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PROMPTON LAKE CONDITION REPORT DAM, OUTLET WORKS & SPILLWAY, PE--ETC(U)
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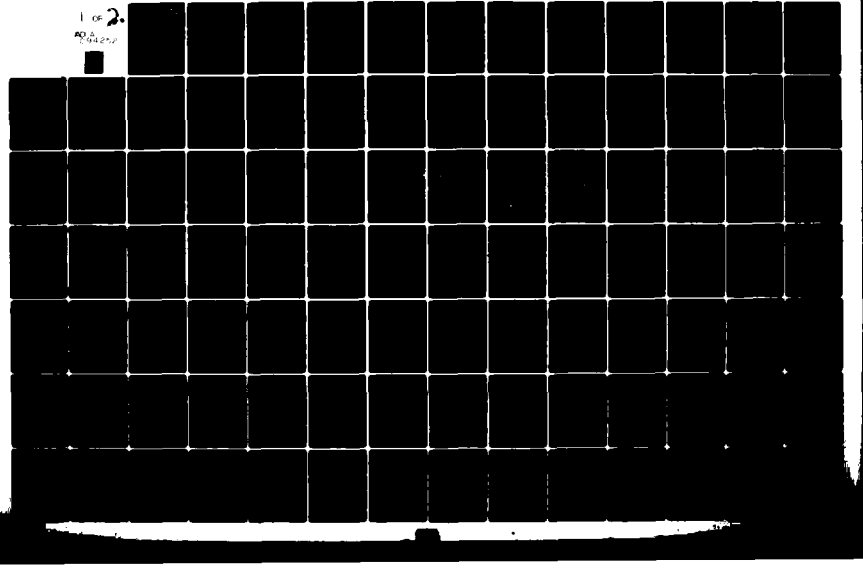

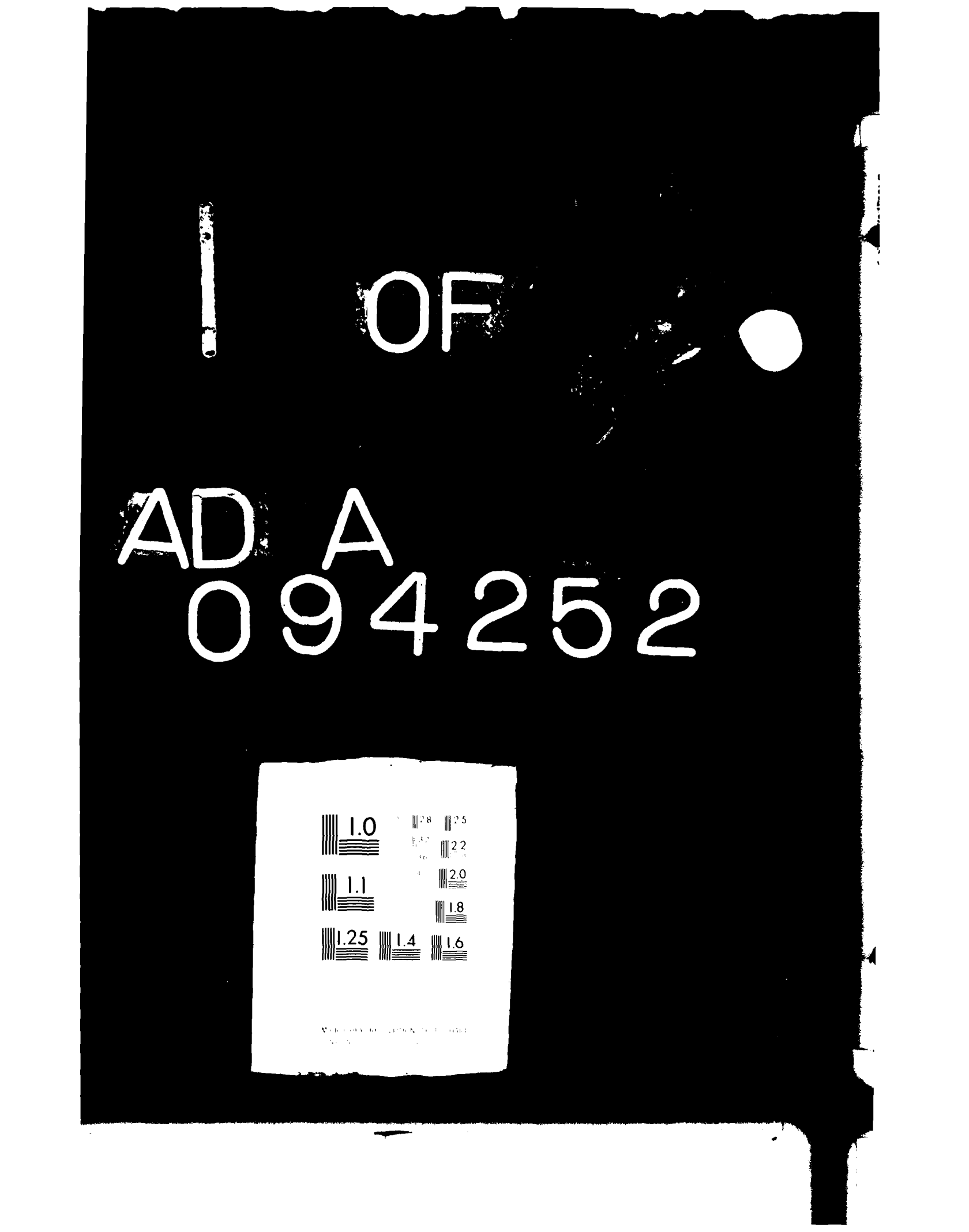
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LACKAWAXEN RIVER BASIN

LACKAWAXEN RIVER, PENNSYLVANIA

PROMPTON LAKE

CONDITION REPORT

DAM, OUTLET WORKS & SPILLWAY

PERIODIC INSPECTION REPORT NO. 2

JULY 1971

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

NOVEMBER 1971

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1. REPORT NUMBER: DAEN/NAP-14620/PIR2-71/11	2. GOVT ACCESSION NO.: AD-A094252
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE (and Subtitle): Prompton Lake condition report dam, outlet works & spillway, periodic inspection report No. 2, July, 1971, Lackawaxen River Basin, Lackawaxen River, Pennsylvania	5. TYPE OF REPORT & PERIOD COVERED: Condition reprot, periodic inspection report June 7-9, 1966
6. PERFORMING ORG. REPORT NUMBER: DAEN/NAP-14620/PIR2-71/11	
7. AUTHOR(s): Army Engineer District Philadelphia	8. CONTRACT OR GRANT NUMBER(s):
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Army Engineer District Philadelphia, 2nd & Chestnut Sts., Phila. PA. 19106	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: 12 134
11. CONTROLLING OFFICE NAME AND ADDRESS	12. REPORT DATE: Nov 1971
	13. NUMBER OF PAGES: 75 p. app.
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT (of this Report)

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

18. SUPPLEMENTARY NOTES

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Prompton Lake, PA	Spillways
Dams	Outlet works
Site surveys	Lackawaxen River Basin
Inspection	Lackawaxen River, PA
	Piezometers

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

This report described the Prompton Lake project, sets schedules for inspections, describes in detail the instrumentation installed and evaluation of the data gathered in the inspection of Prompton Lake during 21 July 1971. Piezometer data and a conduit settelement study for outlet works were also reported. It was found that the project is considered in overall good condition with adequate instrumentation to measure performance of the dam during operation.

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LACKAWAXEN RIVER BASIN
LACKAWAXEN RIVER, PENNSYLVANIA

PROMPTON LAKE

CONDITION REPORT

DAM, OUTLET WORKS & SPILLWAY

PERIODIC INSPECTION REPORT NO. 2

JULY 1971

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106
NOVEMBER 1971

PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA
DAM, OUTLET WORKS AND SPILLWAY

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PROMPTON LAKE

PERTINENT DATA

A. HYDROLOGIC DATA

Location of Lake

Prompton - On Lackawaxen River, one-half mile above Prompton, Pa.

Drainage Area, square miles	60
Spillway Design Flood	
Duration of storm, hours	30
Total precipitation, inches	24.15
Infiltration and initial loss, inches	0.73
Rainfall excess, inches	23.42
Peak natural flow at dam site, cfs	74,000
Peak inflow rate into full reservoir, cfs	81,500

B. DESIGN DATA

Elevations, feet above mean sea level	
Top of dam	1226.0
Maximum pool level during spillway design flood	1220.5
Spillway crest	1205.0
Maximum pool level during lake design flood	1168.1
Recreation pool	1125.0
River bed	1086.0
Storages, acre-feet	
Recreation pool	3,400
Lake design flood	20,300

Additional to spillway crest	28,000
Surcharge above spillway crest	15,300
Total	67,000
Lake Areas, Acres	
Recreation pool	280
At maximum level during lake design flood	630
At spillway crest	910
At maximum level during spillway design flood	1,070
Embankment	
Type - Earth fill with rockfill shell upstream and rock-toe downstream	
Length, feet	1,230
Maximum height above river bed, feet	140
Freeboard, feet	5.5
Cross-section	
Crown width, feet	30
Upstream slope	1:2, 1:2-1/2
Downstream slope	1:2-1/4
Spillway	
Type - Channel cut into rock	
Length of crest, feet	50
Maximum surcharge, feet	15.5
Outlet Works	
Type - Ungated, weir-controlled intake, concrete conduit through dam, stilling basin	

Elevation, crest of weir	1125.0
Elevation, floor of intake structure	—
Elevation, conduit invert, upstream end	1092.0
Elevation, conduit invert, downstream end	1092.0
Diameter of conduit, feet	8.75
Length of conduit, feet	505
Stilling basin	
Floor elevation	1075.0
Length, feet	66.0
Bottom width, feet	30.0

PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA
DAM, OUTLET WORKS AND SPILLWAY

PERIODIC INSPECTION REPORT

1. AUTHORITY AND SCOPE.

This report has been prepared in accordance with Engineer Regulation 1110-2-100, "Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures," to present the periodic inspection, instrumentation, and continuing evaluation of the project during the operational phase.

This report describes the project, sets the schedules for subsequent periodic inspections, discusses, in detail, the types of instrumentation previously installed, the submission and evaluation of data, and presents the results of the initial five-year periodic inspection performed 7-9 June 1966.

2. DESCRIPTION OF PROJECT.

2.1 PROJECT LOCATION. The project is located in Wayne County in Northeastern Pennsylvania, 125 air miles north of Philadelphia, Pennsylvania. The dam site is located in the valley of the Lackawaxen River about one-half mile upstream from the confluence of the Waymart Branch with the river, and about 4 miles west of Honesdale, Pennsylvania, as shown on plate 1.

2.2 BASIN DESCRIPTION. The Lackawaxen River is a tributary of the Delaware River. Several villages and seven townships are located in the lower reaches of the Lackawaxen River. Although some residential, commercial utility and highway developments are located within these townships, the Lackawaxen River is primarily rural in character. The project controls 60 square miles of drainage area and has a storage capacity of 48,300 acre-feet.

2.3 PROJECT DESCRIPTION. Prompton Lake is an earthfill embankment with an ungated, weir controlled intake, located near the natural stream course and adjacent to the west abutment. The dam is 1,230 feet long, with a maximum height of 140 feet above stream bed, a crown width of 30 feet, and an embankment volume of 750,000 cubic yards. The outlet works is a cut and cover conduit on earth foundation. The spillway is an open channel unlined cut in rock, and is

located high on the right abutment adjacent to the dam. The project, completed in 1961, has a storage capacity of 3,400 acre-feet at normal recreation pool. A general plan of the project is shown on plate 3.

a. Site Geology. The present valley floor is about 150 feet wide at the axis of the dam, but widens both upstream and downstream. The left abutment has a 1 vertical on 2-3/4 slope and the contours approximately parallel the river. The lower right abutment at the axis of the dam has a 1 vertical on 1-1/2 horizontal slope, flattening out to 1 on 6 both upstream and downstream of the axis.

The valley of the Lackawaxen River is cut into unconsolidated morainal, fluvial, and lacustrine deposits derived by glacial erosion. The unconsolidated deposits formerly completely filled the broad valley cut by glaciers into the underlying sequence of well-cemented sandstone (greywacke) and siltstone. Along the axis of the dam the thickness of overburden ranges from 100 feet on the left abutment to 140 feet in the valley section to 120 feet on the upper right abutment.

The unconsolidated overburden is a heterogeneous mass, made up of many lenses and beds with a relatively wide range in composition. Most of the masses are well-graded from medium sized gravel through silt. Gravel generally forms from 15 to 20 percent of these well-graded masses. Silt generally forms at lease 20 percent of the mass and commonly more than 50 percent. The density of the overburden increases with depth.

Varved micaceous silt occurs below the west side of the valley (right abutment) and locally extends under the river to the east. Correlation between borings suggests that this silt occurs both as an essentially continuous bed and also as isolated small lenses. These deposits represent deposition in a valley-sized lake caused by temporary damming of the valley and in local oxbow or kettle lakes. Later stream cutting has removed some of the micaceous silt bed locally.

Clean sands and gravels occur locally as small string deposits. A thick narrow mass, representing a buried esker, runs roughly parallel to the stream under the lower left abutment.

The groundwater table varies during the year from a high in early summer to a low in winter. It is generally within a few feet of the surface in the lower slopes and valley floor. The capillary fringe extends four to five feet above the water table in most areas.

The present groundwater conditions indicate that the flow pattern in the valley walls and floor result in artesian flow. At present, most of the artesian flow is caused by subsurface drainage from the valley wall and reservoir. The artesian flow is reflected in the continuous flow from the relief well system and piezometers installed in the vicinity of the relief wells in the left abutment at the toe.

b. Embankment. The embankment consists essentially of an upstream, compacted earthfill zone, covered by a rock shell 3-1/2 feet thick, and a downstream compacted random fill, covered with a rock spall 1-1/2 feet thick. The two zones are separated by an inclined drainage zone 8 feet thick, which connects to a 3-foot horizontal drainage blanket.

Design of both the upstream and downstream slopes was governed by the shear strength of the embankment materials. The critical circle for both zones passed through the embankment and is governed by the shear strengths immediately after construction.

Material for the embankment was obtained from two major sources. The required excavation from the outlet works and spillway area produced approximately half of the volume. The remainder came from a borrow area on the upper western slope of the valley, just upstream of the dam site.

After stripping to a depth of 6 inches, the embankment earthfill was placed in 18-inch compacted lifts and, after raking, was rolled with four passes of a 50-ton rubber-tired roller.

No unusual settlement problems were involved for the major portion of the project. A camber of 2 feet was added to the crest of the dam to compensate for the expected settlement of foundation and for the consolidation of the embankment after construction. Typical sections and details of the project are shown on plate 4.

c. Spillway and Outlet Works. The spillway is an unlined channel cut in rock and has a crest length of 50 feet. The cut material, principally sandstone, was used in the compacted random fill section downstream.

The outlet works consists of a cut and cover conduit, 8 feet 9 inches in diameter and 548 feet long, with an ungated weir controlled intake and stilling basin. The conduit was

constructed on earth foundation consisting primarily of fine-grained silt. Spillway plan and cross-section and outlet works plan and profile are shown on plates 5 and 6, respectively.

d. Construction Notes. During the excavation for the conduit, the passing and vibration of the contractor's equipment made "quick" the fine-grained silts of the foundation, rendering further passage of construction equipment impossible. Consequently, two rows of well points were installed with spacing from 5 to 10 feet in each row. Each row of wells was located in a trench 3 feet deep to facilitate removal of surface water. With the water table drawn down and capillary effectiveness of the silt reduced, the subgrade was stabilized and excavation for the conduit continued through the remaining 2 feet to final grade. The conduit was then constructed with no further difficulties.

During the excavation of the 10-foot test trench into the left abutment of the embankment, a pocket of compact gravelly silty sand containing various sizes of boulders was encountered at elevation 1145. Borings were made in the abutment to determine the extent of this pervious material.

As a result of these investigations, the drainage zone between Stations 1+76 and 3+35 was modified calling for excavation through the pervious lense into impervious material, backfilling with pervious material and extending the toe drain further into the abutment. Sand lenses exposed in the upstream portion of the left abutment were blanketed by a layer of impervious material to preclude seepage around the abutment in the event these lenses and pockets were interconnected. No seepage around the abutment has been noted to date.

The installation of the relief wells effectively reduced the uplift pressures noted in the discussion on site geology. Further data concerning the relief well system is contained in Section 3, entitled "Instrumentation."

e. Design Values. See page 5.

2.4 PROJECT FUNCTIONS. The project is presently a single-purpose flood control project with incidental recreation use managed by the State of Pennsylvania. A volume equal to 20,300 acre-feet has been allocated to flood control storage, pool elevation 1168.1. Plans have been formulated for modifying the project to provide for multiple-purpose use. The proposed modification is contained in Appendix A.

e. Design Values.

Design Values

Embankment and Foundation Materials

	Design Values				
	Dry Density lb./cu.ft.	Average Permeability ft./day	Shear Strength Internal Friction Angle & Cohesion ton/sq.ft.		Type of Test
Embankment	123 lbs.	0.005 ft./day	$\phi = 16^{\circ}$ $\phi = 23^{\circ}$ $\phi = 34^{\circ}$	C = 0.3 C = 0.3 C = 0	UU CU CD
Foundation					
Alluvial Sands and Silts	110 lbs.	2 to 10 ft./day	$\phi = 30^{\circ}$	C = 0	CD
Glacial Till	126 lbs.	0.1 to 4 ft./day	$\phi = 35^{\circ}$	C = 0	CD

2.5 POOL EXPERIENCE TO DATE. Since the beginning of construction of Prompton Lake in April 1958, no floods have occurred for which the project provided protection. Since completion in July 1960, the following maximum annual pool elevations were recorded:

ANNUAL MAXIMUM POOL ELEVATIONS
SINCE COMPLETION

Date of Annual Maximum Pool Elevations	Annual Maximum Pool Elevation (ft./s.l.d.)
13 Sep 60	1128.0
26 Feb 61	1131.2
1 Apr 62	1131.1
27 Mar 63	1131.8
10 Mar 64	1133.45
9 Feb 65	1127.93
30 May 66	1127.40
30 Mar 67	1130.17
11 Sep 68	1129.45
25 Mar 69	1129.7
10 Apr 70	1130.5

3. INSTRUMENTATION.

3.1 GENERAL. At the time of construction, instrumentation other than relief wells was not included but was added subsequent to the first periodic inspection in 1966. Instrumentation installed to measure performance of the project consists of piezometers in the embankment and foundation to measure seepage pressures, surface settlement pipes on the embankment crest, and settlement points on the intake structure, stilling basin, and conduit to measure vertical movements. Relief wells, although not considered direct instrumentation, also have been observed to determine the effectiveness in reducing hydraulic pressures in an aquifer located beneath the downstream slope. Relief well observations and functions will, therefore, be included in this section.

a. Piezometers. A total of thirteen piezometers were installed in the embankment and foundation primarily on the top and downstream slope of the dam. The Casagrande type was used extensively due to the ease of installation afforded by these instruments and the reliability once installed. The purpose and location of these instruments is described below:

(1) Purpose

(a) To measure post construction pressures within the embankment, and to evaluate performance in comparison with design assumptions.

(b) To measure the efficiency of the relief well system.

(2) Location

Piezometer installations are shown in plan view with typical cross-sections appearing on plate 2. The installation consists of four primary lines (stations) of piezometers placed in planes perpendicular to the axis of the dam. The piezometers have been installed in the foundation as well as to selected depths within the embankment at intervals between the top and downstream toe of the dam. The piezometers located near the relief wells measure the efficiency of the relief well system.

(3) Installation

The piezometers were installed by drilling with rock bits to one-half foot below the desired installation elevation and backfilling with pervious filter material. The instrument was then inserted at the desired elevation and 2-1/2 additional feet of pervious material added. The remainder of the hole was backfilled with a 6-foot tamped bentonite clay plug and sand-cement mortar. Approximately 20 to 30 feet of 4-inch diameter black iron pipe, with 3 to 4 feet above ground, remained in place. The rest of the casing was retrieved as the mortar backfill was placed.

Difficulty was encountered in piezometers DLL-5 and DLL-6, a double installation in one drill hole, and DLL-11. These piezometers are located near the relief well system and, as such, are subject to artesian flows. Attempts to install pressure gauges on the piezometer extension pipes resulted in the gauges freezing and bursting. As a result, two replacement piezometers, DLL-5 and DLL-6, were installed during the fall of 1970.

(a) Results to date. Results of piezometer readings taken to date are shown on plates 7 and 8, correlated with pool elevations. Due to the relatively static pool conditions maintained at Prompton Lake since initial piezometer installations, the piezometer fluctuations experienced have been minimal, as expected. The piezometers inserted to measure the effectiveness

of the relief well systems have shown continuous flow, specifically DLL-11 and DLL-6, the latter a replacement piezometer. These piezometers have been refitted with pressures gauges to determine whether an increase in pool elevation will affect the artesian flow in the aquifer.

b. Surface Settlement Pipes.

(1) Purpose

(a) To determine the total settlement of the top of dam at various stations along its crest.

(b) To determine horizontal deflections normal to the centerline of the dam at these same stations.

(2) Location

Surface settlement locations are shown in plan view on plate 2. The installation consists of five instruments spaced approximately 200 feet apart on the upstream roadway crest, top of dam. A typical installation is shown in elevation view, also on plate 2. All surface settlement pipes were installed in late fall and early winter of 1970. Initial elevations and offsets were surveyed during June 1971 and appear in Table 1.

(3) Installation

The indicator is simply a 1-inch diameter steel rod set at a known alignment and elevation. A 4-inch diameter hole is drilled approximately 3 feet into the embankment. A protective 4-inch diameter iron casing pipe is placed in the hole and driven 6 inches deeper than the drilling bottom. A 6-foot length of 1-inch diameter rod is driven inside the casing until flush with the 4-inch diameter casing, both protruding about 3 inches above the embankment elevation. The bar is then cross-marked and its alignment and elevation checked with reference targets and benchmarks established on the abutments.

c. Relief Well System.

(1) Purpose

To provide relief from artesian pressures developed by a pervious aquifer located below an impervious strata of material located at elevation 1070.

(2) Location

Three relief wells, 1 through 3, are located immediately to the left of the outlet works stilling basin, and 4 through 6 are located immediately to the right. Relief well 7 is located downstream of the intersection of the left abutment and downstream toe of the dam.

(3) Installation

The relief wells were designed and installed to elevation 1010 during the initial construction contract for the embankment. Since initial installation, difficulty has been encountered in maintaining the relief wells free of objectionable material.

During the course of investigations and inspections of Prompton Lake since the previous periodic inspection, it was discovered that the inner casings of the relief wells had become partially backfilled with materials of unknown character and origin. An effort to clear the wells was made in November 1968 and again in August 1970. The work was performed by Mobile District Drill Crews under the supervision of Philadelphia District personnel. Two methods were employed to loosen and remove the materials from the inner casing. The first method was the application of air pressure through drill rods to the materials, and the second method was removal with a rock bit if the application of air alone was unsuccessful. The cleaning operations were only partially successful and have led to the conclusion that the materials backfilling the inner casing consist predominantly of gravel size particles. It is felt that these particles will render ineffective that portion of the relief well below which they occur due to reduction of flow capability in the inner casing.

A review of the design of the relief well system reveals that sufficient relief of uplift pressures at the base of the upper impervious strata (El. 1070) would be obtained with a well penetration of 4 to 5 feet into the upper aquifer (penetration to approximate El. 1065). However, the initial design did call for carrying the wells below elevation 1025 into a lower aquifer, below a strata of micaceous silt, in order to relieve artesian pressures in this lower pervious zone. The figures shown in the following table indicate that the inner casings of all but one of the wells are clear of obstructions through the micaceous silt layer, and that all wells are clear well beyond the penetration into the upper aquifer to provide relief of uplift pressures at the base of the impervious layer at elevation 1070. Attempts to

clear relief well No. 6 below elevation 1041 have been largely unsuccessful due to the accumulation of gravel and cobbles in the casing.

The relief well system has not been tested under full pool conditions since the completion of construction; therefore, an evaluation of its performance under design (full pool) conditions is not physically possible. It is believed, however, that the relief wells in their present condition will effectively reduce the uplift pressures developed under full pool conditions.

Although the clear portion of relief well No. 6 does not extend below the impervious strata located between the upper and lower aquifers, this fact is not considered to be detrimental to the primary function of the wells. Relief well No. 6 will, however, cause some reduction in the system's ability to provide relief of artesian pressures present in the lower aquifer.

The fact that the relief of artesian pressures in the lower aquifer has not been accomplished by the existing relief well system is apparent by comparison of piezometer readings taken in this zone after construction, and the artesian pressures encountered in the zone during the explorations performed for design of the structure. There has been little, if any, change in the magnitude of pressures measured in the lower aquifer, particularly those pressures measured close to the bedrock surface.

Although a reduction in the lower aquifer artesian pressures is desirable, they are apparently not influenced significantly by pool levels, thus pressure reduction is not required for the safety of the structure. Therefore, the apparent failure of the system to provide significant relief of pressures at this level in the foundation is not considered a problem.

The results of relief well clean-out are shown below:

Relief Well No.	Original Elevation	1968				1970			
		Before Clean-out		After Clean-out		Before Clean-out		After Clean-out	
		Clear Depth	Elev.	Clear Depth	Elev.	Clear Depth	Elev.	Clear Depth	Elev.
1	1010	53	1035	53	1035	53	1035	67	1021
2	1010	61	1027	67	1021	66	1022	73	1016
3	1010	54	1034	76	1012	71	1017	71	1017*
4	1010	61	1027	72	1016	69	1019	69	1019*
5	1010	46	1042	70	1018	60	1028	68	1020
6	1010	28	1060	31	1057	29	1060	47	1041
7	1010	72	1016	72	1016*	72	1016	72	1016*

* Indicates no attempt to clean relief well

d. Settlement Points, Intake Structure, Conduit and Stilling Basin.

(1) Purpose

(a) To determine the total settlement of the intake structure and the differential settlement of various points on the intake.

(b) To determine the total settlement of the stilling basin and the differential settlement of various points on the stilling basin walls.

(2) Location

The location of the settlement points, as well as data collected and evaluated, is included in Appendix B, entitled "Conduit Settlement Study, Prompton Lake."

3.2 FREQUENCY OF READINGS.

a. Responsibility. Project operating personnel are responsible for instrument observations and collection of data. For those observations beyond the capability of the project staff (such as precise alignment survey), the responsibility of collecting the survey data or making the measurements normally is assigned to Survey Branch, Operations Division. It is also Operation Division's responsibility to forward data obtained to Engineering Division for review and evaluation. Engineering Division is also responsible for the establishment of procedures for promptly informing the Chief of Engineers when evaluation of the condition of the structure or analyses of the instrumentation data indicate the stability of the structure is questionable.

b. Post Filling. Flood Control Pool

(1) Piezometers

If a relatively static pool level is maintained at elevation 1126 for more than 30 days, reading will be taken on a monthly basis. When flooding occurs and causes the pool elevation to exceed 1126 but remain less than 1168.1 (lake design pool), the piezometers will be read at every 5-foot increase in head above elevation 1126 or on a weekly basis, whichever occurs first.

(2) Surface Settlement Pipes

Surface settlement pipes will be read on an annual basis until such time as the reservoir is modified. The survey party will also check the elevations of the Casagrande piezometers.

(3) Relief Wells

The relief wells shall be observed and measured on a schedule in accordance with the piezometer observations,monthly unless flooding occurs. Fluctuation in water levels or pressures within the relief wells, as well as clear depth, should be recorded and submitted with the piezometer water level readings.

(4) Intake Structure and Stilling Basin Settlement

The intake tower and stilling basin elevations will be taken with the conduit top and invert elevations at a five-year interval in preparation for the periodic inspection. The results of the settlement study will be presented in Appendix B, "Conduit Settlement Study, Prompton Lake."

4. INSPECTION AND EVALUATION.

Under the provisions of ER 1110-2-100, "Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures," instrumentation is to be incorporated in major structures to assure their safety and stability. As part of this safety evaluation program, a system of scheduled inspections is planned to detect problem areas and to form a basis for remedial treatment when necessary. In the subparagraphs that follow, the schedule of these inspections, the detailed checklist to be used, and the personnel involved is discussed in detail.

4.1 SCHEDULE OF INSPECTIONS. Previous periodic inspections and future periodic inspections for Prompton Lake are scheduled for the following frequency:

Initial Inspection	June 1966
2nd Five-Year Periodic Inspection	July 1971
Subsequent Inspections (Five-Year Interval)	
3rd	July 1976
4th	July 1981
5th	July 1986

4.2 CHECKLIST. A detailed checklist should be carried by the inspection team and visual inspections should be made of the following items:

a. Embankment.

(1) Surface cracks

(2) Abutment and embankment junctions

(3) Vertical and horizontal alignment

(4) Unusual movement or cracking at or beyond the toe

(5) Unusual through embankment or downstream seepage

(6) Sloughing or erosion of embankment and abutment slopes

(7) Movement of structural features in embankment

(8) Riprap failure (major displacement)

b. Outlet Works. Conduit, Intake Structure, Stilling Basin

(1) Concrete surfaces

(2) Joint and joint materials including relative movement at joints between monoliths or portions of concrete structures

(3) Water passages including drains

(4) Leakage at joints or cracks

(5) Condition of weepholes and other drainage systems

(6) Condition of relief wells

c. Spillway.

(1) Drainage system

(2) Sloughing or erosion of rock and earth slopes

4.3 PERSONNEL. The minimum inspection teams generally consist of District personnel having knowledge of design and construction problems at Prompton with particular

emphasis on soils, embankment design and construction, concrete materials, and concrete construction. Where possible, it is desirable to have representatives of OCE accompany Division personnel on the inspection.

As provided in paragraph 4.1 above, the first periodic inspection was performed in June 1966. The report on the results of the inspection follow in Appendix C.

5. RESULTS OF SECOND PERIODIC INSPECTION.

5.1 GENERAL. On 21 July 1971 the second "Periodic Inspection" was performed at Prompton Lake. Correspondence applicable to implementation of the inspection is contained in Appendix D, entitled "Second Periodic Inspection - 1971."

5.2 INSPECTION REPORT. The inspection was attended by representatives of North Atlantic Division and the Philadelphia District. Upon arrival at the project office, members of the inspection party were briefed on the comments made during the First Periodic Inspection performed in June 1966 and remedial measures accomplished subsequent to that inspection. A pre-inspection report was presented to each party member to familiarize them with the project, present the instrumentation results, and supply the inspection checklist. Following the briefing, the inspection party proceeded to inspect the embankment, spillway, and intake structure, followed by a walk-thru of the outlet works tunnel. The relief well system and outlet works stilling basin were also inspected.

Following the inspection, a critique was held in the project office. The discussion followed, point by point, the checklist for the inspection, previously furnished in the pre-inspection report. During the critique, all comments made by the inspection team were recorded and are summarized below:

a. Embankment.

(1) Surface cracks: None noted

(2) Abutment and embankment junctions: Manholes suggested during the 1966 inspection for incorporation into the toe drain system have not been installed to date. The manholes have been designed by Philadelphia District and are expected to be constructed as funds become available.

(3) Vertical and horizontal alignment: None.

(4) Unusual moving or cracking at or beyond toe: None observed.

(5) Unusual through embankment or downstream seepage: None.

(6) Sloughing or erosion of embankment and abutment slopes: See comment 5.2c(2) below.

(7) Movement of structural features in embankment: Survey measurements taken on the intake structure, conduit, and stilling basin indicate little or no change from readings taken in 1966. Continue surveys of outlet works conduit for future inspections.

(8) Riprap failure (major displacement): None, project has not experienced high pool elevation or wave action. As noted during 1966 inspection, the riprap was poorly placed with pocketed areas of large boulders or fines. Before modification for long term storage, the riprap design will be re-evaluated and a more uniform and durable stone riprap provided.

b. Outlet Works. Conduit, Intake Structure, Stilling Basin

(1) Concrete surfaces: Excellent in conduit, all others good.

(2) Joint and joint materials including relative movement at joints between monoliths or portions of concrete structures: Mastic sealer eroded from conduit construction joints, as observed in 1966 inspection, should be replaced.

(3) Water passages including drains: No comment.

(4) Leakage at joints or cracks: District will conduct condition survey of tunnel. Photographs for documentation will also be taken.

(5) Condition of weepholes and other drainage systems: No comment.

(6) Condition of relief wells: Relief wells appear to be functioning satisfactorily. Since the initial inspection of 1966, all relief wells have been cleaned and surged. These wells are flowing from artesian flow. Since there has never been a substantial head above the recreation pool, the effect of the reservoir on the relief wells has not been determined.

c. Spillway.

(1) Drainage system: No comment.

(2) Sloughing or erosion of rock and earth slopes: Some sloughing or the right spillway wall was observed. District forces will maintain surveillance and remove excess accumulations.

d. Miscellaneous.

(1) The relief well covers and piezometer pipes should be provided with a positive means of preventing removal and vandalism. Piezometer DLL-10 is presently filled with sand and should be cleaned.

(2) The access road off of relocated Route 70 has an approximately 120° turn as approached from the south, in addition to poor visibility when leaving the project area to re-enter Route 70. Consideration of revision to the approach alignment for the access road should be undertaken.

5.3 CONDUIT CONDITION SURVEY. In accordance with paragraph 5.2b(4) above which suggests a condition survey be performed in the Prompton conduit, the survey was made during September 1971 for inclusion into this report. The purpose of the survey was to determine the extent and seriousness of cracking and spalling in the conduit and to document present conditions photographically. The photographs appear in Appendix E entitled "Conduit Condition Survey." It is noteworthy that although Prompton Lake conduit was founded on an unconsolidated overburden glacial-derived material approximately 140 feet deep in the valley section, only one crack of any significance was found in the conduit. An isometric view of the conduit showing the relative position of extent of this crack is shown on plate 11. Although no other cracks were found during the condition survey, the remainder of the tunnel is shown in isometric view on plates 10 and 12 for future use in the event more cracking develops.

6. SUMMARY.

Prompton Lake was completed in November 1960, prior to the requirement for scheduled periodic inspections or installation of instrumentation for specifically measuring post construction conditions during the operational phase of a lake.

The initial periodic inspection performed under the purview of ER 1110-2-100 occurred in June 1966, six years after completion of construction. As a result of that inspection, the installation of the heretofore mentioned instrumentation was recommended and the frequency of all subsequent inspections was programmed for five-year intervals.

In accordance with that schedule, the second (five-year) periodic inspection was performed 21 July 1971. The inspection disclosed no serious problems, but several minor dificiencies were noted. Several remedial measures have been completed and the piezometer caps and relief well covers have been provided with a locking mechanism.

The instrumentation installed to date appears adequate to measure performance of the dam during the operational phase. Results to date have shown no irregular or unusual features, although no significant rise of reservoir level has been experienced to date.

The overall condition of the project is considered very good, while the condition of the conduit appears excellent. Remedial work, as necessary, will be accomplished as funds become available. The next recommended periodic inspection is as scheduled, July 1976.

TABLE 1

SURFACE SETTLEMENT PIPE READINGS

29 June 1971

INITIAL SURVEY *

Instrument Number	Elevation	Offset From Centerline
DLS-1	1226.57	10.50' U.S.
DLS-2	1227.30	9.95' U.S.
DLS-3	1227.07	9.83' U.S.
DLS-4	1227.35	10.31' U.S.
DLS-5	1227.20	9.96' U.S.

* Survey Book #49-108

CORPS OF ENGINEERS **U. S. ARMY**

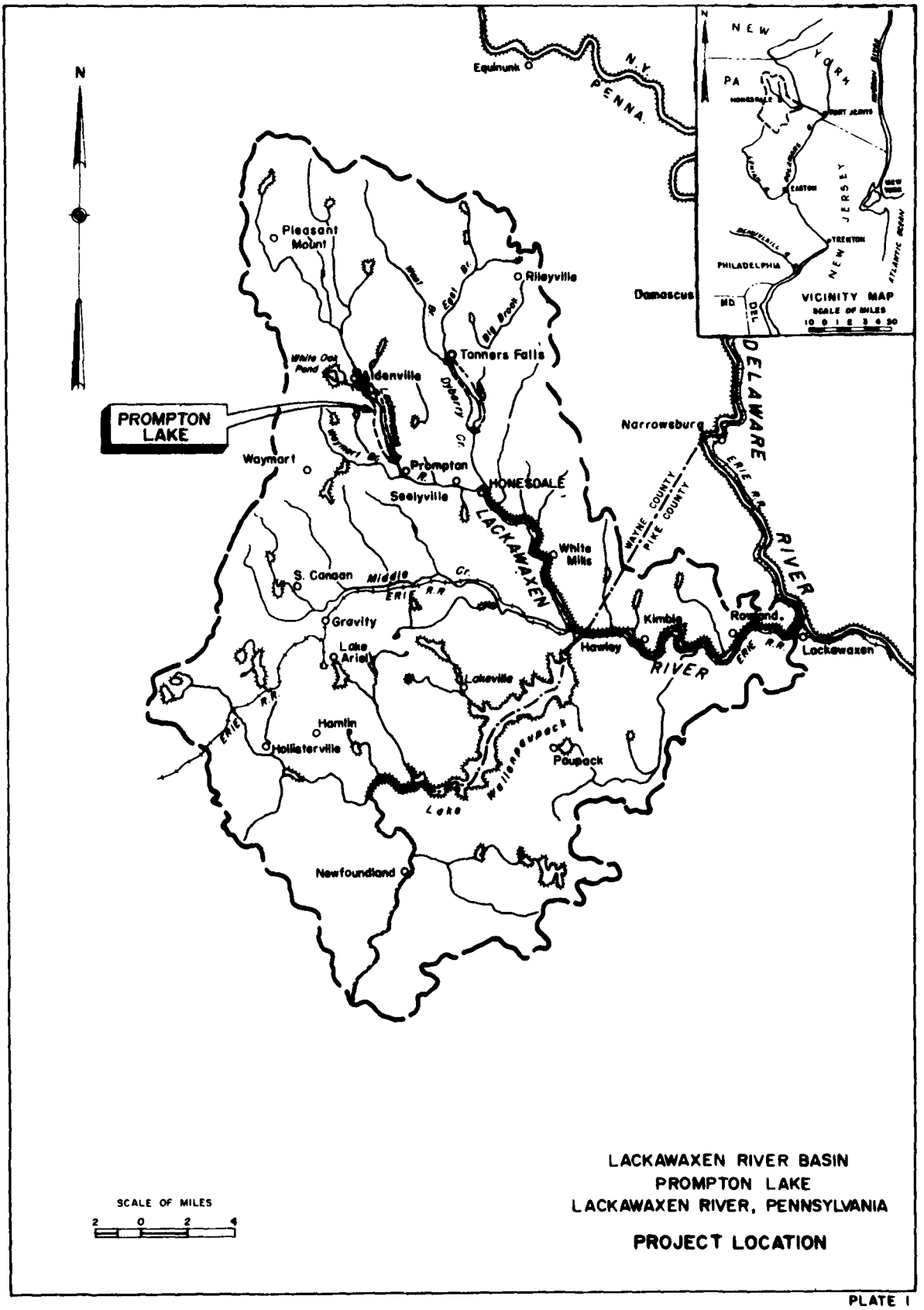
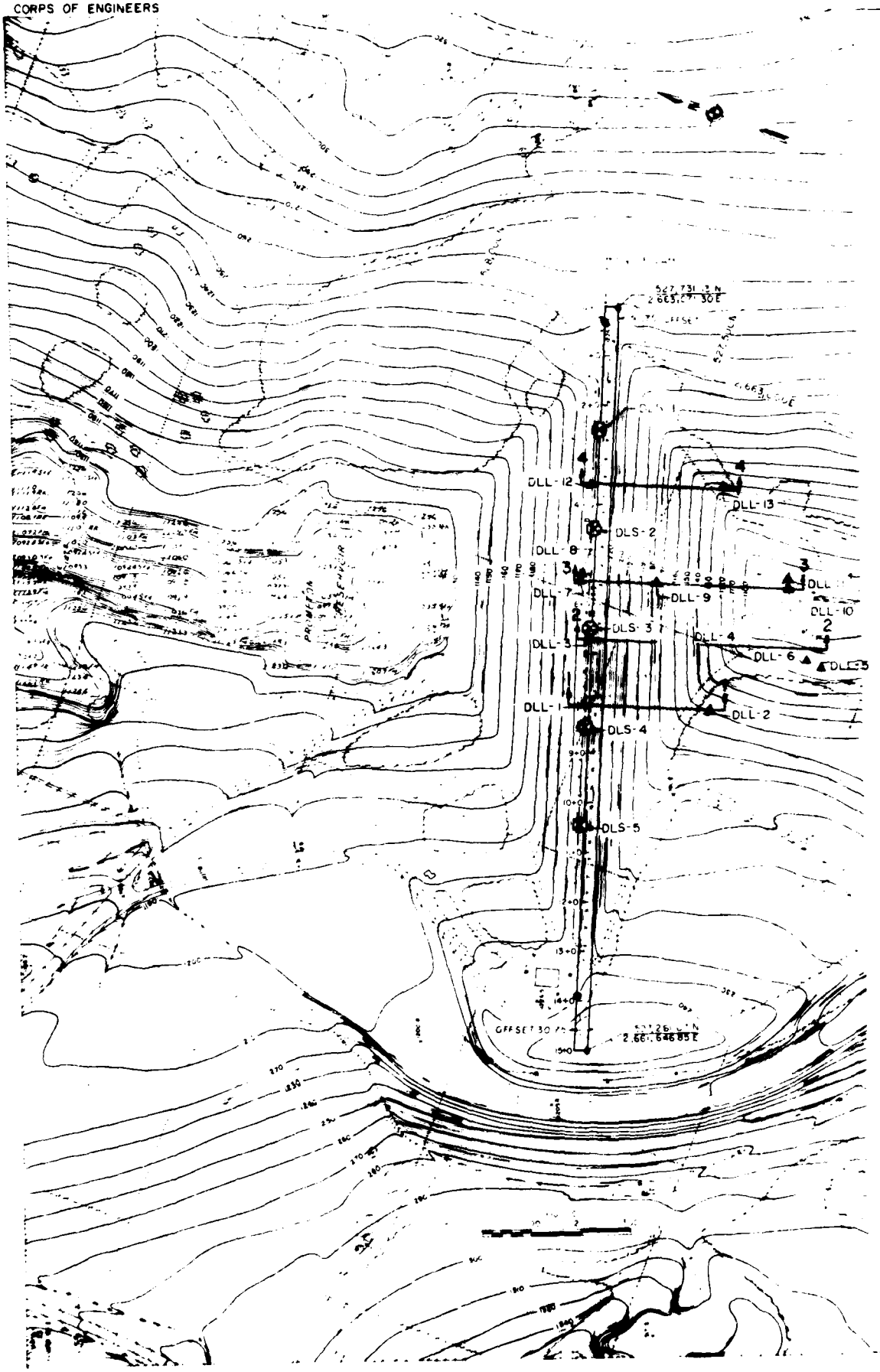
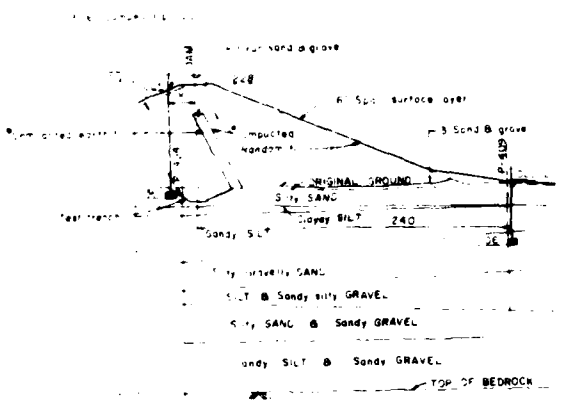


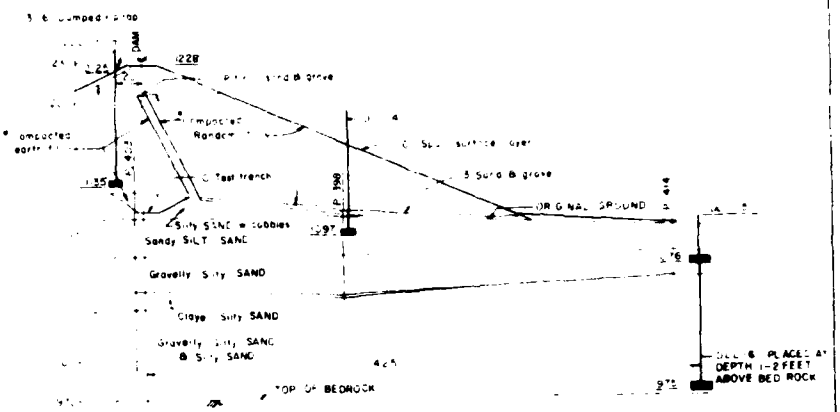
PLATE I

CORPS OF ENGINEERS

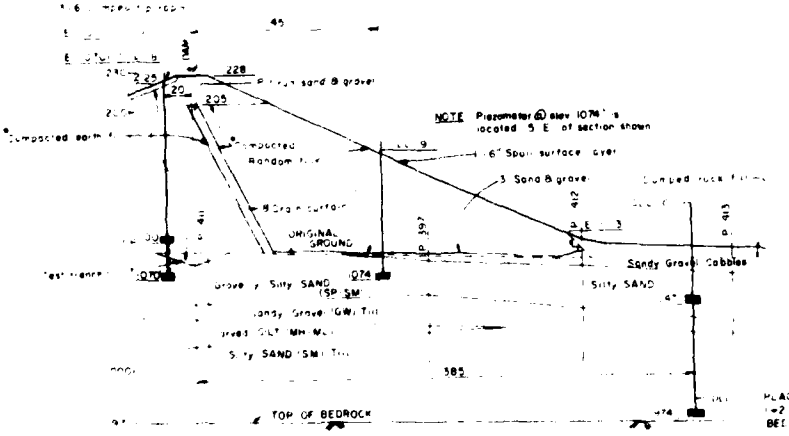




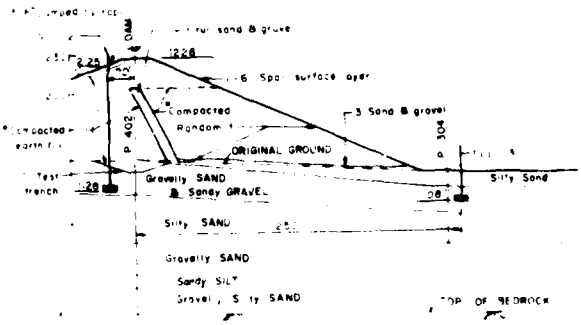
SECTION 1-1



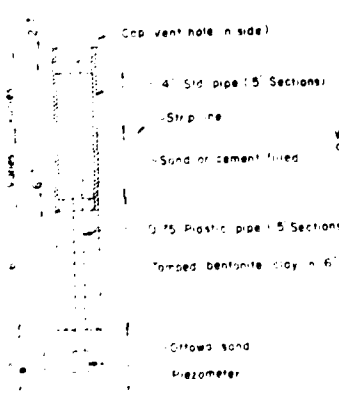
SECTION 2-2



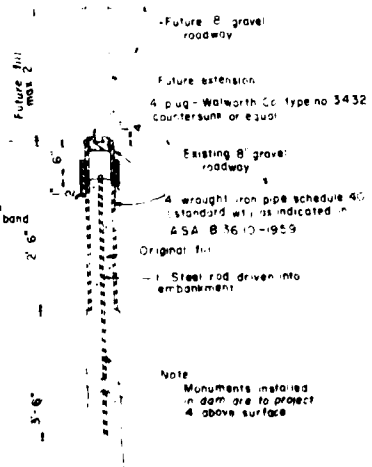
SECTION 3-3



SECTION 4-4



PIEZOMETER INSTALLATION



SETTLEMENT MONUMENT AT DAM ROAD AREA

SCALE IN FEET

LEGEND

- 1100 — Proposed Piezometers at Elevation
- P 402 — Bore Hole
- ⊗ — Location of Settlement Monuments
- ▲ — Location of Casagrande Type Piezometers
- ● — Survey Monuments
- Till products consisting of gravelly sand silt & silty sand
- Earth fill: Some weathered rock

SCALE IN FEET
50 0 50 100

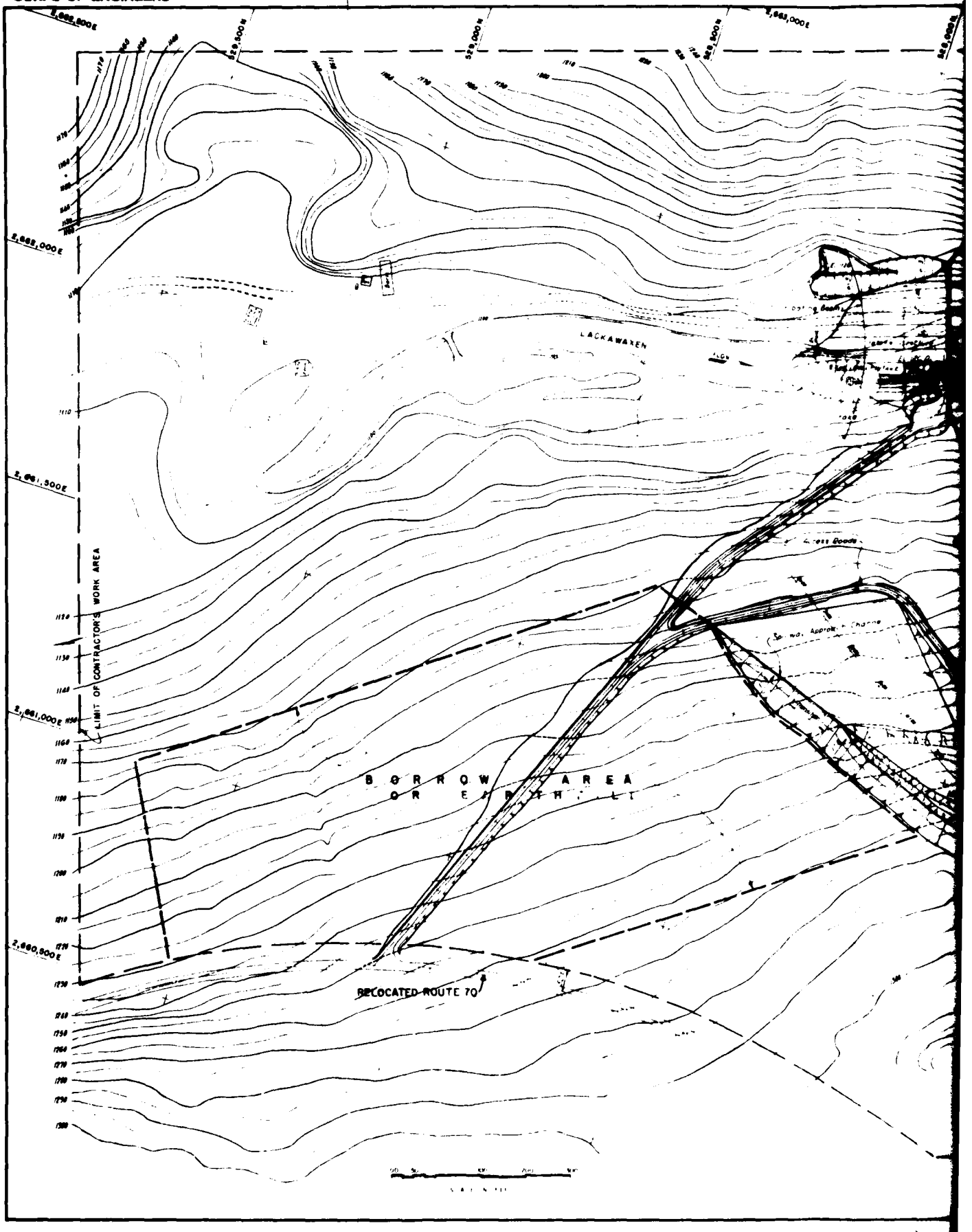
LACKAWAXEN RIVER BASIN
PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA

INSTRUMENTATION PLAN AND DETAILS

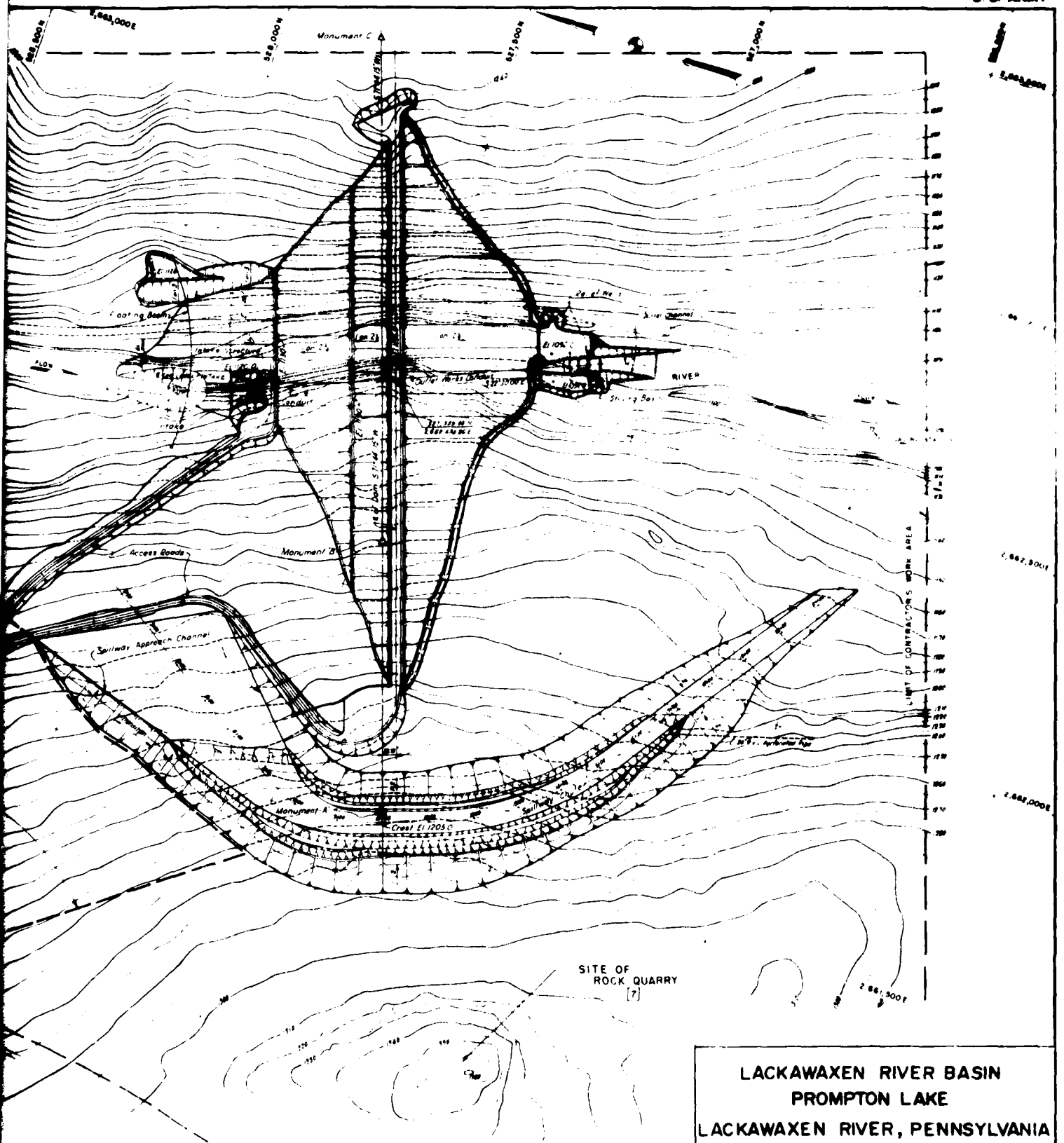
PLATE 2

2

CORPS OF ENGINEERS



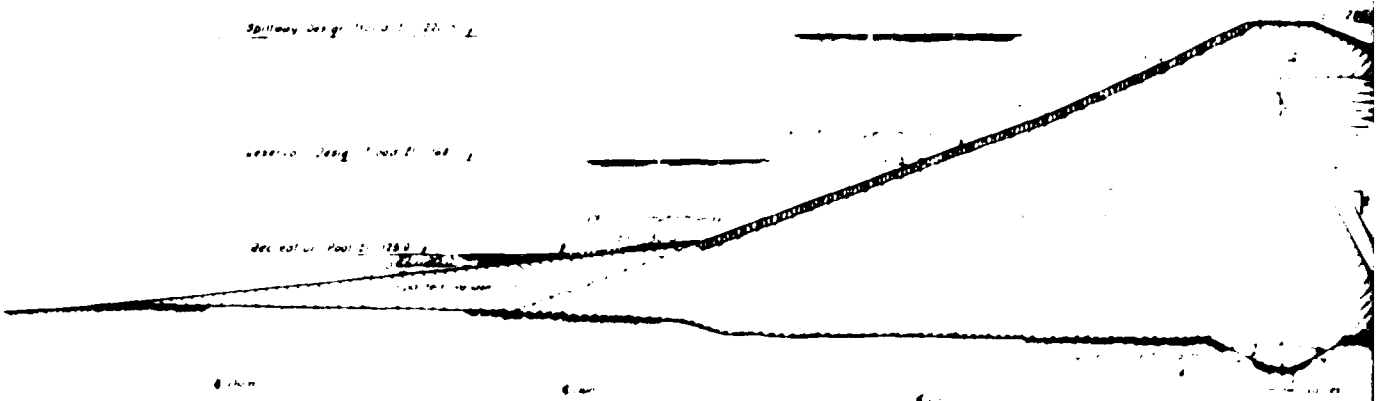
U.S. ARMY



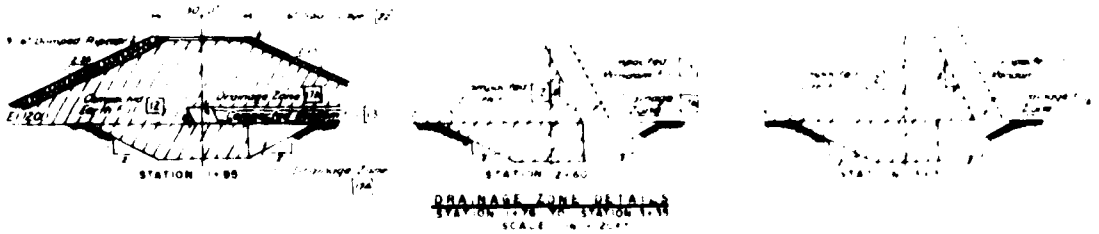
LACKAWAXEN RIVER BASIN
PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA

GENERAL PLAN

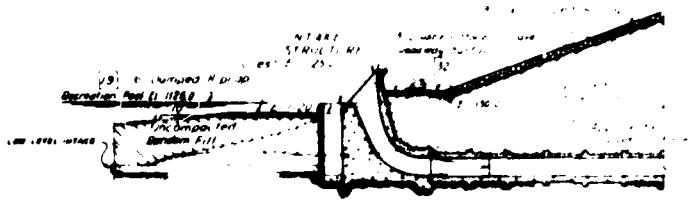
PLATE 3



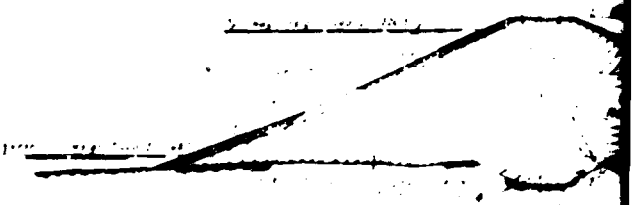
SECTION AT STATION



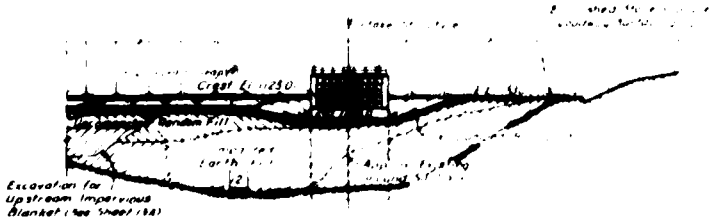
DRAINAGE ZONE DETAILS



DETAIL THROUGH ℄ OF INTAKE STRUCTURE

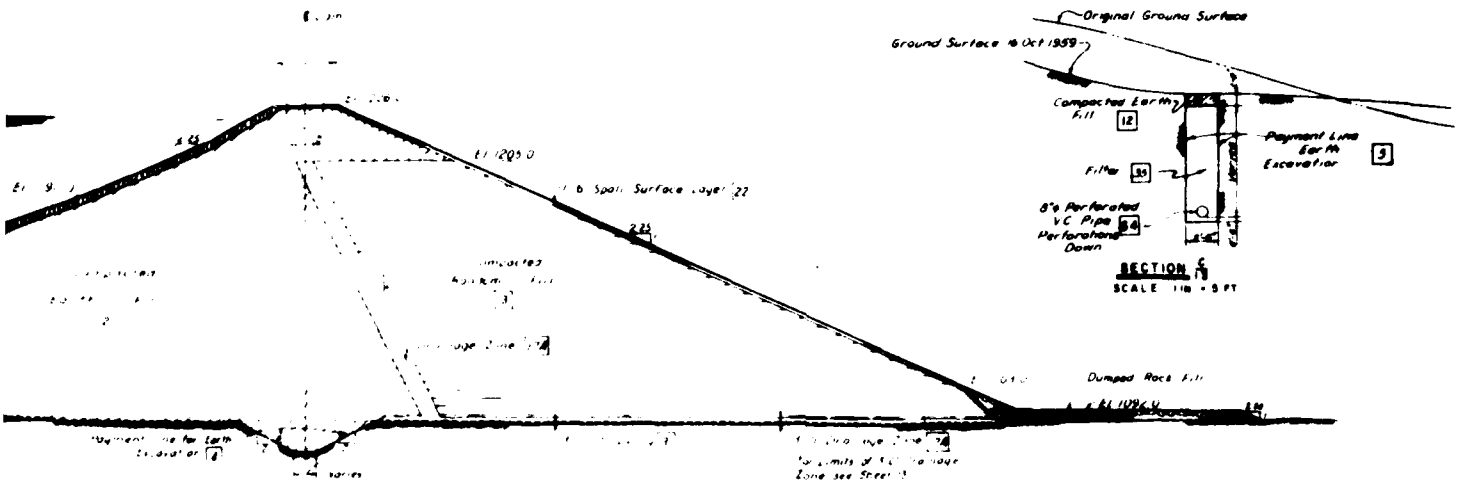


SECTION AT STATION



SECTION A/13

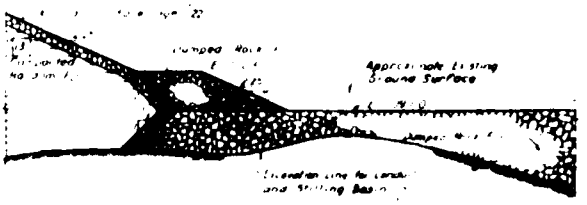
DETAIL OF TOP OF



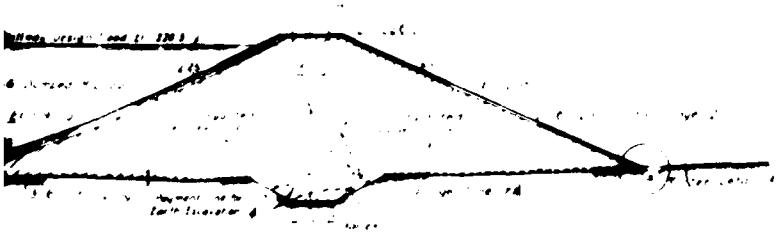
SECTION 6/15

SCALE 1IN = 8 FT

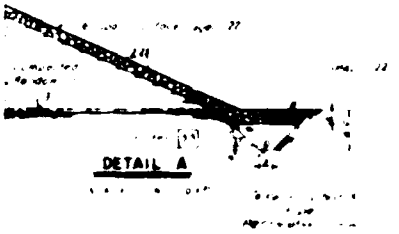
SECTION AT STATION 5+60



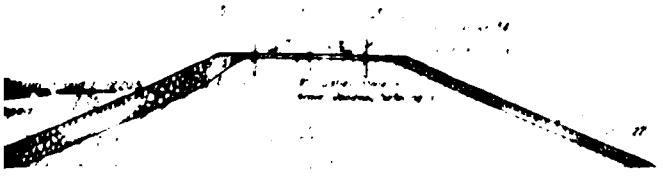
SECTION 8/15



SECTION AT STATION 9+00



DETAIL A



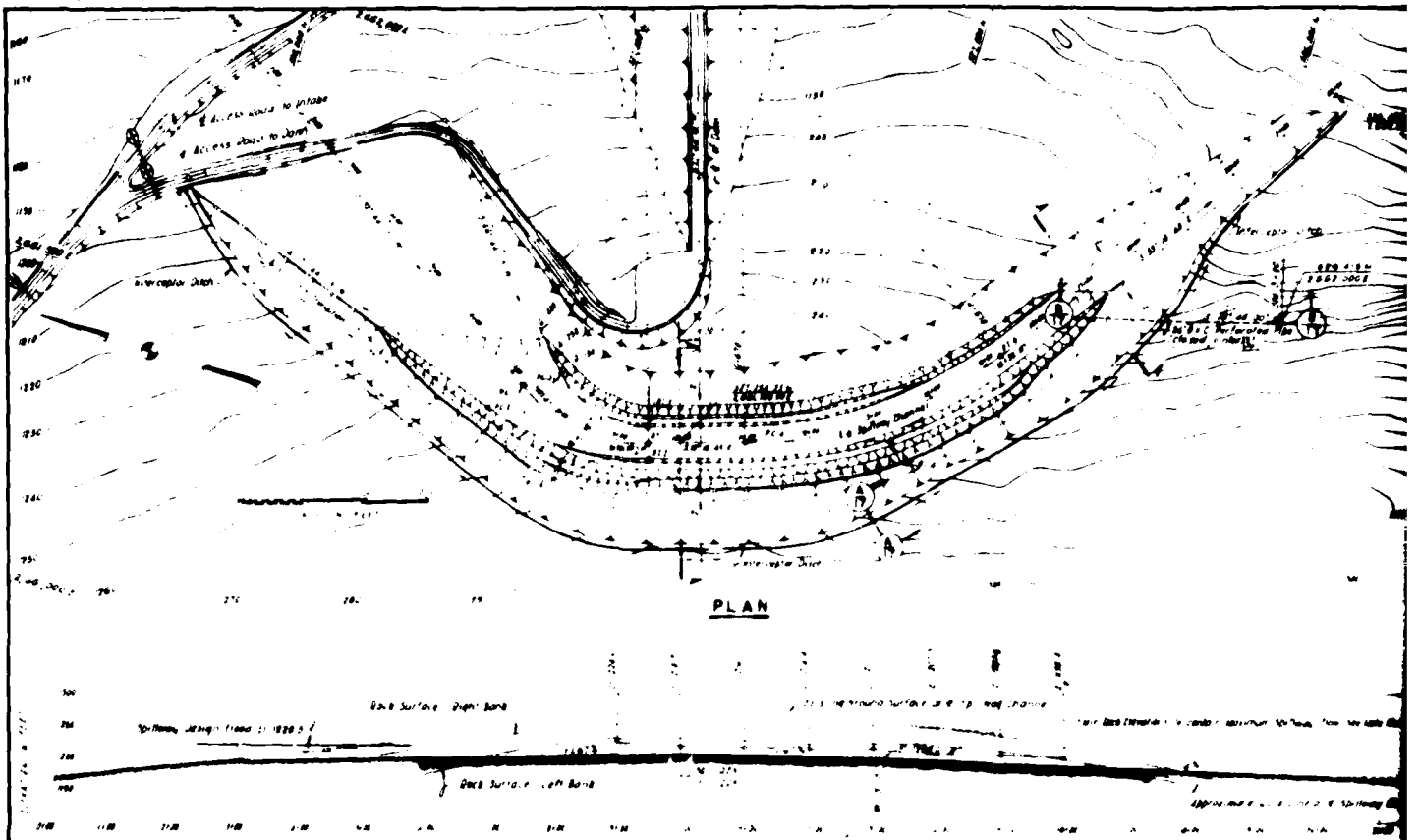
DETAIL OF TOP OF DAM

LACKAWAXEN RIVER BASIN
PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA

TYPICAL SECTIONS
& DETAILS

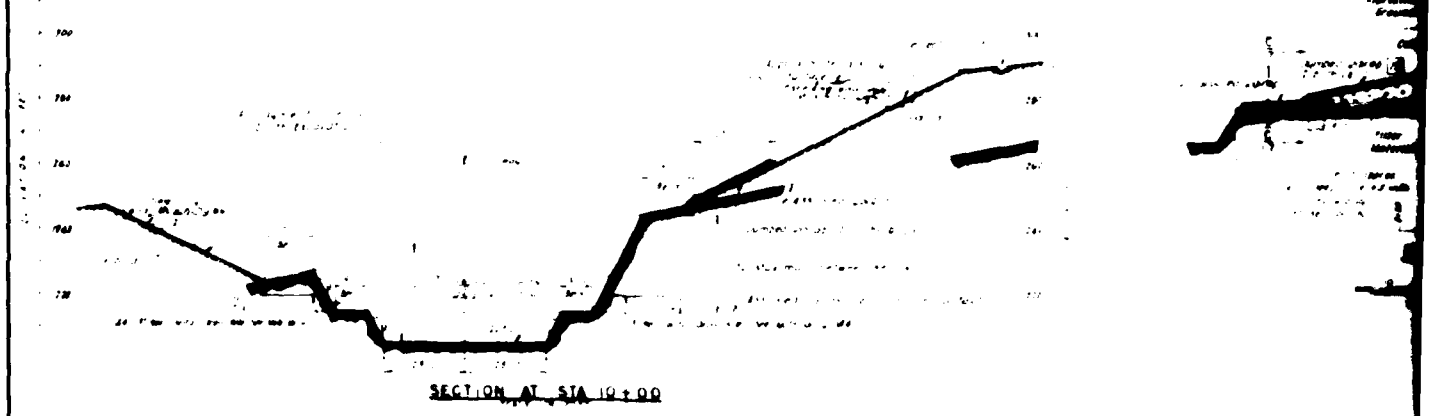
PLATE 4

CORPS OF ENGINEERS

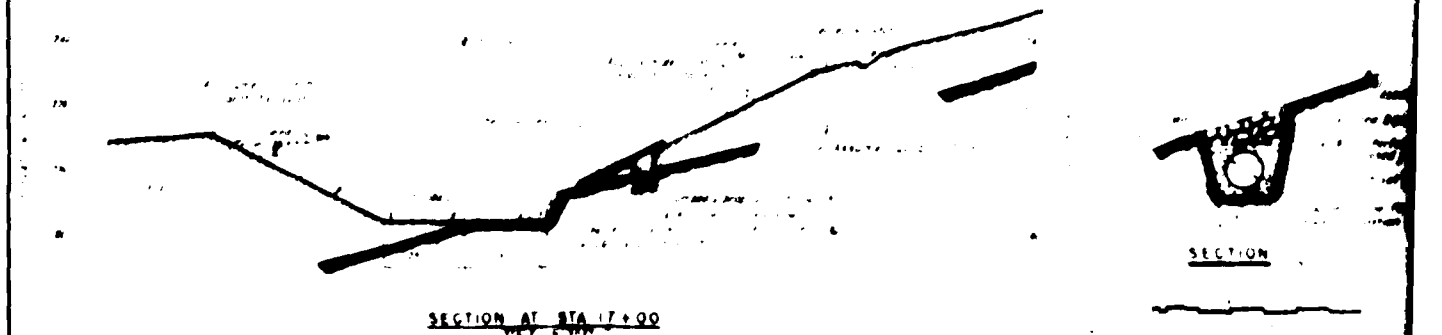


PLAN

PROFILE ON ℄ OF SPILLWAY

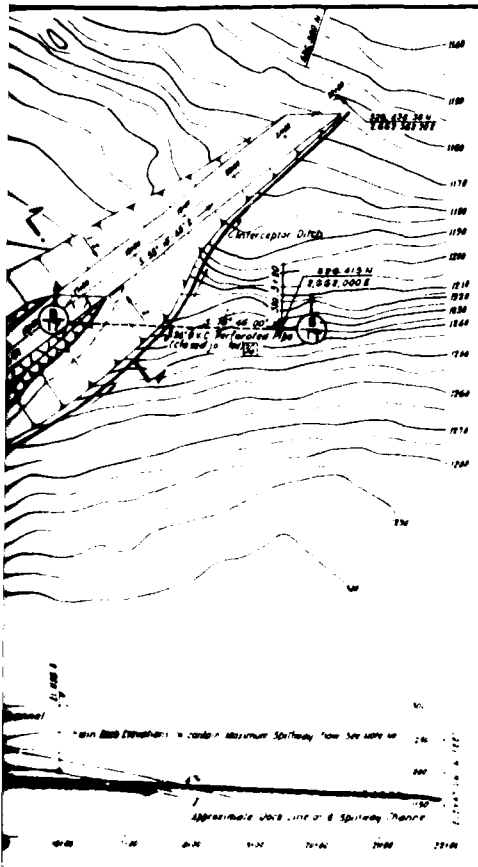


SECTION AT STA 10+00



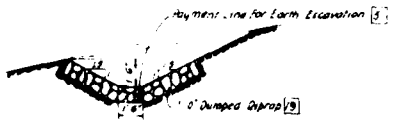
SECTION AT STA 17+00

SECTION

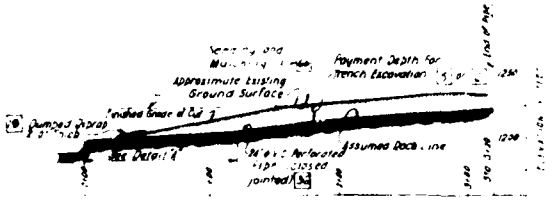


SPILLWAY CURVE DATA

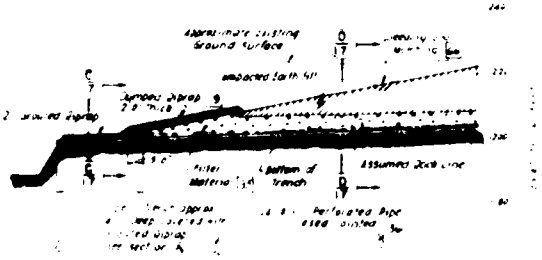
PI No.	P Coordinates N	P Coordinates E	Curve Data Δ	Curve Data D	Curve Data T	Curve Data L	PC No.	PC Coordinates N	PC Coordinates E	PT No.	PT Coordinates N	PT Coordinates E
1	527,414.90	2,661,474.96	51° 00' 00"	380	119.24	222.93	1	527,315.39	2,661,535.49	1	527,381.71	2,661,512.33
2	527,493.47	2,661,466.83	36° 00' 00"	490	156.47	263.89	2	527,383.68	2,661,487.61	2	527,393.88	2,661,488.89
3	527,488.29	2,661,506.19	68° 20' 00"	150	98.56	170.17	3	527,483.88	2,661,571.61	3	527,309.54	2,661,430.69
4	526,948.38	2,661,629.93	37° 00' 00"	870	324.18	451.07	4	527,155.31	2,661,959.36	4	526,831.64	2,661,813.81



TYPICAL SECTION A/17

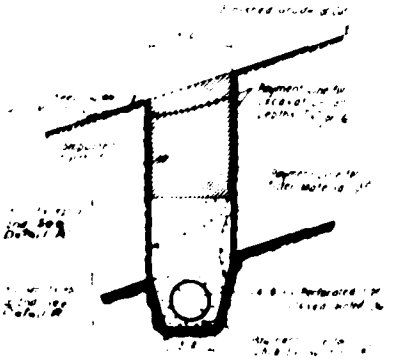


SECTION B/17



DETAIL "A"

SECTION C/17



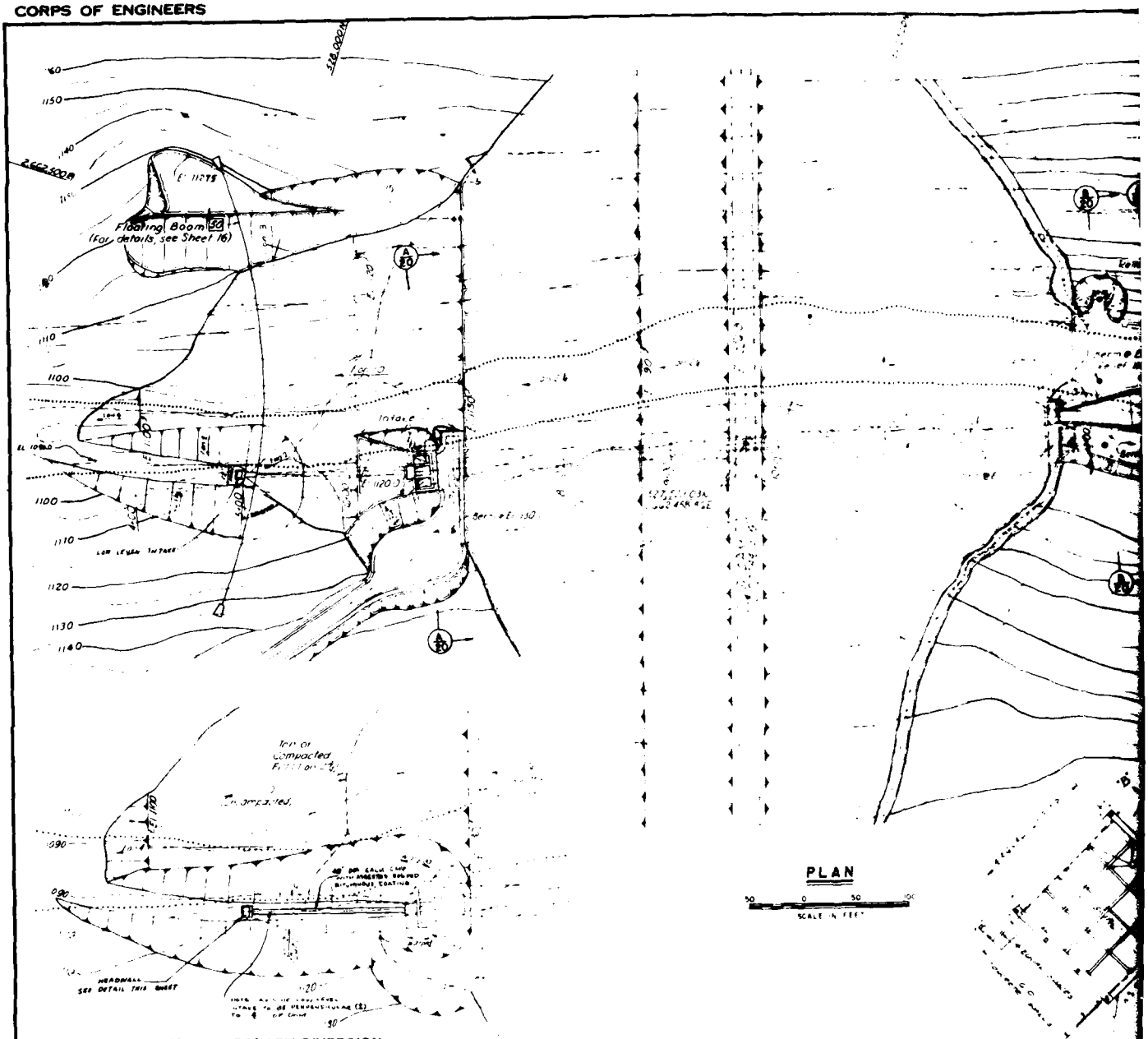
SECTION D/17

LACKAWAXEN RIVER BASIN
PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA

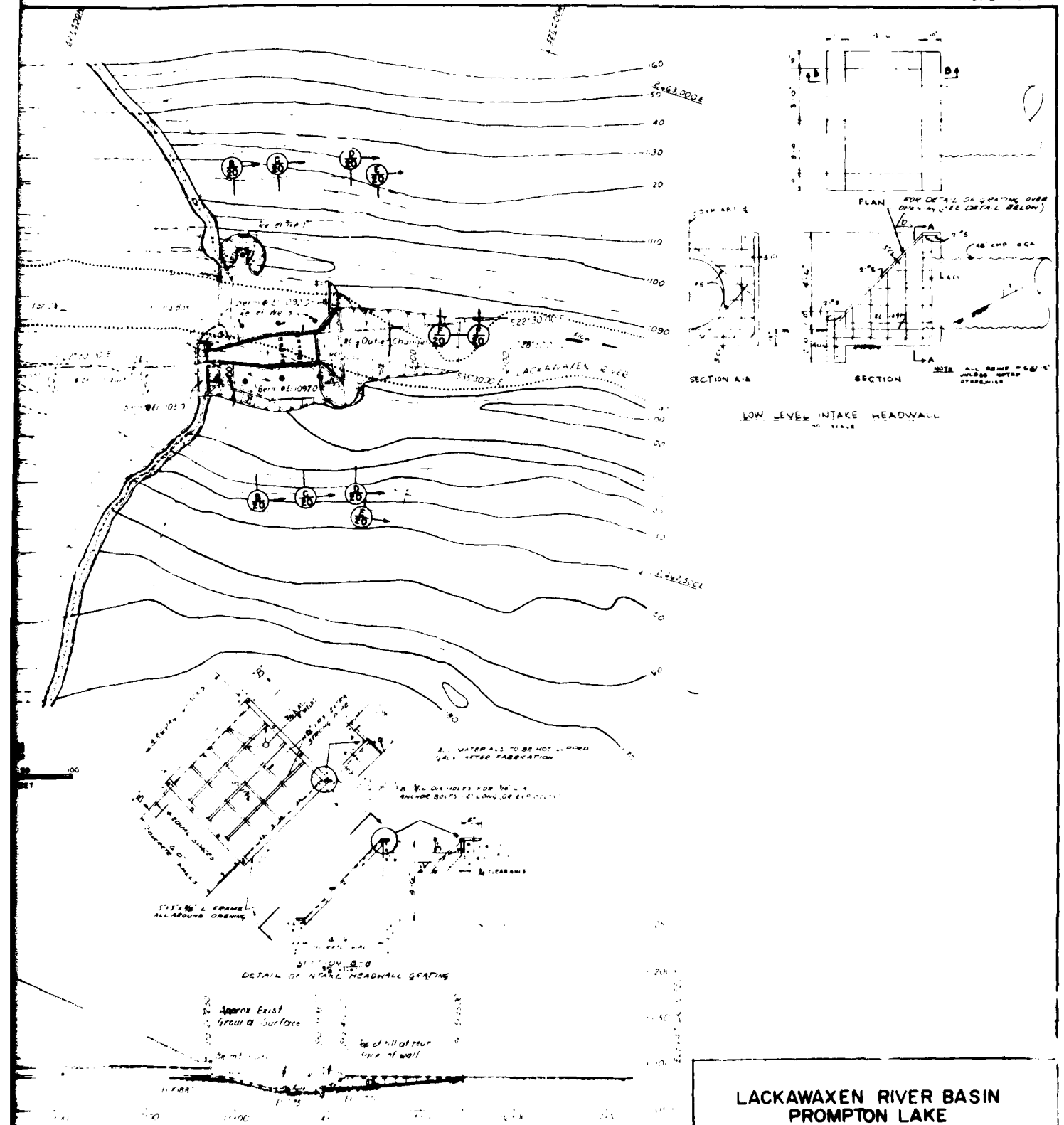
SPILLWAY

PLATE 5

CORPS OF ENGINEERS



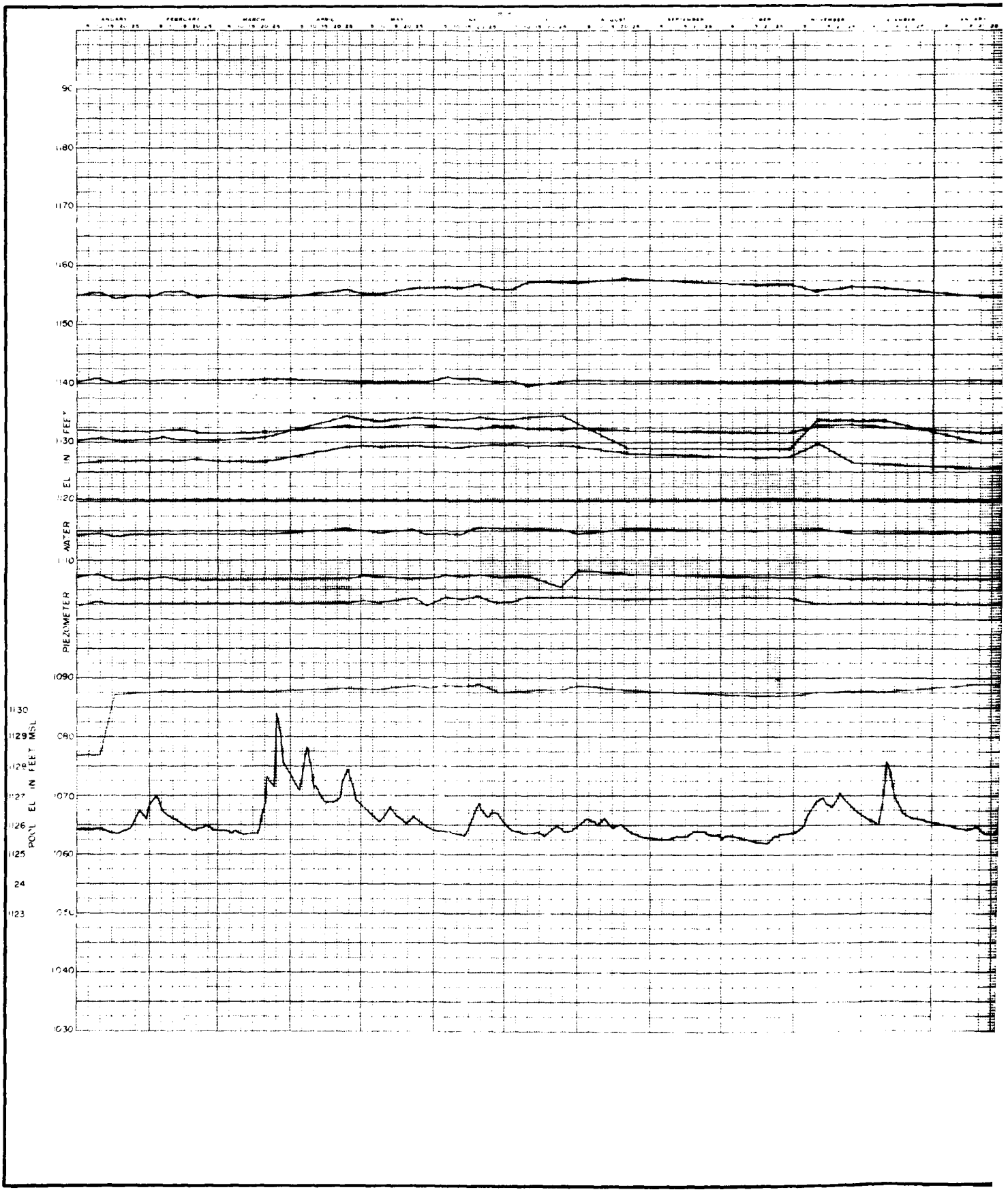
U. S. ARMY



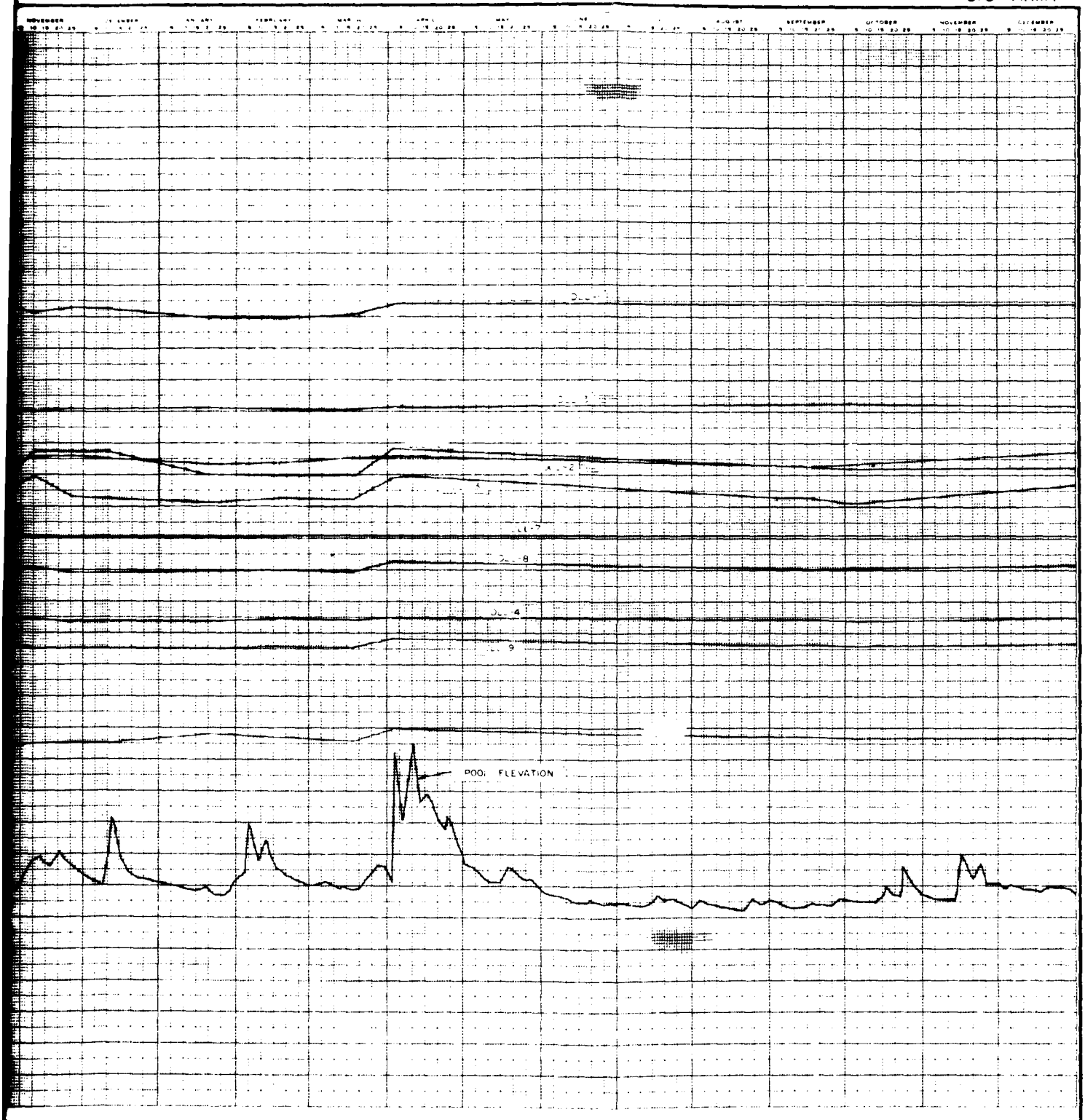
LACKAWAXEN RIVER BASIN
PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA
OUTLET WORKS
PLAN & PROFILE

PLATE 6

CORPS OF ENGINEERS



U.S ARMY

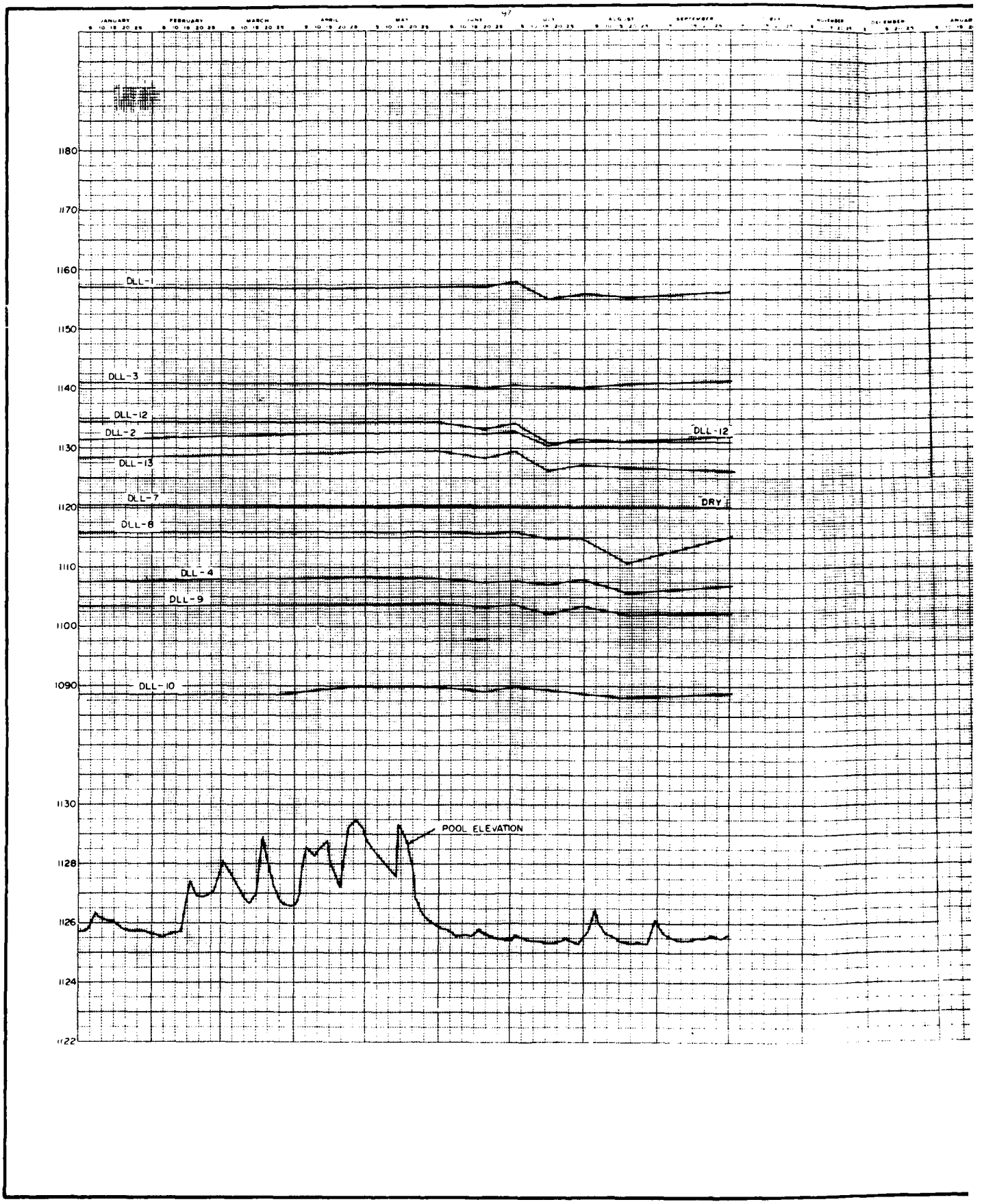


LACKAWAXEN RIVER BASIN
PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA

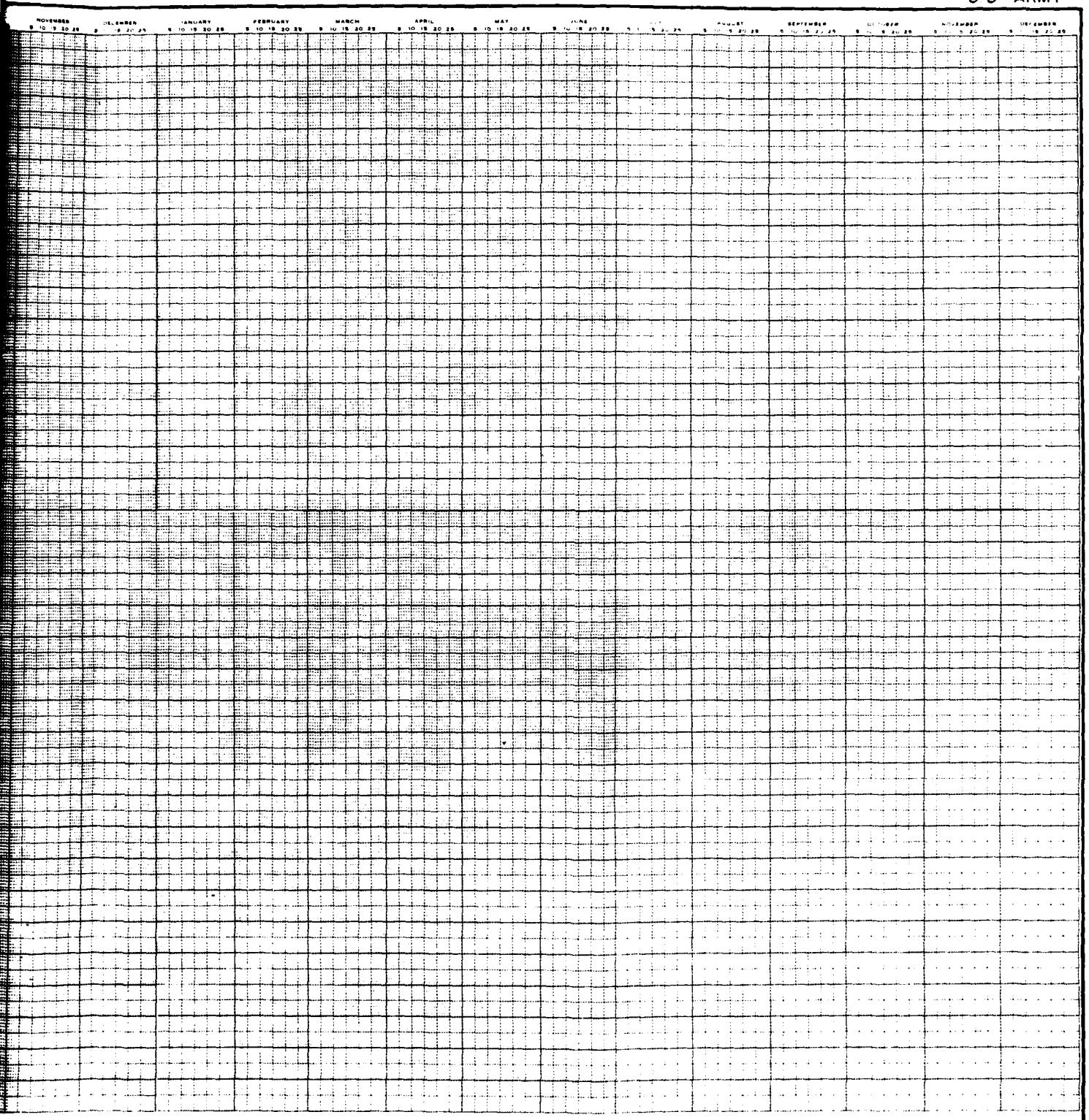
PIEZOMETER DATA
1969-1970

PLATE 7

CORPS OF ENGINEERS



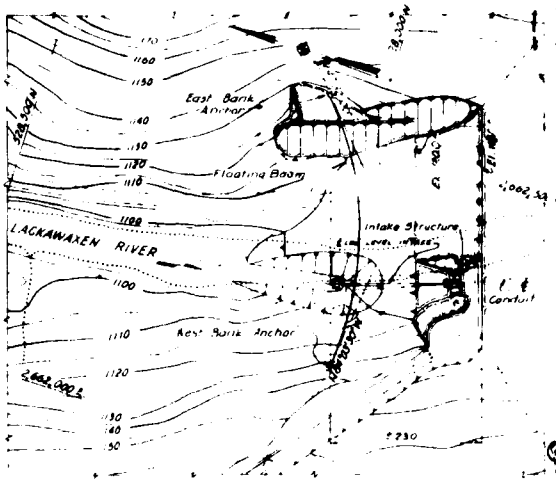
U S ARMY



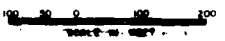
LACKAWAXEN RIVER BASIN
PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA

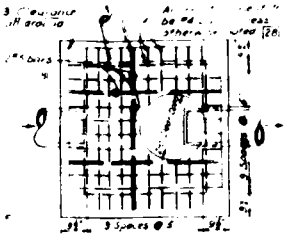
PIEZOMETER DATA
1971

PLATE 8

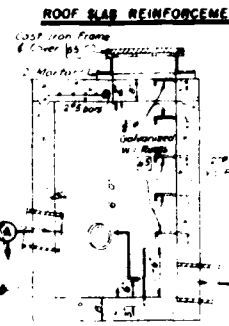


LOCATION PLAN

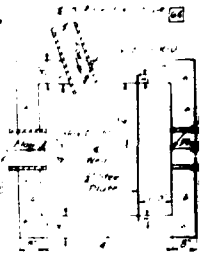




ROOF SLAB REINFORCEMENT



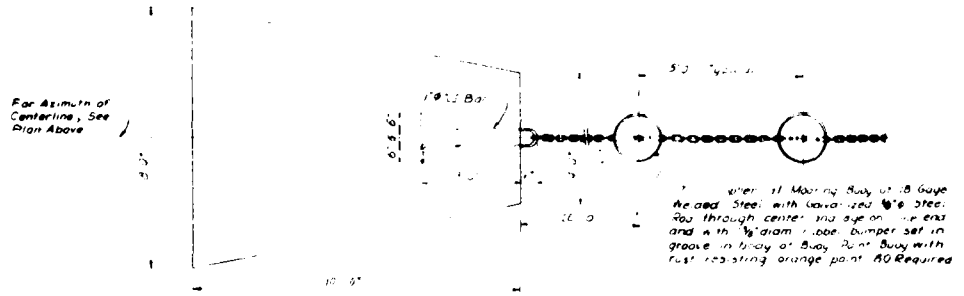
ELEVATION



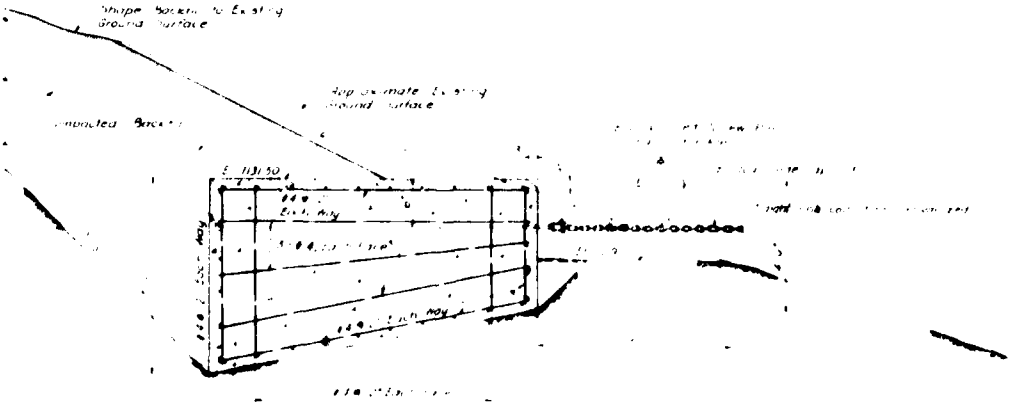
SECTION A-A

CONCRETE MANHOLE DETAILS

SCALE 1 IN. = 2 FT.

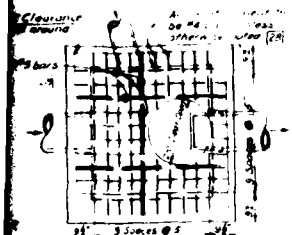


PLAN OF ANCHOR

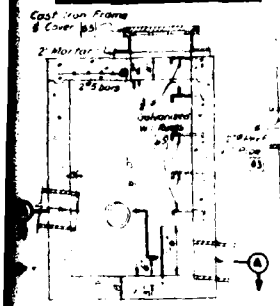


ELEVATION OF ANCHOR

FLOATING BOOM



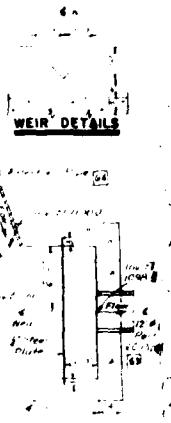
ROOF SLAB REINFORCEMENT



ELEVATION

CONCRETE MANHOLE DETAILS

SCALE 1 IN = 2 FT

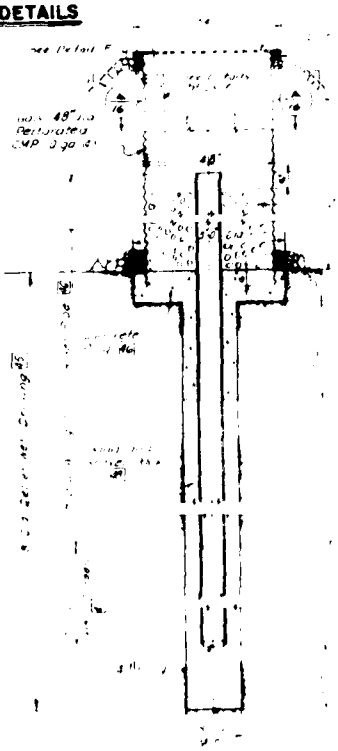


WEIR DETAILS

SECTION A-A

LOCATION PLAN

SCALE IN FEET

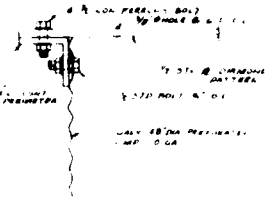


TYPICAL SECTION

RELIEF WELLS

SECTION A/16

NOT TO SCALE

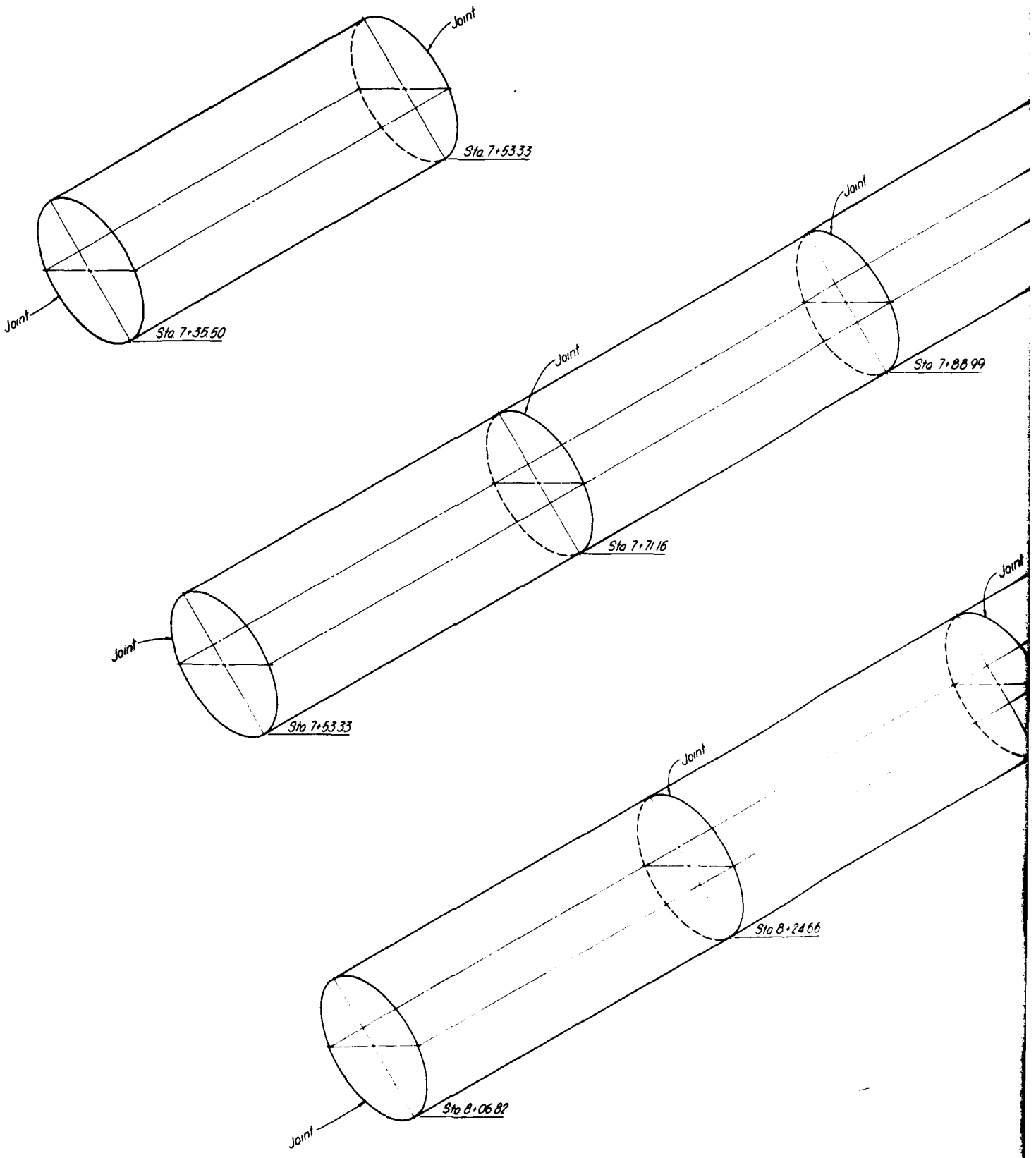


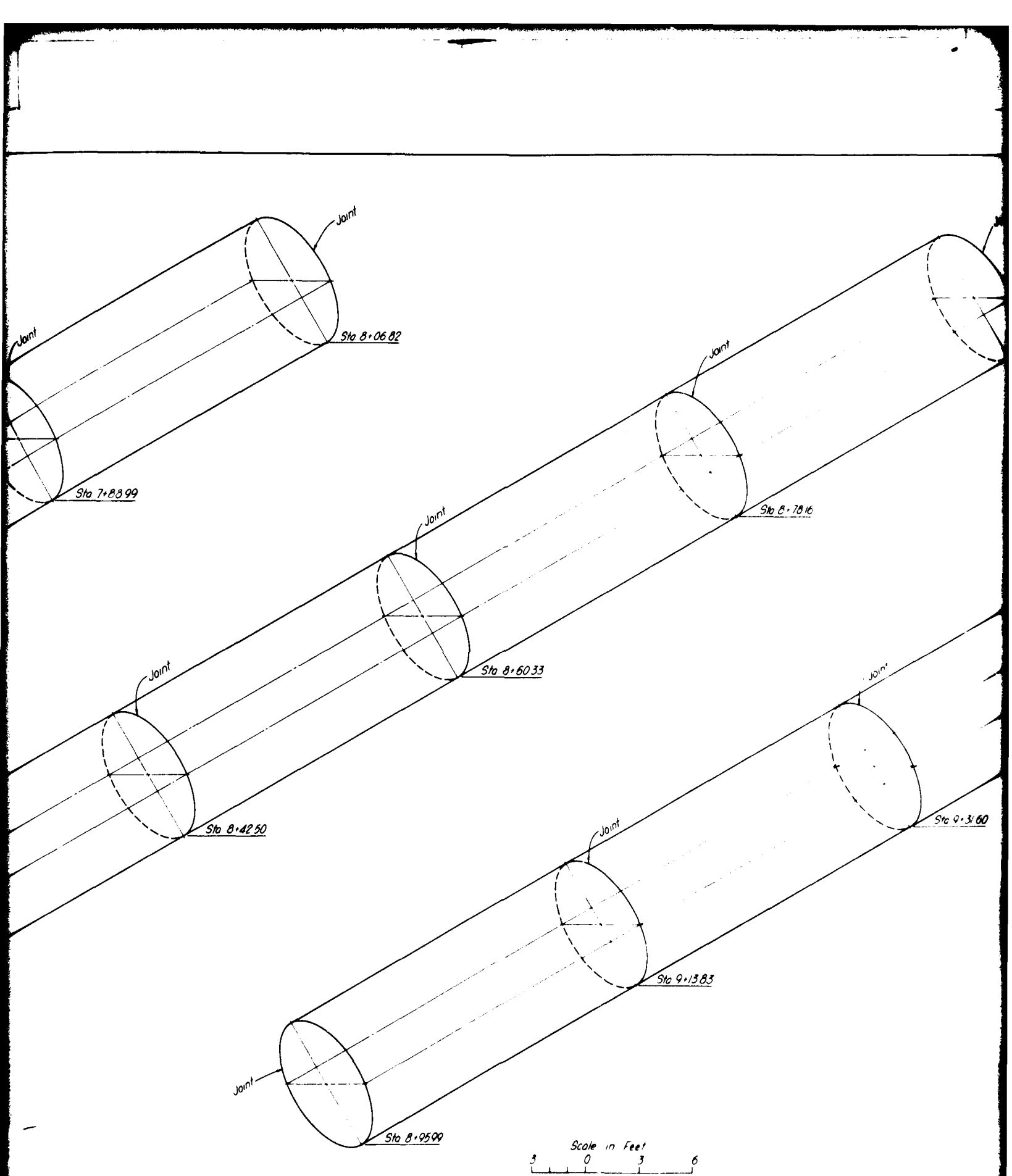
DETAIL "F"

SCALE 3 IN = 1 FT

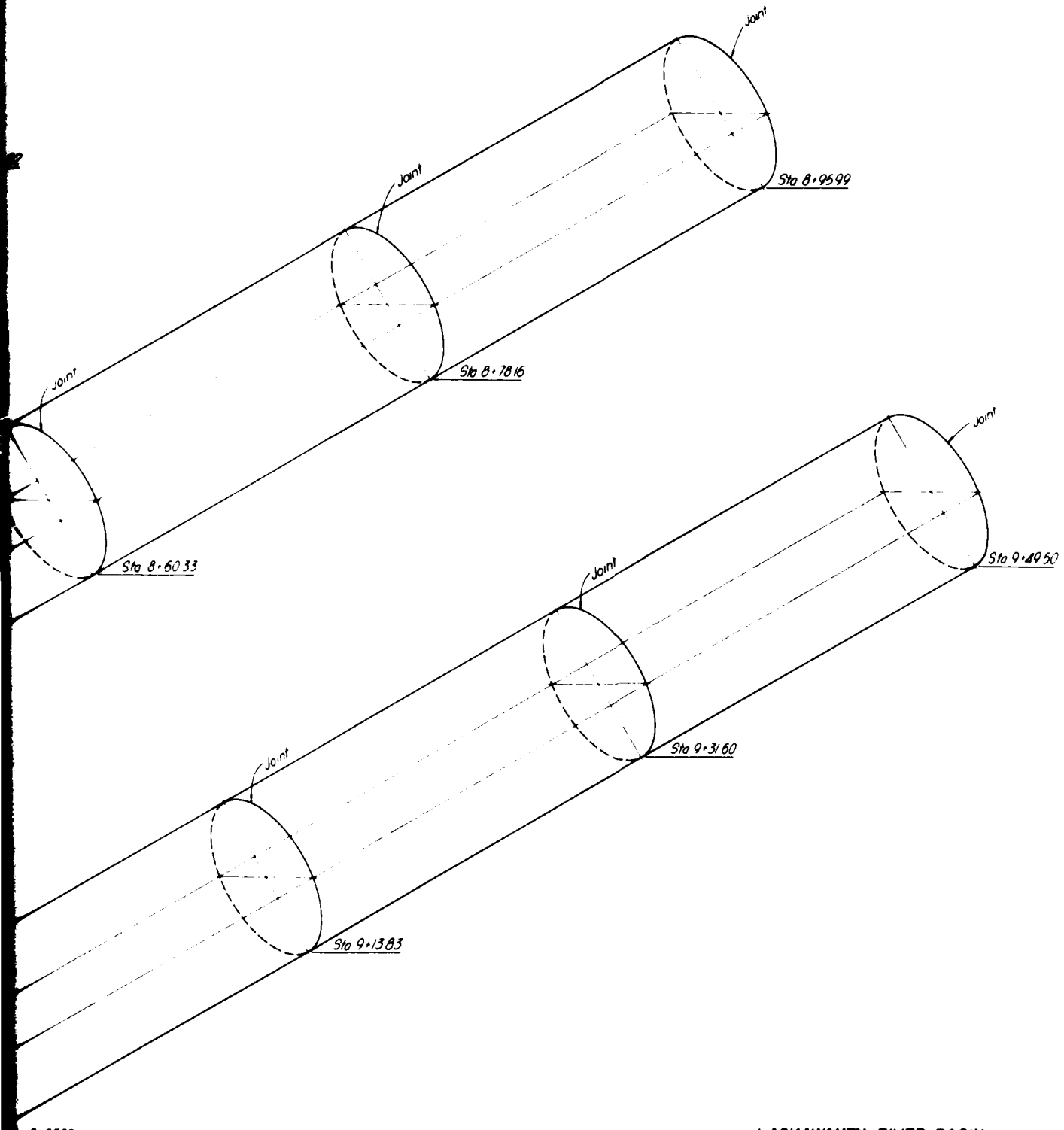
LACKAWAXEN RIVER BASIN
PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA
FLOATING BOOM &
RELIEF WELLS

PLATE 9


Joint
Sta 7+53.33
Joint
Sta 7+35.50
Joint
Sta 7+88.99
Joint
Sta 7+71.16
Joint
Sta 7+53.33
Joint
Sta 8+24.66
Joint
Sta 8+06.82
Joint


Joint
Sta 8+0682
Joint
Sta 7+8899
Joint
Sta 8+7816
Joint
Sta 8+6033
Joint
Sta 8+4250
Joint
Sta 9+3160
Joint
Sta 9+1383
Joint
Sta 8+9599
Scale in Feet
3 0 3 6

STAT

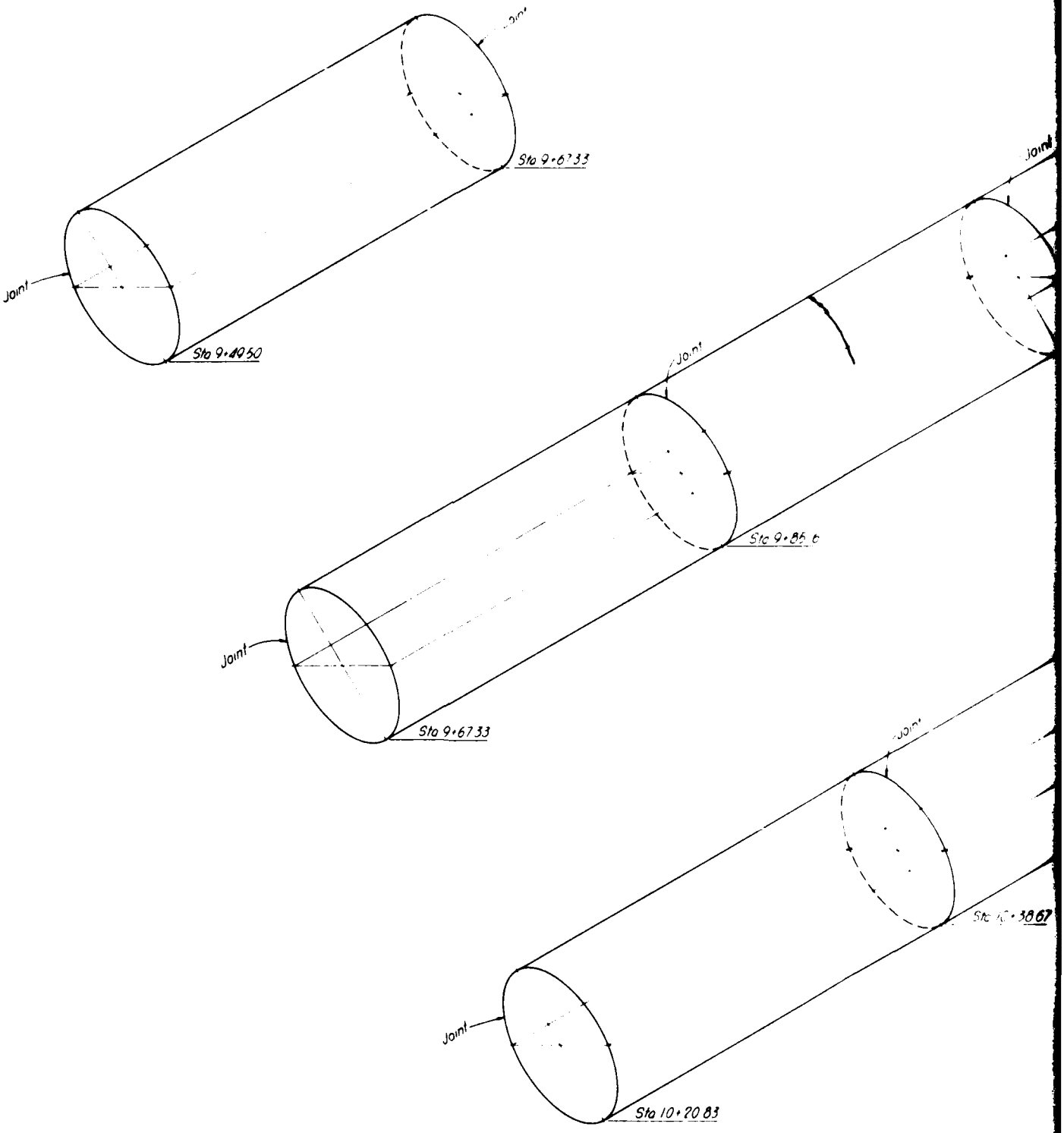


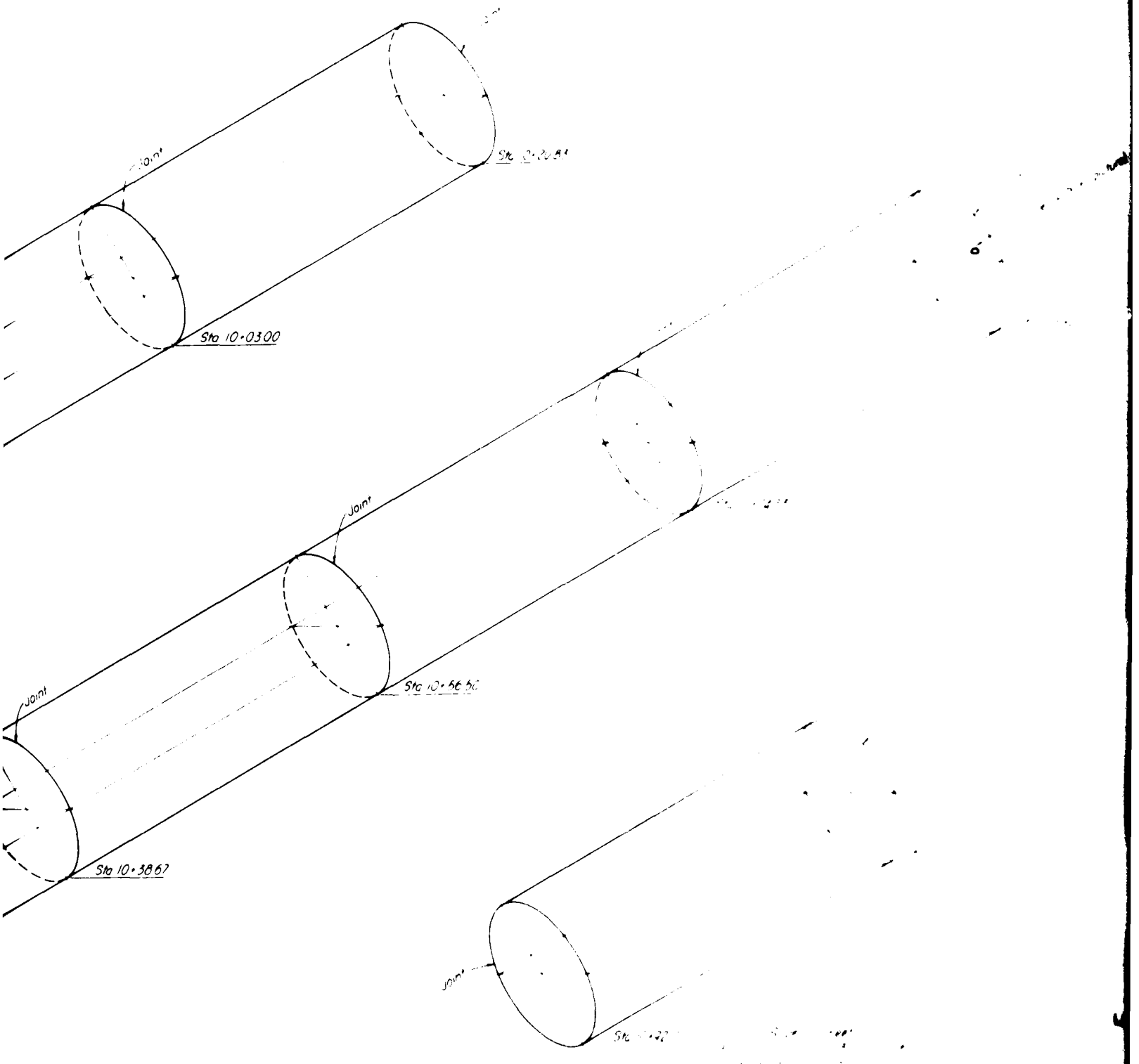
Scale in Feet
3 0 3 6

LACKAWAXEN RIVER BASIN
LACKAWAXEN RIVER PA.
PROMPTON LAKE
CONDUIT CRACK SURVEY
STATION 7+35.50-9+49.50

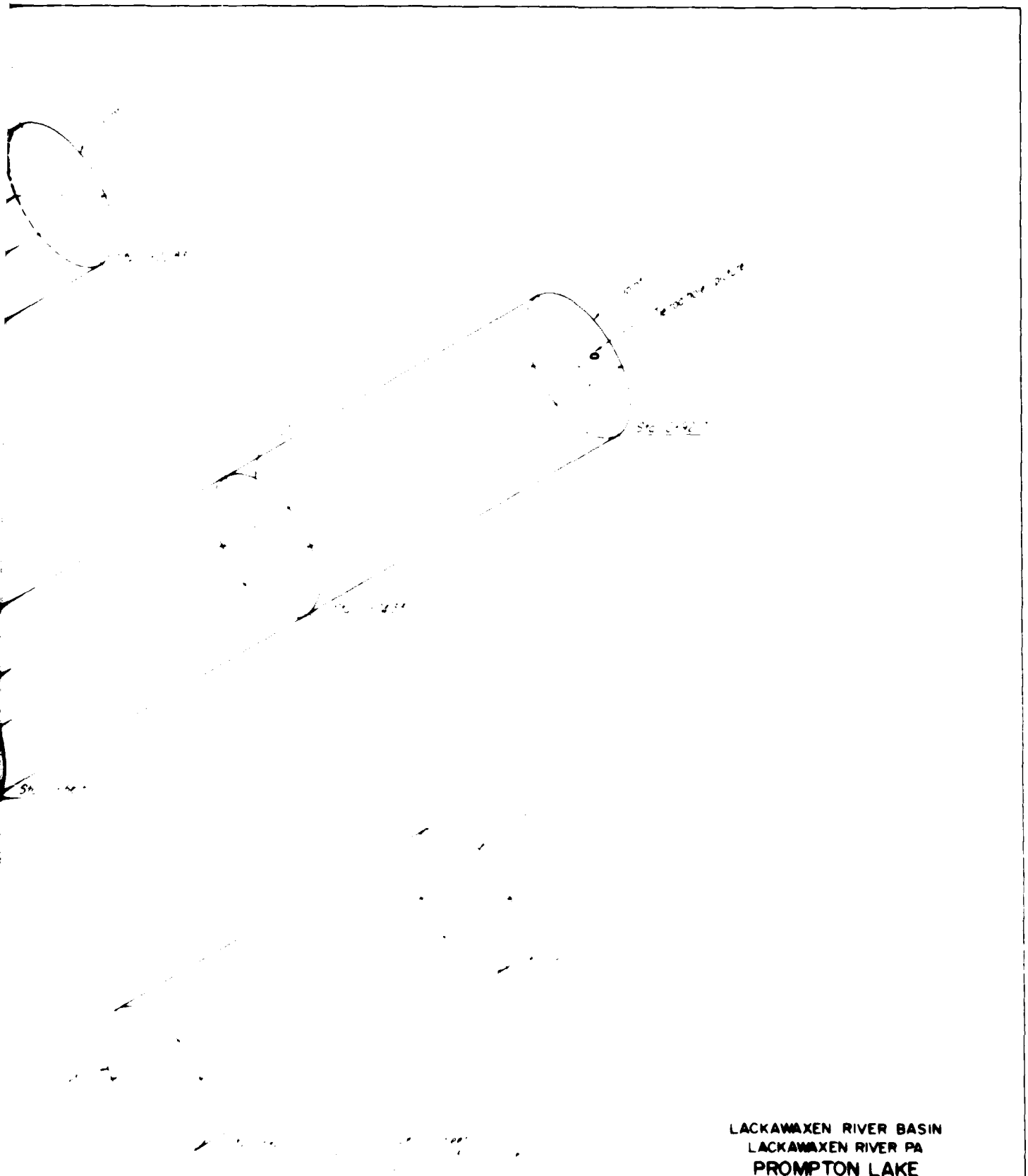
13

PLATE 10


Joint
Sta 9+40 50
Joint
Sta 9+67 33
Joint
Sta 9+67 33
Joint
Sta 9+85 6
Joint
Sta 10+20 83
Joint
Sta 10+38 67

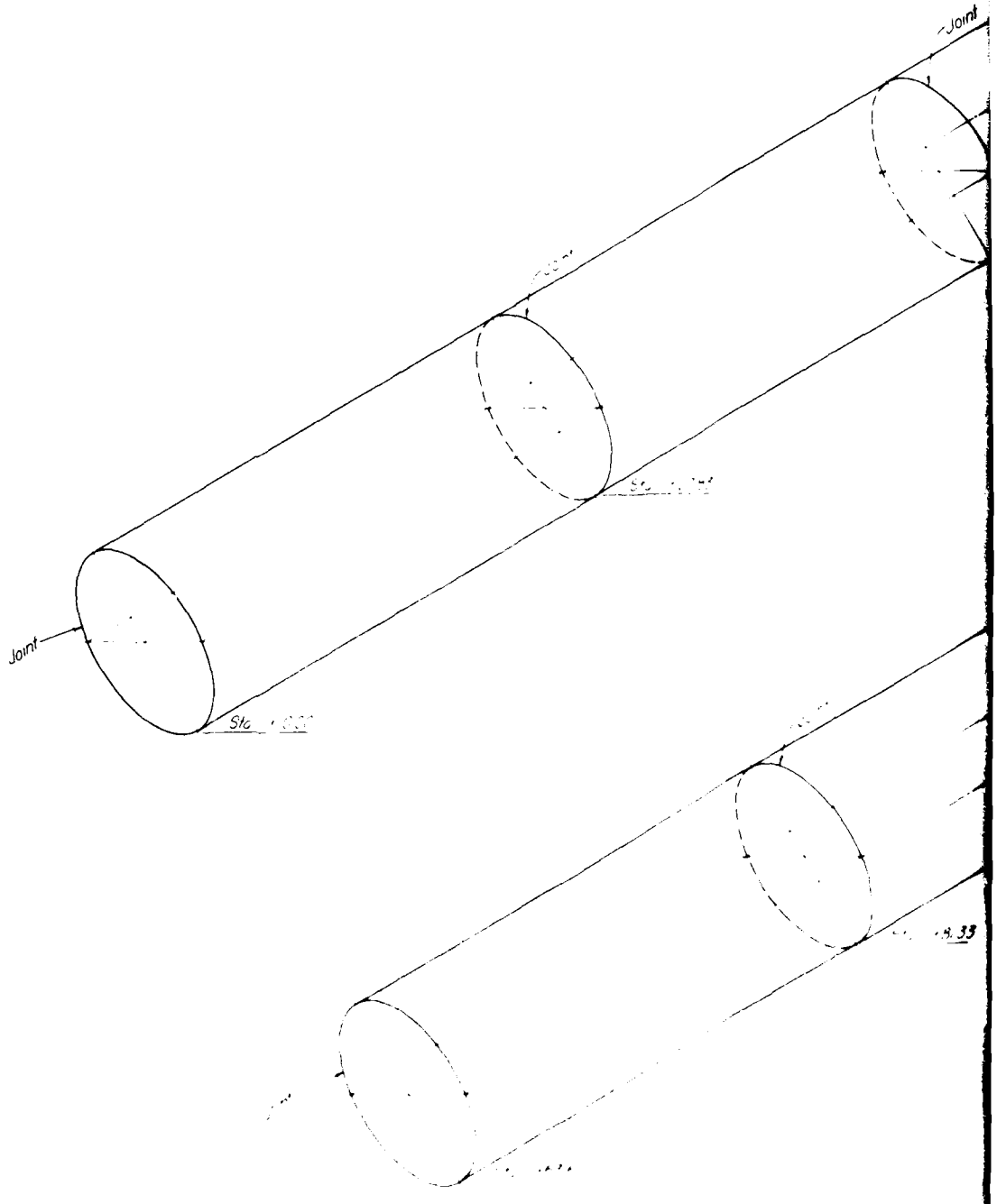


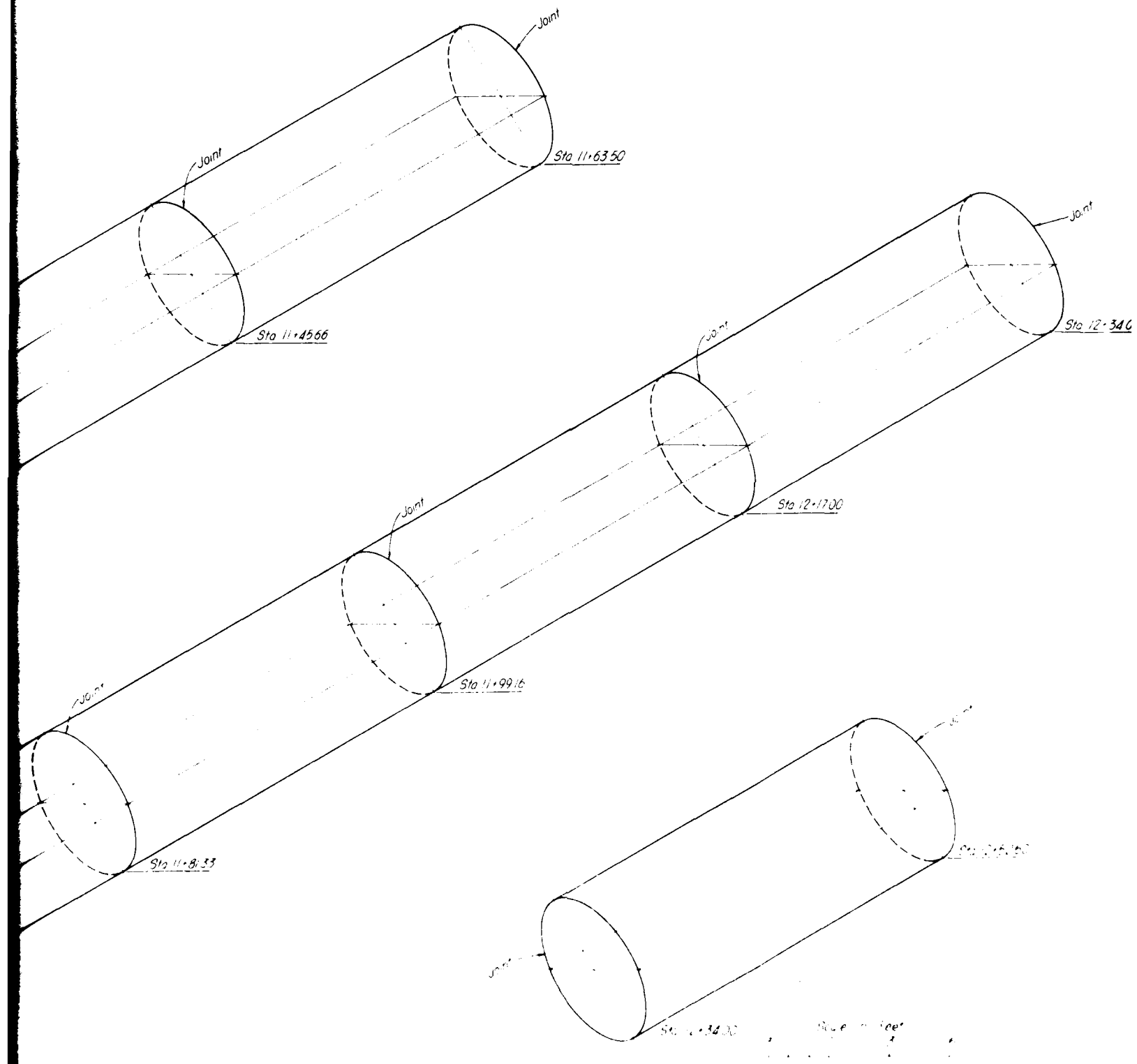
STATI



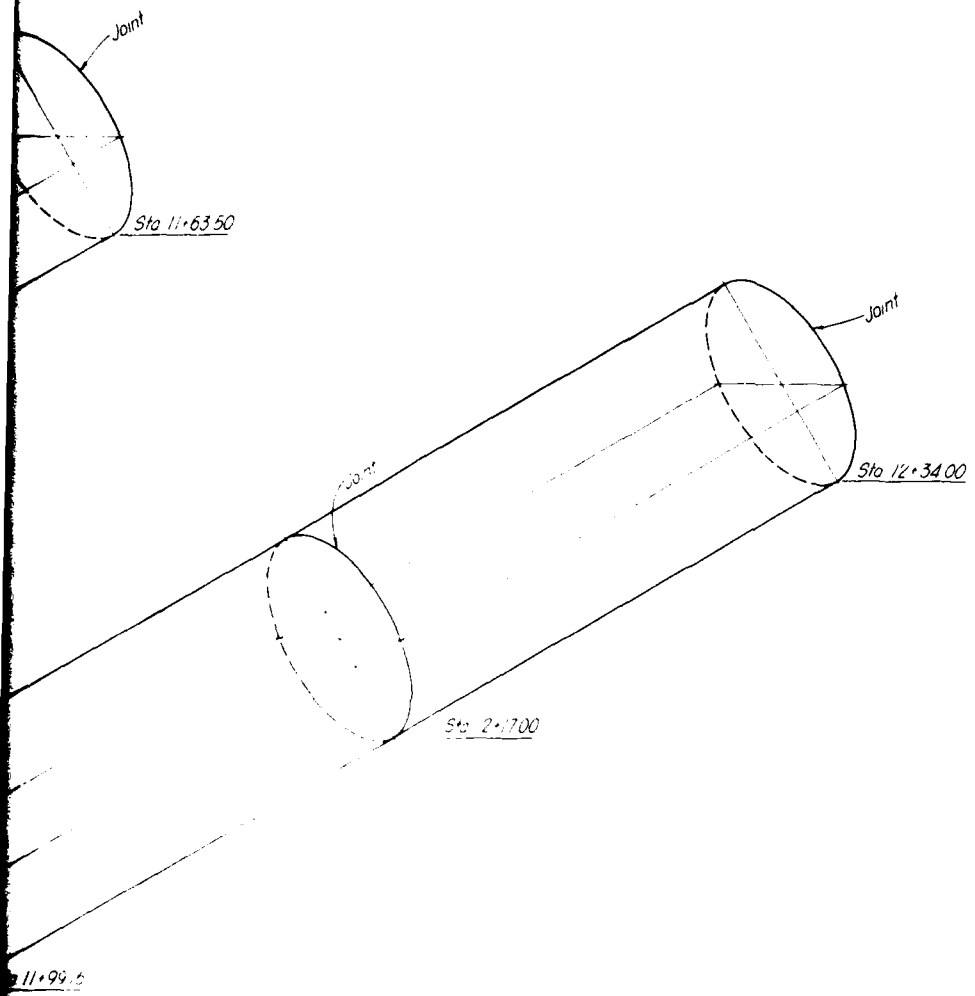
LACKAWAXEN RIVER BASIN
LACKAWAXEN RIVER PA
PROMPTON LAKE
CONDUIT CRACK SURVEY
STATION 9+49.50-11+10.00

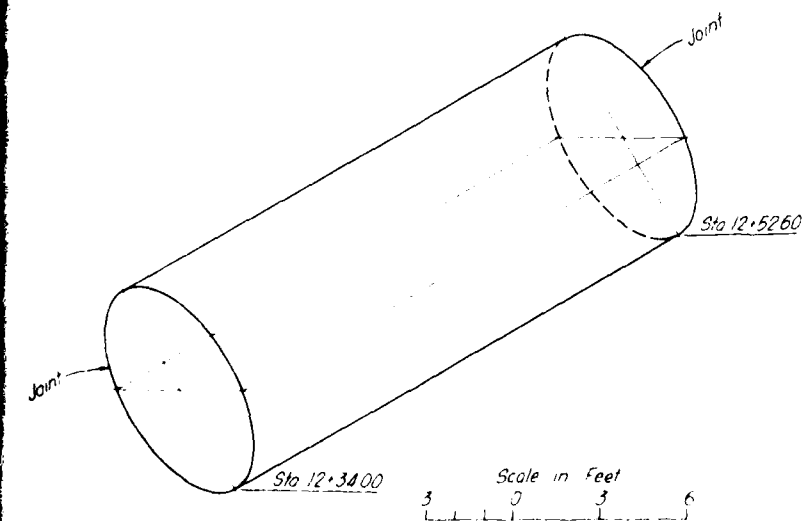
PLATE 11


Joint
Joint


Joint
Joint
Sta 11+6350
Sta 11+4566
Joint
Joint
Sta 12+1700
Joint
Sta 11+9916
Joint
Sta 11+8133

ST





Scale in Feet

3 0 3 6

LACKAWAXEN RIVER BASIN
LACKAWAXEN RIVER PA.
PROMPTON LAKE
CONDUIT CRACK SURVEY
STATION 11+10.00-12+52.60

PLATE 12

APPENDIX A

PROPOSED MODIFICATIONS

PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA

Extract from: House Document 522
87th Congress
2nd Session
16 August 1962

PROMPTON LAKE
PROPOSED MODIFICATIONS

1. Prompton Lake, a single-purpose flood control project (with incidental recreation use), completed in 1960, would be modified for multiple-purpose use to provide supplies of water and recreational benefits, as well as the presently designed flood control function. Prompton Lake is located in the valley of the Lackawaxen River about one-half mile upstream from the confluence of Waymart Branch with the river, and about four miles west of Honesdale, Pennsylvania. The project presently controls 60 square miles of drainage area, is 1,300 feet long and 140 feet high. The spillway, which is cut into the hill around the right (west) end of the dam, is 50 feet wide. A conduit has been built along the right bank to carry limited amounts of flow. This conduit has an uncontrolled inlet at elevation 1125 in the lake pool and a stilling basin at the downstream end.

2. Storage allocations for the modified Prompton Project, based on the most economical modification of the existing lake, would be 3,400 acre-feet of inactive long-term storage to elevation 1125; 28,000 acre-feet of active long-term storage for supplies of water and recreation use to elevation 1180; and 20,300 acre-feet of short-term storage for flood control to elevation 1205. Comparative data on the present and proposed modified project at this site are as follows:

	Present Project	Proposed Modified Project
Capacities, in acre-feet		
Flood Control	20,300	20,300
Water Supply	0	28,000
Inactive	3,400	3,400
Elevation Top of Pool, in feet, M.S.L.		
Flood Control	1168.1	1,205
Water Supply		1,180
Inactive	1125.0	1,125

The long-term storage requirement and operation for multiple-purposes dictate the following additions or modifications to the structures presently in use:

a. A control tower with gates and a service bridge to control releases from the lake.

b. A blanket of impervious material on the valley wall and floor upstream from the present embankment.

c. Widening of the spillway to 250 feet.

d. Clearing of reservoir land and relocating roads subject to inundation.

3. The lake to be created by long-term storage up to elevation 1180 will extend about four miles upstream. The reservoir for short-term storage would rise to about the same level as that for the existing structure and hence would require procurement of flowage easement on only 30 acres of land in addition to that already under easement. The modified Prompton development will include a total area of 2,055 acres. In addition to the 730 acres required for directly related recreation and 400 acres for indirectly related recreation, the total estimated cost of the modified multiple-purpose project, excluding $387,000 for indirectly related recreation, is $8,050,000, which is made up of $3,700,000 as the cost of the present flood control project and $4,350,000 estimated as the cost for the modifications previously discussed. Of this amount, $427,000 are included as the estimated specific costs of directly related recreation. The directly and indirectly related recreation costs are composed of the following:

Item	Estimated Specific Recreation Costs	
	Directly Related	Indirectly Related
Land	$ 144,000	$ 62,000
Facilities	283,000	325,000
Total	$ 427,000	$ 387,000

The cost of land acquired by the Commonwealth for recreation purposes is included in these estimates of recreation costs.

4. Use of 28,000 acre-feet of active long-term storage at the Prompton Lake Project for water supplies would result in a net yield of 57 cubic feet per second. This augmentation of flow will contribute to the satisfaction of the water needs of the Trenton-Philadelphia area for the projected 50-year period under consideration.

Flood heights on the Lackawaxen River were substantially reduced by the Prompton Project and the Edgar Jadwin Dam and Reservoir on Dyberry Creek, above Honesdale, Pennsylvania. The towns of Honesdale, located at the confluence of Dyberry Creek with the Lackawaxen River, and Hawley, located between the junctions Middle Creek and Wallenpaupack Creek with the Lackawaxen River, obtain substantial relief from frequent and considerable flood damage. Several villages and seven townships located in the lower reaches of Lackawaxen River have residential, commercial, utility, highway and other developments on the flood plain, and experienced 1-1/2 million dollars in flood damage in 1955. Conversion of Prompton Lake to a multiple-purpose development would preserve the flood control function of this project as originally authorized and flood reduction benefits will be unaffected by the proposed modification. Control of flood waters by the Prompton and Edgar Jadwin Projects reduce the river stages at Hawley, Pennsylvania by about four feet for a flood of the magnitude experienced in 1955. Additional limited reduction of flood damage will accrue on the main stem of the Delaware River from the Prompton and Edgar Jadwin Projects.

The Prompton Lake Project would provide a total recreation capacity to accomodate a total of 156,300 visitors annually. Of these, 81,900 visitors annually are credited to the directly related recreation developments. Due to the lack of suitable terrain, recreation potential at this project is limited. However, lands suitable for day-use recreation are included in the plan of improvement. Necessary roads, trails, sanitary and administrative facilities will be provided. Hunting will be permitted in appropriate season and under reasonable regulation to assure public safety. Operation of the project will consider the downstream flow requirements for stream fisheries and the management of the impoundment for lake fisheries as a coordinated element for full realization of the recreational potential of the project.

APPENDIX B

CONDUIT SETTLEMENT STUDY
CONDITION REPORT

PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA

PROMPTON LAKE

CONDUIT SETTLEMENT STUDY
CONDITION REPORT

TABLE OF CONTENTS

PROMPTON LAKE
CONDUIT SETTLEMENT STUDY

1. The outlet works conduit for Prompton Lake is founded on overburden extending about 115 feet to bedrock and consisting mainly of glacial till. The circular conduit is 535 feet in length. Construction of the embankment was started in the spring of 1959 and completed in late 1960. Other pertinent data are:

DAM

Height	-	140 feet
Type	-	Earthfill
Upstream Slope	-	2.25:1 and 2.75:1
Downstream Slope	-	2.25:1 and 2.50:1

CONDUIT

Diameter	-	8.75 feet
Wall Thickness	-	2.0 to 2.5 feet
Monolith Length	-	17.83 feet

More detailed pertinent data is heretofore presented as an introduction to the periodic inspection report.

2. Initiation of the Conduit Settlement Study was begun when weaving of the foundation soil under the excavation equipment occurred during initial conduit excavation. Well points were installed to complete the excavation and a reanalysis of possible conduit movements, both vertical and horizontal, was made.

3. The study indicated that settlement of the conduit would occur under existing soil conditions and that horizontal movements could take place resulting in widening of the conduit joints. Changes in the joint design were made to minimize possible adverse effects and settlement observation points were established along the conduit at the intake and stilling basin. Locations of the observation points on the intake and stilling basin structures are shown on plate 1. Lead plugs were installed about one-foot apart at the crown of the conduit on both sides of each construction joint for measurement of the joint openings. Bench marks were also established on the invert at the construction joints. A camber of 0.70 feet at the centerline of dam (no change from initial design) was provided in the conduit grade to compensate for the predicted settlement.

4. Observations and measurements were made over a period of 2-1/2 years during and immediately after construction of the embankment, during the periodic inspection of 1966, and again in 1971 in preparation for the five-year periodic inspection. The readings and indicated movements are listed in tables 1, 2, and 3, and plots of the conduit settlement are shown on plate 2.

5. Maximum settlement of the conduit occurred near the center of the dam (Station 10+56.50). This settlement amounted to 0.41 feet (4.9 inches) for the most recent set of observations and thus did not exceed the camber built into the conduit. The annual increment of settlement in the five-year period preceding the latest set of readings (18 May 1971) was very small in comparison with that for the initial year, 0.01 to 0.37 feet, at the point of maximum settlement. The full height of embankment was in place throughout the last ten years of observation.

6. Observation of the changes in the distance between lead plugs at the conduit construction joints shows that during the first year all the joints opened approximately 1/8-inch. A total increase of length of the conduit, amounting to 2-1/2 inches, is indicated by these readings. During the succeeding years, it appears that a reversal of movement occurred with most of the joints returning to their initial position. The net change, indicated by the 1971 readings, is 0.79 inches decrease in length of the conduit.

7. Settlement measurements were made at six points on the stilling basin, as shown on plate 1. The maximum settlement of 0.13 and 0.12 feet occurred at points 4 and 1 of the stilling basin, where the structure joins the conduit. The maximum increment of settlement during the five-year period prior to 1971 was only 0.02 feet.

8. Measurements were made at two points on the intake structure. The total movement of this structure to date amounted to 0.08 feet. This amount, 0.08 feet, took place in the first year and a half. A movement of 0.1 feet occurred in the second year, and a reversal of that movement took place in the ten-year period since 1961.

9. Performance of the conduit has been satisfactory. The latest inspection of the conduit, conducted in 1971, showed no spalling of concrete at conduit joints, such as might occur from rotation of adjacent monoliths with respect to each other due to unequal settlement.

TABLE 1

SETTLEMENT STUDY - PROMPTON DAM

INTAKE STRUCTURE & STILLING BASIN

Point	(1) Initial Elevation 20 Jul 59	(2) Elevation 15 Aug 60	(3) Elevation 16 Nov 61	(4) Elevation 19 May 71	Difference Between (1) & (2)	Difference Between (2) & (3)	Difference Between (3) & (4)	Difference Between (1) & (4)
I-1	1124.88	1124.96	1124.97	1124.96	0.08	0.01	0.01	0.08
I-2	1124.92	1124.99	1125.00	1124.99	0.07	0.01	0.01	0.07
S-1	1103.94	1103.82	1103.82	1103.82	0.12	0.00	0.00	0.12
S-2	1097.96	1097.88	1097.87	1097.86	0.08	0.01	0.01	0.10
S-3	1097.89	1097.81	1097.82	1097.80	0.08	0.01	0.02	0.09
S-4	1103.95	1103.84	1103.83	1103.82	0.11	0.01	0.01	0.13*
S-5	1097.93	1097.84	1097.85	1097.83	0.09	0.01	0.02	0.10
S-6	1097.92	1097.89	1097.83	1097.82	0.03	0.06	0.01	0.10

* Point of maximum movement.

TABLE 2

CONDUIT SETTLEMENT STUDY - PI

ELEVATION ON LEAD PLUGS AT CROW

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Station	Initial 19 May 59	3 Jun 59	8 Aug 60	15 Nov 61	28 Jun 66	18 May 71	Differe Betwee (2) & (
7+35.50	1099.206	1099.202	1099.02	1099.02	1099.01	1098.98	0.004
7+53.33	1099.159	1099.148	1098.95	1098.98	1098.97	1098.94	0.011
7+71.16	1099.166	1099.158	1098.95	1098.98	1098.96	1098.93	0.008
7+88.99	1099.162	1099.153	1098.94	1098.96	1098.94	1098.92	0.009
8+06.82	1099.182	1099.158	1098.95	1098.98	1098.97	1098.93	0.024
8+24.66	1099.133	1099.126	1098.89	1098.92	1098.90	1098.87	0.007
8+42.50	1099.149	1099.143	1098.90	1098.92	1098.91	1098.88	0.006
8+60.33	1099.036	1099.016	1098.78	1098.80	1098.78	1098.76	0.020
8+78.16	1099.016	1099.010	1098.74	1098.76	1098.75	1098.71	0.006
8+95.99	1098.995	1098.987	1098.71	1098.72	1098.73	1098.67	0.008
9+13.83	1099.008	1099.003	1098.73	1098.74	1098.73	1098.68	0.005
9+31.60	1098.887	1098.882	1098.58	1098.60	1098.58	1098.54	0.005
9+49.50	1098.822	1098.820	1098.50	1098.52	1098.51	1098.46	0.002
9+67.33	1098.754	1098.752	1098.42	1098.44	1098.42	1098.38	0.002
9+85.16	1098.686	1098.680	1098.34	1098.36	1098.34	1098.29	0.006
10+03.00	1098.595	1098.596	1098.25	1098.26	1098.24	1098.20	0.001
10+20.83	1098.473	1098.473	1098.11	1098.13	1098.11	1098.07	0.000
10+38.67	1098.389	1098.390	1098.03	1098.04	1098.03	1097.99	0.001
10+56.50	1098.277	1098.274	1097.90	1097.93	1097.92	1097.87	0.003
10+74.33	1098.153	1098.156	1097.81	1097.83	1097.82	1097.78	0.001
10+92.17	1098.022	1098.020	1097.69	1097.73	1097.72	1097.67	0.002
11+10.00	1097.877	1097.876	1097.57	1097.59	1097.58	1097.54	0.001
11+27.83	1097.760	1097.510	1097.47	1097.49	1097.48	1097.44	0.25
11+45.66	1097.582	1097.574	1097.32	1097.33	1097.33	1097.29	0.00
11+63.50	1097.384	1097.429	1097.19	1097.22	1097.21	1097.18	0.04
11+81.33	1097.237	1097.236	1097.03	1097.04	1097.04	1097.00	0.001
11+99.16	1097.092	1097.131	1096.90	1096.92	1096.91	1096.88	0.03
12+17.00	1096.942	1096.934	1096.77	1096.79	1096.79	1096.76	0.00
12+34.00	1096.734	1096.739	1096.59	1096.62	1096.62	1096.59	0.00
12+52.60	1096.557	1096.558	1096.43	1096.45	1096.45	1096.43	0.00

* Point of Maximum Movement.

TABLE 2

IT SETTLEMENT STUDY - PROMPTON DAM

ON ON LEAD PLUGS AT CROWN OF INTRADOS

(7) 18 May 71	(8) Difference Between (2) & (3)	(9) Difference Between (3) & (4)	(10) Difference Between (4) & (5)	(11) Difference Between (5) & (6)	(12) Difference Between (6) & (7)	(13) Total Difference Between (2) & (7)
1098.98	0.004	0.182	0.00	0.01	0.03	0.226
1098.94	0.011	0.198	0.03	0.01	0.03	0.219
1098.93	0.008	0.208	0.03	0.02	0.03	0.236
1098.92	0.009	0.213	0.02	0.02	0.02	0.242
1098.93	0.024	0.208	0.03	0.01	0.04	0.252
1098.87	0.007	0.236	0.03	0.02	0.03	0.263
1098.88	0.006	0.243	0.02	0.01	0.03	0.269
1098.76	0.020	0.236	0.02	0.02	0.02	0.276
1098.71	0.006	0.270	0.02	0.01	0.04	0.306
1098.67	0.008	0.277	0.01	0.01	0.06	0.325
1098.68	0.005	0.273	0.01	0.01	0.05	0.328
1098.54	0.005	0.302	0.02	0.02	0.04	0.347
1098.46	0.002	0.320	0.02	0.01	0.05	0.362
1098.38	0.002	0.332	0.02	0.02	0.04	0.374
1098.29	0.006	0.340	0.02	0.02	0.05	0.396
1098.20	0.001	0.346	0.01	0.02	0.04	0.395
1098.07	0.000	0.363	0.02	0.02	0.04	0.403
1097.99	0.001	0.360	0.01	0.01	0.04	0.399
1097.87	0.003	0.374	0.03	0.01	0.05	0.407*
1097.78	0.003	0.346	0.02	0.01	0.04	0.373
1097.67	0.002	0.330	0.04	0.01	0.05	0.352
1097.54	0.001	0.306	0.02	0.01	0.04	0.337
1097.44	0.250	0.040	0.02	0.01	0.04	0.320
1097.29	0.008	0.254	0.01	0.00	0.04	0.292
1097.18	0.045	0.239	0.03	0.01	0.03	0.204
1097.00	0.001	0.206	0.01	0.00	0.04	0.237
1096.88	0.039	0.231	0.02	0.01	0.03	0.212
1096.76	0.008	0.164	0.02	0.00	0.03	0.182
1096.59	0.005	0.129	0.03	0.00	0.03	0.144
1096.43	0.001	0.128	0.02	0.00	0.02	0.127

TABLE 3

CONDUIT SETTLEMENT STUDY - PR(

CHANGES IN WIDTH OF CONDUIT

From Approximate Station	To Approximate Station	Distance Between Lead Plugs* (1) 21 Jul 59	(2) 13 Jul 60	(3) 15 Nov 61	(4) 28 Jun 66	(5) 18 May 71
7 + 34	7 + 36	1.285	1.29	1.29	1.29	1.28
7 + 52	7 + 53	1.110	1.12	1.11	1.11	1.10
7 + 70	7 + 71	1.050	1.06	1.05	1.05	1.04
7 + 88	7 + 89	1.340	1.34	1.34	1.34	1.33
7 + 06	8 + 07	1.290	1.30	1.29	1.29	1.29
8 + 24	8 + 25	1.065	1.07	1.07	1.07	1.06
8 + 41	8 + 43	1.065	1.07	1.07	1.07	1.06
8 + 59	8 + 60	1.155	1.17	1.16	1.16	1.16
8 + 77	8 + 78	1.040	1.05	1.04	1.04	1.04
8 + 95	8 + 96	1.015	1.03	1.02	1.02	1.02
9 + 13	9 + 14	1.035	1.04	1.04	1.04	1.04
9 + 31	9 + 32	1.000	1.02	1.01	1.01	1.01
9 + 48	9 + 50	1.020	1.04	1.03	1.03	1.03
9 + 66	9 + 67	1.025	1.03	1.03	1.03	1.02
9 + 84	9 + 85	0.998	1.01	1.00	1.00	1.00
10 + 02	10 + 03	1.040	1.05	1.04	1.04	1.04
10 + 20	10 + 21	1.015	1.02	1.02	1.02	1.01
10 + 38	10 + 39	1.055	1.07	1.06	1.06	1.06
10 + 55	10 + 57	1.038	1.04	1.04	1.04	1.03
10 + 73	10 + 74	1.035	1.05	1.03	1.04	1.03
10 + 91	10 + 92	1.200	1.21	1.20	1.20	1.20
11 + 09	11 + 10	1.110	1.12	1.12	1.12	1.11
11 + 27	11 + 28	1.100	1.12	1.14	1.11	1.11
11 + 45	11 + 46	1.090	1.09	1.08	1.09	1.08
11 + 62	11 + 64	1.090	1.10	1.09	1.09	1.09
11 + 80	11 + 82	1.100	1.11	1.10	1.10	1.10
11 + 98	11 + 99	1.130	1.13	1.12	1.12	1.12
12 + 16	12 + 17	1.090	1.09	1.09	1.09	1.08
12 + 34	12 + 35	1.130	1.13	1.13	1.12	1.12
12 + 51	12 + 53	1.110	1.12	1.11	1.11	1.11

* Distance across joints measured between lead plugs set in crown of conduit.

TABLE 3

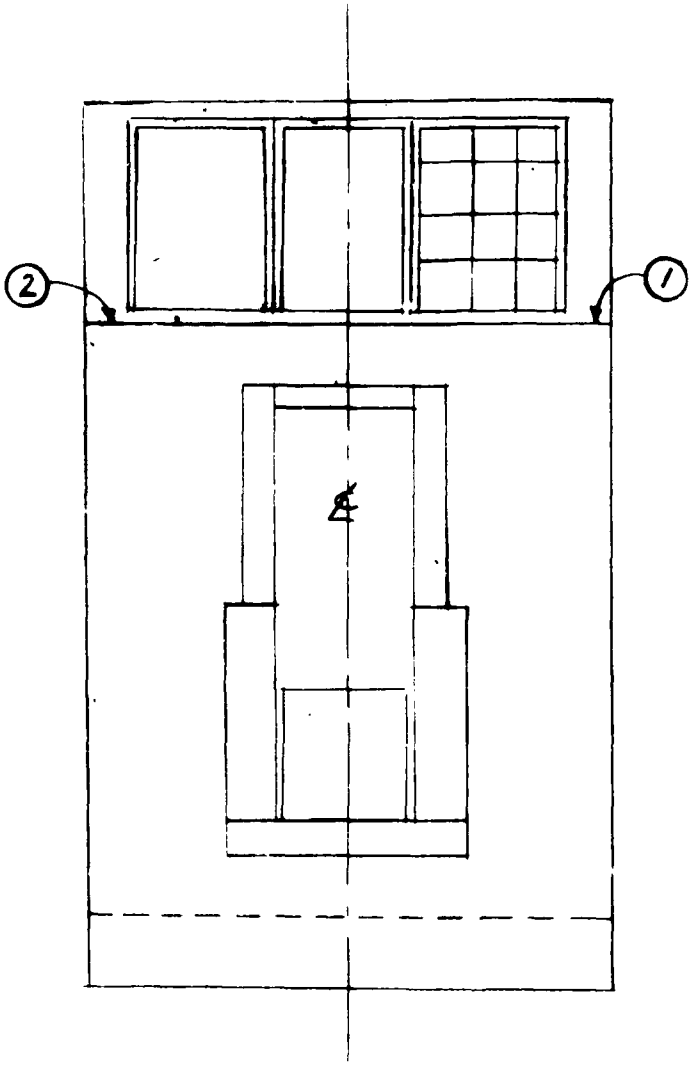
SETTLEMENT STUDY - PROMPTON DAM

S IN WIDTH OF CONDUIT JOINTS

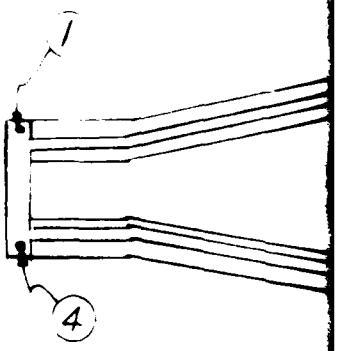
(4)	(5)	Difference Between (1) & (2)	Difference Between (2) & (3)	Difference Between (3) & (4)	Difference Between (4) & (5)	Total Difference Between (1) & (5)
Jun 66	18 May 71					
1.29	1.28	.00	.00	.00	-0.01	-0.01
1.11	1.10	≠.01	-.01	.00	-0.01	-0.01
1.05	1.04	≠.01	-.01	.00	-0.01	-0.01
1.34	1.33	.00	.00	.00	-0.01	-0.01
1.29	1.29	≠.01	-.01	.00	0.00	0.00
1.07	1.06	≠.01	0.00	.00	-0.01	0.00
1.07	1.06	≠.01	0.00	.00	-0.01	0.00
1.16	1.16	≠.01	-.01	.00	0.00	0.00
1.04	1.04	≠.01	-.01	.00	0.00	0.00
1.02	1.02	≠.01	-.01	.00	0.00	0.00
1.04	1.04	.00	.00	.00	0.00	0.00
1.01	1.01	≠.02	-.01	.00	0.00	≠0.01
1.03	1.03	≠.02	-.01	.00	0.00	≠0.01
1.03	1.02	.00	.00	.00	-0.01	0.00
1.00	1.00	≠.01	-.01	.00	0.00	0.00
1.04	1.04	≠.01	-.01	.00	0.00	0.00
1.02	1.01	.00	.00	.00	-0.01	0.00
1.06	1.06	≠.01	-.01	.00	0.00	0.00
1.04	1.03	.00	.00	.00	-0.01	-0.01
1.04	1.03	≠.01	-.02	≠.01	-0.01	0.00
1.20	1.20	≠.01	-.01	.00	0.00	0.00
1.12	1.11	≠.01	.00	.00	-0.01	0.00
1.11	1.11	≠.01	≠.02	-.03	0.00	0.00
1.09	1.08	.00	-.01	≠.01	-0.01	-0.01
1.09	1.09	≠.01	-.01	.00	0.00	0.00
1.10	1.10	≠.01	.00	.00	0.00	0.00
1.12	1.12	.00	-.01	.00	0.00	-0.01
1.09	1.08	.00	.00	.00	-0.01	-0.01
1.12	1.12	.00	.00	-.01	0.00	-0.01
1.11	1.11	≠.01	-.01	.00	0.00	0.00

nduit.

CORPS OF ENGINEERS



FACE OF INTAKE STRUCTURE
LOCATION OF POINTS
SCALE 1/12" = 1'-0"



PLAN OF S
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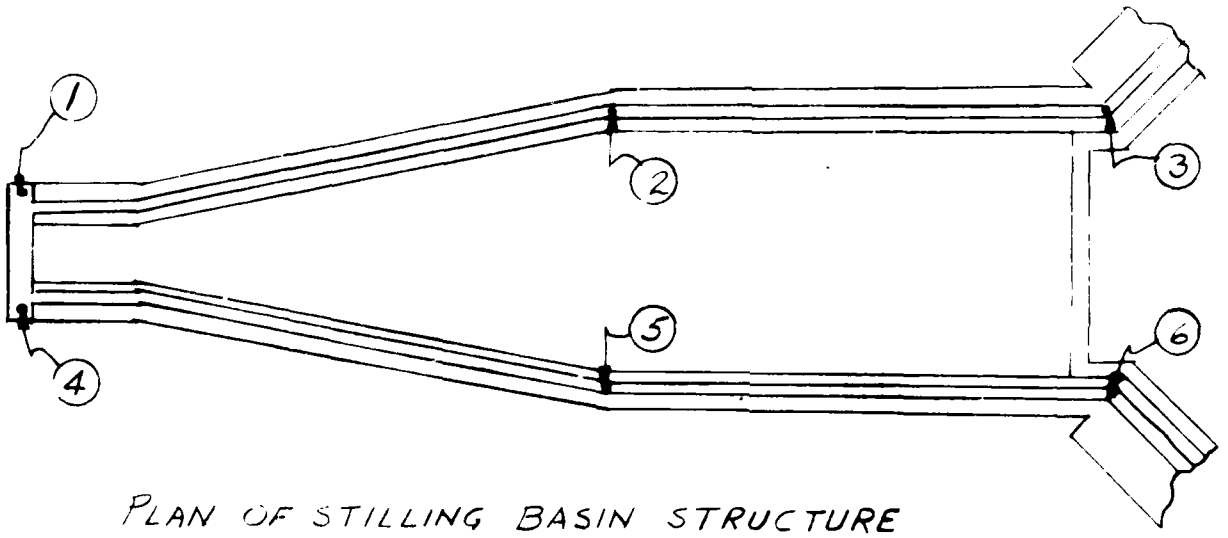
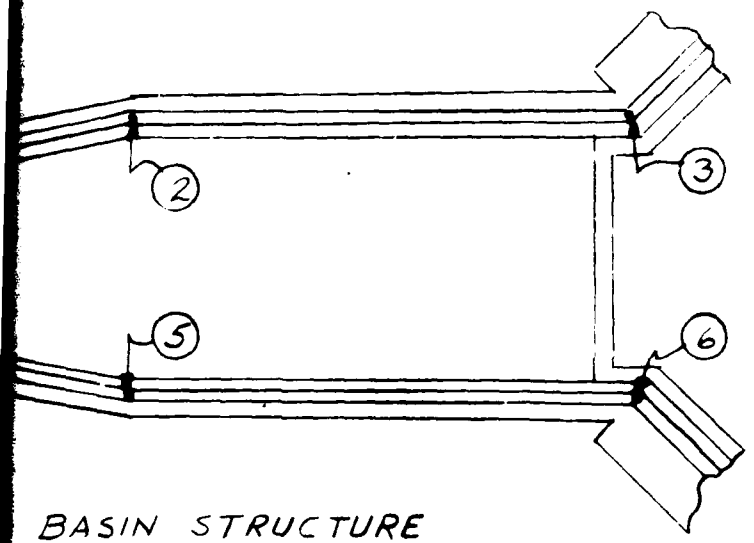


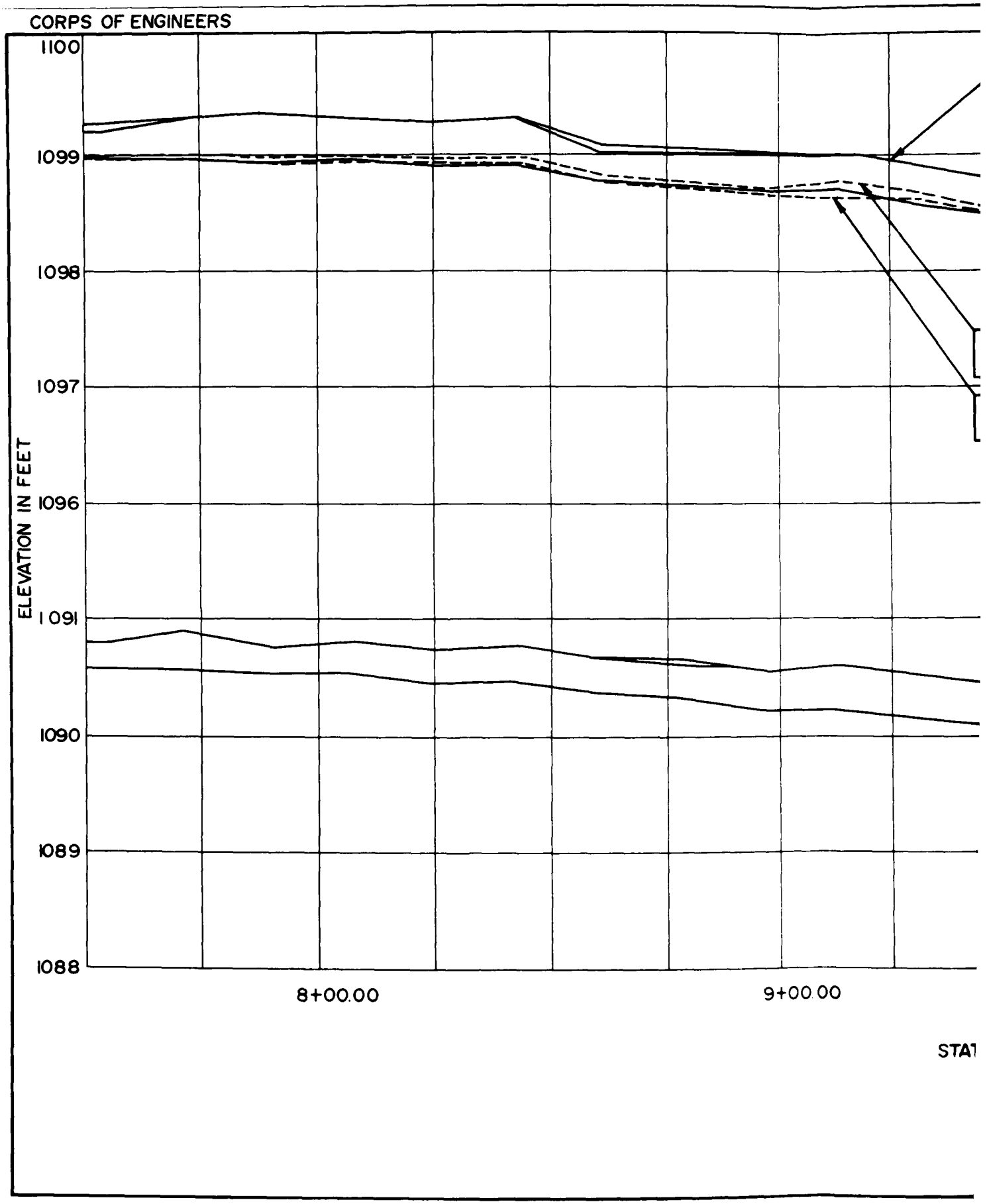
PLAN OF STILLING BASIN STRUCTURE
LOCATION OF POINTS
SCALE 1/20" = 1'-0"

PROMPTON
CONDUIT SETTLEM
INTAKE STRUC
PLAN OF STILLI



BASIN STRUCTURE
POINTS
1/2" = 1'-0"

PROMPTON DAM
CONDUIT SETTLEMENT STUDY
INTAKE STRUCTURE &
PLAN OF STILLING BASIN


CORPS OF ENGINEERS
1100
1099
1098
1097
1096
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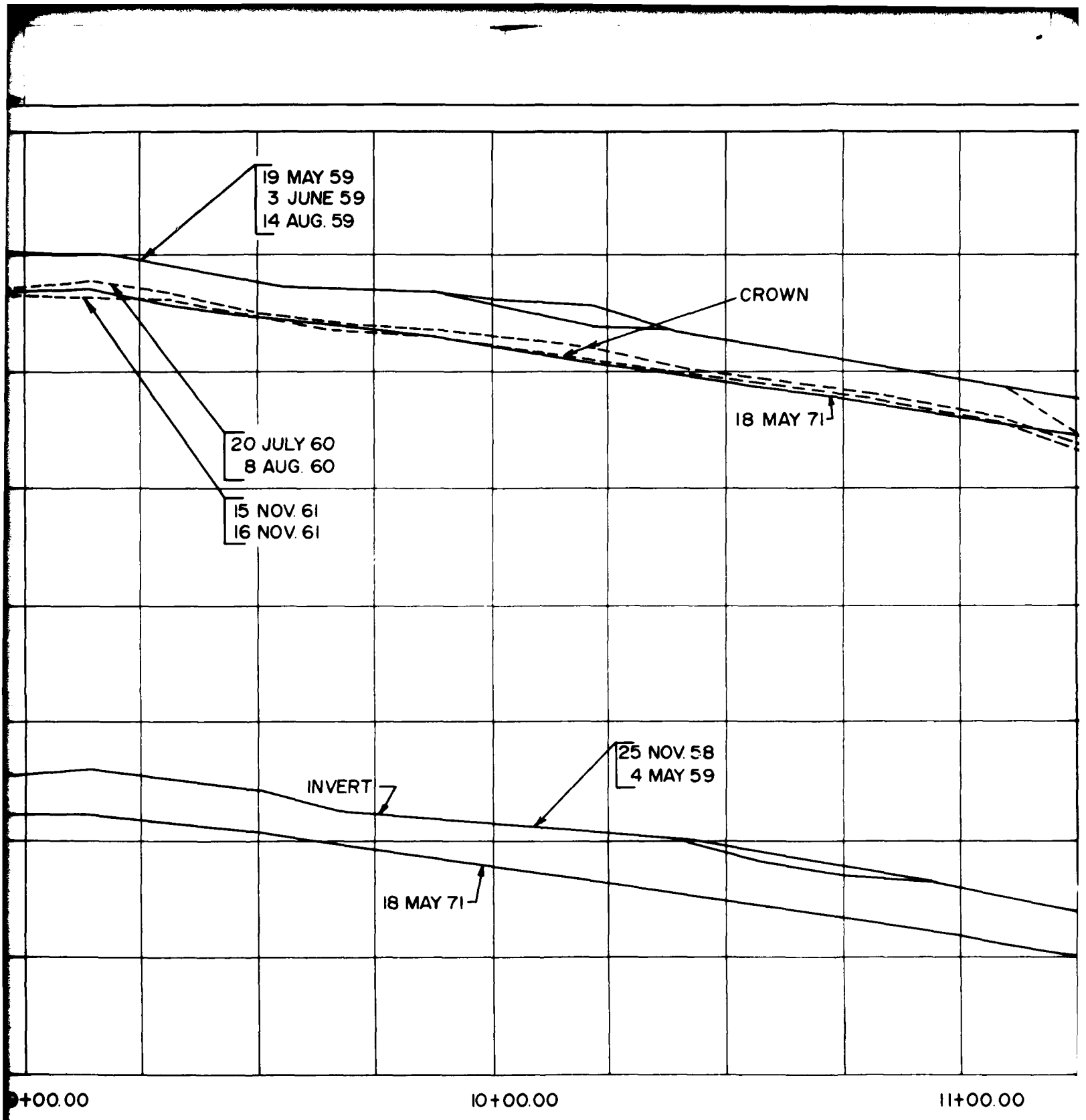
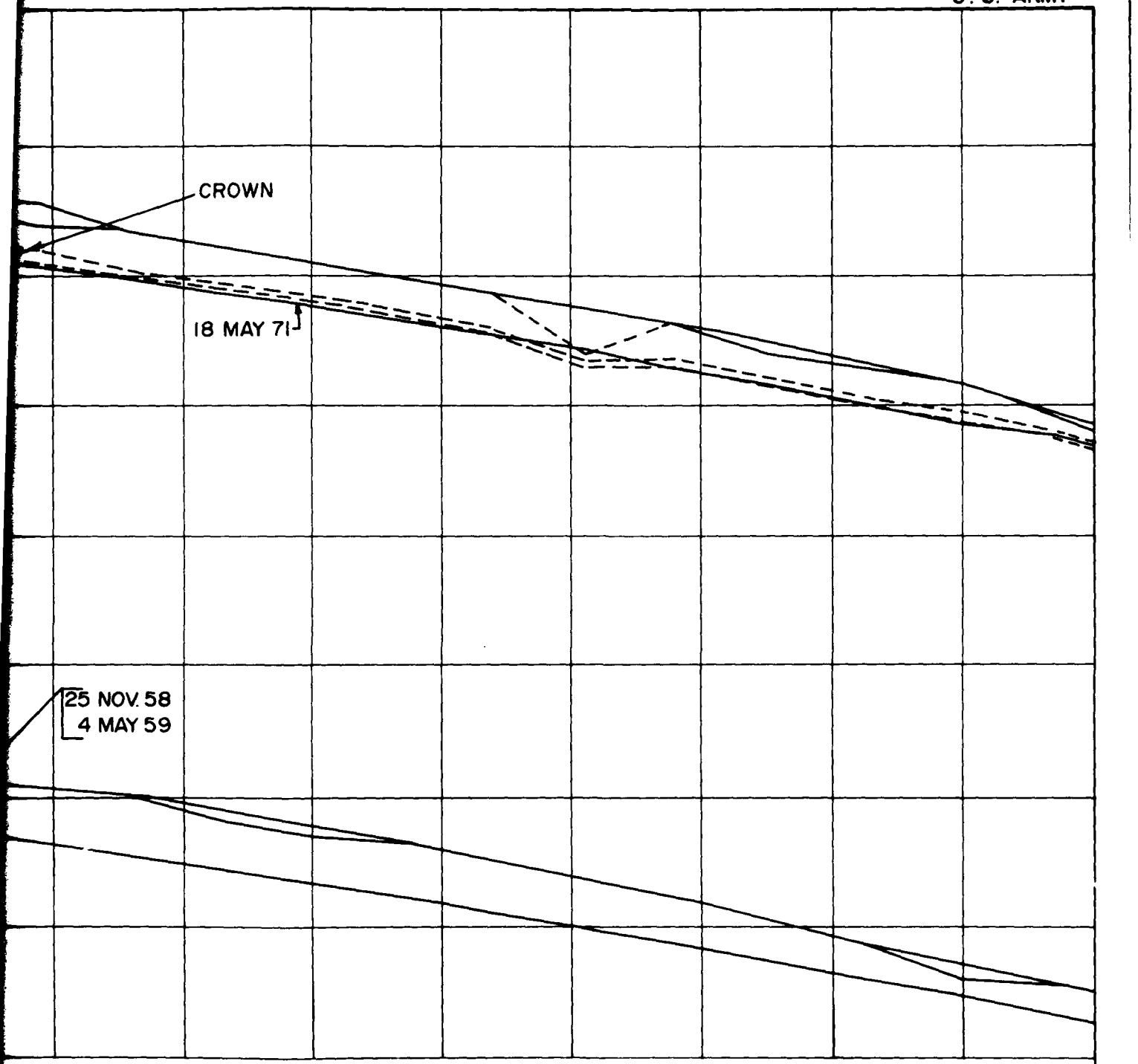
1090
1089
1088
ELEVATION IN FEET
8+00.00
9+00.00
STA



STATIONS ALONG CONDUIT

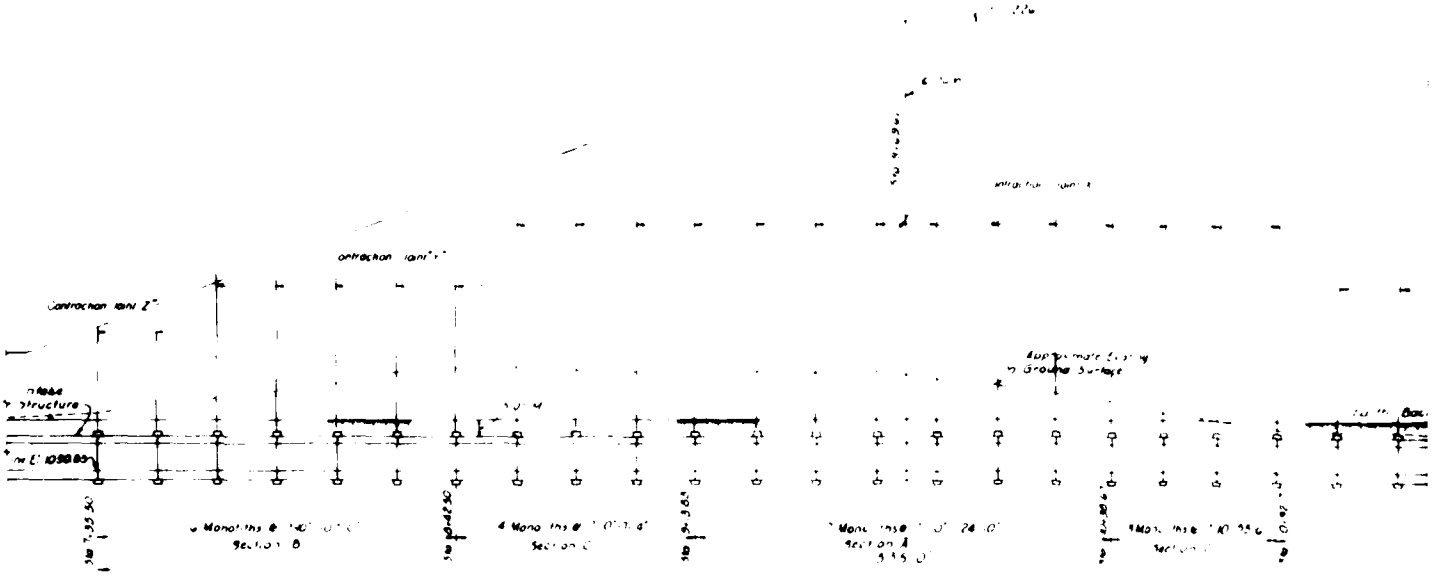
U. S. ARMY



LACKAWAXEN RIVER BASIN
PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA

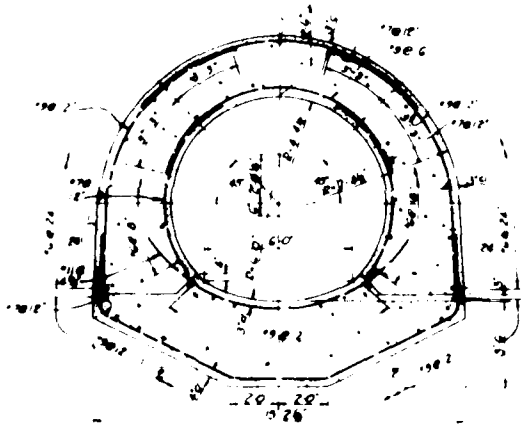
ELEVATION ON LEAD PLUGS
AT CROWN OF INTRADOS

PLATE 2

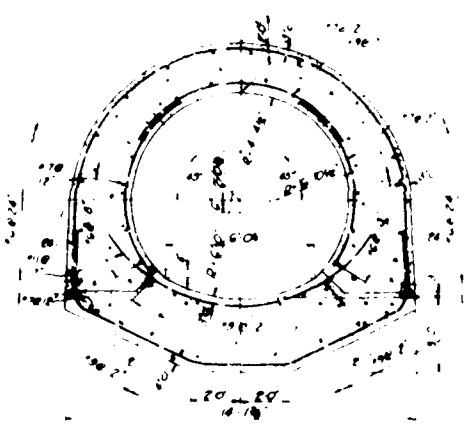


PROFILE ALONG CENTERLINE OF CONDUIT

SCALE 1 in = 20 FT

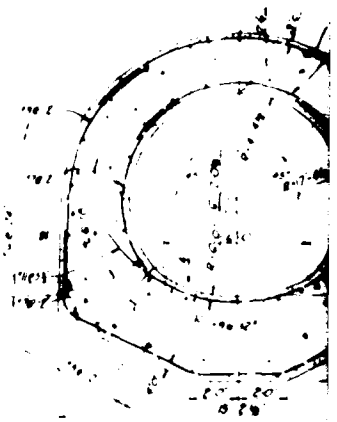


SECTION A

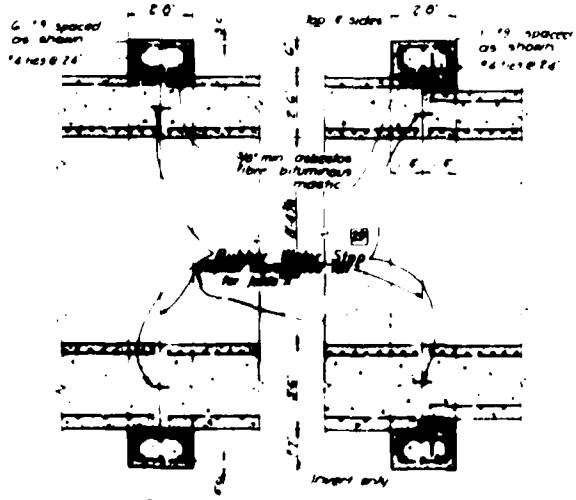


SECTION B

SCALE 3/8 in = 1 FT



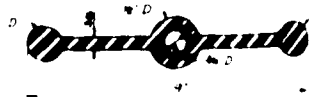
SECTION C



TYPICAL AT CHANGE IN SECTION

CONTRACTION JOINTS AND COLLARS

SCALE 3/8 in = 1 FT



DETAIL OF RUBBER WATER STOP

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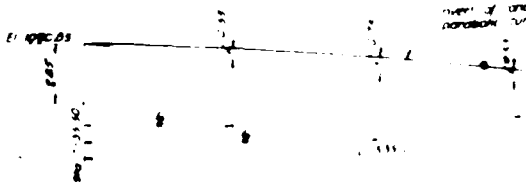
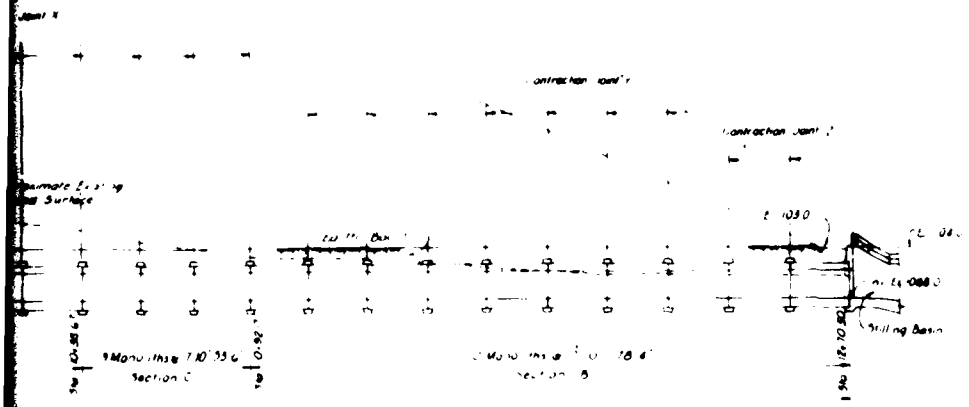
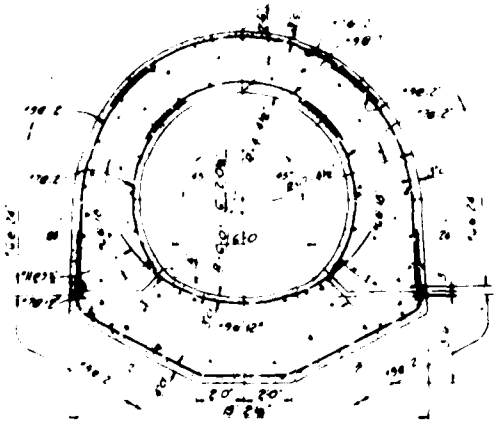


CONDUIT CAMBER DIAGRAM

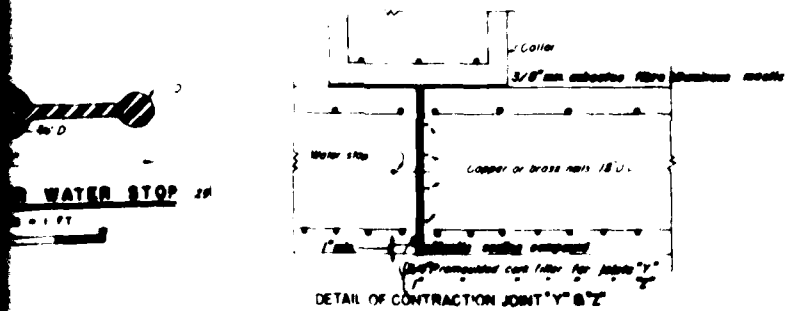
NO SCALE

U S ARMY

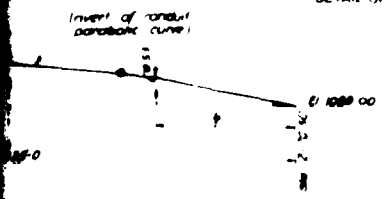




SECTION C



DETAIL OF CONTRACTION JOINT "Y" & "Z"



DIAGRAM

LACKAWAXEN RIVER BASIN
PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA
CONDUIT SETTLEMENT STUDY
OUTLET WORKS

PLATE 3

APPENDIX C

FIRST PERIODIC INSPECTION (1966)

PROMPTON LAKE
LACKAWAXEN RIVER, PENNSYLVANIA

PROMPTON LAKE

FIRST PERIODIC INSPECTION (1966)

TABLE OF CONTENTS

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-F

14

SUBJECT: Periodic Inspection of Completed Civil Works Structures

TO: Division Engineer
U. S. Army Engineer Division, North Atlantic
ATTN: NADEN-T
New York, N. Y. 10007

1. Reference is made to ER 1110-2-100 dated 11 August 1965, subject as above.

2. In accordance with the requirement of referenced ER, there is attached a final report of the OCE, NAD, NAP, 7-9 June 1966 inspection of three completed reservoirs constructed by the Philadelphia District.

3. Inspection reports from District, Division and OCE are included in the section under General Information, Tab A. The status and scope of remedial work and special investigations recommended during the inspection are outlined below for review and approval.

a. Francis E. Walter (Bear Creek) Dam.

(1) Seepage. Seepage was noted on the right abutment during the inspection and measurement of the quantity was suggested. Subsequent to the inspection and immediately preceding the 90-foot drawdown in pool elevation (June 1966) three weirs were installed to measure the quantity of flow. Results of the measurements indicated a low amount of seepage (maximum of 0.3 cfs) which decreased as the pool was lowered and ceased at pool elevation 1343. Observation will continue to be made at high pool levels. A separate report is being prepared to show data in detail and conclusions drawn therefrom.

(2) Instrumentation. The proposed layout of fifteen Casagrande-type piezometers and eight settlement monuments is discussed in the report and shown on the drawing entitled, "Walter Dam, Proposed Instrumentation."

(3) Riprap. The riprap was inspected after the 1966 pool was lowered and no damage nor slope distress was evident.

(4) Miscellaneous. The following work is being planned for FY 1968:

(a) Preparation of Plans and Specifications for flattening right bank slope of outlet works.

(b) Crack survey and preparation of Plans and Specifications for crack and joint repair of tunnel and spillway crest.

(c) Cleaning of gate channels.

b. Prompton Dam.

(1) Relief Wells. The boring logs recorded during drilling of the seven relief wells were studied and analyzed as part of a re-analysis of the entire system. The wells were sounded and found to be partially silted up in some cases. The results of the analysis will be included in the General Design Memorandum for the proposed modification. The field rehabilitation will consist of the following: cleaning and redevelopment of the wells, removing the gravel from around the casings to a level which will prevent its spilling into the wells, and changing the covers to lighter, one-man access covers. A relief well flow meter will be obtained to measure well flows. The existing well locations are shown on Drawing No. 27263.

(2) Toe Drain. Man holes will be built along the toe drain and provided with weirs for flow measurements. It is proposed that three man holes be installed in the right toe drain, three additional man holes at the end of the 130-foot length of 8" ∅ VC pipe sub-drain located along the downstream left bank. The installation of a clean-out riser is also proposed at the 45° ± bend of this sub-drain.

The complete layout of eight man holes (including one existing) and one riser is shown on Drawing No. 27263 of the existing dam construction. In the final design of the man holes, consideration will be given to the conditions to be encountered after the proposed modification for long range storage.

(3) Riprap. In the design memoranda for the proposed modification of the dam, an analysis of the existing riprap will be included. Investigation of the depression noted at the time of inspection indicates that the depression is a result of poorly placed riprap.

(4) Instrumentation. The proposed instrumentation of ten Casagrande-type piezometers and eight settlement monuments is discussed in the report and shown on the drawing entitled, "Prompton Dam, Proposed Instrumentation."

(5) Joints in Conduit. Resealing of the joints is proposed to be done by hired labor in FY 1969.

c. General Edgar Jadwin (Dyberry) Dam.

(1) Drain in spillway slope will be repaired in FY 1969.

(2) Instrumentation. The proposed location of six Casagrande-type piezometers and ten settlement monuments is discussed in the report and shown on the drawing entitled, "Jadwin Dam, Proposed Instrumentation."

4. Funding of the remedial work and special investigations is proposed as follows:

a. Francis E. Walter Dam.

(1) The amount of $12,000 is contained in the program for FY 1968 for repairs to the outlet works tunnel and spillway crest and the amount of $52,000 is in the program for initiation of the instrumentation.

(2) $22,000 is proposed for inclusion in the FY 1969 program to complete the instrumentation and settlement monumentation and the amount of $16,000 to provide for regrading of the outlet works channel.

b. Prompton Dam.

(1) No funds have been included in the FY 1968 Budget for this work.

(2) The amount of $54,000 is proposed for inclusion in the FY 1969 program, of this amount, $29,500 is for instrumentation and settlement monuments and $24,500 is proposed for cleaning relief wells, modifying the well covers and for providing man holes for the toe drains.

NAPEN-F
SUBJECT: Periodic Inspection of Completed Civil Works Structures

c. General Edgar Jadwin Dam.

(1) No funds have been included in the FY 1968 Budget for this work.

(2) The amount of $20,000 is proposed for inclusion in the FY 1969 program. The amount of $15,000 is for instrumentation and settlement monuments and $5,000 for spillway repairs.

FOR THE DISTRICT ENGINEER:

H. F. Michel

H. F. MICHEL
Chief, Engineering Division

Incl
Periodic Inspection
of Completed Civil
Works Structures
Report (in triplicate)

NADEN-T (14 Aug 67) 1st Ind
SUBJECT: Periodic Inspection of Completed Civil Works Structures

U. S. Army Engineer Division, North Atlantic, New York, N. Y.
21 August 1967

TO: Chief of Engineers, ATTN: ENGCW-E

1. In accordance with ER 1110-2-100, there is attached for approval, final report of inspections of completed Civil Works structures at Francis E. Walter, Prompton and General Edgar Jadwin Dams.

2. The statements on funding in paragraph 4 of the basic letter refer to the Operations and Maintenance account. The Division recommendations for FY 1969 O&M include the items outlined under this report.

FOR THE DIVISION ENGINEER:

Paul H. Jaenichen

PAUL H. JAENICHEN
Chief, Engineering Division

Incl (dupe)
n/c excpt 1 cy wd

ENGCW-EZ (NAPEN-F, 14 Aug 67) 2nd Ind
SUBJECT: Periodic Inspection of Completed Civil Works Structures

DA, CofEngrs, Washington, D. C., 20315, 6 October 1967

TO: Division Engineer, North Atlantic Division

1. The inspection report on Francis E. Walter, Prompton and General Edgar Jadwin Dams is approved, subject to the comments of the Division Engineer and to the following comments.

2. Tab A, Concrete Aggregate Sources. The concrete aggregate sources should be further identified by location from known landmarks such as cities, roads, etc. The information should be added to basic data available at the projects if not presently included.

3. Tab B, Table 1. More information on the tunnel should be included such as lining thickness, type of water stop and reinforcement, if any.

FOR THE CHIEF OF ENGINEERS:

Homer B. Wilkins

Incl
nc (fwd usc)

WENDELL E. JOHNSON
Chief, Engineering Division
Civil Works

ENGCW

Field Inspection of Francis E. Walter, Prompton and General Edgar Jadwin Dams, Philadelphia District

1. C/Engr. Div-CW
2. Asst. Dir/CW for Central Divisions
3. Deputy Dir/CW
4. Dir/CW

Soils Branch

20 June 1966
SMITH/57053

1. Places and Dates: Francis E. Walter, Lehigh River, Pa., 7 June 66. Prompton Dam, Lackawaxen River, Pennsylvania and Jadwin Dam, Dyberry Creek, Pa., 8 June 66.

2. Purpose: The above three dams have been included in the District's continuing evaluation program in accordance with DR 1110-18, 29 November 65, Subject: Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures. Inspection was scheduled to document present conditions and evaluate additional instrumentation.

3. Attendance: See attached list.

4. Narrative: Francis E. Walter (formerly Bear Creek Dam).

a. Introduction. The dam, finished in 1961, is a rolled earthfill flood control structure with a gate controlled outlet works located in the Pocono Mountain resort area of northeastern Pennsylvania. Extending 3000 feet across and rising to a maximum height of 234 feet above stream bed, the dam controls 288 square miles of the Lehigh River watershed.

A pair of saddle dikes situated approximately one mile north of the dam close the reservoir rim to top of dam elevation 1474. The outlet works include a three slide gate intake structure founded on bedrock and a concrete lined circular tunnel 16 feet in diameter in the right abutment. The spillway weir is an uncontrolled concrete gravity ogee structure situated in bedrock on the high right abutment.

Glacial drift thinly veneers the bedrock valley walls and fills the pre-glacial river channel at the dam site, attaining a maximum depth of 100 feet beneath the left abutment terrace. An impervious cutoff through the glacial drift to bedrock was provided under the entire dam. Bedrock at the site is a hard, siliceous gray sandstone and conglomerate with occasional discontinuous thin beds of gray to black shale.

b. Problem: It is proposed in the future to modify the dam to make it serviceable for long-time storage in addition to the present flood control storage. This will involve:

(1) Moving and raising the spillway crest 31 feet to elevation 1,481.

(2) Raising the dam to elevation 1503.

(3) Adding 70 feet of concrete conduit to the downstream end of the tunnel.

(4) Constructing new dikes and raising existing dikes. The above contemplated modification was kept in mind while inspecting the dam.

c. Summary of Inspection:

(1) Embankment and Abutment Junctions: On the left downstream abutment there is a small seep. On the right downstream abutment there is considerable seepage starting at about pool elevation 1390 and running along the junction to the toe, estimated at about 60 gallons a minute. In line with the tunnel and up the slope about 10 feet, water can be heard running below the downstream riprapped slope toward the junction of the dam and abutment.

(2) Vertical and horizontal alignment of the embankment crest. There has been no vertical movement so far. Horizontal movement has not been measured.

(3) Unusual movement or cracking beyond the toe. None

(4) Unusual through embankment or downstream seepage. See (1) above.

(5) Sloughing or erosion of embankment and abutment slopes. None.

(6) Movement of structural features such as tunnels, intake towers, or piers. Piers and intake tower have no measurable movement.

(7) Riprap Failures: Last December the upstream slope experienced a drawdown of 50 feet in 36 hours. However, as this part of the slope was below pool elevation, it was not possible to evaluate the result of the drawdown.

(8) Tunnel: The tunnel was dewatered and inspected. It is badly cracked and leaking. The gate seals have leaks in the corners. Poor concrete job throughout. Spalling at joints.

(9) Spillway: The spillway had been patched at the crest but the patches are giving way.

(10) Erosion Downstream of Tunnel: Discharge from the tunnel had started to cut a channel sharply toward the left but rock and boulders have been placed in this channel and the discharge is being forced to go straight downstream. This is being carefully watched as discharge toward the left is toward the toe of the dam.

d. Solutions Considered: It is important to know where the seepage at the junction between the downstream slope and the abutment is coming from, whether through the abutment, through the dam, or at the junction between the cutoff and bedrock. Various methods for investigating the seepage were discussed. One was the boring of holes and introduction of dye. Another was the use of weirs to measure the flow, at the same time observing rainfall and pool elevations.

As the tunnel is cracked, it was decided to make a crack survey and repairs. The spillway patches will also be repaired. To stop the leaking of the gate seals the emergency gates will be closed and the operating gates cleaned.

When the pool is lowered the upstream riprap will be inspected for failures.

e. Conclusions: It was decided to put in weirs to measure the seepage immediately as the pool will be drained down in two weeks. Piezometers will be placed upstream and downstream of the roadway across the dam to read the piezometric pressures in the foundation and the core at three stations, 82+00, 80+00 and 78+00. Monuments will be placed along the road, and on the upstream and downstream slopes to measure settlements and deflections of the dam. The aggregates from which the concrete for the tunnels, intake and spillway structure was made is no longer considered acceptable by the Corps, so any future work at this site should not have the present poor quality concrete.

f. Actions Taken: The above conclusions were agreed to by representatives of the District, Division and OCE.

g. Continuing Actions Required: The weirs will be installed in the next few days. Measurements of weir discharge, pool elevation and rainfall will be started as soon as the weirs are placed. Inspection of upstream riprap should be made as soon as the pool is lowered, in about two weeks. A drawing showing the future location of monuments and piezometers should be sent to the Division and OCE for approval. Wind velocity, direction, fetch and if available, wave height should be studied to check riprap design. A crack survey of the tunnel and repairs will have to be made. The leaks in the operating gate seals will have to be stopped by cleaning the slots.

5. Prompton Dam:

a. Narrative: Introduction. Prompton Dam completed in 1961 is an earth-fill embankment with an ungated, weir controlled intake located near the natural stream course and adjacent to the right abutment. The dam is 1230 feet long, with a maximum height of 140 feet above the stream bed. The outlet works is a cut and cover conduit on earth foundation. Spillway is an open channel, unlined cut in rock, and is located high on the right abutment adjacent to the dam. Along the axis of the dam the thickness of overburden ranges from 100 feet on the left abutment to 140 feet in the valley section to 120 feet on the upper right abutment. The overburden is a heterogeneous mass, made up of many lenses and beds. Most of the masses are well graded from medium sized gravel through silt. Varved micaceous silt occurs below the right side of the valley and locally extends under the river to the left. Seven relief wells were placed at the downstream toe and a drain pipe at the junction between the downstream slopes and the abutments.

b. Problems: It is proposed in the future to modify the project for long range storage requirements and operation for multiple-purposes. The following addition or modifications to the structure would have to be made:

(1) A control tower with gates and a service bridge to control releases from the reservoir.

(2) A blanket of impervious material on the valley wall and upstream from the dam.

(3) Widening of the spillway to 250 feet.

(4) Clearing of the reservoir land and relocating roads subject to inundation.

The above modifications were kept in mind while inspecting the dam.

Summary of Inspection:

(1) Embankment and Abutment Junctions: There is one manhole in the drain on the downstream junction with the left abutment. After removal of the manhole cover it was found that besides the pipes coming into the manhole from the toe drain that there was a 6-1/2 inch cross-drain coming from a spring in the abutment downstream of the dam. Water was flowing into the manhole from both the toe drain and the drain from the spring. As there wasn't any manhole on the right abutment, it is not known whether any water was flowing through this drain.

(2) Vertical and Horizontal Alignment of the Embankment Crest: No settlement and the original 2-foot camber is still in the dam.

(3) Unusual movement or cracking beyond toe: None.

(4) Unusual Through Embankment or Downstream Seepage: See (1) above also five of the seven relief wells are flowing.

(5) Sloughing or Erosion of Embankment Slopes: As both slopes are covered with riprap this cannot be determined.

(6) Movements of Structural Features such as Conduit, Intake Tower and Stilling Basin: Although no recent measurements have been made, the last measurements (November 1961) showed only 4.7 inches of settlement of the conduit near the center of the dam which is about half the original camber of 0.70 feet. The conduit increased in length only 0.75 inches according to the last measurement. The intake structure settled only 0.09 feet during the 2-1/2 years of measurement.

(7) Riprap Failures: There has never been a high pool on this dam so the riprap is about as originally placed.

(8) Conduit: The conduit was dewatered and inspected. It appeared to be in excellent condition having only one crack at Sta. 9+85. No spalling of joints was observed. Concrete surface was good. The joint filling needs some work as many of the joints have lost the filling and the cork underneath is exposed.

(9) Spillway: There is no structure. The channel is in rock which appears to be in good condition.

(10) Erosion Downstream of Conduit: None.

c. Solutions Considered: Before Prompton Dam was built there were many springs in the abutment and high artesian heads in the valley overburdens and it is difficult to determine whether the present seepage in the left abutment is due to springs or seepage around the dam. The relief well near the abutment has always discharged by the other six wells located on each side of the stilling basin did not discharge until recently and therefore must be due to underseepage. Each well at present overflows into a large corrugated perforated metal pipe filled with gravel which surrounds the well and the water seeps out into a rock fill making it difficult to measure the flow. It is also difficult to tell where the water in the toe drain is coming from as there is only one manhole which is located near the bottom of the slope.

The upstream riprap was improperly placed as there are many areas of

fine rock and experience on other dams indicates that these are the areas that first start to fail under high waves.

d. Conclusions: It was decided to remove the gravel from around the relief wells so that the surface of the gravel would be below the top of the pipe as at present it can roll down into the well. Some means of measuring the flow will also be installed. The wells will be sounded and surged to be sure they are in operating condition. The rock overlying the toe drain will be excavated at various locations to locate the pipe and manholes installed so that the flow can be measured. If the dam is modified for long range storage, a layer of the better rock from the spillway widening should be laid over the present riprap. A layout of monuments and piezometers will be sent to OCE and the Division for approval and measurements begun as soon as they are installed.

e. Action Taken: The conclusions given above were agreed to by representatives of the District, Division and OCE.

f. Continuing Actions Required: Action will be taken on the work mentioned in the conclusions.

6. General Edgar Jadwin Dam (Dyberry Dam):

a. Narrative: Introduction. Jadwin Dam, formerly known during construction as Dyberry Dam, is an earth and rockfill flood control structure with an uncontrolled outlet works located at stream bed elevation. The dam is 1225 feet long, with a maximum height of 109 feet above the stream bed. The dam was completed in 1959. Outlet works located in the left abutment includes a concrete lined tunnel, an uncontrolled intake structure and a concrete stilling basin. The spillway is an unlined rock cut in the east abutment with an ungated, ogee type, concrete weir. In the valley flood plain area, bedrock is covered to a maximum depth of 150 feet by relatively pervious, loose to medium dense, glacial stream depositions. Bedrock is gray sandstone with occasional layers of gray and red siltstone. This dam has no formal transition between the downstream rock fill and the earth fill. Instead, boulders greater than 12 inches in size were raked by tractors equipped with rakes from the earthfill into the transition and rockfill zones. The zone, formed by the raking operation, consists of a mixture of earthfill and boulders under 24 inches in size. Due to the lack of a good transition zone properly graded to prevent the earthfill from piping into the rockfill it has always been considered by the Soils Branch of OCE that a permanent pool should not be permitted.

b. Problems: It was not possible to inspect the abutment and embankment junctions for seepage as there was no pool except the water in Dyberry Creek. It also was not possible tocheck for unusual cracking or bulging at the toe as there is a rock berm at the downstream toe. There appeared to be bulges in the downstream slope. The trash racks are on the inside of the slots for the stop logs and this makes it very difficult for

the dam tender to clear out debris as he has to hang from a rope and cut the logs with a gasoline powered chain saw. The tunnel was not inspected as there are no stop logs. A 24-inch pipe drain was installed in the high excabated left slope downstream of the spillway weir crest during construction. The outlet to this pipe was located and water could be heard running in the pipe but no water was discharging at the outlet. It was thought that the pipe may be broken. The spillway weir crest is in good conditions.

c. Solutions Considered: A plan for installing monuments and piezometers will be submitted to the Division and OCE for review and approval. It was throught by the District that what appears to be a bulge on the downstream slope was due to a slide in the rockfill during construction. The District will look into the records and see if the bulge was there during construction. The District will also investigate the reasons for the drain in the spillway slope and see if they can find the break in the pipe. Stop logs are being obtained so that the tunnel can be inspected. The District is planning to revise the inlet so that the trash racks are on the upstream side of the stop log slots.

d. Action Taken: Solutions given above were agreed to by representatives of the District, Division and OCE.

e. Continuing Actions Required: Action will be taken on the solution in paragraph c above.

cc: NAD
Philadelphia District

C. K. SMITH

NADEN-T

Periodic Inspection of Completed Civil Works Structures: Francis E. Walter (Bear Creek), Prompton, and Gen. Edgar Jadwin (Dyberry) Dams

Chiefs, Eng. & Const. Oper. Divs.
THRU: Chiefs, TEB & CWB

E. A. Alcott
A. V. Iarrobino
T. E. Dickson

14 Jun 66

1. The undersigned participated in the subject inspection of completed Civil Works Projects in the Philadelphia District during the period of 7 thru 9 June 1966 in compliance with ER 1110-2-100 dated 11 August 1965 and DR 1110-18 dated 29 November 1965.

2. The District will prepare reports in conformance with paragraph 4d. of appendices I & II of ER 1110-2-100 as noted in paragraph 7 of DR 1110-18 for submittal to this office and OCE.

3. The findings of the inspection are noted herewith:

a. FRANCIS E. WALTER

(1) The downstream junction of both abutments with the embankment was inspected. There was indication of flowing water on the right abutment which could have been a combination of surface drainage and seepage from the reservoir. There will be a series of weirs constructed down the slope and immediately downstream of the blanketed area below the dam. A continuing set of flow readings will permit a correlation of the observed flow with the variations of pool level and storm waters. One small area of moisture was observed on the left abutment but no indication of flow was noted. This area will be located with respect to elevation and correlated with the pool elevations and observed during and after storms. Should either of the above observations establish a direct correlation with the reservoir pool fluctuations, a further study would be required to determine the path of the leakage, i.e. foundation and/or embankment. Dependent on the quantity of seepage indicated, a program will be developed for control to within tolerable limits. Pool elev. normal pool elevation 1300 - time of inspection 1390.

(2) The concrete spillway crest (Ogee) had numerous spalled areas which will be observed and patched as required.

(3) The gate seals showed some leakage, these will be cleaned and re-tallowed by the District. Numerous areas were observed in the tunnel where cracking and spalling will require repairs. A thorough study of the tunnel will be made by the District and appropriate remedial measures proposed.

(4) Repairs to cracks in the Control Tower will be made as soon as the pool elevation is lowered. No inspection was made of the structure.

(5) A program for instrumentation with piezometers in the foundation and embankment and at least 3 stations as discussed in the field will be presented by the District for concurrence by NAD and OCE.

(6) Monuments for observing centerline and cross-section elevations will be established.

b. PROMPTON

(1) The seven relief wells were checked and five determined to be operating. These are to be cleaned out and all made to be operable with provisions made to measure their flows.

(2) The complete system of pipe toe drains for the dam could not be checked out at the time of the inspection. These will be inspected by the District and a proposal for installing manholes for continuing clean-out of the system presented for review.

(3) The conduit was in very good condition; however, some joints had the filler seal compound missing which exposed the cork joint material. These joints should be cleaned and resealed with joint compound as discussed in the field.

(4) The District will make a study of the stratified foundation conditions and submit a proposal for installation of piezometers in the foundation and embankment.

(5) The District is going to investigate the practicability of surfacing the conduit invert with an epoxy compound to improve the smoothness characteristics.

(6) Due to the recent high reservoir flow, the survey of the outlet conduit for alignment and joint orientation had not been made prior to the inspection. This will be performed as soon as possible and data submitted with the District's report of this inspection.

c. GEN'L EDGAR JADWIN

(1) This project has an uncontrolled outlet works and has never had must of a pool to really test the embankment. The general embankment slopes are quite irregular, since the as-built data were not available a system of monuments will be placed in the slopes for continued readings down the slopes as well as the readings along the axis.

(2) The drawings available indicated a 24" dia. sub-drain in the cut slope between spillway and relocated Route 90. The outfall end of this sub-drain was located but the location of the upper end could not be determined. The District will check this out and submit plans, sections

and discussions of the effectiveness of the drain during and after construction.

(3) The flow through the tunnel prevented an inspection of the interior of the outlet works.

(4) Proposal for installation of a minimum of six piezometers will be submitted by the District based on a study of subsurface conditions at the site.

4. It is desirable that the District present proposals for instrumentation and observations of operations for these dams to determine their effectiveness as presently operated and as a guide for designs when Walter and Prompton dams are revised as noted below.

a. WALTER

(1) Raise dam to E 1503 (from El 1474)

(2) Spillway Crest El 1481 (present 1450)

(3) Raise Tower 30' ℄

(4) Extend conduit 70' ℄

(5) Long term storage El 1425' (present conservation pool El 1300)

b. PROMPTON

(1) Construct Intake Tower (for control)

(2) Increase Spillway Width 200'

(3) Long Term Storage El 1180' (present & future inactive pool 1125')

5. With the installation of the instrumentation and the weirs, the frequency of observation will need to be revised from the five years indicated in the 2 March 1966 NAPEN-F subject letter.

E. A. ALCOTT

A. V. IARROBINO

T. E. DICKSON

First Periodic Inspection of Completed Civil Works Structures Constructed by Philadelphia District 7-9 June 1966

Attendees

C. K. Smith	OCE
E. A. Alcott	NAD, Eng. Div.
A. V. Irrabino	NAD, Eng. Div.
T. E. Dickson	NAD, Constn. Oper. Div.
H. F. Michel	NAP, Chief, Eng. Div.
A. A. DePhilippe	NAP, Eng. Div.
J. Hulman	NAP, Eng. Div.
G. Drummond	NAP, Eng. Div.
E. P. Hartzell	NAP, Eng. Div.
W. Staret	NAP, Operations Div.

SUBJECT: First Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures

TO: Chief, Fcundations and Materials Branch

1. Reference is made to the following:

a. ER 1110-2-100, dated 11 August 1965, subject as above
b. DR 1110-18, dated 29 November 1965, subject as above
c. Letter, Phila. Dist. to North Atlantic Division, ~~by 3rd~~ 4th Ind., dated 2 March 1966, subject as above.

2. References 1a and b set policy and determine scope of investigations with recommended frequency of observations. Reference 1c sets forth Phila. District's recommendations of selected structures and features with degree of instrumentation desired and recommended frequency of observations. The indorsements to that letter set up an itinerary and list of attendees.

3. On the 7, 8 and 9th of June the first periodic inspection was held in the Phila. District (it was also the first in the Division). The three sites visited were those recommended in our letter: Bear Creek (Francis E. Walter), Prompton, and Dyberry (Gen. Edgar Jadwin). Bear Creek was inspected on the 7th, Prompton on the morning of the 8th and Dyberry, the only change in itinerary, was inspected on the afternoon of the 8th instead of the morning of the 9th. The inspection party proceeded to Phila. at 0730 hours, 9 June 1966. Attending the inspection were the following:

C. K. Smith	OCE	Engr. Div.
E. A. Alcott	NAD	Engr. Div.
A. V. Iarrobino	NAD	Engr. Div.
T. E. Dixon	NAD	Const-Oper Div.
H. F. Michel	NAP	Chief, Engineering Div.
A. A. DePhilippe	NAP	Engr. Div.
L. G. Hulman	NAP	Engr. Div.
G. Drummond	NAP	Engr. Div.
W. F. Staret	NAP	Oper. Div.
E. P. Hartzell	NAP	Engr. Div.

4. The inspection party arrived at Bear Creek at 1100 hours on the 7th June where a general briefing was held. This included explanation of the handbook report and discussion of the purpose of investigation and what we hoped to accomplish. Following lunch the party was briefed on the essential features of the Dam such as design assumptions, construction difficulties, etc. The inspection then commenced with a walk through of the tunnel [illegible] a thorough examination of the embankment, outlet works, banks, and [illegible]. The group proceeded to Honesdale and the following morning (8th [illegible] method of inspection was followed including a walk through the [illegible] the afternoon, the same routine at Dyberry, with the exception [illegible]

AD-A094 252   ARMY ENGINEER DISTRICT PHILADELPHIA PA   F/G 13/13
PROMPTON LAKE CONDITION REPORT DAM, OUTLET WORKS & SPILLWAY, PE--ETC(U)
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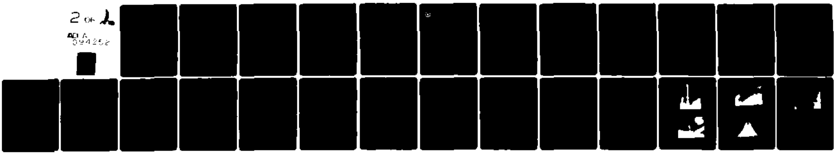

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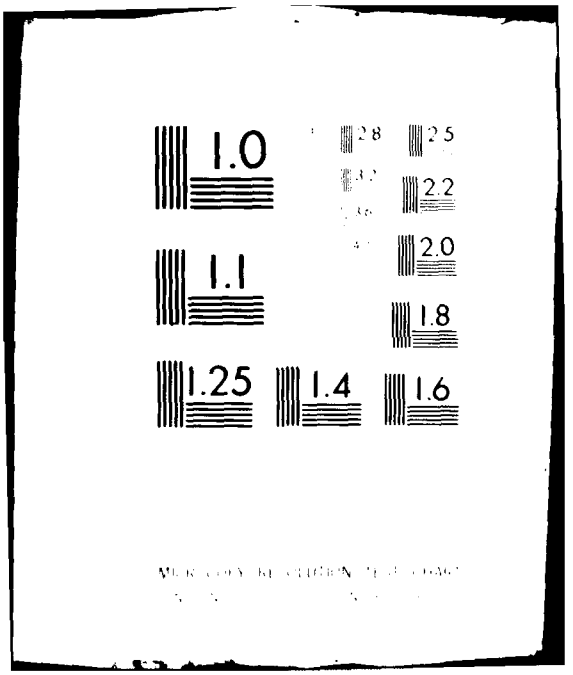
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through the tunnel. Following the Dyberry inspection the group returned to Prompton where a critique was held. The discussion followed point by point the check list recorded in Appendix I and II of ER 1110-2-100. At the end of the critique all the pertinent comments made by various members of the inspection party were recorded and summarized. Where possible the originator of the comment is identified.

5. Summary of Comments

a. Bear Creek Dam (Francis E. Walter), App. II, p. 3, Checklist

(1) Embankment surface cracks - Unable to observe

(2) Abutment and Embankment Junctions. —

Seepage noted at both the left abutment and the previously reported right bank. "Elevations should be taken of these locations and a series of weirs installed, including one at the end of the spoil fill, to record the quantity of water flowing at any given time. Periodic readings should be made and correlated with rainfall including fluctuations in pool level." - Smith

"On all future construction, known seeps should be accurately located so they can be watched during rising pool levels in future reservoir operations." - Alcott

(3) Vertical and Horizontal alignment. —

"Permanent monuments should be established in the Dam and Reservoir area particularly in the downstream slope to check for settlement and be able to determine relationships to pool level upstream." - Smith & Michel

(4) Unusual movement or cracking at or beyond toe - None

(5) Unusual thro embankment or downstream seepage - See above #2

(6) Sloughing or erosion of embankment and abutment slopes - None

(7) Movement of structural features, such as, conduits, intake towers, piers -"Take elevations on piers now submerged to determine settlement or extent of tilting. Continue surveys on embankment profile." - Smith

(8) Riprap Failures - None observed but check effect of last years sudden drawdown, 50' in 36 hours (1350' to 1300') after present pool (1390) is slowly lowered. - Hartzell

(9) Miscellaneous - Cut back left and right banks of outlet works to safe slopes to prevent accumulation of large boulders in outlet channel and provide degree of safety to visitors. - DePhilippe, Dixon & Others.

Appendix I, p. 3, Checklist - <u>Structures</u>

(1) Concrete Surfaces - Make new survey of crack repairs and joint sealing in tunnel and spillway ogee crest where spalling of old joint repairs is evident. - Michel, et al.

(2) Structural details - "Poor alignment of one monolith in left spillway wall." - Smith

(3) Structural Cracking - See (1) above.

(4) Joints and Joint material - See (1) above.

(5) Water passages - No comment.
(6) Foundation, Joint and Face drains - No comment.
(7) Spillways - See (1) above.
(8) Miscellaneous - "Lower emergency gates, raise main gates, clean channels of gravel, etc. and coat with tallow to facilitate operation of gates, prevent binding and reduce leakage." - Dixon

Instrumentation recommended in light of future construction - "Provide at least three lines of piezometers, one line at Sta. 78+00, one at 80+00, one line at 82+00 with 5 piezometers in a line; one on each side of core trench, two in impervious fill, and one at tailwater, for a total of fifteen piezometers." - Smith

b. Prompton Dam - Embankment Checklist, App. II, p. 3, ER 1110-2-100)

(1) Embankment Surface Cracks - Unable to observe
(2) Abutment and Embankment Junctions - Unable to locate pipe drains at contact zone between toe of embankment and left and right abutments on the downstream slope. One manhole was located in left abutment. Inlet pipes consisted of a 12-inch pipe from upslope and a 6-inch pipe from cross slope. The flow from these two pipes crossed a V-notch weir and were carried down slope by a 12-inch pipe. All pipe was clay (perforated). "The drains should be located by digging and when uncovered provided at that location with a manhole or observation risers. Weir measurements should also be made in the manhole." - Michel
(3) Vertical and Horizontal alignment of the embankment crest - "Monuments should be installed in the Dam particularly in downstream slope to provide for observation of settlement and correlation of pool levels with elevations on the downstream slope. Settlement readings should be taken on monuments installed in the two depressions noticed on the downstream slope." - Smith, Michel
(4) Unusual movement or cracking at or beyond toe - None
(5) Unusual through embankment or downstream seepage - At time of inspection only one of the seven relief wells was visibly flowing. The covers of all seven relief wells were removed to allow visual examination. The examination showed that actually five out of the seven were flowing. Flows ranged from a one and a half inch overflow of pipe to a well full to within eighteen inches of the cover. The two wells not flowing were the downstream wells in the right bank adjacent to the stilling basin. Static water level was below (4-5 inches) the top of the pipe. Dam tender, Stanly Kaminski, stated that his inspection in October 1965 showed this static condition in all six wells around the stilling basin. The well in the contact zone between left abutment and toe of slope has flowed continuously (visually) since construction of the dam. - "The whole relief well system should be reanalyzed." - Michel "The wells, some of which have mud deposits on the stone, should be cleaned and pumped out." - Smith & Michel. "The boring logs recorded during drilling for the relief wells should be obtained and used to study the condition of the relief wells." - Smith. The present covers are awkward and heavy. They should be redesigned with view toward easy, one-man access and an easy measuring system devised. At present, the flow can not be measured.

(6) Sloughing or erosion of embankment and abutment slopes - None
(7) Movement of structural features - Continue surveys on outlet works in view of future construction.
(8) Riprap failures - None, but the riprap on the upstream slope should be checked in regards to size and thickness when designing for the higher pool levels after the dam is modified.

Structures Checklist, p. 3 App. I, ER 1110-2-100

(1) Concrete surfaces - Excellent in conduit, all others good
(2) Structural details - No comment
(3) Structural cracks - None
(4) Joints and joint materials - Joint sealing compound has been plucked from joints exposing the cork. The worst cases appear at Stations: 7/88, 8/31, 8/41, 8/61, 9/90, 10/38, 11/46.19, 11/84.09, and at transition of conduit with intake structure. Invert was rough. "Consideration should be given to use of epoxy or hardeners in inverts constructed in the future." Hulman & Hartzell.
(5) Water passages - None
(6) Foundation, Joint and Face drains - No comment
(7) Spillways - No Comment

Piezometer installation for future installation when dam is modified and permanent pool raised - "This dam will need many piezometers. Study piezometers with respect to stratification of foundation materials and submit plan to OCE for comment, recommendation and/or approval." - Smith

c. Dyberry Dam (Jadwin) Embankment Checklist (App. II, p. 3, ER 1110-2-100)

(1) Embankment surface cracks - Unable to observe
(2) Abutment and embankment junctions - "Install permanent monuments, particularly in downstream slope to check settlement in embankment." - Michel
(3) Vertical and Horizontal alignment of embankment crest - See (2) above
(4) Unusual movement or cracking at or beyond toe - None observed
(5) Unusual through embankment or downstream seepage - "Locate, permanently monument and periodically check the 24-inch drain in left bank of spillway." - Michel. At present, settlement has caused the head wall at outlet to break away from pipe.
(6) Sloughing or erosion of embankment or abutment slopes - None
(7) Movement of structural features - None
(8) Riprap failures - None

Structures Checklist - App. I, p. 3, ER 1110-2-100

(1) Concrete surfaces - Good, see note in spillway
(2) Structural details - No comment
(3) Structural cracking - No comment
(4) Joints and joint material - No comment
(5) Water passages - No comment
(6) Drains - Weep holes in stilling basin dry. Bird nest in middle hole left side.
(7) Spillways - Some patching of spalled areas in spillway ogee crest is required.

(8) Miscellaneous - Cavities forming in rock fill toe downstream (spoil) should be checked occasionally. Future designs of approach channels should be designed for drainage. Both Dyberry and Prompton had created swamp conditions in the approach channels.

Piezometer locations were reviewed and the Phila. District recommendations of 2 piezometers was increased by Mr. Smith to 6, or 2 lines, each, having a piezometer at the centerline of embankment, downstream impervious fill and toe location.

c. Action - Report of inspection is due in OCE within 60 days. The following action has or is being taken:

(1) Sketches are being prepared to reflect above comments
(2) The extent of work required was discussed briefly with Operations Division (Griffin, Surveys and Staret, Reservoir Operations) and Vrooman and Vinci of Engineering Division. They all state that there will not be sufficient funds (too late) for what we are planning for FY-67, unless additional funds can be obtained from OCE.
(3) A detailed search is being instigated for as-built drawings
(4) Surveys not completed at time of inspection will be continued and reported.

E. P. HARTZELL

Copies furnished:
Michel
Dodson
Vrooman
Phillips
Klein
Staret

Appendix D

Condition Report

Prompton Lake

Lackawaxen River, Pennsylvania

Dam, Outlet Works & Spillway

Periodic Inspection Report No. 2

Second Periodic Inspection (1971)

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

4 NOV 1971

IN REPLY REFER TO
NAPEN-F

SUBJECT: Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures

Division Engineer, North Atlantic
ATIN: NADEN-T

1. Reference is made to the following:

a. ER 1110-2-100, Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures.

b. Schedule of periodic inspection, inclosure to first indorsement of basic letter, ENGCW-EZ, dated 19 January 1971, subject as above.

2. Reference 1b sets 1971 as the year for periodic inspection of all four dams in the Philadelphia District. The increments are as follows:

a. Beltzville Dam: Second annual inspection (follows impoundment)

b. Walter Dam: Second 5-year frequency inspection

c. Prompton Dam: Second 5-year frequency inspection

d. Jadwin Dam: Second 5-year frequency inspection

3. Based on informal discussion with NAD personnel, a convenient date for the inspection of the structures appears to be 20-22 July 1971. It is planned to depart Philadelphia District early on the morning of 20 July 1971 and follow the tentative itinerary below:

a. 20 July 1971: Inspect Francis E. Walter Reservoir and proceed to Honesdale, Pa. for overnight lodging.

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b. 21 July 1971: Inspect Prompton and Jadwin Reservoirs and proceed to Stroudsburg, Pa. for overnight lodging.

c. 22 July 1971: Inspect Beltzville Reservoir and return to Philadelphia, Pa. late in the evening.

4. Please advise of the suitability of this date for NAD and OCE personnel, furnish names of representatives who will attend, and hotel accommodations desired. Since the inspection will take place during the height of the vacation season in the reservoir areas, it is essential that hotel reservations be made early. Please submit as early as possible the number of personnel to attend.

FOR THE DISTRICT ENGINEER:

L. A. DUSCHA
Chief, Engineering Division

NADEN-T (4 May 71) 1st Ind
SUBJECT: Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures

DA, North Atlantic Division, Corps of Engineers, 90 Church Street, New York, NY 10007 5 May 1971

TO: Chief of Engineers, ATTN: ENGCW-EZ

1. It is requested that the names of your representatives attending the subject inspection be provided with desired hotel accommodations. To permit an early departure on 20 July 1971, it is suggested that the night of 19 July be spent in Philadelphia.

2. The Division requirements will be furnished the District by separate correspondence.

FOR THE DIVISION ENGINEER:

E. E. Brodeck

for M. SCHECHET
Chief, Engineering Division

ENGCW-EZ (NAPEN-F, 4 May 71) 2nd Ind
SUBJECT: Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures

DA, Office of the Chief of Engineers, Washington, D.C. 20314 28 May 1971

TO: Division Engineer, North Atlantic, ATTN: NADEN-T

1. The proposed dates of 20-22 July 1971 for inspection of Beltzville, Walter, Prompton and Jadwin Dams are satisfactory.

2. OCE will be represented by Mr. R. R. W. Beene of the Soil Mechanics Branch.

3. One, single, late arrival lodging accommodation is required beginning the night of 19 July 1971. Confirmation to OCE is requested.

4. A completed DA Form 2544 should be furnished OCE in the near future.

FOR THE CHIEF OF ENGINEERS:

for JOSEPH M. CALDWELL
Chief, Engineering Division
Civil Works Directorate

NADEN-T (4 May 71) 3d Ind
SUBJECT: Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures

DA, North Atlantic Division, Corps of Engineers, 90 Church Street, New York, NY 10007 8 June 1971

TO: District Engineer, Philadelphia, ATTN: NAPEN-F

1. For your information and appropriate action.

2. This office will be represented by Messrs. E.A. Alcott and M.A. Sylvester at the subject periodic inspection 20 thru 22 July 1971.

3. Single room accommodations are desired. In addition to the lodgings noted in paragraph 3 of the basic letter, it is requested that a single room be reserved for Mr. M.A. Sylvester at the Sportsman Motel near White Haven, Pa. for the night of 19 July 1971.

3. Attention is invited to the requirement for submission of Form 2544 as appropriate.

FOR THE DIVISION ENGINEER:

E. E. Wolfe

for M. SCHECHET
Chief, Engineering Division

DISPOSITION FORM Alcott Sylvester Brevoort Rice Brodbeck

For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.

REFERENCE OR OFFICE SYMBOL	SUBJECT
NADEN-T NADCO-C	Periodic Inspection and Continuing Evaluation of Francis E. Walter, Pompton, General Edgar Jadwin and Beltzville Dams in the Philadelphia District.

TO THRU: Chief, Tech. Engrg.Div FROM E.A. Alcott DATE 9 August 1971 CMT 1
Chief, Civil Works Br. M.A. Sylvester Alcott/ch/7556

TO: Chief, Engineering Div. &
Chief, Constr-Operns. Div.

1. Places and Dates: Francis E. Walter Dam, Lehigh River, Pa., 20 July 1971, Pompton Dam, Lackawaxen River and General Edgar Jadwin Dam, Dyberry Creek, Pa., 21 July 1971 and Beltzville Dam, Pohopoco Creek, Pa., 22 July 1971

2. Purpose: The above dams are included in the District's continuing evaluation program in accordance with ER 1110-2-100, "Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures." For Walter, Pompton and Jadwin Dams, this was the second periodic inspection on the 5 year cycle, the initial inspection being in 1966. The inspection of Beltzville is the second annual inspection, the initial inspection was performed in July 1970, shortly following completion of the structures. Work is still proceeding on the recreational facilities.

3. Attendance:

E.A. Alcott	NAD-Engrg. Div.
M.A. Sylvester	NAD-Constr-Operns. Div.
E.L. Dodson	NAP-Engrg. Div.
E.P. Hartzell	NAP-Engrg. Div.
J. Lewis	NAP-Engrg. Div.
R.W. Greene	NAP-Engrg. Div.
J.J. Radley	NAP-Engrg. Div.
V.L. Calvarese	NAP-Engrg. Div.
M.G. Nelson	NAP-Operns. Div.

4. Narrative: a. Francis E. Walter (formerly Bear Creek Dam)

(1) Description: The dam was completed in 1961 and is a rolled earthfill flood control structure with gate controlled outlet works and is located in the resort area of the Pocono Mountains of Northeastern Pennsylvania. The embankment is 234 feet high and extends 3,000 feet across the valley, controlling 288 square miles of the Lehigh River watershed in Luzern, Carbon and Monroe Counties. A pair of saddle dykes sitwated approximately one mile north of the dam close the reservoir rim to the top of dam elevation 1,474. The spillway weir is an uncontrolled concrete gravity ogee structure in bedrock on the high right abutment.

(2) Proposed Changes: To provide for long time storage of water in addition to the present flood control operation, the following modifications are being considered:

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SUBJECT: Periodic Inspection and Continuing Evaluation of Francis E. Walter, Pompton, General Edgar Jadwin and Beltzville Dams in the Philadelphia District.

(a) Moving and raising the spillway crest 31 feet to elevation 1,481.

(b) Raising the dam to elevation 1,503.

(c) Adding 70 feet to conduit the downstream end of outlet work tunnel.

(d) Raising the existing saddle dikes and constructing additional dikes as required.

(3) Summary of Inspection: (PoolEl-1300 when inspected)

(a) Embankment surface cracks. - none

(b) Abutment and embankment junction - good.

(c) Vertical and horizontal movement: - settlement points established along crest and on downstream slopes are being recorded, to date, no conclusive evidence of appreciable settlements.

(d) Unusual movement or cracking beyond the toe.- None.

(e) Unusual through embankment on downstream seepage. None observed at this inspection. Seepage noted at 1966 inspection was observed to stop after the pool was lowered below 1,343. Subsequent fillings of the pool above this elevation have not induced seepage. The District is presently preparing a seepage report covering observations since 1966.

(f) Sloughing or erosion of embankment and abutment slopes - None.

(g) Movement of structural features in embankment (conduit to intake tower) - None.

(h) Rip-rap failure - None.

(i) Tunnel----Still extensively cracked and leaking - District is to re-survey and plot cracks together with photographs for direct comparison with condition during previous inspections. No alarming changes observed. Since the tunnel was inspected with the main gates open and the emergency gates closed, it is suggested that when the cracks are mapped and photographed, the main gates be closed, to check the effectiveness of the seals. The main gate and sides and sill appeared to be in good condition.

(j) Spillway - The spillway has had additional patches that are failing - even these are only surface failures, no structural concern. It was noted that the drain holes in the apron below the spillway had been plugged. The District will check and be sure that these are of a shallow cap type to prevent debris accumulation and could pop-out and permit the drain to function in time of spillway overflow.

(k) Additional items: In order to reduce the amount of drift removal the District is considering the necessity of removing dead trees around the reservoir and the use of a log boom to divert the drift to an accessible area for collection and removal.

All piezometer and settlement pipe caps must be provided with locks. Some caps had beenremoved by visitors, and instruments tampered with.

It was noted that roadway across the top of the dam and some guard cable and posts had been damaged during the installation of the piezometers. These items should be repaired while the Mobile District crews are still doing work for the Philadelphia District.

The access road B, although in good condition, may require widening and addition of allweather shoulders in some areas in order to provide safe access for the increasing number of visitors that are using the facilities. An area of particular congestion and traffic delay, has been at the base of the ramp in the vicinity of the intake tower access bridge pier, where the road, being narrow is further restricted by a curve. The District is considering revisions to the road which may improve movement of traffic and increase safety in this area and others.

b. Pompton Dam:----

(1) Description: Completed in 1960, this dam is an earth fill embankment with an ungated weir controlled intake located near the natural stream course and adjacent to the right abutment. The dam has a maximum height of 140 feet above streambed and is 1,230 feet long. The outlet works is a cut and cover conduit on earth foundation. The spillway is an open channel, unlived cut in rock located high on the right abutment adjacent to the dam.

(2) Proposed Modifications: For long range storage requirements and multi-purpose operations, the following modifications and additions would be required:

(a) Intake control tower with gates and service bridge to control releases from the reservoir.

(b) Impervious blanket on valley wall and upstream from dam.

(c) Widen spillway to 250 feet. (Presently 50' wide.)

(d) Clearing of the reservoir land and road relocations as required.

(3) Summary of Inspection. (Pool El. 1125 when inspected)

(a) Embankment surface cracks - None.

(b) Abutment and embankment junction - The manholes for incorporation into the toe drain have been designed by the Philadelphia District and are expected to be constructed in FY 1972.

(c) Vertical and horizontal alignment - None

(d) Unusual through embankment or downstream seepage - None

(e) Unusual movement or cracking beyond toe - None

(f) Sloughing or erosion of embankment and abutment slopes. - None

(g) Movement of structural features in embankment. In the readings taken on Intake structure, conduit and stilling basis, there has been practically no change from readings taken prior to 1966 inspection.

(h) Riprap Failures- None, project has not been subjected to high pools or wave action. As noted in the initial periodic inspection, the riprap was very poorly placed with many areas of undersized rocks. It should be noted that if any modifications are made to the dam for long term storage, a substantial zone of better rock from the spillway widening excavation should be placed over the present riprap to provide a more uniform surface of durable stone riprap.

(i) Conduit: The conduit still appears in excellent condition. District will resurvey conduit for cracks and also photograph. Some few joints that had some compound missing should be repaired.

(j) Spillway: No concrete structure, channel is cut in rock. Some weathering has taken place with some rock falls of pieces larger than resident maintenance equipment can handle. District forces will maintain surveillance and remove excess accumulations.

(k) Condition at Relief Wells: Since the initial inspection, all relief wells have been cleaned and surged. These wells are flowing from artesian flow. Since therehas never been a substantial head above the recreation pool elevation of 1125, the effect of the reservoir on the relief wells has not been determined.

(1)-Additional Items: The covers for the relief wells and caps for the piezometers and settlement pipes should all have locks or some positive means of preventing removal and vandalism.

The access road off of relocated route 70 has an approximately 120° turn as approached from the south, this in addition to the poor visibility when leaving the area to re-enter route 70, would indicate consideration of revision to the approach alignment for this access.

c. General Edgar Jadwin Dam:

(1) Description: This project completed in 1959, is an earth and rock fill flood control structure with an uncontrolled outlet works located at streambed elevation. The dam is 1,225 feet long and 109 feet at maximum height above streambed. The spillway has a concrete gravity undated ogee weir across an inclined rock cut in the left abutment adjacent to the enbankment. The outlet works is in the left abutment, consisting of an uncontrolled intake structure, concrete lined tunnel and a stilling basin.

(2) Summary of Inspection: (Stream El.974.8 when inspected)

(a) Embankment surface cracks - None

(b) Abutment and embankment junctions: - "OK"

(c) Vertical and horizontal abutment of embankment - surface settlement pipes installed along crest in late - Fall of 1970,- first readings taken June 1971, to be read annually.

(d) Unusual movement or cracking at or beyond toe - None

(e) Unusual through embankment or downstream seepage - None

(f) Sloughing or erosion of embankment or abutment - None

(g) Riprap failures - None, pool has never been on riprap.

(h) Outlet works: Flow was so minimal that party could inspect the tunnel. Some cracking was observed and joint materials missing in some spots. The District will plot cracks and also photograph tunnel surface, since this was the first time the tunnel was inspected. Concrete badly weathered and pitted at base of intake center pier nose. Considerable pitting and erosion were noted at the transverse construction joint at the end of the transition zone, this will be plotted and described more fully by the District.

(i) Spillway: Gravity concrete weir structure is in good condition.

(j) Additional items: Instrumentation pipe caps all should be provided with locks or positive sealing for access by authorized personnel only. Since this project has an uncontrolled outlet works, even with the minor flows experienced to date, the regular seasonal debris accumulation has caused some concern about jamming the intake structure. The District personnel indicated that consideration was being given to a system of upstream diversion dikes in conjunction with a debris attachment basin to control these seasonal accumulations for removal prior to entanglement in the intake structure.

d. Beltzville Dam:

(1) Description: The dam completed in 1970, is a rolled earth fill dam, 170 feet high and 4,560 feet long across the Pohopoco Creek. The spillway is ungated and partially concrete lined channel excavated in a saddle through the right abutment adjacent to the embankment. The outlet works consist of an intake tower, a cut and cover conduit founded on rock and a stilling basin. Bridges provide access to the dam embankment across the spillway and to the control tower from the enbankment.

(2) Summary of Inspection: (Pool El.602 when inspected)

(a) Embankment surface cracks: None observed.

(b) Abutment and enbankment junctions: There is evidence of substantial

erosion along both the upstream and downstream junctions on the right abutment. The District stated that they are presently making a study toward remeding the downstream condition and will also include the upstream area. The conditions observed are not creating unsafe conditions to date but should be kept under observation to prevent undermining of the embankment toe with increased erosion.

(c) Vertical and horizontal alignment: Instruments installed during and after construction are being read and recorded by the District. No excessive settlements or deflections have been indicated to date.

(d) Unusual movement or cracking beyond toe - None

(e) Unusual through enbankment or downstream seepage. None. Springs were observed along left abutment well downstream of dam. District is going to monitor these by observation and/or weirs to correlate with pool fluctuations.

(f) Sloughing or erosion of embankment and abutment slopes. (See item (b) above) - The downstream slope showed indications of minor erosional paths. This slope should be carefully monitored by the District forces and any indication of accelerated erosion path activity should be corrected.

(g) Movement of structural featrues in enbankment - None.

(h) Riprap failures: None.

(i) Outlet works: The conduit was dewatered and inspected from the downstream portal to the emergency gates upstream. Numerous cracks were observed and some joints were leaking in the conduit. There must have been something caught under the right gate but the left one was sealed very well. There was a pressure cell cap missing in the center flume, this can be replaced by operating personnel, - the District will conduct another crack survey and take pictures for comparison of conditions observed last year. When this is done, it is suggested that the main gates be used to check the seal, the gate guides and sill appeared in good condition when inspected.

(j) Spillway: Conditions were about the same as last year. Crack survey and photo record will be made by District. Weepholes in walls need new screens in some places. For future projects, it may be a good idea to have weepholes above where small animals can reach to rip screens off.

(k) Joint displacement and joint material: Extrusion of the premolded joint filler was noted between the spillway bridge piers at the contact with the

spillway slab. It was noted that this extrusion was occuring along the southern face of the bridge pier. Since the bridge and piers were instrumented and no settlement or alignment changes were recorded, it is considered that the extrusion of the material is a result of spillway slab expansion, i.e., (the pier reflects the sun on south and shades the north) to displace the joint filler on the southern face of the pier.

(1) *Additional Items:* As a safety item it was also noted at this project that the approach to the operations building and public overlook area from the relocated highway (township road T-397) required a right angle turn into a relatively narrow drive. Due to the combination of vertical and horizontal curves on the relocated highway in the vicinity of the entrance road, it is difficult to see approaching cars when leaving the area. It was suggested that the State and/or County highway officials be contacted to consider reduction of the speed limit along this portion of the highway.

E.A. ALCOTT
Civil Engineer

M.A. SYLVESTER
Civil Engineer

NAPEN-F

Second Periodic Inspection and Continuing Evaluation of Prompton Lake, 21 July 1971

Chief, Fdns & Mtrls Branch

R. W. Greene
Civil Engineer

3 Aug 71
GREENE/ram/4846

1. Reference is made to the following:

a. ER 1110-2-100, dated 1 September 1970, "Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures." This regulation establishes policy and determines scope and frequency of inspections.

b. Schedule of periodic inspection, enclosure to first indorsement of basic letter, ENGCW-EZ, dated 19 January 1971, subject as in reference 1a. above. In accordance with this schedule, 1971 is the year for the second periodic inspection of Prompton Lake.

c. Basic letter, NAPEN-F, dated 4 May 1971, with indorsements, sets up and confirms the inspection date and notes the personnel attending from higher authority.

2. In the morning of 21 July 1971, the second periodic inspection was held at Prompton Lake. The following personnel were in attendance:

E. E. Alcott	NAD - Engineering Division
M. A. Sylvester	NAD - Operations Division
E. L. Dodson	NAP - Engineering Division
J. Lewis	NAP - Engineering Division
E. P. Hartzell	NAP - Engineering Division
V. L. Calvarese	NAP - Engineering Division
J. J. Radley	NAP - Engineering Division
R. W. Greene	NAP - Engineering Division
M. G. Nelson	NAP - Engineering Division

3. Upon arrival at the project office, members of the inspection party were briefed on the comments made during the 1966 inspection and remedial measures accomplished subsequent to that inspection. A pre-inspection report was presented to each party member to familiarize them with the project, present

the instrumentation results, and supply the inspection checklist. Following the briefing, the inspection party proceeded to inspect the embankment, spillway, and intake structure, followed by a walk-thru of the outlet works conduit. The relief well system and outlet works stilling basin were also inspected.

4. Following the inspection, a critique was held in the project office. The discussion followed, point by point, the checklist for the inspection, previously furnished in the pre-inspection report. During the critique, all comments made by the inspection team were recorded and are summarized below:

a. Embankment

(1) Surface cracks: None noted.

(2) Abutment and embankment junctions: Manholes, suggested during the 1966 periodic inspection, to observe flow through the pipe drains located along the junctions have not been installed to date.

(3) Vertical and horizontal alignment: No problems noted.

(4) Unusual moving or cracking at or beyond toe: None observed.

(5) Unusual through embankment or downstream seepage: None noted.

(6) Sloughing or erosion of embankment and abutment slopes: None noted.

(7) Movement of structural features in embankment: None noted. Continue surveys of outlet works conduit.

(8) Riprap failure (major displacement): Some local "pocketing" of large boulders or fines observed.

b. Outlet Works. Conduit, Intake Structure, Stilling Basin

(1) Concrete surfaces: Excellent in conduit, all others good.

(2) Joint and joint materials including relative movement at joints between monoliths or portions of concrete structures: Mastic missing from conduit joints, as observed in 1966 inspection, has not been replaced. No detrimental results were observed.

(3) Water passages including drains: No comment.

(4) Leakage at joints or cracks: No comment.

(5) Condition of weepholes and other drainage system: No comment.

(6) Condition of relief wells: Relief wells appear to be functioning satisfactorily. Several of the relief wells have mud deposits on the drainage stone which should be cleaned.

c. Spillway

(1) Drainage system: No comment.

(2) Sloughing or erosion of rock and earth slopes: Some sloughing of the right wall has taken place and should be observed.

d. Miscellaneous

(1) Piezometer casing should be fitted with locked caps. Piezometer DLL-10 is presently filled with sand and should be cleaned.

(2) Relief well covers should be locked.

5. Conclusions and Recommendations. The overall appearance of the dam is good. Remedial measures to be taken are considered minor. The work will be accomplished as funds become available.

R. W. GREENE
Materials & Special Studies Section

Appendix E

Condition Report

Prompton Lake

Lackawaxen River, Pennsylvania

Dam, Outlet Works & Spillway

Periodic Inspection Report No. 2

Photographs

Appendix E

Photographs

Photo No.	Description
1	Typical view of construction joint with mastic sealing compound missing.
2	Close-up view of construction joint as above with exposure of pre-moulded cork filler.
3	Calcium filled crack in top of conduit at Station 9+94.5.
4	View of entrance chute to conduit.
5	Tie rod hole at Station 10+91.

Photo No. 1 Typical view of construction joint with mastic sealing compound missing. Stations 7+88, 8+31, 8+41, 8+61, 9+90, 10+38, 11+46, and 11+84.

Photo No. 2 Close-up view of construction joint as above. Note exposure of pre-molded cork filler.

Photo No. 3 Calcium filled crack located at Station 9+94.5. Only crack found throughout conduit.

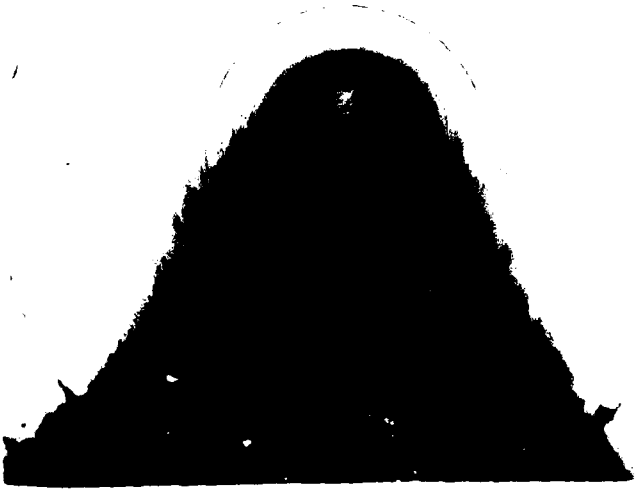

Photo No. 4 View of entrance chute to conduit. Photo taken looking upstream.

Photo No. 5 Tie rod hole at Station 10+91 to be filled.