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ARMY ENGINEERING DISTRICT NORFOLK VA
NATIONAL DAM SAFETY PROGRAM. KENNEDY DAM (VA-17910), RAPPAHANNO--ETC(U)
SEP 79 J A WALSH

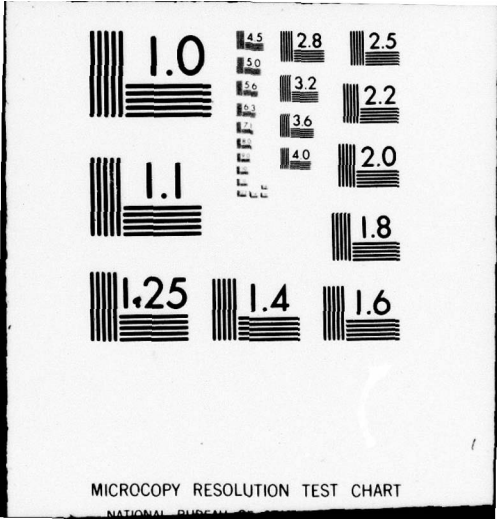
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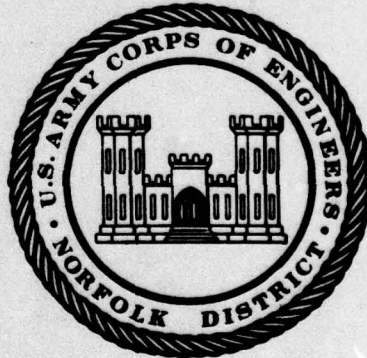
RAPPAHANNOCK RIVER BASIN

B.S.
LEVEL *76*

Name Of Dam: KENNEDY DAM
Location: STAFFORD COUNTY
Inventory Number: 17910

PHASE I INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM

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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.

NAME OF DAM: KENNEDY DAM
LOCATION: STAFFORD, VIRGINIA
INVENTORY NUMBER: VA 17910

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY
NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
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: Kennedy Dam
State: Virginia
County: Stafford
USGS Quad Sheet: Fredericksburg
Stream: Tributary of Rappahannock River
Date of Inspection: 26 June 1979

Kennedy Dam is an earthfill structure about 420 feet long and 15 feet high. The dam is owned by Mrs. P. G. Kennedy and is maintained by the residents around the reservoir. The road across the dam is maintained by the State Highway Department. The dam is classified as a small size with a significant hazard classification. The principal spillway is a concrete drop-inlet on the upstream face of the dam. The secondary spillway is also a concrete drop-inlet located one foot higher and about 25 feet to the right of the principal spillway. This reservoir is used for recreation.

Based on criteria established by the Department of the Army, Office of the Chief of Engineer (OCE), the Spillway Design Flood (SDF) appropriate for this dam is the 100 Year Flood to 1/2 the Probable Maximum Flood (1/2 PMF). Because of the risk involved with this project, the appropriate SDF is 1/2 PMF. The spillways will pass less than 15 percent of the PMF without overtopping the dam; therefore, both spillways are adjudged inadequate.

The visual inspection revealed no apparent problems and there are no immediately needs for remedial measures. It is recommended within 12 months that a regular maintenance program be initiated to maintain the integrity of the structure and correct those deficiencies listed in Section 7.2.

Submitted By:

Original signed by:
JAMES A. WALSH

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

Approved:

Original signed by:
Douglas L. Haller

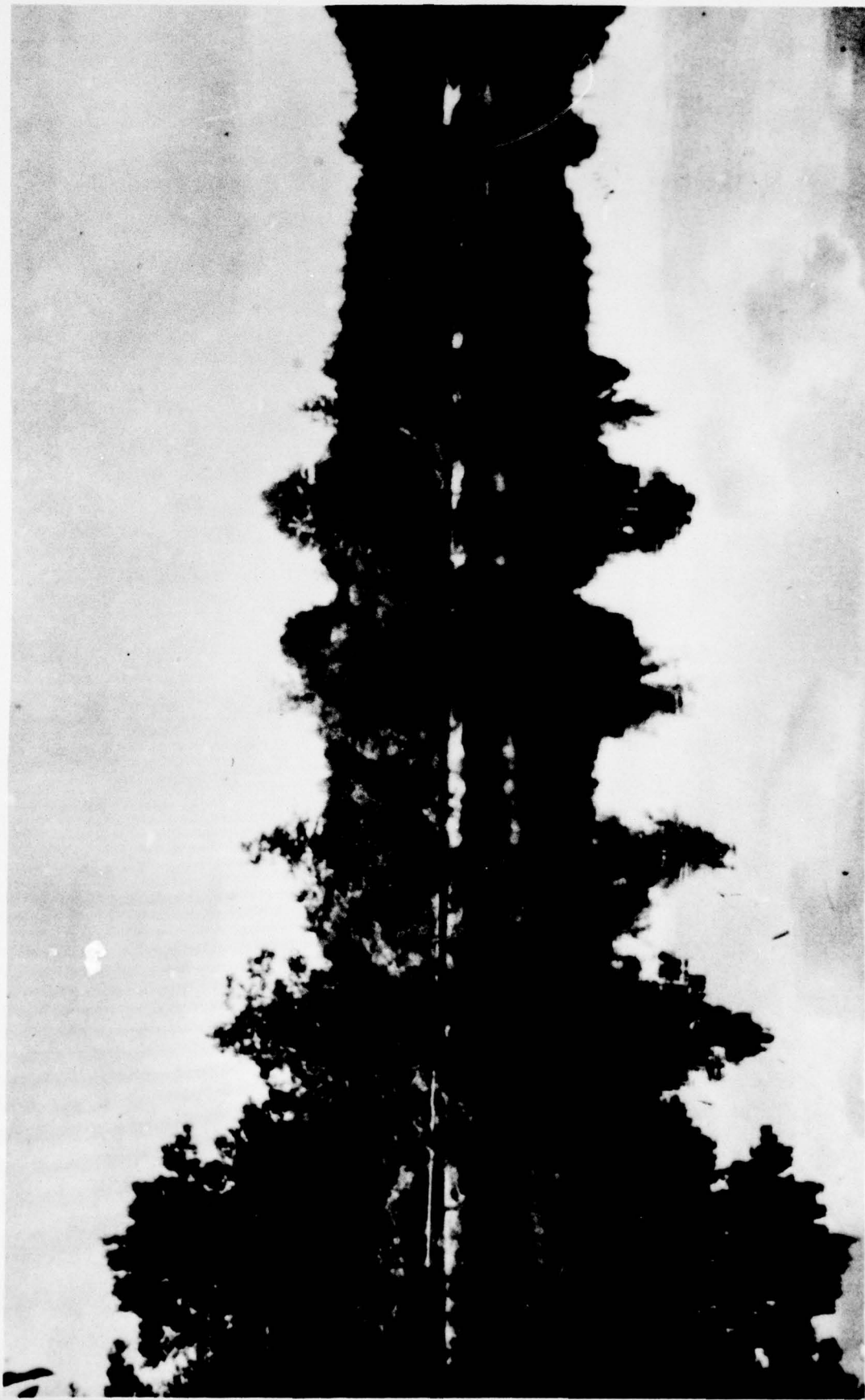
DOUGLAS L. HALLER
Colonel Corps of Engineers
District Engineer

Recommended By

ORIGINAL SIGNED BY:
CARL S. ANDERSON, JR.

CARL S. ANDERSON, JR. P. E.
Acting Chief, Engineering Division

Date: SEP 21 1979



OVERVIEW OF DAM

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: Kennedy Dam is an earthen embankment dam about 420 feet long and 15 feet high. The top of the dam is 34 feet wide with a crest elevation of 99.9 TBM*. The upstream slope is 4 horizontal to 1 vertical (4H:1V) with wooden bulkhead support from elevation 95.0 to 98.0. The downstream slope is 3.25H: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 drop-inlet located on the upstream slope of the dam about 50 feet from the right abutment. The drop-inlet services a 36-inch concrete pipe that passes through the dam and discharges on the right downstream face of the dam near the abutment. The secondary spillway is also a concrete drop-inlet located one foot higher and about 25 feet to the right of the principal spillway. This drop-inlet services another 36-inch concrete pipe passing parallel to the principal spillway and discharging into the same basin as the principal spillway. Flow passes through the basin below the outlets and curves toward the central axis of the dam about 400 feet below the toe of the dam. Natural flows and flows from wet areas at the toe of the dam merge with flows in the spillway channel to form the downstream channel.

* TBM based on assumed water surface elevation 95.0.

1.2.2 Location: Kennedy Dam is located in Statford County on a tributary of the Rappahannock River, about 1/2 mile upstream from State Route 3.

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

1.2.4 Hazard Classification: The dam is located upstream of one home and a few farm support structures; 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: Mrs. P. G. Kennedy

1.2.6 Purpose: Recreation

1.2.7 Design and Construction History: The dam was completed in 1954. The designer is unknown. The contractor's name was Johnson, but he is no longer living.

1.2.8 Normal Operational Procedures: Water passes automatically through the principal and secondary spillway as the water level in the reservoir rises above the spillways crests.

1.3 Pertinent Data:

1.3.1 Drainage area: The dam controls a drainage area of 0.67 square miles.

1.3.2 Discharge at Dam Site:

Maximum flood - approximately 135 cfs or 1/2 foot above the crest of the secondary spillway (elevation 96.5).

Spillways (principal and secondary)
pool level at top of dam 171 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 t.b.m.	Reservoir			Length miles
		Area, acres	Capacity		
			Acre, feet	Watershed, inches	
Top of Dam	99.9	24.8	340	9.52	.50
Secondary Spill- way Crest	96.0	18.5	240	6.72	.45
Principal Spill- way Crest	95.3	17.5	230	6.44	.44
Streambed at Down- stream Toe of Dam	85.0	—	—		—

SECTION 2
ENGINEERING DATA

2.1 Design: There is no available design information.

2.2 Construction: The only available information were observations as recalled by the owner's representative Mr. K. Covert, a local contractor. An account of Mr. Covert's observations is provided in the following paragraph.

The dam was built approximately 25 years ago by a man named Johnson. Johnson is now dead. The foundation consisted of hard, stiff red soil with steep abutments and a small foundation. The embankment was placed in small lifts and was compacted thoroughly with construction equipment. Equipment used during construction were two dozers, one pan, and one sheepsfoot roller.

Mr. Covert had no knowledge about foundation drains or whether the dam was keyed into the foundation. He did not recall rock outcrops. There have not been any known failures and there is no regular maintenance by the state or owner. Mr. Covert checks the spillway intermittently to keep it free of debris.

According to Mr. Covert, the upstream slope is approximately 4H:1V.

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

SECTION 3
VISUAL INSPECTION

3.1 Findings:

3.1.1 General: The results of the 26 June 1979 inspection are recorded in Appendix III. At the time of the inspection the pool elevation was at 95.0 feet TBM or about normal pool elevation. There are no known past inspection reports available.

3.1.2 Dam: The general soil conditions were dry. The embankment was in good condition, but the downstream slope was vegetated with brush. The upstream slope along the crest was sparsely vegetated with up to 12-inch diameter trees. The crest of the dam served as a paved secondary road, Appendix II, Photo 1. The upstream right abutment junction has eroded due to surface runoff, Appendix II, Photo 6. No settlement, misalignment, or sloughing were noted. Two wet spots were found in the downstream area as shown in Plate II, Appendix I. No foundation drain outlets were located.

3.1.3 Appurtenant Structures: The orifices for both the concrete spillway culverts were cracked and deteriorating. The top edges of the two concrete drop inlets were severely cracked and spalled, Appendix II, Photos 3 and 4. The secondary spillway outlet was obstructed by vegetation, Appendix II, Photo 2. The discharge channel was eroded at the base of the spillway outlets, Appendix II, Photo 5. There was no emergency spillway.

3.1.4 Instrumentation: There was no instrumentation on the dam.

3.1.5 Reservoir Area: The surrounding area is lightly wooded with no shoreline erosion or apparent slope failures. There is no available information pertaining to sedimentation.

3.1.6 Downstream Channel: The downstream channel from the spillways is about 15 feet wide and 10 feet deep for about 1000 feet. At this point the channel bends and debris has collected in the area. One home and a store were located about one-half mile downstream of the dam.

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

- a. Trim to the ground the vegetation on the downstream slope.
- b. Dress the eroded area on the upstream right abutment junction with compacted fill and seed.

c. Monitor the deterioration of the orifices of the concrete pipe spillways. If deterioration should continue perform cosmetic repairs when deemed necessary.

d. Perform cosmetic repairs to the two deteriorating concrete drop inlets to prevent further deterioration. Also, remove debris from the drop inlets.

e. Monitor the erosion of the discharge channel at the base of the spillway pipe. Should erosion continue, then the area should be riprapped to prevent further erosion.

f. Install a staff gage in the reservoir near the dam to extend above the top of the dam.

g. Remove the debris collected in the channel bend approximately 1000 feet downstream.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures: The normal storage pool is elevation 95.0, which is just below the crest of the principal spillway. The reservoir provides recreation for residents around the lake. Water passes automatically through the principal and secondary spillways when the water level in the reservoir rises above the crests. There is no other outlet to pass water downstream and no means of dewatering the reservoir.

4.2 Maintenance: Cleaning of debris from around the reservoir is performed by residents living at the dam. State highway crews maintain the road that passes over the dam. There are no other maintenance functions performed at the dam.

4.3 Warning System: At present time, there is no warning system or evacuation plan in operation.

4.5 Evaluation: The dam does not require an elaborate operational and maintenance procedure. However, an annual maintenance and inspection program should be initiated to help detect and control problems that may occur.

SECTION 5
HYDRAULIC/HYDROLOGIC DESIGN

5.1 Design: None were available.

5.2 Hydrologic Records: None were available.

5.3 Flood Experience: The maximum pool level observed was about elevation 96.5 which correspond to a flow of about 135 cfs.

5.4 Flood Potential: The PMF, 1/2 PMF and 100 Year Flood were developed and routed through the reservoir by use of the HEC-1DB 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 Publication (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 secondary spillway as the reservoir level rises above the crests of the spillway.

The storage curve was developed by use of a U.S. Geological Survey Quadrangle Map. Rating curves were developed for both spillways 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 95.0, or just below the principal spillway crest. Flow through the principal and secondary spillways were included in all routings.

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

Item	Normal Flow	Hydrograph		
		100 Yr 1/	1/2 PMF	PMF 2/
Peak flow, c.f.s.				
Inflow	1	1198	3135	6270
Outflow	1	169	2848	5952
Maximum elevation ft, TBM		99.84	101.54	102.70
Non-overflow section (el. 99.9)				
Depth of flow, ft.		—	1.64	2.80
Duration, hrs		—	5.50	8.25
Velocity, f.p.s.3/		—	5.9	7.6
Tailwater elevation ft., TBM	4/		—	—

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

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

3/ Critical velocity.

4/ No tailwater was observed because the location of the discharge channel prohibits a normal tailwater until the downstream channel (400 feet further downstream).

5.7 Reservoir Emptying Potential: There is no outlet to permit dewatering of the reservoir.

5.8 Evaluation: Based on the size (small) and hazard classification (significant), the recommended Spillway Design Flood (SDF) is the 100 Year Flood to the 1/2 PMF. Because of the risk involved in this project, the appropriate SDF is 1/2 PMF. The spillways will pass less than 15 percent of the PMF without overtopping the dam. The SDF will overtop the dam by 1.64 feet with a peak average critical velocity of 5.9 feet per second and flow over the dam for a total of 5.5 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 Abutments: There is no information available on the foundation conditions. The dam is in the Coastal Plain of Virginia. 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.

6.2 Embankment

6.2.1 Materials: There is no information available on the nature of the embankment materials. The area soils are high plastic marine clays.

6.2.2 Stability: There are no available stability calculations. The dam is 15 feet high and 34 feet wide. It has a reported upstream slope of 4H:1V, and a measured downstream slope of 3.25H:1V. The dam has a freeboard of approximately 0.3 feet and is not considered to be seriously subjected to a sudden drawdown due to its low freeboard and low capacity outlet works. The existing normal pool is also approximately the maximum pool.

According to guidelines presented 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 a drawdown, and composed of high plastic fines (CH, MH), the recommended slopes are 3.5H:1V upstream and 2.5H:1V downstream. The recommended width is 13 feet. Based on these guidelines the dam has adequate slopes and an adequate 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. Also, based on the Bureau of Reclamation guidelines, the dam width and slopes are adequate. Based on these conditions, the embankment is considered stable for maximum pool conditions.

Also, despite the inability of the spillway to pass the design flood, the depth, duration, and rate of overtopping flows are not considered detrimental to the embankment. Overtopping flows are shallow, last 5 hours, and the velocity is less than 6 fps, the effective eroding velocity for a vegetated earth embankment.

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 during maximum pool operations. However, there is no regular maintenance program which has allowed the downstream slope to overgrow with brush. The dam is considered stable for maximum pool conditions. 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 a small size and significant hazard dam is 100-Year to 1/2 PMF. Because of the risk involved, the 1/2 PMF has been selected as the SDF. The spillway will pass less than 15 percent of the PMF without overtopping the dam; therefore, both spillways are adjudged inadequate. Flows overtopping the dam during the SDF are not considered detrimental to the embankment.

7.2 Recommended Remedial Measures: It is recommended that an annual maintenance program be initiated within 12 months to maintain the integrity of the structure. The inspection revealed the following maintenance items that should be scheduled by the owner during a regular maintenance period:

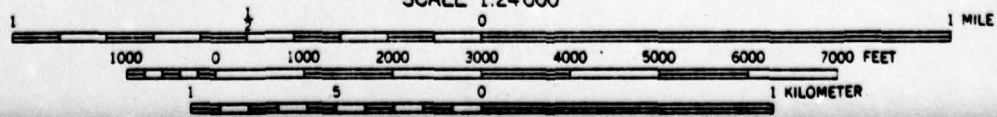
- a. Trim to the ground the vegetation on the downstream slope.
- b. Dress the eroded area on the upstream right abutment junction with compacted fill and seed.
- c. Monitor the deterioration of the orifices of the concrete pipe spillways. If deterioration should continue perform cosmetic repairs when deemed necessary.
- d. Perform cosmetic repairs to the two deteriorating concrete drop inlets to prevent further deterioration. Also, remove debris from the drop inlets.
- e. Monitor the erosion of the discharge channel at the base of the spillway pipe. Should erosion continue, then the area should be riprapped to prevent further erosion.
- f. Install a staff gage in the reservoir near the dam to extend above the top of the dam.
- g. Remove the debris collected in the channel bend approximately 1000 feet downstream.

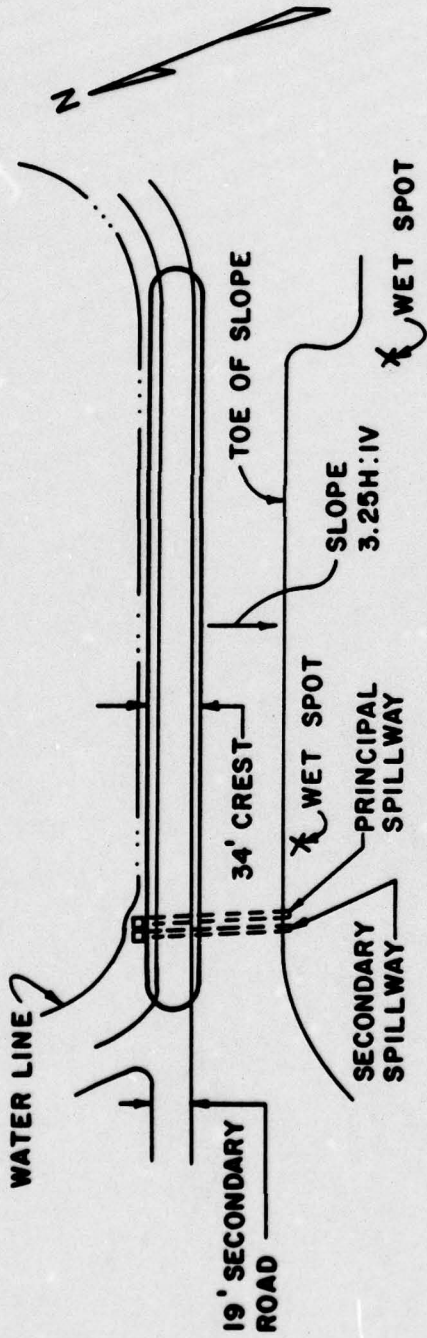
APPENDIX I
MAPS AND DRAWINGS



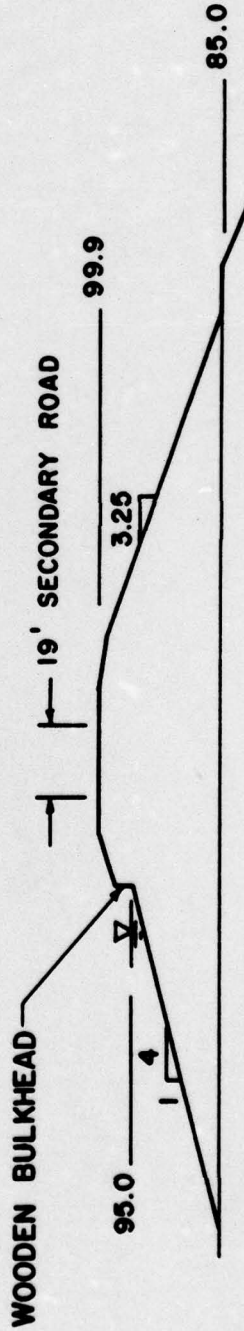
FREDERICKSBURG QUADRANGLE

SCALE 1:24 000





PLAN VIEW



TYPICAL CROSS SECTION

NOTES:

1. SKETCH MADE FROM FIELD NOTES
2. ELEVATIONS BASED ON TBM WITH WATER SURFACE ELEVATION 95.0

KENNEDY DAM
 STAFFORD COUNTY, VA.
 8-28-79
 NOT TO SCALE

APPENDIX II
PHOTOGRAPHS

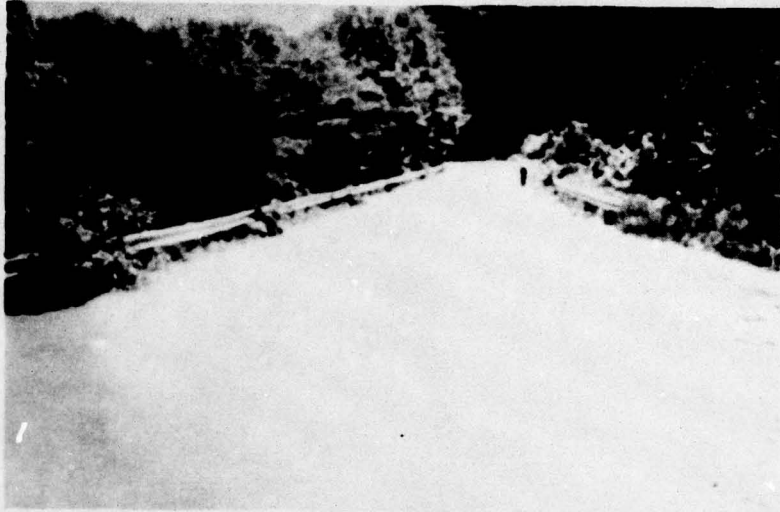


PHOTO #1 CREST OF DAM



PHOTO #2 PRINCIPAL SPILLWAY OUTLET, SECONDARY SPILLWAY
OUTLET OBSCURED-LOCATION NOTED BY ARROW



PHOTO #3 SECONDARY SPILLWAY INTAKE



PHOTO #4 PRINCIPAL SPILLWAY INTAKE

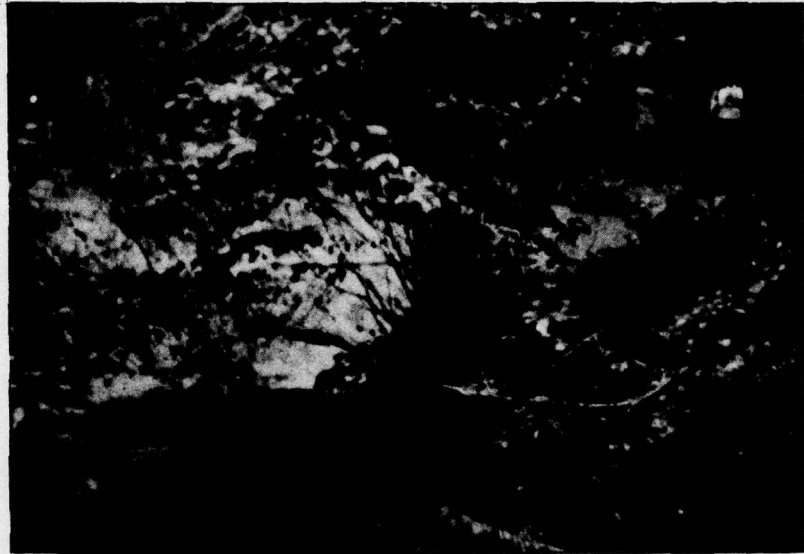


PHOTO #5 DISCHARGE CHANNEL

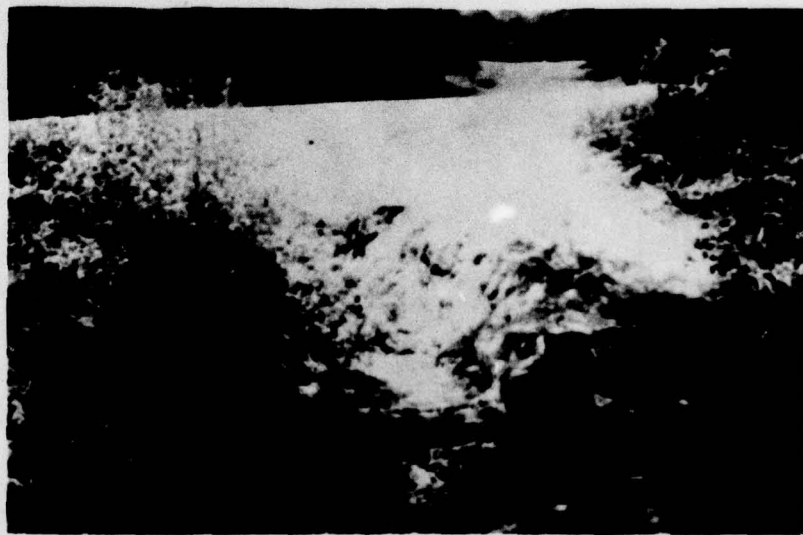


PHOTO #6 EROSION ON RIGHT UPSTREAM ABUTMENT

APPENDIX III
FIELD OBSERVATIONS

Check list
Visual Inspection
Phase I

Name Dam: Kennedy County: Stafford State: Virginia Coordinaters: Lat. 3817.0
Long. 7725.5

Date(s) Inspection: 26 June 79 Weather: Partly Cloudy Temperature: 72 deg. F

Pool Elevation at Time of Inspection: 95.0 TBM Tailwater at Time of Inspection: None

Inspection Personnel:

L. Jones, COE
D. Pezza, COE
J. Robinson, COE

C. Matthias, COE
T. Perry, SWCB

K. Covert, Owner Rep.

Pezza & Robinson, Recorders

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	No surface cracks were visible. The general soil conditions were dry. The downstream slope is vegetated with brush and tulip maple up to 2-3 in. in diameter. Slope appears to have been cleared at one time. The upstream slope along the crest is sparsely vegetated with up to 12 inch diameter trees.	Trim the vegetation to the trunk off the downstream slope.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	No movement or cracking was observed. The downstream area is heavily vegetated with pines and tulip maples.	None
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	No sloughing was observed. Past shallow surface erosion was noted but has been overgrown with grass stabilizing the slope.	None
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	There were no drawings with which to compare the alignment. However, the alignments showed no signs of movement. The top of the dam serves as a paved secondary road.	None
RIPRAP FAILURES	There was no riprap. The upstream slope is protected with a wood-crib bulkhead. The bulkhead alignment was irregular showing signs of movement due to active pressures.	None
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	The right upstream junction has eroded due to surface runoff. There is a storm drain in the left downstream abutment. The mouth of the drain could not be found. The drain was dry.	Dressed the eroded area with compacted fill and seed.
ANY NOTICEABLE SEEPAGE	Two wet spots were located in the downstream area; as shown on Plate II, Appendix I. No foundation drains were located.	None
DRAINS	There are no known drains.	None

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Both 36-inch concrete pipes appear in good condition. Some minor concrete cracking appears at each end of both pipes.	Monitor deterioration during inspections and repair if necessary.
INTAKE STRUCTURE	Two concrete drop inlets are badly cracked and spalled to the point that the crest is not level. One inlet crest is at normal pool and the other is about 1 foot higher. Debris was found in both inlets. No flow in either inlet was observed.	Remove debris from inlets and patch the cracked concrete.
OUTLET STRUCTURE	Two 36-inch pipes discharge freely into the same basin. The basin is cut into highly plastic clay soils. One outlet was obstructed by vines. Soils have eroded from beneath the outlet pipes.	Monitor eroded area. If much more erosion takes place some corrective measure will be necessary.
OUTLET CHANNEL	A well cut natural channel approximately 10 feet deep and 15 feet wide serves both outlets. The slope insures a rapid discharge from the basin area.	None
EMERGENCY GATE	There is no emergency gate.	None

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATION
MONUMENTATION/SURVEYS	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 staff gage should be installed in the reservoir.

RESERVOIR

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The slopes are mild with tree cover around the entire reservoir. No shoreline erosion or slope failures were apparent.	None
SEDIMENTATION	Unable to determine if there is a sediment problem. There is no available information.	None

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel running from below the two 36-inch outlet pipes is about 10 feet deep and 15 feet wide until about 1000 feet downstream where the channel bends and debris has settled in the area.	The debris should be removed during annual inspections.
SLOPES	No steep slopes are apparent in the area but the soil will promote quick runoffs during storms.	None
APPROXIMATE NO. OF HOMES AND POPULATION	One home and a store are located about one-half mile downstream of the dam.	Road embankment blocks flow from other homes downstream

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	There is no plan view of the dam.
REGIONAL VICINITY MAP	There is no other regional vicinity map other than the USGS Fredricksburg quadrangle map.
CONSTRUCTION HISTORY	There is no written record of the dam construction.
TYPICAL SECTIONS OF DAM	There are no sections.
HYDROLOGIC/HYDRAULIC DATA	There are no data.
OUTLETS - PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	There are no plans and details, or known constraints and discharge ratings.
RAINFALL/RESERVOIR RECORDS	There are no records.
DESIGN REPORTS	There are no reports.
GEOLOGY REPORTS	There are no reports.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	There are no computations or studies.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY-FIELD	There are no investigation and boring records, or laboratory and field tests results

ITEM	REMARKS
POST-CONSTRUCTION SURVEYS OF DAM	There are no known post-construction surveys.
BORROW SOURCES	There is no information pertaining to borrow sources.
SPILLWAY PLAN SECTIONS DETAILS	There are no sections or details.
OPERATING EQUIPMENT PLANS & DETAILS	There are no plans or details.
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.
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

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, July 1978).
3. "Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian," Hydrometeorological Report No. 33, (U. S. Weather Bureau, April 1956).
4. "Rainfall Frequency Atlas of the United States," Technical Paper No. 40, (U. S. Weather Bureau, May 1961).