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NATIONAL DAM INSPECTION PROGRAM. HIGH POINT LAKE, NDI NUMBER PA--ETC(U)
OCT 78 DACW31-78-C-0052

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OHIO RIVER BASIN
NEGRO GLADE RUN, SOMERSET COUNTY
PENNSYLVANIA

NDI No. Pa. - 231
HIGH POINT LAKE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

High Point Lake, NDI Number PA-231.
Ohio River Basin, Negro Glade Run, Somerset County, Pennsylvania. Phase I Inspection Report.

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PREPARED FOR

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

PREPARED BY

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

High Point Lake Dam

Pennsylvania

Somerset County

Negro Glade Run

13 October 1978

Inspection Team - GAI Consultants, Inc.
570 Beatty Road
Monroeville, Pennsylvania 15146

Based on a visual inspection, past performance, and available engineering data, the facility is considered in good condition. The spillway and reservoir are capable of passing and/or storing the flow resulting from a storm of PMF magnitude without overtopping; consequently, the spillway is considered adequate.

It is recommended that the owner:

a. Fill in the erosion gullies that have developed to the right of the spillway sidewall with materials that will retard further erosion. The seepage should also be monitored to insure that the condition does not worsen.

b. Develop a formal warning system to notify downstream residents should hazardous conditions develop.

c. Develop a manual for the operation and maintenance of the outlet works at the facility.

GAI Consultants, Inc.

Bernard M. Mihalcin

Bernard M. Mihalcin, P.E.

Date 21 Nov 78

Approved by:

G. K. WITHERS
Colonel, Corps of Engineers
District Engineer

Date 18 Dec 78

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
HIGH POINT LAKE DAM
NDI# PA-231, PENNDER# 56-102

SECTION 1
GENERAL INFORMATION

1.0 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.

1.1 Purpose.

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

1.2 Description of Project.

a. Dam and Appurtenances. High Point Lake Dam is an earth embankment approximately 725 feet in length with a maximum height of 45 feet. The facility is equipped with a 30-inch diameter low level outlet conduit, encased in concrete beneath the embankment and controlled from a vertical concrete riser located on the upstream face of the dam. Excess inflow passes over an ungated spillway with an ogee-shaped crest, located on the left abutment. (Details of the outlet works are shown on Figures 3, 4, 5, and 6 and Photographs 4, 5, and 8).

b. Location. High Point Lake Dam and reservoir are located on Glade Run in Elklick and Addison Townships, Somerset County, Pennsylvania. The dam, reservoir, and watershed are contained on the Markleton, 7.5 minute U.S.G.S. quadrangle. The coordinates of the dam are N39°47.0' and W79°14.3'.

c. Size Classification. Intermediate (45 feet high, 6,580 acre-feet storage capacity at top of dam).

d. Hazard Classification. High (see Section 3.1.c.4).

e. Ownership. Pennsylvania Fish Commission
R. D. #1, Box 70
Bellefonte, Pennsylvania 16823

f. Purpose of the Dam. Recreation.

g. Historical Data. High Point Lake Dam was designed by Neilan Engineers, Inc., of Somerset, Pennsylvania. Construction of the facility commenced in June 1964 and the project was completed in July 1965. The contractor was the Swank Construction Company of Stoystown, Pennsylvania. The project was completed and has functioned without any major problems.

1.3 Pertinent Data.

Note: Despite conversations with the owner and designer, it was not possible to obtain an absolute elevation (MSL) at the dam. Therefore, the elevations contained herein are referenced to an elevation of 100, established as the elevation of the spillway crest (normal pool).

a. Drainage Area. 3.7 square miles.

b. Discharge at Dam Site. Discharge records are not available.

Outlet Works Conduit at Operating Pool Elevation - Discharge curve not available.

Spillway Capacity at Maximum Pool Elevation ≈ (elevation 108) 6,525 cfs.

c. Elevation (relative datum - spillway crest = 100.0 feet)

Top of Dam - 108.0.

Maximum Pool Design Surcharge - 106.0.

Maximum Pool of Record - Not known.

Normal Pool - 100.0.

Upstream Portal Outlet Conduit Invert ≈ 66.0.

Downstream Portal Outlet Conduit Invert ≈ 60.0.

Streambed at Dam Centerline ≈ 63.0.

Maximum Tailwater - Not known.

d. Reservoir Length (miles).

Maximum Pool ≈ 2.1.

Normal Pool ≈ 2.1.

e. Storage (acre-feet).

Top of Dam ≈ 6,580.

Normal Pool ≈ 3,700.

Design Surcharge ≈ 2,880.

f. Reservoir Surface (acres).

Top of Dam ≈ 420.

Normal Pool ≈ 300.

Maximum Design Pool - Not known.

g. Dam.

Type - Earth.

Length - 725 feet.

Height - 45 feet.

Side Slopes - upstream: 2.5H:1V
downstream: 2.0H:1V

Zoning - The embankment contains an impervious core section along the dam centerline. Semi-pervious material was used in the upstream and downstream sections.

Impervious Core - The core was constructed of impervious borrow from within the reservoir area.

Cutoff - A trapezoidal cutoff trench, filled with impervious material, was provided beneath the centerline of the embankment.

Grout Curtain - None.

h. Outlet Conduit.

Type - 30-inch diameter corrugated metal pipe encased in concrete beneath the embankment. The conduit is gated at the base of a vertical concrete riser as shown in Figure 5. Discharge enters a fish catch basin (see Photograph 2) before emptying into the natural downstream drainage.

Length ≈ 275 feet.

Closure - 30-inch square sluice gate manually controlled from the top of the riser.

Access - The gate control is located within the riser. It is situated on a platform just below the roof of the riser and is readily accessible (see Photograph 8).

Regulating Facilities - Regulated flow is discharged from the outlet conduit by manually operating the sluice gate control. Unregulated flow can be discharged through the outlet if the water level rises above the stop logs. A 12-inch diameter top water draw off pipe is provided 8 feet below normal pool. Discharge through this line is controlled with a 12-inch shear gate operated from within the riser (see Figures 5 and 6).

i. Spillway.

Type - Uncontrolled concrete spillway with an ogee-shaped crest.

Length of Weir - 73 feet.

Crest Elevation - 100.0.

Upstream Channel - Earth.

Downstream Channel - Rock-lined trapezoidal channel with grouted riprap sides and riprap bottom which discharges in the natural Glade Run channel.

j. Regulating Outlets. 30-inch sluice gate on low level outlet and 12-inch shear gate on top water draw-off as described in Section 1.3.h.

SECTION 2
ENGINEERING DATA

2.1 Design Data.

a. Design Data Availability and Sources.

1. Hydrology and Hydraulics. No design reports are available. Some design calculations are contained within PennDER files.

2. Embankment. No detailed design reports are available. PennDER files contain a summary report entitled, "Soil Test Data and Report, Incorporating Dam Design," dated November 1962. The report summarizes soil test data, boring correlations, seepage analyses, and also refers to minimum factors of safety for the upstream and downstream embankment slopes as well as the excavated slopes of the spillway channel. However, no calculations are contained within this report. A letter report entitled "Engineer's Report on Additional Auger Drilling of the Dam Site During the Construction" is also available in PennDER's files. This report summarizes the results of auger drilling to delineate a gravel pocket encountered in the core trench excavation (see details in Appendix E, Geology).

3. Appurtenant Structures. No design reports are available. PennDER files contain calculations performed by Neilan Engineers, Inc., following a construction error in steel placement for the spillway walls. Neilan studied the problem and recommended remedial measures which were implemented.

b. Design Features.

1. Embankment. Available drawings indicate that the dam is a zoned earthfill structure with a 19-foot wide crest, an upstream slope of 2.5H:1V and a downstream slope of 2H:1V. The crest and downstream slope are grass covered. A 30-inch thick layer of durable limestone riprap rests on an 8-inch thick filter cushion on the upstream face between elevation 92 and the top of the dam.

Internal drainage is provided by a 4-foot thick rock filter and toe drain as shown on Figure 5. A cut-off trench, backfilled with impervious material, was also provided beneath the embankment.

2. Appurtenant Structures.

a) Spillway. The spillway at High Point Lake Dam is a concrete ungated channel located at the left

abutment. It consists of an unpaved entrance channel, an ogee-shaped weir, a concrete lined spillway chute and a stilling basin (see Figures 3 and 4 and Photographs 1 and 5). The weir is 73 feet wide at the control point and the total length of the concrete chute is approximately 250 feet. Discharge passes through this rectangular channel before emptying into a 60-foot long stilling basin. The drop in elevation from the weir to the stilling basin is approximately 40 feet.

b) Outlet System. The outlet works consists of a 30-inch diameter corrugated metal pipe, encased in concrete, a concrete vertical riser control tower and a fish catch basin. The low level intake structure, consisting of a concrete headwall and trash rack is located at the toe of the embankment. A top water draw-off pipe, positioned 8 feet below the normal pool elevation is also provided.

Discharge through the 30-inch diameter outlet is controlled via a manual gate control housed on a platform immediately beneath the top of the riser. Unregulated flow can also pass through the outlet if the stop logs are overtopped or if the shear gate on the top water draw-off line is operated.

c. Design Data.

1. Hydrology and Hydraulics. No design reports are available; however, PennDER files contain calculations and correspondence which indicate that the spillway was sized to meet the requirements of the Pennsylvania "C" curve (Ref: "Flood Discharge Records Relating to Pennsylvania Streams," by U. S. Department of Interior - Geological Survey; 1960 ed., Page 60, Figure 4). Two feet of freeboard was then apparently provided above the maximum design pool.

2. Embankment. No design data are available except for a summary report prepared by Neilan Engineers, Inc., titled, "Soil Test Data and Report, Incorporating Dam Design," dated November 1962. The report summarizes the results of a subsurface investigation and soil testing program. The report indicates minimum factors of safety of 1.5 for the downstream slope, 2.0 for the upstream slope, and 1.2 for the excavated slopes of the spillway channel. Unfortunately, no back-up data is provided; consequently, the design parameters and methods of analysis are not known.

3. Appurtenant Structures. No information concerning the design of the appurtenant structures is available.

2.2 Construction Records.

Construction records including bi-weekly status reports, field memoranda, and construction photographs are available from PennDER files. Files reviewed at Neilan Engineering offices contained results of several laboratory compaction (ASTM D1557) tests and approximately 70 field density tests.

2.3 Operational Records.

Discussions with the owner's representative present during the inspection indicated that operational records are not kept at this facility.

2.4 Other Investigations.

No formal investigations of the facility have been performed since its completion in 1965.

2.5 Evaluation.

Some engineering data, design drawings, specifications, field memoranda, and construction photographs were provided by PennDER and the Pennsylvania Fish Commission. A GAI representative also visited the offices of Neilan Engineers, Inc., of Somerset, Pennsylvania, and reviewed their files. Sufficient data are available to indicate that the structure was designed in accordance with excepted, modern engineering practice.

SECTION 3
VISUAL INSPECTION

3.1 Observations.

a. General. The general appearance of the project indicates that the dam and its appurtenances are in good condition.

b. Embankment. The upstream slope of High Point Lake Dam is covered with a durable limestone riprap (see Photograph 3) which was dumped in place. The downstream slope and crest are grass covered. No indications of slope settlement were observed at the time of inspection.

Some seepage was observed in the area just to the right of the right spillway sidewall. It is probable that the seepage is passing through or atop the original ground surface since there is little fill in the area (see Figure 1). In any case, the seepage is not considered serious at this time (seepage flow could not be measured) although small erosion gullies are forming.

c. Appurtenant Structures.

1. Spillway. The spillway, spillway abutments, discharge channel, and stilling basin all appeared in excellent condition except for some minor spalling of the weir crest and minor efflorescence.

2. Outlet System. The only portions of the outlet system visible at the time of inspection were part of the vertical riser control tower and the fish catch basin. The visible portion of the riser tower was in good condition and no signs of concrete deterioration were observed. The gate control on the 30-inch sluice gate was located within the riser. It was not operated in our presence; however, it was partially open since there are recharge requirements to Glade Run downstream of the dam.

The discharge end of the outlet, including the asphalt lined fish catch basin were in good condition. Some minor cracking has developed in the asphalt but the basin continues to function as designed. Seepage was noted along the right side of the fish catch basin (see Photographs 9 and 10 and Geology) and is probably related to natural ground water conditions.

3. Reservoir Area. The area surrounding the reservoir is characterized by moderate to steep slopes. The watershed is nearly equally divided between cleared farmland or quarries and wooded slopes.

4. Downstream Channel. The valley downstream of High Point Lake can best be described as a narrow densely wooded valley with steep side slopes. Glade Run terminates at the confluence with McClintock Run approximately two miles downstream of the dam. McClintock Run travels another mile before passing by the small community of Fort Hill. There are numerous improvements about 30 feet above the stream at this point including a secondary road bridge, a church and a few homes. Because of these considerations, the facility was given a "high" hazard rating.

3.2 Evaluation.

The only major item of concern noted during the inspection was the presence of erosion ditches in what appears to be natural ground to the right of the spillway sidewall. These ditches should be infilled with material which will retard erosion and the condition should be monitored to make sure that it does not worsen. On the whole, the facility is in good condition.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Normal Operational Procedure.

Under normal conditions, a predetermined amount of water is permitted to pass through the outlet system to recharge Glade Run, downstream of the dam. Excess inflow discharges over the spillway and enters the downstream drainage. If the need should arise to lower or drain the impoundment, the fish catch basin would serve to temporarily store the fish.

4.2 Maintenance of Dam.

Routine maintenance is provided monthly by Fish Commission personnel. This might include mowing the grass covered slopes as well as cleaning debris from the shoreline and spillway approach channel. The gates, valves, valve stem, etc., are serviced annually. It is the policy of the Fish Commission to file a maintenance report with the area office; however, no formal operations records are kept.

4.3 Maintenance of Operating Facilities.

According to Fish Commission personnel, it is the policy of the Commission to service the operating facilities on a yearly basis. This maintenance might include lubricating gate controls, painting exposed metal surfaces or patching concrete; however, there is no set schedule detailing a maintenance program.

4.4 Warning System.

There are no formal warning systems in effect.

4.5 Evaluation.

The facility, as designed, requires little maintenance. It is recommended, however, that formal manuals be developed to standardize the operating procedures. This will reduce the dependence of the facility on the judgment of the operator and allow persons that may not be familiar with the project to operate it effectively in the event of an emergency. A formal warning system to notify downstream residents in the event of an emergency should also be developed.

SECTION 5
HYDROLOGIC/HYDRAULIC EVALUATION

5.1 Design Data.

Available design computations indicate that the facility was designed in accordance with PennDER's "C" curve criteria (REF: "Flood Discharge Records Relating to Pennsylvania Stream," by U. S. Department of Interior - Geological Survey, 1960 Edition, Page 60, Figure 4, Curve "C"). Accordingly, the dam with a drainage area of 3.7 square miles must have spillway facilities capable of discharging a flow of approximately 4,030 cfs. According to the design calcualtions, the spillway discharges the full inflow while providing an additional 2.0 feet of freeboard above the maximum design pool. In other words, the spillway discharges the design peak inflow under a head of approximately 6 feet. The discharge at this stage (elevation 106) is equivalent to approximately 4,240 cfs.

5.2 Experience Data.

Since reservoir records are not kept at this facility, no data relative to the past performance of the dam and its outlet works are available. The general appearance of the facility would seem to indicate probable adequate past performance.

5.3 Visual Observations.

On the date of the inspection, no conditions were observed that would indicate the appurtenant structures of the dam could not operate satisfactorily during a flood event.

5.4 Overtopping Potential.

The ratio "PMF Peak Flow/Drainage Area" was determined from an empirical curve supplied by the Corps of Engineers, Baltimore District. The curve used was the Ohio River Basin Curve. Based on this curve and a drainage area of 3.7 square miles, Peak PMF Q/A = 1,800 cfs/sq. mi., and Peak PMF Q = 6,600 cfs. The size category is "intermediate" and the hazard rating "high". Consequently, the required spillway design flood is the PMF.

Calculations were performed to evaluate the overtopping potential using spillway and storage capacities during the PMF event.

The spillway has a maximum discharge capacity equivalent to 6,525 cfs. A comparison of peak inflow (Peak PMF Q = 6,600 cfs) with maximum discharge shows the discharge capacity to be approximately the same as the peak inflow resulting from the PMF. The available storage is 2,800 acre-feet. This compares favorably with the required storage of 103 acre-feet. Consequently, the facility is capable of passing and for storing the runoff associated with a storm of PMF magnitude.

5.5 Spillway Adequacy.

The spillway is deemed adequate in that the facility will pass and/or contain the PMF.

SECTION 6
EVALUATION OF STRUCTURAL INTEGRITY

6.1 Visual Observations.

a. Embankment. Based on visual observations, the embankment appeared to be in good condition. Some seepage (saturated zones-flows could not be measured) was noted to the right of the spillway sidewall in the area shown on Figure 1. Small erosion gullies had developed in the area in what appears to be natural ground. The situation, in its present state, is not considered serious.

b. Appurtenant Structures. Based on the visual inspection, the appurtenances appeared to be in good condition. No signs of concrete deterioration were observed on the portion of the vertical concrete riser which was visible. The fish catch basin had experienced some cracking in the asphalt liner but its general condition is good and its operation does not effect the structural integrity of the embankment. The spillway has experienced some concrete deterioration. Scaling was observed particularly on the left portion of the weir and some minor efflorescence was observed on the spillway wingwalls (see Photograph 5). The overall condition of the spillway is considered good.

6.2 Design and Construction Techniques.

The design drawings, specifications, photographs, and calculations obtained from PennDER and the designers files indicate that the facility has been adequately designed and constructed in conformance with modern accepted engineering practice.

6.3 Past Performance.

The facility has apparently functioned as designed during its brief history.

6.4 Seismic Stability.

The dam is located within Seismic Zone No. 1 and is thus subject to only minor earthquake induced dynamic forces. As the dam appears statically stable and is composed of compacted, well drained soils, it is thought to be sufficient to withstand additional minor earthquake forces; however, no calculations, investigations, etc., were performed to confirm this opinion.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS FOR REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. The visual inspection, operational history, hydrologic and hydraulic analysis, and available engineering data suggest that the facility is well maintained and in good condition.

Hydrologic and hydraulic calculations indicate that the dam and spillway are capable of passing and/or storing the flow resulting from a storm of PMF magnitude without overtopping; consequently, the spillway is considered adequate.

b. Adequacy of Information. The data available was considered adequate to make an accurate Phase I assessment of the facility.

c. Urgency. It is suggested that the recommendations listed below be implemented without delay.

d. Necessity for Additional Investigations. No additional investigations are deemed necessary at this time.

7.2 Recommendations/Remedial Measures.

It is recommended that the owner:

a. Fill in the erosion gullies that have developed to the right of the spillway sidewall with materials that will retard further erosion. The seepage should also be monitored to insure that the condition does not worsen.

b. Develop a formal warning system to notify downstream residents should hazardous conditions develop.

c. Develop a manual for the operation and maintenance of the outlet works at the facility.

APPENDIX A

CHECK LIST - ENGINEERING DATA

Field Interviews with following
Pennsylvania Fish Commission Personnel
E. Jon Grindall, P.E. (Sr. Proj. Engr.)
John Thompson - Contract Administrator

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM High Point Lake Dam

ID # PA-231 PennDER #56-102

ITEM	REMARKS	SHEET 1

AS-BUILT DRAWINGS

1. Complete set of construction drawings from PennDER (not As-Builts).
2. Set of As-Built drawings prepared by Neilan Engineers for GSA, not available.
3. Pennsylvania Fish Commission - four preliminary design drawings including topo.

REGIONAL VICINITY MAP

See U.S.G.S. 7.5 minute, Markleton Quadrangle.

CONSTRUCTION HISTORY

Derived from PennDER files.

TYPICAL SECTIONS OF DAM

See construction drawings, Figure 5, Appendix F.

OUTLETS - PLAN Figure 3, Appendix F.

- DETAILS Figures 5 and 6, Appendix F.

- DISCHARGE RATINGS None available.

RAINFALL/RESERVOIR RECORDS

None taken.

ITEM	REMARKS	ID # PA-231	SHEET 2

DESIGN REPORTS

1. Preliminary hydraulic calculations available from Pennsylvania Fish Commission.
2. Hydraulic calculations and summary reports on stability available from PennDER files.

GEOLOGY REPORTS

None available.

DESIGN COMPUTATIONS

HYDROLOGY & HYDRAULICS - Calculation in PennDER files.
DAM STABILITY - Summary report in PennDER files.
SEEPAGE STUDIES - Lab test data available from PennDER files.

MATERIALS INVESTIGATIONS - Letter reports to Pennsylvania Fish Commission from Neilan.
BORING RECORDS - On construction drawings.
LABORATORY
FIELD - Data contained in PennDER files, laboratory and field density tests available from Neilan Engineering files.

POST-CONSTRUCTION SURVEYS OF DAM

None.

BORROW SOURCES

Within Reservoir.

ITEM	REMARKS	ID # PA-231	SHEET 3

MONITORING SYSTEMS

None.
Weir at discharge end of fish catch basin.

MODIFICATIONS

Some remedial work with erosion (mostly maintenance).

HIGH POOL RECORDS

Not known.

POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS

1. Neilan Engineering investigated erosion conditions immediately after construction.
2. Federal aid inspections (infrequent, every three years or so)
3. Department of General Services (DGS) - probably inspect yearly.
4. Pennsylvania Fish Commission maintenance crew monthly.

PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS

None.

MAINTENANCE OPERATION RECORDS

Located within Maintenance Area 2 (Somerset based) of Pennsylvania Fish Commission, Clyde Buell in charge.

1. Routine maintenance monthly, no formal maintenance manual (gates, valves, etc. serviced annually) Maintenance report normal procedure within Pennsylvania Fish Commission.
2. No formal operations records.

ITEM	REMARKS	ID # PA-231	SHEET 4

SPILLWAY PLAN See Figure 2, Appendix F.

SECTIONS See Figure 3 and 4, Sppendix F.

DETAILS See Figure 3 and 4, Appendix F.

OPERATING EQUIPMENT
PLANS & DETAILS

See Figures 5 and 6, Appendix F.

CHECK LIST ID # PA-231; PennDER #56-102
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 3.7 sq. mi.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 100.0 *(6580 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): Not known

ELEVATION MAXIMUM DESIGN POOL: 106.0

ELEVATION TOP DAM: 108.0

SPILLWAY DATA:

a. Crest Elevation 100.0
b. Type Ogee crested concrete weir
c. Weir Length 73.0 feet
d. Channel Length
e. Location Spillover Left abutment
f. Number and Type of Gates N/A

OUTLET WORKS:

a. Type 30-inch CMP encased in concrete
b. Location Left of dam center ≈ 200 ft. right of spillway
c. Entrance Inverts 66.0 ft
d. Exit Inverts 66.0 ft
e. Emergency Draindown Facilities 30" sluice gate controlled from within vertical riser.

HYDROMETEOROLOGICAL GAGES:

a. Type None
b. Location N/A
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: Not known

Note: Despite conversations with the owner and designer, it was not possible to obtain an absolute elevation (MSL) at the dam. Therefore, the elevations contained herein are referenced to and elevation of 100, established as the elevation of the spillway crest (normal pool).

APPENDIX B

CHECK LIST - VISUAL INSPECTION

CHECK LIST
VISUAL INSPECTION
PHASE 1

DAM NAME High Point Lake COUNTY Somerset STATE PA ID # NDI# PA-231

TYPE OF DAM Earth HAZARD CATEGORY High

DATE(S) INSPECTION 10-13-78 WEATHER Cool and Rain TEMPERATURE 62°

POOL ELEVATION AT TIME OF INSPECTION 99.7 M.S.L. TAILWATER AT TIME OF INSPECTION N/A M.S.L.

INSPECTION PERSONNEL:

B. M. Mihalcin
J. P. Nairn
S. R. Michalski
D. L. Bonk

PA Fish Commission
E. Jon Grindall (Senior Proj. Engineer)
John Thompson (Contract Adm.)

J. P. Nairn RECORDER

EMBANKMENT ID# PA-231 Sheet 1

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	Erosion gullies to the right of the spillway (see Figure 1). May be springs in original ground but apparently they are now being fed by the reservoir pool since the spillway excavation would have cut off any source on the left abutment.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Good.	
RIPRAP FAILURES	None.	

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Good.	
ANY NOTICEABLE SEEPAGE	1. Some seepage probably in original ground between embankment and right side of spillway. Flow not measureable at the time of inspection. 2. Seepage at right site of fish catch basin. May be artesion flow from auger boring drilled for investigation of soil conditions during construction.	
STAFF GAGE AND RECORDER	None observed.	
DRAINS	12-inch CMP located along the right bank of the stream channel 40 feet downstream of the spillway stilling basin was observed discharging at an estimated rate of 1/4 gpm. Drawings indicate the conduit originates at the downstream toe of the embankment near the original streambed. 6-inch CMP observed along the left bank of the stream channel downstream of the spillway stilling basin. The conduit was not discharging at the time of inspection. Its origin is not shown on the design drawings, however, it is suspected that this pipe was used to drain the stilling basin.	

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Not visible.	
INTAKE STRUCTURE	Submerged.	
OUTLET STRUCTURE	30-inch CMP discharges into an asphalt lined fish catch basin located just beyond the toe of the embankment.	
OUTLET CHANNEL	Beyond the fish catch basin flow enters the natural downstream drainage.	
EMERGENCY GATE	A 30-inch sluice gate located at the base of the riser controls discharge through the outlet system (see Figure 5).	

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Ogee-shaped weir. Some deterioration of the concrete noted, particularly on the left half of the weir. Pop-outs common.	
APPROACH CHANNEL	Channel cut in original ground.	
DISCHARGE CHANNEL	Rock-lined trapezoidal channel with grouted riprap sidewalls.	
BRIDGE AND PIERS	None.	

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.	

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	Downstream end of fish catch basin.	
PIEZOMETERS	None.	
OTHERS	N/A.	

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderate to steep and nearly equally divided between forested and cleared areas.	
SEDIMENTATION	None observed.	

DOWNSTREAM CHANNEL ID # PA-231 SHEET 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Rock-lined; enters natural stream channel ≈ 400 feet downstream of the crest.	
SLOPES	Steep and wooded.	
APPROXIMATE NO. OF HOMES AND POPULATION	Approximately 3 miles downstream 3 homes and a church are situated along McClintock Run. Population ≈ 10.	

APPENDIX C

HYDROLOGY AND HYDRAULICS

SUBJECT DAM SAFETY INSPECTION
HIGH POINT LAKE

BY DLB DATE 10-18-78 PROJ. NO. 78-501-231

CHKD. BY EJM DATE 10-26-78 SHEET NO. 1 OF 5

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Environmental Specialists

DAM STATISTICS

MAXIMUM HEIGHT - 44 FEET (FIELD MEASURED)

DRAINAGE AREA - 3.7 sq.mi. (SEE NOTE BELOW)

NOTE: A DISCREPANCY EXISTS BETWEEN THE SIZE OF THE DRAINAGE AREA USED IN THE DESIGN (3.7 SQ.MI.) AND THE SIZE OF THE DRAINAGE AREA FOUND BY PLANIMETERING OFF U.S.G.S. 7.5 MINUTE SERIES MARKELTON QUADRANGLE (3.4 SQ.MI.). SINCE THE FORMER REPRESENTS THE MORE EXTREME CASE, IT WILL BE USED FOR THIS ANALYSIS.

STORAGE CAPACITY - (SEE NOTE BELOW)

NOTE: THE FOLLOWING VALUES FOR STORAGE CAPACITY AT NORMAL POOL AND TOP OF DAM WERE ARRIVED AT AFTER A REVIEW OF ALL DATA AVAILABLE WHICH INCLUDED SEVERAL DISCREPANCIES. PENNDER IN REFERENCE 1 GIVES THE NORMAL POOL STORAGE EQUAL TO 1074 AC-FT (350.0 MILLION GALLONS), WHEREAS NUMEROUS INSPECTION REPORTS AND CORRESPONDENCE CONTAINED WITHIN PENNDER FILES INDICATE IT AS BEING SOMEWHAT GREATER THAN 900 AC-FT. THE U.S. ARMY CORPS OF ENGINEERS, PITTSBURGH DISTRICT RECOMMENDS THE FOLLOWING FORMULA FOR DETERMING THE VALUE OF STORAGE CAPACITY. THAT IS

$$V = \frac{1}{3}(\text{RESERVOIR SURFACE AREA})(\text{HEIGHT OF EMBANKMENT})$$

BASED ON AN EMBANKMENT HEIGHT OF 37 FEET (45 FEET MINUS 8 FEET TO NORMAL POOL) AND A RESERVOIR SURFACE AREA OF 300 ACRES, THE STORAGE VOLUME IS APPROXIMATELY EQUAL TO 3700 AC-FT. THE RESERVOIR SURFACE AREA WAS FOUND

SUBJECT DAM SAFETY INSPECTION
HIGH POINT LAKE
BY DLB DATE 10-18-78 PROJ. NO. 78-501-231
CHKD. BY EJM DATE 10-26-78 SHEET NO. 2 OF 5

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BY PLANIMETERING A PLAN OF THE RESERVOIR AS DEPICTED ON DRAWING Nº. 2 ENTITLED "GENERAL PLAN", PROJECT NO. G.S.A. 199-4, CONSTRUCTION OF DAM & DEVELOPMENT OF FACILITIES, ELKLICK & ADDISON TOWNSHIPS, SOMERSET COUNTY, PENNSYLVANIA, BY THE NEILAN ENGINEERS INC., SOMERSET, PENNSYLVANIA, DATED NOVEMBER, 1962. SINCE THIS APPEARS TO BE THE MOST RELIABLE INFORMATION AVAILABLE 3700 AC-FT WILL BE USED FOR THIS ANALYSIS.

STORAGE CAPACITY (@ NORMAL POOL) ≃ 3700 AC-FT

RESERVOIR SURFACE @ TOP OF DAM ≃ 420 ACRES

RESERVOIR SURFACE @ NORMAL POOL ≃ 300 ACRES

AVAILABLE FREEBOARD = 8 FEET (FIELD MEASURED)

$[(300 + 420)_{ACRES}/2](8_{FEET}) = 2880$ AC-FT = SURCHARGE STORAGE

STORAGE CAPACITY (@ TOP OF DAM) ≃ 6580 AC-FT

SIZE CLASSIFICATION

DAM SIZE - INTERMEDIATE (REF 2, TABLE 1)

HAZARD CLASSIFICATION - HIGH (FIELD OBSERVATION)

REQUIRED SDF - PMF (REF 2, TABLE 3)

SUBJECT DAM SAFETY INSPECTION
HIGH POINT LAKE

BY DLB DATE 10-18-78 PROJ. NO. 78-501-231

CHKD. BY EJM DATE 10-26-78 SHEET NO. 3 OF 5

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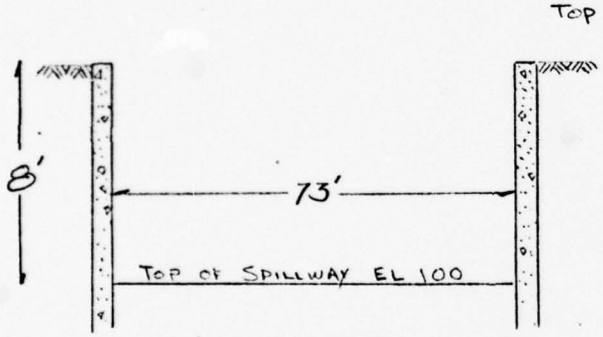
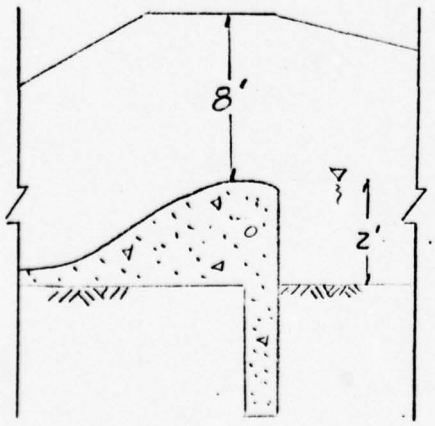
PMF (PEAK FLOW)/AREA = 1800 CFS/SQ. MI. (REF: C OF E CURVE, OHIO RIVER BASIN)

PMF = (1800 CFS/SQ. MI.)(3.7 SQ. MI.) = 6,660 CFS

PEAK PMF Q = 6,600 CFS

SPILLWAY CAPACITY





NOTE: ALL DETAILS, ELEVATIONS AND DIMENSIONS ARE TAKEN FROM DESIGN BY THE NEILAN ENGINEERS, INC. DATED NOV. 1962.

DIMENSIONS WERE VERIFIED BY FIELD MEASUREMENTS. ELEVATIONS ARE RELATIVE TO AN ARBITRARY FIELD DETERMINED DATUM

SUBJECT DAM SAFETY INSPECTION
HIGH POINT LAKE

BY DLP DATE 10-19-78 PROJ. NO. 78-501-231

CHKD. BY EJM DATE 10-25-78 SHEET NO. 4 OF 5

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$Q = CLH^{3/2}$ (REF 3 : EQ 21-121)

L = LENGTH OF SPILLWAY CREST = 73 FT
H = MAXIMUM HEAD = 8 FT

C = COEFFICIENT OF DISCHARGE

(FROM REF 3 : FIGURE 21-67)

P/H_d = FOREBAY DEPTH/MAXIMUM HEAD

= 2FT/8FT = 4

$\therefore C \simeq 3.95$

$Q = (3.95)(73)(8.0)^{3/2} = 6,525$ CFS

PEAK PMF Q (6,660 CFS) > MAXIMUM DISCHARGE (6,525 CFS)

CONSIDER INFLOW RELATIVE TO BOTH OUTFLOW AND STORAGE USING THE SHORT CUT METHOD AS RECOMMENDED BY NAD.

$P = \frac{\text{MAXIMUM DISCHARGE}}{\text{PEAK PMF Q}} = \frac{6525 \text{ CFS}}{6660 \text{ CFS}} = 0.98$

SUBJECT DAM SAFETY INSPECTION
HIGH POINT LAKE

BY DLB DATE 10-18-78 PROJ. NO. 78-501-231

CHKD. BY EJM DATE 10-26-78 SHEET NO. 5 OF 5

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$$(1-P) = \frac{\text{REQUIRED RESERVOIR STORAGE}}{\text{INFLOW VOLUME}} = (1-0.98) = 0.02$$

INFLOW VOLUME BASED ON 26 INCHES OF RUNOFF =

$$= \frac{(26 \text{ INCHES})(3.7 \text{ SQ. MI.})}{(1 \text{ SQ. MI.}/640 \text{ ACRES})(12 \text{ IN/FT})} = 5131 \text{ AC-FT}$$

REQUIRED RESERVOIR STORAGE $= (0.02)(5131 \text{ AC-FT}) = 103 \text{ AC-FT}$

STORAGE REQUIRED (103 AC-FT) < STORAGE AVAILABLE (2880 AC-FT)

REFERENCES

1 : "WATER RESOURCES BULLETIN; DAMS, RESERVOIRS & LAKES", PA. DEPT. OF FORESTS & WATERS, BULLETIN N°5, COMPREHENSIVE WATER RESOURCES PLANNING INVENTORY NO. 1, 1970

2 : "RECOMMENDED GUIDLINES FOR SAFETY INSPECTION OF DAMS" DEPT. OF THE ARMY - OFFICE OF CHEIF ENGINEER, APPENDIX D

3 : STANDARD HANDBOOK FOR CIVIL ENGINEERS, F.S. MERRITT, MCGRAW-HILL 1976

APPENDIX D

PHOTOGRAPHS

1

2

3

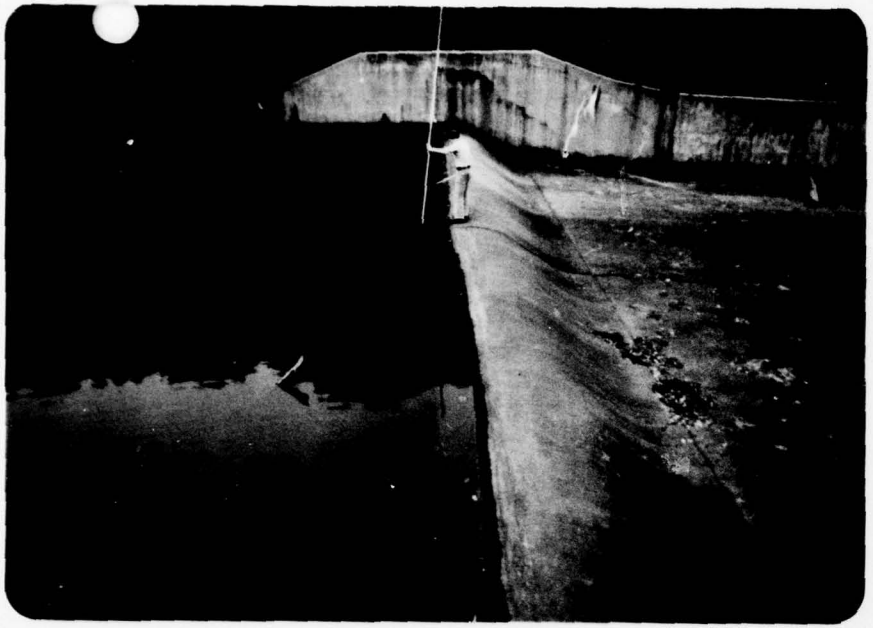
4

PHOTOGRAPH 5 View of the ogee-shaped spillway crest. Note the efflorescence in the spillway wingwall.

PHOTOGRAPH 6 Close-up view of the discharge end of the 12-inch diameter, bitumen-coated toe drain pipe, which discharges into the spillway outlet channel just downstream of the stilling basin.

PHOTOGRAPH 7 View of an erosion gulley and seepage near the contact with the original ground about midway between the right spillway sidewall and the embankment.

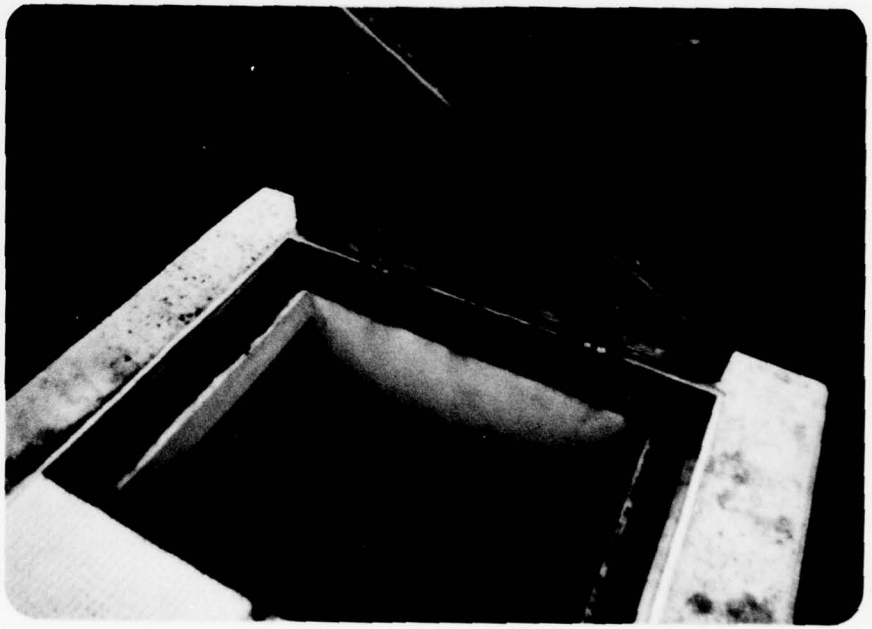
PHOTOGRAPH 8 Close-up view of the gate control located within the concrete riser on the upstream portion of High Point Lake Dam.



5

6

7



8

PHOTOGRAPH 9 View of the downstream valley as it appears from the dam crest.

PHOTOGRAPH 10 View of a small water filled cavity on the right side of fish catch basin. The area to the right of the basin was very swampy. The cavity may be one of many auger holes drilled during construction to delineate a gravel pocket encountered in the core trench excavation.

PHOTOGRAPH 11 View of McClintock Run from a road bridge located approximately three miles downstream of the dam.

9

10

11

APPENDIX E

GEOLOGY

Site Geology and Soils

Numerous borings were drilled to determine foundation conditions for the spillway and embankment prior to the design and construction of this dam. In addition, borings were made in the borrow area to determine the engineering characteristics of these soils. Correlation of the test hole data and laboratory test results indicate a rather impervious soil blanketing the valley. This blanket derived from the decomposition of Mauch Chunk shales and sandstones is primarily composed of mottled red and brown sand and clay generally with varying amounts of sandstone fragments.

During excavation of the key trench in 1964, a very wet, loose seam of clayey, silty, sand and gravel was encountered at the design elevation of the bottom of the key trench. Since this undesirable material was discovered in the foundation area of the dam, an auger boring program was proposed to determine its lateral extent. Twenty-three auger borings were drilled in a cross pattern that extended both upstream and downstream of the key trench and parallel to, but downstream of the trench. The auger borings indicated that the questionable material is 16 feet or more below natural ground and it is located below a relatively impervious clay that overlays most of the valley bottom in the area of the dam construction. The following excerpt is taken from the designer's "Engineer's Report on Additional Auger Drilling at the Dam Site During the Construction."

The drilling of the first few holes indicated that this very wet clayey silty sand and gravel seam existed in the left hand valley abutment, looking upstream (north abutment). It was then decided to explore more closely this area in trying to determine the limits and depths of this material. The drilling in this area was programmed on the basis of the drilling results of each hole as to classification of the material encountered, the stiffness of it and the water table in each successive hole. It was apparent after drilling these holes that the condition is a local pocket of clayey silty sand and gravel varying in thickness from 5 feet to at least 10 feet. This material is being charged with water from the north abutment of the valley at an unknown elevation and location. This material, as mentioned before, is covered by a seam of relatively impervious clay that also varies in thickness, but is a minimum of 16 feet. Artesian flow at elevation 66.4 (A.H. #19) gives some indication of pressure exerted through this pervious saturated seam or pocket.

The results of the initial drilling program 100'± upstream of the present dam centerline, tend to confirm the theory of a local pocket as does observation of the drilling logs for the spillway.

During the current inspection, an artesian flow was observed to be issuing from a 2-foot-deep hole adjacent the bituminous paving of the fish catch basin (see Photograph 10

and Figure 3). The observed discharge may be coincidental with auger hole number 23. This flow is most likely originating in the aforementioned pocket of permeable silty sand and gravel.

General. High Point Dam is located approximately 12 miles west of the Allegheny Topographic Front within the Allegheny Mountain Section of the Appalachian Plateau Province. The Allegheny Mountain Section is characterized by gently folded sedimentary rock strata of Pennsylvanian age or older. Major structural axes strike from southwest to northeast with flanking strata dipping northwest and southeast.

Structurally, the dam and reservoir lie immediately west of the Negro Mountain Anticline and just over a mile from Mt. Davis the highest point in Pennsylvania. With a normal pool elevation of 2,480, High Point Lake is one of the highest lakes in the commonwealth. The bedrock flanking the Negro Mountain Anticline dip to the northwest at just under 400 feet per mile or approximately 4 degrees in the immediate vicinity of the dam and reservoir.

The strata underlying the alluvial and residual soils at the dam site are members of the Mauch Chunk Formation which is the uppermost Mississippian age unit in southern Somerset County. The Mauch Chunk is an interbedded sequence of shale and sandstone with minor amounts of siltstone and limestone. On Negro Mountain the Mauch Chunk is composed of 56 percent shale, 36 percent sandstone and 7 percent silt-

stone and 0.5 percent limestone. About 50 percent of the beds are red in color, 35 percent are gray to light gray, and 15 percent are green to greenish gray. In the Mt. Davis area the Mauch Chunk can be subdivided into a lower and upper part on a lithologic basis. The upper part of the Mauch Chunk contains no limestone beds. It is composed primarily of red shale, but does contain some sandstone and minor calcareous shale. The lower portion contains considerable calcareous shale and calcareous sandstone, and two beds of commercial limestone, each about 8 feet thick. Both limestones are either quarried or deep mined east of the reservoir. It is believed that the embankment is constructed on the upper portion of the Mauch Chunk Formation.

References:

1. Flint, N. K., 1965, Geology and Mineral Resources of Southern Somerset County, Pennsylvania: Topographic and Geologic Survey, Commonwealth of Pennsylvania.
2. The Neilan Engineers, Inc., Somerset, Pennsylvania, 1964, Engineers Report on Additional Auger Drilling at the Dam Site During Construction: Report to the General State Authority, Harrisburg, PA.

APPENDIX F

FIGURES

LIST OF FIGURES

SUBJECT FIELD SKETCH
HIGH POINT LAKE DAM

BY JPN DATE 10-24-78 PROJ. NO. 78-501-231

CHKD. BY DLB DATE 10-24-78 SHEET NO. 1 OF 1

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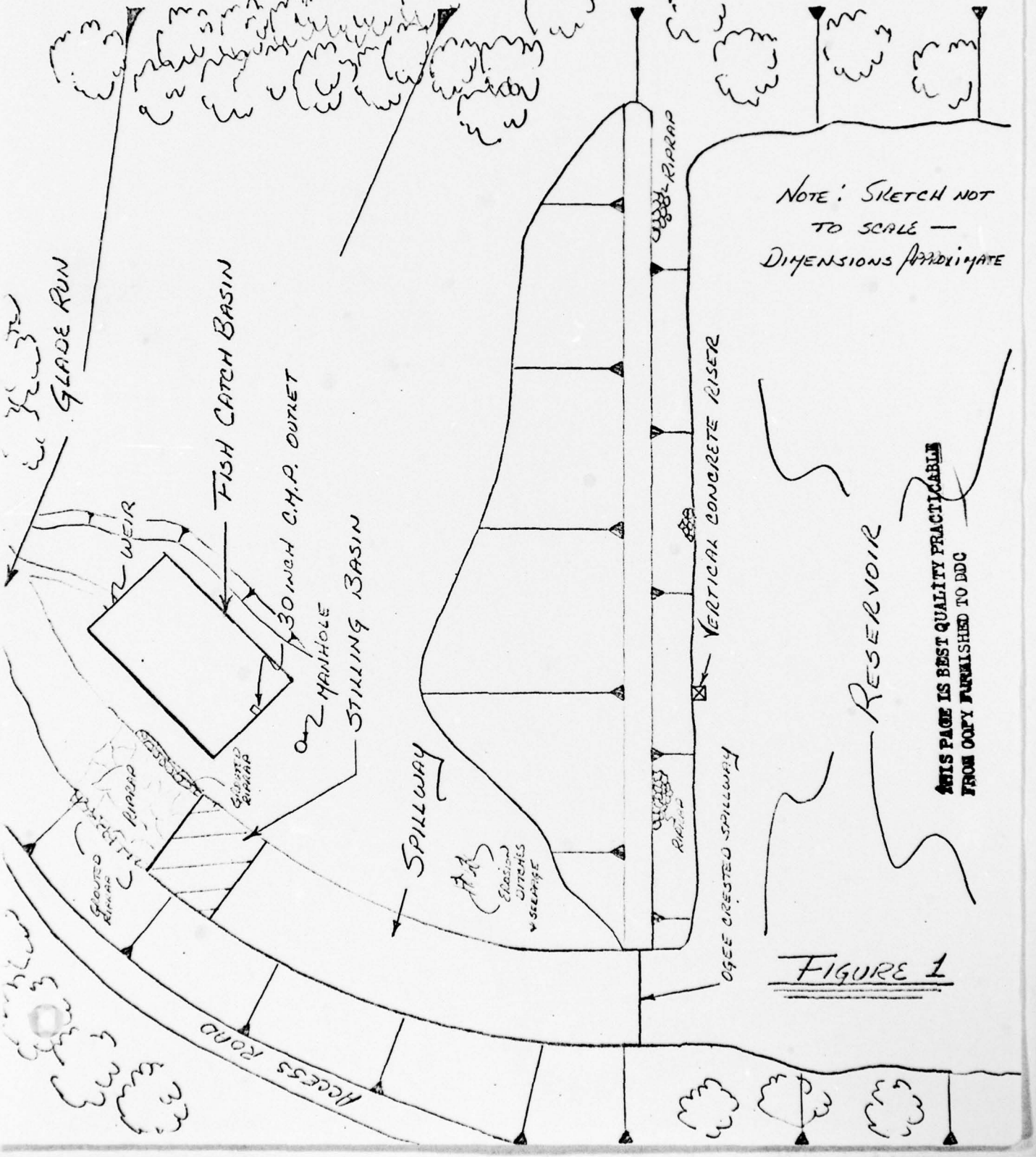
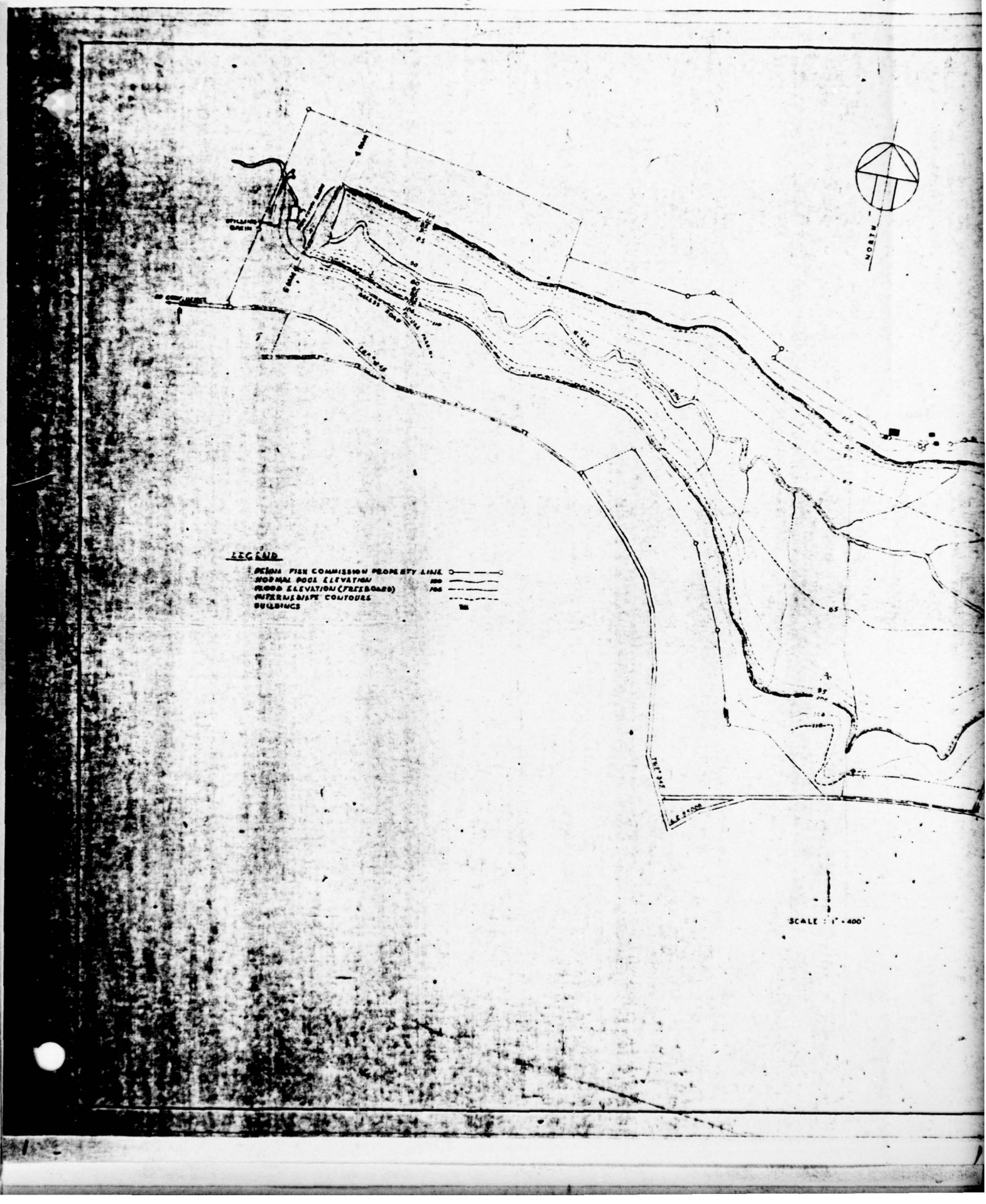


FIGURE 1


NORTH
LEGEND
PENNA FISH COMMISSION PROPERTY LINE
NORMAL POOL ELEVATION
FLOOD ELEVATION (FREEBOARD)
INTERMEDIATE CONTOURS
BUILDINGS
SCALE 1" = 400'

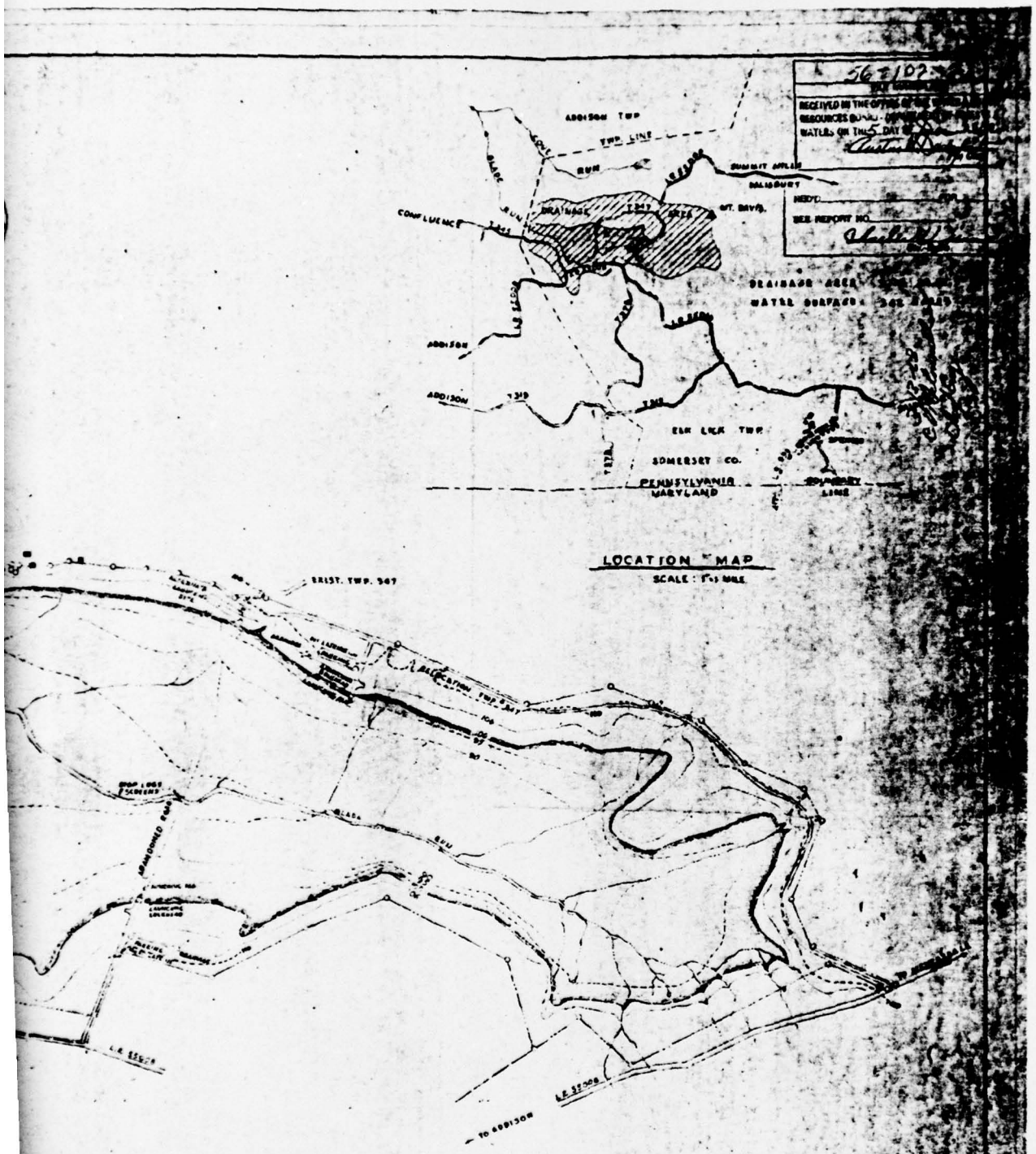
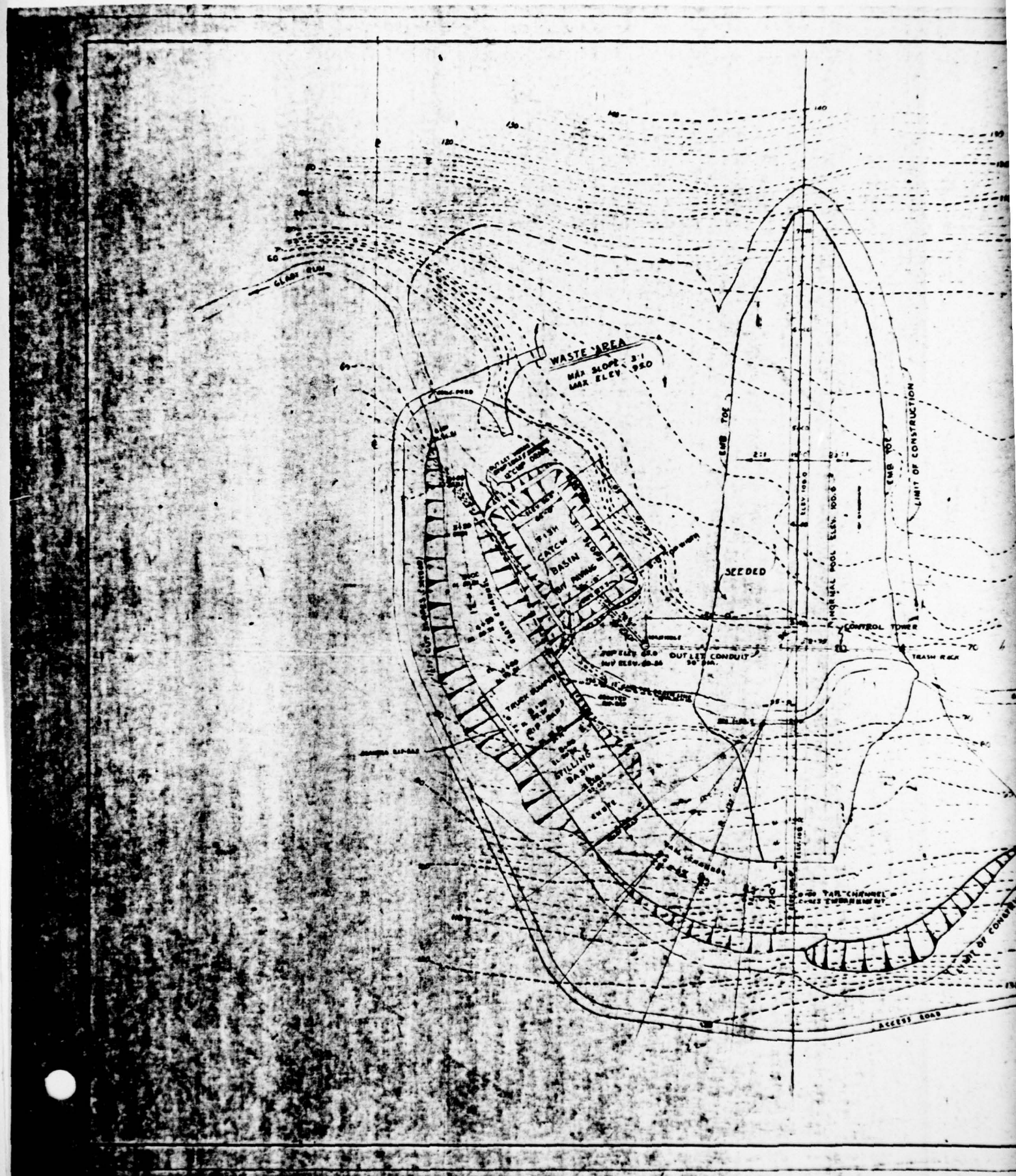


FIGURE 2

GENERAL PLAN

DATA OBTAINED FROM THE NEILAN ENGINEERS INC. OF SOMERSET, PENNSYLVANIA DWG.# 2 DATED NOVEMBER 1962


WASTE AREA
MAX SLOPE 3:1
MAX ELEV 980
SEEDED
FISH CATCH BASIN
STILLING BASIN
OUTLET CONDUIT
CONTROL TOWER
TRASH RACK
ACCESS ROAD
LIMIT OF CONSTRUCTION

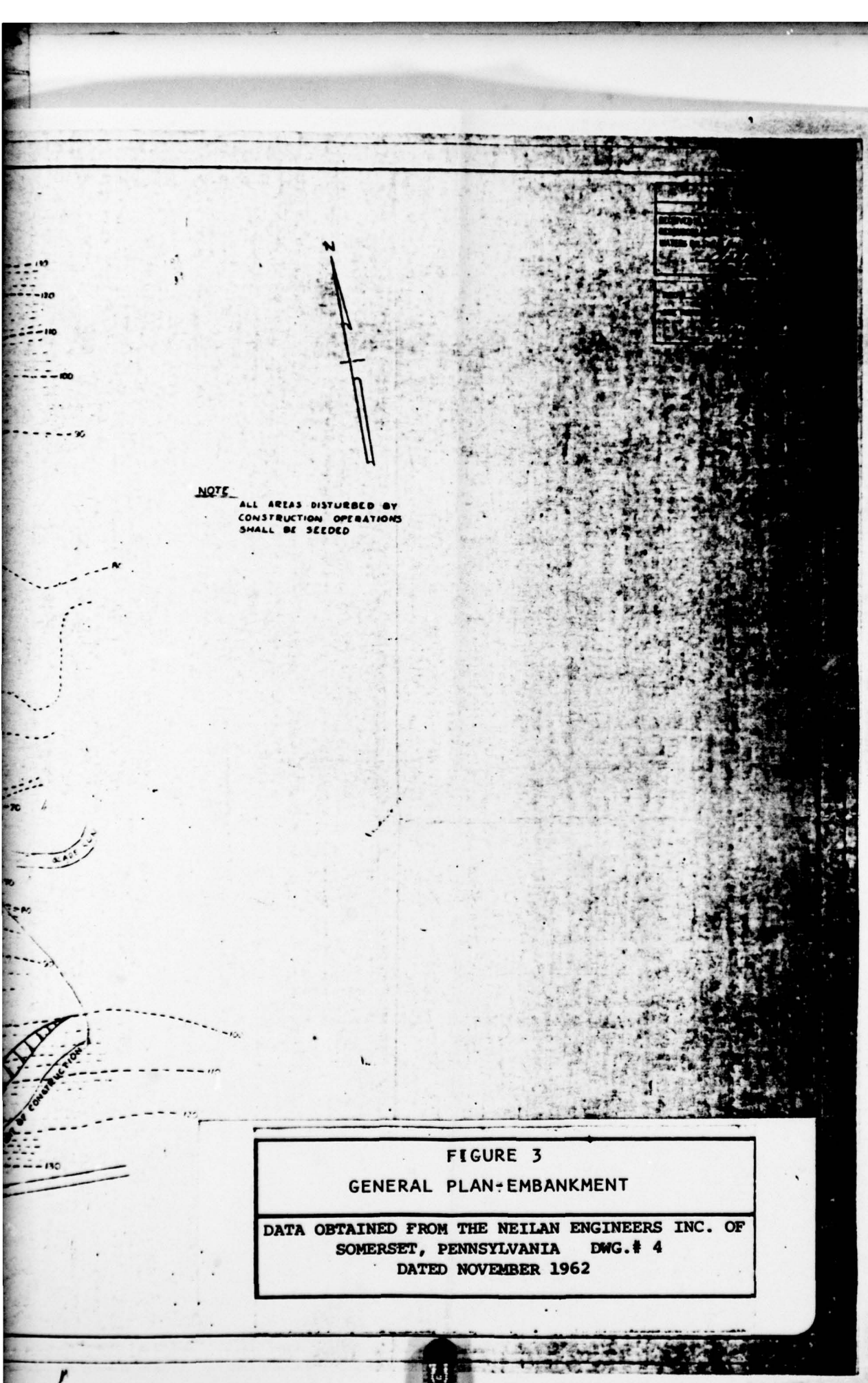
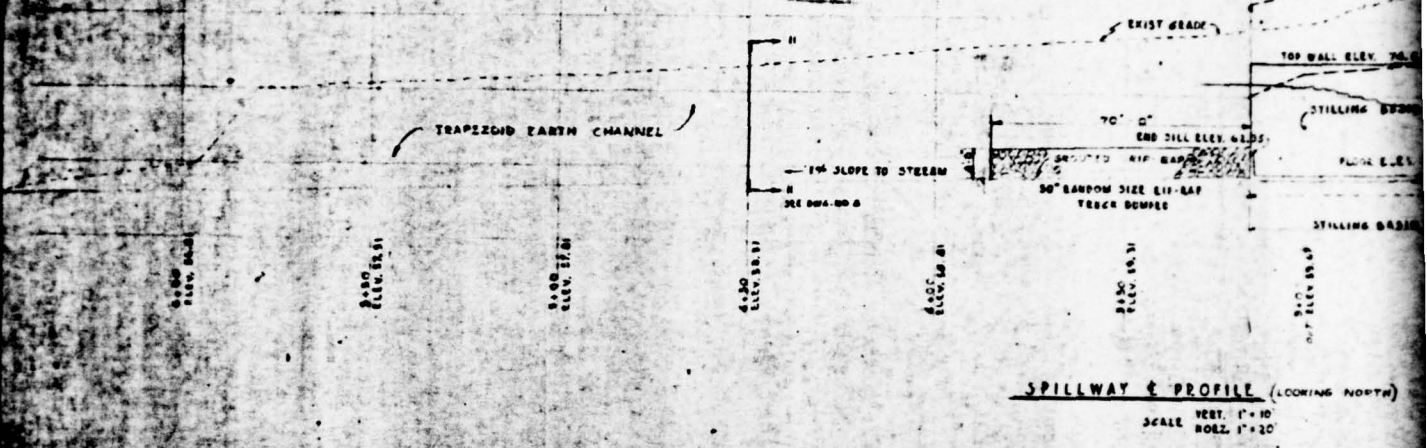


FIGURE 3

GENERAL PLAN-EMBANKMENT

DATA OBTAINED FROM THE NEILAN ENGINEERS INC. OF SOMERSET, PENNSYLVANIA DWG.# 4 DATED NOVEMBER 1962



SPILLWAY & PROFILE (LOOKING NORTH)

SCALE VERT. 1" = 10'
HORIZ. 1" = 20'

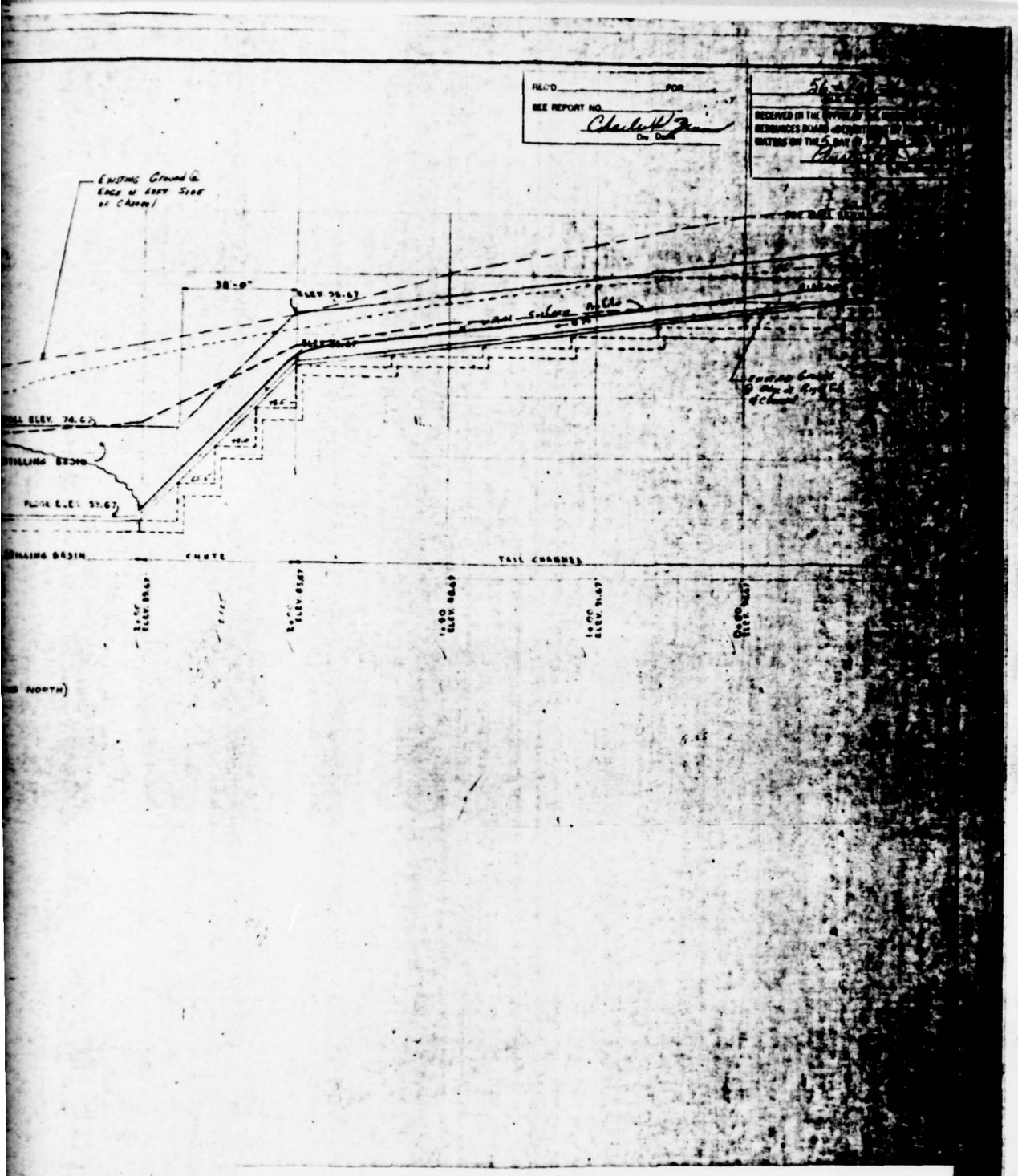
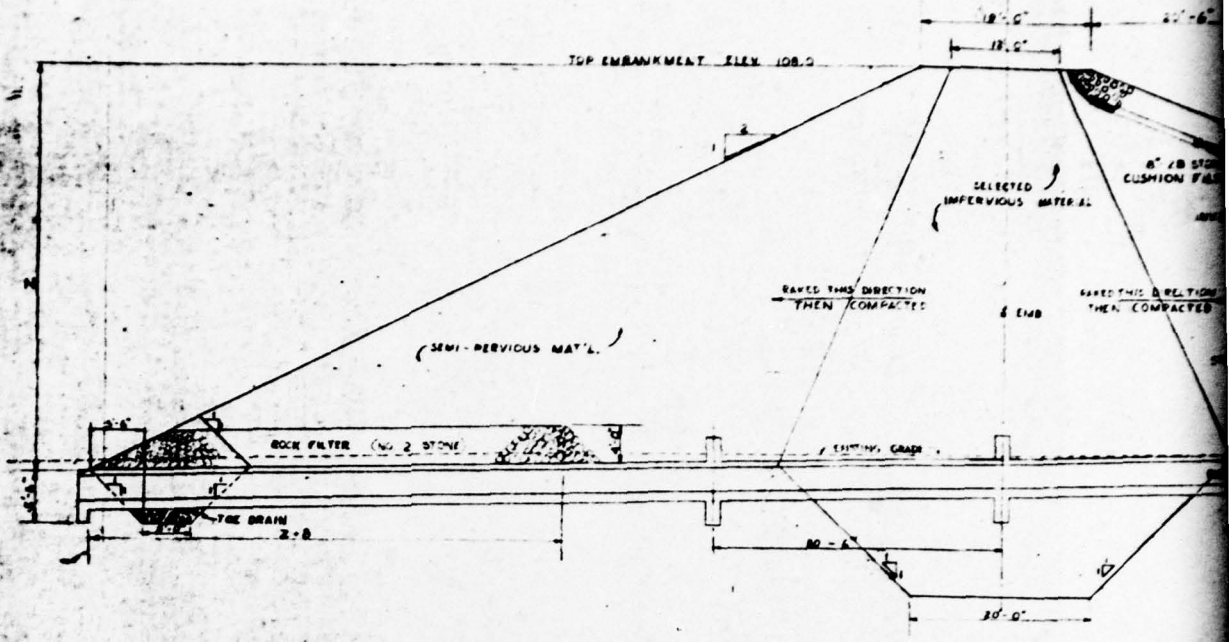


FIGURE 4

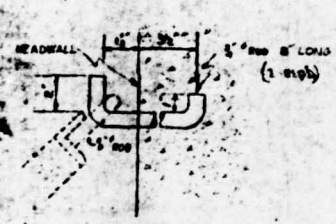
SPILLWAY CENTERLINE PROFILE

DATA OBTAINED FROM THE NEILAN ENGINEERS INC. OF SOMERSET, PENNSYLVANIA DWG.# 6
DATED NOVEMBER 1962



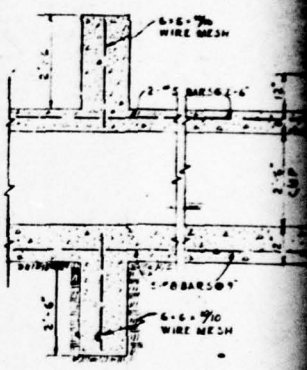
TYPICAL SECTION @ OUTLET WORKS

SCALE: 8"=1'-0"



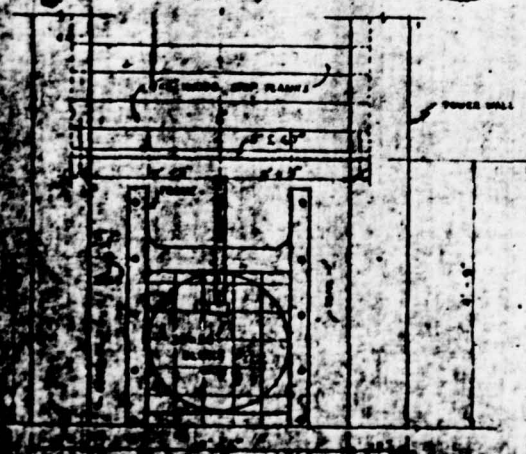
HOOK DETAIL

SCALE: 8"=1'-0"

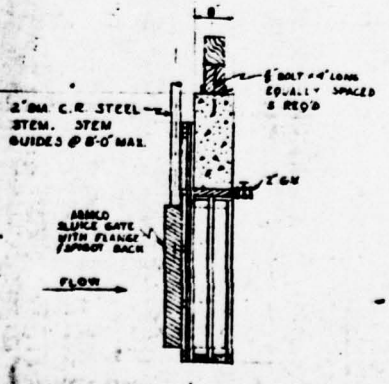


SECTION THRU OUTLET

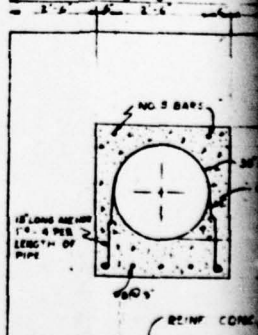
SCALE: 1"=1'-0"



SCALE: 8"=1'-0"



SECTION THRU SLUICE GATE



ELEVATION OF OUTLET ENCASE

SCALE: 1"=1'-0"

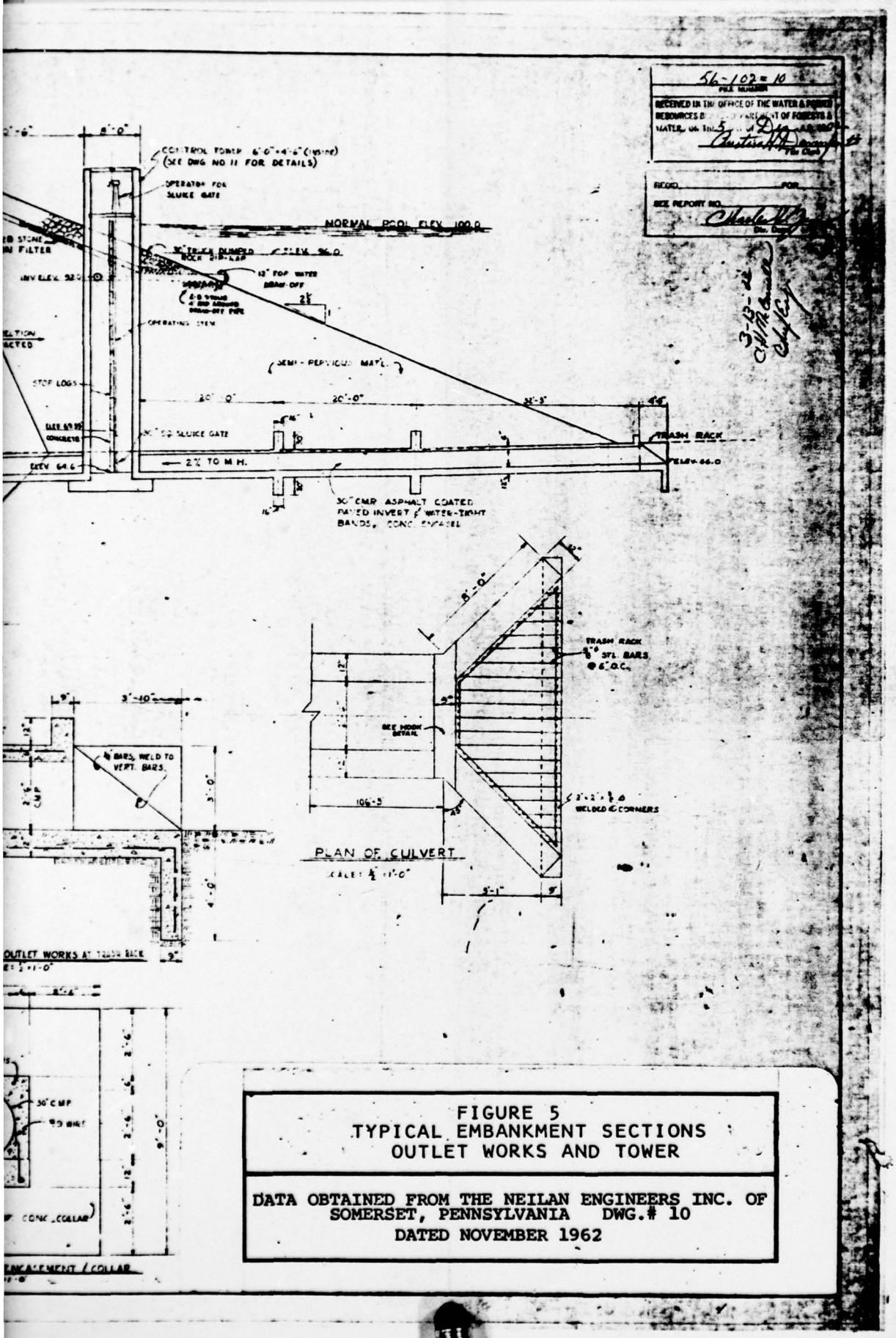
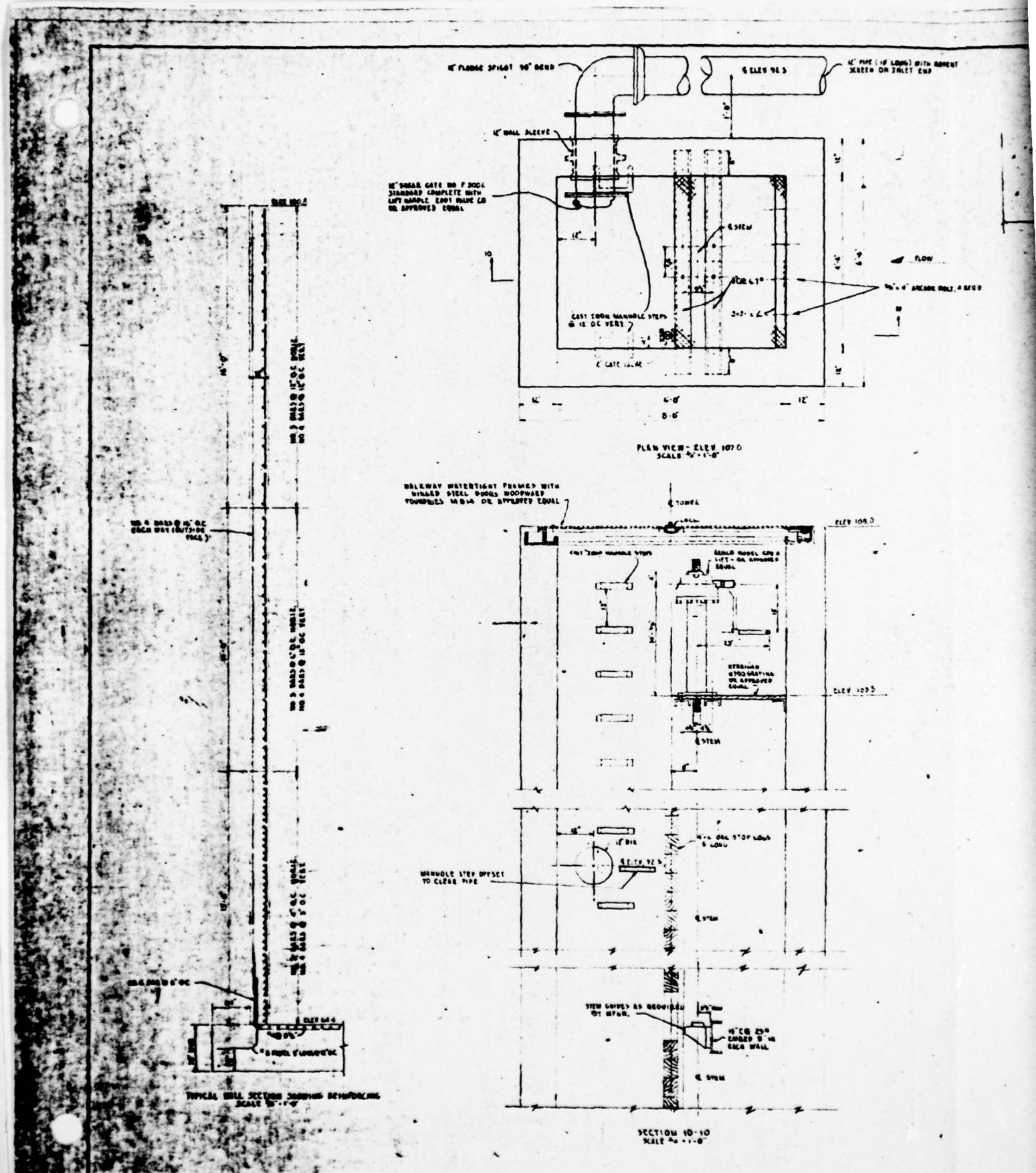
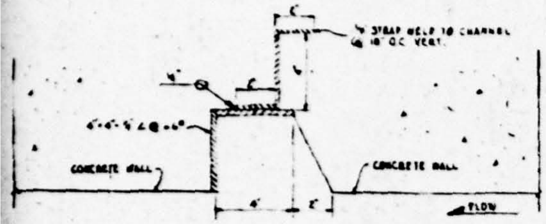


FIGURE 5
TYPICAL EMBANKMENT SECTIONS
OUTLET WORKS AND TOWER

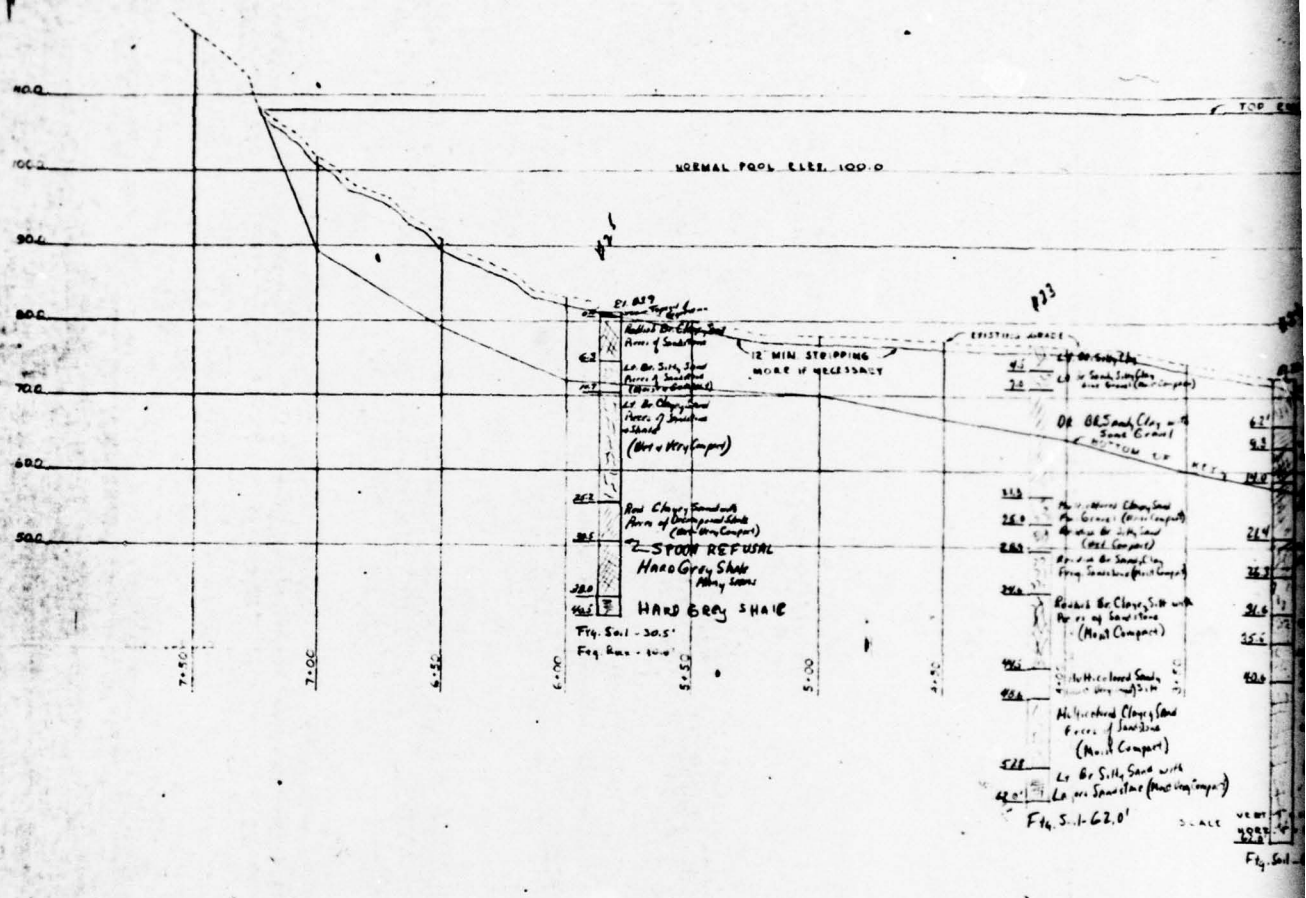
DATA OBTAINED FROM THE NEILAN ENGINEERS INC. OF SOMERSET, PENNSYLVANIA DWG.# 10
DATED NOVEMBER 1962


PLAN VIEW - ELEV. 107.0
SECTION 10-10



TYPICAL STOP LOG CHANNEL (BOTH WALLS)

FIGURE 6
CONTROL TOWER DETAILS
DATA OBTAINED FROM THE NEILAN ENGINEERS INC. OF SOMERSET, PENNSYLVANIA DWG.# 11 DATED NOVEMBER 1962


NORMAL POOL ELEV. 100.0
12 MIN. STRIPPING
MORE IF NECESSARY
EXISTING SURFACE
STOP REFUSAL
HARD Grey Shale
HARD GREY SHALE
Fig. Sol - 30.5'
Fig. Sol - 62.0'
SCALE

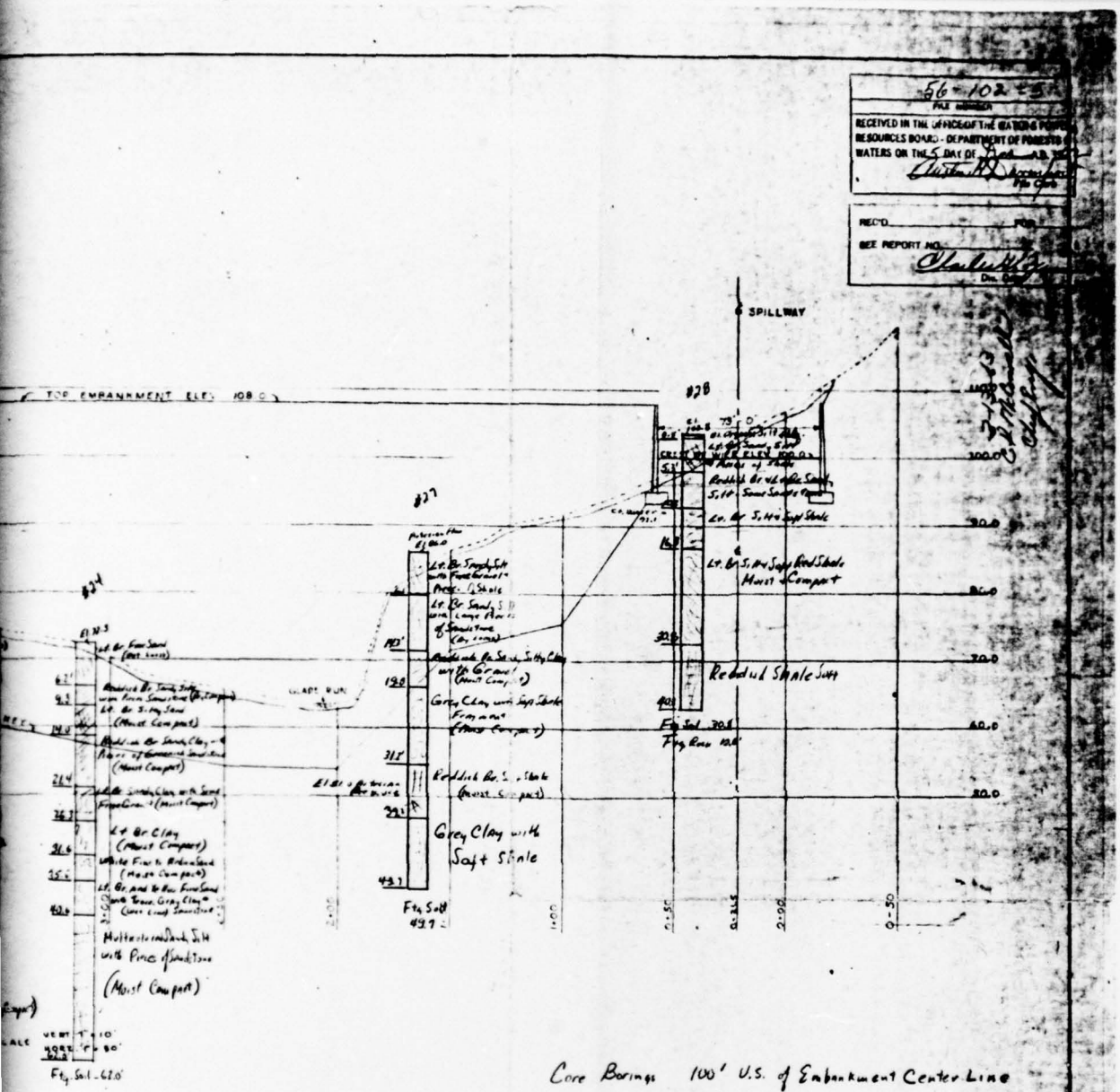
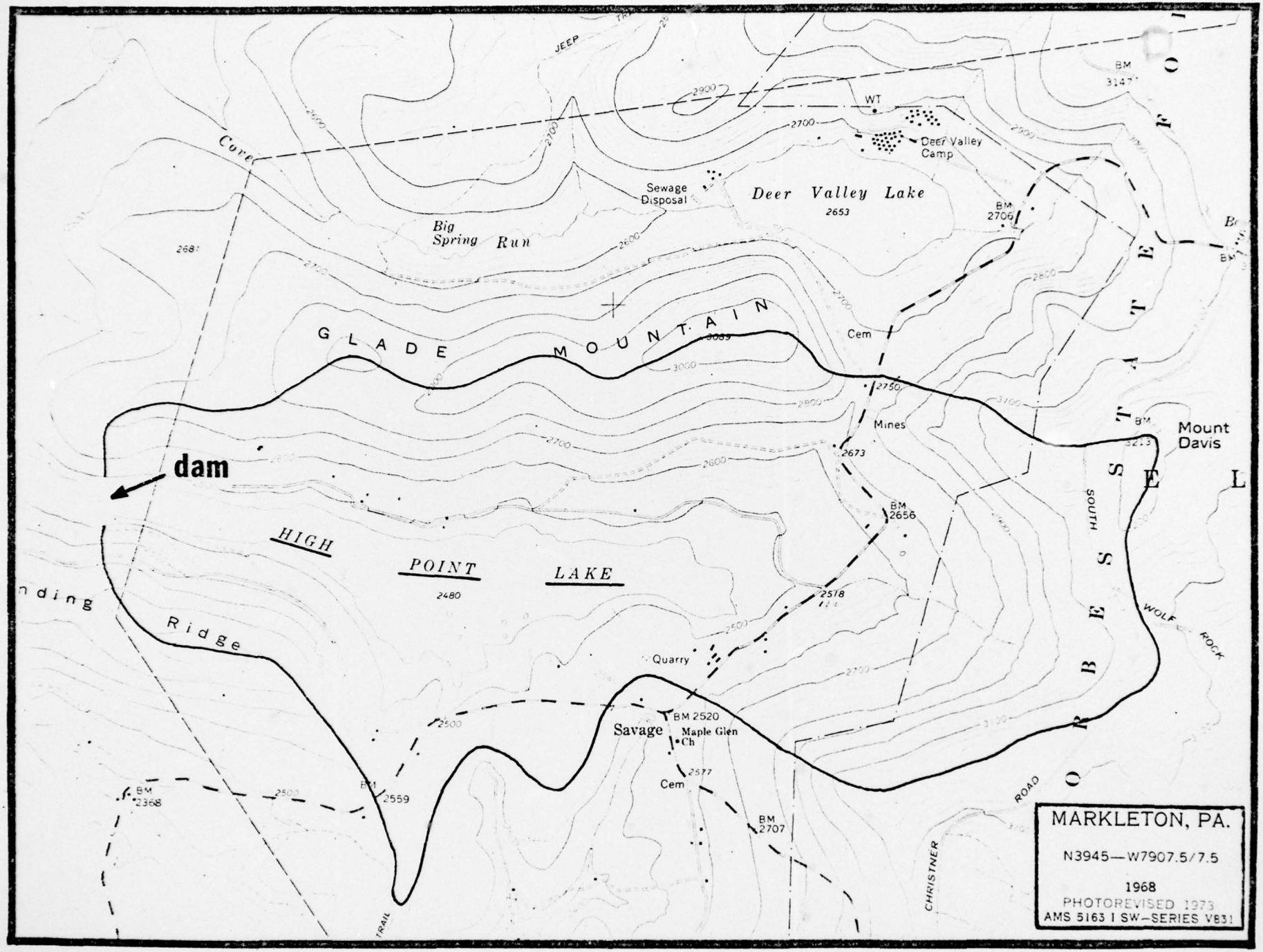


FIGURE 7
CENTERLINE PROFILE OF EMBANKMENT
AND BORING DATA

DATA OBTAINED FROM THE NEILAN ENGINEERS INC. OF SOMERSET, PENNSYLVANIA DWG.# 5
DATED NOVEMBER 1962

APPENDIX G

REGIONAL VICINITY MAP


JEEP
Core
WT
Deer Valley Camp
Sewage Disposal
Deer Valley Lake
2653
BM 2706
Big Spring Run
GLADE MOUNTAIN
Cem
Mines
2673
Mount Davis
dam
BM 2656
HIGH POINT LAKE
2480
2518
Ridge
Quarry
Savage
BM 2520
Maple Glen Ch
2577
Cem
BM 2559
BM 2368
BM 2707
TRAIL
ROAD
CHRISTNER
SOUTH
WOLF ROCK
MARKLETON, PA.
N3945—W7907.5/7.5
1968
PHOTOREVISED 1973
AMS 5163 I SW—SERIES V831