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NATIONAL DAM INSPECTION PROGRAM. TRINITY CHURCH DAM (GILBERT RU--ETC(U)
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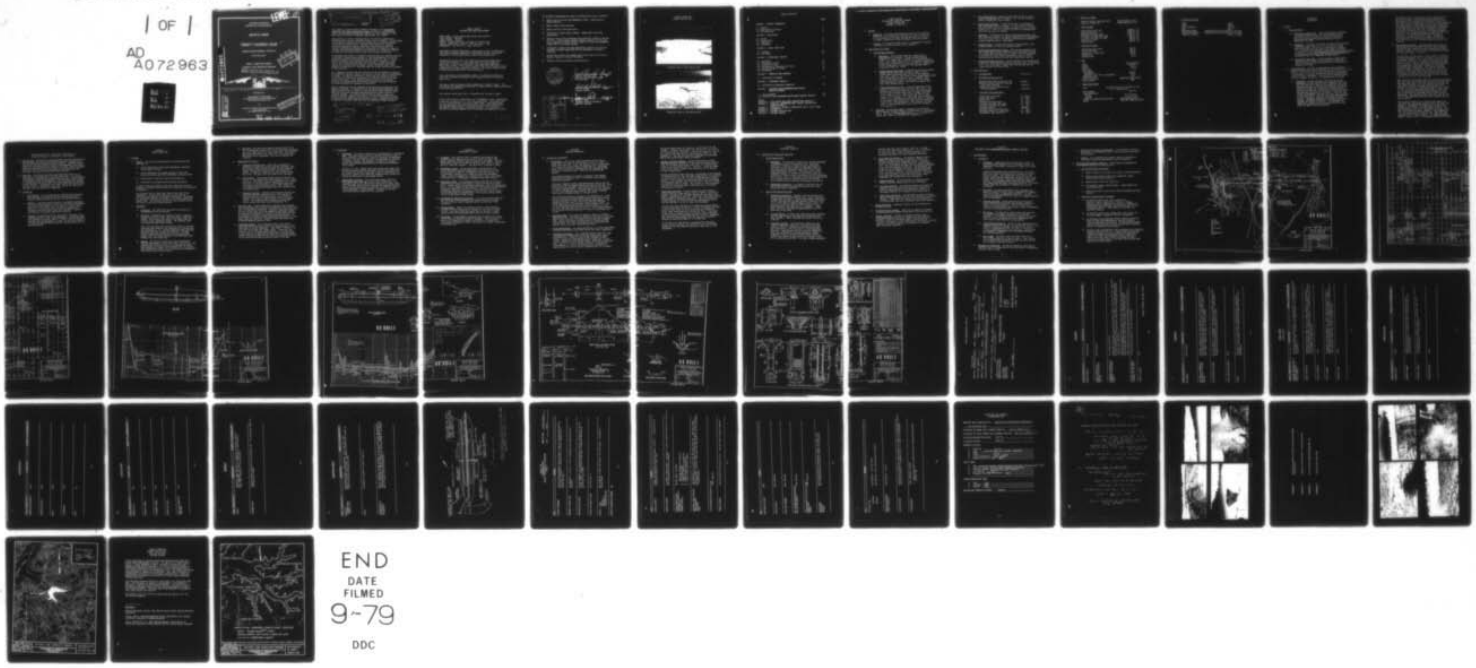

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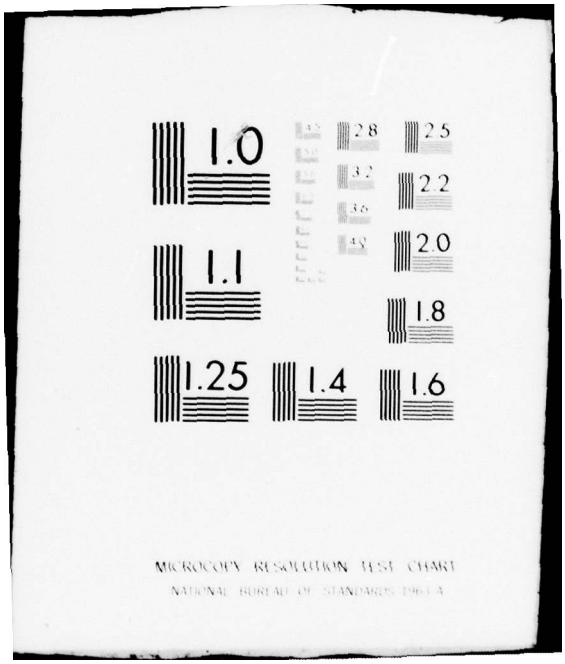
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LEVEL II

POTOMAC RIVER BASIN
GILBERT RUN, CHARLES COUNTY

MARYLAND

TRINITY CHURCH DAM

(GILBERT RUN WATERSHED – SITE NO. 1)

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PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

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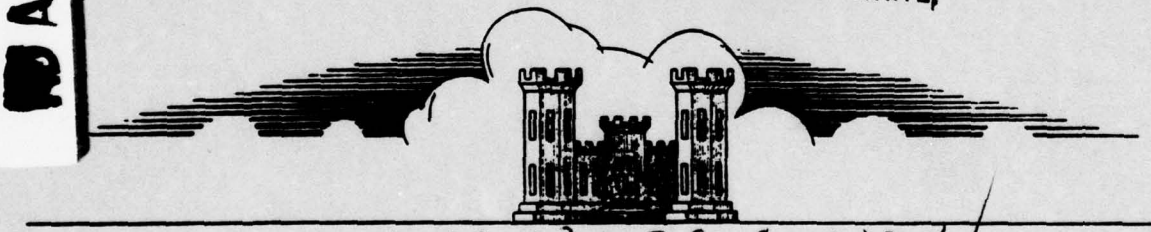

Contract # DACW31-79-C-0038

PREPARED FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

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BY

ACKENHEIL & ASSOCIATES, BALTIMORE, MD, INC.
7902 BELAIR ROAD
BALTIMORE, MARYLAND 21236

JUNE 1979

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(NDI-ID Number MD-37)

(6) National Dam Inspection Program. Trinity Church Dam (Gilbert Run Watershed - Site Number 1), Potomac River Basin, Gilbert Run, Charles County, Maryland. Phase I Inspection Report.

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase 1 investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase 1 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 visual observations and review of available data. Detailed investigation and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase 1 investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

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 avialable to the inpsection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability 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 the dam depends on numerous and constantly changing internal and external factors which are 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 1 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" (PMF) 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.

(15) DACW31-79-C-0038

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PHASE 1 REPORT
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: Trinity Church Dam, Gilbert Run Site No. 1
STATE LOCATED: Maryland
COUNTY LOCATED: Charles
STREAM: Trinity Church Run, tributary of Gilbert Run
DATES OF INSPECTION: March 22, 1979, and June 6, 1979
COORDINATES: Lat. 38° 27.3', Long. 76° 51.0'

ASSESSMENT OF GENERAL CONDITIONS: Based upon the field reconnaissance and review of design documents and performance history, the general condition of Trinity Church Dam is good at the present time.

Seepage drain outlet pipes were found to be partially submerged by plunge pool tailwater. If the outlet channel is obstructed, the water level in the plunge pool could rise, completely submerging these drain outlets. This condition could reduce the efficiency of the seepage drain and make inspection difficult. The outlet channel should be periodically inspected for flow obstructions.

Trees and brush on both embankment slopes, if allowed to continue to grow, will interfere with future slope inspections and kill existing grass cover.

The access road to the dam is badly eroded and in need of repair. This road may not be passable during periods of heavy rainfall, making surveillance of the dam very difficult.

The reservoir drain gate valve is inoperable and in need of repair.

Trinity Church Dam is classified as an "intermediate" size, "significant" hazard dam, according to U.S. Army Corps guidelines. The design storm for this classification is given as ½ PMF to PMF. Based upon design calculations made by the Soil Conservation Service, the spillway can pass 85% PMF runoff without overtopping the dam. The spillway is therefore considered adequate and in accordance with guideline criteria.

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The following recommendations should be implemented as soon as possible:

1) Remove trees and brush from embankment slopes. Seed and mulch where necessary.

2) Repair access road to the dam.

3) Repair reservoir drain gate valve.

4) Periodically inspect outlet channel. Remove debris and flow obstructions.

5) Develop a more active maintenance and inspection program at the dam facility. Program should include frequent inspection of the gate valve, mowing of spillway channel, removal of trees from embankment slopes and filling animal burrows.

6) Periodically observe wet zones identified in Section 3.1-b(4) for evidence of seepage emanating from the embankment or change in condition.

7) Periodically inspect the seepage drain outlet pipes for corrosive damage. Replace or reline if necessary.

8) Develop a flood surveillance and warning plan.

James D. Hainley 29 June 79

James D. Hainley, P.E. Date
Maryland Registration No. 5284
Vice President

Paul A. D'Amato June 29, 79

Paul A. D'Amato Date
Project Engineer

APPROVED BY: James W. Peck 16 July 79

JAMES W. PECK Date
Colonel, Corps of Engineers
District Engineer

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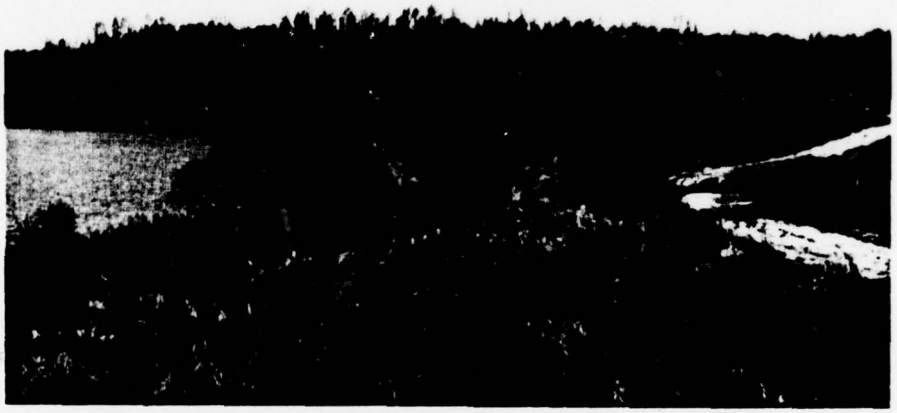
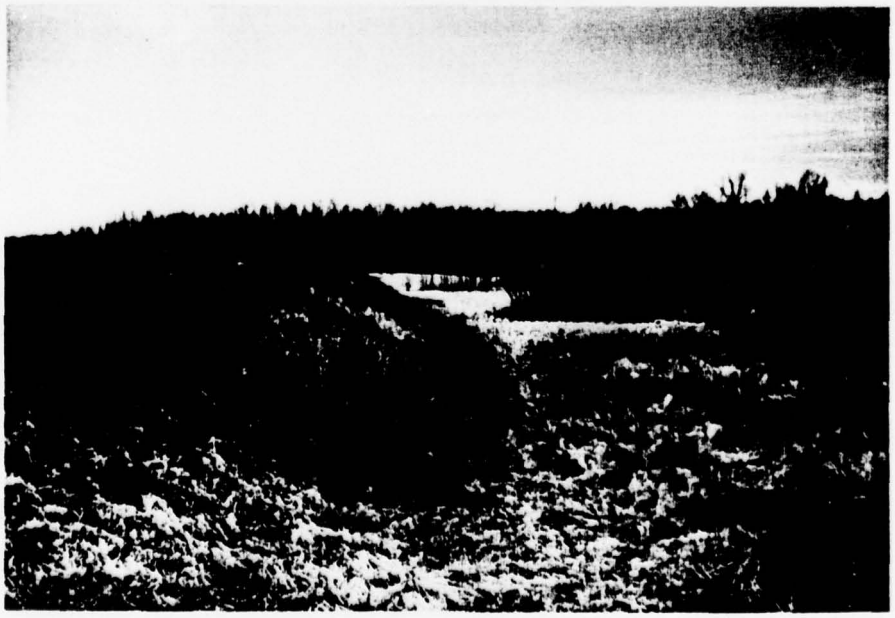
TRINITY CHURCH DAM
GILBERT RUN SITE NO. 1



Upstream slope of dam looking south



Downstream slope of dam looking south

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PHASE 1 REPORT
NATIONAL DAM INSPECTION PROGRAM
TRINITY CHURCH DAM
NATIONAL I.D. NO. MD 37

1.1 General

a. Authority. The study was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

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

1.2 Description of Project

a. Dam and Appurtenances

1) Embankment. Trinity Church Dam was constructed as a zoned earthfill structure. The dam is approximately 1,690 ft. in length, has a maximum toe to crest height of 40 ft., and a crest width of 15 ft. Upstream and downstream slopes have inclinations of 3H:1V and 2.5H:1V, respectively. A 10 ft. wide bench is located on the upstream slope at normal pool level (El. 75.0).

2) Seepage Control Provisions. According to as-built drawings, seepage control provisions include a 1,500 ft. long cutoff trench constructed near the toe of the upstream slope and a 1,360 ft. long filter trench located approximately 70 ft. downstream from the dam crest. Seepage, intercepted by the filter trench, is diverted to the outlet pipe plunge pool by means of perforated corrugated metal pipes and a blanket drain.

3) Flood Discharge Facilities. Flood discharge facilities consist of a principal spillway riser and a 130 ft. wide emergency spillway excavated into the right dam abutment. The principal spillway intake works include a low stage 3.0 ft. wide by 2.0 ft. high orifice and two (2) high stage 9.0 ft. wide by 1.3 ft. high riser crest openings. A 36 in. dia. reinforced concrete outlet pipe is connected to the base of the principal spillway riser and discharges into a 25 ft. wide plunge pool. The principal spillway riser is also equipped with a gate valve for drawdown of the reservoir.

b. Location. Trinity Church Dam is located on Trinity Church Run, a western flowing tributary of Gilbert Run and the Wicomico River. The dam is located approximately 1.7 mi. southwest of Dubois, MD. (Refer to Location Plan, Appendix E.)

c. Size Classification. Based on a dam height of 40 ft. and a maximum storage capacity of 4,840 ac. ft., the dam structure meets "intermediate" size criteria.

d. Hazard Classification. Trinity Church Dam is classified in the "significant hazard" category. In the event of failure, damage to state and county roads, farmlands, and one residence would result. There is a possibility that the homeowner just below the dam would be injured.

e. Ownership. The Gilbert Run Public Watershed Association, Box 356, La Plata, Maryland, is legally responsible for the operation of Trinity Church Dam. The dam was constructed by easement on property owned by several individuals.

f. Purpose of Dam. Trinity Church Dam was constructed for the primary purpose of flood and sediment control.

g. Design and Construction History. The dam was designed by the Soil Conservation Service, Engineering and Watershed Planning Unit, Upper Darby, Pennsylvania, in 1962. Construction began on February 20, 1963, and was completed on July 17, 1964. Construction was directed by the Soil Conservation Service.

h. Normal Operating Procedure. The dam operates as an uncontrolled structure. Under normal conditions, the pool level is maintained at El. 75.0 by passage of normal base flow through the low stage principal spillway orifice.

1.3 Pertinent Data

a. Drainage Area — 8.18 sq. mi.

b. Discharge at Dam Facility

Maximum known flood at dam facility	Unknown
Ungated spillway capacity at design high water elevation	1,350 cfs
Ungated spillway capacity at top of dam elevation	6,100 cfs

c. Elevation (feet above MSL)

Constructed top of dam	El. 100.4
Design high water	El. 96.7
Normal pool	El. 75.0
Emergency spillway crest	El. 94.3
Principal spillway high stage	El. 85.7
Principal spillway low stage	El. 75.0
Maximum tailwater	Unknown
Upstream invert of outlet pipe	El. 60.0
Downstream invert of outlet pipe	El. 59.0
Streambed at dam centerline	El. 62.0

d. Reservoir Length

Length of design high water pool	Approximately 1.6 mi.
Length of normal pool	Approximately 0.75 mi.

e. Total Storage

Constructed top of dam	4,840 ac. ft.
Design high water	3,825 ac. ft.
Emergency spillway crest	3,359 ac. ft.
Principal spillway high stage	1,661 ac. ft.
Principal spillway low stage	480 ac. ft.
Normal pool level	480 ac. ft.
Sediment pool	480 ac. ft.

f. Reservoir Surface

Constructed top of dam	320 ac.
Design high water	273 ac.
Emergency spillway crest	230 ac.
Normal pool	73 ac.
Sediment pool	73 ac.

g. Dam

Type	Zoned earthfill
Length	1,690 ft.
Height	40 ft.
Top width	15 ft.
Side slopes	
Downstream	2.5H:1V
Upstream (with 12 ft. wide berm)	3H:1V
Impervious core	yes
Cutoff provisions	Compacted cutoff trench
Grout curtain	None

h. Regulating Outlet

Type	Concrete intake riser and 36 in. dia. R. C. outlet pipe
Riser height	28.7 ft.
Riser Dimensions	
Inside	3.0 x 9.0 ft.
Outside	5.0 x 11.0 ft.
Length of connecting outlet pipe	Approximately 200 ft.
Gates	Crane No. 793½ slide gate

i. Emergency Spillway

Type	Earth
Width	130 ft.
Crest elevation	94.3 ft.
Gate	None
Upstream channel	Vegetated earth with negative 1.0% slope
Downstream channel	Vegetated earth with positive 2.2% slope
Length of channel	500 ft., curved

SECTION 2
DESIGN DATA

2.1 Design

a. Data Available

1) Hydrology and Hydraulics. Design calculations, discharge rating and storage curves, and flood hydrographs were obtained from Soil Conservation Service design report, Gilbert Run Watershed Protection Project, Site No. 1 dated April 27, 1962.

2) Embankment. Available information includes design drawings, construction specifications, soil test results, slope stability summary, boring logs, and geologist's report. This information was contained in the report identified in Section 2.1-a(1) and Construction and Material Specifications for Gilbert Run Watershed, Flood Detention Structure No. 1, prepared by the U. S. Department of Agriculture.

3) Appurtenant Structures. The two documents identified in Section 2.1-a(2) contain design drawings, construction specifications, and design calculations for principal and emergency spillways.

b. Design Features. The dam and appurtenances were designed to meet Soil Conservation Service structure classification "A" ("low" hazard) design storm criteria and Maryland State requirements. Illustrations of principal features of the dam structure are shown in Plates 1 through 6. A description of design features is also discussed in Section 1.2, "Description of Project".

1) Embankment. Design documents indicate that the dam embankment has been constructed of compacted silty clay and silty sand soils obtained from within the site area. Although not shown on the as-built drawings, the design report and former Soil Conservation Service official involved with the dam's construction indicate that these two materials were selectively placed. The silty clay formed the embankment core and the silty sand was used for the outer shell. Earthfill materials were compacted to 95% of optimum as obtained from Standard Proctor testing. Foundation preparation involved clearing and grubbing and removal of topsoil. The embankment is underlain by sand-silt-clay alluvium and dense clayey silts and sands (Calvert Formation).

An earthfill cutoff trench with a 12 ft. wide bottom and 1H:1V side slopes, is constructed approximately 30 ft. downstream of the upstream toe for the entire dam length. The trench varies in depth from 10 to 15 ft. and is excavated into the clayey silts and sands of the Calvert Formation. The seepage drain, located approximately 70 ft. downstream of the dam centerline, consists of trenches filled with sand and gravel and an 8 in. dia. perforated corrugated metal pipe. The trench extensions run right and left from the 36 in. dia. reinforced concrete outlet pipe and measure 4 ft. wide by 7 to 10 ft. deep. Seepage is discharged into the plunge pool by means of a blanket drain and two 8 in. dia. non-perforated pipe drains (see Plate 4).

2) Appurtenant Structures. The appurtenant structures of the dam consist of a principal spillway intake structure with outlet pipe, pond drain, and an emergency spillway channel. Details of the principal and emergency spillways are shown on Plates 1, 5, and 6.

The principal spillway riser is constructed of reinforced concrete and measures 28.7 ft. high and 5 ft. by 11.0 ft. in exterior dimension. The trash rack for the low stage riser orifice consists of a steel reinforcement bar and angle iron cage. The two high stage riser crest openings are equipped with trash racks composed of horizontal galvanized steel crosspieces. Anti-vortex provisions have been made an integral part of the riser structure design. A pond drain inlet, consisting of a 42 in. dia. perforated, corrugated metal pipe installed vertically, is connected to the gate valve of the principal spillway riser by a 24 in. dia. cast iron pipe.

Water entering the principal spillway riser flows vertically down the riser, through the 200 ft. long outlet pipe, and into the plunge pool. The riser design is such that the pipe conduit controls flow once the reservoir level reaches El. 87 or 12 ft. above normal pool level. The 36 in. dia. reinforced concrete outlet pipe is fitted with six (6) anti-seep collars spaced at intervals of 24 ft. and is supported on a concrete cradle through the dam embankment. The concrete cradle, pile bent, and two (2) cast in-place concrete piles are used to support the pipe outlet section.

The emergency spillway is a natural earth channel cut into silty clay and clayey gravel soils of the right dam abutment. The channel is trapezoidal in shape with a bottom width of 130 ft. and side slopes of 2H:1V. The spillway control section is located 6.1 ft. below top of dam. The upstream spillway channel is approximately 80 ft. long with an uphill slope of 1.0%. The downstream channel section is curved, 380 ft. in length, and has a downhill slope of 2.2%. The emergency spillway discharges

approximately 300 ft. downstream of the dam in a direction leading to the natural stream channel.

2.2 Construction. The available design documents and field observations indicate that the dam was constructed in general accordance with the intended design drawings and specifications. Although as-built drawings do not show earthfill zones in the embankment, the design report and conversation with Mr. Robert F. Fonner, Project Geologist, indicates that the dam was constructed with an impervious core. No unusual construction difficulties were reported.

2.3 Operation. The Gilbert Run Public Watershed Association is responsible for the operation of Trinity Church Dam. The principal and emergency spillways are uncontrolled structures. No performance or operation records are maintained. The only operational feature is a mechanical gate valve used to provide regulation and drawdown of the reservoir. According to Soil Conservation Service officials, the gate valve is infrequently exercised. During the inspection, the gate valve was found to be inoperable.

2.4 Evaluation

a. Availability. All available design information and drawings were provided by the Dam Safety Division, Maryland Water Resources Administration and the Soil Conservation Service.

b. Adequacy. The design data provided is reasonably documented and is considered adequate to evaluate the dam and appurtenant structures in accordance with the scope of a Phase 1 study. Based on a review of this data, the dam and appurtenant structures are considered to have been designed in general conformance with accepted engineering practice.

c. Validity. As stated previously, the as-built drawings do not indicate earthfill zones in the embankment. The design report and conversation with Mr. Robert F. Fonner, Project Geologist, indicate that the embankment is zoned. At this time, there is no reason to question the validity of the dam being built as a zoned embankment.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The on-site reconnaissance of Trinity Church Dam consisted of:

1) Visual examination of the earth embankment, abutments, and emergency spillway.

2) Visual observation of exposed sections of the riser intake structure, gate valve mechanism, and outlet pipe.

3) Observation of reservoir slopes and plunge pool.

4) Evaluation of the downstream area hazard potential.

A visual inspection checklist and field sketch are given in Appendix A. Specific observations are illustrated in photographs of Appendix D.

The reservoir was at normal pool level at the time of the inspections. Several minor deficiencies were observed indicating that the dam is marginally maintained. In general, the structural condition of the dam is considered good at the present time. The following conditions were observed during the dates of the field reconnaissances.

b. Embankment

1) Structural. No significant structural deficiencies of the embankment were discernible.

2) Surficial. Embankment and abutment slopes are densely covered with grass, weeds, and crown vetch. Some brush (sumac), small trees, and stumps of cut down trees are evident on both embankment slopes. The upstream slope also contained some animal burrows.

Grass cover has been worn by vehicular traffic on the dam crest and right abutment (see photograph of upstream face and photograph no. 1). Shallow depressed areas along the dam crest have been leveled with backfill. Slightly eroded footpaths were observed on the upstream slope between crest and intake structure, and downstream slope between crest and plunge pool.

3) Seepage. No springs or seeps were observed emanating from the downstream toe area of the dam. The two 8 in. dia. seepage drain outlets are partially submerged by plunge pool tailwater but appear to be flowing (est. 0.5 gpm ea.) and transporting a brown iron precipitate (see Photograph 5). These pipes are partially rusted.

4) Wet Zones. Wet zones were observed approximately 20 to 100 ft. downstream and parallel to the downstream embankment toe, both right and left of the plunge pool. This condition was more pronounced on the right side of the plunge pool. Both areas are in topographic lows (see photograph nos. 7 and 8).

c. Appurtenant Structures

1) Principal Spillway Riser. There was no evidence of spalling or cracking of exposed concrete surfaces. Both low and high stage trashracks appear in good condition though the low stage trash rack was obstructed with debris. No debris or obstructions were visible inside the riser. The gate valve was found to be inoperable.

2) Outlet Works. The exposed outlet section of the 36 in. dia. R. C. pipe conduit and cradle appeared to be in good condition. Tailwater level was approximately 4 in. below the invert of the pipe outlet. Plunge pool slopes are lined with riprap and appear stable. Both plunge pool and immediate downstream channel were free of debris and flow obstructions.

3) Emergency Spillway. Approach and discharge channels are generally densely covered with tall grass and sparse brush and free of flow obstructions. Inclination of channel side slopes is approximately 2H:1V, and appear stable. The discharge area is densely covered with grass, shrubs, and trees (see Photograph No. 6).

d. Reservoir Area. Visual observations and map review indicate that the drainage area has gentle to moderate sloping shoreline and is predominately woodlands. Reservoir slopes and shoreline are well covered with trees and vegetation and appear stable. No evidence of landslides or siltation problems were observed by inspection personnel or reported by the dam overseer. A minor degree of localized bank sloughing was observed in a few areas along the shoreline. Reservoir water and outlet pipe discharge appeared generally clear.

e. Downstream Channel. The plunge pool drains into Trinity Church Run which intersects Gilbert Run approximately 1.2 mi. downstream of the dam embankment. The channel is about 12 ft. wide with side slopes that appear stable. Except for the elevation of the tailwater (approximately 4 in. below invert of pipe outlet), no condition was observed in the downstream channel that would significantly affect the discharge capacity of the principal spillway or present hazard to the dam.

3.2 Evaluation

a. Embankment. The overall condition of the embankment is considered good. The minor erosion noted on footpaths and access road is not considered to represent a condition hazardous to embankment stability. The wet zones are also not considered to represent a significant hazard. No seepage or evidence of internal erosion was observed emanating from the downstream embankment toe or slope.

The two 8 in. dia. seepage drain pipe outlets were found to be partially submerged by the tailwater level of the plunge pool. An increase in tailwater level due to possible obstruction of the outlet channel could completely submerge these outlets and reduce the efficiency of the seepage drains.

b. Appurtenant Structures. No serious appurtenant structure deficiencies were noted during the visual inspections. The inoperable gate valve, debris obstructing the low stage trash rack, and brush and tall grass covering the emergency spillway channel are not considered to represent a significant hazard to the embankment or appurtenances. Although not serious, these deficiencies should still be corrected.

SECTION 4
OPERATIONAL FEATURES

4.1 Procedure. The reservoir level is normally maintained by the uncontrolled low stage orifice of the principal spillway riser. Normal operating procedure does not require a dam tender. The only operational feature of the dam is the gate valve, which is used to drain or lower the reservoir. The gate valve is normally closed.

4.2 Maintenance of Dam. Trinity Church Dam is maintained by the Gilbert Run Public Watershed Association with the advice of the Soil Conservation Service. Maintenance reportedly consists of cutting grass, removing small trees and brush from embankment slopes, repairing eroded areas, removing trash, and clearing debris from trash racks. Maintenance is generally performed annually.

4.3 Inspection of Dam. The Gilbert Run Public Watershed Association is required by the State of Maryland to inspect the dam on an annual basis. Formal inspections have been performed by the Soil Conservation Service at the request of the Gilbert Run Public Watershed Association. Inspections generally consist of visually inspecting the dam embankment, appurtenant structures, reservoir area, outlet channel, and providing repair recommendations. Dam overseer, Robert Coble, visits the dam several times a year.

4.4 Maintenance of Operating Facilities. It is not known how often the gate valve and lifting mechanism are maintenanced and exercised. The gate valve was found inoperable during our March 22, 1979, inspection.

4.5 Warning System. There is no warning system or formal emergency procedure to alert downstream inhabitants of the threat of a dam failure. The access road from Dubois Road to the dam, is badly eroded and may not be passable during periods of heavy rainfall.

4.6 Evaluation. The maintenance and operational procedures at Trinity Church Dam are considered marginally adequate. This evaluation is based on the apparently inoperable condition of the gate valve, tree growth on embankment slopes, and absence of a formal surveillance and warning plan.

SECTION 5
HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features

a. Design Data. The Trinity Church Watershed has an area of 5,235 acres and ranges in relief from El. 75 to El. 180. At normal pool level (El. 75.0), the reservoir has a surface area of 73 acres and storage volume of 4,840 acre ft. Watershed cover complex consists of approximately 60% woodland and 40% pasture and cultivated land. There are no upstream dams present.

The hydrologic/hydraulic analyses contained in the design report were reviewed and found in accordance with accepted engineering practice.

Fifty year sediment storage requirements were used to set the elevation of the low stage principal spillway orifice (El. 75.0). This orifice was designed to pass normal base flow as well as a 10-year frequency storm. The high stage riser crest openings are set at the maximum stage level of the 10-year frequency storm and are designed to pass a 100 year storm.

Soil Conservation Service structural classification "A" ("low" hazard) and Maryland State design storm criteria were used to evaluate emergency spillway and dam height requirements. The emergency spillway crest is set at the 100 year frequency storm stage and is activated when runoff exceeds 7.2 in. Top of dam determination was based on a design rainfall of 19.8 in./6 hr. and peak inflow of 15,073 cfs. The emergency spillway has a maximum discharge capacity of 6,100 cfs at designed top of dam.

b. Experience Data. No records of reservoir levels or rainfall amounts are kept. The storm of record for this area is Hurricane Connie (8.33 in./18 hr. of rainfall) which occurred in August 1955. Design calculations indicate that if the dam had been constructed at this time, the maximum flood stage would have been El. 91.6, or 8.8 ft. below the dam crest.

c. Visual Observations. As stated previously, no serious appurtenant structure deficiencies were noted during the visual inspections.

d. Overtopping Potential. The recommended design storm for a dam structure with "intermediate" size and "significant" hazard classification is given as ½ PMF to PMF (Probable Maximum Flood). According to Hydrometeorological Report No. 33, the rainfall amounts for these design storms, adjusted for watershed area, are 11.2 in./6 hr. and 22.4 in./6 hr., respectively. (See Appendix C.) Top of dam determination was based on a design rainfall of 19.8 in./6 hr. producing 14.2 in. of runoff.

The design report does not indicate a runoff amount for PMF rainfall. Assuming the rainfall loss for 22.4 in. of rainfall as being the same as indicated in the design report for 19.8 in., the runoff from a PMF storm is estimated to be 16.8 in. (see Appendix C). The dam can therefore accommodate an estimated 85% of PMF runoff without being overtopped.

e. Emergency Spillway Adequacy. Design calculations indicate that the emergency spillway will have peak discharge values of 1,350 cfs at design high water level (13.2 in. rainfall) and 6,100 cfs at top of dam (19.8 in. rainfall). These discharge values yield average channel flow velocities of 4.2 fps and 7.0 fps, respectively.

Maximum permissible flow velocities, recommended by the Handbook of Channel Design for Soil and Water Conservation, are typically in the range of 4 to 6 fps for well maintained grass covered channels. The spillway can discharge 100% of the recommended minimum design storm of ½ PMF (11.2 in./6 hr. rainfall) within an acceptable velocity range. The spillway is thus considered adequate for downstream hazard conditions and in accordance with guideline criteria.

f. Downstream Conditions. Trinity Church Run flows through a valley flood plain approximately 1000 to 1500 ft. wide with a gradient of about 0.4%, and under passes one (1) County road 1500 ft. downstream of the dam. The valley flood plain consists predominately of woodland and pasture. One (1) residence is located adjacent to Trinity Church Run approximately 0.5 mi. from the dam and 10 to 15 ft. above the streambed.

Trinity Church Run intersects with Gilbert Run approximately 1.2 miles downstream of the dam. Gilbert Run empties into the Wicomico River seven (7) miles downstream of the dam and passes under State Routes No. 232 and No. 234. In the event of dam failure, damage to State and County roads, farmland, and one residence is considered certain. U.S.G.S. topographic maps indicate approximately four (4) inhabited structures adjacent to and within 2000 ft. of Gilbert Run.

In the event of a dam failure, the downstream structures, except for one residence, are considered to be sufficiently distant and at high enough elevations to make loss of life improbable.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

1) Embankment. The structural condition of the dam embankment is assessed as good at the present time. Wet zones identified in Section 3.1-b(4) are not considered to represent a significant hazard to embankment stability. Two conditions were observed which may, in the future, affect embankment stability. Trees and brush on both embankment slopes, if allowed to continue to grow, will interfere with future slope inspections and kill neighboring grass cover. Also, if the outlet channel becomes obstructed, it is possible that the effectiveness of the seepage drain system could be reduced by submerged drain outlets.

2) Appurtenant Structures. As stated in Section 3.2-b, no serious appurtenant structure deficiencies were noted during the visual inspections.

b. Design and Construction Data

1) Subsurface Exploration. Eighteen (18) test borings were drilled along the dam centerline and at cutoff trench and seepage drain locations. Samples and standard penetration testing indicates that the dam generally overlies a 10 to 15 ft. thick loose to medium compact alluvial sand, silt, and gravel layer and layers of stiff clayey silt and medium compact silty sand (Calvert Formation). Ground water levels are indicated at approximately 3 to 6 ft. below the valley floor.

2) In-situ Testing. In-place vane shear tests were performed in silty sand layers at two test boring locations (DH-302A, DH-302C). Shear strengths were found in excess of 3,100 psf.

3) Laboratory Testing. Classification, compaction, and triaxial compression tests were conducted on selected samples of borrow. Standard Proctor compaction tests were performed on silty clay and silty sand embankment materials. Consolidated undrained triaxial compression tests were performed on remolded embankment samples compacted to 95% of maximum Standard Proctor density. Samples were tested at optimum moisture content as well as in a saturated condition. The shear strength parameters

obtained from these tests were $\phi = 30.5^{o}$, c = 350 psf for the silty sand and a minimum of $\phi = 17^{o}$, c = 300 psf for the silty clay. These strength parameters are considered reasonable for their respective materials.

4) Slope Stability Analysis. The Modified Swedish Circle Method of analysis was used to evaluate stability of upstream and downstream embankment slopes. The lowest factor of safety against shear failure is reported to be 1.35. This calculation was made for the upstream embankment slope with full drawdown conditions. The embankment was assumed to be homogeneous with shear strength parameters of $\phi = 17^{o}$ and c = 300 psf. Calculations with three (3) trial arcs were made for the above conditions. No report of a slope stability analysis for the as-built zoned embankment was included with design documents.

5) Seepage Analysis. No calculations or references were found to indicate seepage analyses were performed.

6) Settlement Analysis. The preconsolidated silty sands and clayey silts of the Calvert Formation were expected to have low compressibility under embankment loading. No settlement analysis was included in the design report.

7) Appurtenant Structures. The available principal spillway design drawings and calculations were reviewed for structural adequacy. Based upon this review, the basic components of the spillway riser are considered structurally adequate.

c. Operating Records. Operating records are not maintained at the dam facility.

d. Post-Construction Changes. There are no reports or evidence of post-construction changes being made at this dam facility.

e. Seismic Stability. The dam is located in Seismic Zone 1. Earthquake conditions were not considered in the stability analyses included in the design report. Based upon past structural performance, visual observations, and static stability analyses, structural stability is presumed to be adequate under earthquake conditions.

SECTION 7
ASSESSMENTS AND RECOMMENDATIONS/PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Evaluation

1) Embankment. Based upon visual observations, review of available design documents, and performance history, the embankment is assessed as structurally stable and in good condition.

Seepage drain outlet pipes, discharging into the plunge pool, were observed to be partially submerged as noted in Section 3.1-b(3). The possibility exists that if the outlet channel becomes obstructed, the water level in the plunge pool could rise, completely submerging these drain outlets. This condition could reduce the efficiency of the seepage drain and make inspection difficult. The outlet channel should be periodically inspected for flow obstructions.

2) Wet Zones. Wet zones downstream of the embankment toe, noted in Section 3.1-b(4), are not considered to represent significant hazard to embankment stability. The wet zones are not believed to be the result of seepage emanating from the embankment.

3) Emergency Spillway. Visual observations and review of design documents indicate that the emergency spillway is stable and in good condition. The risk of spillway erosion, during discharge, presenting a hazard to embankment stability is considered slight.

4) Gate Valve. The gate valve, used to drain the reservoir, is inoperable and judged inadequate in its present condition. The ability to drain the reservoir and perform remedial work on submerged portions of embankment and riser requires that the drain be operational.

5) Flood Discharge Capacity. Review of hydrological/hydraulic computations indicate the dam can pass 85% PMF (19.8 in./6 hr. rainfall) without overtopping. A ½ PMF to PMF design storm is recommended for this dam facility. The spillway is therefore in accordance with recommended guidelines and considered adequate.

6) Access Road. The access road from Dubois Road to the dam is badly eroded and in need of repair. This road may not be passable during periods of heavy rainfall, making surveillance of the dam difficult.

b. Adequacy of Information. The design information and drawings available for this review were of sufficient detail to adequately conduct a Phase 1 study.

c. Necessity for Further Investigation. The condition of Trinity Church Dam, as it presently exists, does not require additional investigation.

d. Urgency. The recommendations/remedial measures presented in this report should be implemented as soon as possible.

7.2 Recommendations/Remedial Measures. The following recommendations are presented based on the data obtained:

a. Dam and Appurtenant Structures

1) Repair reservoir drain gate valve and/or lifting mechanisms.

2) Remove trees and brush cover from embankment slopes. Seed and mulch where necessary.

3) Remove debris from riser trash rack.

4) Periodically inspect outlet channel. Remove debris and flow obstructions.

5) Remove brush and cut tall grass covering emergency spillway channel.

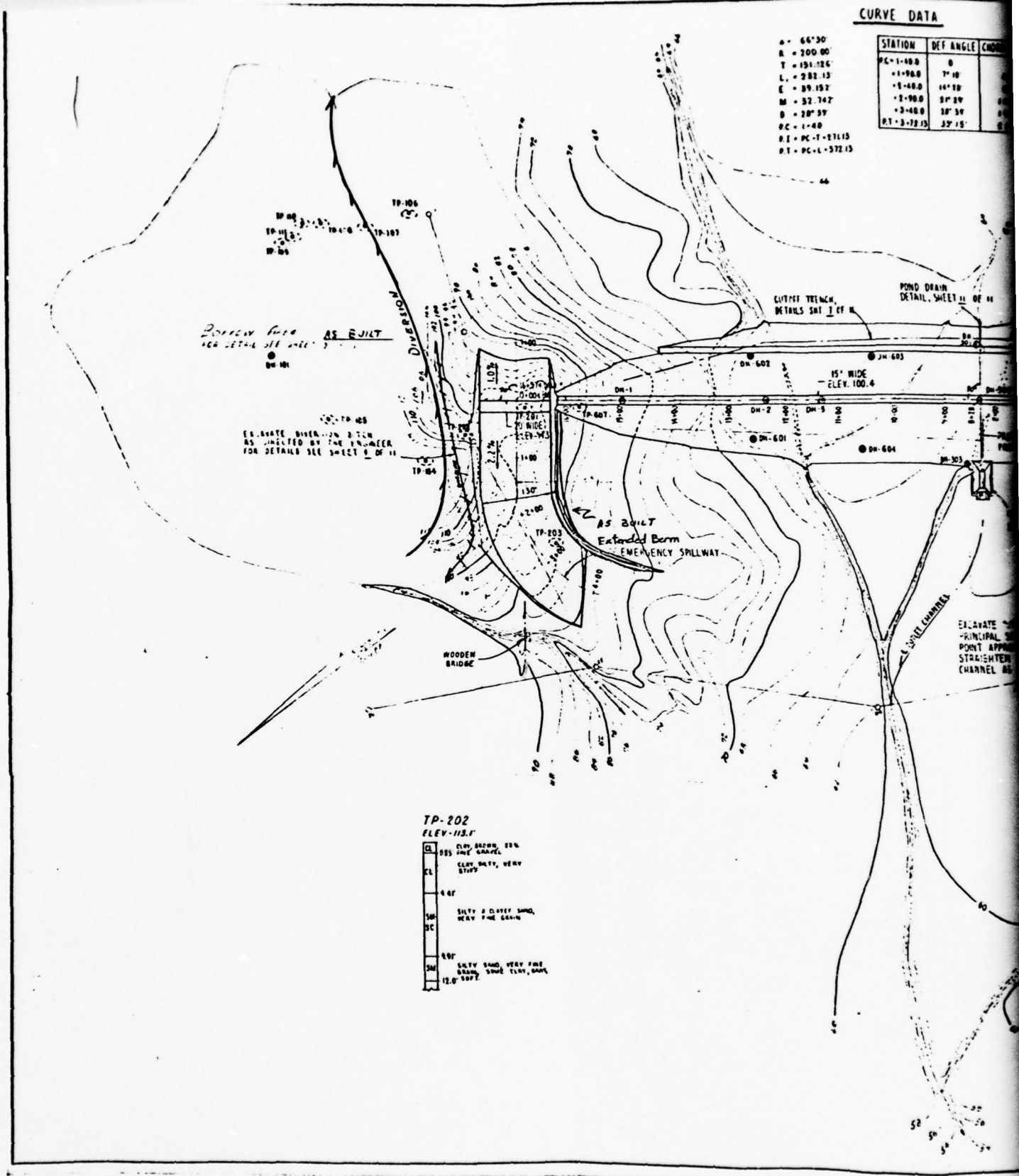
b. Operation and Maintenance Procedure

1) Periodically observe wet zones indicated in Section 3.1-b(4). Report any evidence of seepage emanating from the embankment or change in condition to the Maryland Water Resources Administration and the Soil Conservation Service. Make remedial corrections, as conditions require.

2) Periodically inspect the seepage drain outlet pipes for corrosive damage. Replace or reline if necessary.

3) In the event of possible dam failure, measures should be taken to alert the inhabitants of the one residence directly downstream from the dam. The operating procedure should include periodic survey of the dam facility during periods of unusually heavy rainfall.

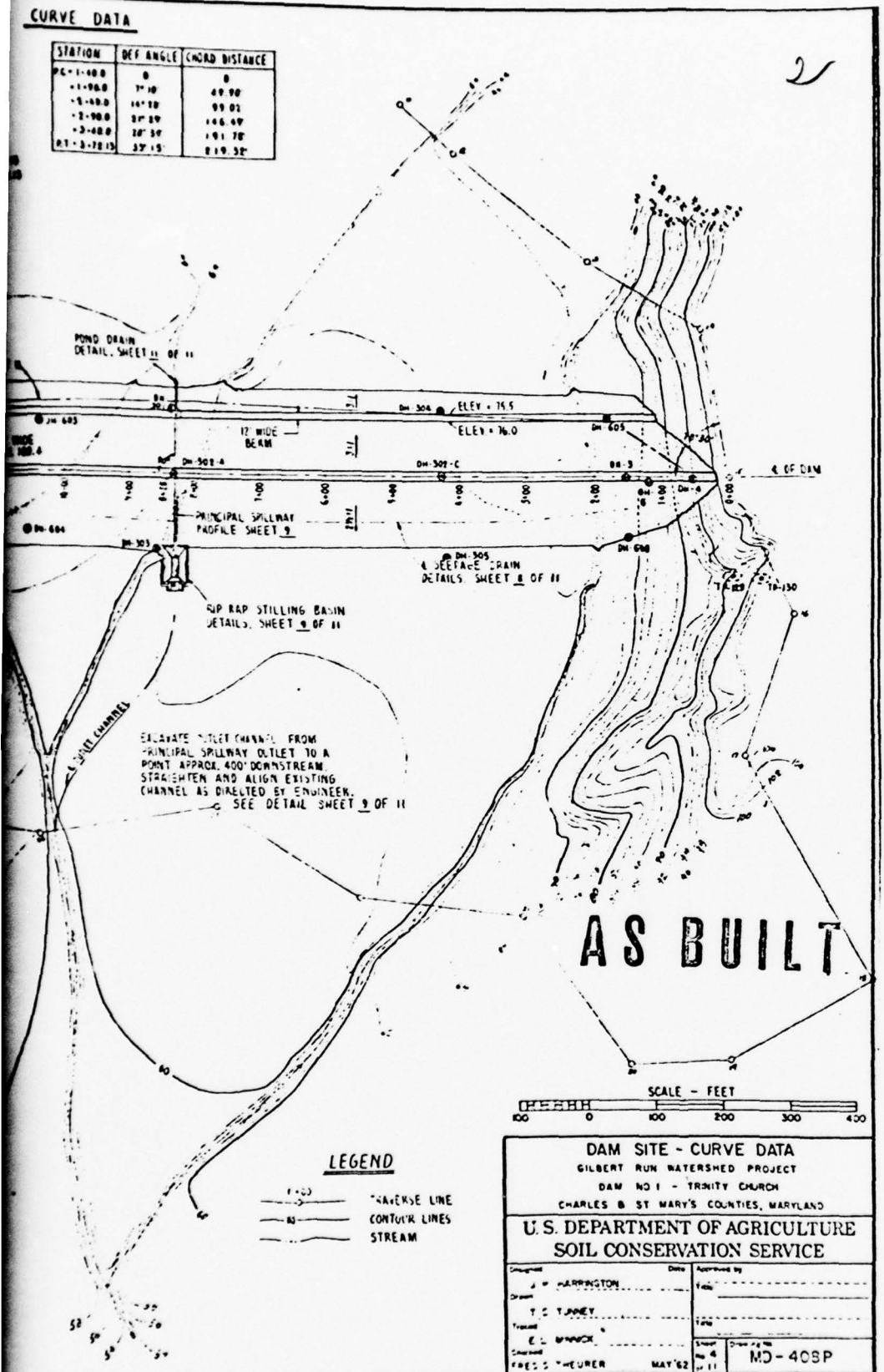
4) Develop a more thorough and active maintenance and inspection program at the dam facility. Program should include more frequent maintenance and exercising of the gate valve, removing of trees from embankment slopes, removing of debris from trash racks, backfilling animal burrows, repairing of eroded areas of the access road, and periodic mowing of spillway channel.


CURVE DATA
Δ = 66°30'
R = 200.00
T = 131.126
L = 232.13
E = 89.152
M = 32.742
D = 28° 39'
PC = 1+40.0
PI = PC+T = 2+71.13
PT = PC+L = 3+72.13
STATION
DEF ANGLE
0
7° 10'
14° 18'
21° 29'
28° 39'
33° 15'
TP-106
TP-107
TP-105
TP-104
TP-103
TP-102
TP-101
DIVERSION
AS BUILT
DOWNSTREAM
SEE DETAIL SHEET
DH-101
CUTOFF TRENCH, DETAILS SHT 7 OF 11
POND DRAIN DETAIL, SHEET 11 OF 11
DH-602
DH-603
15' WIDE
ELEV. 100.4
DH-1
DH-2
DH-5
DH-601
DH-604
DH-303
TP-601
10%
2.2%
TP-201
10 WIDE
ELEV. 113
TP-203
AS BUILT
Extended Berm
EMERGENCY SPILLWAY
WOODEN BRIDGE
TP-202
ELEV-113.1'
CL
CH
SC
SM
12.0' SOFT
SILTY & CLAYEY SAND, VERY FINE GRAIN
SILTY SAND, VERY FINE GRAIN, SOME CLAY, SOME
52
50
54

CURVE DATA

STATION	DEF ANGLE	CHORD DISTANCE
PC = 1+48.0	0	0
+1+98.0	7° 10'	49.90
+2+48.0	14° 28'	99.02
+2+98.0	21° 49'	146.49
+3+48.0	28° 39'	191.78
PT = 3+78.15	33° 15'	219.32

2

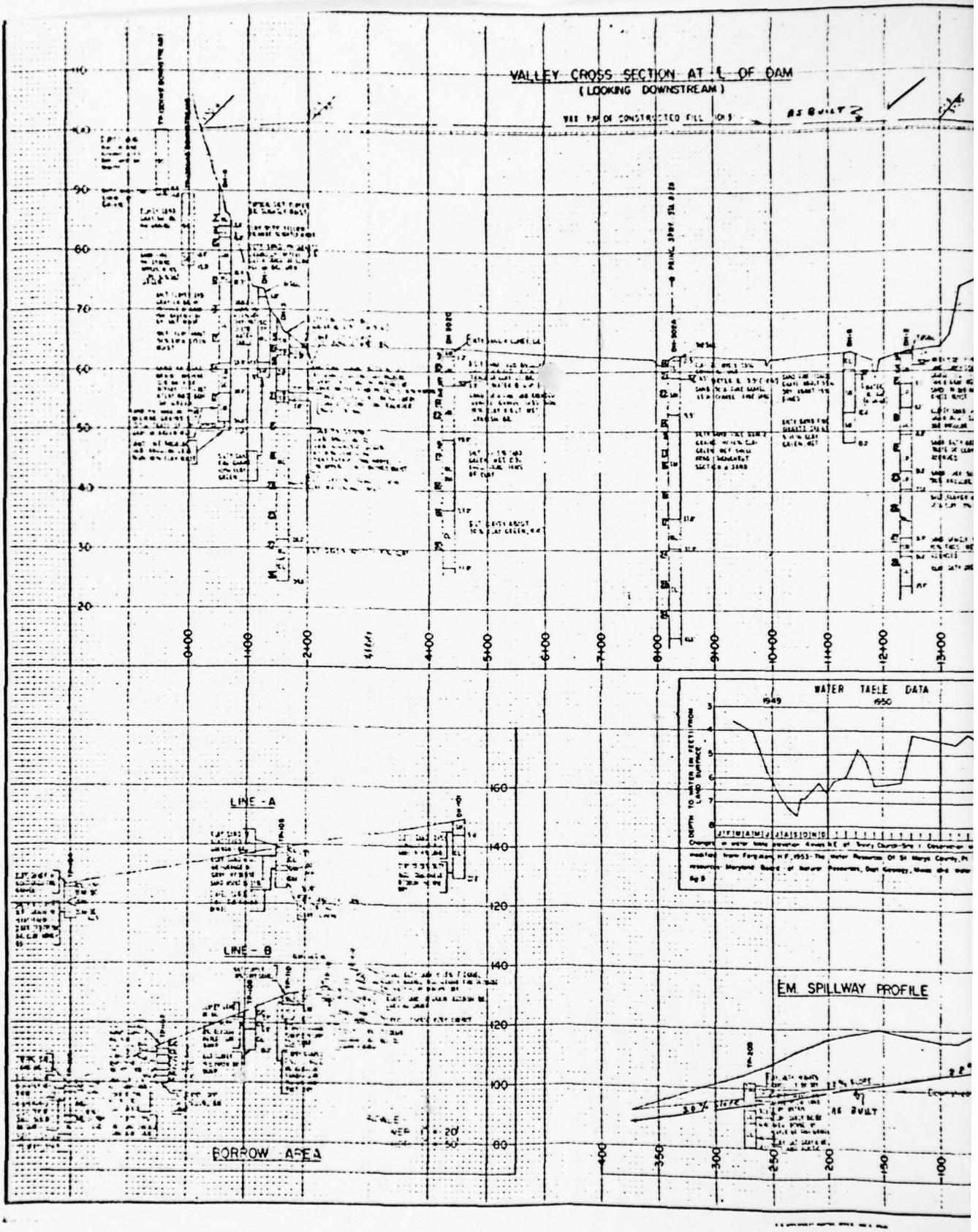


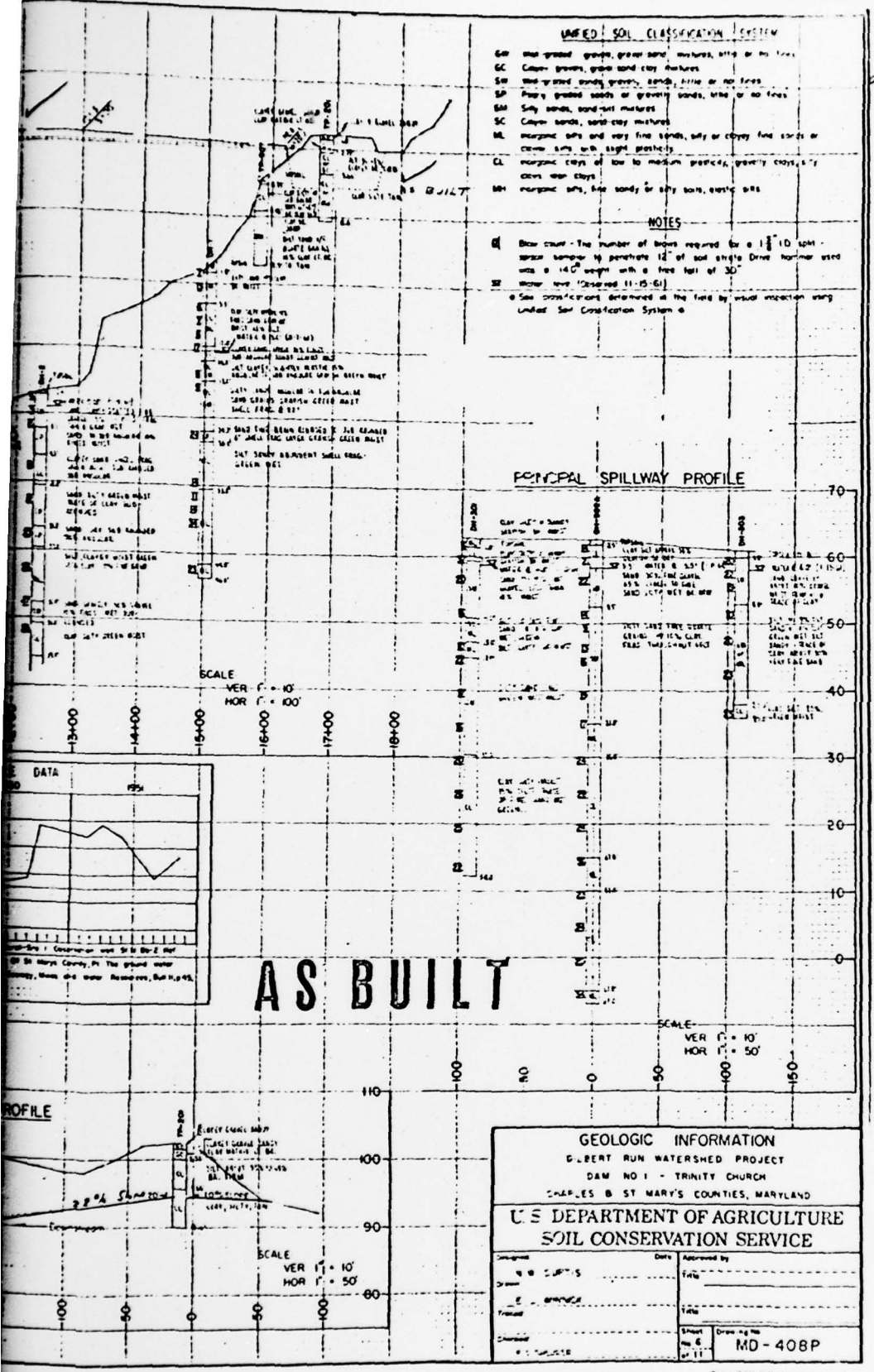
DAM SITE - CURVE DATA
GILBERT RUN WATERSHED PROJECT
DAM NO 1 - TRINITY CHURCH
CHARLES & ST MARY'S COUNTIES, MARYLAND

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	Date	Approved by
J. P. HARRINGTON		Title
Drawn		
T. C. TURNEY		Title
Traced		
E. L. BANNOCK		Sheet No. 4 of 11
Checked		Drawing No. MD-408P
FRED S. HEURER	MAY '62	

PLATE NO. 1


VALLEY CROSS SECTION AT ℄ OF DAM
(LOOKING DOWNSTREAM)
AS BUILT
WATER TABLE DATA
1949
1950
LINE - A
LINE - B
BORROW AREA
EM. SPILLWAY PROFILE
AS BUILT



GEOLOGIC INFORMATION

GILBERT RUN WATERSHED PROJECT

DAM NO 1 - TRINITY CHURCH

CHARLES & ST MARY'S COUNTIES, MARYLAND

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed — Date — Approved by

Drawn — Title

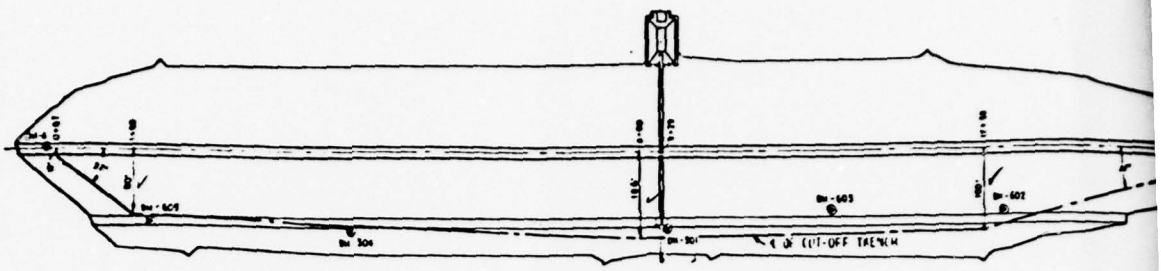
Traced — Title

Checked

Sheet No. 6 of 11 — Drawing No. MD-408P

Form SCS-115 (Rev. 1)

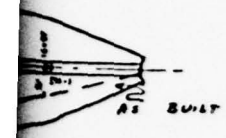
PLATE NO. 2

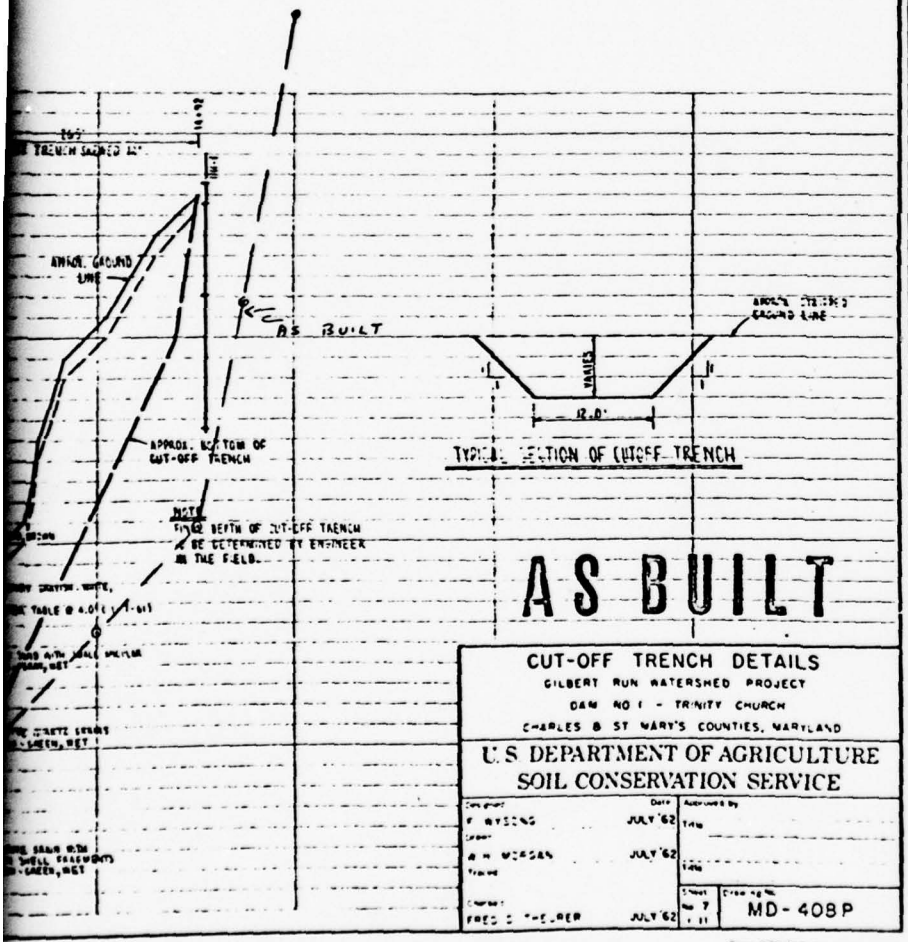


PLAN VIEW
SCALE : 1" = 100'

PROFILE ALONG ℄ OF CUT-OFF TRENCH
SCALE - HOR 1" = 80.0'
VERT 1" = 4.0'

AS BUILT





AS BUILT

CUT-OFF TRENCH DETAILS

GILBERT RUN WATERSHED PROJECT

DAM NO 1 - TRINITY CHURCH

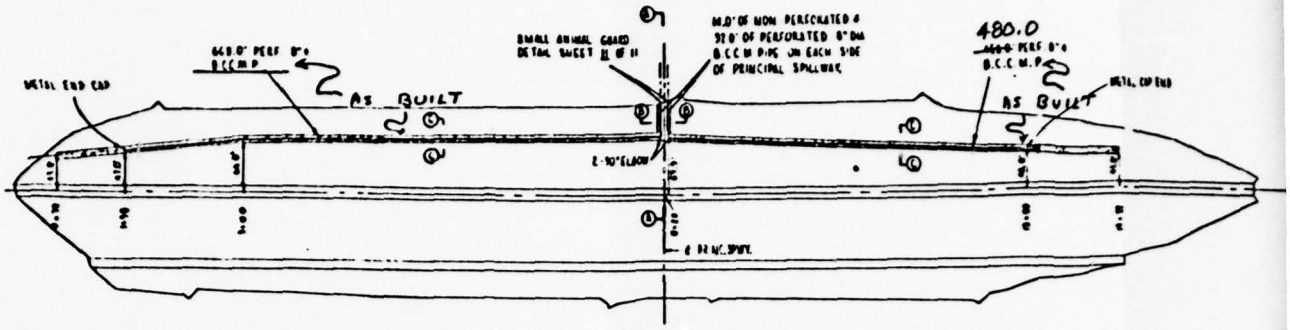
CHARLES & ST MARY'S COUNTIES, MARYLAND

U.S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

F. WIGGINS	JULY '62	Approved by	
A. M. MORGAN	JULY '62	Title	
FRED C. TUCKER	JULY '62	Sheet No. 7 of 11 sheets	Drawing No. MD-408P

PLATE NO. 3

Form SCS 317 November 1955



NOTES:

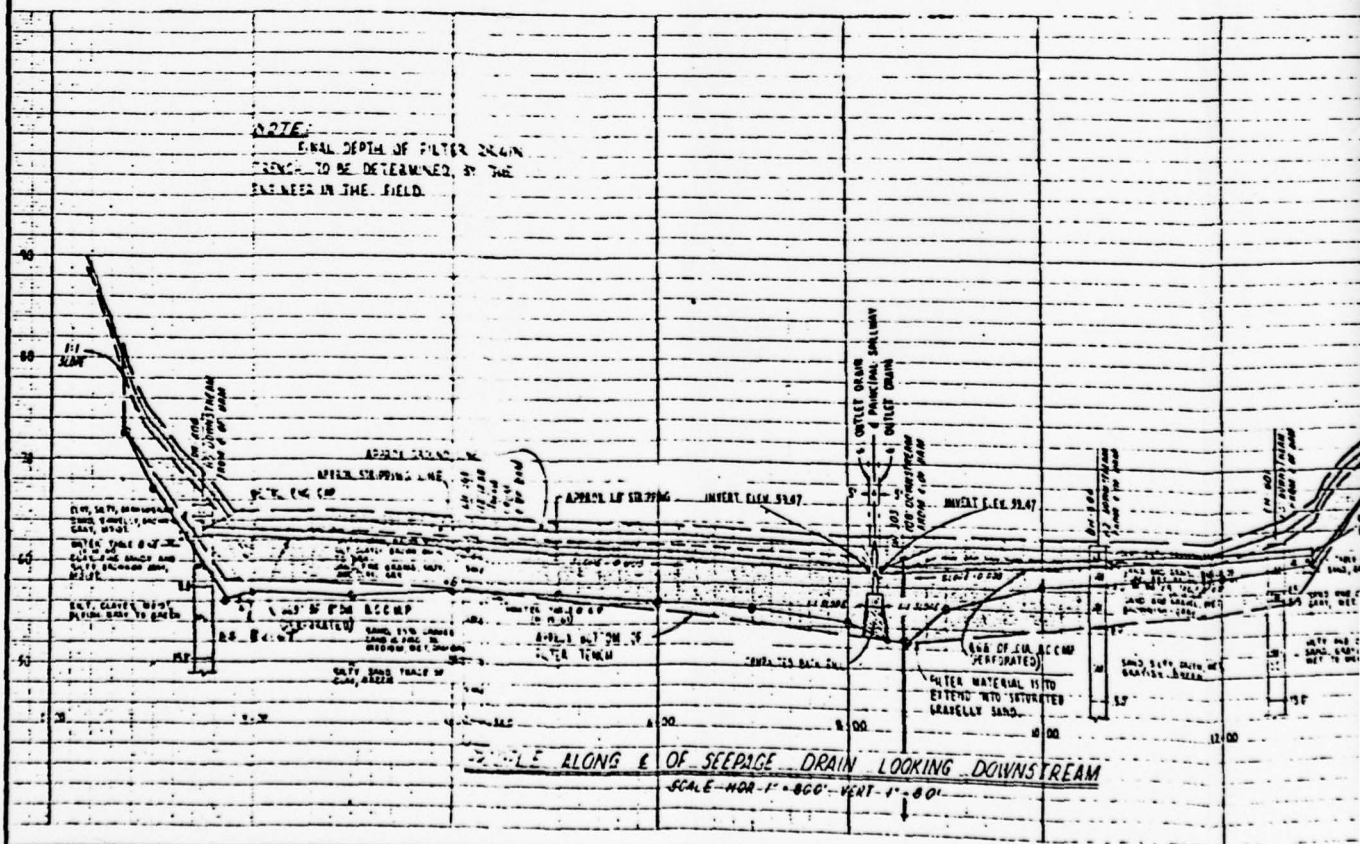
1. THE SEEPAGE DRAIN PIPES, PERF & NON-PERF SHALL BE 8" DIA ANNULAR OR SPIRAL 16 GAGE BIT. COATED CORRU. METAL PIPE WITH STD COUPLING BANDS.
2. ALL PERF. PIPE SHALL BE LAID WITH 3/16" DIA PERF. DOWN.

PLAN OF SEEPAGE DRAIN

SCALE 1" = 100'

SECTION CC

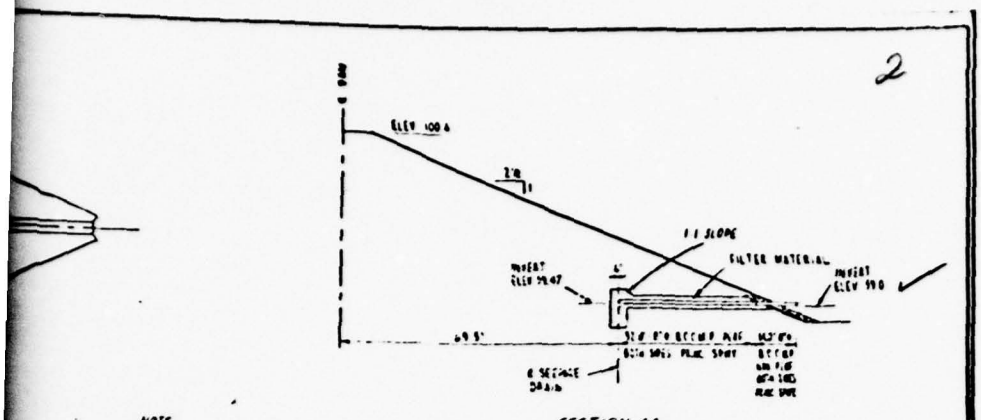
AS BUILT



PROFILE ALONG ℄ OF SEEPAGE DRAIN LOOKING DOWNSTREAM

SCALE—HOR-1"=800'—VERT-1"=80'

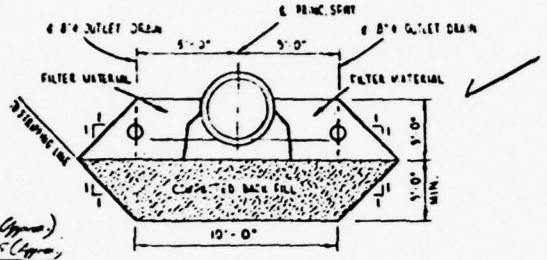
2



SECTION AA

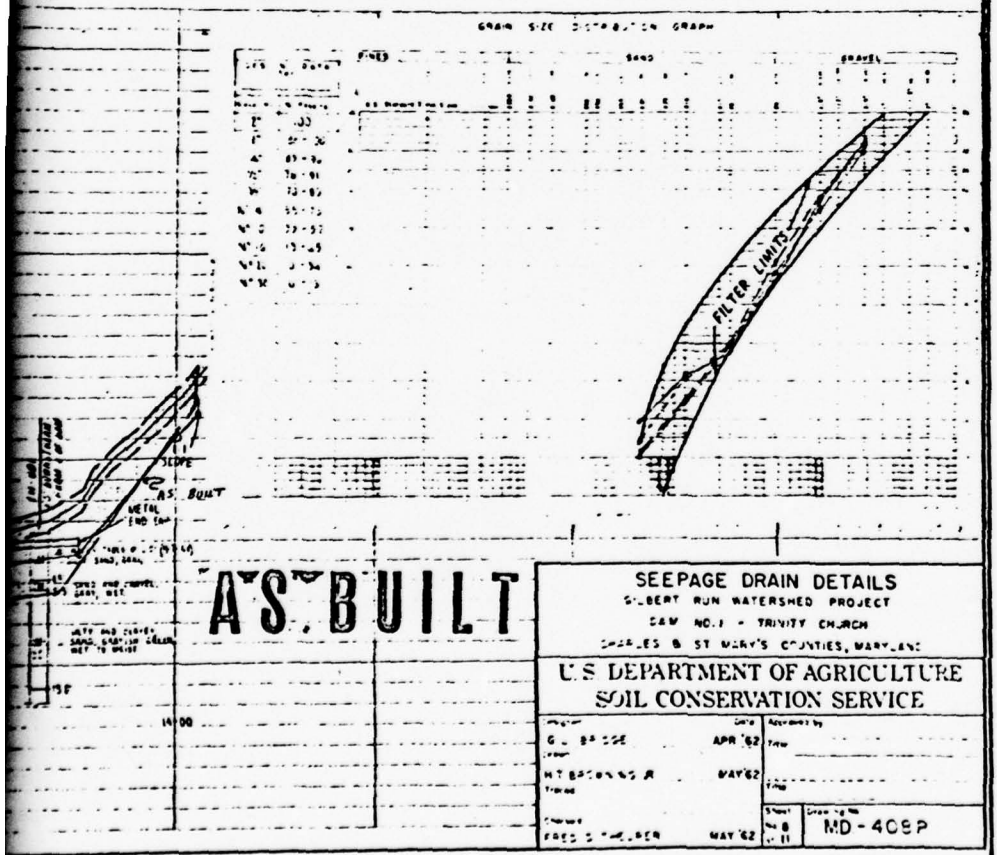
NOTE
FILTER MATERIAL TO EXTEND A MIN OF 2.0' ABOVE STEPPING LINE OR A MIN OF 1.0' ABOVE TOP OF 8"ø DRAIN PIPE WHICH EVER IS GREATER.

SECTION CC



SECTION BB

As Built Sta. 0+20 to 8+30 (Approx.)
" 13+00 to 14+25 (Approx.)
For Sta. 8+30 to 13+00 (Approx.) See letter on file dated Jan. 27, 1964 Referring to EWPO concurrence.



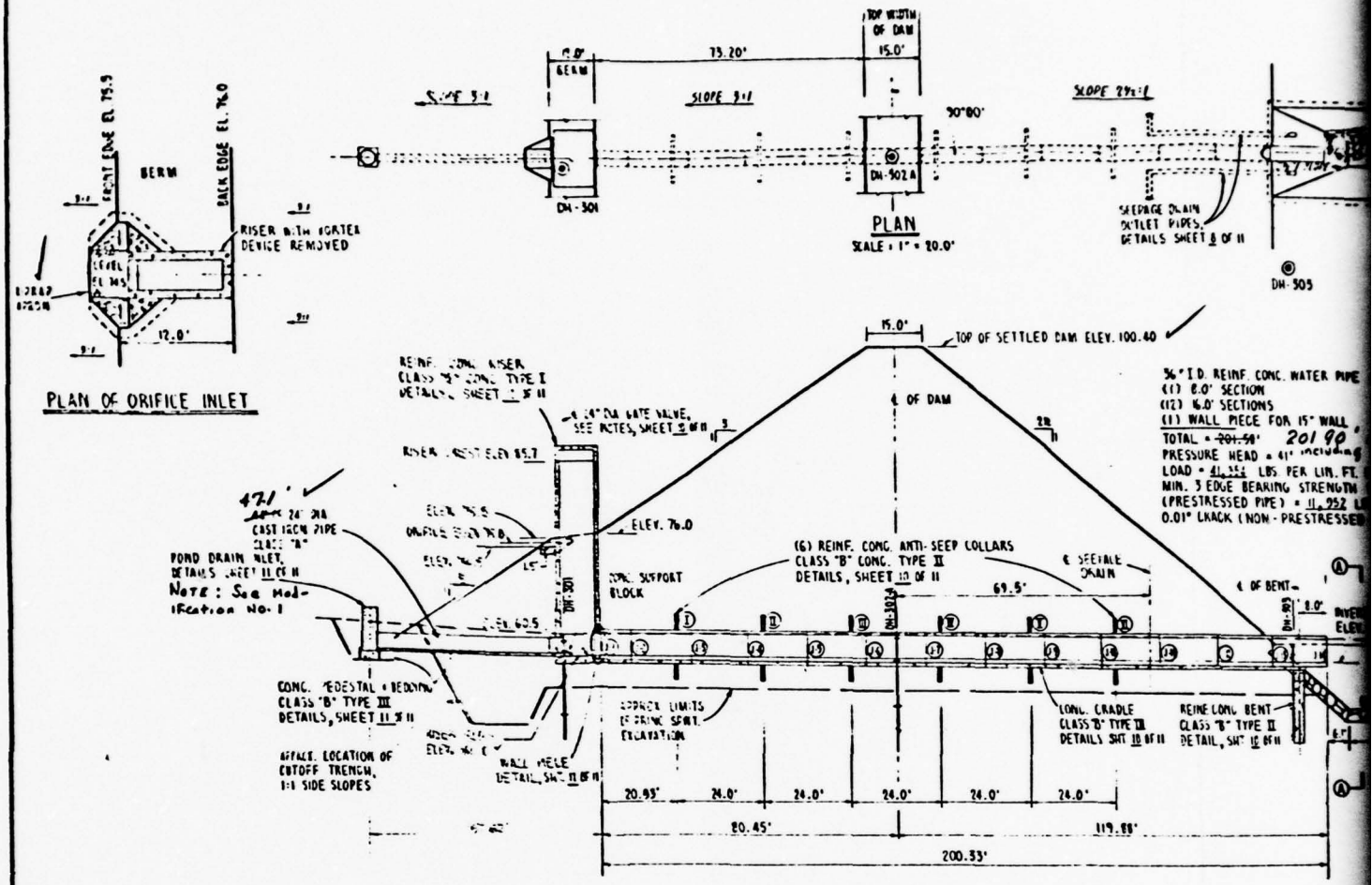
AS BUILT

SEEPAGE DRAIN DETAILS
GILBERT RUN WATERSHED PROJECT
DAM NO. 1 - TRINITY CHURCH
CHARLES & ST MARY'S COUNTIES, MARYLAND

U.S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

G. L. BOSSE	APR '62	Approved by Title
H.T. BROOKS JR	MAY '62	Title
FRED S. MELDER	MAY '62	Sheet No. 8 of 11 sheets; Drawing No. MD-409P

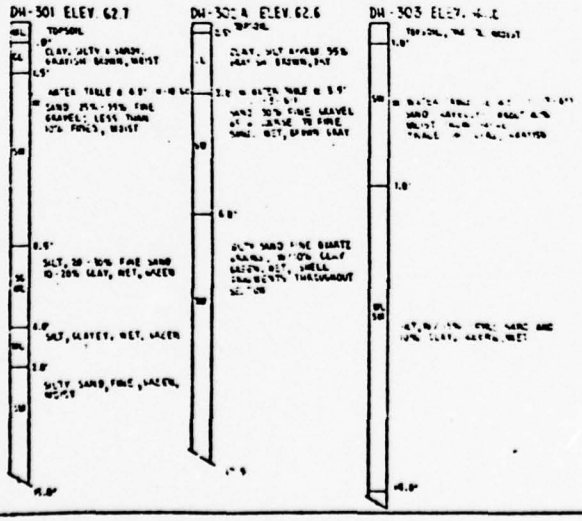
PLATE NO. 4

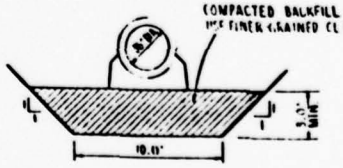


PROFILE ALONG ℄ OF PRINCIPAL SPILLWAY

SCALE : HOR. 1" = 20.0'
VERT. 1" = 10.0'

SOILS DATA: SOIL DESCRIPTIONS DETERMINED BY VISUAL EXAMINATION
DATE OF RECORDING INVESTIGATION : DEC. '46





TYPICAL SECTION OF PRINCIPAL SPILLWAY EXCAVATION

TYPICAL SECTION OF DIVERSION

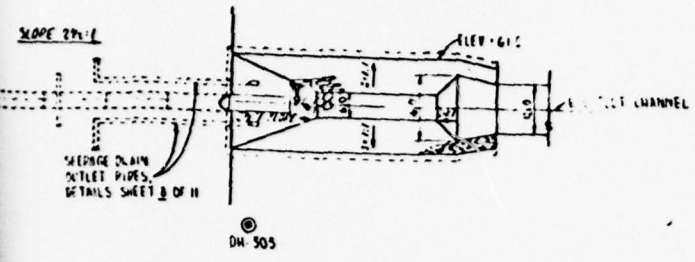
2

AS BUILT

POINT	DISTANCE FROM INSIDE FACE RISER WALL PIECE	INVERT ELEV OF 36" PIPE
J-1	0	60.00
J-2	8	60.00
J-3	24	60.00
J-4	40	60.00
J-5	56	60.00
J-6	72	60.00
J-7	88	60.00
J-8	104	59.90
J-9	120	59.75
J-10	136	59.60
J-11	152	59.45
J-12	168	59.30
J-13	184	59.15
J-14	200	59.00

NOTE: ABOVE DIMENSIONS FOR LENGTHS OF PIPE ARE NOMINAL AND DO NOT INCLUDE CREEP
MAX. CAMBER 0.44" AT J-7

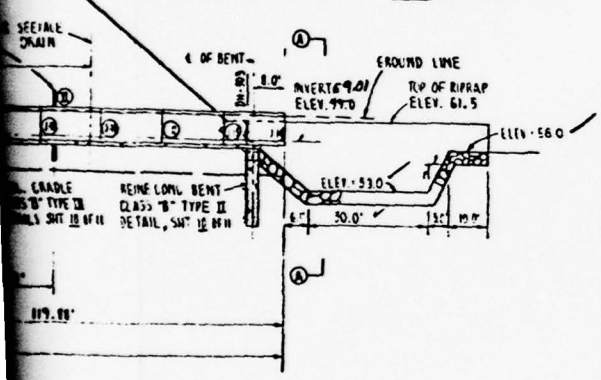
POINT	OUTSIDE FACE RISER WALL PIECE	INVERT ELEV OF 48" PIPE
I	20	59.00
II	44	60.00
III	68	60.00
IV	92	59.93
V	116	59.79
VI	140	59.56



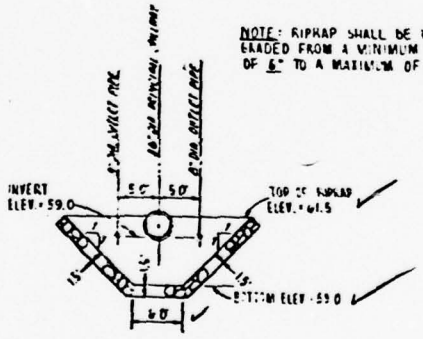
DAM ELEV. 100.40

36" I.D. REINF. CONC. WATER PIPE WITH STANDARD JOINT
(1) 8.0' SECTION
(12) 16.0' SECTIONS
(1) WALL PIECE FOR 15" WALL
TOTAL = ~~201.50'~~ 201.90'
PRESSURE HEAD = 41' including Creep
LOAD = 41,255 LBS PER LIN. FT BASE ON O.D. OF 48"
MIN. 3 EDGE BEARING STRENGTH FOR 0.001" CRACK
(PRESTRESSED PIPE) = 11,952 LBS PER LIN. FT.
0.01" CRACK (NON-PRESTRESSED PIPE = 15,896 LBS. PER LIN. FT.

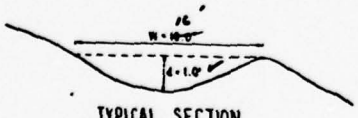
NOTE: COAT OUTSIDE OF SPIGOT JOINT RING WITH CONCRETE ON ONE 16' SECTION.



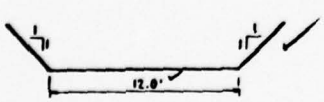
NOTE: RIPRAP SHALL BE WELL GRADED FROM A MINIMUM SIZE OF 6" TO A MAXIMUM OF 12".



SECTION A-A



TYPICAL SECTION OF DIVERSION DITCH



TYPICAL SECTION OF OUTLET CHANNEL

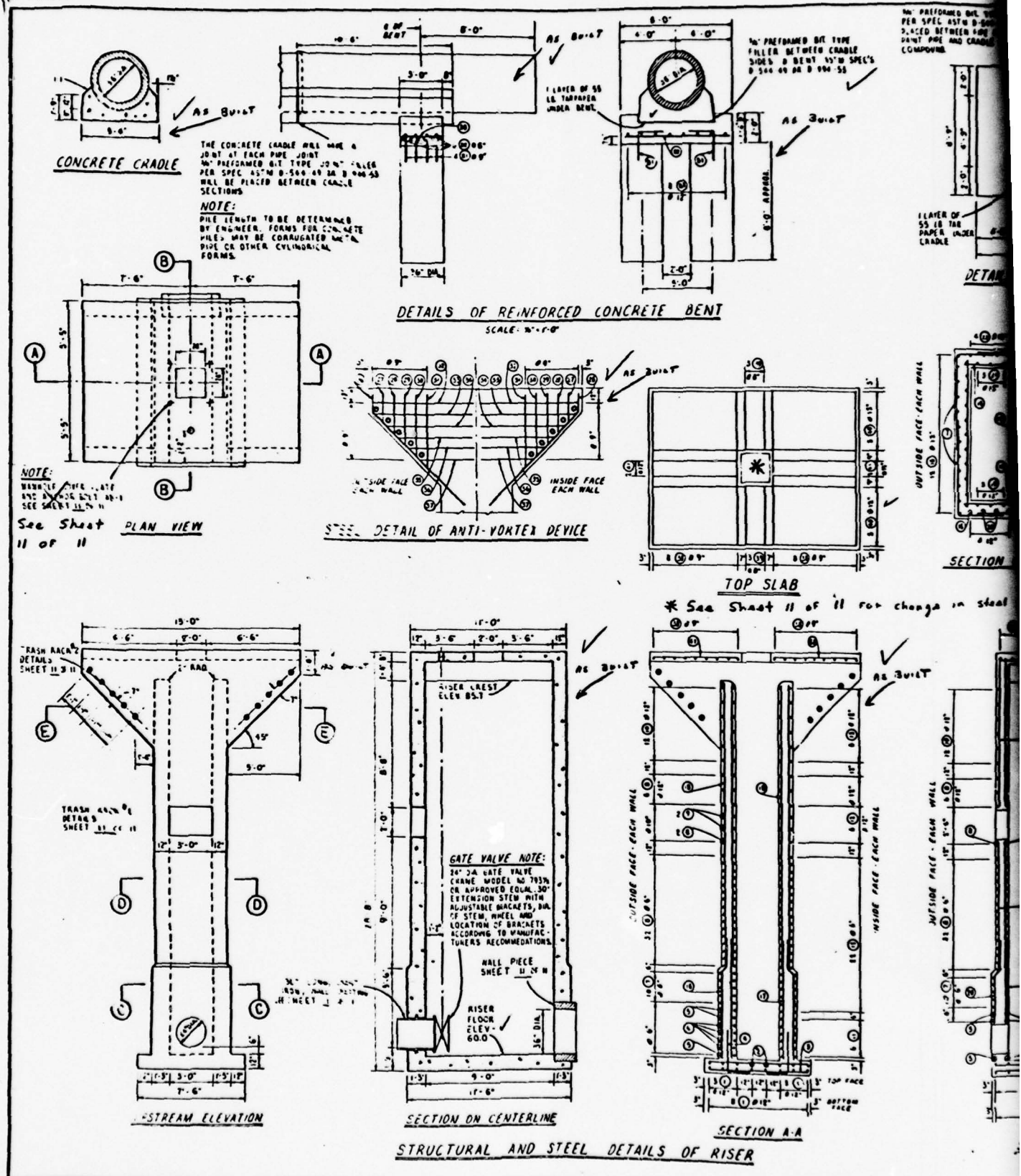
AS BUILT

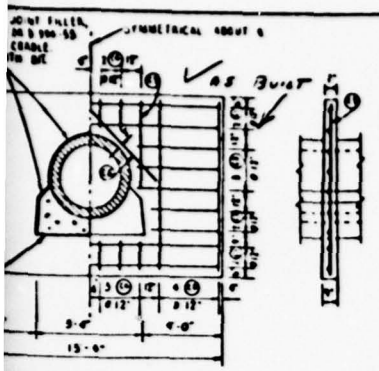
PLAN - PROFILE OF PRINCIPAL SPILLWAY
GILBERT RUN WATERSHED PROJECT
DAM NO. 1 - TRINITY CHURCH
CHARLES & ST. MARY'S COUNTIES, MARYLAND

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

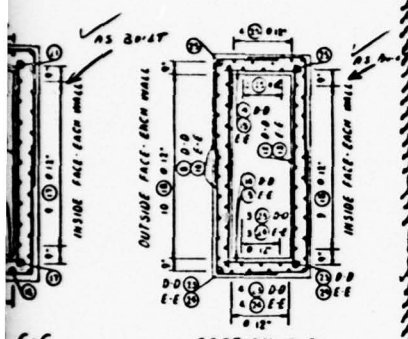
Designed	Date	Approved by	
L. SMITH	APR. '62	Title	
Drawn			
W. H. WILKINSON	APRIL '62	Title	
Traced			
Checked		Sheet No. 9 of 11	Drawing No. MD-408P
FRED C. TWELMEYER	MAY '62		

PLATE NO. 5

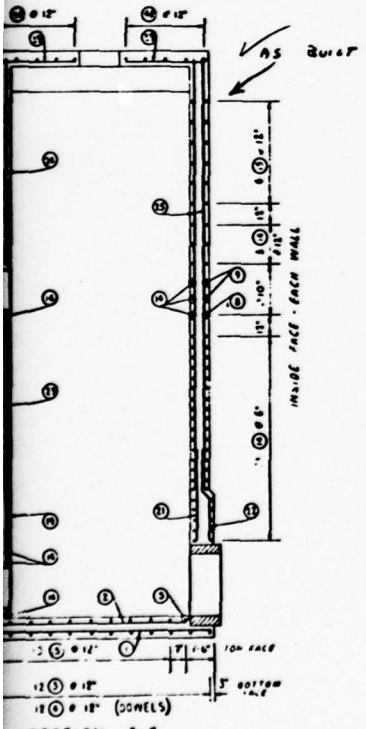

CONCRETE CRADLE
AS BUILT
THE CONCRETE CRADLE WILL HAVE A JOINT AT EACH PIPE JOINT. ½" PREFORMED BIT TYPE JOINT FILLER PER SPEC ASTM D-545-49 OR D 994-55 WILL BE PLACED BETWEEN CRADLE SECTIONS
NOTE:
PILE LENGTH TO BE DETERMINED BY ENGINEER. FORMS FOR CONCRETE PILES MAY BE CORRUGATED METAL PIPE OR OTHER CYLINDRICAL FORMS.
1 LAYER OF 55 LB TARPAPER UNDER BENT
½" PREFORMED BIT TYPE FILLER BETWEEN CRADLE SIDES & BENT PER SPEC'S D 545-49 OR D 994-55
DETAILS OF REINFORCED CONCRETE BENT
SCALE: ½"=1'-0"
NOTE:
See Sheet 11 of 11
PLAN VIEW
INSIDE FACE EACH WALL
STEEL DETAIL OF ANTI-VORTEX DEVICE
TOP SLAB
* See Sheet 11 of 11 for change in steel
TRASH RACK DETAILS SHEET 11 OF 11
GATE VALVE NOTE:
24" DIA GATE VALVE CHAPMAN MODEL NO 793% OR APPROVED EQUAL. 30" EXTENSION STEM WITH ADJUSTABLE BRACKETS, DIA OF STEM, WHEEL AND LOCATION OF BRACKETS ACCORDING TO MANUFACTURERS RECOMMENDATIONS.
RISER CREST ELEV 85.7
WALL PIECE SHEET 11 OF 11
RISER FLOOR ELEV. 60.0
AS BUILT
OUTSIDE FACE - EACH WALL
INSIDE FACE - EACH WALL
TOP FACE
BOTTOM FACE
UPSTREAM ELEVATION
SECTION ON CENTERLINE
SECTION A-A
STRUCTURAL AND STEEL DETAILS OF RISER



S OF REINF CONCRETE ANTI-SEEP COLLAR



SECTION D-D
AND
SECTION E-E



SECTION B-B

STEEL SCHEDULE

LOCATION	SHAPE	#	SIZE	LENGTH	LIKE	A	B	C	
		14	6	11-6					
		2	6	9-6					
		12	5	7-0					
		14	6	6-0					
		6	6	10-6					
		6	6	7-0					
		10	6	10-6					
		80	6	6-0					
		4	6	5-0					
		14	6	9-3					
		28	6	9-3					
		12	6	9-6					
		56	6	10-0					
		28	6	10-0					
		56	6	6-0					
		12	5	6-0					
		16	6	8-3					
		20	6	8-3					
		80	5	10-3					
		8	6	5-6					
		8	6	5-8					
		4	6	6-6					
		11	5	8-6					
		11	5	10-0					
		11	5	11-0					
		8	5	10-3					
		8	5	2-0					
		8	5	2-9					
		8	5	3-6					
		8	5	4-3					
		8	5	5-0					
		4	5	10-6					
		4	5	10-0					
		4	5	12-6					
		4	5	11-0					
		4	5	9-6					
		4	5	8-0					
		16	5	10-6					
		6	5	9-0					
		10	5	10-6					
		4	5	6-2					
		6	5	2-9					
		4	5	2-6					
		4	5	2-6					
		24	6	15-0					
		24	6	3-6					
		48	6	6-3					
		60	6	1-6					
		48	6	8-3					
		12	6	5-0					

BAR TYPES ① ② ③ ④

(STEEL & CONCRETE - THIS SHEET ONLY)

STEEL		CONCRETE
#3 BARS	1146.00 LIN.FT 765 LBS	CLASS "B" TYPE I 34.5 CY
#5 BARS	2844.50 LIN.FT 2962.8 LBS	CLASS "B" TYPE II 22.0 CY
#6 BARS	2648.10 LIN.FT 3934.7 LBS	CLASS "B" TYPE II 54.0 CY

GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS "B" AND OF TYPE NOTED.
2. PORTLAND CEMENT TYPE I WITH AN AIR ENTRAINING ADMIXTURE OF TYPE IA SHALL BE USED.
3. ALL REINFORCING STEEL TO BE LAPPED A MIN. OF 30 BAR DIAMETERS.
4. ALL REINFORCING STEEL PLACED IN CONCRETE POURED AGAINST THE GROUND SHALL HAVE A MINIMUM OF 3" CLEAR COVER. WHERE FORMS ARE USED BARS SHALL HAVE A MINIMUM OF 2" CLEAR COVER.
5. ALL EXPOSED EDGES OF CONCRETE TO HAVE ¾" CHAMFER UNLESS OTHERWISE NOTED.
6. ALL METAL PAD NOT GALVANIZED TO BE PAINTED SPEC MD.M-58

AS BUILT

SCALE: ½":1'-0"

STRUCTURAL DETAILS

GILBERT RUN WATERSHED PROJECT

DAM NO 1 - TRINITY CHURCH

CHARLES & ST MARYS COUNTIES, MARYLAND

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DESIGNED	APP'62	APPROVED BY	
DRAWN	MAY'62	TITLE	
TRACED		DATE	
CHECKED		SHEET NO. 11	DRAWING NO. MD-408P

PLATE NO. 6

VISUAL OBSERVATIONS CHECKLIST

Name Dam Trinity Church Gilbert Run Site #1 County Charles State Maryland National ID # MD 37

Type of Dam Earthfill Hazard Category Class II-Significant Hazard

Date(s) Inspection 3/22/79 Weather Clear Temperature 65°F

Inspection Review Date 6/6/79 (Ackenheil & Associates personnel only.)

Pool Elevation at Time of Inspection 75.0 ft. * M.S.L. Tailwater at Time of Inspection ±58.7* M.S.L.

*Pool at riser orifice elevation.

*Approximately 4 in. below invert R.C. pipe outlet.

Inspection Personnel:

Ackenheil & Associates

Paul D'Amato
Timothy Debes
James Hainley

Water Resources Administration

T. Moynahan

Soil Conservation Service

D. Lloyd
D. Rames
R. Ensor

Gilbert Run Public Watershed Assoc.

R. Coble - dam overseer

Recorder Paul D'Amato

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS*
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	No sloughing observed. Downstream slope densely covered with grass, weeds, and crown vetch with some sumac and small evergreens (approx. 2 to 3 ft. in height). Some tree stumps (approx. 2" dia.) left in place. Footpath with slight erosion on downstream slope from crest to R.C. pipe outlet. Upstream slope densely covered with grass and crown vetch with some animal burrows, brush cover, and tree stumps (approx. 2" dia.), footpath with slight erosion observed from crest to intake structure on upstream slope. Access road worn into dam crest and north abutment by vehicular traffic.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	No noticeable horizontal or vertical misalignment.	
RIPRAP FAILURES	N/A	

*REFER TO REPORT SECTIONS 3 AND 7

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SETTLEMENT	None evident.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Emergency spillway at the north abutment is heavily covered with grass and crown vetch with some sparse brush cover. Area below lower limit of spillway (downstream of dam) is densely covered with brush and small trees. Access road worn into north abutment.	
ANY NOTICEABLE SEEPAGE	Wet zone observed in topographic low paralleling downstream toe on north and south side of plunge pool. (See field sketch.) No perceptible seepage noted emanating from downstream toe of dam.	
STAFF GAGE AND RECORDER	None	
DRAINS	Two 8 in. dia. B.C.C.M.P. drains. Outlets partially submerged by tailwater. Drains appear to be flowing and transporting brown (iron) precipitate.	

OUTLET WORKS

(Pond Drain)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Reinforced concrete pipe conduit is in good condition. No cracking or spalling of concrete was noted. Tailwater level approximately 4 in. below invert of pipe outlet.	
INTAKE STRUCTURE	Reinforced concrete intake riser is in good condition. No cracking or spalling of concrete noted. Reservoir drain valve not operable. Trash rack of low stage orifice was obstructed with debris. Interior of intake riser free of debris and obstructions.	
OUTLET STRUCTURE	None.	
OUTLET CHANNEL	Plunge pool is approximately 25 - 30 ft. wide and lined with riprap. Depth and width approximate that shown on design drawings. Except for small trees that line banks, channel is generally free of flow obstructions. Iron staining in channel near outlet of seepage drains.	
EMERGENCY GATE	None.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	None.	
APPROACH CHANNEL	Channel bottom and side slopes are densely covered with grass with some sparse brush. Generally free of flow obstructions with stable side slopes.	
DISCHARGE CHANNEL	Same condition as "Approach Channel". Area below lower limit of discharge channel is heavily wooded.	
BRIDGE AND PIERS	None.	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	N/A	

GATED SPILLWAY

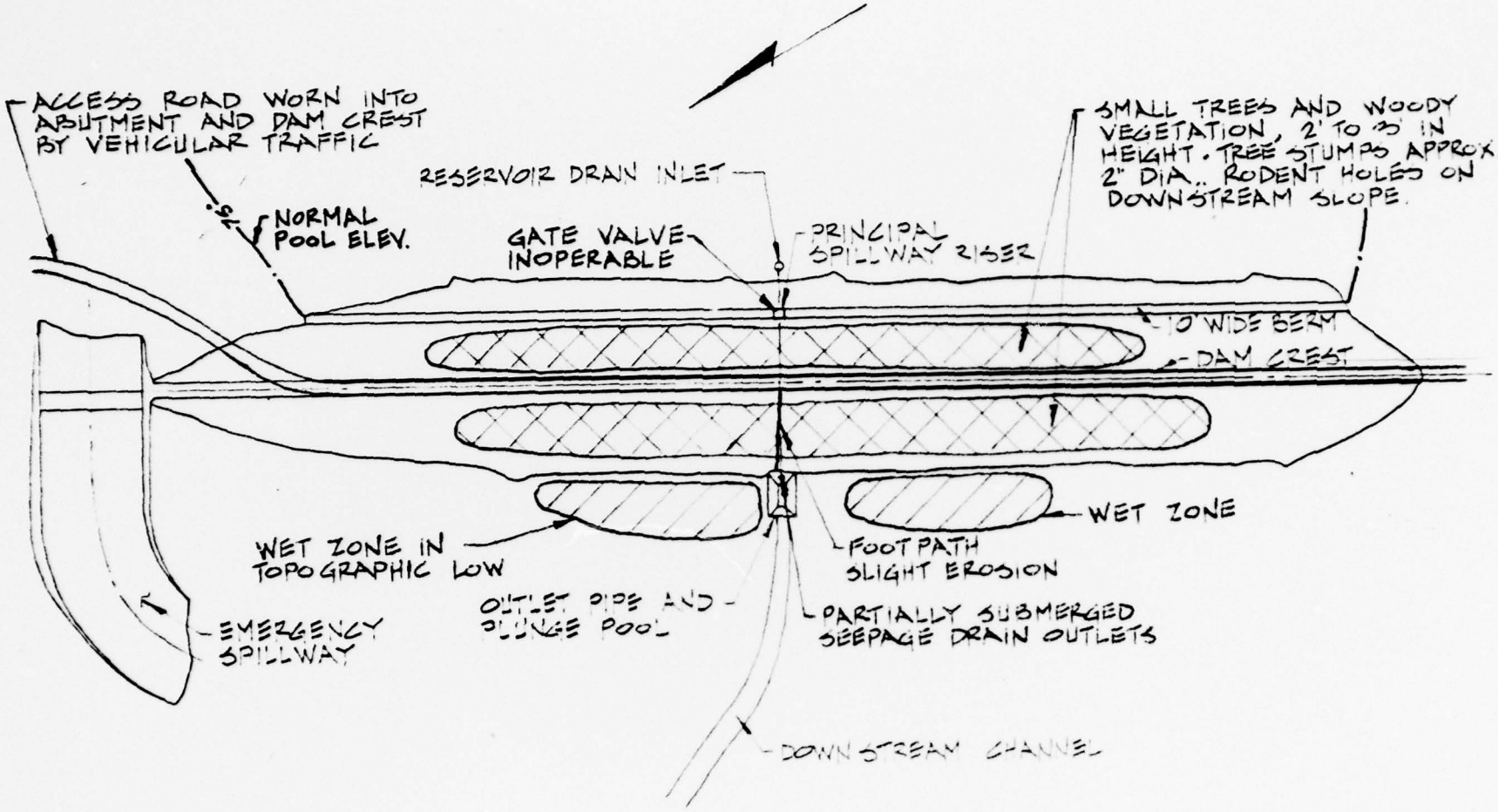
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE AND PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Reservoir slopes have mild to moderate inclinations and are well vegetated. No signs of landslides or shore erosion. Minor bank sloughing in a few locations.	
SEDIMENTATION	Reservoir water and outlet pipe discharge clear. No significant degree of sedimentation evident.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Downstream channel is approximately 12 ft. wide with sides densely lined with small trees. No apparent obstructions capable of affecting spillway discharge evident.	
SLOPES	No apparent evidence of slope instability.	
APPROXIMATE NO. OF HOMES AND POPULATION	One (1) residence located adjacent to Trinity Church Run approximately 1/2 mi. downstream of dam and above flood plain. Approximately four (4) inhabited structures located adjacent to and within 2000 ft. of Gilbert Run, all above estimated flood plain.	



FIELD SKETCH OF TRINITY CHURCH DA
GILBERT RUN DAM No. 1

A1

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

NAME OF DAM Trinity Church

ID # MD-37

ITEM	REMARKS
AS-BUILT DRAWINGS	As-built design drawings were provided by the Soil Conservation Service, see Plates 1 through 6. (Plates do not include a complete set of design drawings.)
REGIONAL VICINITY MAP	See Appendix E, U.S.G.S. 7.5 min. quadrangle map showing dam site location.
CONSTRUCTION HISTORY	*Design documents* and drawings prepared by the Soil Conservation Service in April 1962. Construction of dam began in February 1963 and was completed in July 1964.
TYPICAL SECTIONS OF DAM	See Plate No. 5.
OUTLETS - PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	See Plates No. 5 and 6 for details of outlet works, available in design report.
RAINFALL/RESERVOIR RECORDS	N/A

ITEM	REMARKS
DESIGN REPORTS	Gilbert Run Watershed Protection Project, Site No. 1. Prepared by Soil Conservation Service in April 1962.
GEOLOGY REPORTS	Included in Design Report. Geologist's report prepared by Neville M. Curtis, Jr., Soil Conservation Service geologist.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Design report includes: 1. Hydrology computation summaries 2. Flood hydrographs 3. Hydraulic capacity calculations 4. Flood routing calculations 5. Static slope stability summary.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	See Plates No. 2, 3, and 4 for subsurface profiles. Laboratory tests results included in Design report include shear strength, classification, and compaction. Results of Vane shear test performed in the field included in Design report.
POST-CONSTRUCTION SURVEYS OF DAM	None reported.
BORROW SOURCES	Borrow materials obtained on-site. Location shown on Design drawings.

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	None reported.
HIGH POOL RECORDS	None recorded.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None reported.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported.
MAINTENANCE OPERATION RECORDS	Annual maintenance and inspection reports available from Soil Conservation Service District Office in La Plata, MD.

ITEM	REMARKS
SPILLWAY PLAN	
SECTIONS	See Plate No. 1 for Plan View.
DETAILS	See Plate No. 2 for cross-section and details.
OPERATING EQUIPMENT PLANS & DETAILS	See Plates No. 5 and 6.
SPECIFICATIONS	Construction and Material specifications for Gilbert Run Watershed Flood Detention Structure No. 1 prepared by the U. S. Dept. of Agriculture.
MISCELLANEOUS	Other documents include: 1. Construction Permit, Gilbert Run Public Watershed Association, October 1962.

HYDROLOGIC AND HYDRAULIC ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Approximately 60% woodland, 40% pasture and cultivated land.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 75.0 ft. (480 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 100.4 ft. (4,840 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: 96.7 ft.

ELEVATION TOP DAM: 100.4 ft.

EMERGENCY SPILLWAY

a. Elevation 94.3 ft.
b. Type Trapezoidal open earth channel, vegetated
c. Width 130 ft.
d. Length 500 ft., curved
e. Location Spillover North abutment
f. Number and Type of Gates None

OUTLET WORKS

a. Type Reinforced concrete intake structure with 36 in. dia. R.C. outlet pipe
b. Location 730 ft. south of north abutment and spillway
c. Entrance Inverts Low stage 75.0, high stage 85.7
d. Exit Inverts El. 59.0
e. Emergency Draindown Facilities None.

HYDROMETEOROLOGICAL GAGES

a. Type None
b. Location None
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE Unknown.

PAD 6/20/79
TED 6/20/79

ACKENHEIL & ASSOCIATES
CONSULTING ENGINEERS
BALTIMORE, MARYLAND

PROJECT NO _____

Trinity Church Dam - Hydrology

SHEET NO C-2 OF —

1. Determine Rainfall Amount for PMF Design Storm

PMF rainfall for Charles Co., Maryland = 28 in./6 hr.

obtained from "Design of Small Dams" pg. 48
by U.S. Dept. of Interior
Data based on Hydrometeorlogical Report #33,
National Weather Service.
Watershed area = 8.18 $mi.^2$
Reduction factor = 0.8 (for watershed area less than 10 mi^2.)

Adjusted PMF rainfall = $0.8 \times 28 = 22.4$ in./6 hr.

1/2 PMF = $1/2 \times 22.4 = 11.2$ in./6 hr.

2. Overtopping - Est. % PMF runoff

From design report
19.8 in./6 hr. rainfall (14.2 in. runoff) used
to set crest elev.

assume same rainfall loss for PMF rainfall

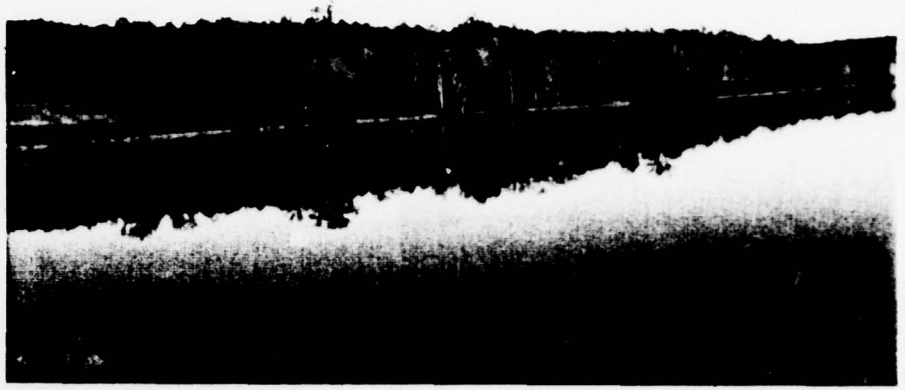
rainfall loss = 19.8 - 14.2 = 5.6 in.

For PMF rainfall, runoff = 22.4 in - 5.6 in = 16.8 in.

$$\% \text{ PMF} = \frac{14.2}{16.8} \times 100 = 85\%$$

Dam can accommodate est. 85% PMF without being overtopped.

1



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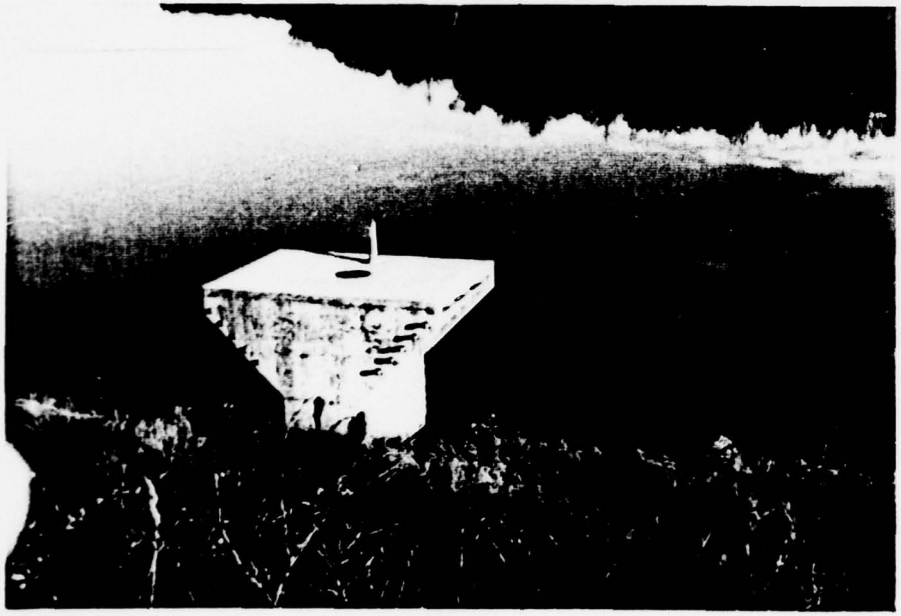


3

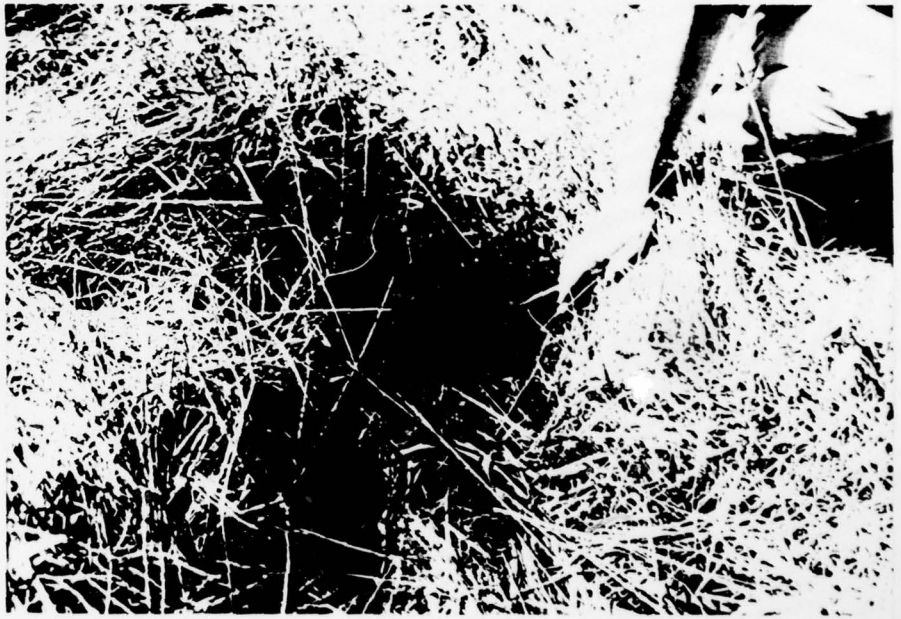
4

PHOTOGRAPH 5	Plunge pool showing principal spillway and seepage drain outlets.
PHOTOGRAPH 6	Emergency spillway channel looking downstream.
PHOTOGRAPH 7	Wet zone near downstream embankment toe.
PHOTOGRAPH 8	Close-up view of wet zone.

5

6

7



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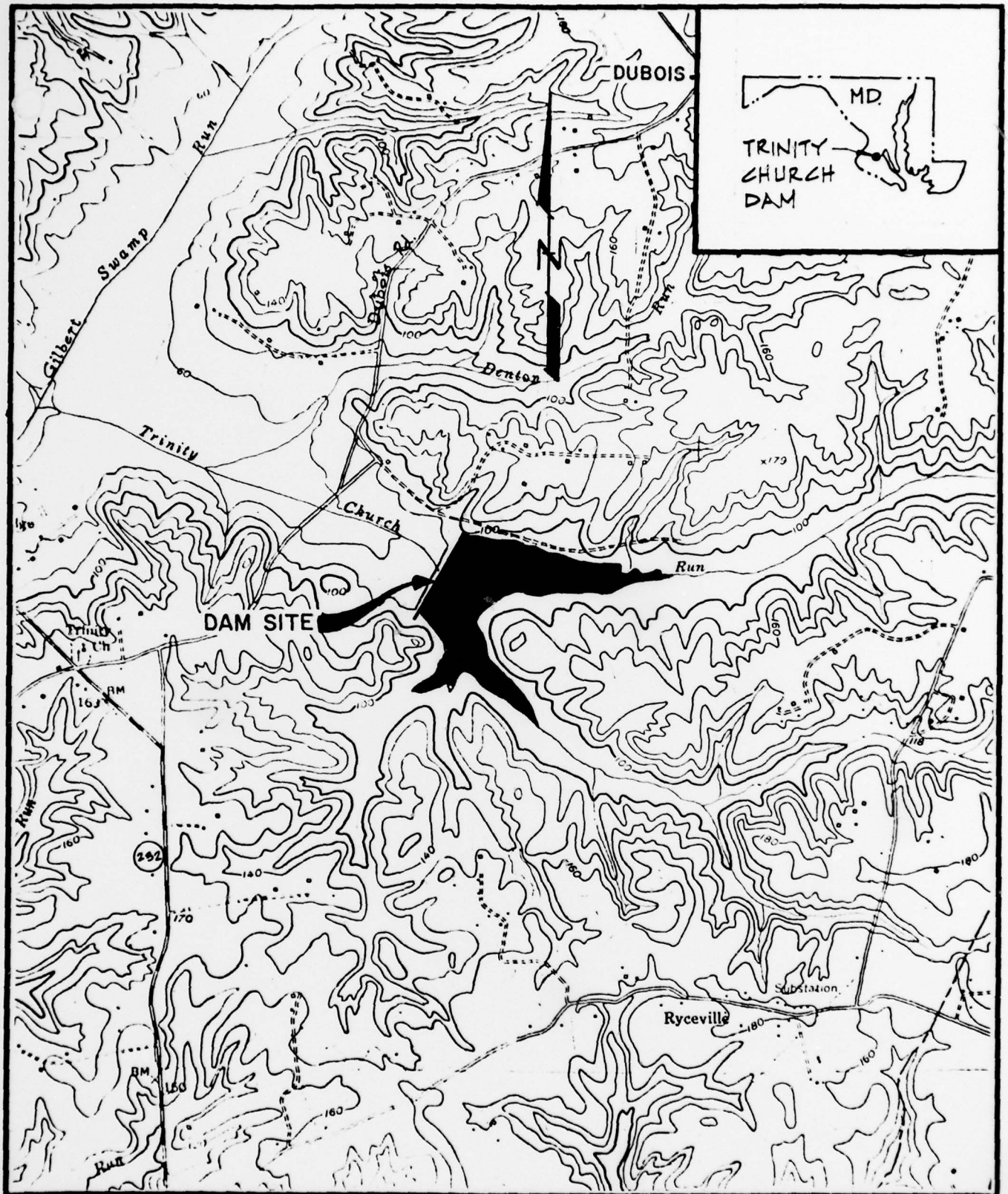


ITE: JUNE 1979	NATIONAL DAM INSPECTION PROGRAM	LOCATION PLAN OF TRINITY CHURCH DAM SITE
SCALE: 1: 24000		
DR: JLM CK: PAD	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS BALTIMORE, MD.	
DWG. NO. E 1		

TRINITY CHURCH DAM
GILBERT RUN SITE NO. 1
NDI I.D. NO. MD 37
REGIONAL GEOLOGY

Trinity Church Dam is located on Maryland's Western Shore within the Coastal Plain Physiographic Province. The dam site is located approximately 1.7 miles southwest of Dubois, Maryland on Gilbert Run and is underlain by the Calvert Formation. The Calvert Formation belongs to the Miocene Chesapeake Group and consists of semi-consolidated beds of clay, clayey silt, sands, and diatomaceous earth. The highly diatomaceous sediments tend to function as an aquiclude. The Calvert Formation is unconformably overlain by the Pleistocene Columbia Group's Sunderland Formation and is exposed in a belt 0.25 to 0.4 miles wide surrounding Trinity Church Run.

The Sunderland Formation consists of loose sand, silt, and gravel slope wash. This formation is present at dam abutments. The Sunderland Formation is overlain by the Wicomico Formation. The upper portion of the Wicomico Formation consists of clay loam containing gravel layers and scattered boulders. The lower half of the formation is composed of clay, sand, gravel, and boulders.

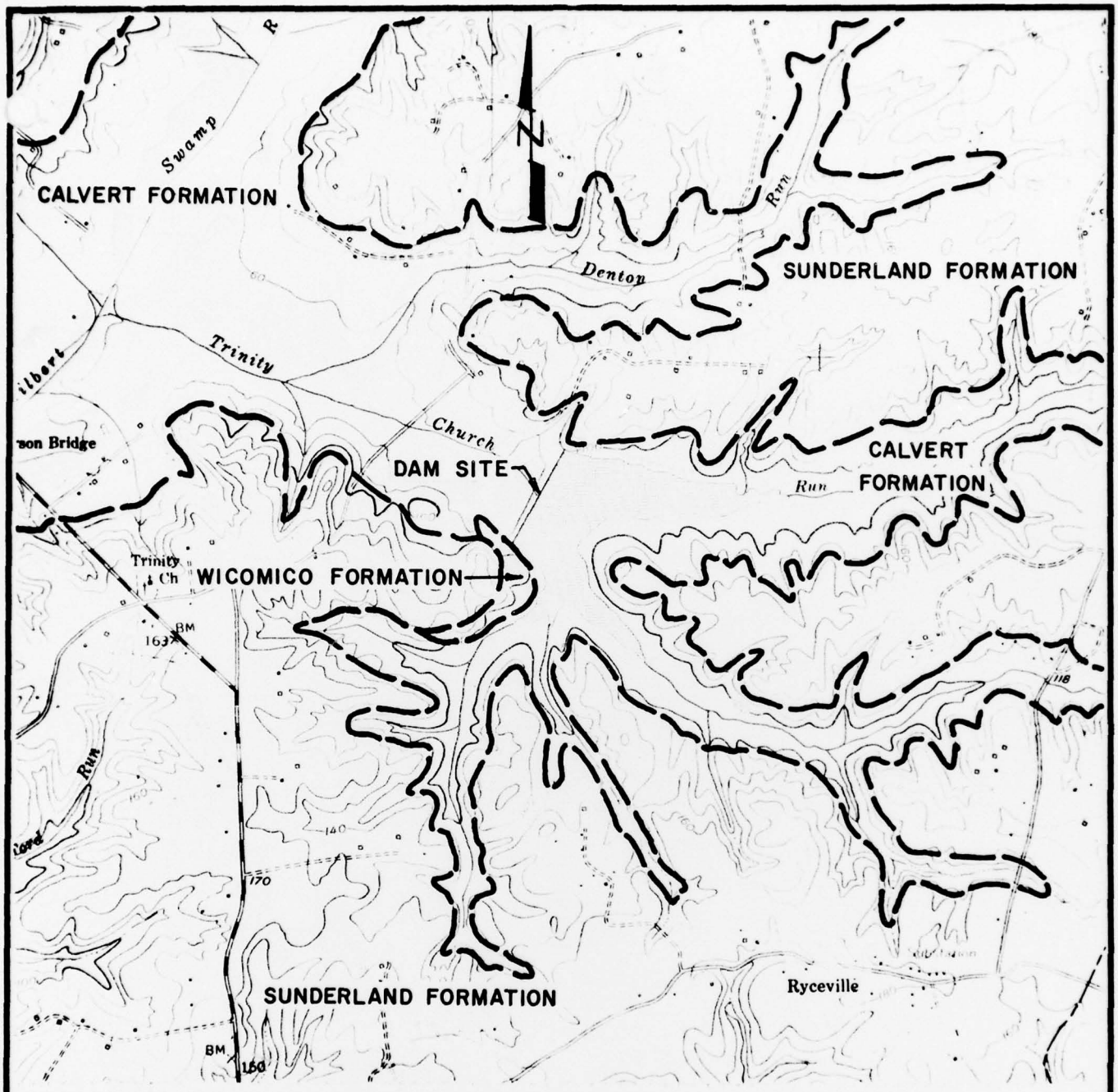
The bedding at the site strikes northeast and dips gently 10 ft. per mile to the southeast.

References

Maryland Geological Survey, 1939, Map of Charles County showing Geological formations.

Glaser, John D., Maryland Geological Survey Investigation #15, Geology and Mineral Resources of Southern Maryland.

Curtis, Neville M., Jr., 1962, Detailed Geologic Investigation of Gilbert Run Watershed (Trinity Church) Site #1, Charles County, Maryland.



CHARLOTTE HALL QUADRANGLE, CHARLES COUNTY, MARYLAND

SCALE: 0 ——— 1/2 MILE 1: 24000

CONTOUR INTERVAL 20FT. DATUM IS MEAN SEA LEVEL

— — — FORMATIONAL CONTACT

DATA OBTAINED FROM MARYLAND GEOLOGICAL SURVEY'S MAP OF CHARLES COUNTY SHOWING THE GEOLOGICAL FORMATIONS, 1939.

DATE: JUNE, 1979	NATIONAL DAM INSPECTION PROGRAM	SITE GEOLOGY OF TRINITY CHURCH DAM
SCALE: AS SHOWN		
DR: JLM CK: PAD	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS BALTIMORE, MD.	
DWG. NO. F2		