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NATIONAL DAM SAFETY PROGRAM. STEVENS LAKE DAM (VA-12509). JAMES--ETC(U)
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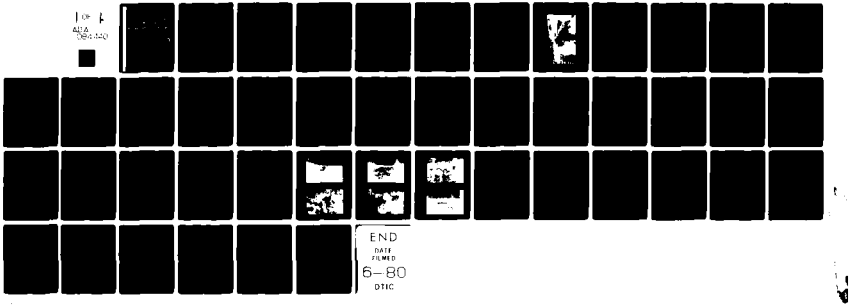

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JAMES RIVER BASIN

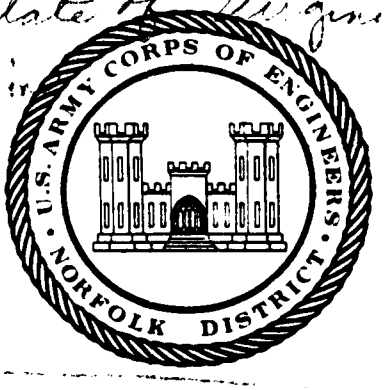
Name of Dam: Stevens Lake Dam
Location: Nelson County, State of Virginia
Inventory Number: VA 12509

LEVEL II

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

Stevens Lake Dam (VA-12509), James River Basin, Nelson County, State of Virginia. Phase I Inspection Report.



DACW65-78-D-0011 / Federal Rpt.

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REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER: VA 12509 — 2. GOVT ACCESSION NO.: AD-A084 440	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)*: Phase I Inspection Report National Dam Safety Program STEVENS LAKE DAM NELSON COUNTY, VA	5. TYPE OF REPORT & PERIOD COVERED: Final 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): Michael Baker, Jr., Inc. 4301 Dutch Ridge Road, Box 280 Beaver, Pennsylvania 15009	8. CONTRACT OR GRANT NUMBER(s): DACW65-78-D-0016
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Army Engineering District, Norfolk 803 Front Street Norfolk, VA 23510	12. REPORT DATE: April 1980 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*	15. SECURITY CLASS. *(of this report)*: Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

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

18. SUPPLEMENTARY NOTES

Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Dams - VA
National Dam Safety Program Phase I
Dam Safety
Dam Inspection

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

(See reverse side)

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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. 20313. 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.

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 aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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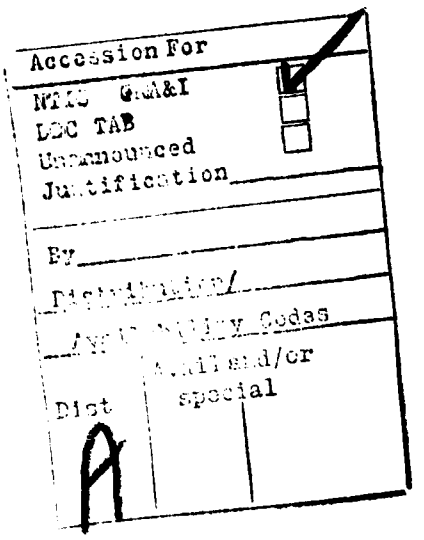

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Stevens Lake Dam
State: Virginia
County: Nelson
USGS 7.5 Minute Quadrangle: Arrington, Virginia
Stream: Unnamed Tributary to Brown Creek
Date of Inspection: 30 November 1979

BRIEF ASSESSMENT OF DAM

Stevens Lake Dam (formerly No Name No. 1) is an earthfill embankment approximately 380 feet long and 31 feet high with a 40 foot wide vegetated earth emergency spillway and an 8.5 inch diameter corrugated metal pipe principal spillway. The dam, located approximately 1 mile east of Colleen, Virginia, is used for livestock water supply by the owner, Mr. Russel A. Stevens. Stevens Lake Dam is a "small" size - "high" hazard structure as defined by the Recommended Guidelines for Safety Inspection of Dams.

Using the Corps of Engineers' screening criteria for initial review of spillway adequacy, the 1/2 Probable Maximum Flood (1/2 PMF) was selected as the spillway design flood (SDF). The SDF was routed through the reservoir and found to overtop the dam by a maximum depth of 0.3 foot with an average critical velocity of 2.5 f.p.s. Total duration of overtopping would be approximately 0.3 hour. The spillway is capable of passing up to 28 percent of the Probable Maximum Flood (PMF). It is adjudged as inadequate, but not seriously inadequate. Visual inspection and office analyses indicate deficiencies requiring further attention.

The seeps and areas of wetness on and below the downstream embankment require further investigation to determine if they pose a threat to the stability of the dam. A qualified geotechnical engineering firm should be retained to perform a stability check of the dam.

A warning system and emergency action plan should be developed and put into effect as soon as possible.

The following items should be accomplished as part of the general maintenance of the dam:

1) Remove the trees and brush from the embankment; cut the grass on the embankment regularly.

2) Clear the trash rack on the principal spillway.

3) Repair all areas where erosion has occurred.

4) Remove the scattered small trees from the emergency spillway. Consideration should be given to moving the barbed wire fence further downstream where its tendency to catch debris will not restrict flows.

5) Install a staff gage.

MICHAEL BAKER, JR., INC.

Michael Baker, III, P.E.
Chairman of the Board and
Chief Executive Officer

COMMONWEALTH OF VIRGINIA
MICHAEL
BAKER III
NO. 3176
CERTIFIED PROFESSIONAL ENGINEER

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Jack G. Starr, P.E.
Chief, Engineering

APPROVED: Original signed by: Douglas L. Haller
Douglas L. Haller
Colonel, Corps of Engineers
District Engineer

Date: MAY 6 1980

OVERALL VIEW OF DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM: STEVENS LAKE DAM ID# VA 12509

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. The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Description of Project

1.2.1 Description of Dam and Appurtenances: Stevens Lake Dam (formerly No Name No. 1) is an earthfill embankment approximately 380 feet long and 31 feet high[1]. The upstream and downstream slopes are both approximately 3H:1V (Horizontal to Vertical). The crest of the dam is approximately 18 feet wide and has a minimum elevation[2] of 703.3 feet Mean Sea Level (M.S.L.) adjacent to the emergency spillway.

The principal spillway consists of a vertically standing 8.5 inch diameter corrugated metal pipe, located approximately 18 feet from the upstream edge of the dam crest, which acts as a riser. The upper portion of the riser is enclosed in a vertical section of 18 inch diameter corrugated metal pipe

[1]Measured from the streambed at the downstream toe to the embankment crest.
[2]All elevations are referenced to Mean Sea Level (M.S.L.) Datum, as estimated from the Arrington, Virginia, 7.5 minute USGS Quadrangle.

serving as a trash rack at low flows (see Appendix I, Plate 4). At 699.8 feet M.S.L., which is the elevation of the top of the 8.5 inch riser, the 18 inch pipe has a row of closely spaced very small holes extending completely around its circumference. The top of the 18 inch pipe is at elevation 700.1 feet M.S.L. The 8.5 inch diameter outlet pipe for the principal spillway is approximately 135 feet long and discharges into a natural channel at the toe of the embankment.

The emergency spillway, a 40 foot wide vegetated earth channel, is located outside the left[3] abutment of the dam. The invert of the emergency spillway's control section is at elevation 700.9 feet M.S.L. There are no facilities for dewatering the reservoir.

1.2.2 Location: Stevens Lake Dam is located on an unnamed tributary to Brown Creek, approximately 1 mile east of Colleen, Nelson County, Virginia. A Location Plan is included with this report.

1.2.3 Size Classification: The maximum height of the dam is 31 feet and the reservoir storage capacity at the crest of the dam (elevation 703.3 feet M.S.L.) is 38 acre-feet. Therefore, the dam is in the "small" size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

1.2.4 Hazard Classification: There is one residence located in the floodplain immediately downstream of the dam. U.S. Route 29 crosses the stream approximately 600 feet downstream of the dam. Loss of life could occur in the event of failure by overtopping. The dam is therefore classified in the "high" hazard category as defined in the Recommended Guidelines for Safety Inspection of Dams. The hazard classification used to categorize dams is a function of location only and has nothing to do with its stability or probability of failure.

1.2.5 Ownership: The dam is owned by Mr. Russell A. Stevens, Colleen, Route 1, Lovingston, Virginia 22949.

[3]Facing downstream.

1.2.6 Purpose: The dam was constructed to provide water supply for livestock.

1.2.7 Design and Construction History: The dam was completed in 1960. No other information on the design and construction of the dam is available.

1.2.8 Normal Operational Procedures: The reservoir is typically maintained at the normal pool elevation of 699.8 feet M.S.L. by the crest of the riser. No formal operating procedures are followed for the dam. See paragraph 4.1 for detailed operating procedures.

1.3 Pertinent Data

1.3.1 Drainage Area: The drainage area tributary to the reservoir is 0.125 square mile.

1.3.2 Discharge at Dam Site: The maximum discharge from the reservoir is unknown.

Principal Spillway:
Pool level at top of dam . . . . 3.2 c.f.s.

Emergency Spillway:
Pool level at top of dam . . . . 602 c.f.s.

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 M.S.L.	Reservoir Capacity Area acres	Reservoir Capacity Acre-feet	Reservoir Capacity Watershed inches	Length feet
Top of dam	703.3	5.7	38	5.7	850
Emergency spillway crest	700.9	5.1	26	3.9	815
Principal spillway crest (normal pool)	699.8	4.8	20	3.0	800
Streambed at downstream toe of dam	672.3	-	-	-	-

SECTION 2 - ENGINEERING DATA

2.1 Design: Design plans, specifications, and boring logs were not available for use in preparing this report. There were no rock outcrops in the vicinity of the dam; however, the bedrock in this area is of Precambrian age, specifically of the Virginia Blue Ridge complex. These formations are characterized by biotitic and feldspathic granite, quartz, gneiss, and quartz monzonite.

2.2 Construction: Construction records, as-built plans, and inspection logs were not available for review.

2.3 Evaluation: No stability analyses or hydrologic and hydraulic data were available for review. No construction records or as-built plans were available to adequately assess the condition of the dam. All evaluations and assessments in this report were based upon field observations, discussions with the owner, and office analyses.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

3.1.1 General: The field inspection was conducted on 30 November 1979; the weather was sunny and cold, with temperatures in the mid-40's°F. At the time of the inspection, the pool elevation was 699.8 feet M.S.L.; the tailwater elevation was 672.8 feet M.S.L. The ground surface at the embankments and abutments was dry. The dam and appurtenant structures at the time of inspection were found to be in fair to poor condition. The following are brief summaries of deficiencies found during the inspection. A Field Sketch of conditions is shown as Plate 1. The complete visual inspection check list is given in Appendix III. No record was found of any previous inspections.

3.1.2 Dam: The embankment had no surface cracks; however, there were numerous areas of slumping at the downstream toe and on the downstream face of the embankment. The downstream face was extremely overvegetated with pine trees, thick brush, and high grass. The extent of erosion and/or slumping on this face was difficult to determine due to the excess vegetation, but there were visible gullies present. The entire toe was wet and marshy, with occasional pools of standing water visible at and beyond the toe. There were two flowing seeps, one a few feet to the left of the principal spillway outlet and one approximately 20 feet downstream of the outlet on the right bank, with an estimated flow rate of 2 gallons per minute each. Both seeps appeared to be clear.

The vertical alignment of the crest varies by approximately 1.8 feet along its length. The horizontal alignment was difficult to observe due to the heavy vegetation present; however, it appeared to be good. There were vehicle tracks, as well as cow paths, running along the crest. Cow paths were also present along the lake's edge on the upstream embankment. There was no riprap present on the upstream face or elsewhere on the dam.

The junctions of the abutments and downstream embankment were damp, and erosion gullies

were beginning to form in these areas. There was an erosion gully approximately 1 foot deep on the right abutment near the junction with the downstream embankment. The junction between the emergency spillway and the dam had been eroded and was no longer well-defined. Slumping was also evident in this area.

3.1.3 Appurtenant Structures: The principal spillway intake structure is a vertical 8.5 inch diameter corrugated metal pipe surrounded by a vertical 18 inch diameter corrugated metal pipe acting as a trash rack. A ring of small holes perforate the trash rack 4 inches below the top. At the time of the inspection, the holes were partially clogged with weeds. The outlet pipe is of heavy gage and its original coating of bituminous is almost entirely worn away. The end of the pipe is flanged. The outlet conduit protrudes directly from the toe of the embankment with no visible supporting structure. The discharge falls approximately 2 feet into a natural channel. There are no facilities for dewatering the reservoir.

The emergency spillway approach channel showed signs of erosion and sloughing of its side slopes. The discharge channel was very highly eroded in various areas. Approximately 100 feet downstream of the embankment within the discharge channel, a 7 foot deep and 6 to 8 foot wide erosion gully had formed. Small trees were growing in the spillway and a barbed wire fence extended across the spillway below the control section.

3.1.4 Reservoir Area: The reservoir slopes are gentle. There are cow paths and vehicle tracks surrounding the lake; there is slumping and erosion of the slopes associated with the paths and tracks. The western slopes are tree-covered while the eastern slopes are used as pastureland. Sedimentation was not observed, but it is not expected to be significant.

3.1.5 Downstream Channel: The outlet channel is very narrow and heavily overgrown with brush. There are no obstructions between the dam and U.S. Route 29, approximately 600 feet downstream. The road surface is at approximately the same

elevation as the dam crest. The downstream channel has a slope of approximately 0.9 percent. The side slopes are covered with high grass, thick brush, and trees. There is one residence between Route 29 and the dam, immediately downstream of the dam, that would be affected by a dam failure.

3.1.6 Instrumentation: There is currently no instrumentation at the dam site.

3.2 Evaluation: Generally, the dam and appurtenant structures are in fair to poor condition. The wet areas and seeps on and below the downstream embankment require further investigation to determine if they pose a threat to the stability of the dam. A qualified geotechnical engineering firm should be retained to perform a stability check of the dam. The slumping and erosion areas should be regraded and reseeded. All trees and brush on the embankment and along the outlet channel should be removed, as well as the small trees and fence within the emergency spillway. For trees with a trunk diameter greater than 3 inches, the root systems should be removed. Smaller trees and brush should be cut off at ground level. The trash rack covering the principal spillway intake should be cleaned. Vehicular traffic should be prohibited from the dam and its appurtenant structures. A staff gage should be installed to monitor reservoir levels above normal pool.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures: Regulation of flow from the reservoir is automatic. The reservoir level is maintained at normal pool, elevation 699.8 feet M.S.L., by means of the principal spillway riser crest. In the event that the reservoir level rises above elevation 700.9 feet M.S.L., water also flows past the dam through the 40 foot wide emergency spillway cut into the left abutment.

4.2 Maintenance of Dam: Maintenance of the dam is the responsibility of the owner.

4.3 Maintenance of Operating Facilities: There is no operating equipment at the dam.

4.4 Warning System: At the present time, there is no formal warning system or emergency action plan in operation.

4.5 Evaluation: Maintenance of the dam has been inadequate in the past and must be improved. A regularly scheduled inspection and maintenance program should be implemented. A formal warning system and emergency action plan should also be developed.

SECTION 5 - HYDRAULIC/HYDROLOGIC DATA

5.1 Design: No design data were available for use in preparing this report.

5.2 Hydrologic Information: No rainfall, stream gage, or reservoir stage records are maintained for this dam.

5.3 Flood Experience: No records were available.

5.4 Flood Potential: The Probable Maximum Flood (PMF), 1/2 Probable Maximum Flood (1/2 PMF), and the 100-year flood were developed and routed through the reservoir by use of the HEC-1 DB computer program (Reference 9, Appendix IV) and appropriate unit hydrograph, precipitation, and storage-outflow data. Clark's T_c and R coefficients for the local drainage areas were estimated from basin characteristics. The rainfall applied to the unit hydrograph was taken from publications by the U.S. Weather Bureau and the National Oceanic and Atmospheric Administration (References 16 and 17, Appendix IV). Rainfall losses for the 100-year flood were estimated at an initial loss of 1.5 inches and a constant loss thereafter of 0.15 inch per hour. An initial loss of 1.0 inch and a constant loss rate of 0.05 inch per hour were used for the PMF and 1/2 PMF.

5.5 Reservoir Regulation: Pertinent dam and reservoir data are shown in Table 1.1, Paragraph 1.3.3.

Regulation of flow from the reservoir is automatic. Normal flows are maintained by the crest of the riser at elevation 699.8 feet M.S.L. Water also flows past the dam through the ungated emergency spillway in the event water in the reservoir rises above an elevation of 700.9 feet M.S.L.

Outlet discharge capacity was computed by hand; reservoir area was planimetered from the Arrington, Virginia 7.5 minute USGS quadrangle; and storage capacity was computed by the HEC-1 program. All flood routings were begun with the reservoir at normal pool. Flow through the principal spillway was included in the routings.

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

TABLE 5.1 RESERVOIR PERFORMANCE

Item	Normal(a)	Hydrographs 100-year flood	1/2 PMF	PMF(b)
Peak flow, c.f.s.				
Inflow	0.5	458	1100	2219
Outflow	0.5	292	991	2219
Peak elev., ft. M.S.L.	699.8	702.4	703.6	704.3
Emergency spillway (c) (elev. 700.9 feet M.S.L.)				
Depth of flow, ft.	-	1.5	2.7	3.4
Average velocity, f.p.s.	-	5.7	7.6	8.5
Duration of flow, hrs.	-	5.4	28.0	29.9
Non-overflow section (c) (elev. 703.3 ft. M.S.L.)				
Depth of flow, ft.	-	-	0.3	1.0
Average velocity, f.p.s.	-	-	2.5	4.7
Total duration of over-topping, hrs.	-	-	0.3	0.7
Tailwater elev., ft. M.S.L.	672.8	-	-	-

(a) Conditions at time of inspection.
(b) 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 a region.
(c) Velocity estimates were based on critical depth at control section.

5.7 Reservoir Emptying Potential: There are no facilities for dewatering the reservoir.

5.8 Evaluation: Stevens Lake Dam is a "small" size - "high" hazard dam requiring evaluation for a spillway design flood (SDF) in the range between the 1/2 PMF and the PMF. Because of the risk involved, the 1/2 PMF has been selected as the SDF. The 1/2 PMF was routed through the reservoir and found to overtop the dam with a maximum depth of 0.3 foot with an average critical velocity of 2.5 f.p.s. Total duration of dam overtopping would be 0.3 hour. The spillway is capable of passing up to 28 percent of the PMF.

Conclusions pertain to present-day conditions and 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 located in the Blue Ridge geologic region of Virginia. The predominate deposit in the area is the Precambrian Age Lovingston formation of biotite granite, biotite gneiss, and biotite and quartz monzonite. Based on the visual inspection, it is suspected that the dam has no drainage system. How the dam is keyed into the foundation is unknown. As noted in the visual inspection, there are seeps and large wet areas, on and below the downstream embankment.

6.2 Embankment

6.2.1 Materials: There is no information available on the nature of the embankment materials. The area soils are generally low-plastic silts and clays.

6.2.2 Stability: There are no available stability calculations. The dam is 31 feet high and 18 feet wide. It has an estimated upstream slope of 3H:1V and a measured downstream slope of 3H:1V. The dam has a freeboard of 3.5 feet and is not considered to be subjected to a sudden draw down because there are no facilities for dewatering the reservoir.

According to the guidelines presented in Design of Small Dams by the 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 low-plastic fines (CL, ML), the recommended slopes are 3H:1V upstream and 2.5H:1V downstream. The recommended width is 16 feet. Based on these guidelines, the dam has adequate embankment slopes and width.

6.2.3 Seismic Stability: Stevens Lake 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. Based

on the Bureau of Reclamation guidelines, the width and slopes of the embankment are adequate. However, the visual inspection revealed seeps and large wet areas at the downstream toe and on the downstream face of the embankment. A qualified geotechnical engineering firm should be retained to perform a stability check of the dam.

Despite the inability of the spillway to pass the SDF (as described in Section 5 of this report), overtopping flows are shallow and only last 0.3 hour and the velocity is less than 6 f.p.s., the effective eroding velocity for a vegetated earth embankment. The badly eroded area of the emergency spillway discharge channel is approximately 100 feet downstream of the embankment, and in its present condition is not considered to have a detrimental effect on the functioning of the emergency spillway.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment: No engineering data was available for review. The dam and appurtenant structures are generally in fair to poor condition. Maintenance of the dam is inadequate. Visual inspection and office analyses indicate that the seeps and areas of wetness on and below the downstream embankment make a stability check of the dam necessary.

Using the Corps of Engineers' screening criteria for initial review of spillway adequacy, the 1/2 PMF was selected as the SDF for the "small" size - "high" hazard classification of Stevens Lake Dam. It has been determined that the dam would be overtopped by the SDF by a maximum depth of 0.3 foot with an average critical velocity of 2.5 f.p.s. Total duration of overtopping would be approximately 0.3 hour. The spillway is capable of passing up to 28 percent of the PMF.

Despite the inability of the spillway to pass the SDF, overtopping flows are shallow and only last 0.3 hour and the velocity is less than 6 f.p.s., the effective eroding velocity for a vegetated earth embankment. The badly eroded area of the emergency spillway discharge channel is approximately 100 feet downstream of the embankment, and in its present condition is not considered to have a detrimental effect on the functioning of the emergency spillway.

The spillway is adjudged as inadequate, but not seriously inadequate.

7.2 Recommended Remedial Measures: A qualified geotechnical engineering firm should be retained to perform a stability check of the dam.

A formal warning system and emergency action plan should be developed and put into effect as soon as possible for the protection of the occupants of the house immediately downstream of the dam.

The following repair items should be accomplished as part of the general maintenance of the dam:

1) Remove the trees and brush from the dam. For trees with a trunk diameter greater than 3 inches, the root systems should also be removed. Smaller trees and brush should be cut off at ground level. After this is done, the grass on the embankment should be cut regularly.

2) Clear the trash rack on the principal spillway.

3) Fill, regrade, and seed all areas where erosion has occurred.

4) Remove the scattered small trees from the emergency spillway. Consideration should also be given to moving the barbed wire fence further downstream where its tendency to catch debris will not restrict flows.

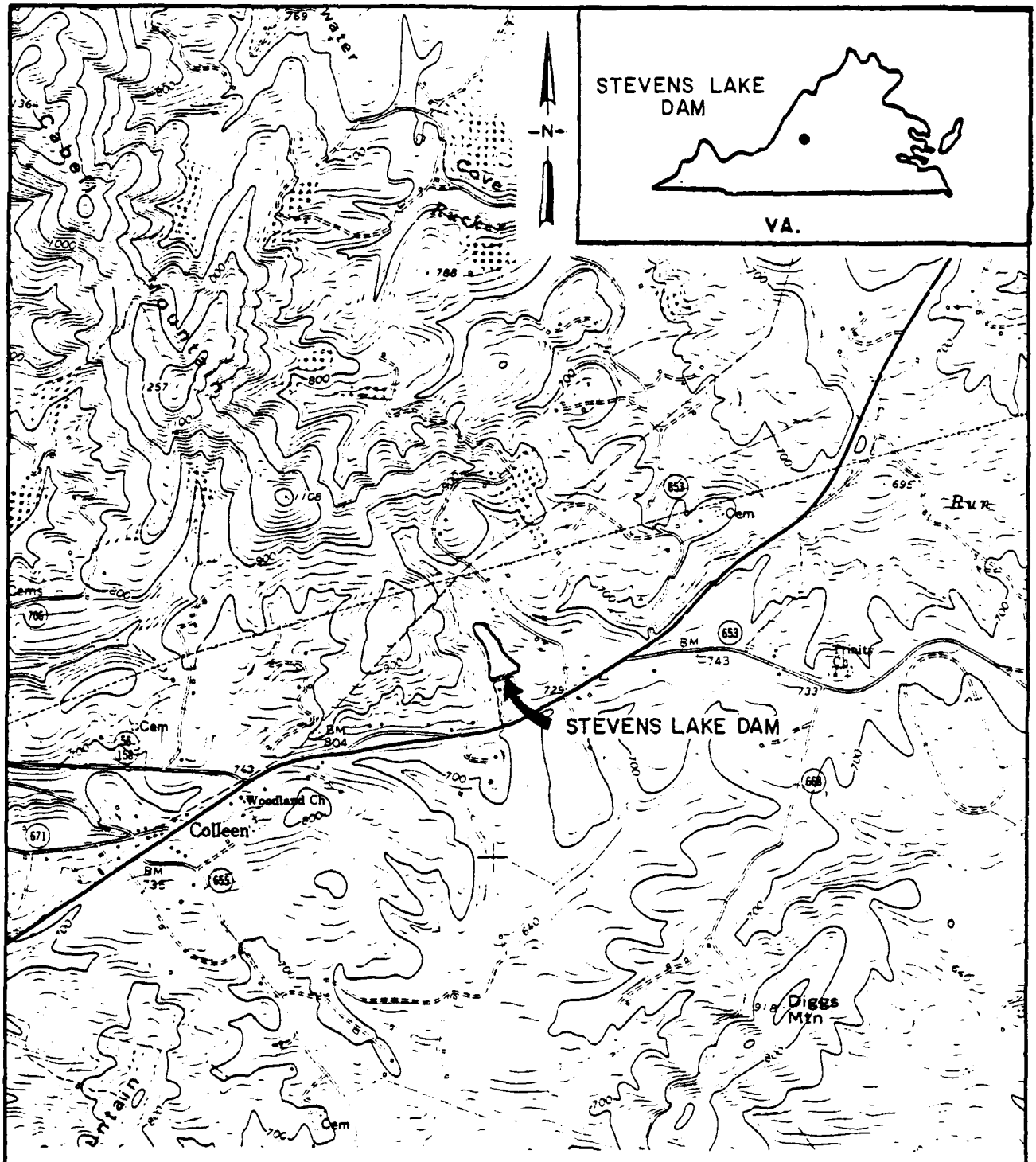
5) Install a staff gage to monitor reservoir levels above normal pool.

APPENDIX I

PLATES

CONTENTS

NAME OF DAM: STEVENS LAKE DAM



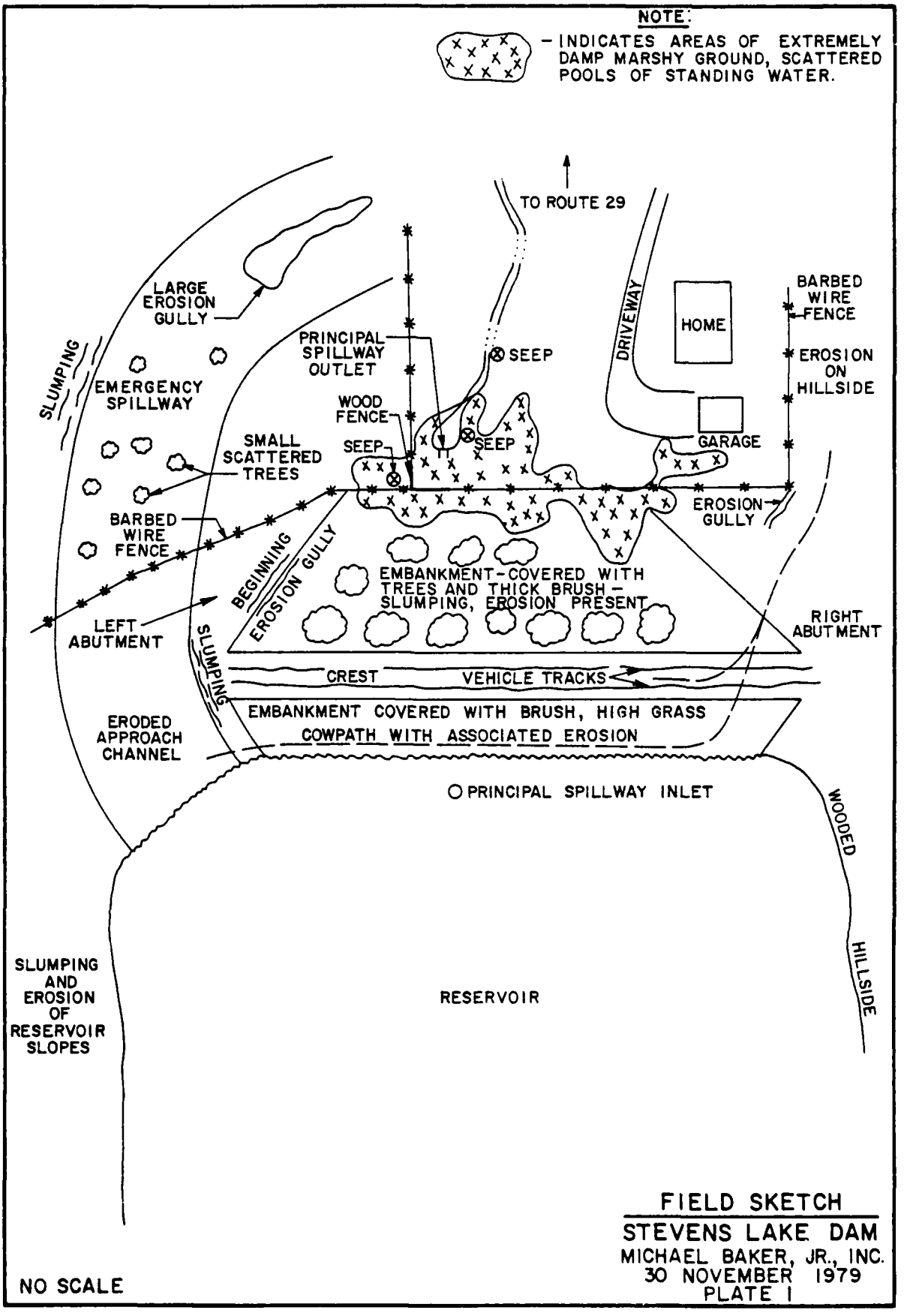
SCALE 1:24000

1 0 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

LOCATION PLAN


NOTE:
- INDICATES AREAS OF EXTREMELY DAMP MARSHY GROUND, SCATTERED POOLS OF STANDING WATER.
TO ROUTE 29
LARGE EROSION GULLY
SLUMPING
EMERGENCY SPILLWAY
PRINCIPAL SPILLWAY OUTLET
SEEP
DRIVEWAY
HOME
BARBED WIRE FENCE
EROSION ON HILLSIDE
WOOD FENCE
SEEP
SEEP
GARAGE
SMALL SCATTERED TREES
BARBED WIRE FENCE
EROSION GULLY
BEGINNING EROSION GULLY
EMBANKMENT-COVERED WITH TREES AND THICK BRUSH - SLUMPING, EROSION PRESENT
LEFT ABUTMENT
RIGHT ABUTMENT
SLUMPING
CREST
VEHICLE TRACKS
EMBANKMENT COVERED WITH BRUSH, HIGH GRASS
COWPATH WITH ASSOCIATED EROSION
ERODED APPROACH CHANNEL
PRINCIPAL SPILLWAY INLET
WOODED
HILLSIDE
SLUMPING AND EROSION OF RESERVOIR SLOPES
RESERVOIR
NO SCALE
FIELD SKETCH
STEVENS LAKE DAM
MICHAEL BAKER, JR., INC.
30 NOVEMBER 1979
PLATE 1

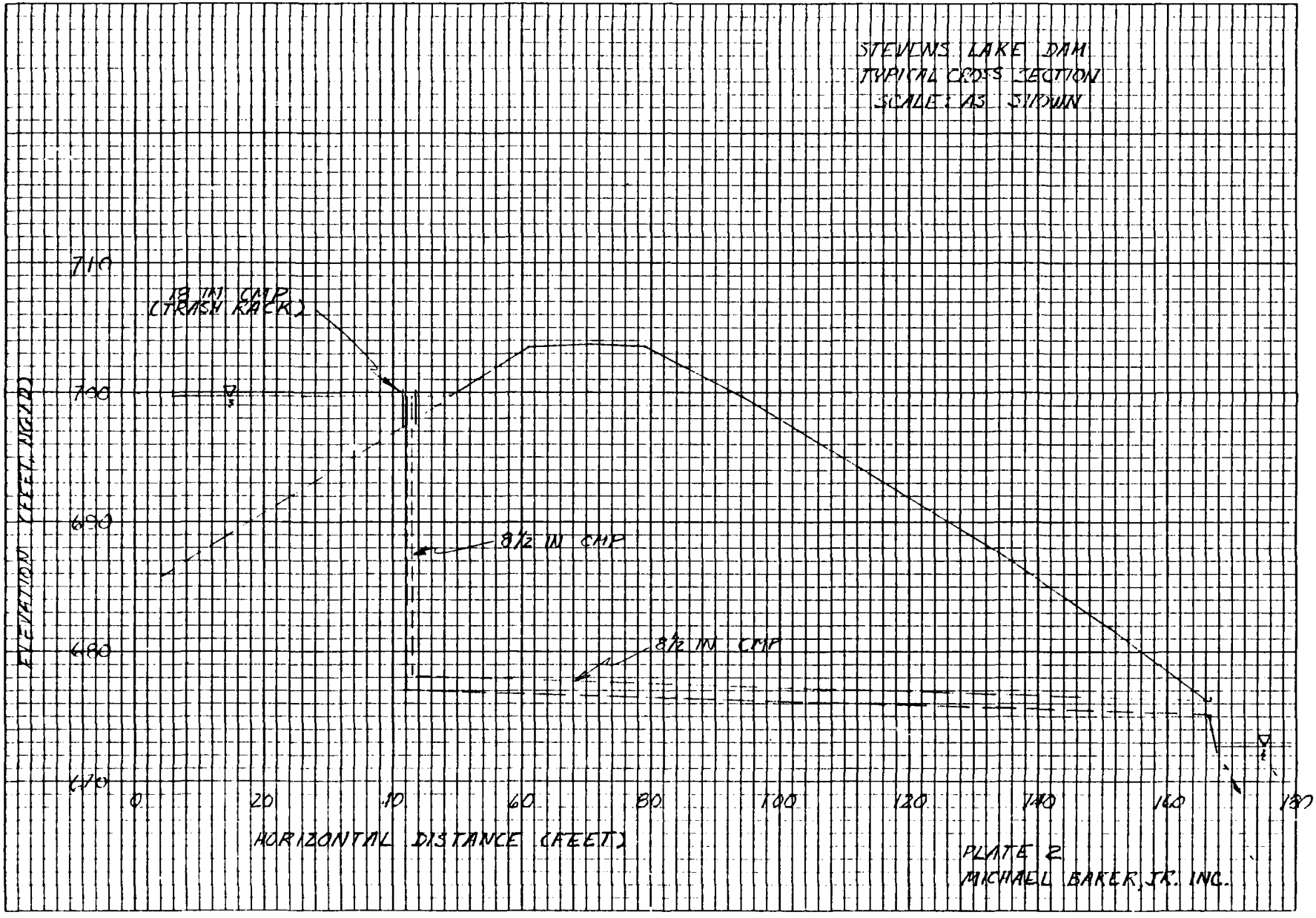


PLATE 2
MICHAEL BAKER, JR. INC.

STEVENS LAKE DAM
TOP OF DAM PROFILE
SCALE: AS SHOWN

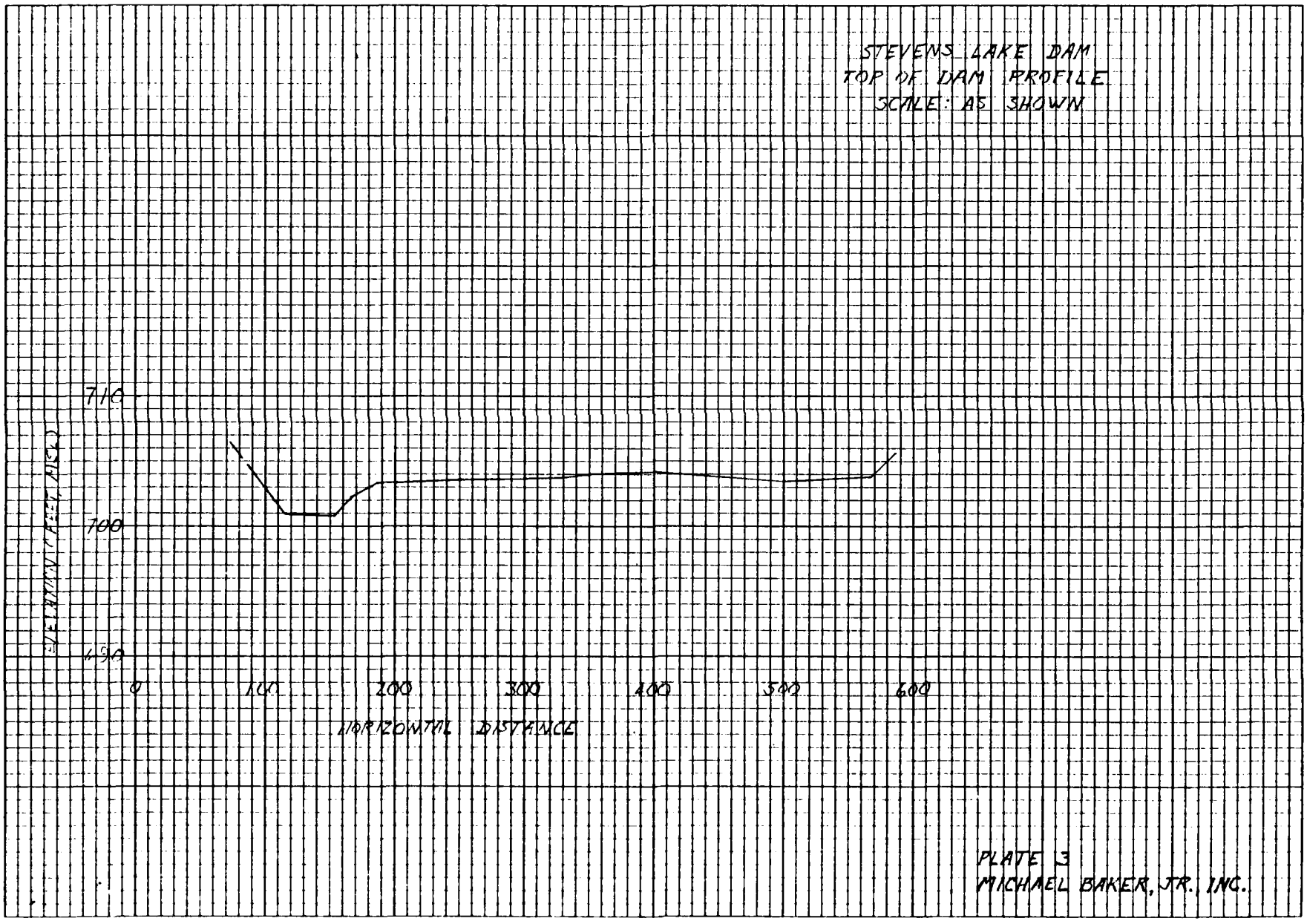
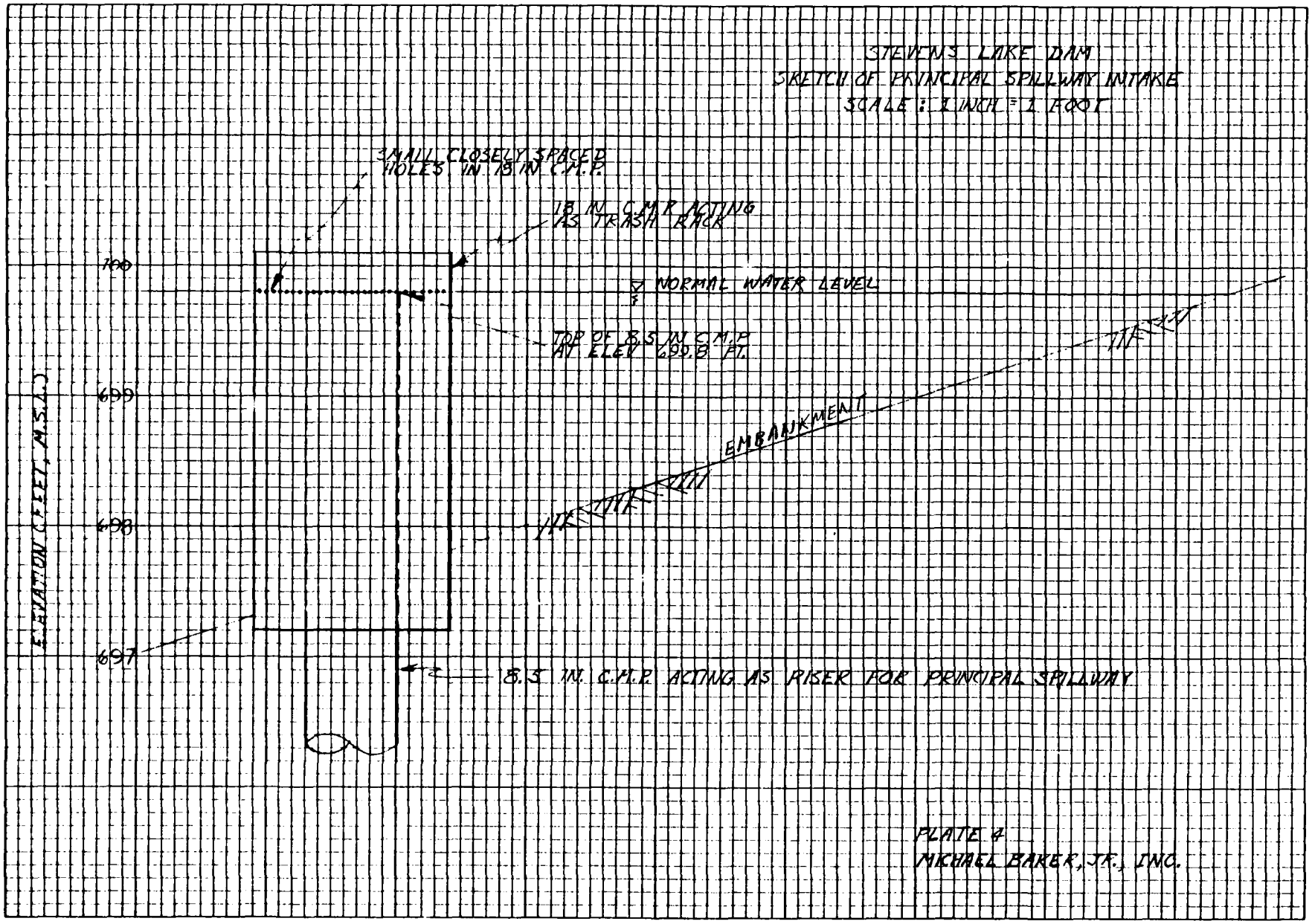


PLATE 3
MICHAEL BAKER, JR. INC.



APPENDIX II

PHOTOGRAPHS

CONTENTS

Note: Photographs were taken on 30 November 1979.

STEVENS LAKE DAM

PHOTO 1. Principal Spillway Intake

PHOTO 2. Principal Spillway Outlet

STEVENS LAKE DAM

PHOTO 3. Emergency Spillway from Upstream Left Abutment

PHOTO 4. Severe Erosion in Emergency Spillway Discharge Channel

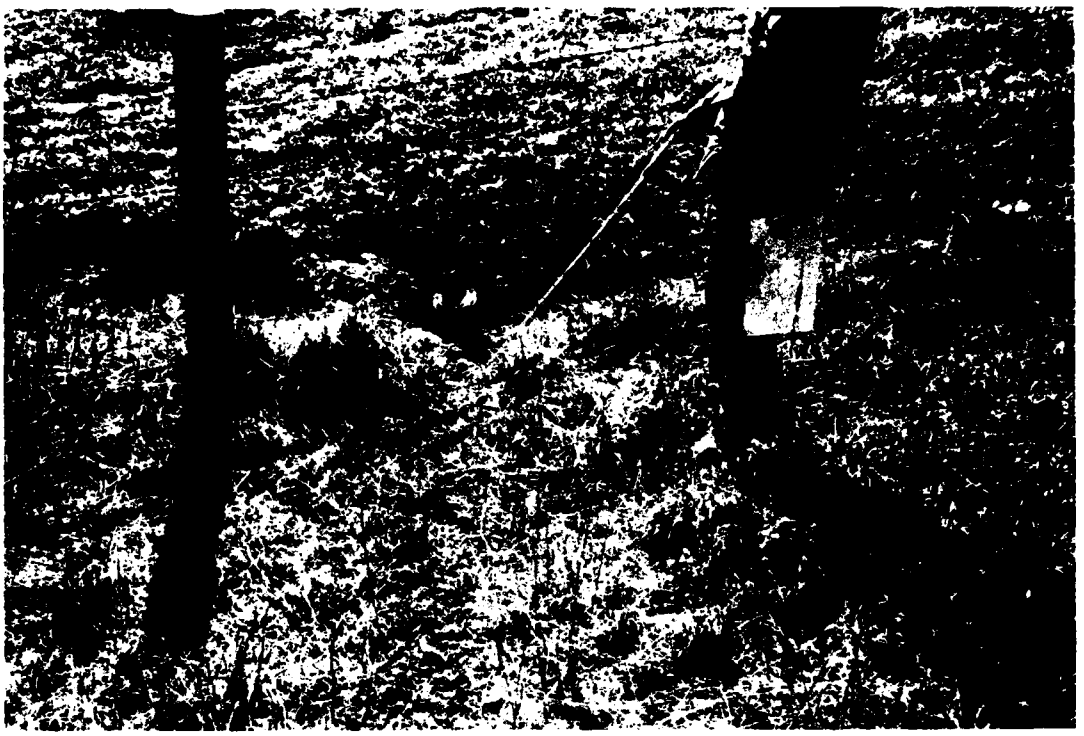


PHOTO 5. Erosion Gully in Right Downstream Abutment

PHOTO 6. Downstream Embankment Showing Excessive Vegetation

APPENDIX III

VISUAL INSPECTION CHECK LIST

Check List
Visual Inspection
Phase 1

Name of Dam Stevens Lake Dam County Nelson State Virginia **Coordinates** Lat. 3742.9

Long. 7855.0

Date of Inspection 30 November 1979 Weather Sunny, cold Temperature 45° F.

Pool Elevation at Time of Inspection 699.8 ft. M.S.L. Tailwater at Time of Inspection 672.8 ft. M.S.L.

Inspection Personnel:

Michael Baker, Jr., Inc:	Virginia State Water Control Board:	Owner's Representatives:
Jeffrey A. Quay	Edwin B. Constantine, III	None
James A. Kuncelman		
Leslie K. Black		

Leslie K. Black Recorder

EMBANKMENT

Name of Dam: STEVENS LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	There are numerous small areas of slumping along the toe.	All areas of slumping should be repaired and reseeded.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	There are numerous small areas of slumping on the downstream face of the embankment. There are vehicle tracks and cow paths on the crest of the dam and a cow path on the upstream face of the embankment. There is an erosion gully approximately 1 ft. deep in the right abutment downstream of the dam.	All areas of slumping and erosion should be repaired and reseeded.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The vertical alignment varies by approximately 1.8 ft. along the length of the crest. The embankment is heavily overgrown, which made observation difficult, but the horizontal alignment of the dam appears to be good.	
RIPRAP FAILURES	There is no riprap present on the dam.	

EMBANKMENT

Name of Dam: STEVENS LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATION	The embankment is heavily overgrown with long grass, thick brush, and small to medium size pine trees.	All trees and brush should be removed. For trees with a trunk diameter greater than 3 in., the root systems should be removed. Smaller trees and brush should be cut off at ground level.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	The junctions of the abutments and downstream embankment are damp and erosion gullies are beginning to form in these areas. The junction of the spillway and dam is no longer well-defined because of the erosion that has taken place in this area; there was also slumping here.	All areas of erosion and slumping should be repaired and reseeded.
ANY NOTICEABLE SEEPAGE	A large area below the toe of the dam is very wet as is much of the downstream face of the embankment. There were numerous areas containing standing water at the time of the inspection. Two flowing seeps were located, one a few ft. to the left of the principal outlet (estimated flow, 2 g.p.m.), and one on the right bank approximately 20 ft. downstream of the toe (estimated flow, 2 g.p.m.). Both appeared to be clear.	This extensive seepage should be investigated further to determine if it threatens the stability of the dam.
STAFF GAGE AND RECORDER	None present	A staff gage should be installed.
DRAINS	None observed	

OUTLET WORKS

Name of Dam: STEVENS LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
OUTLET CONDUIT	The outlet conduit is an 8.5 in. diameter C.M.P. of a very heavy gage. The pipe was originally coated with bituminous, but this coating is almost completely worn away. The end of the pipe is flanged.	
INTAKE STRUCTURE	The intake structure is a vertical 8.5 in. diameter C.M.P. surrounded by a vertical 18 in. diameter C.M.P. acting as a trash rack. The 18 in. pipe rises 4 in. above the top of the 8.5 in. pipe. A ring of closely-spaced small holes have been punched in the 18 in. pipe 4 in. below the top. The holes in the 18 in. pipe are partially clogged with weeds.	
OUTLET STRUCTURE	The outlet conduit protrudes directly from the toe of the embankment with no visible supporting structure. The discharge falls approximately 2 ft. into a natural channel.	
OUTLET CHANNEL	The outlet channel is very narrow and heavily overgrown with brush.	
EMERGENCY GATE	There are no facilities for dewatering the reservoir.	

UNGATED SPILLWAY

Name of Dam: STEVENS LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	None present	
APPROACH CHANNEL	Moderate erosion and some slumping of the side slopes has taken place. Vegetation consists of short grass and some very small trees.	The small trees should be removed.
DISCHARGE CHANNEL	The discharge channel is highly eroded in scattered areas. There is an erosion channel 7 ft. deep and 6 to 8 ft. wide approximately 100 ft. downstream of the embankment. Vegetation consists of short grass and some very small trees. A barbed wire fence stretches across the discharge channel just below the control section.	The small trees should be removed. The barbed wire fence will catch debris and reduce the capacity of the emergency spillway during a major flood, and should therefore be moved farther downstream.
BRIDGE AND PIERS	Not Applicable	

INSTRUMENTATION

Name of Dam: STEVENS LAKE DAM

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	No permanent markers were found.	
OBSERVATION WELLS	None observed	
WEIRS	None	
PIEZOMETERS	None observed	
OTHER		

RESERVOIR

Name of Dam: STEVENS LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir slopes are gentle. There are cow paths and vehicle tracks surrounding the lake; there is slumping and erosion of the slopes associated with the paths and tracks. The western slopes are tree-covered and the eastern slopes are used as pastureland.	
SEDIMENTATION	Sedimentation was not observed, but is not expected to be significant.	

DOWNSTREAM CHANNEL

Name of Dam: STEVENS LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel is very narrow and overgrown with brush but there are no obstructions between the dam and U.S. Route 29, approximately 600 ft. downstream. Route 29 is a four lane, divided highway in this area. The top of road is at approximately the same elevation as the dam crest.	
SLOPES	The downstream channel has a slope of approximately 0.9%. The side slopes are covered with high grass and some brush and trees.	
APPROXIMATE NO. OF HOMES AND POPULATION	There is only one residence between Route 29 and the dam, immediately downstream of the dam.	In the event of a dam failure, the flood wave should not be able to move downstream farther than U.S. Route 29.

APPENDIX IV

GENERAL REFERENCES

GENERAL REFERENCES

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