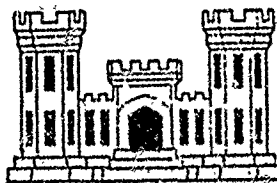


A086352

**STILWELL LAKE DAM
ORANGE COUNTY, NEW YORK
INVENTORY NO. 770**

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



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NEW YORK DISTRICT CORPS OF ENGINEERS

DECEMBER 1978

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dam Safety National Dam Safety Program Visual Inspection Hydrology, Structural Stability		Stilwell Lake Dam Orange County U.S. Military Academy - Fort Montgomery			
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization. Visual observations made during the course of the inspection did not indicate any severe structural deficiency or mechanical malfunction which would adversely affect the immediate safety or stability of the dam. → over					

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The total discharge capacity of the spillway and the regulating outlets is approximately 39,975 cfs. This is greater than the estimated Probable Maximum Flood (PMF) of 24,245 cfs, therefore, the project discharge capacity is adequate.

No remedial measures are required to assure the safety of the dam at the present time. ↙

Some measures are recommended and included in Section 7 of the Inspection Report.

② National Dam. Inspection
Program.

STILWELL LAKE DAM
ORANGE COUNTY, NEW YORK.

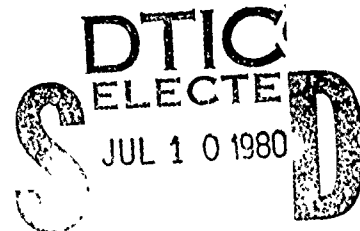
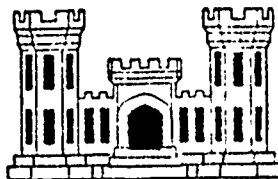
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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

⑪ Dec 78

⑩ Eugene O'Brien

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⑮ DACW 51-78-C-0024

Prepared by: TIPPETTS-ABBETT-McCARTHY-STRATTON

NEW YORK DISTRICT CORPS OF ENGINEERS

DECEMBER 1978

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HUDSON RIVER BASIN
STILWELL LAKE DAM
INVENTORY NO. 770
PHASE I INSPECTION REPORT

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PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: STILWELL LAKE DAM (I.D. NO. 770)
State Located: NEW YORK
County Located: ORANGE
Stream: POPOLOPEN BROOK
Date of Inspection: DECEMBER 5, 1978

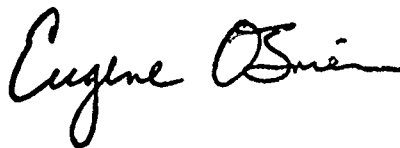
ASSESSMENT

Visual observations made during the course of the inspection did not indicate any severe structural deficiency or mechanical malfunction which would adversely affect the immediate safety or stability of the dam.

The total discharge capacity of the spillway and the regulating outlets is approximately 39,975 cfs. This is greater than the estimated Probable Maximum Flood (PMF) of 24,245 cfs, therefore, the project discharge capacity is adequate.

No remedial measures are required to assure the safety of the dam at the present time.

Some measures are recommended and included in Section 7 of the Inspection Report.



Eugene O'Brien, P.E.
New York No. 29823



Approved by: Col. Clark H. Benn
New York District Engineer

Date:

11 March 80



1. OVERVIEW OF SPILLWAY AND RESERVOIR VIEWED
FROM RIGHT NON-OVERFLOW MONOLITH

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
STILWELL LAKE DAM, INVENTORY NO. 770
HUDSON RIVER BASIN
ORANGE COUNTY, NEW YORK

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I Inspection reported herein was authorized by the DEPARTMENT OF THE ARMY, NEW YORK DISTRICT, CORPS OF ENGINEERS by Contract No. DACW 51-78-C-0024, Modification No. P 00002, in fulfillment of the request by the Commandant, United States Military Academy in accordance with criteria specified in the National Dam Inspection Act, Public Law 92-367, 8 August 1976.

b. Purpose of Inspection

The purpose of this inspection and report is to investigate and evaluate the existing conditions of subject dam in order to: identify deficiencies and hazardous conditions; determine if they constitute hazards to human life or property; and notify the Commandant of the United States Military Academy of these results along with recommendations for remedial measures where necessary.

1.2 DESCRIPTION OF THE PROJECT

a. Description of Dam and Appurtenances

Stilwell Lake Dam is a concrete gravity dam which trends about north-south and consists of a dropped center spillway and eight non-overflow monoliths. The length of spillway is 160 feet. The height of spillway crest is at El 602.0, about 43 feet above the bedrock foundation. The lengths of the north and south non-overflow monoliths are 120 feet and 200 feet, respectively. The maximum height of the non-overflow monolith is about 61 feet above its foundation. The differential height between the top of the non-overflow monolith at El 617.8 and spillway crest is 15.8 feet.

Two spray walls are located along both sides of the spillway to contain the flows. The spray walls are extended downstream by gravity retaining walls with stone filled drains behind the walls.

Two core walls 85 feet and 35 feet long are extended from the ends of the north and south non-overflow monoliths respectively into sound rock.

An intake chamber is provided in the north non-overflow monolith approximately 46 feet north of the spillway. The chamber has two 20-inch diameter sluice gates at different elevations which control discharges through 20-inch diameter cast iron pipes. A steel "A" type hoist frame, located at the top of the chamber, can be used to lower and raise the intake screens.

A 36-inch diameter cast iron low level outlet pipe, located 15 feet south of the spillway centerline, can be used to lower the water level in the reservoir for maintenance and in the case of an emergency. A bell-mouth pipe entrance is provided with bar screen. Stoplogs are also provided to permit repairs to the valve located in the drainage and grouting gallery.

A 5-foot wide by 7-foot high drainage and grouting gallery is located in the spillway monoliths at El 565 and extends into both non overflow monoliths. Access to the gallery is provided by two gates on the downstream face of the non-overflow sections. Pipes, 3 inches in diameter on 5-foot centers, have been drilled for the purpose of creating a grout curtain. Pressure relief pipes, 6 inches in diameter on 20 foot centers, are provided near the downstream face of the gallery wall with outlets draining into a gutter. Seepage collected in the gutter can be emptied through two 6-inch diameter drains leading to the downstream face of the spillway.

b. Location

The dam is located approximately 5 miles southwest of the United States Military Academy, about 2 1/2 miles west of the town of Fort Montgomery.

c. Size Classification

The dam is greater than 40 feet high but less than 100 feet high, therefore, classified as an "intermediate" dam.

d. Hazard Classification

The dam is in the "significant" hazard potential category because of the few isolated homes located a short distance downstream from the dam.

e. Ownership

Stilwell Lake Dam is owned by the United States Military Academy. The day-to-day operation and maintenance of the operating facilities is managed by the Water Plants Section of the Utilities Division. The maintenance of the dam is managed by the Buildings and Structures Section of the Buildings and Grounds Division. Both Divisions are directly responsible to the Directorate of Facilities Engineering, United States Military Academy.

f. Use of Dam

The impoundment provided by the dam is for water supply and recreational purposes.

g. Design and Construction History

The dam was designed by Alexander Potter Associates, Architect-Engineers of New York City. It was constructed and completed in November, 1948 by the U.S. Army Corps of Engineers. Design data, calculation and as-built drawings can be obtained from the Directorate of Facilities Engineering, United States Military Academy.

h. Normal Operating Procedures

The water level in the reservoir is usually maintained to the spillway crest with the upper sluice gate open. During September to April, water passes over the spillway crest with flashboards in the open position.

1.3 PERTINENT DATA

a. <u>Drainage Area</u> (square miles)	12.5
b. <u>Discharge at Dam Site</u> (cfs)	
Maximum regulating gate outlets	285
Un gated Spillway at maximum pool, El 617.8	39,690
Total Spillway capacity at maximum pool, El 617.8	39,975
c. <u>Elevation</u> (feet above MSL)	
Top of Dam	617.8
Maximum pool-design surcharge	617.8
Crest of Spillway (ungated)	602
Streambed at centerline of dam	560
d. <u>Reservoir</u> (miles)	
Length of Maximum pool	0.75
e. <u>Storage</u> (acre-feet)	
Crest of Spillway, El 602	1920
Top of dam, El 617.8	9465
f. <u>Dam</u>	
Type:	Concrete gravity
Length:	480 feet
Height:	58 feet ±
Side Slopes:	Upstream: vertical at top 8V on 1H at bottom Downstream: 10V on 8H
Top Width:	9.67 feet
Grout Curtain:	3-inch diameter grout pipes spaced at 5 foot centers

g. Spillway

Type: .

Concrete Ogee Weir
section

Length:

160 feet

Crest Elevation:

602

h. Regulating Outlets

Two 20-inch diameter sluice gates are located at El 592 and El 585. They are connected to a common 20-inch diameter cast iron pipe with its outlet at El 565.5. A gate valve is provided to regulate the discharge.

A 36-inch diameter cast iron pipe is located at El 562. A valve is provided in the drainage and grouting gallery to regulate the discharge.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Design data, engineering information and as-built drawings are available for evaluation of the original design of the dam. There are no records available of any design changes to the dam.

2.2 CONSTRUCTION RECORDS

There are no construction records available for the project.

2.3 OPERATION RECORDS

There are no operation records available.

A record of reservoir elevation and rainfall are kept daily and are available at the Lusk Reservoir Water Treatment Plant.

2.4 EVALUATION OF DATA

Information and drawings were made readily available by personnel of the Water Plants Section of the Utilities Division and the Civil Section of the Engineering Plans and Services Division; Directorate of Facilities Engineering, United States Military Academy.

The information obtained from available data, the personal interviews and the visual inspection are considered adequate for this Phase I inspection and evaluation.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

A visual inspection of Stilwell Lake Dam was made on December 5, 1978. At that time the reservoir level was at El 599±, about 3 feet below spillway crest.

Water was discharging from the 20-inch diameter cast iron pipe into the spillway bucket. The water level at the bucket was maintained at the top of bucket sill by discharges from two 12-inch diameter drain pipes leading into the downstream channel.

Flashboards on the spillway crest were in an upright position except for those on the monolith adjacent to the north (left) non-overflow monoliths which were in a horizontal position.

b. Dam

Both north and south non-overflow monoliths were in good condition. No displacements of the horizontal and vertical alignments were observed. There was some white mineral deposition along horizontal joints on the downstream face of the dam. No seepage and/or leakage were observed.

c. Spillway

On the downstream face, there was some deterioration of concrete existing in the area near the crest.

There was some spalling along the horizontal and vertical joints. The horizontal joint above the 36-inch diameter low level outlet pipe appears to have a wide gap. There was wetness existing on the concrete face below this gap, but no seepage was detected. Grass was growing along one of the vertical joints.

The wooden flashboards were in deteriorating condition. It was reported that the owner is planning to replace them. It is also reported that an accessway will be installed between the spillway crest and the top of the dam.

d. Appurtenant Structures

The two 20-inch diameter sluice gates in the intake chamber were found to be in operating condition. Downstream, opposite the intake chamber, a 20-inch diameter gate valve and a flow indicator were provided. It appears that the flow indicator is now abandoned and the stem and wheel of gate valve are rusted. It is reported that this gate valve is kept open all the time.

A 36-inch diameter valve located in the drainage and grouting gallery was found well maintained. The valve was closed at the time inspected. It was reported that an original butterfly valve was replaced in 1974.

Inside the drainage and grouting gallery, water has collected to approximately one inch deep. The gutter was full of water and silt. Significant amounts of silt and debris were found deposited near the south end of the gallery to the degree that the two 6-inch diameter gutter drains were blocked. No leakage was observed through joints. On the downstream side of the gallery wall, the entire surface below the first horizontal joint was found wet and covered by white mineral deposits. The entrance gates to the gallery were locked and in good condition.

The railings along south retaining walls were rusted with paint completely peeled off. The lock on the south entrance gate on the top of the dam failed to open with the key inserted.

e. Downstream Channel

Riprap protection is provided on the south (right) bank of the channel. Some debris, broken concrete pipes and bushes were found in the downstream channel.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the inspection did not indicate any severe structure deficiency or mechanical malfunction which would adversely affect the immediate safety of the dam. However, there is continuous need of inspection, maintenance and repair programs.

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

During the months of September to April, water passes over the spillway crest with the flashboards open. During May to September the upper sluice gate is opened to maintain the water level about one inch over the spillway crest.

The 36-inch diameter valve located in the drainage and grouting gallery is usually kept closed. This valve is opened when it is desired to maintain the reservoir level not higher than one foot above flashboards so that the flashboards will stay in an upright position.

4.2 MAINTENANCE OF THE DAM

There is no operation and maintenance manual for the dam; however, present maintenance of the project appears adequate.

4.3 MAINTENANCE OF OPERATING FACILITIES

The two 20-inch diameter sluice gates, at the intake chamber, and the 36-inch diameter valve in the drainage and grouting gallery, appear to be in acceptable operating condition. An original 36-inch diameter butterfly valve was replaced in 1974.

Records of daily operation of gates are kept in the office.

4.4 DESCRIPTION OF WARNING SYSTEM IN EFFECT

An electric water level indicator is located at the Water Plant and automatically registers reservoir level. If deemed necessary, Plant personnel will report conditions to a higher authority by telephone communications.

4.5 EVALUATION

There appears to be nothing in the present operational or maintenance procedures which would adversely affect the safety of the project. Overall maintenance of the dam and appurtenant features is considered to be adequate.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 DRAINAGE AREA CHARACTERISTICS

Stilwell Lake is the last significant lake on Popolopen Brook before the Brook enters the Hudson River. The watershed of Stilwell Lake has a maximum length of 6.4 miles in the NE-NW direction and a maximum width of 2.6 miles. The entire watershed, which is wooded and includes many lakes and ponding areas, occupies 8021 acres (12.53 square miles). About 45% (3630 acres) of the area is controlled by Popolopen Lake, the outflow of which, to a degree, is attenuated again, by Mine Lake before entering Stilwell Lake. Mine Lake and a number of other lakes and ponding areas control an additional 29% (2349.2 acres) of the watershed so that flow from only 2041.8 acres can be considered as uncontrolled flow entering Stilwell Lake. It is estimated that the available storage, in the lakes upstream of Mine Lake, a 480.9 acre-feet could attenuate up to 4.64 inches of runoff over that partial area. The estimated available storage over the entire basin of 12.53 square miles is about 3780 acre-feet which is equivalent to approximately 5.5 inches of runoff.

5.2 SPILLWAY CAPACITY

Normal discharges from Stilwell Lake is possible through two low level valve controlled 20-inch diameter cast iron pipe outlets. The spillway is 160 feet in length with an "ogee" shaped crest and has a computed maximum discharge (water level El 617.8) of 39,690 cfs. It is estimated that with the water surface at El 602 the discharge capacities of the 20-inch diameter and 36-inch diameter pipes are 71 cfs and 214 cfs respectively.

5.3 RESERVOIR CAPACITY

According to an available as-built drawing¹ the maximum reservoir capacity (El 617.8) is given as 1455 million gallons or 4465 acre-feet. It is estimated that the surcharge storage between spillway crest El 602 and El 617.8 is 2541 acre-feet.

5.4 FLOODS OF RECORD

There are no stream gages or records of major floods for the Popolopen Brook Watershed. Flow records for gages in the Wallkill River basin indicate that the worst flooded recorded was October 16, 1955.

5.5 DESIGN FLOOD

Because there are no data available on floods for the Popolopen Brook

It was necessary to synthesize the Standard Project Flood.

The Probable Maximum 6-hour rainfall for the United States Military Academy area is 24.4 inches². This amount, adjusted³ for conformity of generalized isohyets (in Reference 2) with the shape of the watershed, becomes 19.52 inches. The inflow is based on the sum of the flows entering Stilwell Lake from the directly contributing area (2041.8 acres), the lake area (131 acres), and the outflow from Mine Lake. Inflow to Mine Lake is based on the sum of the flows from the directly contributing area (777 acres), the lake area (24.5 acres), the upstream area affected by ponding (1171 acres), and the outflow from Popolopen Lake. Unit hydrographs, based on the Snyder method⁴, and using $C_T = 2$ and $640 C_p = 400$, were developed for sub-basins VI, VII and X. Flows from all other areas were computed by the instantaneous conversion of excess rainfall to runoff because of the small contributing drainage areas and the negligible lag time. A loss of 0.2 inches per hour was applied to all rainfall over the land areas. The runoff volume equal to the estimated retention capacity of each ponding sub-area was subtracted from the beginning of the flood runoff and in each case the remaining runoff was lagged appropriately before it was added to form the inflow to Mine Lake. The inflow peaks of the Probable Maximum Flood and the Standard Project Flood to Stilwell Lake are 26,291 cfs and 10,170 cfs respectively.

The potential of the dam being overtopped was investigated on the basis of the available surcharge storage and spillway discharge capacity to meet a potential emergency inflow. It was assumed that the lake levels were at spillway crest elevation (Mine Lake El 648.63, and Stilwell Lake El 602) at the start of the flood inflow and the low level outlets were closed during the occurrence. The maximum capacity of the spillway on Mine Lake was calculated to be 1420 cfs. The computed discharge of the Stilwell Lake spillway with the water level at El 617.8, equivalent to the top of the dam, is 39,690 cfs.

5.6 EVALUATION

The PMF and SPF were routed through the lakes using a computerized technique, and resulted in a maximum lake elevation of 613.35 and 607.97 for the PMF and SPF respectively, and with peak outflows of 24,245 cfs and 9232 cfs respectively.

The PMF peak outflow is about 61% of the computed spillway capacity and the spillway is therefore considered adequate.

References

- ¹ As-built drawing titled: USMA Water Supply Dam and Reservoir - Hydrologic and Design Data, drawing no. 512-464, dated November 1948

- 2 "Rainfall Frequency Atlas of the United States," USWB Technical Paper No. 40.
- 3 Engineering Circular EC 1110-2-27, August 1966
- 4 "Flood Hydrograph Analyses and Computations," EM 1110-2-1405

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not indicate either existing or potential conditions which would adversely affect the safety or structural stability of the dam.

b. Design and Construction Data

Stability design calculations and other engineering data are available from the Directorate of Facilities Engineering, United States Military Academy.

c. Operating Records

The dam has never been overtopped. The daily records of reservoir elevations and operation of gates are kept and available at the Water Plant.

d. Post-Construction Changes

There are no records of any post-construction changes except for the 1974 replacement of the 36-inch diameter butterfly valve in the drainage and grouting gallery.

e. Seismic Stability

The dam is located in Seismic Zone No. 1, therefore, no seismic analyses are warranted.

6.2 REVIEW OF STABILITY COMPUTATIONS

The original stability calculations indicated that 50% of the head was assumed for the uplift along the base of the dam. This is not in accordance with the present design practice indicated on Chapter 2, paragraph 2-04 of EM 1110-2-2200, revised November 23, 1960, published by the Corps of Engineers, U.S. Army.

Using the above criteria with an assumed maximum 50% drain efficiency, it is found that for the Design Loading Case III, water surface at El 617.8, the sliding factor would be 0.98. This is greater than 0.65 allowed by the criteria specified in Chapter 3, paragraph 3-03 of the above mentioned manuals.

It should be noted that the water surface for the Probable Maximum Flood (PMF) is 4.5 feet below that assumed for Design Loading Case III. Thus, the sliding factor for the case of PMF would be less than 0.98. In view of the fact that its severity, short duration and unusual occurrence

in nature, the safety against sliding can be considered not critical.
Therefore, the stability of the dam is considered adequate.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

Visual observations made during the course of the inspection did not indicate any severe structural deficiency or mechanical malfunction which would adversely affect the immediate safety or stability of the dam.

The total discharge capacity of the spillway and the regulating outlets is approximately 39,975 cfs. This is greater than the estimated Probable Maximum Flood (PMF) of 24,245 cfs, therefore, the project discharge capacity is adequate.

b. Adequacy of Information

Information and data available are considered adequate for the performance of this investigation.

Records of previous inspections made in April 1976 were not available at the time of this Phase I inspection.

7.2 REMEDIAL MEASURES

No remedial measures are required to assure the safety of the dam at the present time.

Certain measures are recommended as follows:

a. Deteriorated concrete surface and spalling along joints should be monitored so that the repairs can be made when needed.

b. Silt and debris deposited in the drainage and grouting gallery should be removed. The two 6-inch diameter gutter drains should be cleaned to ensure the free-passage of water collected in the gallery.

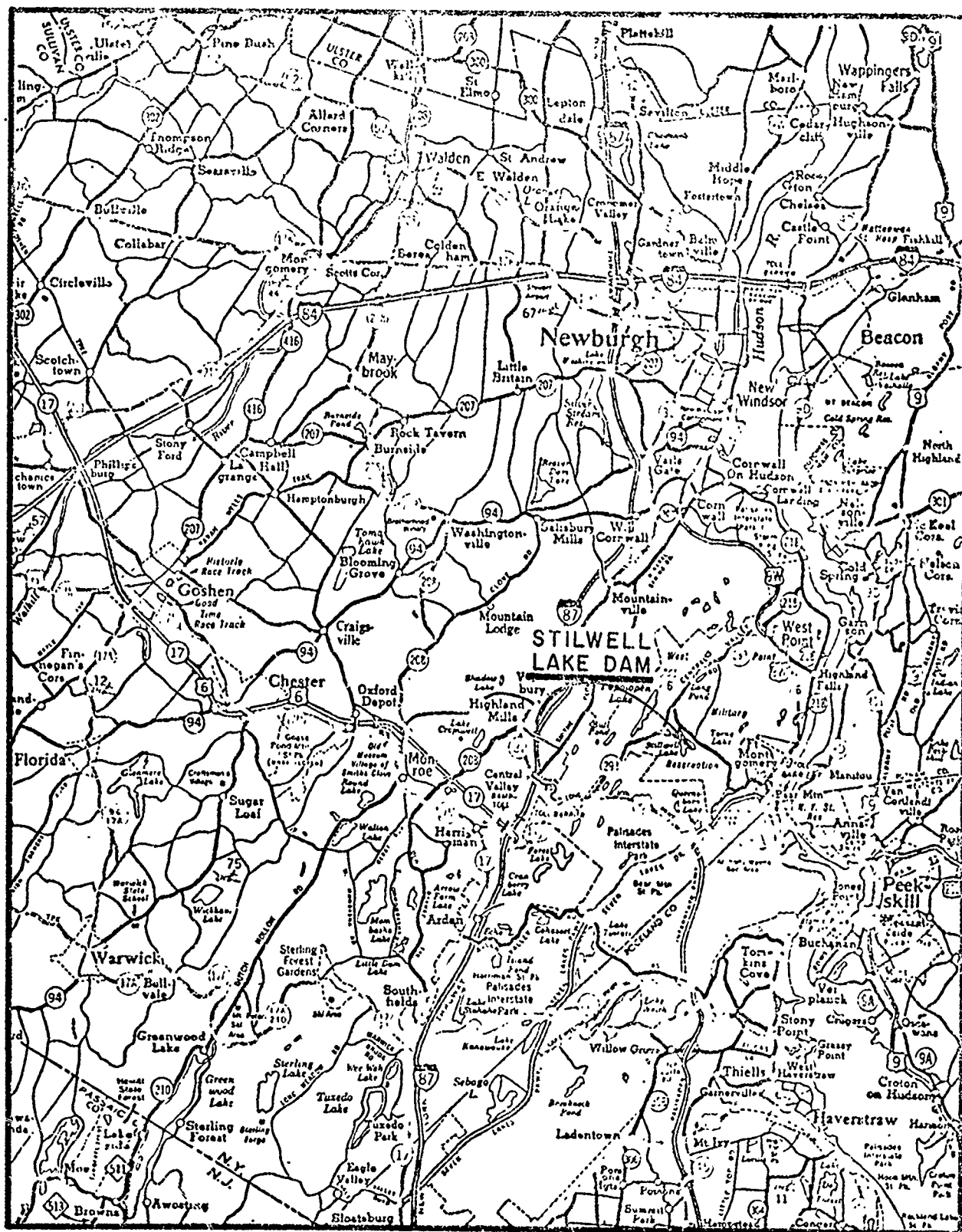
c. Establish an observation and monitoring program of the pattern and quantity occurring on the downstream side of the gallery wall.

d. Establish a program of periodic inspections of the project features.

e. Prepare an Operation and Maintenance Manual.

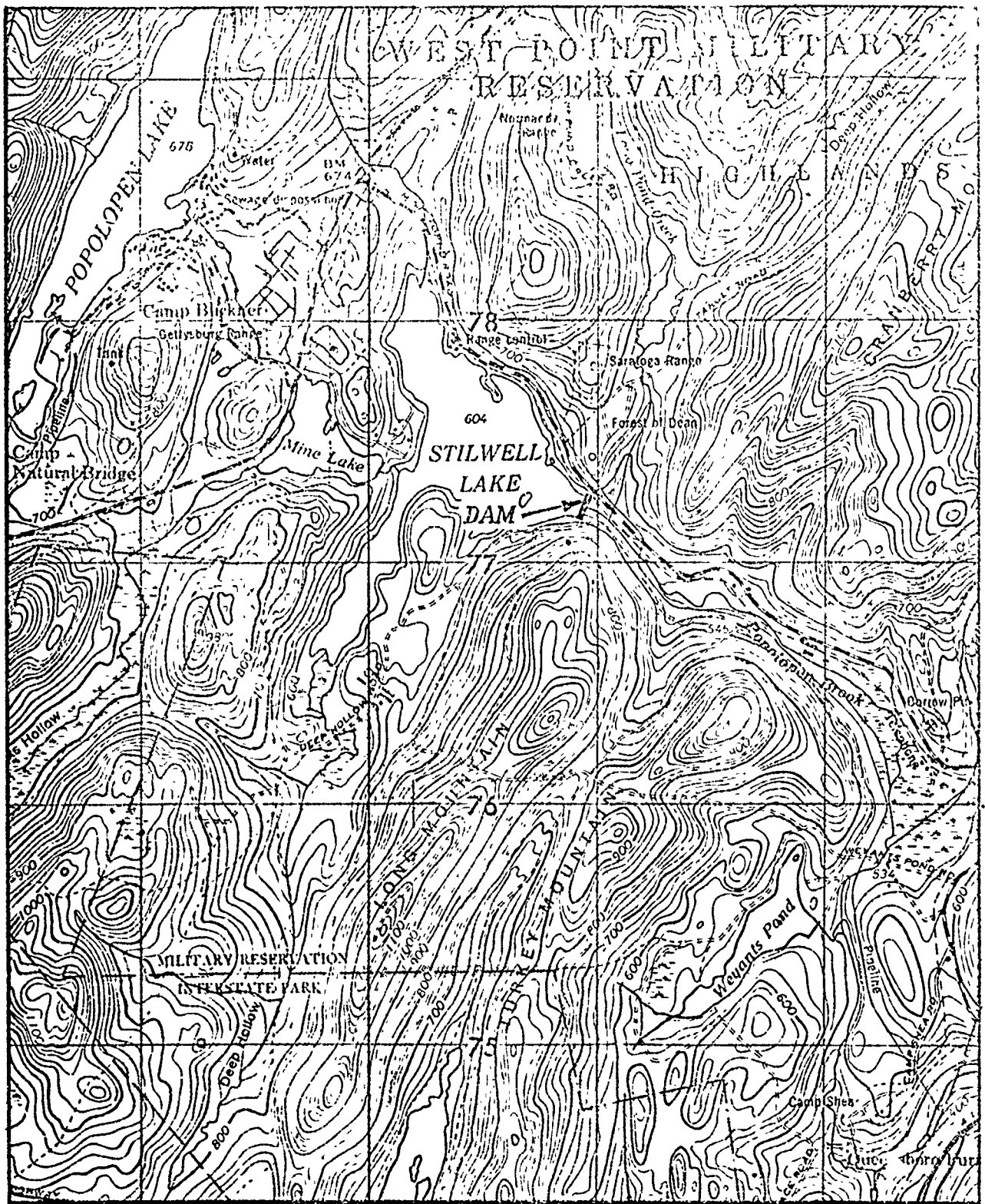
DRAWINGS

APPENDIX A

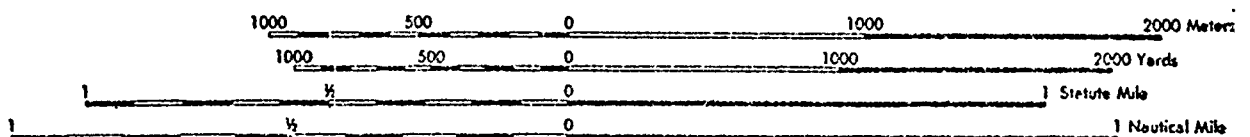


VICINITY MAP
STILWELL LAKE DAM

SCALE OF MILES



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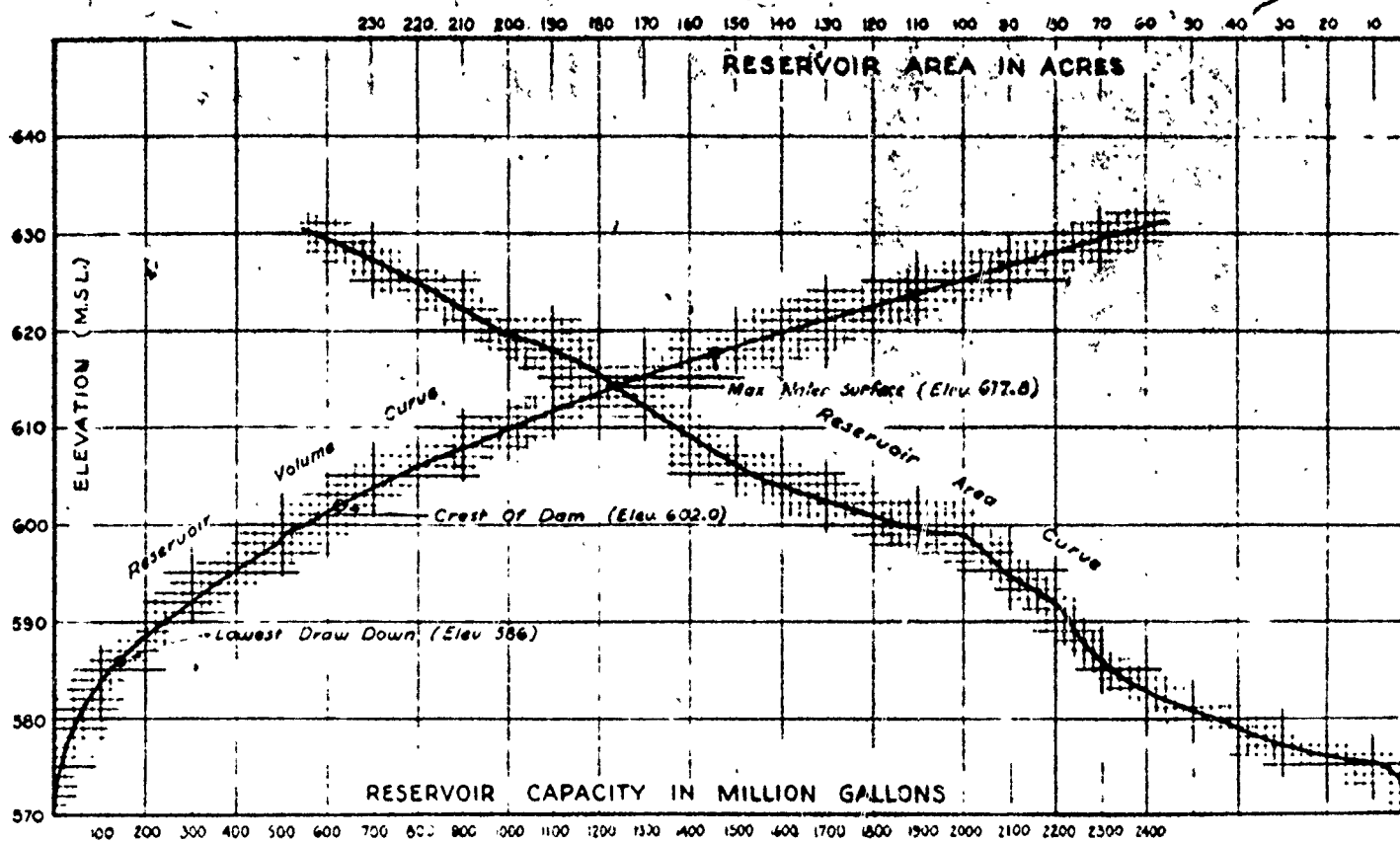


TOPOGRAPHIC MAP
STILWELL LAKE DAM

STILWELL LAKE DAM LIST OF DRAWINGS

7512-461	GENERAL LOCATION PLAN
7512-462	RESERVOIR
7512-464	HYDROLOGIC & DESIGN DATA
7512-465.1 .	GENERAL PLAN OF DAM
7512-466	PLAN OF SPILLWAY AND BUCKET SECTIONS
7512-467	SPILLWAY SECTIONS & ELEVATION OF DAM
7512-468	NON-OVERFLOW SECTIONS & SPRAY WALL
7512-469.1	INTAKE AND DRAW-OFF DETAILS
7512-470	GROUTING GALLERY AND PLANT
7512-471	WATER STOPS, BLOW-OFF & MISCELLANEOUS DETAILS
7512-472	MISCELLANEOUS DAM APPURTENANCES

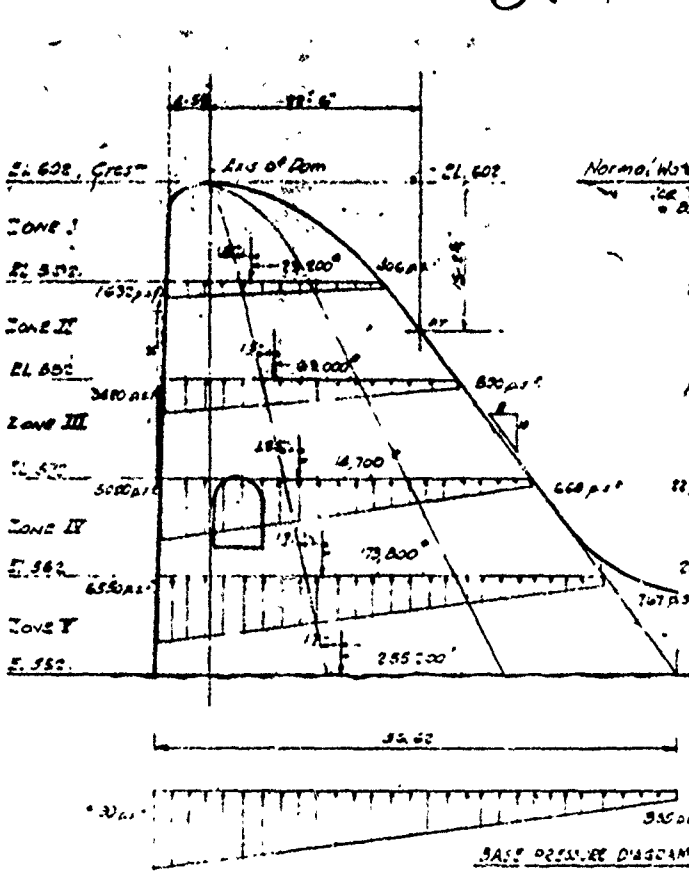
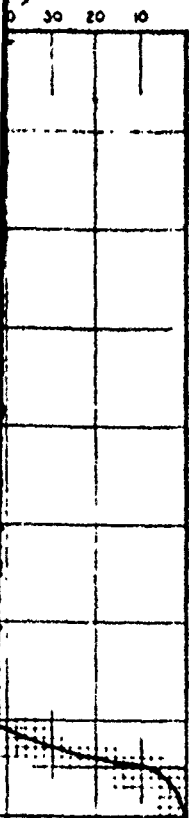
WAR DEPARTMENT



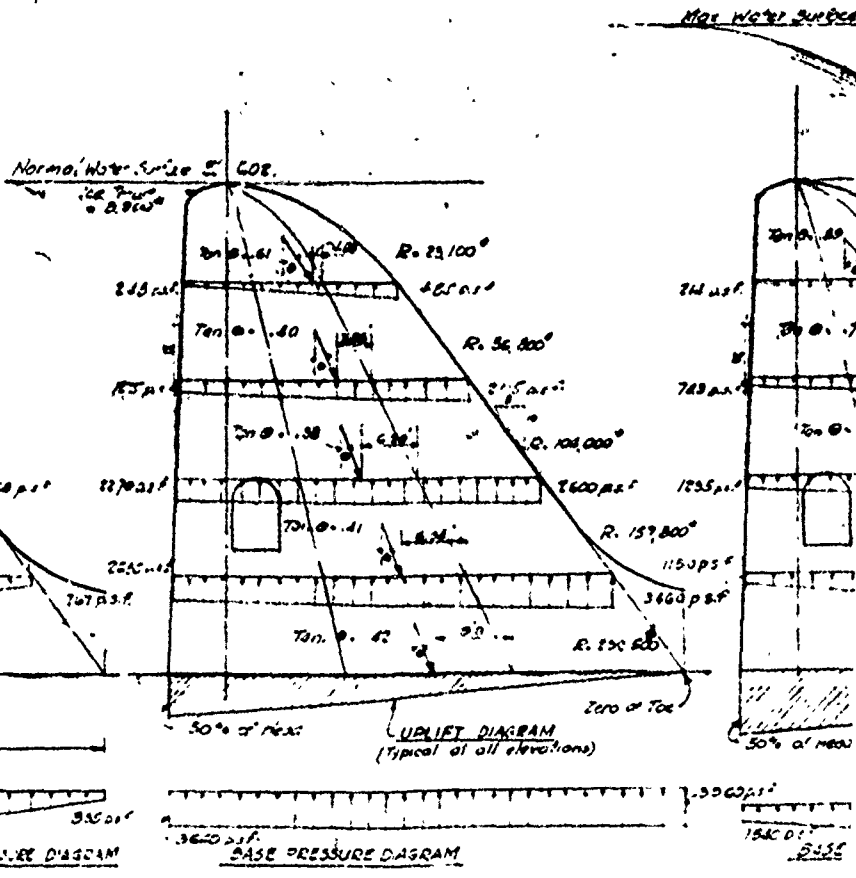
RAINFALL DATA

[illegible]

2



CASE I - RESERVOIR EMPTY

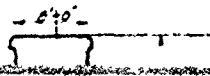


CASE II - RESERVOIR FULL TO CREST & ICE THRUST

SPILLWAY SECTION

INCHES	FEET
1/8	0.0125
1/4	0.025
3/8	0.0375
1/2	0.05
5/8	0.0625
3/4	0.075
7/8	0.0875
1	0.1

2' 6" 0" 11 27 61 3

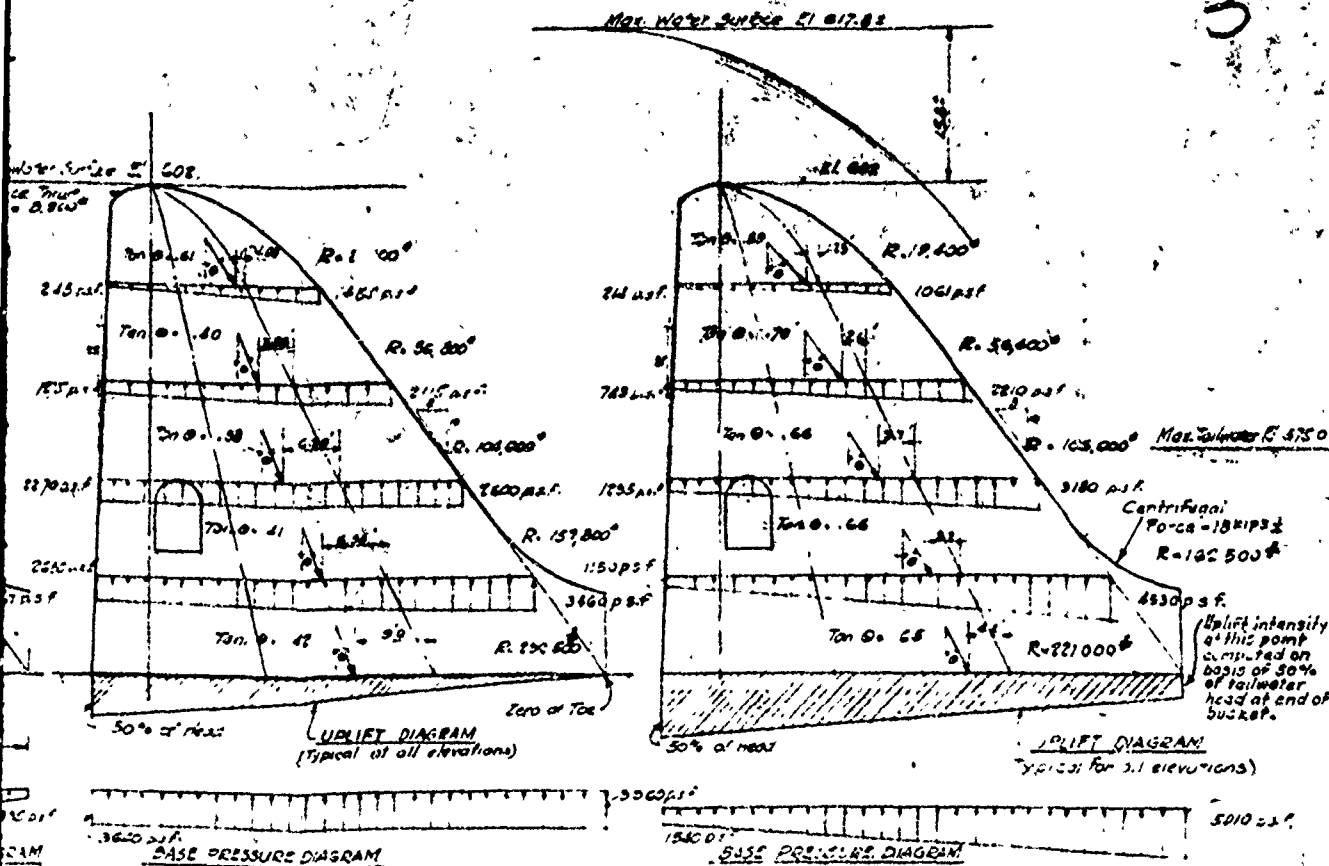


Max Water Surface El 617.5



CORPS OF ENGINEERS, U.S. ARMY

3



CASE II - RESERVOIR FULL TO CREST & ICE THRUST

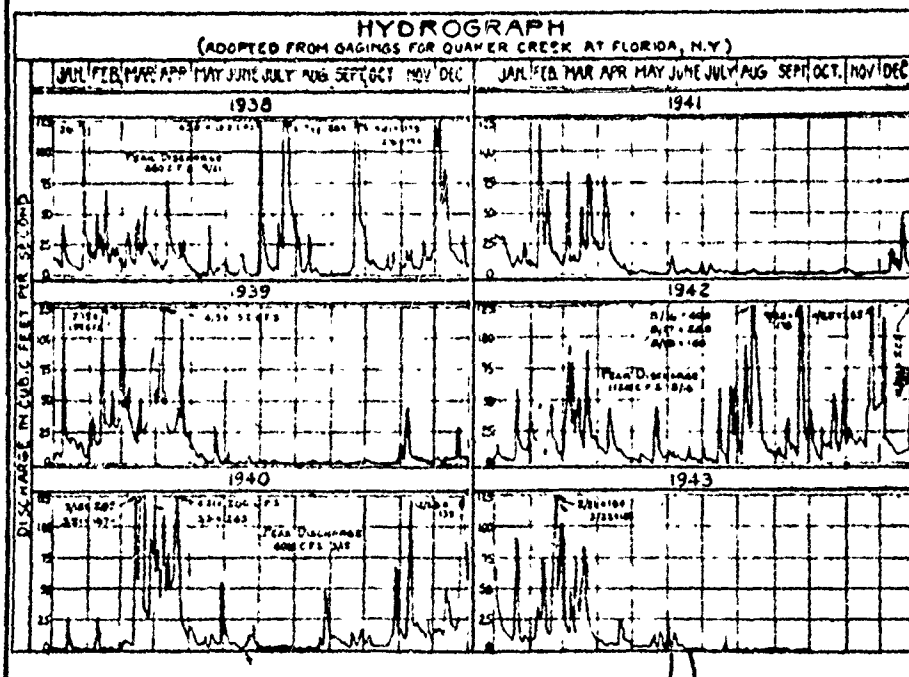
CASE III - RESERVOIR FULL TO MAX FLOOD LEVEL PLUS UPSTREAM DAM FAILURE

SPILLWAY SECTION

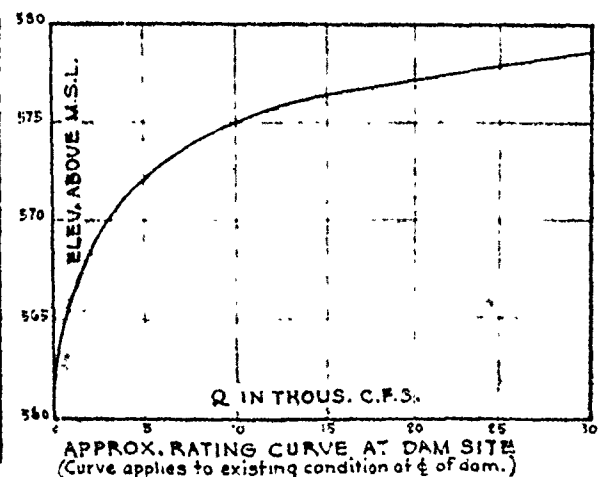
Max Water Surface El 617.85

	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916		
JANUARY	8	4.70	1.30	2.0	5.70	4.91	4.41	3.14	5.49	5.31	3.14	4.40	3.50	4.15					2.75	2.35	4.4	13.410	13.421	12.75	11.410	11.35	12.40	12.1	12.2		
FEBRUARY	0	3.70	2.80	5.12	4.68	1.07	7.29	1.30	6.0	4.40	3.15	1.20	3.71						2.20	2.40	4.3	12.354	12.307	8.211	9.432	8.230	7.301	11.2	11.3		
MARCH	9	3.42	1.50	1.91	2.83	4.15	3.74	3.5	1.10	12.02	3.55	2.40	7.45						3.80	2.80	3.8	5.43	6.154	12.420	11.610	11.431	6.512	13.2	13.3		
APRIL	9	2.60	4.50	3.80	2.70	1.09	3.6	2.80	6.80	1.90	3.17	3.74	1.70						4.45	3.40	2.59	5.83	11.943	7.330	10.399	9.714	4.375	9.240	4.0		
MAY	9	4.72	3.00	5.07	1.90	4.84	5.14	4.45	3.35	2.80	4.70	7.51	2.31						1.60	4.71	3.4	7.59	1.82	13.560	8.057	13.424	9.411	4.10	11.315	3.2	
JUNE	8	1.04	1.32	4.60	2.46	3.61	8.3	2.20	2.63	4.77	3.20	1.83	4.05						5.83	2.75	3.73	2.45	4.66	10.477	12.501	6.156	7.134	9.474	9.241	13.4	
JULY	9	7.10	3.32	7.00	4.10	3.97	4.53	1.04	4.86	2.50	13.05	3.80	5.78						4.57	3.55	2.57	4.11	2.00	10.107	8.297	9.252	9.706	11.487	10.419	8.2	
AUGUST	8	6.00	4.09	4.10	4.80	3.67	6.62	1.80	3.42	1.86	5.15	1.20	1.70						4.00	1.80	0.82	4.35	4.35	8.281	10.710	13.210	6.431	12.234	10.635	8.1	
SEPTEMBER	7	4.60	6.42	6.80	1.66	3.73	2.00	6.30	1.10	5.70	2.90	1.57	6.39						5.30	2.83	10.60	1.50	2.57	10.235	10.450	16.315	7.452	6.109	5.10	10.3	
OCTOBER	7	1.90	4.85	4.50	0.93	7	4.25	5.25	4.22	3.10	1.43	4.62	1.64						3.00	4.10	2.71	1.70	0.69	11.335	11.645	10.330	12.844	7.119	8.228	1.1	
NOVEMBER	8	---	8.00	30	2.83	3.03	3.03	4.90	3.78	3.10	3.40	1.12	3.14						1.85	1.45	0.67	2.27	13.446	12.337	10.303	10.240	11.451	13.121	11.2	11.3	
DECEMBER	7	4.42	1.20	---	3.03	1.33	1.60	2.92	4.20	1.63	5.60	1.4	2.23						2.55	4.40	3.90	2.79	4.59	11.241	11.150	11.540	8.783	11.131	11.544	12.1	12.2
Annual	97	5.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76
1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949
JANUARY	11.112	8.261	11.41	9.254	8.227	15.320	11.317	12.221	11.241	12.3	12.91	14.152	13	1.47	15.591	9.172	13.331	14.164	16.559	15.643	13.141	4.312	12.412	14.34	12.371	15.4	15.5	15.6	15.7	15.8	15.9
FEBRUARY	10.119	9.37	11.143	10.480	10.328	11.200	10.732	8.475	11.410	10.243	11.600	10.400	10	12.91	15.243	12.290	9.284	12.237	9.290	9.231	13.200	12.482	12.530	9.249	15.391	11.2	11.3	11.4	11.5	11.6	11.7
MARCH	7.177	12.418	10.420	10.803	11.564	11.233	7.031	11.510	11.400	10.243	11.774	12.744	12	9.236	15.400	14.099	11.216	16.300	11.230	11.262	16.335	15.340	10.230	15.350	11.1	11.2	11.3	11.4	11.5	11.6	11.7
APRIL	7.354	13.736	12.640	13.394	10.241	9.894	11.557	8.164	11.17	8.240	12.415	17.255	9.297	13.495	10.241	13.522	12.343	12.490	16.290	16.429	12.353	15.10	12.646	7.2	12.1	12.2	12.3	12.4	12.5	12.6	12.7
MAY	12.353	15.430	11.643	7.104	2.10	8.250	15.635	1.190	7.072	10.350	12.32	13.151	13.149	10.405	9.129	11.599	9.162	10.300	12.549	11.359	7.101	15.467	9.240	13.492	17.3	17.4	17.5	17.6	17.7	17.8	17.9
JUNE	9.154	7.303	11.531	8.507	14.000	9.570	10.215	5.105	12.136	9.155	12.612	9.594	10.300	9.369	11.111	8.123	9.535	14.535	6.300	12.527	10.553	11.803	16.321	9.537	11.431	11.22	11.3	11.4	11.5	11.6	11.7
JULY	10.345	10.721	12.354	9.405	9.334	8.154	9.251	2.464	9.230	13.327	12.730	16.350	13.35	12.210	12.830	9.247	4.504	15.370	5.275	9.306	10.772	9.247	11.536	11.580	12.723	11.78	11.9	12.0	12.1	12.2	12.3
AUGUST	8.203	11.434	11.453	7.103	11.120	7.770	10.310	6.22	13.480	11.737	5.724	8.124	9.241	10.240	10.320	12.160	9.233	10.170	11.355	11.632	10.494	8.304	8.284	11.580	12.494	11.2	11.3	11.4	11.5	11.6	11.7
SEPTEMBER	16.291	15.419	9.273	9.440	6.285	9.531	3.933	12.350	10.230	10.430	10.150	9.209	9.12	11.102	8.173	11.502	12.310	9.310	9.343	4.427	10.100	11.346	9.281	6.242	11.400	11.3	11.4	11.5	11.6	11.7	11.8
OCTOBER	11.730	14.237	11.513	10.705	6.580	6.354	2.930	4.181	14.390	10.630	11.143	10.411	7.230	15.152	12.530	8.158	9.315	10.717	13.627	14.120	11.404	9.1	9.2	10.250	10.318	12.1	12.2	12.3	12.4	12.5	12.6
NOVEMBER	9.210	11.29	2.547	9.533	9.725	9.275	7.340	1.1	11.515	15.043	12.124	5.237	9.436	11.070	10.830	12.000	14.370	10.730	12.732	14.220	11.233	11.271	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9
DECEMBER	12.404	11.371	1.579	9.930	10.14	15.215	2.252	11.37	1.256	15.548	8.120	14.420	11.400	11.070	11.51	9.570	12.570	5.700	11.600	14.220	15.230	15.230	15.230	15.230	15.230	15.230	15.230	15.230	15.230	15.230	15.230
Annual	12.3143	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054	12.3054

NOTE: Rainfall data prior to 1888 available at U.S. Weather Bureau.



WEST POINT AVERAGE TEMPERATURES THROUGH 1930												
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Maximum	32.349	35.1	40.1	50.4	58.5	64.8	68.7	68.7	64.8	58.5	50.4	40.1
Minimum	33.191	18.7	27.6	38.2	48.4	57.8	62.4	60.4	54.4	44.4	34.4	24.4

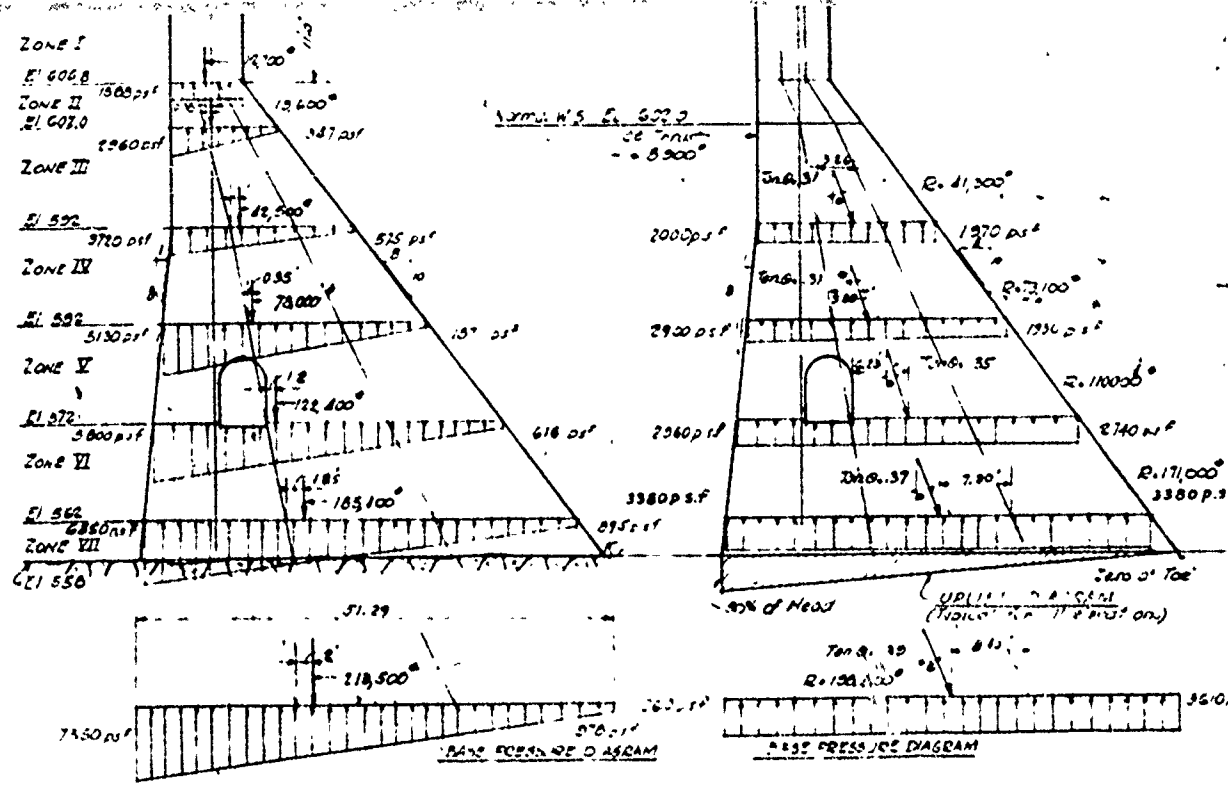
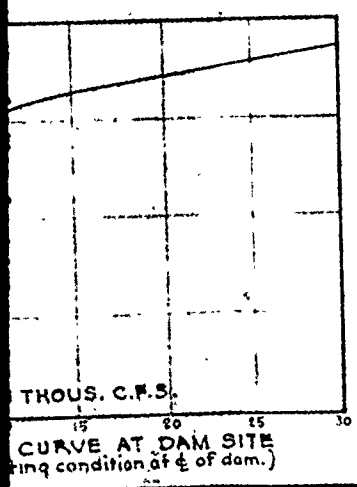


1911	1912	1913	1914	1915	1916	1917
12 425	12 775	12 479	11 515	12 494	12 264	12 512
12 307	8 273	9 432	8 230	9 369	14 236	11 231
12 426	11 614	11 438	11 453	6 052	13 526	12 631
7 398	14 399	10 314	14 375	7 298	4 088	10 132
8 657	13 424	9 441	8 101	11 333	13 278	15 334
12 601	6 186	7 134	9 474	9 291	15 485	15 230
8 292	9 252	9 196	11 407	14 629	8 271	12 373
7 710	15 216	8 493	12 214	14 632	8 189	10 433
18 450	14 323	7 634	6 109	5 228	10 321	7 132
11 843	18 334	12 844	7 719	9 228	1 83	15 594
12 537	4 303	10 240	11 431	13 320	11 244	6 043
11 736	11 525	5 248	11 233	11 511	12 342	6 317
12 718	12 151	42 831	12 564	12 941	12 941	12 941

1936	1939	1940	1941	1942	1943	1944
13 341	4 373	12 512	14 134	12 397	3 243	9 279
13 240	12 481	12 258	9 248	13 591	3 180	11 113
12 162	12 395	13 630	10 216	13 533	11 279	13 599
12 258	15 148	12 640	9 148	10 172	5 278	13 341
11 431	7 181	12 467	9 244	13 442	17 332	9 111
10 533	11 563	14 343	9 537	11 431	11 225	12 194
13 773	9 247	11 336	11 646	12 723	11 780	9 134
10 441	8 314	8 230	9 357	9 999	8 242	8 144
14 174	11 346	9 281	8 042	11 410	7 347	12 514
8 12	14 419	9 133	15 232	12 538	12 144	9 142
11 243	8 107	15 471	10 241	3 422	12 422	12 173
14 430	13 240	14 277	12 393	4 512	6 312	14 312

ST POINT
ATURES THROUGH 1930

DATE	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV	DEC	ANNUAL
1930	16 71	5 648	8 848	8 375	7 515	6 824	5 611	5 071	62.2
1931	40 457	12 424	10 754	5 441	14 317	12 403			



CASE I RESERVOIR EMPTY

CASE II RESERVOIR FULL TO CREST & ICE WITH

NON-OVERFLOW SECTION

RECORD DRAWING
OF WORK AS BUILT

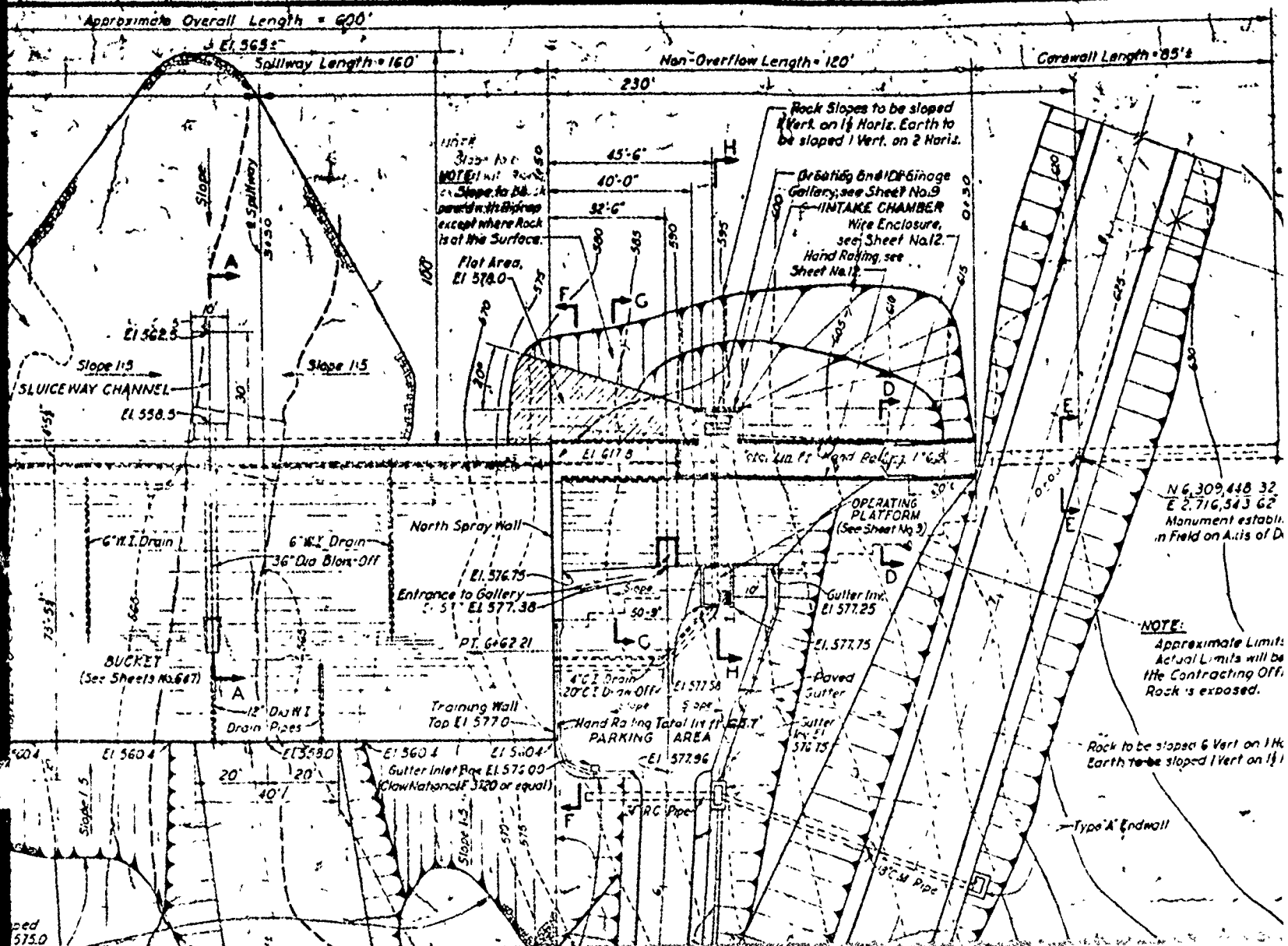
John G. ...

Contracting Officer
19 November 1946

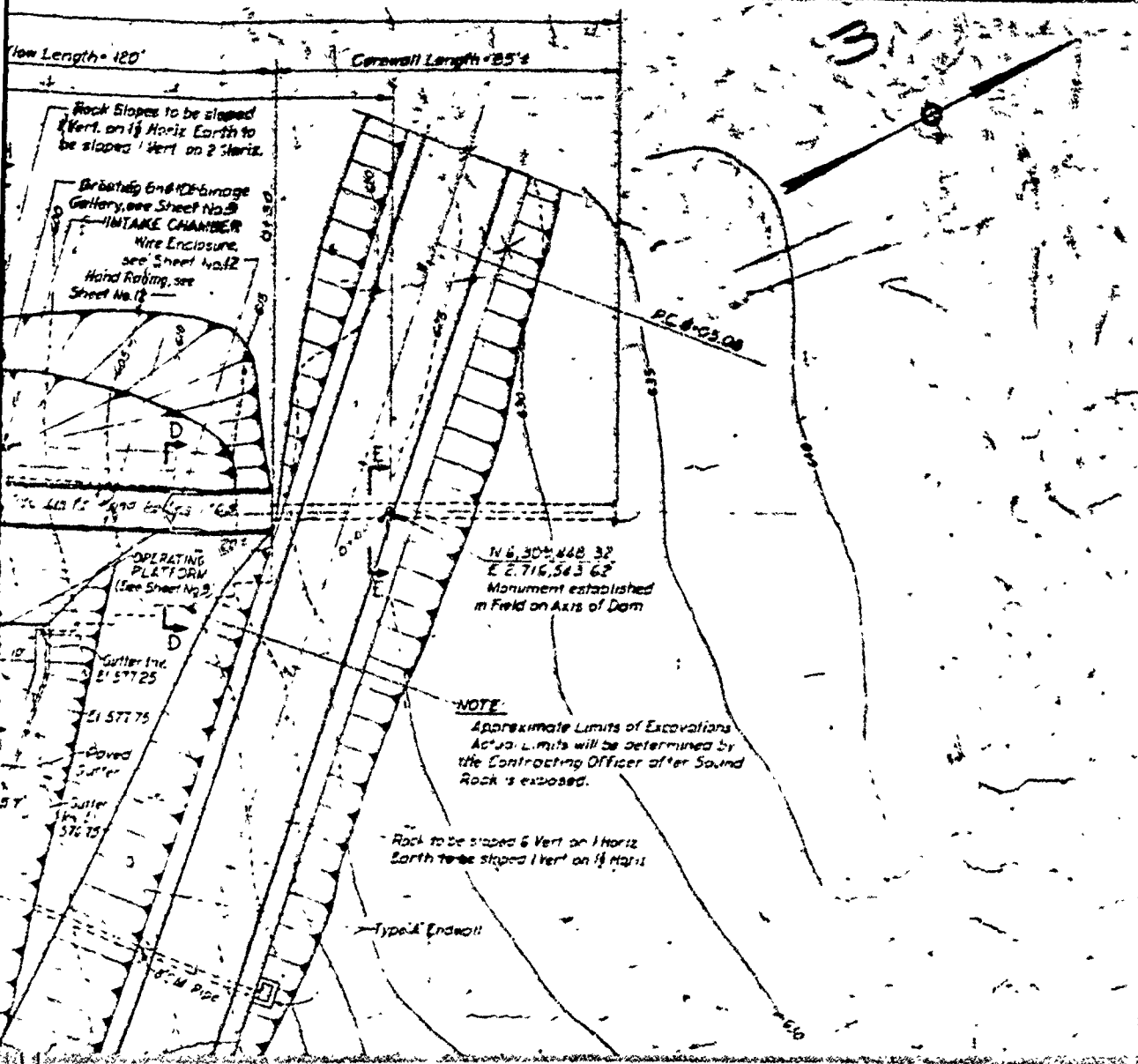
CONT NO W 30 075 ENG 2846

NO. 18	1	RECORD WORK AS BUILT	11 11
DATE	REV. NO.	REVISIONS	REV BY APP

5



CORPS OF ENGINEERS, U. S. ARM.



NOTE:
Slopes to be paved w/
Riprap except where R.
is at the Su face



NOTE:
Slopes to be paved with
Riprap except where Rock
is at the Surface

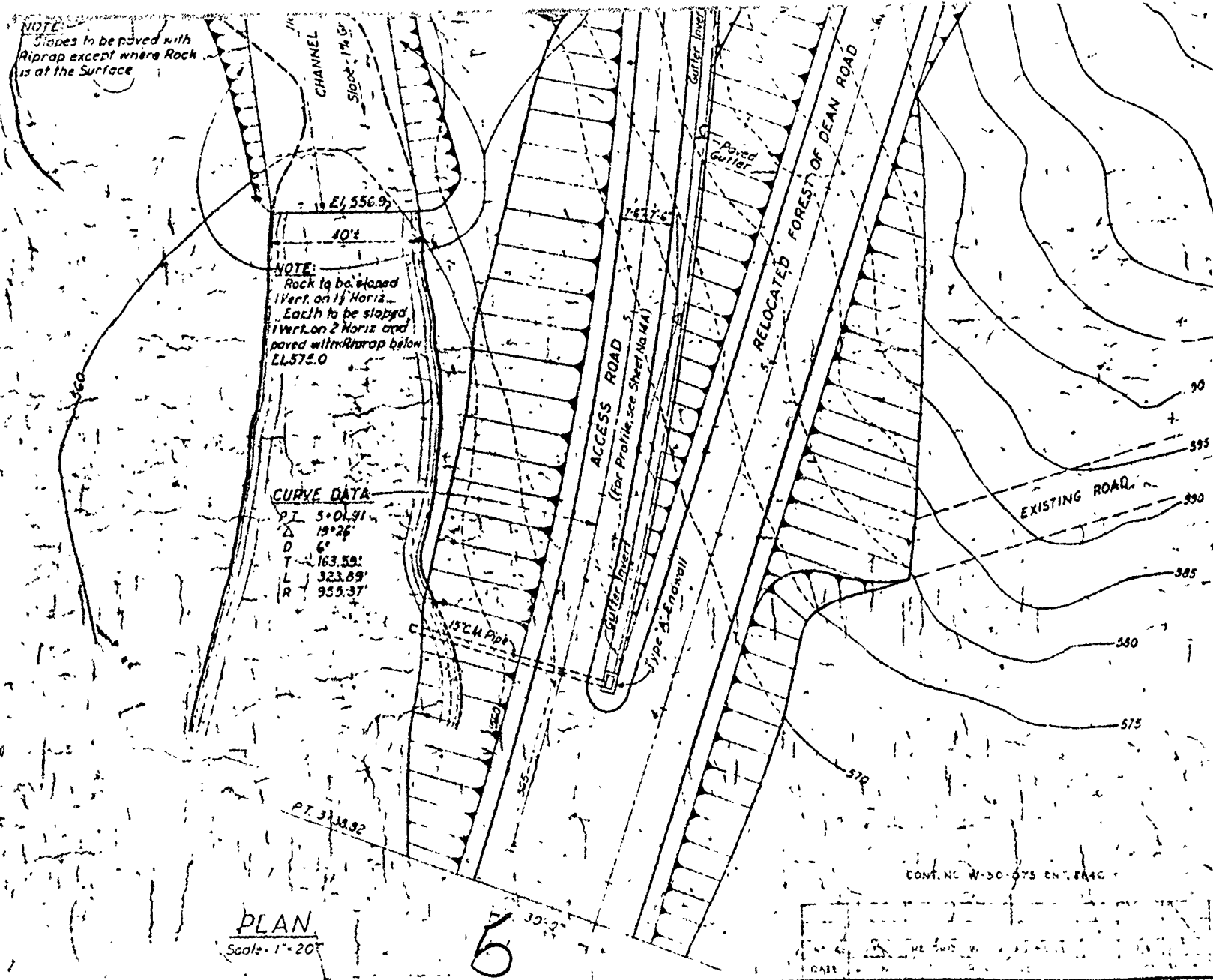
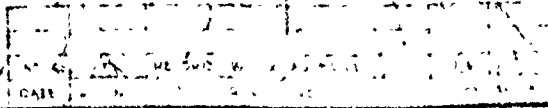
NOTE:
Rock to be placed
1 Vert. on 1 Horiz.
Earth to be sloped
1 Vert. on 2 Horiz. and
paved with Riprap below
EL 575.0

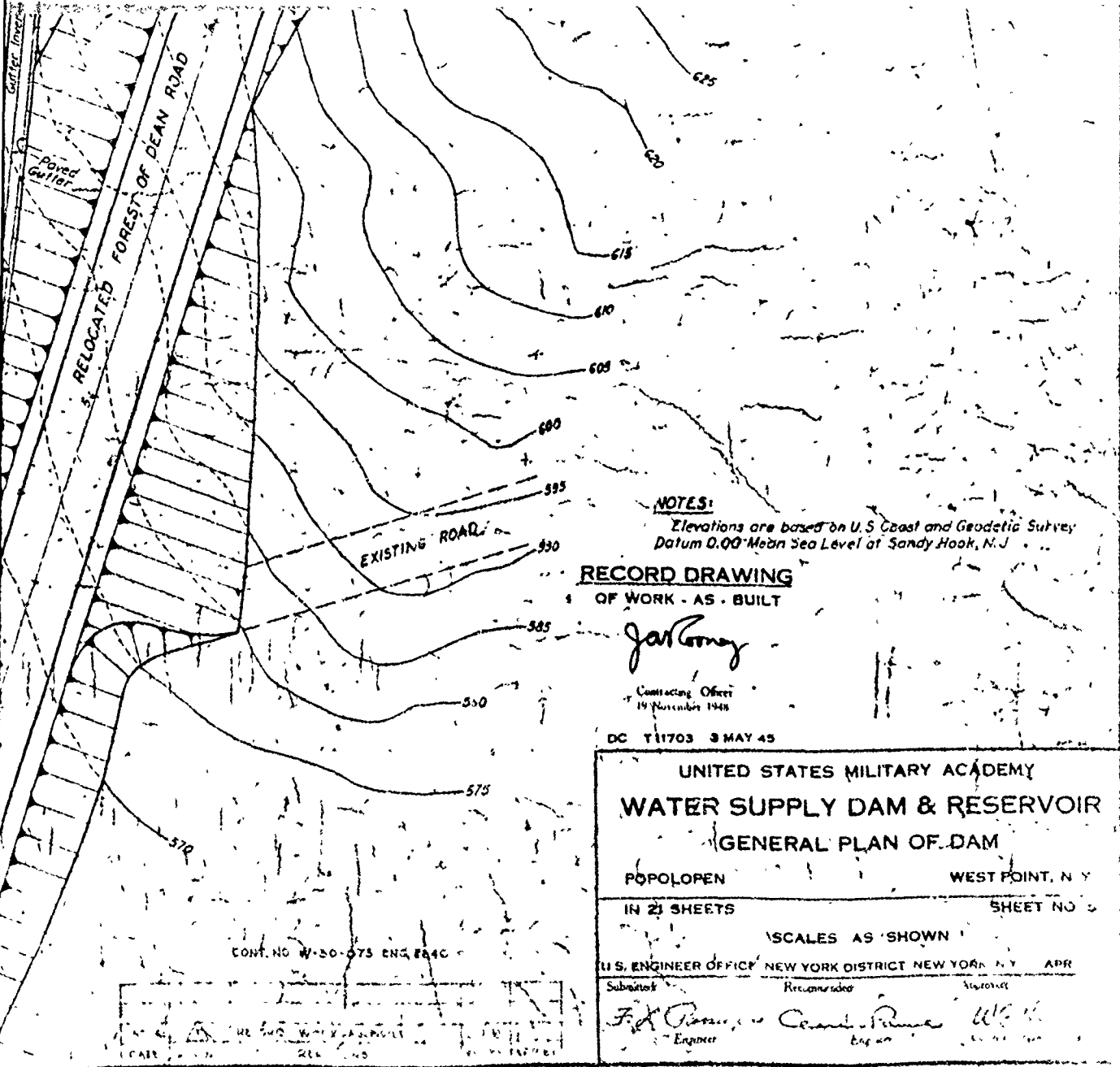
CURVE DATA
P.T. 5+01.91
Δ 19°26'
D 6'
T 163.59'
L 323.69'
R 955.37'

PLAN
Scale: 1" = 20'

6

CONT. NC W-30-575 EN. PAGE





NOTES:

Elevations are based on U.S. Coast and Geodetic Survey
Datum 0.00 Mean Sea Level at Sandy Hook, N.J.

**RECORD DRAWING
OF WORK - AS - BUILT**

J. J. Conroy

Contracting Officer
19 November 1948

DC T11703 3 MAY 49

**UNITED STATES MILITARY ACADEMY
WATER SUPPLY DAM & RESERVOIR
GENERAL PLAN OF DAM**

POPOLOPEN

WEST POINT, N. Y.

IN 21 SHEETS

SHEET NO. 5

SCALES AS SHOWN

U.S. ENGINEER OFFICE NEW YORK DISTRICT NEW YORK, N. Y. APR

Submitted

Recommended

Approved

F. J. Conroy
Engineer

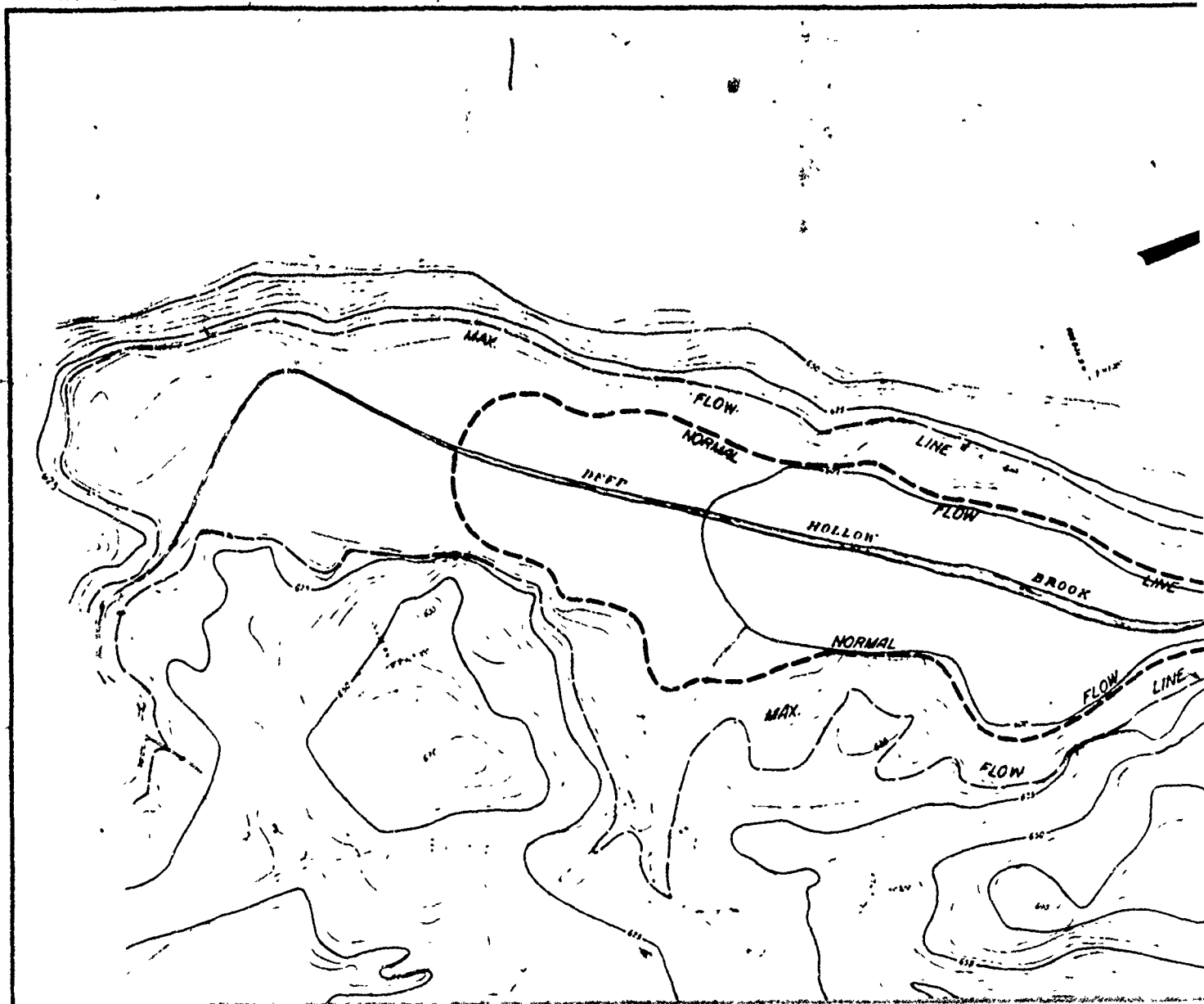
Conroy
Engineer

W. H. H.
Engineer

1. Approved by Special Agent David B. June 1949

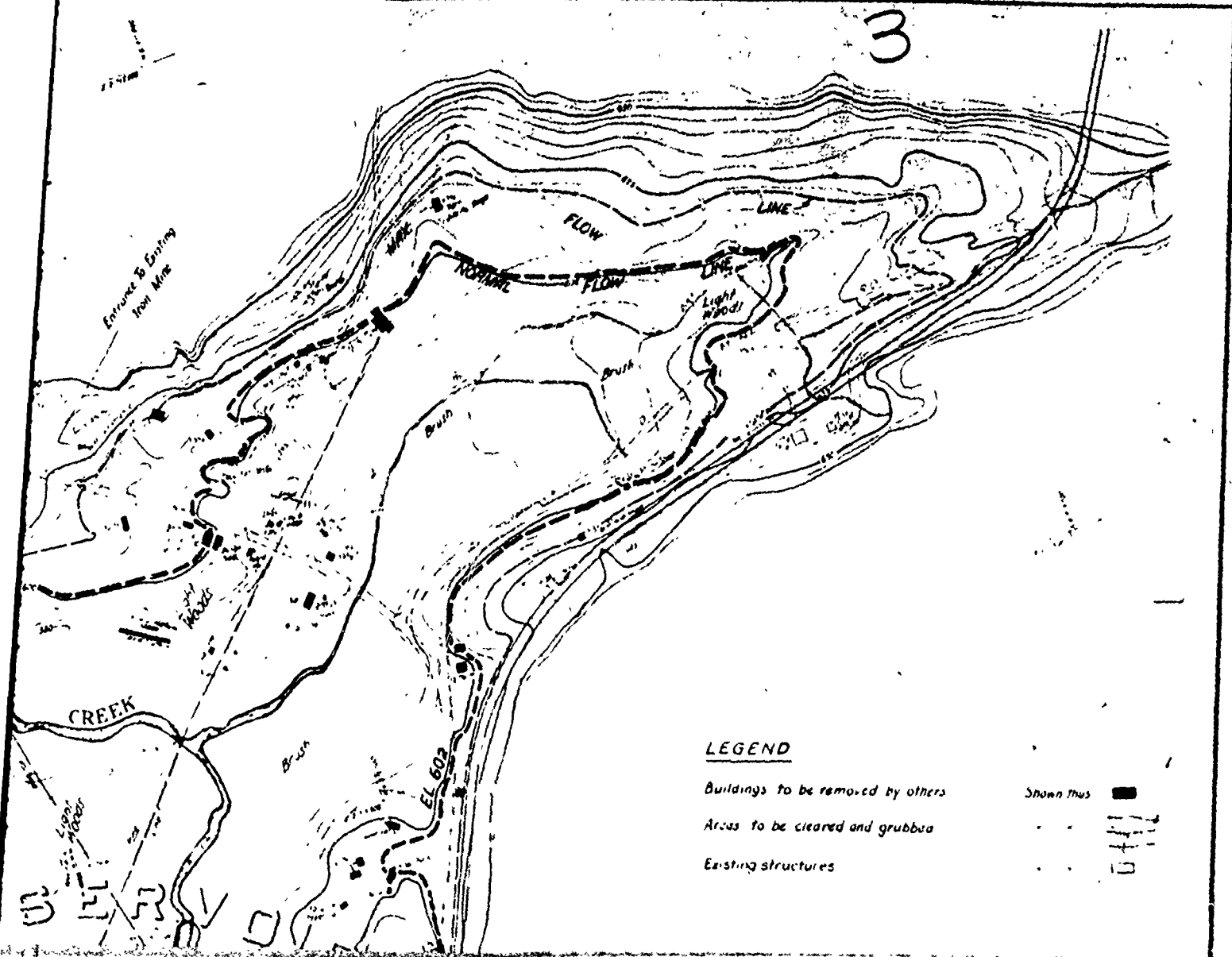
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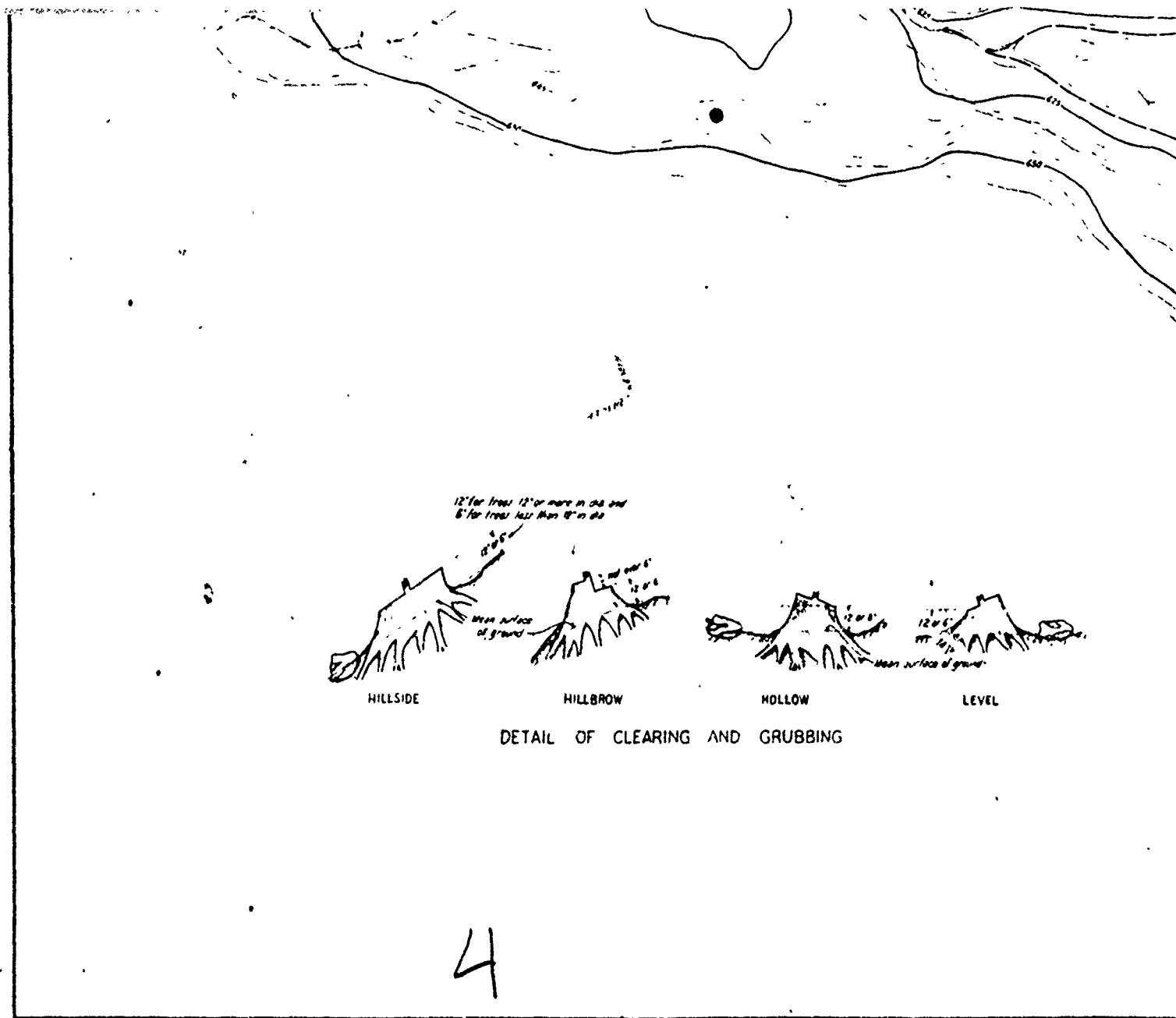
WAR DEPARTMENT

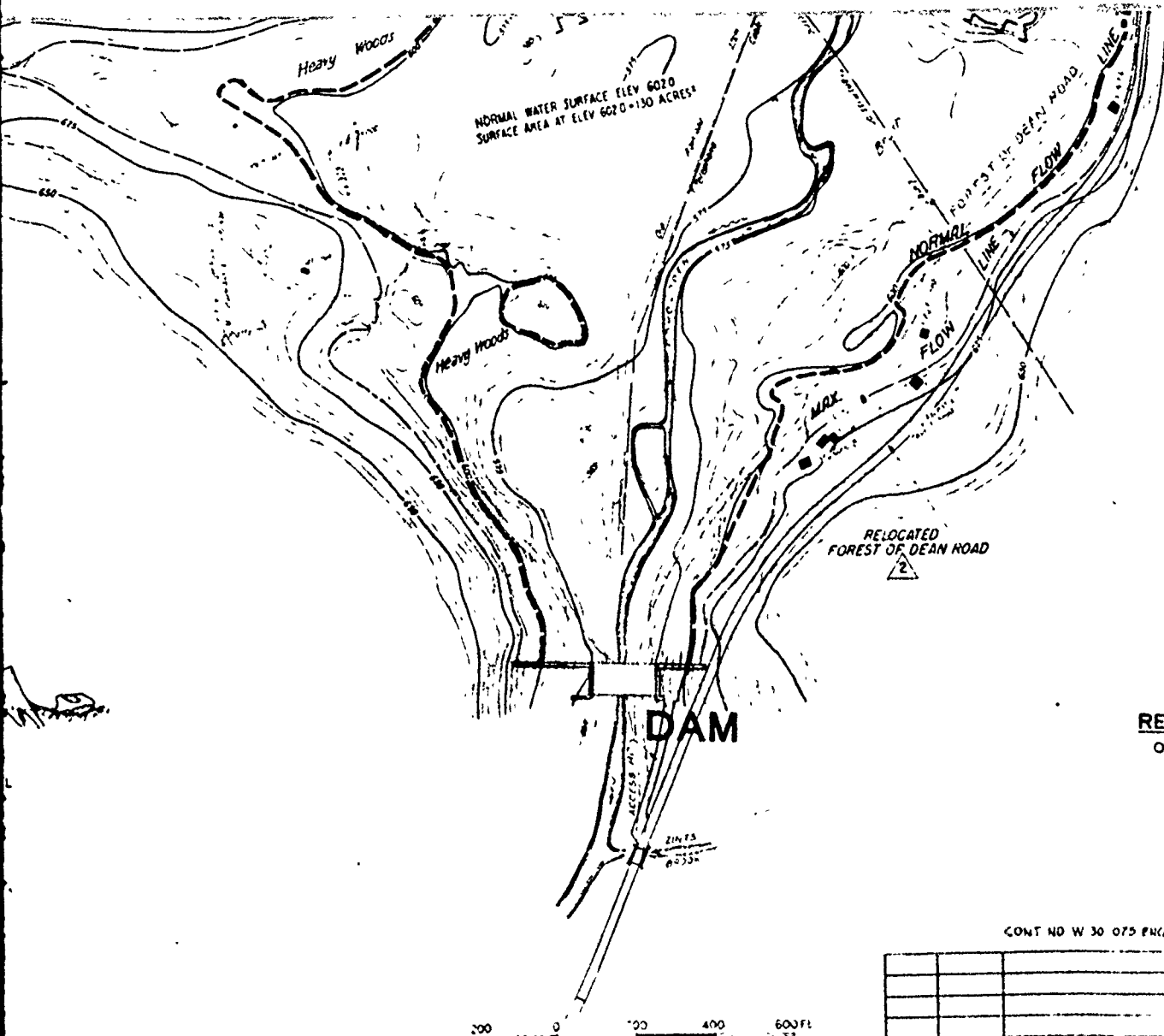




3







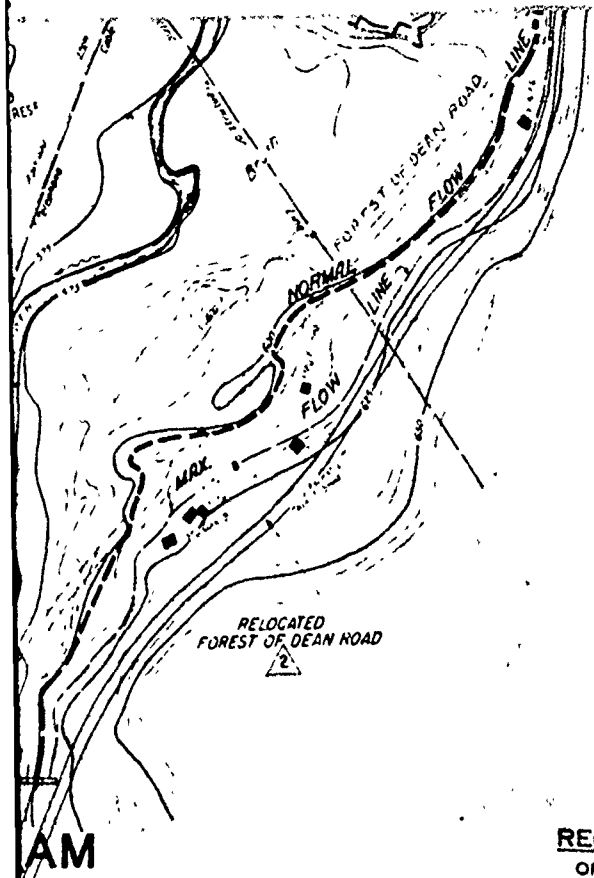
**RECORD DRAWING
OF WORK - AS BUILT**

Jarvis

Contracting Office
10 November 1945

CONT NO W 30 075 ENG. 2846

NO. 40	5	RECORD WORK AS BUILT	J. M.		
3/21/45	△	2nd REVISION	J. M.		
10/5/45	△	Bridge Deleted	H. A. I.		
DATE	REV. NO.	REVISIONS	PLD BY	APP BY	



NOTES

Area and volume curves for Reservoir shown on Sheet No 4
 Contour interval = 5 ft
 Existing Telephone Cable Line and existing high voltage Electric Transmission Line will be relocated by others.
 Entrance to existing iron line shall be plugged with concrete. Details of construction will be furnished at a later date and payment made under appropriate items.
 Existing Electric Distribution Lines along Forest of Dean Road will be relocated by others.
 Elevations are based on U.S.C. & G.S. datum 000 MSL.
 Sandy Hook
 Coordinate system is arbitrary.

RECORD DRAWING OF WORK - AS - BUILT

J. L. Gonyea

Contracting Officer
 19 November 1945

CONT NO W 30 075 ENG, 2846

DATE	REV NO	REVISIONS	REV BY	APP. BY
NOV 45	1	RECORD WORK AS BUILT	J. L. G	
APR 46	2	Changed to located	JWS	
10 Sep 45	3	Change Deleted	HAT	

DC T11703 8 MAY 45

UNITED STATES MILITARY ACADEMY WATER SUPPLY DAM & RESERVOIR RESERVOIR

POPOLOPEN

WEST POINT, N. Y.

IN 21 SHEETS

SHEET NO. 2

SCALES AS SHOWN

U.S. ENGINEER OFFICE, NEW YORK DISTRICT, NEW YORK, N. Y. 1945

Reviewed

Recommended

Approved

F. L. Panuzio
 Principal Engineer

Charles F. Finner
 Lt Col Corps of Engineers

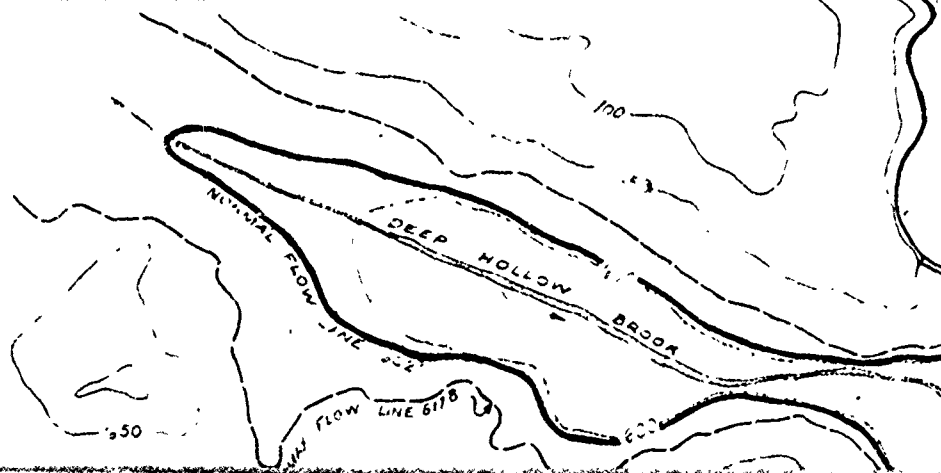
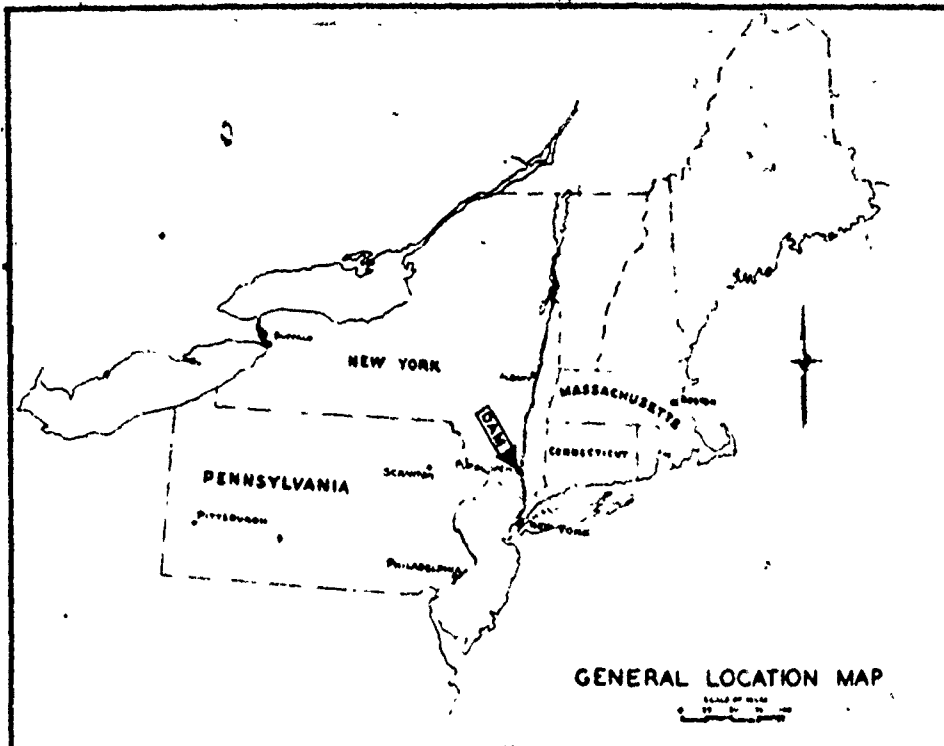
Ed. H. H. H.
 Colonel, Corps of Engineers

H. J. H.
 Alexander's Office, 1945, Architect-Engineers

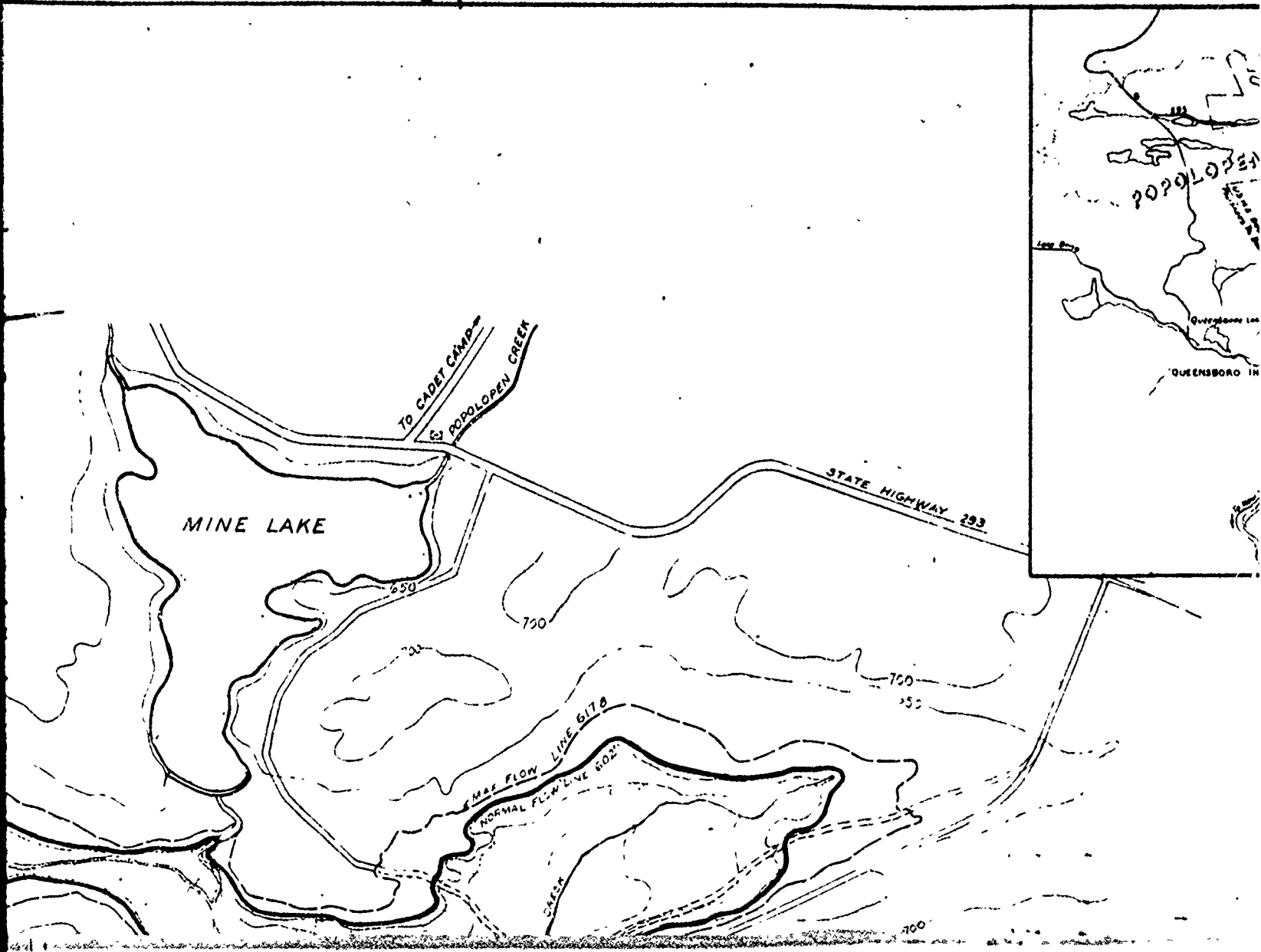
To Accompany Specifications Dated 8 June 1945

7512-462

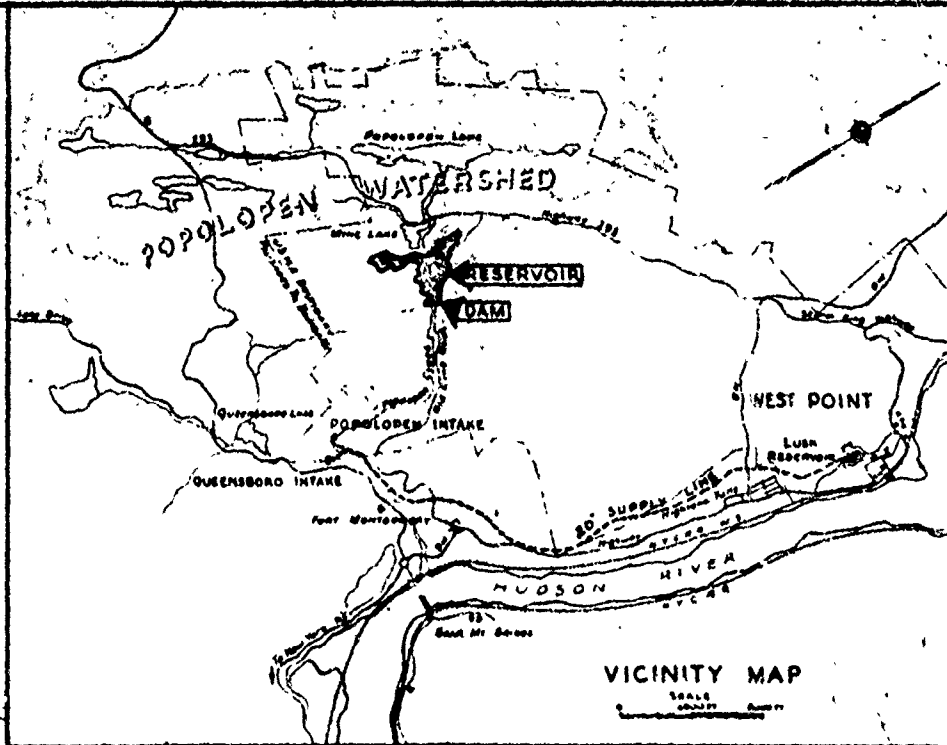
WAR DEPARTMENT



2



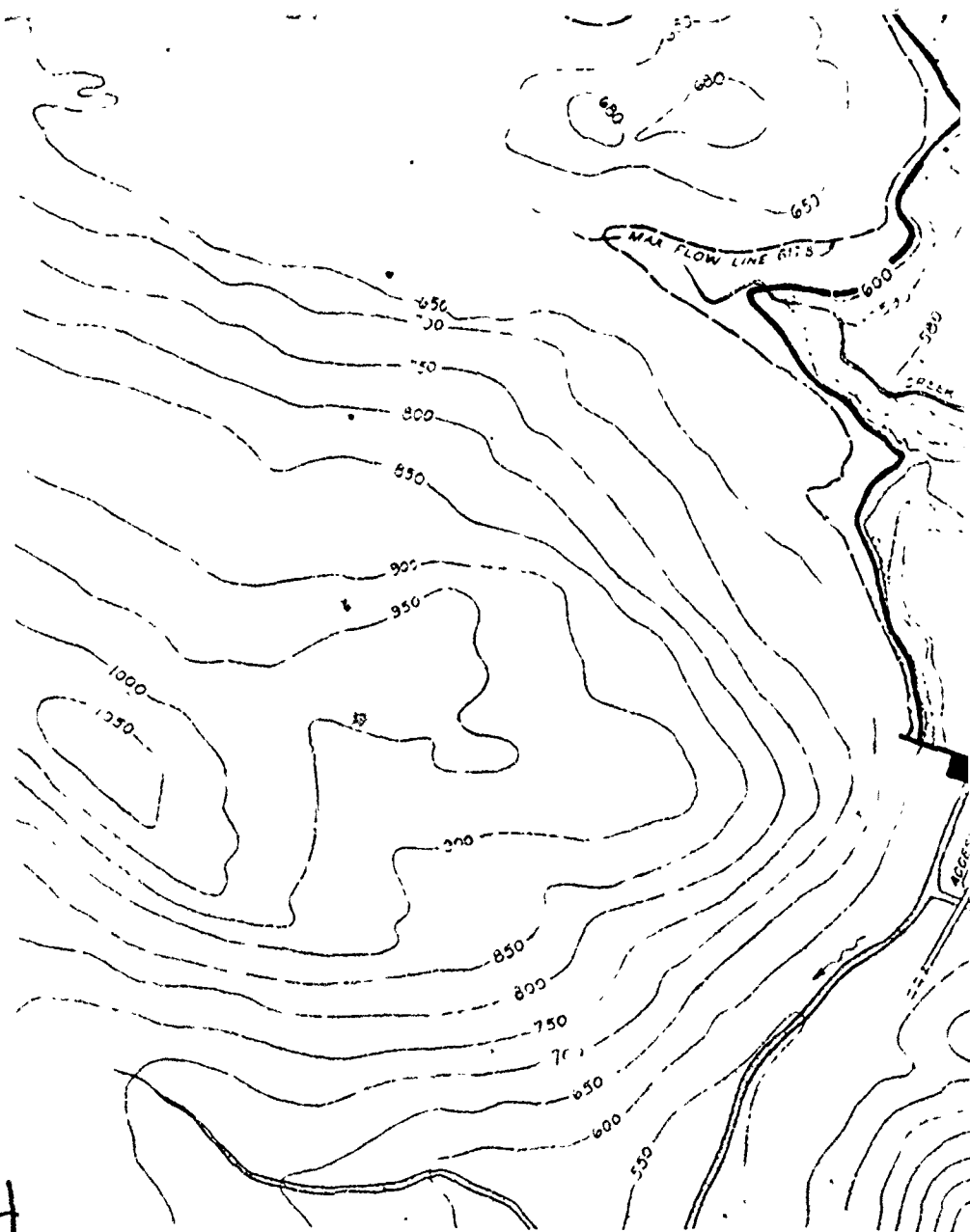
3
CORPS OF ENGINEERS, U. S. ARMY



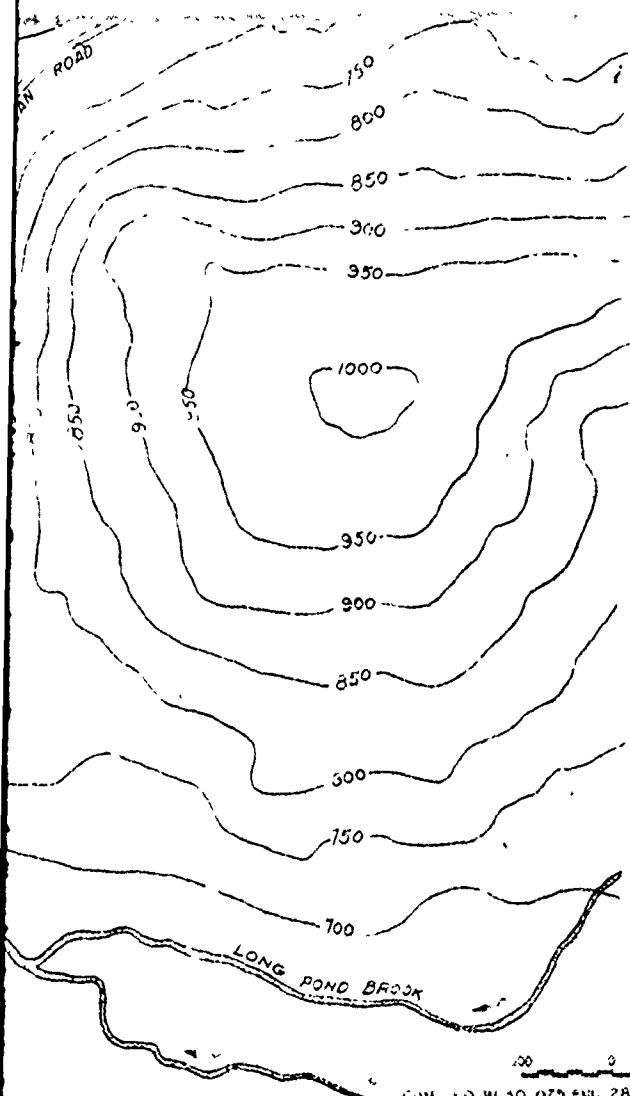
STATE HIGHWAY 293

750
755

700



4



Contours shown are intended to indicate the general nature of topography in vicinity of dam and shall not be used for any other purpose

Elevations are based on U.S.C. & G.S datum 000 M.S.L. Sandy Hook.

**RECORD DRAWING
OF WORK - AS - BUILT**

J. J. M.

Contracting Officer
U.S. Army Corps of Engineers

DC 111703 8 MAY 45

**UNITED STATES MILITARY ACADEMY
WATER SUPPLY DAM & RESERVOIR
GENERAL LOCATION PLAN**

POPOLOPEN WEST POINT, N. Y.

IN 21 SHEETS SCALES AS SHOWN SHEET NO. 1

U. S. ENGINEER OFFICE, NEW YORK DISTRICT, NEW YORK, N. Y. 1945

Reviewed: *F. L. Parsons* (Principal Engineer) *Charles F. Paine* (Lt. Col. Corps of Engineers) *Ed. W. Fairbank* (Colonel, Corps of Engineers)
Subscribed: *J. J. M.* (Assistant Architect-Engineer)

DATE	REV. NO.	REVISIONS	REV. BY	APP. BY
10 Sep 45	1	Truss Deleted	J. J. M.	F. L. P.

10 Appendix Specifications Dated 8 June 1945

7512 - 461

Non-Overflow Sec. Overflow Sec.

SECTION X-X PLAN
DETAIL A
Scale 1/2" = 1'0"

for Elev see sheet No 5
C.I. Gutter Inlet Box equal to P-3720 Clew-National
8" Dia C.I.
E15770

DETAILS OF GUTTER DRAIN
Scale 1/8" = 1'0"

Non-Overflow Section - 200'0"

DETAIL A

Top of Non-Overflow
E1617.80

Expansion Joint

Top Wall E15720

Spray Wall

Trimming Wall

Expansion Joint

Original Structure (Detail See Sec. 25 B)

Continued Stone Base

Gravel Tracks on 8" Drains (Shown in Sec. 8 B)

Rad. = 10'0"

MONOLITHS No.

DETAIL A

OVERFLOW SECTION - 160'-0"

Crest
EL 602.00

AXIS OF DAM

DAM

GROUTING and DRAINAGE GALLERY

36" Dia C.I. Blow-Off

6" W.I. Drain
10'-0"

6" W.I. Drain
10'-0"

Int. EL 562.7

Int. EL 562.29

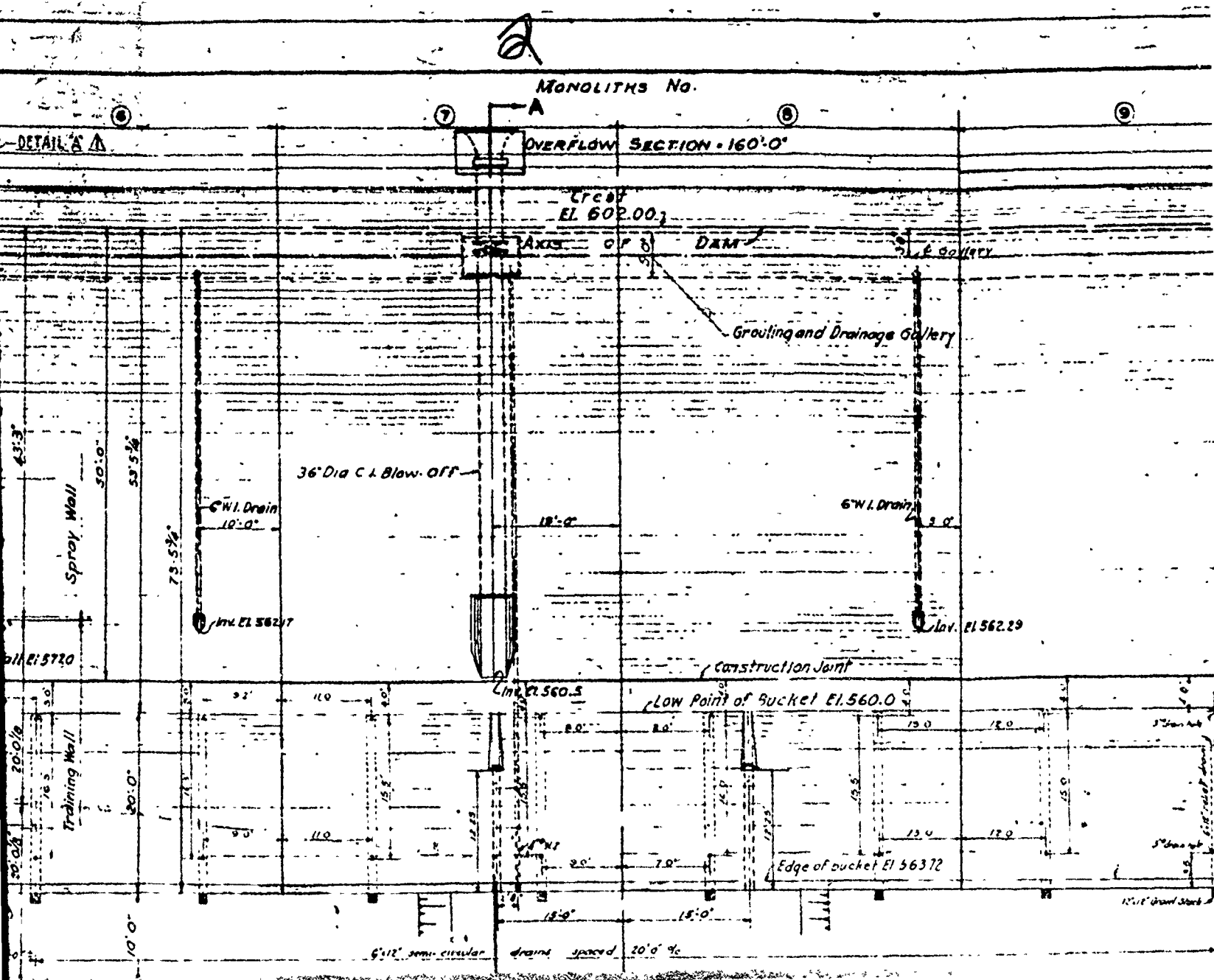
Construction Joint

Int. EL 560.5

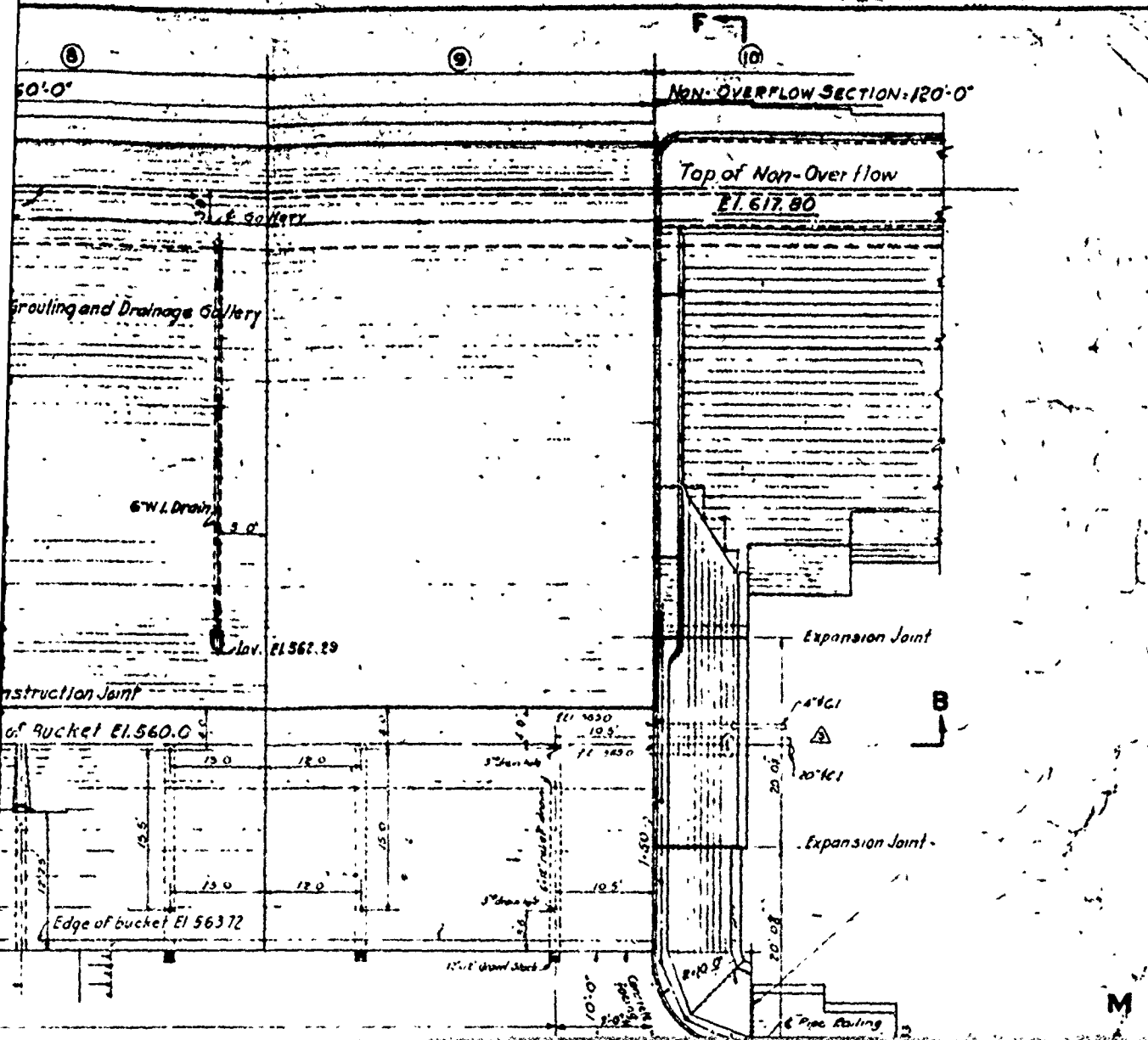
Low Point of Bucket EL 560.0

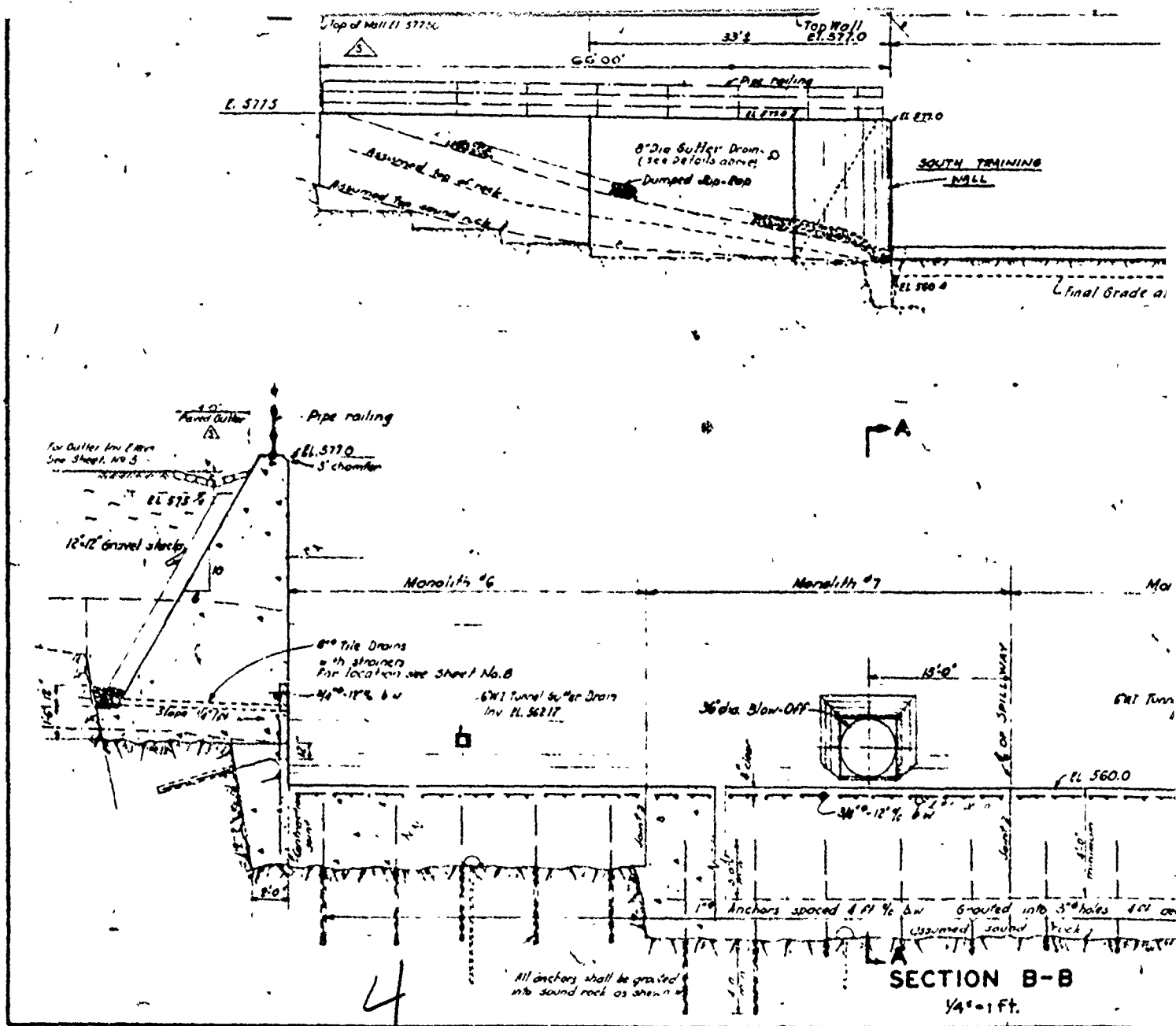
Edge of bucket EL 563.72

6" 12" semi-circular drains spaced 20'-0" 4c



3





PLAN OF SPILLWAY

1/8" = 1 Ft.

TRAINING

ALL

NO. 1

NO. 2

Concrete floor
where required
show curbs

Edge of Bucket El 563.72

Final Grade at edge of Bucket

El 550.4

SECTION M-M

1/8" = 1 Ft.

Assumed original surface

Pipe railing

El. 577.02

3' channel

For Final Grade Elevation
See Sheet No. 5

Assumed top of rock

Payment Line for
Dam Excavation

Payment Line for
Road Excavation

Paved Area

El. 575.2

12" gravel
stock

Continuous stone paving

Assumed top of sound rock

Rock to be benched for width of wall

4" holes, 4 ft deep, spaced 8" c/c,
1" anchors grouted in place

RECORD DRAW
OF WORK - AS - BUILT

Contracting Office
November 1966

CONT NO W 30 075 ENG 2846

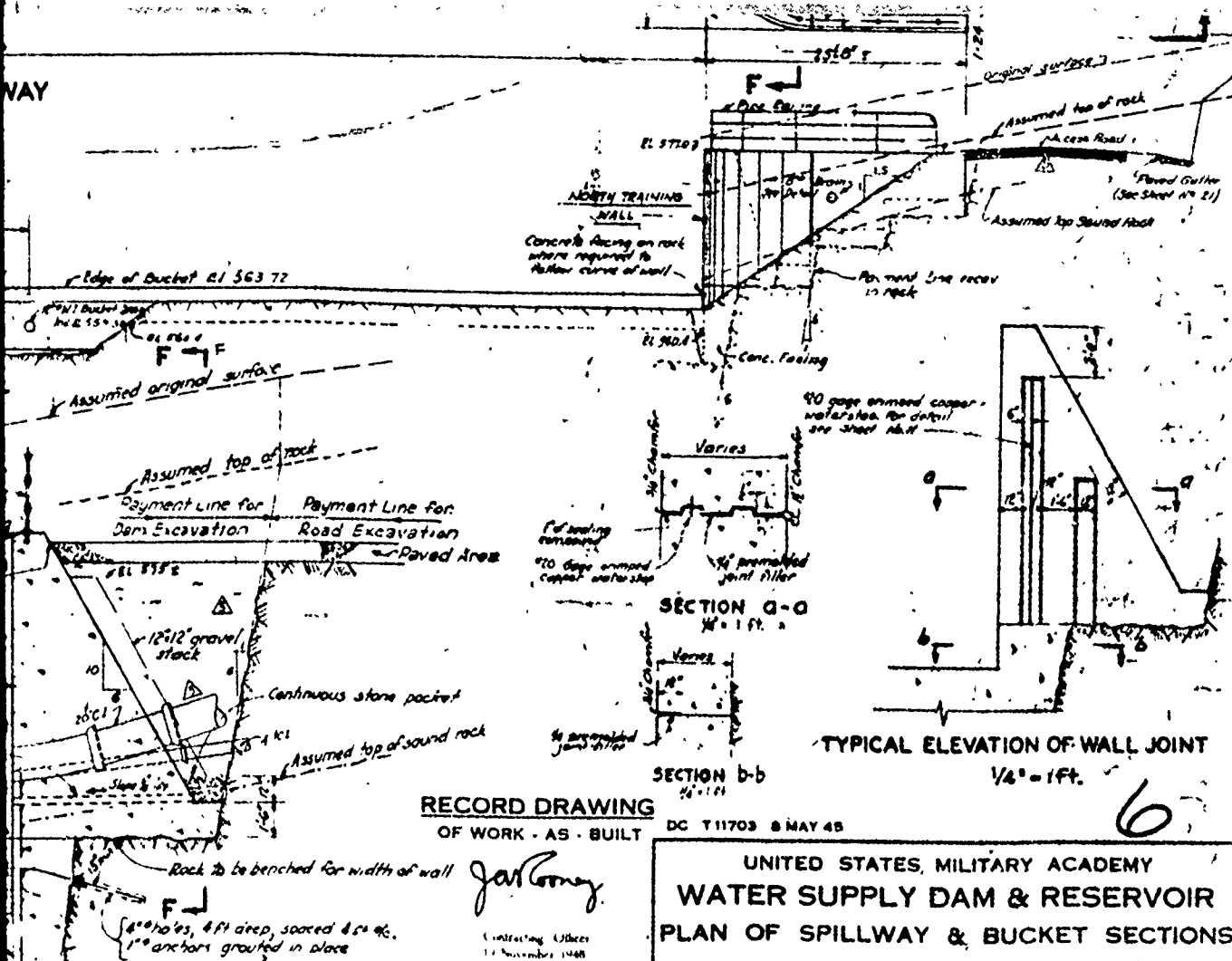
DATE	REV NO	REVISIONS	REV BY	APP BY
10/28/48	1	RECORD WORK AS BUILT	JJM	
11/20/48	2	Added note referring to grades	JJM	
8/27/45	3	Added detail A	AFA	
	4	Added note referring to grades	AFA	
	5	Added detail A	AFA	

ON B-B

1/8" = 1 Ft.

Excavation for bucket may
be stopped at higher elevation
provided rock of satisfactory
nature is found at such level and
if so directed by the Contract Officer

5



RECORD DRAWING
OF WORK - AS - BUILT

DC T11703 8 MAY 48

UNITED STATES MILITARY ACADEMY
WATER SUPPLY DAM & RESERVOIR
PLAN OF SPILLWAY & BUCKET SECTIONS

POPOLOPEN

WEST POINT, N. Y.

IN 21 SHEETS

SCALES AS SHOWN

SHEET NO. 6

U S ENGINEER OFFICE NEW YORK DISTRICT, NEW YORK, N. Y. 1945

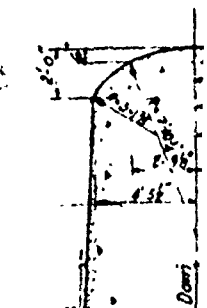
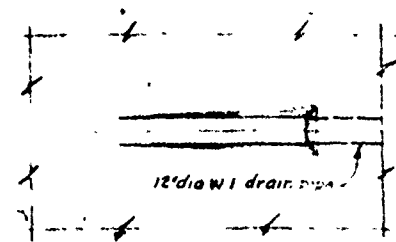
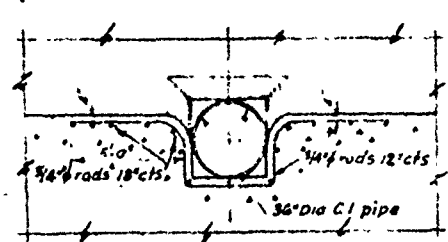
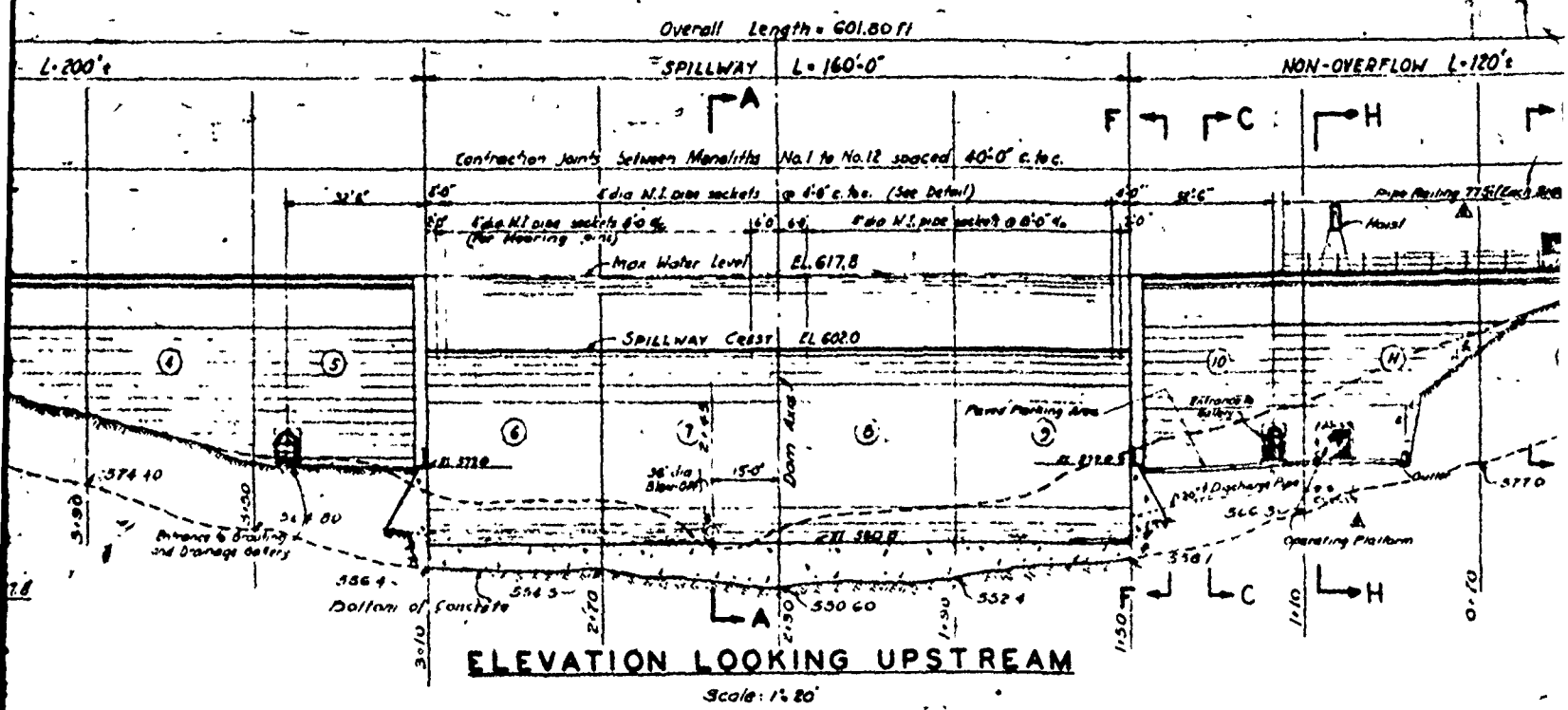
Reviewed *F. J. P. [Signature]* Recommended *Charles A. [Signature]* Assigned *E. W. [Signature]*
Principal Engineer Lt. Col. Corps of Engineers Colonel, Corps of Engineers
Substantive *[Signature]*
Alexander Popey Associates, Architects - Engineers

DATE	REV NO	REVISIONS	REV BY	APP. BY
1/1/48	G	RECORD WORK AS BUILT	JJM	
2/1/48	A	Int. to [unclear] was reinforced	JJM	FEH
8/27/48	A	Added Gutter dimension G.1	APA	
	A	reference Note	APA	
	A	Added note referring to Grades	APA	
	A	Added detail A	ASF	

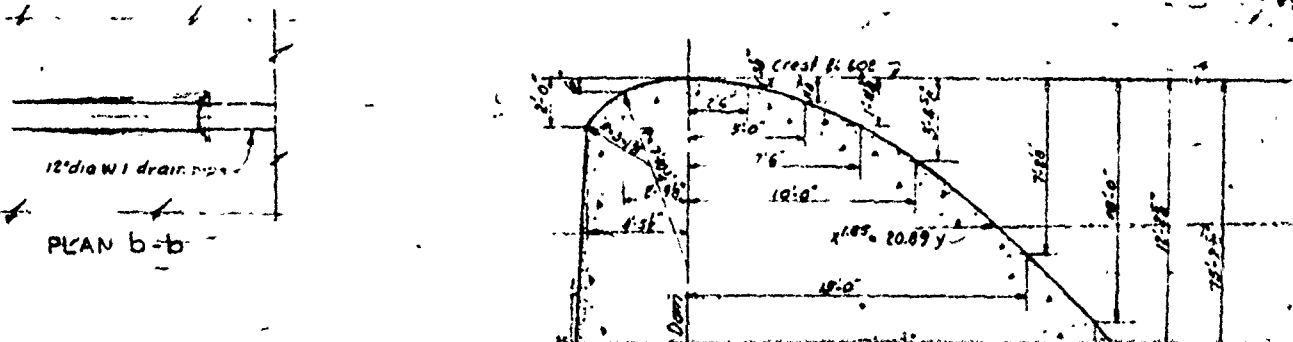
To Accompany Specifications Dated Oct. 1, 1945

7512 - 466

2

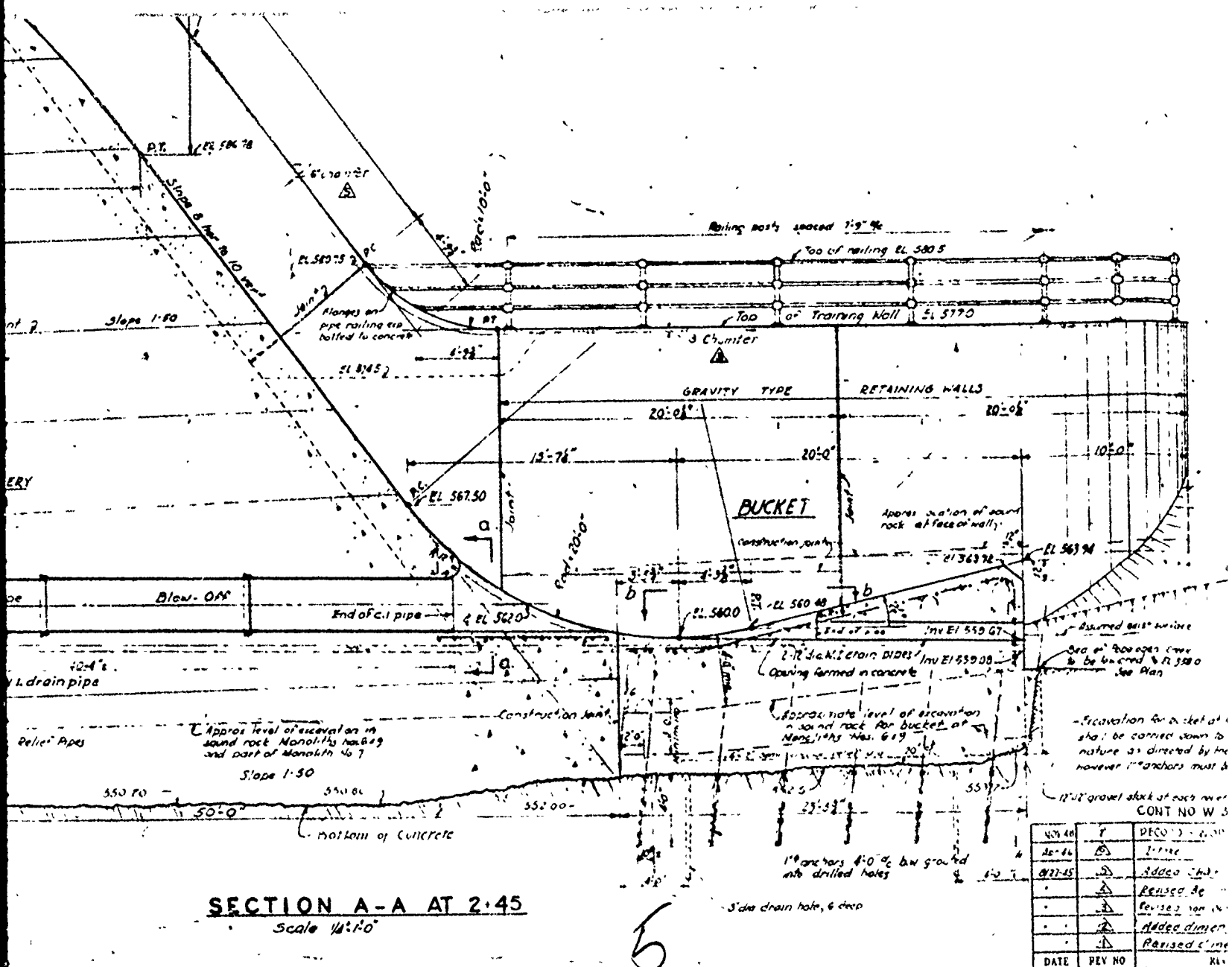


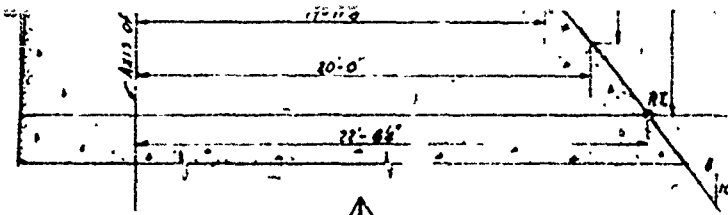
SPRAY WALL
(For details of construction see Sheet No. 8)





SECTION A-A
Scale 1/4"=1'-0"

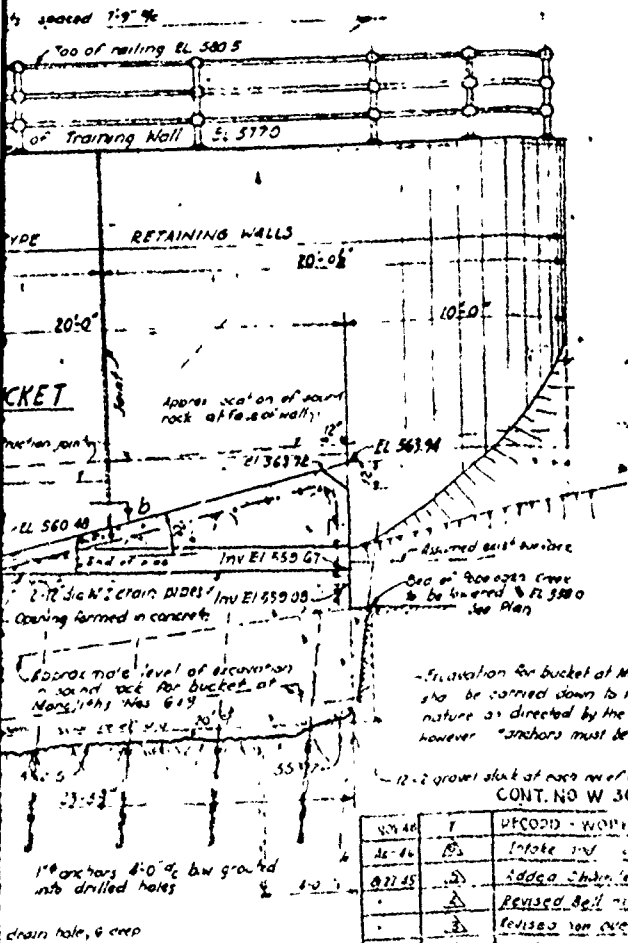




DETAIL OF CREST

Scale: 1/4" = 1'-0"

Note
Edges of concrete at contraction joints of Spillway Monoliths shall be chamfered 1 1/2" on the upstream face and only 3/4" on the downstream face.



RECORD DRAWING OF WORK - AS - BUILT

John R. [Signature]

Longfellow Office
14 November 1946

DC T11703 8 MAY 45

UNITED STATES MILITARY ACADEMY WATER SUPPLY DAM & RESERVOIR SPILLWAY SECTION & ELEVATION OF DAM

POPOLOPEN

WEST POINT, N. Y.

IN 21 SHEETS

SHEET NO 7

SCALES AS SHOWN

U. S. ENGINEER OFFICE, NEW YORK DISTRICT, NEW YORK, N. Y.

REVIEWED

DESIGNED

APPROVED

F. J. [Signature]

Charles [Signature]

[Signature]

Major [Title]

Lt. Col. [Title]

Colonel [Title]

[Signature]

[Signature]

[Signature]

Major [Title]

Lt. Col. [Title]

Colonel [Title]

Major [Title]

Lt. Col. [Title]

Colonel [Title]

Major [Title]

Lt. Col. [Title]

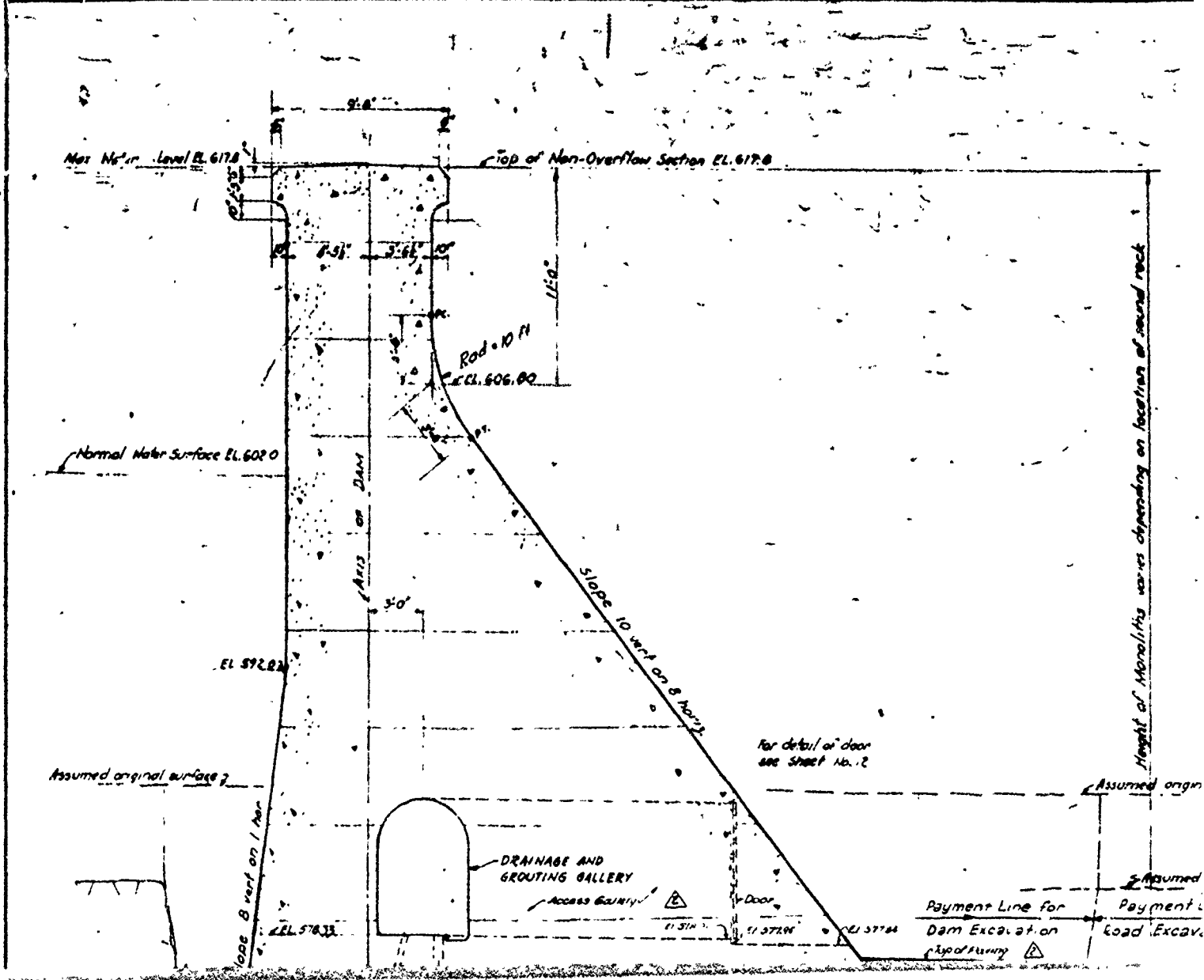
Colonel [Title]

NO.	REV.	DESCRIPTION	DATE	BY
1		RECORD - WORK - AS - BUILT	JUN 1946	JRM
2		Intake structure relocated	JUN 1946	JRM
3		Edge structure	JUN 1946	JRM
4		Revised Bell structure	JUN 1946	JRM
5		Revised van over Flow Section	JUN 1946	JRM
6		Revised dimensions	JUN 1946	JRM
7		Revised dimensions	JUN 1946	JRM
8		Revised dimensions	JUN 1946	JRM
9		Revised dimensions	JUN 1946	JRM
10		Revised dimensions	JUN 1946	JRM
11		Revised dimensions	JUN 1946	JRM
12		Revised dimensions	JUN 1946	JRM
13		Revised dimensions	JUN 1946	JRM
14		Revised dimensions	JUN 1946	JRM
15		Revised dimensions	JUN 1946	JRM
16		Revised dimensions	JUN 1946	JRM
17		Revised dimensions	JUN 1946	JRM
18		Revised dimensions	JUN 1946	JRM
19		Revised dimensions	JUN 1946	JRM
20		Revised dimensions	JUN 1946	JRM
21		Revised dimensions	JUN 1946	JRM

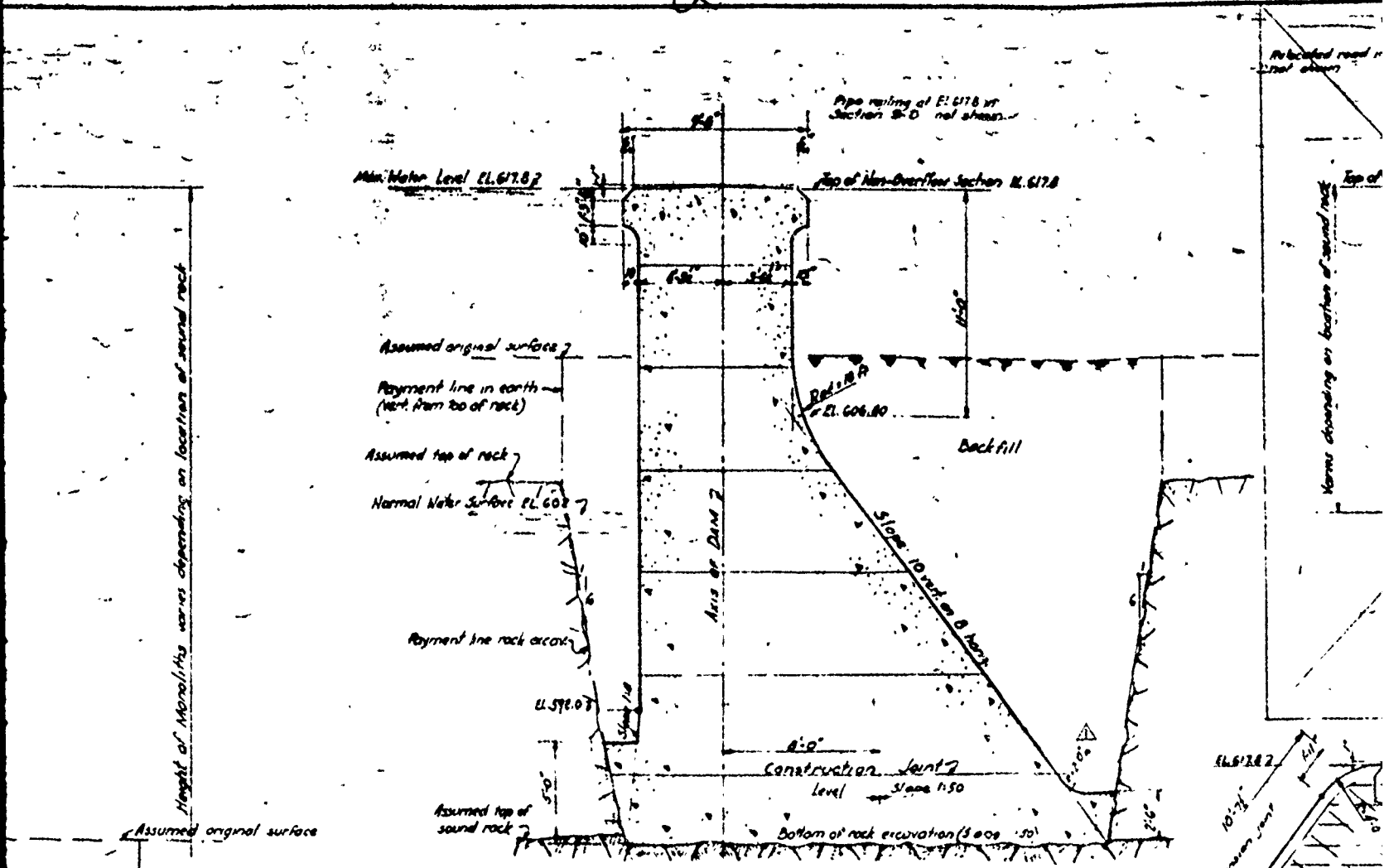
1. Approved for Release Dated 5 June 1945

7512-467

WAR DEPARTMENT



2



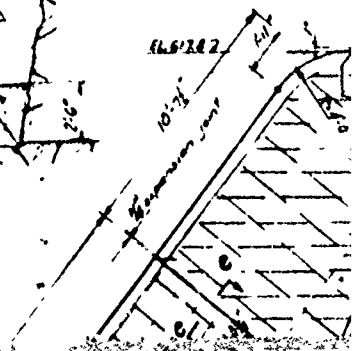
SECTION D-D

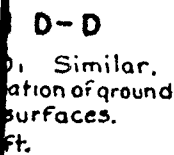
SECTION D-D. Similar, except for elevation of ground and rock surfaces.

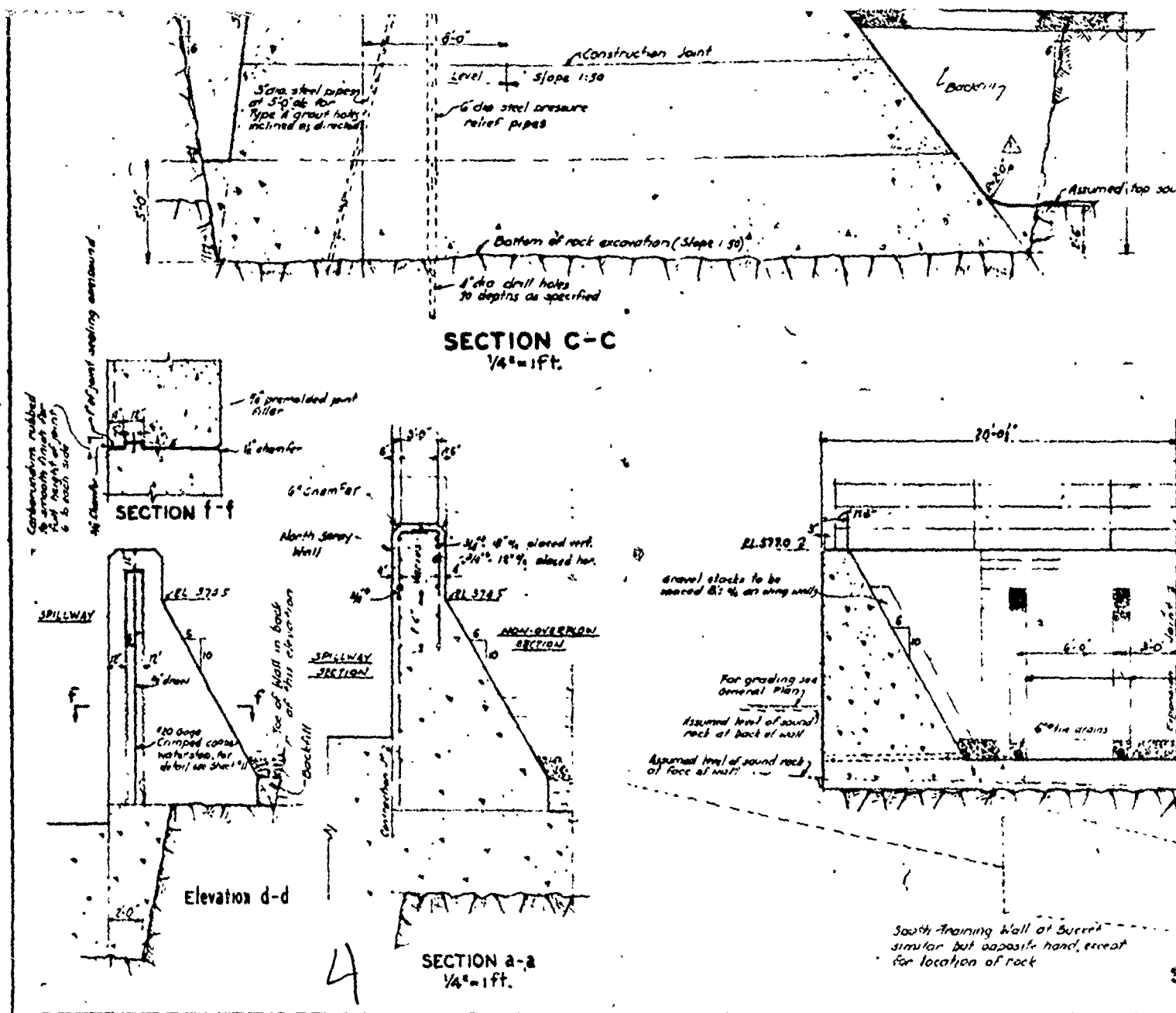
1/4" = 1 ft.

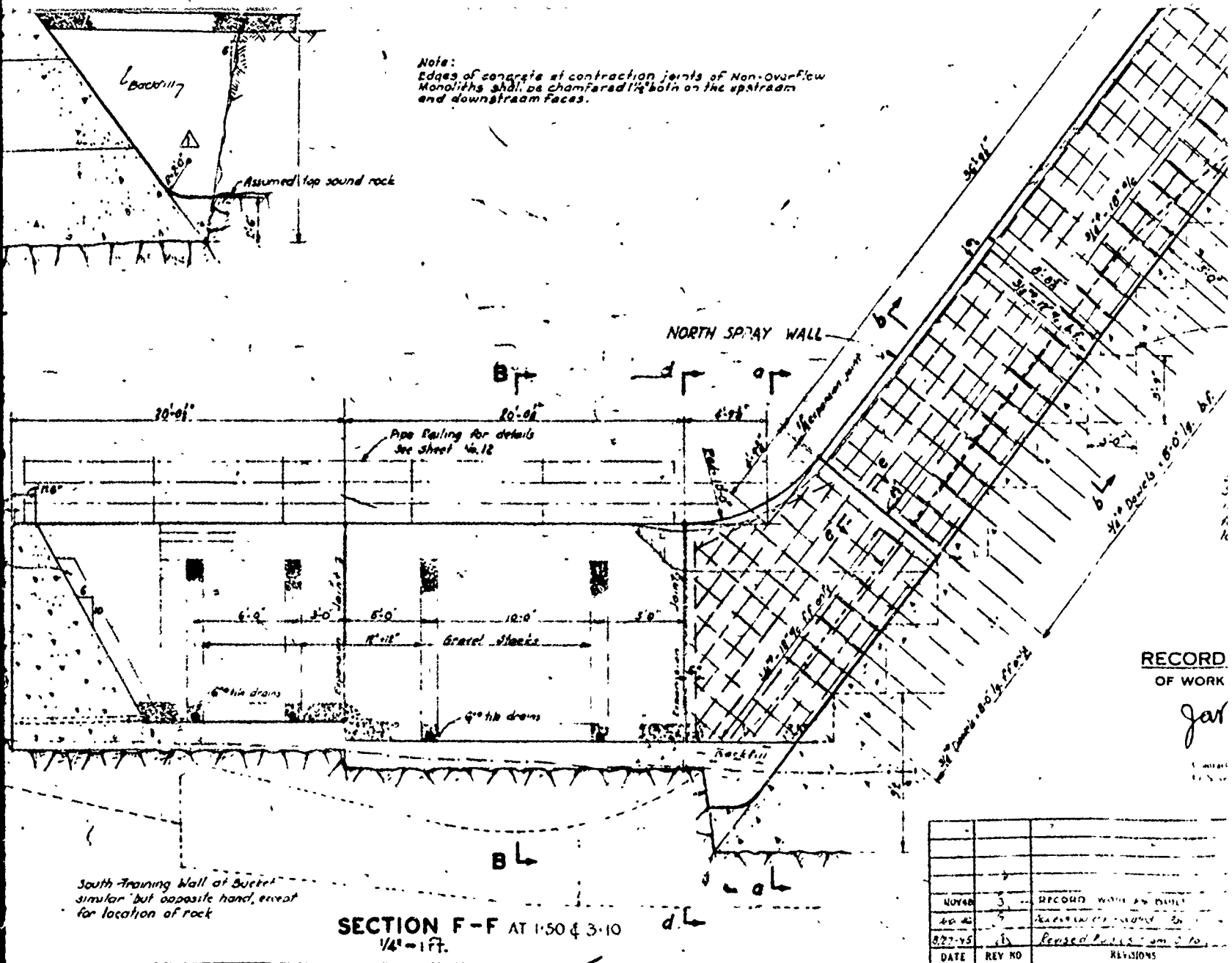
Assumed top of rock
Payment Line for
Road Excavation

Payment Line for
Excavation

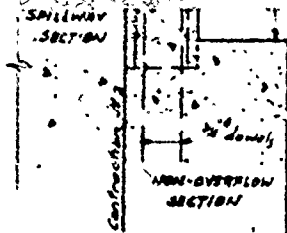
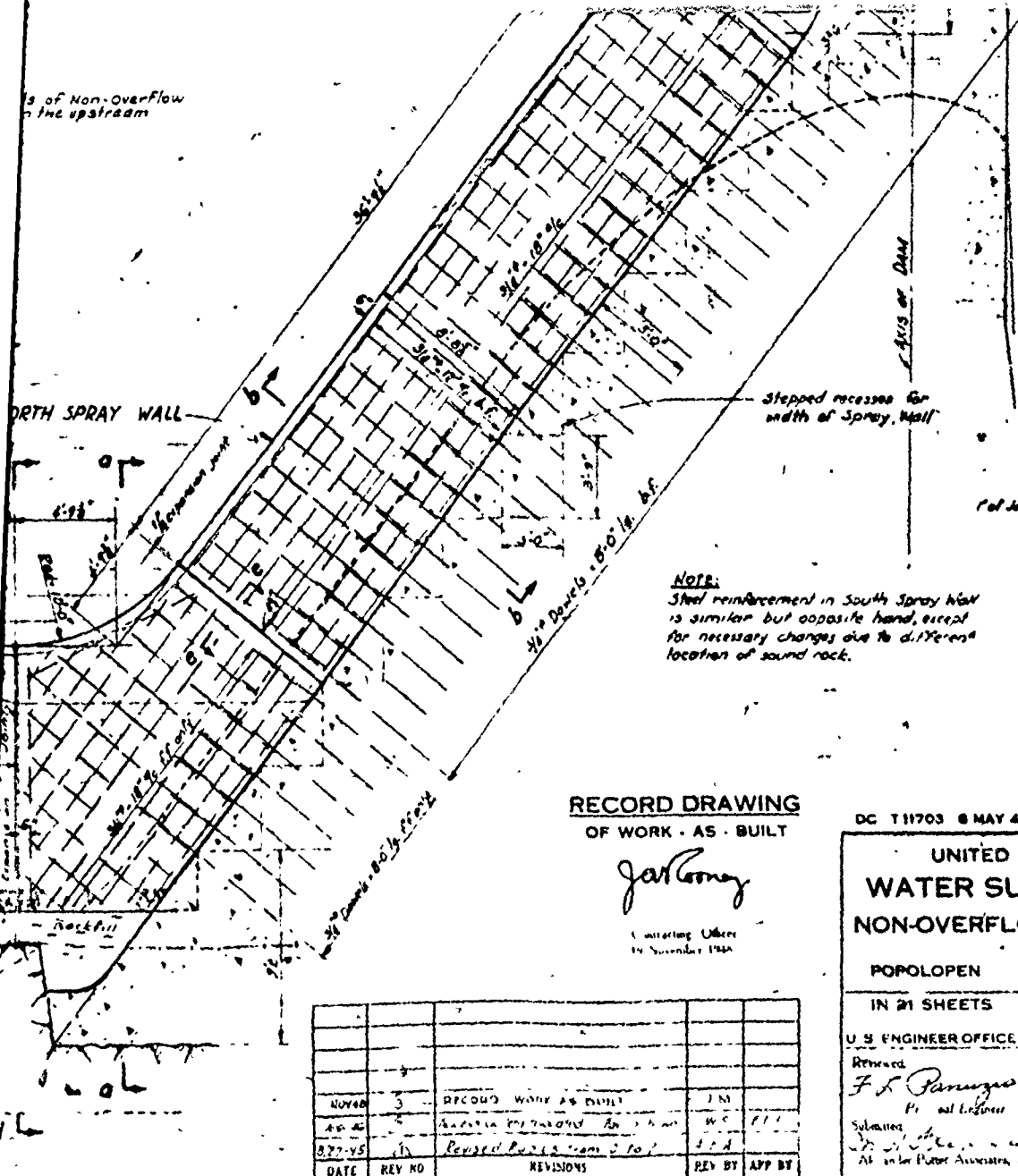




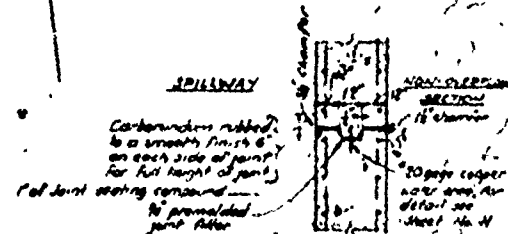




is of Non-Overflow
in the upstream



SECTION b-b
1/4" = 1 ft.



SECTION e-e
1/4" = 1 ft.

DC 111703 6 MAY 48

UNITED STATES MILITARY ACADEMY
WATER SUPPLY DAM & RESERVOIR
NON-OVERFLOW SECTIONS & SPRAY WALL

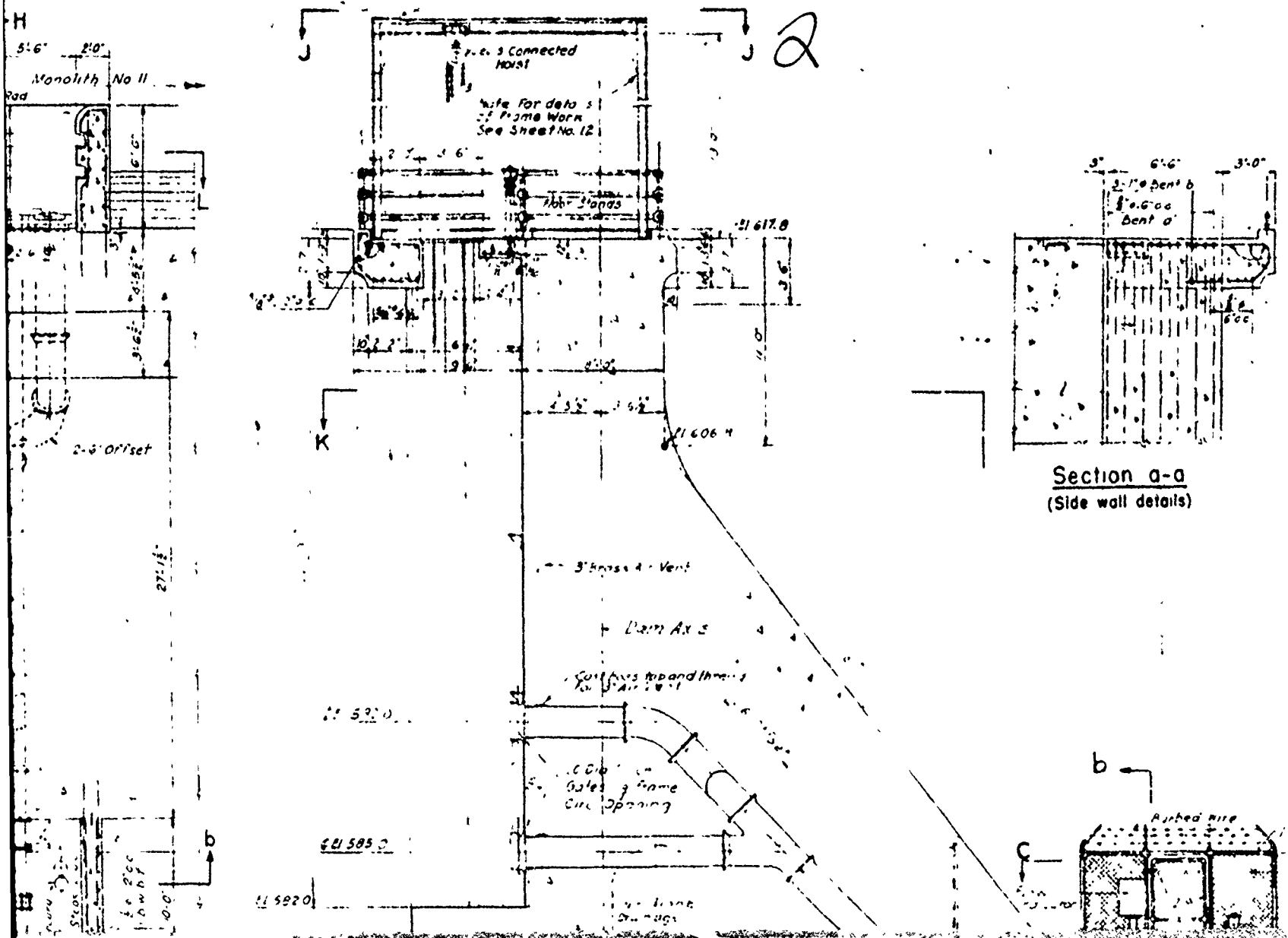
POPOLOPEN WEST POINT, N Y

IN 21 SHEETS / SHEET NO. 8

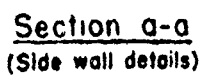
U S ENGINEER OFFICE, NEW YORK DISTRICT, NEW YORK, N Y 1945

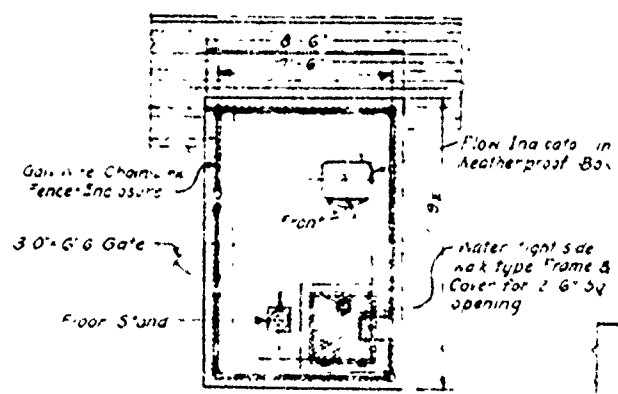
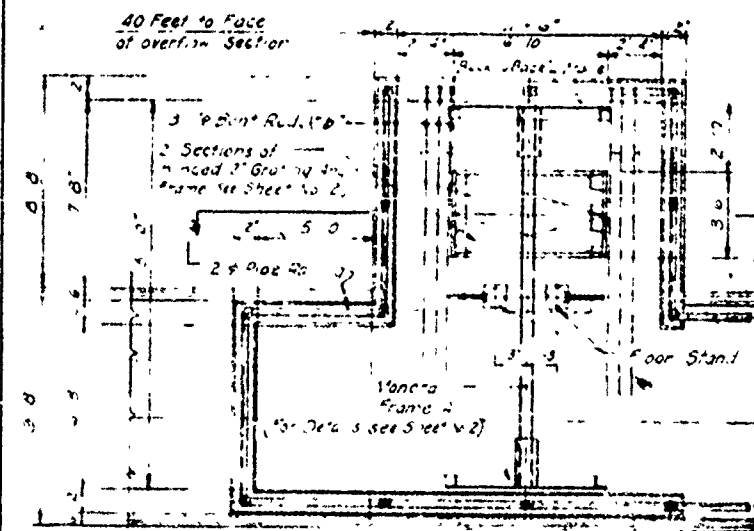
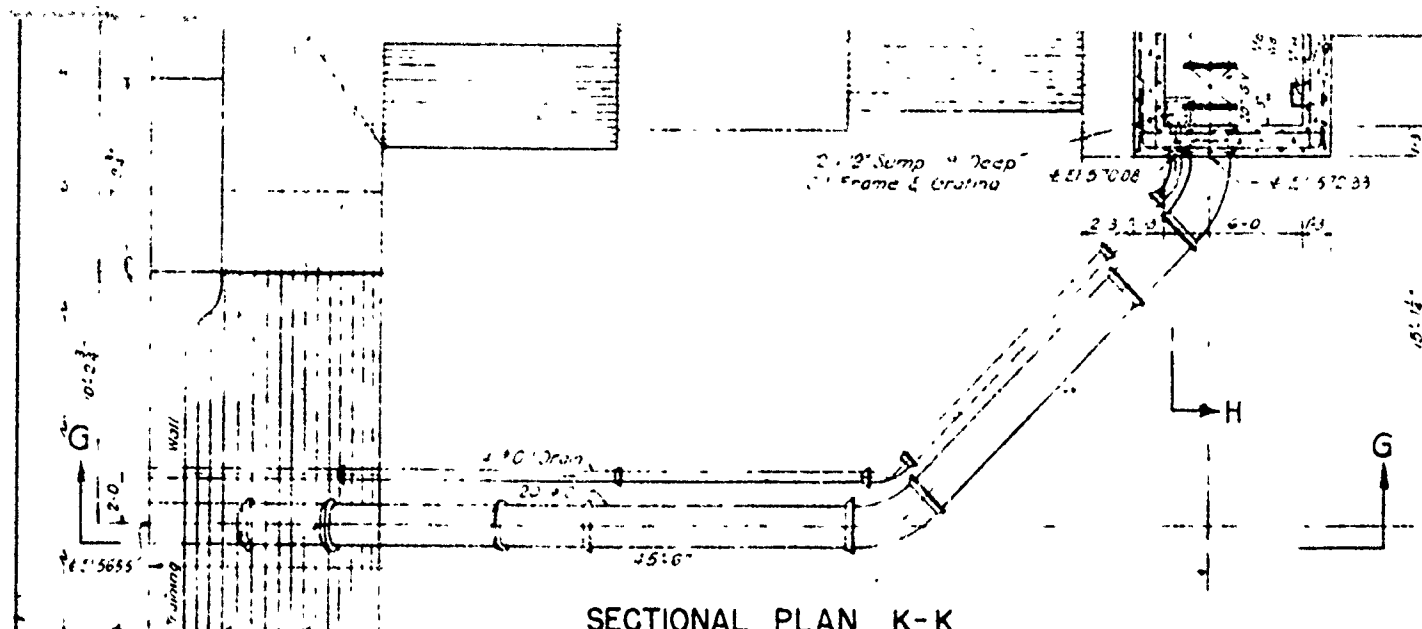
Reviewed
F. L. Panuzio Chief Engineer
W. S. Conway Lt. Col. Corps of Engineers
Submitted
W. S. Conway Lt. Col. Corps of Engineers
At and for Project Association, A Joint Engineer.

To Accompany Specifications Dated 5 June 1945 7512-468



3

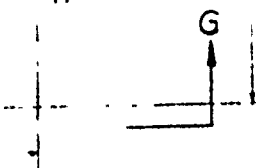




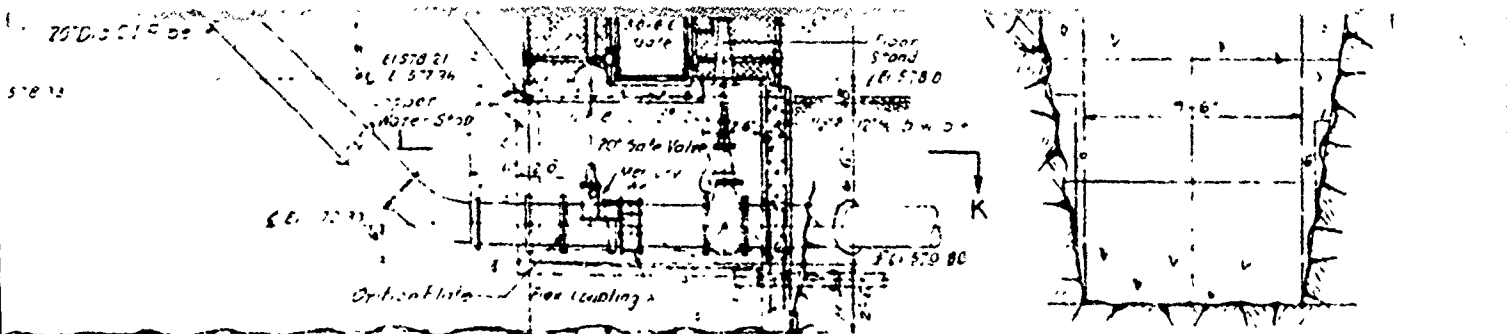
PLAN J-J

PLAN C-C

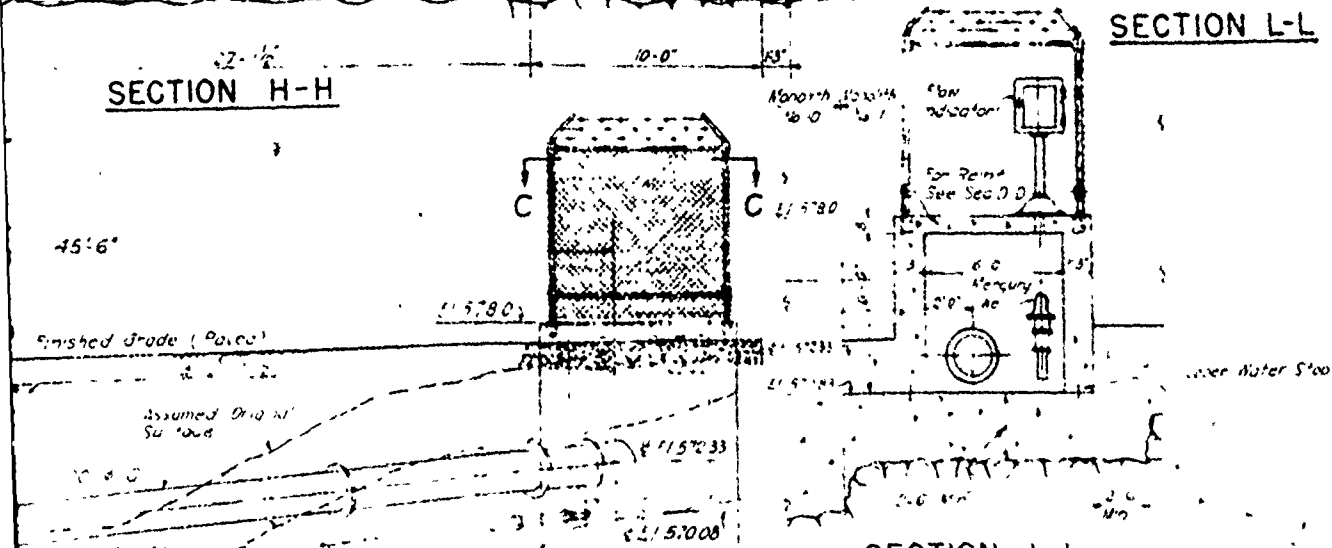
4



DATE	REV NO	REVISION	J.F. REV.
------	--------	----------	--------------



SECTION L-L



SECTION b-b

DC F11703 8 MAY 45

RECORD DRAWING
OF WORK - AS BUILT

J. L. Paine

SECTION G-G

DATE	REV NO	REVISION	REV BY	APP BY
10-48	1	Revised work as built	J. L.	

UNITED STATES MILITARY ACADEMY		
WATER SUPPLY DAM & RESERVOIR		
INTAKE AND DRAW-OFF DETAILS		
POPOLOPEN	WEST POINT N Y	
IN 21 SHEETS	SHEET NO 9	
SCALES AS SHOWN		
U.S. ENGINEER OFFICE NEW YORK DISTRICT NEW YORK N Y APR. 1948		
Submitted	Reviewed	Approved
<i>J. L. Paine</i> Engineer	<i>Clem. Paine</i> Engineer	<i>W. F. Hawley</i> Colonel, Consulting Engineer

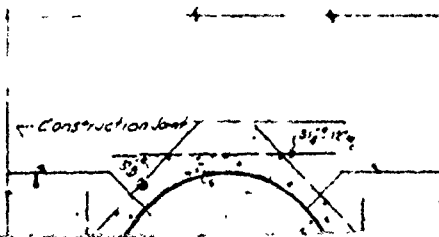
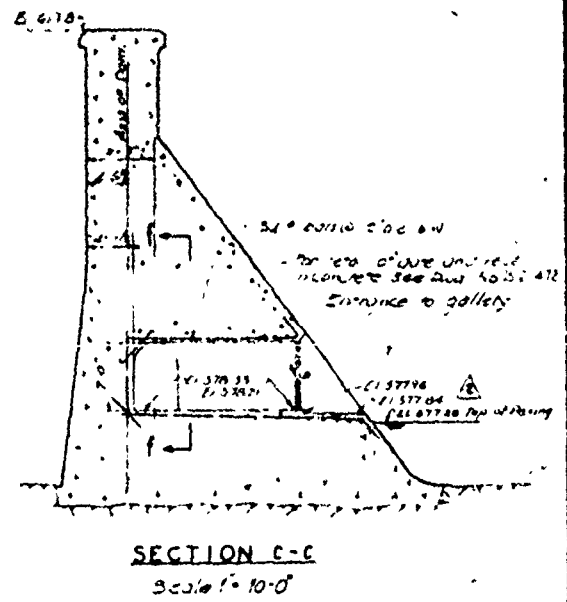
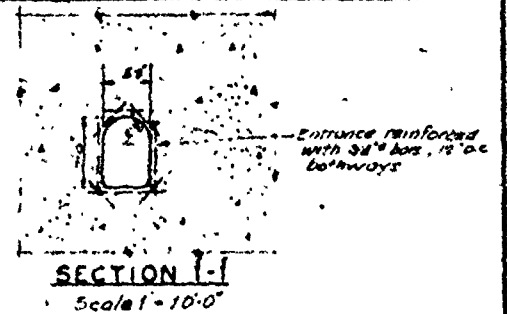
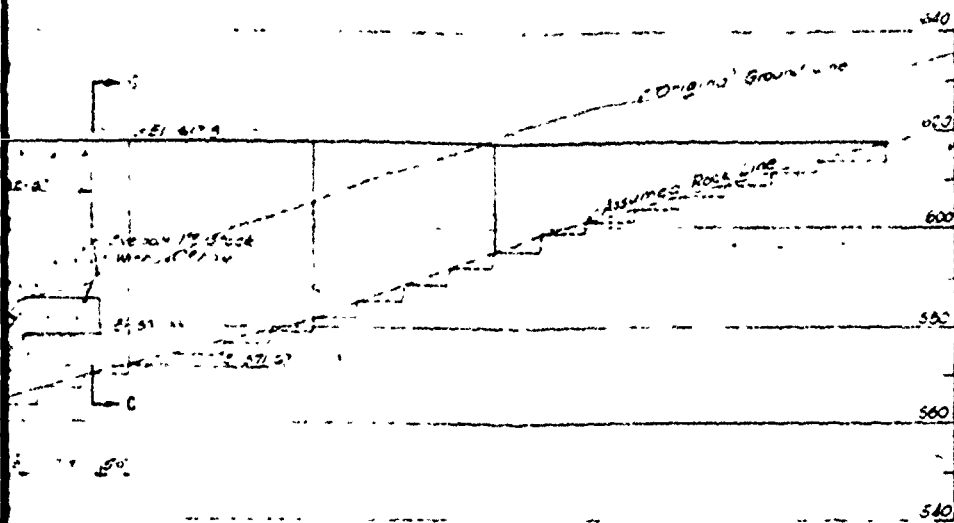
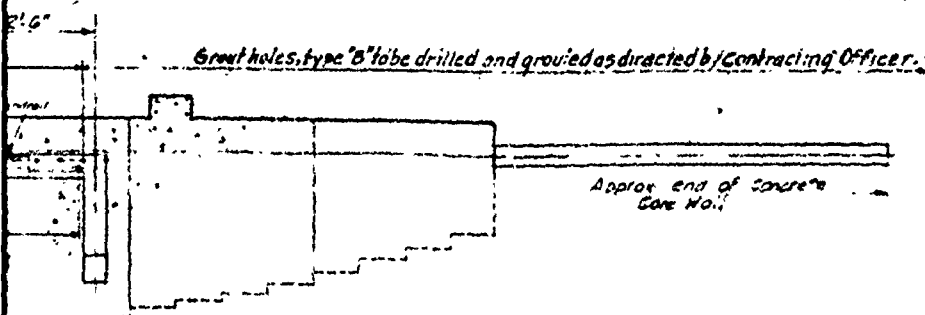
To Accompany Specifications Dated 4 June 1945

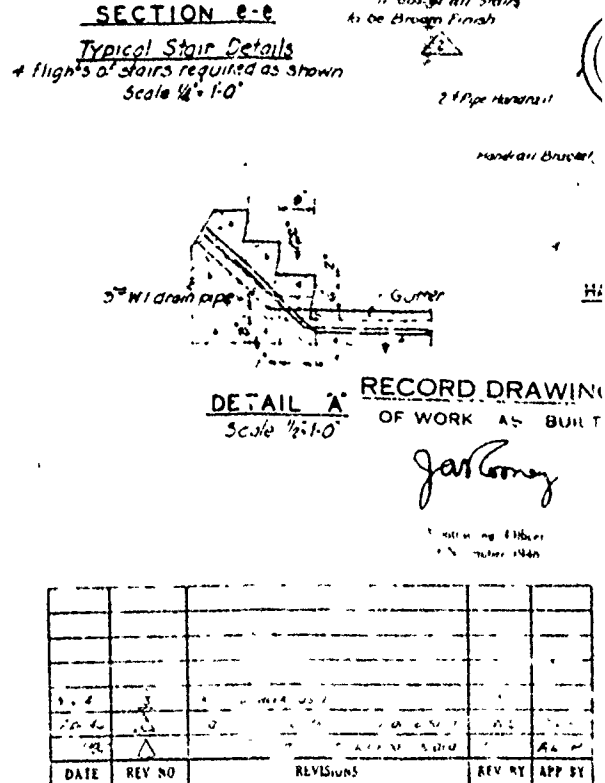
7512-4691

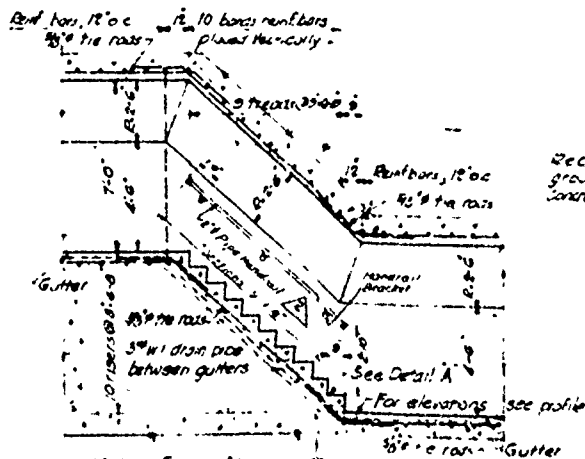
PROFILE ON CENTER
S. 1/4

3

CORPS OF ENGINEERS U.S. ARMY



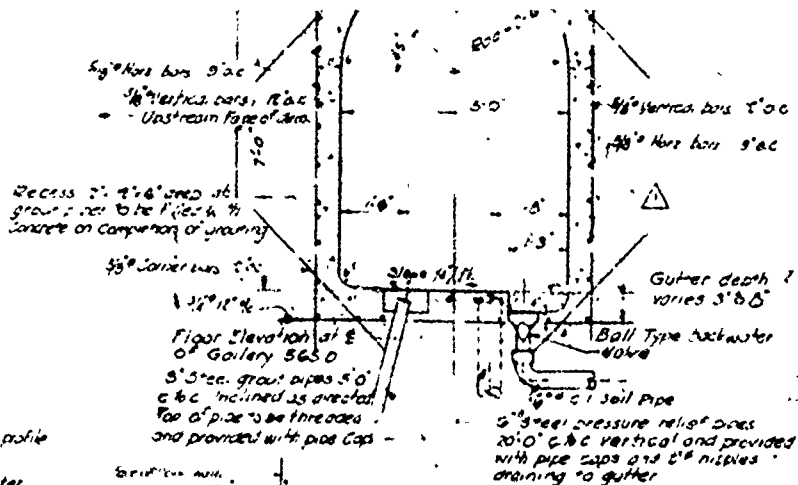




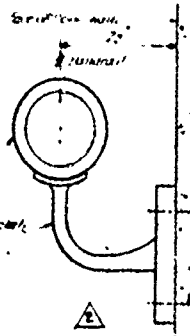
SECTION e-e
Typical Stair Details
 4 flights of stairs required as shown
 Scale 1/4" = 1'-0"



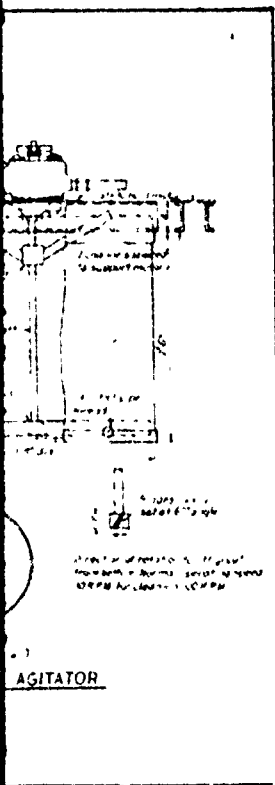
DETAIL A
 Scale 1/2" = 1'-0"



SECTION d-d
 Scale 1/2" = 1'-0"



HANDRAIL DETAIL
 1/2 FULL SIZE



DATE	REV NO	REVISIONS	REV BY	APP BY

DC T 1703 8 MAY 49

UNITED STATES MILITARY ACADEMY
WATER SUPPLY DAM & RESERVOIR
GROUTING GALLERY AND PLANT

POPCLOPEN

WEST POINT, N. Y.

IN 21 SHEETS

SHEET NO 10

U.S. ENGINEERING OFFICE NEW YORK DISTRICT NEW YORK N.Y. 1948

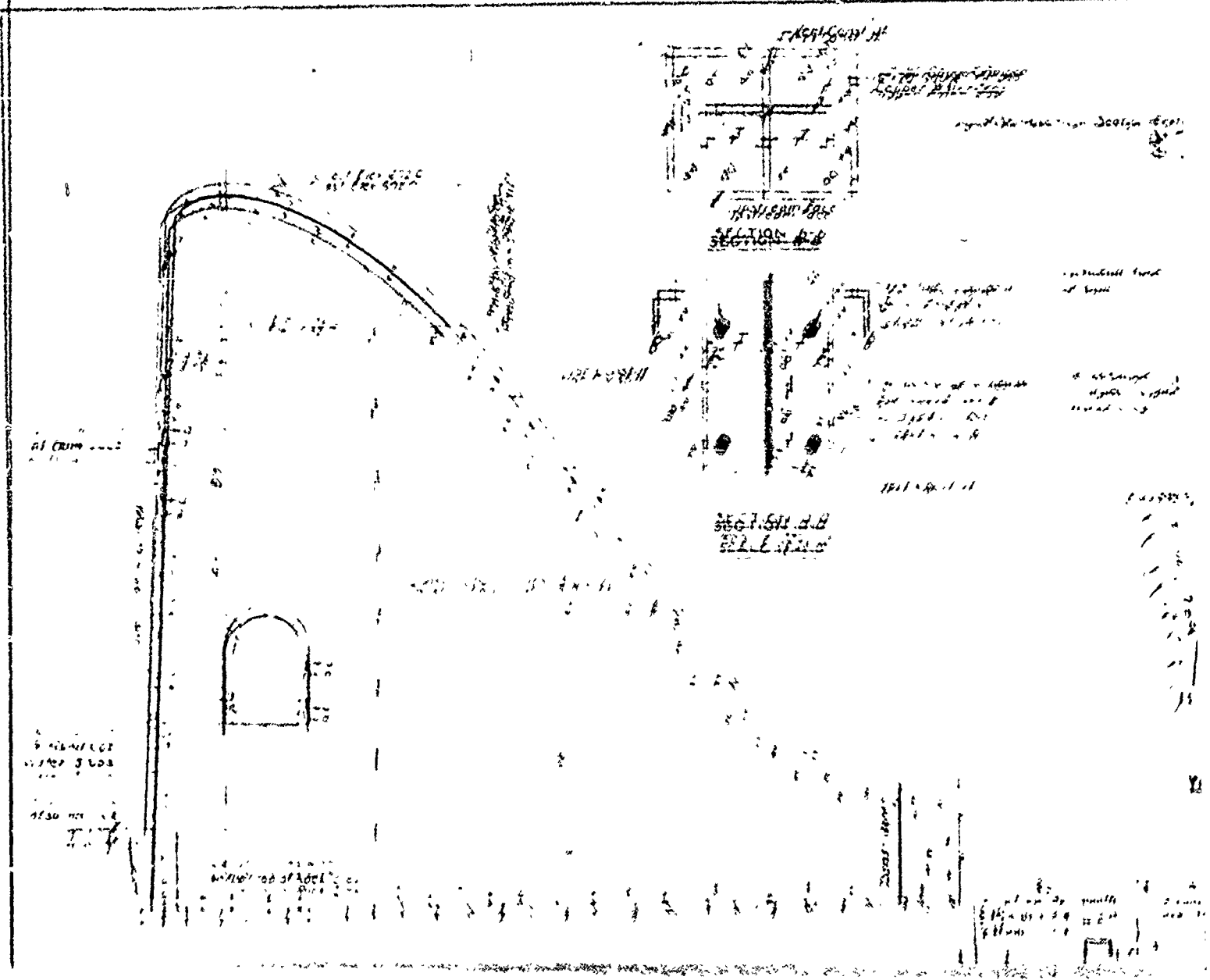
Reviewed: *F. A. Pascoe* (Chief Engineer)
 Checked: *Charles A. Fennell* (Chief Engineer)
 Approved: *E. W. Harbison* (Chief Engineer)

Submitted: *W. J. Pascoe* (Chief Engineer)
 Checked: *W. J. Pascoe* (Chief Engineer)
 Approved: *W. J. Pascoe* (Chief Engineer)

To be approved by the Engineer in Charge

7512-470

WAR DEPARTMENT
WAR DEPARTMENT



0 Gauge Crimped
in Water Stop

Top of Non-Overflow Section Elev 6178

Holes spaced at
except as
wn at joints

0 Gauge unneled
copper strip
ped as shown
ction b-b

Const Jt

Upstream Face
of Dam

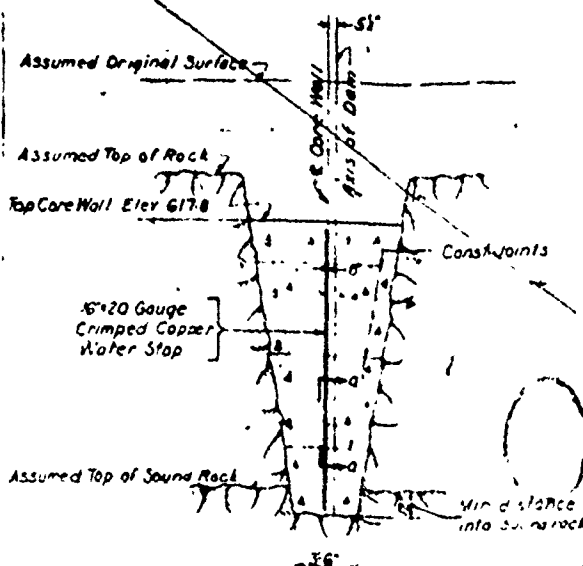
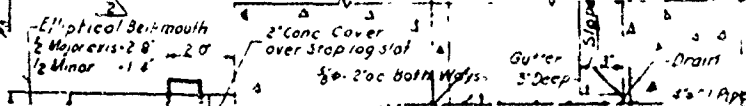
6x20 Gauge
Crimped Copper
Water Stop

Elev 5920

Length varies with
at top of Rock Elev

WATER STOPS FOR NON-OVERFLOW SECTION

TYPICAL
SCALE 1/2"=1'-0"



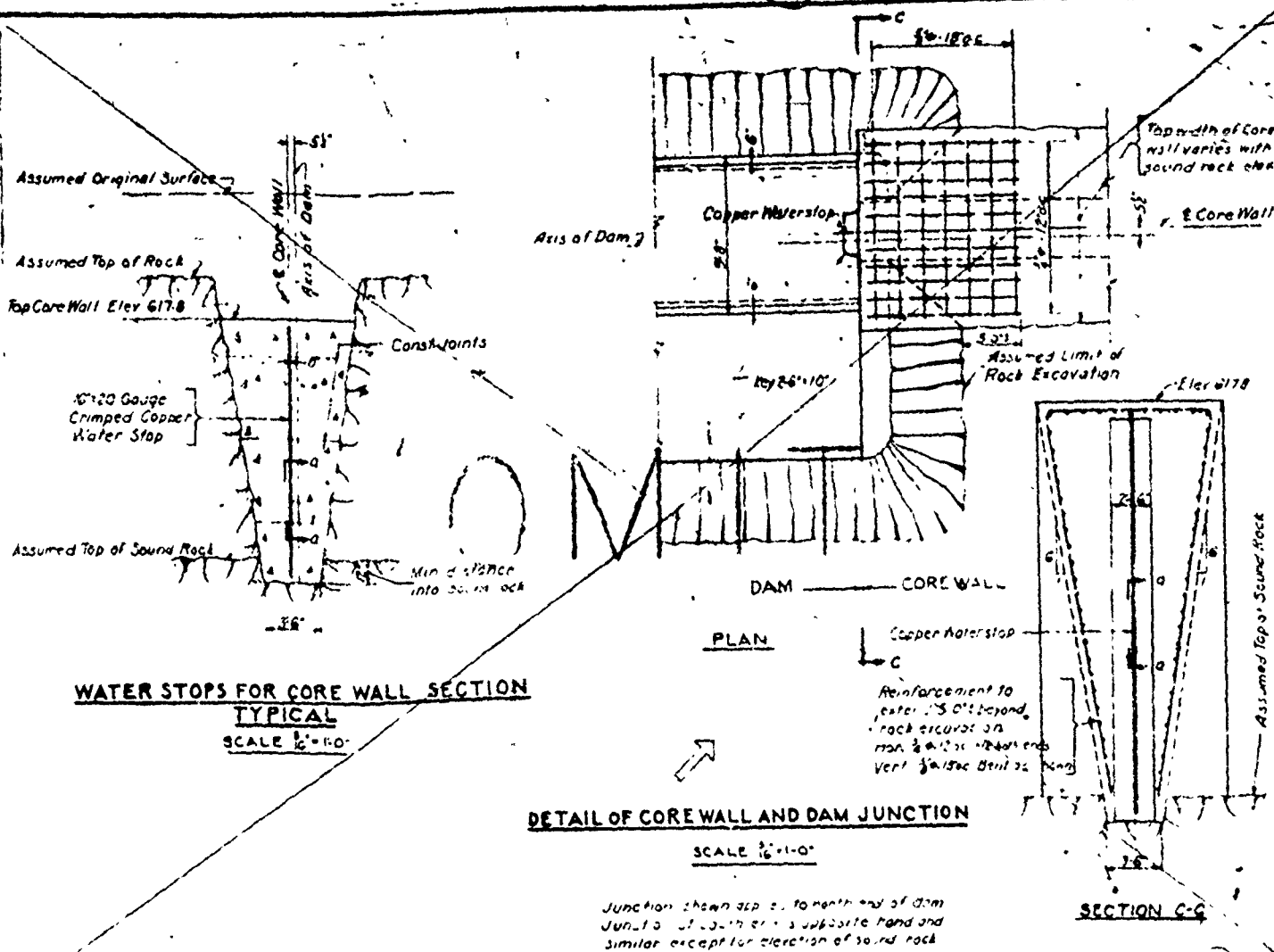
WATER STOPS FOR CORE WALL SECTION

TYPICAL
SCALE 1/2"=1'-0"

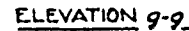
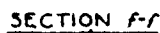
DET

3

CORPS OF ENGINEERS, U.S. ARMY

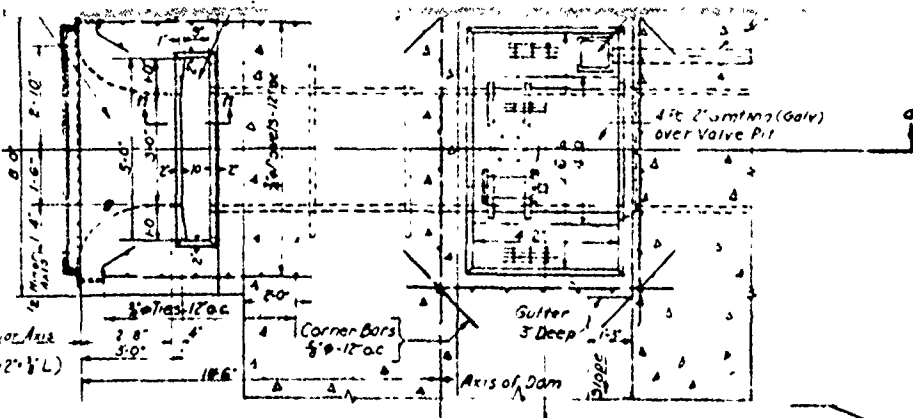


SCALE - $\frac{1}{4}$ " = 10'

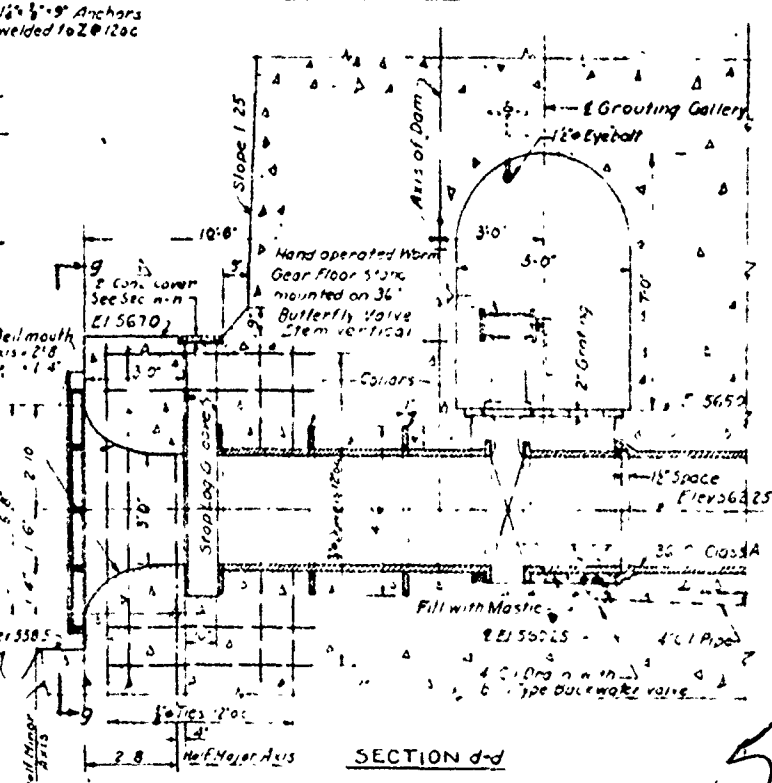


SCALE 3/8"=1'-0" EXCEPT AS NOTED

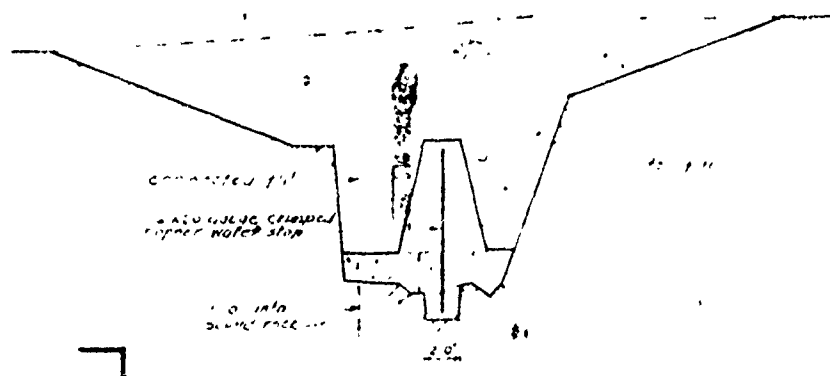
4



SECTIONAL PLANCE F



SECTION d-d



AS BUILT
TYPICAL DRAIN SECTION

RECORD DRAWING
OF WORK AS BUILT

John R. ...

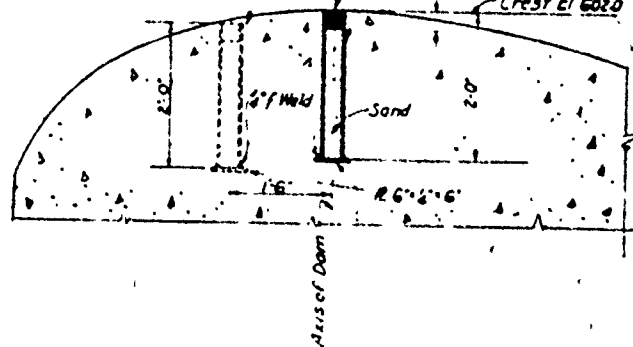
(Characterizing Officer
for this drawing)

DATE	REV NO	REVISIONS	REV BY	APP BY
Apr 40	1	As built		
Jan 42	2	Revised		
3/27-48	3	Revised Bell m/c in place of 36" A.P.A.		
8/27-48	4	Revised Bell m/c in place of 36" A.P.A.		

Seal with asph mastic

Fill with sand and seal

Crest El 602.0



DETAIL OF FLASHBOARD SOCKETS

SCALE - 3"=1'-0"

Gravel fill
ALL GULCH CRIPPLED
UPPER WOLF STOP

Gravel fill
Gravel fill

AS BUILT

INITIAL BLANK

RECORD DRAWING
(OF WORK - AS BUILT)

John G. ...

(Contracting Officer
12 November 1945)

DC T11703 8 MAY 45

**UNITED STATES MILITARY ACADEMY
WATER SUPPLY DAM & RESERVOIR
WATER STOPS, BLOW-OFF & MISC. DETAILS**

POPOLOPEN

WEST POINT N. Y.

IN 21 SHEETS

SHEET NO 11

SCALES AS SHOWN

U.S. ENGINEER OFFICE NEW YORK DISTRICT, NEW YORK N. Y.

1945.

Reviewed

Recommended

Approved

F. J. ...
Major, P.A. Associate Architect Engineer

Charles ...
Lt. Col. Corps of Engineers

E. W. ...
Colonel, Corps of Engineers

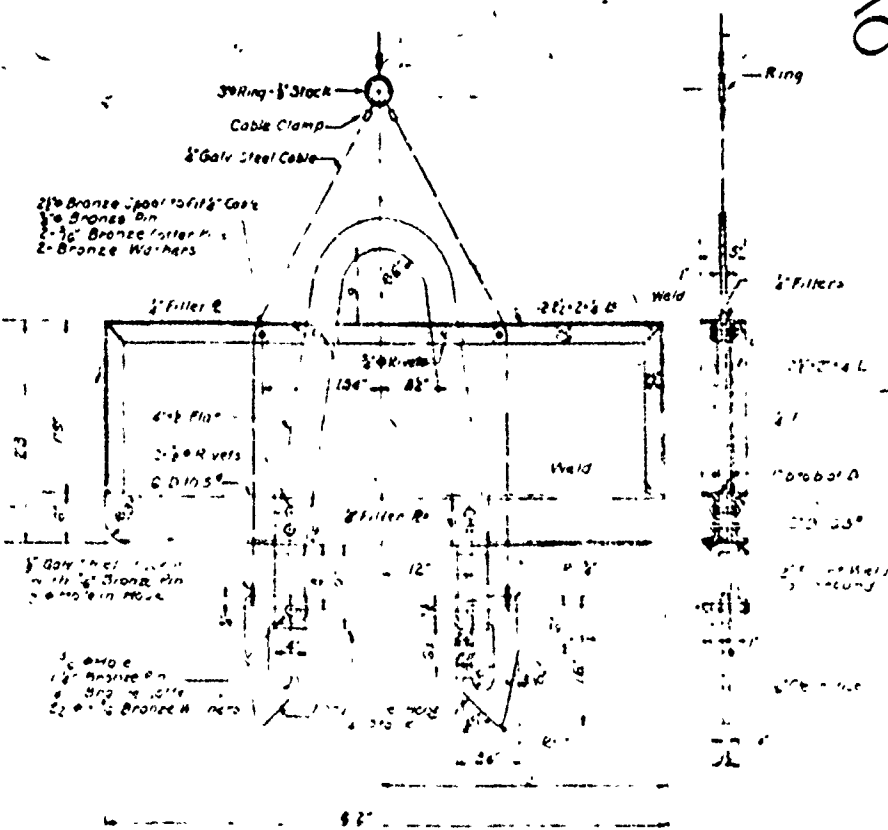
DATE	REV NO	REVISIONS	REV BY	APP BY
3/27-45	1	Revised Bell mouth (Blow-off) sec. 4 P.A.		
8/27-45	2	Revised Blow-off (No. 2) sec. 4 P.A.		

To Verify for design by 8/27/45

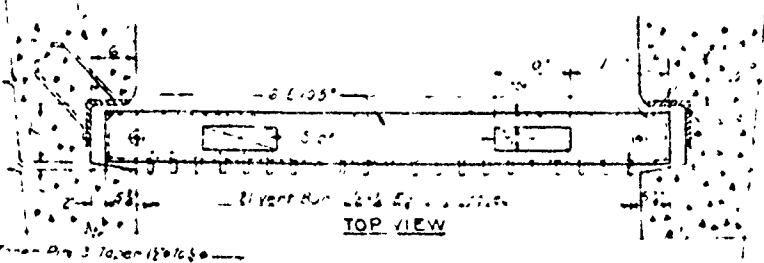
7512-471

The image contains three technical drawings of a metal gate assembly:

- Top Drawing (Side View):** Shows a cross-section of the gate. Labels include "Gate", "Pac Back Hasps", "Welded to Frame", "1/2\" D. 1/2\" Bar", "Welded to 1/2\" D. 1/2\" Bar", "Welded to Frame", "Pivot", "2\" Bronze Door to 1/2\" Cable", "2\" Bronze Pin", "2\" Bronze Roller", "2\" Bronze Washers", "3\" Ring 1/2\" Stock", "Cable Clamp", and "1/2\" Gate Steel Cable".
- Middle Drawing (Detail of Gate):** A detailed view of the gate's edge. Labels include "Welded to Frame", "Gate 1/2\" D. 1/2\" Bar", "1/2\" D. 1/2\" Bar", "Welded to 1/2\" D. 1/2\" Bar", "Welded to Frame", "Pivot", "2\" Bronze Door to 1/2\" Cable", "2\" Bronze Pin", "2\" Bronze Roller", "2\" Bronze Washers", "3\" Ring 1/2\" Stock", "Cable Clamp", and "1/2\" Gate Steel Cable".
- Bottom Drawing (Plan View):** Shows the gate from above. Labels include "Pivot", "1/2\" D. 1/2\" Bar", "Welded to 1/2\" D. 1/2\" Bar", "Welded to Frame", "Pivot", "2\" Bronze Door to 1/2\" Cable", "2\" Bronze Pin", "2\" Bronze Roller", "2\" Bronze Washers", "3\" Ring 1/2\" Stock", "Cable Clamp", and "1/2\" Gate Steel Cable".

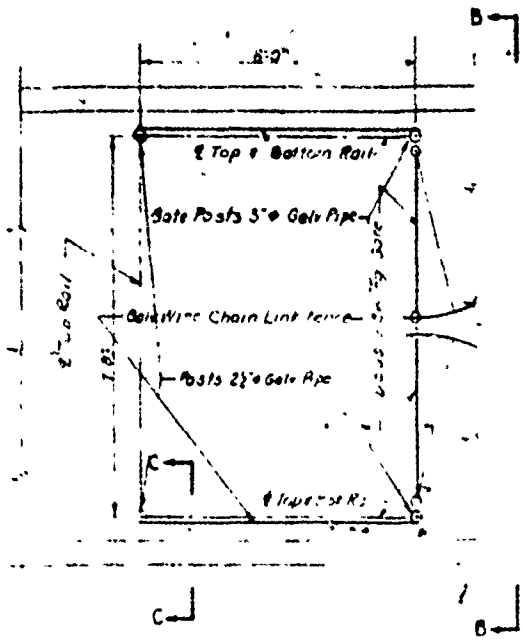


SCREEN LIFTER
2'-0" x 1'-0"



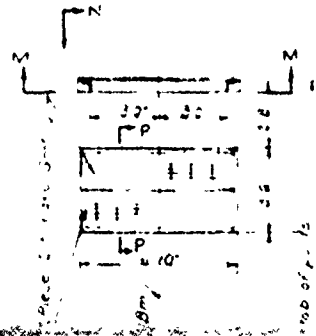
TOP VIEW

2



PLAN

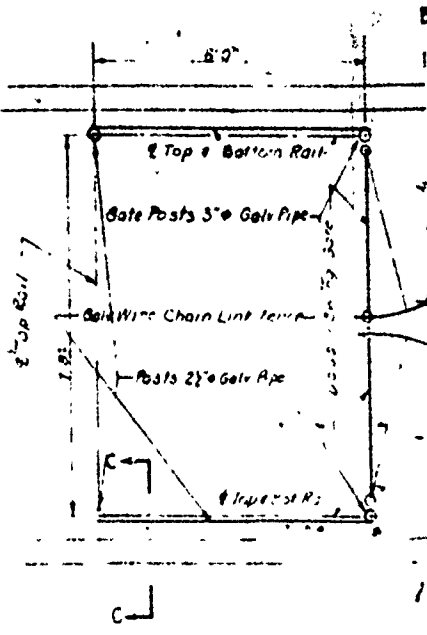
WIRE CHAIN LINK
SCALE 1/2"



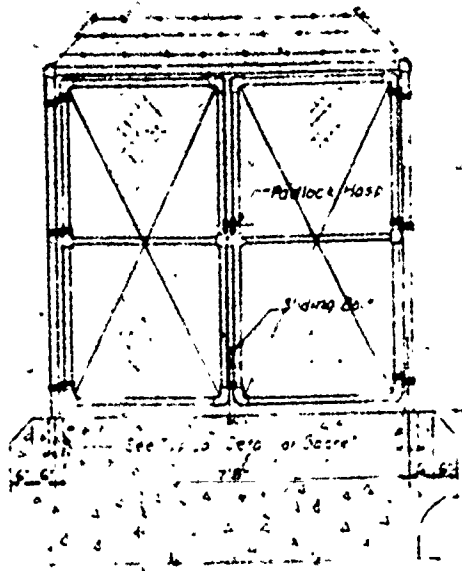
Note - All Rivets 1/2"



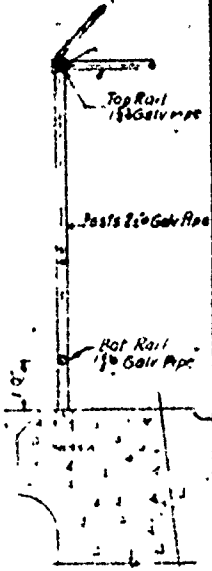
3



PLAN

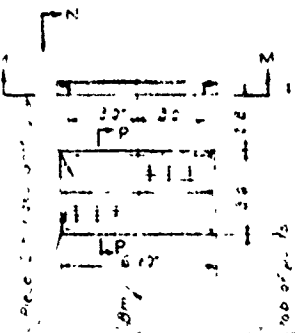


ELEV B-B DOUBLE SWING GATE

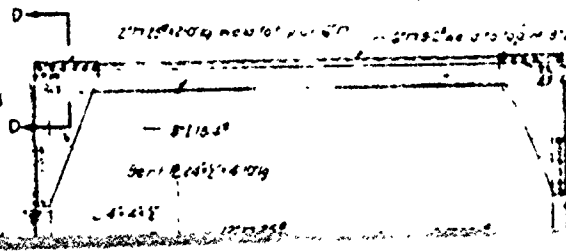


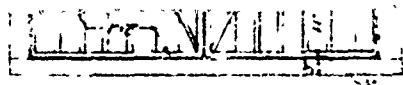
SECT C-C

WIRE CHAIN LINK ENCLOSURE
SCALE: 1/8" = 1'-0"

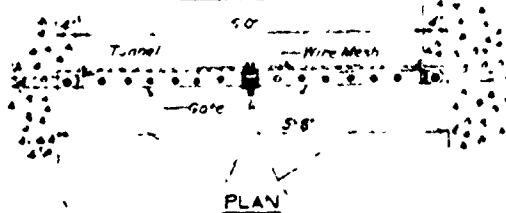


Note: All Rivets 3/8"

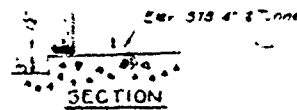




ELEVATION

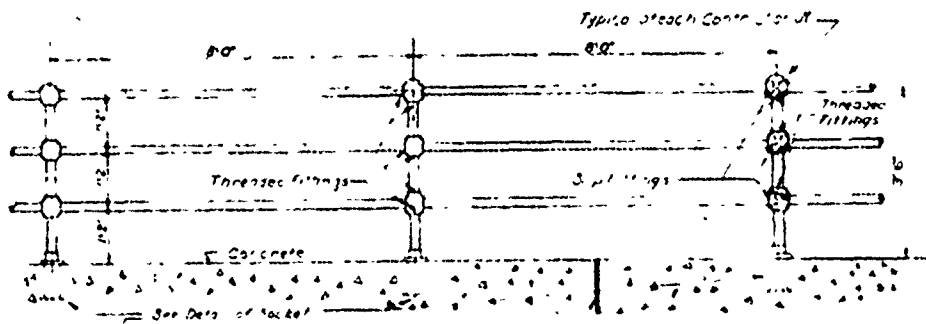


PLAN

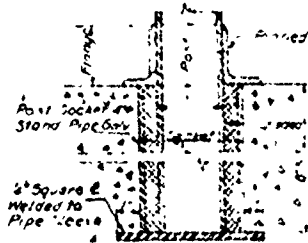


SECTION

DETAILS OF GATE
AT ENTRANCE TO
DRAINAGE GALLERY
SCALE: 3/4"=1'-0"

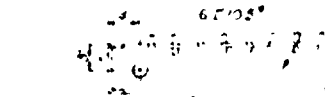
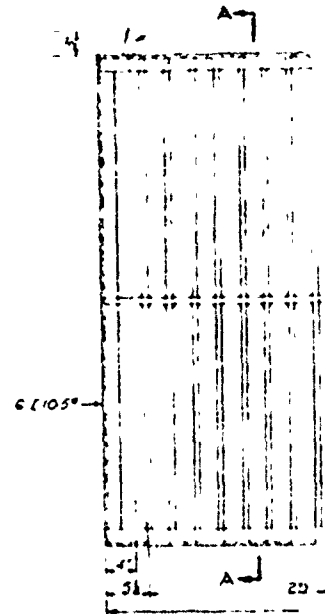


ELEVATION
SCALE: 3/4"=1'-0"

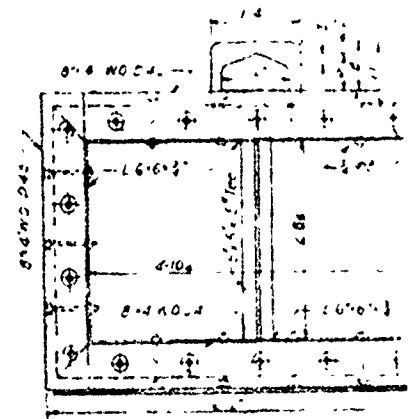


DETAIL OF SOCKET
AT BOTTOM OF EACH POST
SCALE: 3/4"=1'-0"

40 lbs 2 in. 1/2 in. 1/2 in.
All pipe steel, first quality, standard
All pipe & fittings shall be galvanized
after cutting & threading
5 lb fittings & bolts & nuts & c. 1/2 in. 1/2 in.
joints shall be pinned & riveted to the
a low free of air
At all times & shall be kept up
Samples of fittings shall be given for
for approval

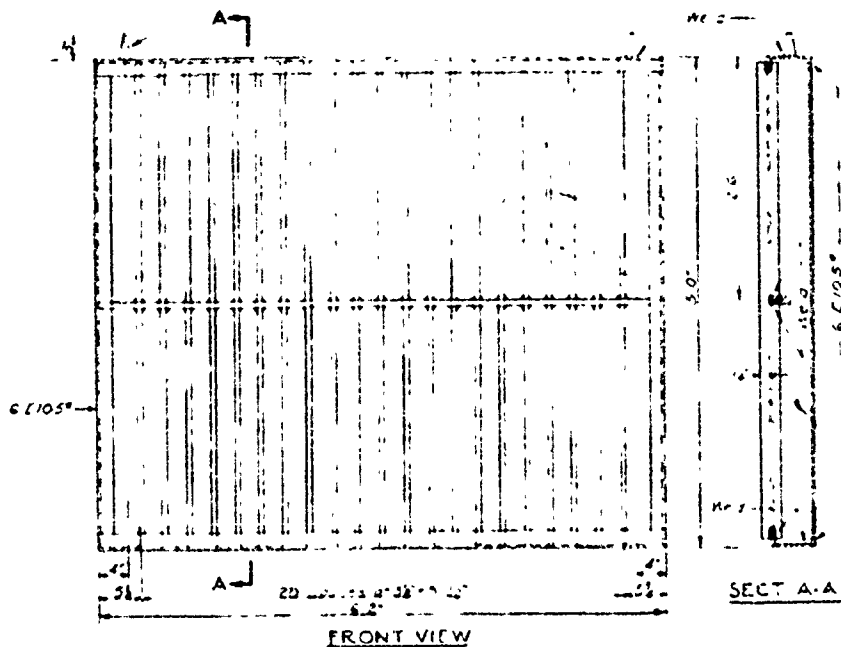


INT.

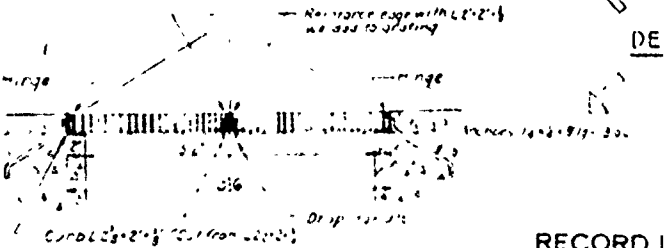
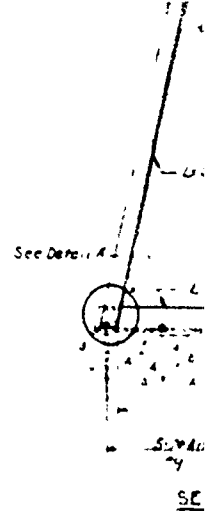
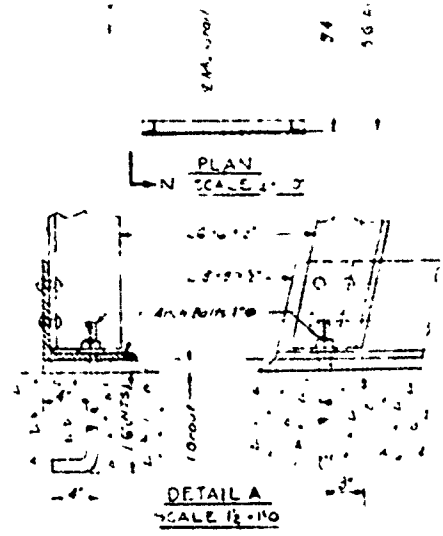
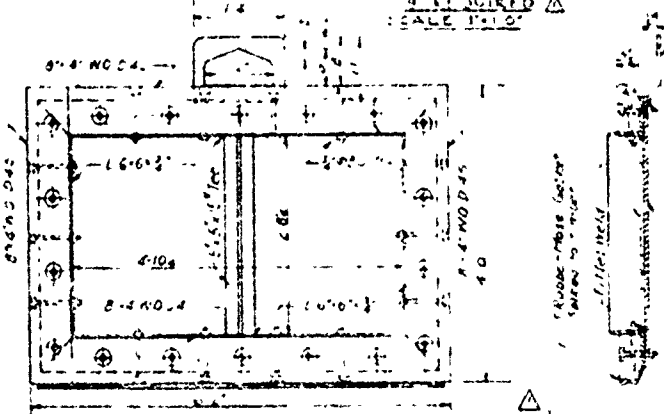


REQUIRED STOP

DETAILS OF RAILING AT TOP OF NON-OVERFLOW SECTIONS



INTAKE SCREEN
SCALE 1" = 1' 0"



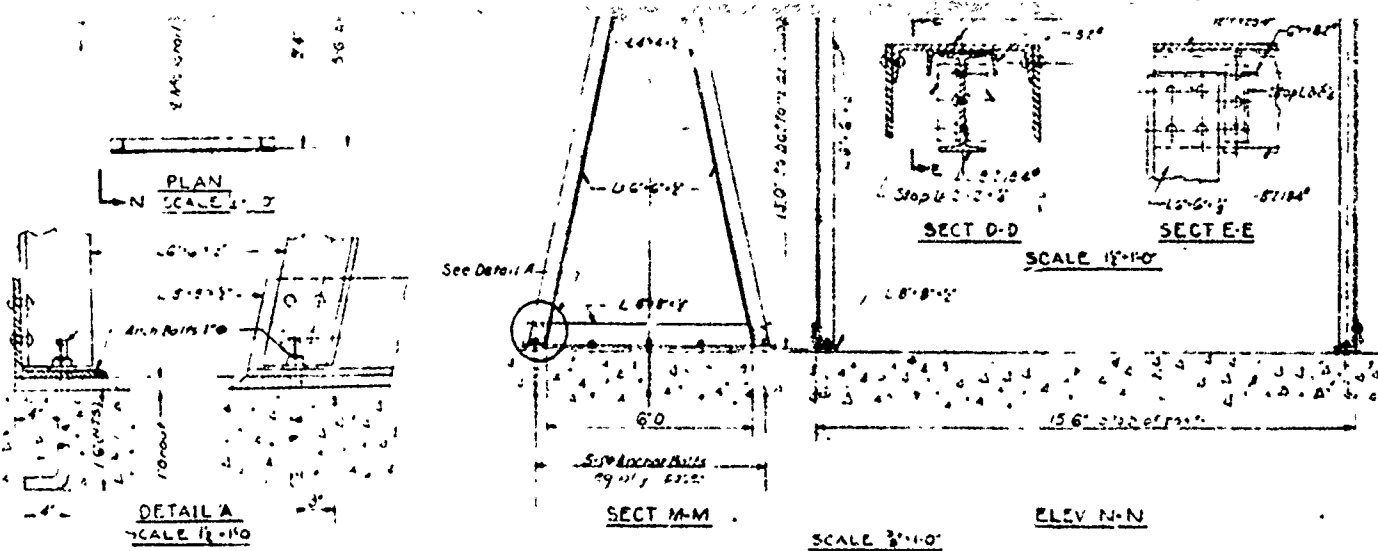
SECT A-A
SCALE 1/2" = 1' 0"

RECORD
OF WORK

jar

CONT'D. A 30 x 10' 1/2" 2646

DATE	REV No	REV No	REV No
4/1/46	1	RECORD WORK AS SHOWN	1
4/1/46	2	RECORD WORK AS SHOWN	2
4/1/46	3	RECORD WORK AS SHOWN	3



DETAILS OF HOIST FRAME AND GRAT OVER INTAKE SCREEN

SCALE AS SHOWN

RECORD DRAWING
OF WORK AS BUILT

J. J. Conroy

DC 111703 5 MAY 45

UNITED STATES MILITARY ACADEMY
WATER SUPPLY DAM & RESERVOIR
MISCELLANEOUS DAM APPURTENANCES

POPOLOPEN WEST POINT, N Y
IN 21 SHEETS SHEET NO 12

U.S. ENGINEER OF ICE NEW YORK DISTRICT NEW YORK N.Y. 1945

Approved: *J. J. Conroy* Principal Engineer
Checked: *Charles A. Conroy* Chief of Engineers
Designed: *W. J. Conroy* Chief of Engineers

DATE	REV NO	REVISIONS	REV BY	APP BY
1945	1	ISSUED WORK AS BUILT	J. J. C.	
1945	2	REVISION OF WORK PERIOD	J. J. C.	
1945	3	REVISION OF WORK PERIOD	J. J. C.	

7512-472

PHOTOGRAPHS

APPENDIX B



2. DOWNSTREAM FACE OF SPILLWAY AND RIGHT
NON-OVERFLOW MONOLITH



3. DOWNSTREAM FACE OF SPILLWAY AND LEFT
NON-OVERFLOW MONOLITH



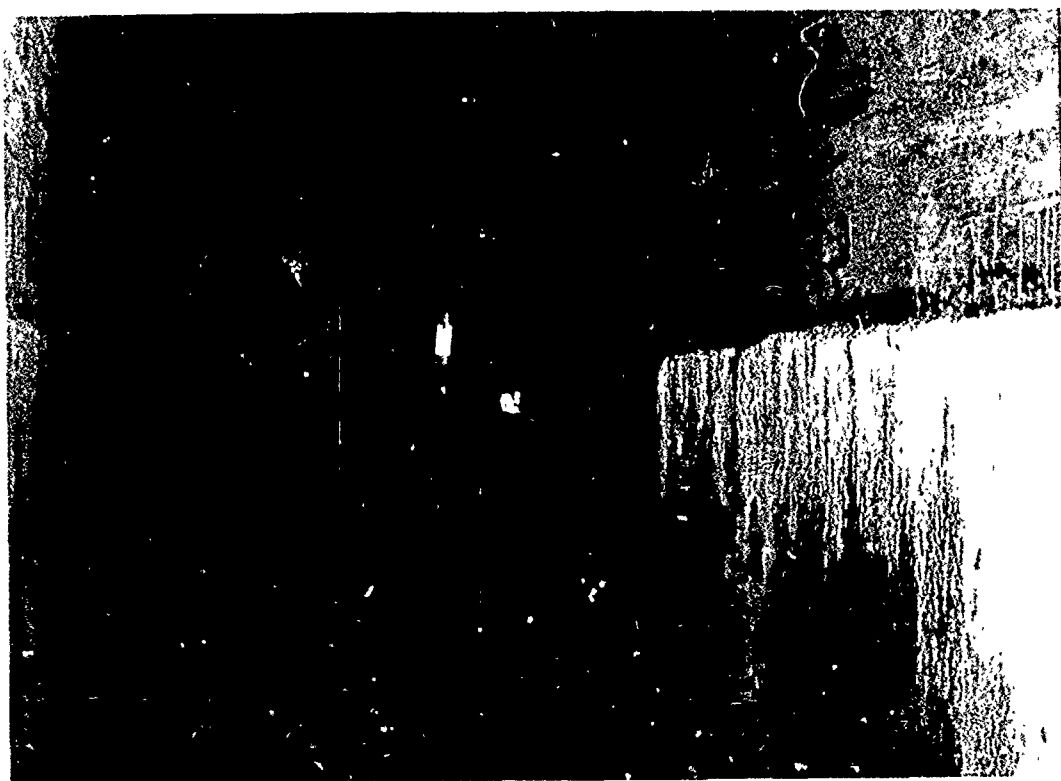
4. UPSTREAM VIEW OF DAM



5. DOWNSTREAM VIEW OF SPILLWAY BUCKET SILL DISCHARGE OF 20 INCH
OUTLET AND TWO 12 INCH BUCKET DRAINS, VIEWED FROM RIGHT BANK



6. INTAKE CHAMBER SHOWING "A" TYPE HOIST FRAME
AND TWO FLOOR STANDS OF SLUICE GATES



7. INTERIOR OF GALLERY, SHOWING 36 INCH VALVE AND
WHITE MINERAL DEPOSITION ALONG D/S SIDE OF WALL



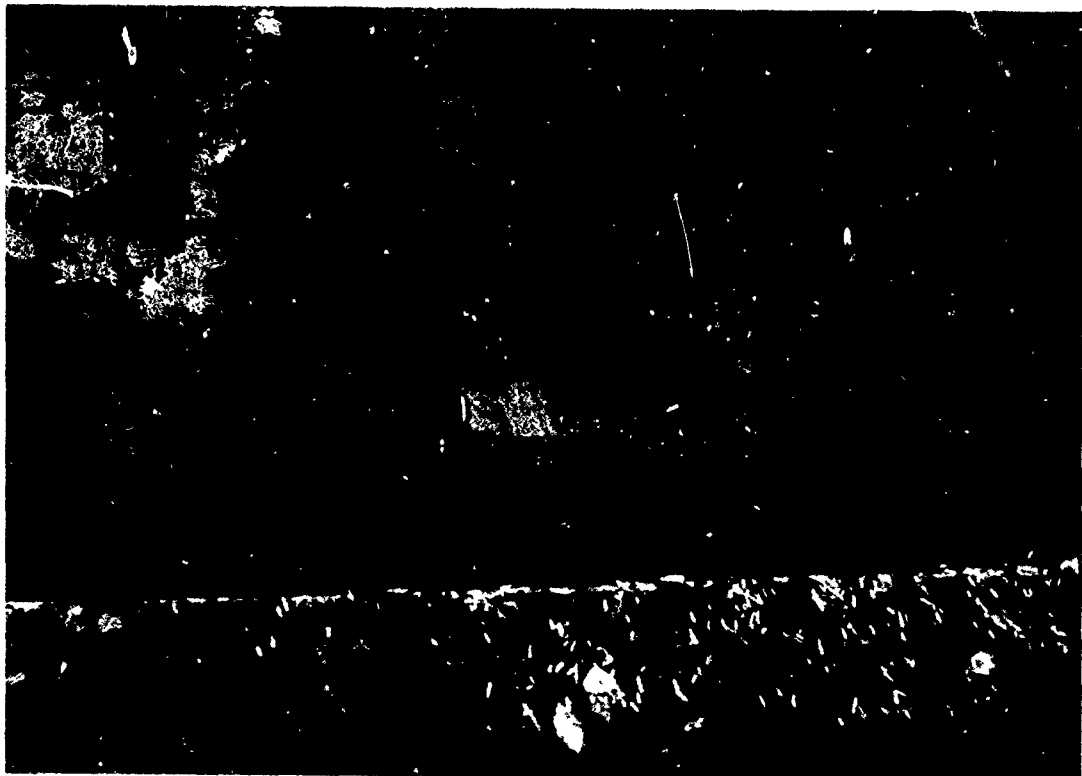
8. DOWNSTREAM CHANNEL WITH RIPRAP AT RIGHT BANK



9. OVERALL VIEW OF DOWNSTREAM CHANNEL



10. DETERIORATING CONCRETE SURFACE
AND SPALLING ALONG JOINTS



11. WIDENED GAP AT HORIZONTAL JOINT AND WET MARK



12. GALLERY ENTRANCE GATE AT RIGHT NON-OVERFLOW
MONOLITH SHOWING WHITE MINERAL DEPOSITION

ENGINEERING DATA CHECKLIST

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM STILWELL LAKE

ID # 770

ITEM	REMARKS
AS-BUILT DRAWINGS	see Appendix for list of drawings available.
REGIONAL VICINITY MAP	U.S.G.S.
CONSTRUCTION HISTORY	Construction procedures and diversion schemes were discussed in design Report.
TYPICAL SECTIONS OF DAM	Concrete gravity section see drawings NOS. 7512-468, 7512-469.1
OUTLETS-PLAN	see Dwg. 7512-465.1
-DETAILS	20 inch dia. C.I. pipe controlled by two sluice gates, 36 inch dia. blow-off controlled by valve in the gallery
-CONSTRAINTS	None. There is a 20 inch dia. intake pipe at Queensboro Furnace for water supply to Lusk Reservoir.
-DISCHARGE RATINGS	available, see Dwg. 7512-464
RAINFALL/RESERVOIR RECORDS	Available at Water Plant.

ITEM	REMARKS
DESIGN REPORTS	<i>Available from Alexander Potter Associates, New York City</i>
GEOLOGY REPORTS	<i>Same as above</i>
DESIGN COMPUTATIONS	} <i>same as above</i>
HYDROLOGY & HYDRAULICS	
DAM STABILITY	
SEEPAGE STUDIES	<i>None available</i>
MATERIALS INVESTIGATIONS	} <i>see Design Reports above</i>
BORING RECORDS	
LABORATORY	
FIELD	
POST-CONSTRUCTION SURVEYS OF DAM	<i>None available</i>
BORROW SOURCES	<i>unknown</i>

ITEM	REMARKS
MONITORING SYSTEMS	Level indicator installed at office of Water plant.
MODIFICATIONS	None except that 36 inch diameter valve in gallery was replaced in 1974.
HIGH POOL RECORDS	Dam has not been overtopped. Reservoir elevations are recorded by level indicator.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	previous inspection was made in April, 1976. upper sluice gate is usually open, reservoir level is normally maintained near spillway crest. Records of gate and valve opening is maintained. No operation and maintenance Manual

ITEM

REMARKS

SPILLWAY PLAN

SECTIONS

concrete ogee weir section

DETAILS

see drawing no. 7512-467

OPERATING EQUIPMENT

Gates and valve are hand operated.

PLANS & DETAILS

none

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1. Basic Data

a. General

Name of Dam Stilwell Lake Dam Hazard Category Significant
County Orange ID# 770
Stream Name Popolopen Creek Tributary of Hudson River
Location Orange County Nearest Town (P.O.) Fort Montgomery
Longitude 79°-01'-57" Latitude 41°-20'-39" Other Directions
About 5 miles S.W. of West Point, 600 ft. S.E. of Rt. 293 and Mine Torne Rd.
Date of Insp Dec. 5, 1978 Weather Sunny - Cloudy Temperature 45°F

b. Inspection Personnel T.C. Chiang - Structural Engineer

M.A. Marine - Geotechnical Engineer

c. Persons Contacted

John O'Connor, Kenneth J. Toman R. Hunjan
of Civil Engineer of U.S.M.A.

Jim McDonald, water plant foreman USMA

d. History: Date Constructed Nov. 1948

Present Owner U.S.M.A.

Designed by Alexander Potter Associates, New York C.

Constructed by U.S. Army Corps of Engineer

Recent History

2. Technical Data

Type of Dam Concrete Gravity Drainage Area 8021 Acres

Height 58 ft Length 220 ft

Upstream Slope 8 (V) to 1 (H) Downstream Slope 10 (1) on 8 (H)

Top Crest Width 9'-8" Bottom Freeboard at Spillway Crest 15.8 ft

Low Level Control: (Type and Size) 36" C.I. Pipe
Valve Condition good condition, replaced in 1974
Emergency Spillway Type (Material) concrete over weir Width 160 feet
Side Slopes (See design)
Height (Crest to Top) 15.8 feet
Exit Slope ^{of Dam} (See design)
Exit Length (See design)
Ponded Surface Area _____ Acres
Capacity (Normal Level) 1924 Acre Feet
Capacity Emergency Spillway Level 1924 Acre Feet

3. Embankment

Not applicable - Concrete Gravity Dam

a. Crest _____

(1) Vertical Alignment _____

(2) Horizontal Alignment _____

(3) Longitudinal Surface Cracks _____

(4) Transverse Surface Cracks _____

(5) General Condition of Surface _____

(6) Miscellaneous _____

b. Upstream Slope Not applicable

(1) Undesirable Growth or Debris

(2) Sloughing, Subsidence, or Depressions

(3) Slope Protection

(a) Condition of Riprap

(b) Durability of Individual Stones

(c) Adequacy of Slope Protection Against Waves and Runoff

(d) Gradation of Slope Protection - Localized Areas of Fine Material

(4) Surface Cracks

c. Downstream Slope

(1) Undesirable Growth or Debris

- (2) Sloughing, Subsidence, or Depressions; Abnormal Bulges or Non-Uniformity

Not applicable

- (3) Surface Cracks on Face of Slope

- (4) Surface Cracks or Evidence of Heaving at Embankment Toe

- (5) Wet or Saturated Areas or Other Evidence of Seepage on Face of Slope; Evidence of "Piping" or "Boils"

- (6) Fill Contact with Outlet Structure

- (7) Condition of Grass Slope Protection

d. Abutments

- (1) Erosion of Contact of Embankment with Abutment from Surface Water Runoff, Upstream or Downstream

- (2) Springs or Indications of Seepage Along Contact of Embankment with the Abutments

- (3) Springs or Indications of Seepage in Areas a Short Distance
Downstream of Embankment - Abutment Tie-in

Not applicable

c. Area Downstream of Embankment, Including Tailrace Channel

- (1) Localized Subsidence, Depressions, Sinkholes, Etc.

- (2) Evidence of "Piping" or "Boils"

- (3) Unusual Presence of Lush Growth, such as Swamp Grass, etc.

- (4) Unusual Muddy Water in Downstream Channel

- (5) Sloughing or Erosion

- (6) Surface Cracks or Evidence of Heaving Beyond Embankment, Too

(7) Stability of Tailrace Channel Sideslopes _____

(8) Condition of Tailrace Channel Riprap _____

(9) Adequacy of Slope Protection Against Waves, Currents and Surface
Runoff _____

(10) Miscellaneous _____

f. Drainage System _____

(1) Condition of Relief Wells, Drains and Appurtenances _____

(2) Unusual Increase or Decrease in Discharge from Relief Wells _____

4. Instrumentation

None

(1) Monumentation/Surveys _____

(2) Observation Wells None

(3) Weirs None

(4) Piezometers None

(Other)

5. Reservoir

water elevation at el. 599 or 3 ft below spillway crest at time of inspection.

a. Slopes Portions of reservoir slopes visible from the dam show no signs of distress, instability or other adverse conditions

Both banks immediate ups of dam are well protected by riprap.

b. Sedimentation Not visible

6. Spillways

ungated spillway with 5 ft Flashboard, 4 monoliths width 160 ft.

a. Principal Spillway: Inlet Condition

Pipe Condition

General Remarks (include information such as recently repaired, potential for debris accumulation, special items of note, etc.)

crest at el. 602. Some minor deterioration of concrete near crest existed. No repair has been made. Spillway is in good condition. Flashboards at first left monolith were in horizontal position, all others were in upright position.

b. Emergency Spillway: General Condition Owner is contemplating to replace flash boards and also to provide access from top of non-overflow monolith (el. 617.8) to spillway crest.

Tree Growth some debris and bushes existed in the downstream of channel.

Erosion No erosion observed

Other Observations 36" & Blow-off is closed. Two 12" & CI. drains for Bucket are working properly. Water @ d/s of Spillway is retained to top of sill.

7. Structural (if required) See Attached Appendix

8. Downstream Channel

Immediate right bank has good riprap protection while the left bank has rock outcrop.

a. Condition (obstructions, debris, etc.) There is no concrete apron beyond the dam. The stream bed is full of rocks and stones. Some debris existed but constitute no obstruction. There are a line of trees along o/s face of right non-overflow monoliths.

b. Slopes appeared to be stable.

c. Approximate No. Homes and Population

Few houses within 2 miles could be affected by a flood.

d. General

Maurice Maurin
TEAM CAPTAIN

STRUCTURAL INSPECTION CHECKLIST

PHASE I DAM INSPECTION

1. Concrete Surfaces Minor deterioration at d/s face near spillway crest.
Some spalling along horizontal joints of spillway. Some white mineral
deposit along horizontal joint above Gallery entrance gate at right non-overfl.
monolith. overall condition is good.
2. Structural Cracking
None observed.
3. Movement - Horizontal and Vertical Alignment none observed.
4. Junctions with Abutments or Embankments good condition
5. Drains - Foundation, Joint, Face foundation drains not visible. Two 12" ϕ
Bucket drains and 20" ϕ C.I. outlet from intake chamber are in good
working condition.
6" ϕ drains in gutter of Gallery are clogged by silt, 1" deep water in gutter.
6. Water Passages, Conduits, Sluices No overflow from spillway. 36" ϕ
blow-off is closed. Two 20" ϕ sluice gates in Intake Chamber. Lower
one is closed, while the upper one is open. water flows out from
20" ϕ C.I. pipe.
7. Seepage or Leakage No seepage or leakage observed.
there are white mineral deposit along d/s face wall of
Gallery.
8. Monolith Joints - Construction Joints In general, good condition.
Some spalling along horizontal joints of spillway.
9. Foundation d/s face of dam covered by dirt and leaves.
Left bank has rock outcrop. Dam foundation found to
be typical granite gneiss.

10. Abutments No defect or damage observed.

11. Control Gates Two 20" ϕ sluice gates at two levels are located at Intake Chamber to permit withdrawal of water through 20" ϕ C.I pipe. Gates are in operating condition.

12. Approach and Outlet Channels well protected by riprap.

13. Stilling Basin Not applicable

14. Intake Structure located at left non-overflow monolith to house two 20" ϕ sluice gates. "A" type steel hoist frame and other maintenance features are in good condition

15. Settlement None.

16. Stability

a. Overturning there is no adverse effect to the stability.

b. Sliding Shear-friction resistance should be investigated

c. Seismic Not significant - Seismic zone No. 2.

17. Instrumentation

a. Alignment None

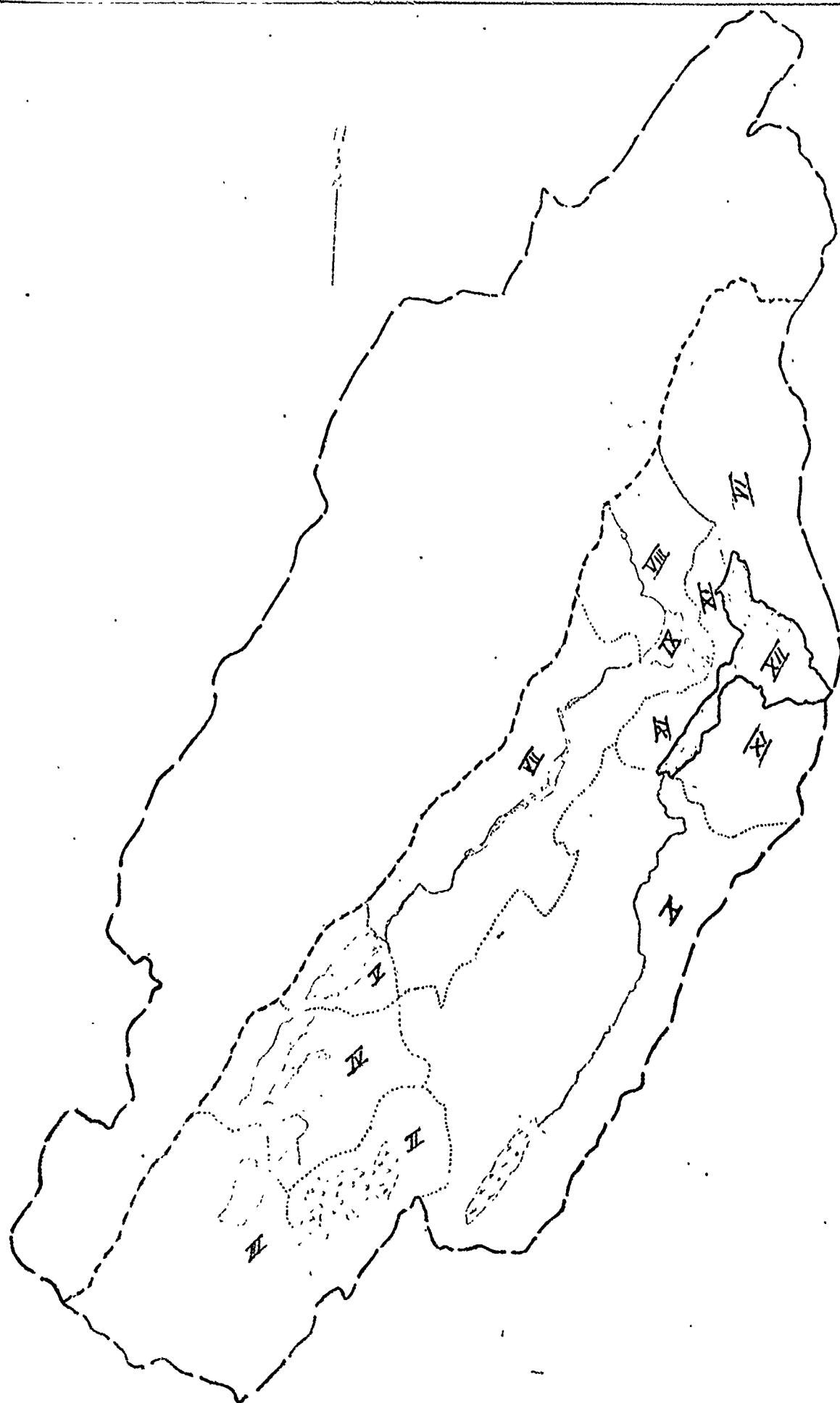
b. Uplift

c. Seismic

18. Miscellaneous

HYDROLOGIC DATA AND COMPUTATIONS

APPENDIX E



TAMS

Job No. 1487-16 Sheet 1 of 1
 Project STILLWELL LAKE Date 11/2/78
 Subject UPSTREAM STORAGE OF PKF IN MINE LAKE By CV
WATER 5.00 Ch'k. by

SUB AREA	TOTAL SURFACE AREA (ACRES)	LAND USE (%)	Loss* (IN)	PMP RO (IN)	PONDING AREA (IN)	3-FT PONDING STORAGE (AC FT)	3-FT PONDING STORAGE (IN · RO)
II	244.1	79.3	0.95	18.57	50.5	151.5	7.45
III	580.7	96.0	1.15	18.37	23.2	69.6	1.44
IV	97.7	67.2	0.81	18.71	32.0	96.0	11.79
IVa	219.5	88.2	1.06	18.46	25.9	77.7	4.25
V	101.0	71.6	0.86	18.66	28.7	86.1	10.23
Σ 1243.0				Σ 160.3		480.9	

TOTAL PONDING AREA 160.3, ASSUMING 3 FEET AVERAGE PONDING DEPTH, AVAILABLE STORAGE IN 1243 ACRES IS 480.9 ACRE-FOOT $\frac{480.9}{1243} \times 12 = 4.64" RO$

SUB AREA	PERCENT: PONDED TO TOTAL RUNOFF	APPRX. TIME SPLGE BEGINS (HRS)	ADOPTED EVEN-TIME BEGINS. HOUR
II	$7.45:18.57 = .4012$	2.47	2:50
III	$1.44:18.37 = .0784$	1.05	1.00
IV	$11.79:18.71 = .6301$	3.12	3.25
IVa	$4.25:18.46 = .2302$	2.02	2:00
V	$10.23:18.66 = .5482$	2.85	2.75

6-HR PMP = 24.4" . EFFECTIVE PMP : $0.8(24.4) = 19.52"$

≠ EQUIVALENT FLOW TO BE SUBTRACTED FROM BEGINNING OF EACH HYDROGRAPH

* LOSS = $0.2 \times 6 \text{ hr} \times \%$

TAMS

Job No. 1487-18

Sheet 2 of

Project STILWELL AKE

Date 11/21/78

Subject PMF FROM "PONBING" AREAS ABOVE
MINE LAKE BEFORE LAG

By CU

Ch'k. by

	Δ%	II	III	IV	IVa	V
1.						
1.25	.029	530.2	1247.7	213.8	473.9	220.4
1.50	.029	530.2	1247.7	213.8	473.9	220.4
1.75	.041	749.6	1764.0	302.3	670.1	311.7
2.	.060	1097.0	2581.5	442.4	980.6	456.1
2.25	.077	1407.8	3313.0	567.7	1252.4	585.3
2.50	.107	1956.3	4603.7	788.9	1758.3	813.4
2.75	.101	1846.6	4345.6	744.6	1650.6	767.8
3.	.085	1554.0	3657.2	626.7	1389.1	646.1
3.25	.070	1279.8	3011.8	516.1	1144.0	532.1
3.5	.058	1060.4	2495.5	427.6	947.9	440.9
3.75	.045	822.7	1936.1	331.8	735.4	342.1
4	.037	676.5	1591.9	272.8	604.7	281.2
4.25	.033	603.3	1419.8	243.3	539.3	250.8
4.50	.027	493.6	1161.7	196.4	441.3	205.2
4.75	.024	438.8	1032.6	176.9	392.2	182.4
5	.022	402.2	946.6	162.2	359.5	167.2
5.25	.022	402.2	946.6	162.2	359.5	167.2
5.50	.022	402.2	946.6	162.2	359.5	167.2
5.75	.022	402.2	946.6	162.2	359.5	167.2
6.	.018	329.1	774.5	132.7	294.2	136.8

$$II \quad \frac{18.57 \times 244.1 \times 43560}{12 \times 15 \times 60} = 18.57 \times 244.1 \times 4.033 = 18282.8$$

$$III \quad 18.37 \times 580.7 \times 4.033 = 43025.4$$

$$IV \quad 18.71 \times 97.7 \times 4.033 = 7372.8$$

$$IVa \quad 18.46 \times 219.5 \times 4.033 = 16342.9$$

$$V \quad 18.66 \times 101.0 \times 4.033 = 7601.5$$

TAMS

Job No. 1487-18

Sheet 3 of

Project STILWELL LAKE SAFETY INSPECTION

Date Nov 30. 78

Subject PMF from Ponding Areas after LAG

By DLC

Ch'k. by

	II	III	IV	IVa	V	Σ
1						
1.25						
1.50						
1.75						
2.		1247.7				1247.7
2.25		1247.7				1247.7
2.50		1764.0				1764.0
2.75		2581.5		1258.4		3839.5
3.00		3133.0		1758.3		4891.3
3.25	1846.6	4603.7		1650.6		8100.9
3.50	1554.0	4345.6		1389.1	646.1	7934.8
3.75	1279.8	3657.2		1144.0	522.1	6603.1
4.	1060.4	3011.8	427.6	947.9	440.9	5888.6
4.25	822.7	2495.5	331.8	735.4	342.1	4727.5
4.50	676.5	1936.1	272.8	604.7	281.2	3771.3
4.75	603.3	1591.9	243.3	539.3	250.8	3228.6
5.	493.6	1417.8	196.4	441.3	205.2	2756.3
5.25	438.8	1161.7	176.9	392.2	182.4	2352.0
5.50	402.2	1032.6	162.2	359.5	167.2	2123.7
5.75	402.2	946.6	162.2	359.5	167.2	2037.7
6.	402.2	946.6	162.2	359.5	167.2	2037.7
6.25	402.2					
6.50	329.1					
6.75						
					Σ	64552.4

$$\frac{64522.4 \times 15 \times 60 \times 12}{1171. \times 43560} = 13.67$$

Losses

1.20

Available Storage 19.52 - 14.87 = 4.65" R.O.
used

IAMS

Job No. 1487-18

Sheet 4 of

Project STILWELL LAKE INSPECTION

Date DEC 1 1978

Subject Upstream Storage of 1/2 PMP in Mine

By DLC

Lake Watershed (1/2 PMP)

Ch'k. by

	Total Surface Area (acres)	LAND AREA (%)	50% PMP	% Padded to Excess RD.	Outflow Start time
<u>II</u>	244.1	79.3	9.285	$7.45/9.285 = 0.802$	3.56/4.00
<u>III</u>	580.7	96.0	9.185	$1.44/9.185 = 0.157$	1.70/1.75
<u>IV</u>	97.7	67.2	9.355	$11.79/9.355 = 1.26$	NO OUTFLOW
<u>IVa</u>	219.5	88.2	9.23	$4.25/9.23 = 0.460$	1.62/1.50
<u>V</u>	101.0	71.6	9.33	$10.23/9.33 = 1.09$	no outflow.

Σ 1243.0

Time	Δ %	<u>II</u>	<u>III</u>	<u>IV</u>	<u>IVa</u>	<u>V</u>
1.50	.029			0	237.	0
1.75	.041		882.	0	335.	
2.0	.060		1290.7		490.3	
2.25	.077		1656.3		629.2	
2.5	.107		2301.7		874.3	
2.75	.101		2172.6		825.3	
3.	.085		1828.4		694.5	
3.25	.07		1505.8		572.0	
3.5	.058		1247.6		473.9	
3.75	.045		968.0		367.7	
4.	.037	338.2	795.9		302.3	
4.25	.033	301.7	709.9		269.6	
4.5	.027	246.8	580.8		220.6	
4.75	.024	219.4	516.3		196.1	
5.	.022	201.1	473.2		179.8	
5.25	.022	201.1	473.2		179.8	
5.5	.022	201.1	473.2		179.8	
5.75	.022	201.1	473.2		179.8	
6.0	.018	164.5	387.2	0	147.1	0

II $9.285 \times 244.1 \times 4.033 = 9.285 \times 244.1 \times 4.033 = 9141$
 $12 \times 15 \times 60$

III $9.185 \times 580.7 \times 4.033 = 21,511$

IV $9.355 \times 97.7 \times 4.033 = 3,711$

TAMS

Job No. 1487-18

Sheet 5 of

Project Safety Inspection STILLWELL LAKE.

Date DEC 1 197

Subject 50% PMF from PONDING AREAS AFTER
LAG Mine LAKE

By D L C

Ch'k. by

	<u>II</u>	<u>III</u>	<u>IV.</u>	<u>Σ</u>
2.			237.	237
2.25			335.	335
2.5		882.	490.3	1372.3
2.75		1290.7	629.2	1919.9
3.		1656.3	874.3	2530.6
3.25		2301.7	825.3	3127.0
3.5		2172.6	694.5	2867.1
3.75		1828.4	572.0	2400.4
4.		1505.8	473.9	1979.7
4.25		1247.6	367.7	1615.3
4.5	338.2	968.0	302.3	1608.5
4.75	301.7	795.9	269.6	1367.2
5.	246.8	709.9	220.6	1177.3
5.25	219.4	580.8	196.1	996.3
5.5	201.1	516.3	179.8	897.2
5.75	201.1	473.2	179.8	854.1
6.0	201.1	473.2	179.8	854.1

Σ 26139.0

$$\frac{26139.0 \times 15 \times 60 \times 12}{1171 \times 43560} = 5.53$$

Losses 0.6

UTILIZED STORAGE.

9.76 - 6.13

3.63" R.O.

TAMS

Job No. 1487-18

Sheet 6 of

Project STILWELL LAKE

Date DEC 1 1970

Subject Inflow Computations for Mine LAKE

By DLE

Ch'k. by

For instantaneous conversion of rainfall to runoff
Adjacent Lake Area (VIII) 206.5 acres — 89 %
Mine lake Area 24.5 — 11 %

Σ 231.0 acres

$$\text{Weighted PMP} = (89 \times 18.32) + (11 \times 19.52) / 100 \\ = 18.45 \text{ inches.}$$

U/H. for Brooks Hollow.

$L = 1.74$ $L_{ca} = 0.98$ Area = 1.48 square miles

Assume $C_T = 2$ and 640 $C_p = 400$.

$$(LL_{ca})^{0.3} = 1.17$$

$$t_p = C_T (LL_{ca})^{0.3} = (2.0)(1.17)$$

$$= 2.34 \text{ hrs.}$$

$$t_n = t_p / 5.5 = 0.425 \approx 25.5 \text{ mins. Use } t_R = 15 \text{ mins} = 0.25 \text{ hrs}$$

$$T_{pR} = 2.34 + 0.25(.25 - .425)$$

$$= 2.20 \text{ hrs use } 2.25 \text{ hrs}$$

$$q_p = 400 / 2.25 = 177.8 \text{ cfs}$$

$$Q_p = 177.8 \times 1.48 = 264 \text{ cfs.}$$

TAMS

Job No. 1487-1E

Project Safety Inspection STILLWELL LAKE

Subject UPH for Brooks Hollow (inflow to
Pines Lake)

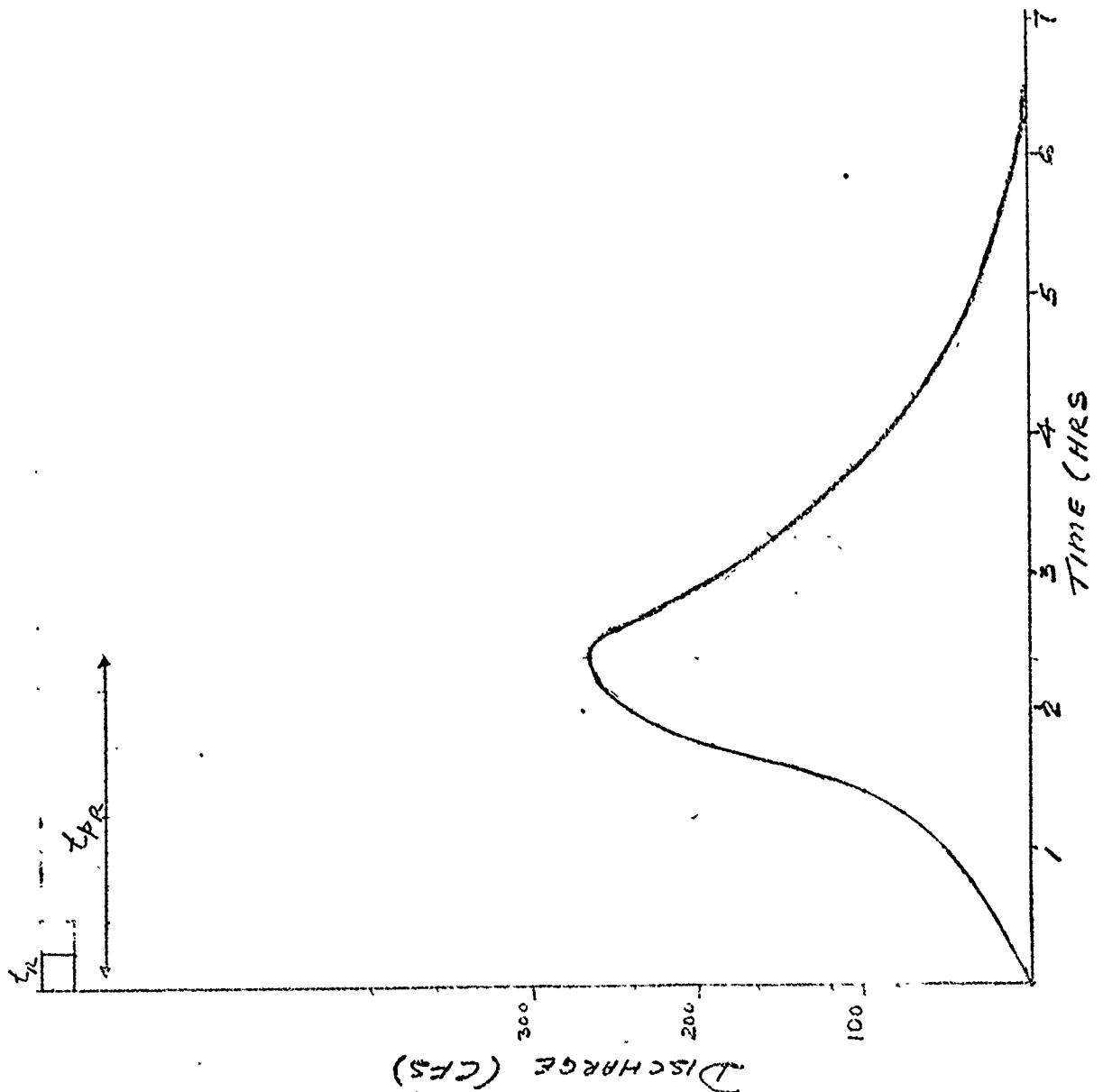
Sheet 1 of

Date Dec 17

By DLC

Ch'k. by

CUH ORDINATES	
Time (HRS)	Q (CFS)
0	0
.5	21
1	52
1.5	120
2	240
2.5	462
3	195
3.5	130
4	84
4.5	52
5	32
5.5	18
6	6
6.5	0



TAMS

Job No. 1487-18 Sheet 8 of
 Project INSPECTION STILLWELL LAKE Date DEC 8, 78
 Subject Mine In OUTFLOW & STORAGE (SURCHARGE) By DLC
COMPUTATIONS Ch'k. by

Spillway Crest EL.			143.0' ±				
* TOP OF DAM EL.			92.3' ±				
CREST WIDTH			5.5'				
Dam Length			390.0'				
Field EL (FT)	HEAD (FT)	C (H _b)	Q = C H ^{3/2} (CFS)			EL (MSL)	Area (acres)
			Q _b	Q _s	Σ Q		
92.3	0					648.63	46.4
93.	0.7	2.68		224	224	649.33	49.6
94.	1.7	2.65		840	840	650.33	54.2
* 94.7	2.4	2.67		1420	1420	651.03	57.4
95.0	2.7 (13)	2.67	125	1694	1819	651.33	58.8
96.0	3.7 (13)	2.69	1131	2738	3869	652.33	63.4
98.0	5.7 (33)	2.88	4574	5605	10179	654.33	72.6
100.0	7.7 (33)	3.07	9310	9380	18690	656.33	81.9

FL	AREA	MEAN AREA	Δ VOLUME	SURCHARGE STORAGE (AC FT)
USGS.	Field			
648.63	92.3	46.4		0
		48.0	33.6	
649.33	93.0	49.6		33.6
		51.9	51.9	
650.33	94.0	54.2		85.5
		55.8	39.1	
651.03	94.7	57.4		124.6
		58.1	17.4	
651.33	95.0	58.8		142.
		61.1	61.1	
652.33	96.0	63.4		203.1
		68.0	136.0	
654.33	98.0	72.6		339.1
		77.25	154.5	
656.33	100.0	81.9		493.6
		90.45	332.95	
660.	103.67	99.		825.6

TAMS

Job No. 1487-18

Sheet 82 of

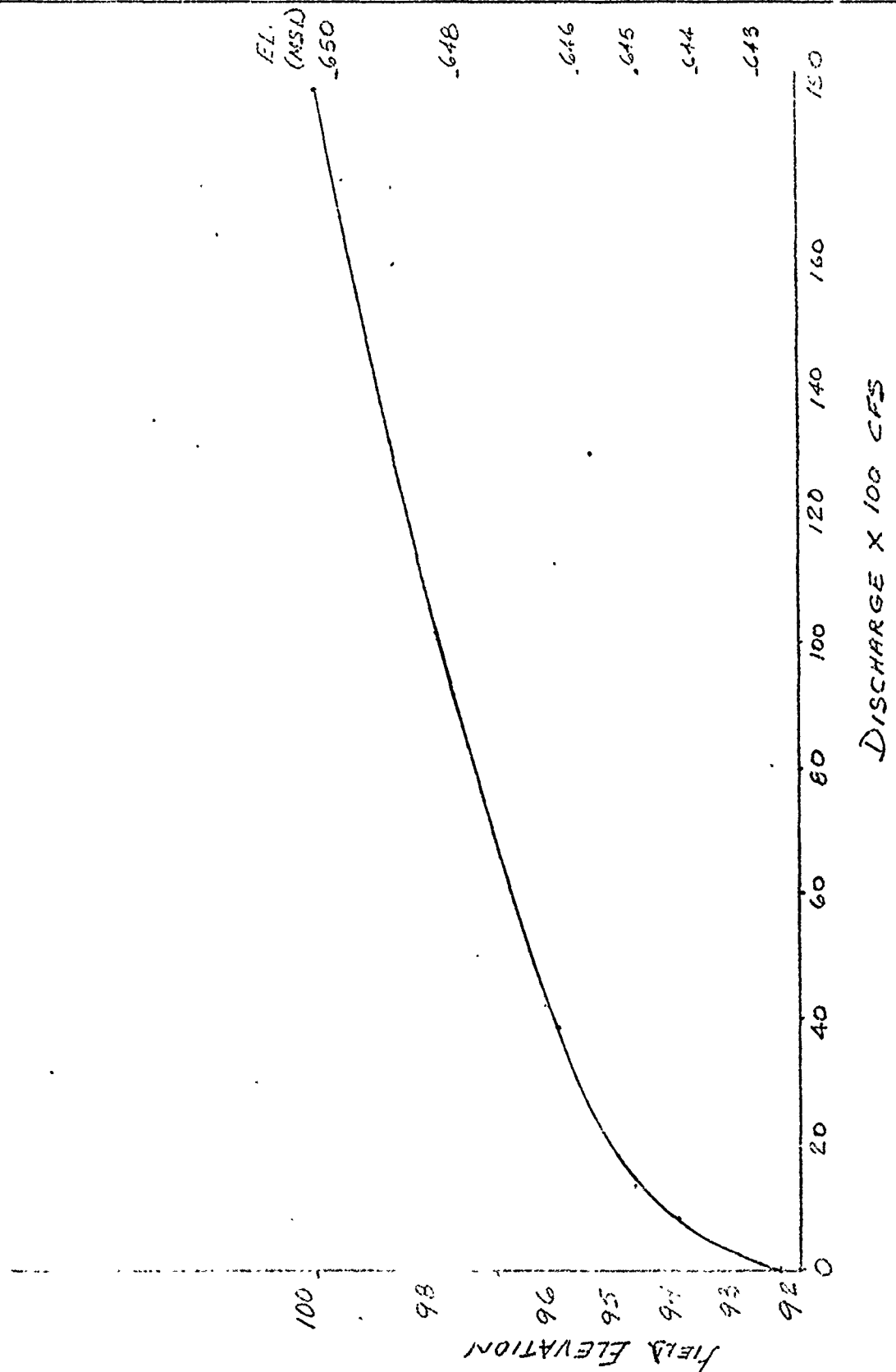
Project INSPECTION STILLWELL LAKE

Date DEC 8 78

Subject MINES LAKE Spillway rating curve

By D.L.C

Ch'k. by



IAMS

Job No. 1487-18

Sheet 9 of

Project INSPECTION STILWELL LAKE

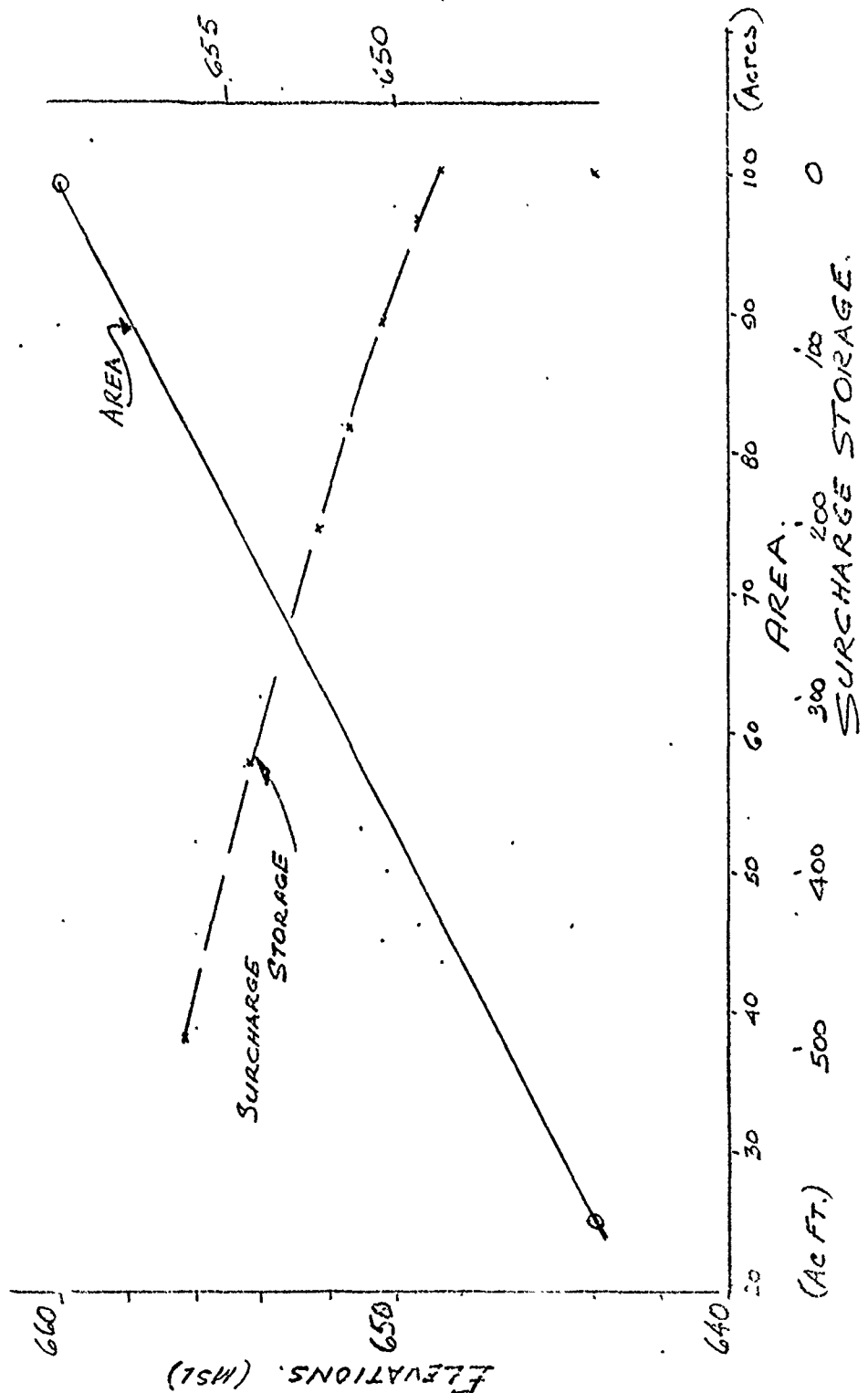
Date DEC 8, 1978

Subject AREA/SURCHARGE STORAGE CURVES for
MINE LAKE.

By D.L.C.

Ch'k. by

Area planimeted from USGS Popolopen
Lake Quadrangle.



PMT		Popotepan Lake		Ponding Areas		MINE LAKE	
TIME	TOTAL RUN-OFF	PMF	OUTFLOW	OUTFLOW	OUTFLOW	INFLOW	INFLOW
(HOURS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)
0.000	0.0					0.0	
0.250	276.5	0.31				276.8	
0.500	311.8	1.09				312.9	
0.750	340.0	2.18				342.2	
0.999	363.2	3.69				366.9	
1.249	565.6	5.93				571.5	
1.499	608.2	9.07				617.3	
1.749	872.9	13.37				886.3	
1.999	1312.8	19.40	1241.1			2579.9	
2.249	1750.2	30.07	1247.7			3028.0	
2.499	2345.3	1303.44	1764			5412.7	
2.749	2421.7	4084.09	3839.5			10345.3	
2.999	2396.9	6647.93	4891.3			13936.1	
3.249	2340.9	9040.19	8100.9			19482.0	
3.499	2406.0	11323.19	7954.8			21664.0	
3.749	2482.8	12899.45	6603.1			21985.4	
3.999	2661.9	13543.07	5888.6			22092.6	
4.249	2859.5	13679.64	4727.5			21266.6	
4.499	3026.9	13542.22	3771.3			20340.4	
4.749	3120.8	13263.79	3228.6			19613.2	
4.999	3118.4	12892.99	2756.3			18767.7	
5.249	3049.9	12451.29	2352.0			17853.2	
5.499	2929.6	11980.67	2123.7			17034.0	
5.749	2736.4	11510.11	2037.7			16284.2	
5.999	2556.8	11044.64	2037.7			15639.1	
6.249	2025.4	10490.57				12516.0	
6.499	1841.7	9761.08				11602.8	
6.749	1665.7	8882.48				10548.2	
6.999	1502.4	7875.73				9378.1	
7.249	1344.0	6914.96				8259.0	
7.499	1189.9	6048.80				7238.7	
7.749	1029.5	5233.22				6262.7	
7.999	860.9	4462.18				5323.1	
8.249	701.7	3753.51				4455.2	
8.499	552.2	3121.87				3674.1	
8.749	428.6	2572.38				3001.0	
8.999	330.5	2102.37				2432.9	
9.249	251.4	1704.73				1956.1	
9.499	189.4	1370.29				1559.7	
9.749	140.6	1138.88				1279.5	
9.999	103.8	998.47				1102.3	
10.249	75.0	858.13				932.1	
10.499	53.6	723.41				777.0	
10.749	36.8	598.15				635.0	
10.999	24.2	485.03				509.2	
11.249	14.6					14.6	
11.499	7.8					7.8	
11.749	3.2					3.2	

SAFETY INSPECTION STILLWELL LAKE
 RESEVOIR ROUTING MINES LAKE
 TAMS JOB NO. 1478-18 DEC 1978

PMF

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL (HOURS)	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
48.63	0.25	0.00	11.75	1	NO	NO	1.000	1.000	1.000	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
48.63	0.0000	0.00
49.33	33.6000	224.00
50.33	85.5000	840.00
51.03	124.6000	1420.00
51.33	142.0000	1694.00
52.33	203.1000	2738.00
54.33	339.1000	5605.00
56.33	493.6000	9380.00

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00	17.80	0.0000	48.63
0.25	276.80	53.45	2.6712	48.68
0.50	312.90	88.72	8.0185	48.79
0.75	342.20	122.93	13.3088	48.90
1.00	366.90	167.48	18.4396	49.01
1.25	571.50	222.42	25.1230	49.15
1.50	617.30	336.53	33.3630	49.32
1.75	886.30	640.24	43.0817	49.51
2.00	2579.89	1172.75	68.6697	50.00
2.25	3028.00	2032.52	107.9319	50.73
2.50	5412.70	3981.82	161.8119	51.65
2.75	10345.30	7040.37	262.1024	53.19
3.00	13956.10	14714.03	397.8460	55.09
3.25	19482.00	17530.84	554.6024	57.11
3.50	21664.00	19316.69	711.9071	59.15
3.75	21985.40	20252.73	827.1909	60.64
4.00	22092.60	20470.91	900.2807	61.59
4.25	21266.60	20275.17	938.5900	62.09
4.50	20340.40	19245.47	947.5195	62.20
4.75	19313.20	18256.60	939.5085	62.10
5.00	18767.70	17786.93	921.9221	61.87
5.25	17853.20	17063.86	867.9526	61.55
5.50	17034.00	1580.87	808.0788	61.17
5.75	16284.20	14367.03	837.6718	60.78
6.00	15639.10	13663.13	864.3402	60.40
6.25	12516.00	11835.10	894.0806	59.77
6.50	11602.80	10640.13	945.1737	58.97
6.75	10548.20	9494.78	998.2977	58.28
7.00	9378.10	8407.74	1044.084	57.63
7.25	8259.00	7371.90	1114.4144	56.99
7.50	7238.70	6288.38	1171.1619	56.39
7.75	6262.70	5185.00	1214.4144	55.81
8.00	5323.10	4017.51	1253.7955	55.26
8.25	4455.20	2803.58	1286.2111	54.74
8.50	3674.10	1689.72	1314.9744	54.24
8.75	3001.00	871.22	1337.9744	53.71
9.00	2432.90	532.62	1351.5641	53.22
9.25	1956.10	202.28	1361.5641	52.77
9.50	1569.70	127.73	1368.2111	52.37
9.75	1279.50	77.00	1371.9744	51.98
10.00	1102.30	635.00	1374.9744	51.65
10.25	933.10	509.20	1377.9744	51.36
10.50	777.00	379.11	1380.6247	51.09
10.75	635.00	280.35	1382.74	50.85
11.00	509.20	202.28	1384.84	50.63
11.25	14.60	87.6049	1386.92	50.36
11.50	7.80	679.11	1388.92	50.06
11.75	3.20	532.62	1390.92	49.83
MAX. VALUES				
MIN. VALUES				
22092.60 20470.91 62.20				
0.00 0.00 48.63				

SPF

TOTAL RUN-OFF		SPF	
TIME (HOURS)	COMPUTED (CFS)	Popolopen Lake	
		OUTFLOW (CFS)	
0.000	0.0	0.0	0.0
0.250	138.2	0.15	138.4
0.500	155.9	0.54	156.4
0.750	170.0	1.09	171.1
0.999	181.6	1.64	183.4
1.249	282.3	2.96	285.8
1.499	304.1	4.53	308.6
1.749	436.4	6.68	443.1
1.999	656.4	9.70	666.1
2.249	875.1	13.79	888.9
2.499	1172.6	19.22	1191.8
2.749	1210.8	28.23	1239.0
2.999	1198.4	796.51	1994.9
3.249	1170.4	2311.30	3481.7
3.499	1203.0	3642.76	4845.8
3.749	1241.4	4571.38	5812.8
3.999	1330.9	5214.70	6545.6
4.249	1429.7	5738.38	7168.1
4.499	1513.4	6075.69	7589.1
4.749	1560.4	6197.01	7757.4
4.999	1559.2	6196.33	7755.5
5.249	1524.9	6110.94	7635.8
5.499	1464.8	5958.77	7423.6
5.749	1368.2	5773.10	7141.3
5.999	1278.4	5558.26	6836.7
6.249	1012.7	5234.45	6247.2
6.499	920.8	4774.10	5694.9
6.749	832.8	4267.79	5100.6
6.999	751.2	3794.07	4545.3
7.249	672.0	3371.64	4043.6
7.499	594.9	2973.16	3568.6
7.749	514.7	2586.03	3100.7
7.999	430.4	2212.83	2643.2
8.249	350.3	1865.86	2216.7
8.499	276.1	1554.43	1830.5
8.749	214.3	1282.29	1496.6
8.999	165.2	1115.41	1280.6
9.249	125.7	991.86	1117.6
9.499	94.7	868.99	963.7
9.749	70.3	751.05	821.4
9.999	51.9	640.58	692.5
10.249	37.5	539.07	576.6
10.499	26.8	447.33	474.1
10.749	18.4	365.72	384.1
10.999	12.1	294.38	306.5
11.249	7.3		7.3
11.499	3.9		3.9
11.749	1.6		1.6

SAFETY INSPECTION STILLWELL LAKE
 RESERVOIR ROUTING MINES LAKE
 TAMS JOB NO. 1478-18 DEC 1978

SPF

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL (HOURS)	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
48.63	0.25	0.00	11.75	1	NO	NO	1.000	1.000	1.000	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
48.63	0.0000	0.00
49.33	33.6000	224.00
50.33	85.5000	840.00
51.03	124.6000	1420.00
51.33	142.0000	1692.00
52.33	203.1000	2738.00
54.33	339.1000	5605.00
56.33	493.6000	9382.00

TIME (HRS.)	INFLOW (CCS)	OUTFLOW (CCS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00	8.90	0.0000	48.63
0.25	138.40	26.72	1.3356	48.45
0.50	156.40	44.35	4.0087	48.71
0.75	171.10	61.45	6.6535	48.76
1.00	183.40	83.73	9.2185	48.82
1.25	285.80	111.20	12.5604	48.89
1.50	308.60	145.25	16.6805	48.97
1.75	443.10	197.92	21.7885	49.08
2.00	666.10	307.39	29.6894	49.24
2.25	888.90	466.78	40.6264	49.46
2.50	1191.80	625.58	54.0557	49.72
2.75	1239.00	845.30	67.7719	49.98
3.00	1994.90	1344.95	85.8377	50.33
3.25	3481.70	2157.45	119.5410	50.93
3.50	4245.80	3179.18	169.1239	51.77
3.75	5812.80	4238.10	224.0281	52.65
4.00	6545.60	5162.45	274.2596	53.37
4.25	7168.10	5993.02	318.1071	54.02
4.50	7589.10	6658.62	354.9808	54.53
4.75	7757.40	7093.51	382.2219	54.88
5.00	7755.50	7332.04	400.0207	55.11
5.25	7635.80	7410.34	409.7830	55.24
5.50	7423.60	7359.67	412.9875	55.28
5.75	7141.30	7232.64	410.9140	55.25
6.00	6936.70	6978.83	395.3273	55.05
6.25	6247.20	6579.61	378.9882	54.84
6.50	5694.90	6111.43	359.8268	54.59
6.75	5100.60	5601.34	338.9268	54.32
7.00	4545.30	5140.04	317.0444	54.00
7.25	4043.60	4669.20	294.7091	53.67
7.50	3588.60	4198.13	272.3637	53.34
7.75	3100.70	3730.03	250.1582	53.02
8.00	2643.20	3271.13	228.3900	52.70
8.25	2216.70	2830.79	207.5016	52.39
8.50	1830.50	2470.57	187.4490	52.07
8.75	1456.60	2148.79	168.6167	51.76
9.00	1280.60	1866.35	152.0869	51.49
9.25	1117.60	1626.20	137.6945	51.25
9.50	963.70	1422.46	124.7566	51.03
9.75	821.40	1246.69	112.9168	50.82
10.00	692.50	1085.12	102.0245	50.62
10.25	576.60	937.37	92.0641	50.44
10.50	474.10	810.25	82.9938	50.28
10.75	384.10	709.14	74.4748	50.11
11.00	306.50	588.75	64.3316	49.92
11.25	4.57	461.64	53.6220	49.71
11.50	3.90	361.64	45.2141	49.55
11.75	1.60			
MAX. VALUES				
	7757.40	7410.34		55.28
MIN. VALUES				
	0.00	0.00		48.63

TAMS

Job No. 1467-1 Sheet 16 of
 Project INSPECTION STILLWELL LAKE Date DEC 4 - 1970
 Subject U/H for Insp Station (8) & sub-b. By D.L.C.
VI -- INFLOW INTO STILLWELL LAKE. Ch'k. by

AREA 1.79 sq miles 1146.2 acres

L = 2.42 miles $L_{CA} = 1.10$ miles

Assume $C_T = 2.0$ $E = 640$ $C_p = 400$

$$t_p = C_T (L L_{CA})^{0.3} = 2.68 \text{ hrs}$$

$$t_n = t_p / 5.5 = 0.49 \text{ hrs Use } 0.50.$$

$$q_p = 640 C_p / t_p = \frac{400}{2.68} = 149.25$$

$$Q_p = 149.25 \times 1.79 = 267.2 \text{ CFS.}$$

Sub-basin VI

AREA = 0.728 sq mi / 465.9 acres

L 1.33 miles $L_{CA} = 0.44$ miles

Assume $C_T = 2.0$ $640 C_p = 400$

$$t_p = 0.85 \quad t_r = t_p / 5.5 = 0.15 \text{ Use } t_r = 0.25$$

$$t_{PR} = 0.85 + 0.25(0.25 - 0.15) = 0.85 + 0.025$$

$$= 0.875 \text{ hrs / 52.5 min}$$

$$q_{PR} = 640 C_p / t_{PR} = \frac{400}{0.875} = 457. \text{ cfs / sq mi.}$$

$$Q_p = 332.7 \text{ CFS.}$$

TAMS

Job No. 1487-1B

Sheet 17 of

Project INSPECTION STILLWELL LAKE

Date NOV. 1 1975

Subject INFLOW - LAKE : ADJACENT LAND AREA.

By D. L. G.

FILE #

Ch'k. by

LAKE AREA.

131 acres / 0.205 sq mi 30.1

Adjacent Land area (Σ)

298.7 acres / 0.46 sq mi 69.2

Σ

429.7 acres / 0.665 sq mi

6 HR PMP 19.52"

Assuming 0.2"/hour loss on adj land area

Excess - 18.32"

Weighted excess rainfall =

$$(.692 \times 18.32) + (.308 \times 19.52)$$

$$= 18.69"$$

TAMS

Job No. 1437-18

Project INSPECTION STILLWELL LAKE

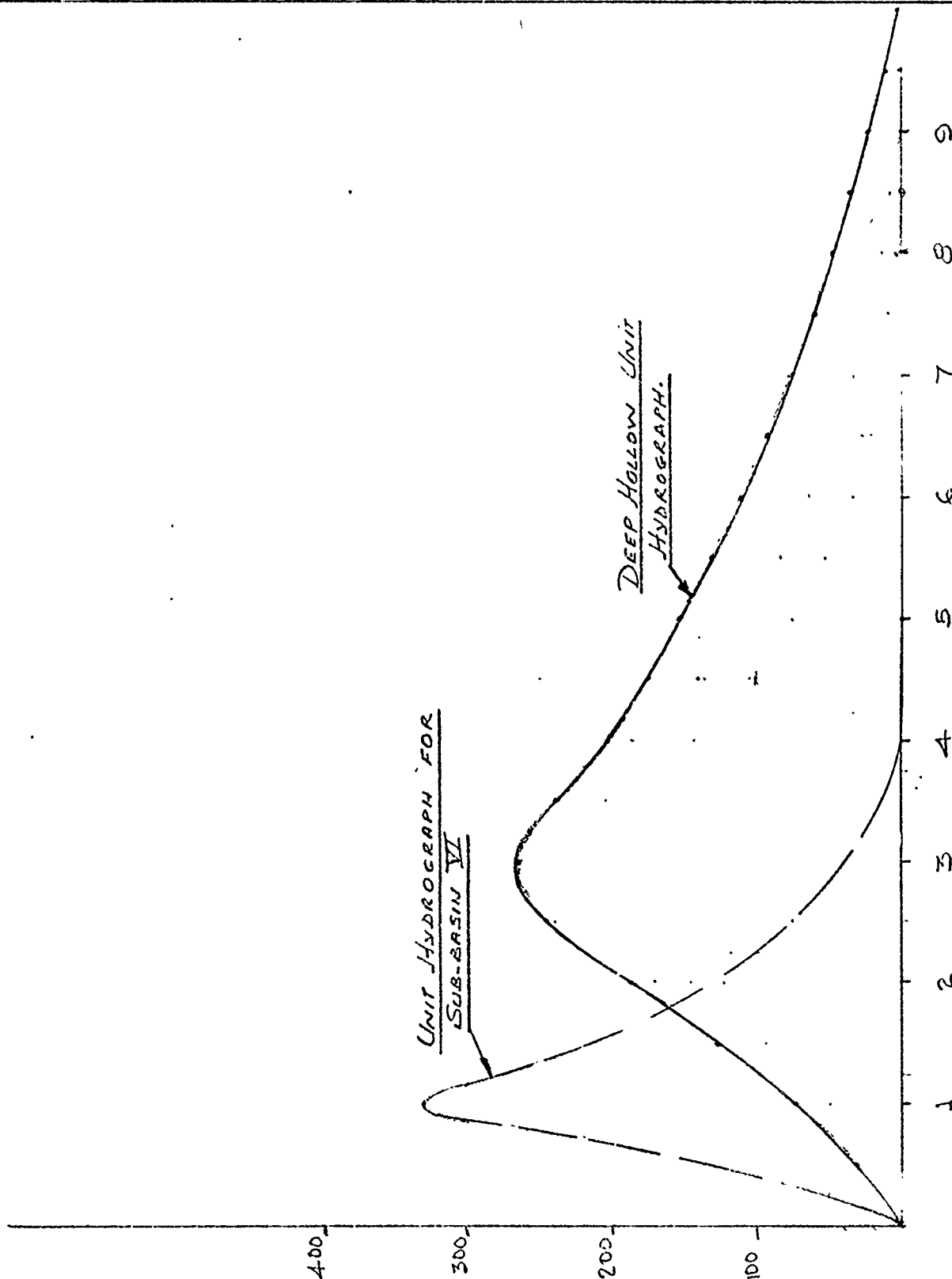
Subject UNIT HYDROGRAPHS FOR DEEP HOLLOW E/
SUB-BASIN VI

Sheet 13 of

Date DEC 4, 1971

By DLC

Ch'k. by



TAMS

Job No. 1487-1B

Sheet 19 of

Project INSPECTION STILLWELL LAKE

Date DEC 4, 1975

Subject UNIT HYDROGRAPH UNINITIALIZED FOR DEEP

By D. L. C.

HOLLOW & SUC BASIN TL

Ch'k. by

DEEP HOLLOW
TIME (HRS) Q (CFS)

0	0
0.5	30
1.0	70
1.5	125
2.0	185
2.5	245
3.0	265
3.5	240
4.0	208
4.5	177
5.0	155
5.5	133
6.0	115
6.5	94
7.0	79
7.5	65
8.0	48
8.5	34
9.0	25
9.5	15
10.0	6
10.5	0

SUC. BASIN VI
TIME (HRS) Q (CFS)

0	0
0.25	35
0.50	135
0.75	240
1.00	333
1.25	279
1.5	218
1.75	170
2.	130
2.25	104
2.5	75
2.75	55
3.	40
3.25	28
3.5	14
3.75	7
4.	0

TAMS

Job No. 1487-18

Sheet 20 of

Project INSPECTION STILLWELL LAKE

Date DEC 8, 78

Subject SPILLWAY ELEVATION - DISCHARGE RELN

By D.L.C.

COMPUTATIONS

Ch'k. by

SPILLWAY LENGTH

160.0'

CREST EL.

602' (MSL)

"OGEE" shaped CREST.

* TOP OF DAM

617.8'

DAM LENGTH

480.0'

ELEV	HEAD	C_s	Q_s	H_D	C_D	Q_D	Q_T
602	0						
603	1.	3.95	632				632
604	2.		1788				1788
606	4.		5056				5056
608	6.		9288				9288
610	8.		14300				14300
612	10.		19990				19990
614	12.		26270				26270
* 617.8	15.8	3.95	32400	0			39,692
620	18	3.94	48140	2.2	2.64	3084	51220
624	22	3.93	64880	6.2	2.64	14,590	79470

**

LAWS

Job No. 1487-1B

Project INSPECTION STILWELL LAKE

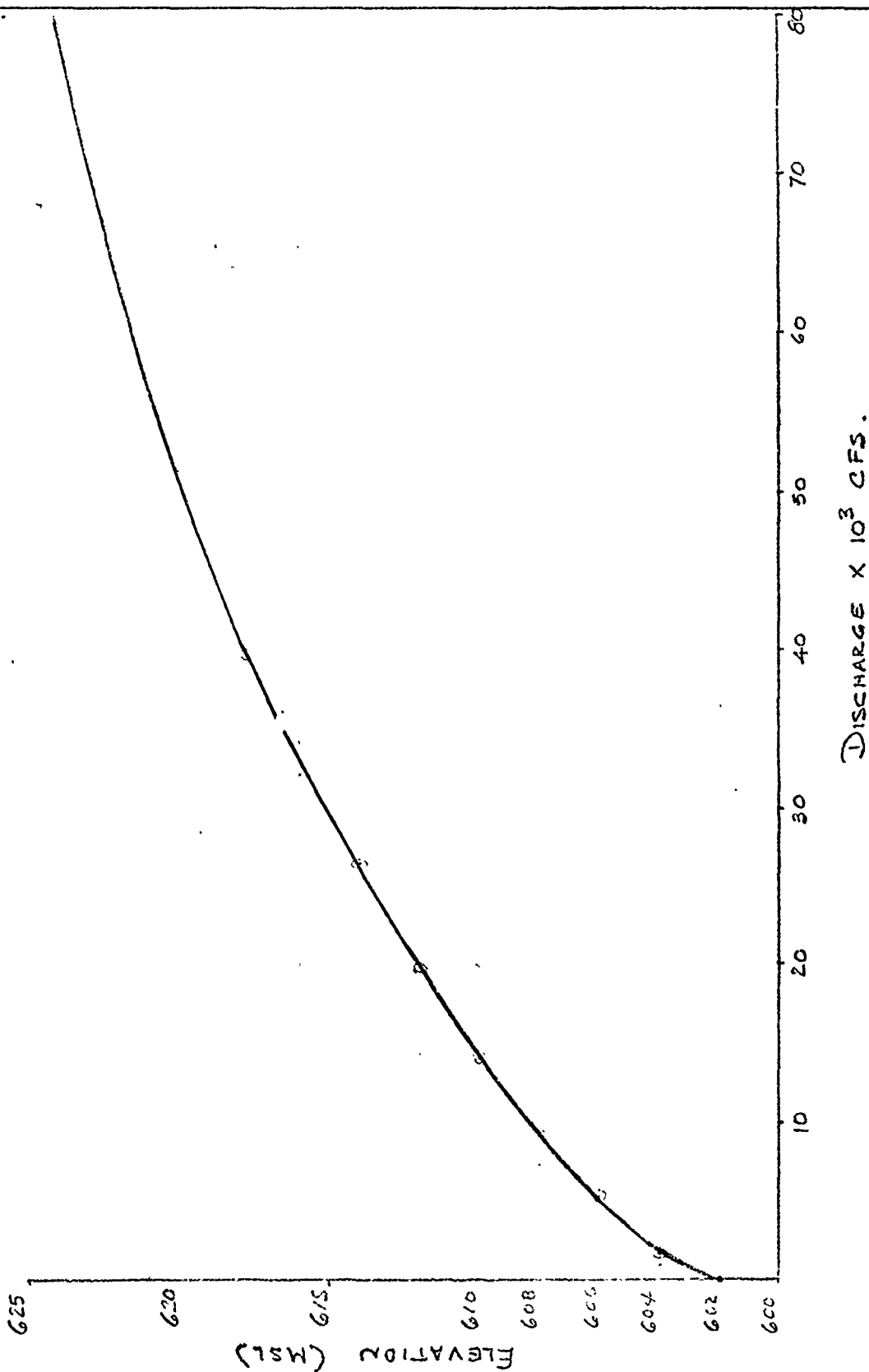
Subject SPILLWAY RATING CURVE

Sheet 20a. of

Date DEC 8, 78

By D.L.C.

Ch'k. by



Sheet 21 of _____

Date Dec 11 1971

By D L C

Ch'k. by _____

Storages supplied by

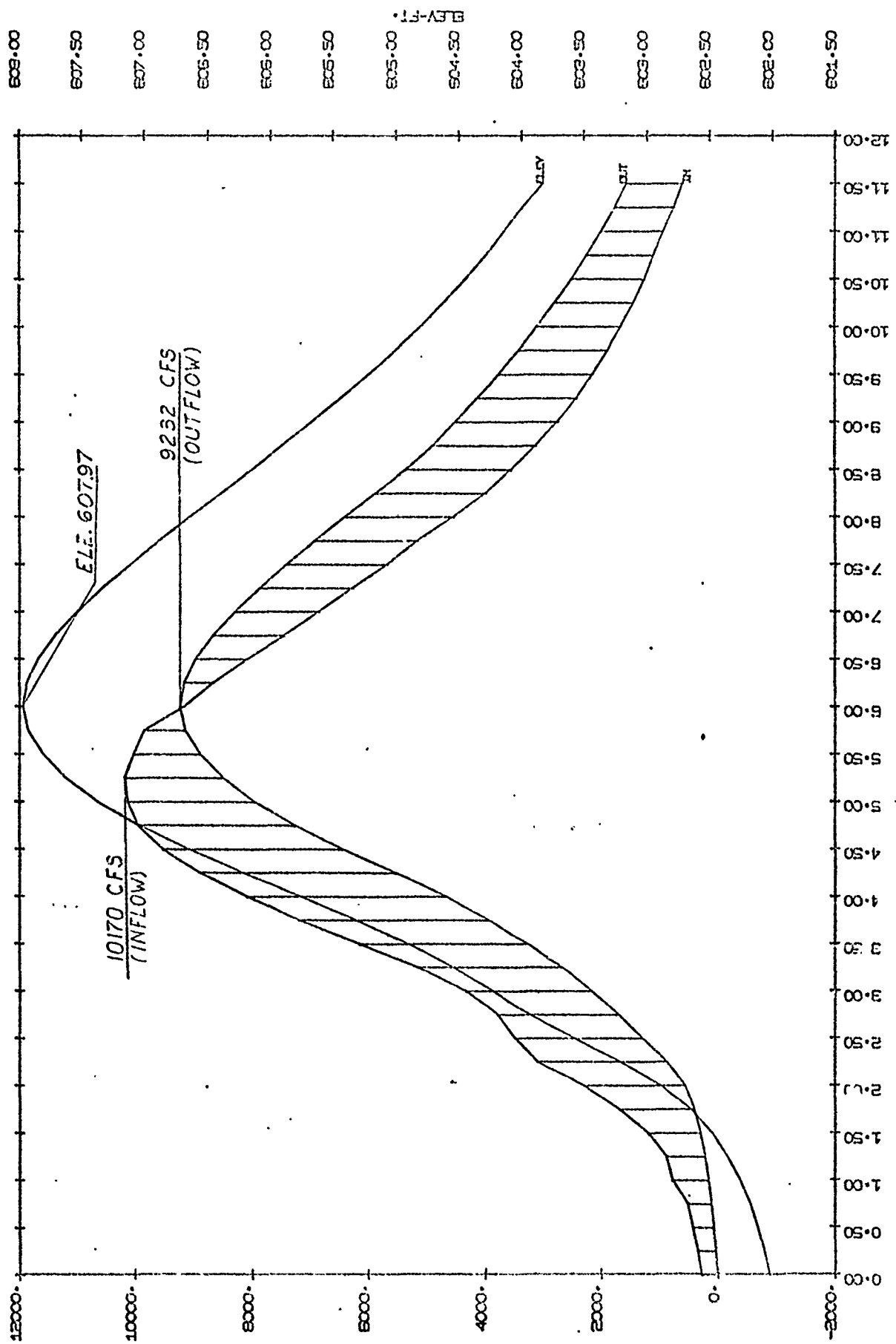
TOTAL RUN-OFF COMPUTED (CFS)		MINE LAKE SPF OUTFLOW (CFS)	
ME DU (S)			
0.000	0.0		0.0
0.250	270.2	8.90	279.1
0.500	322.6	26.72	349.3
0.750	387.1	44.35	426.1
1.000	458.2	61.45	519.7
1.250	697.8	83.73	781.5
1.500	773.4	111.20	884.6
1.750	1062.5	145.25	1207.8
2.000	1509.0	197.92	1706.9
2.250	1991.0	307.39	2298.4
2.500	2639.4	466.78	3106.2
2.750	2851.0	629.58	3480.6
3.000	2948.5	845.30	3793.8
3.250	2985.6	1344.95	4330.6
3.500	3018.9	2157.45	5176.4
3.750	2975.1	3179.18	6154.3
4.000	2954.0	4238.10	7192.1
4.250	2923.2	5162.45	8085.7
4.500	2910.2	5993.02	8903.2
4.750	2870.5	6658.62	9529.1
5.000	2844.8	7093.51	9938.3
5.250	2790.6	7332.04	10122.6
5.500	2760.0	7410.34	10170.3
5.750	2656.2	7359.67	10015.9
6.000	2598.1	7232.64	9830.7
6.250	2181.7	6978.83	9160.5
6.500	2085.3	6579.61	8664.9
6.750	1962.4	6111.43	8073.8
7.000	1830.9	5601.34	7432.2
7.250	1703.2	5140.04	6843.2
7.500	1590.8	4669.20	6260.0
7.750	1478.9	4198.13	5677.0
8.000	1376.2	3730.03	5106.2
8.250	1269.0	3271.13	4540.2
8.500	1167.7	2830.79	3998.5
8.750	1069.3	2470.57	3539.9
9.000	973.9	2148.79	3122.7
9.250	887.6	1866.35	2754.0
9.500	803.9	1626.20	2430.1
9.750	728.0	1422.46	2150.5
10.000	653.4	1246.69	1900.1
10.250	586.0	1085.12	1671.1
10.500	518.5	937.37	1455.9
10.750	459.5	810.25	1269.8
11.000	400.5	709.14	1109.6
11.250	349.5	588.75	938.3
11.500	298.5	461.64	760.1
11.750	254.6	361.84	616.4
12.000	210.8		
12.250	175.8		
12.500	140.8		
12.750	115.2		
13.000	89.6		

STANDARD PROJECT FLOOD

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL (HOURS)	GATE OPTION	PILOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
602.00	0.25	0.00	11.75	1	NO	YES	1.000	1.000	1.000	1.000	0.000
RESERVOIR											
RESERVOIR ELEV. (FT.)				RESERVOIR STORAGE (ACF)				RESERVOIR OUTFLOW (CFS)			
602.00				0.0000			0.00				
603.00				131.9000			632.00				
604.00				254.7000			1782.00				
606.00				561.6000			5056.00				
608.00				868.5001			9222.00				
610.00				1175.4001			14300.00				
612.00				1513.0002			19990.00				
614.00				1881.3000			26270.00				

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00	13.15	0.0000	602.00
0.25	279.10	41.52	2.7451	602.02
0.50	349.30	74.15	8.6671	602.06
0.75	426.10	111.74	15.4767	602.11
1.00	519.70	163.53	23.3205	602.17
1.25	781.50	225.73	33.9206	602.25
1.50	884.60	303.06	47.1106	602.35
1.75	1207.80	411.86	63.2504	602.47
2.00	1706.90	561.80	85.9567	602.65
2.25	2298.46	882.58	117.2497	602.88
2.50	3106.20	1308.69	158.5188	603.21
2.75	3480.60	1720.25	203.7839	603.58
3.00	3793.80	2175.35	247.5035	603.94
3.25	4330.60	2624.50	291.0771	604.23
3.50	5176.40	3273.16	338.8909	604.54
3.75	6154.30	3944.62	394.1732	604.90
4.00	7192.10	4674.18	457.2296	605.31
4.25	8085.70	5532.29	525.7431	605.76
4.50	8903.20	6445.52	602.3668	606.65
4.75	9529.10	7260.66	721.4799	607.04
5.00	9938.30	7947.29	771.2738	607.36
5.25	10122.60	8492.46	810.8090	607.62
5.50	10170.30	8899.26	839.5843	607.81
5.75	10015.90	9145.60	858.1737	607.93
6.00	9830.70	9232.36	864.4656	607.97
6.25	9160.50	9153.12	858.7188	607.93
6.50	8664.90	8958.82	844.6285	607.84
6.75	8023.80	8652.82	822.9508	607.70
7.00	7432.20	8282.54	795.5854	607.52
7.25	6843.20	7853.44	764.6674	607.32
7.50	6260.00	7386.16	730.5508	607.10
7.75	5677.00	6898.40	695.2069	606.87
8.00	5160.20	6390.65	658.3874	606.63
8.25	4540.20	5864.77	620.2517	606.38
8.50	3998.50	5345.28	582.5784	606.13
8.75	3539.90	4892.05	546.2038	605.89
9.00	3122.70	4506.22	509.9707	605.66
9.25	2754.00	4128.20	474.4705	605.43
9.50	2430.10	3765.25	440.3850	605.21
9.75	2150.50	3421.63	408.1161	604.99
10.00	1900.10	3098.54	377.7744	604.80
10.25	1671.10	2795.40	349.3056	604.61
10.50	1455.90	2512.49	322.7377	604.44
10.75	1269.80	2251.26	298.2054	604.28
11.00	1109.60	2008.88	275.4438	604.13
11.25	938.30	1780.77	253.2327	603.99
11.50	760.10	1587.67	233.4196	603.82
11.75	616.40			
MAX. VALUES				
10170.30		9232.36		607.97
MIN. VALUES				
0.00		0.00		602.00



PMF INFLOW HYDROGRAPH

MINE LAKE

TOTAL RUN-OFF

PMF

TIME
(HOURS)COMPUTED
(CFS)OUTFLOW
(CFS)

0.000	0.0		0.0
0.250	540.5	17.80	558.3
0.500	645.2	53.45	698.7
0.750	774.3	88.72	863.0
1.000	916.4	122.93	1039.3
1.250	1395.7	167.48	1563.2
1.500	1546.9	222.42	1769.3
1.750	2125.1	336.53	2461.6
2.000	3018.1	640.24	3658.3
2.250	3982.1	1172.75	5154.9
2.500	5278.9	2032.52	7311.4
2.750	5702.1	3981.82	9683.9
3.000	5897.0	7040.37	12937.4
3.250	5971.2	10870.50	16841.7
3.500	6037.8	14714.03	20751.8
3.750	5950.3	17530.84	23481.1
4.000	5908.1	19316.69	25224.8
4.250	5846.5	20252.73	26099.2
4.500	5820.4	20470.91	26291.3
4.750	5741.0	20275.17	26016.2
5.000	5689.6	19845.47	25535.1
5.250	5581.3	19237.39	24818.7
5.500	5520.1	18526.80	24046.9
5.750	5312.5	17786.93	23099.4
6.000	5196.3	17063.86	22260.2
6.250	4363.4	15880.87	20244.3
6.500	4170.7	14367.03	18537.7
6.750	3924.9	13063.13	16988.0
7.000	3661.8	11835.10	15496.9
7.250	3406.4	10640.13	14046.5
7.500	3181.6	9494.78	12676.4
7.750	2957.9	8407.74	11365.6
8.000	2752.5	7371.90	10124.4
8.250	2538.0	6388.38	8926.4
8.500	2335.5	5485.00	7820.5
8.750	2138.6	4727.01	6865.6
9.000	1947.9	4017.51	5965.4
9.250	1775.2	3374.03	5149.2
9.500	1607.8	2803.58	4411.4
9.750	1456.0	2382.74	3838.7
10.000	1306.8	2028.28	3335.1
10.250	1172.0	1727.73	2899.7
10.500	1037.1	1483.37	2520.5
10.750	919.1	1275.34	2194.4
11.000	801.0	1089.72	1890.7
11.250	699.1	871.22	1570.3
11.500	597.1	679.11	1276.2
11.750	509.3	532.62	1041.9
12.000	421.6		
12.250	351.6		

STILLWELL LAKE SAFETY INSPECTION
RESERVOIR ROUTING STILLWELL LAKE
TAMS NEW YORK JOB NO. 1487-17 DEC 78

PROBABLE MAXIMUM FLOOD

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL (HOURS)	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
602.00	0.25	0.00	11.75	1	NO	YES	1.000	1.000	1.000	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
602.00	0.0000	0.00
603.00	131.9000	632.00
604.00	254.7000	1288.00
606.00	561.6000	5036.00
608.00	868.5001	9228.00
610.00	1175.4001	14300.00
612.00	1513.0002	19990.00
614.00	1881.3000	26279.00

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00	26.31	0.0000	602.00
0.25	558.30	83.07	17.3371	602.04
0.50	698.70	148.84	31.0633	602.13
0.75	863.00	224.46	46.8458	602.23
1.00	1039.30	325.95	68.0277	602.35
1.25	1563.20	452.28	94.3931	602.51
1.50	1769.30	609.04	127.1098	602.71
1.75	2461.60	1023.42	173.4805	602.96
2.00	3658.30	1621.39	237.0023	603.33
2.25	5154.90	2513.96	322.8760	603.85
2.50	7311.40	3695.64	433.8485	604.44
2.75	9633.90	5239.69	574.9217	605.16
3.00	12937.40	7631.90	748.4018	606.08
3.25	16841.70	10592.79	948.3956	607.21
3.50	20751.80	13592.65	1150.4570	608.52
3.75	23481.10	16598.46	1333.1325	609.83
4.00	25224.80	19517.49	1484.9653	610.93
4.25	26099.20	21455.92	1601.3173	611.83
4.50	26291.30	22787.77	1682.4167	612.47
4.75	26016.20	23738.82	1732.8554	612.92
5.00	25335.10	24165.76	1757.8942	613.19
5.25	24818.70	24245.04	1762.5434	613.32
5.50	24046.90	24045.56	1750.8447	613.35
5.75	23099.40	23640.08	1727.0647	613.29
6.00	22260.20	22931.16	1685.4390	613.16
6.25	20244.30	21180.12	1623.8496	612.93
6.50	18537.70	20657.75	1552.1618	612.60
6.75	16928.00	19353.76	1475.2512	612.21
7.00	15496.90	18106.53	1395.3171	611.77
7.25	14046.50	16440.78	1314.2836	611.30
7.50	12676.40	15252.46	1233.6916	610.82
7.75	11365.60	13956.61	1154.4960	610.34
8.00	10124.40	12489.13	1076.7622	609.86
8.25	8926.40	11453.32	1001.0891	609.35
8.50	7820.50	10276.32	929.0179	608.86
8.75	6865.60	9188.02	861.2501	608.39
9.00	5965.40	8287.96	795.9786	607.95
9.25	5149.20	7418.41	732.5195	607.52
9.50	4411.40	6604.98	673.7131	607.11
9.75	3838.70	5854.54	619.5094	606.73
10.00	3355.10	5176.00	570.3023	606.37
10.25	2890.70	4666.28	525.5015	606.05
10.50	2520.50	4210.32	482.1822	605.76
10.75	2194.40	3782.22	441.9790	605.48
11.00	1890.70	3377.04	403.9280	605.22
11.25	1570.30	2971.19	367.6932	604.97
11.50	1276.20	2629.37	333.7145	604.73
11.75	1041.90	2425.04		604.51
	26291.30	0.00		613.35
				602.00

MAX. VALUES
MIN. VALUES

