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NATIONAL DAM INSPECTION PROGRAM. BRIER CREST WOODS DAM, DELAWAR--ETC(U)
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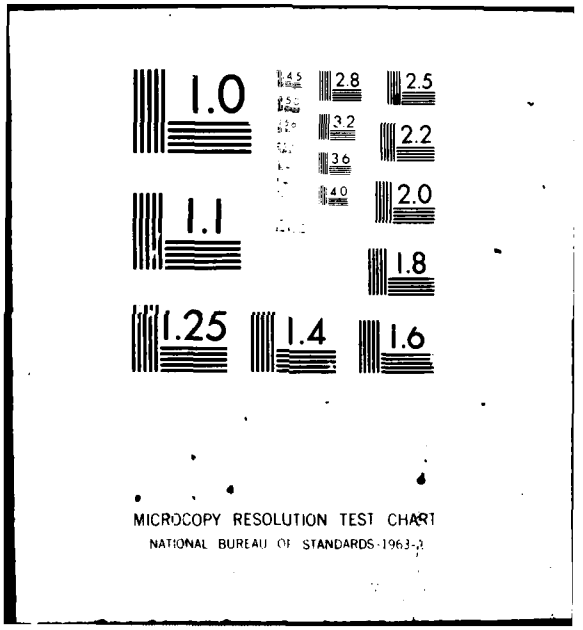
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AD A083378

DELAWARE RIVER BASIN,

TRIBUTARY TO TUNKHANNOCK CREEK, MONROE COUNTY,

PENNSYLVANIA

BRIER CREST WOODS DAM

(NDI ID No. PA-00879
DER ID No. 45-245)

BRIER CREST WOODS, INC.

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

Prepared by

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
P.O. Box 1963
Harrisburg, Pennsylvania 17105

DACW31-80-C-0017

For

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

FEBRUARY 1980

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

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

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway 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.

DELAWARE RIVER BASIN

TRIBUTARY TO TUNKHANNOCK CREEK, MONROE COUNTY

PENNSYLVANIA

BRIER CREST WOODS DAM

NDI ID No. PA-00879
DER ID No. 45-245

BRIER CREST WOODS, INC.

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

FEBRUARY 1980

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APPENDICES

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam:	Brier Crest Woods Dam NDI ID No. PA-00879 DER ID No. 45-245
Size:	Small (16 feet high; 247 acre-ft)
Hazard Classification:	Significant
Owner:	Brier Crest Woods, Inc. Vincent Marconi, President P.O. Box 1 Blakeslee, Pa. 18610
State Located:	Pennsylvania
County Located:	Monroe
Stream:	Tributary to Tunkhannock Creek
Date of Inspection:	14 November 1979

Based on visual inspection, available records, calculations, and past operational performance, Brier Crest Woods Dam is judged to be in good condition. The existing spillway will pass the Probable Maximum Flood (PMF), which is twice the Spillway Design Flood (SDF), with 0.2 foot of freeboard. Based on the criteria and the downstream conditions, the SDF is the 1/2 PMF. If the low areas on the top of the dam were filled to the design elevation, the freeboard would increase to 0.5 foot. The spillway capacity is rated as adequate.

No stability problems were evident for the embankment. The spillway weir meets recommended guidelines for stability.

The ability of the outlet works to function is uncertain.

Maintenance procedures for the dam and appurtenant structures are inadequate.

The following studies and remedial measures are recommended to be undertaken by the Owner, in approximate order of priority, without delay:

(1) Ensure the operational adequacy of the outlet works, and operate it on a regular basis.

(2) Establish an adequate grass cover on the downstream slope.

(3) Fill in low areas at the top of the dam.

In addition, the Owner should institute the following operational and maintenance procedures:

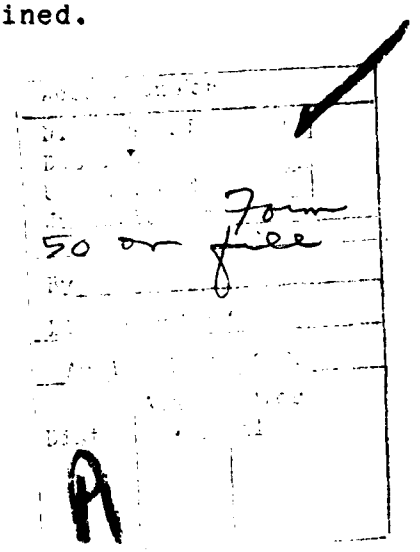
(1) Develop a detailed emergency operation and warning system for Brier Crest Woods Dam.

(2) During periods of unusually heavy rains, provide round-the-clock surveillance of Brier Crest Woods Dam. Have sufficient personnel available to remove debris that may collect at the spillway bridge.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system.

(4) Institute an inspection program such that the dam is inspected frequently. As presently required by the Commonwealth, the inspection program should include a formal annual inspection by a professional engineer experienced in the design and contruction of dams. Utilize the inspection results to determine if remedial measures are necessary.

(5) Institute a maintenance program so that all features of the dam are properly maintained.



BRIER CREST WOODS DAM

Submitted by:

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.

FREDERICK FUTCHKO
Project Manager, Dam Section

Date: 21 March 1980

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT,
CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: 10 APR 1980

BRIER CREST WOODS DAM

Overview

DELAWARE RIVER BASIN

TRIBUTARY TO TUNKHANNOCK CREEK, MONROE COUNTY

PENNSYLVANIA

BRIER CREST WOODS DAM

NDI ID No. PA-00879
DER ID No. 45-245

BRIER CREST WOODS, INC.

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

FEBRUARY 1980

SECTION 1

PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Brier Crest Woods Dam is a homogeneous earthfill embankment with a toe drain. The dam, including the spillway, is 790 feet long and is 16 feet high at maximum section. The spillway is located near the middle of the dam. It is a concrete gravity weir with a concrete exit channel apron. A reinforced concrete bridge crosses

over the spillway. The spillway crest is 25 feet long and is 5.0 feet below the design top elevation of the dam. Vertical walls that retain the embankment act as approach and exit channel walls. The walls also act as bridge abutments to support the spillway bridge. The underside of the bridge is 4.0 feet above the spillway crest. The outlet works consists of a 12-inch diameter corrugated metal pipe in the spillway weir with a sluice gate at the upstream end. The gate operating mechanism extends up to the bridge railing. The various features of the dam are shown on the Photographs in Appendix C and on the Plates in Appendix E. A description of the geology is included in Appendix F.

b. Location. Brier Crest Woods Dam is located on a tributary to Tunkhannock Creek in Tunkhannock Township, Monroe County, Pennsylvania. The dam is approximately 3.7 miles southeast of Blakeslee. Brier Crest Woods Dam is shown on the 1973 Photorevision to USGS Quadrangle, Blakeslee, Pennsylvania, at latitude N 41° 02' 50" and longitude W 75° 33' 15". A location map is shown on Plate E-1.

c. Size Classification. Small (16 feet high, 247 acre-feet).

d. Hazard Classification. Significant hazard. Downstream conditions indicate that a significant hazard classification is warranted for Brier Crest Woods Dam (Paragraphs 3.1e and 5.1c (5)).

e. Ownership. Brier Crest Woods, Inc., Vincent Marconi, President, P.O. Box 1, Blakeslee, PA 18610.

f. Purpose of Dam. Recreation.

g. Design and Construction History. Brier Crest Woods Dam was designed by Edward C. Hess Associates, Inc., Consulting Engineers of Stroudsburg, PA. The preliminary design was submitted to the Commonwealth in 1971. The Commonwealth, apparently suggested some changes to mitigate the environmental impact. The final design was submitted to the Commonwealth in April 1972. The Commonwealth issued a permit for construction in June 1972. Construction was started in the summer of 1972 by G. H. Litts and Son, Inc., Contractors of Marshalls Creek, PA., under the supervision of Edward C. Hess Associates. The dam was completed in September 1973. Clifford L. Dennis of Edward C. Hess Associates was the project engineer throughout design and construction.

h. Normal Operational Procedure. The pool is maintained at the spillway crest level with excess inflow discharging over the spillway. The outlet works is not used. Spillway discharge flows downstream to the confluence with Tunkhannock Creek.

1.3 Pertinent Data.

a. Drainage Area. (square miles)	0.5
b. Discharge at Damsite. (cfs.)	
Maximum known flood at damsite	Unknown.
Outlet works at maximum pool elevation	15
Spillway capacity at maximum pool elevation	
Design conditions	970
Existing conditions	920
c. Elevation. (feet above msl.)	
Top of dam	
Design conditions	1807.0
Existing conditions	1806.7
Maximum pool	
Design conditions	1807.0
Existing conditions	1806.7
Normal pool (spillway crest)	1802.0
Upstream invert outlet works	1791.7
Downstream invert outlet works	1791.5
Streambed at toe of dam	1791.0
d. Reservoir Length. (miles)	
Normal pool	0.33
Maximum pool	0.38
e. Storage. (acre-feet)	
Normal pool	110
Maximum pool (design)	247
f. Reservoir Surface. (acres)	
Normal pool	26.2
Maximum pool (design)	28.5
g. Dam.	
Type	Homogeneous earthfill with toe drain.

g.	Dam. (cont'd)	
	Length (feet)	790
	Height (feet)	16
	Topwidth (feet)	44 (changes to 30 feet adjacent to spillway)
	Side Slopes	
	Design	
	Upstream	1V on 2.5H
	Downstream	1V on 2.5H (slopes flatten adjacent to spillway)
	Zoning	Earthfill with toe drain.
	Cut-off	Cutoff trench backfilled with embankment fill.
	Grout Curtain	None.
h.	Diversion and Regulating Tunnel.	None.
i.	Spillway.	
	Type	Concrete gravity weir.
	Length of Weir (feet)	25.0
	Crest Elevation	1802.0
	Upstream Channel	Reservoir, vertical concrete walls.
	Downstream Channel	Concrete apron.

j.	Regulating Outlets. Type.	One 12-inch diameter corrugated metal pipe.
	Length (feet)	13
	Closure	Sluice gate at intake at upstream end.
	Access	On bridge over spillway.

SECTION 2

ENGINEERING DATA

2.1 Design.

a. Data Available. Design data available for review included the following: approved design drawings, specifications, foundation data from test pits, and permit application reports.

b. Design Features. The project is described in Paragraph 1.2a. The various features of the dam are shown on the Photographs in Appendix C and on Plates E-2 to E-5 in Appendix E. The embankment is shown on Photographs A through D. The spillway is shown on Photographs D through F. The outlet works is shown on Photographs D and E.

c. Design Considerations. Nothing was noted in the review of the design data that would cause concern. The specifications generally reflected good engineering practice.

2.2 Construction.

a. Data Available. Construction data available for review included construction progress reports prepared by the design engineer and correspondence regarding construction. The design engineer verbally amplified the construction reports.

b. Construction Considerations. The design engineer amplified the records to explain that some of the embankment material that was placed during the fall of 1972 came from a swamp in the reservoir area. Consequently, the material was quite wet and drying the material sufficiently to meet density requirements was time consuming. He pointed out, however, that although it was difficult, the Contractor did dry the material sufficiently to compact the fill to the required density. He stated that no other problems arose during construction. The available information indicates that the embankment was well constructed.

2.3 Operation. There are no formal records of operation. There have been no formal inspections of the dam since its construction. There are no records of any problems with the dam.

2.4 Evaluation.

a. Availability. Engineering data were provided by the Bureau of Dams and Waterway Management, Department of Environmental Resources, Commonwealth of Pennsylvania (PennDER). The Owner made available a representative for information during the visual inspection. The design engineer researched his files and provided information at the request of the inspection team.

b. Adequacy. The type and amount of available design data and other engineering data are somewhat limited; the assessment is based on the combination of available data, visual inspection, performance history, hydrologic assumptions, and hydraulic assumptions.

c. Validity. There is no reason to question the validity of the available data.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. The overall appearance of the dam is good. Some deficiencies were observed as noted below. A sketch of the dam with the locations of deficiencies is presented on Exhibit B-1 in Appendix B. Survey information acquired for this report is summarized in Appendix B. On the day of the inspection, the pool was at spillway crest. Rainfall immediately preceding the inspection resulted in very wet soil conditions.

b. Embankment. The embankment is in good condition. The top of the dam is used as an access road; it is not covered with vegetation. Vehicular traffic has created minor depressions, which were full of water on the day of the inspection (Photograph A). The upstream slope is protected by riprap, which is in good condition (Photograph A). The grass on the downstream slope is in poor condition. It is thin and many bare areas exist. Surface runoff has eroded many very shallow rills over most of the downstream slope (Photograph B). Soil eroded from the embankment covers the toe drains, which were not evident during the inspection (Photograph C). A 0.25-gpm flow was observed along the downstream toe of the dam to the right of the spillway. Its source could not be determined.

The survey performed for this inspection (Appendix B) reveals that low areas exist on the top of the embankment to the left of the spillway. The lowest area is 0.3 foot below design elevation. The survey section shown in Appendix B has flatter slopes and a narrower top width than the typical section shown on Plate E-3 in Appendix E.

c. Appurtenant Structures. The spillway is in good condition. No deficiencies were observed at either the weir or the exit channel apron. The sidewalls of the exit channel apron, which also act as the bridge abutments, have a shrinkage crack on each side approximately coincident with the axis of the dam. The weep holes in these walls were trickling (Photograph F). The bridge deck is in good condition.

The outlet works is located at the spillway. It consists of a corrugated metal pipe extending through the weir with a sluice gate at the upstream end. The pipe is rusty. The Owner's representative could not locate the key to the padlock that secures the gate operating mechanism to the bridge railing (Photograph E). He did not recollect the gate ever being operated.

d. Reservoir Area. The watershed is mostly wooded. The only development is minor and is part of the Brier Crest Woods Development. Slopes in the watershed are generally mild.

e. Downstream Conditions. The valley at the damsite is relatively wide and flat. About 0.2 mile downstream, the valley narrows and steepens. It then passes below Pa. Route 903 in a small culvert. Just beyond Route 903, the stream drops very rapidly to its confluence with Tunkhannock Creek, which is about 0.4 mile downstream from the dam. Were the dam to fail, damage would probably occur at both a dwelling and a ski shop. Downstream conditions showing the probable limits of flooding from a dam failure are sketched in Appendix D.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure. The reservoir is maintained at the spillway crest level with excess inflow discharging over the spillway and into the downstream channel. The outlet works is not used.

4.2 Maintenance of Dam. The Owner's representative reported that maintenance of the dam was infrequent. He also reported that inspections were infrequent, informal, and not in detail. Apparently, some inspections of the dam are being performed as the design engineer was recently called to the site to investigate a minor leak in the sluice gate.

4.3 Maintenance of Operating Facilities. The outlet works is not maintained.

4.4 Warning Systems in Effect. The Owner's representative stated that he was not aware of any emergency operation and warning system.

4.5 Evaluation of Operational Adequacy. The maintenance of the outlet works is inadequate. Although the embankment and spillway are in good condition, the lack of formal maintenance procedures could result in eventual deterioration of the dam. Inspections are necessary to detect hazardous conditions at the dam. An emergency operation and warning system is necessary to reduce the risk of dam failure should adverse conditions develop and to prevent loss of life should the dam fail.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features.

a. Design Data. The available data for the spillway indicates that the design was based on a Curve "C" discharge of 720 cfs that was required by the Commonwealth. The design head was 4 feet, with 1 foot of freeboard provided. The underside of the spillway bridge was set at the design head elevation. The design spillway capacity used in this Report is 973 cfs, and it was computed using the maximum available head of 5.0 feet for design conditions.

b. Experience Data. No records of maximum pool levels are available.

c. Visual Observations.

(1) General. The visual inspection of Brier Crest Woods Dam, which is described in Section 3, resulted in a number of observations relevant to hydrology and hydraulics. These observations are evaluated herein for the various features.

(2) Embankment. The low areas on the top of the dam limit the existing spillway capacity to less than the maximum capacity.

(3) Appurtenant Structures. The design elevation of the underside of the spillway bridge is lower than the design top of dam elevation, which would cause pressure flow when water is near the top of the dam. Discharges under pressure flow would be less than under a free overfall condition. In computing the existing spillway capacity and in evaluating the spillway adequacy, the effect of the above condition was included. There is the potential for the bridge to collect debris during storms. This would reduce the spillway capacity. In computing the existing spillway capacity, the effect of debris was not considered.

The ability of the outlet works to function is uncertain. At present, it cannot be relied upon to draw down the reservoir.

(4) Reservoir Area. No conditions were observed in the watershed that might present significant hazard to the dam.

(5) Downstream Conditions. No conditions were observed downstream from the dam that would reduce the hydraulic capacity of the spillway. A failure of the dam would result in a significant discharge along Pa. Route 903. This would probably occur as sheet flow. It would cause damage to a ski shop and to the basement of a dwelling. Loss of life from a failure is possible but unlikely. Downstream from the confluence with Tunkhannock Creek, there are no structures adjacent to the stream for 2.5 miles. The downstream conditions indicate that a significant hazard classification is warranted for Brier Crest Woods Dam.

d. Overtopping Potential.

(1) Spillway Design Flood. According to the criteria established by the Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) for the size (Small) and hazard potential (Significant) of Brier Crest Woods Dam is between the 100-Year Flood and one-half of the Probable Maximum Flood (PMF). Because of the possibility of loss of life downstream, the one-half PMF is selected as the SDF for Brier Crest Woods Dam. The watershed was modeled with the HEC-1DB computer program. A description of the model is included in Appendix D. The assessment of the dam is based on existing conditions. The effects of future development are not considered.

(2) Summary of Results. Pertinent results are tabulated at the end of Appendix D. The analysis reveals that Brier Crest Woods Dam can pass the PMF with 0.2 foot of freeboard. If the low areas at the top of the dam were filled in, the freeboard would increase to 0.5 foot.

(3) Spillway Adequacy. The criteria used to rate the spillway adequacy of a dam are described in Appendix D. Because the dam can pass the PMF, which is twice the SDF, the spillway capacity is rated as adequate.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) General. The visual inspection of Brier Crest Woods Dam, which is described in Section 3, resulted in a number of observations relevant to structural stability. These observations are evaluated herein for the various features.

(2) Embankment. The depressions caused by vehicular traffic on the top of the dam are of no concern. The erosion on the downstream slope, which was caused by surface runoff, is not a hazard at present. Long-term neglect could worsen the situation. The design engineer reported that the grass cover at the end of construction was adequate. The reason for the poor growth of the grass is unknown. The design engineer reported that the toe drains were constructed as shown on Plate E-3. The soil which covers them should not affect their proper functioning. The flow that was observed along the toe is insignificant. In all probability it was surface runoff.

The low areas on the top of the embankment probably resulted from settlement. The design engineer reported that the template of the section surveyed for this inspection was approximately the same as the as-constructed template. He reported that the design drawings do not clearly reflect the template near the spillway.

(3) Appurtenant Structures. The shrinkage cracks in the exit channel walls are not a hazard at present; they do have the potential to eventually start spalling. The minor flow from the weep holes indicates that they are probably functioning correctly.

The outlet works operation is assessed in Section 5. The rusty outlet works pipe is of no concern. In essence, the pipe just acts as a form for the surrounding spillway weir concrete.

b. Design and Construction Data. The design engineer reported that no stability analysis was performed for the

embankment. He also reported that an analysis for the spillway weir was performed but that it could not be located in his files.

For this report, the stability of the spillway weir was checked under the maximum loading condition. Earth pressure and uplift were used in the analysis. For the maximum loading condition, pool level at design top of dam, the resultant was within the middle third of the base. Both the resistance to sliding and toe pressure were adequate. The stability of the spillway weir meets the criteria established by the Office of the Chief of Engineers (OCE) for stability of gravity structures.

c. Operating Records. There are no formal records of operation. According to available data, no stability problems have occurred over the operational history of the dam.

d. Post-construction Changes. There have been no post-construction changes to Brier Crest Woods Dam.

e. Seismic Stability. Brier Crest Woods Dam is located in Seismic Zone 1. Earthquake loadings are not considered to be significant for small dams located in Zone 1 when there are no readily apparent stability problems. As there are no readily apparent stability problems, the ability of the dam to withstand an earthquake is assumed to be adequate.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety.

(1) Based on available records, visual inspection, calculations, and past operational performance, Brier Crest Woods Dam is judged to be in good condition. Based on existing conditions, the spillway will pass the PMF which is twice the Spillway Design Flood (SDF), with 0.2 foot of freeboard. Based on the criteria and the downstream conditions, the SDF is the 1/2 PMF. If the low areas on the top of the dam were filled to the design elevation, the freeboard would increase to 0.5 foot. The spillway capacity is rated as adequate.

(2) No stability problems were evident for the embankment.

(3) The spillway weir meets OCE guidelines for stability under the maximum operating condition.

(4) The ability of the outlet works to function is uncertain.

(5) Maintenance procedures for the dam and appurtenant structures are inadequate.

(6) A summary of the features and observed deficiencies is listed below:

Feature and Location	Observed Deficiency
Embankment:	Low areas at top; minor erosion of downstream slope; poor vegetation on downstream slope.
Spillway:	Shrinkage cracks in exit channel sidewalls.
Outlet Works:	Uncertain operation.

b. Adequacy of Information. The information available is such that an assessment of the condition of the dam can be inferred from the combination of visual inspection, past performance, and computations performed prior to and as part of this study.

c. Urgency. The recommendations in Paragraph 7.2 should be implemented without delay.

d. Necessity for Further Investigations. Accomplishment of remedial measures will not require further investigations by the Owner.

7.2 Recommendations and Remedial Measures.

a. The following studies and remedial measures are recommended to be undertaken by the Owner, in approximate order of priority, without delay:

(1) Ensure the operational adequacy of the outlet works.

(2) Establish an adequate grass cover on the downstream slope.

(3) Fill in low areas at the top of the dam.

b. In addition, the Owner should institute the following operational and maintenance procedures:

(1) Develop a detailed emergency operation and warning system for Brier Crest Woods Dam.

(2) During periods of unusually heavy rains, provide round-the-clock surveillance of Brier Crest Woods Dam. Have sufficient personnel available to remove debris that may collect at the spillway bridge.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system.

(4) Institute an inspection program such that the dam is inspected frequently. As presently required by the Commonwealth, the inspection program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the inspection results to determine if remedial measures are necessary.

(5) Institute a maintenance program so that all features of the dam are properly maintained.

APPENDIX A

CHECKLIST - ENGINEERING DATA

CHECKLIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, AND OPERATION
PHASE I

NAME OF DAM: Brier Crest Woods

NDI ID NO.: PA - 00879 DER ID NO.: 45-245

Sheet 1 of 4

ITEM	REMARKS
AS-BUILT DRAWINGS	Design Drawing. See Plates E-2 to E-5
REGIONAL VICINITY MAP	See Plate E-1
CONSTRUCTION HISTORY	Built 1972 to 1973
TYPICAL SECTIONS OF DAM	See Plate E-3
OUTLETS: Plan Details Constraints Discharge Ratings	See Plate E-4 No rating available.

A-1

ENGINEERING DATA

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	NONE
DESIGN REPORTS	WATER AND POWER RESOURCES BOARD ANALYSIS OF DESIGN
GEOLOGY REPORTS	AVAILABLE SOIL DATA - SEE PLATE E-3 AND MATERIALS INVESTIGATION BELOW.
DESIGN COMPUTATIONS: Hydrology and Hydraulics (H&H) Dam Stability Seepage Studies	STABILITY AND SEEPAGE - NONE
MATERIALS INVESTIGATIONS: Boring Records Laboratory Field	IN FILES: 2 SOIL SAMPLES ① SILTY SAND: D_{100} = 1½", D_{50} = #100±, 41% < #200, PERM 1.33×10^{-6} cm/sec ② SANDY SILT: D_{100} = 1", 64% < #200, PERM 5.26×10^{-7} cm/sec
POSTCONSTRUCTION SURVEYS OF DAM	NONE

ENGINEERING DATA

ITEM	REMARKS
BORROW SOURCES	Site
MONITORING SYSTEMS	None
MODIFICATIONS	None
HIGH POOL RECORDS	None
POSTCONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM: Description Reports	None

ENGINEERING DATA

ITEM	REMARKS
MAINTENANCE AND OPERATION RECORDS	NONE
SPILLWAY: Plan Sections Details	See PLATE E-4
OPERATING EQUIPMENT: Plans Details	SEE PLATE E-4
PREVIOUS INSPECTIONS Dates Deficiencies	NONE

APPENDIX B

CHECKLIST - VISUAL INSPECTION

CHECKLIST

VISUAL INSPECTION

PHASE I

Name of Dam: Brier Crest Woods County: Monroe State: Pennsylvania

NDI ID No.: PA-00879 DER ID No.: 45-245

Type of Dam: Zoned Earthfill Hazard Category: Significant

Date(s) Inspection: 14 November 1979 Weather: Cloudy-Windy Temperature: 40-45°F

Soil conditions - very wet

Pool Elevation at Time of Inspection: 1802.0 msl/Tailwater at Time of Inspection: 1791.0 msl

Inspection Personnel:

D. Wilson (GFCC)

D. Ebersole (GFCC)

A. Whitmhn (GFCC) Recorder

B-1

EMBANKMENT

Sheet 1 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	NONE	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	NONE	
SLOUGHING OR EROSION: Embankment Slopes Abutment Slopes	DOWNSTREAM SLOPE: ALMOST NO VEGETATION, SHALLOW SURFACE RUNOFF SWALES ON ENTIRE SLOPE	
CREST ALIGNMENT: Vertical Horizontal	HORIZ. - NO DEFICIENCIES VERT. - SEE SURVEY DATA FOLLOWING INSPECTION FORMS	
RIPRAP ~~FAILURES~~	GOOD CONDITION	

EMBANKMENT

Sheet 2 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT WITH: Abutment Spillway Other Features	No deficiencies	
ANY NOTICEABLE SEEPAGE	Swale along downstream toe. Flow of about 0.25 gpm in swale to right of spillway.	Flow could be surface runoff.
STAFF GAGE AND RECORDER	None	
DRAINS	Not evident from visual inspection.	

OUTLET WORKS

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	12" CMP IN CONCRETE SPILLWAY WEIR.	
INTAKE STRUCTURE	SUBMERGED	
OUTLET STRUCTURE	PIPE OUTFALLS AT TOE OF SPILLWAY WEIR	
OUTLET CHANNEL	SEE SPILLWAY	
EMERGENCY GATE	OPERATOR EXTENDS TO BRIDGE OVERHEAD.	OWNER'S REPRESENTATIVE COULD NOT LOCATE KEY TO PADLOCK.

UNGATED SPILLWAY

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	GOOD CONDITION	
APPROACH CHANNEL	RESERVOIR	
DISCHARGE CHANNEL	SHRINKAGE CRACKS EXTEND ALONG BRIDGE ABUTMENT CONCRETE.	TRICKLE FROM SOME WEEP HOLES.
BRIDGE AND PIERS	NO PIERS BRIDGE IN GOOD CONDITION.	

B-5

INSTRUMENTATION

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	NONE AT SITE	
OBSERVATION WELLS		
WEIRS		
PIEZOMETERS		
OTHER	NONE AT SITE	

DOWNSTREAM CHANNEL

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION: Obstructions Debris Other	No deficiencies	
SLOPES	MILD AT damsite, VERY STEEP AT DAMAGE CENTER.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	1 dwelling 1 Commercial Structure	SEE SKETCH IN Appendix D.

RESERVOIR AND WATERSHED

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	MILD	
SEDIMENTATION	NO REPORTED OR OBSERVED PROBLEMS.	
WATERSHED DESCRIPTION	ABOUT 40% SPARSELY developed by BRIER CREST Woods. REMAINDER WOODED.	

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HARRISBURG, PA.

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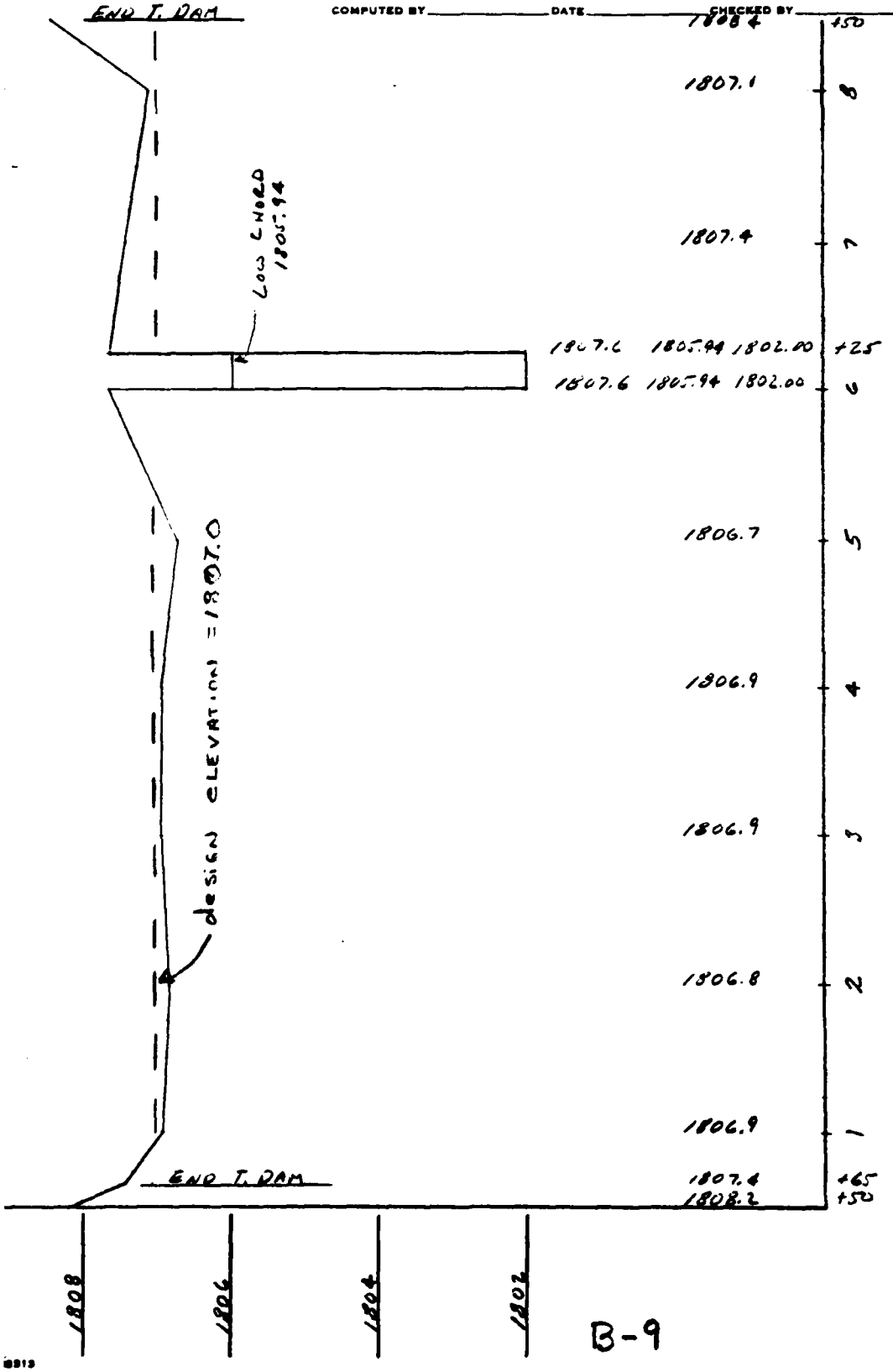
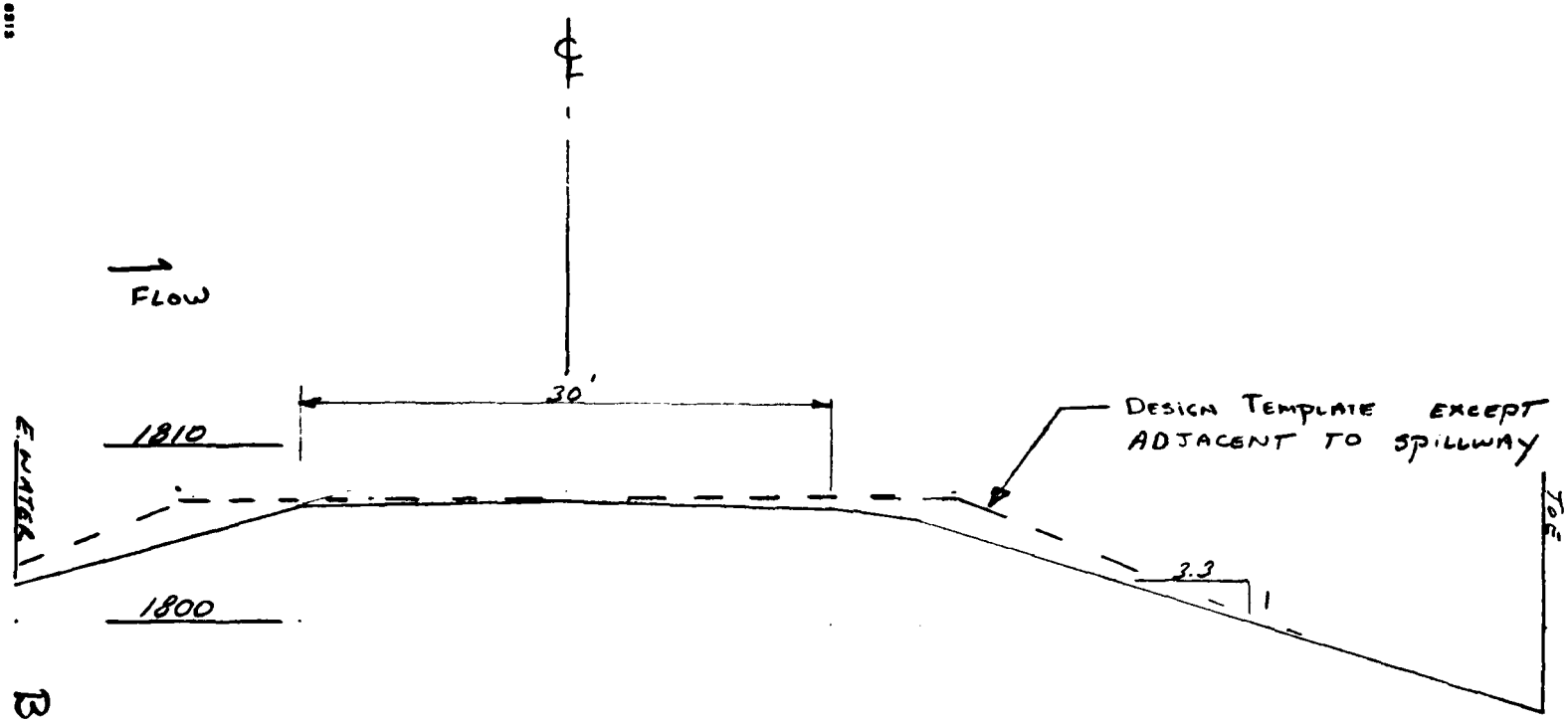
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____



BEIBK CREST WOODS DAM
PROFILE - TOP of DAM

B-9

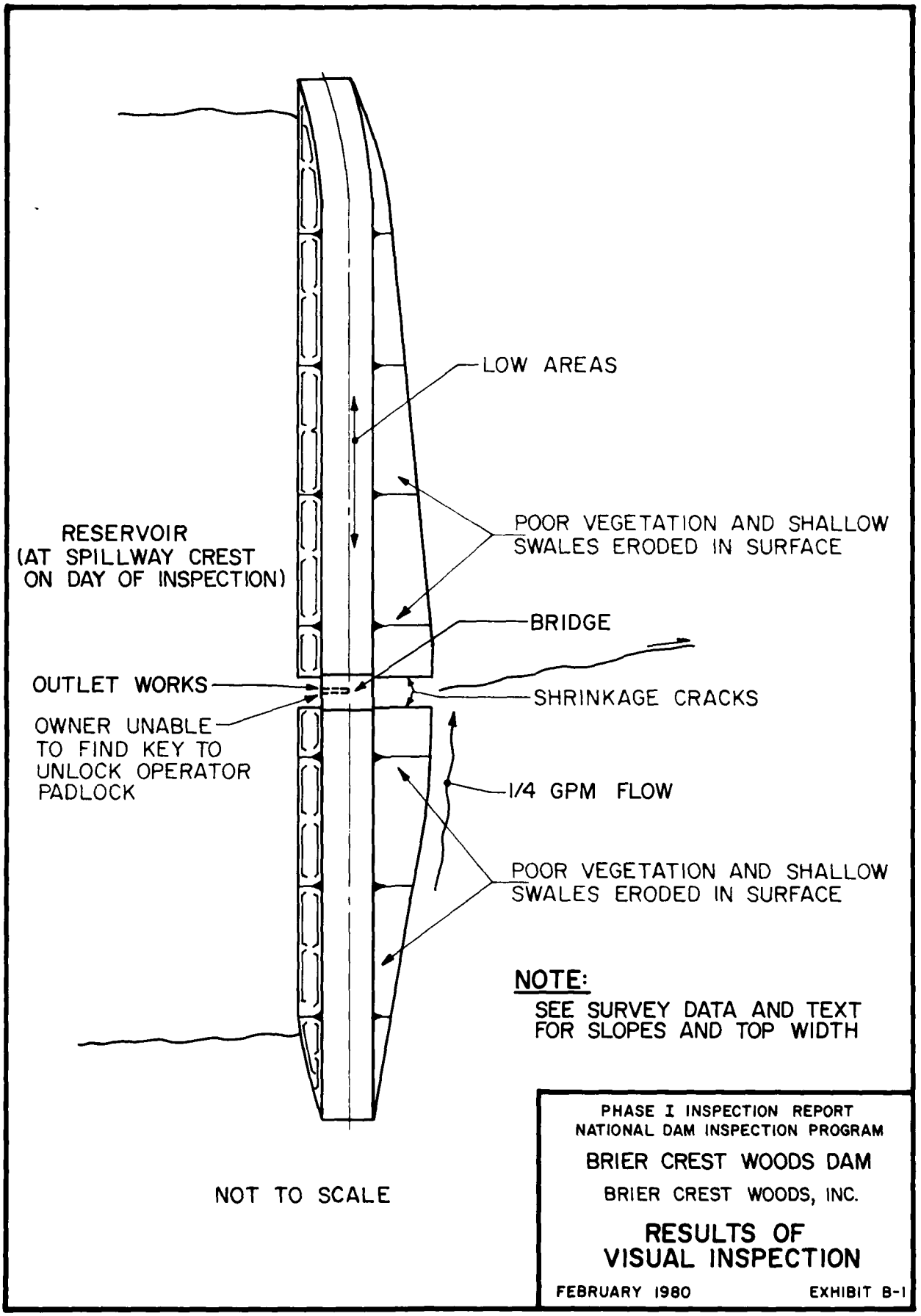
8813



B-10

SECTION Q
STA 5+75 (IMMEDIATELY TO LEFT OF SPILLWAY

BRIER CREST WOODS DAM
SCALE: 1"=10'



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIER CREST WOODS DAM

BRIER CREST WOODS, INC.

RESULTS OF VISUAL INSPECTION

FEBRUARY 1980 EXHIBIT B-1

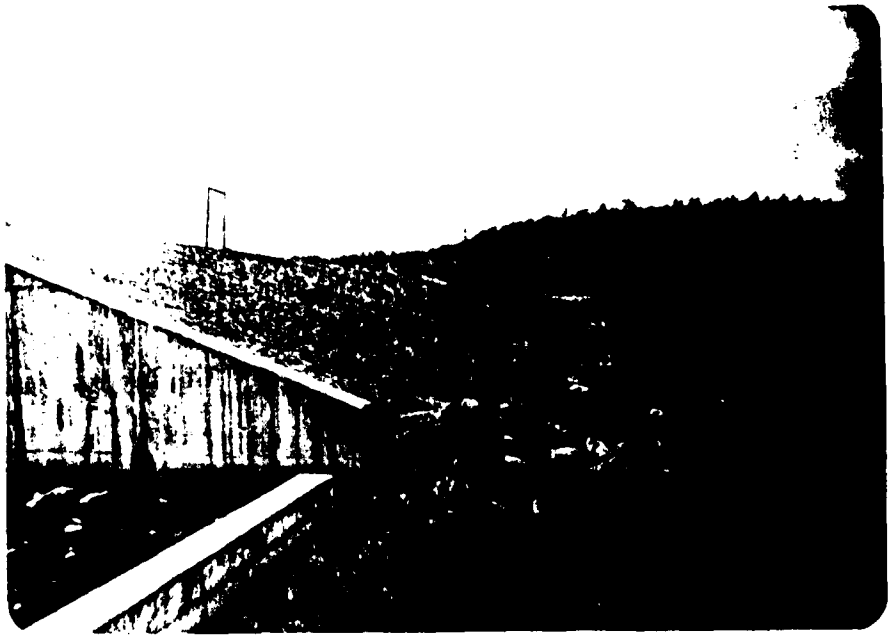
APPENDIX C

PHOTOGRAPHS

BRIER CREST WOODS DAM

A. Upstream Slope

B. Downstream Slope

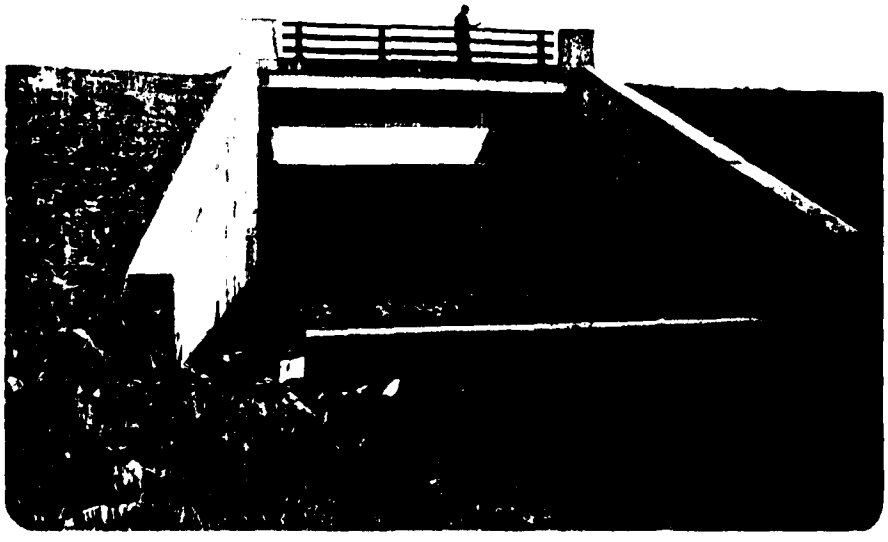


C. Downstream Slope

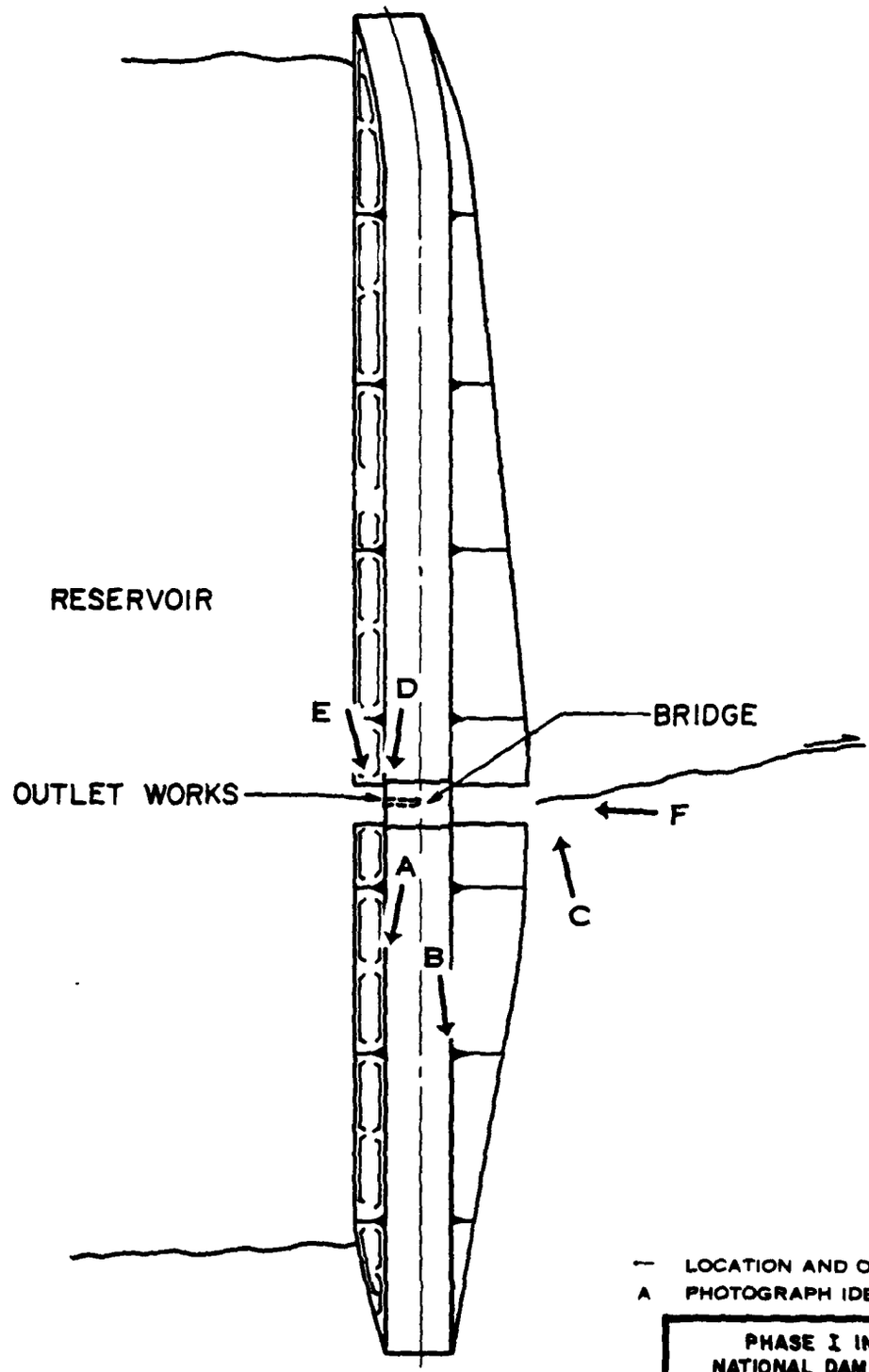
D. Spillway Bridge

BRIER CREST WOODS DAM

E. Spillway Approach



F. Spillway



NOT TO SCALE

— LOCATION AND ORIENTATION OF CAMERA
A PHOTOGRAPH IDENTIFICATION LETTER

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIER CREST WOODS DAM

BRIER CREST WOODS, INC.

GUIDE TO LOCATION OF PHOTOGRAPHS

FEBRUARY 1980 EXHIBIT C-1

APPENDIX D

HYDROLOGY AND HYDRAULICS

APPENDIX D

HYDROLOGY AND HYDRAULICS

Spillway Capacity Rating:

In the recommended Guidelines for Safety Inspection of Dams, the Department of the Army, Office of the Chief of Engineers (OCE), established criteria for rating the capacity of spillways. The recommended Spillway Design Flood (SDF) for the size (small, intermediate, or large) and hazard potential (low, significant, or high) classification of a dam is selected in accordance with the criteria. The SDF for those dams in the high hazard category varies between one-half of the Probable Maximum Flood (PMF) and the PMF. If the dam and spillway are not capable of passing the SDF without overtopping failure, the spillway capacity is rated as inadequate. If the dam and spillway are capable of passing one-half of the PMF without overtopping failure, or if the dam is not in the high hazard category, the spillway capacity is not rated as seriously inadequate. A spillway capacity is rated as seriously inadequate if all of the following conditions exist:

(a) There is a high hazard to loss of life from large flows downstream of the dam.

(b) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

(c) The dam and spillway are not capable of passing one-half of the PMF without overtopping failure.

Description of Model:

If the Owner has not developed a PMF for the dam, the watershed is modeled with the HEC-1DB computer program, which was developed by the U.S. Army Corps of Engineers. The HEC-1DB computer program calculates a PMF runoff hydrograph (and percentages thereof) and routes the flows through both reservoirs and stream sections. In addition, it has the capability to simulate an overtopping dam failure. By modifying the rainfall criteria, it is also possible to model the 100-year flood with the program.

APPENDIX D

DELAWARE River Basin
Name of Stream: TRIBUTARY TO TUNKHANNOCK CREEK
Name of Dam: BRIER CREST WOODS
NDI ID No.: PA-00879
DER ID No.: 45-245
Latitude: N 41° 02' 50" Longitude: 75° 33' 15"
Top of Dam Elevation: 1807.0 (DESIGN)
Streambed Elevation: 1791.0 Height of Dam: 16 ft
Reservoir Storage at Top of Dam Elevation: _____ acre-ft
Size Category: SMALL
Hazard Category: SIGNIFICANT (see Section 5)
Spillway Design Flood: VARIES 100-YR TO ½ PMF
SELECT ½ PMF

UPSTREAM DAMS

Name	Distance from Dam (miles)	Height (ft)	Storage at top of Dam Elevation (acre-ft)	Remarks
NONE				

DOWNSTREAM DAMS

Name	Distance from Dam (miles)	Height (ft)	Storage at top of Dam Elevation (acre-ft)	Remarks
NONE				

DELAWARE River Basin

Name of Stream: TRIB. TO TUNKHANNOCK CREEK

Name of Dam: BRIER CREST WOODS

DETERMINATION OF PMF RAINFALL & UNIT HYDROGRAPH

UNIT HYDROGRAPH DATA:

Sub-area	Drainage Area (square miles)	Cp (1)	Ct (2)	L miles (3)	L_{ca} miles (4)	L' miles (5)	Tp hours (6)	Map Area (7)	Plate (8)
A	0.48	0.45	2.1	1.15	0.42	N/A	1.69	2	B
Total	0.48								

(See Sketch on Sheet D-4)

(1) & (2): Snyder Unit Hydrograph coefficients supplied by Baltimore District, Corps of Engineers on maps and plates referenced in (7) & (8)

The following are measured from the outlet of the subarea:

(3): Length of main watercourse extended to divide

(4): Length of main watercourse to the centroid

The following is measured from the upstream end of the reservoir at normal pool:

(5): Length of main watercourse extended to divide

(6): $Tp=C_t \times (L \times L_{ca})^{0.3}$, except where the centroid of the subarea is located in the reservoir. Then $Tp=C_t \times (L')^{0.6}$

Initial flow is assumed at 1.5 cfs/sq. mile

Computer Data: QRCSN = -0.05 (5% of peak flow)

RTIOR = 2.0

RAINFALL DATA:

PMF Rainfall Index= 22.1 in., 24 hr., 200 sq. mile.

	Hydromet. 40 (Susquehanna Basin)	Hydromet. 33 (Other Basins)
Zone:	N/A	1
Geographic Adjustment Factor:	N/A	1.0
Revised Index Rainfall:	N/A	22.1

RAINFALL DISTRIBUTION (percent)

Time	Percent
6 hours	111
12 hours	123
24 hours	133
48 hours	142
72 hours	-
96 hours	-

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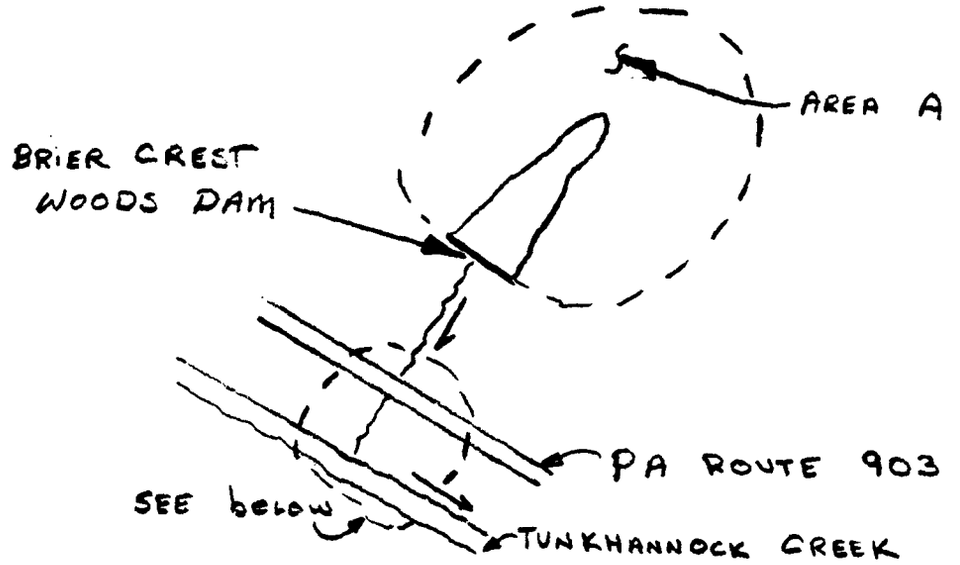
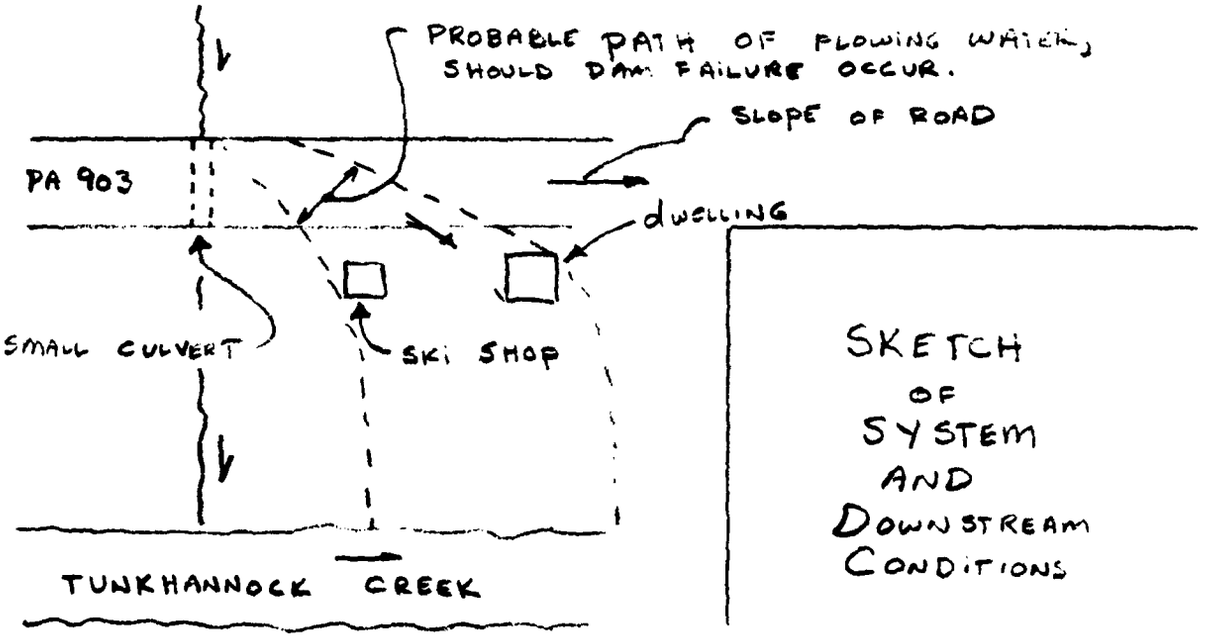
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____



SYSTEM



SKETCH OF SYSTEM AND DOWNSTREAM CONDITIONS

DOWNSTREAM CONDITIONS

6918

Data for Dam at Outlet of Subarea A (see Sketch on Sheet D-4)

Name of Dam: Brier Crest Woods

SPILLWAY DATA:	Existing Conditions	Design Conditions
Top of Dam Elevation	1806.7	1807.0
Spillway Crest Elevation	1802.0	1802.0
Spillway Head Available (ft)	4.7	5.0
Type Spillway	NEAR - OGEE	
"C" Value - Spillway	SEE FOLLOWING SHEET	
Crest Length - Spillway (ft)	25	25
Spillway Peak Discharge (cfs)	923	973
Auxiliary Spillway Crest Elev.	N/A	N/A
Auxiliary Spill. Head Avail. (ft)	↓	↓
Type Auxiliary Spillway		
"C" Value - Auxiliary Spill. (ft)		
Crest Length - Auxil. Spill. (ft)	N/A	N/A
Auxiliary Spillway Peak Discharge (cfs)		
Combined Spillway Discharge (cfs)	923	973

Spillway Rating Curve: SEE SHEET FOLLOWING

Elevation	Q Spillway (cfs)	Q Auxiliary Spillway (cfs)	Combined (cfs)
1802.0	0	N/A	
1803.0	85		SEE G
1804.0	257		Spillway
1805.0	503		
1805.5	638		
1806.0	780		
1806.5	888		
1806.7	923		
1807.0	973		
1810.0	1376		
		N/A	

OUTLET WORKS RATING:	Outlet 1	Outlet 2	Outlet 3
Invert of Outlet	1791.5		
Invert of Inlet	1791.7		
Type	12"CMP IN CONCRETE		
Diameter (ft) = D	1		
Length (ft) = L	13'		
Area (sq. ft) = A	.79		
N	.024		
K Entrance	0.5		
K Exit	1.0		
K Friction=$29.1N^2L/R^{4/3}$	1.38		
Sum of K	2.88		
$(1/K)^{0.5}$ = C	.59		
Maximum Head (ft) = HM	15		
Q = CA $\sqrt{2g(HM)}$ (cfs)	14.48		
Q Combined (cfs)	≈ 15		

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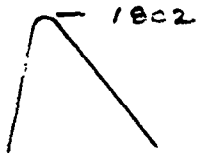
Spillway Rating Curve

Weir - similar to "Kings Handbook of Hydraulics" Fig 73

$C = 3.15 + .24H$ $\quad C_{MAX} = 3.9$

HEAD	C	$Q = CLH^{1.5}$	POOL = HEAD + 1802
0	3.15	0	1802.0
0.5	3.28	29	1802.5
1	3.40	85	1803.0
1.5	3.52	161	1803.5
2	3.64	257	1804.0
2.5	3.77	371	1804.5
3	3.89	503	1805.0
3.5	3.9	638	1805.5
4	3.9	780	1806.0
4.5	3.9	931	1806.5
5.0	3.9	1090	1807.0



USE ORIFICE EQUATION $A = 4 \times 25 = 100$

$$Q = 0.7 \times 100 \times \sqrt{2g(POOL - 1804)}$$

POOL	Q
1806.5	888
1806.7	923
1807.0	973
1810.0	1376

8313

Data for Dam at Outlet of Subarea A (See sketch on Sheet D-4)

Name of Dam: BRIER CREST WOODS

STORAGE DATA:

Elevation		Area (acres)		Storage million gals	Storage acre-ft		Remarks
1789.4	=ELEVO*	0		0	0		
1802.0	=ELEV1	26.2	=A1	33	110	=S1	DER RECORDS
1806.7		28.4			238		
1807.0		28.5			247		
1820.0		35					

* ELEVO = ELEV1 - $(3S_1/A_1)$
** Planimetered contour at least 10 feet above top of dam

Reservoir Area at Normal Pool is 9 percent of subarea watershed.

BREACH DATA: Not Used

See Appendix B for sections and existing profile of the dam.

Soil Type from Visual Inspection: _____

Maximum Permissible Velocity (Plate 28, EM 1110-2-1601) _____ fps
(from $Q = CLH^{3/2} = V \cdot A$ and depth = (2/3) x H) & A = L·depth

HMAX = $(4/9\ V^2/C^2)$ = _____ ft., C = ____ Top of Dam El.= ____

HMAX + Top of Dam El. = _____ = FAILEL
(Above is elevation at which failure would start)

Dam Breach Data:

BRWID = _____ ft (width of bottom of breach)
Z = _____ (side slopes of breach)
ELBM = _____ (bottom of breach elevation, minimum of zero storage elevation)
WSEL = _____ (normal pool elevation)
T FAIL= _____ mins = _____ hrs (time for breach to develop)

SELECTED COMPUTER OUTPUT

EXISTING CONDITIONS

MULTI-RATIO ANALYSIS

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
    1              A1                    NATIONAL DAM INSPECTION PROGRAM
    2              A2                  TRIBUTARY TO TUNKHANNOCK CREEK
    3              A3                       BRIER CREST WOODS DAM
    4              B   300       0      15       0       0       0       0       0      -4       0
    5              B1    5
    6              J     1       6       1
    7              J1    1      .8      .6      .5      .4      .3
    8              K                    1                               1
    9              K1       RUNOFF INTO RESERVOIR
   10              M     1       1     .68              .48                             1
   11              P             22.1     111     123     133     142
   12              T                                                      1     .05             .09
   13              W  1.69    0.45
   14              X  -1.5   -0.05     2.0
   15              K     1       1                                        1
   16              K1       ROUTE THROUGH DAM
   17              Y                             1
   18              Y1    1                                                -1802     -1
   19              Y4 1802     1803    1804    1805   1805.5    1806   1806.5  1806.7    1807    1810
   20              Y5    0       85     257     503     638     780     888     923     973    1376
   21              $A    0     26.2      35
   22              $E1789.4     1802    1820
   23              $$ 1802
   24              $D1806.7
   25              $L    1       50     320     435     450     735     800
   26              $V1806.7  1806.8  1806.9    1807  1807.1  1807.6    1810
   27              K    99
```

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS					
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
				1.00	.80	.60	.50	.40	.30
HYDROGRAPH AT	1	.48	1	1042.	834.	625.	521.	417.	313.
	(	1.24)	(	29.51)(	23.61)(	17.71)(	14.76)(	11.80)(	8.85)(
ROUTED TO	1	.48	1	879.	710.	521.	429.	335.	237.
	(	1.24)	(	24.88)(	20.12)(	14.76)(	12.14)(	9.47)(	6.71)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ••••••••••••••••

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1802.00	1802.00	1806.70
STORAGE	110.	110.	238.
OUTFLOW	0.	0.	923.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1806.46	0.00	231.	879.	0.00	42.75	0.00
.80	1805.75	0.00	212.	710.	0.00	42.75	0.00
.60	1805.07	0.00	193.	521.	0.00	43.00	0.00
.50	1804.70	0.00	182.	429.	0.00	43.00	0.00
.40	1804.32	0.00	172.	335.	0.00	43.00	0.00
.30	1803.88	0.00	160.	237.	0.00	43.25	0.00

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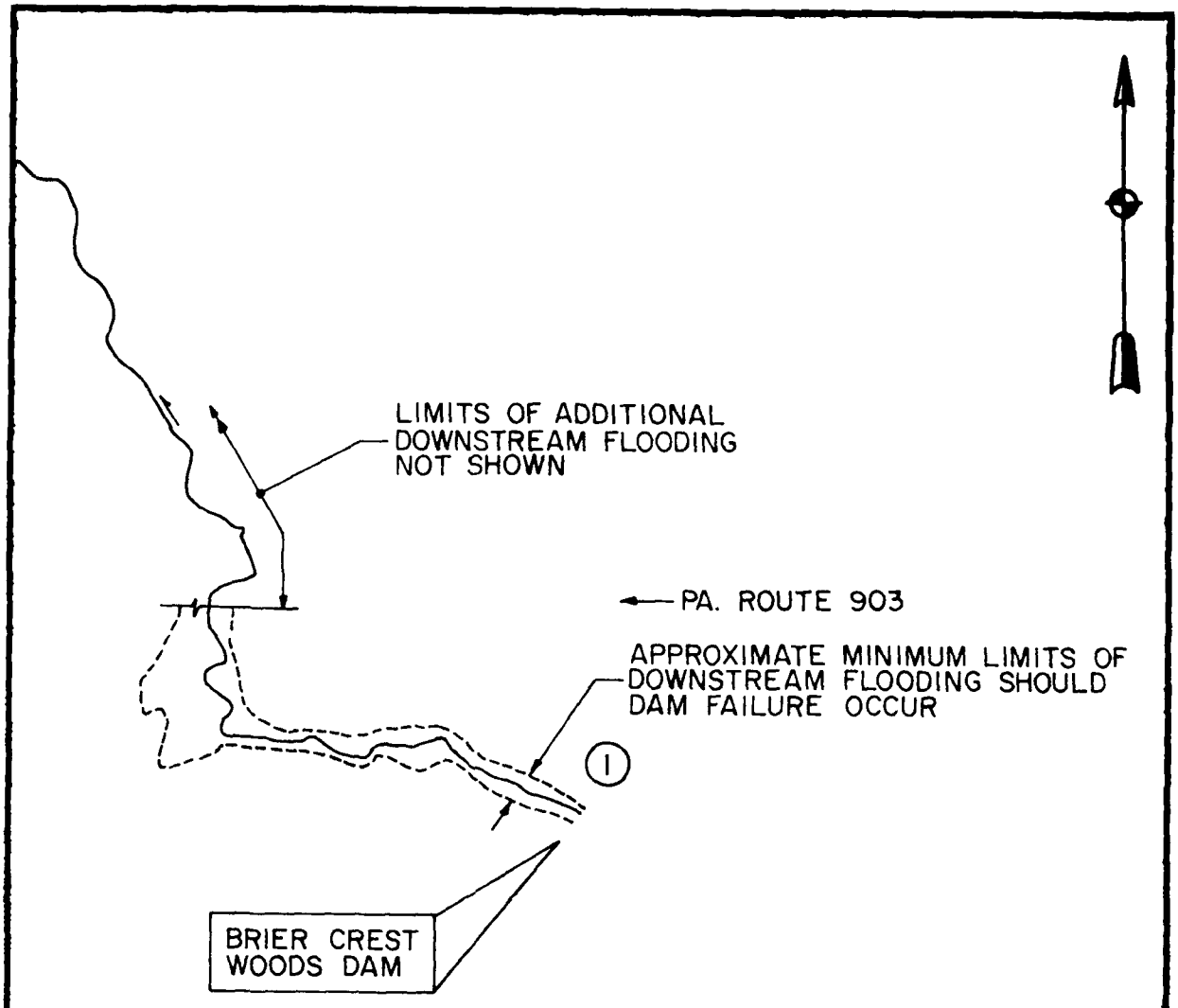
SUMMARY OF PERTINENT DATA

EXISTING CONDITIONS

PMF RAINFALL = 25.11"

	PMF	½ PMF
RUNOFF (INCHES)	22.93	11.47
INFLOW (CFS)	1042	521
OUTFLOW (CFS)	879	429
FREEBOARD (FT)	0.24	2.0

0813



NOTES:

1. LIMITS OF DOWNSTREAM FLOODING ARE ESTIMATES BASED ON VISUAL OBSERVATIONS. THIS MAP SHOULD NOT BE USED IN CONNECTION WITH THE EMERGENCY OPERATION AND WARNING PLAN.
2. CIRCLED NUMBERS INDICATE STATIONS USED IN COMPUTER ANALYSIS.

2000 0 2000

SCALE: 1 IN. = 2000 FT.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIER CREST WOODS DAM

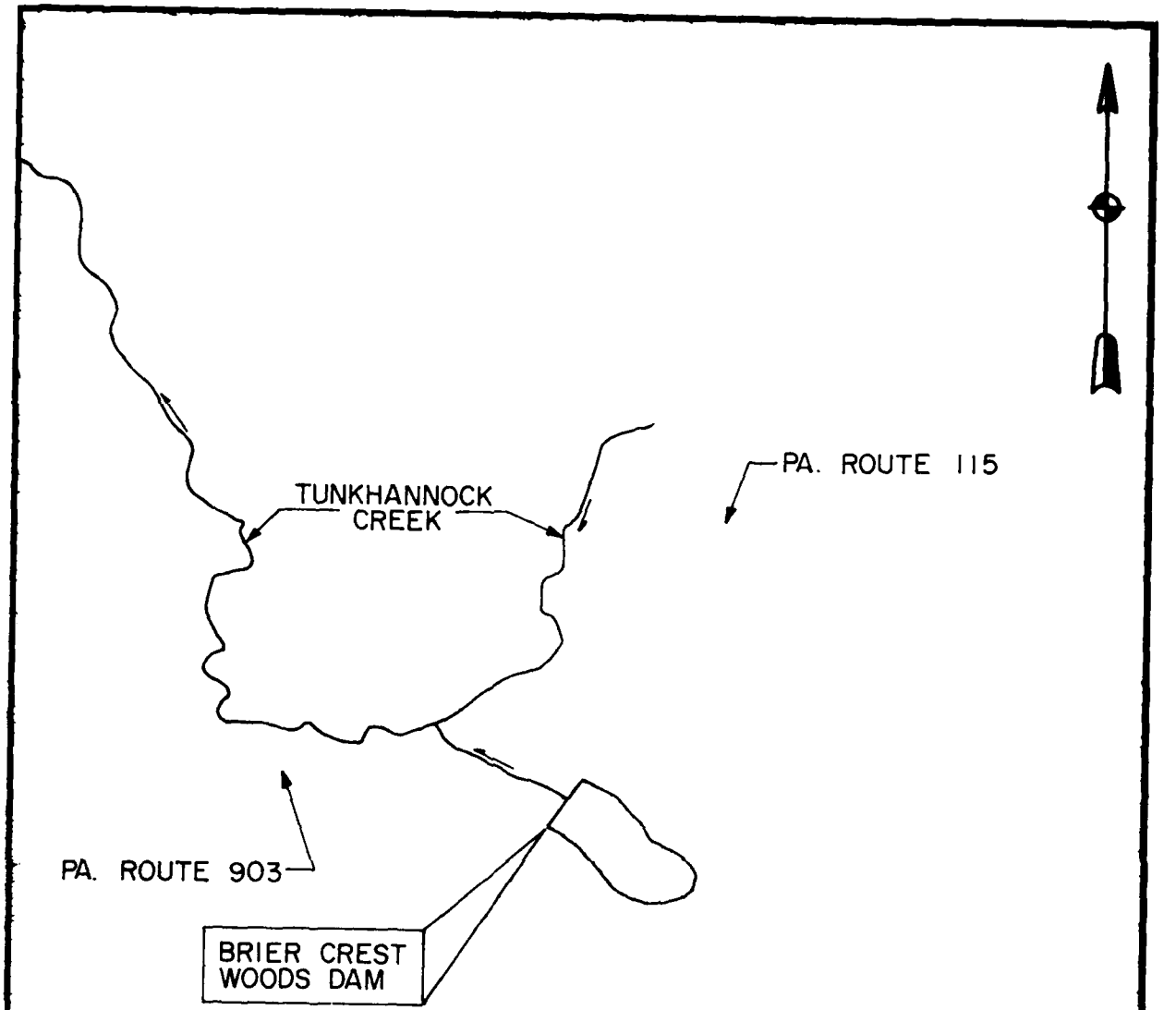
BRIER CREST WOODS, INC.

DOWNSTREAM DEVELOPMENT PLAN

FEBRUARY 1980 EXHIBIT D-1

APPENDIX E

PLATES



2000 0 2000

SCALE: 1 IN. = 2000 FT.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

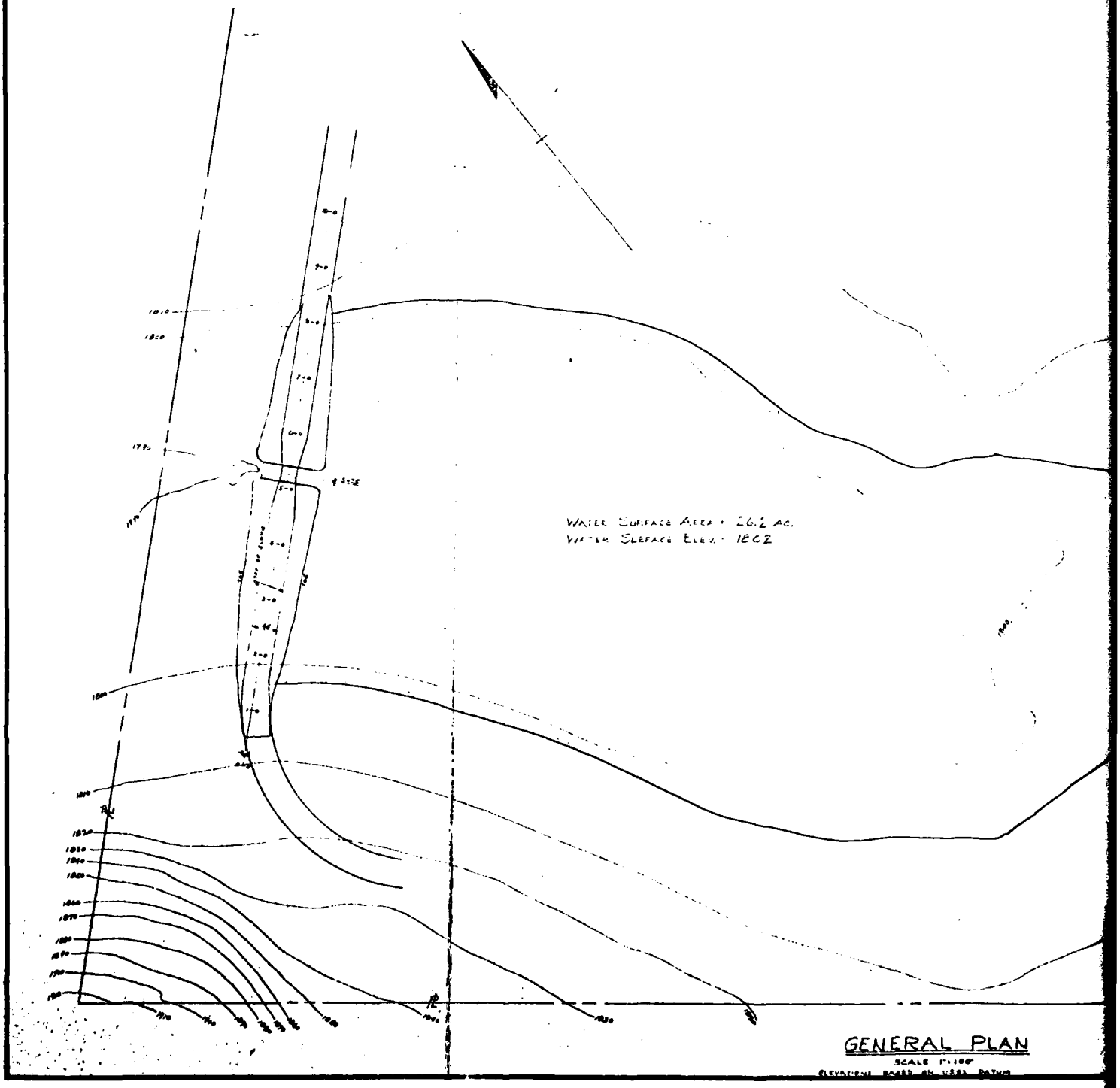
BRIER CREST WOODS DAM

BRIER CREST WOODS, INC.

LOCATION MAP

FEBRUARY 1980 PLATE E-1

CONSTRUCTION TO BE IN ACCORDANCE
DEPT OF FORESTS AND WATERS FORM
DEPT OF TRANSPORTATION FORM 40
OTHERWISE SPECIFIED ON PLANS

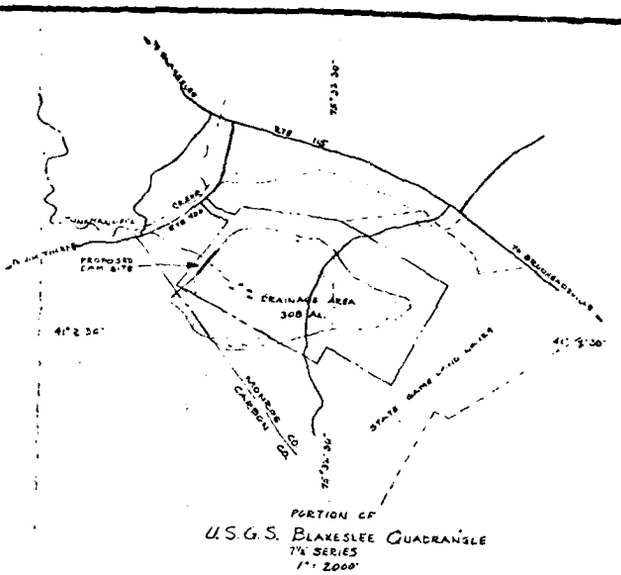


GENERAL PLAN

SCALE 1"=100'

ELEVATIONS BASED ON USGS DATUM

WITH
I WCE-S AND
PB UNLESS



PORTION OF
U.S.G.S. BLAKESLEE QUADRANGLE
7½' SERIES
1" = 2000'

CONTENT
LOCATION PLANS

PROPOSED DAM
BRIER CREST WOODS CORP.
TUNKHANNOCK TWP. - MONROE CO. - PENNA
JUNE 6, 1971 SCALE AS SHOWN

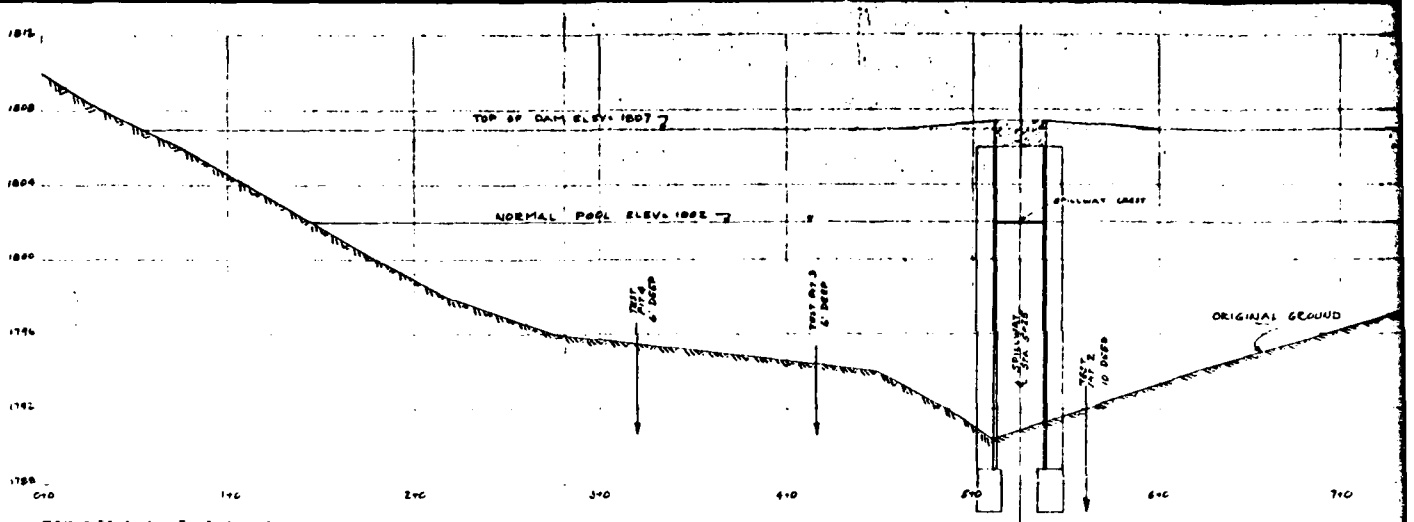
EDWARD C. NESS ASSOC. INC.
STROUDSBURG, PA.

SHEET 1 OF 4

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
BRIER CREST WOODS DAM
BRIER CREST WOODS, INC.

GENERAL PLAN

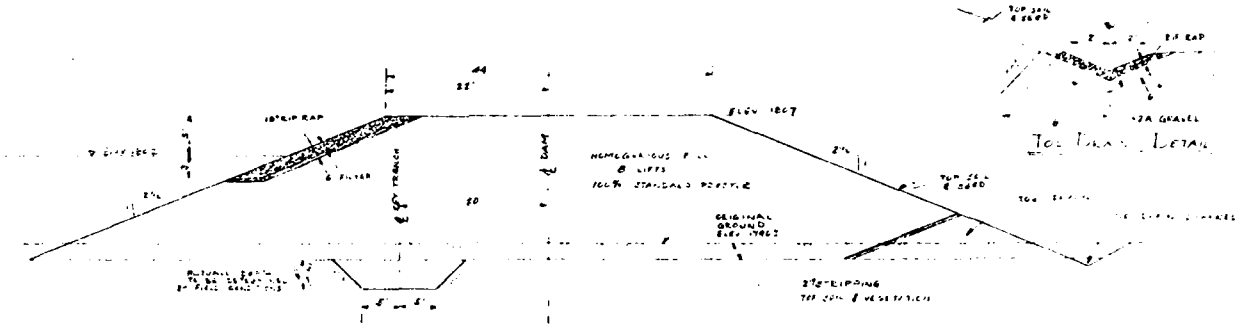
FEBRUARY 1980 PLATE E-2



TEST PITS DUG WITH BACKHOE
18"± LOAM AND ROOT MAT
SAME MATERIAL ALL HOLES - BROWN TO ORANGE SILTY SAND FROM BOTTOM OF LOAM TO BOTTOM OF HOLE

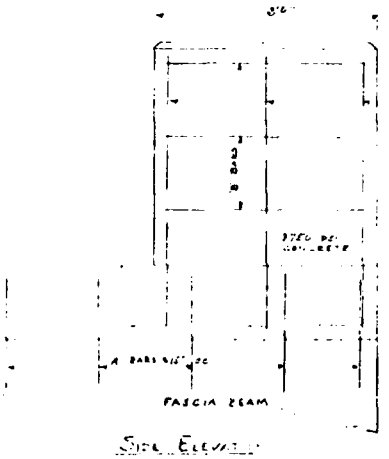
PROFILE OF DAM SITE

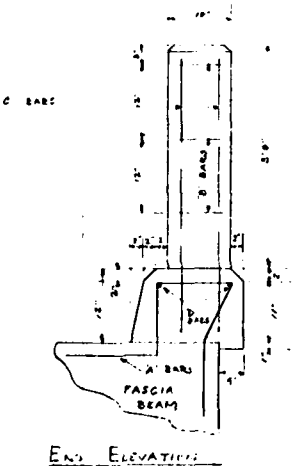
SCALE - HOR. 1" = 40'
VERT 1" = 4'

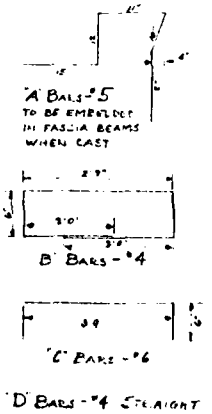


MAXIMUM CROSS SECTION

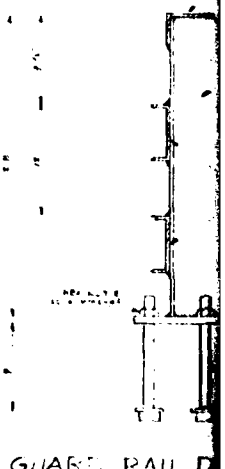
SCALE 1" = 10'







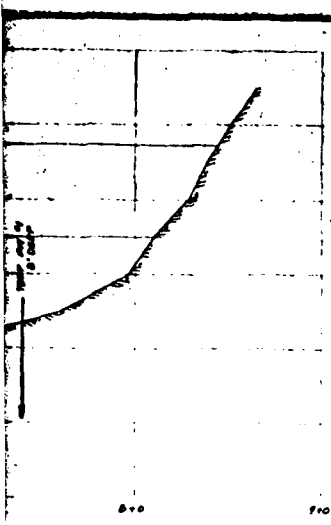
'D' BARS - #4 STRAIGHT

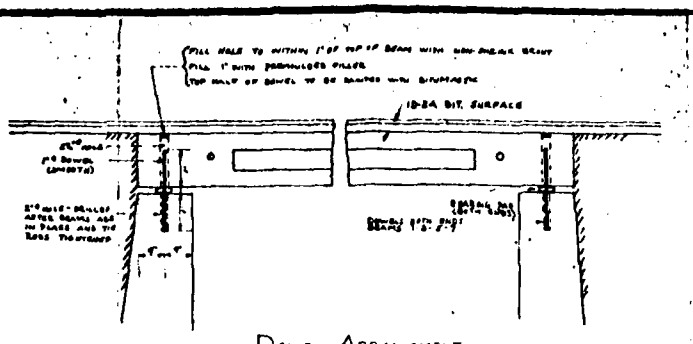


GUARD RAIL D

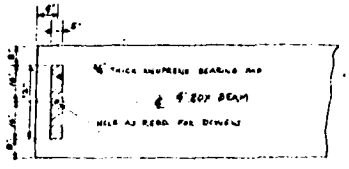
CURB AND END POST

1" = 1'0

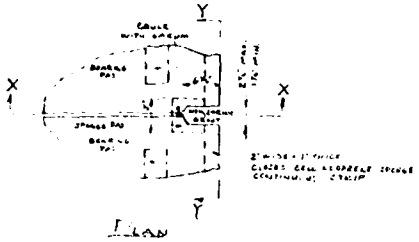




DOWEL ARRANGEMENT
SCALE 1"=1'

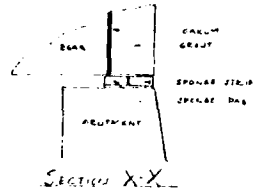


BEARING PAD DETAIL
SCALE 3/8"=1'0"



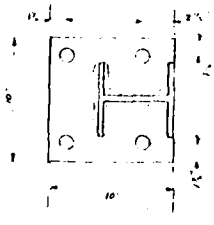
PLAN

SECTION Y-Y



SECTION X-X

WATERPROOFING AT ABUTMENTS



BASE PLATE DETAIL
2"=1'0"

CONTENT
PROFILE
MAXIMUM CROSS SECT
MISCELLANEOUS DETAILS

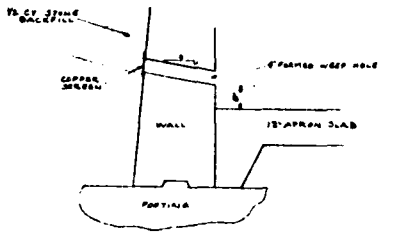
PROPOSED DAM
BRIER CREST WOODS CORP
TUNKHANNOCK TWP - MONROE CO - PENNA
JUNE 4, 1971 SCALE AS SHOWN

EDWARD E HESS ASSOC. INC.
STROUDSBURG, PA.

REVISED APR 13 1978
REVISED MAY 8 1978

SHEET 2 of 4

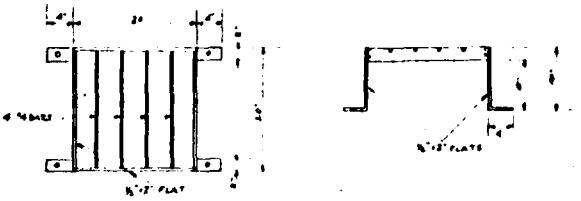
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
BRIER CREST WOODS DAM
BRIER CREST WOODS, INC.
PROFILE AND SECTION
FEBRUARY 1980 PLATE E-3



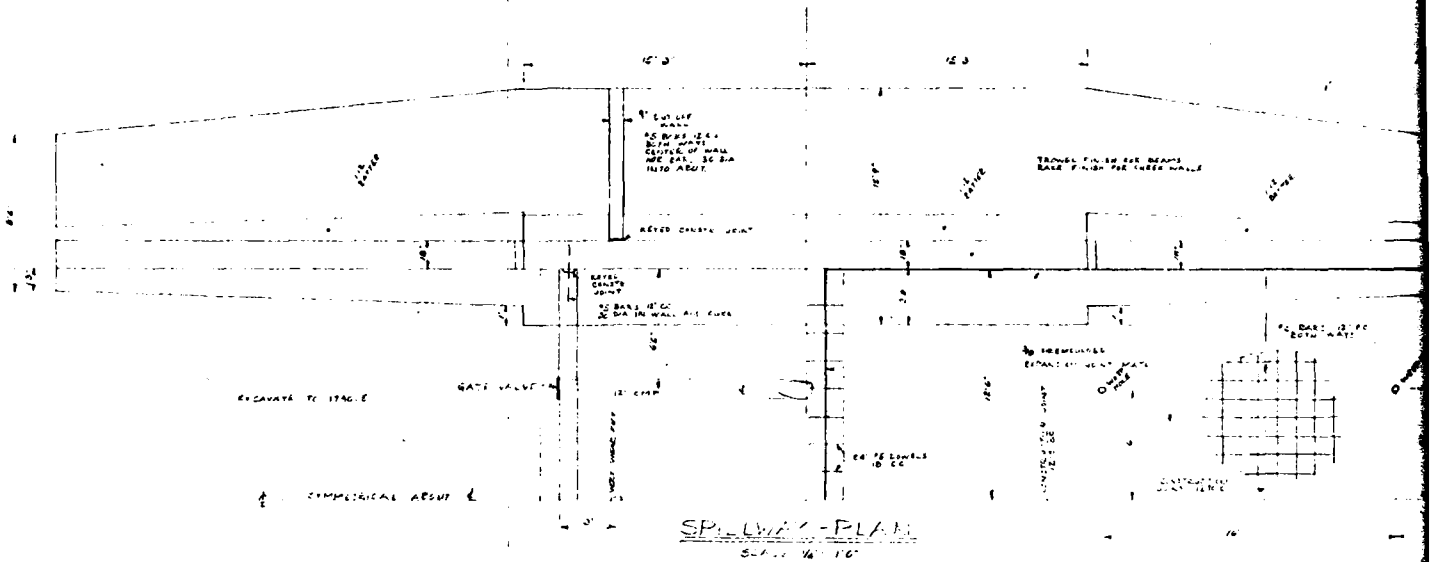
WEEP HOLE IN WALL - DETAIL

SLUICE GATE

ARMCO MODEL 36-10 SLUICE GATE
SELF CONTAINED — NON RISING STEM
FLAT BACK — 12" ROUND OPENING
MATERIAL COMBINATION #2
1 1/8" DIA STEM
HB-1B LIFT TYPE 1 STEM GUIDE
ARMCO WALL BRACKET
F TYPE WALL THIMBLE

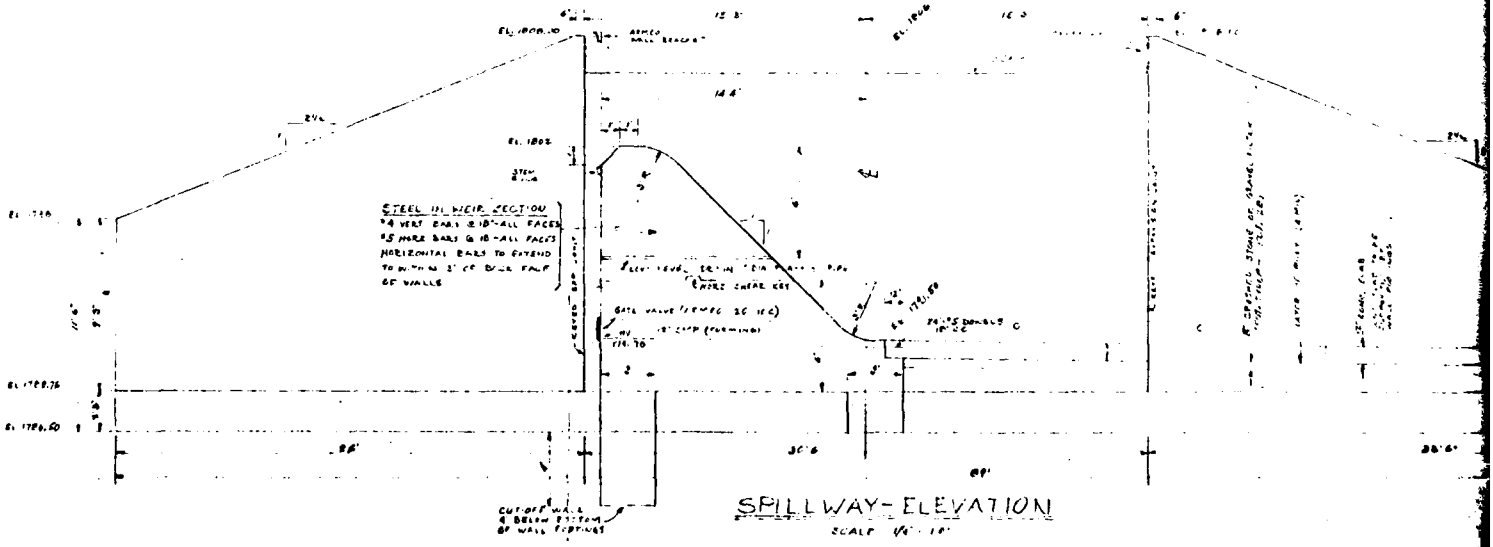


GRATE FOR GATE VALVE



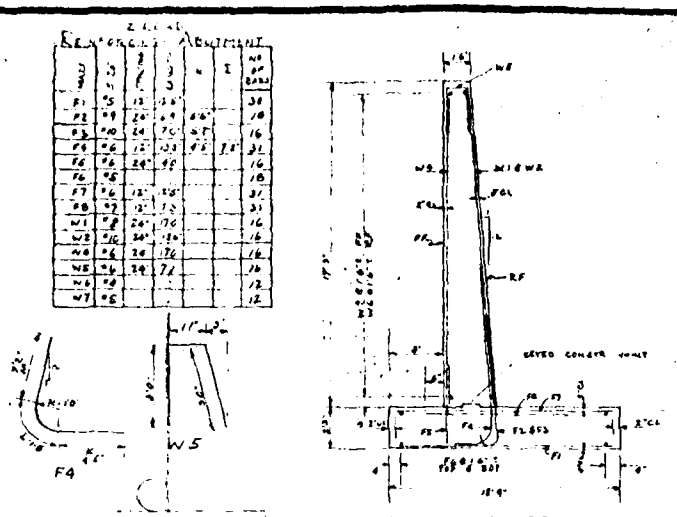
SPILLWAY - PLAN

SCALE 1/8" = 1'-0"

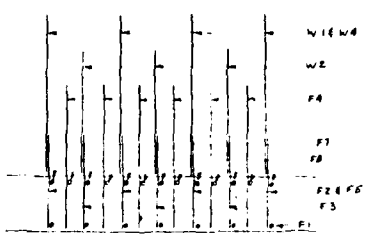


SPILLWAY - ELEVATION

SCALE 1/8" = 1'-0"

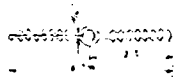


ABUTMENT - SECTION



ABUTMENT KEYWAY ARRANGEMENT

NOTES - PVC WATER STOP TO BE USED IN ALL JOINTS



PVC WATERSTOP DETAIL

ALL CONCRETE 3000 PSI

CONTENT
SPILLWAY

PROPOSED DAM
BRIER CREST WOODS CORP.
TOWAMENSING TWP. - MONROE CO. - PENNA
JUNE 4, 1971 SCALE AS SHOWN

EDWARD C. NESS ASSO. INC
STROUDSBURG, PA

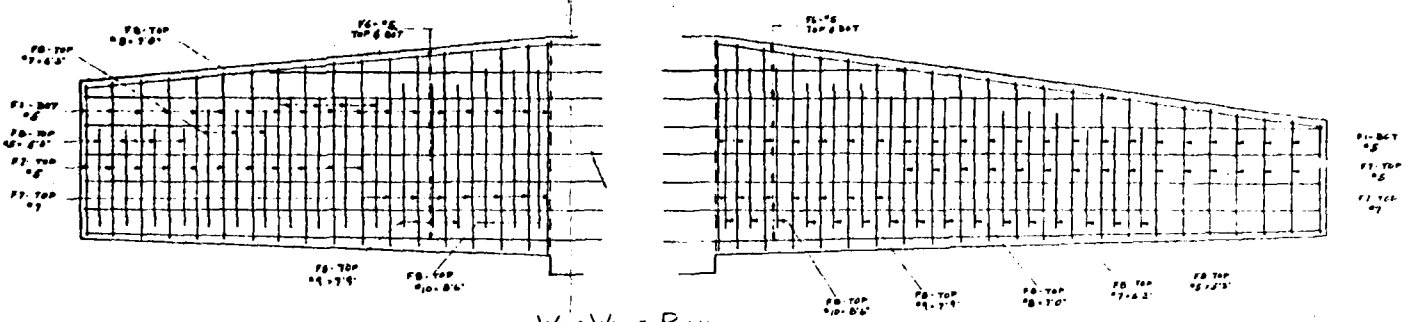
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIER CREST WOODS DAM

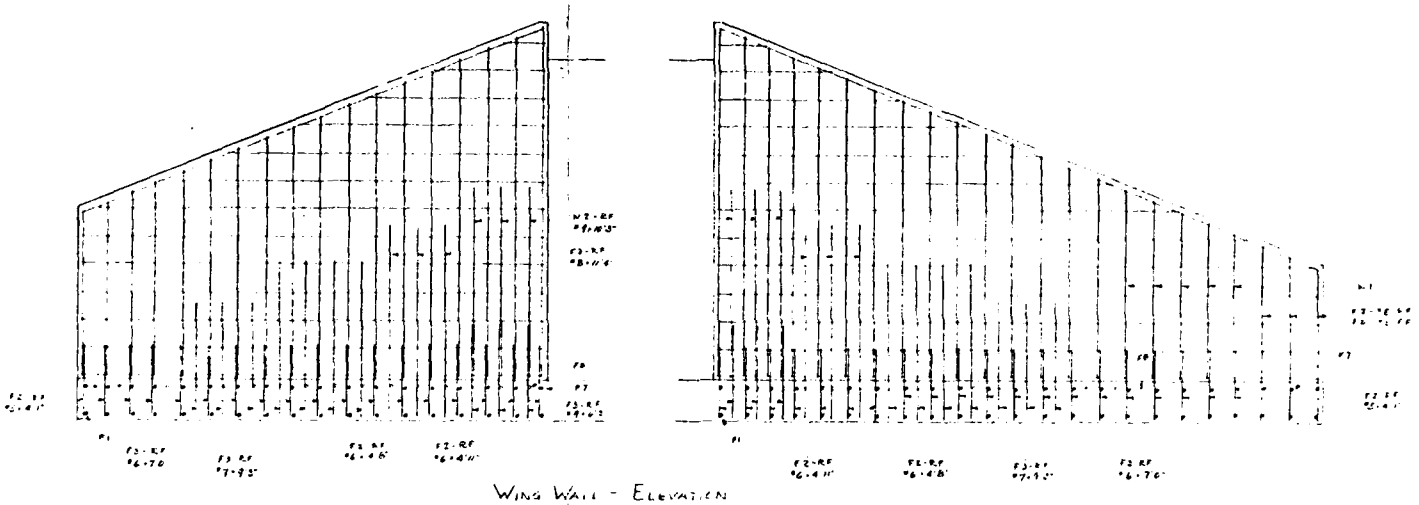
BRIER CREST WOODS, INC.

SPILLWAY

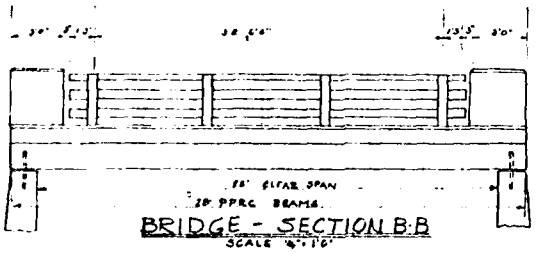
FEBRUARY 1980 PLATE E-4



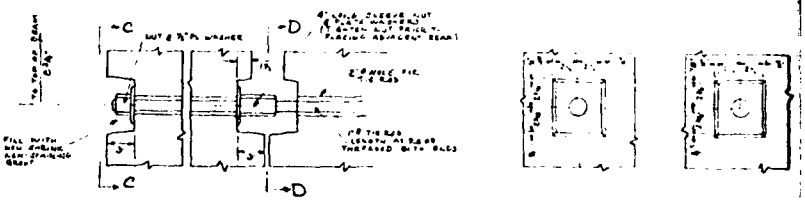
WING WALL - PLAN
REINF. ARRANGEMENT
SCALE ¼" = 1'0"



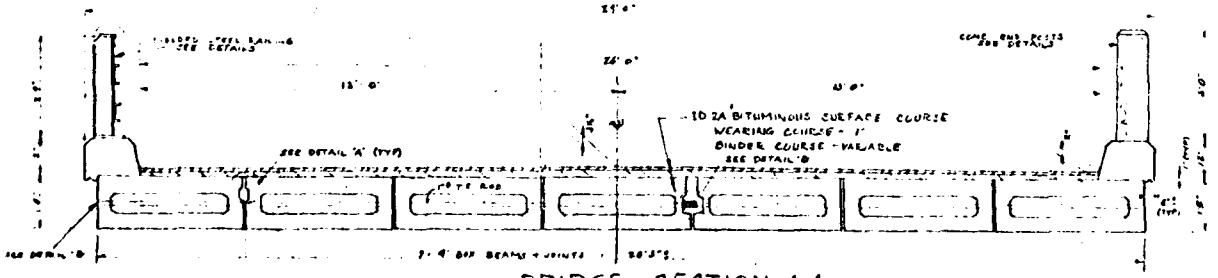
WING WALL - ELEVATION
REINF. ARRANGEMENT
SCALE ¼" = 1'0"



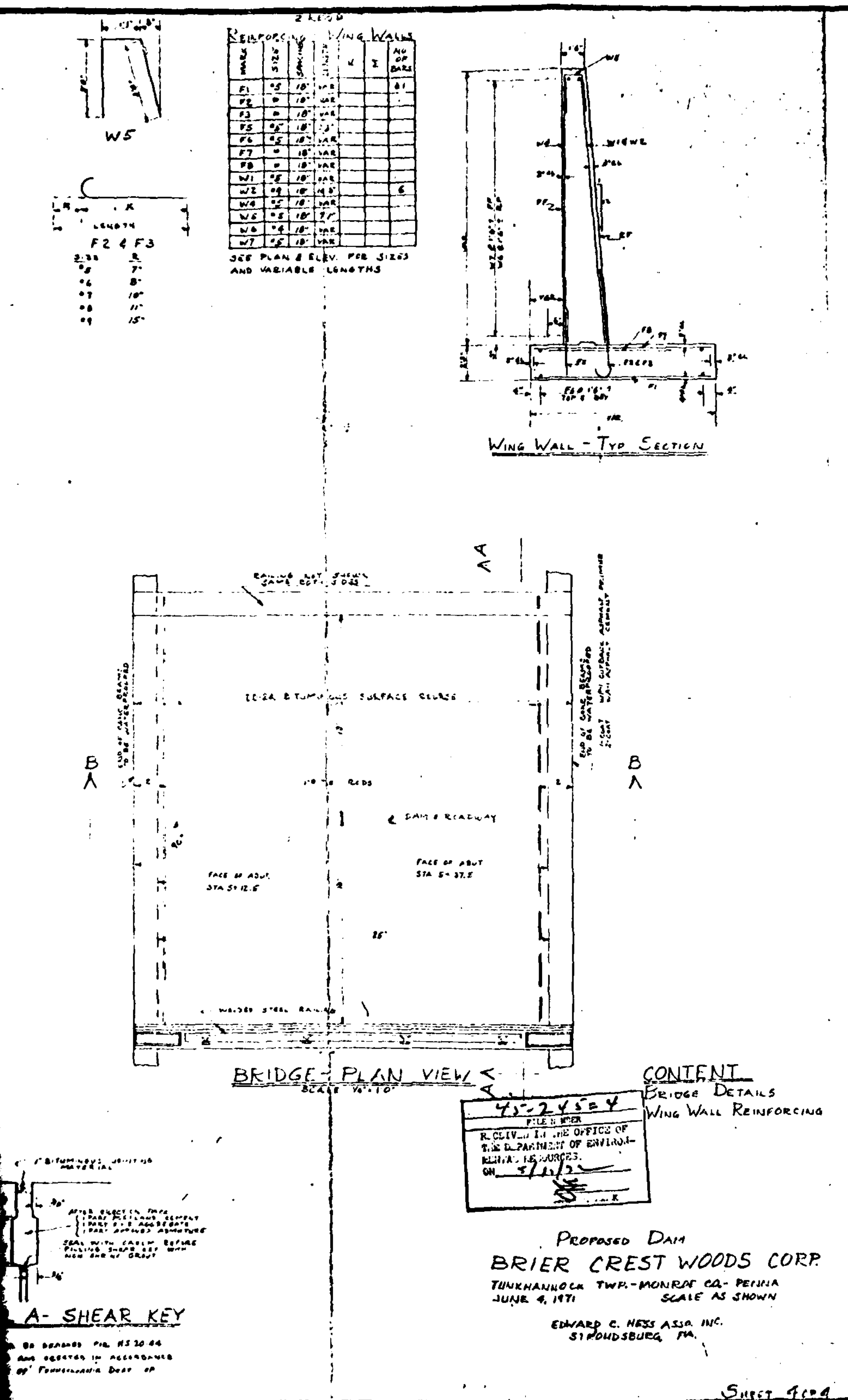
BRIDGE - SECTION B-B
SCALE ¼" = 1'0"



DETAIL B - TIE ROD



BRIDGE - SECTION A-A
SCALE ¼" = 1'0"



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIER CREST WOODS DAM
BRIER CREST WOODS, INC.

SPILLWAY DETAILS

FEBRUARY 1980 PLATE E-5

APPENDIX F

GEOLOGY

BRIER CREST WOODS DAM

APPENDIX F

GEOLOGY

Brier Crest Woods Dam is located in Monroe County within the Appalachian Plateau Province. The most pronounced topographic feature in the area is Camelback Mountain, which is a part of the Pocono Plateau Escarpment. The escarpment has a well-defined southwestward trend from Camelback Mountain, but is more irregular between Camelback and Mt. Pocono, which lies to the north. Streams east of the escarpment drain directly to the Delaware River, while those to the west drain to the Lehigh River.

The Pocono Plateau Section lies to the west of the escarpment. This area is relatively flat, with local relief seldom exceeding 100 feet. The topography has been greatly influenced by continental glaciation. Many features were created by deposition of glacial materials. The entire plateau lacks well-developed drainage.

East of the escarpment is the Glaciated Low Plateaus Section of the province. This area is characterized by pre-glacial erosional topography with locally-thick glacial deposits. Local relief is generally 100 to 300 feet.

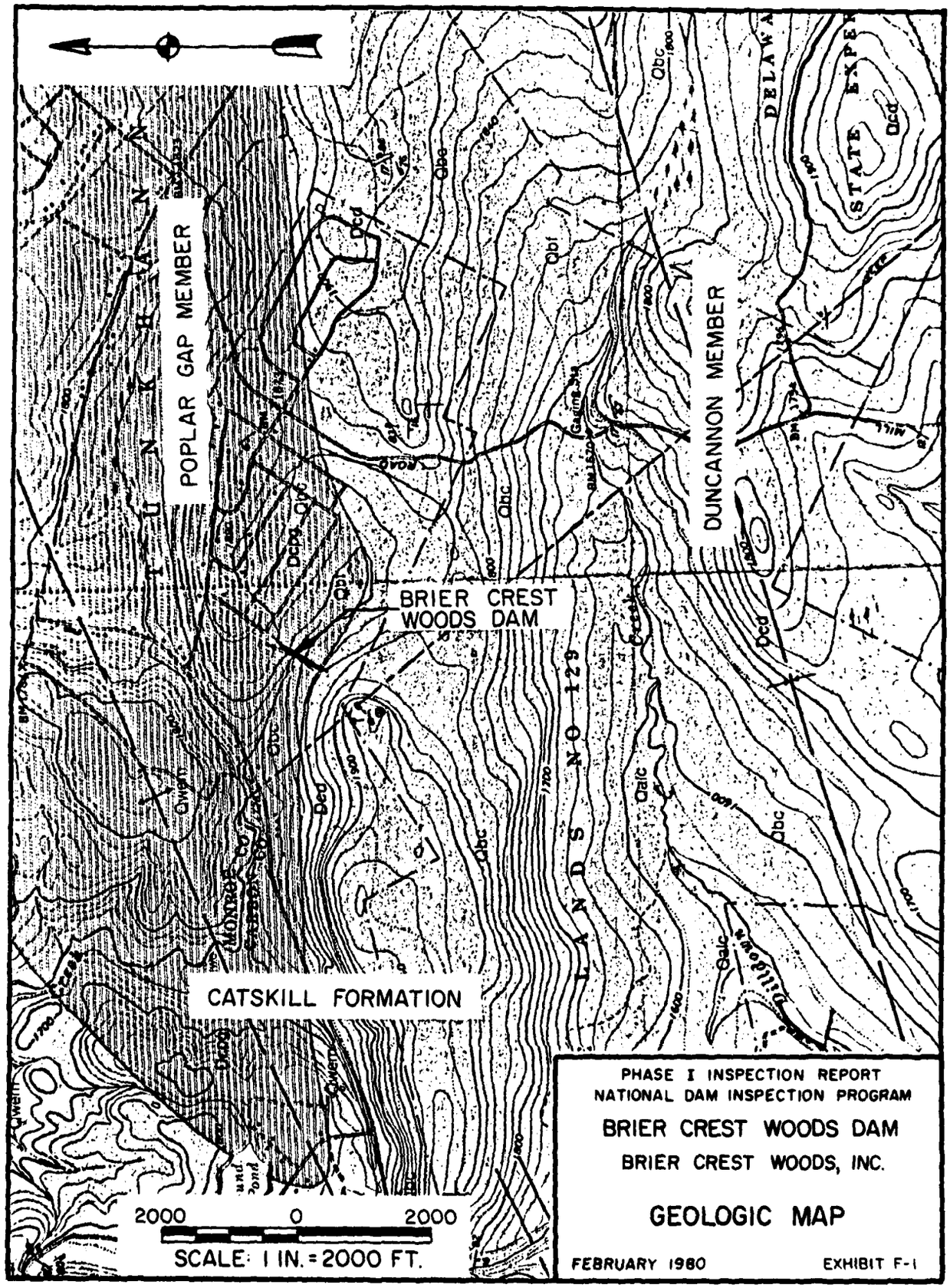
Bedrock units of the sections described above are the lithified sediments of offshore marine, marginal marine, deltaic and fluvial environments associated with the Devonian Period. These units include siltstones of the Mahantango Formation, siltstones and shales of the Trimmers Rock Formation, and seven mapped members of the Catskill Formation. These members include sandstones, siltstones, and shales of the Towamensing Member; sandstone, siltstone and shale of the Walcksville member; sandstones, siltstones and shale of the Beaverdam Run Member; sandstone and shale in the Long Run Member; sandstones and conglomerates in the Packerton Member; sandstones and some conglomerates in the Poplar Gap Member; and sandstones and conglomerates in the Duncannon Member.

Brier Crest Woods Dam is underlain by the Poplar Gap Member of the Catskill Formation. The Poplar Gap Member is predominantly a gray sandstone and conglomeratic sandstone with interbedded siltstones and shales. Sandstones present

are thick-bedded, fine-to coarse-grained and exhibit very low primary porosity due to a clay and silica matrix. Effective porosity results from fractures and parting planes. Conglomeratic sandstone occurs primarily as concentrates of sub-round to round quartz pebbles. The siltstones and shales at the site are thin-bedded and also have low porosity.

The rocks are well-indurated and generally are not susceptible to slope failure; however, the presence of well-developed bedding and joint planes will result in some rockfall from vertical and high-angle cut slopes.

Bedrock is entirely overlain by glacial till of Late Wisconsin Age. This till is an unsorted mixture of clay, silt, sand, and gravel. It is moderately cohesive and is derived locally from the sandstones of the Catskill Formation. Thickness of the till varies from 5 to 75 feet. The dam is founded on this till.


POPLAR GAP MEMBER
DUNCANNON MEMBER
BRIER CREST WOODS DAM
CATSKILL FORMATION
LANDS NO 129
2000 0 2000
SCALE: 1 IN. = 2000 FT.
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
BRIER CREST WOODS DAM
BRIER CREST WOODS, INC.
GEOLOGIC MAP
FEBRUARY 1980
EXHIBIT F-1