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NATIONAL DAM SAFETY PROGRAM. GREENE ACRES (ID NUMBER VA-07903),--ETC(U)
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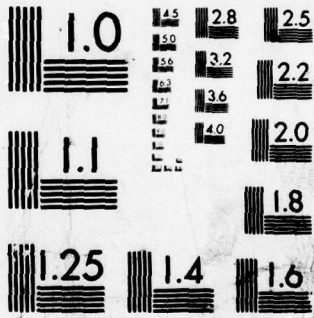
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MICROCOPY RESOLUTION TEST CHART
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RAPPAHANNOCK RIVER BASIN

Name Of Dam: Greene Acres

Location: Greene County, State of Virginia

Inventory Number: VA 07903

LEVEL #

**PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM**

ADA073615



DACW-65-78-D-0016
MARCH 1979

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PREPARED FOR

**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 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.

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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.

**PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM**

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NAME OF DAM: GREENE ACRES

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Greene Acres
State: Virginia
County: Greene
Stream: Tributary of South River
Date of Inspection: 27 November 1978

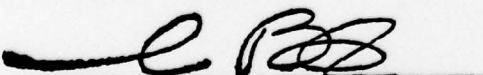
BRIEF ASSESSMENT OF DAM

Greene Acres Dam, an earthen dam approximately 37 feet high and 900 feet long, is owned by the First American Group of Companies and was designed by R. M. Bartenstein and Associates. The visual inspection and review of available engineering data indicate no deficiencies requiring immediate attention.

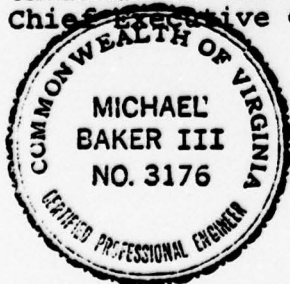
The emergency spillway will pass 56 percent of the Probable Maximum Flood without overtopping the dam which is considered adequate for the "small" size-"high" hazard classification of Greene Acres Dam. Visual observations during the inspection indicated no evidence of embankment instability or piping of an emergency nature. However, an area of sloughing along the crest was observed, and it is recommended that further visual inspection and a stability analysis be conducted.

It is recommended that riprap be placed along the embankment at the waterline to protect against wave erosion. Riprap should also be placed in the channel from the overflow pipe to prevent further erosion. The downstream channel should be improved to allow normal drainage away from the toe of the dam. An annual maintenance and inspection program should be instituted at which time minor maintenance items could be accomplished including removing small trees and brush from the embankment, and filling and seeding bare areas and erosion gullies on the embankment and in the emergency spillway.

MICHAEL BAKER, JR., INC.



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



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Chief, Engineering

APPROVED:

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

Date

MAR 13 1979

NAME OF DAM: GREENE ACRES



OVERALL VIEW OF DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM: GREENE ACRES ID# VA 07903

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. 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: Greene Acres Dam is a homogeneous earthfill dam approximately 37 feet high and 900 feet long. Side slopes of the dam are approximately three horizontal to one vertical (3:1) on the upstream side and 2:1 on the downstream side. The crest width of the dam is 17 feet. Seepage control is provided by a cutoff trench and toe drain.

The principal spillway consists of 24 inch diameter C.M.P. extending approximately 70 feet through the embankment about 200 feet from the right abutment. This overflow structure has a 5 foot vertical section of pipe in the reservoir with a crest elevation of 95.0 feet P.D.* The pipe, with an exit invert of 88.0 feet P.D., empties into a concrete-lined channel which extends along the abutment beyond the toe of the dam and into an open channel near the toe.

* P.D. - Plan datum is approximately 630± feet above U.S.G.S. datum.

NAME OF DAM: GREENE ACRES

The emergency spillway; a 170 foot wide, earth, side-channel type; is located in the left abutment area of the dam and has a crest elevation of 97.0 feet P.D.

The toe drain consists of 6 inch diameter perforated B.C.C.M.P. with granular backfill. The toe drain extends approximately 150 feet right and 200 feet left of the reservoir drainpipe.

The reservoir is used solely for recreation as part of the Greene Acres Development Area. The homes around the lake are both summer homes and permanent homes. The reservoir has a drain at the toe near the center of the dam. The drain is operated by a 10 inch gate valve.

- 1.2.2 Location: Greene Acres Dam is located on a tributary to the South River approximately 2 miles northwest of Standardville, Virginia. The dam is located off State Route 637 about 1.4 miles northwest from its intersection with State Route 230. A Location Plan is included in this report.
- 1.2.3 Size Classification: The maximum height of the dam is 37 feet and the reservoir storage capacity to the top of dam elevation is 341 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: Several homes are located in the area immediately downstream from the dam. Due to the possible loss of life in the event of a failure, the dam is considered in the "high" hazard category as defined by Section 2.1.2 of 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 the First American Group of Companies of Fallingwaters, West Virginia. Currently, Greene Acres Property Owners Association is investigating purchase of the property.

NAME OF DAM: GREENE ACRES

- 1.2.6 Purpose of Dam: The dam is used solely for recreational purposes.
- 1.2.7 Design and Construction History: The dam was designed by R. M. Bartenstein and Associates of Warrenton, Virginia in 1969. The dam, completed in 1970, was constructed by Kibler Construction Company of Luray, Virginia.

Letters and memorandums (Appendix V) between the designer, project geologists, and contractor indicate partial construction history and information.

According to the correspondence, the contractor encountered solid bedrock at less than a 6 foot depth while excavating for the cutoff depth. The design plans specified the drainpipe as 10 inch diameter cast-iron; however, reports indicate that 20 inch diameter, 1/4 inch thick, steel, gas pipe was approved as a substitute at the request of the contractor. Excavated material from the spillway borrow area was indicated to be used along the upstream toe as a blanket material since it was highly impervious and the least stable.

- 1.2.8 Normal Operating Procedures: No formal operating procedures are followed for this dam. Normal pool is maintained by the vertical section of 24 inch C.M.P. with a crest elevation of 95.0 feet P.D. Excess flows are diverted past the dam through the emergency spillway with a crest elevation of 97.0 feet P.D. The reservoir drain (10 inch gate valve) is not operated periodically.

1.3 Pertinent Data

- 1.3.1 Drainage Area: The drainage area of Greene Acres Dam is 0.64 square miles.
- 1.3.2 Discharge at Dam Site: The maximum discharge at the dam site is unknown.

Principal Spillway:

Pool level at emergency spillway crest	22 c.f.s.
Pool level at top of dam . .	31 c.f.s.

Emergency Spillway:

Pool level at top of dam . .	2998 c.f.s.
------------------------------	-------------

NAME OF DAM: GREENE ACRES

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 P.D. (a)	Area acres	Reservoir Capacity		Length feet
			Acre- feet	Watershed inches	
Top of dam	100.0	29.2	341	10.0	1900
Emergency spillway crest	97.0	25.4	271	8.0	1800
Principal spillway crest	95.0	23.0	230	6.7	1700
Streambed at centerline of dam	63 ₊	-	-	-	-

(a) All elevations are based on plan datum which is about 630₊ feet above U.S.G.S. datum.

NAME OF DAM: GREENE ACRES

SECTION 2 - ENGINEERING DATA

- 2.1 Design: The design data reviewed included the following information obtained from the design file:
- 1) Design drawings indicating typical section of dam, plan of dam, toe drains, overflow pipe, and emergency spillway profile. Plan and typical sections of the dam are included as Plates 1, 2, and 3 (Appendix I).
 - 2) Preliminary hydrologic and hydraulic design data including surface areas, storage capacity, drainage area, and time of concentration estimates.
 - 3) Miscellaneous correspondence including construction reports and memorandums (Appendix V).
 - 4) Soil tests data (Appendix VI) including liquid limits, plasticity index, and moisture content in the borrow areas and spillway.

All design data was borrowed from Mr. Richard Vogel of V. H. & D., Warrenton, Virginia, who was formerly employed with the designer of the dam.

- 2.2 Construction: The dam, constructed by Kibler Construction Company, was completed in 1970. Complete construction records were not available; however, miscellaneous construction reports and memorandums were in the design file.
- 2.3 Operation: No operational records are kept for Greene Acres Dam. No written record on the frequency of use of the reservoir drain was available. A local resident indicated that the drain is not periodically checked.
- 2.4 Evaluation:

- 2.4.1 Design: The hydrologic and hydraulic design data was used along with calculations made as part of this report to assess the adequacy of design. No as-built drawings or boring records were available for review to aid in assessing the stability of the dam. However, some data on soil tests was available (Appendix VI).

NAME OF DAM: GREENE ACRES

- 2.4.2 Construction: Complete construction records were unavailable for review. Miscellaneous reports and memorandums were useful to indicate modifications and changes made during construction (Appendix V).
- 2.4.3 Operation: The dam requires no formal operation and therefore has no operational records. The only operational feature of the dam is the 10 inch gate valve used as a reservoir drain.

NAME OF DAM: GREENE ACRES

SECTION 3 - VISUAL INSPECTION

3.1 Findings

3.1.1 General: The field investigation was made on 27 November 1978. The weather was rainy with a 33°F. temperature and a light cover of snow on the ground. The embankment and the appurtenant structures were found to be in satisfactory condition and do not require immediate remedial action.

3.1.2 Dam: The dam was in an adequate condition except for an apparent slough in the downstream slope on the right side near the crest. Evidence of a 300 foot long, steep scarp with a 2 to 4 foot height exists. There did not appear to be any easily observable bulge or cracks to signify distress in the embankment. This scarp did not appear to be the result of a recent sliding or erosion of the embankment. Reddish-brown, clayey silt with sand and traces of rock fragments was observed on most of the surfaces of the embankment. Snow and vegetation cover, including small trees on the slope, obscured detailed observations. The upstream slope (see Photo 1) has been severely eroded by wave action, which has cut a steep slope 2 feet high above the present shoreline.

Clear seepage was observed for a 50 foot width at the toe of the embankment 50 feet right of the reservoir drain. The clear seep has no defined flow and flow was too minimal to estimate (less than 1 g.p.m.). A small stream originates in the ditch just downstream from the end of the paved overflow ditch in the vicinity of the clear seepage (see Photo 3).

3.1.3 Appurtenant Structures: The inlet and outlet of the 24 inch C.M.P. overflow pipe appear to be in good physical condition and are able to function properly (see Photos 1 and 2). Water was about 0.5 foot below the crest of the overflow pipe. The 10 inch submerged blow-off pipe with a closed gate valve appears to be functional (see Photo 4). Water is ponded at the outlet of the pipe toe drain.

NAME OF DAM: GREENE ACRES

There is minor surface erosion, which has removed portions of the grass cover, in the emergency spillway (see Photo 5). Some clear seepage was observed from the end of the sod in the discharge channel of the emergency spillway (see Photo 6). There are several bare areas on the left cut slope.

- 3.1.4 Reservoir Area: The slopes in the reservoir area are satisfactorily vegetated with little or no erosion and sloughing.
- 3.1.5 Downstream Channel: The downstream channel of the paved overflow ditch has well-defined slopes of adequate depth in soil, and its banks are covered with bushes and trees. The outlet area for the pipe toe drains (not observed in the field) is swampy and the channel is poorly defined.
- 3.2 Evaluation: The most significant deficiency is the apparent slough along the upper portion of the embankment on the right side. However, there may have been additional grading on top of the dam which produced a slope steeper (1:1) than the overall downstream slope of 2:1, because there did not appear to be an obvious bulge or cracks in the embankment. Additional inspection is recommended in the area before corrective measures are taken. Trees and brush should be removed from the embankment. The amount of clear seepage at the toe of the dam to the right of the reservoir drain is small and could be flow from the toe drain which was not observed in the field. The overflow ditch is large enough to convey the spring which forms a stream past the end of the paved portion. The outlets for the toe drains near the 10 inch gate valve should be located, and adequate drainage from the toe of dam by a well-defined downstream channel should be provided. Riprap should be placed on the shoreline where wave action has undercut the upstream slope to prevent further erosion. The gullies in the emergency spillway should be filled, covered with topsoil, and seeded. A staff gage should be installed to monitor reservoir levels above normal pool. The cited deficiencies do not appear to seriously affect the immediate stability of the dam.

NAME OF DAM: GREENE ACRES

SECTION 4 - OPERATIONAL PROCEDURES

- 4.1 Procedures: Greene Acres Dam has no formal operating procedures since the dam is used solely for recreational purposes. The dam remains at normal pool level (95.0 feet P.D.) with excess flows passing through the emergency spillway at an elevation of 97.0 feet P.D. The reservoir drain is not operated periodically to check for proper functioning.
- 4.2 Maintenance of Dam: Maintenance of the dam is the responsibility of the First American Group of Companies. No regular maintenance inspections are routinely conducted.
- 4.3 Maintenance of Operating Facilities: Periodic inspection and opening of the 10 inch gate valve on the reservoir drain is not conducted. It is not known what type of maintenance is provided for the reservoir drain.
- 4.4 Warning System: At the present time, there is no warning system or evacuation plan in operation. It is recommended that a formal emergency procedure be prepared and prominently displayed, and furnished to all operating personnel. This should include:
- 1) How to operate the dam during an emergency.
 - 2) Who to notify, including public officials, in case evacuation from the downstream area is necessary.
 - 3) Procedures for evaluating inflow during periods of emergency operation.
- 4.5 Evaluation: Regular (at least annual) maintenance inspections should be conducted by qualified personnel, and recommendations for maintenance items should be reported to the owner.

NAME OF DAM: GREENE ACRES

SECTION 5 - HYDRAULIC/HYDROLOGIC DATA

- 5.1 Design: Partial hydrology and hydraulic design data was reviewed and used, where possible, in the computation of spillway adequacy for this report.
- 5.2 Hydrologic Records: No rainfall or stream flow records were available at the dam site.
- 5.3 Flood Experience: No exact high water marks were available; however, local residents indicated that the emergency spillway was activated during the June 1972 flood.
- 5.4 Flood Potential: Performance of the dam and reservoir by routing the Probable Maximum Flood (PMF), the 1/2 PMF, and the 100-year flood is shown in Table 5.1.

Surface area and storage capacity data were obtained from the design file and checked for accuracy. Outlet discharge capacity, hydrograph, and routing determinations were computed as part of this report. Flood routings were started assuming the reservoir level was at normal pool (elevation 95.0 feet P.D.).

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

Regulation of flow from Greene Acres Dam is automatic. Normal pool (elevation 95.0 feet P.D.) is maintained by the 24 inch C.M.P. overflow located approximately 200 feet from the right abutment. Water entering the overflow pipe flows through the embankment and exits into a concrete-lined, "v" shaped channel on the abutment just beyond its junction with the downstream embankment. Excess flows are diverted around the embankment through the ungated, earth, side-channel, emergency spillway in the event the reservoir level rises above the crest elevation of 97.0 feet P.D.

NAME OF DAM: GREENE ACRES

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

TABLE 5.1 RESERVOIR PERFORMANCE

Item	Normal	Hydrographs		
		100 Year	1/2 PMF	PMF
Peak flow, c.f.s.				
Inflow	-	1617	3240	6481
Outflow	-	318	2674	5844
Peak elev., ft. P.D.(a)	95.0	97.6	99.8	100.8
Emergency spillway				
Depth of flow, ft. (b)	-	0.4	1.8	2.5
Avg. velocity, f.p.s.	-	3.7	7.7	9.0
Duration of flow, hrs.	-	2.0	6.1	6.6
Non-overflow section				
Depth of flow, ft.	-	-	-	0.8
Average velocity, f.p.s.	-	-	-	2.3
Duration of overtopping, hrs.	-	-	-	0.9
Tailwater elev., ft. P.D.	62.7	-	-	-

(a) Plan datum is approximately 630+ feet above U.S.G.S. datum.

(b) Depth at control section, not including velocity head.

5.7 Reservoir Emptying Potential: Neglecting inflow, the time required to drawdown the reservoir from the crest of the overflow pipe (normal pool) is approximately 20 days.

5.8 Evaluation: Greene Acres Dam is classified according to COE criteria as a "small" size-"high" hazard structure requiring passage of a spillway design flood equal to 1/2 PMF. Greene Acres Dam will pass approximately 56 percent of the PMF without overtopping.

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

NAME OF DAM: GREENE ACRES

SECTION 6 - DAM STABILITY

6.1 Foundation and Abutments: Boring records were not available. Based on visual observations and soils information from the investigation for the design (Appendix VI), however, it was determined that less than 6 feet of sand and gravel were present in the bottom of the gully near the original stream. There is clayey and sandy silt on the slopes above. Bedrock is apparently quartz monzonite and granite with two outcrops shown on the site plan and others observed on the right side near the downstream toe of embankment. The bedrock is in the Lovingson Formation of the Virginia Blue Ridge complex. The cutoff trench had been designed to be 2 feet deep by 2 feet wide in soil on the slopes and approximately 6 feet deep by 30 feet wide to the bottom of the granular soils near the old stream channel. The cutoff trench was back filled with clay and silt.

6.2 Stability Analysis

6.2.1 Visual Observations: During the inspection, no unusual movement or cracking was noted beyond the toe. A 300 foot long section on the downstream side on the right abutment near the crest exhibited a steeper slope which was 2 to 4 feet high. The "scarp" appeared to be caused by localized slumping. The upstream slope above the present shoreline has been eroded by wave action which cut a steep slope 2 feet high and formed a small bench. Clear seepage was observed at the toe of the embankment in a 50 foot wide section to the right of the reservoir drain. Flow from the clear seep is non-measurable and could originate from the toe drain.

6.2.2 Design Data: No stability analyses were available.

According to design plans and field measurements, the side slopes are 3:1 on the upstream embankment and 2:1 on the downstream embankment with a crest width of 17 feet. Seepage control according to design plans is provided by a cutoff trench 20 feet wide and 2 feet deep, and toe drains consisting of 6 inch perforated B.C.C.M.P. extending along the toe of the dam and exiting on both sides of the reservoir drainpipe (seepage drain outlets were not observed during the field inspection).

NAME OF DAM: GREENE ACRES

According to the construction reports and memorandums in Appendix V, coarse soils from the borrow areas such as decomposed rock and clayey or silty sands were to be placed in the downstream section of the embankment. Excavated material from the spillway area was to be used in the flat portion of the embankment along the upstream toe because these soils were highly impervious and least stable. Materials excavated from the borrow area on the left abutment along the reservoir side of the spillway saddle were to be mixed by cutting through the surface plastic clays and obtaining the silty, sandy clays and clayey sands below. It was also noted that moisture content should be kept under control as some of the soils indicated moderate swell possibilities.

- 6.2.3 Operating Records: The structure has no instrumentation which would provide stability information. There were no inspection, maintenance, or operating records available.
- 6.2.4 Post-Construction Changes: No apparent post-construction changes have been made to the dam.
- 6.2.5 Seismic Stability: Greene Acres dam is located in Seismic Zone 2. Therefore, the dam is considered to have no hazard from earthquakes according to the Recommended Guidelines for Safety Inspection of Dams, provided static stability conditions are satisfactory and conventional safety margins exist.
- 6.3 Evaluation: Although no stability analyses were available for this review, it appears that the dam has been adequately constructed. The localized sloughing at the crest on the right side does not appear to have adversely affected the rest of the embankment in that area. The source of the clear seepage at the downstream toe is not known. The design plans indicate the outlet of the toe drain should be in the general area of the clear seepage and may be the source of the clear seep. The toe drains should be located, cleaned, and their flow directed away from the toe of the dam. If it is determined that the drains were not constructed, then an adequate means of draining the toe of the dam should be investigated. A thorough field inspection including surveyed cross-sections should be performed, especially on the right abutment, to assess the extent of the sloughing, and a stability analysis should be performed before a final evaluation can be made.

The owner should provide wave erosion protection on the upstream slope, and repair and protect eroded sections of the downstream toe near the overflow pipe.

NAME OF DAM: GREENE ACRES

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

- 7.1 Dam Assessment: The dam will pass 56 percent of the PMF without overtopping which is considered adequate according to the Recommended Guidelines for Safety Inspection of Dams for a "small" size-"high" hazard category. No boring logs or stability calculations were available for review; however, miscellaneous correspondence did indicate partial foundation investigations and soil tests. A section of the downstream embankment near the crest revealed possible sloughing. The area extends from near the right abutment 300 feet along the crest. Small trees and brush hindered observations, but no cracks or bulging indicating extreme embankment distress were evident.

Erosion was evident where the open concrete channel from the overflow pipe ends and the natural channel begins. Although the natural channel appears to have eroded to rock, any erosion at or near the toe of an earth dam is not desirable and should be remedied. Severe erosion from wave action was also evident on the upstream slope of the embankment along its entire length and has created a steep condition above normal pool. There was some erosion observed in the emergency spillway due primarily to the lack of adequate grass cover. However, the spillway size and discharge slope is sufficient to divert high discharges away from the embankment.

The area immediately downstream of the reservoir drain is rather swampy with flat slopes. The stream channel is not well-defined and, with the flat slopes, cannot remove all drainage from near the toe of the dam. Outlets to the toe drain, if they exist, were not found during the field inspection and could possibly be covered with soil or submerged by the water at the toe.

- 7.2 Recommended Remedial Measures: It is recommended that the owner have a visual inspection and stability analysis conducted due to the apparent sloughing on the downstream embankment at the crest. Also, a channel capable of providing adequate drainage away from the toe of the dam should be excavated. Outlets from the toe drains (shown on the plans but not observed during the field inspection) should be opened, and their flow should be directed to this channel. If the outlets and drain are not located or do not exist, a means of providing drainage through the dam should be investigated.

NAME OF DAM: GREENE ACRES

Protection against wave action on the upstream embankment near the waterline and against additional erosion in the earth section of the drainage channel from the overflow pipe should be provided by placement of riprap.

The inspection revealed certain preventative maintenance items which should be scheduled as part of an annual maintenance program. These are:

- 1) Remove all trees and brush growing on the embankments and obstructing flow in the downstream channel.
- 2) Fill and seed any erosion gullies and bare areas on the embankment and in the emergency spillway.
- 3) Maintain an adequate downstream channel to provide proper drainage from the toe of the dam.
- 4) Install a staff gage to monitor reservoir levels above normal pool.

NAME OF DAM: GREENE ACRES

APPENDIX I

PLATES

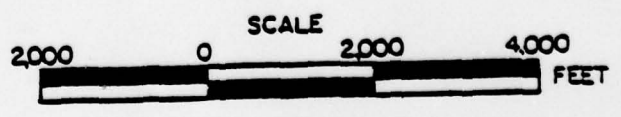
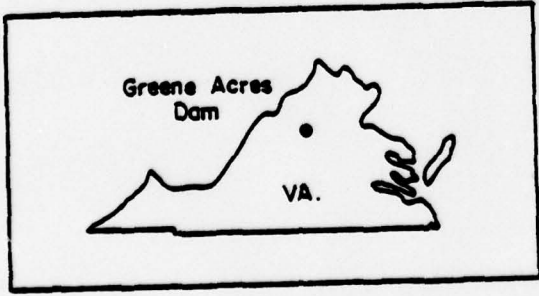
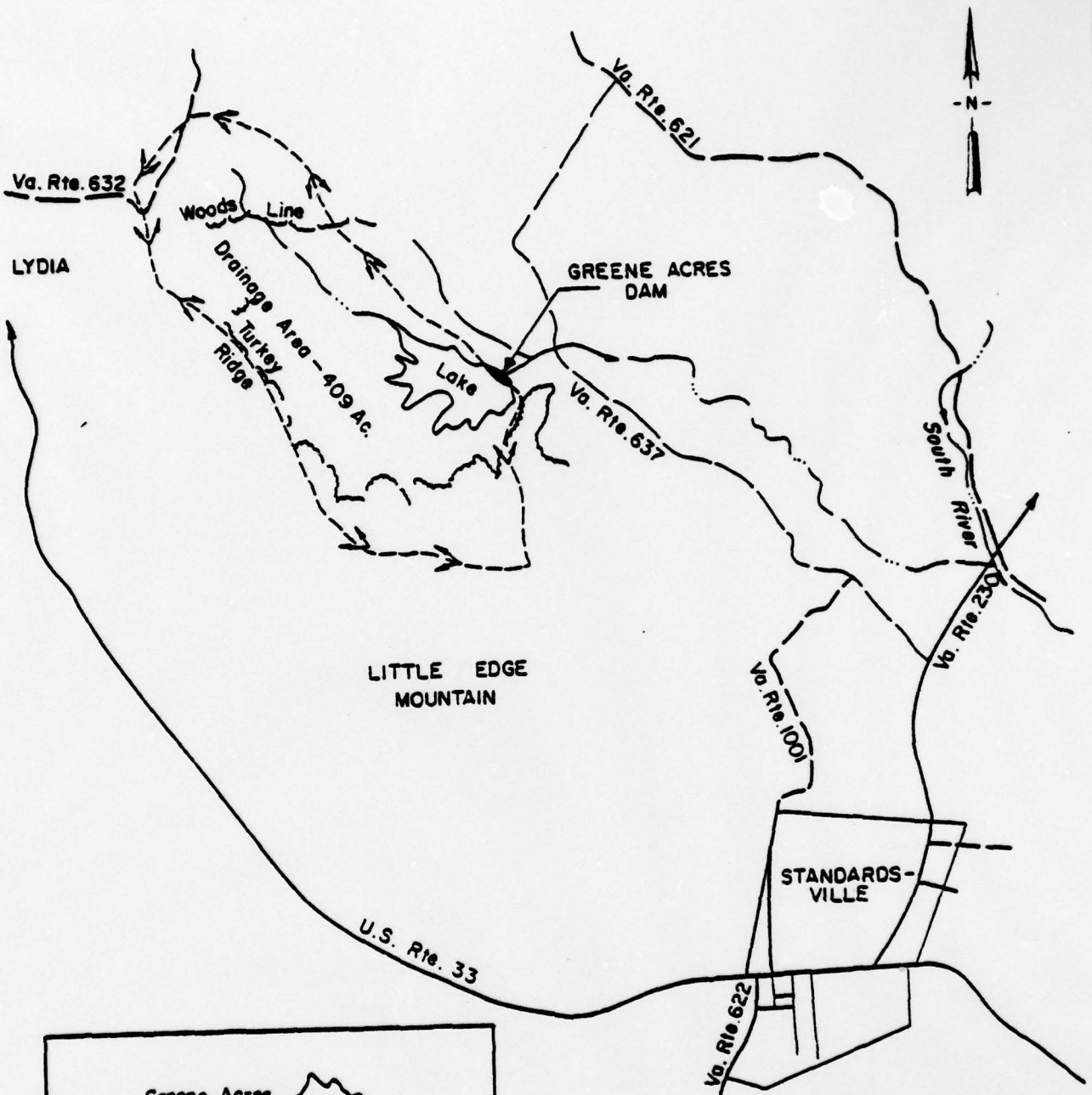
CONTENTS

Location Plan

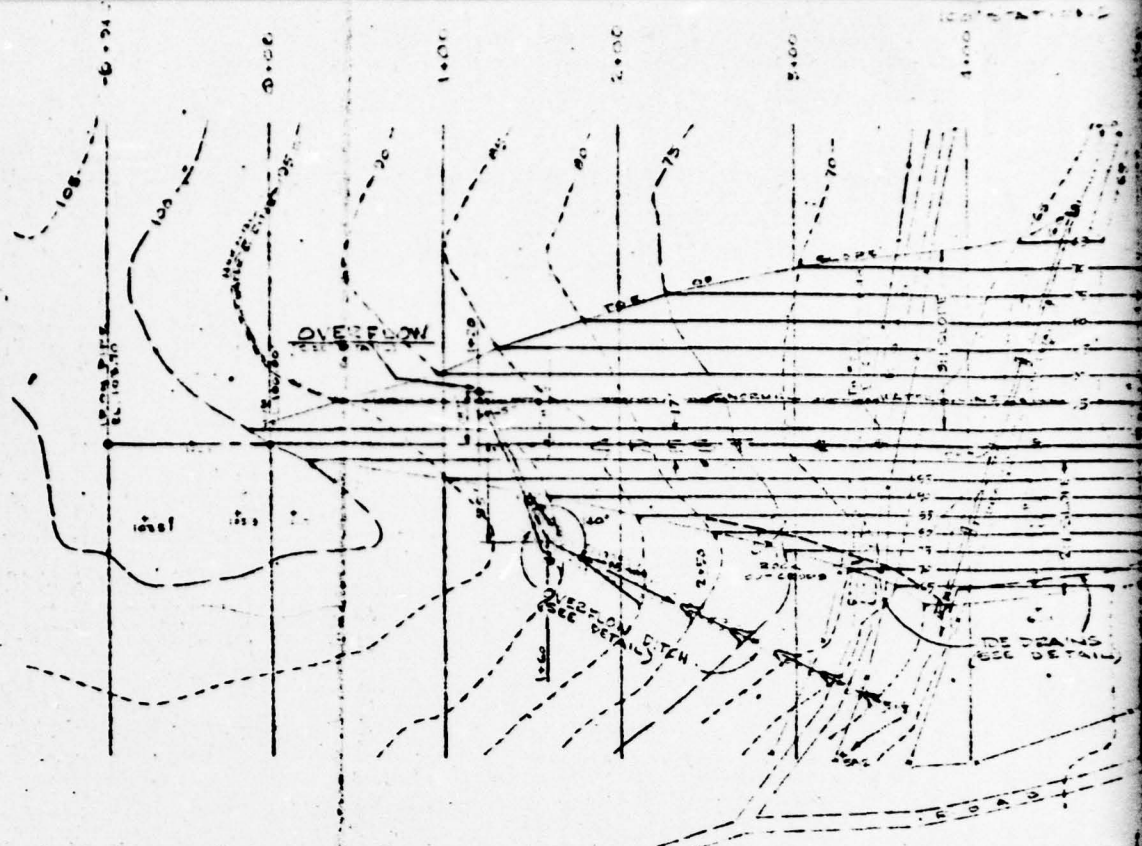
Plate 1: Plan and Profile of Dam

Plate 2: Typical Section and Details of Dam

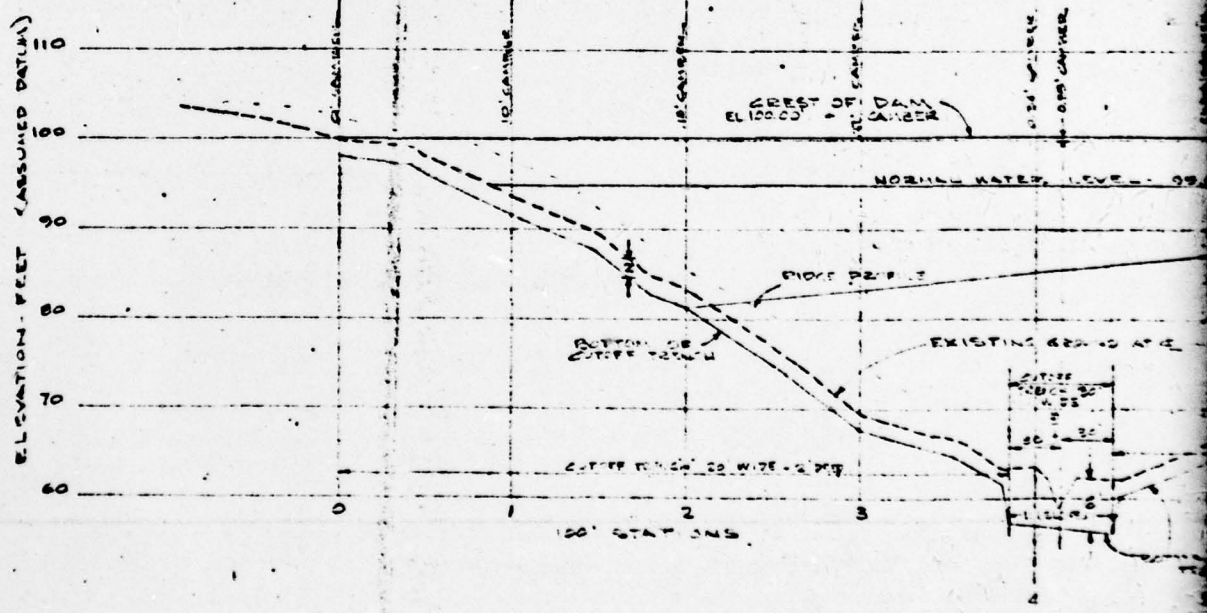
NAME OF DAM: GREENE ACRES



LOCATION PLAN
GREENE ACRES DAM

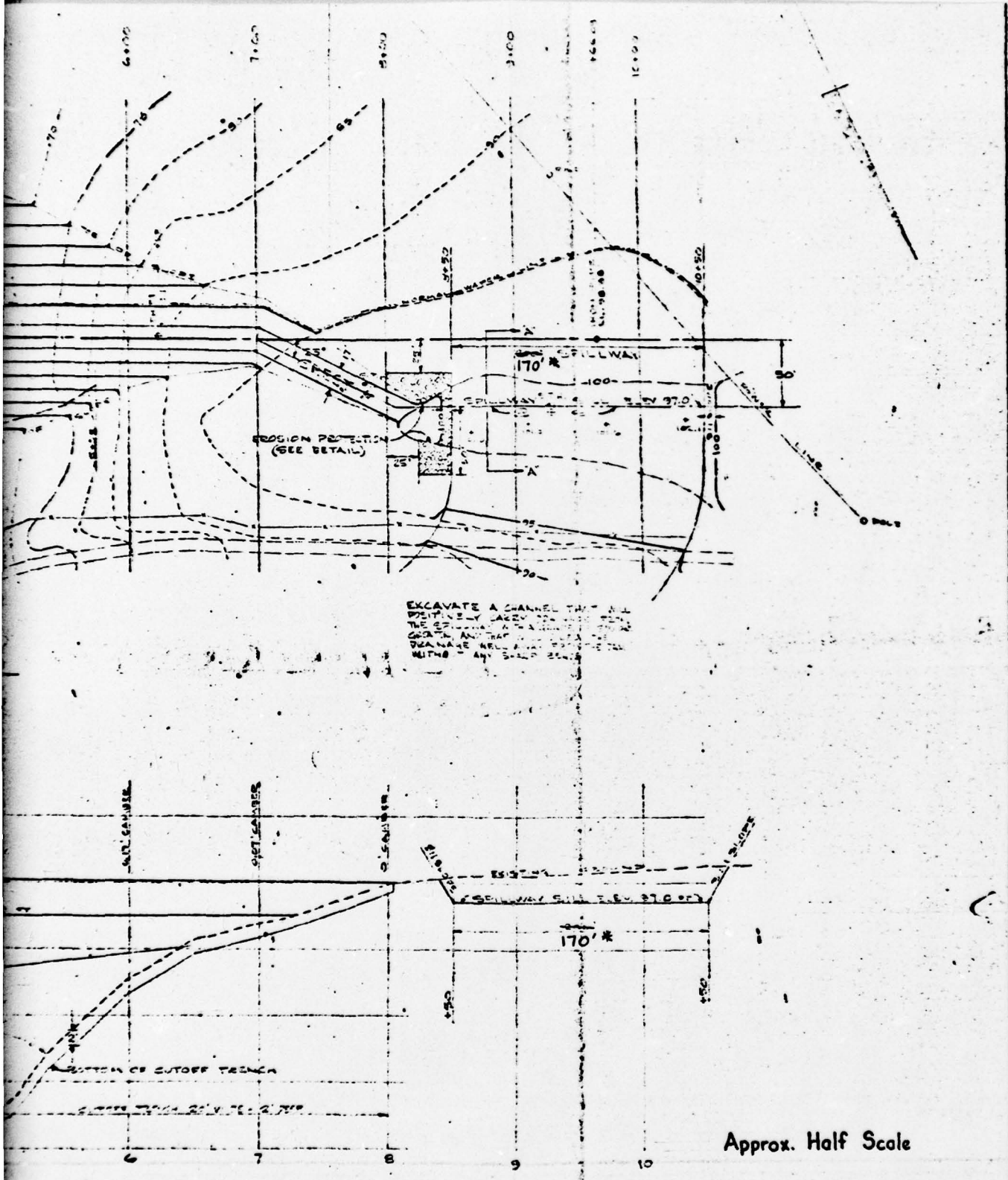


PLAN
1" = 50'



PROFILE
1" = 50' H = 10' V

* AS-BUILT CONDITIONS FOUND DURING MICHAEL B



EXCAVATE A CHANNEL THAT IS POSITIVELY SLOPED TO THE DOWNSTREAM SIDE OF THE SPILLWAY AND THAT WILL DRAINAGE ANY WATER THAT RUNS WITHIN ANY SLOPE STAKE

Approx. Half Scale

LEGEND

PROPOSED CHANNEL
 EXISTING CHANNEL
 PROPOSED SLOPE
 EXISTING SLOPE
 PROPOSED ELEVATION
 EXISTING ELEVATION

'GREENE ACRES' DAM
 GREENE COUNTY, VA.

REVISED:

CHECKED BY:

R. M. BARTENSTEIN & ASSOCIATES
 CONSULTING ENGINEERS AND SURVEYORS
 WARRINGTON AND MANASSAS, VIRGINIA

PROJECT NO. 2211

DRAWN BY: H.P.

DRAWING NO.

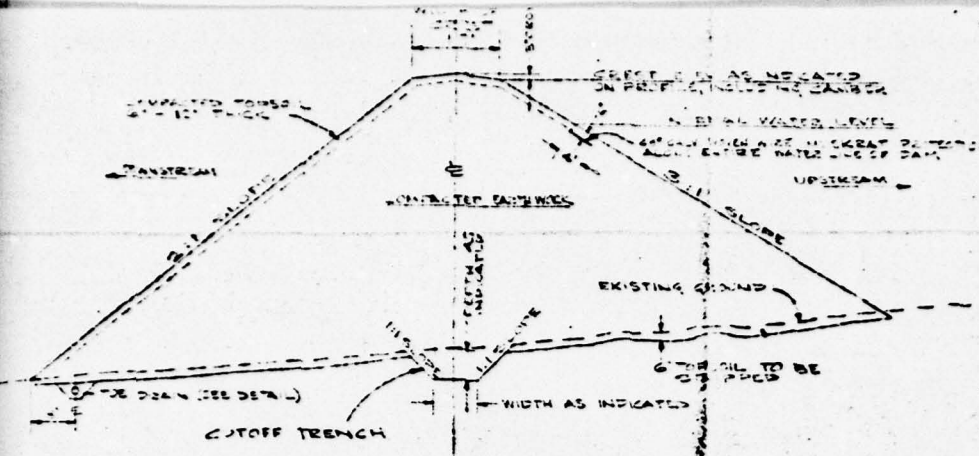
SHEET

OF

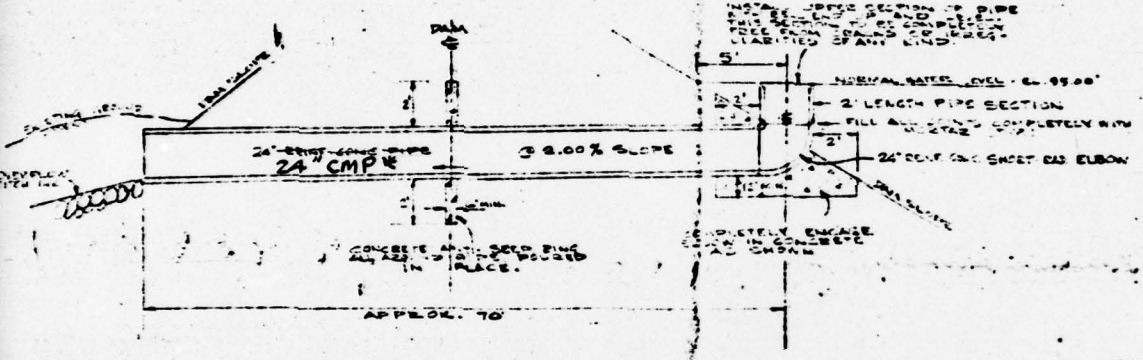
SCALE

AKER, JR., INC. FIELD INSPECTION ON 11/27/78

PLATE 1 2

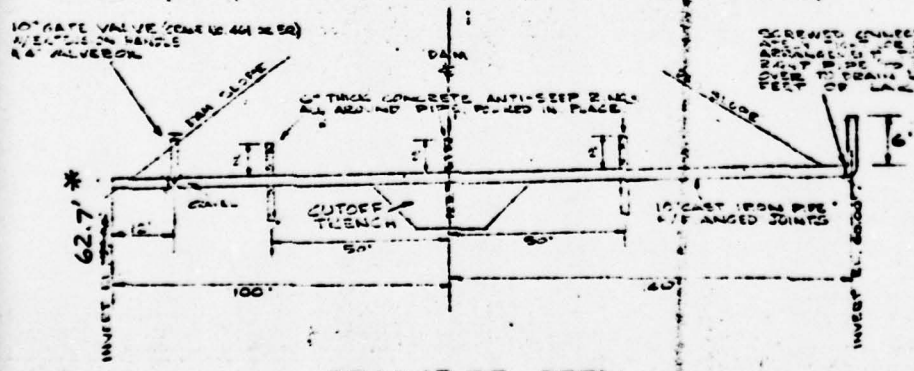


TYPICAL SECTION OF DAM
NO SCALE



OVERFLOW DETAIL
NO SCALE

NOTE: THE CONTRACTOR SHALL FURNISH TO THE DISTRICT FOR APPROVAL A DRAWING OF THE DIMENSIONS OF ELBOW AND UPPEX SECTION OF PIPE TO BE INSTALLED AND GROUND CONDITIONS INVERT ELEVATIONS AND HORIZONTAL DISTANCES TO BE USED FOR CONSTRUCTION.

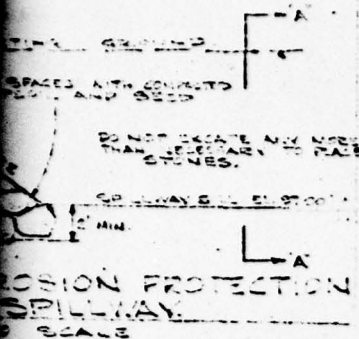


DRAINPIPE DETAIL
NO SCALE

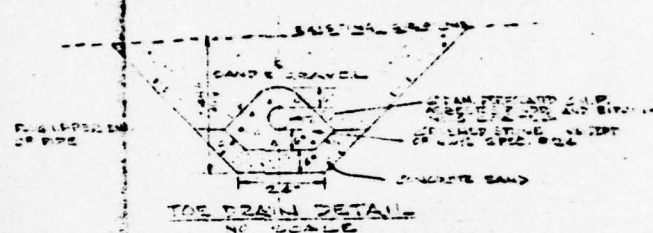
ELEVATION

1. CLEAR: Areas to be cleared of debris and vegetation.
2. EARTHWORK: Fill and compact earth in accordance with specifications.
3. EROSION PROTECTION: Take measures to prevent erosion on exposed surfaces.
4. PIPES:
 - a. The pipe shall be installed in accordance with specifications.
 - b. The pipe shall be supported by concrete blocks.
 - c. Care shall be taken to ensure proper alignment.
 - d. The pipe shall be protected from damage.
 - e. The pipe shall be installed in accordance with specifications.
5. RESTORATION:
 - a. All work shall be completed in accordance with specifications.
 - b. The work shall be completed in accordance with specifications.
6. MODIFICATIONS: No modifications shall be made without the approval of the District.

* AS-BUILT CONDITIONS FOUND DURING MICHAEL BAKER



SECTION A-A THRU SPILLWAY
NO SCALE



SPECIFICATIONS

to be excavated and/or flooded shall be cleared of all trees and bushes, and such items as buildings, fences and machinery, etc. and stumps shall be pulled or cut flush with the ground to leave no protrusions which could injure a swimmer or a boat. Topsoil of at least 6" and grass shall be removed from all areas to be excavated or filled and temporary stockpiled where directed in manner of engineer.

Material will be excavated from locations on the site as directed by the owner or the engineer. Care will be taken to use only which exhibits the most clay-like and impervious qualities available, excluding any appreciable quantities of sandy, rocky, gravelly or vegetable matter. Fill material shall be spread and thoroughly compacted by sheepfoot roller in layers not greater than 6" before compaction. Optimum moisture shall be maintained throughout compaction. All filled and excavated areas outside the water line of the lake shall be covered at a depth of 6", or as otherwise indicated, with a layer of topsoil compacted by roller. Earthwork shall be accurately and smoothly finished to the dimensions shown on the plans. (Continued below.)

Erosion protection where indicated in the plans shall consist of stones weighing an average minimum of 100 lbs. Care shall be taken that all voids between and around the stones shall be filled with thoroughly tamped soil to exclude all voids. Voids near the surface shall be filled with thoroughly tamped topsoil and seeded.

Overflow pipe shall consist of standard strength reinforced concrete pipe installed as indicated on the plans.

Drain line shall consist of extra strength cast iron pipe with flanged connections capable of withstanding tension at all points. Care shall be taken to insure that all pipe joints are completely watertight. Mortar shall be used liberally in all concrete pipe joints and approved gaskets in all cast iron pipe joints. All pipe shall be free in the inside of any irregularities.

Special care shall be taken to thoroughly handcompact soil completely around pipes and antiseep rings to preclude any voids. No pipe shall be in contact with pipe. Pipe shall be laid accurately on elevations and grades as shown on the plans. The overflow pipe shall be erected vertically, the rim of which shall be horizontal and placed accurately at the proposed normal lake water level.

Drains shall consist of 6" perforated C/P laid on an even grade at a constant downward pitch. Elbows shall be provided at the lower ends to direct drainage from under the dam at the low point. Drains shall be installed in ditches and surrounded by thoroughly compacted gravel and sand as shown on the plans.

Areas of construction outside of the normal waterline of the lake shall be seeded as soon as possible after completion of construction. 10-10-10 fertilizer shall be spread at the rate of 20 pounds per 1000 sq. ft. immediately before seeding. The ground will be covered by an approved seeds to a depth of at least 2". The seed shall consist of a mixture of one-half Kentucky bluegrass and half creeping red fescue, to be sown at the rate of 2 1/2 pounds per 1000 sq. ft.

Contractor shall restore the site as shown on the plans, where not otherwise specified, all ground, fences and other items encountered shall be restored to an equal or better condition than at the beginning of construction. Care shall be taken to avoid damage to trees and shrubbery not in the way of construction wherever possible. The contractor shall clean up and dispose of all excess material, and other debris resulting from construction and shall leave the entire site in a neat condition.

Deviations from these plans shall be made without notification of and the written consent of the engineer.

Compaction in the fill of material taken from the spillway shall be 95% of Standard Proctor 1-99 with optimum moisture deviation of 2-3%. Compaction in the fill of material from the remainder of the borrow area shall be 95% of Standard Proctor 1-99 with optimum moisture deviation of 2-3%.

"GREENE ACRES" DAM
GREENE COUNTY, VA.

REVISED:

CHECKED BY:

DRAWN BY: R. M. BARTENSTEIN & ASSOCIATES

R. M. BARTENSTEIN & ASSOCIATES
CONSULTING ENGINEERS AND SURVEYORS
WARRENTON AND MANASSAS VIRGINIA
PROJECT NO. 2-3-1-1

DRAWING NO. 11

SCALE
SHEET
11

PLATE 2

Approx. Half Scale

ER, JR., INC. FIELD INSPECTION ON 11/27/78

APPENDIX II

PHOTOGRAPHS

30

CONTENTS

- Photo 1: Corrugated Outlet Pipe Near Right Abutment**
- Photo 2: Concrete-Lined Drainage Channel From Outlet Pipe and Eroded Area**
- Photo 3: Clear Seepage at End of Concrete Drainage Channel**
- Photo 4: Gate Valve on Outlet of Reservoir Drainpipe**
- Photo 5: Left Abutment of Dam and Emergency Spillway**
- Photo 6: Exit Slope From Emergency Spillway**

Note: Photographs were taken on 27 November 1978.

NAME OF DAM: GREENE ACRES

GREENE ACRES DAM



PHOTO 1. Corrugated Outlet Pipe Near Right Abutment



PHOTO 2. Concrete Lined Drainage Channel From Outlet Pipe and Eroded Area

GREENE ACRES DAM

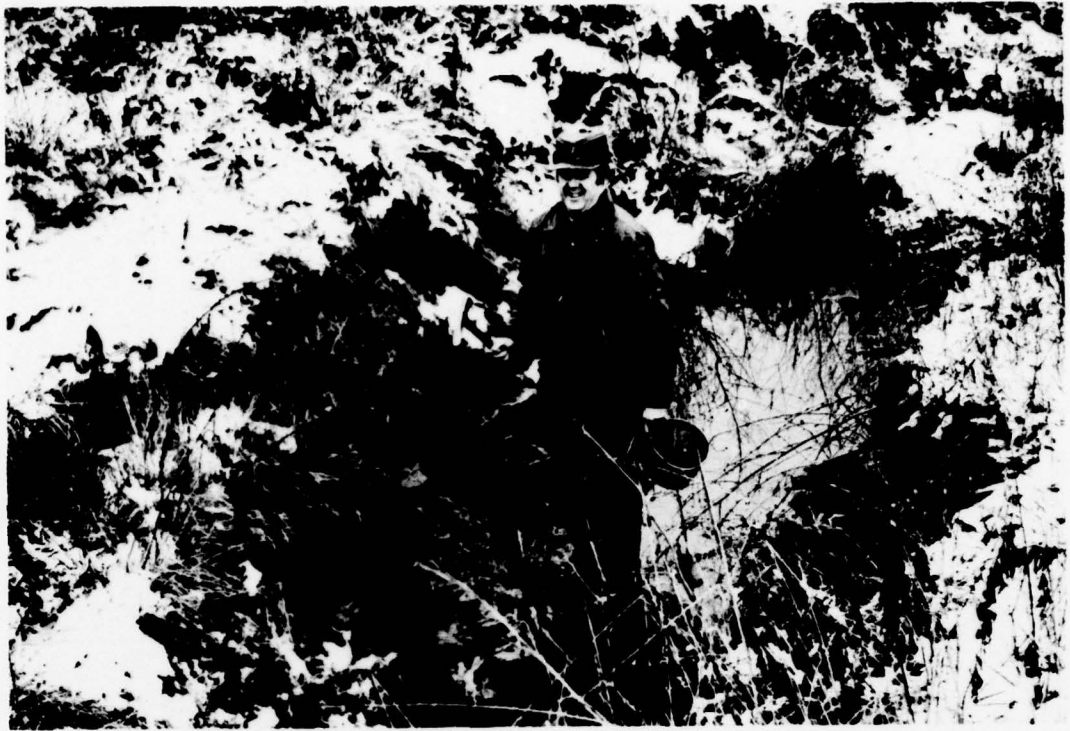


PHOTO 3. Clear Seepage at End of Concrete Drainage Channel

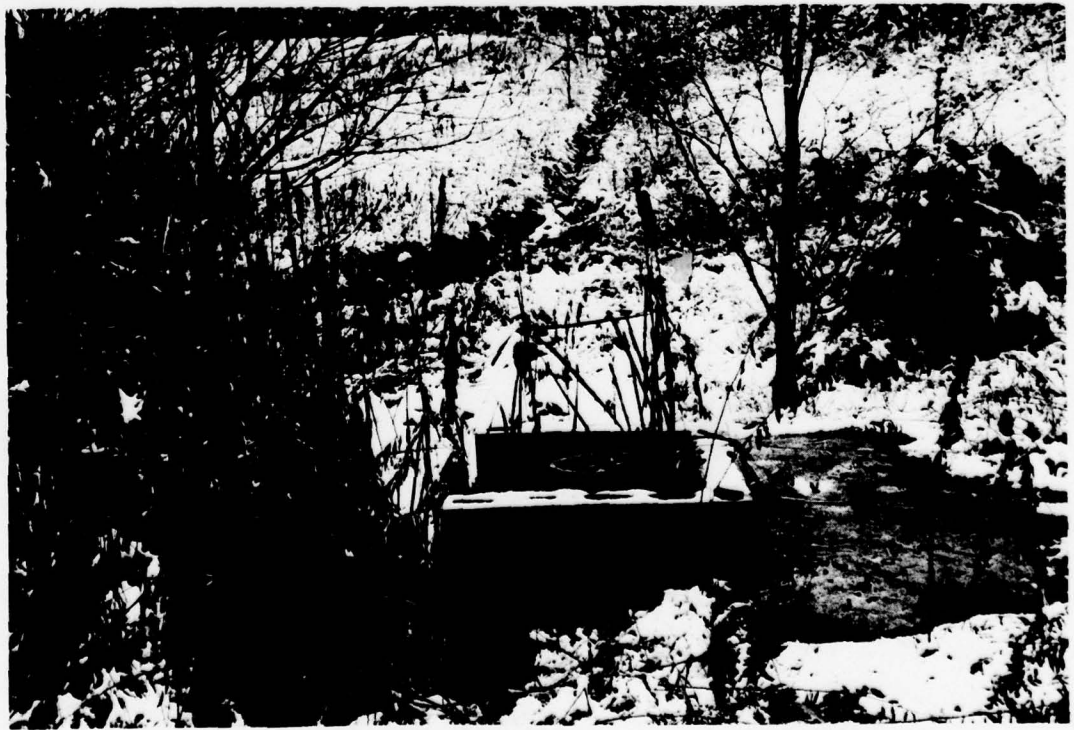


PHOTO 4. Gate Valve on Outlet of Reservoir Drainpipe

GREENE ACRES DAM



PHOTO 5. Left Abutment of Dam and Emergency Spillway



PHOTO 6. Exit Slope From Emergency Spillway

APPENDIX III

CHECK LIST - VISUAL INSPECTION

Check List
Visual Inspection
Phase 1

Name of Dam Greene Acres County Greene State Virginia Coordinates Lat. 3819.3
Long. 7827.1

Date Inspection 27 November 1978 Weather Rainy, Cold Temperature 33°F.

Pool Elevation at Time of Inspection 94.4 ft. P.D.* M.S.L.
Tailwater at Time of Inspection 62.7 ft. P.D.* M.S.L.

*Plan Datum (P.D.) is approximately 630± feet above U.S.G.S. datum.

Inspection Personnel:

Michael Baker, Jr., Inc.

T. W. Smith
W. L. Sheaffer
T. J. Dougan

Greene Acres Property
Owners Association:

Mr. Mullens
Mr. Smith

T. W. Smith Recorder

EMBANKMENT

Name of Dam: GREENE ACRES

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None were visible.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None was visible.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	There appears to be some sloughing and erosion near the crest on the upper portion of the downstream slope where a 2 to 4 ft. scarp at a ratio steeper than 1:1 has developed for a 300 ft. ± section of the dam on the right side. The slope on the left side is uniform. The upstream slope is steeply eroded above the shoreline.	Placement of additional fill, grading, compaction, and seeding are recommended on the right side of the downstream slope. Riprap should be placed on the shoreline to prevent erosion.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Good at centerline of dam.	
RIPRAP FAILURES	Stone riprap with topsoil and grass cover is shown in the plans on the right side of the spillway at the dam abutment. However, the riprap was not observed during the inspection.	
SLOPES	The slopes are well-covered with vegetation except adjacent to the upstream shoreline. Small trees are scattered on the downstream slope. The downstream slope was constructed at a 2:1 ratio with grass and topsoil cover. The upstream slope was constructed at 3:1 with topsoil and grass near the crest.	The trees should be removed.

11 1 2

EMBANKMENT

Name of Dam: GREENE ACRES

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONSTRUCTION MATERIALS	Reddish-brown, clayey silt with a little sand and traces of rock fragments were observed on most of the surface. The consulting geologist, according to reports in Appendix V, had recommended to place most of the least permeable soils on the upstream side and the granular soils downstream.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	The abutment on the right side is in reddish-brown, clayey and sandy silt with a small outcrop of decomposed granite exposed. The left abutment consists of red, clayey silt with sandy lenses and traces of rock fragments. The embankment has been constructed on top of a hill on the left near the open spillway.	
ANY NOTICEABLE SEEPAGE	Clear seepage (non-measurable) occurs at the downstream toe for a length of 50 ft. on the right side of the blow-off pipe where the clayey silt is soft and wet at the surface. There was no apparent flow or piping effect. The toe drain which was not visible may be the source of water. A small stream originates 50 ft. downstream from the toe in the overflow ditch in the vicinity of the seepage.	Periodic observations of the wet areas are advised. Uncover and open the buried toe drain.
STAFF GAGE AND RECORDER	None	A staff gage should be installed to monitor reservoir levels above normal pool.
DRAINS	A pipe toe drain with granular backfill is shown on the plans at the downstream toe of slope.	

EMBANKMENT

Name of Dam: GREENE ACRES

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ABUTMENT SLOPE GUTTERS	An erosion gully (1 x 1 ft. maximum) occurs on the left of the lower slope where surface drainage flows into a wet area near the blow-off pipe outlet. A paved overflow ditch for the 24 in. C.M.P. on the right collects the drainage. There is an unpaved ditch extension to the dam crest.	Stone should be placed in the gully on the left to prevent further erosion.
FOUNDATION	Less than 6 ft. of sand and gravel was reported in the bottom of the gully near the original stream. There is clayey and sandy silt on the slopes above. Bedrock is apparently quartz monzonite and granite of the Lovington Formation in the Virginia Blue Ridge complex. It had been recommended to excavate the cutoff trench 2 ft. deep x 20 ft. wide in soil on the slopes and approximately 6 ft. deep x 30 ft. wide to the bottom of the granular soils near the old stream channel. The cutoff trench was back filled with clay and silt. Boring records were not available. The foundation appears to be stable.	

OUTLET WORKS

Name of Dam: GREENE ACRES

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Normal outlet conduit is a 24 in. C.M.P. through the embankment which discharges into a "v" shaped concrete channel which runs along the downstream right abutment of the dam. Concrete in this channel shows no unusual cracking or spalling.	
INTAKE STRUCTURE	The intake structure consists of a vertical section of 24 in. diameter C.M.P. (invert elevation of 95.0 ft. P.D.) turning 90°, running 73 ft. through the embankment near the right abutment, and exiting at an elevation of 88.0 ft. P.D. The 24 in. inlet has a 2 ft. section of 36 in. diameter C.M.P. around it which serves as a trash shield.	
OUTLET STRUCTURE	The 24 in. C.M.P. exits into the "v" shaped channel which runs toward the toe of the dam along the right abutment near the junction with the dam embankment (see Photo 1).	
OUTLET CHANNEL	The paved overflow ditch outlets into loose rocks and weathered quartz monzonite bedrock near the downstream toe of the dam where a stream is formed from clear seepage and/or a small spring in the area (see Photo 3). No water was flowing in the paved ditch which has some cracks (see Photo 2).	
RESERVOIR DRAIN AND CHANNEL	The 10 in. blow-off drainpipe (invert elevation 72.7 ft. P.D.) outlets in a low wet area with some brush. Some of the water flows into the stream channel downstream from the overflow ditch. The outlet valve is closed. Apparently, the water comes from the outlet of the toe drain (see Photo 4).	The channel for the outlets of the blow-off pipe and toe drain should be well-formed to conduct the water into the adjacent stream channel. A stone riprap basin would prevent erosion near the outlets. The consulting geologist Adoif Honkala expressed "apprehensions" about the contractor's use of gasoline pipe for the blow-off drain in the fill.

UNGATED SPILLWAY

Name of Dam: GREENE ACRES

VISUAL EXAMINATION OF OBSERVATIONS REMARKS OR RECOMMENDATIONS

CONCRETE WEIR

None

APPROACH CHANNEL

The approach channel for the emergency spillway has been eroded. There is a sparse grass cover overlying red, clayey silt with sand and clay lenses, and traces of rock fragments (see Photo 5).

Topsoil should be placed in the bare areas and seeded with grass. Erosion gullies should be filled.

DISCHARGE CHANNEL

The upper part of the channel has areas of erosion created, apparently, by the overflow during Hurricane Agnes. Clear seepage was observed from beneath the end of the soil cover. Surface drainage flows down the ditches in red, clayey silt adjacent to the access road on the right side (see Photo 6).

It is recommended that topsoil be placed and seeded in the bare areas to prevent erosion.

BRIDGE AND PIERS

None

SLOPES

Reddish-brown, clayey silt with traces of rock fragments was deposited in the gentle cut slope on the left abutment which is mostly covered with low vegetation. The slope (2:1) on the right side is embankment fill above a cut, both of which are in clayey silt with traces of rock fragments.

The bare areas on the left cut slope should be seeded with grass to prevent more erosion.

INSTRUMENTATION

Name of Dam: GREENE ACRES

VISUAL EXAMINATION **OBSERVATIONS** **REMARKS OR RECOMMENDATIONS**

MONUMENTATION/SURVEYS

None were observed.

OBSERVATION WELLS

None

WEIRS

None

PIEZOMETERS

None

OTHER

RESERVOIR

Name of Dam: GREENE ACRES

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The slopes are gentle near the dam where there is grass. The other slopes are moderate in the areas near the cottages and steeper in the wooded portions. There are few exposures of weathered bedrock on the slopes of clayey and sandy silt with little rock fragments.	
SEDIMENTATION	No unusual sedimentation was noted. However, there is minor sedimentation around the 24 in. C.M.P. inlet pipe.	

DOWNSTREAM CHANNEL

Name of Dam: GREENE ACRES

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	There is a considerable amount of small trees and brush in the downstream area. The area is flat and rather swampy.	The brush and obstructing trees should be removed to allow an open channel for discharges.
SLOPES	The slopes are well-defined in sandy and clayey silt with some rock fragments.	
APPROXIMATE NO. OF HOMES AND POPULATION	There are a few homes located immediately downstream of the dam.	

APPENDIX IV

CHECK LIST - ENGINEERING DATA

45

**CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION**

Name of Dam: GREENE ACRES

ITEM	REMARKS
-------------	----------------

PLAN OF DAM is included in this report as Plate 1 and was obtained from design file.

REGIONAL VICINITY MAP is included in this report as Location Plan.

CONSTRUCTION HISTORY The dam was constructed in 1970 by Kibler Construction Company of Luray, Virginia.

1-1

TYPICAL SECTION OF DAM is shown on Plate 2.

HYDROLOGIC/HYDRAULIC DATA Partial hydrologic and hydraulic data was contained in the design file.

OUTLETS - PLAN,
DETAILS,
and
CONSTRAINTS

are shown on Plates 1 and 2.

- DISCHARGE RATINGS were obtained from design data.

RAINFALL/RESERVOIR RECORDS None were available.

Name of Dam: GREENE ACRES

ITEM REMARKS

DESIGN REPORTS The design file was obtained from Mr. Richard Vogel of V.H.&D., Warrenton, Virginia, formerly associated with Bartenstein and Associates, the designer.

GEOLOGY REPORTS There is a brief note in the available soils reports by the consulting geologist which cites the presence of bedrock. The available geologic data is minimal.

DESIGN COMPUTATIONS Some hydrologic and hydraulic data were contained in the design file. There were no
HYDROLOGY & HYDRAULICS dam stability analyses or seepage studies available for this report.
DAM STABILITY
SEEPAGE STUDIES

2-41

MATERIALS INVESTIGATIONS Some laboratory test results of soil samples from two borrow areas and the
BORING RECORDS emergency spillway were available for this report. Boring and test pit records
LABORATORY were not available.
FIELD

POST-CONSTRUCTION SURVEYS OF DAM No post-construction surveys of the dam were available.

BORROW SOURCES The soil from the excavation for the emergency spillway was suitable for placement in the embankment. The consulting geologist indicated that an approved borrow area was located in the ridge near the left abutment in the vicinity of the approach for the spillway in the reservoir.

Name of Dam: GREENE ACRES

ITEM	REMARKS
------	---------

MONITORING SYSTEMS There are none.

MODIFICATIONS Modifications that were discovered by the Michael Baker, Jr., Inc. field inspection were different than those shown on the design drawings (Plates 1 and 2) and are noted.

HIGH POOL RECORDS None available

IV-3

POST-CONSTRUCTION ENGINEERING None available
STUDIES AND REPORTS

PRIOR ACCIDENTS OR FAILURE OF DAM There are no known prior failures or accident reports on the dam.
DESCRIPTION
REPORTS

MAINTENANCE There are no maintenance or operating records available.
OPERATION
RECORDS

Name of Dam: GREENE ACRES

<u>ITEM</u>	<u>REMARKS</u>
-------------	----------------

SPILLWAY PLAN ,

SECTIONS,
and
DETAILS are shown on Plates 1 and 2.

OPERATING EQUIPMENT are shown on Plates 1 and 2.
PLANS & DETAILS

**CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA**

DRAINAGE AREA CHARACTERISTICS: 0.64 sq.mi.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 95.0 ft. P.D. (230 ac.-ft.)

ELEVATION EMERGENCY SPILLWAY CREST (STORAGE CAPACITY): 97.0 ft. P.D. (292 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: 100.0 ft. P.D. (341 ac.-ft.)

ELEVATION TOP DAM: 100.0 ft. P.D.

CREST: Emergency Spillway

- a. Elevation 97.0 ft. P.D.
- b. Type Earth, side-channel
- c. Width 170 ft. (bottom width)
- d. Length Level section, approximately 50 ft.
- e. Location Spillover Outside left abutment
- f. Number and Type of Gates Not Applicable

OUTLET WORKS: _____

- a. Type 24 in. C.M.P. used as a drop-inlet
- b. Location In reservoir near right abutment
- c. Entrance inverts 95.0 ft. P.D. (controls normal pool)
- d. Exit inverts 88.0 ft. P.D. at 24 in. C.M.P.
- e. Emergency draindown facilities 10 in. diameter cast-iron pipe (invert 72.7 ft. P.D.)

HYDROMETEOROLOGICAL GAGES: None at dam site

- a. Type _____
- b. Location _____
- c. Records _____

MAXIMUM NON-DAMAGING DISCHARGE Unknown

Name of Dam: GREENE ACRES

APPENDIX V

CONSTRUCTION REPORTS AND MEMORANDUMS

ADOLF U. HONKALA

*Geologist*GEOLOGIC STUDIES AND INVESTIGATIONS
FOR
FOUNDATIONS, CONSTRUCTION MATERIALS, WATER SUPPLY AND MINERAL DEPOSITS3819 ARKLOW ROAD
RICHMOND, VIRGINIA

17 November 1969

Mr. Robert Bartenstein
Bartenstein & Associates
P. O. Box 298
Warrenton, Virginia 22186

Subject: Price Job, Standardsville, Va.

Dear Bob:

The borrow samples from two areas were tested for Atterburg limits and found to offer good possibilities. One borrow material shows liquid limits below 40 and P.I.'s of around 10 which is a relatively stable material. This material came from Borrow Holes 1, 2 and 3 and is a brown sandy clay.

From the spillway area a red silty clay shows an average liquid limit of 45 and a P.I. of 15 which makes it less stable but still a good borrow source.

To further test these materials the laboratory is now completing compaction tests and will utilize type samples to complete two remolded triaxial shear tests, one for the brown sandy clay and one for the red silty clay. These tests will tell us what slopes may be used.

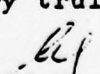
The borings placed at the centerline show stable soil to exist along the proposed axis. The only treatment excepting a cutoff trench would be the removal of a shallow lense of gravelly sand along the creekbed itself to a depth of 6-7'. At the present moment it would not appear necessary to excavate to rock, only remove this sandy zone.

If test results are as anticipated, a stable random zone w/cutoff, would be constructed out of the most stable material using the more plastic red silty clay as an upstream blanket. A toe trench is proposed for the downstream toe.

These are preliminary ideas and figures and final conclusions will be supported by test data. It appears that laboratory data should be complete by the end of next week.

I will keep you informed. Can you have a crew at Leigh's Mountain - say on the 28th of November, or the 1st of December?

Very truly yours,


Adolf U. Honkala, CPG

AUH/e

V-1

R. M. BARTENSTEIN & ASSOCIATES

P. O. BOX 298 • WARRENTON, VIRGINIA 22186 • PHONE 347-2200

MESSAGE

REPLY

TO Mr. Adolph U. Hankata
3819. Arklow Road
Richmond, Virginia

DATE

DATE November 26, 1969

Re: Green Acres Lake

Dear Al: After talking to you this AM, the contractor called to tell us that in excavating the cut-off trench at the creek they encountered solid bedrock at less than six feet depth. They found the sand and gravel you mentioned. I told him to clean off down to the rock being careful to remove all sand and gravel and not to disturb the rock in any way, as you instructed, and gave him permission to begin backfill with impervious material after pumping out the water. He is preparing to do this and to begin laying 20" welded steel pipe with 3" poured concrete antiseep rings. 50' ft. apart, the middle one at the CL.

BY

10-473 © The Drawing Board Inc., Box 555, Dallas, Texas

SIGNED

DETACH AND FILE FOR FOLLOW-UP

ADOLF U. HONKALA

Geologist

GEOLOGIC STUDIES AND INVESTIGATIONS
FOR
FOUNDATIONS, CONSTRUCTION MATERIALS, WATER SUPPLY AND MINERAL DEPOSITS

3819 ARKLOW ROAD
RICHMOND, VIRGINIA

5 December 1969

Mr. R. M. Bartenstein
R. M. Bartenstein & Associates
Consulting Engineers and Surveyors
P. O. Box 298
Warrenton, Virginia

Re: Green Acres Dam Site

Dear Bob:

I want to comment in general about the inspection made on December 4, 1969, at subject project.

Overall capabilities of the contractor appear to be good and his attitude toward cooperation seems to be satisfactory. I explained to Mr. Kibler the purpose of compaction control and the essentials of material distribution within the dam as I feel it should be. These items were pointed out:

- (1) Any waste should be stored upstream in the first small draw, i.e. on right abutment, and not be used to fill in below dam except where used as topsoil in a thin surface dressing.
- (2) The borrow area on the left abutment along the reservoir side of the spillway saddle should be developed as a half moon shaped cut and not vertically into the spillway ridge. Soils should be mixed by cutting through the surface plastic clays and picking up the silty sandy clays and clayey sands below.
- (3) If there are coarse soils encountered in the borrow areas, as decomposed rock soil and clayey or silty sands, such soils should be placed in the downstream section.
- (4) Moisture content should be kept under control as some of these soils indicate moderate swell possibilities.
- (5) The spillway excavation should be used in the upstream portion of the dam, as a sloped blanket along the upstream toe. This is a highly impervious soil and is the least stable hence should occupy the flattest slope area.

5 December 1969

The contractor still has more cleaning to do prior to fill preparation around the inlet area of the drainpipe and he so agreed.

I still have apprehensions about the use of the gas line pipe in the fill. Perhaps it is all right, but I believe it should be 100% the responsibility of the contractor.

Regarding use of material from the spillway channel I suggest that some be used to fill in the old road along the base of the spillway saddle where erosion has deepened its position.

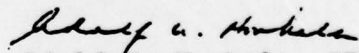
The contractor's suggestion about the muskrat wire is concurred to, and I feel that a galvanized wire should be used.

I spoke at some length with Dick Dress, the Price & Radin representative. He appeared very interested in proper controls and asked me about the influence of frozen soil lumps in the fill which is negative, naturally. Also, we discussed the value received by the owner when too much preparation is required to get ready and close down on cold days. There is soon a point of diminishing values.

Mr. Kibler and I discussed briefly the condition in which the dam should be left over the winter, if not complete. He suggests compacting and rounding off the fill. This is all right to minimize damage from overflow but perhaps even better is to crowd the water to one abutment and cut a flat trench with the pan in order to distribute the water evenly over a flat surface.

These comments are submitted for your information.

Very truly yours,


Adolf U. Honkala, CPG

AUH/e

P.S. I have not designated to anyone, but compaction of the fill should be 95% of STANDARD PROCTOR T-99 with optimum moisture. deviation allowable 2-3% \pm . For the blanket material from the spillway 90% of STANDARD PROCTOR T-99 with optimum moisture deviation of 2-3% \pm . The laboratory will have the unit weights and optimum moistures. You will receive laboratory copies as soon as I receive them. I am now working on lab notes.

Enclosures 4

APPENDIX VI

SOIL TESTS DATA

GREEN ACRES LAKE
STANDARDSVILLE, VIRGINIA

SOIL TEST DATA FOR DAM AND
FOUNDATION DESIGN

DECEMBER 1969



FROEHLING & ROBERTSON, INC.
 INSPECTION ENGINEERS • CHEMISTS • BACTERIOLOGISTS
 CABLE ADDRESS—"FROEHLING"

MAIN OFFICE AND LABORATORIES
 P. O. BOX 737, 814 WEST CARY STREET
 RICHMOND, VIRGINIA 23204
 PHONE 644-1023

BRANCH LABORATORIES
 NORFOLK, CHARLOTTE, RALEIGH
 WASHINGTON, BALTIMORE
 GREENVILLE, ZANESVILLE, FAYETTEVILLE
 ASHEVILLE

Richmond, Va.
 December 5, 1969

Record No: T-1056-12
 Report Of: Soil Tests
 Made For: Adolf U. Honkala
 3819 Arklow Road
 Richmond, Va.
 Project: Standardsville Dam

0-00-0

	Borrow No.1	Borrow No.2	Borrow No.3	
	0-9'	0-9'	0-9'	
Liquid Limit	34.0	36.0	32.0	
Plasticity Index	8.4	9.0	11.7	
Natural Moisture	24.1	24.5	21.2	

	Borrow No.5	Borrow No.6	Borrow No.7	
	Refusal 3'	0-20'	0-4'	
Liquid Limit	33.8	23.1	20.5	
Plasticity Index	13.7	N.P.	N.P.	
Natural Moisture	20.4	11.6	18.6	

	Spillway No.1	Spillway No.2	Boring No.2	Boring No.3
	0-8'	0-8'	0-15'	Centerline
Liquid Limit	44.5	43.8	23.5	27.9
Plasticity Index	10.6	10.3	3.8	4.8
Natural Moisture	25.2	29.5	24.7	21.9

Note: T-49 test standard Proctor
 Borrow 6, 7 = 158.2, optimum moisture = 12.9%
 " 1, 2 = 106.5, " " = 15%
 - p.c.t.

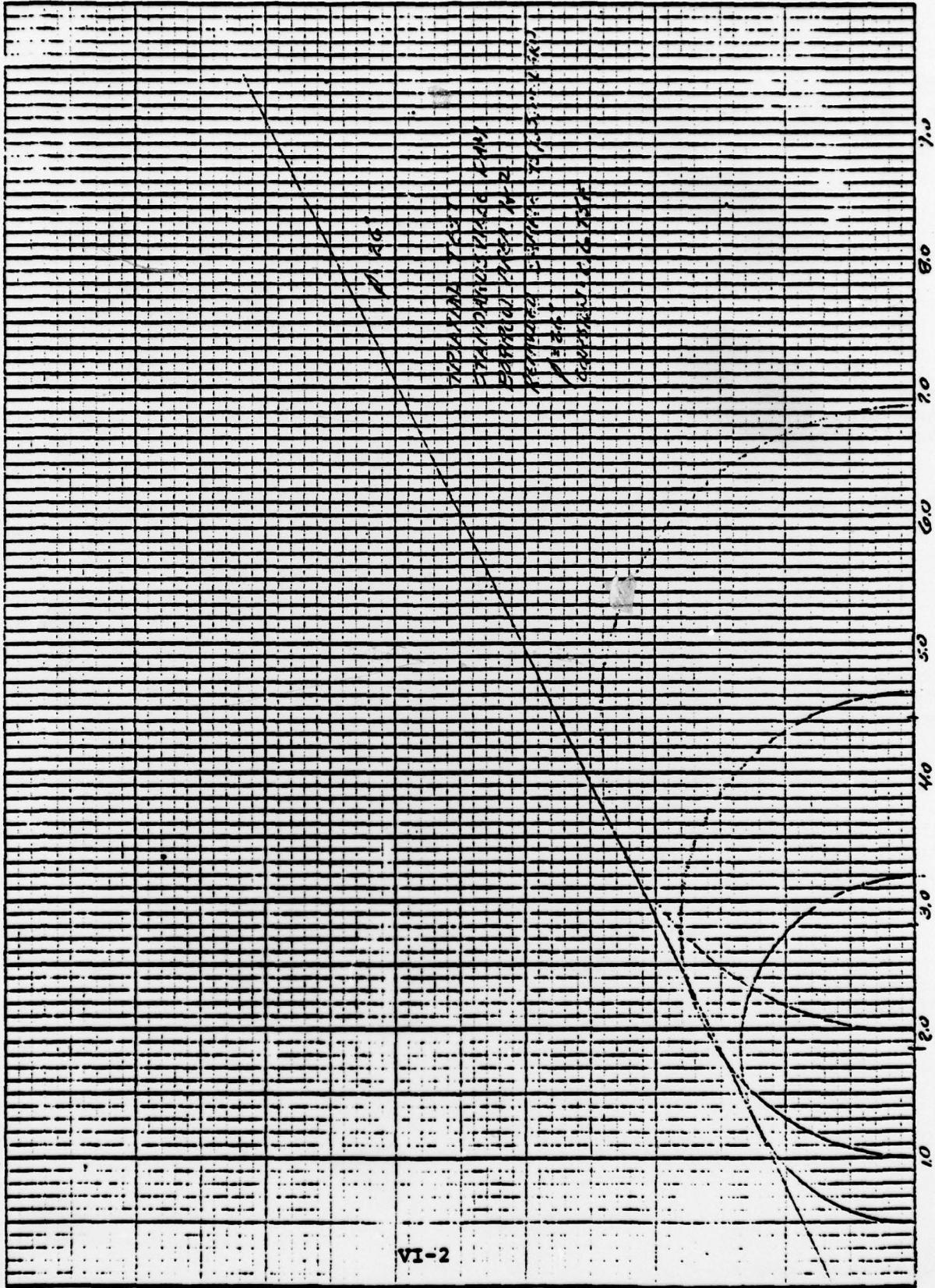
Respectfully,

FROEHLING & ROBERTSON, INC.

Acc: Adolf Honkala

VI-1

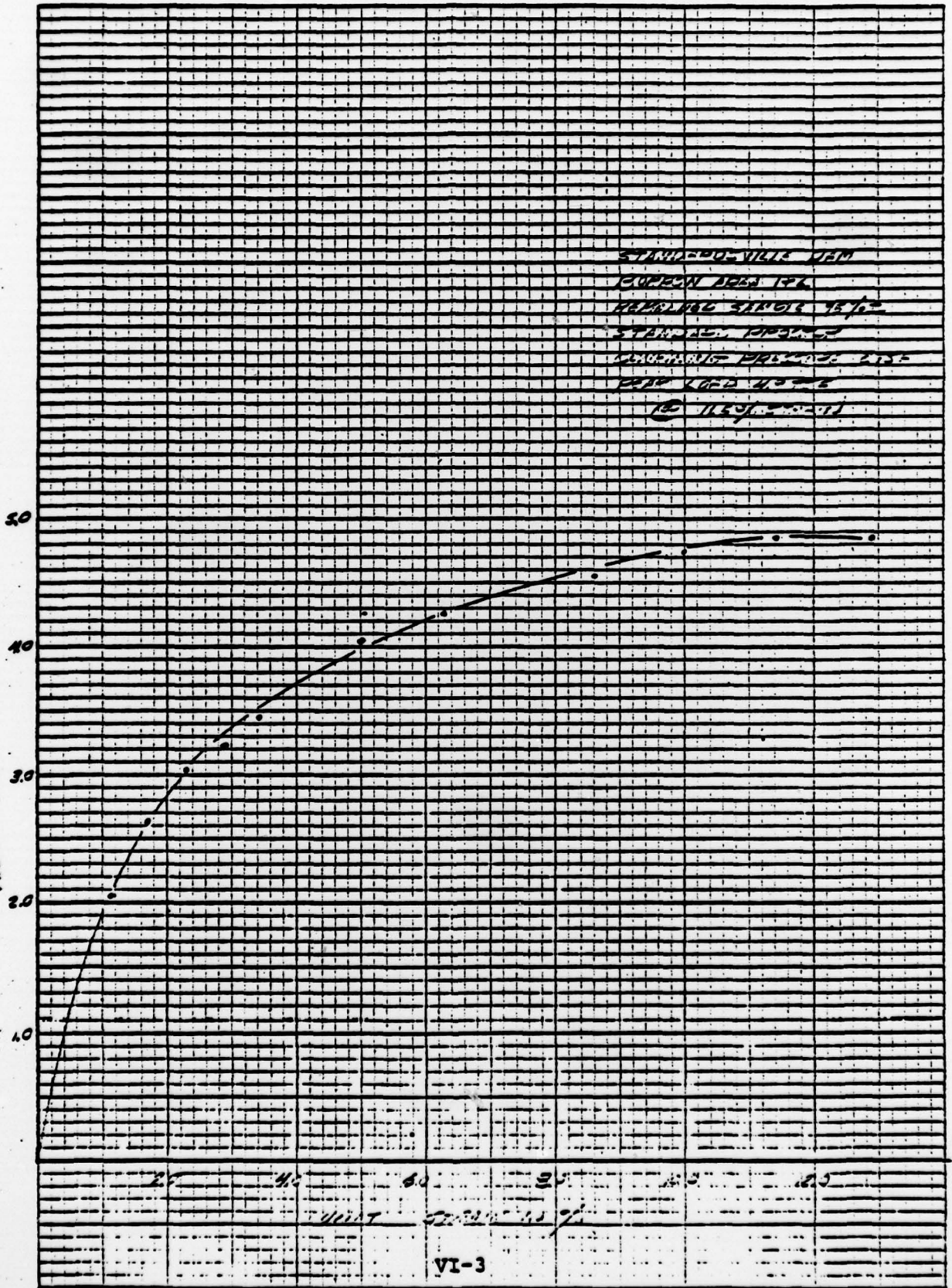
16E 10 X 10 TO THE INCH 48 0782
7 1/2 TO INCHES
MURPHY & BAKER CO.



NORMAL STRESS, TSE

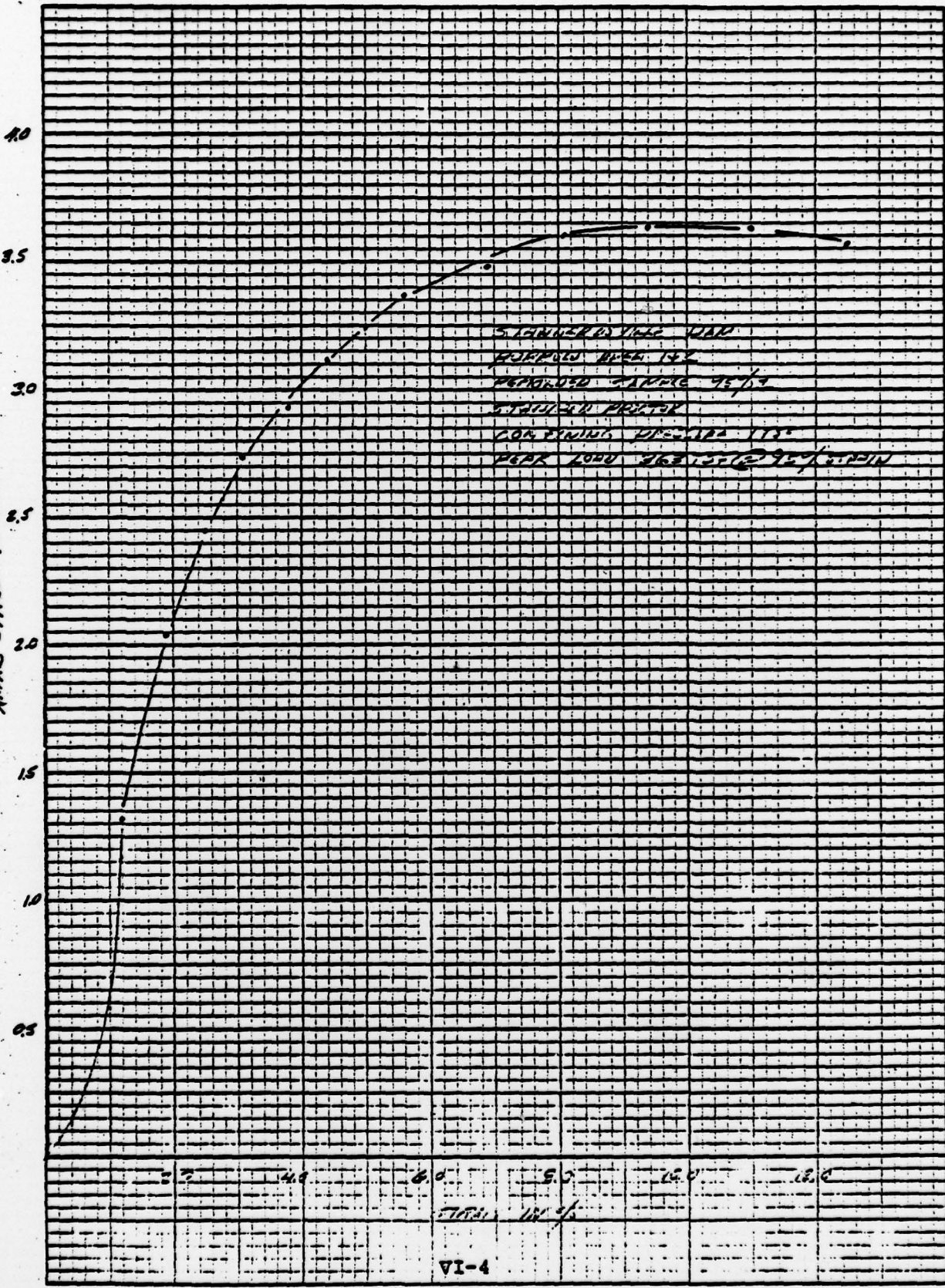
K&E 10 X 10 TO THE INCH 48 0782
7 X 10 INCHES MADE IN U.S.A.
BEUFFEL & EGGES CO.

AXIAL STRESS WT%F



KE 10 X 10 TO THE INCH 46 0782
 MADE IN U.S.A.
 GEORGE & ERBER CO.

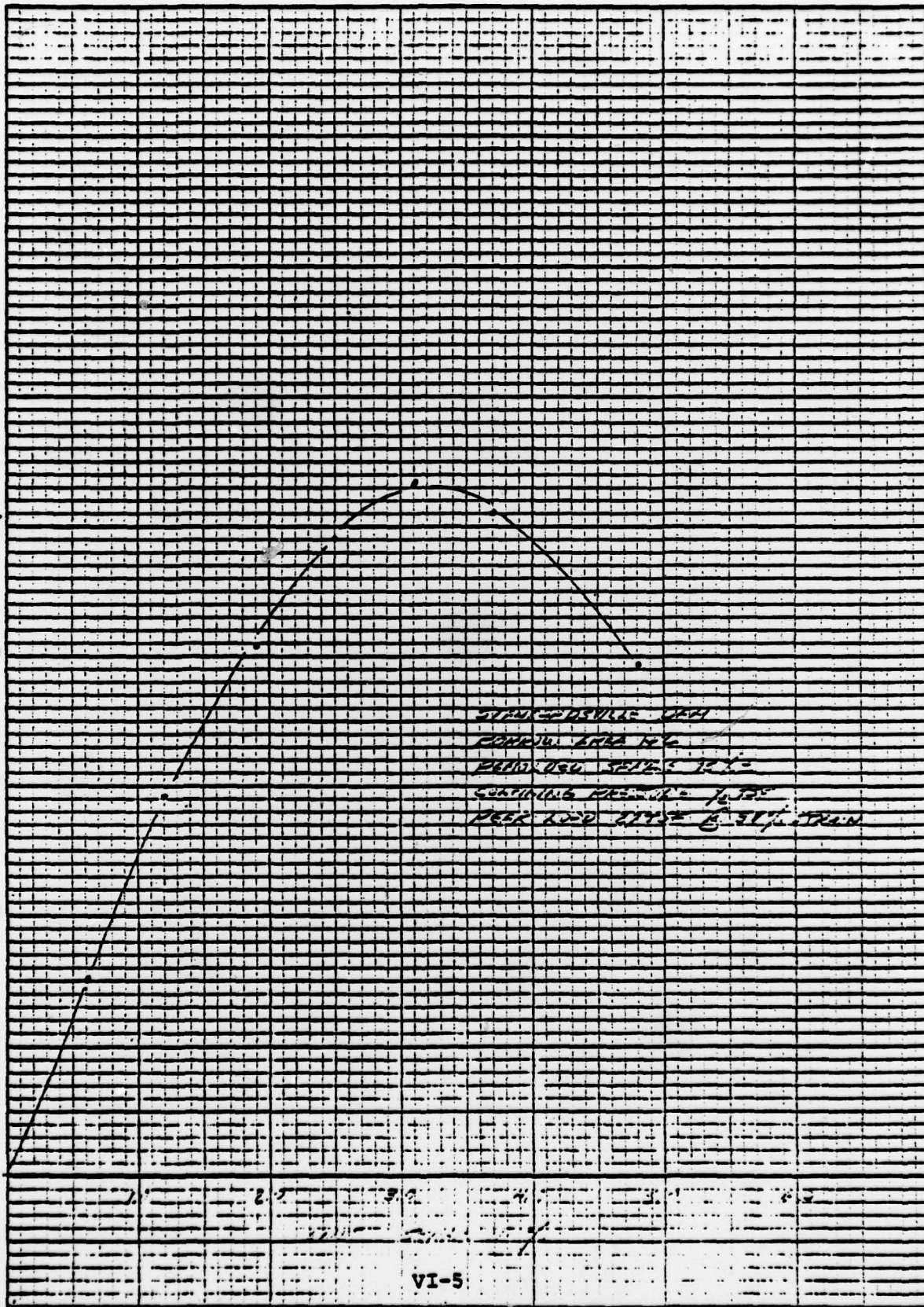
ANIMAL STRESS IN TST



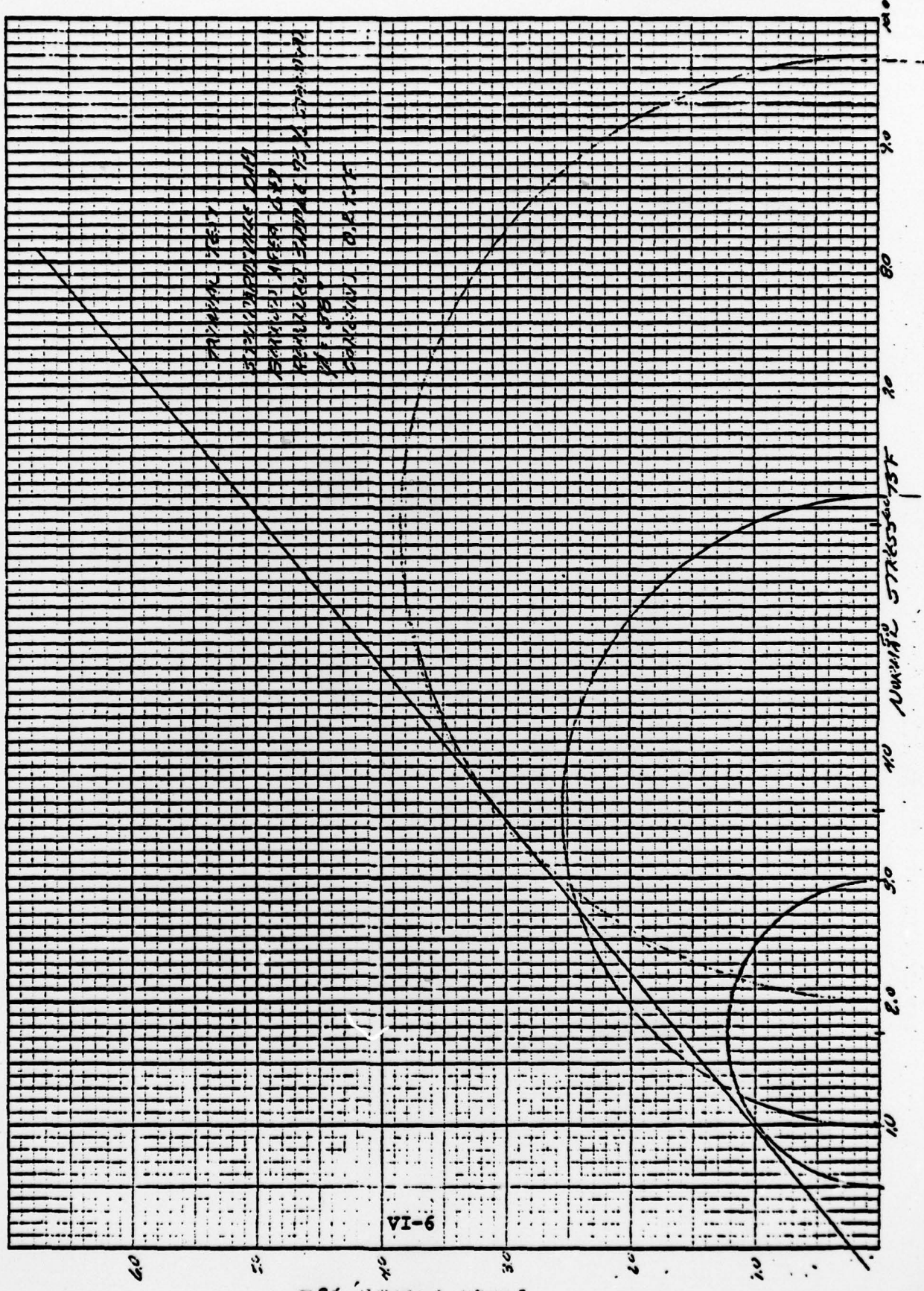
VI-4

K-E 10 X 10 TO THE INCH 46 0782
7 1/2 INCHES
REUFEL & BRONER CO.

3.0
2.5
2.0
1.5
1.0
0.5
ANNUAL STRESS INTST



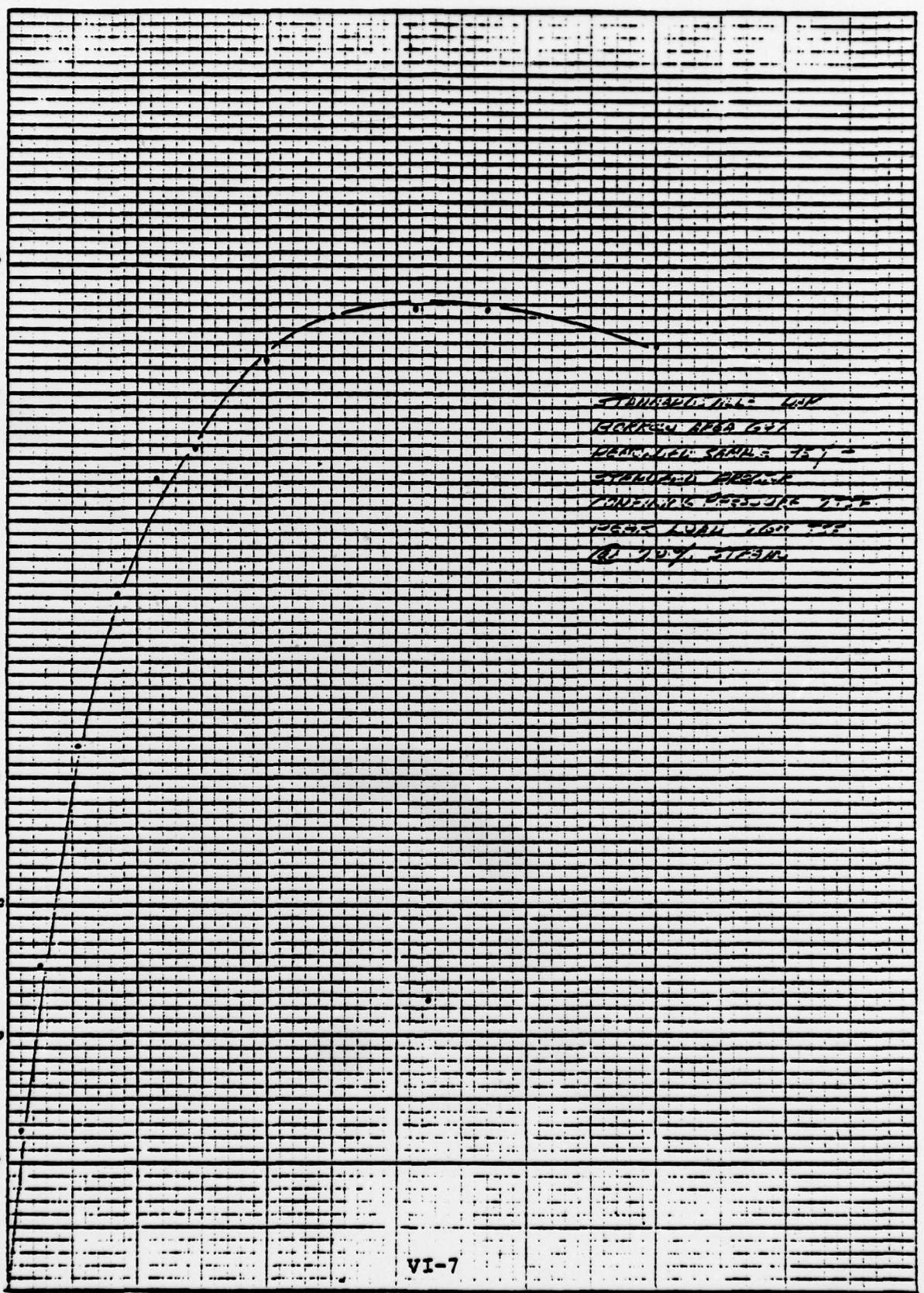
KE 10 X 10 TO THE INCH 46 0782
7 X 10 INCHES
MAY 28 1954
NEUFEL & BERGER CO.



16-E 10 X 10 TO THE INCH 46 0782
3 X 10 INCHES
MADE IN U.S.A.
NEUFEL & ESSER CO.

AVG STRESS IN TSE

0.0
20
40
60
80
100



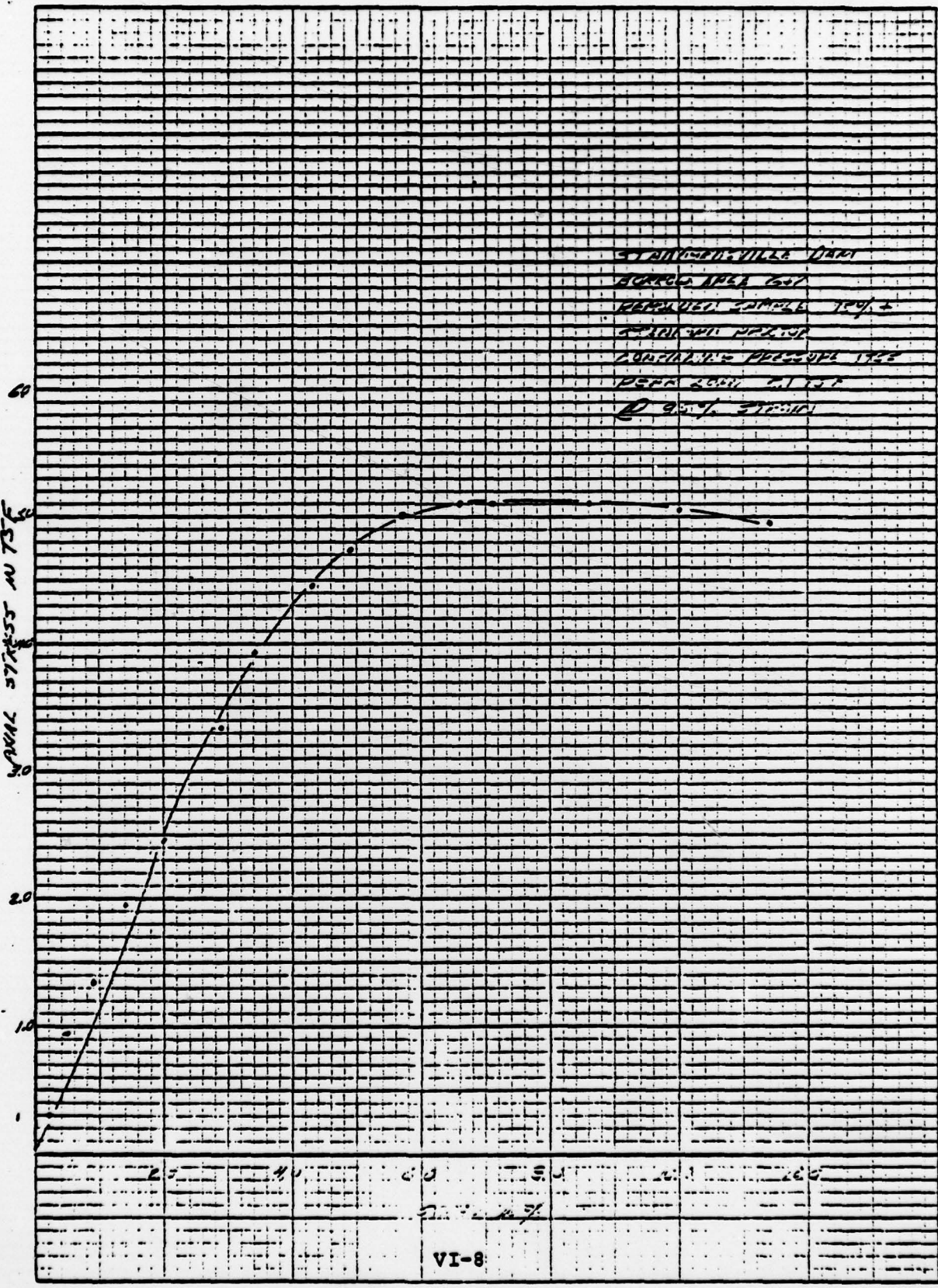
STANDARD TILL - 41P
ROCKSIN AREA 63A
DEVELOPED SAMPLE 757 -
STANDARD PRESSURE
IMMEDIATE PRESSURE TIME
PRESSURE LOAD 1600 PSI
IN 75% STEADY

VI-7

STRAIN IN %

K-E 10 X 10 TO THE INCH 46 0782
 7 X 10 INCHES
 HAUFFEL & ESSER CO.

NORMAL STRESS IN TSE



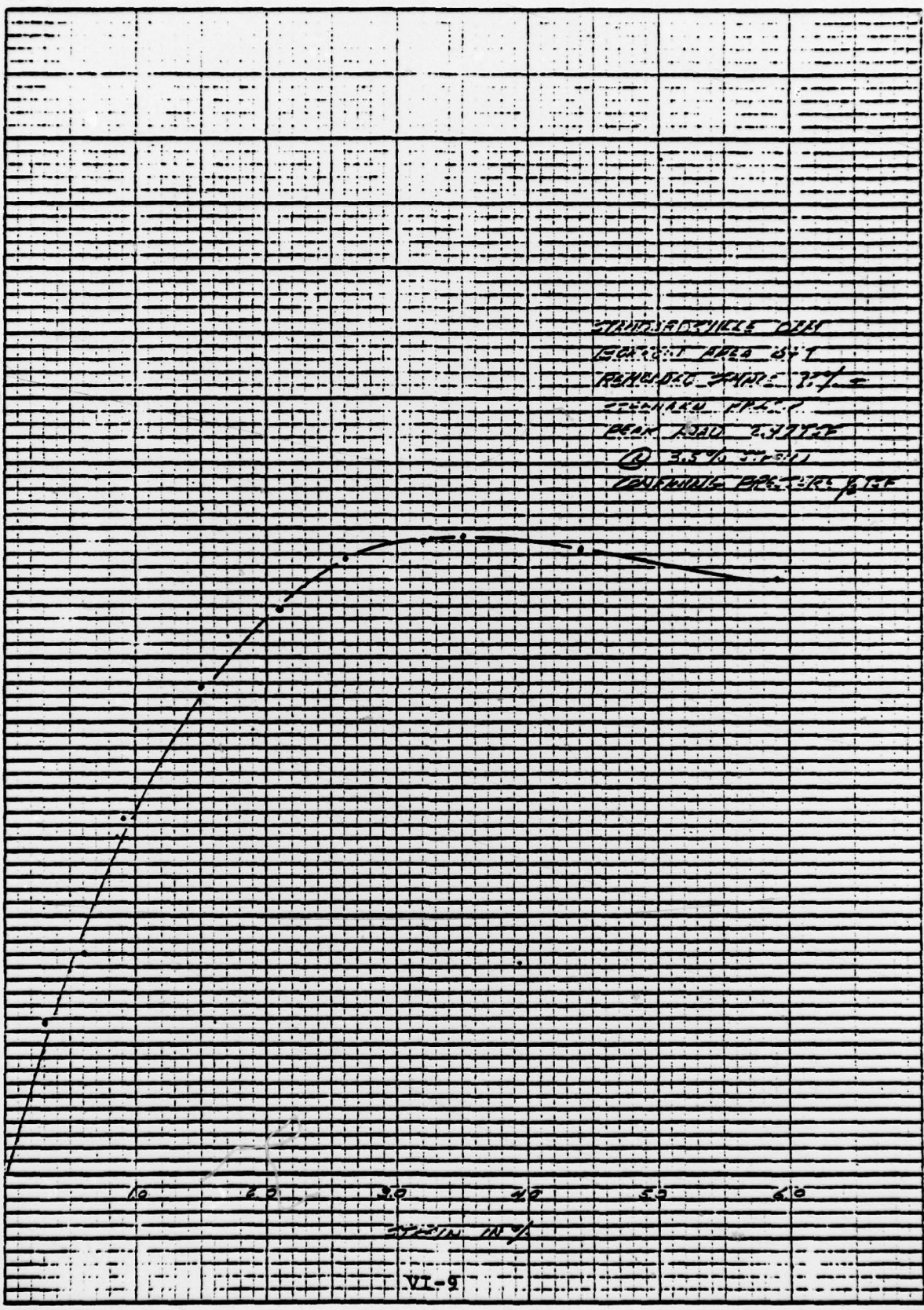
STANBURYVILLE DAM
 APRIL 1951 607
 REPRODUCED SAMPLE 129/2
 STAIN-WIT PRESSURE
 LONGITUDINAL PRESSURE 1752
 PRESSURE 2000 IN TSE
 @ 90% STRESS

VI-8

KE 10 X 10 TO THE INCH 46 0782
3/2 TO INCHES
MUSKEL & LOREN CO.

AXIAL STRESS IN TSE

30
25
20
15
10
5
0.5



STANDARDVILLE DIST
REPORT MADE BY
RECORDED MADE BY
STEVEN H. HALL
PEAK LOAD 2.37 TSE
(3.5 TO 3.5 IN)
TENSILE BREAKERS 1/16

STRAIN IN INCHES

VI-9

APPENDIX VII

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REFERENCES

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NAME OF DAM: GREENE ACRES

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NAME OF DAM: GREENE ACRES

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