts and compacted with loaded pans. Fill around concrete structures and pipe was compacted by application of water.

6.2.2 Subdrainage and Seepage: There is no known drainage system. No toe drain outlets were observed. Saturated or wet areas encountered along the downstream slope represent seepage through the dam.

6.2.3 Stability: There are no stability calculations for this structure. The dam is 25 ft high and has a crest width of about 18 ft. The upstream slope is approximately 1.5H:1V, while the downstream slope varies from about 1.5H:1V to 1.8H:1V.

Since the type materials used during construction cannot be confirmed visually, it is assumed the structure is homogeneous and constructed with SC to SM soils. The dam is not subjected to a rapid drawdown because of the inability to dewater the reservoir. According to the guidelines present in Design of Small Dams, U. S. Department of the Interior Bureau of Reclamation, for small homogeneous dams with a stable foundation, not subjected to rapid drawdown and composed of SC to SM materials, the recommended slopes range from 2H:1V to 2.5H:1V for the downstream and upstream slopes respectively. A crest width of about 15 ft is specified. Based upon existing slopes of 1.5H:1V for the upstream slope and 1.5H to 1.8H:1V for the downstream slope, both slopes are considered to be inadequate. The crest width is adequate based upon the above guidelines.

6.2.4 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: An accurate check on the stability of this structure cannot be made since there is no design and construction data. Foundation conditions are not known and the embankment slopes do not meet the requirements recommended by the U. S. Bureau of Reclamation for small homogeneous earthfill dams on stable foundation. Flows overtopping the dam during the SDF are not considered detrimental.

the embankment with respect to erosion, as the calculated velocity of 5.8 fps is slightly less than the effective eroding velocity (6 fps) for a vegetated earth embankment. It is recommended that the Owner retain the services of Professional Engineers with expertise in geotechnical analysis to evaluate the stability of the dam. Since no undue settlement, cracking or sloughing was noted at the time of inspection, it appears that the embankment is adequate for maximum control storage with water at elevation 1557 msl. As previously stated, the iron-stained saturated areas observed along the toe of the downstream slope are believed to represent seepage through the embankment and are of concern. It is recommended that these areas be monitored quarterly to detect any increase in flow rates, which could result in piping through the embankment.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment: The Lower Wallace Dam at the time of inspection appeared to be in fair condition. The appropriate SDF for this dam is the ½ PMF. The spillway will pass 15 percent of the PMF (30% of the SDF) without overtopping. During the SDF the dam will be overtopped by a maximum of 1.7 ft for a period of 5 hours at a velocity of 5.8 fps. The spillway is judged to be inadequate but not seriously inadequate.

Flows overtopping the dam during the SDF are not considered detrimental to the embankment with respect to erosion. There are no design or construction records available for this structure, therefore, an accurate check on its stability cannot be made.

Only a limited maintenance program exists for the structure and maintenance is considered inadequate.

7.2 Recommended Remedial Measures: The following remedial measures should be implemented within one year of the date of this report:

7.2.1 The Owner should engage the services of a qualified Professional Geotechnical Engineer to perform a subsurface investigation and stability analysis in order to evaluate the stability of the dam and modify as necessary. The widespread seepage observed along the downstream slope should be assessed in this study.

7.2.2 An emergency action plan should be developed to warn downstream dwellings of any dangers which may be imminent.

7.3 Required Maintenance and Observation:

7.3.1 Seepage present along the downstream slope should be monitored quarterly and after periods of high pool levels in the reservoir to detect any increase in flow rates which may cause piping within the embankment.

7.3.2 The debris rack on the principal spillway should be repaired.

7.3.3 The grass and weeds on the embankment should be cut at least once and preferably twice a year. Maintenance in the early summer and fall is recommended.

7.3.4 All small trees and saplings present on the embankment should be cut to ground level yearly during maintenance operations.

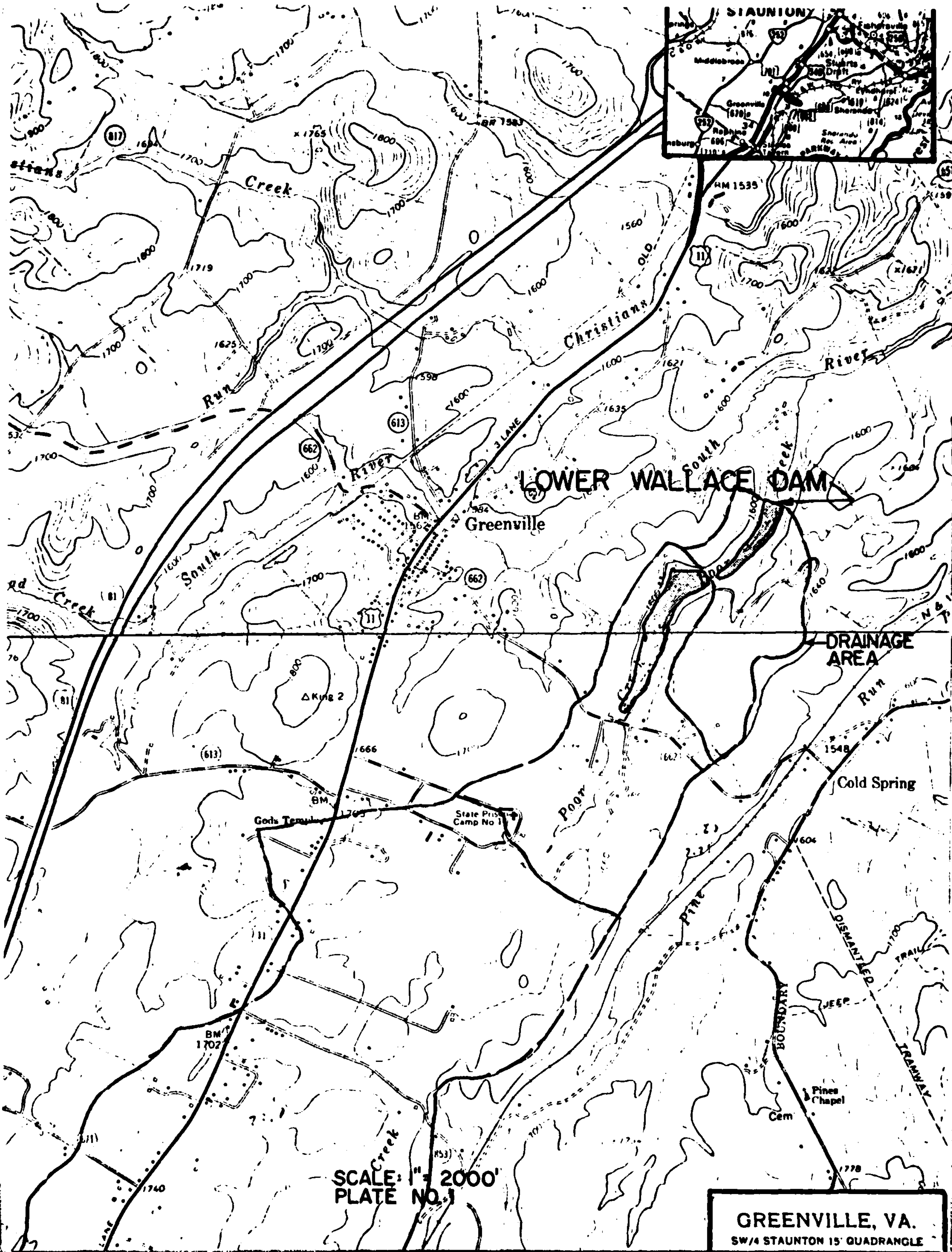
7.3.5 Bare areas in the emergency spillway and along the left spillway slope should be reseeded in order to minimize surface erosion.

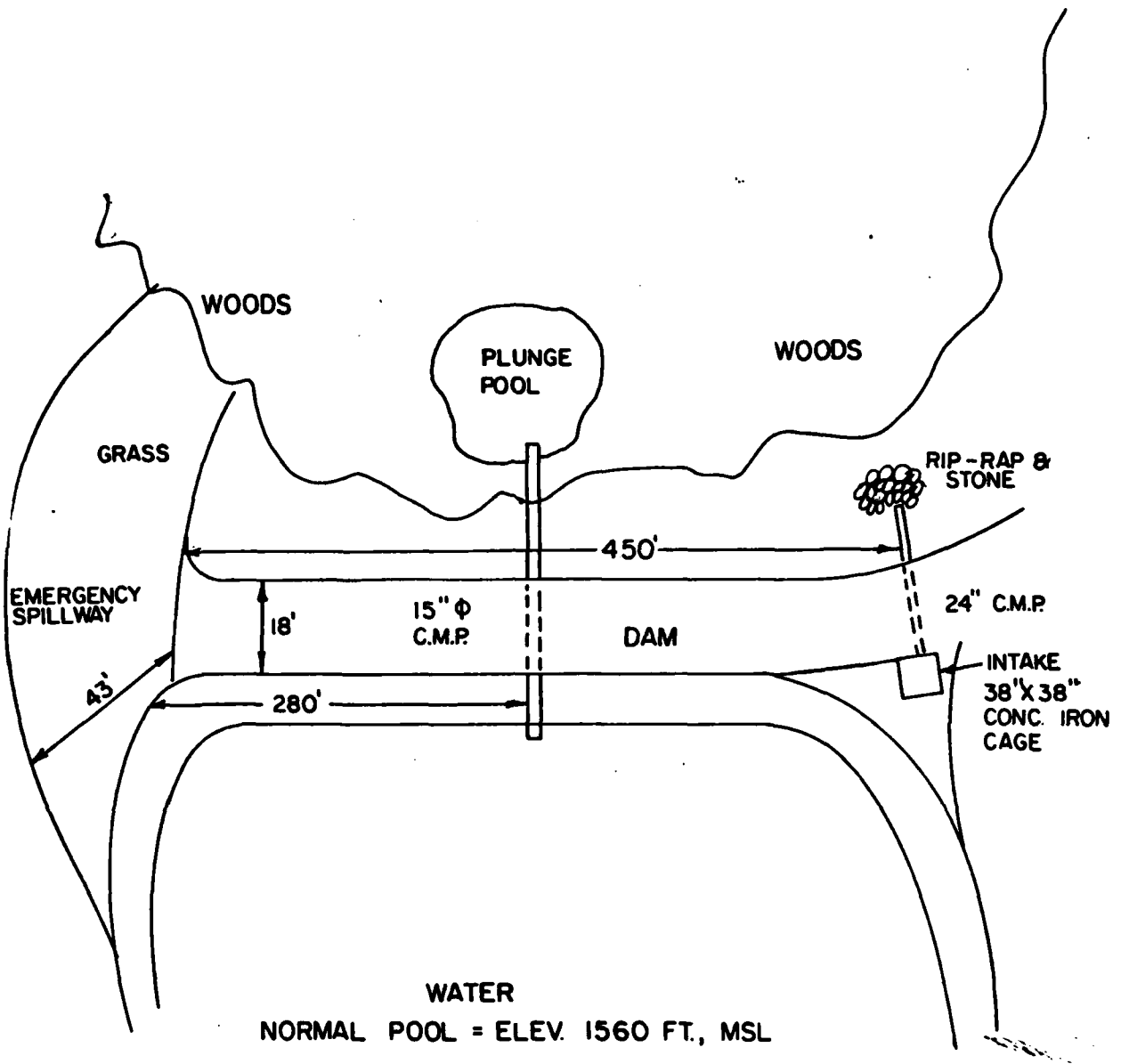
7.3.6 Groundhog burrowing in the embankment should be backfilled.

7.3.7 A staff gage should be installed to monitor water levels.

APPENDIX I

MAPS AND DRAWINGS


LOWER WALLACE DAM
DRAINAGE AREA
Greenville
Cold Spring
State Prison Camp No 11
Gods Temple
Pines Chapel
Cem
SCALE: 1" = 2000'
PLATE NO. 1
GREENVILLE, VA.
SW/4 STAUNTON 15' QUADRANGLE



PLAN

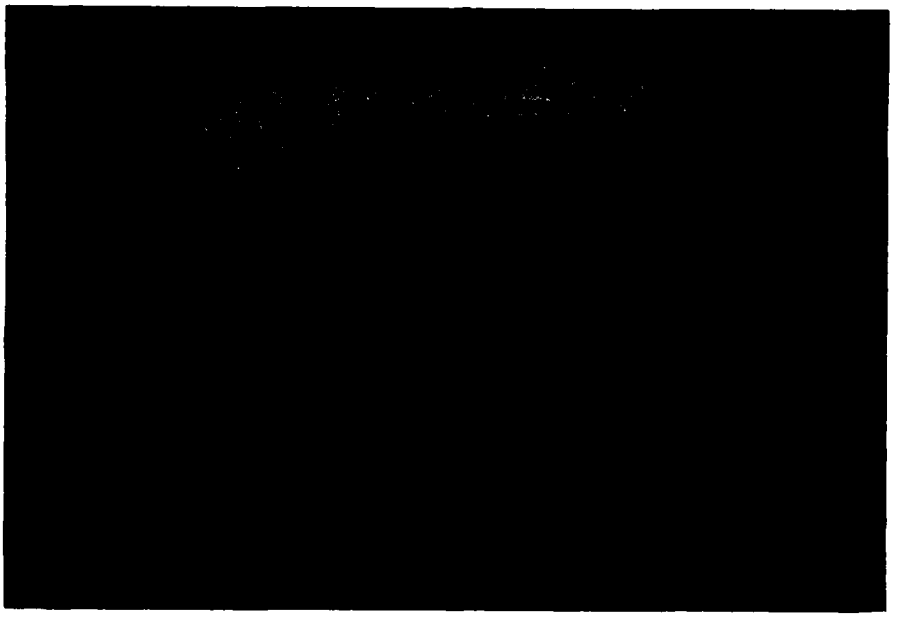
LOWER WALLACE DAM

FIELD SKETCH

PLATE NO. 2

APPENDIX II

PHOTOGRAPHS



Intake Structure (Note Dislocation of Debris Rack)

Photograph No. 1

Secondary Intake Structure at Right Abutment

Photograph No. 2

Downstream Face of Dam

(Note Seepage Area)

Photograph No. 3

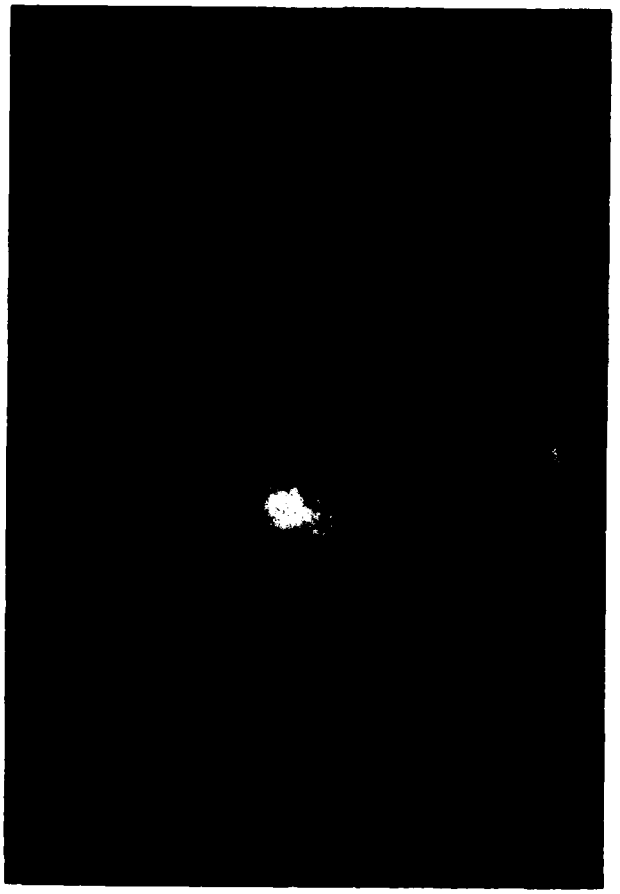
Closeup View of Seepage Area

Photograph No. 4

Emergency Spillway

(Note Erosion on Left Embankment)

Photograph No. 5



Outlet Pipe, Plunge Pool and Downstream Channel

(Note Outlet Pipe is Submerged)

Photograph No. 6

APPENDIX III

FIELD OBSERVATIONS

Check List
Visual Inspection
Phase I

Name Dam Lower Wallace County Augusta State Virginia Coordinators Lat. 38°-00.3' Long 79°-08.2'

Date(s) Inspection 4/16/80 Weather Cloudy, windy Temperature 39°F

Pool Elevation at Time of Inspection 1553 msl Tailwater at Time of Inspection 1538 msl

Inspection Personnel:

Schnabel Engineering Associates, P.C.
Raymond A. DeStephen, P.E.
Stephen G. Werner (recorder)

J. K. Timmons and Associates, Inc.
Robert G. Roop, P.E.
Donald I Balzer (recorder)

State Water Control Board
Hugh M. Gildea, P.E.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	The slopes, crest, emergency spillway and abutment contacts were inspected and no cracks were noted. Approximately the upper half to upper two-thirds of the downslope and most of the upstream slope were thickly vegetated with honeysuckle. Neither slope could be examined closely because of the vegetation.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Thick vegetative cover hindered the detection of erosion on the embankment. The downstream slope did appear to be irregular and included scattered shallow erosion gullies usually less than 1 ft deep. The upstream slope was approximately 1.5H:1V while the downstream slope ranged from 1.5 to 1.8H:1V. One groundhog hole was encountered 10 ft± below the crest on the downstream slope, 90 ft± right of the emergency spillway.	
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Appeared to be good.	
RIPRAP FAILURES	None observed. Riprap ranging from 6" to 2 ft± in size was present, extending 1 to 2 ft± above pool level. The riprap consisted of alluvial gravel and boulders.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No bedrock was observed at the site. Both abutments tie into alluvial/colluvial materials consisting of red to brown mixtures of sand, silt, silty clayey sands, and gravel (SM to SC). The emergency spillway (left abutment) appears to be cut into residual silty clay. Local geology appears to consist of alluvial/colluvial soils overlying residual limestone clays and silty clays. No faults were encountered during the inspection.	
ANY NOTICEABLE SEEPAGE	Considerable seepage and heavy iron staining was observed along the downstream toe. No flow movement was observed from the seepage areas. See accompanying field sketch.	
STAFF GAGE AND RECORDER	None observed	
DRAINS	None observed	

EMERGENCY SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	None	-
APPROACH CHANNEL	Earth and grass at 3% slope. Control section 4 ft above pool elevation. Partially vegetated and left side very bare.	Good condition, needs some grass cover.
DISCHARGE CHANNEL	All grass with 2:1 side slopes. Bottom width of 43 ft. Left slope lacks vegetative cover.	Good condition. Slope needs seeding.
BRIDGE AND PIERS	None	-

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	-	-
INTAKE STRUCTURE	Trash rack dislocated. Circular riser submerged, size unknown.	Needs to be corrected.
OUTLET STRUCTURE	15" CMP. Pipe is submerged by 3" to 6". 24" CMP in good condition.	Condition unknown. No signs of deterioration.
OUTLET CHANNEL	Plunge pool, no erosion. Riprap intact.	Good condition.
SECONDARY OUTLET	38" x 38" weir box with iron trash cage. 24" CMP outlet. No deterioration noted.	Good condition.

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Wooded, some grass, 2:1 slopes overall. No debris.	Good condition.
SEDIMENTATION	None. Water was clear.	-

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	250 ft wide flood plain. N = 0.1, dense vegetative cover. No debris in primary channel. Primary channel is 3 ft wide.	-
SLOPES	3H:1V side slopes immediately below dam. Valley broadens in width where Poor Creek joins the South River.	-
APPROXIMATE NO. OF HOMES AND POPULATION	Several homes 1 to 2 miles downstream. Homes approximately 15 ft above stream.	Could be affected by dam breach.

INSTRUMENTATION

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

BY SW DATE 4/16/89 **SCHNABEL ENGINEERING ASSOCIATES**

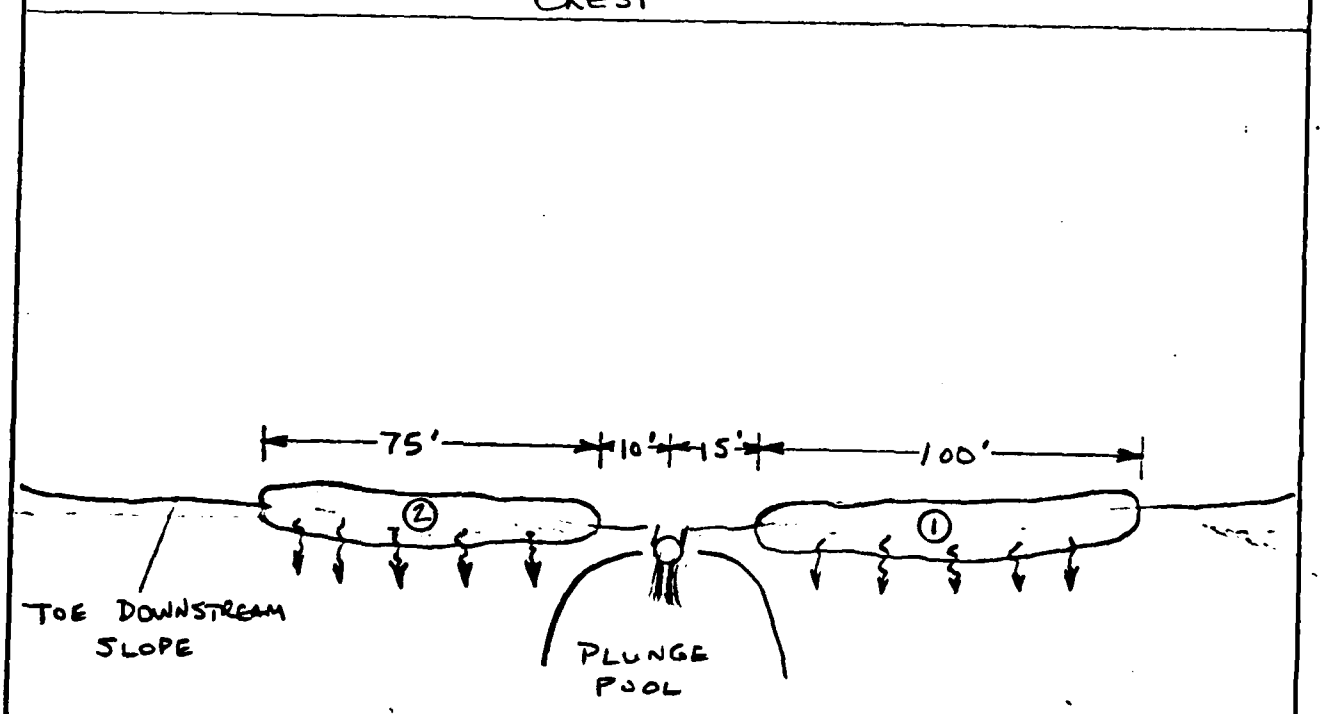
CHKD. BY ..... DATE ..... **CONSULTING ENGINEERS**

SHEET NO. 1 OF 1

SUBJECT FIELD SKETCH — SEEPAGE AREAS, LOWER WALLACE DAM

JOB NO. V80214

NO SCALE



① SEEPAGE AREA 25 FT ± WIDE, WITH TOP OF AREA LOCATED 2 FT ± ABOVE THE TOE OF SLOPE WET AREA 25 FT ± WIDE NO FLOW OBSERVED, BUT DOES INCLUDE ABUNDANT IRON STAINING.

② SEEPAGE AREA 25 - 30FT ± WIDE, WITH TOP OF AREA LOCATED 3 FT ± ABOVE TOP OF OUTLET PIPE. NO FLOW OBSERVED, BUT DOES INCLUDE ABUNDANT IRON STAINING.

APPENDIX IV - REFERENCES

1. Recommended Guidelines for Safety Inspection of Dams, Department of Army, Office of the Chief of Engineers, 46 pp.
2. Design of Small Dams, U. S. Department of Interior, Bureau of Reclamation, 1974, 816 pp.
3. Geology of the Staunton, Churchville, Greenville, and Stuarts Draft Quadrangles, Virginia, Report of Investigations 12, Eugene K. Rader, Virginia Division of Mineral Resources, 1967, 43 pp.
4. Geology of the Vesuvius Quadrangle, Virginia, Report of Investigations 7, H. J. Werner, Virginia Division of Mineral Resources, 1966, 53 pp.
5. Section 4, Hydrology, Part 1 Watershed Planning, SCS National Engineering Handbook, Soil Conservation Service, U. S. Department of Agriculture, 1964.
6. Hydrometerological Report No. 33, U. S. Department of Commerce, Weather Bureau, U. S. Department of Army, Corps of Engineers, Washington, D.C., April 1956.