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THAMES RIVER BASIN

CONNECTICUT,
MASSACHUSETTS, AND RHODE ISLAND

MASTER MANUAL

OF

RESERVOIR REGULATION

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
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PREFACE

The Thames River basin comprises an area of 1,473 square miles, 75 percent of which is located in eastern Connecticut, 20 percent in south-central Massachusetts and the remaining 5 percent in western Rhode Island. The coordinated flood control plan and reservoir regulation procedures for the basin, described in this manual, include six dams and reservoirs and one major and several minor local protection projects.

The main portion of this Master Manual gives a general description of population, industry, climate, hydrology, past floods, flood damages and analyses of floods. Other subjects included are: organization, communications, hydrologic reporting networks, forecasting methods and general reservoir regulation procedures. Plates such as basin maps, river profiles, regulation studies, as-built contract plans for each reservoir project and the Norwich Local Protection Project are included.

To facilitate the coordinated regulation of all projects, detailed reservoir regulation procedures and methods are shown in Appendix A. Forecast curves, standard operating procedures, emergency operating procedures, emptying schedules and spillway discharge schedules as well as outlet and spillway ratings, inflow curves, area-capacity data, percent and available storage curves for all projects are included in Appendix A.

Discharge rating curves and tables at all principal locations in the Thames basin are included in Appendix B.

Maintenance procedures for hydrologic equipment are described in Appendix C.

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THAMES RIVER BASIN
CONNECTICUT, MASSACHUSETTS AND RHODE ISLAND

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THAMES RIVER BASIN

PERTINENT DATA

DRAINAGE AREAS AND RIVER MILES

Location	Drainage Area (sq.mi.)	Miles from Mouth of Thames
Thames River		
At Mouth	1,473	0
At Norwich Town Line	1,365	13
Confluence of Yantic and Shetucket Rivers	1,362	15
Yantic River		
At Mouth	98	15
The Falls Company Dam	97	15.5
Yantic (USGS Gage)	88.6	19.8
Shetucket River		
At Mouth	1,264	15
Greenville Dam	1,260	17
Below Mouth of Quinebaug River	1,252	18
Above Mouth of Quinebaug River	508	18
Taftville Dam	508	19.6
Occum Dam	462	21.4
Town of Baltic	445	24.0
Scotland Dam	420	28.2
Willimantic (USGS Gage)	401	32
Confluence of Willimantic and Natchaug Rivers	395	33.3
Hop River		
At Mouth	81	39
Columbia (USGS Gage)	76.2	43.2

Location	Drainage Area (sq.mi.)	Miles from Mouth of Thames
Willimantic River		
At Mouth	225	33.3
American Thread Company (Dam #2)	224	34.0
Below Hop River	206	38.8
Above Hop River	125	38.8
South Coventry (USGS Gage)	121	41.3
Eagleville Dam	110	44.2
Below Roaring Brook	79.4	54.5
Above Roaring Brook	58.7	54.5
Below Furnace Brook	51.0	58.2
Above Furnace Brook	33.8	58.2
Natchaug River		
At Mouth	170	35
Willimantic (USGS Gage)	169	36.7
Willimantic Water Company Dam	161	39
Kirby Dam	159	40.4
Mansfield Hollow Dam	159	40.5
Quinebaug River		
At Mouth	744	18
Tunnel Dam (CL&P Co.)	744	18.3
Jewett City (USGS Gage)	711	25
Below Mouth of Pachaug River	709	25.3
Above Mouth of Pachaug River	649	25.3
Aspinook Finishing Co. Dam	649	25.4
Below Mouth of Moosup River	565	36.8
Above Mouth of Moosup River	475	36.8
Wauregan Mills Dam	474	39.8
Below Mouth of Five Mile River	462	42.5
Above Mouth of Five Mile River	384	42.5
Danielson (United Merchants Co. Dam)	384	42.5
Goodyear (Rogers Co. Dam)	377	47.4
Putnam (USGS Gage)	331	56
Below Mouth of Little River	331	56.1
Above Mouth of Little River	291	56.1

Location	Drainage Area (sq.mi.)	Miles from Mouth of Thames
Quinebaug River (cont.)		
Belding - Hemingway Dam	290	57.3
Below Mouth of French River	285	59
Above Mouth of French River	174	59
West Thompson Dam	174	59.2
At Quinebaug (USGS Gage)	157	67
Southbridge (American Optical Co.)	126	72
Russell Harrington Co. Dam	106	73.9
Westville Dam	99.5	77
Old Sturbridge Village Dams	70	80
East Brimfield Dam	67.5	82.5
French River		
At Mouth	112	59
Grosvenordale	100	61.7
North Grosvenordale	98	63.7
Webster (USGS Gage)	85.3	69
Above Outlet of Lake Webster	73	70
Below Little River	61	74.3
Above Little River	31.5	74.3
Hodges Village	31.1	75.5
Little River		
Buffumville (USGS Gage)	27.7	74.6
Gordon Chemical Co. Dam	27.0	75.4
At Buffumville Dam	26.5	75.9

USGS GAGING STATIONS - THAMES RIVER BASIN

Stream	Location	Drainage Area (sq.mi.)	Date Established
Shetucket Basin			
Willimantic River	Stafford Springs, Conn.	53.9	Oct 1962
Roaring Brook	Stafford Springs, Conn.	14.6	Aug 1961
Willimantic River	South Coventry, Conn.	121.0	Sept 1931
Ash Brook	North Coventry, Conn.	2.73	Aug 1962
Skungamaug River	North Coventry, Conn.	23.5	Aug 1962
Hop River	Columbia, Conn.	76.2	Sept 1932
Safford Brook	Woodstock Valley, Conn.	4.1	June 1950
Mount Hope River	Warrenville, Conn.	27.8	July 1940
Natchaug River	Willimantic, Conn.	16.9	Oct 1930
Shetucket River	Willimantic, Conn.	401.0	Sept 1928
Little River	Hanover, Conn.	29.1	July 1951
Quinebaug Basin			
Quinebaug River	East Brimfield Dam, Mass.	67.5	Mar 1962
Quinebaug River	Westville Dam, Mass.	99.1	Oct 1962
Quinebaug River	Quinebaug, Conn.	157.0	Sept 1931
French River	Hodges Village Dam, Mass.	31.0	Mar 1962
Little River	Buffumville, Mass.	27.7	July 1939
Browns Brook	Webster, Mass.	0.5	Oct 1962
French River	Webster, Mass.	85.3	Dec 1948
Little River	Harrisville, Conn.	35.5	July 1961
Quinebaug River	Putnam, Conn.	331.0	Dec 1929
Mashamoquet Brook	Abington, Conn.	11.0	Apr 1962
Five Mile River	Killingly, Conn.	58.2	Oct 1937
Moosup River	Moosup, Conn.	83.5	Oct 1932
Pachaug River	Pachaug, Conn.	50.4	July 1961
Quinebaug River	Jewett City, Conn.	711.0	July 1918
Yantic River	Yantic, Conn.	88.6	Oct 1930

STREAMFLOW DATA

AT SELECTED USGS GAGING STATIONS

	Willimantic River at South Coventry	Shetucket River at Willimantic	Quinebaug River at Putnam	Quinebaug River at Jewett City
Drainage Area (sq.mi.)	121	401	331	711
Period of Record	1931-1964	1928-1964	1929-1964	1918-1964
Average Annual (cfs)	211	699	567	1,250
Maximum Year (cfs)	1938-370	1938-1,243	1938-988	1938-2,007
Minimum Year (cfs)	1932-114	1930-384	1930-269	1930-598
Maximum Month (cfs)	Sept 1938 1,176	Mar 1936 3,949	Mar 1936 3,627	Mar 1936 6,930
Minimum Month (cfs)	Sept 1957 14.5	Aug 1957 44.5	Sept 1957 37.0	Sept 1957 97.4

MASTER MANUAL OF RESERVOIR REGULATION
THAMES RIVER BASIN
CONNECTICUT, MASSACHUSETTS AND RHODE ISLAND

AUTHORIZATION AND SCOPE

1. AUTHORITY

This report is prepared in accordance with instructions contained in ER 1110-2-240 and EM 1110-2-3600.

2. SCOPE

The purposes of this manual are:

a. To outline the flood problems in the Thames River basin.

b. To present a coordinated plan of operation for all flood control reservoirs in the Thames River basin, i.e., Mansfield Hollow on the Natchaug River, Buffumville on the Little River, Hodges Village on the French River and East Brimfield, Westville and West Thompson reservoirs on the Quinebaug River.

c. To serve as a guide and ready reference for personnel in the New England Division office and the respective flood control dam operators in the field.

PRIOR REPORTS

3. "308" REPORT

A report dated 1 December 1930 and printed as House Document 644, 71st Congress, 3d session, covered navigation, flood control, power development and irrigation in the Thames River basin. The report found that further improvements were not warranted at that time.

4. 1940 REPORT

A preliminary examination, survey and review of reports on the

Thames River for flood control and other purposes, dated 11 April 1940 was printed as House Document 885, 76th Congress, 3d session. The report recommended construction of one local channel improvement project at Norwich, Connecticut and seven flood control reservoirs: Hodges Village, Buffumville, East Brimfield, Westville, Mansfield Hollow, Andover and South Coventry. The plan was authorized by Public Law 228, 77th Congress, 1st session, approved 18 August 1941.

5. NENYIAC REPORT

Flood control in the Thames River basin is also considered in Part Two, Chapter XX of "The Resources of the New England-New York Region," a comprehensive report on power potentialities and on the land, water, and related natural resources of the region. Prepared by the New England-New York Interagency Committee (NENYIAC), the report was submitted to the President of the United States by the Secretary of the Army on 27 April 1956. This report is printed as Senate Document 14, 85th Congress, 1st session.

6. MASTER REGULATION MANUAL - MANSFIELD HOLLOW RESERVOIR

A Master Regulation Manual for Mansfield Hollow Reservoir was prepared in January 1952. The manual generally described the regulation of Mansfield Hollow Reservoir, which was the first Corps of Engineers flood control project to be completed in the Thames basin. A supplement to the manual was issued in March 1953.

7. INTERIM REPORT

An Interim Report on Review of Survey on the Quinebaug River subbasin of the Thames River for flood control and other purposes, dated 31 January 1958, was printed as Senate Document 41, 86th Congress, 1st session. The report recommended the addition of West Thompson Dam and Reservoir. The West Thompson project was authorized by the Flood Control Act of 1960 (Public Law 86-645).

DESCRIPTION OF THAMES RIVER BASIN

8. GENERAL DESCRIPTION

The Thames River basin, shown on plate 1, comprises an area of

1,473 square miles of which 1,159 are in eastern Connecticut, 253 in southern Massachusetts, and 61 in western Rhode Island. The basin is roughly elliptical in shape, having a maximum width in an east-west direction of 38 miles and a maximum north-south dimension of 67 miles. Generally the basin is hilly with numerous swamps, mill ponds and reservoirs, and a few natural lakes and ponds. Topographic elevations range from sea level at the mouth of the Thames River to a maximum of 1,286 feet above mean sea level (msl) along the northwestern divide between the Connecticut and Thames River basins. The average elevation of the entire basin is approximately 500 feet msl. Schematic profiles of the main streams in the Thames basin are shown on plate 2.

9. THAMES RIVER

The Thames River is formed by the confluence of the Yantic and Shetucket Rivers at Norwich, Connecticut. It flows southerly for a distance of 15 miles emptying into Fishers Island Sound at New London, Connecticut. Above New London the river width varies from 400 to 4,000 feet. The Thames River proper is a tidal estuary which has a mean tidal range of 3.1 feet at Norwich and 2.6 at New London Harbor. A navigation channel with a controlling depth of 25 feet is maintained to Norwich by the Federal Government.

10. TRIBUTARIES

a. General. The chief tributaries of the Thames River are the Yantic and Shetucket Rivers. The Shetucket River, the principal source of flooding, drains approximately 85 percent of the entire Thames River drainage area (see Pertinent Data for drainage areas), and has three principal tributaries - Quinebaug, Natchaug and Willimantic Rivers.

b. Yantic River. The Yantic River, with its headwaters in small streams rising in the towns of Lebanon and Colchester, Connecticut, flows easterly to Gilman, Connecticut and thence southeasterly 9 miles to Norwich. It is tidal and navigable for one-half mile above its mouth. Below Gilman it has a fall of 229 feet of which 141.5 are utilized for development of water power. The Yantic River, which combines with the Shetucket to form the Thames River, does not contribute to the principal flood problems in the Thames River basin.

c. Shetucket River. The Shetucket River is formed by the confluence of the Willimantic and Natchaug Rivers just below Willimantic, Connecticut where it flows southeasterly and southerly in a general narrow valley to Norwich, a total distance by river of about 20 miles. As shown on plate 3, it has a fall of 142 feet of which 81.2 are developed at 4 dams. Below the Greenville dam in Norwich the river drops 6 feet in a distance of 2.1 miles to its mouth. This and other dams above Norwich at Taftville, Occum and Scotland form a succession of ponds upstream to South Windham, a distance of about 15 miles.

d. Quinebaug River. The Quinebaug River, the largest tributary of the Shetucket River, has its origin in several brooks at East Brimfield, Massachusetts and flows southeasterly to Mechanicsville, Connecticut where it is joined by the French River, thence southwesterly to its confluence with the Shetucket River 3 miles above Norwich. As shown on plates 5, 6, 7 and 8 it has a total length of 67.5 miles and a total fall of 612 feet. The main tributaries of the Quinebaug, in downstream order, are the French, Five Mile, Moosup and Pachaug Rivers all of which are highly developed for water power, mostly at mill dams.

e. French River. The French River, formed by small brooks in Leicester, Massachusetts, flows southerly for a total distance of 28 miles to its confluence with the Quinebaug River at Mechanicsville, Connecticut and has a total fall of 618 feet (shown on plate 9). Within its basin are numerous natural and artificial reservoirs, the largest being Lake Chaubunagungamaug (Lake Webster) with a drainage area of 11 square miles and a surface area of 2 square miles.

f. Natchaug River. The Natchaug River, formed by the junction of Still River and Bigelow Brook south of Phoenixville, Connecticut, has a length of 16 miles and a total fall of 267 feet. Many mill dams which existed on the main stream and its tributaries have been washed out or abandoned. The water supply dam for the city of Willimantic is located 4 miles above the mouth and 1.5 miles below the Mansfield Hollow Dam. Its principal tributaries are the Fenton, Still and Mount Hope Rivers.

g. Willimantic River. The Willimantic River, formed by the junction of several brooks at Stafford Springs, Connecticut, flows in a general southerly direction for about 24 miles to Willimantic where it joins the Natchaug to form the Shetucket River. As shown on plate 4 it has a fall of 319 feet below Stafford Springs of which 101 feet are developed at 7 dams.

h. Hop River. The Hop River with one large tributary, the Skungamaug River, has its origin near Bolton Notch, Connecticut and flows south and east to join the Willimantic River 3 miles above Willimantic. All former power developments on the Hop River have been abandoned.

11. EXISTING LAKES AND RESERVOIRS

Numerous lakes, reservoirs and natural ponds located in the Thames River basin are used mainly for recreation, water supply and increasing low flows for downstream industrial purposes. Most of these lakes and reservoirs have small storage capacities and tend to have a slight modifying effect on flows during freshet periods and sustain the flows during dry periods. Excluding the Yantic River basin, these lakes and reservoirs provide approximately 50,000 acre-feet of storage, which is equivalent to only 0.7 inch of runoff from the drainage area above Norwich. The largest reservoir, Lake Webster, located in the French River basin, has an estimated usable storage capacity of 4,750 acre-feet, equivalent to 8 inches of runoff from its drainage area of 11 square miles.

DEVELOPMENT IN THE BASIN

12. POPULATION

The Thames River basin lies in a highly industrialized and densely populated section of southern New England. The total population is estimated at 245,100 of which approximately 189,700 or 77 percent are in Connecticut; 53,600 or 22 percent in Massachusetts; and 1,800 or 1 percent in Rhode Island. The major population centers are as follows:

Community	Population
Norwich, Connecticut	38,500
New London, Connecticut	34,200
Southbridge, Massachusetts	16,500
Willimantic, Connecticut	13,900
Webster, Massachusetts	13,700
Putnam, Connecticut	7,000

13. INDUSTRY

Industry is scattered widely throughout the basin and the noted population centers are also the major industrial centers. The principal industries are the manufacture of textile goods and, more recently, diversified products. Agriculture, owing to the concentration of industry and population along the rivers, is generally limited to the upland areas. Dairying and poultry raising are the major agricultural activities. However, agriculture is now relatively unimportant and limited to small farms, many of which are operated on a part time basis. Much of the land originally cleared for agriculture has been allowed to revert to forest growth but has very little value at present as a source of lumber.

14. RECREATION

A wide variety of recreational opportunities including hunting, fishing, boating, bathing and camping are offered within the basin. The extensive forest areas and the many lakes and streams in the watershed provide fine habitat for fish and game. Many of the lakes and ponds have been extensively developed as sites for private summer camps and cottages.

CLIMATOLOGY AND HYDROLOGY

15. CLIMATE

The Thames River basin has a variable climate characterized by frequent but short periods of heavy precipitation. The basin lies in the path of the "prevailing westerlies" and of cyclonic disturbances that cross the country from the west or southwest towards the east or northeast. It is also exposed to occasional coastal storms that travel up the Atlantic Seaboard. Some storms are of tropical origin and occasionally are of hurricane intensity, and are heavily laden with moisture from the ocean. The southern portion of the basin, due to its proximity to the Atlantic Ocean and Long Island Sound, escapes the severity of cold and depth of snowfall experienced at the higher elevations in the northern part of the watershed.

16. TEMPERATURE

The average annual temperature of the Thames River basin is about 48° Fahrenheit. For particular locations within the basin average annual temperatures range from about 50° F. near the coast to 46° F. in the northern areas. Average monthly temperatures vary widely throughout the year, from 68-72° F. in July and August to 25-30° F. in January and February. Extremes in temperature range from occasional highs in the upper 90's to infrequent lows of minus 10° Fahrenheit or lower. Temperature data for selected locations are shown in table 1.

17. PRECIPITATION

The average annual precipitation over the Thames River basin is about 44 inches, varying from about 42 inches in the vicinity of Webster Lake, in the French River watershed, to about 48 inches in the upland areas northwest of Southbridge, Massachusetts. Distribution of precipitation throughout the year is rather uniform. Precipitation data for selected locations are shown in table 2.

18. SNOWFALL

The annual snowfall over the watershed varies from about 30 inches near the coast to more than 50 inches in the upland areas in Massachusetts. In the early spring, water content of the snow cover seldom averages more than 2 inches over the entire basin. However, 4 inches or more have been experienced occasionally in upland areas. Snowfall data for selected locations are shown in table 3.

19. STREAMFLOW RECORDS

The U. S. Geological Survey maintains gaging stations at 26 locations in the Thames River basin, as shown on plate 1 and as listed in pertinent data. All are water-stage recorders with records generally rated "good to excellent" except during periods of ice when they are rated "fair."

20. RUNOFF

The average annual runoff for the basin, based on available records of flow at existing gaging stations, is approximately 22.5 inches (1.64 cfs per square mile) or just over 50 percent of the

TABLE 1

MONTHLY TEMPERATURES
Degrees Fahrenheit

	Worcester, Massachusetts Elevation 625 feet msl Period of Record 67 Years			Putnam, Connecticut Elevation 240 feet msl Period of Record 24 Years			Storrs, Connecticut Elevation 600 feet msl Period of Record 66 Years		
Month	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum
January	25.5	69	-18	25.6	68	-26	25.8	68	-15
February	25.6	67	-24	27.7	69	-23	25.7	69	-20
March	34.9	84	- 6	35.0	84	-16	34.4	83	- 6
April	45.7	91	8	46.0	88	7	45.4	87	10
May	57.2	92	25	56.0	92	22	56.3	92	25
June	66.0	96	33	64.9	100	31	64.8	95	35
July	70.9	102	41	70.0	102	37	69.8	99	43
August	68.8	99	35	68.4	100	30	67.8	97	37
September	61.9	100	26	61.0	100	20	61.0	97	26
October	51.7	89	13	51.0	88	15	51.6	89	16
November	40.3	81	3	40.6	81	- 1	40.5	82	1
December	28.6	67	-17	28.9	66	-16	28.8	72	-17
ANNUAL	48.1	102	-24	47.9	102	-26	47.6	99	-20

TABLE 2

MONTHLY PRECIPITATION
(Depth in Inches)

	Worcester, Massachusetts Elevation 625 feet msl Period of Record 118 Years			Webster, Massachusetts Elevation 465 feet msl Period of Record 78 Years			Putnam, Connecticut Elevation 240 feet msl Period of Record 24 Years			Southbridge, Massachusetts Elevation 720 feet msl Period of Record 49 Years		
Month	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum
January	3.56	9.03	0.70	3.59	8.86	0.71	3.60	6.93	0.80	3.75	7.47	0.85
February	3.16	8.09	0.67	3.46	6.96	1.05	2.83	5.02	1.09	3.40	5.47	1.96
March	3.84	11.13	0.04	3.88	8.43	0.10	3.89	9.43	1.51	4.19	11.85	0.16
April	3.61	10.77	0.35	3.45	7.11	0.56	4.00	5.64	0.99	4.14	6.89	1.21
May	3.70	8.84	0.76	3.23	6.49	0.42	3.60	5.96	1.03	3.77	9.22	0.77
June	3.34	8.31	0.66	3.40	8.68	0.31	3.48	7.71	0.23	3.83	8.02	0.27
July	3.64	11.41	0.62	3.55	10.53	0.70	4.17	11.32	0.61	4.17	11.69	0.94
August	4.00	18.58	0.35	3.89	12.47	0.75	4.34	14.74	0.83	4.35	19.78	1.36
September	3.50	10.82	0.20	3.53	12.96	0.35	3.63	9.06	0.47	3.97	15.62	0.20
October	3.61	10.79*	0.36	3.20	8.00	0.17	3.30	8.36	0.27	3.48	11.83	0.17
November	3.75	9.82	0.56	3.55	7.91	0.59	4.64	9.50	0.80	4.20	9.51	0.89
December	3.48	7.77	0.78	3.61	9.43	0.54	3.96	8.28	1.02	3.71	8.12	0.80
ANNUAL	43.19	61.89	27.92	42.34	56.72	29.99	45.44	62.07	30.71	46.96	67.35	31.39

* Estimated

TABLE 3

MEAN MONTHLY SNOWFALL
(Average Depth in Inches)

Month	Worcester, Massachusetts Elevation 625 feet msl Period of Record 64 Years	Mansfield Hollow Dam, Conn. Elevation 250 feet msl Period of Record 8 Years	Southbridge, Massachusetts Elevation 720 feet msl Period of Record 19 Years	Putnam, Connecticut Elevation 240 feet msl Period of Record 23 Years
January	15.0	13.6	15.4	12.0
February	15.6	8.3	11.8	9.5
March	10.1	10.1	14.8	11.4
April	3.1	2.1	2.2	1.3
May	T	T	T	0
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	T	0	0	0
October	0.1	T	0.1	0.1
November	2.9	0.5	1.6	1.7
December	9.7	8.8	9.6	8.7
ANNUAL	56.5	43.4	55.5	44.8

average annual precipitation. For particular areas within the basin, the average annual runoff ranges from a maximum of more than 25 inches (1.87 cfs per square mile) from the drainage area of the Moosup River to a minimum of less than 20 inches (1.45 cfs per square mile) from the area around Webster Lake in the French River basin. More than one-half of the annual runoff occurs in the months of March, April and May while the rest is rather uniformly distributed throughout the remainder of the year. Runoff data for two gaging stations are shown in table 4.

FLOODS AND FLOOD ANALYSIS

21. FLOOD HISTORY

Since 1828 the Thames River basin has experienced 4 localized and 8 general basin floods. Local events occurred in March 1877, August 1877, March 1888 and November 1927. General floods occurred in September 1828, March 1876, February 1886, March 1936 (2 floods), July 1938, September 1938 and August 1955. Maximum stages and discharges for the March 1936, September 1938 and August 1955 events at selected locations are shown in table 5. Flood profiles for the Shetucket, Willimantic, Quinebaug and French Rivers are shown on plates 3 through 9.

22. LOCAL FLOODS

The flood of March 1877, severe only on the upper Willimantic River, was augmented by the failure of a storage reservoir above Stafford Springs. In August 1877, a cloudburst of approximately 8½ inches of rain in 3 hours caused local flooding on Oxoboxo Brook. The flood of March 1888 was severe on the French River and also in the city of Norwich where flooding was caused by an ice jam in the upper Thames River. The great New England storm of November 1927 was not severe in the Thames River basin except on the Moosup River where local flooding occurred.

23. FLOODS OF MARCH 1936

The March 1936 floods resulted from two storms, 9-13 and 16-22 March. Hydrographs at all gaging stations show two peaks separated by a recession almost to base flow. The first, was caused by about 3 inches of rain falling on snow with a water equivalent of

TABLE 4

MONTHLY RUNOFF
(Inches)

	Quinebaug River at Quinebaug, Conn. (DA = 157 sq. mi.)			Willimantic River at South Coventry, Conn. (DA = 121 sq. mi.)		
Month	Mean	Maximum	Minimum	Mean	Maximum	Minimum
January	2.41	4.32	0.54	2.29	4.86	0.57
February	2.13	5.10	0.86	2.14	4.86	0.79
March	4.02	12.22	2.01	3.96	10.01	1.91
April	3.96	8.80	1.73	3.76	8.27	1.85
May	2.26	4.14	0.96	2.39	4.07	1.03
June	1.44	4.57	0.33	1.54	3.69	0.38
July	0.86	5.14	0.13	0.87	4.01	0.21
August	1.13	14.53	0.09	0.92	9.26	0.16
September	1.16	9.20	0.09	1.09	10.84	0.13
October	0.97	5.14	0.12	1.01	5.78	0.15
November	1.62	5.05	0.24	1.67	5.81	0.27
December	2.12	4.42	0.62	2.03	4.14	0.59
ANNUAL	24.08	40.31	13.40	23.67	41.46	12.77

TABLE 5

THAMES RIVER BASIN - FLOOD DATA

Location	Drainage Area (sq.mi.)	March 1936 Stage (msl)	March 1936 Discharge (cfs)	September 1938 Stage (msl)	September 1938 Discharge (cfs)	August 1955 Stage (msl)	August 1955 Discharge (cfs)
Willimantic River							
South Coventry	121	251.2	7,880	257.1	15,500	257.7	24,200
Shetucket River							
Willimantic	401	149.8	23,900	159.0	52,200	148.8	21,300*
Norwich (Greenville)	1,260	32.0	51,500	35.0	75,000	36.0	56,000*
Quinebaug River							
Jewett City	711	87.1	29,200	84.8	22,800	92.1	40,700
Putnam	331	234.0	17,200	236.2	20,900	243.3	48,000
Quinebaug	157	355.0	10,500	357.7	19,000	360.5	49,300
Westville	94	-	4,420	-	8,400	553.8	17,500
French River							
Webster	85.3	-	4,700	-	2,700	432.8	14,400

* Affected by regulation at Mansfield Hollow Reservoir

approximately 3 inches. In addition, minor ice jams and failure of many small dams aggravated the flood. The first peak surpassed the previous record flood in most of the basin and is still the maximum of record along the Moosup River. The second occurred before extensive pond and swamp storage became available and the ground thoroughly dried out. Heavy rainfall in the second storm, from 3 to 5 inches, caused rivers to rise to levels surpassing the first in most parts of the basin.

24. FLOOD OF JULY 1938

The July 1938 flood was generally smaller than the March 1936 event. The storm averaged about 5 inches in the basin and occurred when conditions were favorable for heavy runoff. Precipitation during June was well above normal minimizing the amount of available storage in the ponds and swamps and maintaining a high ground water table. Considerable portions of the lower Quinebaug River and its tributaries as far north as the French River were flooded and considerable damage was evident.

25. FLOOD OF SEPTEMBER 1938

The September 1938 event, the flood of record along the Shetucket and Natchaug Rivers, was accompanied by a disastrous hurricane and 10-14 inches of rainfall was recorded in the basin. Rainfall during the previous month was heavier than normal, thereby tending to reduce initial storage and infiltration losses. In the lower reaches of the Shetucket and Yantic Rivers the flood peak almost synchronized with the hurricane tidal surge.

26. FLOOD OF AUGUST 1955

The August 1955 flood, produced by intense rainfall associated with hurricane Diane, was preceded by substantial rainfall from hurricane Connie one week earlier. Hurricane Connie deposited from 3-6 inches of precipitation in the Thames basin. As the 1955 summer was hot and dry, a large percentage of Connie's rainfall was absorbed by the soil. Hurricane Diane produced rainfall from 2 inches in New London to 10-16 inches in the headwaters, resulting in the flood of record in the Quinebaug, French and Willimantic River basins. Flood hydrographs for the August 1955 flood are shown on plates 12 and 14.

27. FLOOD DAMAGES

Only fragmentary records are available of the losses that

occurred in the Thames River basin prior to 1936. Basin damages experienced in the floods of March 1936 amounted to $7,220,000 of which $3,340,000 occurred in Massachusetts and $3,880,000 in Connecticut. The July 1938 flood caused damages of $180,800 in the basin. The general flood of September 1938 resulted in the loss of three lives and damages of $11,500,000 of which more than $4,600,000 were on the Shetucket River between Willimantic and Norwich. Losses in the basin during the major flood of August 1955 amounted to $58,700,000 and a loss of eight lives, of which $32,600,000 and all the loss of life occurred in Massachusetts. The French River and upper reaches of the Quinebaug River together accounted for almost 60 percent of the total loss in the basin. The loss along the Willimantic and Shetucket Rivers amounted to about 10 percent of the total. Regulation provided by Mansfield Hollow Reservoir and Norwich Channel Improvement reduced the overall loss in this area by an estimated $4,300,000. Distributions of experienced damages in the March 1936, September 1938 and August 1955 floods by tributaries are shown in table 6. Stage-damage curves for the basin are shown on plate 10.

TABLE 6

EXPERIENCED FLOOD LOSSES THAMES RIVER BASIN
(In Dollars)

Tributary	March 1936 Flood	September 1938 Flood	August 1955 Flood
French River	$3,132,000	$ 159,000	$15,220,000
Moosup River	41,000	-	-
Quinebaug River	2,284,000	4,550,000	37,420,000
Natchaug River	418,000	837,000	25,000
Willimantic River	306,000	840,000	5,650,000
Hop River	28,000	165,000	20,000
Shetucket River	930,000	4,614,000	365,000
Yantic River	68,000	335,000	-
Others	13,000	-	-
TOTAL	$7,220,000	$11,500,000	$58,700,000

28. FLOOD PROBLEM

Flooding in the Thames River basin can be expected to occur in any season of the year. The basin is susceptible to inundation caused by heavy rain or in a combination with melting snow. Runoff id rapid due to general hilly topography. Flooding has been aggravated by inadequate channels, restricted bridge openings and small dam failures. Many areas in the flood plain contain industrial and commercial developments as well as residential sections. The problem therefore is twofold and consists of (1) controlling general flooding of the narrow river valleys which contain most of the settled areas and utilities of the basin; and (2) providing necessary protection against the inundation of industrial and urban areas concentrated in several cities and scattered along the principal tributaries in small mill communities.

29. FLOOD CONTROL PLANS

Full consideration has been given to the several methods of preventing flood damages in the Thames River basin. The communities and manufacturing plants in principal damage areas are so well established that their relocation would obviously be impractical and costly. Topographical features preclude any practical possibility of diverting floodwaters to adjoining watersheds or from one tributary drainage area to another within the basin. Channel improvement, including excavation and removal of obstructions, alterations to existing bridges to increase clear openings, and the installation of crest gates on existing dams, were considered in detail as a possible solution to the flood problems at major damage centers of Webster, Southbridge, Putnam, Willimantic and Norwich. Dikes and walls to confine floodwaters were also investigated for highly developed damage areas in the major cities and towns of the basin. Flood control reservoirs located in the tributary headwaters were studied as a single solution to the problem and also in conjunction with local improvements.

30. ANALYSIS OF FLOODS

In order to determine the most effective flood control plan for the Thames River basin flood producing potentialities were analyzed using data on the March 1936, September 1938 and August 1955 floods. For purposes of hydrologic and hydraulic analyses, the Shetucket and Quinebaug Rivers were divided into basin subdivisions and routing reaches with limits at the mouth of principal tributaries and at

points such as gaging stations and dams where streamflows could be computed. Observed hydrographs were used where available. For ungaged areas, flood hydrographs were developed synthetically from observed streamflow and rainfall data for comparable gaged areas. Component hydrographs from the basin subdivisions were routed to determine their contributions to the peak discharges at downstream damage centers, allowance being made for the distance of travel, character of the reach, amount of intervening inflow and relative timing of peak flows.

a. Shetucket River. The analyses indicate that the Shetucket River is the major contributor to peak floodflows at Norwich, Connecticut situated on the river just below the mouth of the Quinebaug River. The highest contributions to floodflows on the Shetucket River come from the 3-streamed fan-shaped watershed of the Natchaug River where narrow valleys and steep slopes tend to produce high rates of runoff. High floodflows are also experienced on the Willimantic River and flood crests on this tributary synchronize with those of the Natchaug River at their confluence in Willimantic. Although the Yantic River has minor flood problems within its own basin, it does not contribute appreciably to inundation at Norwich or the Thames River proper.

b. Quinebaug River. Flood development on the Quinebaug River is influenced by the long, narrow shape of its basin and the amount of natural storage in numerous swamps, lakes and mill ponds. Although the flood crest from the Quinebaug River usually falls on the recession side of the flood hydrograph at Norwich about one day later than the peak, the Quinebaug River is still a substantial contributor to flood peaks at Norwich. Tributaries to the Quinebaug River above Southbridge, Massachusetts and the Little and French Rivers above their confluence have moderate slopes which are conducive to rapid runoff and severe flooding at Putnam, Southbridge, and other points in the headwaters. Between Putnam and Jewett City in Connecticut the Quinebaug River has flood characteristics that differ distinctly from those of the upper portion of the river and the Shetucket River. The flatter slope and relatively large amount of available valley storage provide a reducing and retarding influence on flood crests as they move downstream in this reach of the river. Flood crests on the Fivemile, Moosup and Pachaug Rivers tend to synchronize with the Quinebaug River crests but their contributions to the flood peak are reduced because of the extensive artificial and valley storage above Webster. Consequently, the French River flood crests arrive at the mouth of the French River on the

recession side of the main Quinebaug River hydrograph. The studies also indicated that the local areas immediately above the damage centers in the Quinebaug basin are the prime contributors to the peak flows

31. STANDARD PROJECT FLOODS

Examination of the records of great storms in the Thames River basin and adjacent watersheds indicates that somewhat greater floods than those previously experienced may be expected to occur in the future, therefore, standard project floods were developed to be used as a guide in determining flood control requirements in the basin. Due to geographical distribution of the damage centers, two standard project floods were developed, one with the storm centered over the upper Quinebaug River basin and the second, with the storm centered over the Willimantic River. Standard project storm rainfall was determined as described in Civil Engineer Bulletin 52-8. Standard project flood hydrographs were determined by means of unit hydrographs and flood routings. Standard project flood peak discharges for selected points within the Thames River basin are shown in table 7 and on plates 16 and 18.

TABLE 7

STANDARD PROJECT FLOODS
THAMES RIVER BASIN

Location	River	Drainage Area (sq.mi.)	Peak Discharge (cfs)
South Coventry	Willimantic	121	38,000*
Willimantic	Natchaug	169	28,700*
Willimantic	Shetucket	401	80,300*
Norwich	Shetucket	1,260	129,000*
Webster	French	85	16,300**
Southbridge	Quinebaug	126	28,500**
Putnam	Quinebaug	331	55,000**
Jewett City	Quinebaug	711	61,500**

* Storm centered over Willimantic River basin
** Storm centered over Quinebaug River basin

32. SPILLWAY DESIGN FLOODS

Spillway design floods for each reservoir were determined using values of rainfall for the maximum probable storm obtained from Hydrometeorological Report 33 and minimum losses for the New England area. The probable maximum storm isohyetal pattern was located over the drainage area of each reservoir to produce the most critical spillway design flood inflow, which was derived by applying the respective rainfall excess values to adopted unit hydrographs for each damsite. The inflow hydrograph was routed through the reservoir surcharge storage assuming the reservoir initially full to spillway crest. The spillway design flood hydrographs are shown on plates 19 to 22.

FLOOD CONTROL PLAN FOR THAMES RIVER BASIN

33. GENERAL

A system of reservoirs supplemented by local protection works constitutes the most effective and adaptable plan for relieving the flood problem in the basin. The Corps of Engineers, Department of Agriculture and the States of Connecticut and Massachusetts have been active in planning and executing flood control projects and measures in the basin. Plans of these agencies are discussed in the following paragraphs.

34. CORPS OF ENGINEERS FLOOD CONTROL PLAN

The Corps of Engineers comprehensive plan consists of 8 reservoirs and 1 local protection project as shown in table 8. The local protection project and 6 reservoirs have been completed, while the remaining two are inactive. Effect of the completed projects on floodflows at the principal damage centers is shown in table 9 and on plates 11 through 18.

a. Mansfield Hollow Dam and Reservoir.

(1) Dam. Mansfield Hollow Dam at Mansfield Hollow, Connecticut is located on the Natchaug River about 5.3 miles upstream from its confluence with the Shetucket River at Willimantic, Connecticut (see plate 27). The dam, completed in 1952, is rolled filled earth with 6 dikes totaling approximately 15,000 feet in

TABLE 8

THAMES RIVER BASIN
CORPS OF ENGINEERS
COMPREHENSIVE FLOOD CONTROL PLAN

Reservoirs	River	State	Drainage Area (sq.mi.)	Flood Control Storage (acre-feet)	Status
Hodges Village	French	Mass.	31	13,250	1959*
Buffumville	Little	Mass.	26.5	11,300	1958*
East Brimfield	Quinebaug	Mass.	67.5	29,900	1960*
Westville	Quinebaug	Mass.	32**	11,000	1962*
West Thompson	Quinebaug	Conn.	74**	25,600	1965*
Mansfield Hollow	Natchaug	Conn.	159	49,200	1952*
Andover	Hop	Conn.	52	16,800	Inactive
South Coventry	Willimantic	Conn.	114	36,900	Inactive
Local Protection Project					
Norwich	Shetucket	Conn.	1260	-	1959*

* Year completed
** Net drainage area

TABLE 9

EFFECT OF FLOOD CONTROL RESERVOIRS AT DAMAGE CENTERS

River	Damage Center	Low Water Stage (ft)	March 1936 Flood				September 1938 Flood			
			Natural		Modified		Natural		Modified	
			Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)
Quinebaug	Southbridge, Mass. American Optical Company Dam Headwater	0.0	4.8	6,500	2.6	3,400	6.8	13,000	2.6	3,400
Quinebaug	Putnam, Conn. USGS Gage	2.0	17.5	17,000	10.9	6,500	19.5	20,900	10.2	5,600
Quinebaug	Jewett City, Conn. USGS Gage	4.0	24.0	29,200	21.8	22,900	21.7	22,800	15.7	11,900
French	Webster, Mass. USGS Gage	4.5	15.9	4,700	9.7	1,500	12.4	2,800	8.8	1,200
Shetucket	Willimantic, Conn. USGS Gage	2.0	18.4	23,900	13.5	12,900	27.6	52,200	19.1	25,700
Shetucket	Norwich, Conn. Greenville Dam Headwater	20.0	30.6	51,500	29.0	37,200	33.6	75,000	30.6	47,200

River	Damage Center	Low Water Stage (ft)	August 1955 Flood				Standard Project Flood			
			Natural		Modified		Natural		Modified	
			Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)
Quinebaug	Southbridge, Mass. American Optical Company Dam Headwater	0.0	11.4* 8.4**	36,000* 20,400**	8.1* 3.3**	24,500* 8,000**	10.2	28,500	3.0	9,600
Quinebaug	Putnam, Conn. USGS Gage	2.0	26.5* 25.6**	48,000* 43,800**	16.0* 14.8**	14,100* 12,000**	27.5	55,000	18.6	19,300
Quinebaug	Jewett City, Conn. USGS Gage	4.0	29.0	40,700	19.9	17,500	35.5	61,500	28.6	39,500
French	Webster, Mass. USGS Gage	4.5	26.0	14,000	16.2	4,900	27.5	16,300	19.5	7,600
Shetucket	Willimantic, Conn. USGS Gage	2.0	21.7	33,200	17.4	21,300	35.7	80,300	28.0	53,600
Shetucket	Norwich, Conn. Greenville Dam Headwater	20.0	33.6	65,000	28.6	35,200	40.6	129,000	36.8	94,000

* Includes dam failure on Cady Brook
** Assumes no dam failure on Cady Brook

NOTE: Reservoir system includes: Mansfield Hollow, Buffumville, Hodges Village, East Brimfield, Westville and West Thompson

length with a maximum height of 70 feet. The top of dam is at elevation 273.0 feet msl. The spillway as shown on plates 29 and 30 is a concrete ogee section 690 feet long across the main stream with crest at elevation 257.0. The outlet works consist of five 5'-6" x 7'-0" conduits in the concrete spillway section. Two of the conduits (Nos. 3 and 4) have inverts at elevation 195.0, and three (Nos. 1, 2 and 5) have inverts at elevation 199.0. Each conduit is provided with one service gate hydraulically operated with individual control as shown on plate 30. Normal tailwater is controlled by a small stone dam located approximately 300 feet downstream and owned by the G. J. Kirby Company. Crest of the dam is elevation 198.7. Weirs, shown on plate 31, are located upstream of gates 1 and 2 to maintain the recreation pools automatically at the required elevations.

(2) Reservoir. The Mansfield Hollow Dam creates a reservoir at spillway elevation 257.0, with 49,200 acre-feet of storage which is equivalent to 5.8 inches of runoff from the drainage area of 159 square miles. The water surface, as outlined on plate 28, will cover an area of 1,880 acres with a maximum depth of 62 feet. The reservoir will extend up the Natchaug River approximately 3.0 miles, Mount Hope River about 2.3 miles and Fenton River about 3.2 miles. Approval was received from OCE in 1964 to maintain a recreation pool at elevation 211.5 (16.5' stage) from 1 May until Labor Day, after which the pool will be lowered to elevation 205 and maintained at this minimum level until the following 1 May. At elevation 211.5 the pool has an area of 450 acres, containing 2,800 acre-feet or 0.33 inch of storage. At elevation 205 the pool has an area of 200 acres, containing 580 acre-feet or 0.07 inch of storage.

(3) Chapin Brook dike. Part of the dam, designated as dike "B" and shown on plates 32 and 33, is constructed across Chapin Brook in order to prevent the reservoir from inundating Mansfield Center during high reservoir stages. A conduit is provided through dike "B" to permit Chapin Brook to continue to flow into the Fenton River except during high reservoir stages. This brook, having a drainage area of 2.34 square miles, will form a reservoir with 520 acre-feet of storage (4.2 inches) at elevation 245, and 760 acre-feet (6.1 inches) at elevation 250. Elevation 245 is considered to be the maximum desirable elevation, but stages higher than this will cause only minor damages. A rectangular conduit 4'-0" x 5'-0" has invert elevations established at 218.0 at the entrance and 216.0 at the exit to conform to existing

topography. The conduit is about 230 feet long and furnished with a backwater gate on the exit end and a sluice gate to provide positive closure when high reservoir stages occur. The discharge capacity of the conduit with pool at elevation 245.0 is about 450 cfs. In the event of a storm occurring concurrently with a high stage in Mansfield Hollow Reservoir, the runoff would be stored until the reservoir stage had dropped sufficiently to permit discharge from Chapin Brook.

(4) Real Estate. The taking line for the acquisition of property has been generally established at elevation 260.0, which is 3 feet above spillway crest. However, there are many properties below the taking line for which flowage easements have been procured in lieu of direct acquisition. During flood periods when high reservoir stages are expected, all affected residents will be immediately notified of conditions. It is also possible that a rare flood may cause the reservoir to rise above the taking line which would also require immediate warning to all concerned. Appendix A includes an itemized list of residents affected by high reservoir stages.

b. Buffumville Dam and Reservoir

(1) Dam. Buffumville Dam, completed in 1958, is located on Little River 1.3 miles above its junction with French River in the town of Charlton, Massachusetts, 5 miles northeast of Webster, Massachusetts and 15 miles north of Putnam, Connecticut. The dam (as shown on plate 35) consists of a rolled fill embankment with a concrete spillway section. The rolled fill earth embankment section of the dam is 3,255 feet in length having an average height of 25 feet and maximum of 66 feet above the streambed with top elevation at 539 feet msl. Top width of the dam is 20 feet with a 14-foot surface roadway. The overflow concrete ogee spillway with a crest length of 220 feet at elevation 524.0 is joined to the earth dam by concrete nonoverflow gravity walls at each end. The outlet works, located in the center of the spillway, consist of three 3'-0" x 4'-6" gated rectangular conduits, with inverts at elevation 481.5 feet msl. Flow through the outlets is controlled by three 3'-0" x 4'-6" electrically operated slide gates. The piers between the gate passages are elongated on the upstream side to form a weir for controlling a permanent recreation pool.

(2) Reservoir. Buffumville Reservoir at spillway elevation 524.0 contains a net storage of 11,300 acre-feet, equivalent to

8.0 inches of runoff from a drainage area of 26.5 square miles as shown on plate 38. The water surface covers an area of 530 acres with a maximum depth of 43 feet as shown on plate 34. The reservoir will extend up the Little River approximately 1.7 miles north and 1.9 south. The general area of the Buffumville Reservoir is rural with a few small hamlets nearby. The reservoir at full pool inundates 2 ponds and a reservoir. Normal elevation of the recreation pool at 492.5 feet msl creates a lake 2-1/4 miles in length and an average width of 0.1 mile providing a surface area of 200 acres and storage of 1,400 acre-feet, equivalent to 1.0 inch of runoff.

(3) Pierpoint Meadow pond dike. A rolled fill dike, 610 feet long, is constructed in a saddle at the south end of Pierpoint Meadow pond, 2-3/4 miles from the spillway. The top of the dike is elevation 539.0 feet msl, the same as the dam. The top width of the main dike and the ramp is 24 feet and has a 16-foot bituminous treated gravel pavement flanked by 4-foot gravel shoulders. The section of the dike which will not carry a road is reduced to a width of 12 feet.

(4) Real estate. Over 50 percent of the land acquired is woodland with the remaining divided evenly between tillage, water and residential areas. For this project, 488 acres have been acquired in fee simple. This acreage includes those lands necessary for permanent structures and borrow areas, and the lands below the 5-year flood frequency (510 feet). The lands between the fee taking and guide taking lines have been acquired in flowage easement. The flowage guide taking line established at elevation 529 feet is 5 feet above spillway crest. The flowage easement area amounts to approximately 273 acres.

c. Hodges Village Dam and Reservoir

(1) Dam. Hodges Village Dam, completed in December 1959, is located on the French River 15 miles above its confluence with the Quinebaug River at Hodges Village in the town of Oxford, Massachusetts about 5 miles north of Webster, Massachusetts. The dam, shown on plate 40, consists of an earth and rock fill embankment with a concrete ogee spillway section. The rolled fill earth embankment section of the dam is 2,050 feet in length with a maximum height of 55 feet. Top of dam is at elevation 520 feet msl. The ogee weir, 125 feet long, has a spillway crest elevation of 501.0 feet. The outlet works consist of two 5' x 6' conduits having inverts at elevation

465.5. Each is provided with one service gate 5' x 6' with electrically controlled slide.

(2) Reservoir. Hodges Village Reservoir at spillway elevation 501 contains 13,250 acre-feet of storage, equivalent to 8.0 inches of runoff from a drainage area of 31.1 square miles. The water surface, shown on plate 39, covers an area of 740 acres with a maximum depth of 36 feet. Hodges Village Reservoir extends about 3 miles upstream and is located in the town of Oxford, Massachusetts. There is no recreation pool at this reservoir.

(3) Dikes. Included in the project are 4 earth dikes which are necessary for closing saddles in the reservoir perimeter. The dikes, shown on plate 39, have a total length of 2,600 feet and a maximum height of 520.0 feet msl.

(4) Real estate. Land in the Hodges Village Reservoir area may be described generally as slightly hilly with the French River carving a shallow valley which forms the reservoir bed. The land purchased in fee (264 acres) includes those necessary for permanent structures, borrow areas, and roads for the relocation of the town of Oxford Well Fields. Remainder of the reservoir area, 843 acres, below the guide taking line of 504.0 feet msl is taken as a flowage easement.

d. East Brimfield Dam and Reservoir

(1) Dam. East Brimfield Dam, completed in June 1960, is located on the Quinebaug River 64.5 miles above its confluence with the Shetucket River and 1 mile southwest of the village of Fiskdale in the town of Sturbridge, Massachusetts. The dam, shown on plate 45, is a rolled earth fill and rock embankment with a concrete ogee spillway section. The overflow concrete ogee spillway is 75 feet long with crest elevation at 653.0 feet msl. The rolled earth fill embankment section of the dam is 520 feet in length with a maximum height of 55 feet. Elevation at the top of the dam is 672.2 feet msl. The outlet works, located on the right bank, include a 10'-6" horseshoe-shaped conduit approximately 210 feet long, service bridge, and an intake with stoplog facilities for maintenance and emergency use in lieu of emergency gates. Two 6'-3" x 11'-0" sluice gates, electrically operated, with invert at elevation 619.0 control the flow through the reservoir. The discharge capacity of the outlet with pool at spillway crest is 2,850 cfs.

(2) Reservoir. East Brimfield Reservoir at spillway elevation 653.0 contains a gross storage of 32,200 acre-feet, equivalent to 8.9 inches of runoff from a drainage area of 67.5 square miles. The reservoir at spillway crest extends about 5.5 miles upstream and has a surface area of 2,270 acres. A conservation and recreation pool with a surface area of 360 acres at elevation 632 (13-foot stage) has been provided upstream from the intake. The pool is maintained by a concrete box weir around the intake structure as shown on plate 48. The weir contains 8 stoplog sections and two 24-inch square gates for release of the conservation storage. At elevation 632, the pool has a storage capacity of 2,320 acre-feet, equivalent to 0.64 inch of runoff.

(3) Real estate. The general area of the East Brimfield project is rural and consists chiefly of woodland with a few cleared fields for small farm units. There are many lakes in the region and along the shores are summer homes and resorts. The terrain is very hilly with hills tending to run in a north-south direction, and the reservoir, at flood stage, will cover a large swamp which is in a valley formed by these hills. The area below elevation 634, 2 feet above the permanent pool, has been cleared and contains approximately 400 acres. For this project 2,138 acres have been acquired in fee simple. This acreage includes those lands necessary for permanent structures and borrow areas, and the lands below the 5-year frequency line (elevation 645.0 feet). A flowage easement for 649 acres has been taken for land between the fee taking line (645.0 feet) and the flowage guide taking line at elevation 656.0 which is 3 feet above spillway crest.

e. Westville Dam and Reservoir

(1) Dam. Westville Dam, completed in August 1962, is located on the Quinebaug River 56.7 miles above its confluence with the Shetucket River in the towns of Sturbridge and Southbridge, Massachusetts and 1.3 miles west of the center of Southbridge. The dam, shown on plate 51, consists of a rolled fill earth embankment with a concrete ogee spillway section. The rolled fill earth embankment section of the dam is 560 feet in length with a maximum height of 78 feet at elevation 587 feet msl. The overflow concrete ogee spillway, 200 feet long with crest elevation at 572.0 feet msl, is flanked by the control house structure on the right abutment and by a nonoverflow section at elevation 584.0 on the left bank. The outlet works located in the center of the spillway consist of 3 gated rectangular conduits with inverts at elevation 515.0 msl.

Three 4'-0" x 6'-0" electrically operated slide gates control the flow through the outlet works. Discharge capacity of the outlets is 3,750 cfs with the pool at spillway crest. A permanent U-shaped concrete weir containing 5 stoplog openings and located upstream of the center gate will control a recreation pool at elevation 525.0 msl.

(2) Reservoir. At spillway elevation 572.0 feet Westville Reservoir contains 11,000 acre-feet, equivalent to 6.5 inches of runoff from a net drainage area below East Brimfield Dam of 32.0 square miles (total drainage area is 99.5 square miles). At spillway crest the water surface, shown on plate 50, covers an area of 913 acres with a maximum depth of 57 feet. The reservoir extends about 2 miles within the town of Southbridge, and about 6.5 miles upstream within the town of Sturbridge. The recreation pool has a surface area of 23 acres and storage of 100 acre-feet, equivalent to 0.10 inch of runoff.

(3) Real estate. The general project area contains woodland, homesites and summer camps, an industrial enterprise and several commercial entities including "Old Sturbridge Village." The latter enterprise lies near the center of Sturbridge and is made up of restored early colonial buildings, identical with those previously constructed in various parts of New England during early colonial days. The portion of the reservoir below elevation 530 which is 5 feet above the level of the recreation pool has been cleared. The area at this elevation is 44 acres of which 17.5 are wooded. The minimum guide taking line has been established at elevation 574.0. The total area is approximately 1,039 acres of which 573 have been acquired in fee to provide construction, clearing and borrow areas and the reservoir area to elevation 563.0. The flowage easement area is between elevations 574.0 and 577.0. The remainder of 466 acres have been acquired under suitable flowage easement. A portion of "Old Sturbridge Village" including a number of buildings and scenic structures are within the flowage easement area.

f. West Thompson Dam and Reservoir

(1) Dam. West Thompson Dam, completed in 1965, is located on the Quinebaug River in the town of Thompson, Connecticut. The site is in the village of West Thompson 2.0 miles upstream from the city of Putnam, Connecticut. The dam, shown on plate 55, consists of a rolled earth fill embankment with a maximum height of 70 feet, and a length of 2,550 feet. The top of the embankment is elevation

362 with a side channel spillway 320 feet long and crest elevation at 342.5. The outlet works located near the right abutment consists of a 12-foot diameter horseshoe-shaped conduit with three 5'-0" x 9'-0" gates. Three electrically operated slide gates control the flow through the outlet works with gate sill at elevation 292.0 msl. The channel immediately upstream of the outlet works includes a weir with provisions for stoplogs to maintain a recreation pool at elevation 305, which is 13 feet deep at the gate sills.

(2) Reservoir. At spillway elevation 342.5 West Thompson Reservoir contains 25,600 acre-feet, equivalent to 6.5 inches of runoff from a net drainage area of 74 square miles (total drainage area is 174 square miles). The water surface at spillway crest, shown on plate 54, extends about 7 miles upstream of the dam in the town of Thompson and covers an area of 1,250 acres with a maximum depth of 40 feet. The recreation pool at elevation 305.0 (stage 13) covers an area of 200 acres.

(3) Dike. A rolled fill dike, 600 feet long, is located in a saddle about 3,500 feet north of the left abutment of the dam. The top of the dike, similar to the dam, is elevation 361.5 feet msl.

g. Norwich Local Protection Project

(1) Description of project. The project, located near the civic center of Norwich, Connecticut, extends downstream from the New Haven railroad bridge to about 300 feet downstream of the Laurel Hill bridge. The project consists of widening and deepening a 700-foot reach of the Shetucket River. The improved channel is 108 feet wide at the Laurel Hill bridge and extends in depth 32 feet below mean sea level. At the upstream and downstream limits, respectively, the widths are 140 and 132 feet and the depths 20 and 26 feet below mean sea level. Transition sections at each end grade the widening and deepening into the dimensions of the existing channel. The major portion of the project is excavated in rock except for a 150-foot reach along the right (north) bank of the river, immediately below the railroad bridge, which is excavated in earth and the slope protected with dumped rock. A plan of the project is shown on plate 58.

(2) Construction history. Construction of the initial portion was started in June 1947 and completed in March 1949. Work on the final section was initiated in September 1957 and completed in

January 1959. The completed project necessitated removal of approximately 30,000 cubic yards of rock. Completion of the project also required removal of the old Laurel Hill bridge which was replaced with a new bridge, all of which was accomplished by the Connecticut State Highway Department. Federal cost of the channel improvement was approximately $1,210,000. An O&M Manual is available for further details.

35. DEPARTMENT OF AGRICULTURE PROJECTS

The U. S. Department of Agriculture under Public Law 566 has a program of land management designed to produce benefits for individual landowners and to reduce certain local flood damages. The program includes farm ponds, land treatment measures, floodwater retarding structures and channel improvements. Miscellaneous farm ponds and land treatment measures have been carried out throughout the basin. Use of floodwater retarding structures and channel improvement have been concentrated in the upper Willimantic River basin in the Furnace Brook - Middle River watersheds above Stafford Springs. Listed below and shown on plate 1 are the following completed projects:

Project	Job Number	Drainage Area (sq.mi.)	Storage Acre-Feet	Storage Inches
Whitney	1	2.9	1,167	8.4
Ellis	2	1.5	654	8.9
Pomeroy	3	1.4	701	8.4
Bradway	4	1.2	6,130	8.0
Ellithorpe	5	10.3	3,930	8.3
Shenipsit	6	1.0	370	8.2
Channel Improvement	7	53.0	-	-

36. NON-FEDERAL IMPROVEMENTS

Along the French River in Webster, the Commonwealth of Massachusetts has improved the channel, installed a dike and floodwall, and removed a dam. In Southbridge, the state has improved several brooks flowing into the Quinebaug River, notably, Nuisance, Cohasse and Cady. In Putnam, the State of Connecticut has installed a stoplog structure, improved the channel, modified a dam with a bascule gate and razed several low-lying residences along the Quinebaug River. It has established flood plain encroachment lines along the major streams in the State of Connecticut. No erection of additional structures or replacement of existing structures will be allowed within these encroachment lines. In addition, local town authorities and individual property owners in Massachusetts and Connecticut have made some improvements based on their experiences during the August 1955 flood.

37. OPERATION AND MAINTENANCE OF FLOOD CONTROL PROJECTS

Operation and maintenance of the completed flood control reservoirs are under the supervision of the New England Division, Corps of Engineers. The Department of Agriculture dams are maintained by local interests, but with ungated outlets and spillways the projects operate automatically as retarding basins. The completed local protection projects at Norwich, Putnam, Webster and Southbridge are maintained by local interests. Operation is generally automatic except for a few minor conduit closures in the dike at Webster and stoplog structure in Putnam which must be made manually.

REGULATION OF NED FLOOD CONTROL RESERVOIRS

38. ORGANIZATION

An organization chart of the New England Division, Corps of Engineers for both normal operation and flood regulation of its flood control reservoirs is shown on plate 23. General routine supervision of the dams and reservoirs comes under the jurisdiction of the Maintenance Branch in the Operations Division. The Reservoir Regulation Section (RRS) in the Hydrology and Hydraulics Branch, Engineering Division is responsible for the flood control regulation of the reservoirs. Instructions from RRS are given directly to the damtender with advisory reports forwarded to the Operations Division.

The RRS is also responsible for monthly reports on reservoir regulation, continuing studies on regulation procedures, analysis of actual flood operations, establishment and maintenance of a reporting network, and training of personnel.

39. ASSIGNMENTS AND DUTIES

Plate 23 shows the NED dams operable at present and names of the dam operators and their assistants. The assignments of RRS personnel are applicable during alerting reports and minor regulation periods, primarily during off-duty hours. The normal staff of RRS will be supplemented during major flood emergencies by other Engineering Division personnel. A duty roster, plate 24, will be prepared whenever RRS is mobilized for flood regulation duty. The number of personnel required for duty will depend on the severity and areal extent of the flood. Duty rosters will be filled in to show the hours and assignments of the various personnel on duty. The duty assignments are divided into two main categories:

a. Regulator. Duties consist of appraising the flood situation and possible future developments, determining desirable regulation of the reservoirs according to procedures in the various regulation manuals and SOP's, and issuing regulation instructions to the dam operators.

b. Analyst. Duties consist of organizing and analyzing basic data received from the dams and maintaining up-to-date flood progress charts for the respective reservoirs and various river index stations.

40. COMMUNICATIONS

Communications between the dam operators and RRS during working hours will be by NED Radio Network. If radio is inoperative and unavailable, telephone will be used. Instructions during nights, weekends and holidays will be issued by telephone from the homes of RRS personnel unless severity of the flood requires the office to be opened and NED radio station WUA is manned.

HYDROLOGIC DATA REPORTING NETWORK

41. GENERAL

A reporting network for hydrologic data has been established for

the Thames River basin in order to provide the dam tenders and RRS with prompt data on rainfall and runoff conditions. Emphasis in the reporting network has been placed on river stations due to the short time of runoff concentration in the basin. Rainfall reports are used primarily for purposes of alerting RRS and providing an appraisal of the location and severity of the storm. Snow surveys give an indication of water equivalent of the snow and snowmelt potential in the basin. To avoid duplication of effort, reporting networks have been established in cooperation with the USWB, USGS and local authorities. Reports from the network stations are received weekly during nonflood periods. During storm periods, rainfall and river reports are received every 24 hours and as frequently as every 3 hours during severe rainstorms or hurricanes.

42. RAINFALL REPORTING NETWORK

A rain gage, either recording or nonrecording, is located at all Corps of Engineers dams. Several additional gages at other locations, shown on plate 1, are used to help fill out the network and give a more complete picture of the precipitation distribution during a storm. Stations in the rainfall reporting network for the Thames River basin are listed in table 10.

43. RIVER REPORTING NETWORK

An extensive reporting network of river stations upstream and downstream of flood control reservoirs has been established. Due to rapid runoff in the basin emphasis has been placed on stations at damage centers downstream of reservoirs, and computing reservoir inflow rather than gaging it. These selected river stations are shown on plate 1 and listed in table 11.

44. SNOW SURVEY NETWORK

Snowfall in the Thames basin, located in southern New England and near the coast, is less than that experienced in the inland or northern river basins. In addition, snowfall generally melts intermittently during the winter months rather than building up continually as in northern areas. As a result snowmelt is not as important a factor as it is in other parts of New England, but is considered more as a guide in regulation of the Thames River reservoirs. Snow surveys are made from January through April in the Thames basin on the same schedule as other NED snow surveys, i.e., survey of all courses on Mondays near the 1st and 15th of the month and selected

TABLE 10

RAINFALL REPORTING NETWORK

Precipitation Station	Type of Gage	Observer	Report To
Mansfield Hollow Dam	Rec.	NED Operator	-
Storrs	Rec.	University of Connecticut	Mansfield Hollow
Eastford (Natchaug State Forest)	*Nonrec.	State Forest Ranger	Mansfield Hollow
Tunnel Dam	*Nonrec.	Conn. Light & Power Company	Mansfield Hollow
Jewett City	Rec.	Jewett City Water Company	Mansfield Hollow
Buffumville Dam	Rec.	NED Operator	-
Hodges Village Dam	Nonrec.	NED Operator	-
East Brimfield Dam	Rec.	NED Operator	-
Westville Dam	Nonrec.	NED Operator	-
Southbridge	Nonrec.	Southbridge Water Company	Westville
Southbridge	Nonrec.	American Optical Company	Westville
West Thompson Dam	Rec.	NED Operator	-

* Future radio gage site

TABLE 11

RIVER REPORTING NETWORK

River	Location	Owner	Observer	Report To
Willimantic	Willimantic	American Thread Co.	American Thread Co.	Mansfield Hollow
Shetucket	Willimantic	USGS*	Telemark	Mansfield Hollow
Shetucket	Baltic	Town Personnel	Town Personnel	Mansfield Hollow
Shetucket	Norwich	Greenville Dam	City of Norwich	Mansfield Hollow
Quinebaug	Southbridge	American Optical Co.	American Optical Co.	Westville
Quinebaug	Putnam	USGS	Telemark	West Thompson
Quinebaug	Tunnel Dam	Connecticut Light & Power Company*	Connecticut Light & Power Company	Mansfield Hollow
French	Webster	USGS*	Telemark	Buffumville

* Future radio gage site

index courses on alternate Mondays. Snow courses listed in table 12 are also shown on plate 1. Water equivalent data (in inches) based on snow surveys made through 1967 are listed below:

Date	Shetucket River (Upper)			Quinebaug River (Upper)		
	Mean	Maximum	Minimum	Mean	Maximum	Minimum
1 Feb	1.20	3.2	0.0	1.66	3.8	0.0
15 Feb	1.41	4.6	0.0	2.21	4.9	0.0
1 Mar	1.30	3.2	0.0	2.15	5.2	0.0
15 Mar	1.00	1.9	0.0	1.99	4.7	0.0
1 Apr	0.18	0.6	0.0	0.23	0.7	0.0
15 Apr	0.00	0.0	0.0	0.00	0.0	0.0

45. O&M OF HYDROLOGIC INSTRUMENTS

Operation and maintenance of hydrologic instruments and equipment in the Thames Hydrologic Network are described in Appendix C.

WEATHER AND RIVER FORECASTS

46. WEATHER FORECASTS

Quantitative weather forecasts initiated by the U. S. Weather Bureau are received over the Massachusetts Weather Teletype Network by RRS as well as the usual daily weather forecasts. Additional weather and precipitation data and forecasts, when deemed necessary, are obtained by telephone from the USWB offices at Boston and Windsor Locks (Hartford).

47. RIVER FORECASTS (USWB)

The USWB River Forecast Center at Windsor Locks, Connecticut prepares and disseminates river forecasts and flood warnings to the

TABLE 12

SNOW COURSES

Location	Elevation (msl)	Latitude	Longitude	Record Started
Quinebaug R. (Upper)				
Leicester	1050	42-16-35	71-54-30	Jan 1958
Douglass	840	42-03-30	71-49-40	Jan 1961
Quinebaug	380	42-01-30	71-57	Jan 1958
Hodges Village	520	42-07-10	71-53-15	Jan 1961
North Oxford	630	42-10-30	71-53-50	Jan 1960
Spencer	1050	42-12-00	71-58-50	Jan 1961
Wales	1000	42-04-10	72-14-10	Jan 1961
Sturbridge	640	42-06-15	72-04-30	Jan 1958
East Brimfield	550	42-06-15	72-08-45	Jan 1958
Shetucket R. (Upper)				
Mansfield Hollow Dam	250	41-45-30	72-11	Jan 1958
Spring Hill	620	41-47-30	72-14	Jan 1958
South Willington	450	41-50-30	72-18	Jan 1958
Stafford Springs	450	41-56-30	72-18-30	Jan 1958
Union	930	41-59-30	72-09-30	Jan 1958
Kenyonville	600	41-55-30	72-05	Jan 1958
Eastford	440	41-50-30	72-05-30	Jan 1958

general public. These river forecasts and warnings are received over the Massachusetts Weather Teletype Network by RRS. In the Thames basin, stage forecasts are made for Willimantic and Jewett City. Supplementary information, when deemed necessary, is obtained by telephone from the River Forecast Center.

48. RIVER FORECASTS (C OF E)

Provisional curves for forecasting flood peaks at Willimantic, Norwich, Southbridge, Webster, Putnam and Jewett City have been developed for Corps of Engineers use only. These curves are based on total storm rainfall (either observed or forecasted) and antecedent conditions. Forecast curves are included in Appendix A.

RESERVOIR REGULATION - NORMAL PERIODS

49. POSITION OF GATES

Normal settings for flood control gates have been determined for each dam and are listed in Appendix A. These settings are maintained at all times unless instructed by RRS to do otherwise. No regulation of the gates is required for increases in discharge where downstream channel capacities are not exceeded.

RESERVOIR REGULATION - LOW FLOW PERIODS

50. CONSERVATION STORAGE

A contract exists between the United States Government and the American Optical Company at Southbridge, Massachusetts whereby approximately 1,140 acre-feet of storage in the East Brimfield Reservoir between stages 9.0 and 13.0 feet are available for use by the American Optical Company in regulating the flow of water on the Quinebaug River for their water supply purposes. Low flow releases from East Brimfield Reservoir will be made only at the request of the American Optical Company and are subject to specific conditions enumerated in Appendix A. East Brimfield is the only NED project in the Thames basin with conservation storage.

RESERVOIR REGULATION - FLOOD PERIODS

51. BASIC CRITERIA

Reservoirs are operated primarily for the following communities:

Reservoirs	River	Communities
Mansfield Hollow	Shetucket	Willimantic to Norwich
East Brimfield and Westville	Quinebaug	Sturbridge and Southbridge
Buffumville and Hodges Village	French	Webster to Putnam
West Thompson	Quinebaug	Putnam to Norwich

Regulation of the reservoirs for the index points usually will afford optimum reduction at other locations further downstream. Location of the index control points are shown on plates 1, 25 and 26. The safe channel capacities and stages, shown in table A-1, have been compiled from past observations and flood damage surveys and may be subject to minor modifications based on future observations and experience.

To facilitate the coordinated regulation of all projects, detailed reservoir regulation procedures and methods are shown in Appendix A. Guide and forecast curves, standard operating procedures (SOP), emergency operating procedures (EOP), emptying and spillway discharge schedules as well as outlet and spillway ratings, inflow curves, area-capacity data, percent and available storage curves for all projects are included in this same appendix.

52. PHASES OF REGULATION

Regulation of flow at the reservoirs in the Thames River basin may be considered in three phases during the course of a flood, namely, Phase I - appraisal and initial regulation during development of the flood; Phase II - regulation during the flood period and Phase III - emptying the reservoir following recession of the flood. These phases are illustrated in the examples of reservoir regulation on plates 11, 13, 15 and 17. Phase I is usually the most critical due to the short period of runoff concentration in the Thames River

tributaries. A prompt collection and analysis of reports are necessary to recognize the development of flood conditions. The following paragraphs briefly describe methods of regulation for individual reservoirs during these various phases, details of which are discussed in Appendix A.

53. PHASE I - APPRAISAL AND INITIAL REGULATION OF FLOW

Gates at the flood control dams are normally set at partially open positions so as to restrict flows in the event of flash floods. River forecasts based on rainfall and antecedent conditions are determined initially. Further restriction of flow is based on storm rainfall and river stages at the index points. Determination of these additional gate closures are based on guide curves which correlate channel capacities, concurrent river stages and flows, rates of rise and travel times at the various index points. The guide curves, included in Appendix A, cover all possible combinations of river stages and rates of rise, and prescribe the maximum allowable discharge from each dam. In most cases the guide curves give a reliable indication of how to restrict reservoir outflow. This is the case at Willimantic, Norwich and Webster where satisfactory flood data have been obtained in flood operations since completion of Mansfield Hollow, Buffumville and Hodges Village Dams. Other guide curves such as Southbridge and Putnam are conservative with a factor of safety included due to the lack of observed and experienced flood data since completion of East Brimfield, Westville and West Thompson Dams. Regulation based on the latter two guide curves for Southbridge and Putnam are therefore provisional and subject to future revision.

54. PHASE II - REGULATION DURING FLOOD PERIOD

Following the appraisal and initial regulation of flow, regulation of the reservoirs will continue as prescribed by the various guide curves during Phase II, the flood period, with rising downstream river stages and until rivers downstream have peaked. Transition from Phases I to II takes place after the first gate regulation. During Phase II, hydrologic and hydraulic data are collected, especially precipitation, river stages and other flood information available from local observers or on-site inspections by NED personnel.

55. PHASE III - EMPTYING THE RESERVOIRS

When downstream river index points have peaked and are starting to recede, Phase III - emptying of the reservoirs, shall commence.

Each reservoir shall be emptied as rapidly as possible without exceeding the safe channel capacity at the various index points, and subject to certain restrictions below each dam as discussed in Appendix A. During minor or moderate floods, emptying shall not commence until each index point has receded to channel capacity. However, during severe flood conditions when a major portion of reservoir storage has been utilized, it may be desirable to commence emptying the reservoirs before downstream flows have receded to channel capacity. The latter procedure should be followed whenever weather forecasts indicate further storm activity or flood damage conditions will safely allow a retardation in the flood recession.

EXAMPLES OF REGULATION

56. GENERAL

In order to test the prescribed regulation procedures and to determine their effectiveness the following floods were analyzed: March 1936, September 1938, August 1955, standard project floods - Shetucket and Quinebaug River subbasins, and spillway design flood. Results of these studies for the flood of August 1955 are shown on plates 11 through 14, standard project flood (Shetucket River subbasin) on plates 15 and 16, standard project flood (Quinebaug River subbasin) on plates 17 and 18, and spillway design floods on plates 19 through 22.

57. FUTURE STUDIES

Each flood occurring in the Thames River basin will be analyzed to determine the effectiveness of both the hydrologic reporting network and regulation procedures, especially forecast and guide curves. Channel capacities of the Quinebaug River at Sturbridge, Southbridge, Quinebaug, and from Putnam to Jewett City will be checked. The Hammond Plastic Company dam below Buffumville has been modified and the effect, if any, upon discharges from Buffumville will be checked. A radio hydrologic network is planned for installation in the near future.

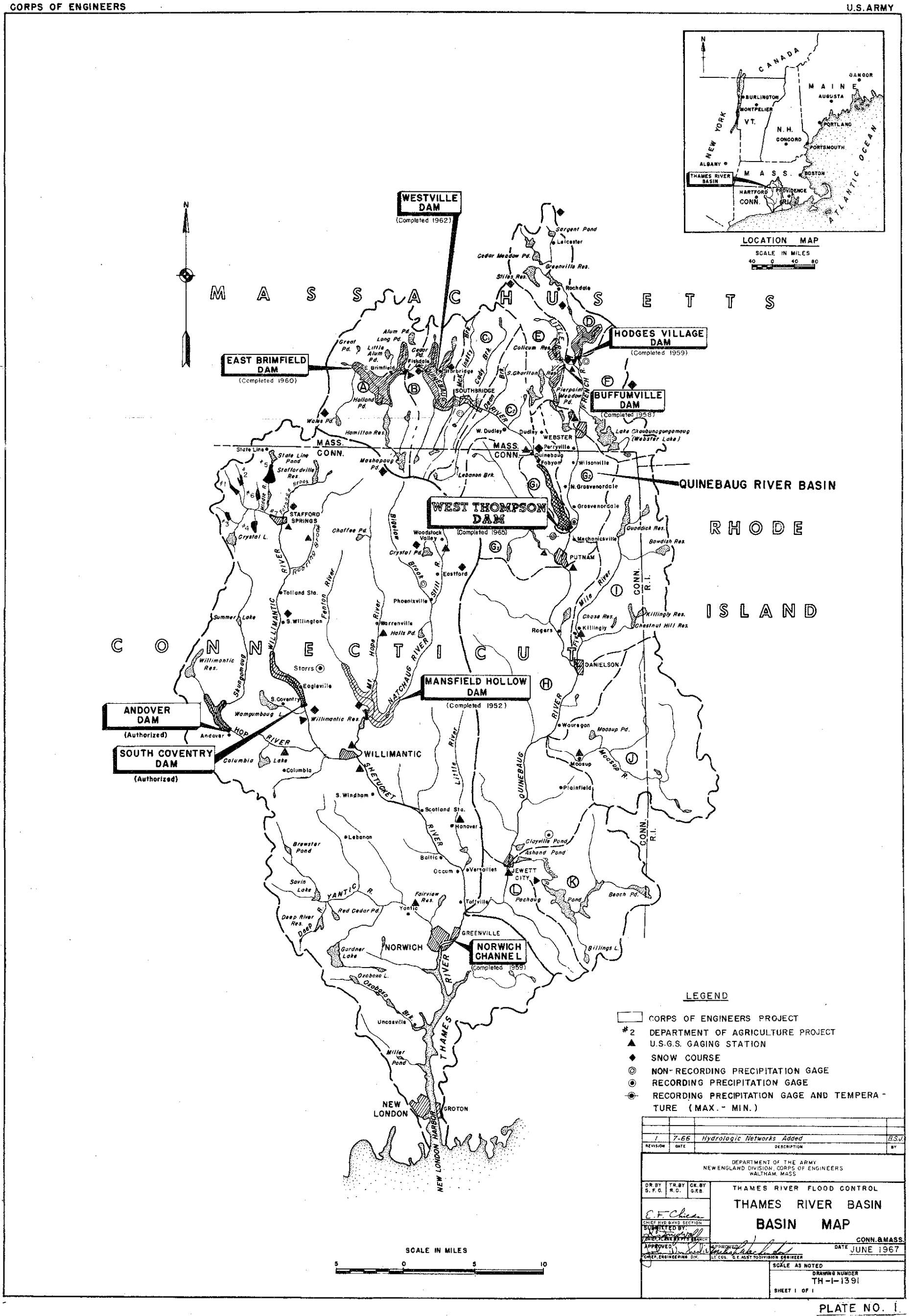
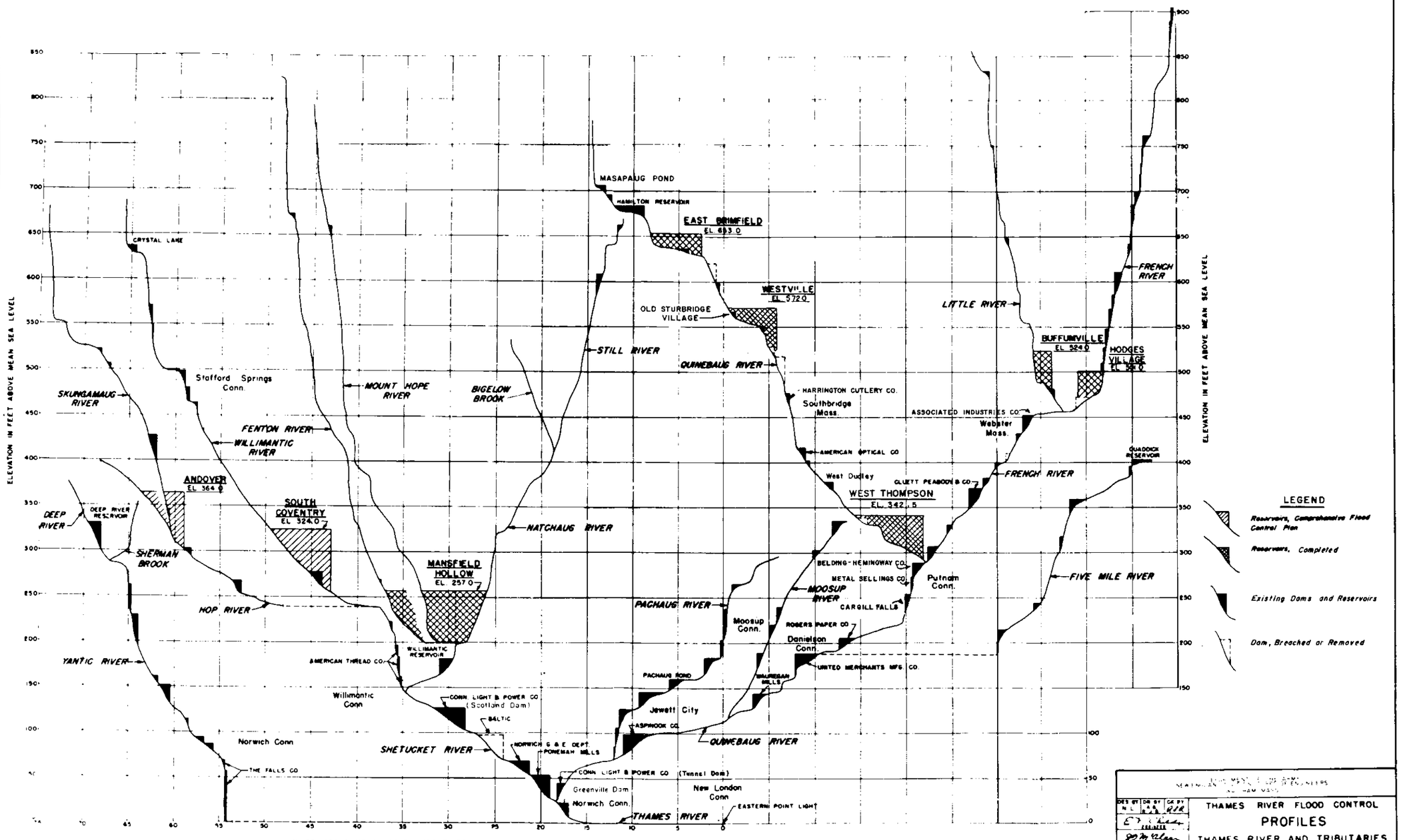

LOCATION MAP
SCALE IN MILES
40 0 40 80
CANADA
MAINE
BANGOR
AUGUSTA
BURLINGTON
MONTPELIER
VT.
N.H.
CONCORD
PORTLAND
PORTSMOUTH
NEW YORK
ALBANY
MASS.
BOSTON
THAMES RIVER BASIN
HARTFORD
PROVIDENCE
CONN.
R.I.
ATLANTIC OCEAN
WESTVILLE DAM
(Completed 1962)
EAST BRIMFIELD DAM
(Completed 1960)
HODGES VILLAGE DAM
(Completed 1959)
BUFFUMVILLE DAM
(Completed 1958)
WEST THOMPSON DAM
(Completed 1965)
MANSFIELD HOLLOW DAM
(Completed 1952)
ANDOVER DAM
(Authorized)
SOUTH COVENTRY DAM
(Authorized)
NORWICH CHANNEL
(Completed 1959)
QUINEBAUG RIVER BASIN
MASSACHUSETTS
RHODE ISLAND
CONNECTICUT
MASS.
CONN.
R.I.
WILLIMANTIC
NORWICH
GREENVILLE
NEW LONDON
GROTON
WEBSTER
SOUTHBRIDGE
STAFFORD SPRINGS
PUTNAM
DANIELSON
JEWETT CITY
Storrs
Eagleville
Willimantic Res.
Columbia Lake
Andover
Tolland Sta.
S. Willington
Eastford
Phoenixville
Warrenville
Hanover
Scotland Sta.
Baltic
Occum
Versailles
Toffville
Yantic
Lebanon
Brewster Pond
Savin Lake
Deep River Res.
Red Cedar Pd.
Gardner Lake
Oxoboxo L.
Oxoboxo Brk.
Uncasville
Miller Pond
Billings L.
Beach Pd.
Pachaug Pond
Claywille Pond
Ashland Pond
Moosup
Plainfield
Wauregan
Moosup Pd.
Rogers
Killingly
Killingly Res.
Chestnut Hill Res.
Chase Res.
Quaddick Res.
Bowdish Res.
Mechanicsville
Grosvenordale
N. Grosvenordale
Wilsonville
Perryville
Quinebaug
Fabyan
Dudley
W. Dudley
Lake Chaubunagungamaug (Webster Lake)
Pierpoint Meadow Pd.
S. Charlton Res.
Colicum Res.
Sargent Pond
Leicester
Cedar Meadow Pd.
Greenville Res.
Stiles Res.
Rochdale
Sturbridge
Fiskdale
E. Brimfield
Holland Pd.
Wales Pd.
Hamilton Res.
Mashapaug Pd.
Lebanon Brk.
Woodstock Valley
Crystal Pd.
Chaffee Pd.
Crystal L.
State Line
State Line Pond
Staffordville Res.
Willimantic Res.
Wamgumbaug L.
Summer Lake
Skungamaug
Fenton River
Hope River
Mt. Hope River
Bigelow Brook
Still R.
Mile River
Five Mile River
Little River
Moosup R.
Pachaug R.
Quinebaug River
Shetucket River
Yantic R.
Deep R.
Thames River
Natchaug River
Willimantic River
Roaring Brook
Middle R.
Furnace Brook
Cady Brk.
McKinstry Brk.
Dean Brk.
Little R.
French R.
Alum Pd.
Long Pd.
Great Pd.
Little Alum Pd.
Cedar Pd.
Mashapaug Pd.
Lake Chaubunagungamaug
SCALE IN MILES
5 0 5 10
LEGEND
CORPS OF ENGINEERS PROJECT
#2 DEPARTMENT OF AGRICULTURE PROJECT
U.S.G.S. GAGING STATION
SNOW COURSE
NON-RECORDING PRECIPITATION GAGE
RECORDING PRECIPITATION GAGE
RECORDING PRECIPITATION GAGE AND TEMPERATURE (MAX.-MIN.)
1 7-66 Hydrologic Networks Added B.S.J.
REVISION DATE DESCRIPTION BY
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.
DR. BY S.F.C.
TR. BY R.C.
CK. BY G.F.B.
THAMES RIVER FLOOD CONTROL
THAMES RIVER BASIN
BASIN MAP
CONN. & MASS.
CHIEF HYD & HYD SECTION
SUBMITTED BY:
CHIEF, PLANN. & RPTS BRANCH
APPROVED
CHIEF, ENGINEERING DIV.
APPROVED
LT. COL. C.E. ASST TO DIVISION ENGINEER
DATE JUNE 1967
SCALE AS NOTED
DRAWING NUMBER
TH-1-1391
SHEET 1 OF 1

PLATE NO. 1



LEGEND

Reservoirs, Comprehensive Flood Control Plan

Reservoirs, Completed

Existing Dams and Reservoirs

Dam, Breached or Removed

THAMES RIVER FLOOD CONTROL

PROFILES

THAMES RIVER AND TRIBUTARIES

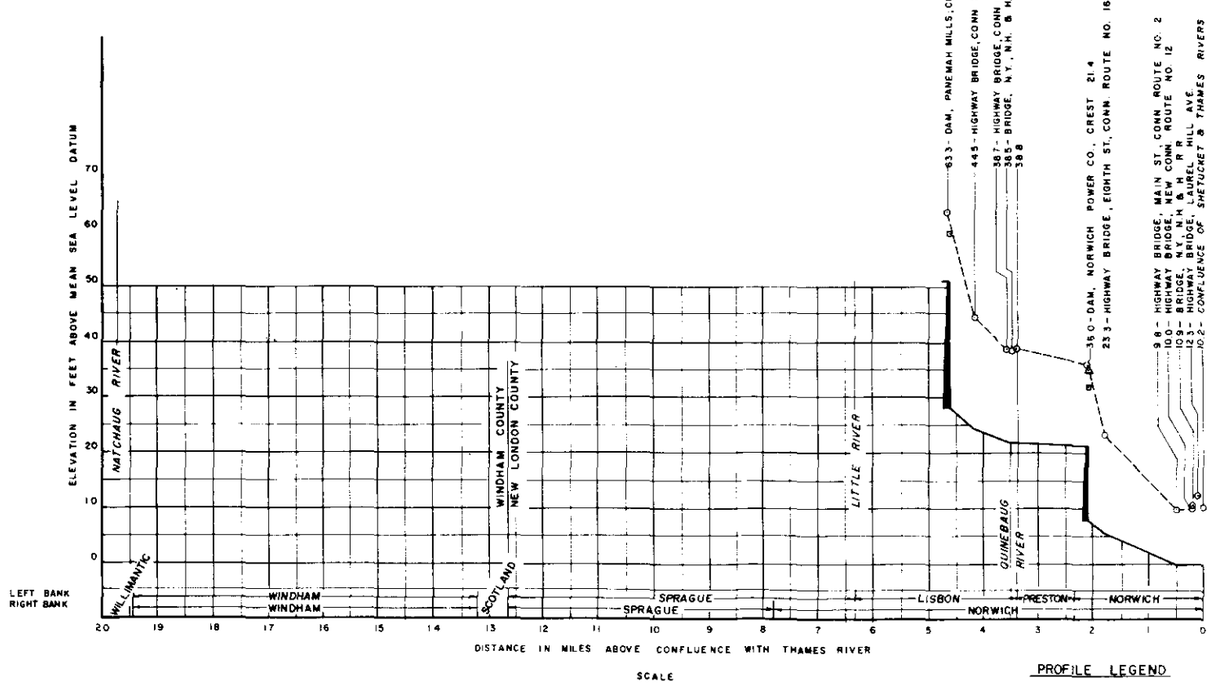
CONN MASS & R I

DATE JUNE 1967

DRAWING NUMBER TH - 3 - 1016

Nov 7-66

PLATE NO. 2



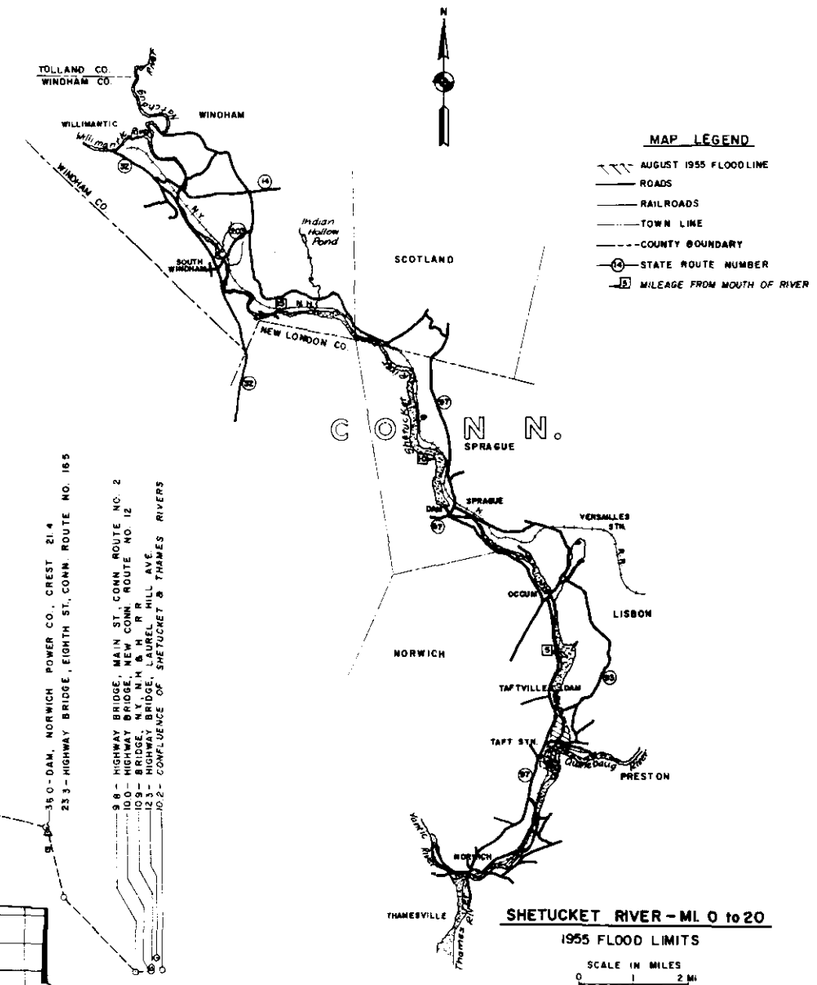
SCALE

VERTICAL 1 INCH = 10 FEET
HORIZONTAL 1 INCH = 1 MILE

PROFILE LEGEND

345 HIGH WATER ELEVATIONS OF AUGUST 1955
HIGH WATER PROFILE OF AUGUST 1955
NORMAL WATER PROFILE OF 1955
1936 FLOOD HIGH WATER MARKS
DAM
1938 FLOOD HIGH WATER MARKS

NOTE: ELEVATIONS ARE IN FEET AND REFER TO MEAN SEA LEVEL DATUM



SHETUCKET RIVER - MI. 0 to 20

1955 FLOOD LIMITS

SCALE IN MILES
0 1 2 MI

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

DR. BY | TR. BY | CK. BY

THAMES RIVER FLOOD CONTROL
SHETUCKET RIVER
PLAN AND PROFILE
FLOOD OF AUGUST 1955 - MILE 0 to 20
THAMES RIVER WATERSHED CONN., MASS. & R.I.

CHIEF H & H SECTION
SUBMITTED BY
CHIEF PLANN. & RPT'S BRANCH
APPROVED
CHIEF ENGINEERING DIV.
APPROVED
COL. C.E. DIVISION ENGINEER
DATE JUNE 1967

PREPARED BY
FENTON G. KEYES ASSOC.
CONSULTING ENGINEERS
PROV., R. I. - BOSTON, MASS.

SCALE AS SHOWN
DRAWING NUMBER
SHEET 1 OF 1

PLATE NO. 3

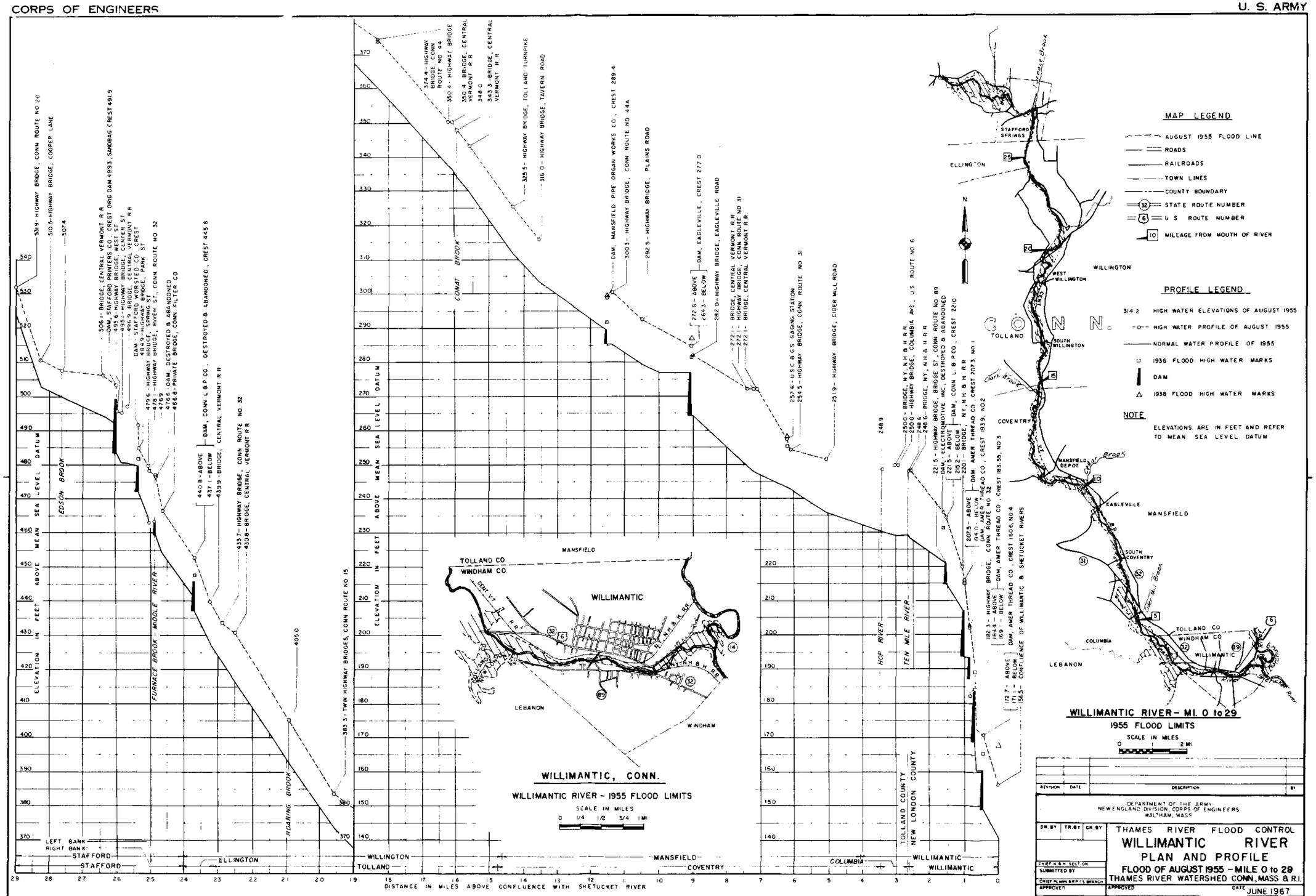
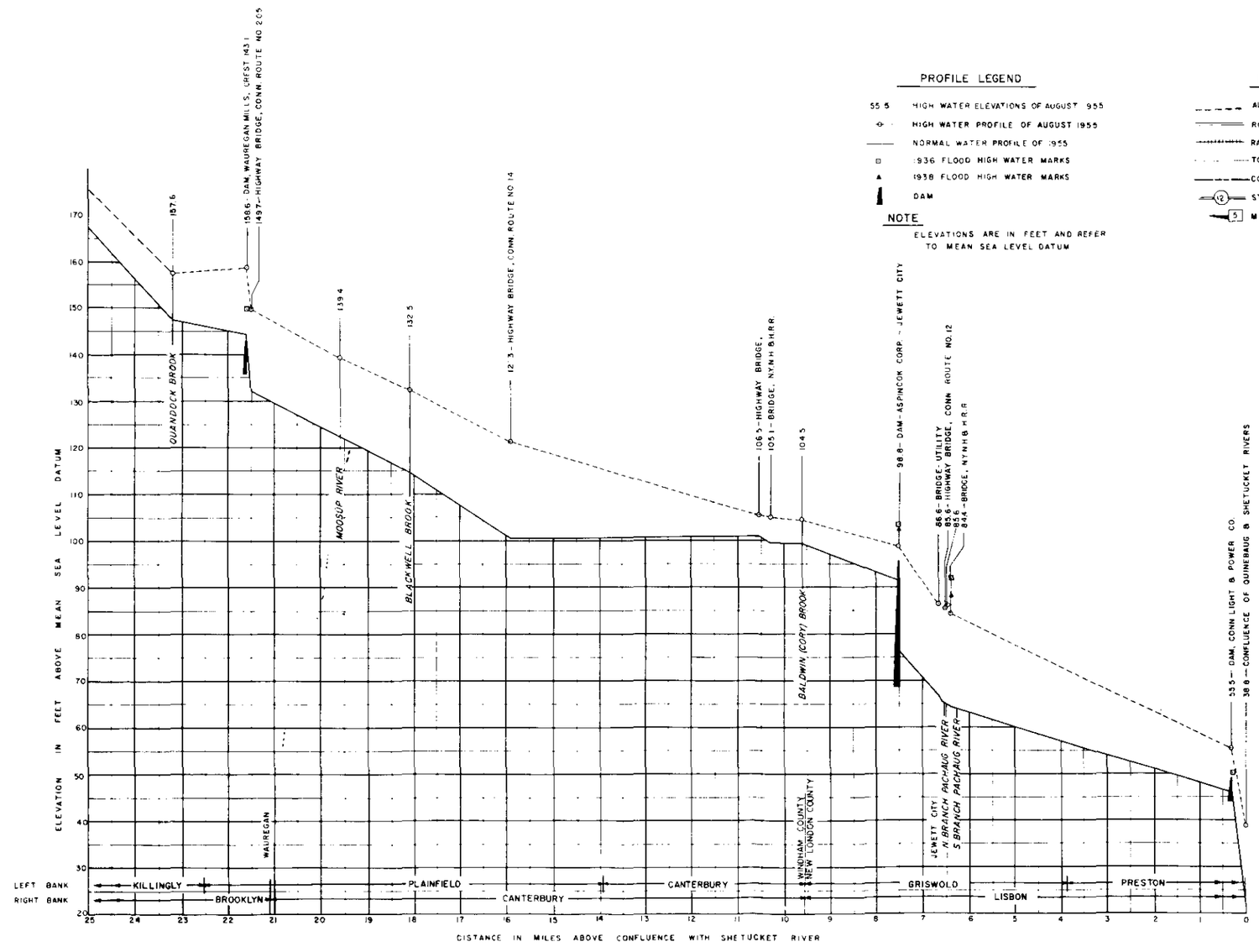

WILLIMANTIC, CONN.
WILLIMANTIC RIVER - 1955 FLOOD LIMITS
SCALE IN MILES
0 1/4 1/2 3/4 1 MI
MAP LEGEND
AUGUST 1955 FLOOD LINE
ROADS
RAILROADS
TOWN LINES
COUNTY BOUNDARY
STATE ROUTE NUMBER
U S ROUTE NUMBER
MILEAGE FROM MOUTH OF RIVER
PROFILE LEGEND
HIGH WATER ELEVATIONS OF AUGUST 1955
HIGH WATER PROFILE OF AUGUST 1955
NORMAL WATER PROFILE OF 1955
1936 FLOOD HIGH WATER MARKS
DAM
1938 FLOOD HIGH WATER MARKS
NOTE
ELEVATIONS ARE IN FEET AND REFER TO MEAN SEA LEVEL DATUM
WILLIMANTIC RIVER - MI. 0 to 29
1955 FLOOD LIMITS
SCALE IN MILES
0 2 MI
DISTANCE IN MILES ABOVE CONFLUENCE WITH SHETUCKET RIVER
SCALE
VERTICAL 1 INCH = 10 FEET
HORIZONTAL 1 INCH = 1 MILE
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.
THAMES RIVER FLOOD CONTROL
WILLIMANTIC RIVER
PLAN AND PROFILE
FLOOD OF AUGUST 1955 - MILE 0 to 29
THAMES RIVER WATERSHED CONN., MASS & R.I.
JUNE 1967
PREPARED BY
FENTON G KEYES ASSOC
CONSULTING ENGINEERS
PROV, 3 R I - BOSTON, 54 MASS.
SCALE AS SHOWN
DRAWING NUMBER
SHEET 1 OF 1

PLATE NO. 4



PROFILE LEGEND

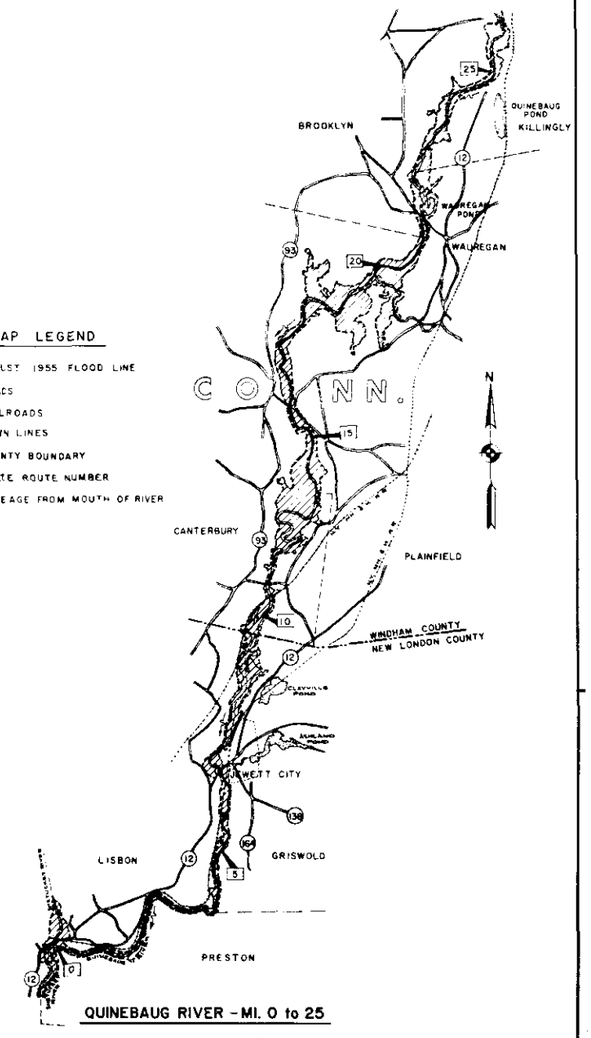
- 55.5 HIGH WATER ELEVATIONS OF AUGUST 1955
- HIGH WATER PROFILE OF AUGUST 1955
- NORMAL WATER PROFILE OF 1955
- 1936 FLOOD HIGH WATER MARKS
- 1938 FLOOD HIGH WATER MARKS
- DAM

NOTE

ELEVATIONS ARE IN FEET AND REFER TO MEAN SEA LEVEL DATUM

MAP LEGEND

- AUGUST 1955 FLOOD LINE
- ROADS
- RAILROADS
- TOWN LINES
- COUNTY BOUNDARY
- STATE ROUTE NUMBER
- MILEAGE FROM MOUTH OF RIVER



QUINEBAUG RIVER - MI. 0 to 25

1955 FLOOD LIMITS

SCALE IN MILES

0 1 2 MI.

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

DR. BY | TR. BY | CK. BY

THAMES RIVER FLOOD CONTROL

QUINEBAUG RIVER
PLAN AND PROFILE
FLOOD OF AUGUST 1955 - MILE 0 to 25
THAMES RIVER WATERSHED CONN., MASS. & R.I.

DATE JUNE 1967

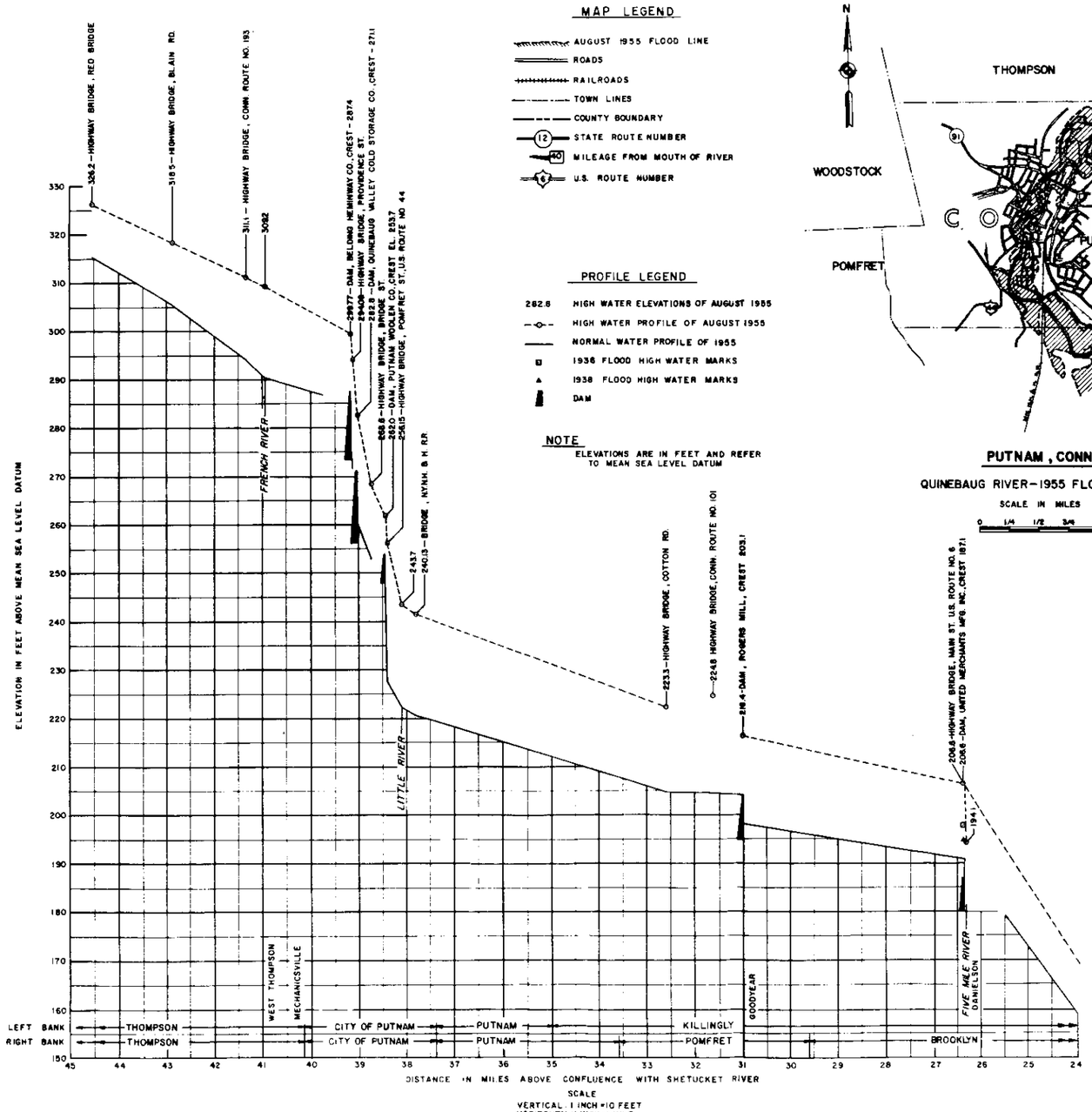
SCALE AS SHOWN

ACCOMPANY REPORT
DATED 31 JANUARY 1958

DRAWING NUMBER
TH-3-1030

SHEET 1 OF 4

PLATE NO 5



MAP LEGEND

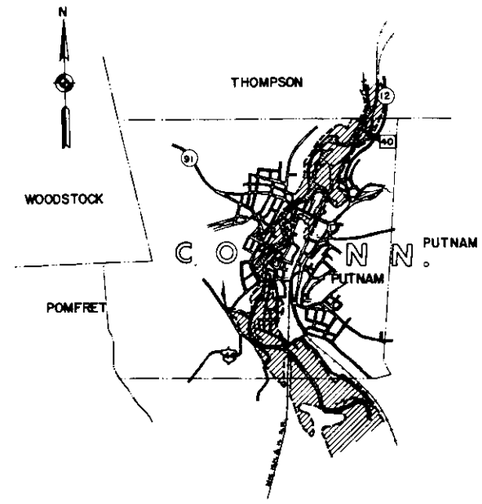
- AUGUST 1955 FLOOD LINE
- ROADS
- RAILROADS
- TOWN LINES
- COUNTY BOUNDARY
- (12) STATE ROUTE NUMBER
- [40] MILEAGE FROM MOUTH OF RIVER
- (6) U.S. ROUTE NUMBER

PROFILE LEGEND

- 282.6 HIGH WATER ELEVATIONS OF AUGUST 1955
- HIGH WATER PROFILE OF AUGUST 1955
- NORMAL WATER PROFILE OF 1955
- 1936 FLOOD HIGH WATER MARKS
- 1938 FLOOD HIGH WATER MARKS
- DAM

NOTE

ELEVATIONS ARE IN FEET AND REFER TO MEAN SEA LEVEL DATUM

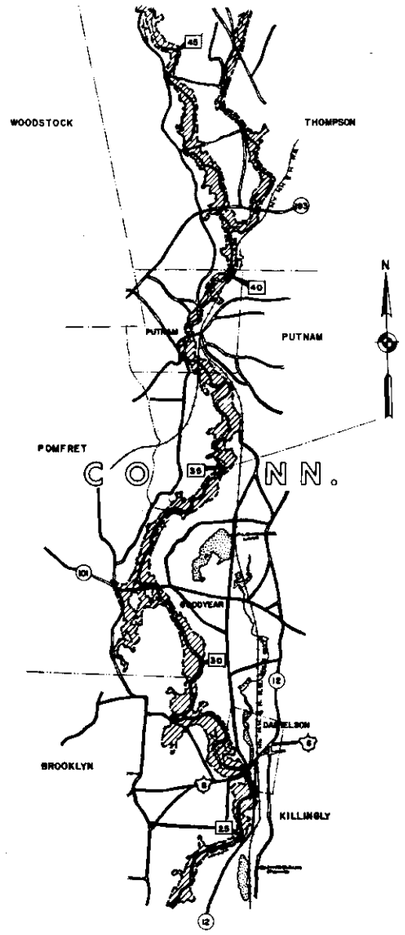


PUTNAM, CONN.

QUINEBAUG RIVER—1955 FLOOD LIMITS

SCALE IN MILES

0 1/4 1/2 3/4 1 MI.



QUINEBAUG RIVER —MI. 24 to 45

1955 FLOOD LIMITS

SCALE IN MILES

0 1 2 MI

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

DR BY TR BY CK BY

THAMES RIVER FLOOD CONTROL

QUINEBAUG RIVER
PLAN AND PROFILE
FLOOD OF AUGUST 1955—MILE 24 to 45

THAMES RIVER WATERSHED CONN., MASS. & R.I.

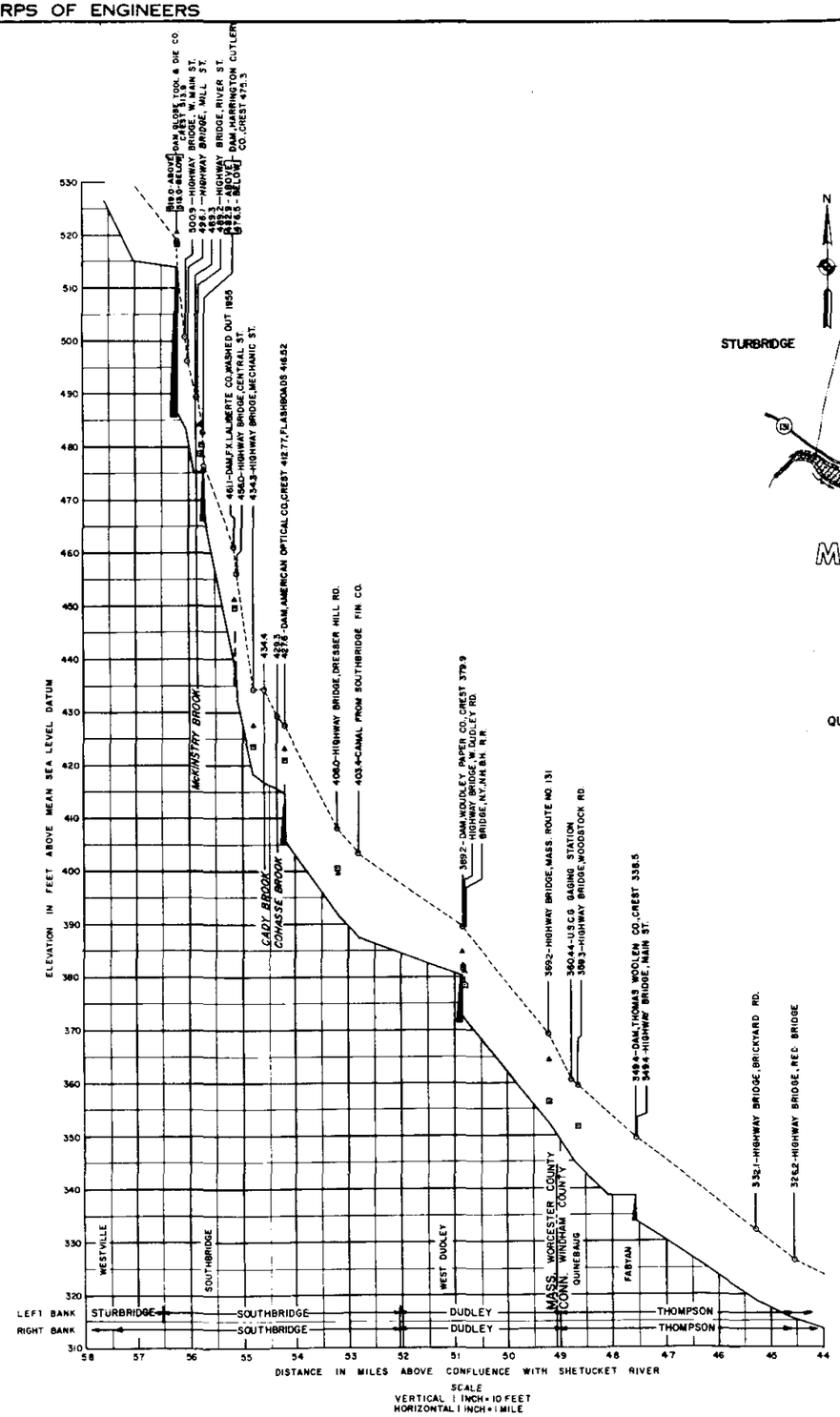
DATE JUNE 1967

ACCOMPANY REPORT DATED 31 JANUARY 1958

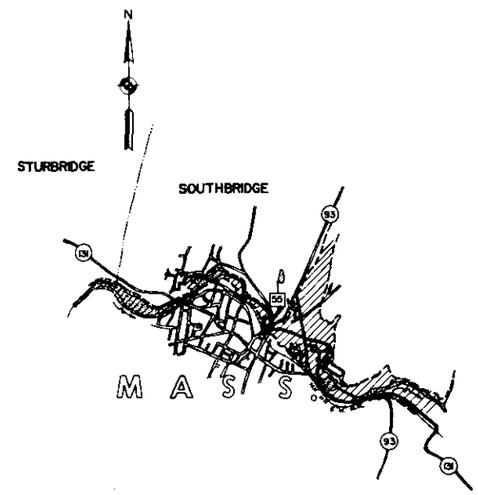
SCALE AS SHOWN

DRAWING NUMBER TH-3-1031

SHEET 2 OF 4



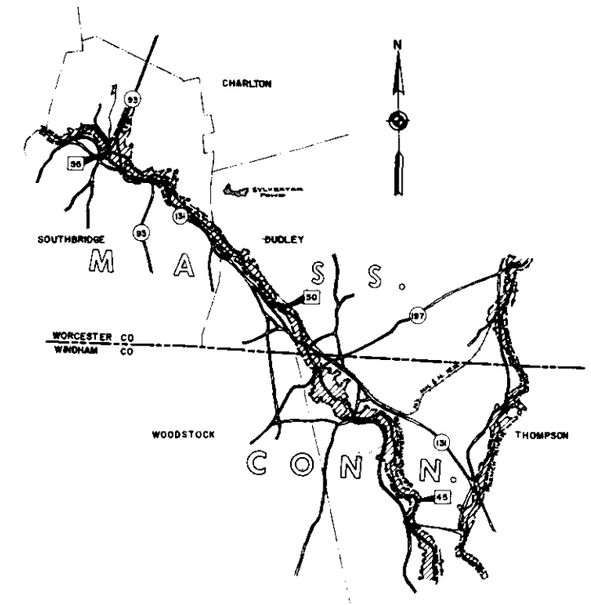
SCALE
VERTICAL 1 INCH = 10 FEET
HORIZONTAL 1 INCH = 1 MILE



SOUTHBRIDGE, MASS.

QUINEBAUG RIVER-1955 FLOOD LIMITS

SCALE IN MILES



QUINEBAUG RIVER-MI. 44 to 57

1955 FLOOD LIMITS

SCALE IN MILES

MAP LEGEND

- AUGUST 1955 FLOOD LINE
- ROADS
- RAILROADS
- TOWN LINES
- COUNTY BOUNDARY
- (93) STATE ROUTE NUMBER
- [40] MILEAGE FROM MOUTH OF RIVER

PROFILE LEGEND

- 349.4 HIGH WATER ELEVATIONS OF AUGUST 1955
- HIGH WATER PROFILE OF AUGUST 1955
- NORMAL WATER PROFILE OF 1955
- 1936 FLOOD HIGH WATER MARKS
- 1938 FLOOD HIGH WATER MARKS
- DAM

NOTE

ELEVATIONS ARE IN FEET AND REFER TO MEAN SEA LEVEL DATUM

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

DR. BY | TR. BY | CK. BY

THAMES RIVER FLOOD CONTROL

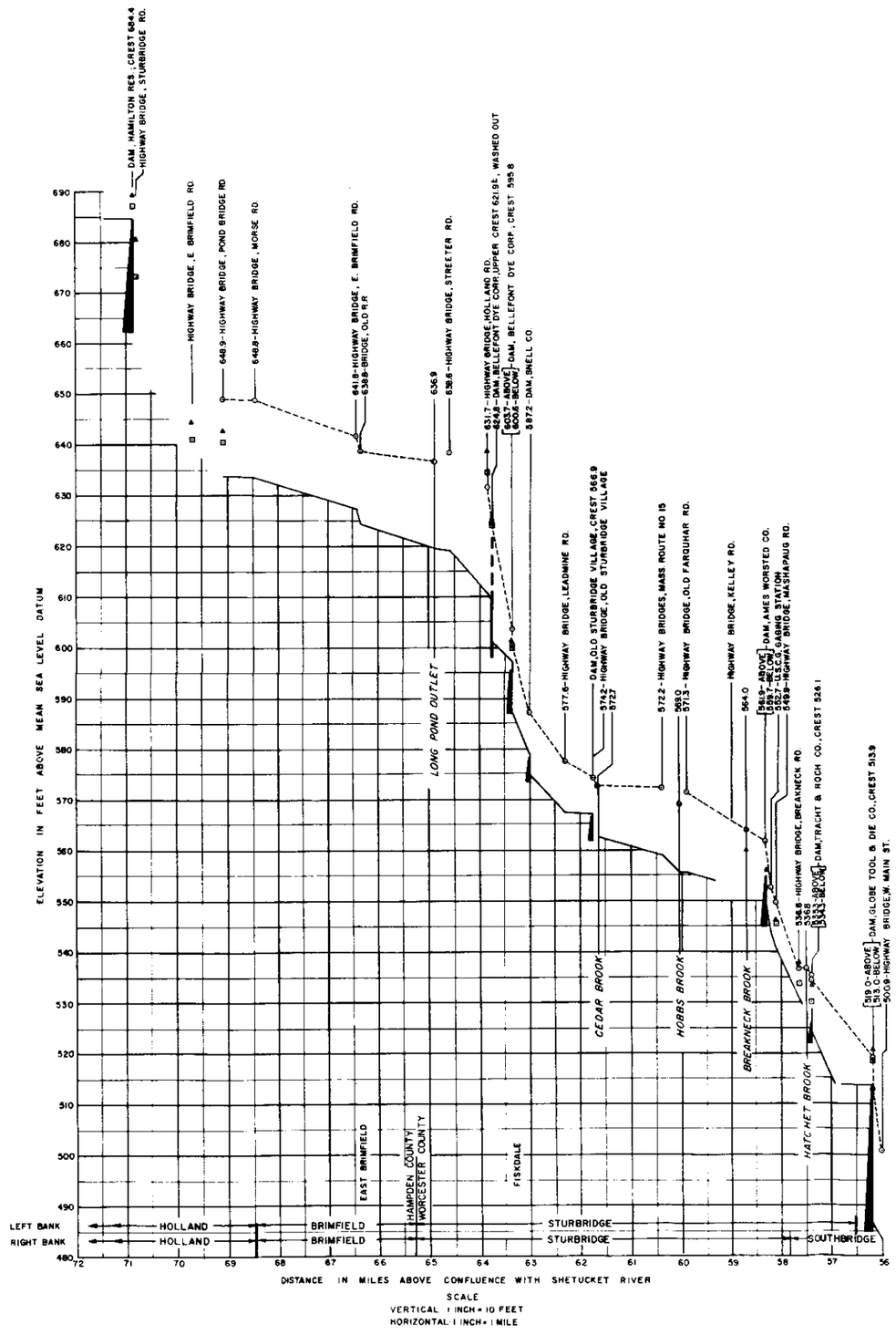
QUINEBAUG RIVER
PLAN AND PROFILE
FLOOD OF AUGUST 1955-MILE 44 to 57
THAMES RIVER WATERSHED CONN., MASS. & R.I.

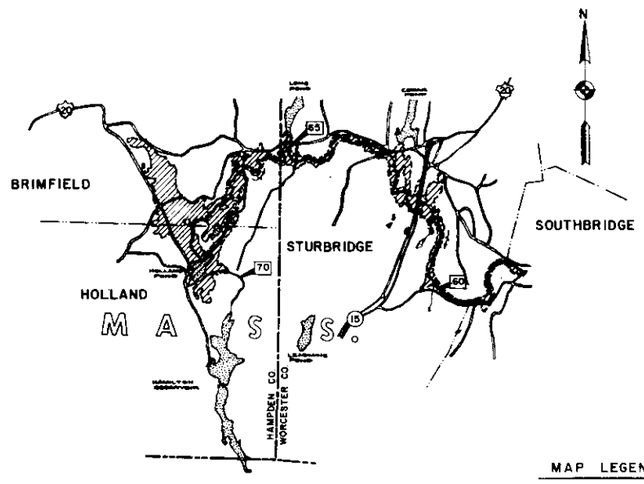
E. F. Chase
CHIEF H & H SECTION
SUBMITTED BY
CHIEF, PLANNING BRANCH
REVIEWED
CHIEF ENGINEERING DIV.
APPROVED
LT. COL. C. E. ASS'T TO DIVISION ENGINEER
DATE JUNE 1967

ACCOMPANY REPORT
DATED 31 JANUARY 1958

SCALE AS SHOWN
DRAWING NUMBER
TH-3-1032
SHEET 3 OF 4

PLATE NO. 7





QUINEBAUG RIVER-MI.56to71

1955 FLOOD LIMITS

SCALE IN MILES

0 1 2 MI.

MAP LEGEND

- AUGUST 1955 FLOOD LINE
- ROADS
- RAILROADS
- TOWN LINES
- COUNTY BOUNDARY
- STATE ROUTE NUMBER
- MILEAGE FROM MOUTH OF RIVER
- U.S. ROUTE NUMBER

PROFILE LEGEND

- 574.2 HIGH WATER ELEVATIONS OF AUGUST 1955
- HIGH WATER PROFILE OF AUGUST 1955
- NORMAL WATER PROFILE OF 1955
- 1936 FLOOD HIGH WATER MARKS
- 1938 FLOOD HIGH WATER MARKS
- DAM

NOTE

ELEVATIONS ARE IN FEET AND REFER TO MEAN SEA LEVEL DATUM

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

DR. BY | TR. BY | CK. BY

THAMES RIVER FLOOD CONTROL

QUINEBAUG RIVER
PLAN AND PROFILE
FLOOD OF AUGUST 1955 - MILE 56 to 71
THAMES RIVER WATERSHED CONN., MASS. & R.I.

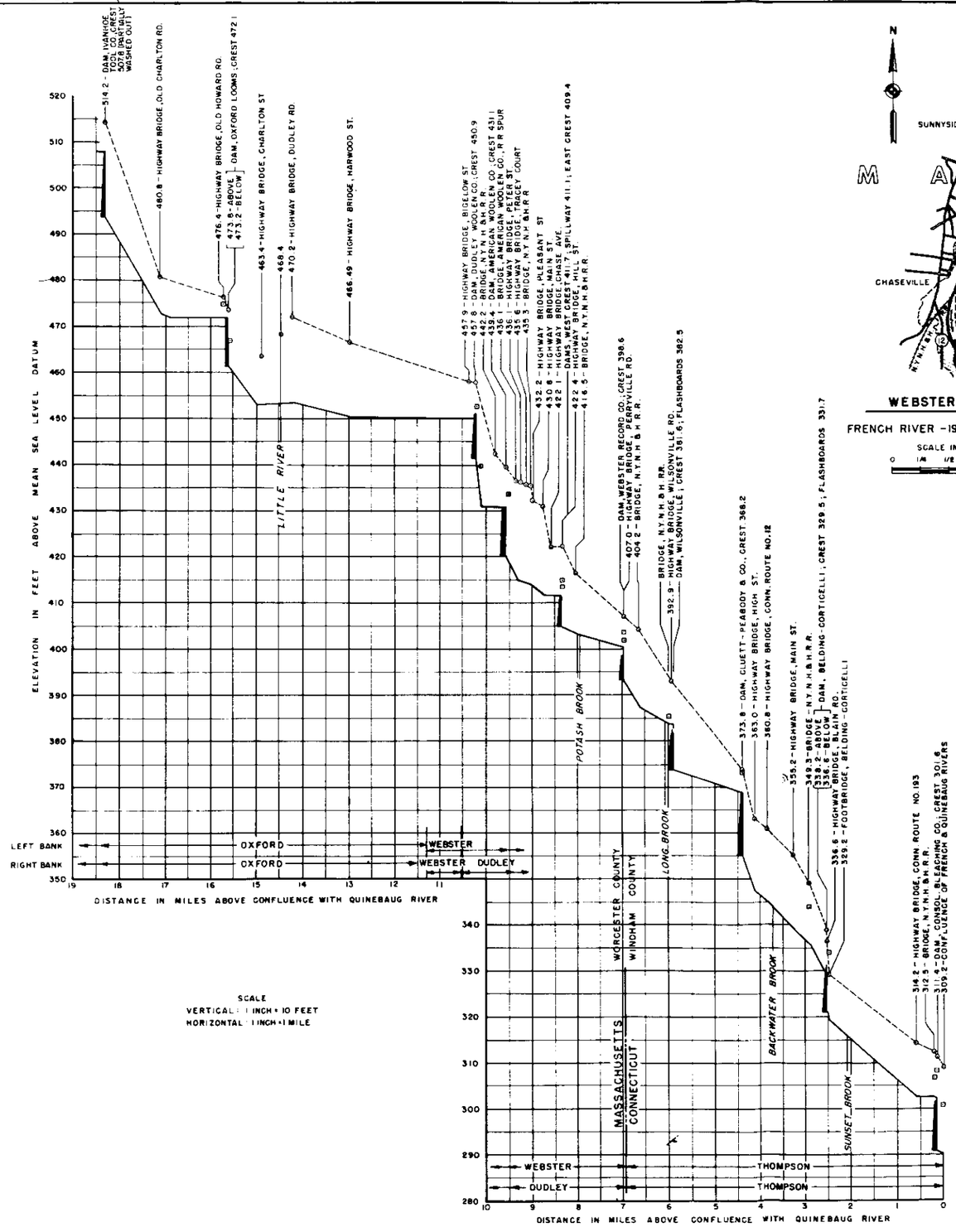
CHIEF, N.B.H. SECTION
SUBMITTED BY
CHIEF, PLANNING & REPORTS BRANCH
APPROVED
CHIEF, ENGINEERING DIV.
APPROVED
LT. COL. C.E. ASST. TO DIVISION ENGINEER

DATE JUNE 1967

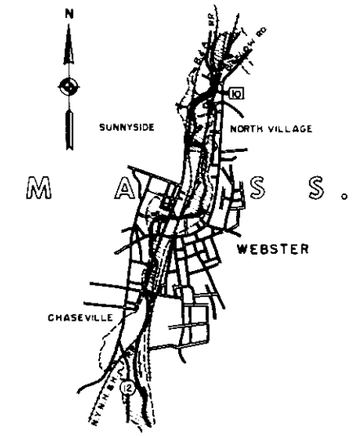
ACCOMPANY REPORT
DATED: 31 JANUARY 1958

SCALE AS SHOWN
DRAWING NUMBER TH-3-1033
SHEET 4 OF 4

PLATE NO. 8



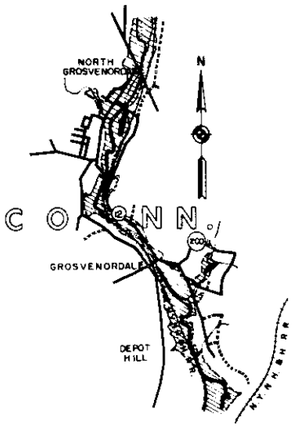
SCALE
VERTICAL: 1 INCH = 10 FEET
HORIZONTAL: 1 INCH = 1 MILE



WEBSTER, MASS.

FRENCH RIVER - 1955 FLOOD LIMITS

SCALE IN MILES 0 1/4 1/2 3/4 1 MI.



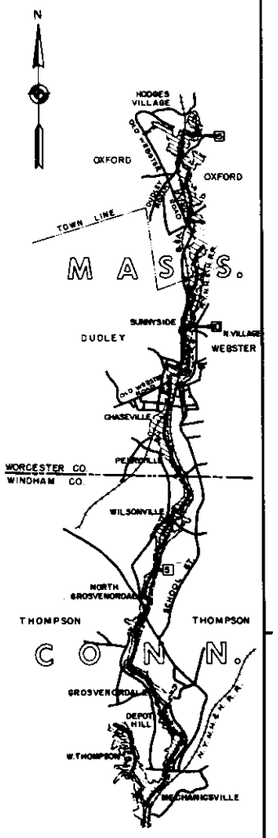
GROSVENORDALE, CONN.

FRENCH RIVER - 1955 FLOOD LIMITS

SCALE IN MILES 0 1/4 1/2 3/4 1 MI.

MAP LEGEND

- AUGUST 1955 FLOOD LINE
- ROADS
- RAILROADS
- TOWN LINES
- COUNTY BOUNDARY
- (12) STATE ROUTE NUMBER
- [10] MILEAGE FROM MOUTH OF RIVER



FRENCH RIVER - MI. 0 to 18.3

1955 FLOOD LIMITS

SCALE IN MILES 0 1 2 MI.

PROFILE LEGEND

- 314.2 HIGH WATER ELEVATIONS OF AUGUST 1955
- HIGH WATER PROFILE OF AUGUST 1955
- NORMAL WATER PROFILE OF 1955
- 1936 FLOOD HIGH WATER MARKS
- DAM

NOTE

ELEVATIONS ARE IN FEET AND REFER TO MEAN SEA LEVEL DATUM.

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

DR. BY | TR. BY | CK. BY

E. F. Chen
CHIEF H & H SECTION

SUBMITTED BY
CHIEF, PLANNING BRANCH

APPROVED:
CHIEF ENGINEERING DIV.

LT. COL. C.E. ASST TO DIVISION ENGINEER

THAMES RIVER FLOOD CONTROL

FRENCH RIVER

PLAN AND PROFILE

FLOOD OF AUGUST 1955 - MILE 0 to 18.3

THAMES RIVER WATERSHED CONN., MASS. & R.I.

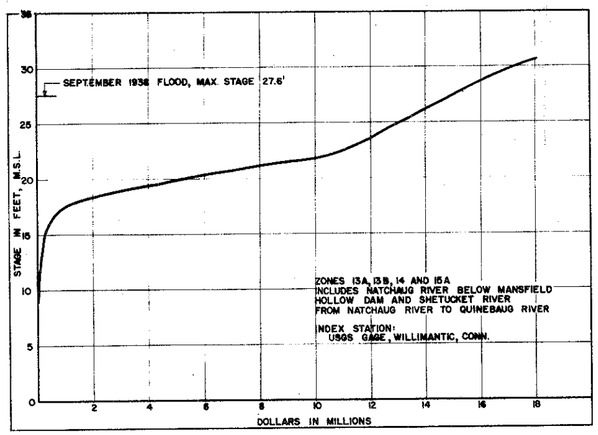
DATE JUNE 1967

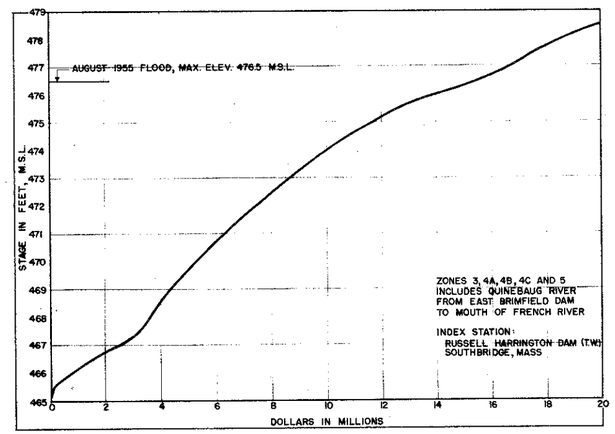
ACCOMPANY REPORT
DATED: 31 JANUARY 1958

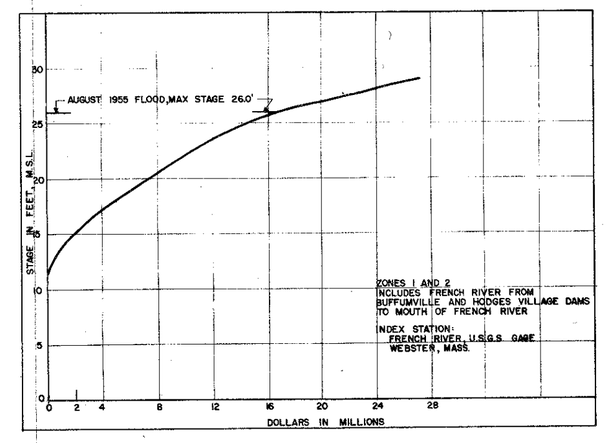
SCALE: AS SHOWN

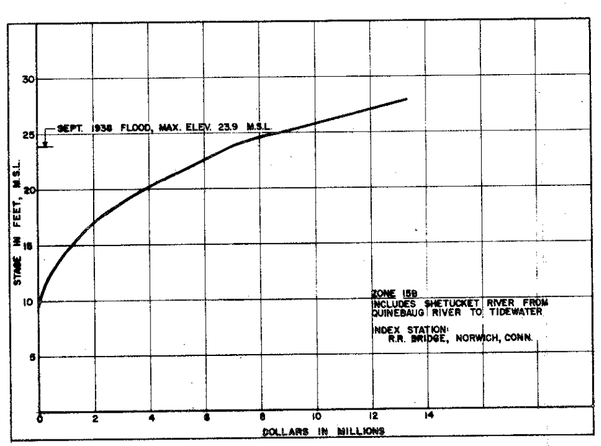
DRAWING NUMBER
TH-3-1034

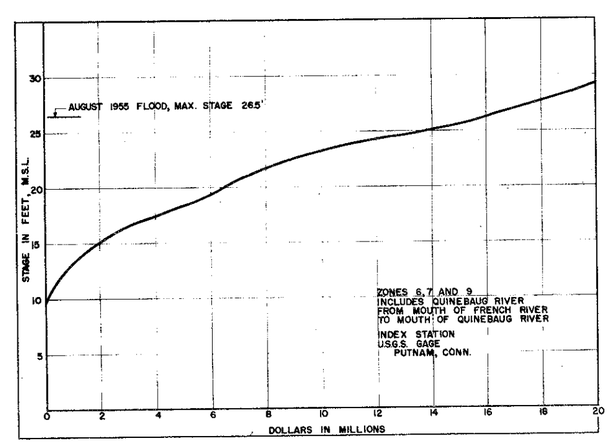
SHEET 1 OF 1











DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY ABW	DR. BY LJS	CK. BY
SUBMITTED:		
CHIEF, SECTION		
REVIEWED:		
PROJECT ENGINEER		
APPROVED:		
CHIEF, DESIGN BRANCH		

THAMES RIVER FLOOD CONTROL

STAGE – DAMAGE CURVES THAMES RIVER BASIN

CONNECTICUT & MASSACHUSETTS

APPROVED: CHIEF, ENGINEERING DIVISION

DATE JUNE 1967

SCALE

SPEC. NO. CIV. ENG. 19-016-

DRAWING NUMBER

SHEET

PLATE NO. 10

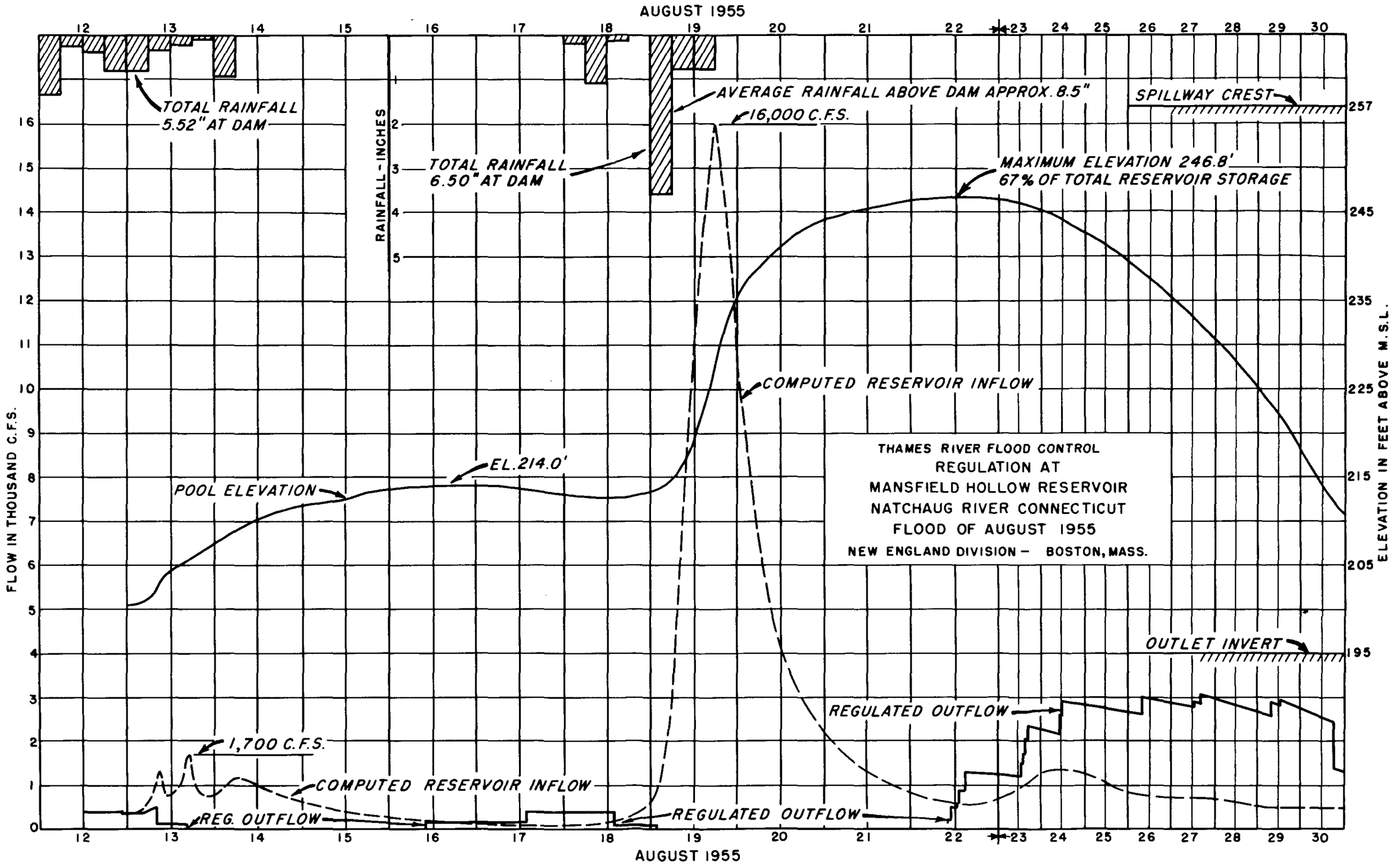
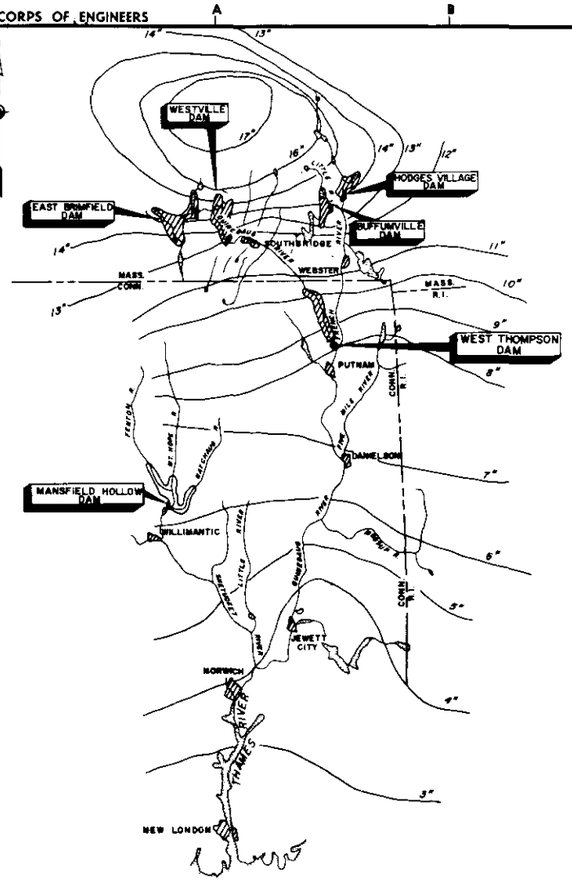
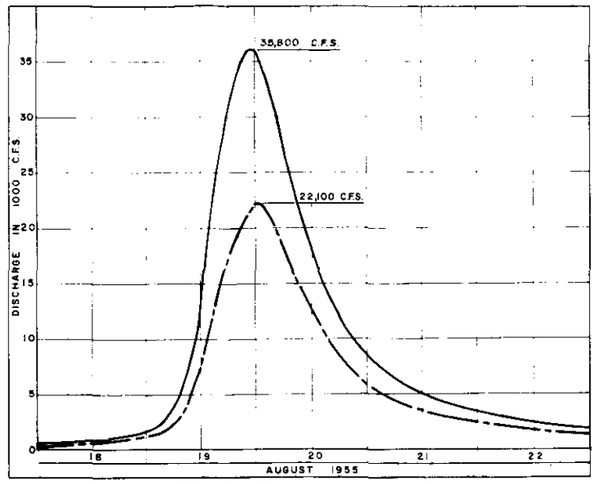

AUGUST 1955
TOTAL RAINFALL 5.52" AT DAM
TOTAL RAINFALL 6.50" AT DAM
RAINFALL - INCHES
AVERAGE RAINFALL ABOVE DAM APPROX. 8.5"
16,000 C.F.S.
SPILLWAY CREST
MAXIMUM ELEVATION 246.8'
67% OF TOTAL RESERVOIR STORAGE
COMPUTED RESERVOIR INFLOW
EL. 214.0'
POOL ELEVATION
THAMES RIVER FLOOD CONTROL
REGULATION AT
MANSFIELD HOLLOW RESERVOIR
NATCHAUG RIVER CONNECTICUT
FLOOD OF AUGUST 1955
NEW ENGLAND DIVISION - BOSTON, MASS.
OUTLET INVERT
REGULATED OUTFLOW
1,700 C.F.S.
COMPUTED RESERVOIR INFLOW
REG. OUTFLOW
REGULATED OUTFLOW
FLOW IN THOUSAND C.F.S.
ELEVATION IN FEET ABOVE M.S.L.
AUGUST 1955

PLATE NO. 1

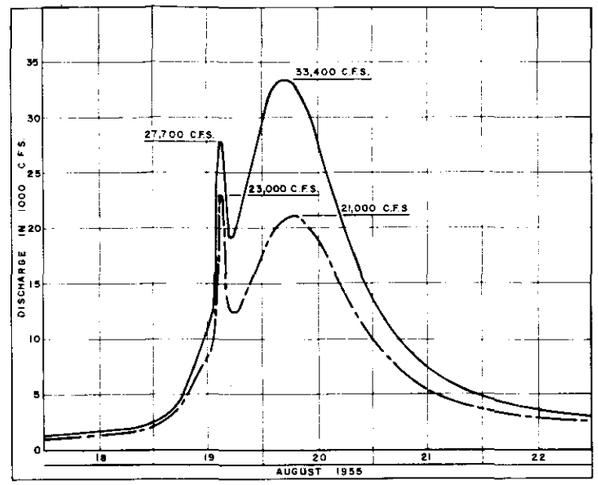
CORPS OF ENGINEERS — U. S. ARMY



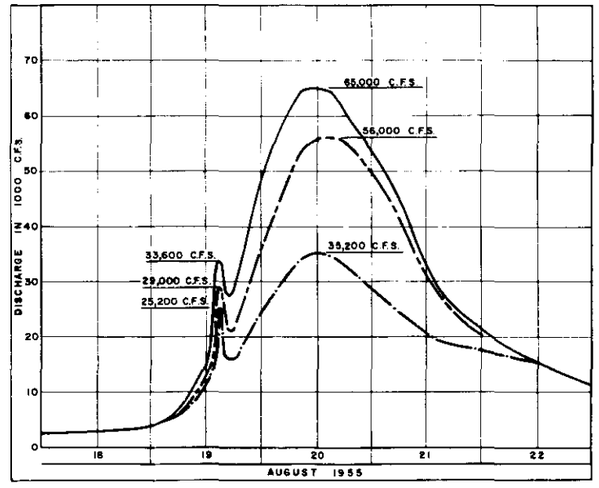
ISOHYETALS
FOR STORM OF AUGUST 18-19, 1955



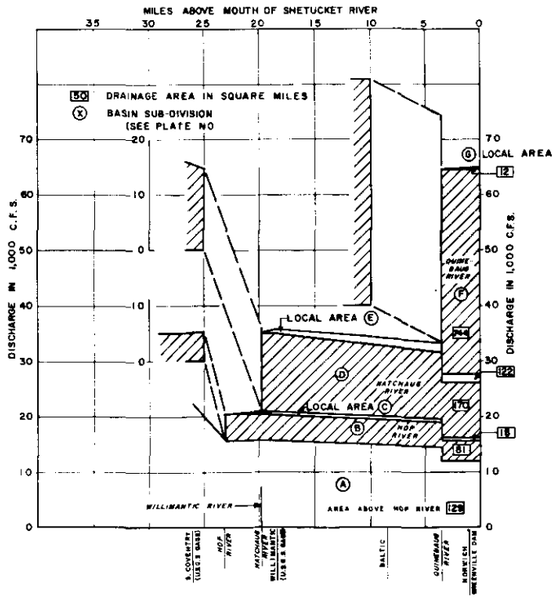
SHETUCKET RIVER AT WILLIMANTIC, CONN.

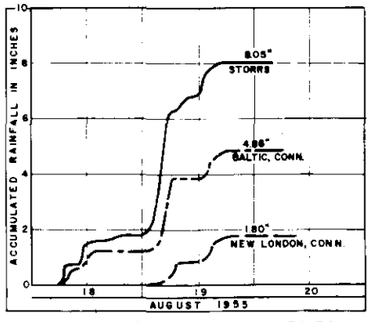


SHETUCKET RIVER AT TAFTVILLE, CONN.



SHETUCKET RIVER AT NORWICH, CONN.





MASS RAINFALL CURVES

LEGEND

- ESTIMATED NATURAL
- OBSERVED (MODIFIED BY MANSFIELD HOLLOW)
- MODIFIED BY MANSFIELD HOLLOW, BUFFUMVILLE, HODGES VILLAGE, EAST BRIMFIELD, WESTVILLE AND WEST THOMPSON

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

DES. BY A.P.M. — DR. BY E.J.K. — CK. BY

THAMES RIVER FLOOD CONTROL

SHETUCKET RIVER SUB-BASIN
FLOOD OF AUGUST 1955

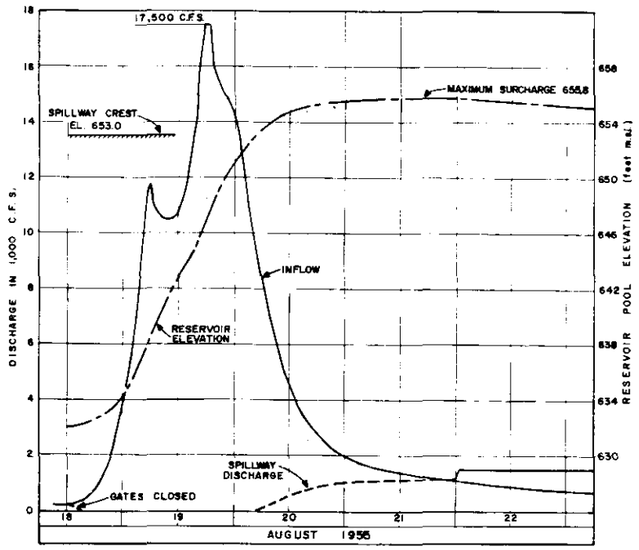
SHETUCKET RIVER — CONN. & MASS

APPROVED: — DATE: JUNE 1967

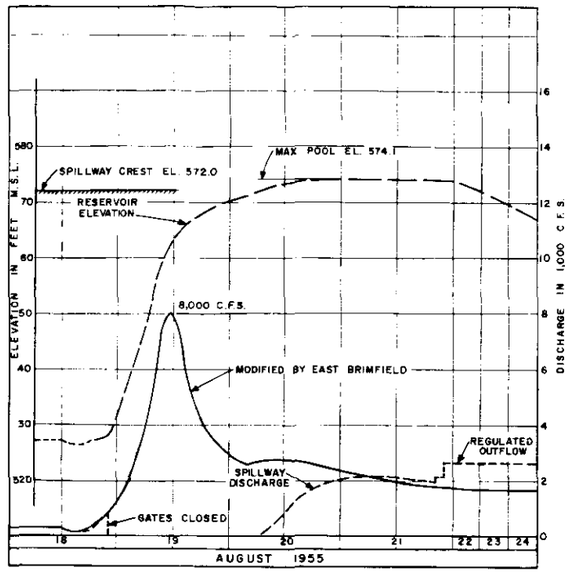
SCALE — SPEC. NO. CIV. ENG. 19-016- — DRAWING NUMBER — SHEET

PLATE NO. 12

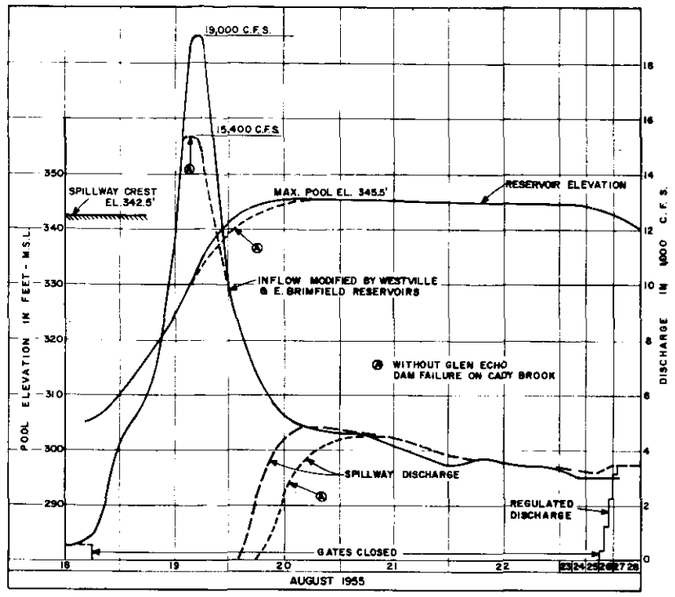
CORPS OF ENGINEERS U. S. ARMY



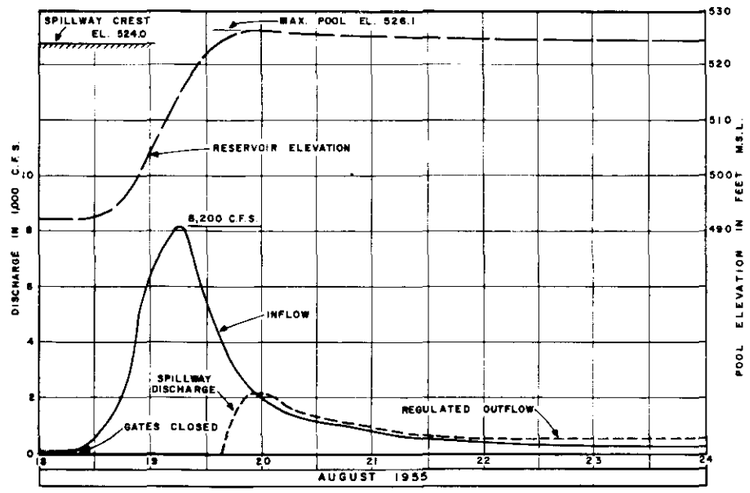
EAST BRIMFIELD RESERVOIR



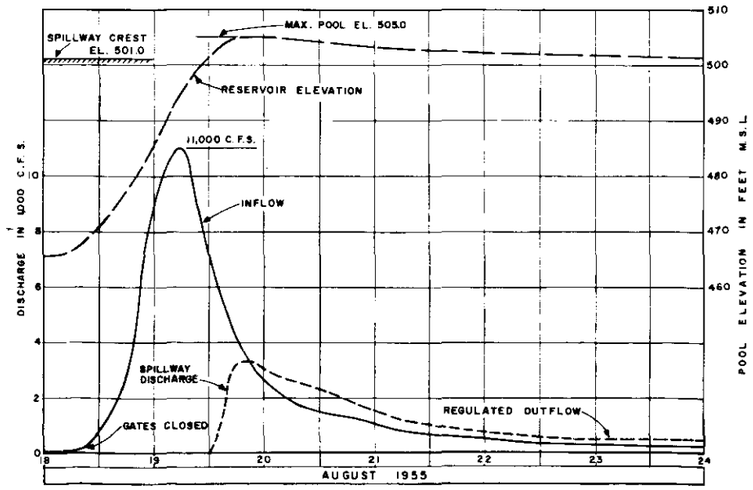
WESTVILLE RESERVOIR



WEST THOMPSON RESERVOIR



BUFFUMVILLE RESERVOIR



HODGES VILLAGE RESERVOIR

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY B.J. | DR. BY E.J.K. | CK. BY

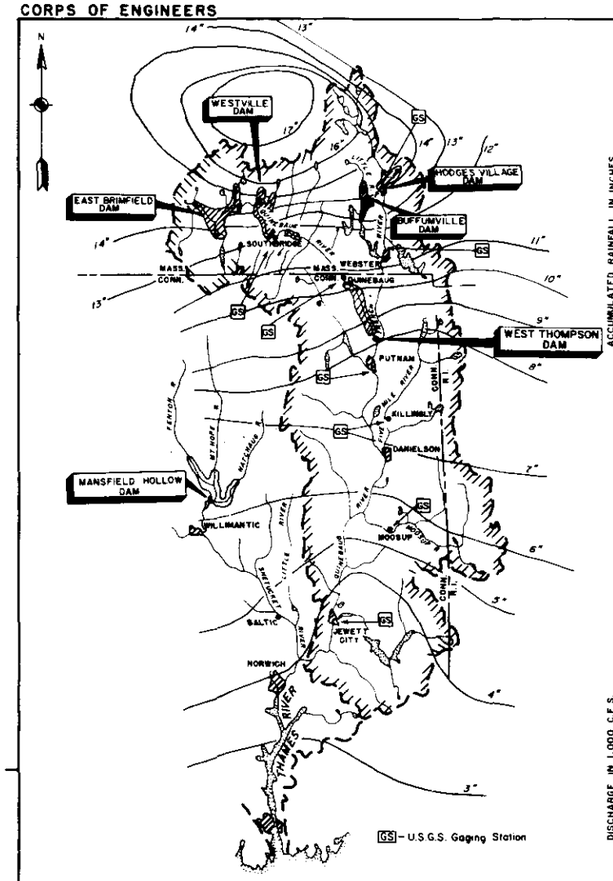
THAMES RIVER FLOOD CONTROL
QUINEBAUG RIVER SUB-BASIN
FLOOD OF AUGUST 1955
REGULATION AT FLOOD CONTROL RESERVOIRS
QUINEBAUG RIVER CONN. & MASS.

DATE JUNE 1967

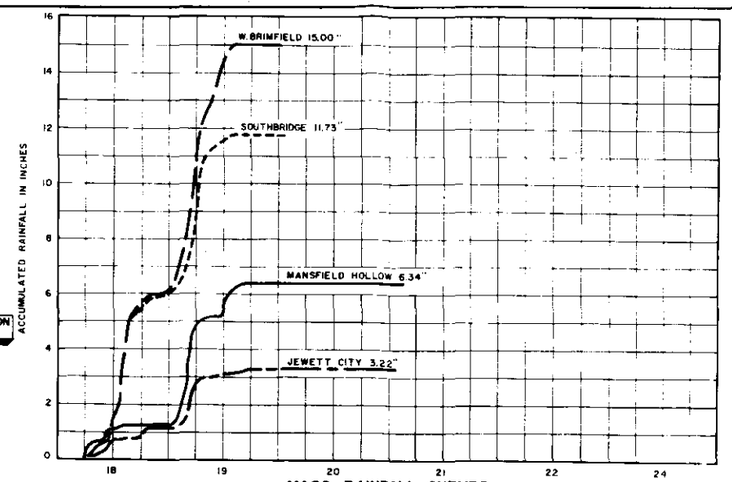
SCALE SPEC. NO. CIV. ENG. 19-016-

SHEET

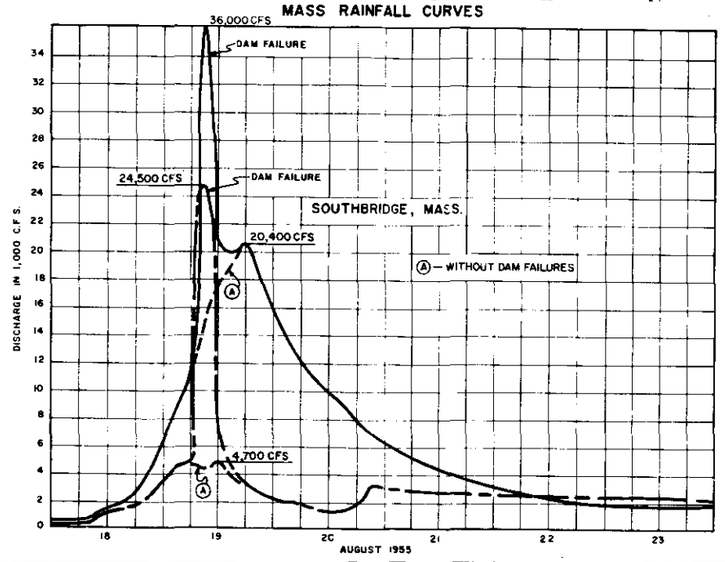
PLATE NO. 13

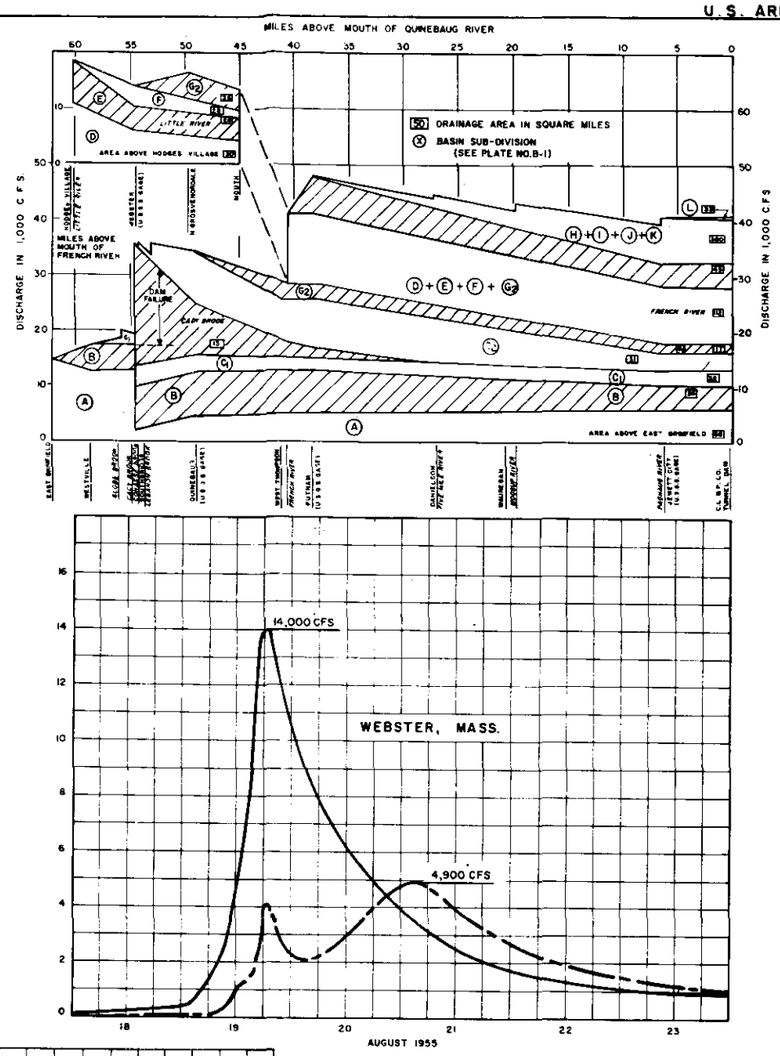


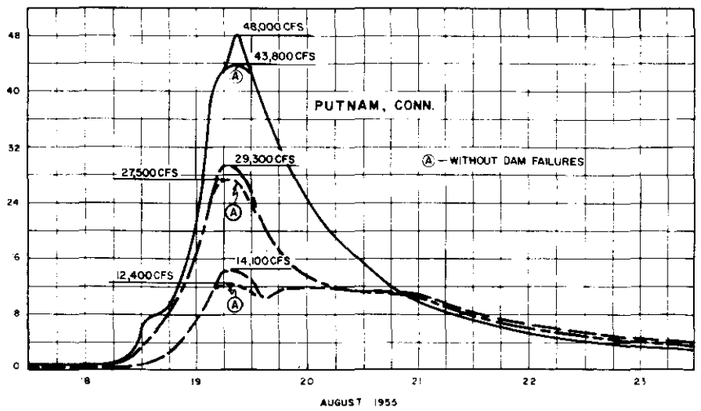
ISOHYETALS

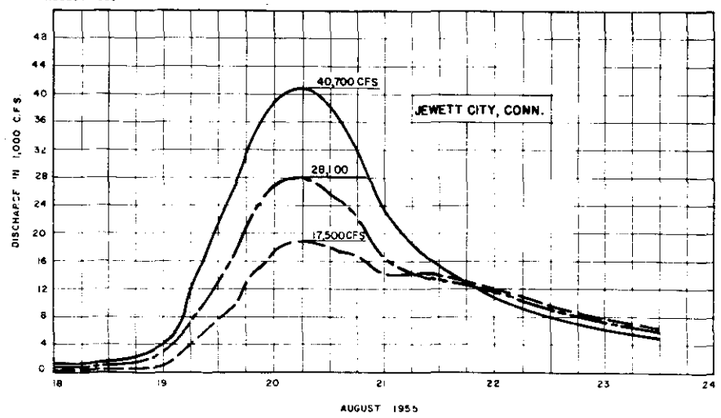


MASS RAINFALL CURVES









NATURAL

MODIFIED BY BUFFUMVILLE, HODGES VILLAGE, EAST BRIMFIELD AND WESTVILLE RESERVOIRS.

MODIFIED BY BUFFUMVILLE, HODGES VILLAGE, EAST BRIMFIELD, WESTVILLE AND WEST THOMPSON RESERVOIRS.

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

DR BY | TR BY S.J.C. | CK BY

THAMES RIVER FLOOD CONTROL

FLOOD OF AUGUST 1955

QUINEBAUG RIVER WATERSHED CONN. & MASS.

CHIEF HYD. & HYD. SECTION — SUBMITTED BY — CHIEF, PLANN. & RPTS. BRANCH — APPROVED — CHIEF ENGINEERING DIV. — APPROVED — LTCOL. C.E. ASST TO DIVISION ENGINEER

DATE JUNE 1967

ACCOMPANY REPORT DATED 31 JANUARY 1958

SCALE

DRAWING NUMBER TH-3-1035

SHEET OF

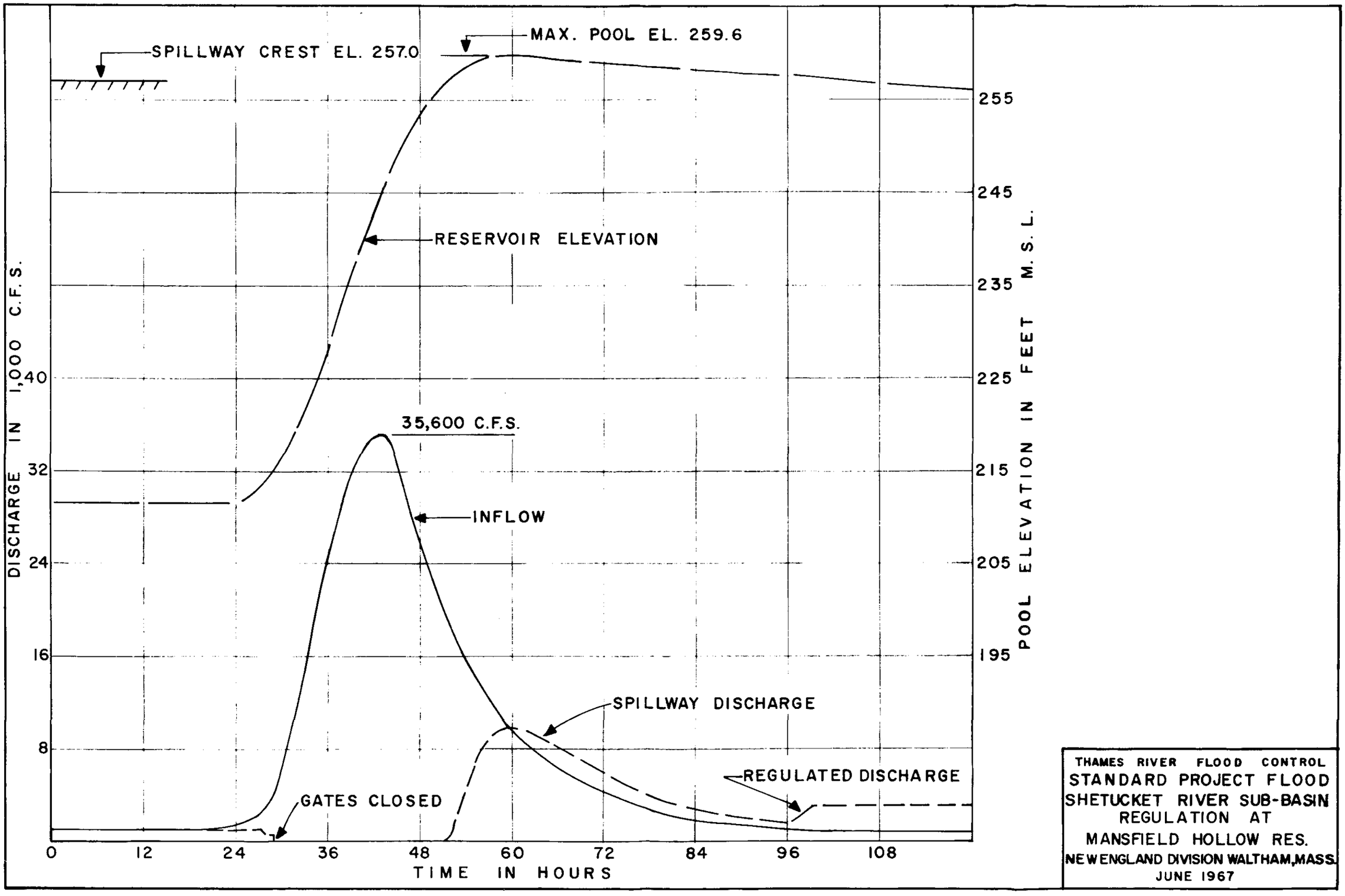
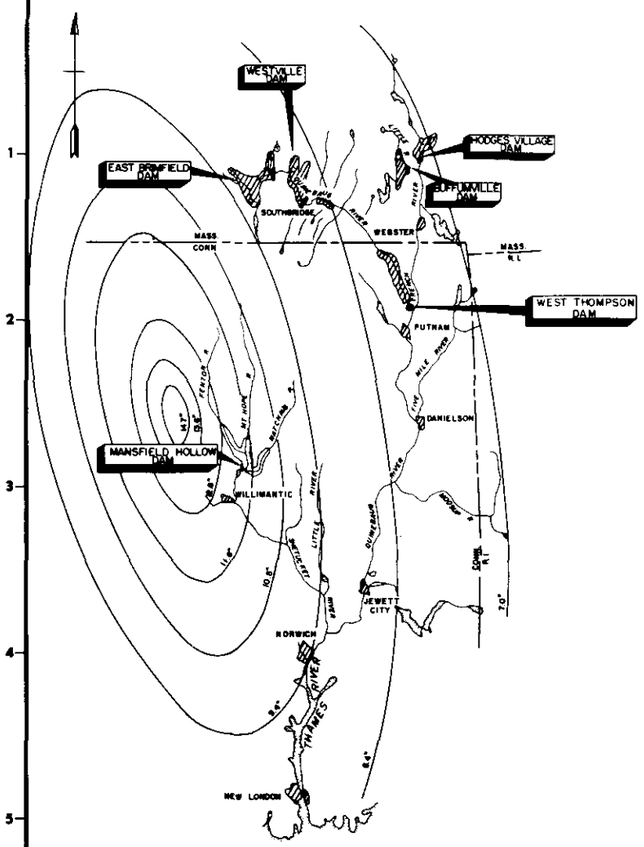
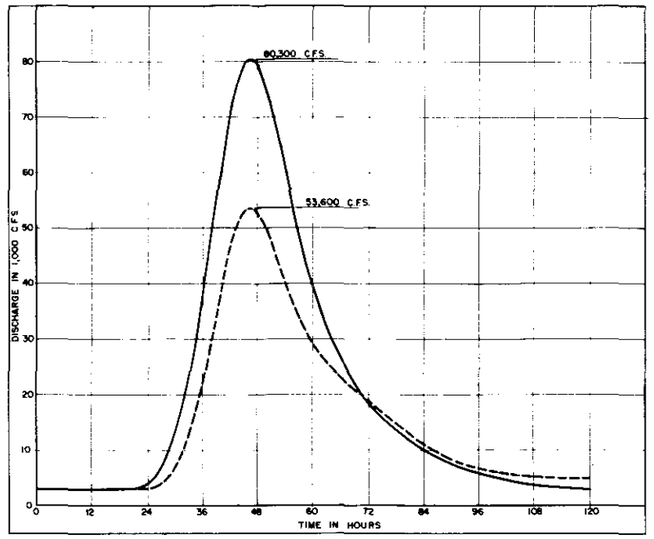

SPILLWAY CREST EL. 257.0
MAX. POOL EL. 259.6
RESERVOIR ELEVATION
35,600 C.F.S.
INFLOW
SPILLWAY DISCHARGE
REGULATED DISCHARGE
GATES CLOSED
DISCHARGE IN 1,000 C.F.S.
40
32
24
16
8
0
12
24
36
48
60
72
84
96
108
TIME IN HOURS
POOL ELEVATION IN FEET M.S.L.
255
245
235
225
215
205
195
THAMES RIVER FLOOD CONTROL
STANDARD PROJECT FLOOD
SHETUCKET RIVER SUB-BASIN
REGULATION AT
MANSFIELD HOLLOW RES.
NEW ENGLAND DIVISION WALTHAM, MASS.
JUNE 1967

PLATE NO. 15

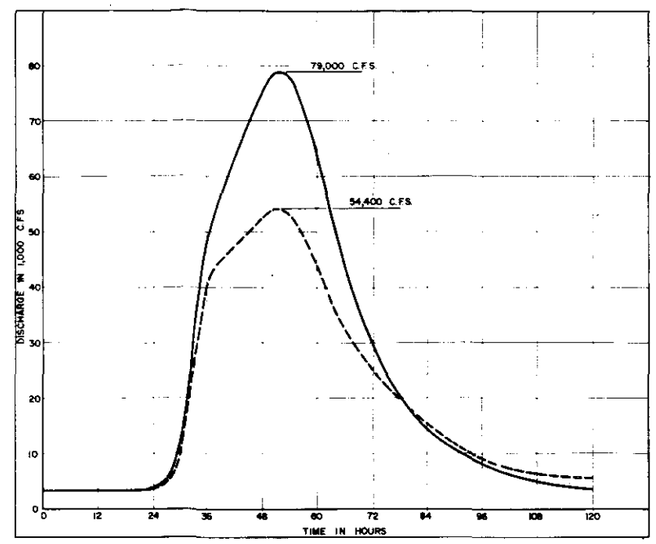
CORPS OF ENGINEERS — U. S. ARMY



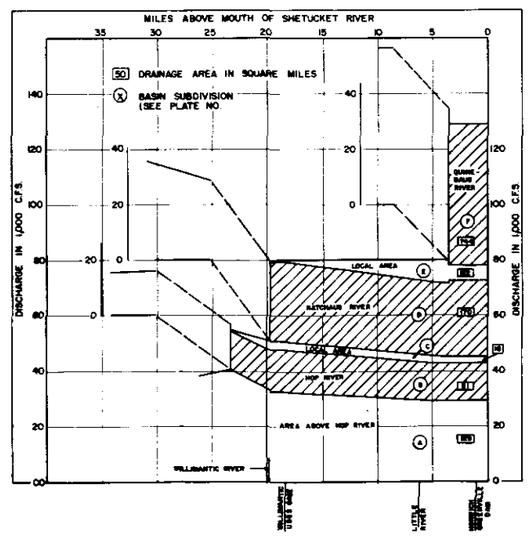
ISOHYETALS

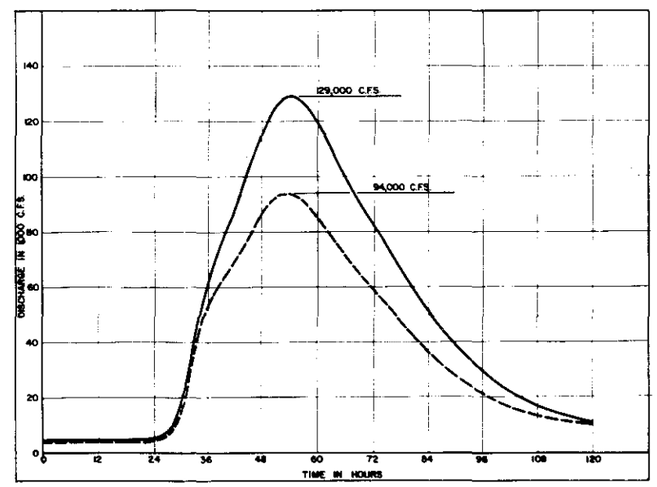


SHETUCKET RIVER AT WILLIMANTIC, CONN.

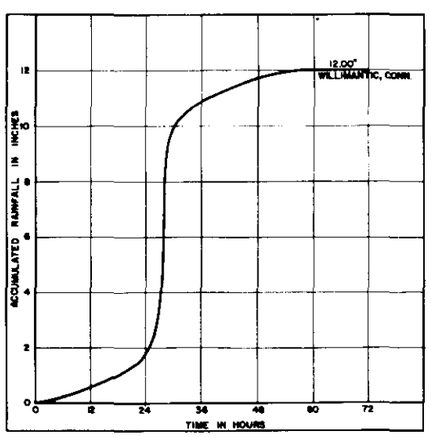


SHETUCKET RIVER AT TAFTVILLE, CONN.





SHETUCKET RIVER AT NORWICH, CONN.



MASS RAINFALL CURVE

LEGEND

——— NATURAL

- - - - MODIFIED BY MANSFIELD HOLLOW, BUFFUMVILLE, HODGES VILLAGE, EAST BRIMFIELD, WESTVILLE AND WEST THOMPSON RESERVOIRS

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY A.P.M. DR. BY L.J.S. CK. BY

THAMES RIVER FLOOD CONTROL

SHETUCKET RIVER SUB-BASIN
STANDARD PROJECT FLOOD

SHETUCKET RIVER — CONN. & MASS.

DATE JUNE 1967

SCALE

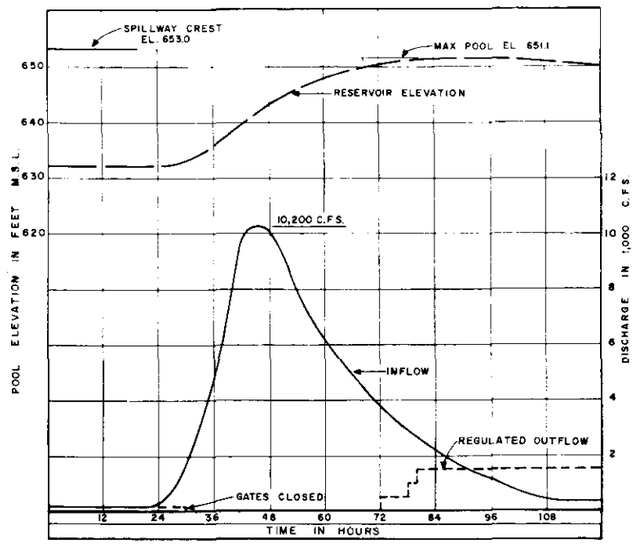
SPEC. NO. CIV. ENG. 19-090-

DRAWING NUMBER

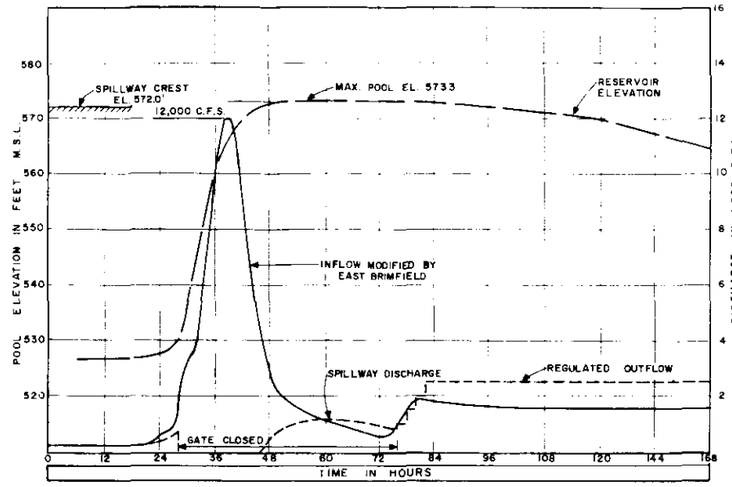
SHEET

PLATE NO. 16

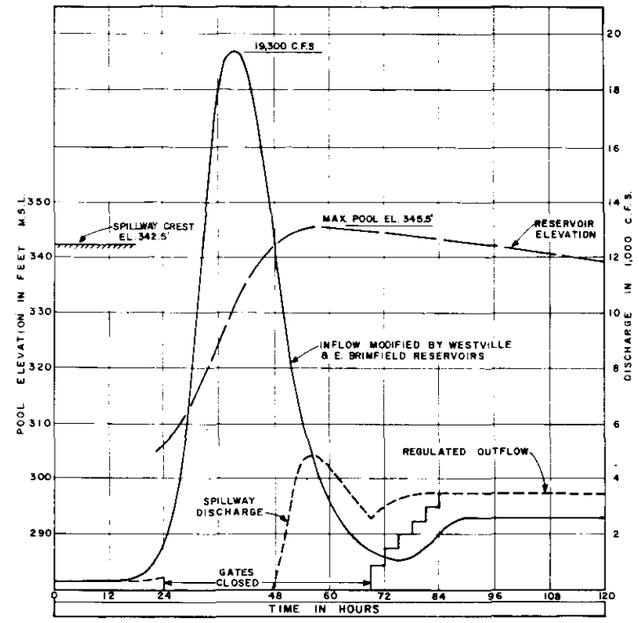
CORPS OF ENGINEERS U. S. ARMY



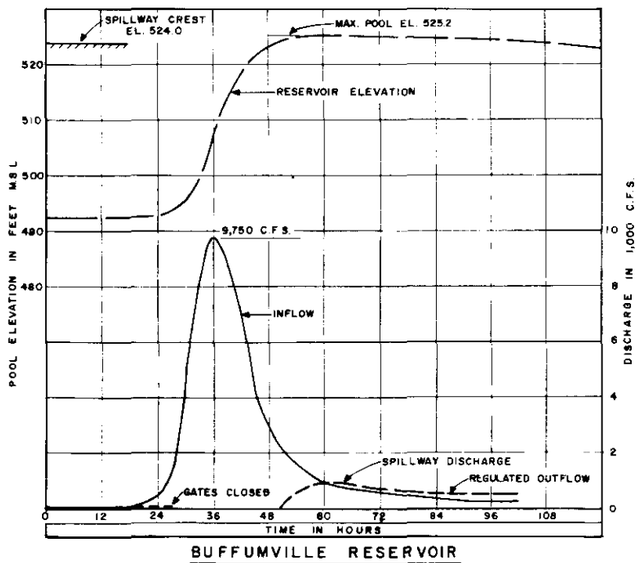
EAST BRIMFIELD RESERVOIR



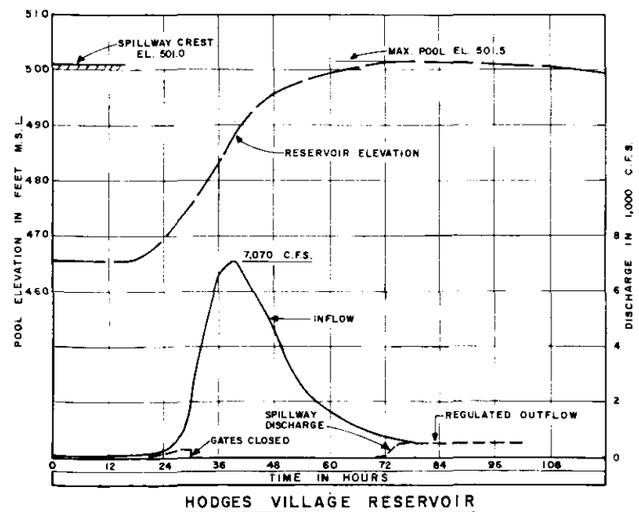
WESTVILLE RESERVOIR



WEST THOMPSON RESERVOIR



BUFFUMVILLE RESERVOIR



HODGES VILLAGE RESERVOIR

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

DES. BY B.J. | DR. BY E.J.K. | CK. BY

SUBMITTED: CHIEF, SECTION

REVIEWED: CHIEF, DESIGN BRANCH

APPROVED: CHIEF, DESIGN BRANCH

THAMES RIVER FLOOD CONTROL
QUINEBAUG RIVER SUB-BASIN
STANDARD PROJECT FLOOD
REGULATION AT FLOOD CONTROL RESERVOIRS
QUINEBAUG RIVER CONN. & MASS.

APPROVED: CHIEF, ENGINEERING DIVISION

DATE JUNE 1967

SCALE

SPEC. NO. CIV. ENG. 19-016-

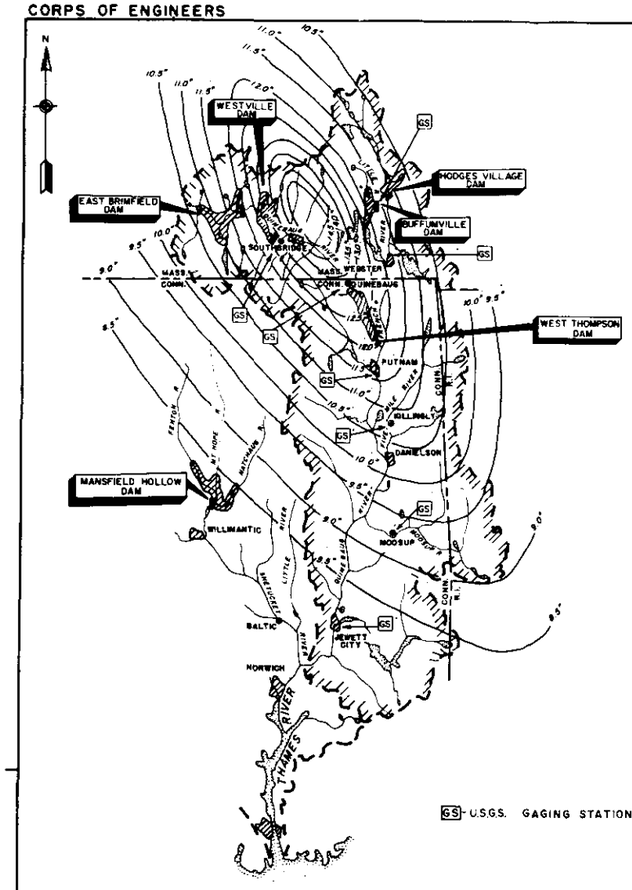
DRAWING NUMBER

SHEET

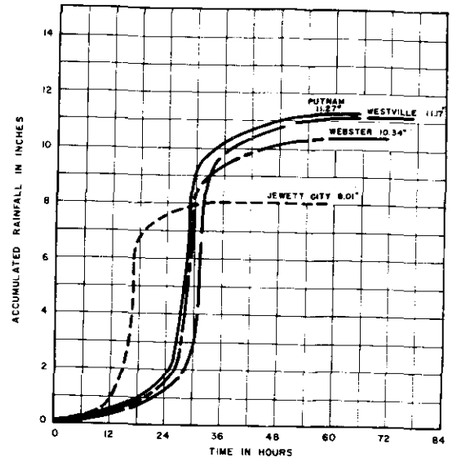
PLATE NO. 17

CORPS OF ENGINEERS

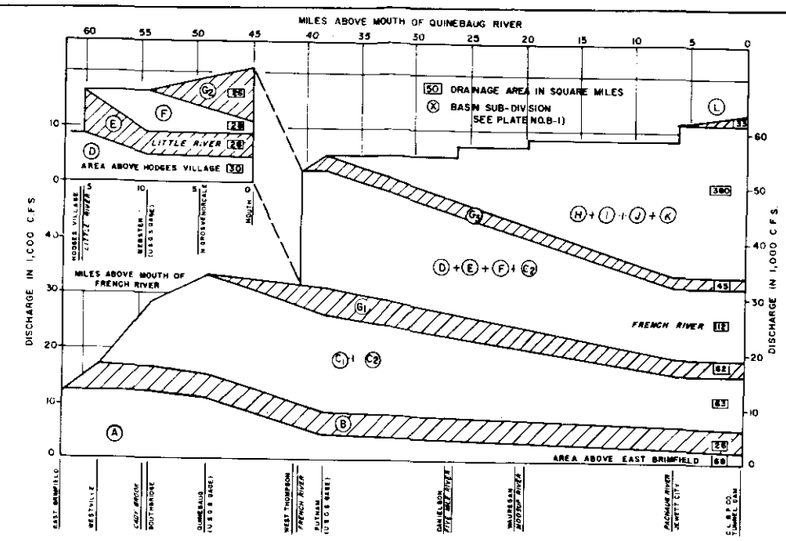
U.S. ARMY

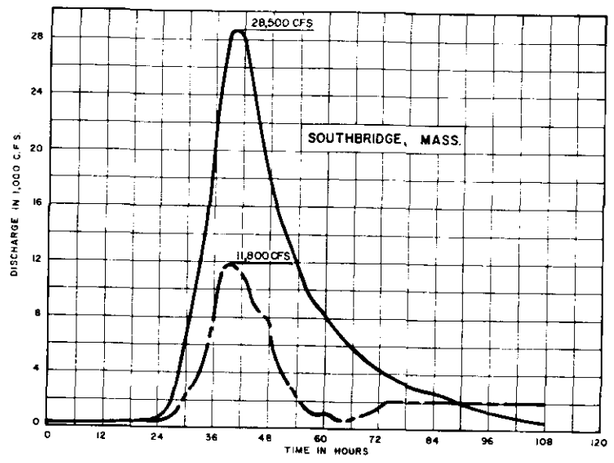


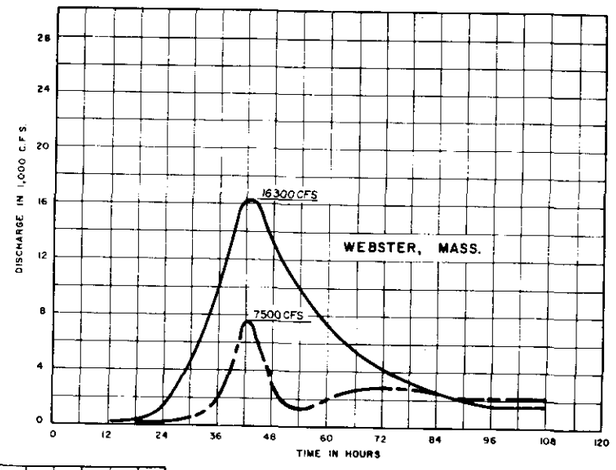
ISOHYETALS

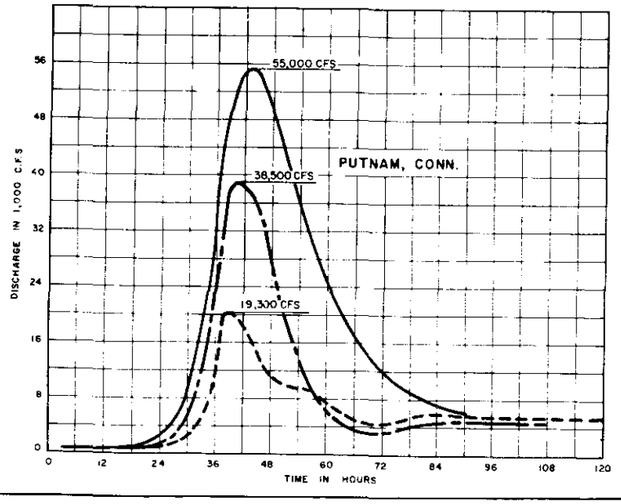


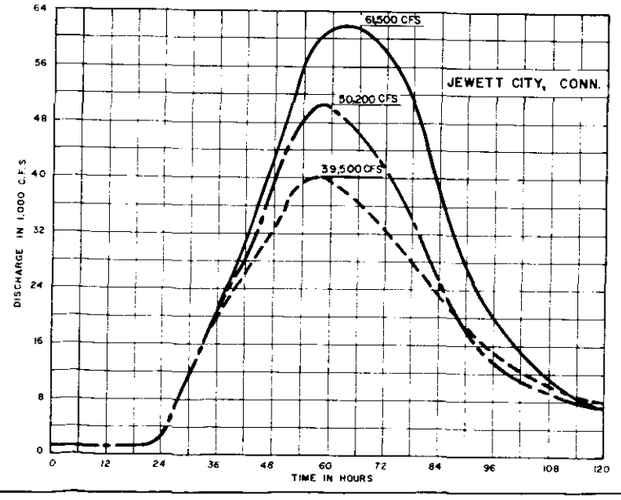
MASS RAINFALL CURVES











NATURAL

MODIFIED BY BUFFUMVILLE, HODGES VILLAGE, EAST BRIMFIELD AND WESTVILLE RESERVOIRS.

MODIFIED BY BUFFUMVILLE, HODGES VILLAGE, EAST BRIMFIELD, WESTVILLE AND WEST THOMPSON RESERVOIRS.

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

DR. BY | TR. BY S.J.C. | CK. BY

THAMES RIVER FLOOD CONTROL

STANDARD PROJECT FLOOD

QUINEBAUG RIVER WATERSHED CONN. & MASS.

DATE JUNE 1967

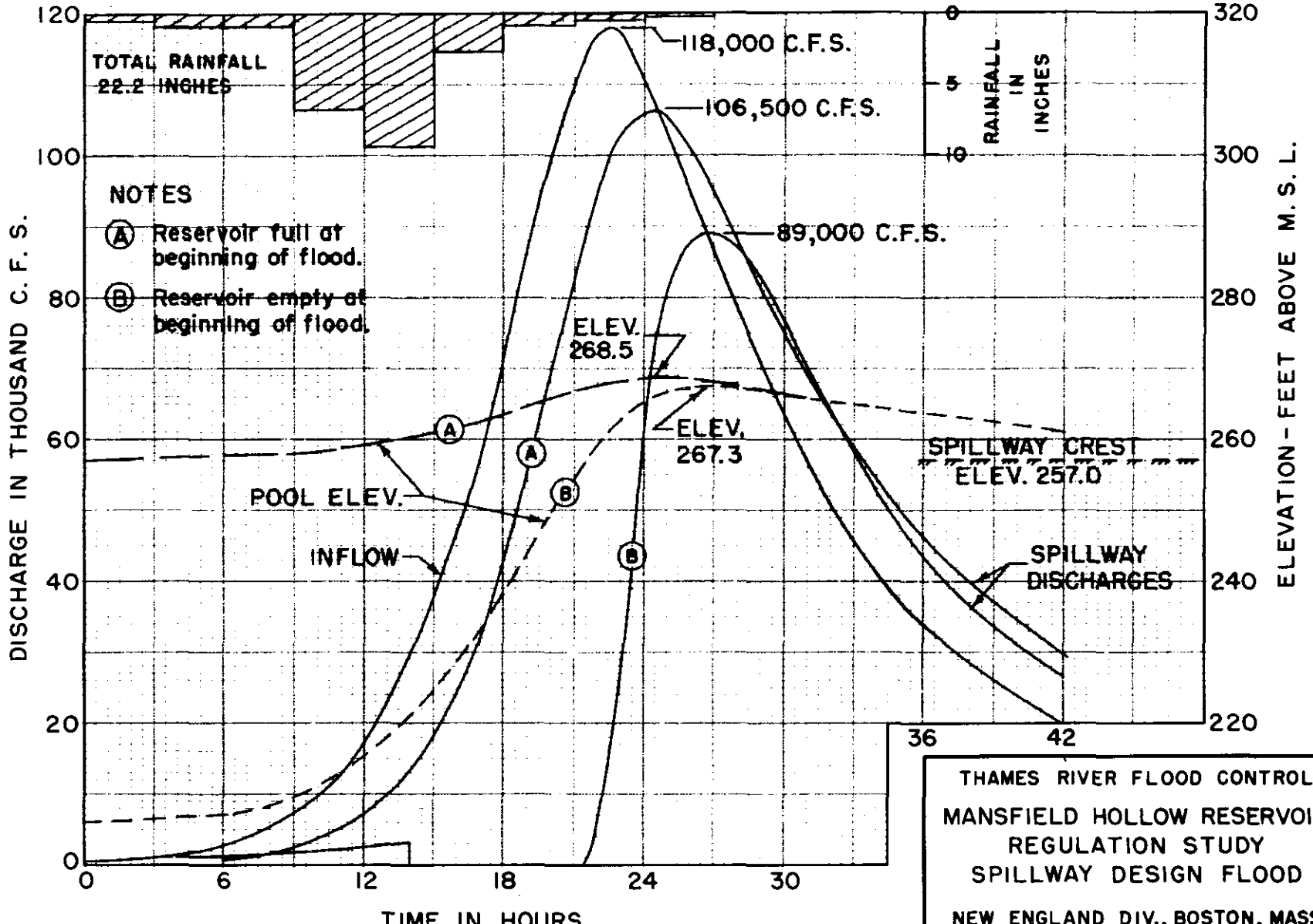
SCALE AS SHOWN

ACCOMPANY REPORT DATED: 31 JANUARY 1958

DRAWING NUMBER TH-3-1039

SHEET 1 OF 1

PLATE NO. 18

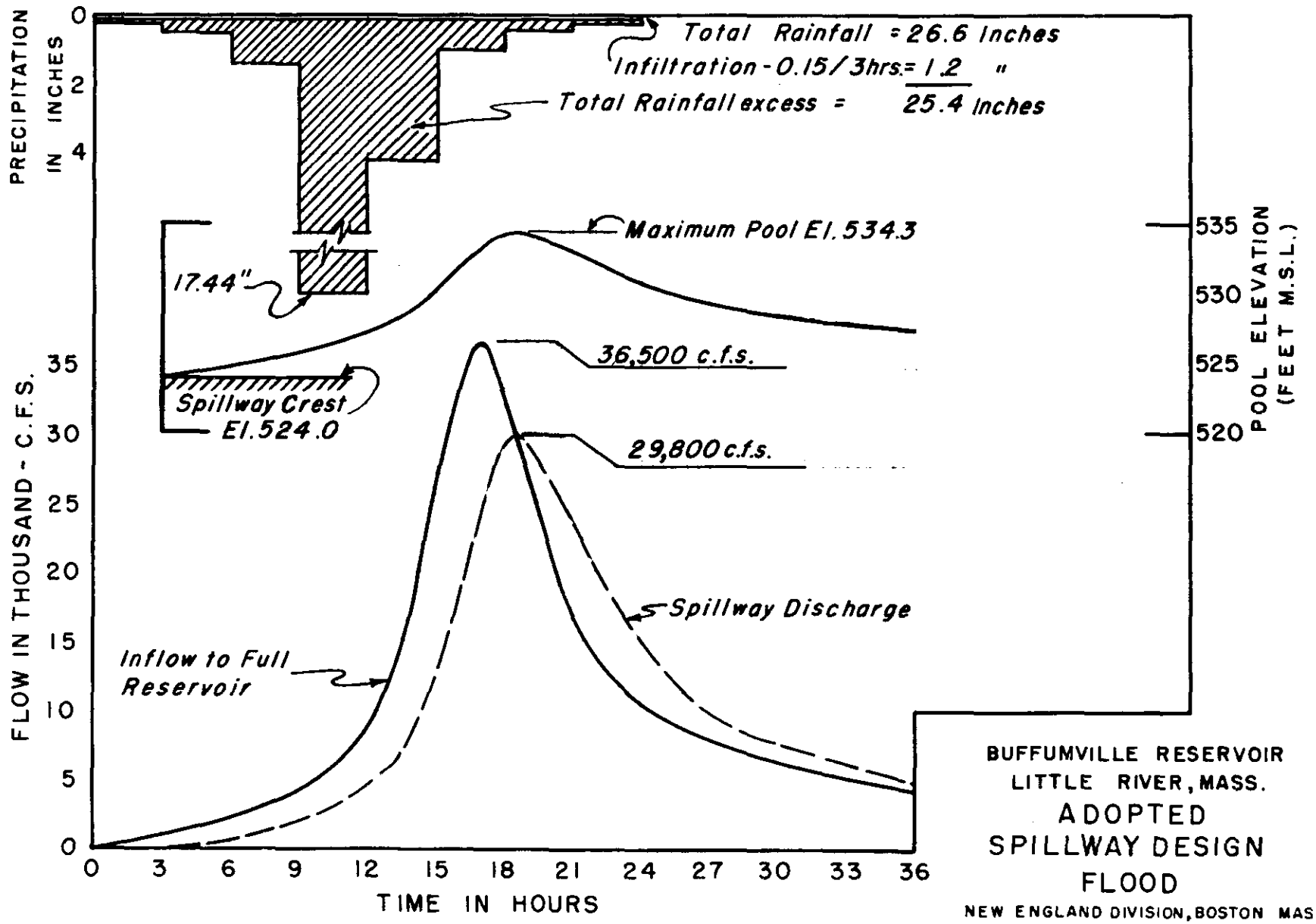


THAMES RIVER FLOOD CONTROL

MANSFIELD HOLLOW RESERVOIR
REGULATION STUDY
SPILLWAY DESIGN FLOOD

NEW ENGLAND DIV., BOSTON, MASS.
JANUARY 1952

PLATE NO. 19



BUFFUMVILLE RESERVOIR
LITTLE RIVER, MASS.

ADOPTED
SPILLWAY DESIGN
FLOOD

NEW ENGLAND DIVISION, BOSTON MASS.

APRIL 1955

PLATE NO. 20

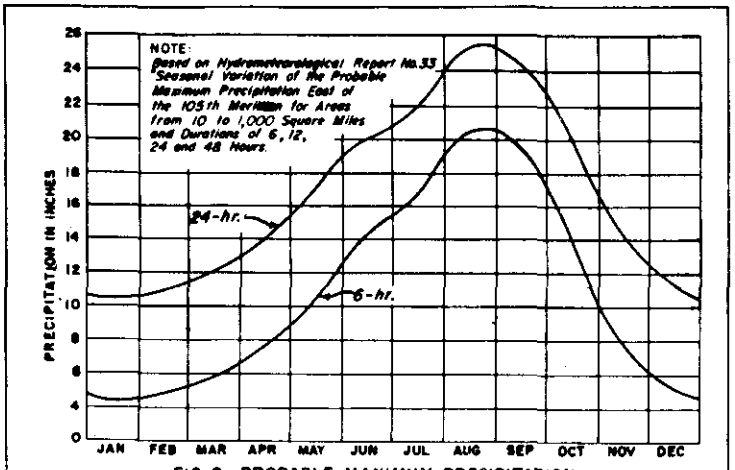


FIG. 2 PROBABLE MAXIMUM PRECIPITATION
FRENCH RIVER BASIN ABOVE HODGES VILLAGE DAM SITE

THAMES RIVER FLOOD CONTROL
HODGES VILLAGE RESERVOIR
SPILLWAY
DESIGN FLOOD
FRENCH RIVER, MASSACHUSETTS
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

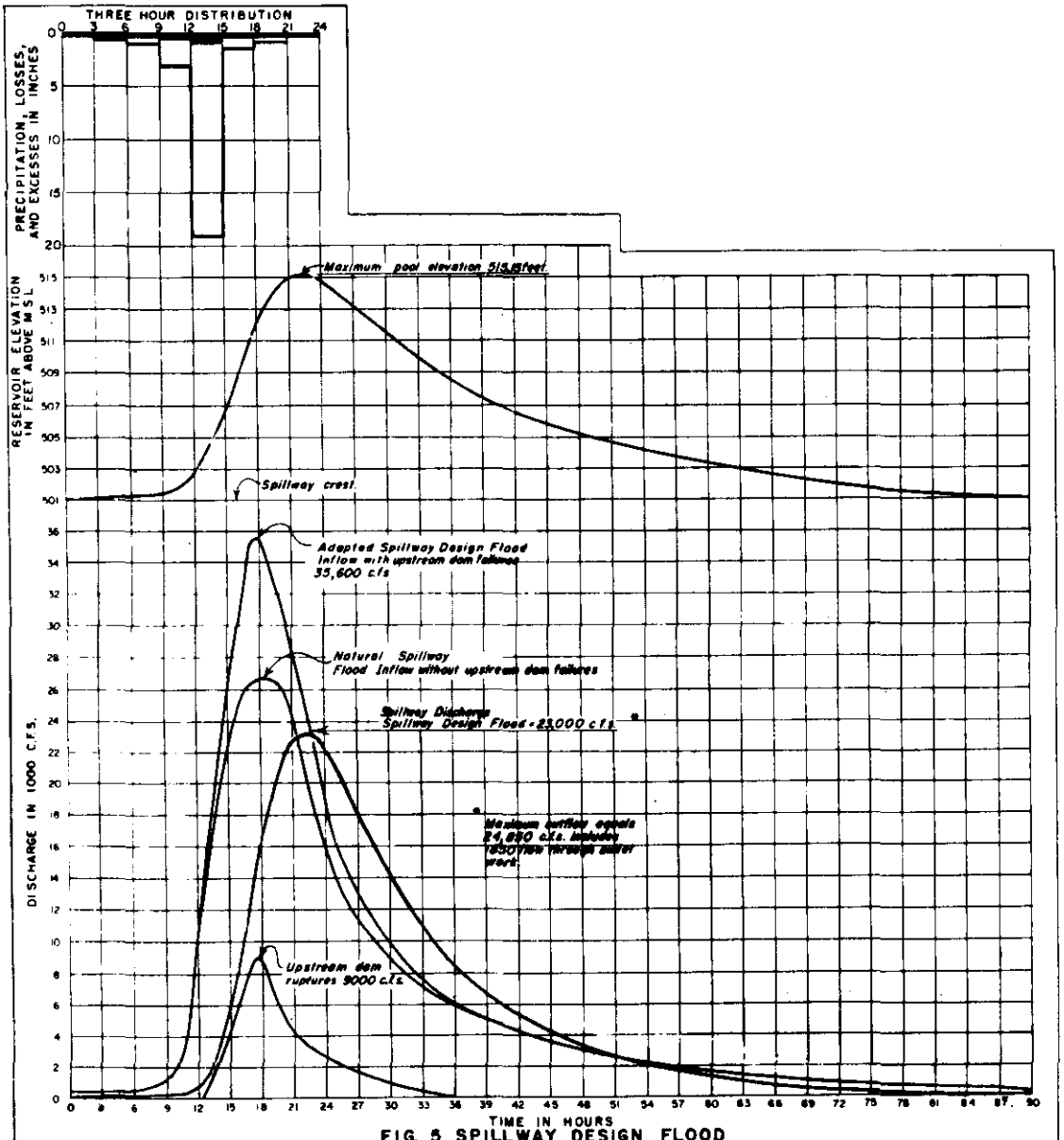
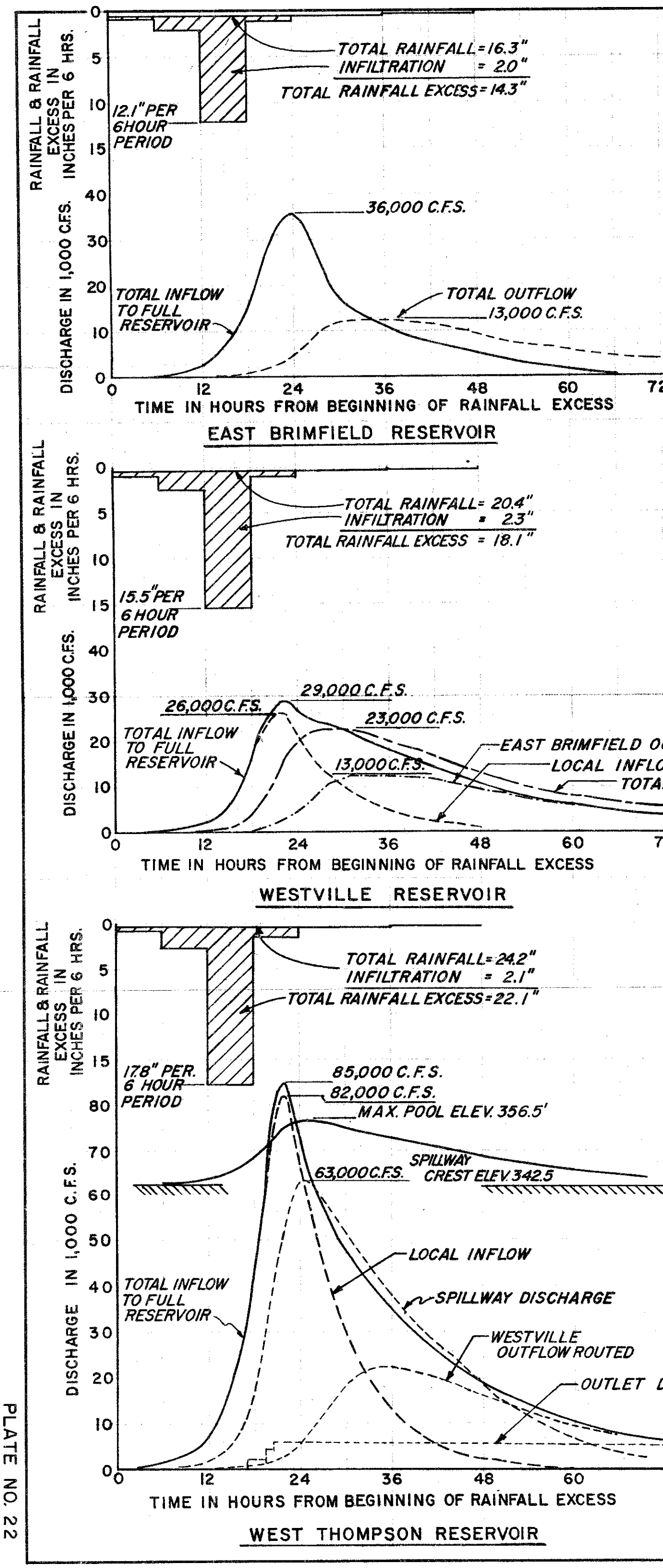


FIG. 5 SPILLWAY DESIGN FLOOD

PLATE NO. 21



THAMES RIVER FLOOD CONTROL
WEST THOMPSON RESERVOIR
SPILLWAY
DESIGN FLOOD
JUNE 1967
QUINEBAUG RIVER MASS. & CONN.
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. 22

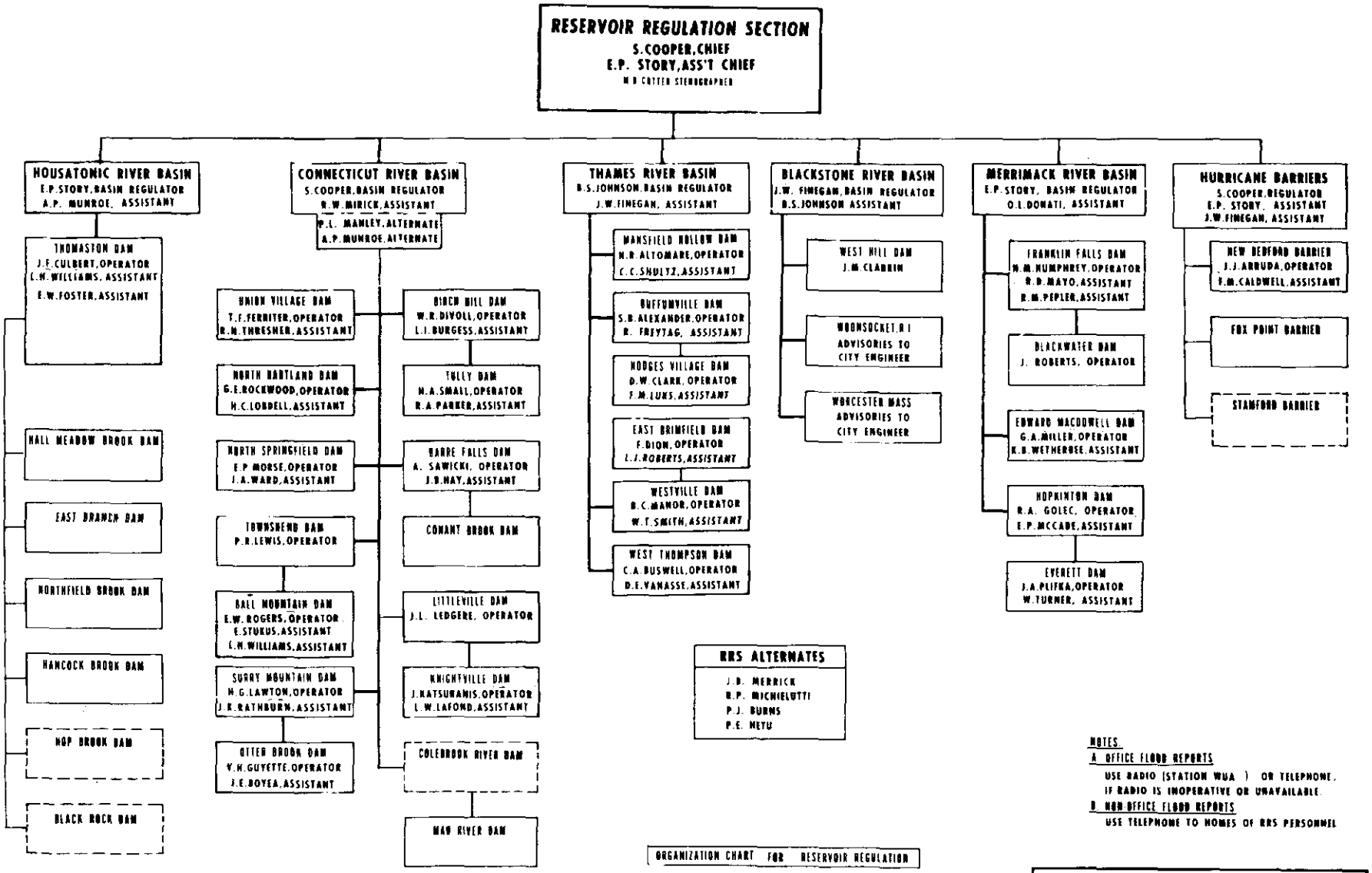


PLATE NO. 23

PLATE A-1

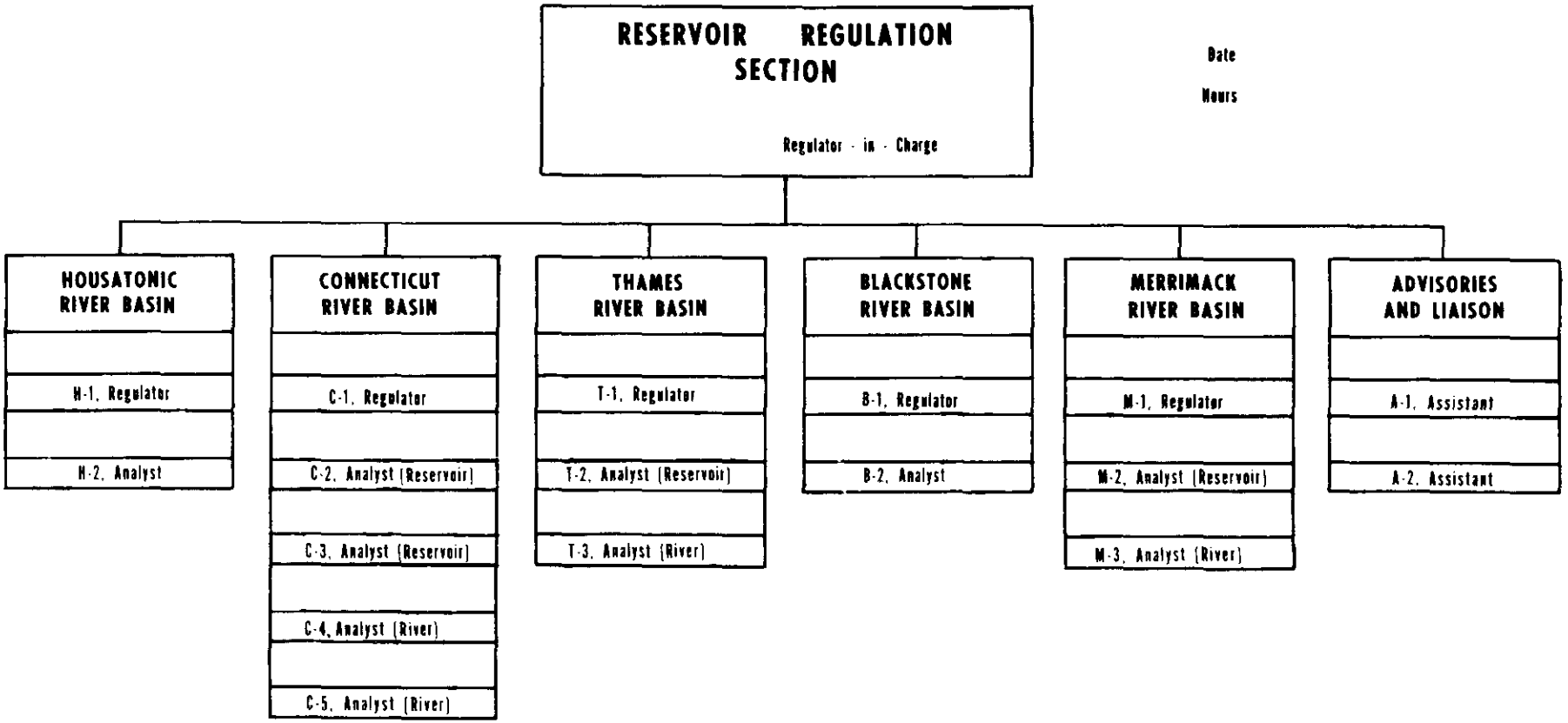
RESERVOIR REGULATION SECTION

Regulator - in - Charge

Date

Hours

HOUSATONIC RIVER BASIN	CONNECTICUT RIVER BASIN	THAMES RIVER BASIN	BLACKSTONE RIVER BASIN	MERRIMACK RIVER BASIN	ADVISORIES AND LIAISON
H-1, Regulator	C-1, Regulator	T-1, Regulator	B-1, Regulator	M-1, Regulator	A-1, Assistant
H-2, Analyst	C-2, Analyst (Reservoir)	T-2, Analyst (Reservoir)	B-2, Analyst	M-2, Analyst (Reservoir)	A-2, Assistant
	C-3, Analyst (Reservoir)	T-3, Analyst (River)		M-3, Analyst (River)	
	C-4, Analyst (River)				
	C-5, Analyst (River)				



NORMAL STAFF			EMERGENCY ALTERNATES		
E. Childs	S. Cooper	L. Reid	R. McIntosh	L. Milette	J. Squarebrigs
	J. Finegan	E. Story	J. Smith	D. Martin	R. Kotelly
R. Mirick	O. Donati	A. Munroe	N. Lally	N. Avtges	G. Blodgett
B. Johnson	P. Manley	R. Michielutti	P. Hetu		
	P. Burns				
	J. VanderHoeff	J. Merrick			

RESERVOIR REGLATION SECTION

DUTY ROSTER

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. 24

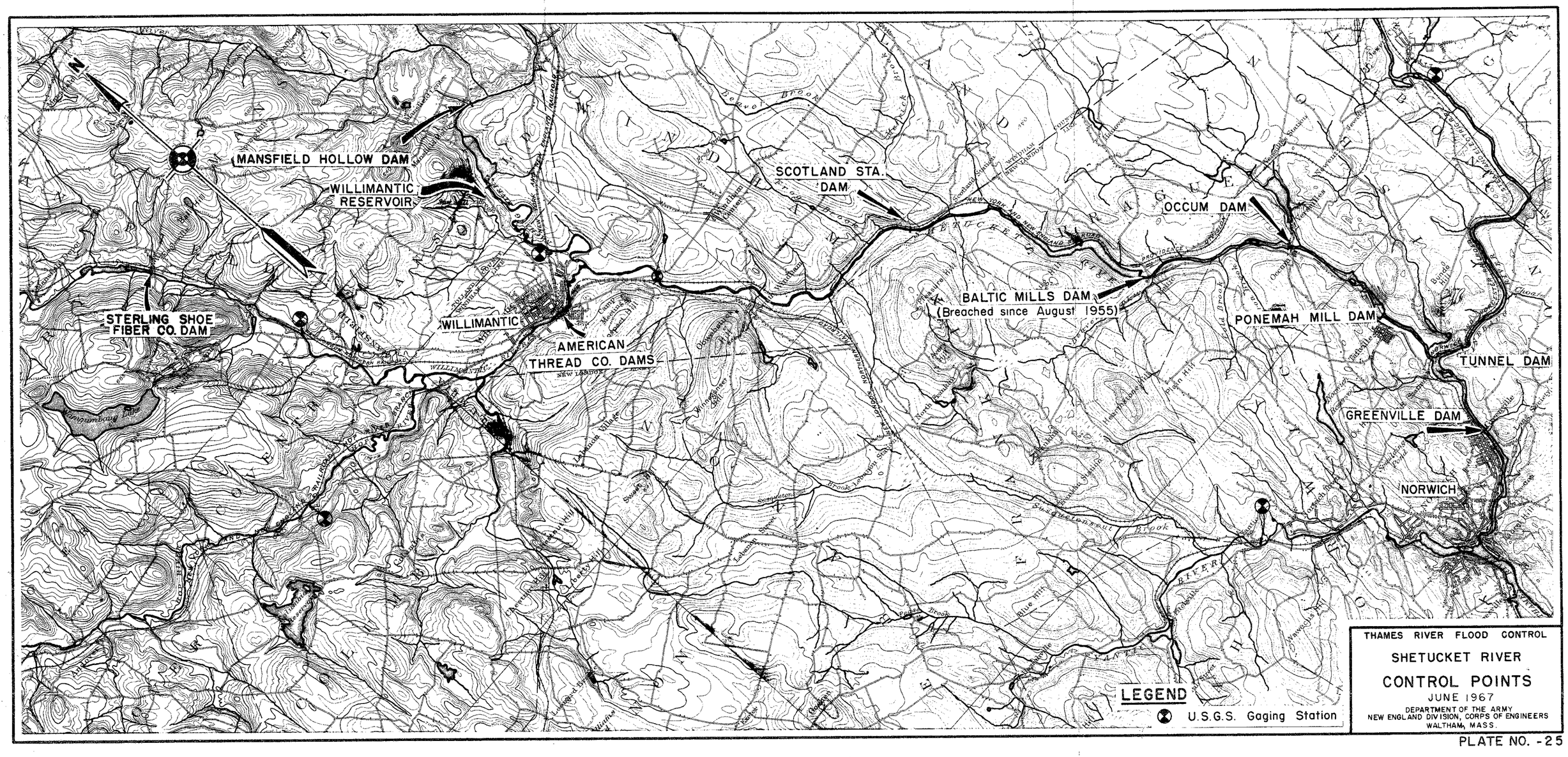
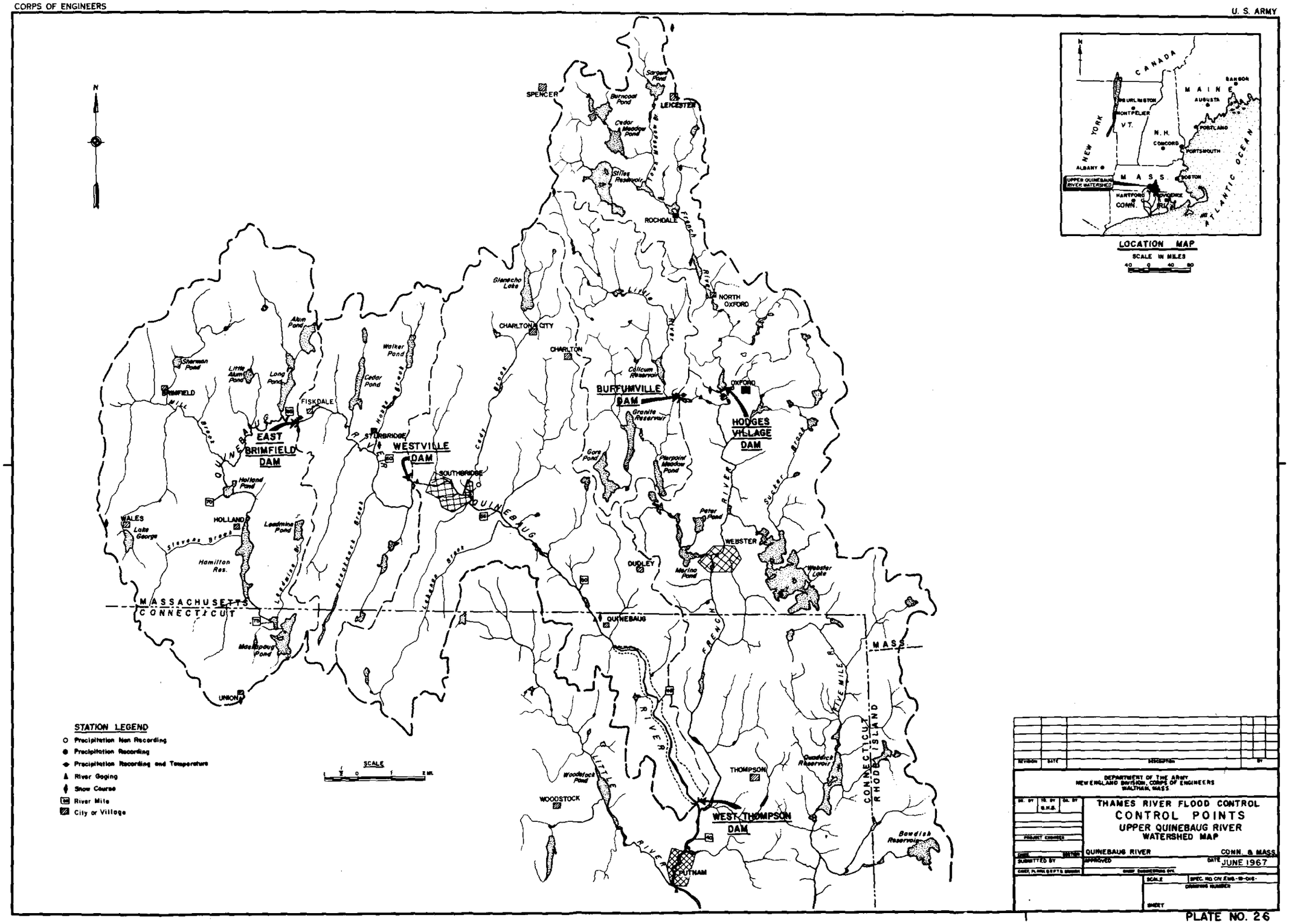

MANSFIELD HOLLOW DAM
WILLIMANTIC RESERVOIR
STERLING SHOE FIBER CO. DAM
WILLIMANTIC
AMERICAN THREAD CO. DAMS
SCOTLAND STA. DAM
BALTIC MILLS DAM
(Breached since August 1955)
OCCUM DAM
PONEMAH MILL DAM
TUNNEL DAM
GREENVILLE DAM
NORWICH
LEGEND
U.S.G.S. Gaging Station
THAMES RIVER FLOOD CONTROL
SHETUCKET RIVER
CONTROL POINTS
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. -25



Revision	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

THAMES RIVER FLOOD CONTROL
CONTROL POINTS
UPPER QUINEBAUG RIVER
WATERSHED MAP

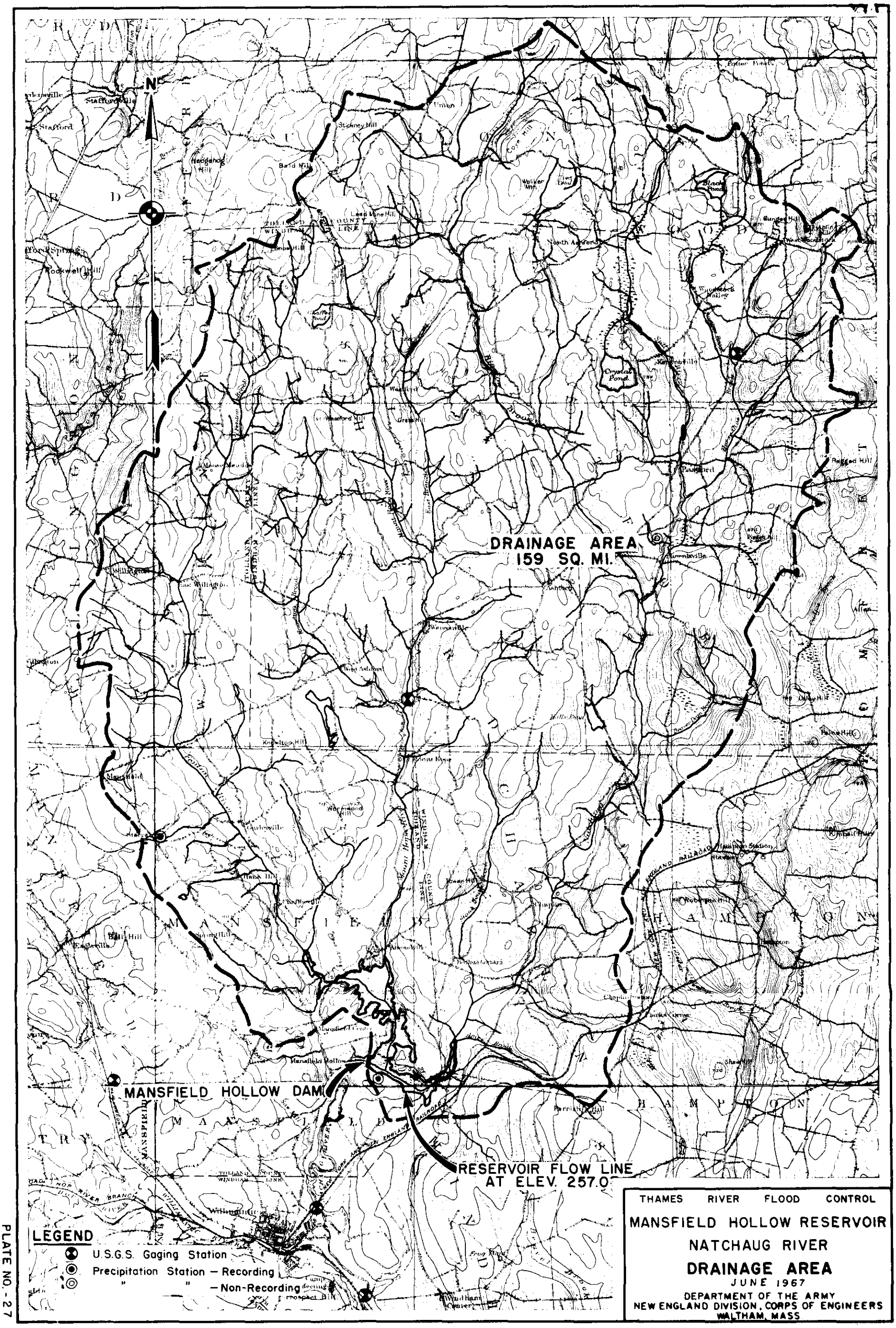
QUINEBAUG RIVER — CONN. & MASS.

SUBMITTED BY — APPROVED — DATE JUNE 1967

SCALE — SPEC. NO. CIV. ENG.-19-016-

DRAWING NUMBER

SHEET



THAMES RIVER FLOOD CONTROL

MANSFIELD HOLLOW RESERVOIR

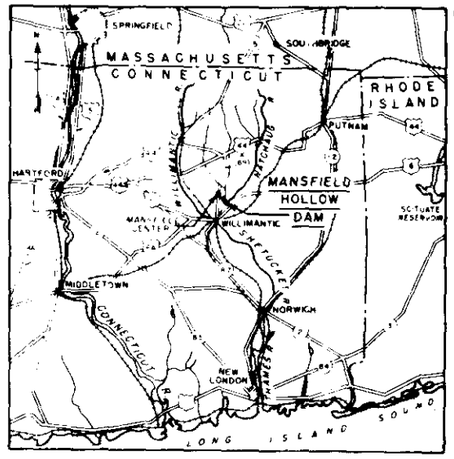
NATCHAUG RIVER

DRAINAGE AREA

JUNE 1967

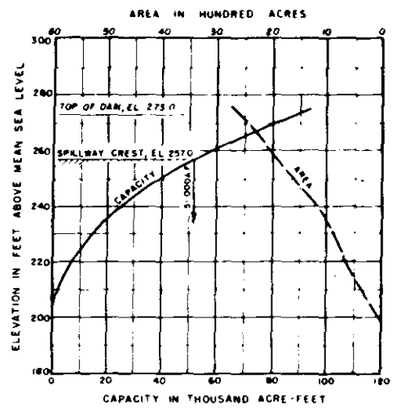
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. - 27



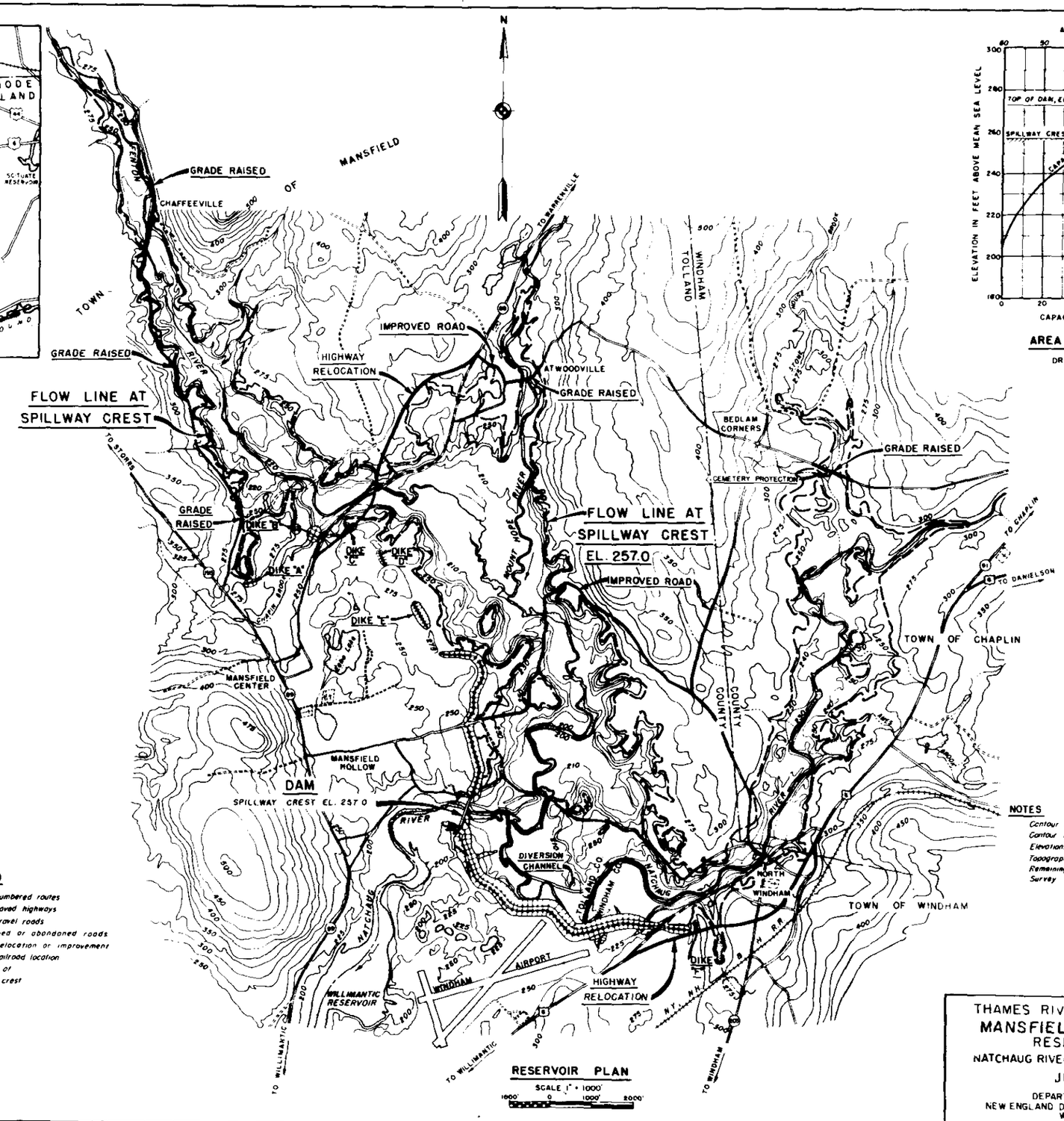
VICINITY MAP

SCALE IN MILES



AREA AND CAPACITY CURVES

DRAINAGE AREA 159 SQ MI



RESERVOIR PLAN

SCALE 1" = 1000'

1000' 0 1000' 2000'

LEGEND

- Existing numbered routes
- Existing paved highways
- Existing gravel roads
- Discontinued or abandoned roads
- Highway relocation or improvement
- Existing railroad location
- Reservoir at spillway crest

NOTES

Contour interval 10 feet within Reservoir Area
Contour interval 25 feet outside Reservoir Area
Elevations refer to Mean Sea Level Datum
Topography at damsite based on Plane Table Survey
Remaining topography based on Aerial Photographic Survey

THAMES RIVER FLOOD CONTROL

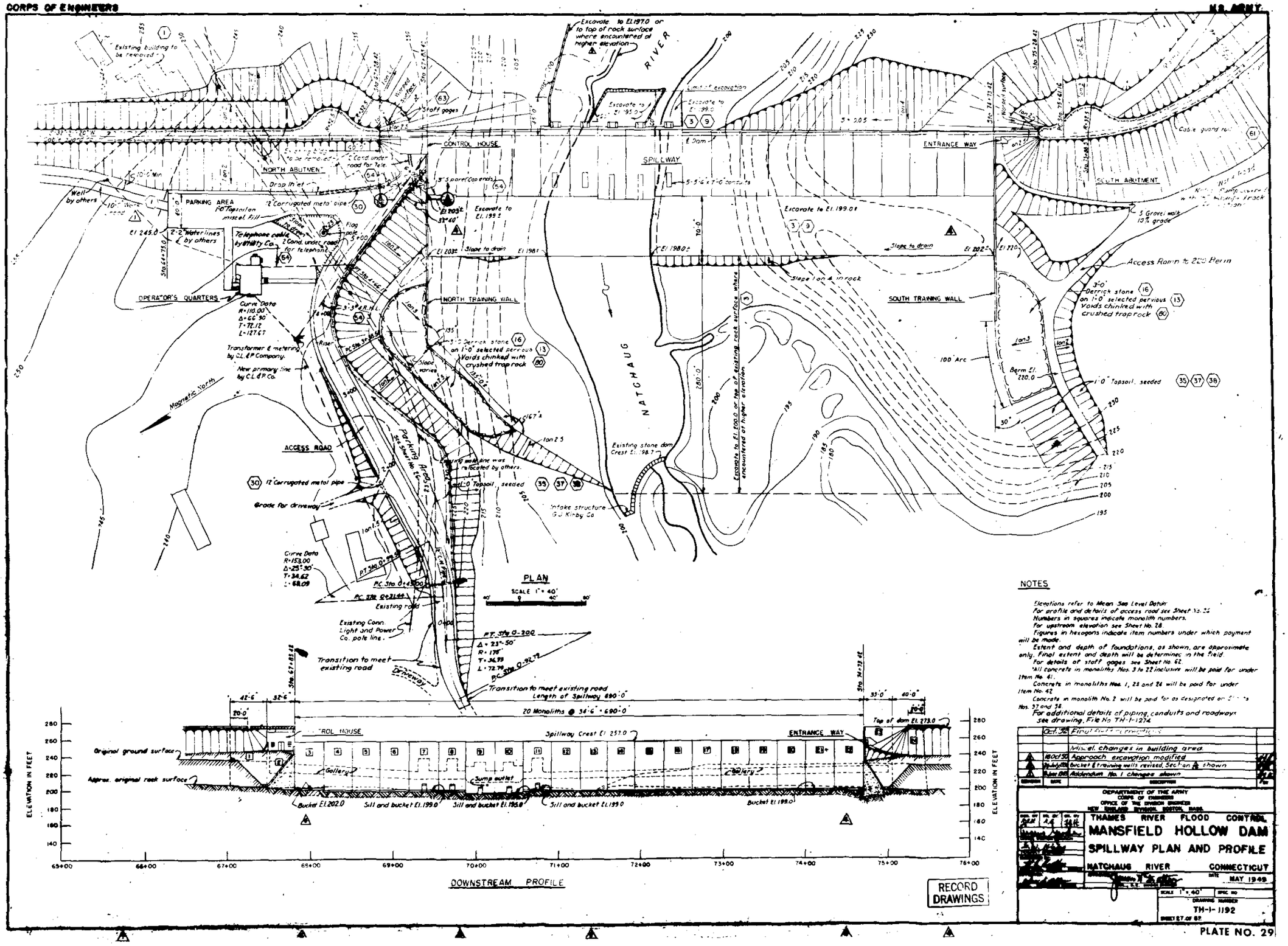
MANSFIELD HOLLOW DAM

RESERVOIR MAP

NATCHAUG RIVER, CONNECTICUT

JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS



NOTES

Elevations refer to Mean Sea Level Datum.
For profile and details of access road see Sheet No. 26.
Numbers in squares indicate monolith numbers.
For upstream elevation see Sheet No. 28.
Figures in hexagons indicate item numbers under which payment will be made.
Extent and depth of foundations, as shown, are approximate only. Final extent and depth will be determined in the field.
For details of staff gages see Sheet No. 62.
All concrete in monoliths Nos. 3 to 22 inclusive will be paid for under Item No. 41.
Concrete in monoliths Nos. 1, 23 and 24 will be paid for under Item No. 42.
Concrete in monolith No. 2 will be paid for as designated on Sheets Nos. 37 and 38.
For additional details of piping, conduits and roadways see drawing, File No. TH-1-1274.

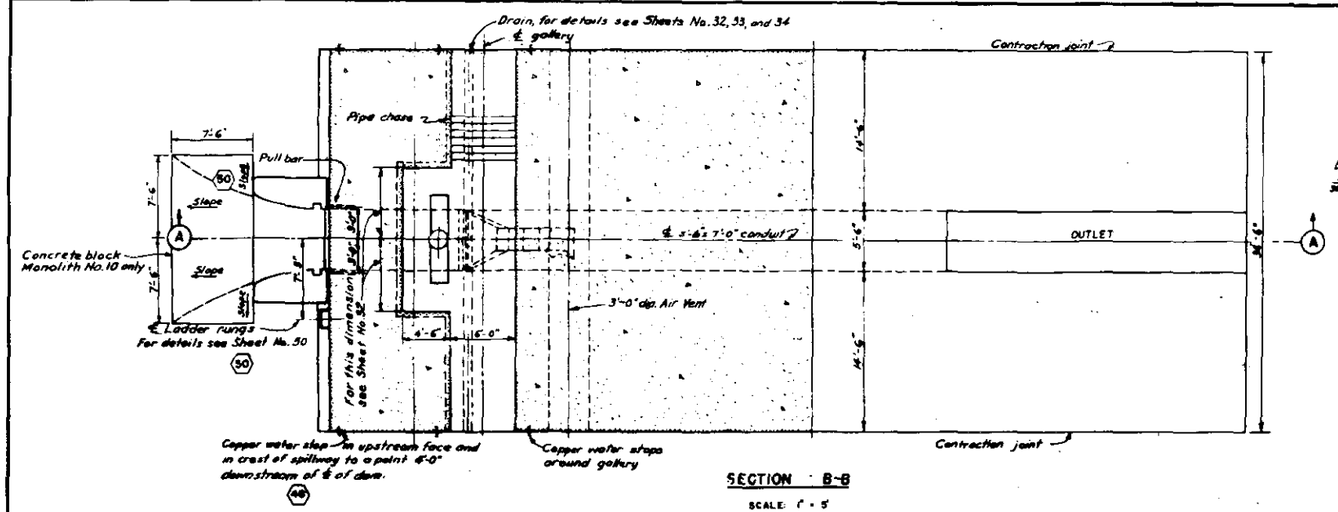
REVISION	DATE	DESCRIPTION	
	Oct. 52	Final field corrections	
		Miscel. changes in building area.	
	18 Oct 50	Approach excavation modified	
		Bucket & training walls revised, Section A shown	
		Addendum No. 1 changes shown	

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

THAMES RIVER FLOOD CONTROL
MANSFIELD HOLLOW DAM
SPILLWAY PLAN AND PROFILE
NATCHAUG RIVER CONNECTICUT

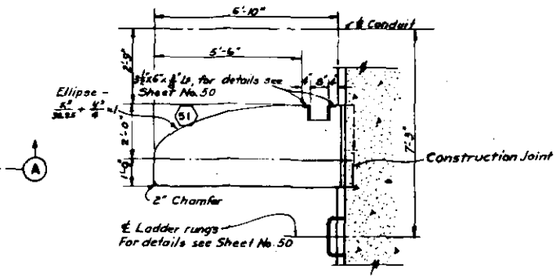
DATE MAY 1949
SCALE 1" = 40'
DRAWING NUMBER TH-1-1192
SHEET 27 OF 62

PLATE NO. 29



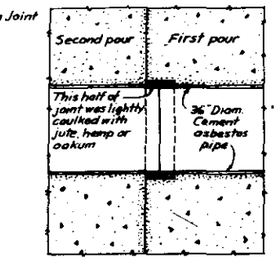
SECTION B-B

SCALE: 1" = 5'



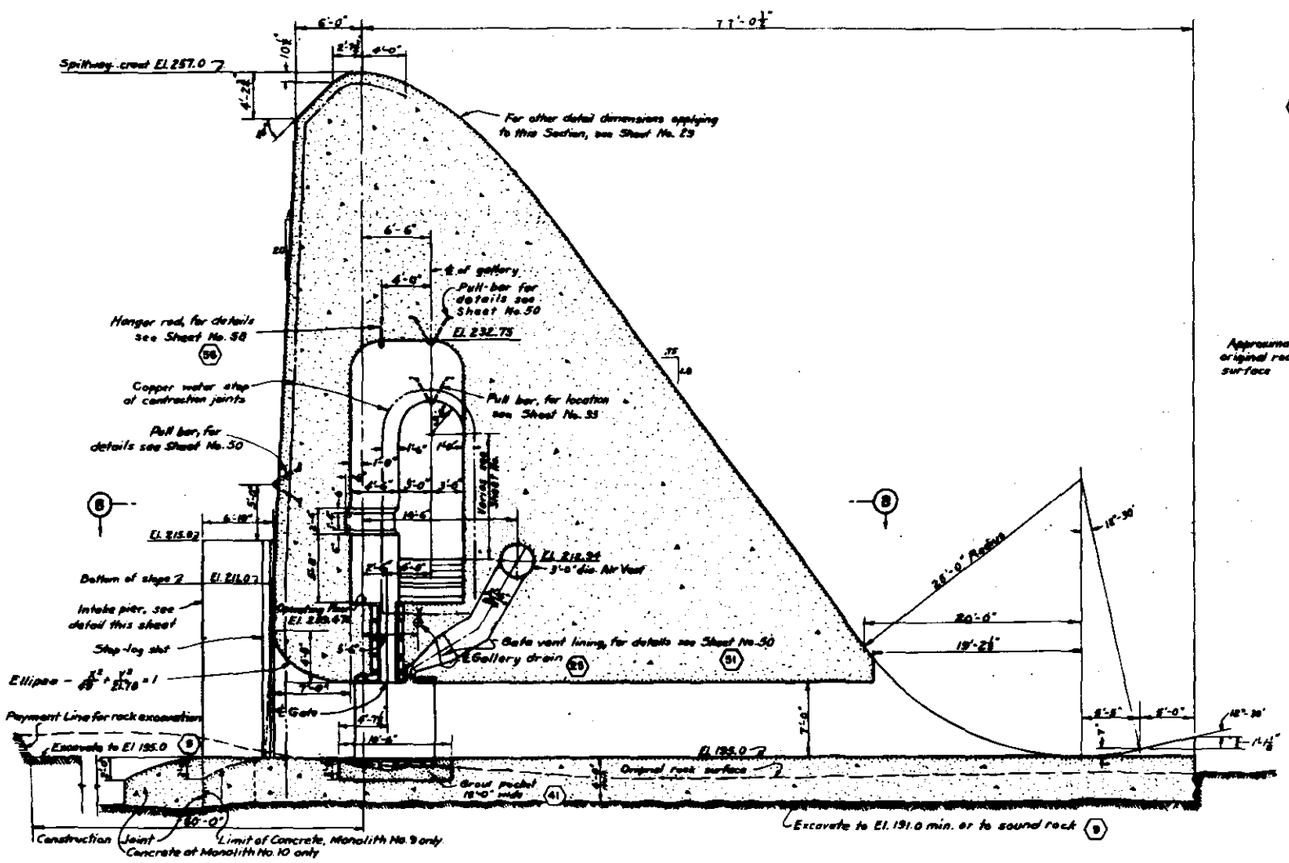
INTAKE PIER PLAN

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



AIR VENT AT CONTRACTION JOINT

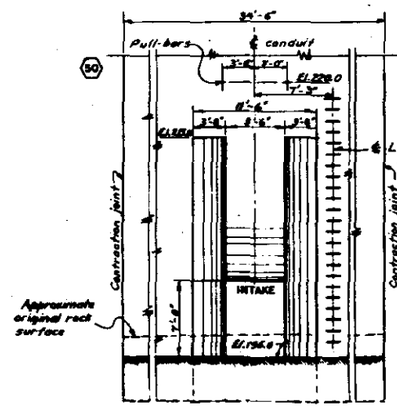
SCALE: 1/2" = 1'-0"



SECTION A-A

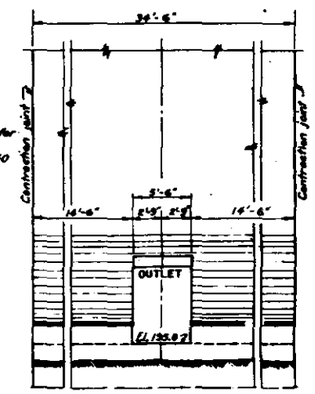
MONOLITHS NO. 9 & 10

SCALE: 1" = 5'



INTAKE ELEVATION

SCALE: 1" = 5'



OUTLET ELEVATION

SCALE: 1" = 5'

SCALE: 1" = 5'

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

RECORD DRAWING

NOTES

For complete details of gallery, pipe chase, float well intake, drainage and air vent see Sheets No. 33, 34, 35, and 50.

No horizontal construction joints shall be made above El. 248.75.

Payment for concrete will be made under Item No. 41.

REVISION	DATE	DESCRIPTION	BY
		Col. 52 Final field corrections	

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

THAMES RIVER FLOOD CONTROL
MANSFIELD HOLLOW DAM
SPILLWAY SECTIONS NO. 3
NATCHAUG RIVER CONNECTICUT

DATE MAY 1949

DRAWING NUMBER TH-1-1196

SHEET 31 OF 62

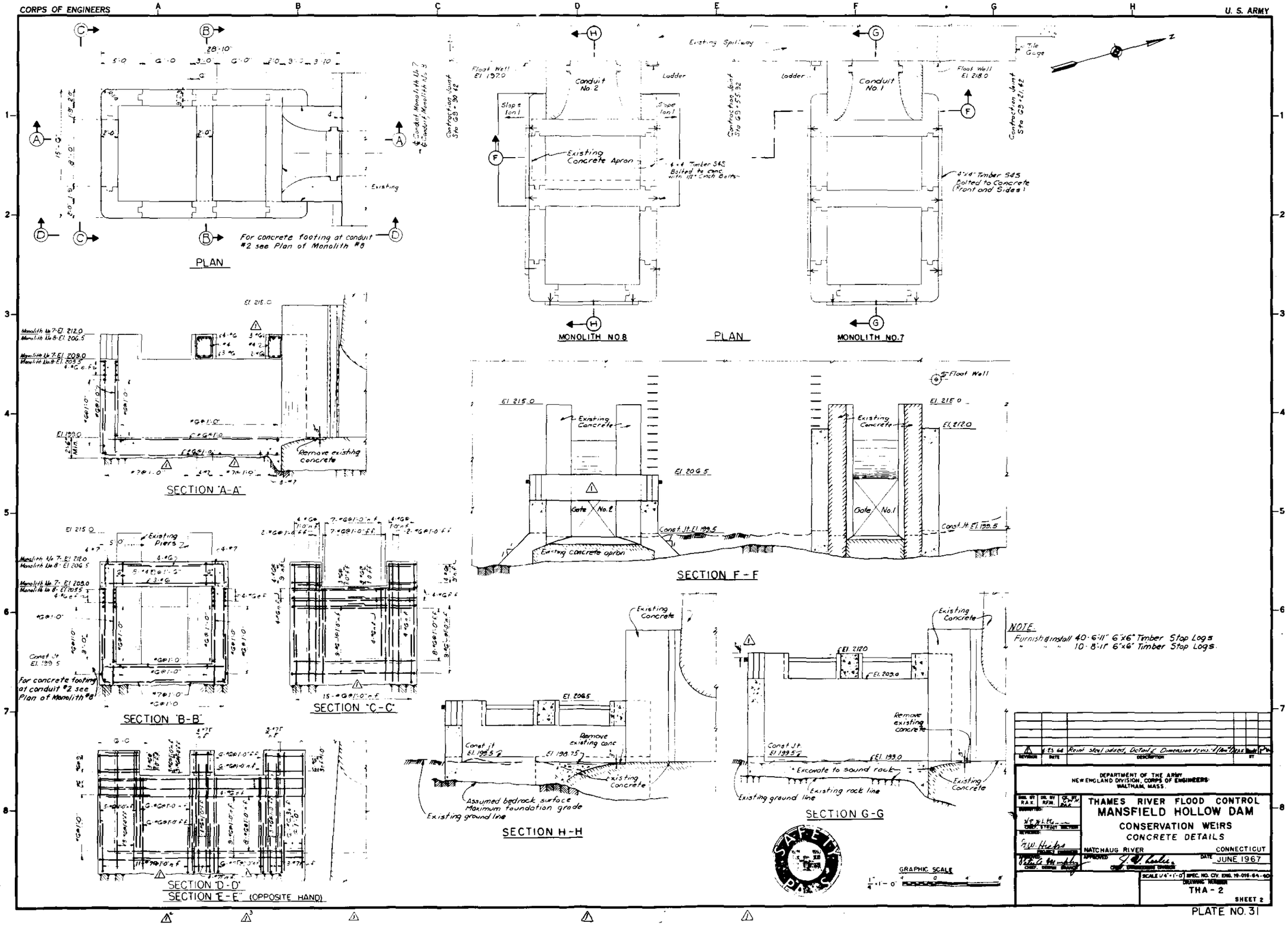
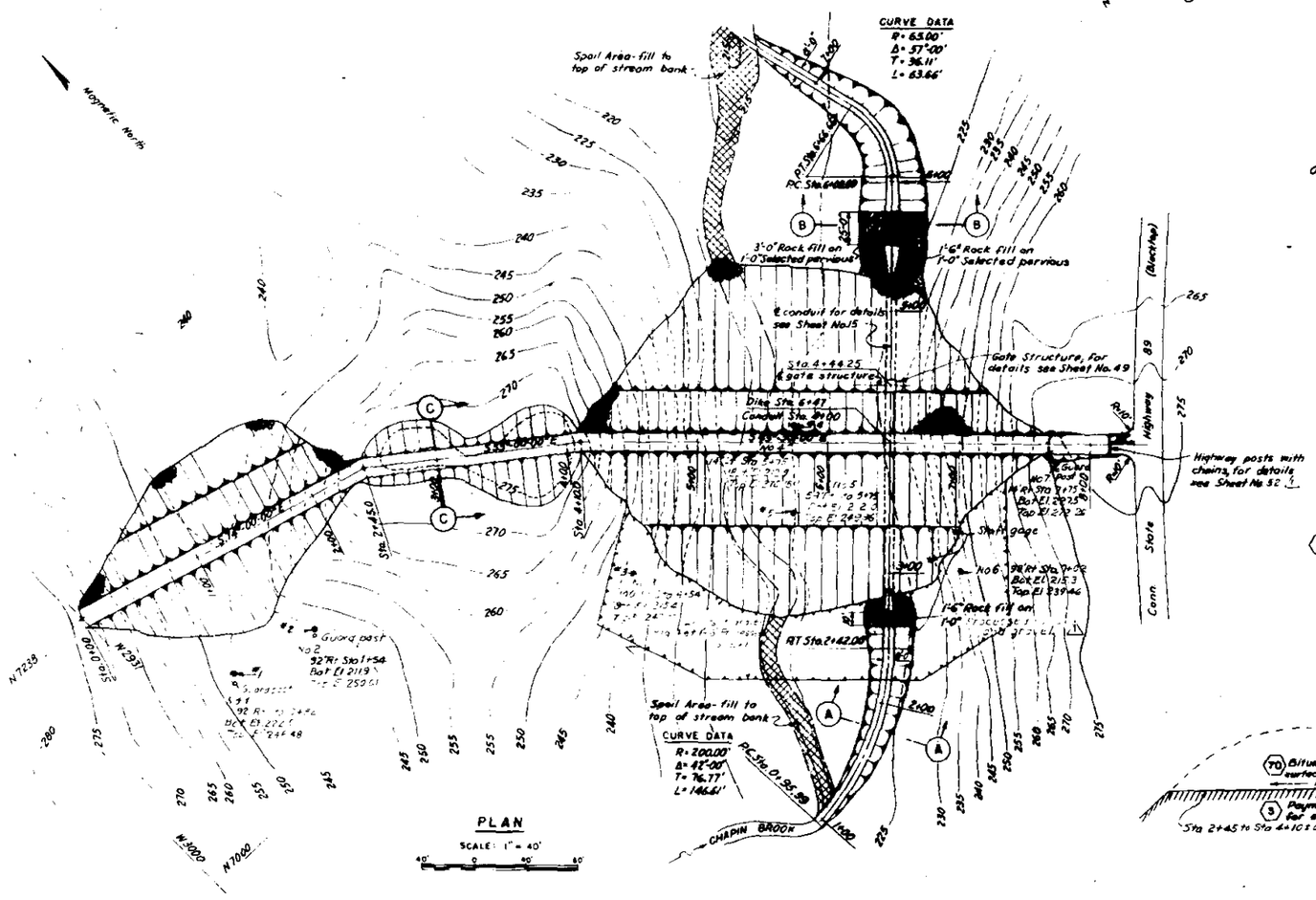
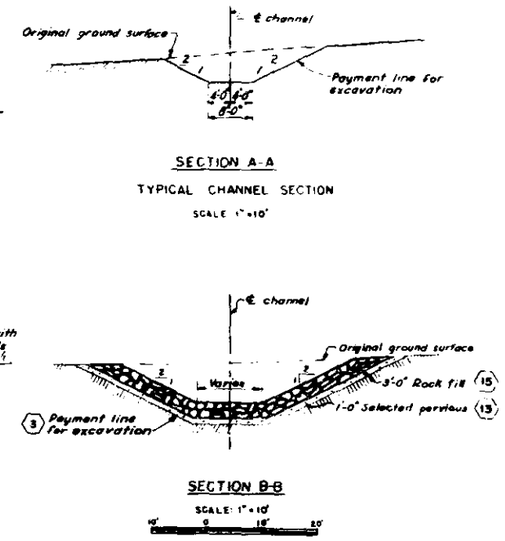
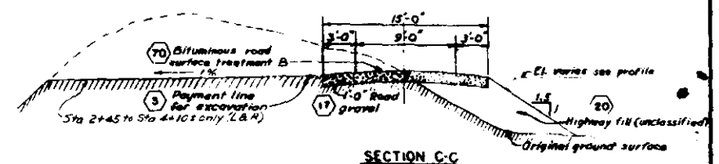
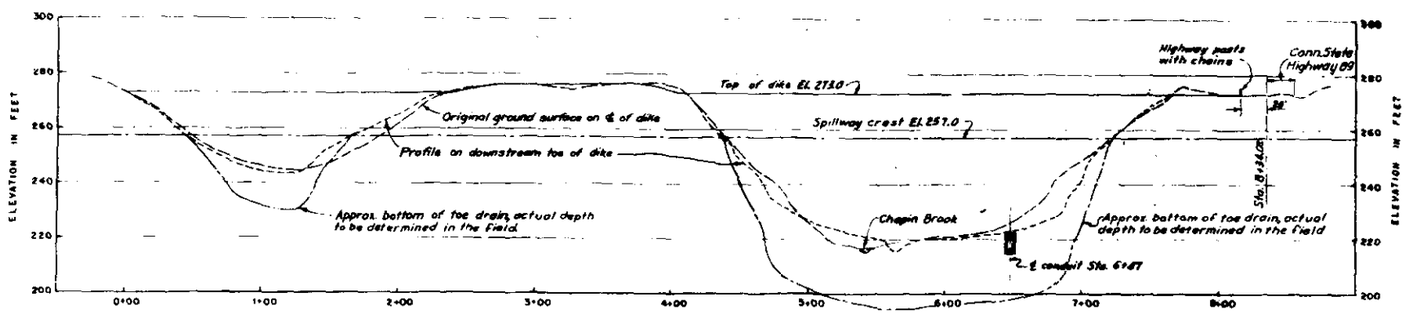

CORPS OF ENGINEERS
U. S. ARMY
PLAN
For concrete footing at conduit #2 see Plan of Monolith #8
SECTION "A-A"
Remove existing concrete
SECTION "B-B"
For concrete footing at conduit #2 see Plan of Monolith #8
SECTION "C-C"
SECTION "D-D"
SECTION "E-E" (OPPOSITE HAND)
MONOLITH NO.8
PLAN
MONOLITH NO.7
Existing Spillway
Conduit No. 2
Conduit No. 1
Existing Concrete Apron
4"x4" Timber S4S Bolted to Concrete (Front and Sides)
SECTION F-F
Existing Concrete apron
SECTION H-H
Assumed bedrock surface Maximum foundation grade
Existing ground line
SECTION G-G
Excavate to sound rock
Existing rock line
Existing ground line
NOTE.
Furnish & install 40-6'-11" 6"x6" Timber Stop Logs
" " " 10-8'-11" 6"x6" Timber Stop Logs.
GRAPHIC SCALE
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.
THAMES RIVER FLOOD CONTROL
MANSFIELD HOLLOW DAM
CONSERVATION WEIRS
CONCRETE DETAILS
NATCHAUG RIVER
CONNECTICUT
JUNE 1967
THA - 2
SHEET 2

PLATE NO. 31









NOTE:
For notes applying to details on this sheet see Sheet No. 16

DRAWINGS

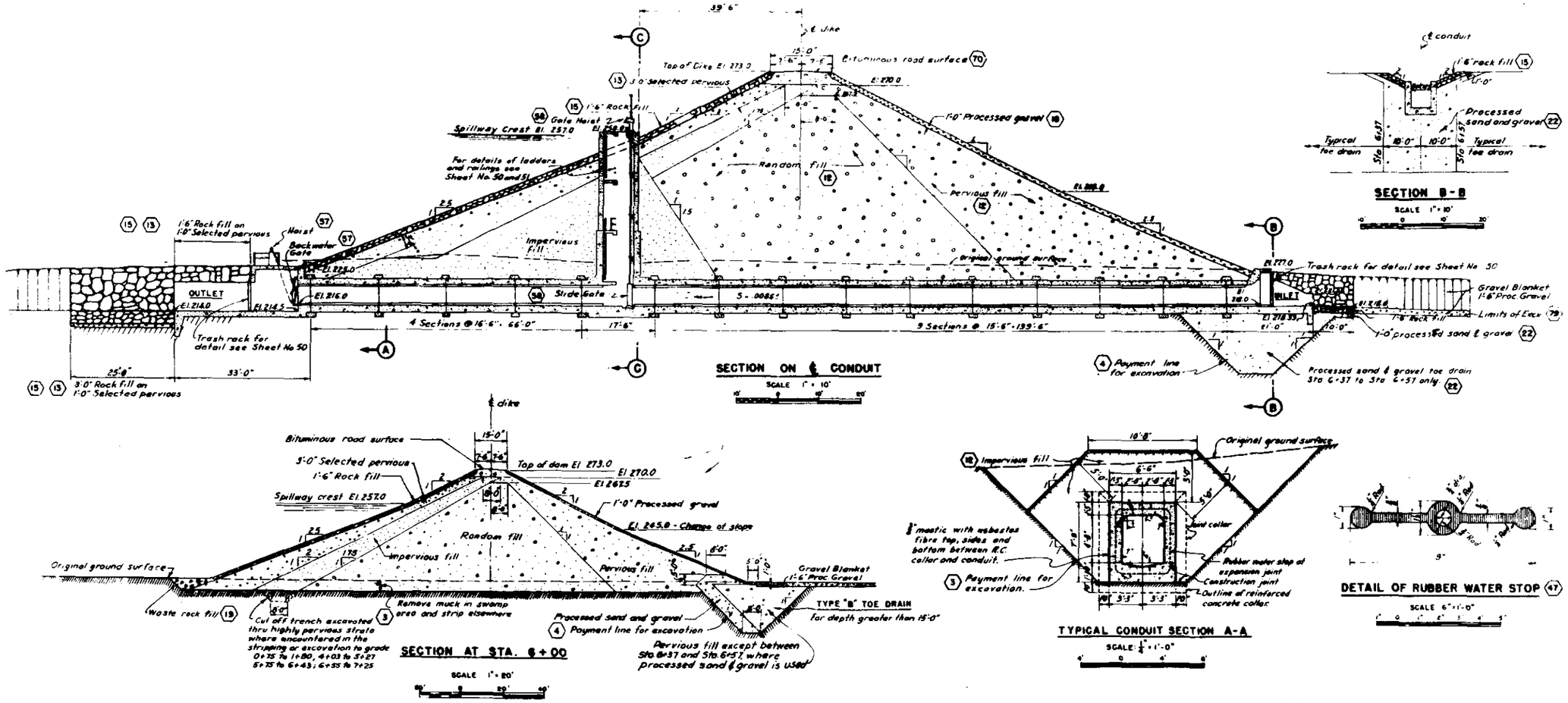
	Oct. 59	Field	
1	8 June 1960	Addendum No.1. Changes shown.	
REVISIONS	DATE	DESCRIPTION	

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

THAMES RIVER FLOOD CONTROL
MANSFIELD HOLLOW DAM
DIKE B
PLAN, PROFILE AND SECTIONS
NATCHAUG RIVER CONNECTICUT

DATE MAY 1959
SCALE 1" = 40'
DRAWING NUMBER TH-1-1179
SHEET 14 OF 62

INCL. 2



NOTE

Transition from Type "A" and Type "B" toe drain will be made in a distance of 50 feet.

NOTES:

Elevations refer to Mean Sea Level Datum.
Figures in hexagons indicate item numbers under which payment will be made.
All concrete shown on this sheet will be paid for under Item No 44.
For details of top of dike, see Sheet No 22.

For details of inlet, outlet and conduit, see Sheets No 47, 48 and 49.

REVISION	DATE	DESCRIPTION
		Final field corrections

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION BOSTON MASS

THAMES RIVER FLOOD CONTROL
MANSFIELD HOLLOW DAM
DIKE B
SECTIONS AND DETAILS
NATCHAUG RIVER CONNECTICUT
MAY 1962

TH-1-1180

PLATE NO. 33

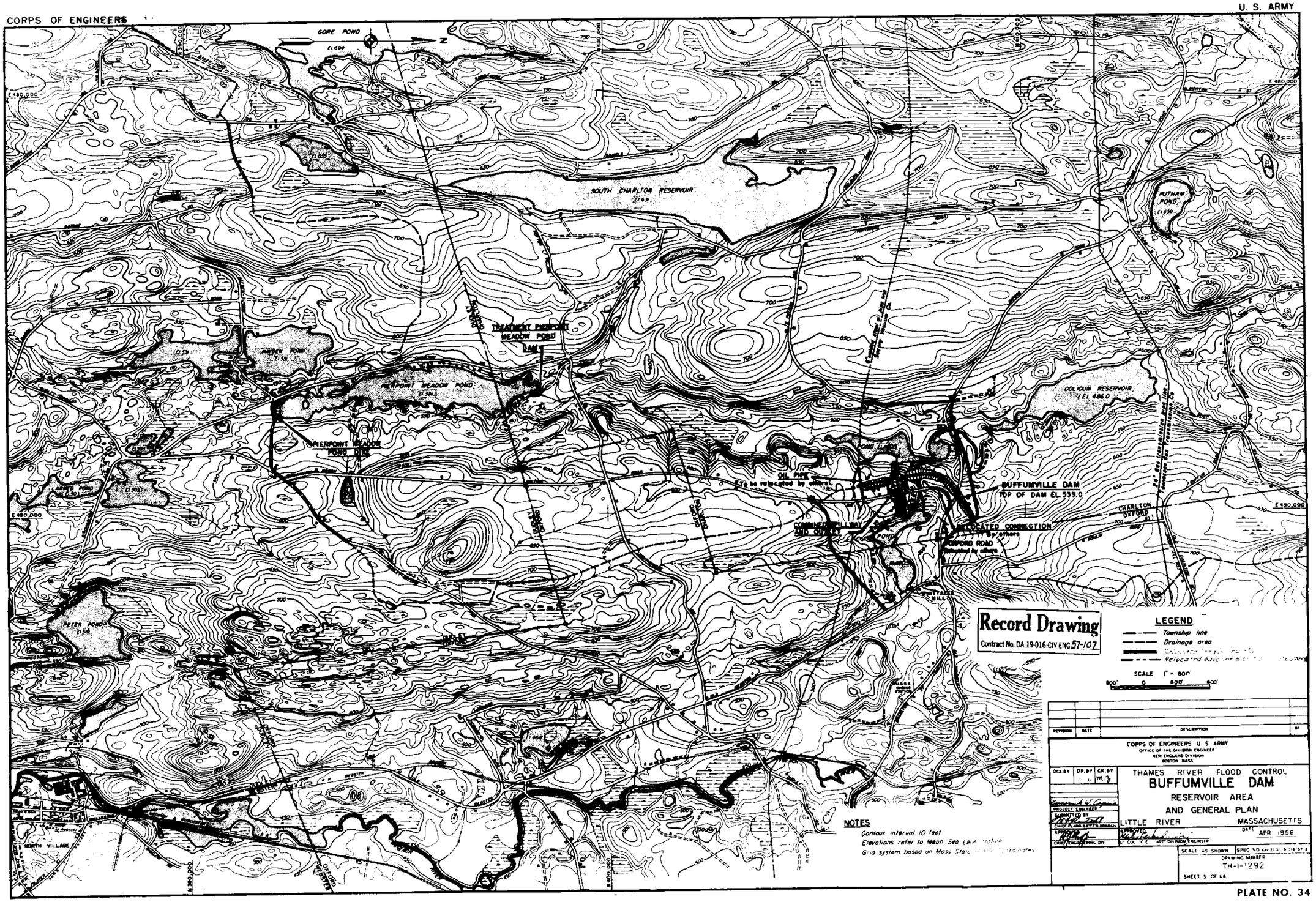
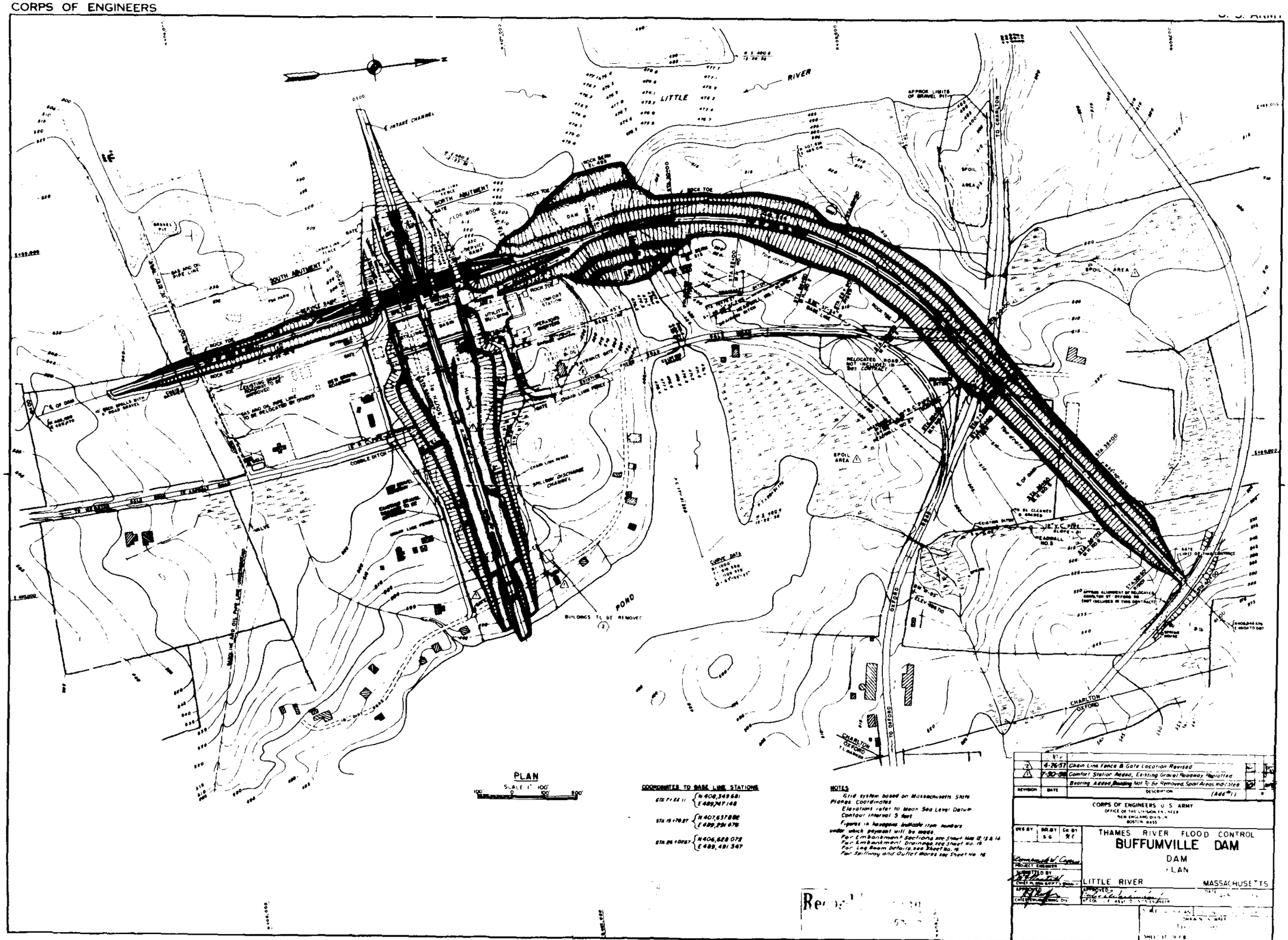

GORE POND
SOUTH CHARLTON RESERVOIR
PUTNAM POND
TREATMENT PIERPOINT MEADOW POND DAM
PIERPOINT MEADOW POND
PIERPOINT MEADOW POND DIKE
COLICUM RESERVOIR
OIL PIPE
BUFFUMVILLE DAM
TOP OF DAM EL 539.0
CHARLTON OXFORD
RELOCATED CONNECTION
PETER POND
WEBSTER
NORTH VILLAGE
OXFORD
Record Drawing
Contract No. DA 19-016-CIV ENG 57-107
LEGEND
Township line
Drainage area
SCALE 1" = 800'
800' 0 800' 1600'
REVISION DATE DESCRIPTION BY
CORPS OF ENGINEERS U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION
BOSTON MASS
DES. BY DR. BY CK. BY
THAMES RIVER FLOOD CONTROL
BUFFUMVILLE DAM
RESERVOIR AREA
AND GENERAL PLAN
LITTLE RIVER MASSACHUSETTS
DATE APR 1956
SCALE AS SHOWN
DRAWING NUMBER
TH-1-1292
SHEET 3 OF 68
NOTES
Contour interval 10 feet
Elevations refer to Mean Sea Level Datum
Grid system based on Mass State

PLATE NO. 34


LITTLE RIVER
INTAKE CHANNEL
NORTH ABUTMENT
SOUTH ABUTMENT
DAM
ROCK TOE
LOG BOOM
SERVICE RAMP
UTILITY BUILDING
OPERATION STATION
ENTRANCE GATE
CHAIN LINK FENCE
COBBLE DITCH
SPILLWAY DISCHARGE CHANNEL
BUILDINGS TO BE REMOVED
POND
SPOIL AREA
APPROX. LIMITS OF GRAVEL PIT
TO CHARLTON
TO OXFORD
CHARLTON
OXFORD
RELOCATED ROAD NOT INCLUDED IN THIS CONTRACT
EXISTING DITCH
TO BE CLEANED & GRADED
HEADWALL NO. 3
GATE LIMIT OF THIS CONTRACT
CURVE DATA
BUILDING TO BE REMOVED
PLAN
SCALE 1" = 100'
COORDINATES TO BASE LINE STATIONS
STA 7+22.11 N 408,349.681 E 489,787.148
STA 15+70.27 N 407,637.886 E 489,251.676
STA 26+07.67 N 406,828.072 E 489,491.547
NOTES
Grid system based on Massachusetts State Plane Coordinates
Elevations refer to Mean Sea Level Datum
Contour interval 5 feet
Figures in hexagons indicate item numbers under which payment will be made.
For Embankment Sections see Sheet No. 12 & 14
For Embankment Drainage see Sheet No. 15
For Log Boom Details see Sheet No. 16
For Spillway and Outlet Works see Sheet No. 16
2 4-26-57 Chain Link Fence & Gate Location Revised
1 7-30-56 Comfort Station Added, Existing Gravel Roadway Replotted
Bearing Added, Building Not To Be Removed, Spoil Areas Indicated
REVISION DATE DESCRIPTION (Add'n)
CORPS OF ENGINEERS U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION
BOSTON, MASS.
THAMES RIVER FLOOD CONTROL
BUFFUMVILLE DAM
DAM
PLAN
LITTLE RIVER
MASSACHUSETTS
DES. BY
DR. BY
CK. BY
PROJECT ENGINEER
SUBMITTED BY
CHIEF, PLANN. & REPTS. BRANCH
APPROVED
CHIEF, ENGINEERING DIV.
APPROVED
CHIEF, ENGINEER

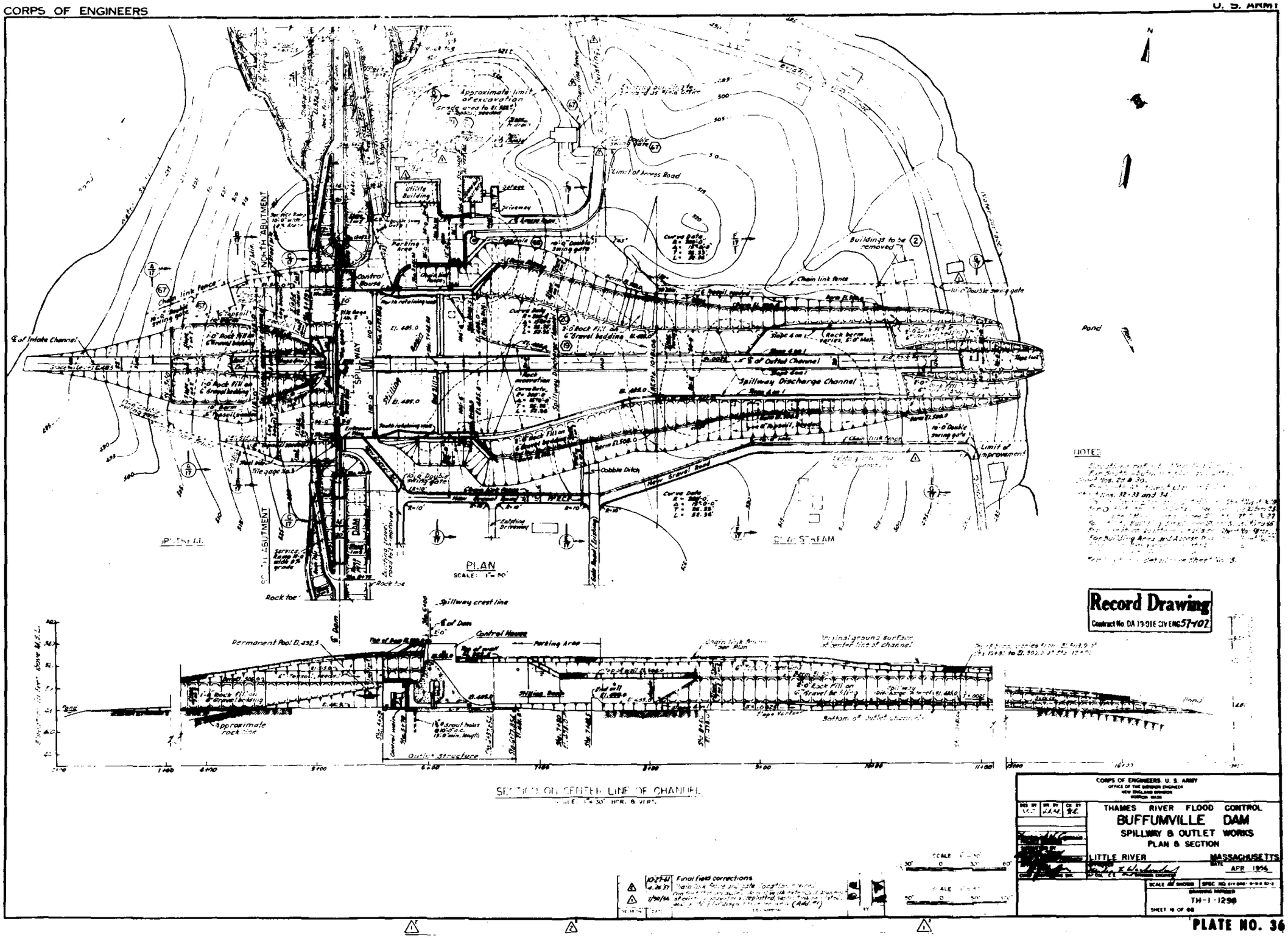
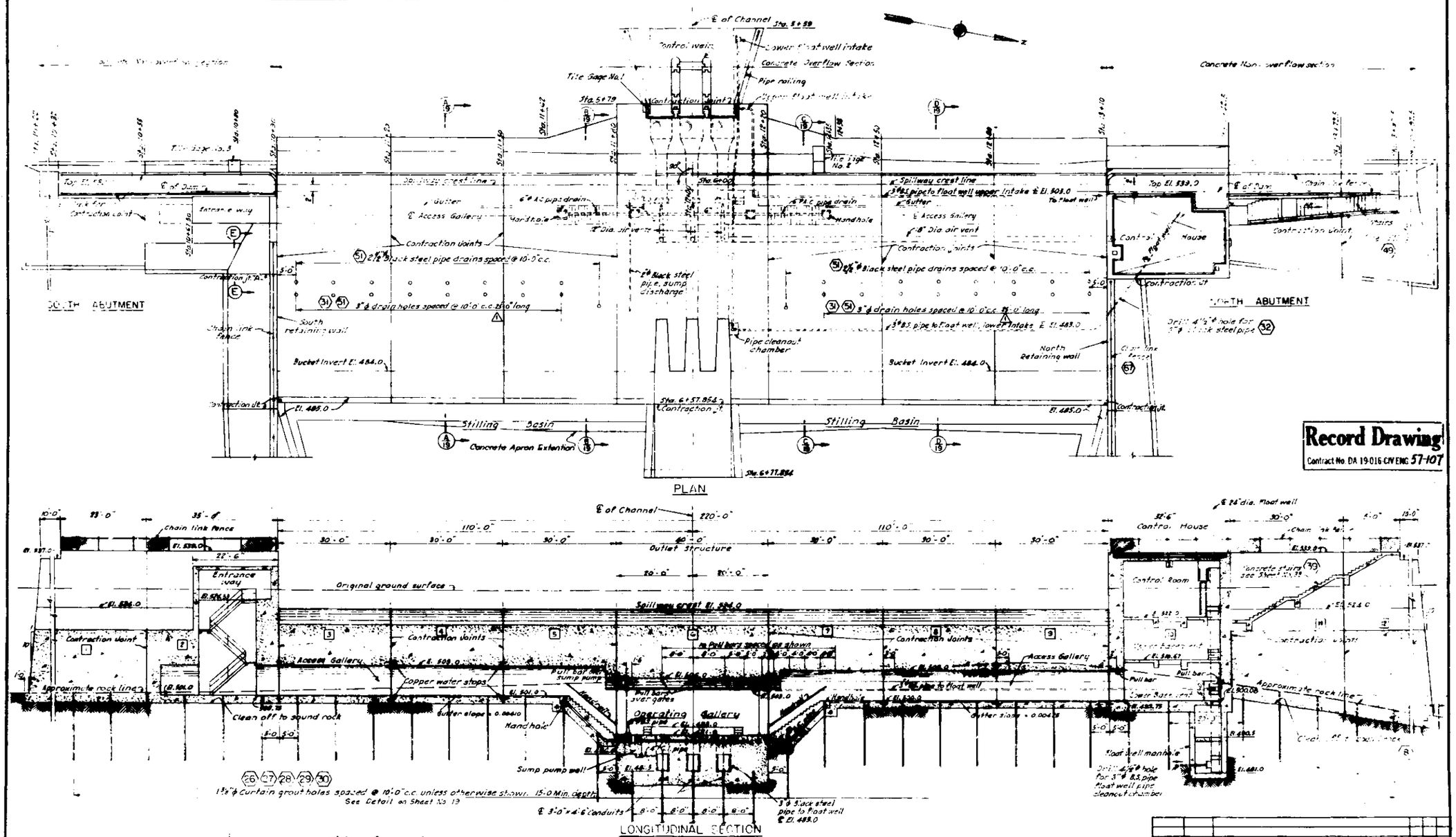
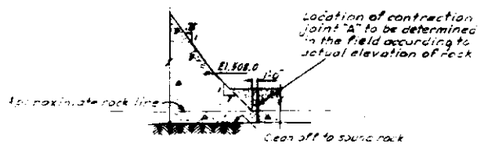

PLAN
SCALE: 1" = 50'
SECTION ON CENTER LINE OF CHANNEL
Approximate limit of excavation
Limit of Access Road
Utility Building
Control House
Parking Area
Buildings to be removed
Chain link fence
Spillway Discharge Channel
Cobble Ditch
New Gravel Road
Limit of improvement
Pond
NORTH ABUTMENT
SOUTH ABUTMENT
SPILLWAY
DAM
Rock toe
Spillway crest line
Permanent Pool El. 492.5
Control House
Parking Area
Original ground surface at center line of channel
Bottom of Outlet Channel
Outlet Structure
Approximate rock line
Record Drawing
Contract No. DA 19-016 CIV ENG 57-107
NOTES
Final field corrections
CORPS OF ENGINEERS U. S. ARMY
THAMES RIVER FLOOD CONTROL
BUFFUMVILLE DAM
SPILLWAY & OUTLET WORKS
PLAN & SECTION
LITTLE RIVER
MASSACHUSETTS
APR 1956
TH-1-1298

PLATE NO. 36



Record Drawing
Contract No. DA 19-016-CIVENG 57-107



SECTION E-E

NOTES

Elevations refer to Mean Sea Level datum.
Figures in hexagons indicate item numbers under which payment will be made.
For South Abutment plan and section see Sheet Nos. 29 & 30
For North Abutment plan and section see Sheet Nos. 32, 33 & 34
For Outlet Works plan and section see Sheet Nos. 20 thru 24
For Control House details see Sheet Nos. 25, 26 & 27
For Contraction Joint detail see Sheet No. 19
Extent and depth of foundation excavation are approximate only. Final extent and depth to be determined in the field.
Numbers in squares refer to Monolith numbers.
All concrete in intake structure
Monolith No. 1, 2, 11 and 12 ... 33
Monolith No. 3 to 10 ... 35
Monolith No. 13 and 14 ... 36
Monolith No. 15 and 16 ... 37
All concrete in intake structure paid under item No. 38

SCALE 1" = 10'

REVISION	DATE	DESCRIPTION	BY
1	7/30/56	Length of drain holes increased to 10'	

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION
BOSTON, MASS.

DES. BY R.E. | DR. BY L.A.N. | CK. BY W.B.

THAMES RIVER FLOOD CONTROL
BUFFUMVILLE DAM
SPILLWAY & ABUTMENTS
PLAN & SECTION

LITTLE RIVER MASSACHUSETTS

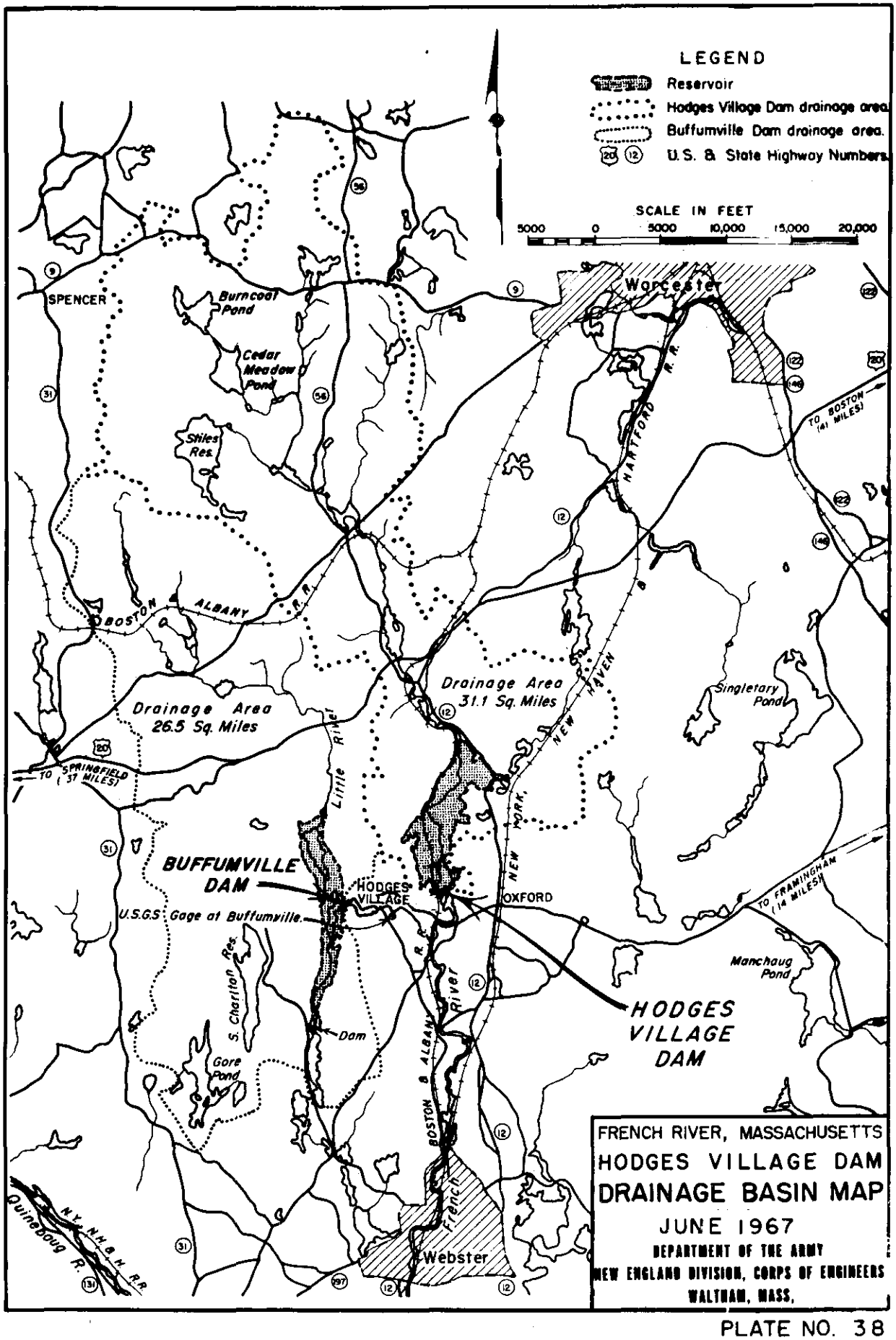
DATE APR 1956

LT. COL. C.E. DIST. ENGINEER

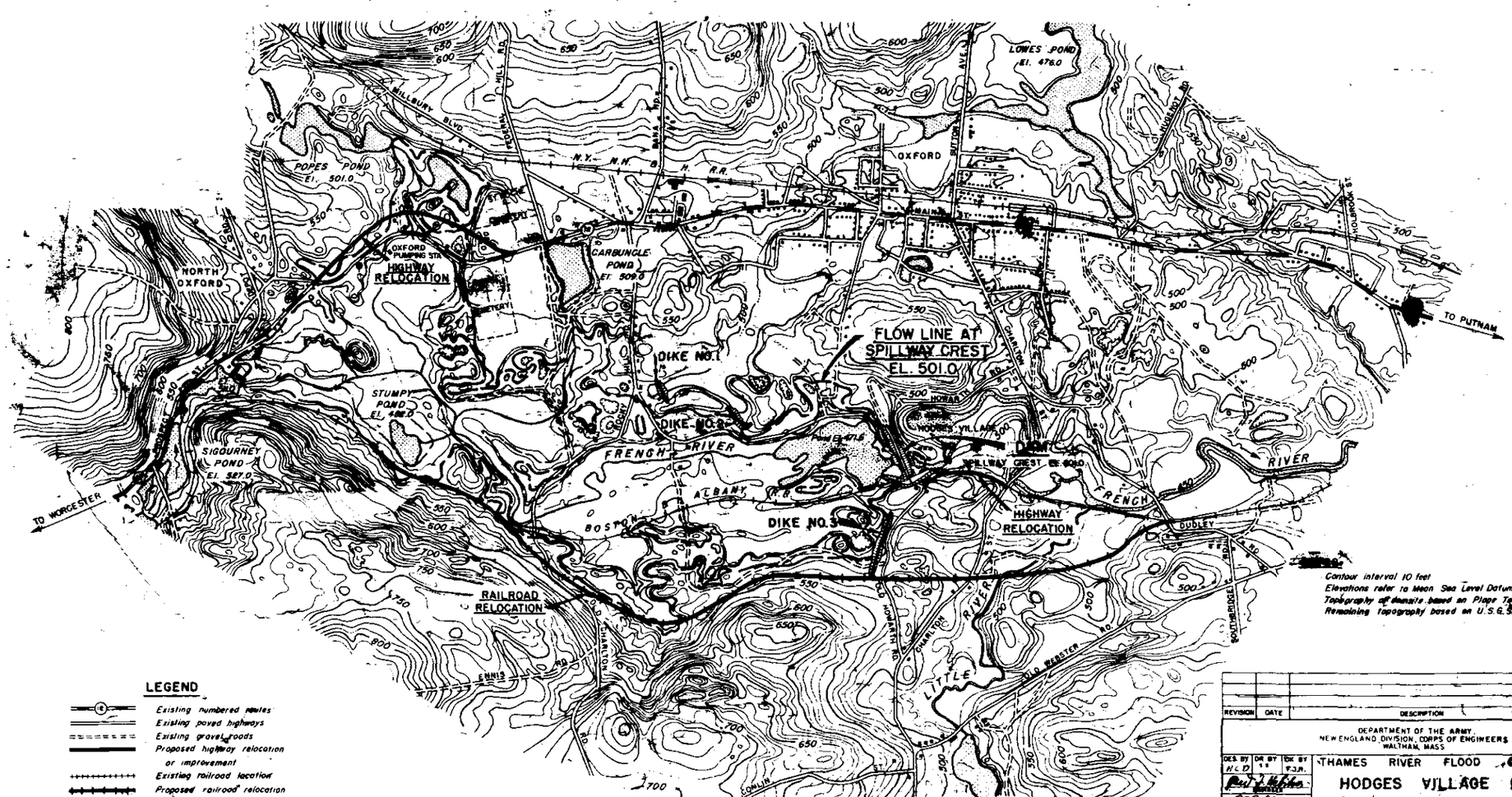
SCALE 1" = 10'-0" | SPEC. NO. DA-19-016-CIV-ENG-57-2

DRAWING NUMBER
TH-1-1300

SHEET 18 OF 68



FRENCH RIVER, MASSACHUSETTS
HODGES VILLAGE DAM
DRAINAGE BASIN MAP
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.



REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

DES. BY H.C.D. DR. BY T.S. CK. BY P.J.R.

THAMES RIVER FLOOD CONTROL

HODGES VILLAGE DAM

RESERVOIR MAP

FRENCH RIVER — MASSACHUSETTS

SUBMITTED BY: CHIEF, ENGINEERING DIVISION

APPROVED: CHIEF, ENGINEERING DIVISION

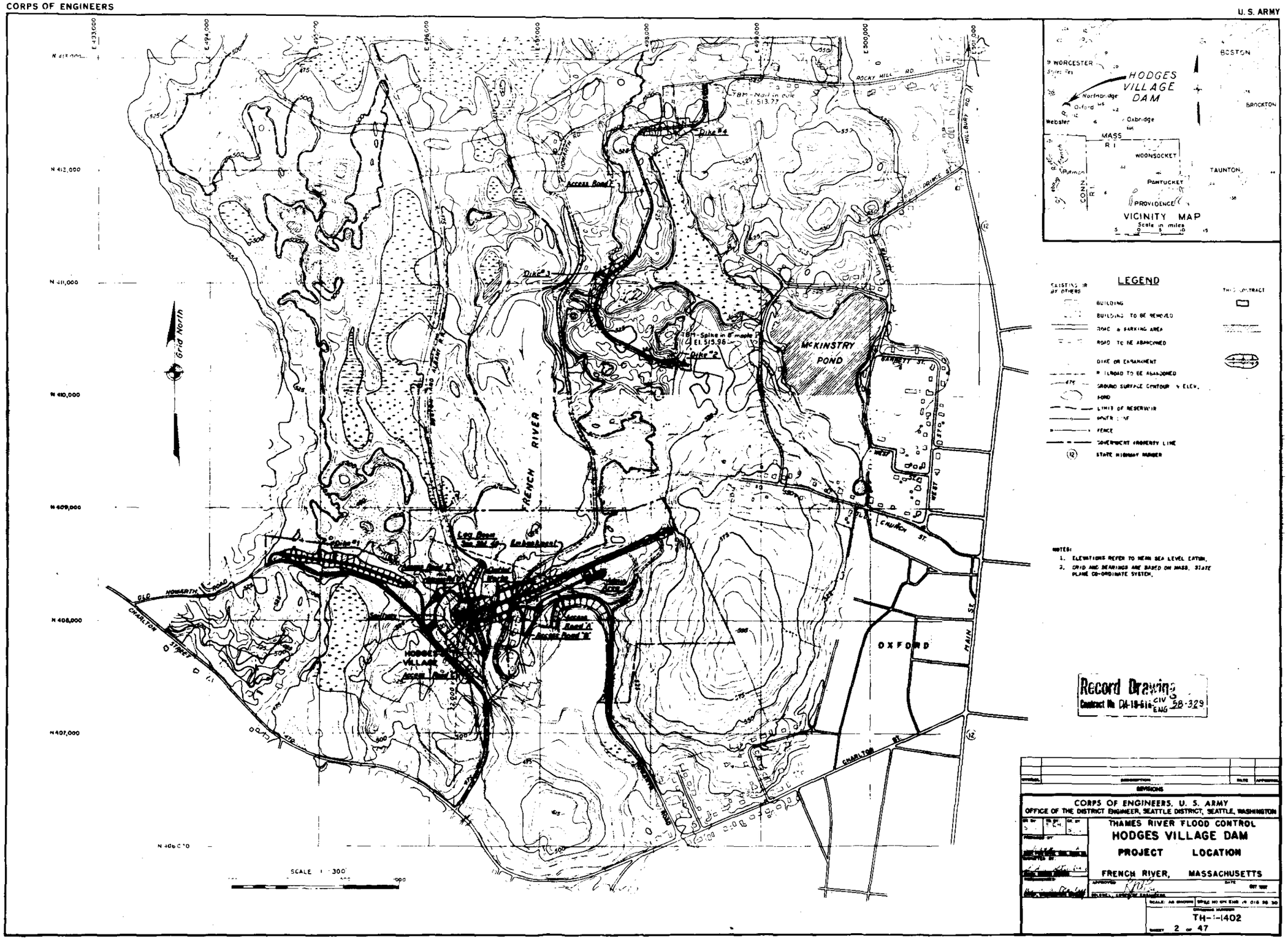
APPROVED: CHIEF, CONSTRUCTION DIVISION

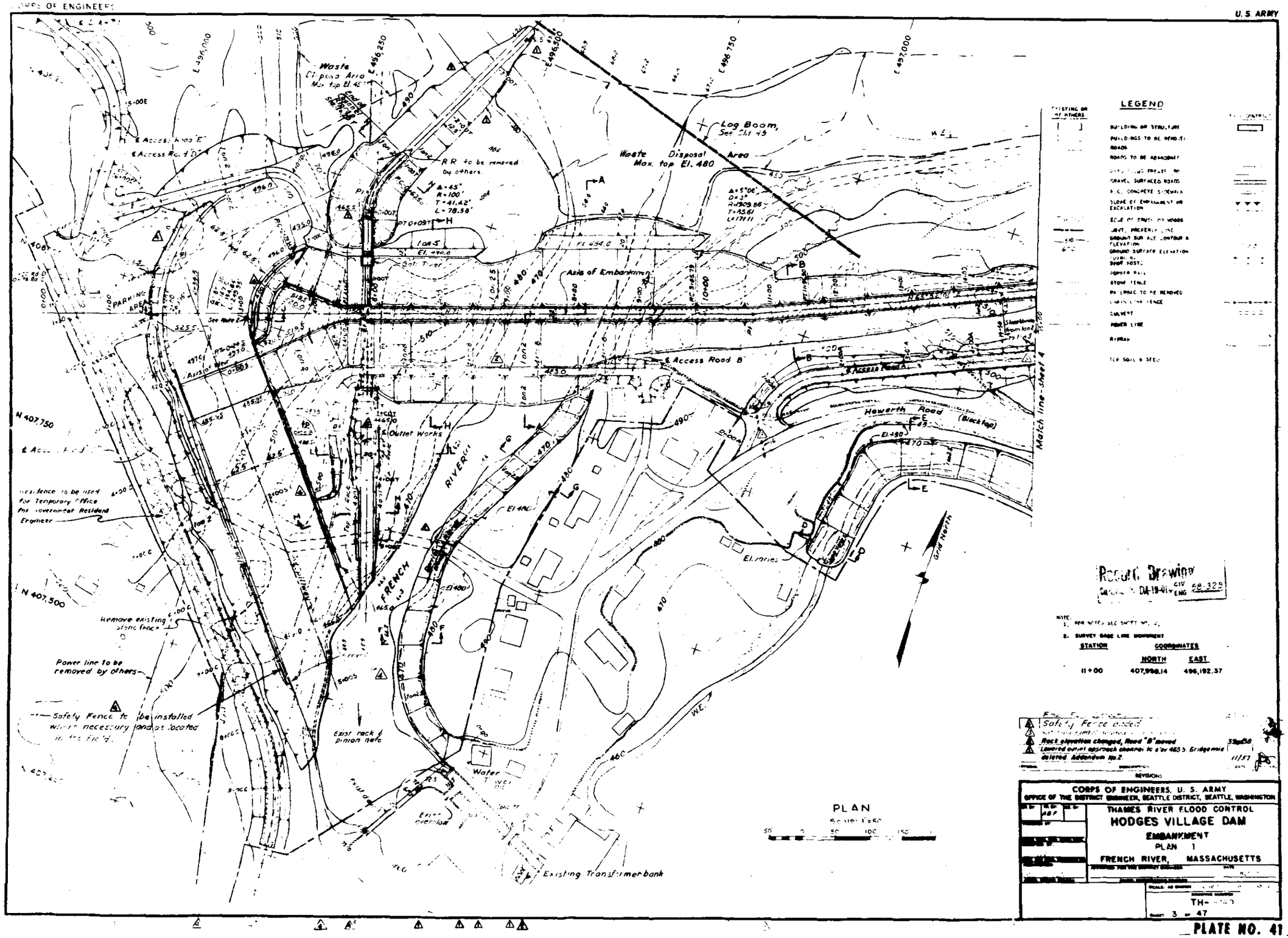
DATE: OCT 1950

SCALE AS SHOWN SPEC. NO.

DRAWING NUMBER TH-1-1235

SHEET OF


VICINITY MAP
Scale in miles
WORCESTER
BOSTON
HODGES VILLAGE DAM
Northbridge
Oxford
Webster
Oxbridge
BROCKTON
MASS
R I
WOONSOCKET
TAUNTON
Pawtucket
PROVIDENCE
CONN
LEGEND
BUILDING
BUILDING TO BE REMOVED
ROAD & PARKING AREA
ROAD TO BE ABANDONED
DIKE OR EMBANKMENT
RAILROAD TO BE ABANDONED
GROUND SURFACE CONTOUR & ELEV.
POND
LIMITS OF RESERVOIR
FENCE
GOVERNMENT PROPERTY LINE
STATE HIGHWAY NUMBER
NOTES:
1. ELEVATIONS REFER TO MEAN SEA LEVEL DATUM.
2. GRID AND BEARINGS ARE BASED ON MASS. STATE PLANE CO-ORDINATE SYSTEM.
Grid North
FRENCH RIVER
McKINSTRY POND
HODGES VILLAGE
OXFORD
ROCKY HILL RD.
HILLBURY RD.
PRINCE ST.
BARNETT ST.
WEST
CHURCH ST.
MAIN ST.
CHARLTON ST.
OLD HOWARTH ROAD
Dike #1
Dike #2
Dike #3
Dike #4
Access Road "A"
Access Road "B"
Access Road "C"
Access Road "D"
Access Road "E"
Log Boom
Spillway
Outlet Works
Intake Tower
Emergency Spillway
Footbridge
Bridge
TBM - Nail in pole El. 513.77
TBM - Spike in 8" maple El. 515.96
N 413,000
N 412,000
N 411,000
N 410,000
N 409,000
N 408,000
N 407,000
N 406,000
E 493,000
E 494,000
E 495,000
E 496,000
E 497,000
E 498,000
E 499,000
E 500,000
E 501,000
SCALE 1" = 300'
Record Drawing
Contract No. DA-19-016-CIV ENG 58-329
REVISIONS
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, SEATTLE DISTRICT, SEATTLE, WASHINGTON
THAMES RIVER FLOOD CONTROL
HODGES VILLAGE DAM
PROJECT LOCATION
FRENCH RIVER, MASSACHUSETTS
TH-1-1402
SHEET 2 OF 47



CORPS OF ENGINEERS
U. S. ARMY
LEGEND
BUILDING OR STRUCTURE
BUILDINGS TO BE REMOVED
ROADS
ROADS TO BE ABANDONED
GRAVEL SURFACED ROADS
P.C. CONCRETE SIDEWALK
SLOPE OF EMBANKMENT OR EXCAVATION
EDGE OF BRUSH OR WOODS
GROUND SURFACE CONTOUR & ELEVATION
GROUND SURFACE ELEVATION
SHOP POSTS
STONE FENCE
RAILROAD TO BE REMOVED
CHAIN LINK FENCE
CULVERT
POWER LINE
RIPRAP
TOP SOIL & SEED
Waste Disposal Area Max. top El. 480
Log Boom, See Sht 45
Waste Disposal Area Max. top El. 480
R.R. to be removed by others
Axis of Embankment
Access Road B
Access Road A
Howarth Road (Blacktop)
Match line - Sheet 4
Outlet Works
FRENCH RIVER
Grid North
El. varies
Water Tower
Existing Transformer bank
Exist rock & pinion nets
Remove existing stone fence
Power line to be removed by others
Safety Fence to be installed where necessary and as located in the field
Residence to be used for Temporary Office for Government Resident Engineer
PARKING AREA
N 407,750
N 407,500
E 496,000
E 496,250
E 496,500
E 496,750
E 497,000
PLAN
Record Drawing
DA-19-01
CIV ENG 58-329
NOTE:
1. FOR NOTES SEE SHEET NO. 2.
2. SURVEY BASE LINE MONUMENT
STATION
COORDINATES
NORTH
EAST
11+00
407,998.14
496,192.37
Safety Fence added
Rock elevation changed, Road "B" moved
Lowered outlet approach channel to elev 465.5. Bridge mile deleted. Addendum No. 2.
REVISIONS
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, SEATTLE DISTRICT, SEATTLE, WASHINGTON
THAMES RIVER FLOOD CONTROL
HODGES VILLAGE DAM
EMBANKMENT
PLAN 1
FRENCH RIVER, MASSACHUSETTS
TH-
SHEET 3 OF 47

PLATE NO. 41

CORPS OF ENGINEERS

U. S. ARMY

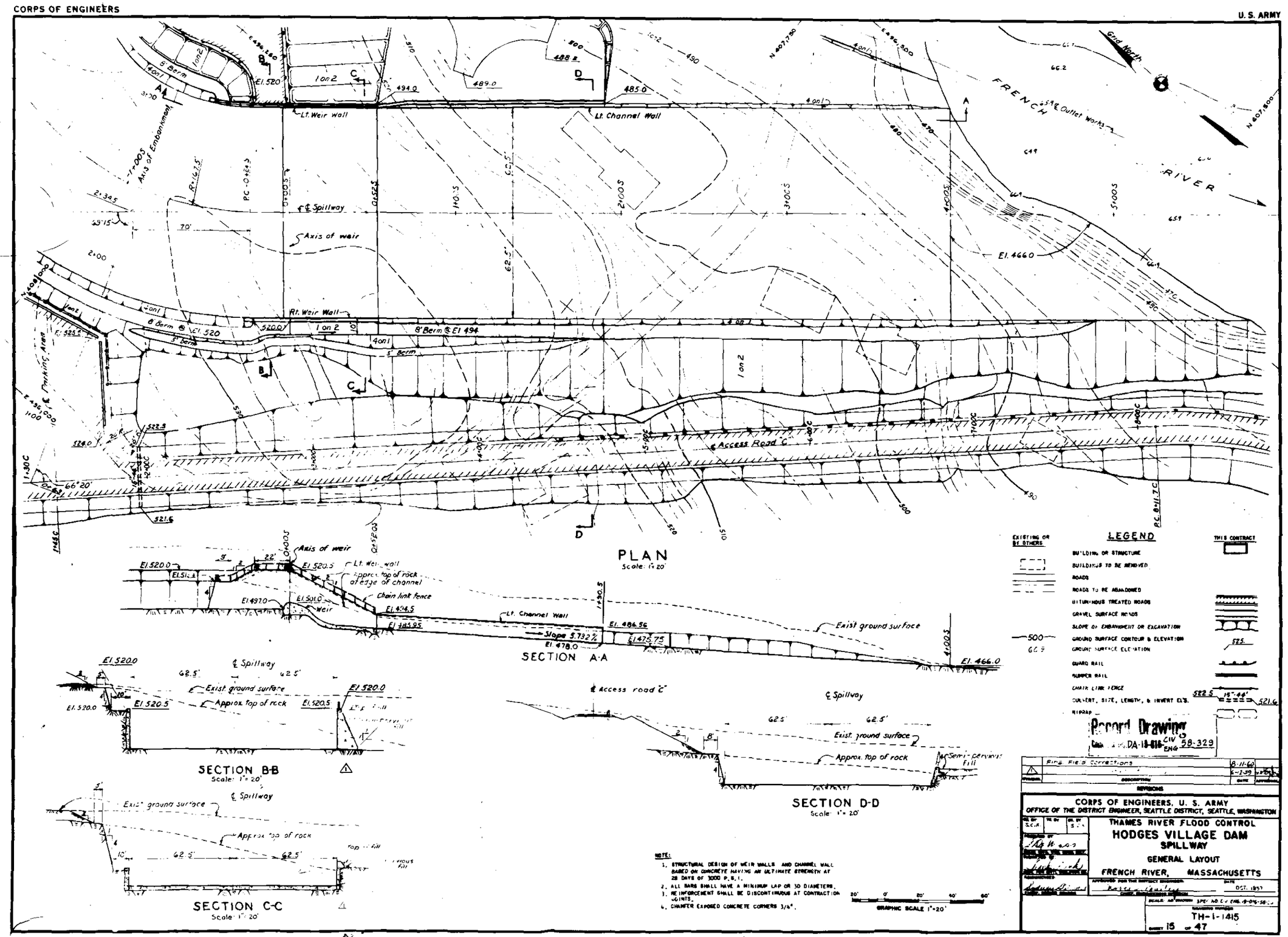


PLATE NO. 42

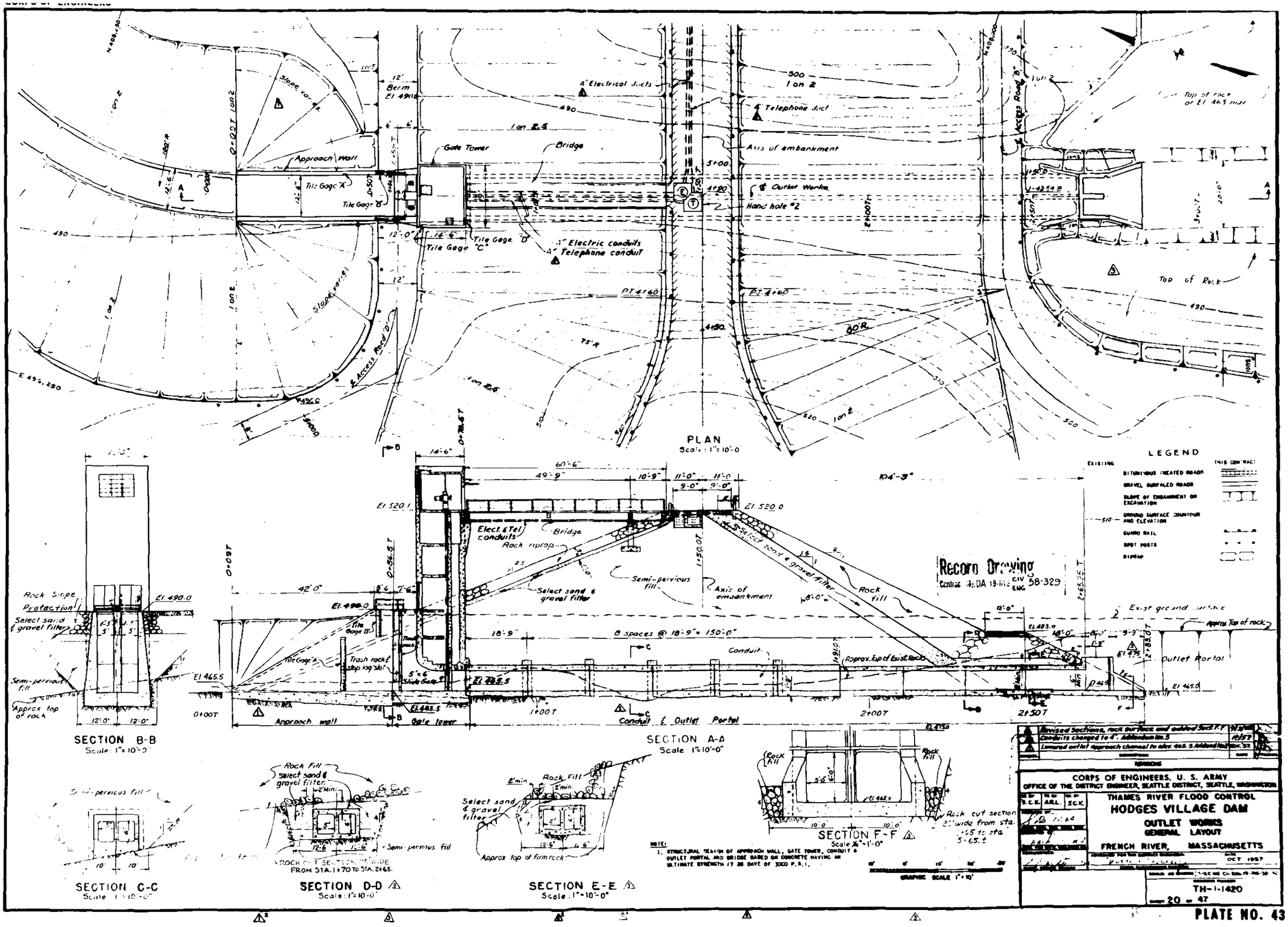
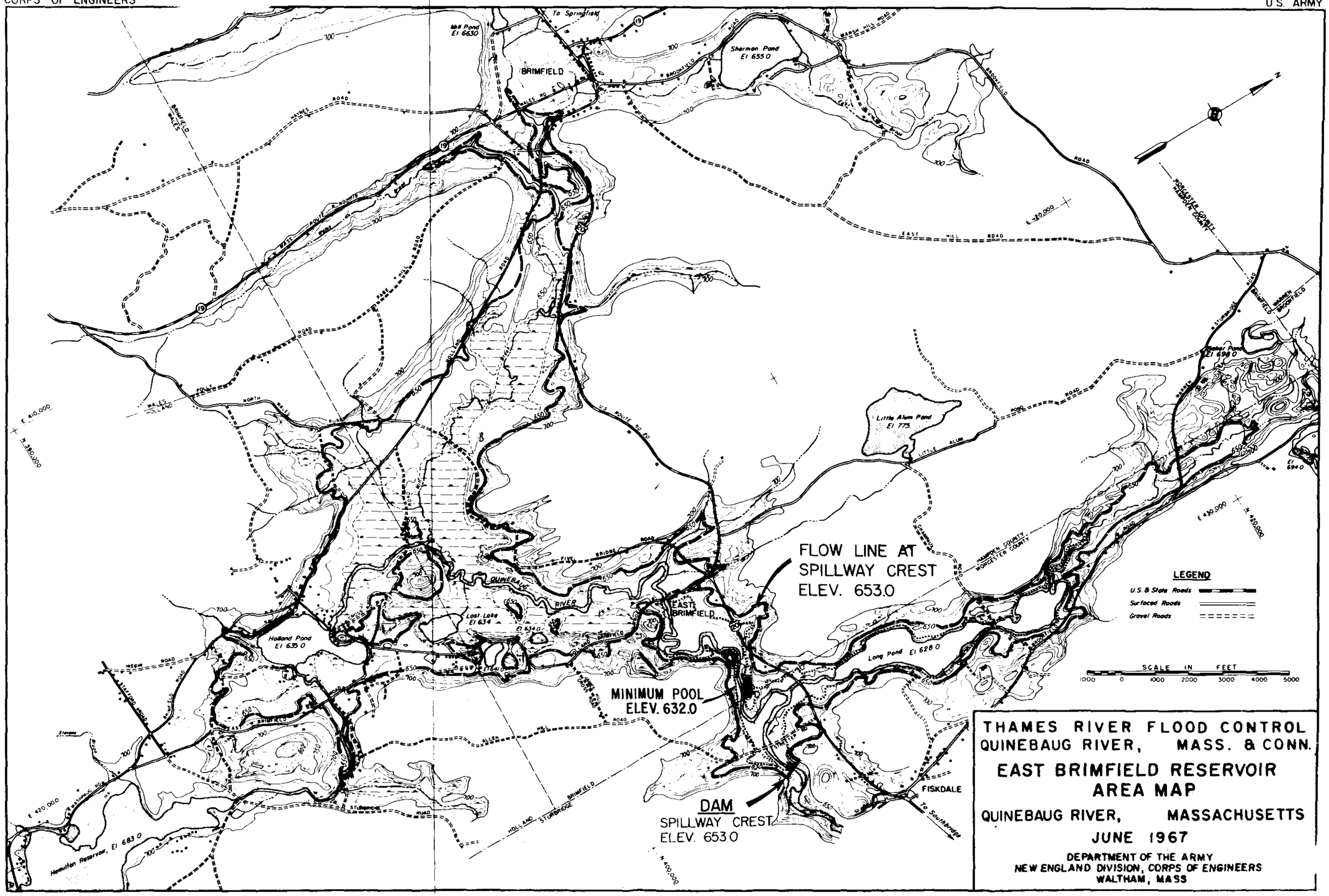

PLAN
Scale: 1"=10'-0"
SECTION A-A
Scale: 1"=10'-0"
SECTION B-B
Scale: 1"=10'-0"
SECTION C-C
Scale: 1"=10'-0"
SECTION D-D
Scale: 1"=10'-0"
SECTION E-E
Scale: 1"=10'-0"
SECTION F-F
Scale: 1/4"=1'-0"
LEGEND
Record Drawing
Contract No. DA 19-116 CIV ENG 58-329
Revised Sections, rock surface and added Sect. F-F
Conduits changed to 4". Addendum No. 5
Lowered outlet approach channel to elev. 465. 5 Addend No. 5
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, SEATTLE DISTRICT, SEATTLE, WASHINGTON
THAMES RIVER FLOOD CONTROL
HODGES VILLAGE DAM
OUTLET WORKS
GENERAL LAYOUT
FRENCH RIVER, MASSACHUSETTS
OCT 1957
TH-1-1420
20 of 47

PLATE NO. 43



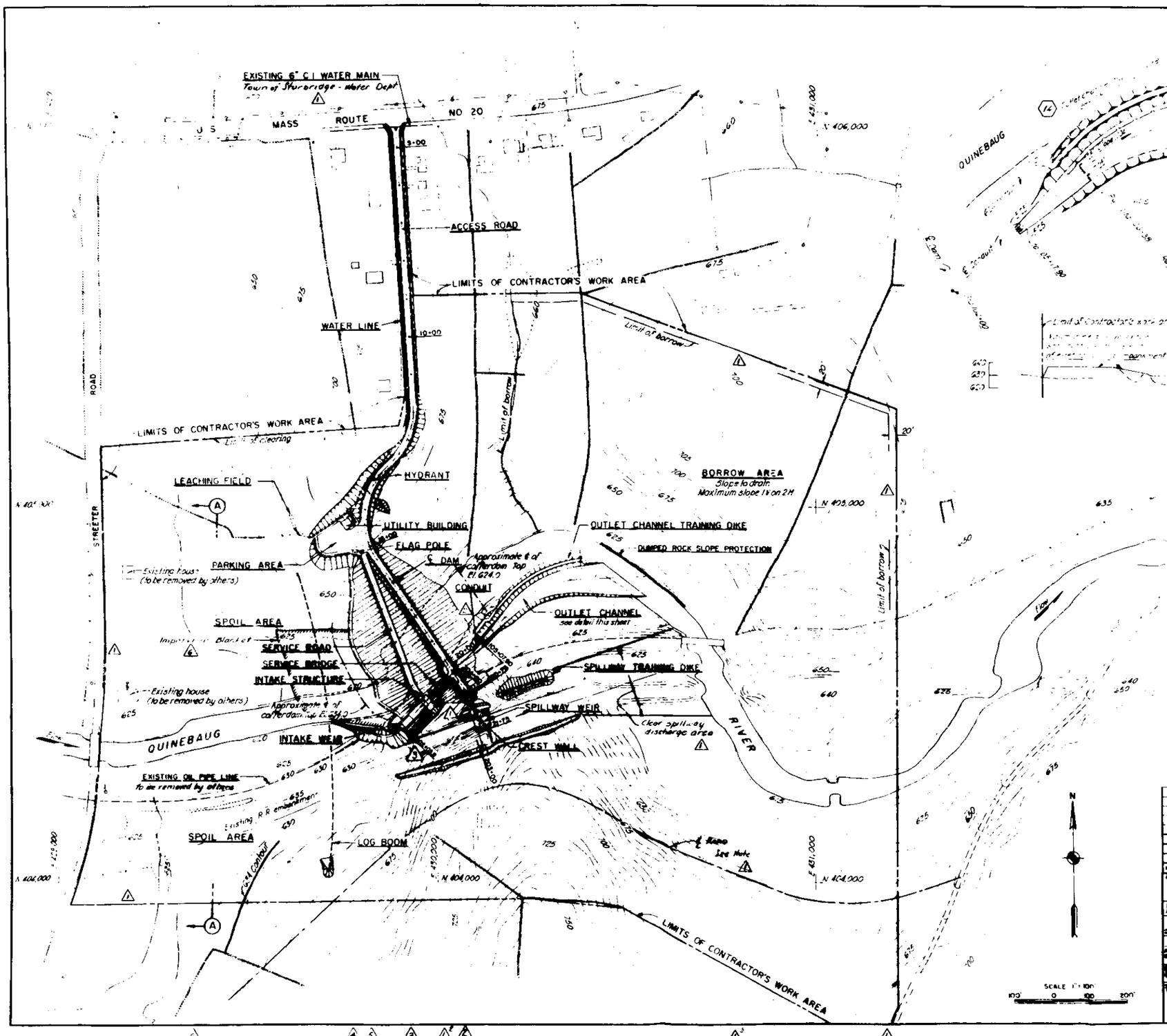
THAMES RIVER FLOOD CONTROL
QUINEBAUG RIVER, MASS. & CONN.

EAST BRIMFIELD RESERVOIR
AREA MAP

QUINEBAUG RIVER, MASSACHUSETTS

JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS



GENERAL NOTES

Contour interval 5 feet.

Elevations refer to Mean Sea Level Datum.

Grid System based on Mass State Plane Coordinates

Figures in hexagons indicate item numbers under which payment will be made.

Rock foundation lines shown on the drawings are assumed and are indicated only for estimating purposes

Structures shall be founded on sound rock at or below the assumed foundation indicated on the drawing.

Construction joints shown thus ——— or indicated C.J.

All exposed concrete edges shall have 3/4 inch chamfer unless otherwise shown.

Contraction joints shall have 1/8 inch mastic applied in two coats

Approximate location, relocated Streeter Road, to be constructed by others. Contractors work area will be modified when details of road are available.

REVISION	DATE	DESCRIPTION	MADE	APP
6	10-3-59	[illegible]		
5	8-10-59	Location of Operator's Quarters Deleted.		
4	5-29-59	[illegible] Quarters Added		
3	[illegible]	[illegible] Intake Weir		
2	7-17-58	Outlet structure revised		
1	2-3-58	Revised limit of clearing - Delete Training [illegible]		
		[illegible]		

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
BUFFALO DISTRICT
BUFFALO, NEW YORK

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION
BOSTON, MASS.

THAMES RIVER FLOOD CONTROL

EAST BRIMFIELD DAM

GENERAL PLAN

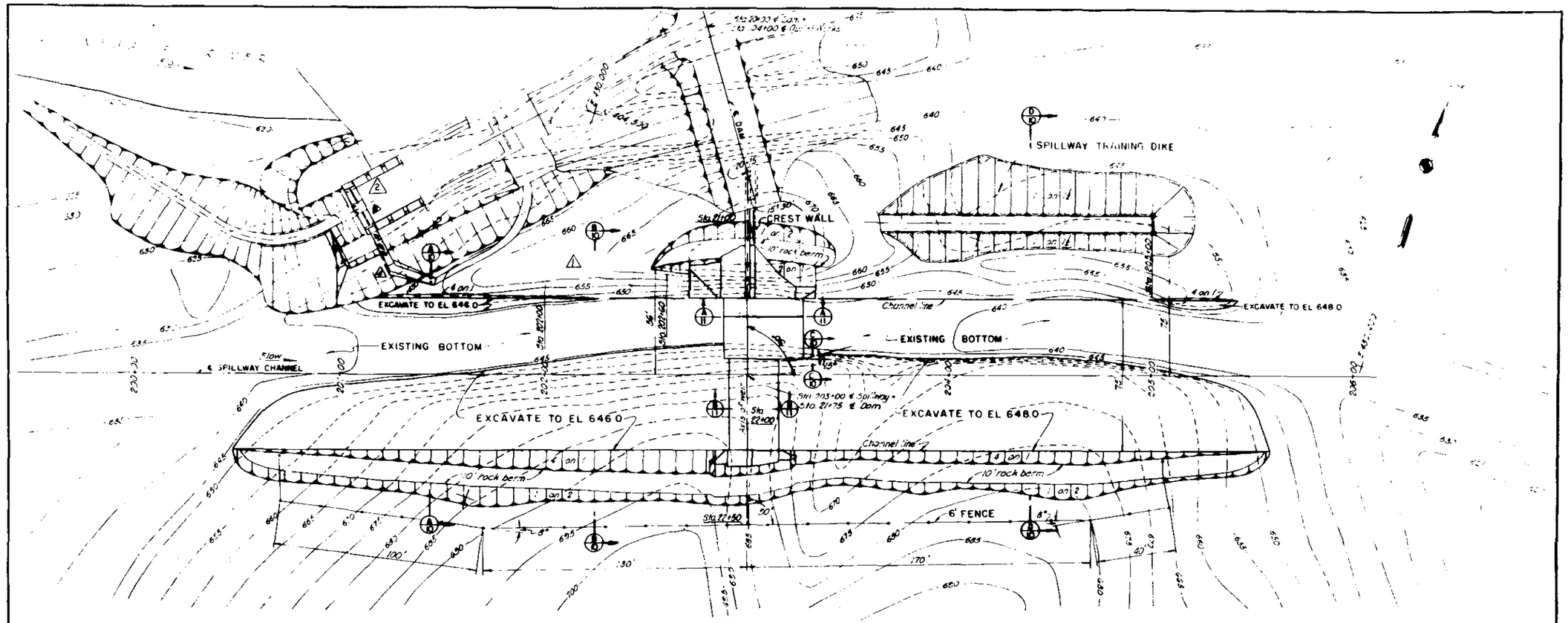
QUINEBAUG RIVER, MASSACHUSETTS

DATE: FEB. 1958

SCALE:

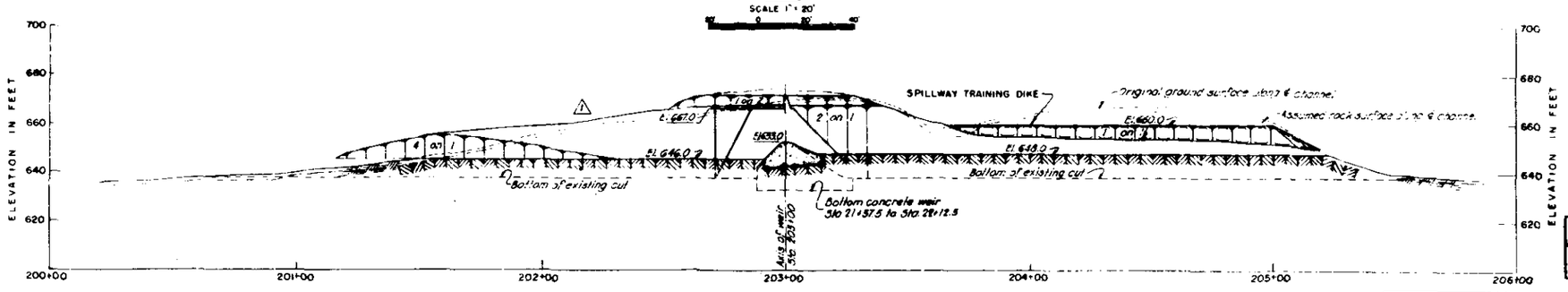
DRAWING NUMBER
TH-1-10/1
SHEET 2 OF 94

PLATE NO. 45



PLAN

SCALE 1" = 20'



PROFILE ALONG ℄ SPILLWAY CHANNEL

SCALE: 1" = 20'

NOTES:

For general notes, see sheet No. 2

4	2-1-60	Intake Weir access revised.	
3	11-14-59	Above Sluice gate.	
2	11-13-59	Revised Intake Weir	
1	9-8-59	DELETE TRAINING WALL	

COMPLETED AS CONVENIENT 58-501

COMPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
BUFFALO DISTRICT
BUFFALO, NEW YORK

COMPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION
BOSTON, MASS.

THAMES RIVER FLOOD CONTROL
EAST BRIMFIELD DAM
SPILLWAY
PLAN AND PROFILE
QUINEBAUG RIVER, MASSACHUSETTS

DATE FEB. 1958

SCALE: AS SHOWN

TH-1-12/1

SHEET 9 OF 36

PLATE NO. 46

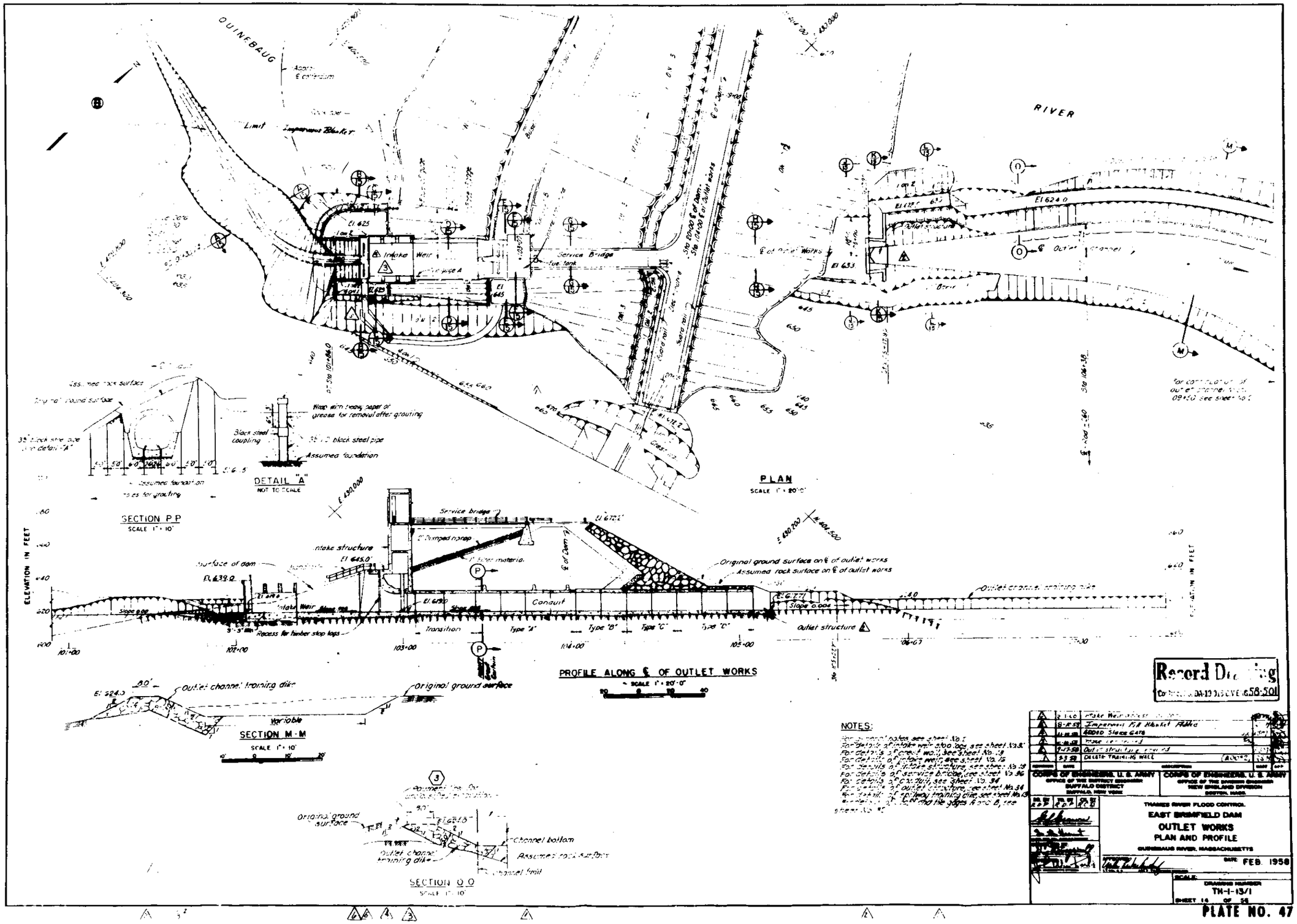

QUINEBAUG
RIVER
Limit Impervious Blanket
Intake Weir
Service Bridge
Fuel tank
Outlet Channel
Outlet structure
El 624.0
El 625
El 645
El 633
PLAN
SCALE 1" = 20'-0"
DETAIL "A"
NOT TO SCALE
Wrap with heavy paper or grease for removal after grouting
Black steel coupling
Assumed foundation
SECTION P-P
SCALE 1" = 10'
ELEVATION IN FEET
Service bridge
Intake structure
Surface of dam
Original ground surface on ℄ of outlet works
Assumed rock surface on ℄ of outlet works
Conduit
Transition
Type "A"
Type "B"
Type "C"
Type "D"
Outlet structure
Outlet channel training dike
Original ground surface
Variable
SECTION M-M
SCALE 1" = 10'
Original ground surface
Channel bottom
Assumed rock surface
Channel limit
SECTION O-O
SCALE 1" = 10'
NOTES:
Record Drawing
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
BUFFALO DISTRICT
BUFFALO, NEW YORK
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION
BOSTON, MASS.
THAMES RIVER FLOOD CONTROL
EAST BRIMFIELD DAM
OUTLET WORKS
PLAN AND PROFILE
QUINEBAUG RIVER, MASSACHUSETTS
DATE FEB. 1958
DRAWING NUMBER
TH-1-13/1
SHEET 14 OF 56

PLATE NO. 47

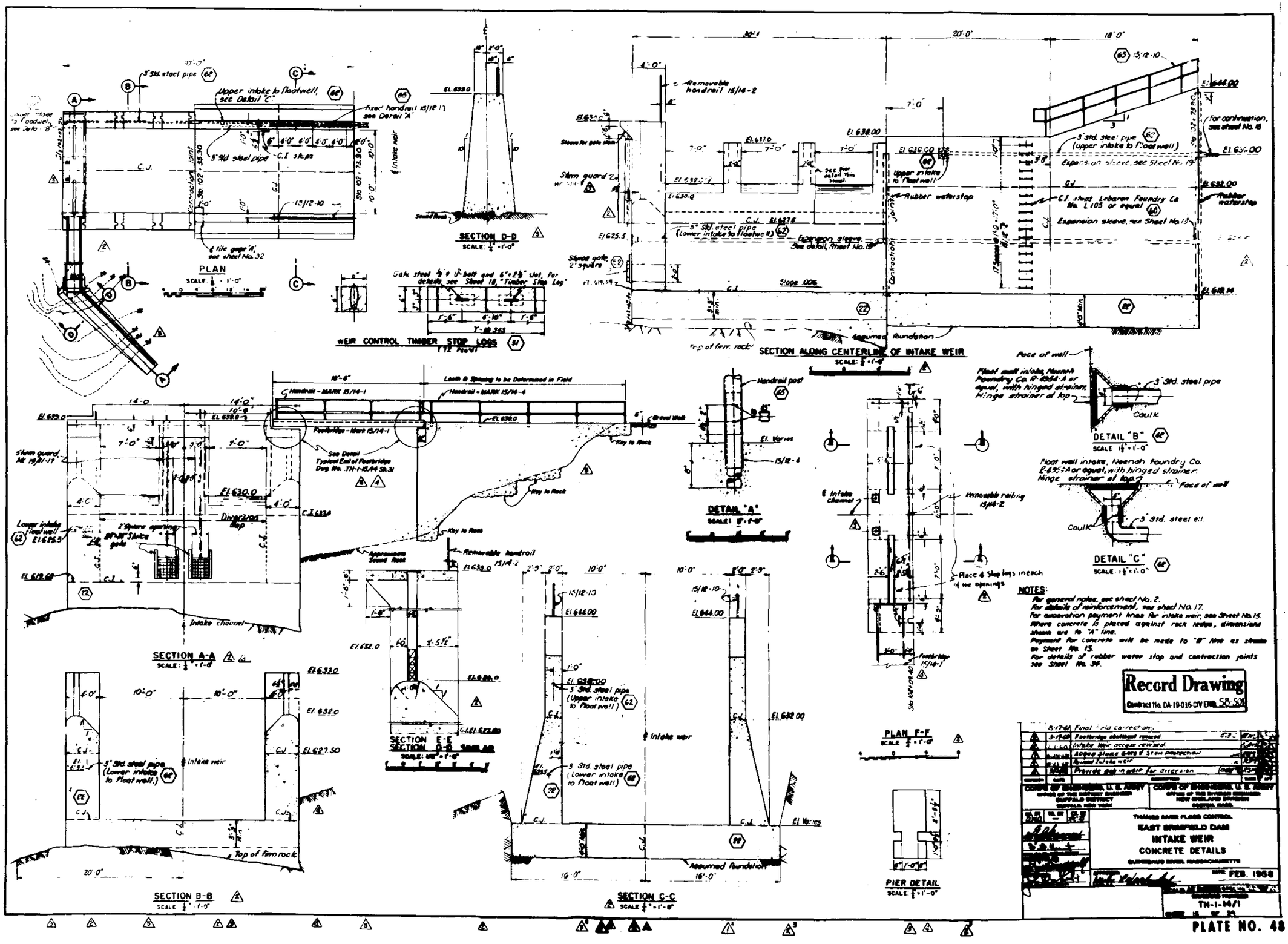

PLAN
SECTION D-D
WEIR CONTROL TIMBER STOP LOGS
SECTION ALONG CENTERLINE OF INTAKE WEIR
DETAIL "A"
DETAIL "B"
DETAIL "C"
SECTION A-A
SECTION B-B
SECTION C-C
SECTION E-E
PLAN F-F
PIER DETAIL
NOTES:
For general notes, see sheet No. 2.
For details of reinforcement, see sheet No. 17.
For excavation payment lines for intake weir, see Sheet No. 15.
Where concrete is placed against rock ledge, dimensions shown are to "A" line.
Payment for concrete will be made to "B" line as shown on Sheet No. 15.
For details of rubber water stop and contraction joints see Sheet No. 34.
Record Drawing
Contract No. DA-19-016-CIV ENG. 58-501
THAMES RIVER FLOOD CONTROL
EAST BRIMFIELD DAM
INTAKE WEIR
CONCRETE DETAILS
FEB. 1958
TH-1-14/1

PLATE NO. 48

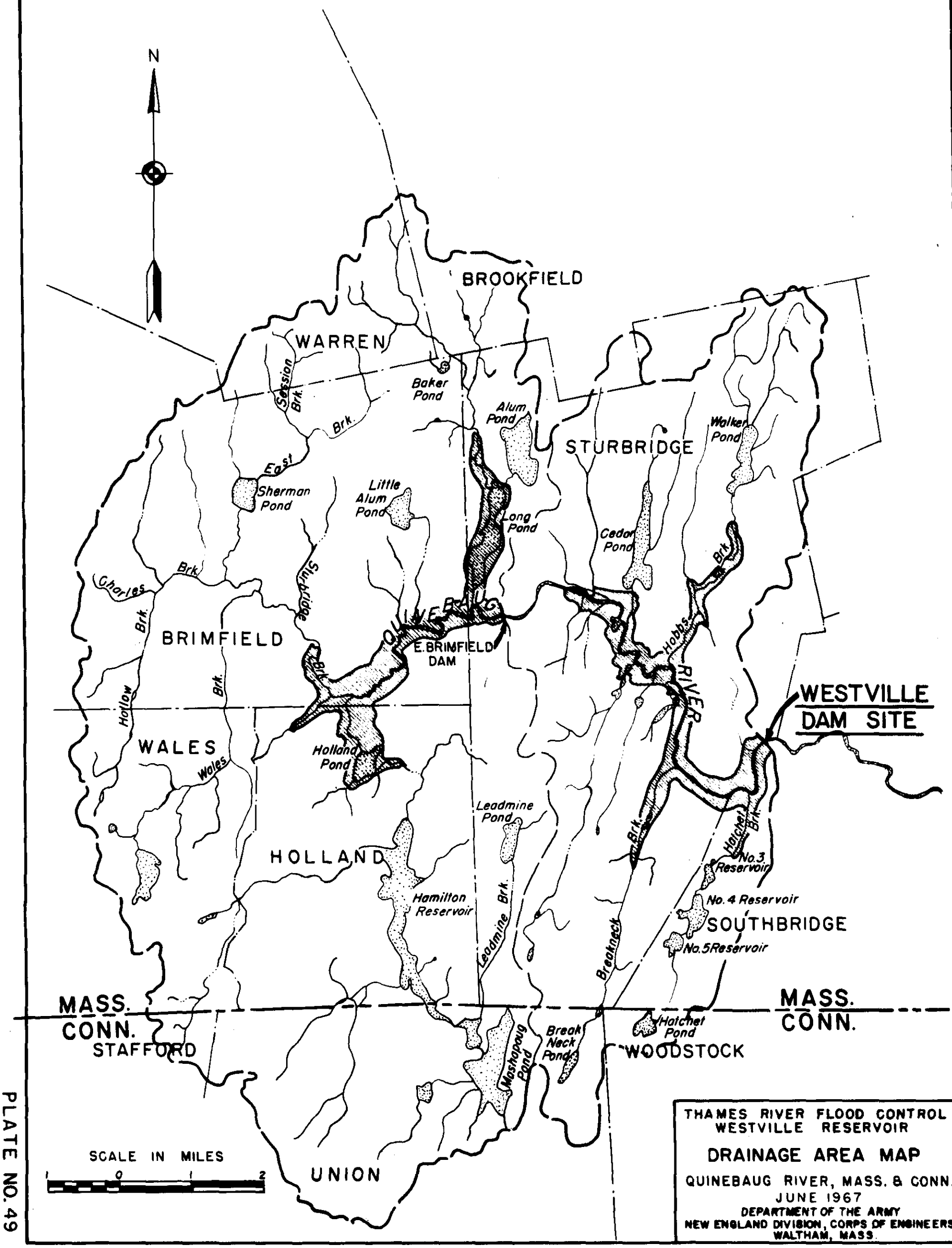
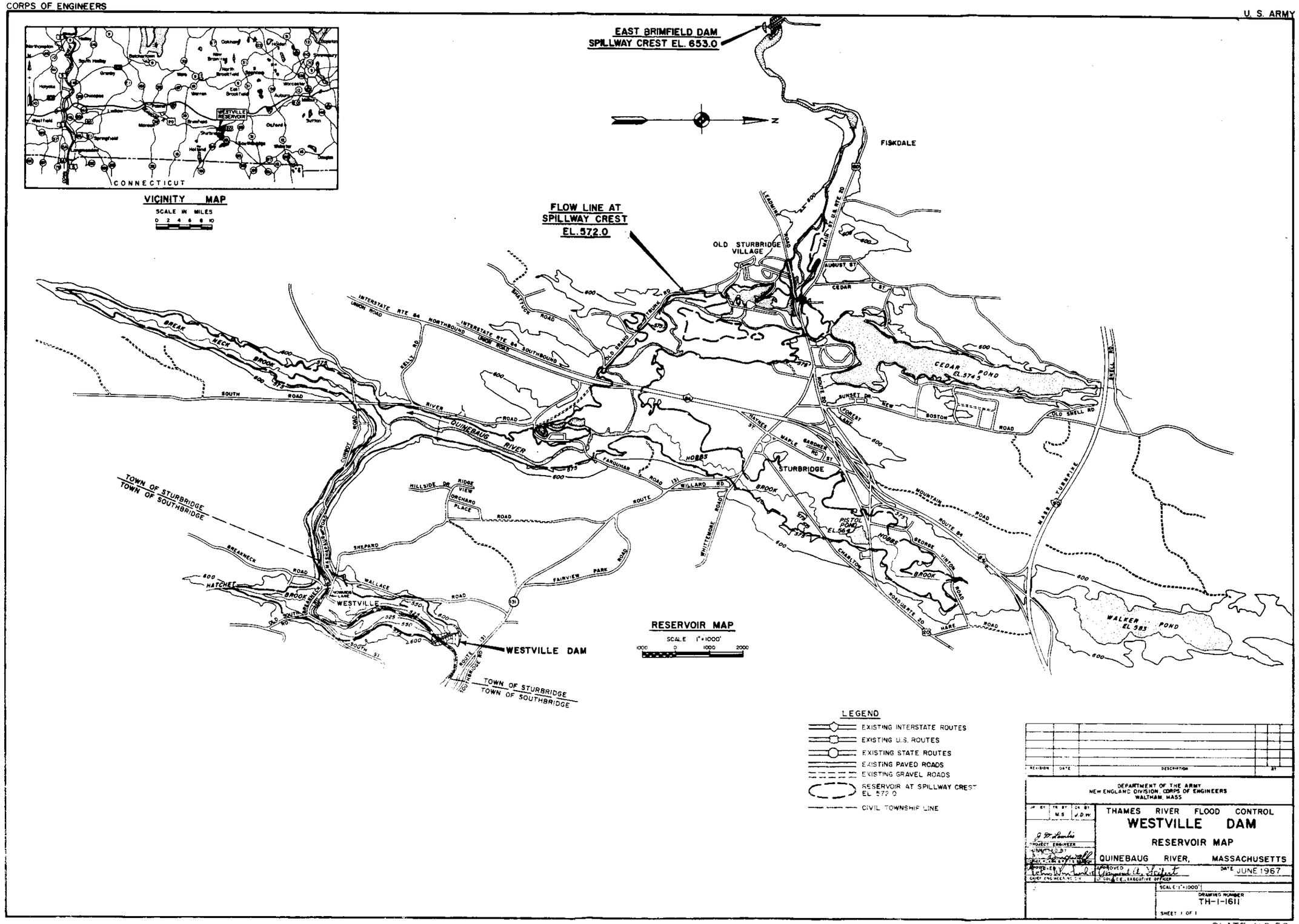

N
BROOKFIELD
WARREN
Session Brk.
Brk.
Baker Pond
Alum Pond
STURBRIDGE
Walker Pond
East
Sherman Pond
Little Alum Pond
Long Pond
Cedar Pond
Brk.
Charles
Brk.
Stur-bridge
QUINEBAUG
BRIMFIELD
E. BRIMFIELD DAM
Hobbs
RIVER
WESTVILLE DAM SITE
Brk.
Hollow
Brk.
WALES
Wales
Holland Pond
Leadmine Pond
Brk.
Hatchet Brk.
HOLLAND
No. 3 Reservoir
Hamilton Reservoir
Leadmine Brk.
No. 4 Reservoir
SOUTHBRIDGE
Breakneck
No. 5 Reservoir
MASS.
CONN.
MASS.
CONN.
Hatchet Pond
Break Neck Pond
Mashapaug Pond
STAFFORD
WOODSTOCK
SCALE IN MILES
1 0 1 2
UNION
THAMES RIVER FLOOD CONTROL
WESTVILLE RESERVOIR
DRAINAGE AREA MAP
QUINEBAUG RIVER, MASS. & CONN.
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. 49

CORPS OF ENGINEERS

U. S. ARMY



REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

THAMES RIVER FLOOD CONTROL

WESTVILLE DAM

RESERVOIR MAP

QUINEBAUG RIVER, MASSACHUSETTS

DATE JUNE 1967

SCALE 1"=1000'

DRAWING NUMBER TH-1-1611

SHEET 1 OF 1

PLATE NO. 50

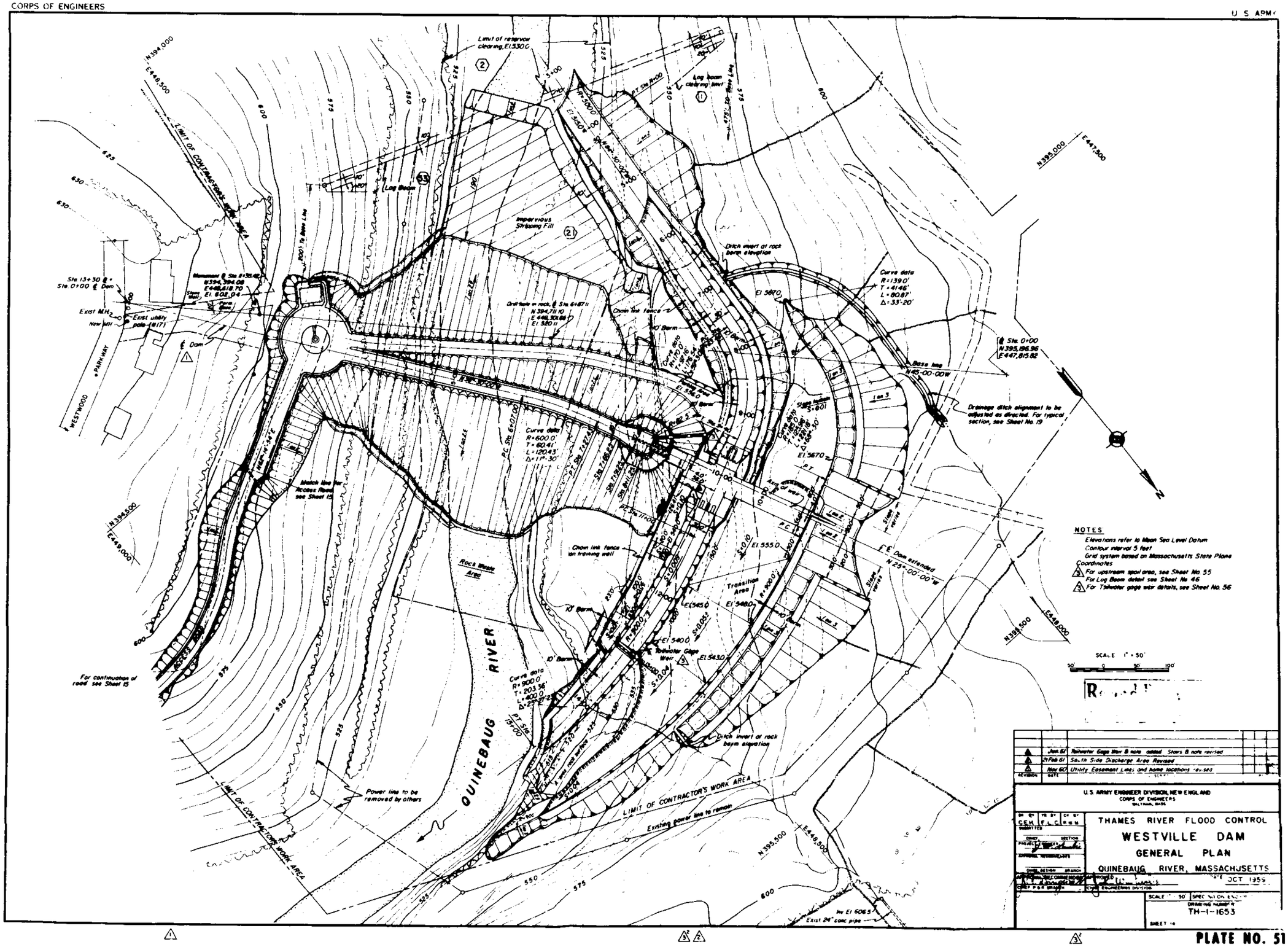

CORPS OF ENGINEERS
U S ARMY
Limit of reservoir clearing, El 530.0
Log Boom
Impervious Stripping Fill
Ditch invert at rock berm elevation
Curve data
R=139.0'
T=41.46'
L=80.87'
Δ=33°-20'
Drainage ditch alignment to be adjusted as directed. For typical section, see Sheet No. 19
Curve data
R=600.0'
T=60.41'
L=120.43'
Δ=11°-30'
Match line for Access Road see Sheet 15
Chain link fence on training wall
Rock Waste Area
Transition Area
Tailwater Gage Weir
Curve data
R=900.0'
T=203.36'
L=400.0'
Ditch invert at rock berm elevation
QUINEBAUG RIVER
LIMIT OF CONTRACTOR'S WORK AREA
Existing power line to remain
Power line to be removed by others
For continuation of road see Sheet 15
Exist 24" conc pipe
NOTES
Elevations refer to Mean Sea Level Datum
Contour interval 5 feet
Grid system based on Massachusetts State Plane Coordinates
For upstream spoil area, see Sheet No. 55
For Log Boom detail see Sheet No. 46
For Tailwater gage weir details, see Sheet No. 56
SCALE 1" = 50'
Jan 61 Tailwater Gage Weir & note added. Stairs & note revised
21 Feb 61 South Side Discharge Area Revised
Nov 60 Utility Easement Lines and home locations revised
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
THAMES RIVER FLOOD CONTROL
WESTVILLE DAM
GENERAL PLAN
QUINEBAUG RIVER, MASSACHUSETTS
DATE OCT 1959
DRAWING NUMBER
TH-1-1653
SHEET 14

PLATE NO. 51

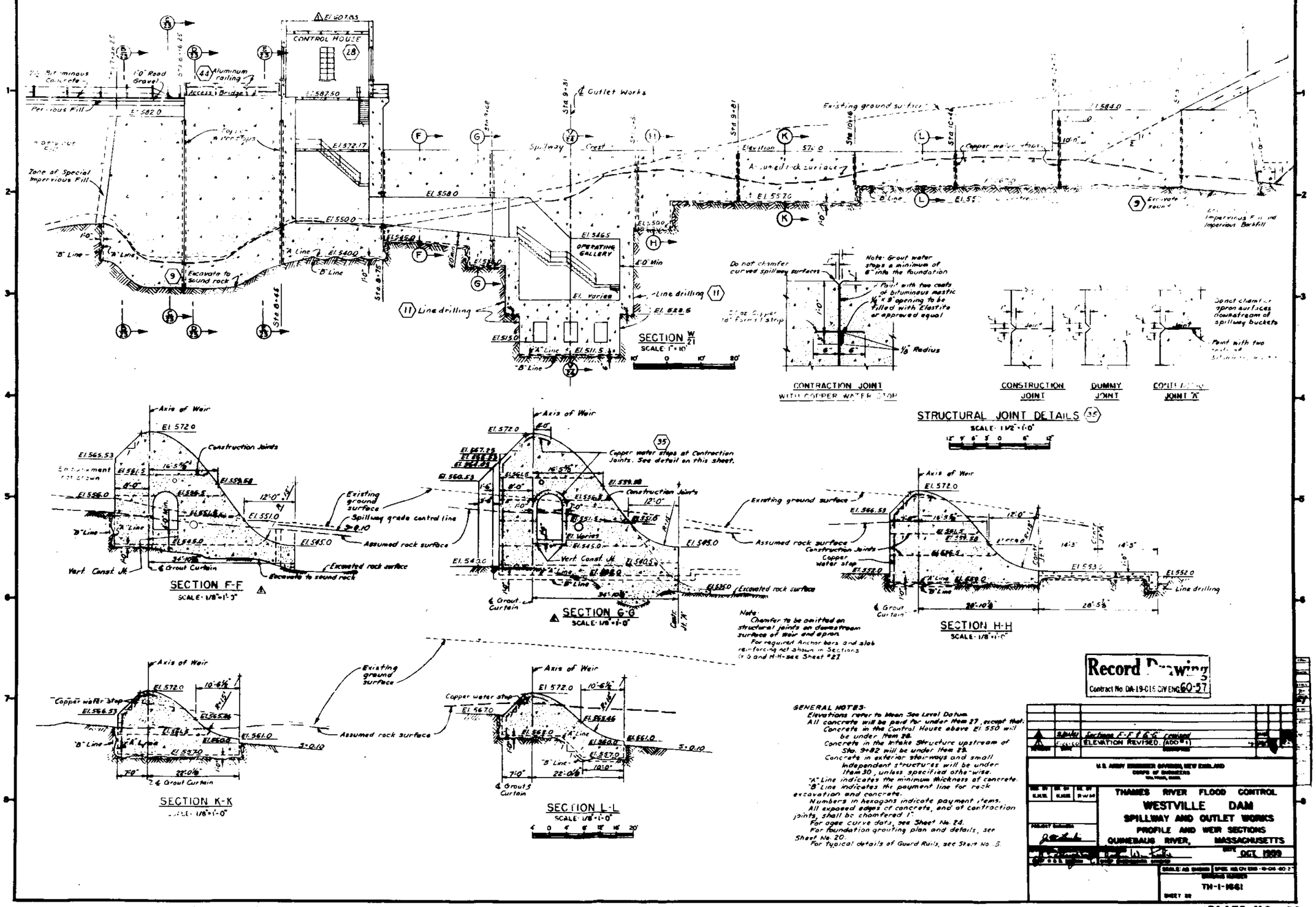
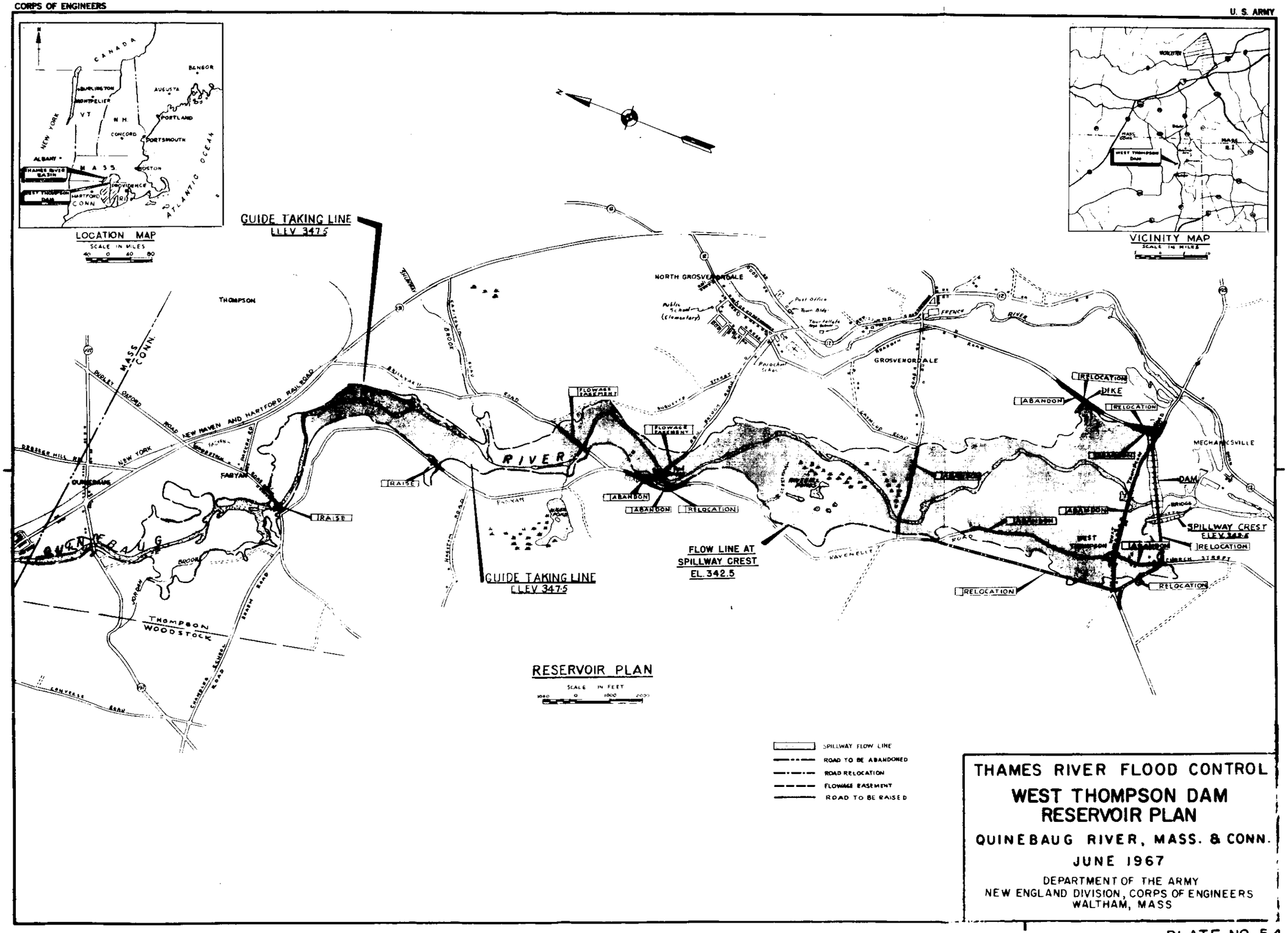

CORPS OF ENGINEERS
U. S. ARMY
CONTROL HOUSE
Aluminum railing
Access Bridge
Pervious Fill
Zone of Special Impervious Fill
Excavate to sound rock
Line drilling
Outlet Works
Spillway Crest
OPERATING GALLERY
Existing ground surface
Assumed rock surface
Copper water stops
Impervious Fill and Impervious Backfill
SECTION W/21
SCALE 1"=10'
Do not chamfer curved spillway surfaces
Note: Grout water stops a minimum of 6" into the foundation
Paint with two coats of bituminous mastic
1/8" Radius
CONTRACTION JOINT WITH COPPER WATER STOP
CONSTRUCTION JOINT
DUMMY JOINT
JOINT "A"
STRUCTURAL JOINT DETAILS
SCALE 1 1/2"=1'-0"
Axis of Weir
Construction Joints
Existing ground surface
Spillway grade control line
Assumed rock surface
Excavated rock surface
Excavate to sound rock
Vert. Const. Jt.
Grout Curtain
SECTION F-F
SCALE 1/8"=1'-0"
Copper water stops at Contraction Joints. See detail on this sheet.
SECTION G-G
SCALE 1/8"=1'-0"
Note: Chamfer to be omitted on structural joints on downstream surface of Weir and apron.
For required Anchor bars and slab reinforcing not shown in Sections G-G and H-H see Sheet #27
SECTION H-H
SCALE 1/8"=1'-0"
Copper water stop
SECTION K-K
SCALE 1/8"=1'-0"
SECTION L-L
SCALE 1/8"=1'-0"
GENERAL NOTES:
Elevations refer to Mean Sea Level Datum.
All concrete will be paid for under Item 27, except that:
Concrete in the Control House above El. 550 will be under Item 28.
Concrete in the Intake Structure upstream of Sta. 9+82 will be under Item 29.
Concrete in exterior stairways and small independent structures will be under Item 30, unless specified otherwise.
"A" Line indicates the minimum thickness of concrete.
"B" Line indicates the payment line for rock excavation and concrete.
Numbers in hexagons indicate payment items.
All exposed edges of concrete, and at contraction joints, shall be chamfered 1".
For agee curve data, see Sheet No. 24.
For foundation grouting plan and details, see Sheet No. 20.
For typical details of Guard Rails, see Sheet No. 5.
Record Drawing
Contract No. DA-19-015 CIV ENG 60-57
Sections F-F & G-G revised
ELEVATION REVISED. (ADD #1)
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
THAMES RIVER FLOOD CONTROL
WESTVILLE DAM
SPILLWAY AND OUTLET WORKS
PROFILE AND WEIR SECTIONS
QUINEBAUG RIVER, MASSACHUSETTS
OCT. 1959
TH-1-1661

PLATE NO. 53



THAMES RIVER FLOOD CONTROL

WEST THOMPSON DAM
RESERVOIR PLAN

QUINEBAUG RIVER, MASS. & CONN.

JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

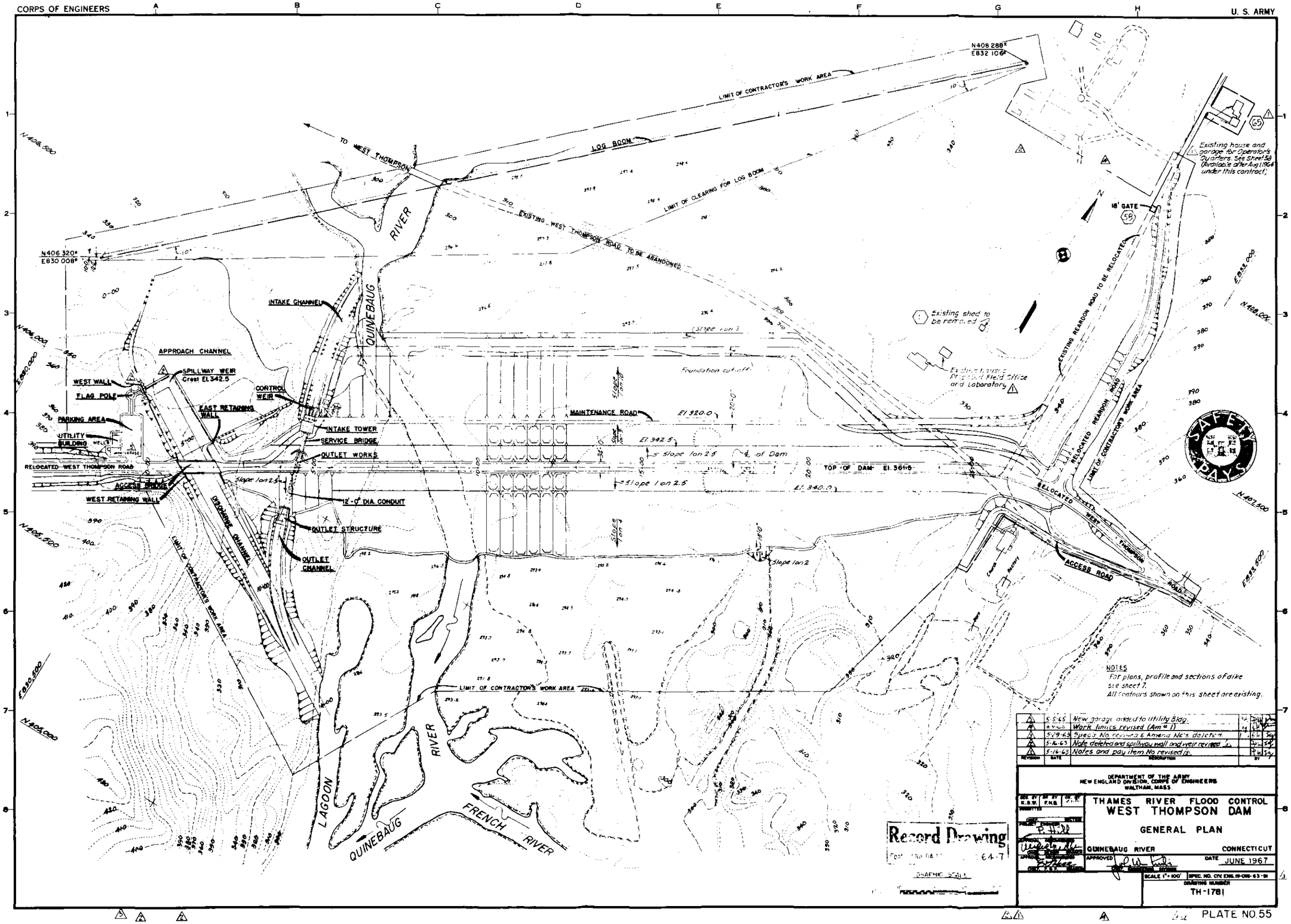

CORPS OF ENGINEERS
U. S. ARMY
LIMIT OF CONTRACTOR'S WORK AREA
LOG BOOM
TO WEST THOMPSON
LIMIT OF CLEARING FOR LOG BOOM
EXISTING WEST THOMPSON ROAD TO BE ABANDONED
QUINEBAUG RIVER
INTAKE CHANNEL
APPROACH CHANNEL
SPILLWAY WEIR Crest EL 342.5
WEST WALL
FLAG POLE
CONTROL WEIR
EAST RETAINING WALL
PARKING AREA
UTILITY BUILDING
INTAKE TOWER
SERVICE BRIDGE
OUTLET WORKS
RELOCATED WEST THOMPSON ROAD
ACCESS BRIDGE
WEST RETAINING WALL
12'-0" DIA. CONDUIT
OUTLET STRUCTURE
OUTLET CHANNEL
DISCHARGE CHANNEL
LIMIT OF CONTRACTOR'S WORK AREA
MAINTENANCE ROAD
TOP OF DAM El. 361.5
Slope 1 on 2.5
Slope 1 on 2
Foundation cut-off
Existing shed to be removed
Existing house and garage for Operator's Quarters. See Sheet 58 (Available after Aug 1964 under this contract)
18' GATE
EXISTING REARDON ROAD TO BE RELOCATED
RELOCATED REARDON ROAD
RELOCATED WEST THOMPSON ROAD
ACCESS ROAD
LAGOON
FRENCH RIVER
Record Drawing
GRAPHIC SCALE
NOTES
For plans, profile and sections of dike see sheet 7.
All contours shown on this sheet are existing.
5-5-65 New garage added to Utility Bldg.
Work limits revised (Am # 1)
5-29-63 Spec's No. revised & Amend No's. deleted.
5-16-63 Note deleted and spillway wall and weir revised
5-16-63 Notes and pay item No revised
REVISION DATE DESCRIPTION BY
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.
THAMES RIVER FLOOD CONTROL
WEST THOMPSON DAM
GENERAL PLAN
QUINEBAUG RIVER
CONNECTICUT
APPROVED
DATE JUNE 1967
SCALE 1" = 100'
SPEC. NO. CIV. ENG. 19-016-63-91
DRAWING NUMBER
TH-1781
SAFETY PAYS

PLATE NO. 55

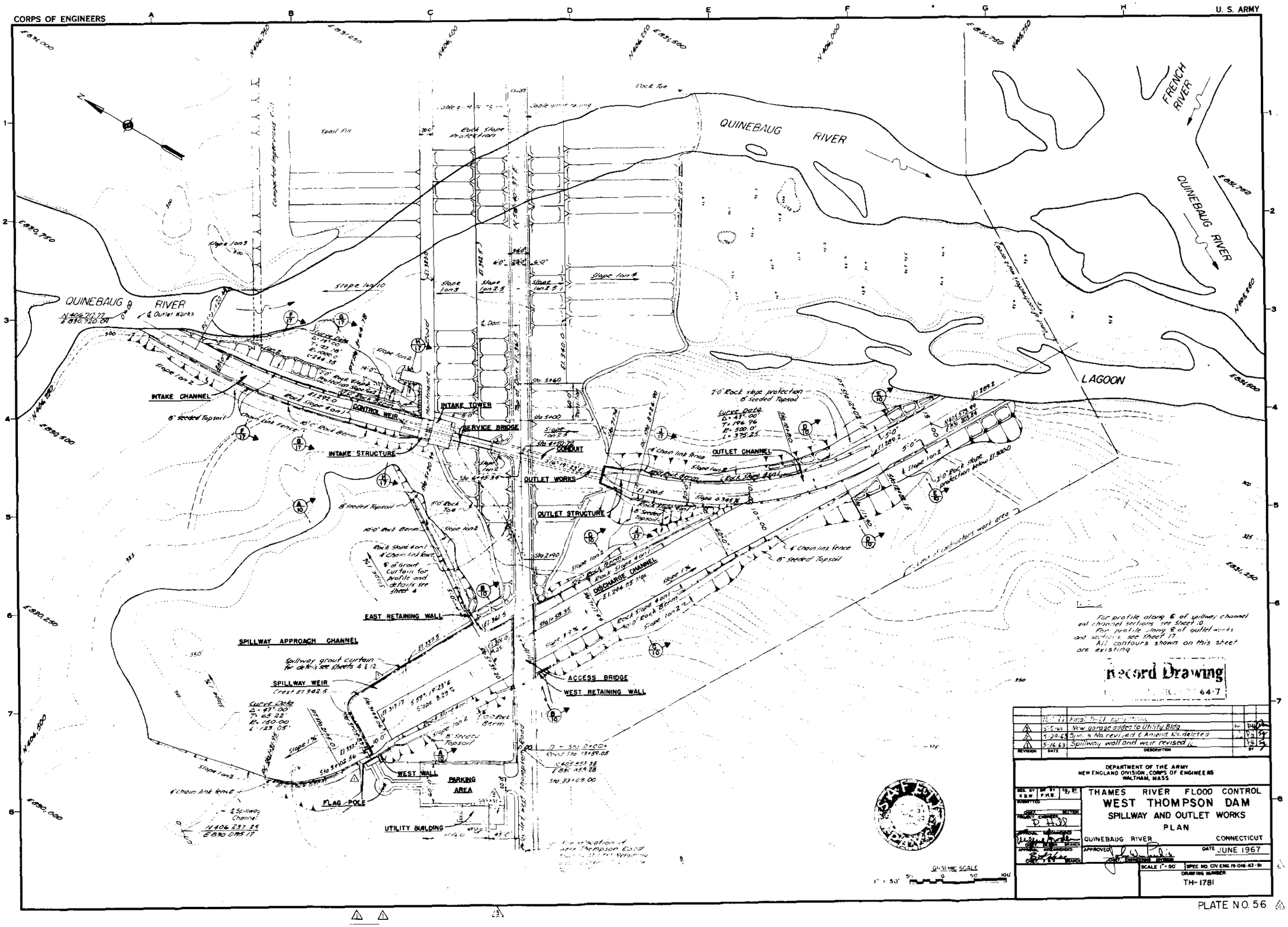
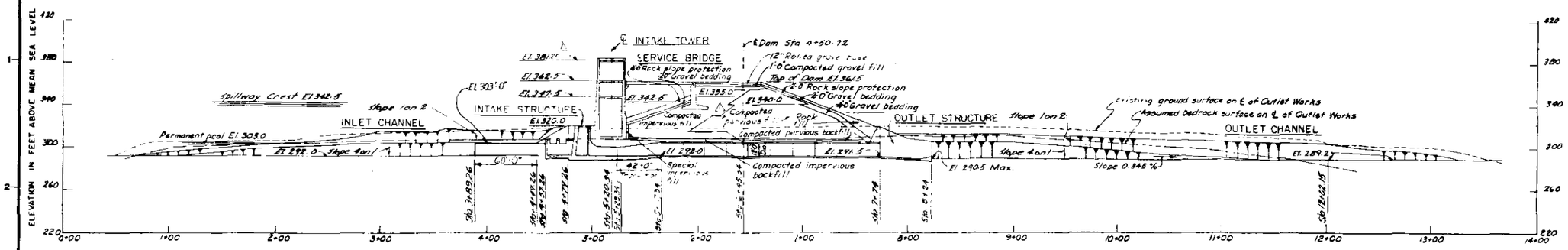

CORPS OF ENGINEERS
U. S. ARMY
QUINEBAUG RIVER
FRENCH RIVER
LAGOON
INTAKE CHANNEL
CONTROL WEIR
INTAKE TOWER
SERVICE BRIDGE
INTAKE STRUCTURE
CONDUIT
OUTLET WORKS
OUTLET STRUCTURE
OUTLET CHANNEL
DISCHARGE CHANNEL
EAST RETAINING WALL
SPILLWAY APPROACH CHANNEL
SPILLWAY WEIR
ACCESS BRIDGE
WEST RETAINING WALL
WEST WALL
PARKING AREA
FLAG POLE
UTILITY BUILDING
Spoil Fill
Rock Slope Protection
Rock Toe
Compacted Impervious Fill
Outlet Works
Curve Data
Limit of contractors work area
For profile along ℄ of spillway channel and channel sections see Sheet 10.
For profile along ℄ of outlet works and sections see Sheet 17.
All contours shown on this sheet are existing
Record Drawing
64-7
Final field corrections
New garage added to Utility Bldg.
Spills No. revised & Amend. No. deleted
Spillway wall and weir revised
REVISION
DATE
DESCRIPTION
BY
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS
THAMES RIVER FLOOD CONTROL
WEST THOMPSON DAM
SPILLWAY AND OUTLET WORKS
PLAN
QUINEBAUG RIVER
CONNECTICUT
DATE JUNE 1967
SCALE 1" = 50'
SPEC. NO. CIV. ENG. 19-016-63-91
DRAWING NUMBER
TH-1781
GRAPHIC SCALE

PLATE NO. 56

CORPS OF ENGINEERS

U. S. ARMY



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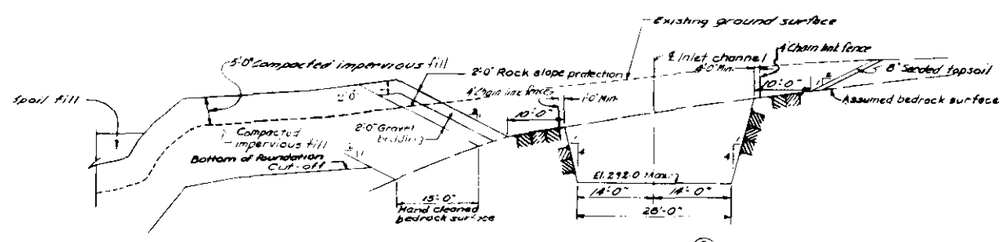

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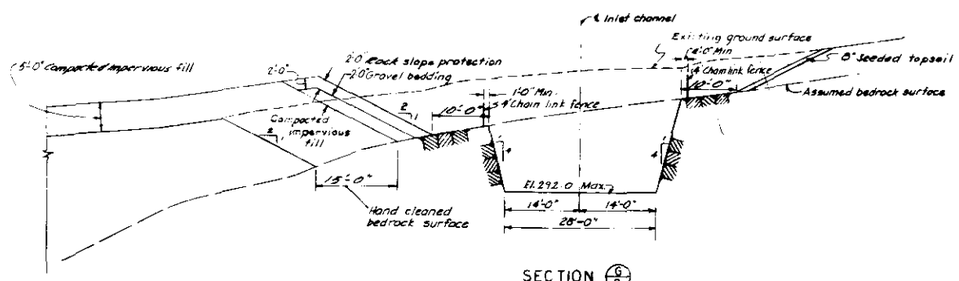

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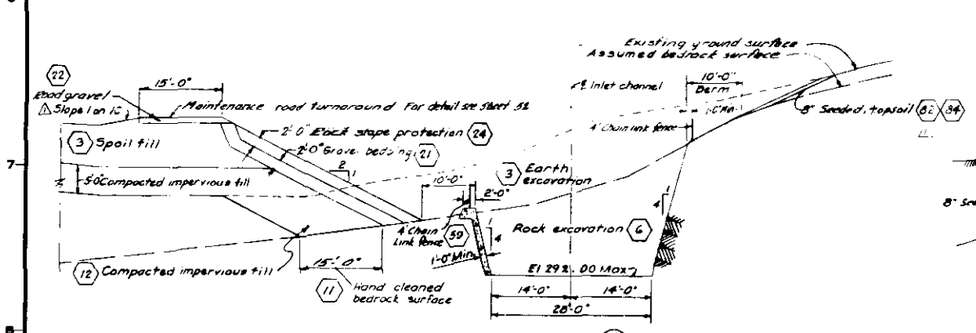

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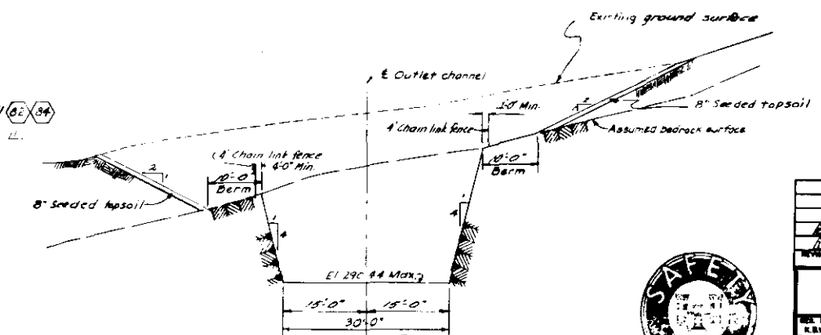


SECTION J/9
SCALE 1" = 10'

GRAPHIC SCALE
1" = 10'-0"
1" = 40'

Record Drawing
Contract No. DA 19 016-CIV ENG 64-7

REVISION	DATE	DESCRIPTION	BY
2	5-29-63	Spec's No. revised & Amend. No. deleted.	
1	5-13-63	Profile & sections revised.	

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

THAMES RIVER FLOOD CONTROL
WEST THOMPSON DAM
OUTLET WORKS
PROFILE AND SECTIONS

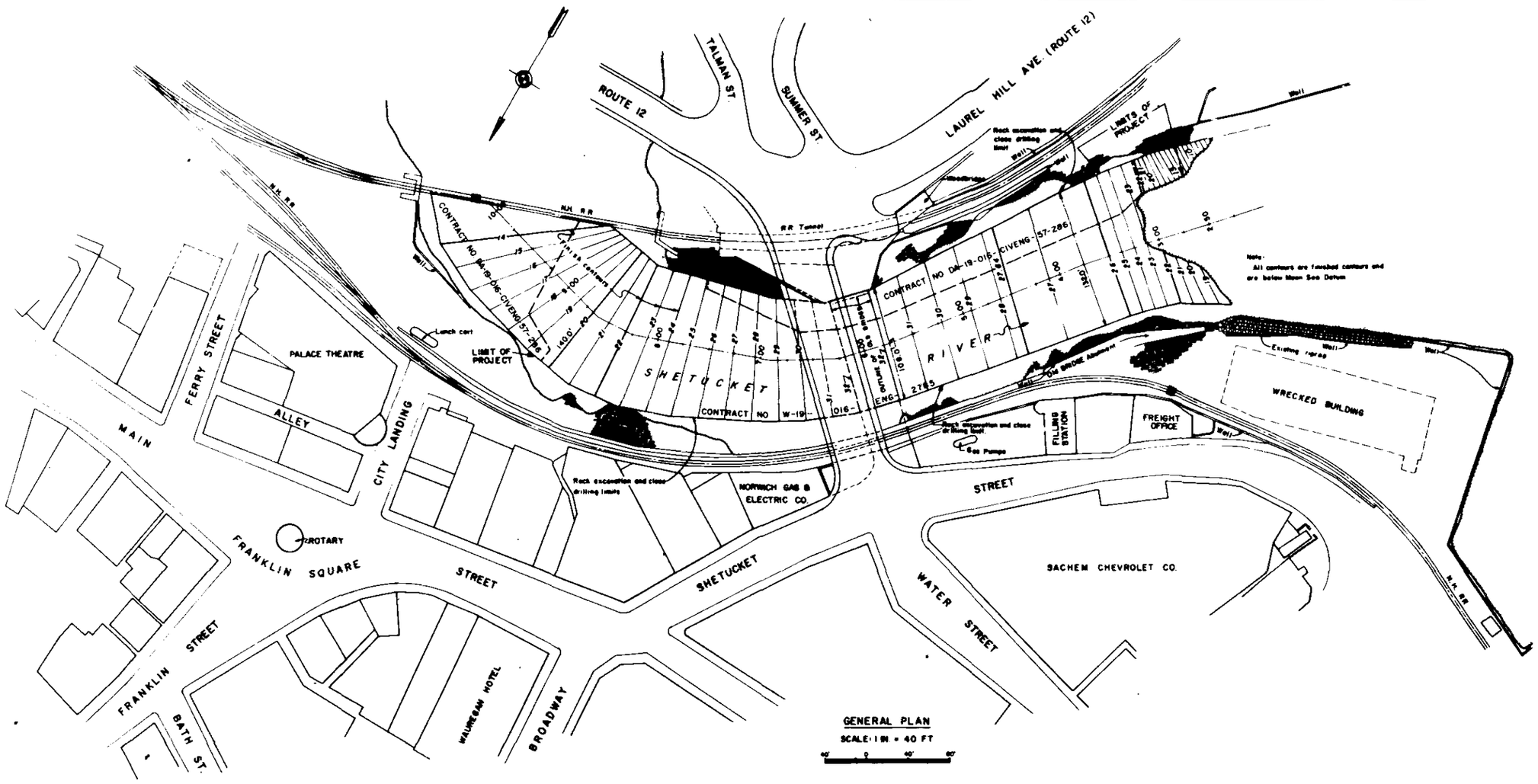
QUINEBAUG RIVER — CONNECTICUT

APPROVED — DATE JUNE 1967

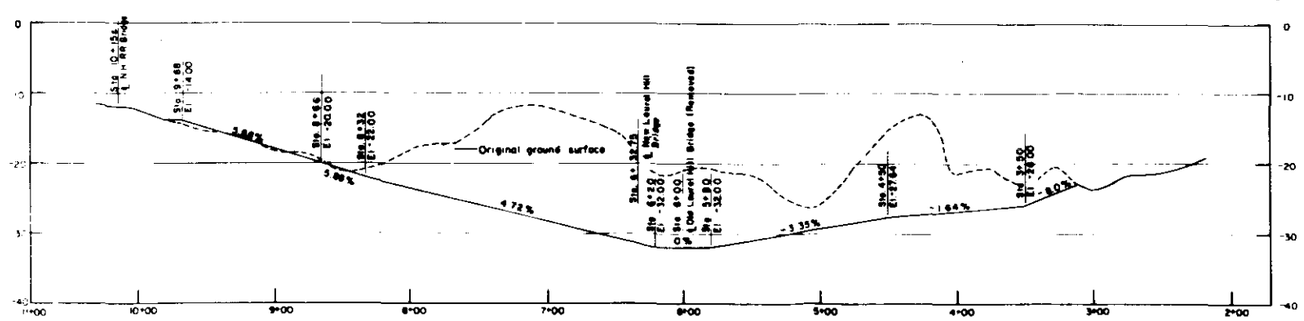
SCALE AS SHOWN — SPEC. NO. CIV ENG. 19-016-63-91

DRAWING NUMBER TH-1781

PLATE NO. 57



GENERAL PLAN
SCALE: 1 IN. = 40 FT



PROFILE ALONG ℄ NEW CHANNEL
SCALE: HOR. 1" = 40'
VERT. 1" = 8'

THAMES RIVER FLOOD CONTROL

NORWICH CHANNEL IMPROVEMENT

NORWICH, CONNECTICUT

GENERAL PLAN & PROFILE

SHETUCKET RIVER, CONNECTICUT

JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

A P P E N D I X A

THAMES RIVER BASIN

RESERVOIR REGULATION PROCEDURES

APPENDIX A

THAMES RIVER BASIN

RESERVOIR REGULATION PROCEDURES

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APPENDIX A

THAMES RIVER BASIN

RESERVOIR REGULATION PROCEDURES

A-1 GENERAL

This appendix describes the detailed reservoir regulation procedures for all NED reservoirs in the Thames basin. These procedures are based on flood analyses and regulation studies described in paragraph 30 of this manual. From these studies and analyses, appropriate guide curves, SOP's, EOP's, forecast curves, emptying and spillway discharge schedules were determined and are included herewith. All other text and plates including curves for spillway and outlet discharge, inflow, percent storage used and available storage for all projects are grouped together in this appendix to facilitate coordination of their regulation. This appendix and the SOP is for use of both members of RRS and the operators.

RESERVOIR REGULATION - NORMAL PERIODS

A-2 POSITION OF GATES

Normal settings for flood control gates have been determined for each dam and are listed below:

Mansfield Hollow:	F-O-O-O-O (for 16.5' pool) F-F-O-O-O (for 10' pool)
Buffumville:	O-F-O
Hodges Village:	3'-3'
East Brimfield:	Flood gates - 2'-2' Weir gates - O-O
Westville:	O-F-O
West Thompson:	O-F-O

Normal settings should be maintained at all times unless instructed otherwise by RRS. All gate changes, regardless of duration of the change in gate position, should be carefully noted on NED form 90 (revised February 1960) and submitted monthly with the pool chart to RRS. The report should include date and time of day, gate opening, pool stage and reason for operation.

A-3 COOPERATION WITH DOWNSTREAM WATER USERS

The damtender should acquaint himself with water users downstream of the dam in order to determine the amount of water required by riparian owners. It is the policy of the Corps of Engineers to cooperate whenever possible with water users, police authorities and other interested parties and agencies. The operator may be requested by downstream operators to modify the riverflow for short periods of time to facilitate repairs or for other reasons. Whenever such a request is received, the dam operator shall ascertain validity of the request and obtain assurances from other water users that they are agreeable to the proposed operation. The operator will then relay the information to RRS and request instructions.

RESERVOIR REGULATION - LOW FLOW PERIODS

A-4 CONSERVATION STORAGE

A contract exists between the United States Government and the American Optical Company whereby approximately 1,140 acre-feet of storage in the East Brimfield Reservoir between stages 9 and 13 feet are made available for use by the American Optical Company in regulating the flow of water for water supply purposes. Low flow releases from East Brimfield will be made only at the request of the American Optical Company and are subject to the following conditions:

a. Water for this purpose will be released only during the period 30 June through 31 December.

b. Reservoir level shall not be drawn below stage 12 before 1 August, below stage 11 before Labor Day or below stage 9 after Labor Day.

c. Reservoir level shall not be lowered more than 6 inches in any one week.

d. No regulation will be permitted which, in the opinion of the Government, infringes upon downstream water rights or might contribute to downstream flooding.

e. Variation in the regulation procedures will be permitted only as approved by the Government.

Low flow releases will be made by use of weir gates at East Brimfield Dam. No regulation should be necessary at Westville Dam. When a request for low flow release is received by the East Brimfield operator from American Optical Company, he will contact RRS for instructions.

RESERVOIR REGULATION - FLOOD PERIODS

A-5 GATE REGULATION FOR FLOODS

a. Minor floods. No regulation of the gates is required for minor floods where downstream channel capacities, listed in table A-1, are not exceeded. Outflow from the dams are limited by capacities of the normal gate settings. Excess flow will be stored and released automatically from the reservoirs.

b. Major floods. Regulation of gates for major floods will follow procedures shown in the following paragraphs.

A-6 STANDARD OPERATING PROCEDURE

A standard operating procedure (SOP) for each reservoir is shown on plates A-2, A-12, A-26 and A-41. The SOP indicates normal conditions, schedule of reports and flood regulation criteria for each reservoir. Normal gate openings should be maintained at all times unless instructed otherwise by RRS. Flood reports should be made either to RRS or a primary dam as shown in the SOP schedule or as instructed by RRS. Regulation of the gates will be based on the appropriate forecast and guide curves during Phases I and II, and based on downstream capacities and storage utilized during Phase III, as discussed in the following paragraphs.

A-7 PHASE I - INITIAL REGULATION OF FLOW

Gates at the flood control dams are normally set at partially

TABLE A-1

SAFE CHANNEL CAPACITIES - THAMES RIVER BASIN

City or Town	River	Damage Index Point	Discharge Index Point: Location	Beginning of Real Damage: Flow (cfs)	Beginning of Real Damage: Stage (ft)	Beginning of Nuisance Damage: Flow (cfs)	Beginning of Nuisance Damage: Stage (ft)	USWB Flood Stage: Flow (cfs)	USWB Flood Stage: Stage (ft)
Mansfield	Natchaug	Riverview Street Houses	Outflow (Mansfield Hollow)	2,800	-	2,500	-	-	-
Willimantic	Shetucket	"Bricktop Area" Houses	Willimantic USGS Gage	9,000	11.2	7,000	9.9	12,000	13
Baltic	Shetucket	River Street Houses	Grist Mill Gage	-	5.0	-	2.0	-	-
Norwich	Shetucket	U. S. Finishing Co.	Greenville Dam	25,000	26.8	*	-	-	-
Webster	French	Associated Industries Co.	Webster USGS Gage	1,000	7.7	*	-	-	-
Grosvenordale	French	Belding-Cortecelli Co.	Dam	*	-	*	-	-	-
Fiskdale	Quinebaug	Old Sturbridge Village	Outflow (East Brimfield)	*	-	1,000 E	-	-	-
Southbridge	Quinebaug	Harrington Cutlery Co.	American Optical Co.	*	-	1,500 E	-	-	-
West Dudley	Quinebaug	West Dudley Paper Co.	Quinebaug USGS Gage	*	-	2,000 E	5.6	3,160	7
Putnam	Quinebaug	Belding-Hemingway Co.	Putnam USGS Gage	*	-	5,000 E	9.6	7,870	12
Goodyear	Quinebaug	Rogers Paper Co.	Putnam USGS Gage	*	-	5,000 E	9.6	7,870	12
Danielson	Quinebaug	United Merchant Co.	Dam	*	-	*	-	-	-
Plainfield	Quinebaug	Wauregan Mills Co.	Dam	*	-	*	-	-	-
Jewett City	Quinebaug	Aspinook Manufacturing Co.	Tunnel Dam	*	-	15,000	7.3	-	-

E = Estimated

* = To be determined

open positions in order to restrict flows in the event of flash floods. Further restriction of flow is based on storm rainfall (either forecasted or observed), antecedent conditions, river stages and rates of rise at primary index points as follows:

Reservoir	Primary Index Points	Forecast Curves (plate)	Guide Curves (plate)
Mansfield Hollow	Willimantic and Norwich	A-1	A-3
Buffumville and Hodges Village	Webster	A-1	A-13
East Brimfield and Westville	Southbridge	A-1	A-27
West Thompson	Putnam	A-1	A-42

A-8 PHASE II - REGULATION DURING THE FLOOD

During Phase II, the allowable outflow determined by the guide curves will be followed until floodflows from uncontrolled areas have peaked at the index points. During Phase II, hydrologic and hydraulic data are collected, especially precipitation, river stages, and other flood information available from local observers or on-site inspections by NED personnel.

A-9 PHASE III - EMPTYING THE RESERVOIR

When downstream points have peaked and are starting to recede, Phase III - emptying of the reservoirs, shall commence. Emptying of each reservoir will be based generally on channel capacities at the same index points used for Phases I and II, but all major downstream damage centers will be checked for flow conditions (see table A-1). In addition, maximum emptying discharges have been established for each dam for the river channel immediately below the dam. In the emptying phase, the maximum rate of outflow generally should not exceed the peak rate of inflow as this would cause an artificial peak higher than a natural event. The following tabulation summarizes channel capacities at the key control points to be used as guides in emptying the various reservoirs.

SAFE CHANNEL CAPACITIES

Reservoir	Below Dam	Downstream Points
Mansfield Hollow	(See schedule, paragraph A-11)	9,000 cfs at Willimantic 25,000 cfs at Norwich
Buffumville	(See schedule, paragraph A-12)	1,000 cfs at Webster (coordinate with Hodges Village)
Hodges Village	500 cfs (paragraph A-10)	1,000 cfs at Webster (coordinate with Buffumville)
East Brimfield	1,000 to 1,500 cfs (paragraph A-10)	Coordinate with Westville for conditions at Southbridge
Westville	1,500 to 2,500 cfs (paragraph A-10)	1,500 to 3,000 cfs at Southbridge (coordinate with East Brimfield)
West Thompson	3,000 to 5,000 cfs (paragraph A-10)	5,000 to 7,500 cfs at Putnam (coordinate with East Brimfield, Westville, Buffumville and Hodges Village)

All index points in table A-1 should be checked during the emptying phase. During minor or moderate floods, emptying shall not commence until each index point has receded to channel capacity. However, during severe flood conditions when a major portion of reservoir storage has been utilized, it may be desirable to start Phase III - emptying the reservoirs, before downstream flows have receded to channel capacity. The latter procedure should be followed whenever weather forecasts indicate further storm activity or flood damage conditions will safely allow a retardation in the flood recession.

A-10 FIELD TESTING RATES OF EVACUATION

The maximum emptying discharge of 500 cfs for Hodges Village

Reservoir has been tested and is satisfactory. However, total flow at Webster produced by discharges from Hodges Village, Buffumville and the local area should not exceed 1,000 cfs in Webster. There has been no opportunity to date to test maximum emptying releases from East Brimfield, Westville and West Thompson Reservoirs which are subject to future testing. Channel capacities at the primary control points of Willimantic (9,000 cfs), Norwich (25,000 cfs), and Webster (1,000 cfs) have been tested and are satisfactory. Channel capacities at Southbridge and Putnam have not been tested and are subject to future determination.

A-11 MANSFIELD HOLLOW EVACUATION

At Mansfield Hollow, the maximum allowable release is restricted by the housing development at Natchaug Village. Maximum emptying releases, based on storage utilized, are listed below:

Pool Stage (feet)	Maximum Emptying Discharge (cfs)
Under 25	2,500
25 - 35	2,600
35 - 45	2,700
Over 45	2,800

A-12 BUFFUMVILLE EVACUATION

At Buffumville Dam releases are restricted by the present poor condition of the Gordon Chemical Company dam. Maximum emptying releases, based on storage utilized, are listed below:

Pool Stage (feet)	Maximum Emptying Discharge (cfs)
Under 20	300
20 - 30	400
Above 30	500

A-13 EVACUATION AT BUFFUMVILLE AND HODGES VILLAGE

Assuming residual available storage in Buffumville and

Hodges Village is the same, the outflow should be distributed equally between the two reservoirs without exceeding 1,000 cfs at Webster. However, should the available storage not be equal, outflow from the reservoir with lesser available storage should be increased and outflow from the other should be decreased proportionately. Contact should be made with Cranston Print Works in Webster for information on the outflow from Lake Webster. Some adjustment in outflow from Buffumville and Hodges Village may be necessary to allow for changes in the discharge from Lake Webster.

A-14 EVACUATION AT EAST BRIMFIELD AND WESTVILLE

Allowable discharge from Westville, the downstream dam, should first be determined based on conditions at Southbridge. Then the residual available storage at both dams, expressed in inches from the net drainage areas, should be determined. East Brimfield outflow should be determined from the Westville outflow using the following formula:

East Brimfield outflow =

$$\frac{2}{3} \times \frac{\text{inches available at Westville}}{\text{inches available at E. Brimfield}} \times \text{Westville outflow}$$

A-15 INCREASING RATES OF OUTFLOW

In order to avoid large downstream surges during emptying, maximum increases in outflow per hour have been determined for each dam as follows:

Dam	Maximum Increase in Outflow (cfs per hour)
Mansfield Hollow	500
Buffumville	100
Hodges Village	100
East Brimfield	200
Westville	300
West Thompson	500

A-16 SPILLWAY DISCHARGE

Ordinarily during a major flood the gates will not be opened in order to avoid spillway discharge. Surcharge storage above spillway crest will be utilized if downstream capacity continues to be exceeded by runoff from the uncontrolled areas. However, if the stage in any reservoir continues to rise causing high rates of spillway discharge and eventually threatening safety of the dam, the gates will be opened in accordance with the schedules listed in table A-2.

A-17 REGULATION FOR EXTRAORDINARY CONDITIONS

It is conceivable that extraordinary and unpredictable flood conditions may arise from dam or bridge failures, highway or railroad washouts, ice jams or debris deposits. As the prime purpose of the reservoir is to prevent further damage, regulation during such unusual conditions may not follow the previously described rules but will be governed by exigency of the circumstances. If time permits and communications are available the RRS will be immediately notified of any unusual incident so prompt action may be taken and gates operated to provide maximum protection. If the emergency requires prompt action, the operator will take whatever steps are necessary to prevent loss of life and property damage.

A-18 EMERGENCY OPERATING PROCEDURE (EOP)

Emergency Operating Procedures (EOP) have been established for each dam for the condition when the operator is unable to communicate with RRS or a primary dam (see plates A-2, A-12, A-26 and A-41. However, instructions contained in the EOP do not relieve the damtender of his responsibility for continued efforts to communicate with the Reservoir Regulation Section. Use of the Massachusetts or Connecticut State Police to transmit messages between the damtender and NED should be used whenever other means of contact have failed. Personal visits by the damtender will be required whenever local communications fail with the telemark or downstream observers. It should be emphasized that, whenever communications fail, or due to lack of adequate reports it is impossible to fully appraise the runoff from an intense storm, it is preferable to immediately restrict, or completely stop the reservoir discharge than to delay regulation and actually contribute to downstream flood conditions.

TABLE A-2

OUTLET REGULATION SCHEDULES DURING SPILLWAY DISCHARGE
(to prevent overtopping or failure of dam)

Description	Mansfield Hollow		Buffumville		Hodges Village	
	Stage	Gates	Stage	Gates	Stage	Gates
Spillway Crest	62.0	0-0-0-0-0	42.5	0-0-0	35.5	0-0
Guide Taking Line	65.0	0-0-0-0-0	47.5	0-0-0	38.5	0-0
	69.0	0-0-0-0-0	49.0	F-0-0	47.0	F-0
	70.0	0-0-F-0-0	50.0	F-F-0	48.0	F-F
	71.0	F-0-F-0-F	51.0	F-F-F		
	72.0	F-F-F-F-F				
Design Surcharge	73.5	F-F-F-F-F	52.8	F-F-F	49.5	F-F
Top of Dam	78.0	F-F-F-F-F	57.5	F-F-F	54.5	F-F

Description	East Brimfield		Westville		West Thompson	
	Stage	Gates	Stage	Gates	Stage	Gates
Spillway Crest	34.0	0-0	57.0	0-0-0	50.5	0-0-0
Guide Taking Line	37.0	0-0	60.0	0-0-0	55.5	0-0-0
	44.0	F-0	64.0	F-0-0	61.0	F-0-0
	46.0	F-F	65.0	F-F-0	62.0	F-F-0
			66.0	F-F-F	63.0	F-F-F
Design Surcharge	48.3	F-F	67.1	F-F-F	64.5	F-F-F
Top of Dam	53.2	F-F	72.0	F-F-F	69.5	F-F-F

Increasing the outflow will not be made until communication is re-established with RRS, unless spillway discharge has commenced in which case the gate schedule listed in table A-2 should be followed.

A-19 COMMUNICATIONS

For reservoir regulation purposes all dams have been classified either as "single" or "paired". Although the operation of a single dam must be coordinated with all other dams in the basin, it can be operated somewhat independently during flood periods. Paired dams are located nearby in the same watershed and must be operated together at all times. Paired dams are further broken into two categories, i.e., "primary paired" and "secondary paired." The operator of a primary paired dam is assigned certain additional responsibilities during some flood periods such as receiving data and relaying instructions to the operator of a secondary paired dam, and in case of emergency, coordinating regulation of both dams. The following tabulation classifies the Thames basin reservoirs according to these criteria:

Dam	Single or Paired	Primary or Secondary
Mansfield Hollow	Single	-
Buffumville	Paired	Primary
Hodges Village	Paired	Secondary
Westville	Paired	Primary
East Brimfield	Paired	Secondary
West Thompson	Single	-

Communications between RRS and NED dams will be through the use of radio during normal working hours and whenever Station WUA is manned for emergency operations. The telephone will be used only after all attempts to use the radio are unsuccessful. The telephone will also be used during nonduty hours to the homes of RRS personnel.

For routine and flood radio reports the operator of each dam, single or paired, will transmit his own data directly to RRS. In

the case of paired dams, the operator of each dam will relay his own data in sequence upon request from RRS and regulation instructions will be given in similar sequence. Operators of paired dams will monitor each other's report and regulation instructions. Should the radio be out of order at one of the paired dams, but functioning at the second, the operator at the second dam will relay reports and receive instructions for both.

When contact cannot be made by radio with NED Headquarters, the telephone will be used. Single dams will telephone direct to RRS. In paired dams, only the operator of the primary dam will telephone RRS. The operator of the secondary dam will radio or telephone his data to the primary dam, who in turn will relay data from both to RRS by telephone. Regulation instructions will be issued by RRS for both to the operator of the primary dam, who in turn, will relay instructions to the secondary dam. Should the operator of the primary paired dam be absent during a flood, the operator of the secondary dam will be responsible for transmitting reports for both and receiving instructions from RRS.

In the event of both radio and telephone failure with RRS, each operator should follow the emergency operating procedure (EOP) prescribed for each dam. In the case of paired dams, the primary dam operator will direct the regulation of both until communication is re-established with RRS. In the event of absence of the operator of the primary dam, the operator of the secondary paired dam will assume his duties.

A-20 COMMUNICATION TEST REPORTS

A weekly report to RRS will be made each Friday morning to test the communication system and provide opportunity for the operators and RRS personnel to become familiar with transmission of hydrologic data. NED form 477 has been prepared for the main purpose of recording data in the weekly communication checks. This form may also be used during initial storm reports prior to development of flood conditions or actual regulation of a reservoir. NED form 503 will be used in lieu of form 477 for individual projects whenever instructions are issued by RRS, or sooner, if so requested by RRS or the operator due to threatening storms or river conditions. It is possible that some operators, in southern areas for example, may be in an area of severe storms and rising rivers and are using form 503, while operators in northern sections may still be using form 477 for a minor storm and nonoperating conditions.

A-21 ALERTING REPORTS

Alerting reports to RRS or a primary dam should be made according to schedules shown in the various SOP's. Initial reports should be made whenever any of the conditions under Alert 1 are reached. The alerting report will include pertinent data readily available such as rainfall amount at the dam, reservoir stage, outflow, and a general appraisal of local conditions. This report should be made without delay even though complete data from all rainfall and flood-warning stations are not available.

A-22 FLOOD REGULATION REPORTS

If heavy rainfall continues and flood conditions in the basin are developing, the damtender will make frequent radio reports, dependent on severity of conditions and receive instructions from RRS. Insofar as practicable the following information should be included in the report to RRS:

a. Total amount of precipitation at time of reporting and intermediate amounts with the time of observation.

b. Pool elevation at time of reporting and previous readings with corresponding time to define hydrograph or rate of rise at the pool (accurate simultaneous readings of both stage and time are very essential to facilitate inflow computations by RRS).

c. Gate openings and discharges at time of reporting and beginning of the storm.

d. Reports of precipitation received from other sources.

e. River stages at downstream index points.

f. General snow cover and runoff conditions throughout the basin.

g. Any other pertinent information

A-23 OBSERVATIONS AT DAM

During regulation of the reservoir for floods, information pertinent to the regulation will be entered in the log book or on prescribed forms for record purposes at the dam. However, if unusual

circumstances occur during a flood or upon request of RRS, a report which may be written in longhand will be submitted to the Division Office. The damtender will make general observations of conditions occurring at the outlet works and enter them in the log book. If possible, it is desirable to take photographs noting date, time and reservoir gage height. Conditions to be noted are listed below:

a. Extent and action of eddies and waves in the vicinity of the conduit intakes and portals

b. Extent and action of turbulence of eddies downstream of the spillway and outlet works

c. Effect on flow through the gates due to an accumulation of ice or debris at the intakes

d. Pool elevation and position of gate opening where vibration may develop

e. Any other hydraulic phenomena

A-24 OBSERVATIONS AT CONTROL POINTS

During periods of floodflow a reconnaissance of the river will be made by each damtender to obtain further data on safe channel capacity of the rivers. It is very likely there will be adjustments in the present conception of the channel capacities, for invariably with the completion of flood control reservoirs, additional information becomes available relative to stage of nuisance and real damage. Stages at damage points will be correlated with the concurrent stage at the nearest gaging station to obtain the corresponding discharge.

A-25 ABSENCE FROM DAM

The Reservoir Regulation Section shall be advised in advance whenever the operator will be absent overnight from the dam or his home. Extended annual leave will be requested on SF 71 from his immediate supervisor in Operations Division, with a copy to RRS in time for approval before commencement of the pay period in which the leave is to be taken. In the event of emergency leave, telephone or radio contact shall be made with RRS who will advise the Operations Division. In all instances the assistant damtender will be advised and detailed information as to his location and method of contact shall be furnished RRS.

A-26 ROADS AND HIGHWAYS IN RESERVOIR AREA

Each operator should become familiar with roads in the reservoir area that are subject to inundation during storage of floodwaters. Roads will be barricaded in accordance with prescribed schedules and should be checked and kept in repair during periods of storage. At present, schedules showing effect of regulation on roads and private property within the reservoir have been determined only for Mansfield Hollow Reservoir. Studies to determine similar schedules for the other 5 reservoirs are being made and will be submitted at a later date.

A-27 EFFECT OF REGULATION ON ROADS WITHIN MANSFIELD HOLLOW RESERVOIR

Roads within the reservoir area for which the Government has acquired flowage easements will also be closed by the damtender. However, before the roads become flooded, the damtender shall notify the proper authorities. If it appears imminent that a town road will be flooded, the First Selectman of the respective town will be advised. The State Highway Commissioner will be notified, as well as the First Selectman of the affected town, if a state road will be closed. Lowest elevations of roads within the reservoir area are shown graphically on plate A-11 and table A-3.

A-28 EFFECT OF REGULATION ON RESIDENTS AND PROPERTY WITHIN MANSFIELD HOLLOW RESERVOIR

The general policy in acquiring land has been to purchase all lands in the reservoir area up to elevation 260. However, flowage easements have been obtained on a number of properties below this elevation where the first floor of the houses is slightly below elevation 257, notably at Hartson's Mill and the Chapin Brook area at dike B. The damtender will familiarize himself with these properties so that during flood periods he may anticipate local developments in order to notify residents. The Government is not legally required or bound to warn occupants of impending floods, but for good public relations the damtender should advise them as soon as possible. Plate A-11 shows graphically the lowest elevation of each tract, and table A-4 lists properties on which flowage easements have been obtained. For reservoir stages above elevation 260 and elevation 250 in the Chapin Brook basin, State Police or other authorities will be advised and requested to notify immediately as many families as possible.

TABLE A-3

ROADS SUBJECT TO INUNDATION WITHIN MANSFIELD HOLLOW RESERVOIR AREA

Roadway	Controlling Agency	Town	Lowest Elevation MSL	Lowest Elevation Stage	Point of Lowest Elevation
Wormwood Hill Road*	NED	Mansfield	215	20	Intersection
Bassett Bridge Road	Town	Mansfield	224	29	Roadway
Old Route 6*	NED	Windham	228	33	Roadway
North Windham Road	Town	Windham	235	40	Roadway
Bates Road	Town	Chaplin	242	47	Intersection
Old Route 6	Town	Windham	248	53	Intersection
Route 203	State	Windham	248	53	Intersection
Station Road	Town	Windham	248	53	Intersection
Spencer Lane	Town	Windham	252	57	Intersection
SPILLWAY CREST, MANSFIELD HOLLOW DAM			257	62	--
Route 89	State	Mansfield	260	65	Roadway
Bedlam Corners Road	Town	Chaplin	260	65	Roadway
Chaffeeville Road	Town	Mansfield	260	65	Roadway
Atwoodville Road	Town	Mansfield	260	65	Roadway
New Route 6	State	Windham	260	65	Roadway
Mulberry Road	Town	Mansfield	260	65	Intersection

* Abandoned, but permanent barricades are sometimes removed by fishermen or hunters

TABLE A-4

FLOWAGE EASEMENTS - MANSFIELD HOLLOW RESERVOIR

A. IN RESERVOIR AREA

Tract No.	Owner	Location	Telephone Number	Elevation	Remarks
50 E	Lubin C. Wheeler	North Windham Road Mansfield	423-4273	242 255 ± 262.3	Access flooded Basement First floor
49 E	C. Francis Johnstone	North Windham Road Mansfield	423-9363	242 257 ± 264.2	Access flooded Basement First floor
(46)	George H. Jay	North Windham Road Mansfield	423-7259	242	Access flooded Property above elevation 260
61 E	L. M. Hartson Co. - 2 houses and mill Mill office (vacant) Lester M. Hartson	North Windham	423-3643 423-3643	248.7 250.9 253 ± 254 256.2 257.9	Basement Basement Boiler room Access flooded First floor First floor
55 E	Arthur Chovnick	Junction Bates Road and Mansfield Hollow Road	423-2713	249 ± 254 256.2	Basement Access flooded First floor
58 E	Clarence Peterson	Station Road, North Windham	423-9138	251 254 258.3	Basement Access flooded First floor
56 E	Mrs. R. V. Newcombe	Bates Road, North Windham	423-0381	252 ± 254 259.8	Basement Access flooded First floor
59 E	Roger Lizee	North Windham	423-0258	252.3 256 259.8	Basement Access flooded First floor
57 E	J. P. Burnham, Jr.	Bates Road	455-9575	256 253 ± 259.8	Access flooded Basement First floor
62 E	Howard A. Hartson 2 houses	North Windham	423-0230	253.5 254 261.0	2 Basements Access flooded First floors
131 E	Ilia C. Williams and Julia DeGroot	Atwoodville Road	429-4000	253.9 260 262.3	Basement Access flooded First floor
130 E	Robert and Delbert O. Benjamin	Atwoodville Road	429-4212	255.8 263.3	Basement First floor
133 E	Joseph C. Boucar	Atwoodville Road	429-4138	257.8 260 264.3	Basement Access flooded First floor
134 E	Thomas and Martha Meikle	Atwoodville Road	429-4194	257.7 262 264.7	Basement Access flooded First floor
63 E	Leslie F. Hartson	North Windham	423-3447	258.8 264 266.5	Basement Access flooded First floor

B. OTHER EASEMENTS IN RESERVOIR AREA - NO BUILDINGS BELOW ELEVATION 260

67 E	Pauline and Michael Shirshac	North Windham	423-0644	261.8 264 268.5	Basement Access flooded First floor
135 E	Elsie Schlesinger	Atwoodville Road	423-0615	263.4 266 270.6	Basement Access flooded First floor
65 E	Roger Lizee	North Windham	423-0258	258.6±	

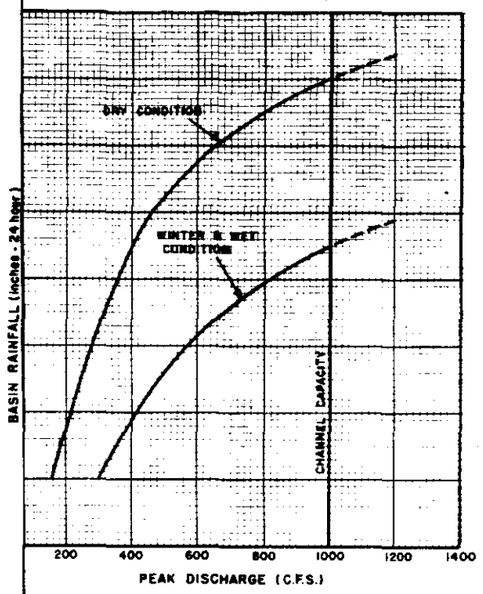
C. IN CHAPIN BROOK AREA (NEAR DIKE "B") - NO BUILDINGS

Tract No.	Owner	Address
172 E	Charlotte F. Davis	Franklin, Connecticut
171 E	Gaylord and Gladys Mattison	Mansfield Center, Connecticut
170 E	Arlene D. Payne	Mansfield Center, Connecticut
169 E	Ruth Oden	Mansfield Center, Connecticut
168 E	Helen Dressen	Mansfield Center, Connecticut
167 E	Sarah Lynch and Charlotte Davis	Mansfield Center, Connecticut
32 E	First Congregational Church	Mansfield Center, Connecticut
29 E	Louise Ferguson	Mansfield Center, Connecticut
25 E	Herbert Lane	Weathersfield, Connecticut

CORPS OF

U. S. ARMY

FRENCH RIVER AT WEBSTER, MASS.



E FORECAST CURVES SHOWN REPRESENT RUN-OFF
UNCONTROLLED DRAINAGE AREA DOWNSTREAM OF
RVOIRS.

EXAMPLE A

SHETUCKET RIVER BASIN ANTECEDENT CONDITIONS
WET.
AGE BASIN RAINFALL IN TWENTY FOUR HOURS WAS 4.2".
PREDICTED PEAK DISCHARGE AT WILLIMANTIC WILL
,000 C.F.S.
GATES AT MANSFIELD HOLLOW DAM SHOULD BE CLOSED.

EXAMPLE B

SHETUCKET RIVER CONDITIONS ARE DRY.
AGE BASIN RAINFALL IN TWENTY FOUR HOURS WAS 3.4".
FORECASTED PEAK DISCHARGE AT WILLIMANTIC WILL
00 C.F.S. FROM THE UNCONTROLLED DOWNSTREAM
AGE AREA.
GATES AT MANSFIELD HOLLOW DAM ARE AT F-O-O-O-O,
ARGING 900 C.F.S.
TE CHANGES ARE NECESSARY.

BASIN RAINFALL (inches - 24 hour)

PROVISIONAL

THAMES RIVER FLOOD CONTROL

RIVER FORECAST CURVES FOR INDEX POINTS

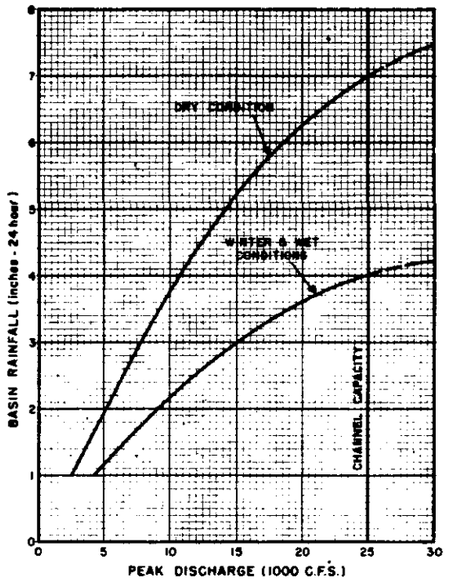
THAMES RIVER BASIN

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION-CORPS OF ENGINEERS
WALTHAM, MASS.

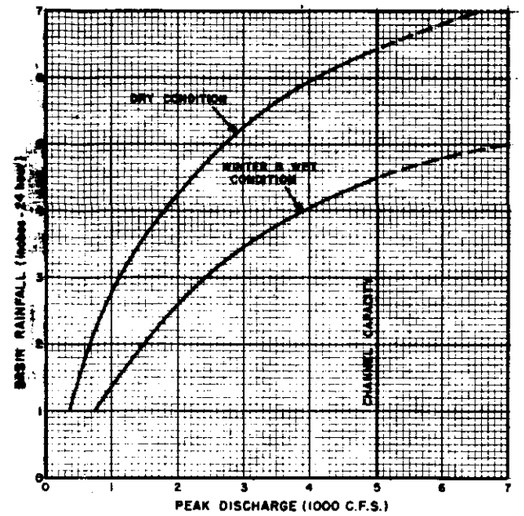
JUNE 1967

PLATE NO. A-1

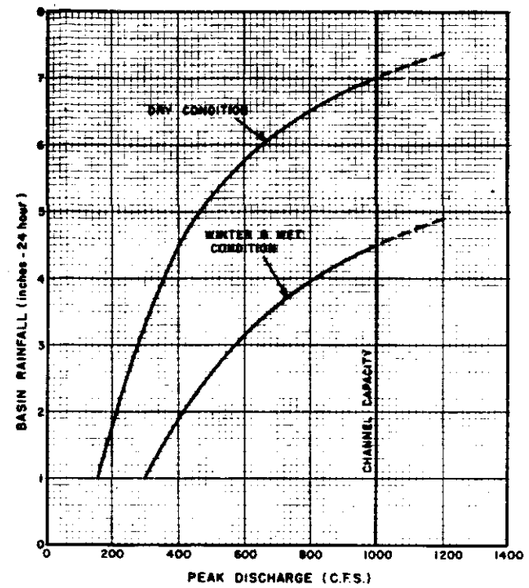
SHETUCKET RIVER AT NORWICH, CONN.



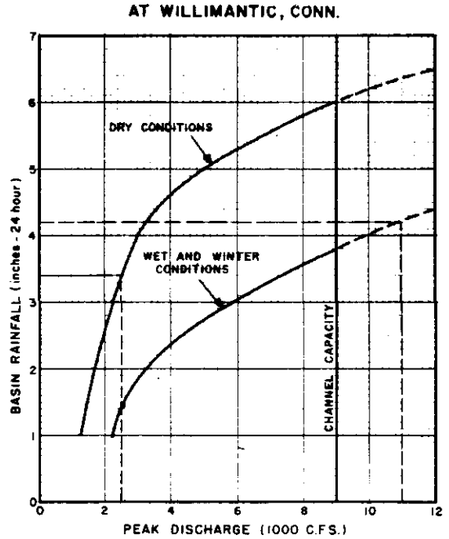
QUINEBAUG RIVER AT PUTNAM, CONN.



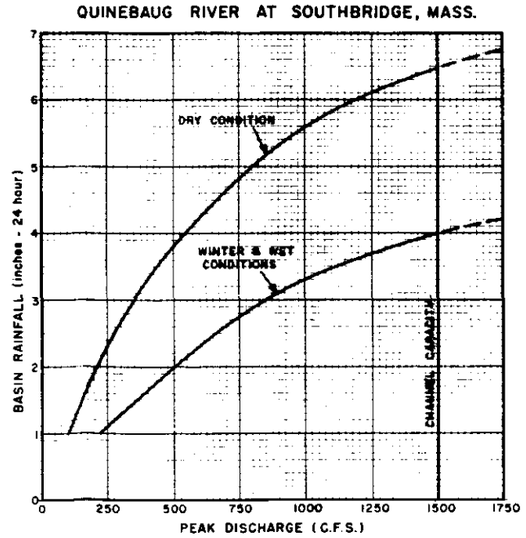
FRENCH RIVER AT WEBSTER, MASS.



SHETUCKET RIVER AT WILLIMANTIC, CONN.



QUINEBAUG RIVER AT SOUTHBRIDGE, MASS.



NOTE

THE FORECAST CURVES SHOWN REPRESENT RUN-OFF FROM UNCONTROLLED DRAINAGE AREA DOWNSTREAM OF RESERVOIRS.

EXAMPLE A

1. THE SHETUCKET RIVER BASIN ANTECEDENT CONDITIONS ARE WET.
2. AVERAGE BASIN RAINFALL IN TWENTY FOUR HOURS WAS 4.2".
3. THE PREDICTED PEAK DISCHARGE AT WILLIMANTIC WILL BE 11,000 C.F.S.
4. THE GATES AT MANSFIELD HOLLOW DAM SHOULD BE CLOSED.

EXAMPLE B

1. THE SHETUCKET RIVER CONDITIONS ARE DRY.
2. AVERAGE BASIN RAINFALL IN TWENTY FOUR HOURS WAS 3.4".
3. THE FORECASTED PEAK DISCHARGE AT WILLIMANTIC WILL BE 2500 C.F.S. FROM THE UNCONTROLLED DOWNSTREAM DRAINAGE AREA.
4. THE GATES AT MANSFIELD HOLLOW DAM ARE AT F-0-0-0-0, DISCHARGING 900 C.F.S. NO GATE CHANGES ARE NECESSARY.

PROVISIONAL

THAMES RIVER FLOOD CONTROL

RIVER FORECAST CURVES FOR INDEX POINTS

THAMES RIVER BASIN

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION-CORPS OF ENGINEERS
WALTHAM, MASS.

JUNE 1967

MANSFIELD HOLLOW RESERVOIR
STANDARD OPERATING PROCEDURE (SOP) FOR RESERVOIR REGULATION

Condition	Storm Precipitation Antecedent Conditions		Pool Stage		Downstream Index Points												Flood Gates Gate Openings		Dike B	
					American Thread Co.		Shetucket River Telemark		Norwich Tunnel Dam Tailwater		Norwich Greenville Dam		Jewett City USGS Gage		Tunnel Dam Headwater					
	Wet	Dry	High Pool	Low Pool	Feet	CFS	Feet	CFS	Feet	CFS	Feet	CFS	Feet	CFS	Feet	CFS	High Pool	Low Pool	Backwater Gate	Sluice Gate
Normal Conditions	-	-	16.5'	10.0'	0.0	-	2.0	-	0.0	-	20.0	-	4.0	-	3.0	-	F-0-0-0-0	F-F-0-0-0	Raised	Open
Phase I - Appraisal																				
Alert 1	1.0"	1.0"	18.0'	12.0'	2.0	2,000	6.6	3,100	3.7	10,000	23.5	10,000	13.4	8,000	5.6	8,000	Refer to plates A-1, A-3, A-4, A-5 and paragraph A-16		Lowered	Open
Alert 2	1.5"	2.0"	19.0'	14.0'	3.0	4,000	8.0	4,550	4.2	12,000	24.0	12,000	15.4	11,000	6.5	11,000			Lowered	Close if res. stage is 10' higher than Chapin Brook
Phase II - Regulation	2.0"	3.0"	20.0'	16.0'	5.0	7,000	11.3	9,000	7.3	25,000	26.8	25,000	18.0	15,000	7.3	15,000			Lowered	
Phase III - Emptying	Storm abated		Refer to paragraphs A-31, A-32		Refer to paragraph A-9												Refer to paragraphs A-9, A-11, A-15, A-16		Raised if res. stage drops to 20'	Open if res. stage falls below Chapin Brook stage
Channel Capacity	-	-	-	-	5.0	7,000	11.3	9,000	7.3	25,000	26.8	25,000	18.0	15,000	7.3	15,000	Refer to paragraph A-11			

EMERGENCY OPERATING PROCEDURE (EOP)
(To be followed when contact cannot be made with RRS)

1. Set flood gates at 0-1'-0-0-0 for any of the following conditions:

   a. Storm rainfall of 2 inches or more
   b. High pool 19' or higher
   c. Low pool 16' or higher
   d. Shetucket River telemark 8' or higher
   e. Greenville dam 24' or higher

2. At dike B:

   a. Lower backwater gate when reservoir stage reaches 18'
   b. Close sluice gate when reservoir stage is 10' higher than Chapin Brook pool or whenever it is suspected that the backwater gate is allowing water to flow upstream through the dike B conduit.

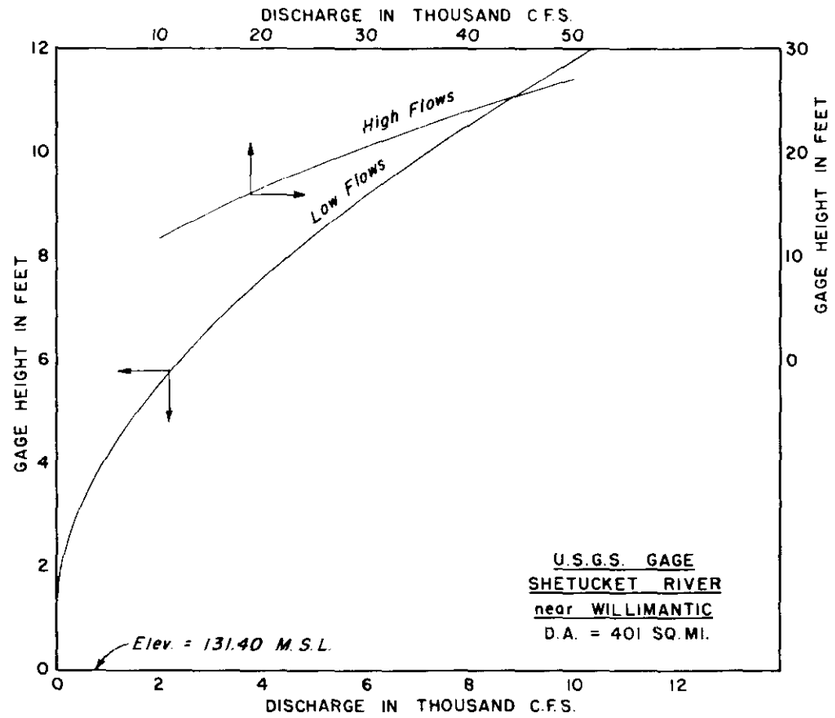
3. Until contact has been re-established with RRS, no increase in outflow or emptying reservoir storage should be initiated.

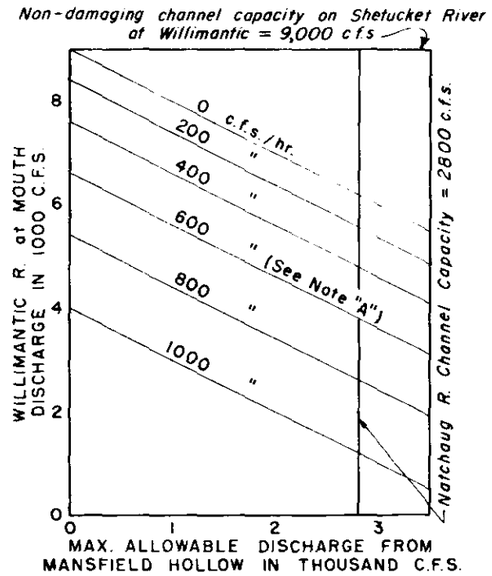
THAMES RIVER FLOOD CONTROL

MANSFIELD HOLLOW RESERVOIR

RESERVOIR REGULATION
STANDARD OPERATING PROCEDURE (SOP)
EMERGENCY OPERATING PROCEDURE (EOP)

New England Division, Waltham, Mass.
June 1967

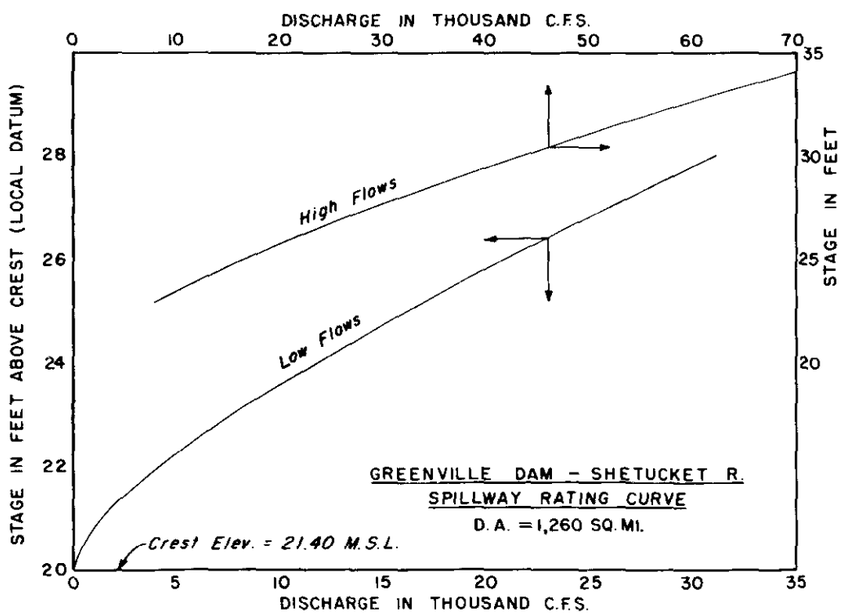


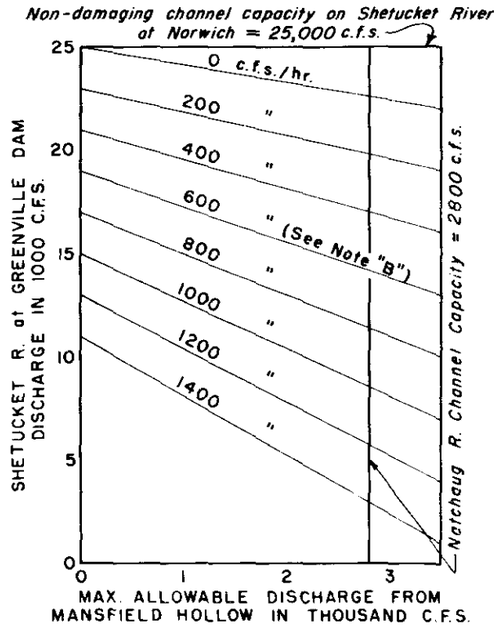


NOTES:

A. *Rate of increase in discharge in c.f.s. per hour on the Willimantic River at the mouth.*

B. *Rate of increase in discharge in c.f.s. per hour on the Shetucket River at Greenville Dam, Norwich.*





Example:

1. *Shetucket R. gage near Willimantic reads 10.5. From Rating Curve, Q = 8,000 c.f.s. Natchaug R. discharge at mouth = 3,500 c.f.s., therefore Willimantic R. is contributing 4,500 c.f.s. If discharge from Willimantic R. is increasing at 600 c.f.s. per hour, allowable discharge from Mansfield Hollow is 2,100 c.f.s.*

2. *Discharge at Greenville Dam is 12,000 c.f.s., and increasing at 1,000 c.f.s. per hour. Allowable discharge from Mansfield Hollow is 1,300 c.f.s.*

3. *Prescribed discharge from Mansfield Hollow Dam will be the smaller of the above allowable discharges which is 1,300 c.f.s.*

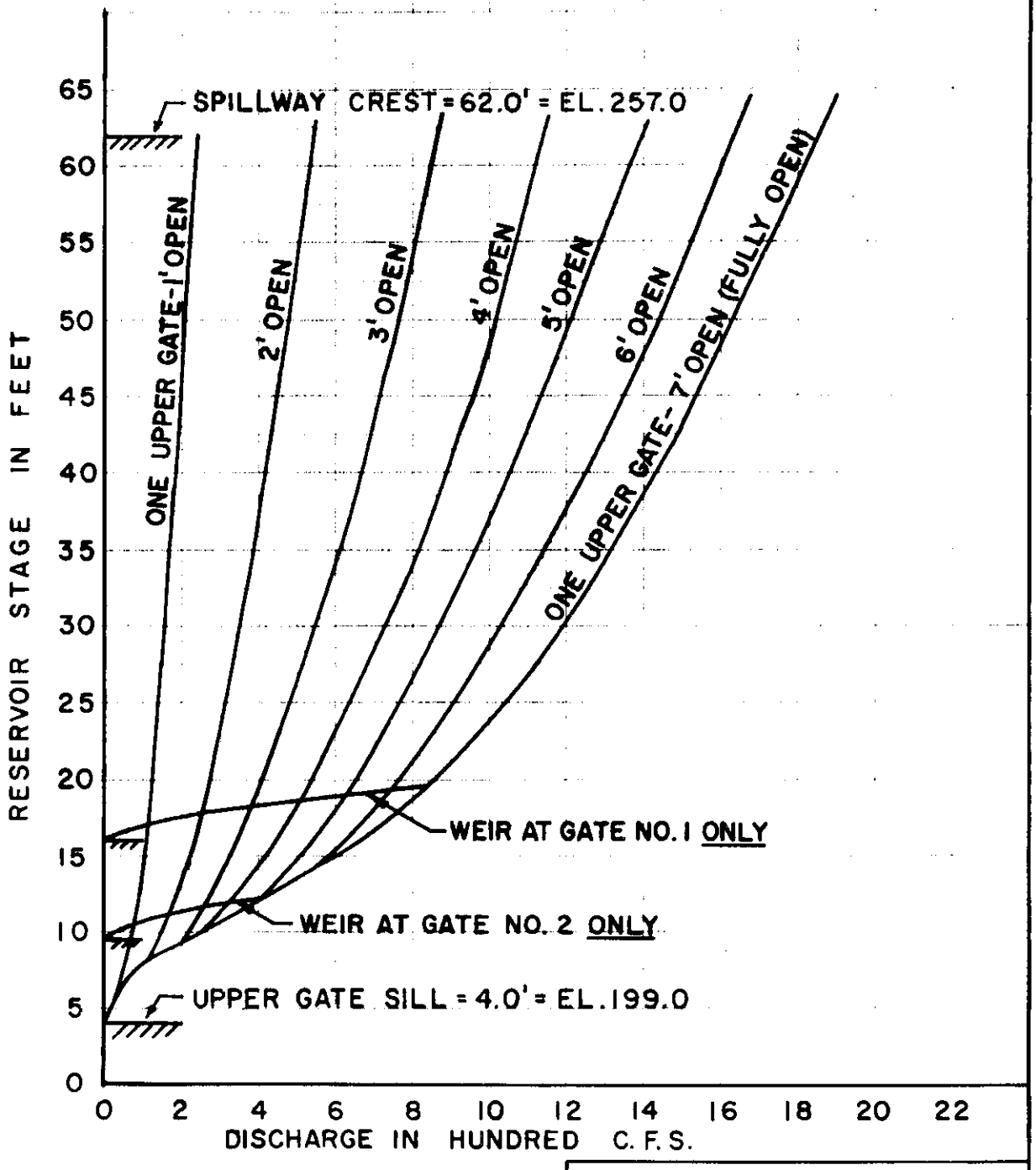
THAMES RIVER FLOOD CONTROL
GUIDE CURVES
FOR REGULATION OF
MANSFIELD HOLLOW RESERVOIR

JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

Rev. May 1966

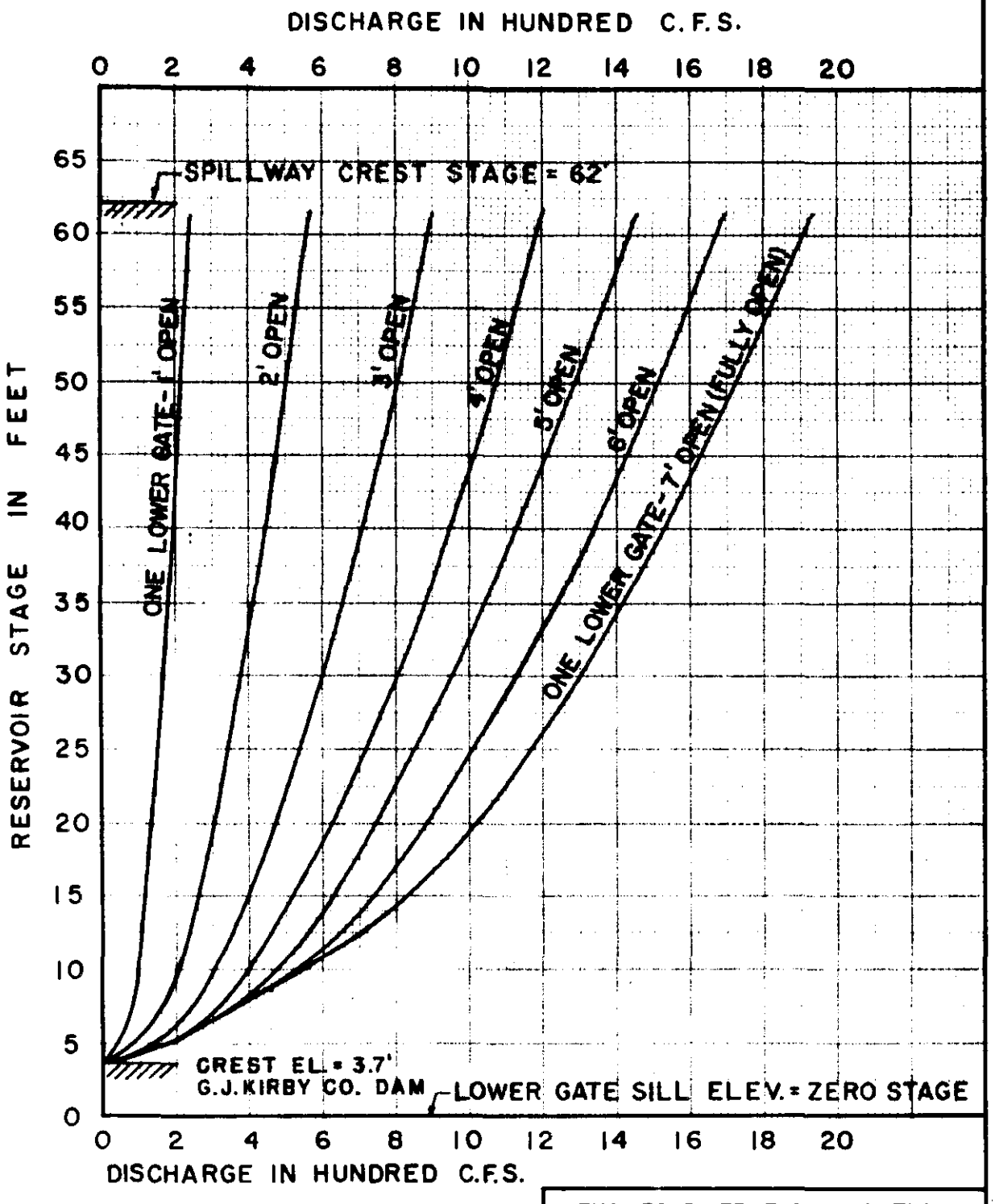
PLATE NO. A-3



NOTE:

Use this plate for gates Nos. 1, 2 and 5
For gates Nos. 3 and 4, see Plate A-5

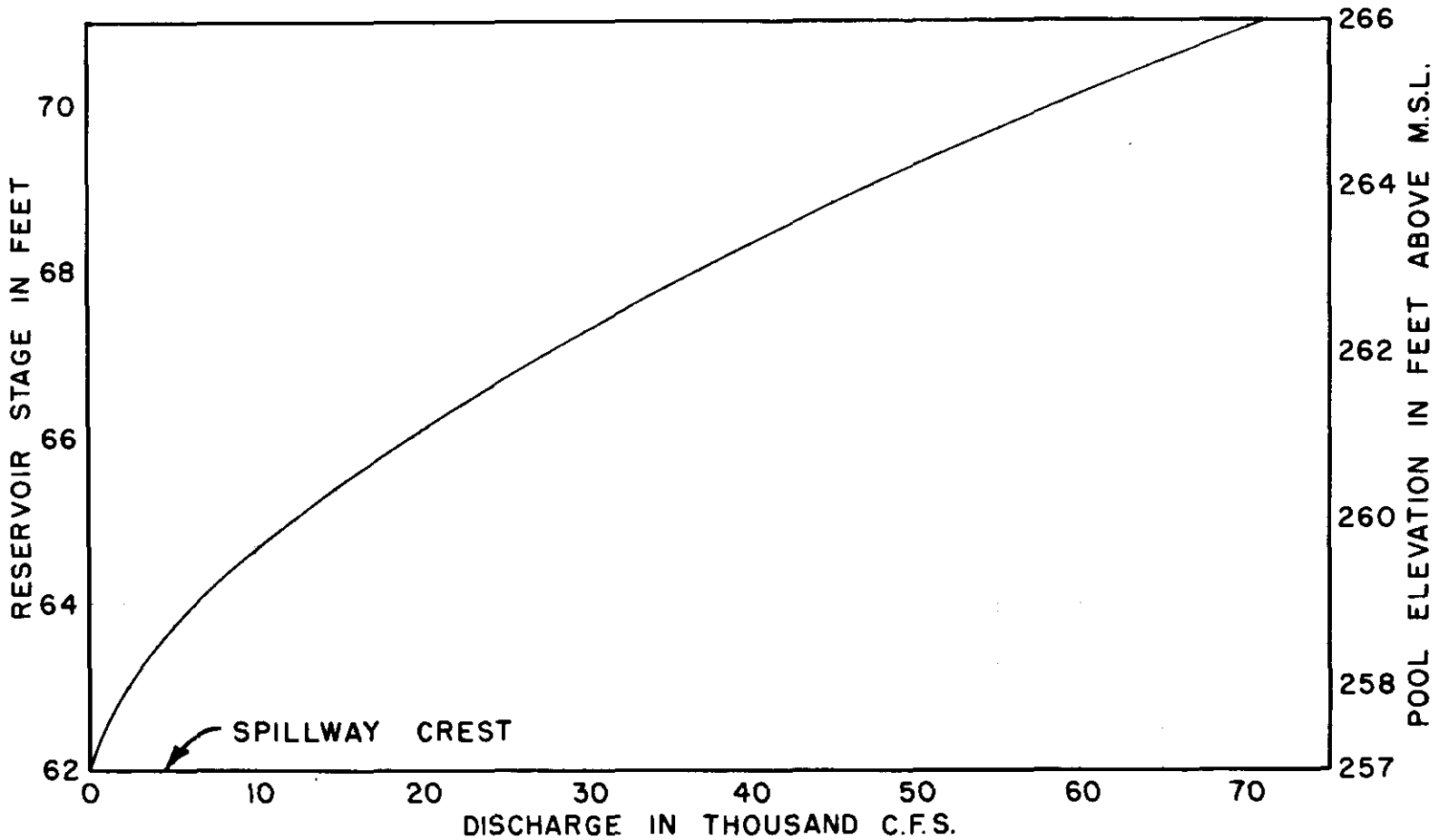
THAMES RIVER FLOOD CONTROL
MANSFIELD HOLLOW RESERVOIR
OUTLET RATING CURVES FOR UPPER GATES
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS



NOTE:
Use this plate for gates Nos. 3 and 4.
For gates Nos. 1, 2 and 5 see Plate A-4

THAMES RIVER FLOOD CONTROL
MANSFIELD HOLLOW RESERVOIR
OUTLET RATING CURVES FOR LOWER GATES
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. A-5



THAMES RIVER FLOOD CONTROL

MANSFIELD HOLLOW RES.

NATCHAUG RIVER

SPILLWAY RATING CURVE

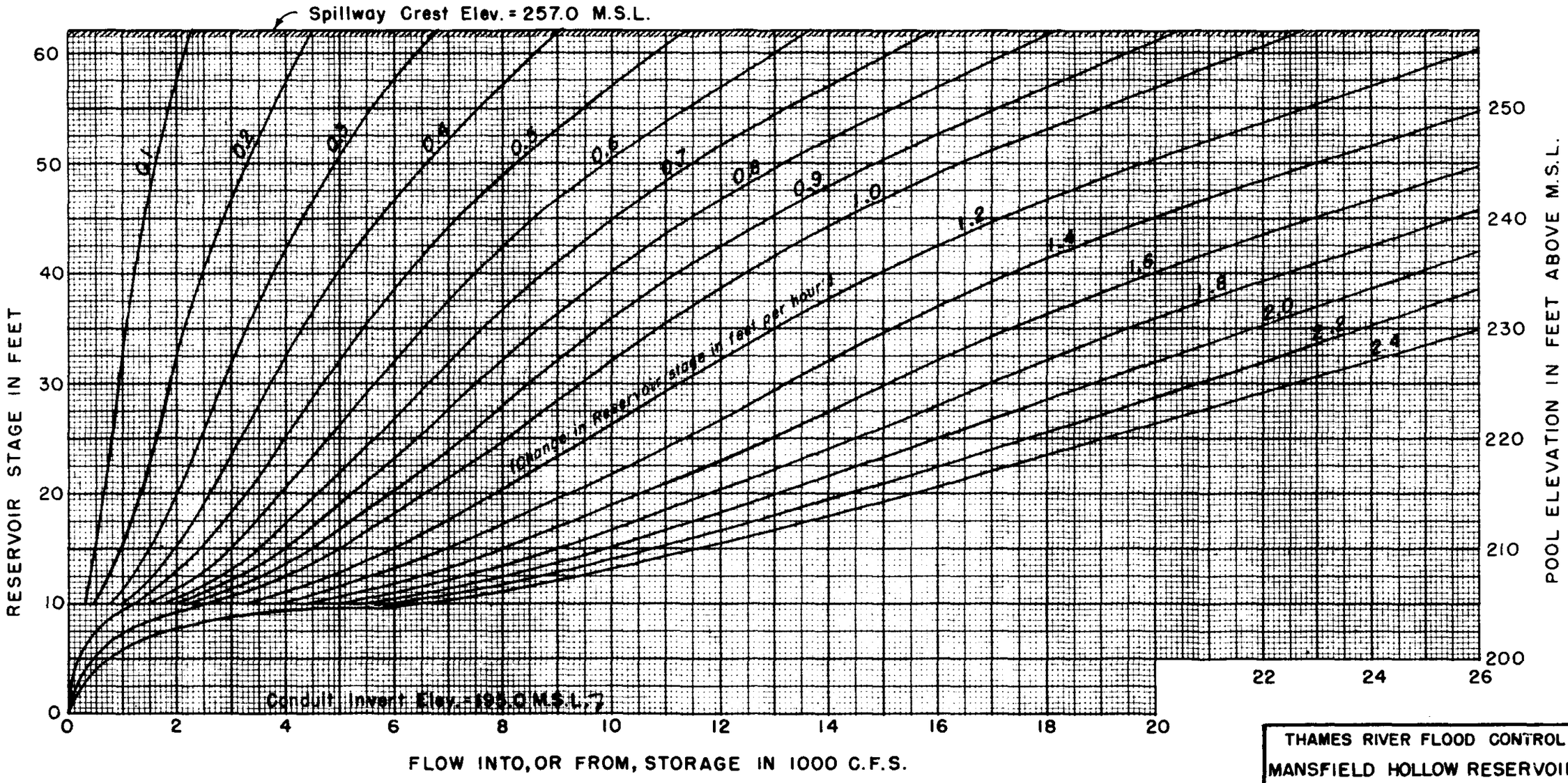
JUNE 1967

DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS.

PLATE NO. A-6

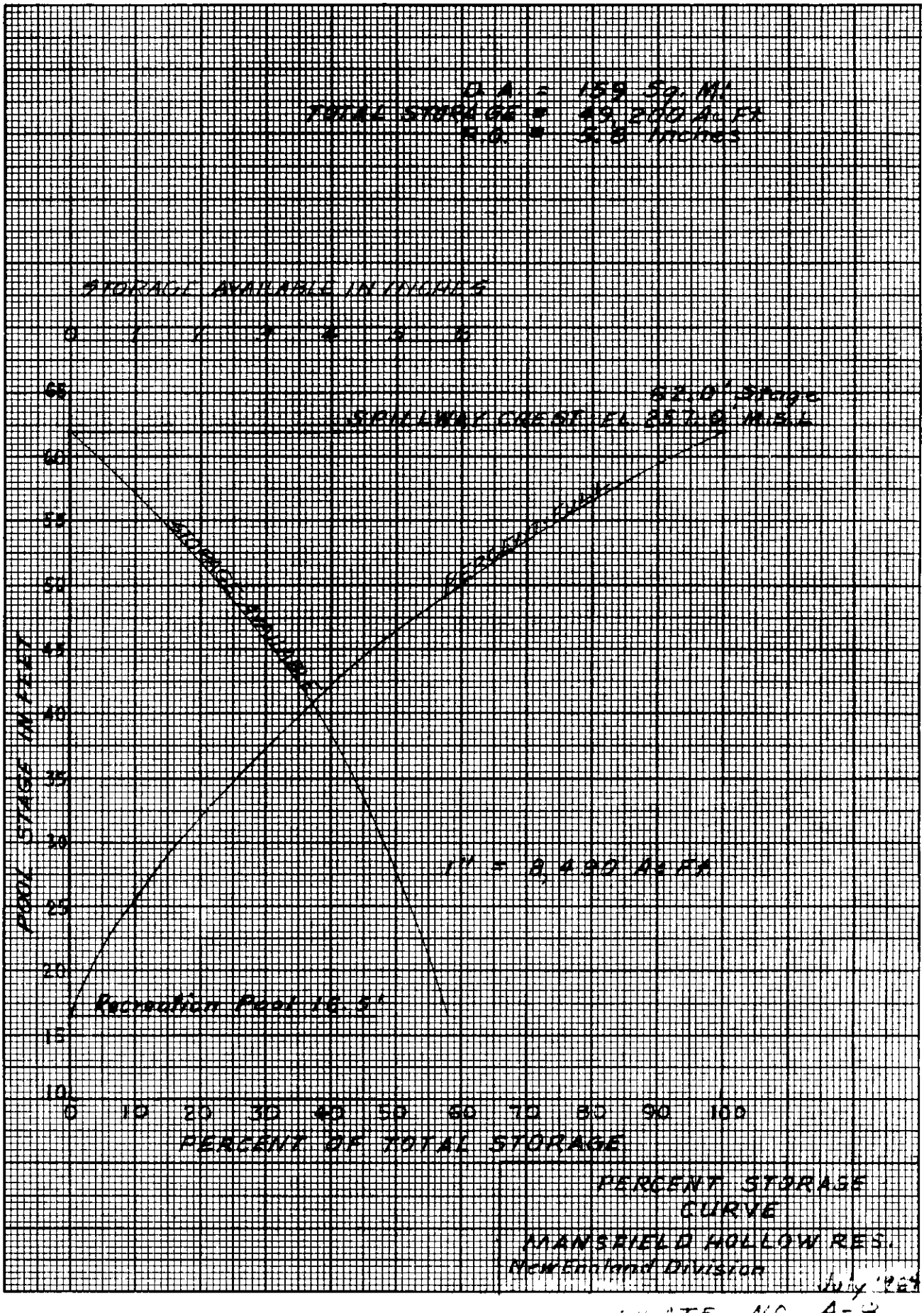


NOTES:

1. Total reservoir inflow equals the regulated outflow, plus (for rising stage) or minus (for falling stage) the flow into, or from, storage in c.f.s.

THAMES RIVER FLOOD CONTROL
MANSFIELD HOLLOW RESERVOIR
CURVES FOR DETERMINATION OF RESERVOIR INFLOWS
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. A-7



PERCENT STORAGE CURVE

MANSFIELD HOLLOW RES.

New England Division

July 1964

PLATE NO. A-4

MANSFIELD HOLLOW RESERVOIR
AREA AND CAPACITY
DRAINAGE AREA: 159 SQ. MI.

Elev. (msl)	Stage (ft.)	Area (acres)	Capacity (ac.ft.)	Capacity (inches)
Recreation Storage				
195	0	0	0	0
196	1	0	0	0
197	2	5	0	0
198	3	8	0	0
199	4	18	0	0
200	5	25	20	0
201	6	70	55	0.01
202	7	100	135	0.02
203	8	130	250	0.03
204	9	165	400	0.05
205	10	200	580	0.07
206	11	240	800	0.09
207	12	280	1,060	0.12
208	13	325	1,365	0.16
209	14	370	1,715	0.20
210	15	415	2,120	0.25
211	16	440	2,545	0.30
211.5	16.5	450	2,800	0.33
Flood Control Storage				
211.5	16.5	450	0	0
212	17	465	200	0.02
213	18	490	680	0.08
214	19	515	1,180	0.14
215	20	540	1,710	0.20
216	21	565	2,200	0.26
217	22	595	2,840	0.33
218	23	620	3,450	0.41
219	24	650	4,080	0.48
220	25	675	4,750	0.56
221	26	690	5,430	0.64
222	27	710	6,130	0.72
223	28	740	6,850	0.81
224	29	760	7,600	0.90
225	30	785	8,400	0.99
Flood Control Storage (cont.)				
226	31	810	9,200	1.10
227	32	835	10,000	1.18
228	33	855	10,800	1.27
229	34	880	11,700	1.38
230	35	900	12,600	1.49
231	36	925	13,500	1.59
232	37	955	14,450	1.70
233	38	980	15,400	1.82
234	39	1,015	16,400	1.93
235	40	1,040	17,450	2.05
236	41	1,070	18,500	2.18
237	42	1,095	19,600	2.31
238	43	1,125	20,700	2.44
239	44	1,160	21,800	2.57
240	45	1,190	23,000	2.71
241	46	1,225	24,200	2.85
242	47	1,260	25,450	3.00
243	48	1,295	26,700	3.15
244	49	1,330	28,000	3.30
245	50	1,360	29,400	3.47
246	51	1,400	30,800	3.63
247	52	1,450	32,200	3.80
248	53	1,490	33,700	3.97
249	54	1,530	35,200	4.15
250	55	1,580	36,700	4.33
251	56	1,625	38,300	4.52
252	57	1,670	40,000	4.71
253	58	1,710	41,600	4.91
254	59	1,750	43,400	5.12
255	60	1,790	45,400	5.35
256	61	1,840	47,200	5.57
257*	62	1,880	49,200	5.80
258	63	1,920	51,000	6.01
259	64	1,960	52,900	6.24
260	65	2,010	55,000	6.49

* Spillway Crest Elevation = 257 msl

PLATE NO. A-9

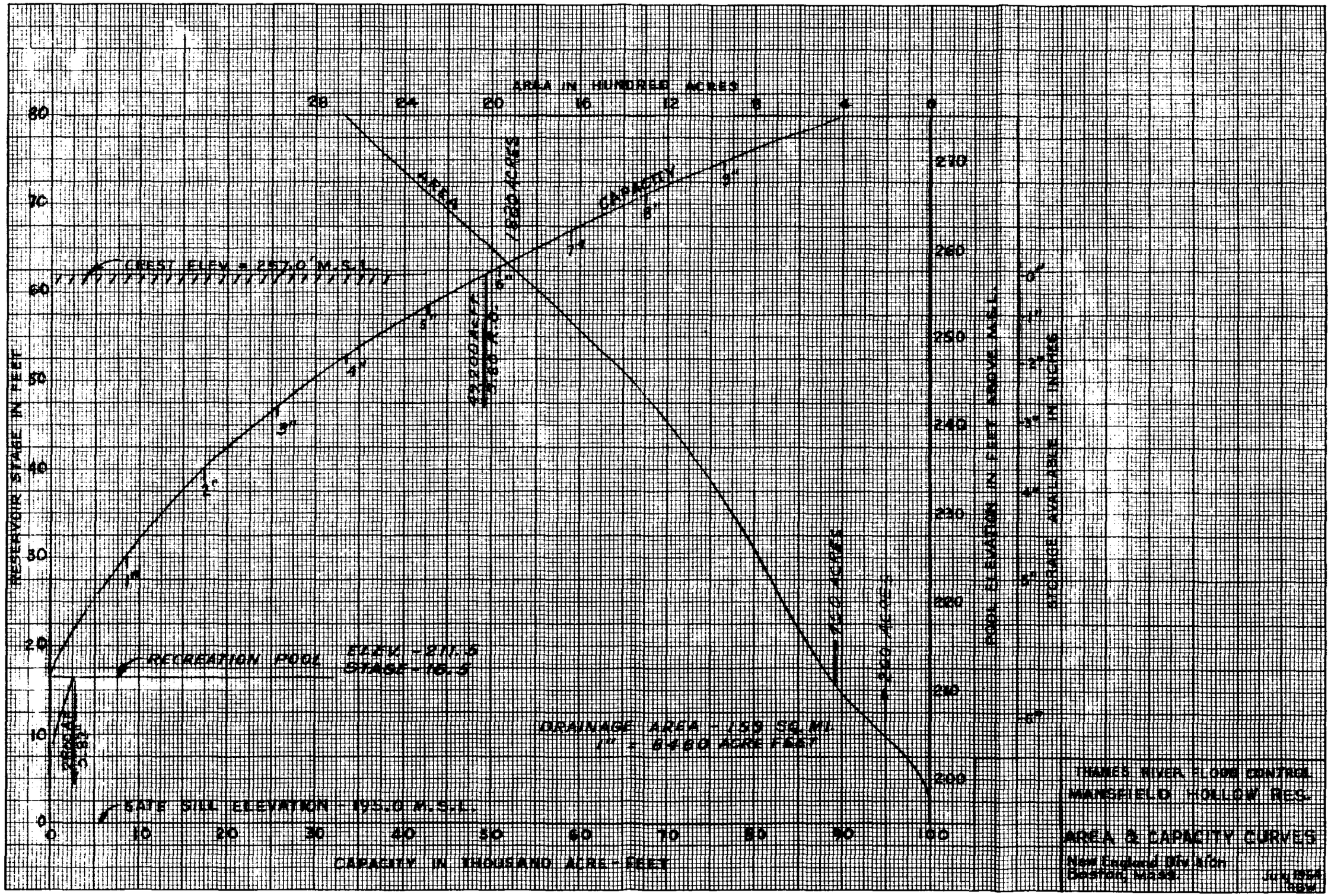

AREA IN HUNDRED ACRES
28
24
20
16
12
8
4
0
AREA
CAPACITY
CREST ELEV. = 257.0' M.S.L.
RECREATION POOL
ELEV. - 211.5
STAGE - 16.5
DRAINAGE AREA - 159 SQ. MI.
1" = 8480 ACRE FEET
SATE SILL ELEVATION - 195.0 M.S.L.
RESERVOIR STAGE IN FEET
POOL ELEVATION IN FEET ABOVE M.S.L.
STORAGE AVAILABLE IN INCHES
CAPACITY IN THOUSAND ACRE-FEET
THAMES RIVER FLOOD CONTROL
MANSFIELD HOLLOW RES.
AREA & CAPACITY CURVES
New England Division
Boston, Mass.

PLATE NO A-10

MANSFIELD HOLLOW RESERVOIR

CRITICAL ELEVATIONS OF ROADS AND PROPERTY WITHIN RESERVOIR AREA

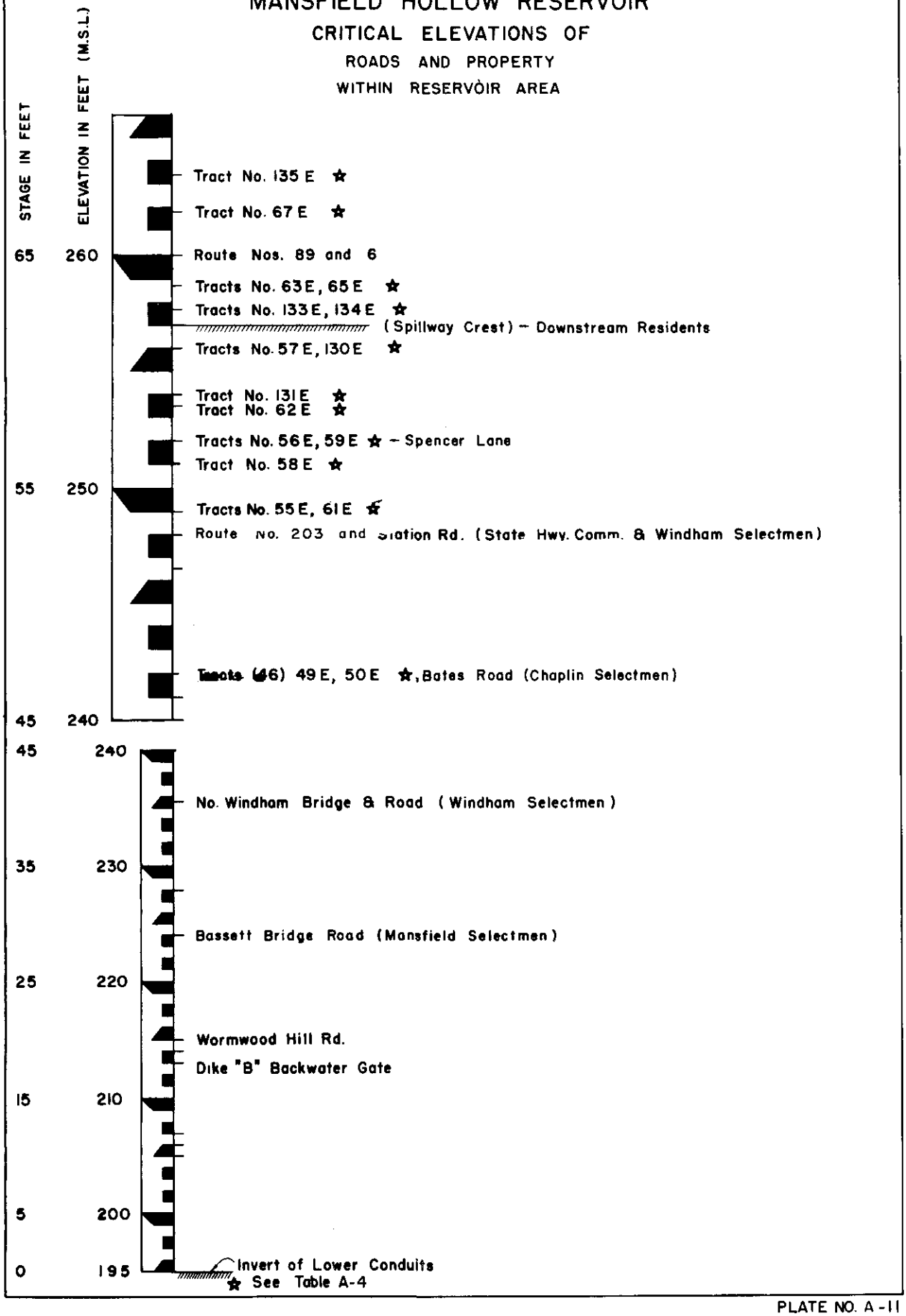


PLATE NO. A-11

BUFFUMVILLE AND HODGES VILLAGE RESERVOIRS
STANDARD OPERATING PROCEDURE (SOP)
FOR RESERVOIR REGULATION

Condition	Storm Precipitation Antecedent Conditions		Pool Stage		Downstream Index Point French River at Webster		Flood Gate Openings	
	Wet	Dry	Buffumville	Hodges Village	Feet	CFS	Buffumville	Hodges Village
Normal Conditions	-	-	11.0'	2.0'	4.5	-	0-F-0	3'-3'
Phase I - Appraisal								
Alert 1	1.0"	1.0"	12.0'	4.0'	6.0	440	Refer to plates A-1, A-13, A-14, A-20 and paragraph A-16	
Alert 2	1.5"	2.0"	13.0'	5.0'	6.5	600		
Phase II - Regulation	2.0"	3.0"	14.0'	6.0'	7.5	1000		
Phase III - Emptying	Storm abated		Check reservoir roads and easement areas		Refer to paragraph A-9		Refer to paragraphs A-9, A-12, A-13, A-15, A-16	
Channel Capacity	-	-	-	-	7.5	1000	Refer to paragraph A-12	500 cfs

EMERGENCY OPERATING PROCEDURE (EOP)
(To be followed when contact cannot be made with RRS)

1. Communication intact between FCDO's:

   The Buffumville FCDO is responsible for closure of gates at both dams, Buffumville to 0-0.1'-0 and Hodges Village to 0-0.1', for any of the following conditions:

   a. Storm rainfall of 2 inches or more
   b. Buffumville pool stage 13' or higher
   c. Hodges Village pool stage 5' or higher
   d. Stage at Webster 6.5' or higher

2. Contact lost between FCDO's:

   Each FCDO is responsible for closure of gates at their respective dams, Buffumville to 0-0.1'-0 and Hodges Village to 0-0.1' for any of the conditions in 1 above.

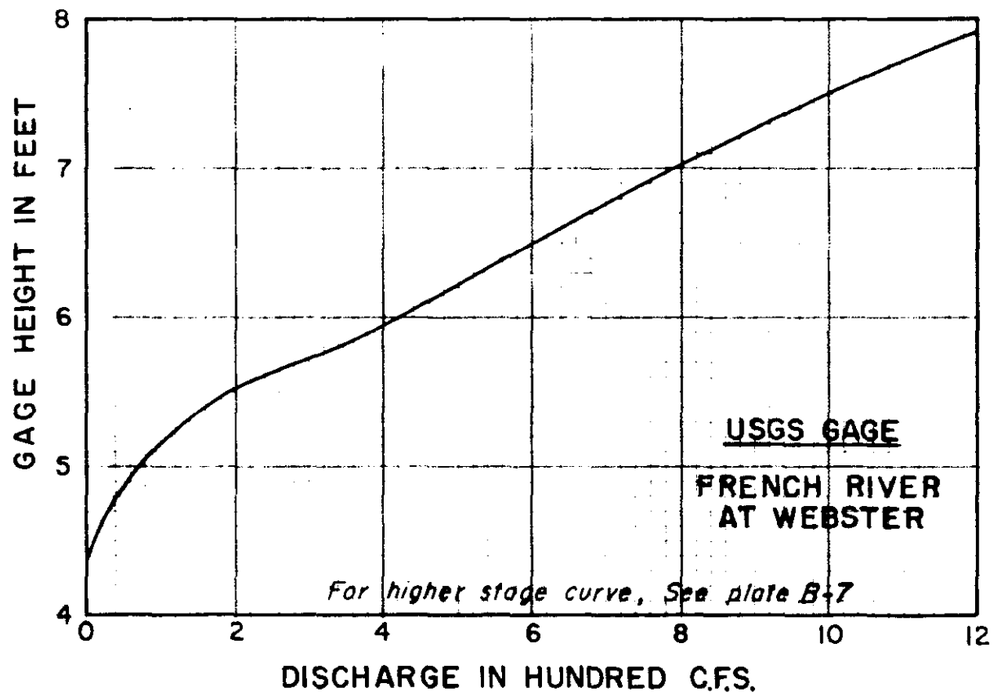
3. Until contact has been re-established with RRS, no increase in outflow or emptying reservoir storage should be initiated at either dam.

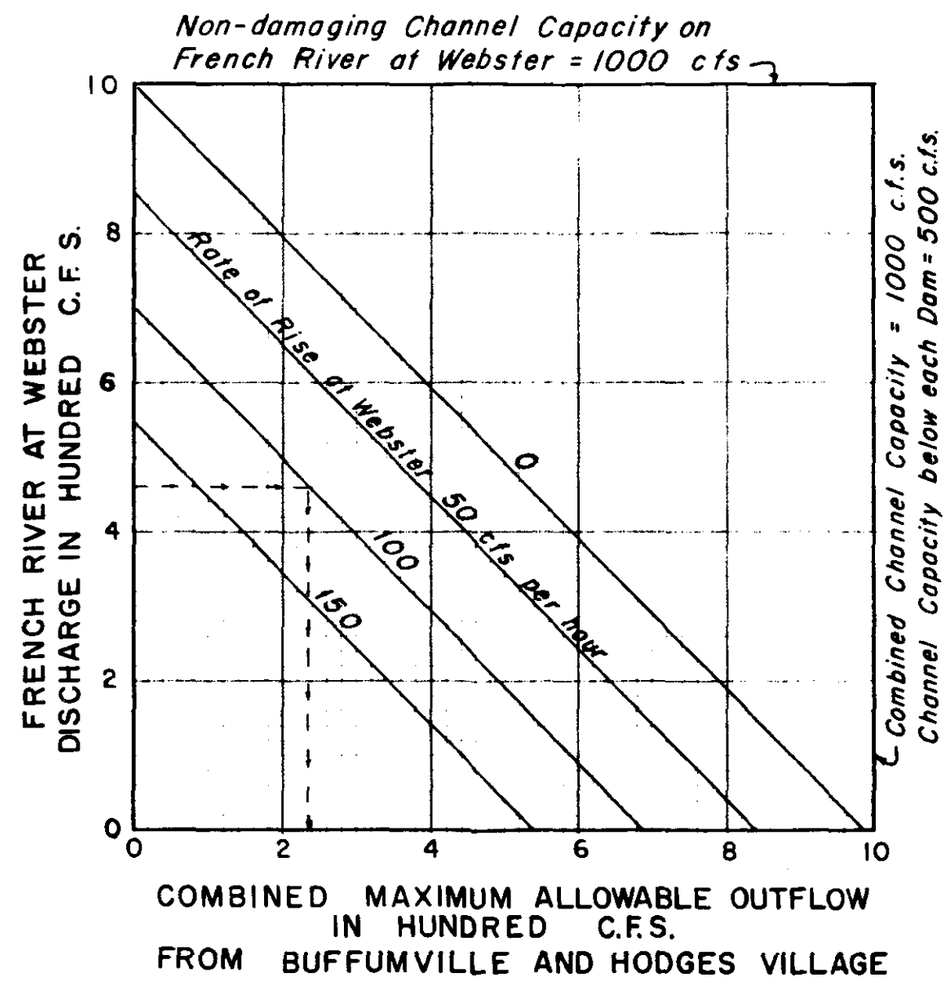
THAMES RIVER FLOOD CONTROL

BUFFUMVILLE RESERVOIR
HODGES VILLAGE RESERVOIR

RESERVOIR REGULATION
STANDARD OPERATING PROCEDURE (SOP)
EMERGENCY OPERATING PROCEDURE (EOP)

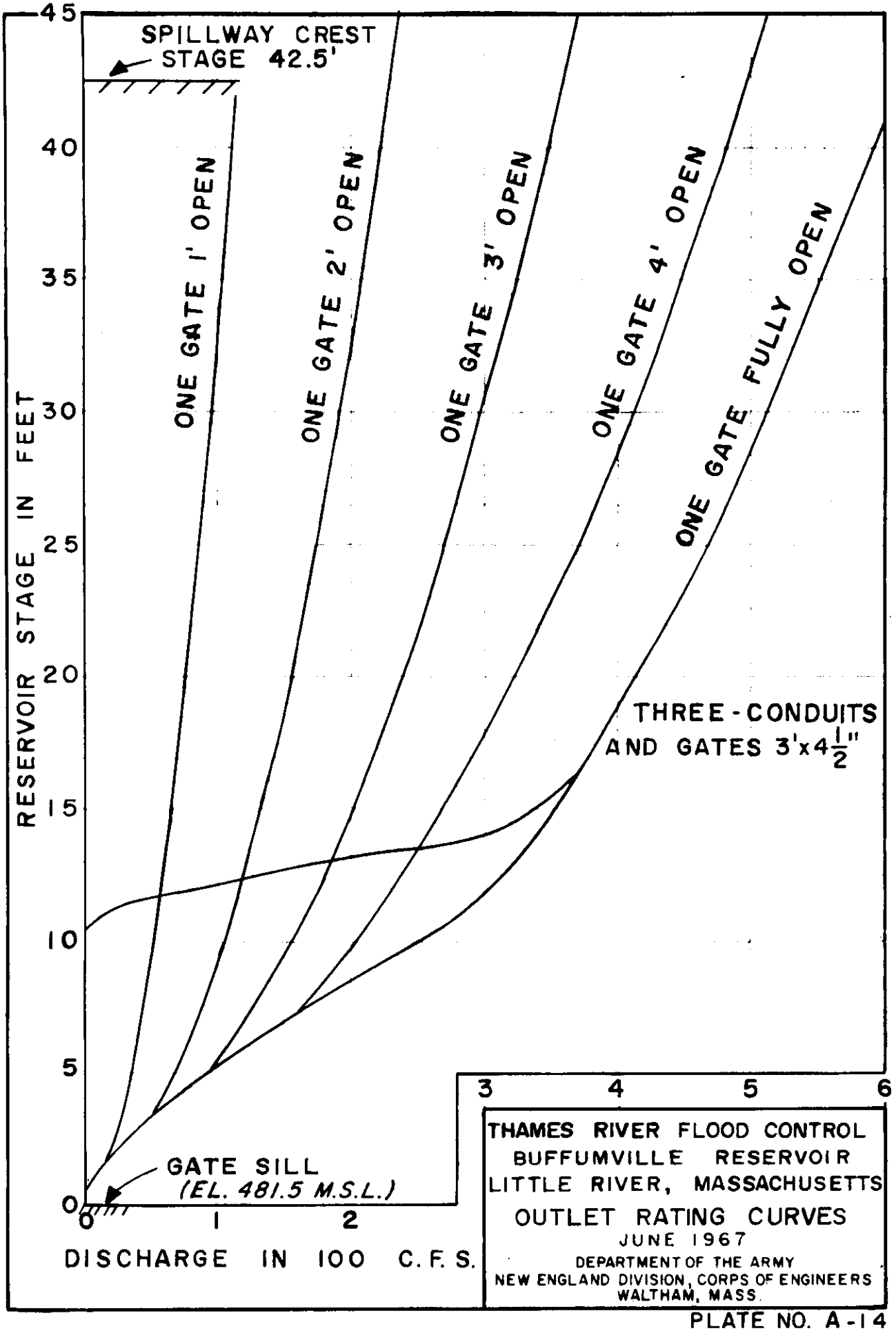
New England Division, Waltham, Mass.
June 1967





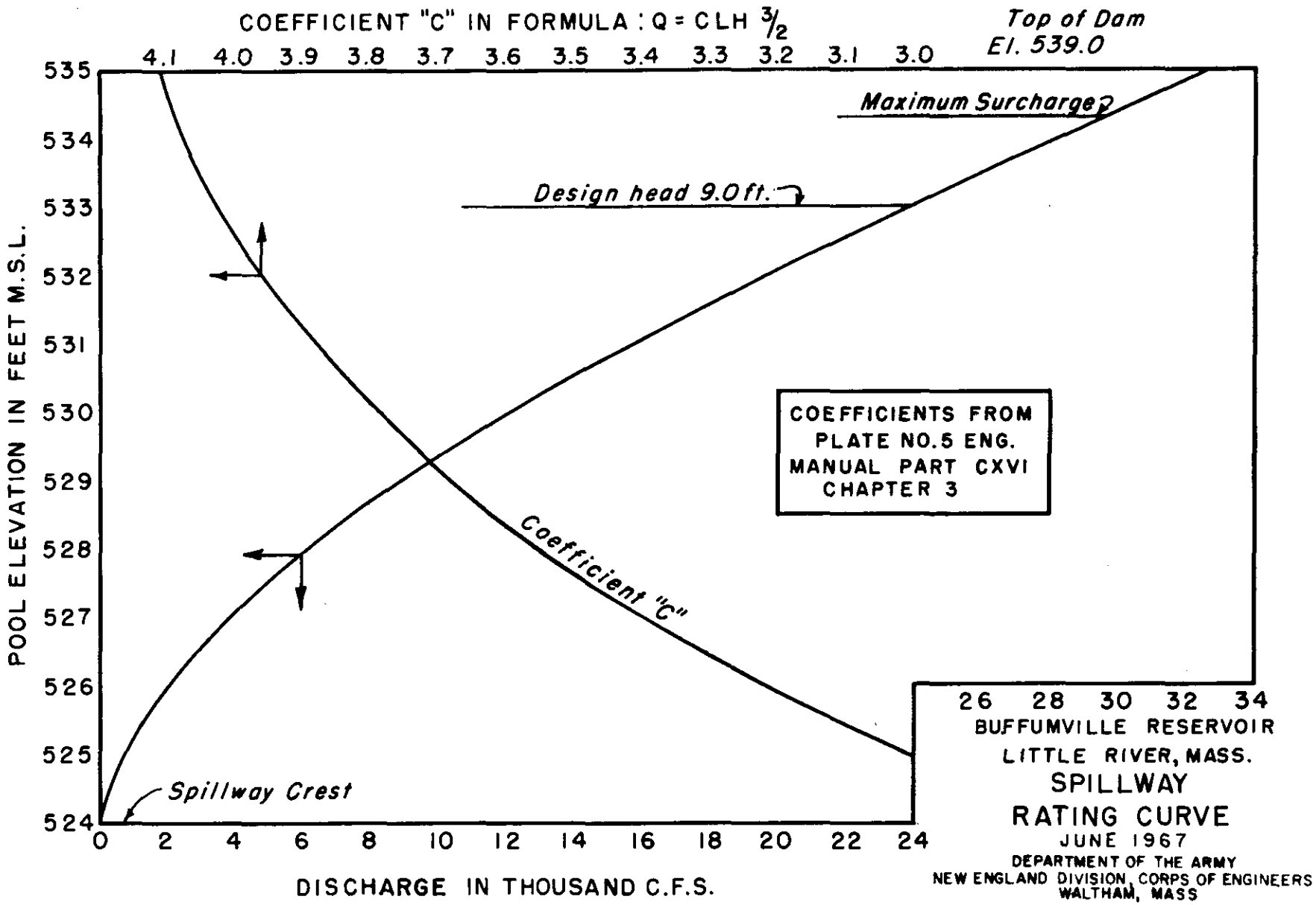
NOTE *Distribution of the combined maximum Allowable Outflow determined by these guide curves between each reservoir should be based on available storage at each reservoir. See (paragraph)*

THAMES RIVER FLOOD CONTROL
GUIDE CURVES
FOR REGULATION OF
BUFFUMVILLE AND
HODGES VILLAGE RESERVOIR
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS



THAMES RIVER FLOOD CONTROL
BUFFUMVILLE RESERVOIR
LITTLE RIVER, MASSACHUSETTS
OUTLET RATING CURVES
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. A-14



BUFFUMVILLE RESERVOIR
LITTLE RIVER, MASS.
SPILLWAY
RATING CURVE
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

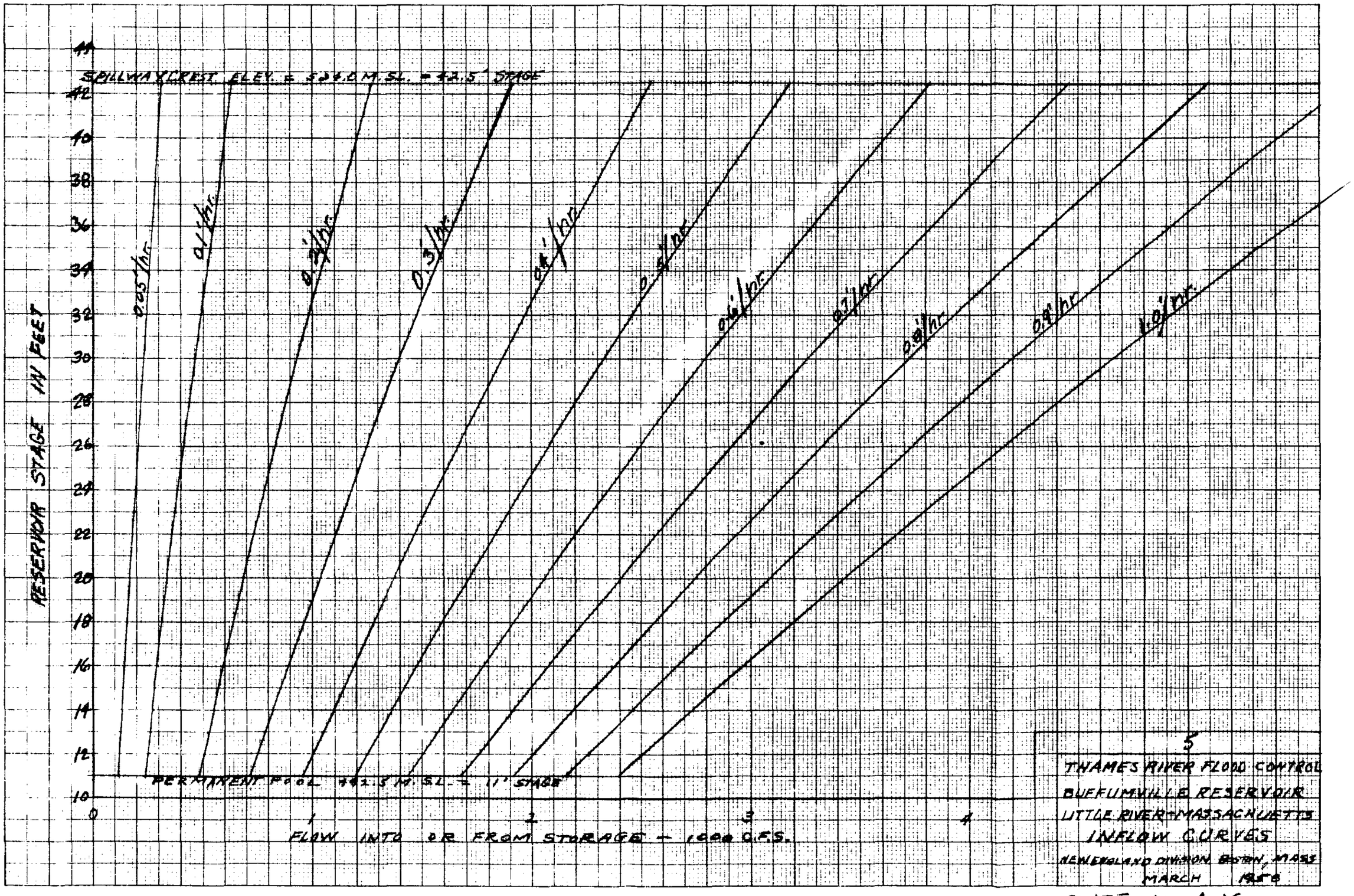

SPILLWAY CREST ELEV. = 534.0 M.S.L. = 42.5' STAGE
RESERVOIR STAGE IN FEET
44
42
40
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
0
0.05'/hr.
0.1'/hr.
0.2'/hr.
0.3'/hr.
0.4'/hr.
0.5'/hr.
0.6'/hr.
0.7'/hr.
0.8'/hr.
0.9'/hr.
1.0'/hr.
PERMANENT POOL 492.5 M.S.L. = 11' STAGE
1
2
3
4
5
FLOW INTO OR FROM STORAGE - 1000 C.F.S.
THAMES RIVER FLOOD CONTROL
BUFFUMVILLE RESERVOIR
LITTLE RIVER-MASSACHUSETTS
INFLOW CURVES
NEW ENGLAND DIVISION BOSTON, MASS.
MARCH 1958

PLATE NO. A-16

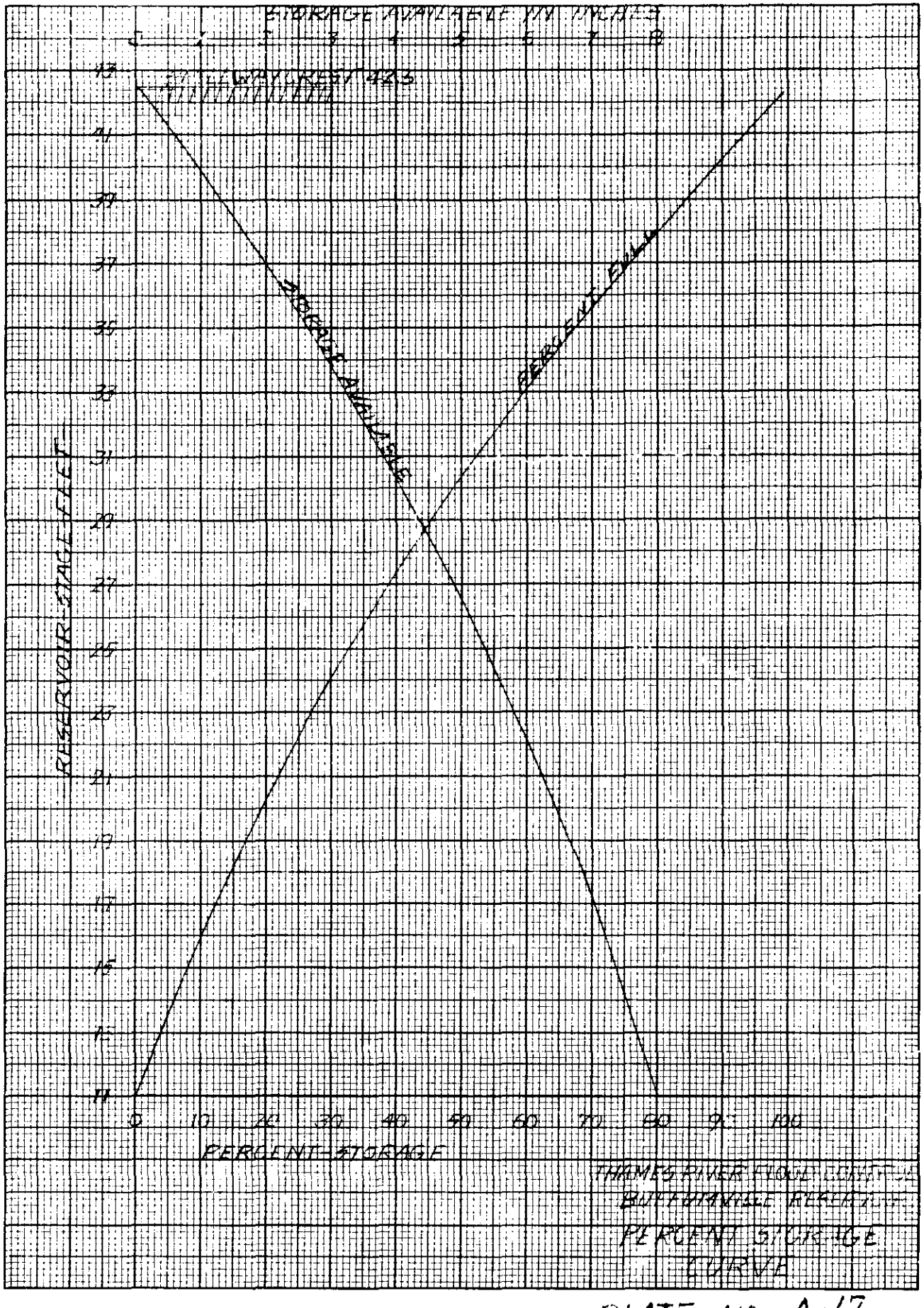

STORAGE AVAILABLE IN INCHES
0 1 2 3 4 5 6 7 8
SPILLWAY CREST 423
STORAGE AVAILABLE
PERCENT FULL
RESERVOIR STAGE FEET
43 41 39 37 35 33 31 29 27 25 23 21 19 17 15 13 11
0 10 20 30 40 50 60 70 80 90 100
PERCENT STORAGE
THAMES RIVER FLOOD CONTROL
BUFFUMVILLE RESERVOIR
PERCENT STORAGE
CURVE

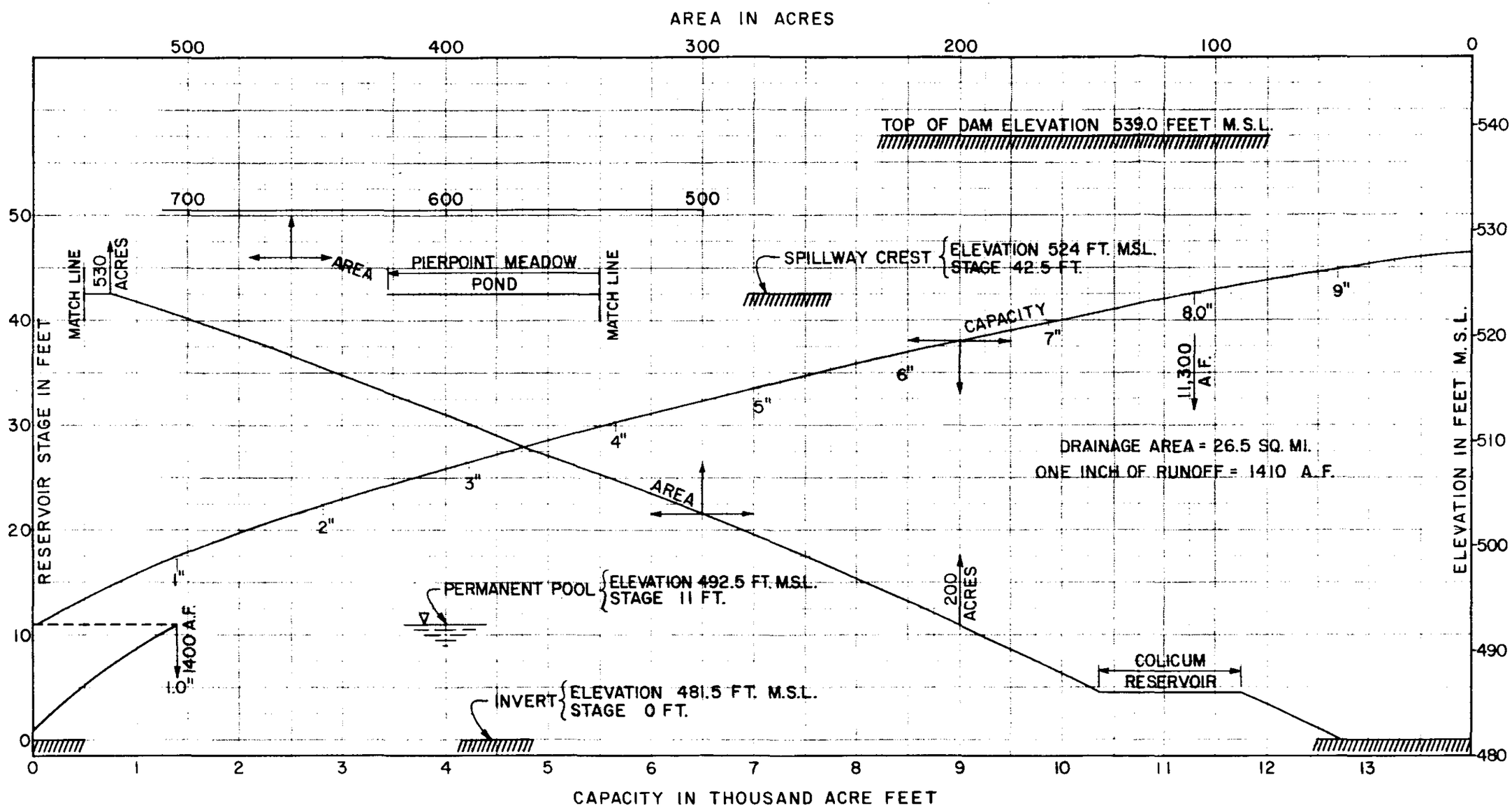
PLATE NO. A-17

BUFFUMVILLE RESERVOIR
AREA AND CAPACITY
DRAINAGE AREA = 26.5 SQ. MI.

ELEV. M.S.L.	STAGE FEET	AREA ACRES	CAPACITY AC.FT.	CAPACITY INCHES
	Permanent Storage			
481.5	0	51	0	
482.5	1	60	55	
483.5	2	68	120	
484.5	3	76	190	
485/5	4	85	210	
486.5	5	150	390	
487.5	6	158	540	
488.5	7	167	700	
489.5	8	176	880	
490.5	9	184	1060	
491.5	10	192	1240	
492.5	11	200	1440	1.02
	Flood Control Storage			
492.5	11	200	0	0
493.5	12	209	300	.14
494.5	13	218	420	.30
495.5	14	228	640	.45
496.5	15	237	870	.62
497.5	16	246	1110	.79
498.5	17	256	1360	.96
499.5	18	266	1620	1.15
500.5	19	276	1900	1.35
501.5	20	286	2180	1.54
502.5	21	296	2470	1.75
503.5	22	306	2770	1.96
504.5	23	316	3080	2.18
505.5	24	326	3400	2.41
506.5	25	336	3730	2.64
507.5	26	346	4070	2.88
508.5	27	356	4420	3.13
509.5	28	367	4780	3.38
510.5	29	377	5160	3.65
511.5	30	388	5540	3.92
512.5	31	399	5930	4.20
513.5	32	410	6340	4.49
514.5	33	422	6750	4.78
515.5	34	433	7180	5.08
516.5	35	444	7620	5.39
517.5	36	456	8060	5.71
518.5	37	468	8530	6.04
519.5	38	479	9000	6.37
520.5	39	490	9480	6.71
521.5	40	501	9980	7.07
522.5	41	513	10500	7.45
523.5	42	524	11000	7.80
524.0	42.5	530	11300	8.00
524.5	43	626	11600	8.25
525.5	44	637	12200	8.65
526.5	45	648	12850	9.11
527.5	46	660	13500	9.57
528.5	47	671	14200	10.07
529.5	48	682	14850	10.53
530.5	49	694	13500	10.99
531.5	50	706	16200	11.49

Note: Gate Sill = 481.5' M.S.L.
Spillway Crest = 524.0 Feet, M.S.L.

PLATE NO A-18



THAMES RIVER FLOOD CONTROL

BUFFUMVILLE RESERVOIR

LITTLE RIVER, MASSACHUSETTS

AREA & CAPACITY CURVES

JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. A-19

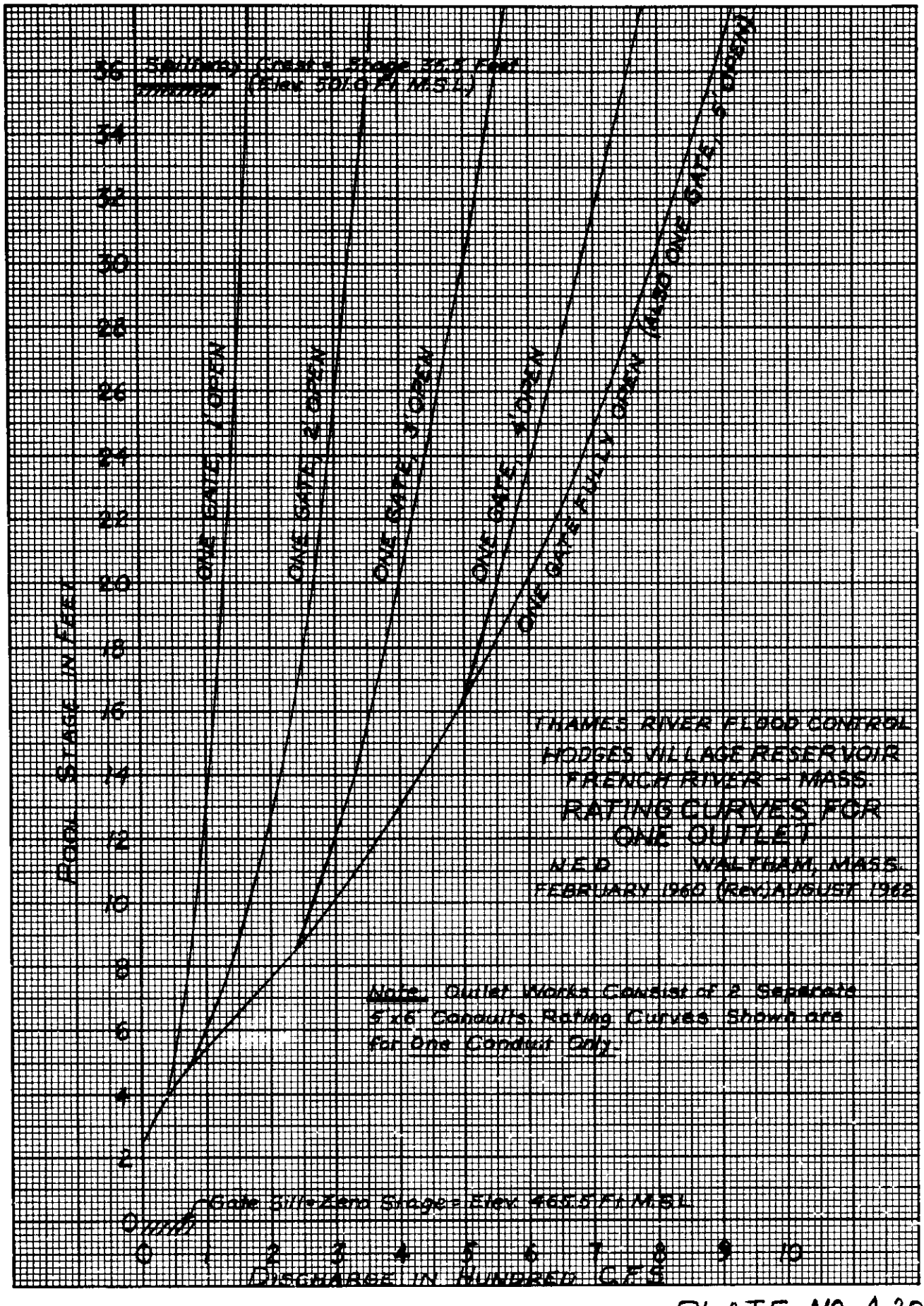

Spillway Crest = Stage 32.5 Feet
(Elev. 501.0 Ft. M.S.L.)
ONE GATE 1' OPEN
ONE GATE 2' OPEN
ONE GATE 3' OPEN
ONE GATE 4' OPEN
ONE GATE 5' OPEN
ONE GATE FULLY OPEN (ALSO ONE GATE 6' OPEN)
STAGE IN FEET
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0 mm
Gate Sill = Zero Stage = Elev. 465.5 Ft. M.S.L.
0
1
2
3
4
5
6
7
8
9
10
DISCHARGE IN HUNDRED C.F.S.
THAMES RIVER FLOOD CONTROL
HODGES VILLAGE RESERVOIR
FRENCH RIVER - MASS.
RATING CURVES FOR
ONE OUTLET
N.E.D. WALTHAM, MASS.
FEBRUARY 1960 (REV) AUGUST 1962
Note: Outlet Works Consist of 2 Separate
5'x6' Conduits. Rating Curves Shown are
for One Conduit Only.

PLATE NO A-20

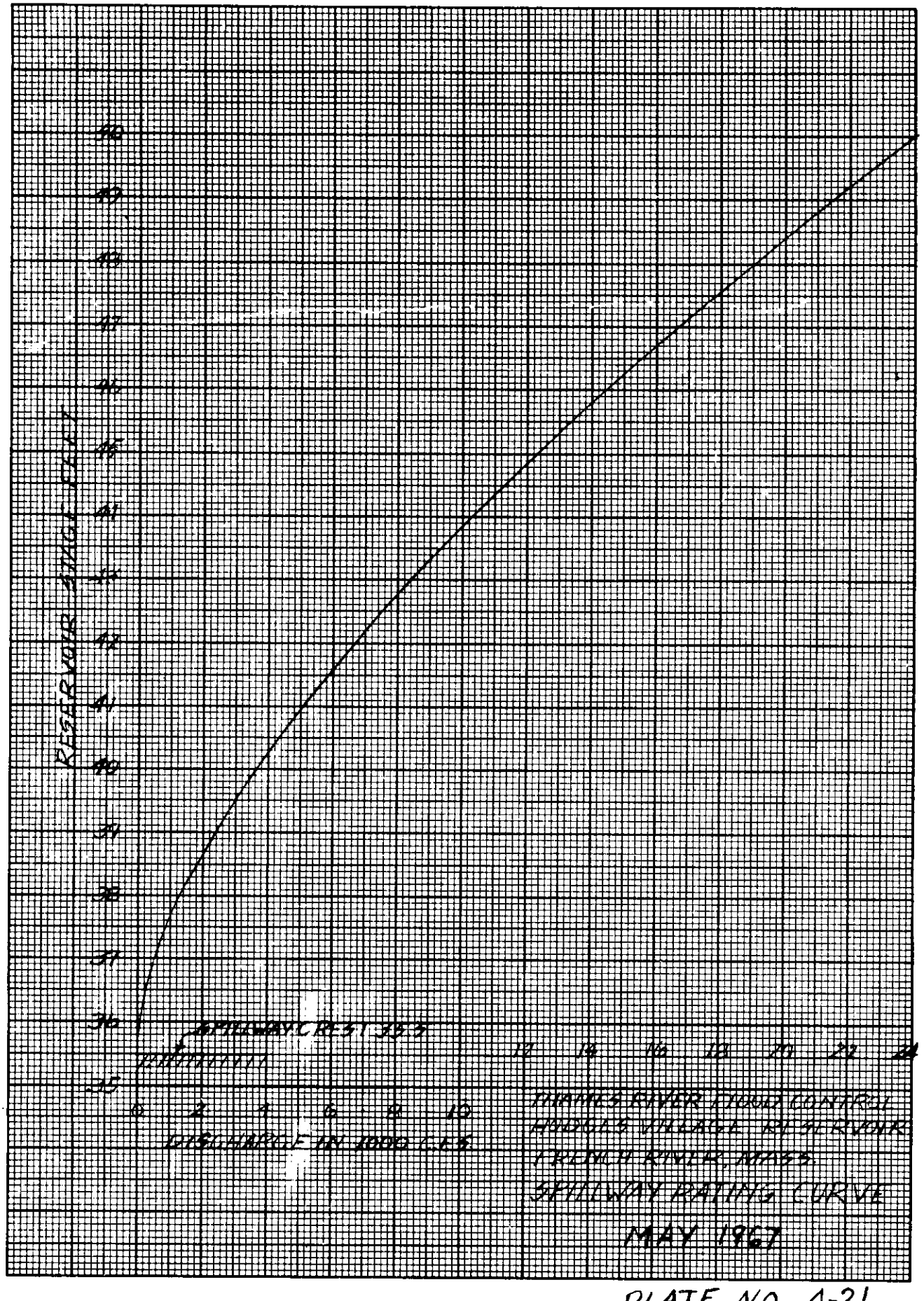

RESERVOIR STAGE FEET
SPILLWAY CREST 35.5
DISCHARGE IN 1000 C.F.S.
THAMES RIVER FLOOD CONTROL
HODGES VILLAGE RESERVOIR
FRENCH RIVER, MASS.
SPILLWAY RATING CURVE
MAY 1967

PLATE NO. A-21

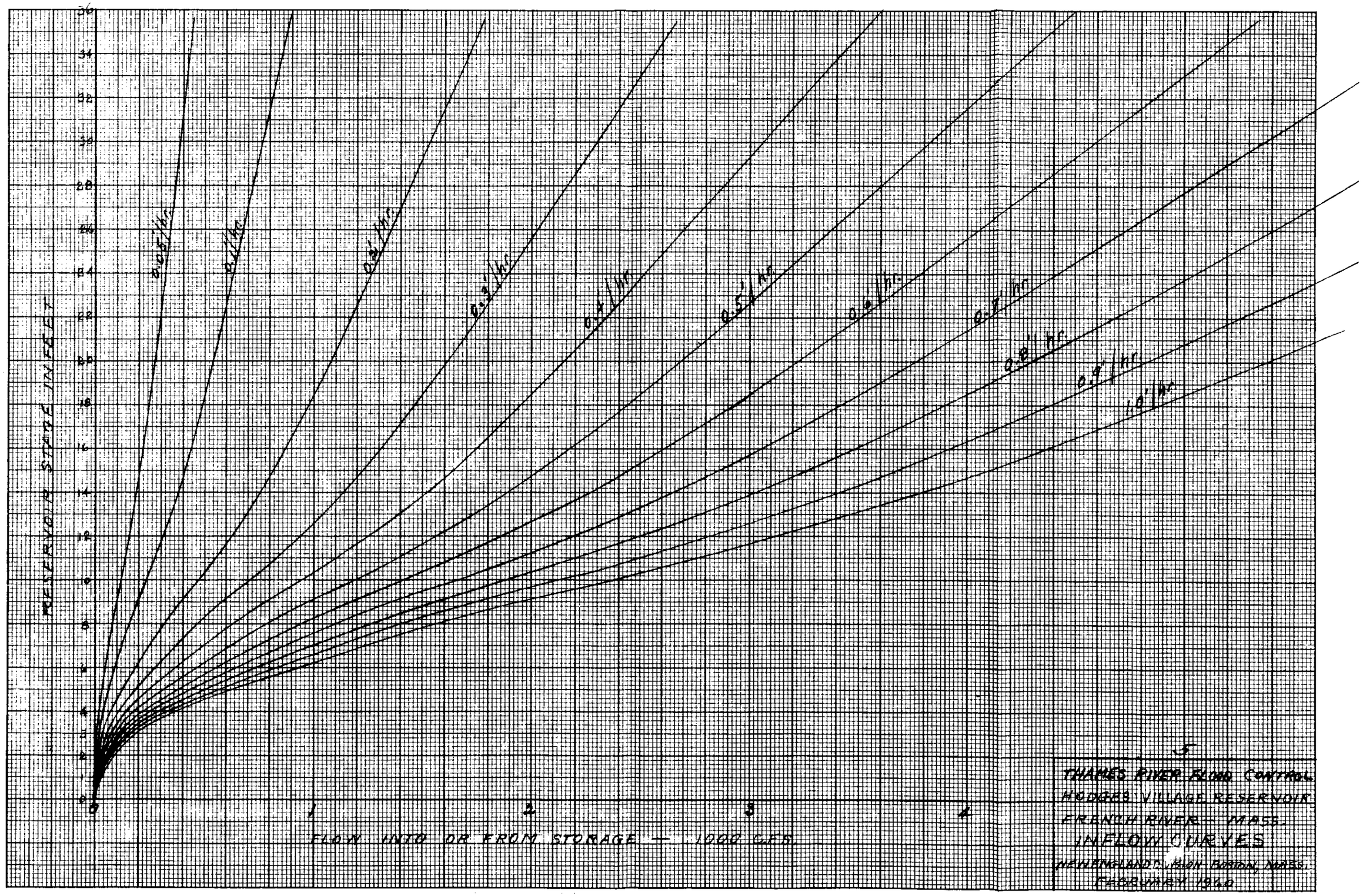

RESERVOIR STAGE IN FEET
FLOW INTO OR FROM STORAGE — 1000 C.F.S.
0.05"/hr
0.1"/hr
0.2"/hr
0.3"/hr
0.4"/hr
0.5"/hr
0.6"/hr
0.7"/hr
0.8"/hr
0.9"/hr
1.0"/hr
THAMES RIVER FLOOD CONTROL
HODGES VILLAGE RESERVOIR
FRENCH RIVER — MASS.
INFLOW CURVES
NEW ENGLAND D. & O. BOSTON, MASS.
FEBRUARY 1960

PLATE NO. A-22

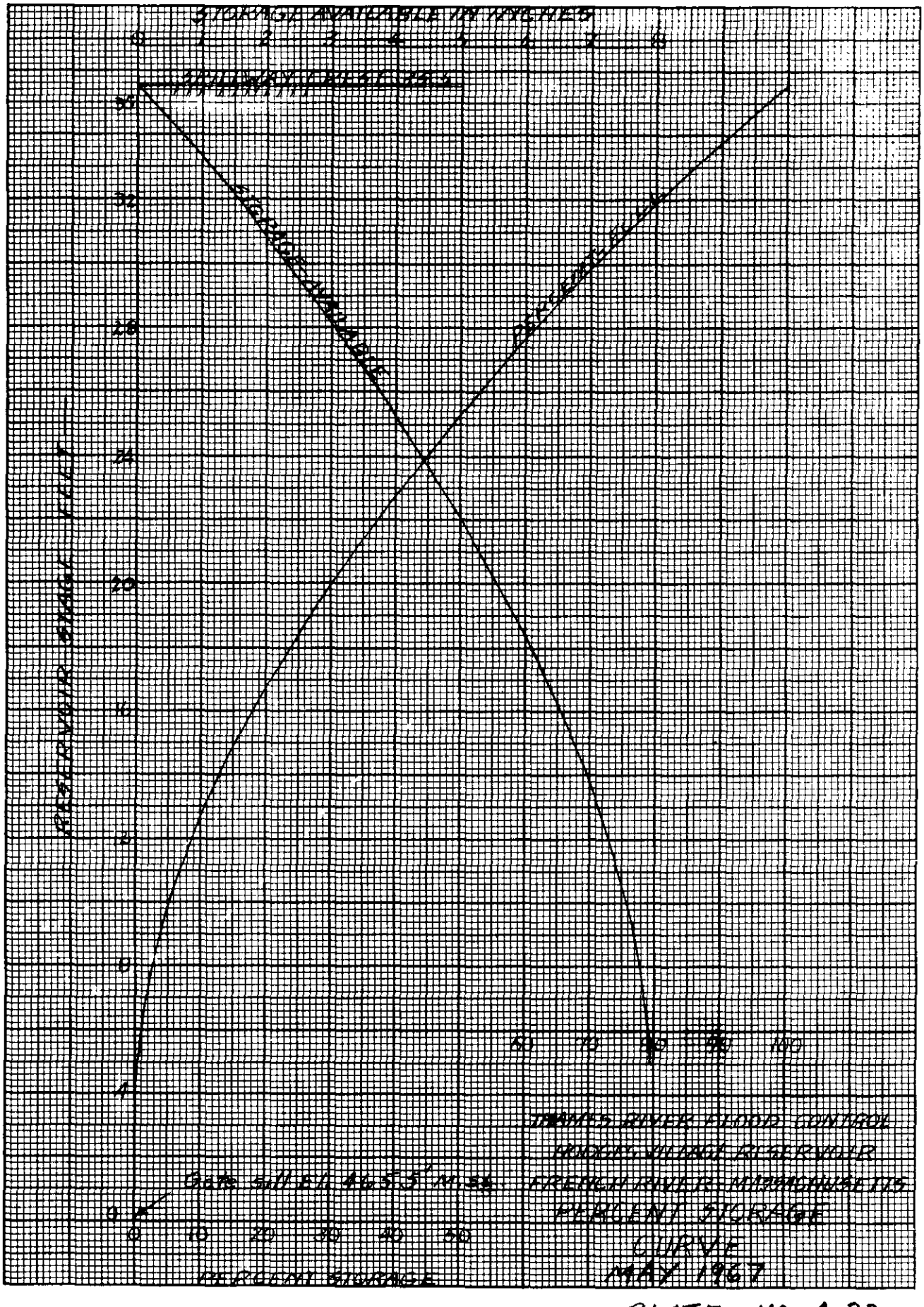

STORAGE AVAILABLE IN INCHES
0 1 2 3 4 5 6 7 8
SPILLWAY CREST 35.5
STORAGE AVAILABLE
PERCENT FULL
RESERVOIR STAGE FEET
35
32
28
24
20
16
12
8
4
0
0 10 20 30 40 50
60 70 80 90 100
Gate sill El. 465.5' M.S.L.
PERCENT STORAGE
THAMES RIVER FLOOD CONTROL
HODGES VILLAGE RESERVOIR
FRENCH RIVER - MASSACHUSETTS
PERCENT STORAGE
CURVE
MAY 1967

PLATE NO. A-23

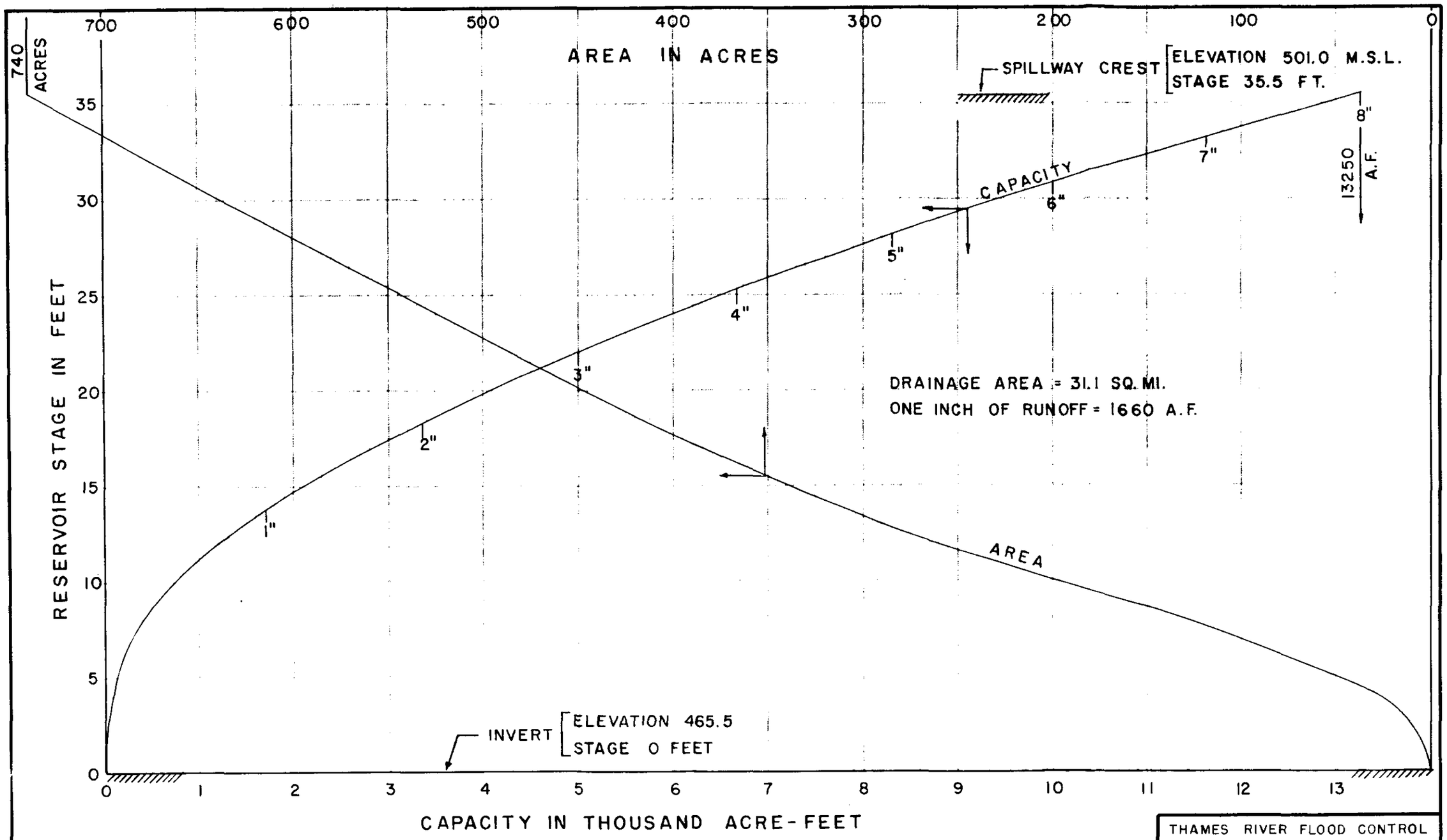
HODGES VILLAGE RESERVOIR
AREA AND CAPACITY
DRAINAGE AREA - 31.1 SQ. MI.

Stage (feet)	Area (acres)	Capacity Acre-Feet	Capacity Inches
0	0	0	
1	2	1	0
2	7	6	0
3	15	17	0.01
4	30	40	0.02
5	52	80	0.05
6	77	145	0.09
7	103	235	0.14
8	130	350	0.21
9	161	500	0.30
10	197	675	0.41
11	230	890	0.54
12	260	1,130	0.68
13	288	1,410	0.85
14	316	1,710	1.03
15	340	2,040	1.23
16	363	2,390	1.44
17	385	2,765	1.67
18	406	3,160	1.90
19	427	3,575	2.15
20	447	4,010	2.42
21	466	4,470	2.69
22	487	4,945	2.98
23	506	5,440	3.28
24	526	5,960	3.59
25	544	6,490	3.91
26	563	7,050	4.25
27	582	7,620	4.59
28	600	8,210	4.95
29	619	8,820	5.31
30	638	9,450	5.69
31	657	10,100	6.08
32	675	10,760	6.48
33	693	11,450	6.90
34	712	12,150	7.32
35	730	12,870	7.75
35.5	740	13,250	8.00

Gate Sill = 465.5 feet msl (zero stage)

Spillway Crest = 501.0 feet msl (35.5' stage)

PLATE NO. A-24



THAMES RIVER FLOOD CONTROL

HODGES VILLAGE RESERVOIR

FRENCH RIVER, MASS.

AREA & CAPACITY CURVES

JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. A-25

EAST BRIMFIELD AND WESTVILLE RESERVOIRS
STANDARD OPERATING PROCEDURE (SOP)
FOR RESERVOIR REGULATION

Condition	Storm Precipitation Antecedent Conditions Wet	Storm Precipitation Antecedent Conditions Dry	Pool Stage East Brimfield	Pool Stage Westville	Downstream Index Point Southbridge American Optical Co. Feet	Downstream Index Point Southbridge American Optical Co. CFS	Flood Gate Openings East Brimfield	Flood Gate Openings Westville
Normal Conditions	-	-	13'	10'	0.0	-	2'-2'	0-F-0
Phase I - Appraisal								
Alert 1	1.0"	1.0"	14'	12'	0.5	Refer to plate A-27	Refer to plates A-1, A-27, A-28, A-35 and paragraph A-16	
Alert 2	1.5"	2.0"	15'	15'	1.0	Refer to plate A-27		
Phase II - Regulation	2.0"	3.0"	16'	17'	Refer to plate A-27	1500		
Phase III - Emptying	Storm abated		Check reservoir roads and easement areas		Refer to paragraph A-9		Refer to paragraphs A-9, A-14, A-15, A-16	
Channel Capacity	-	-	-	-	Refer to plate A-27	1500	Refer to paragraph A-10	

EMERGENCY OPERATING PROCEDURE (EOP)
(To be followed when contact cannot be made with RRS)

1. Communication intact between FCDO's:

   The Westville FCDO is responsible for closure of gates at both dams, East Brimfield to 0-0.1' and Westville to 0-0.5'-0, for any of the following conditions:

   a. Storm rainfall of 2 inches or more
   b. East Brimfield pool stage 15' or higher
   c. Westville pool stage 15' or higher
   d. Stage at American Optical Co. dam 1.0' or higher

2. Contact lost between FCDO's:

   Each FCDO is responsible for closure of gates at their respective dams, East Brimfield to 0-0.1' and Westville to 0-0.5'-0 for any of the conditions in 1 above.

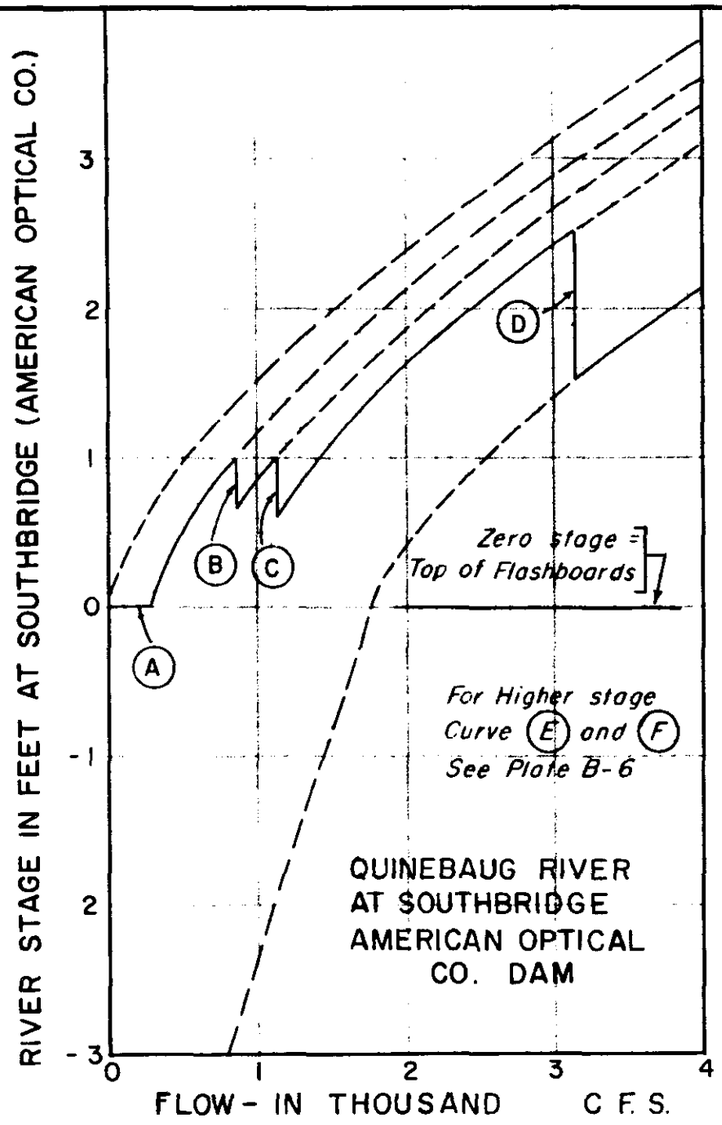
3. Until contact has been re-established with RRS, no increase in outflow or emptying reservoir storage should be initiated at either dam.

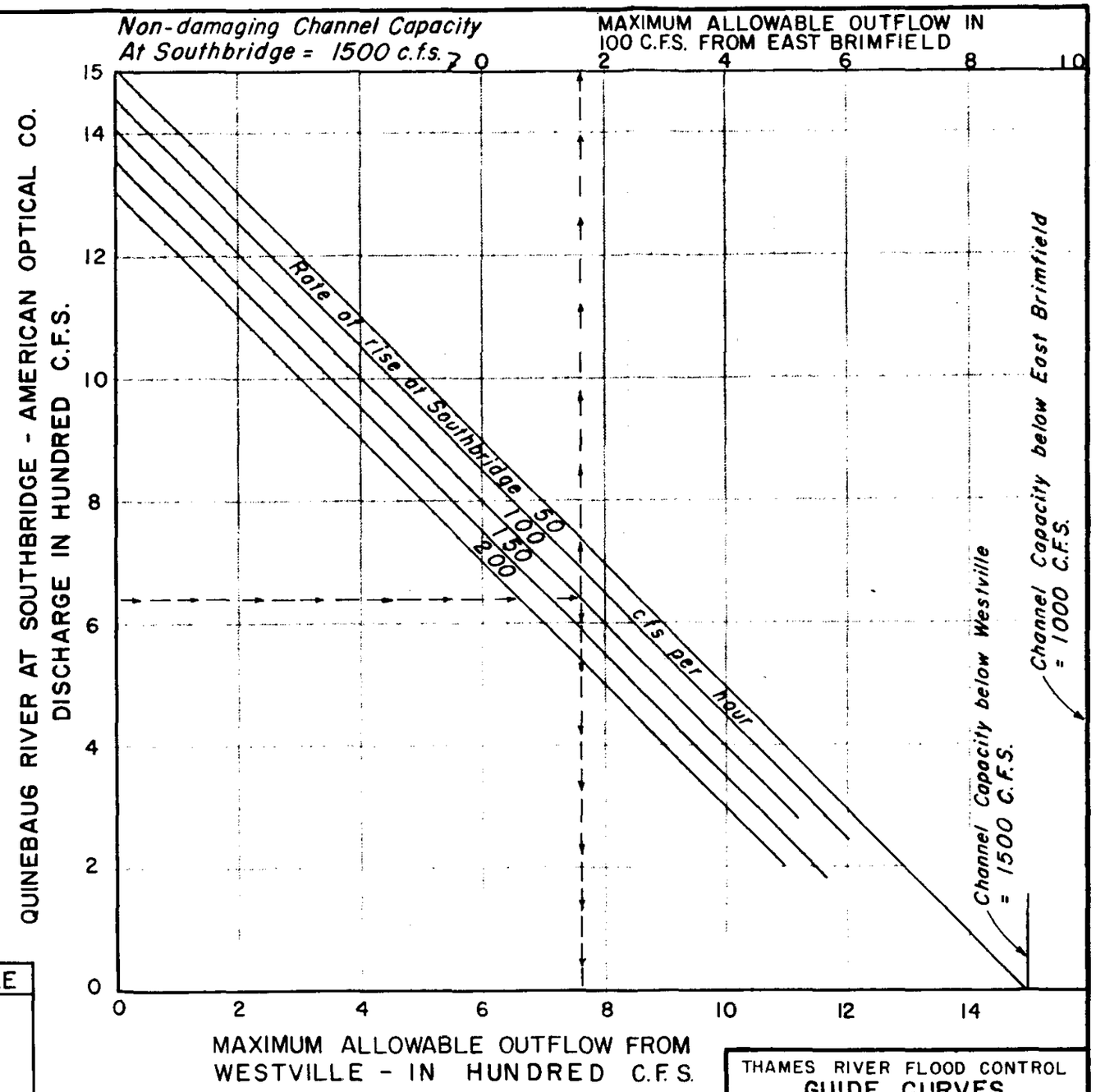
THAMES RIVER FLOOD CONTROL

EAST BRIMFIELD RESERVOIR
WESTVILLE RESERVOIR

RESERVOIR REGULATION
STANDARD OPERATING PROCEDURE (SOP)
EMERGENCY OPERATING PROCEDURE (EOP)

New England Division, Waltham, Mass.
June 1967



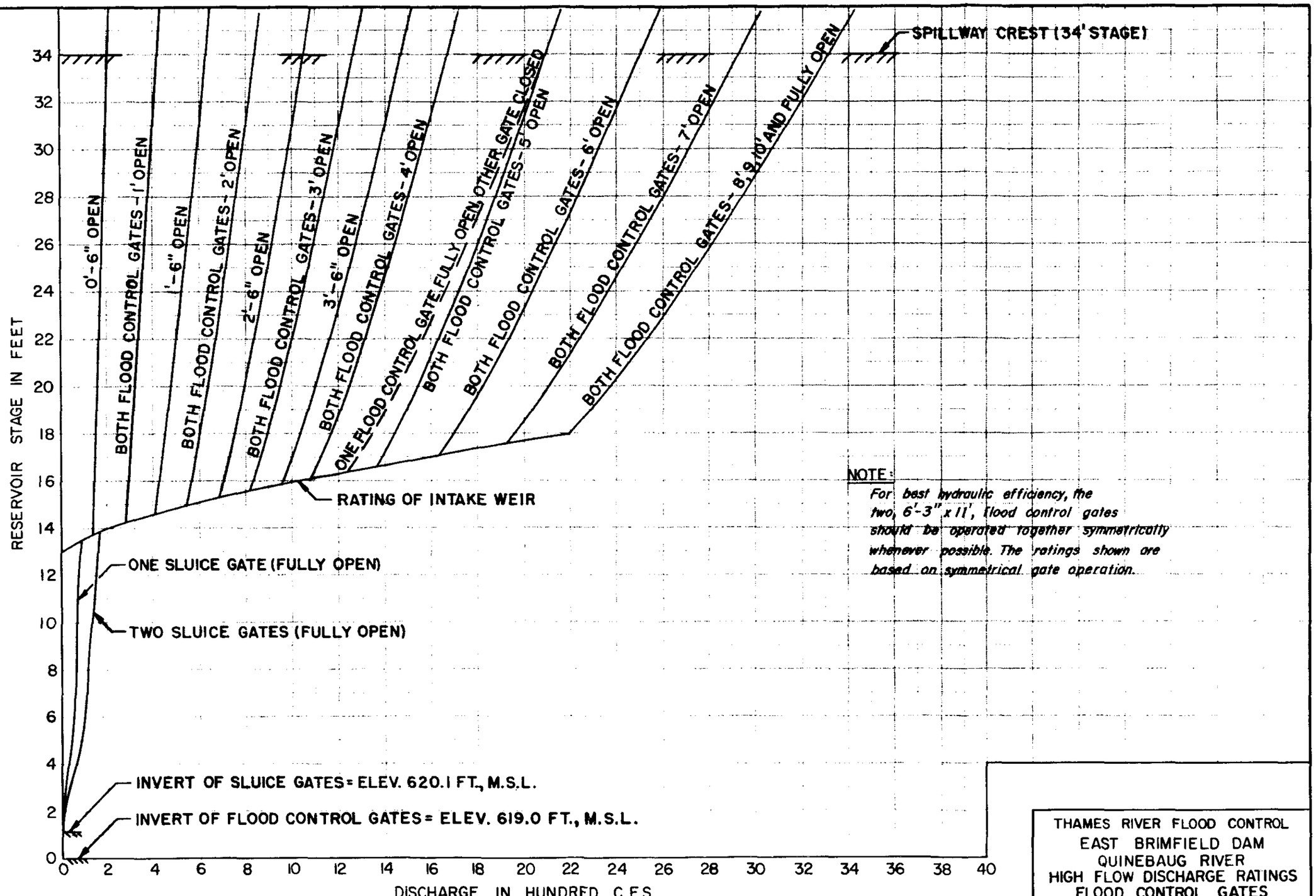


AMERICAN OPTICAL CO. - FLOOD OPERATION SCHEDULE

	OPERATION	STAGE	C.F.S.
A	Operate Water Wheel (Whenever river flow is adequate)		
B	Open flood gate	1.0'	850
C	Remove 2'-6" of stanchions	1.0'	1100
D	Remove all stanchions (6')	2.5'	3150
E	Release first set of flash boards	3.0'	5300
F	Release remainder of flash boards	3.5'	8400

THAMES RIVER FLOOD CONTROL
GUIDE CURVES
FOR REGULATION OF EAST BRIMFIELD AND WESTVILLE RESERVOIR
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

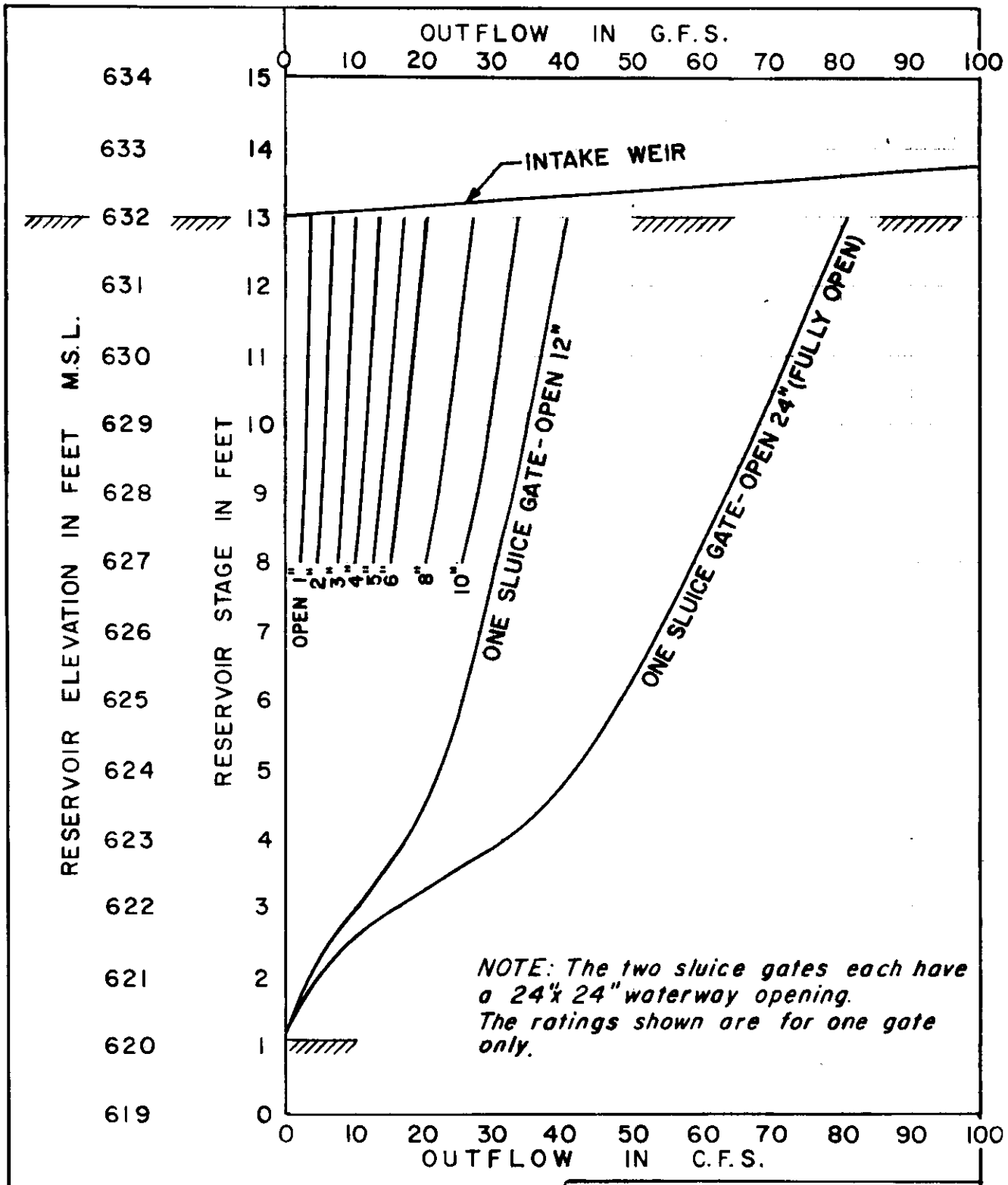
PLATE NO. A-27



NOTE:
For best hydraulic efficiency, the two, 6'-3" x 11', flood control gates should be operated together symmetrically whenever possible. The ratings shown are based on symmetrical gate operation.

THAMES RIVER FLOOD CONTROL
EAST BRIMFIELD DAM
QUINEBAUG RIVER
HIGH FLOW DISCHARGE RATINGS
FLOOD CONTROL GATES
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. A-28



THAMES RIVER FLOOD CONTROL
EAST BRIMFIELD DAM
DISCHARGE RATINGS FOR
INTAKE WEIR SLUICE GATES
JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. A-29

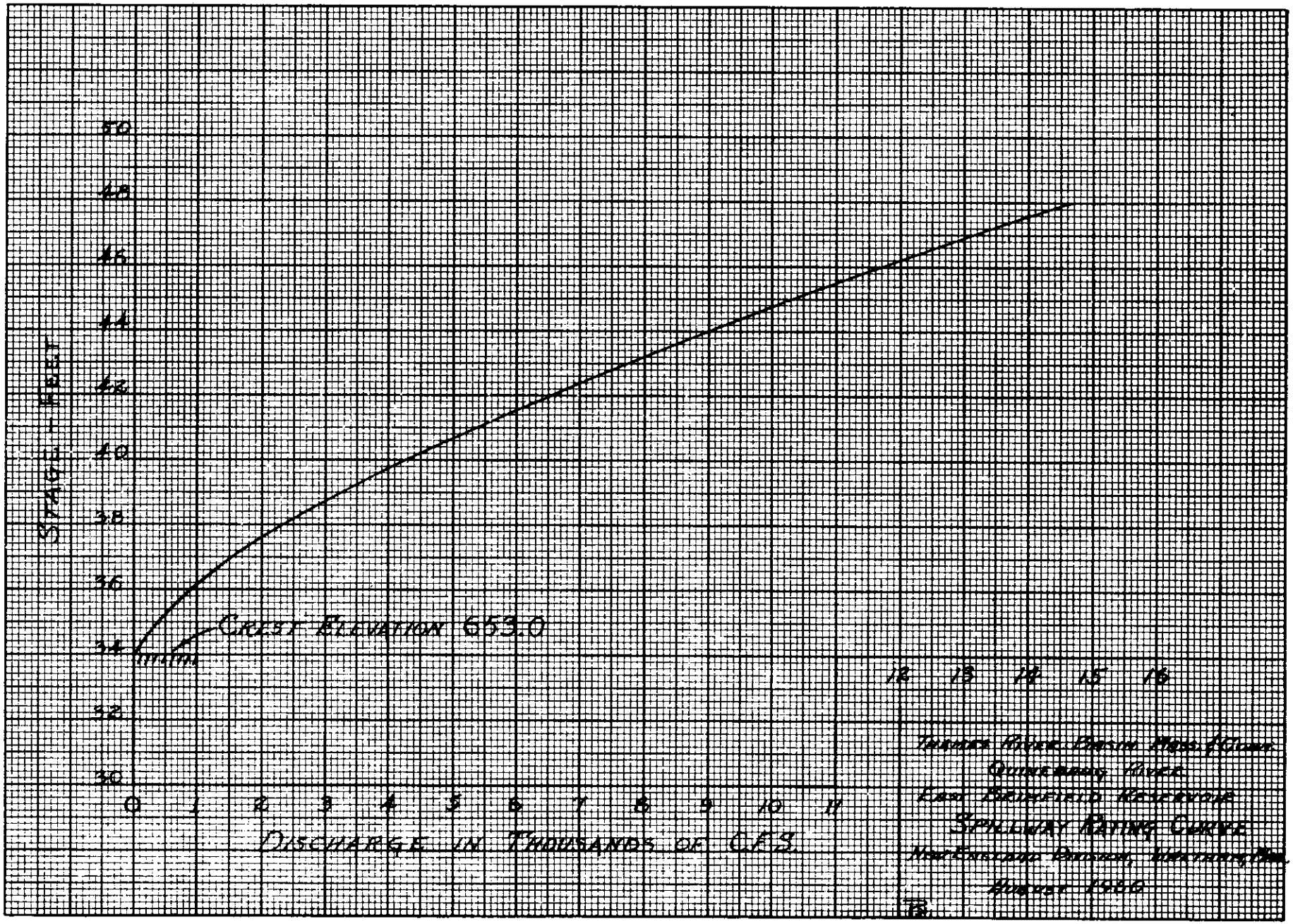
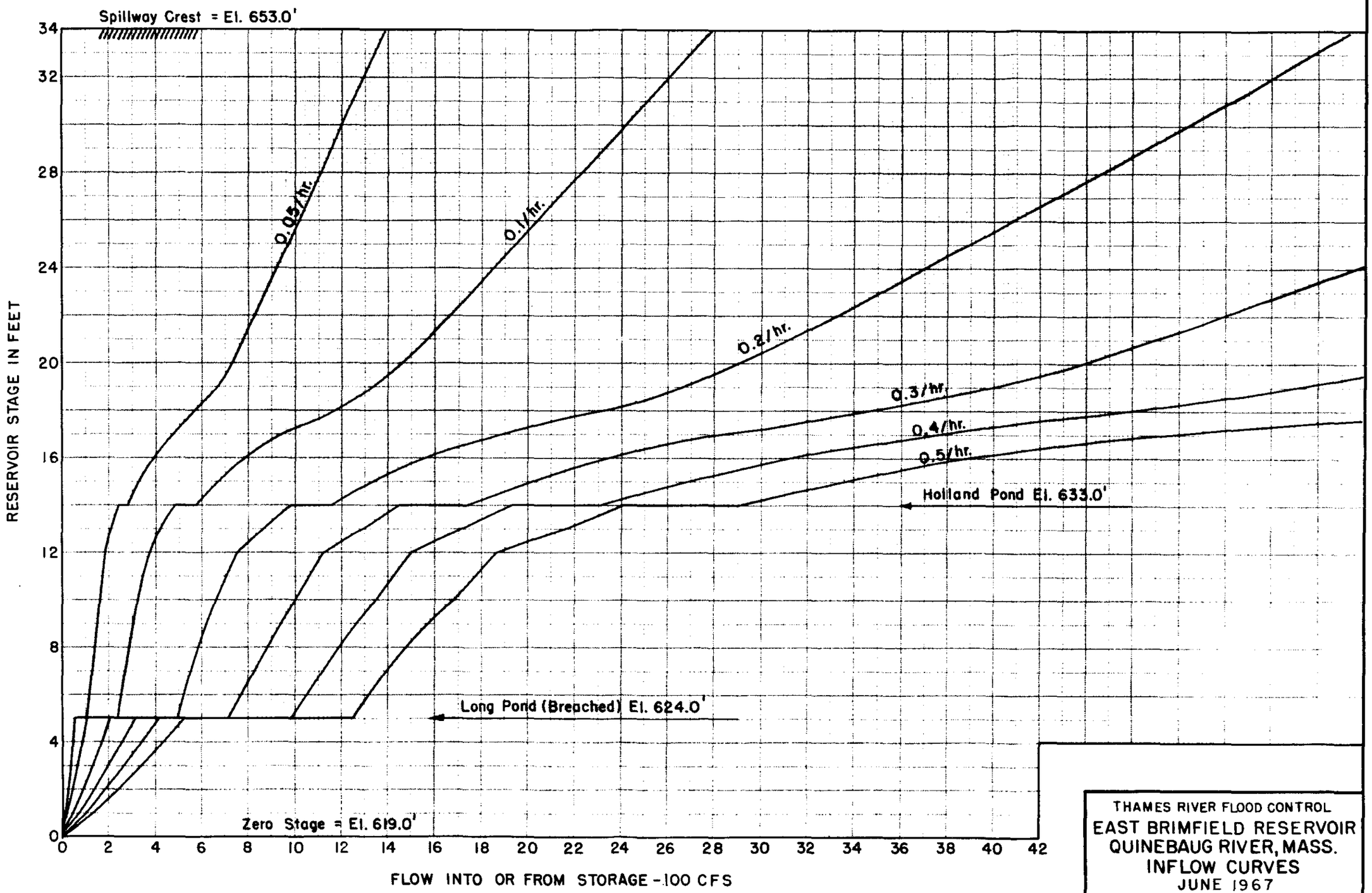

STAGE - FEET
50
48
46
44
42
40
38
36
34
32
30
CREST ELEVATION 653.0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
DISCHARGE IN THOUSANDS OF C.F.S.
THAMES RIVER BASIN MASS. & CONN.
QUINEBAUG RIVER
EAST BRIMFIELD RESERVOIR
SPILLWAY RATING CURVE
NEW ENGLAND DIVISION, WALTHAM, MASS.
AUGUST 1960

PLATE NO. A-30



THAMES RIVER FLOOD CONTROL

EAST BRIMFIELD RESERVOIR
QUINEBAUG RIVER, MASS.
INFLOW CURVES
JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. A-31

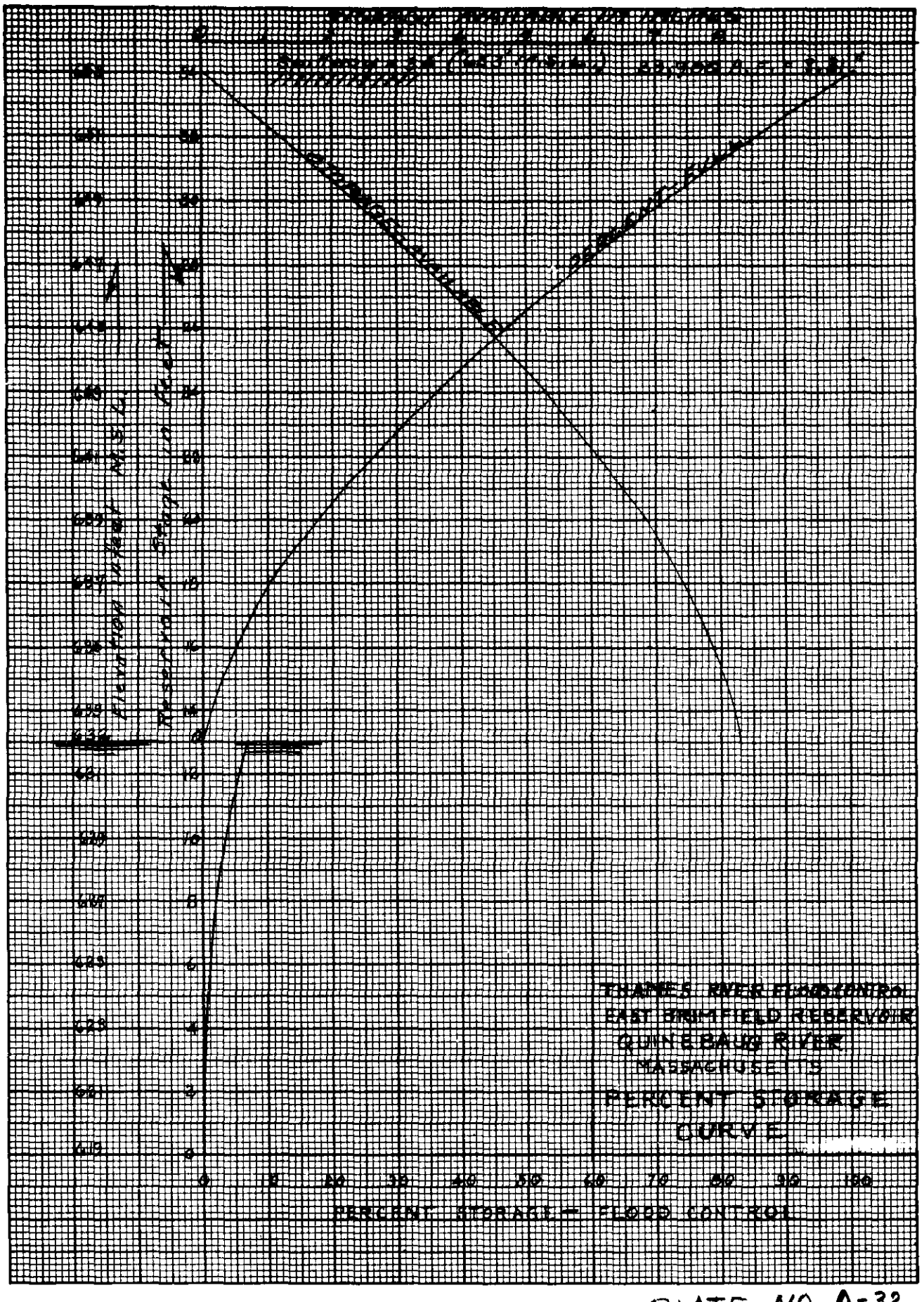

THAMES RIVER FLOOD CONTROL
EAST BRIMFIELD RESERVOIR
QUINEBAUG RIVER
MASSACHUSETTS
PERCENT STORAGE
CURVE
PERCENT STORAGE — FLOOD CONTROL
0
10
20
30
40
50
60
70
80
90
100

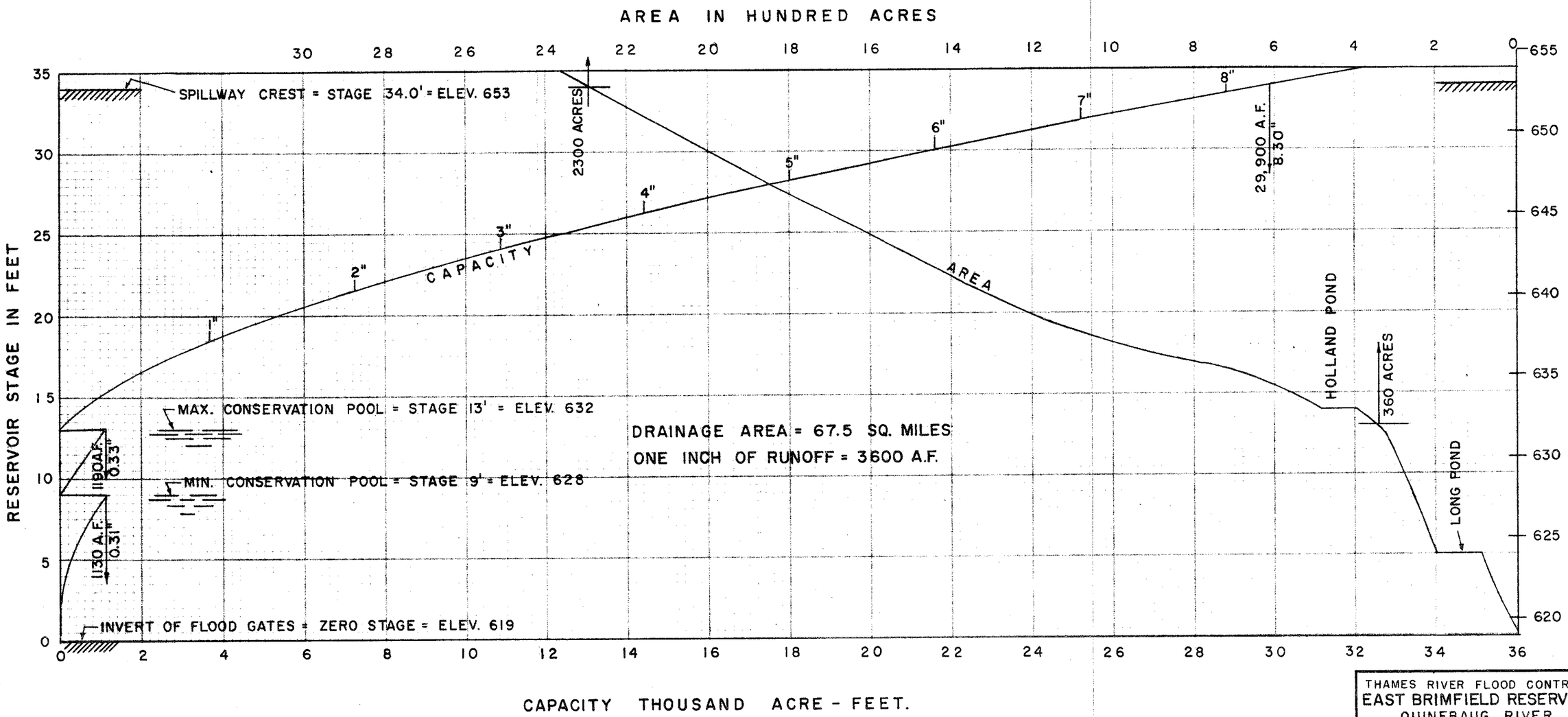
PLATE NO. A-32

EAST BRIMFIELD RESERVOIR
AREA AND CAPACITY
DRAINAGE AREA - 67.5 SQ. MI.

Elevation (msl)	Stage (feet)	Area (acres)	Capacity Acre-Feet	Capacity Inches
		Permanent Storage		
619	0	Sill of Flood Gates		
620.1	1.1	Sill of Weir Gates		
621	2	40	40	0.01
622	3	57	90	0.03
623	4	72	150	0.04
624	5	90	230	0.06
624	5	200	(Long Pond)	
625	6	210	430	0.12
626	7	225	650	0.18
627	8	240	880	0.24
628	9	260	1,130	0.31
		Conservation Storage		
628	9	260	0	0
629	10	280	270	0.07
630	11	295	550	0.15
631	12	310	860	0.24
632	13	360	1,190	0.33
		Flood Control Storage		
632	13	360	0	0
633	14	400	380	0.11
633	14	480	(Holland Pond)	
634	15	560	900	0.25
635	16	650	1,500	0.42
636	17	790	2,220	0.62
637	18	960	3,090	0.86
638	19	1,100	4,120	1.14
639	20	1,210	5,270	1.46
640	21	1,300	6,510	1.81
641	22	1,380	7,850	2.18
642	23	1,460	9,270	2.58
643	24	1,540	10,800	3.00
644	25	1,610	12,300	3.42
645	26	1,690	14,000	3.89
646	27	1,770	15,700	4.36
646	28	1,850	17,500	4.86
648	29	1,920	19,400	5.40
649	30	2,000	21,400	5.94
650	31	2,070	23,400	6.50
651	32	2,140	25,500	7.09
652	33	2,220	27,700	7.70
653*	34*	2,300	29,900	8.30

* Spillway Crest

PLATE NO. A-33



THAMES RIVER FLOOD CONTROL
EAST BRIMFIELD RESERVOIR
QUINEBAUG RIVER
AREA - CAPACITY CURVES
JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. A-34

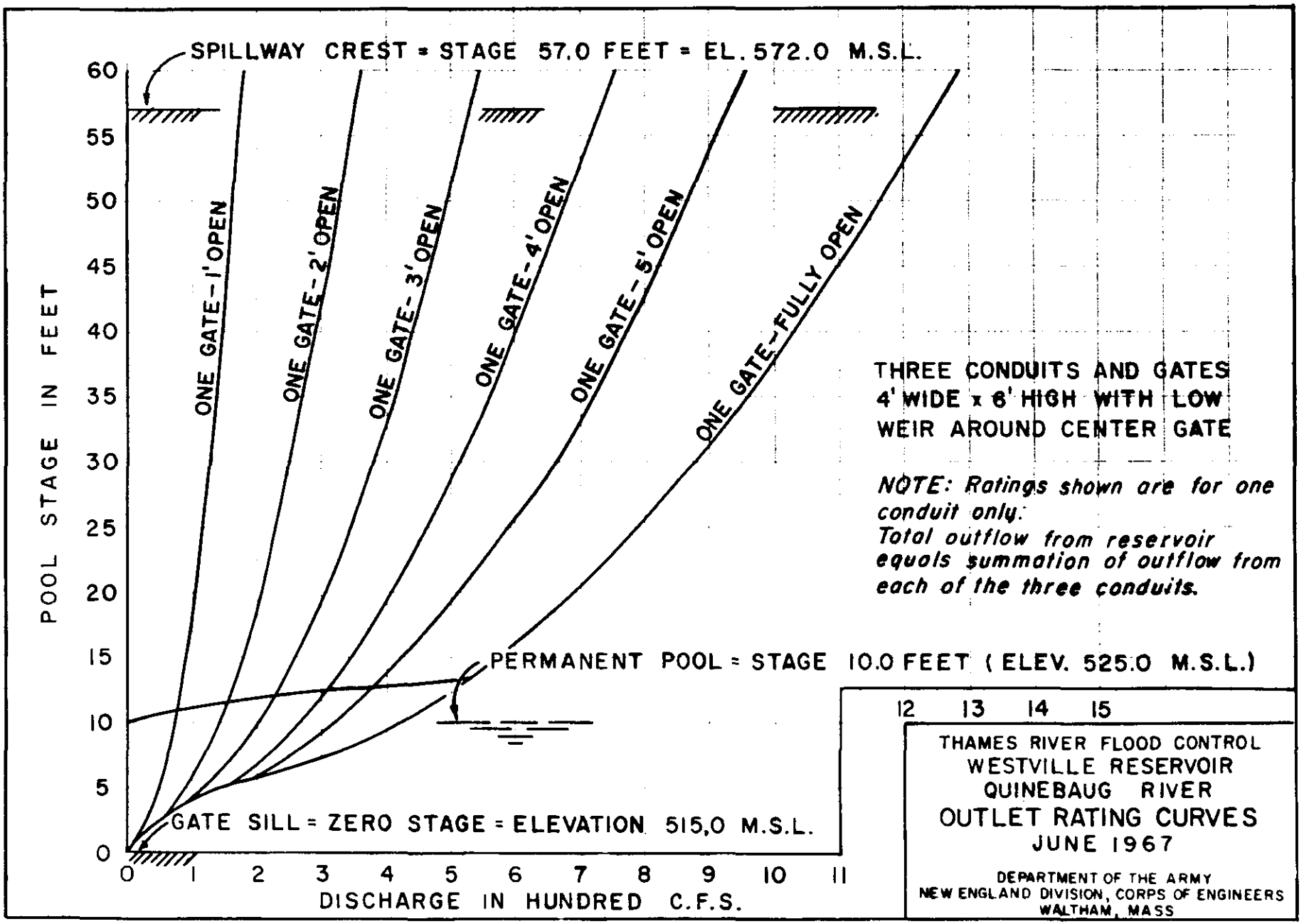

SPILLWAY CREST = STAGE 57.0 FEET = EL. 572.0 M.S.L.
POOL STAGE IN FEET
60
55
50
45
40
35
30
25
20
15
10
5
0
ONE GATE-1' OPEN
ONE GATE-2' OPEN
ONE GATE-3' OPEN
ONE GATE-4' OPEN
ONE GATE-5' OPEN
ONE GATE-FULLY OPEN
THREE CONDUITS AND GATES
4' WIDE x 6' HIGH WITH LOW
WEIR AROUND CENTER GATE
NOTE: Ratings shown are for one conduit only.
Total outflow from reservoir equals summation of outflow from each of the three conduits.
PERMANENT POOL = STAGE 10.0 FEET (ELEV. 525.0 M.S.L.)
GATE SILL = ZERO STAGE = ELEVATION 515.0 M.S.L.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
DISCHARGE IN HUNDRED C.F.S.
THAMES RIVER FLOOD CONTROL
WESTVILLE RESERVOIR
QUINEBAUG RIVER
OUTLET RATING CURVES
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. A-35

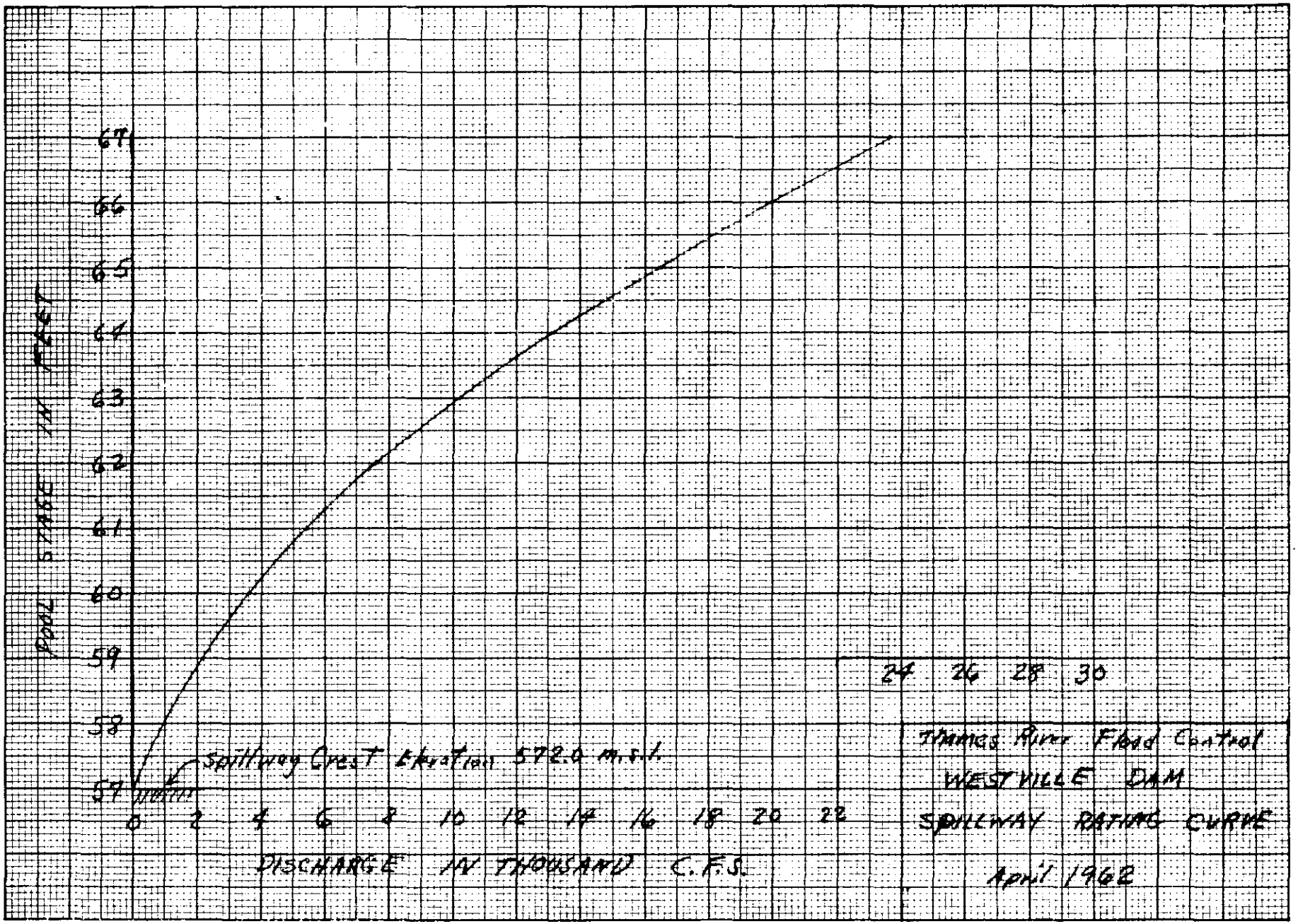

POOL STAGE IN FEET
67
66
65
64
63
62
61
60
59
58
57
Spillway Crest Elevation 572.0 m.s.l.
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
DISCHARGE IN THOUSAND C.F.S.
Thames River Flood Control
WESTVILLE DAM
SPILLWAY RATING CURVE
April 1962

PLATE NO. A-36

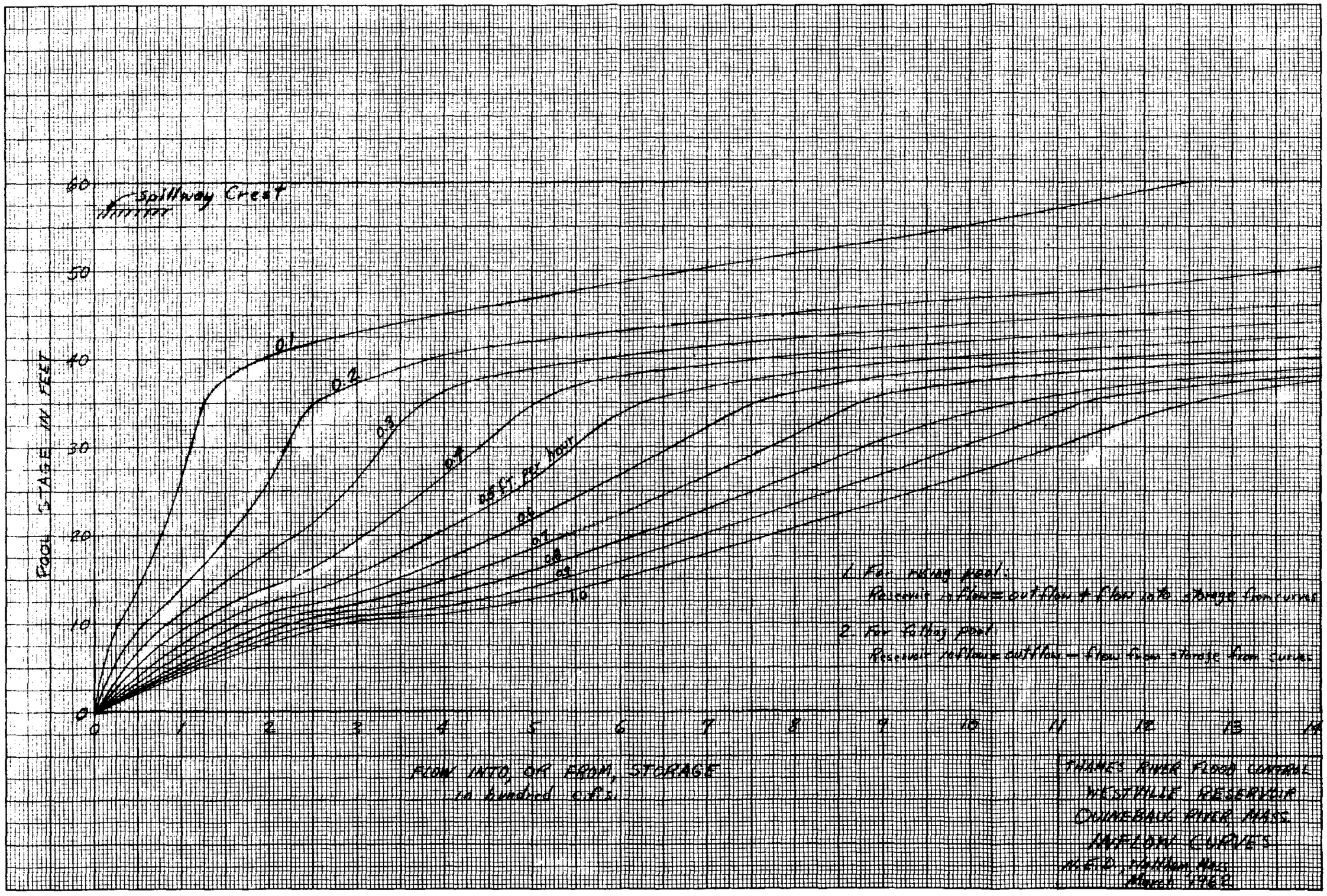
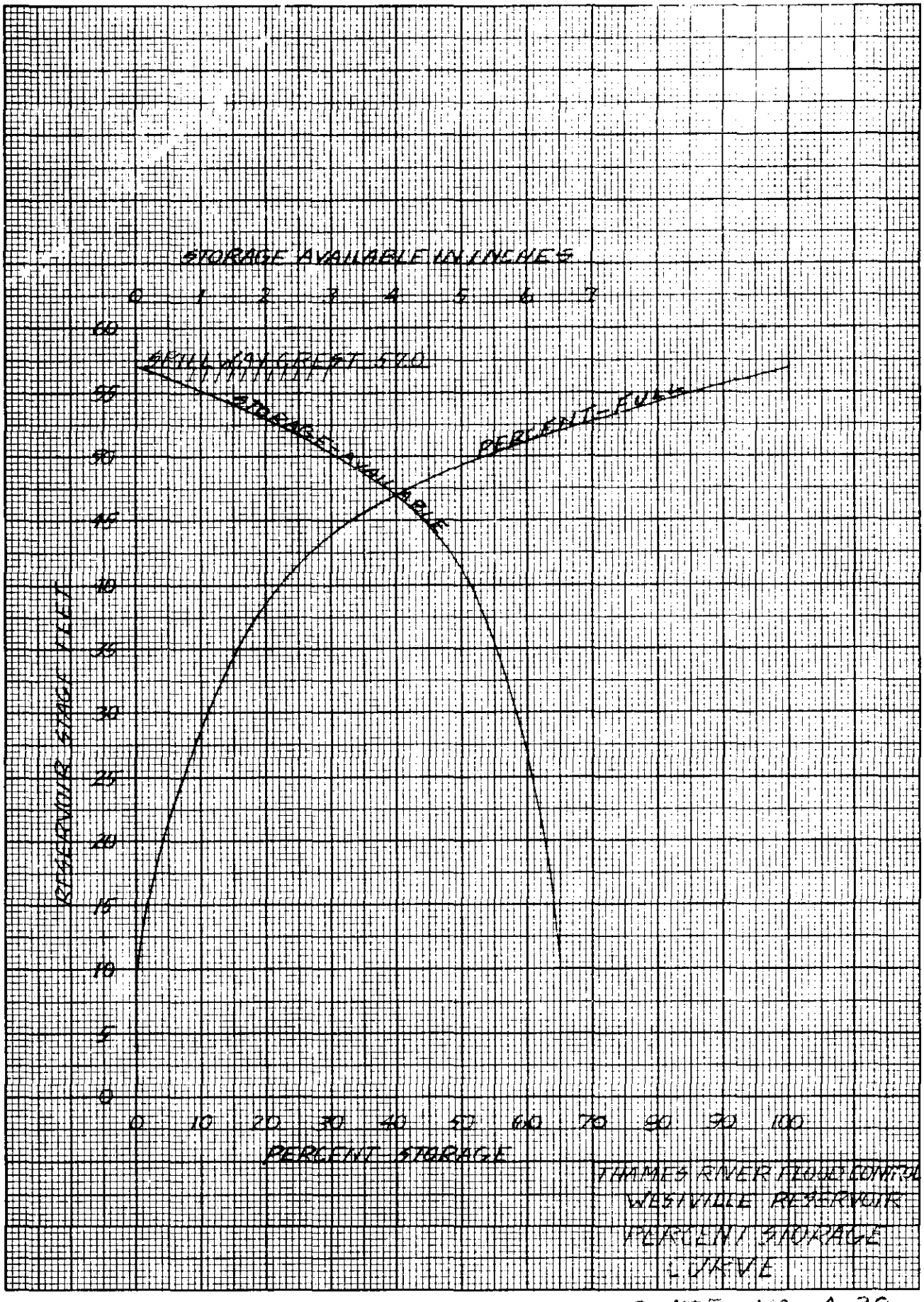

Spillway Crest
POOL STAGE IN FEET
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
0.1
0.2
0.3
0.4
0.5 ft. per hour
0.6
0.7
0.8
0.9
1.0
1. For rising pool:
Reservoir inflow = outflow + flow into storage from curves
2. For falling pool:
Reservoir inflow = outflow − flow from storage from curves
FLOW INTO, OR FROM, STORAGE
in hundred c.f.s.
THAMES RIVER FLOOD CONTROL
WESTVILLE RESERVOIR
QUINEBAUG RIVER, MASS.
INFLOW CURVES
N.E.D., Waltham, Mass.
March 1962

PLATE NO. A-37



THAMES RIVER FLOOD CONTROL
WESTVILLE RESERVOIR
PERCENT STORAGE
CURVE

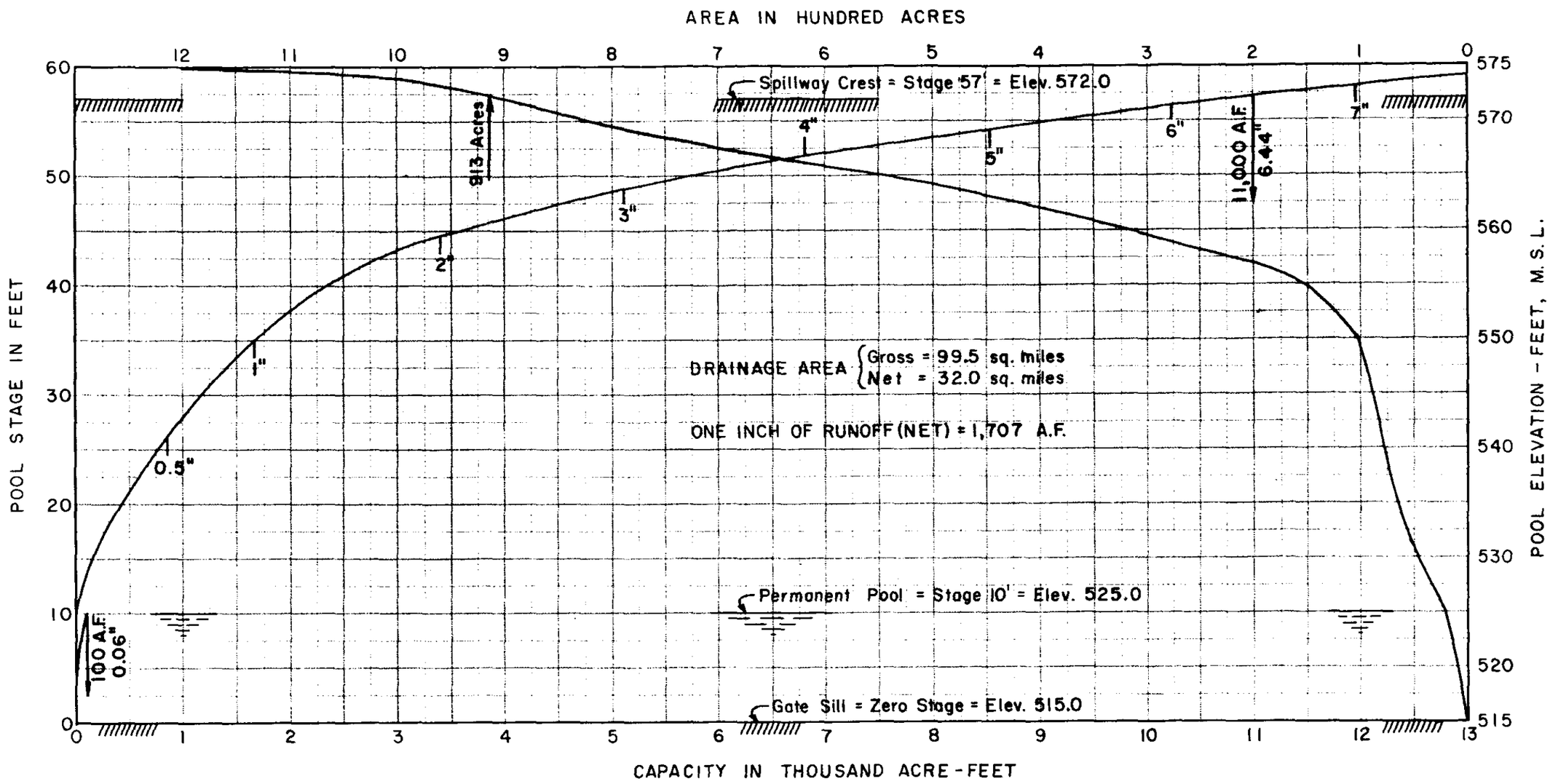
PLATE NO. A-38

WESTVILLE RESERVOIR
AREA AND CAPACITY
DRAINAGE AREA: (NET) 32.0 Sq. Mi.
(GROSS) 99.5 Sq. Mi.

ELEV. M.S.L.	STAGE FEET	AREA ACRES	CAPACITY AC. FT.	CAPACITY INCHES
Permanent Storage				
515	0	3	0	0
516	1	3	3	0
517	2	4	7	0
518	3	5	12	0
519	4	6	18	0.01
520	5	7	25	.01
521	6	9	34	.02
522	7	12	46	.03
523	8	15	61	.04
524	9	19	79	.05
525	10	23	100	.06
Flood Control Storage				
525	10	23	0	0
526	11	27	25	0.01
527	12	31	54	.03
528	13	35	87	.05
529	14	39	124	.07
530	15	44	165	.10
531	16	48	210	.12
532	17	52	260	.15
533	18	56	315	.18
534	19	60	375	.22
535	20	64	435	.25
536	21	67	500	.29
537	22	69	570	.33
538	23	71	640	.37
539	24	73	710	.42
540	25	76	785	.46
541	26	79	860	.50
542	27	82	940	.55
543	28	85	1020	.60
544	29	88	1110	.65
545	30	91	1200	.70
546	31	94	1290	0.76
547	32	97	1390	.81
548	33	99	1490	.87
529	34	101	1590	.93
550	35	104	1690	.99
551	36	108	1800	1.05
552	37	116	1920	1.12
553	38	127	2050	1.20
554	39	141	2190	1.28
555	40	160	2340	1.37
556	41	184	2510	1.47
557	42	212	2710	1.59
558	43	244	2950	1.73
559	44	286	3230	1.89
560	45	326	3560	2.09
561	46	375	3900	2.28
562	47	425	4300	2.52
563	48	470	4750	2,78
564	49	520	5240	3.07
565	50	568	5790	3.39
566	51	620	6380	3.74
567	52	670	7030	4.12
568	53	720	7720	4.52
569	54	770	8470	4.96
570	55	819	9260	5.42
571	56	866	10100	5.92
572	57	913	11000	6.44
573	58	960	11900	6.97
574	59	1010	12900	7.56
575	60	1220	14000	8.20

Note: Gate Sill - Elev. 515.0 M.S.L.
Spillway Crest - Elev. 572.0 M.S.L.

PLATE NO. A-39



THAMES RIVER FLOOD CONTROL
WESTVILLE RESERVOIR
QUINEBAUG RIVER
AREA-CAPACITY CURVES
JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. A-40

WEST THOMPSON RESERVOIR
STANDARD OPERATING PROCEDURE (SOP) FOR RESERVOIR REGULATION

Conditions	Storm Precipitation Antecedent Conditions		Pool Stage	Downstream Index Points				Flood Gate Openings
				Putnam USGS Gage		Jewett City USGS Gage		
	Wet	Dry		Feet	CFS	Feet	CFS	
Normal Conditions	-	-	13'	2.0	-	4.0	-	0-F-0
Phase I - Appraisal								
Alert 1	1.0"	1.0"	15'	6.0	1,850	9.0	3,000	Refer to plates A-1, A-42, A-43, A-44 and paragraph A-16
Alert 2	1.5"	2.0"	17'	7.0	2,570	13.0	7,500	
Phase II - Regulation	2.0"	3.0"	19'	9.6	5,000	18.0	15,000	
Phase III - Emptying	Storm abated		Check reservoir roads and easement areas	Refer to paragraph A-9				Refer to paragraphs A-9, A-15, A-16
Channel Capacity	-	-	-	9.6	5,000	18.0	15,000	Refer to paragraph A-10

EMERGENCY OPERATING PROCEDURE (EOP)
(To be followed when contact cannot be made with RRS)

1. Set flood gates at 0-1'-0 for any of the following conditions:

   a. Storm rainfall of 2 inches or more
   b. Pool stage of 17' or higher
   c. Putnam stage 7' or higher
   d. Jewett City stage 13' or higher

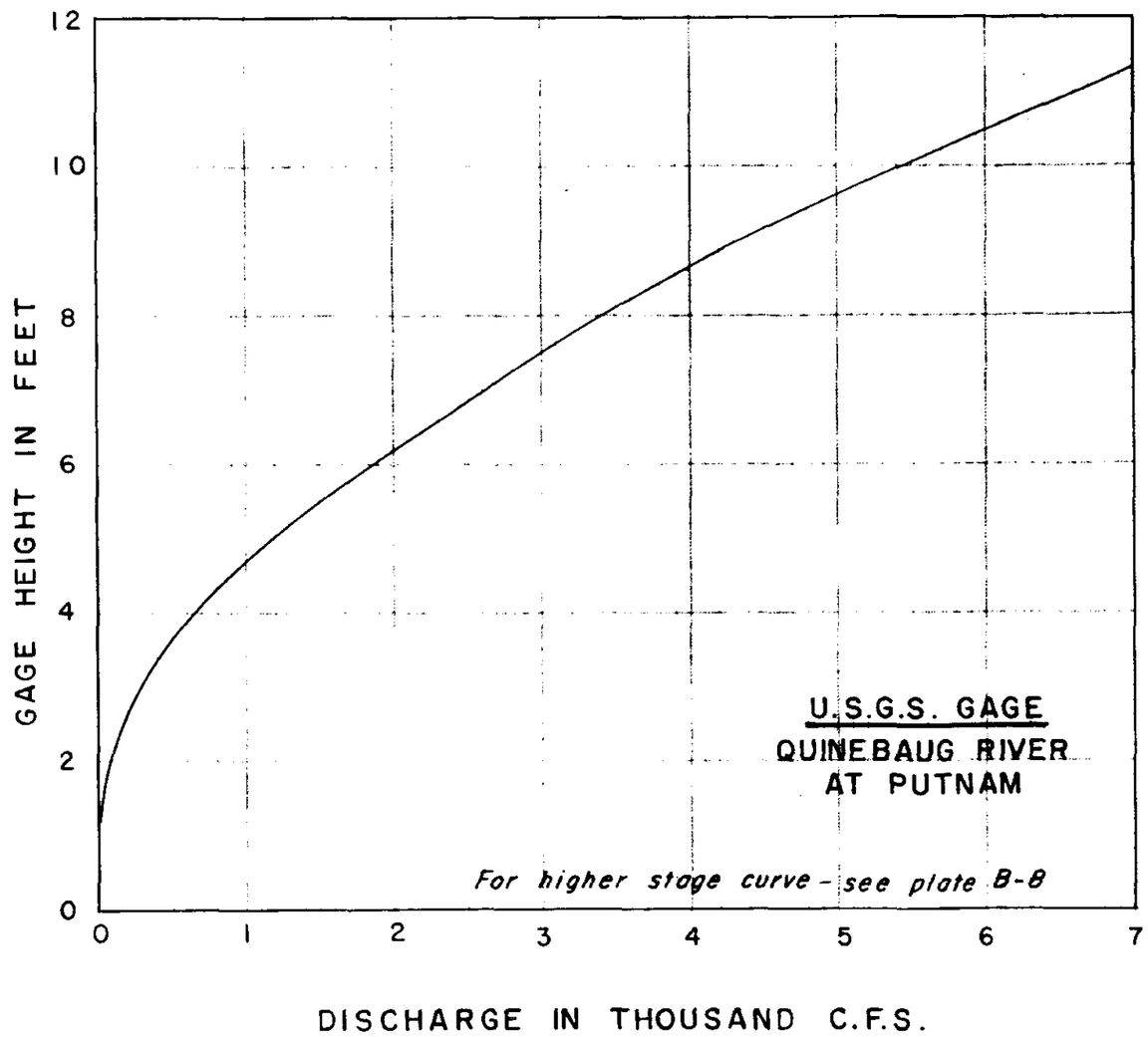
2. Until contact has been re-established with RRS, no increase in outflow or emptying reservoir storage should be initiated.

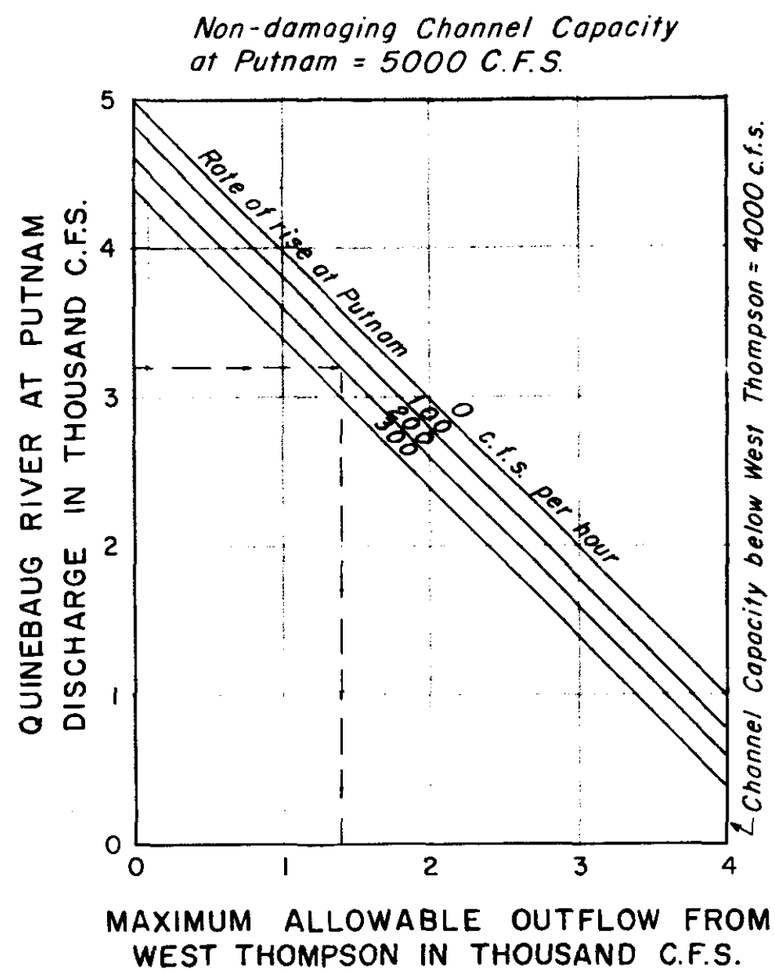
THAMES RIVER FLOOD CONTROL

WEST THOMPSON RESERVOIR

RESERVOIR REGULATION
STANDARD OPERATING PROCEDURE (SOP)
EMERGENCY OPERATING PROCEDURE (EOP)

New England Division, Waltham, Mass.
June 1967





NOTES:

1. Outflow from Westville should not be greater than West Thompson outflow
2. If West Thompson is closed, Buffumville and Hodges Village should be closed also.

THAMES RIVER FLOOD CONTROL
GUIDE CURVES
FOR REGULATION OF
WEST THOMPSON RESERVOIR
JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. A-42

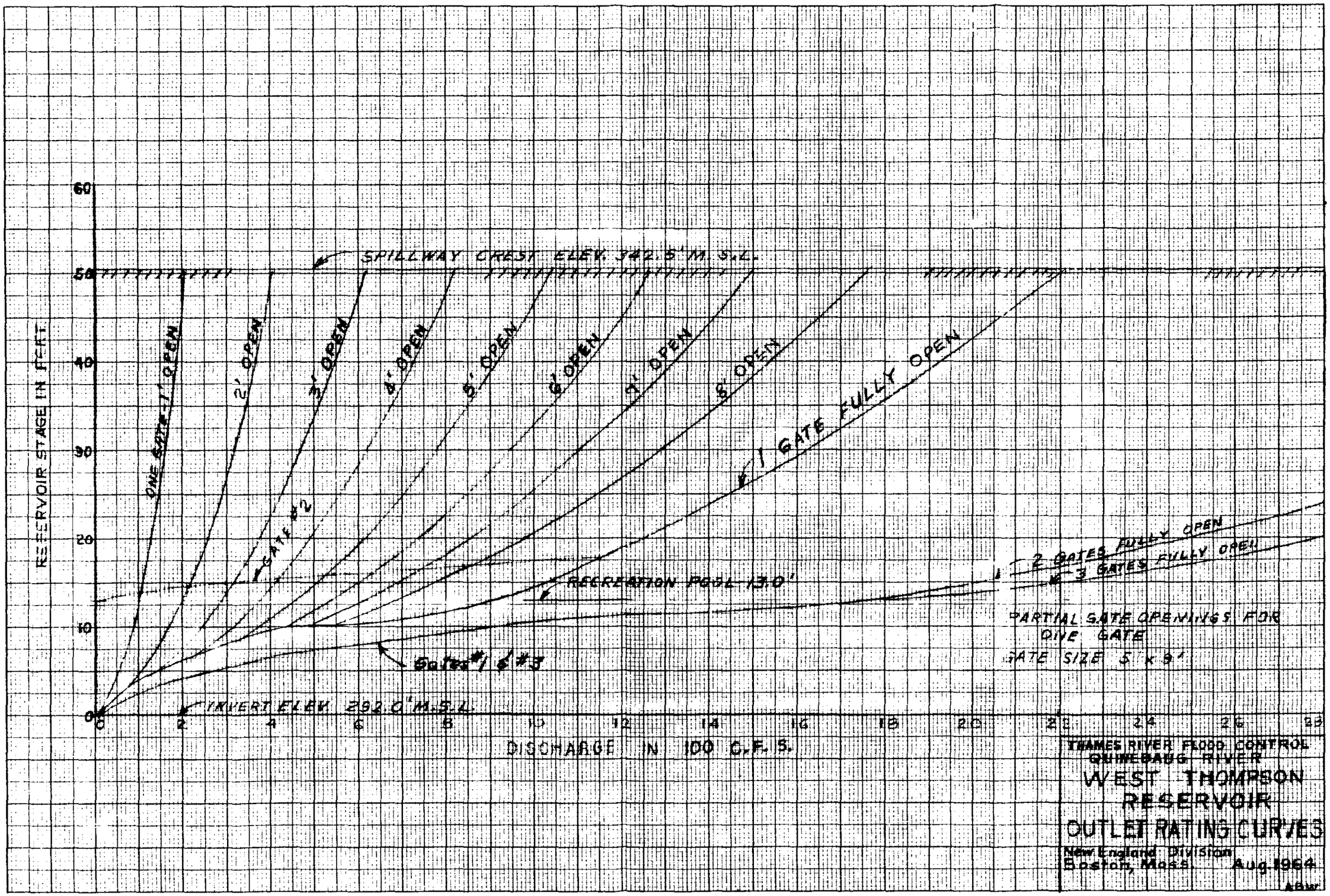
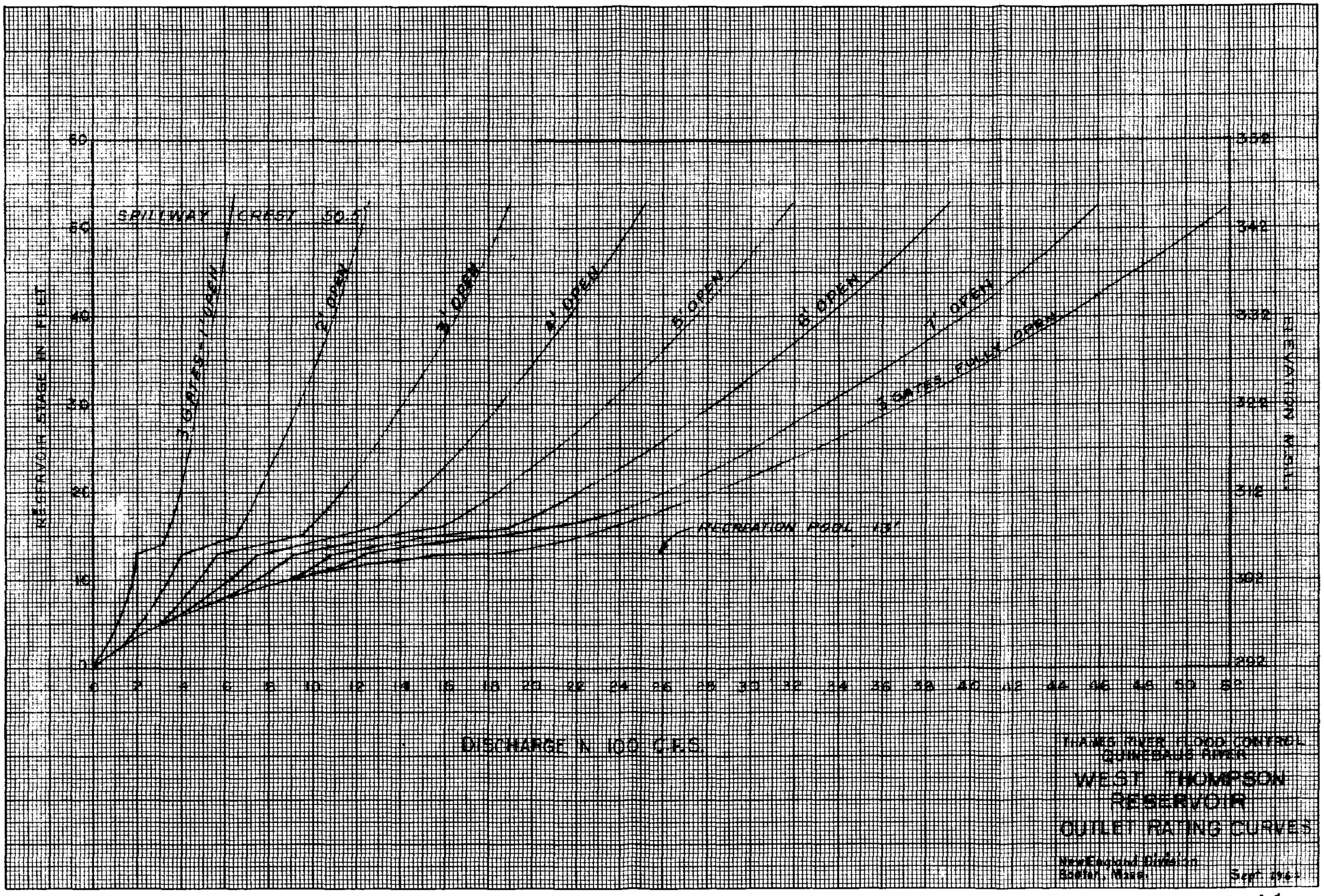
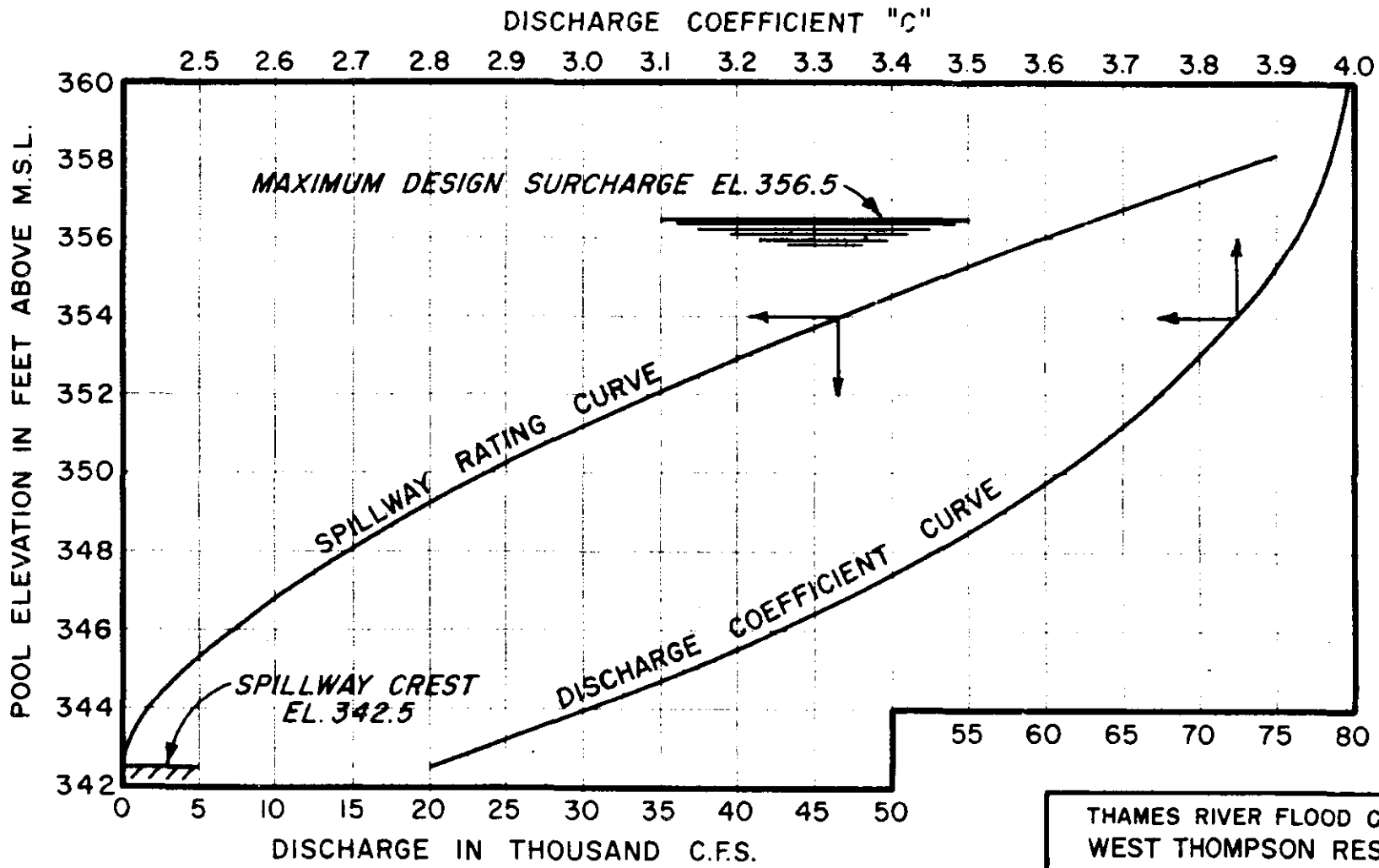

SPILLWAY CREST ELEV. 342.5' M.S.L.
RESERVOIR STAGE IN FEET
DISCHARGE IN 100 C.F.S.
ONE GATE-1' OPEN
2' OPEN
3' OPEN
4' OPEN
5' OPEN
6' OPEN
7' OPEN
8' OPEN
1 GATE FULLY OPEN
GATE #2
2 GATES FULLY OPEN
3 GATES FULLY OPEN
RECREATION POOL-13.0'
PARTIAL GATE OPENINGS FOR
DIVE GATE
GATE SIZE 5' x 8'
Gates #1 & #3
INVERT ELEV. 292.0' M.S.L.
THAMES RIVER FLOOD CONTROL
QUINEBAUG RIVER
WEST THOMPSON
RESERVOIR
OUTLET RATING CURVES
New England Division
Boston, Mass.
Aug. 1964
ABW

PLATE NO. A-43



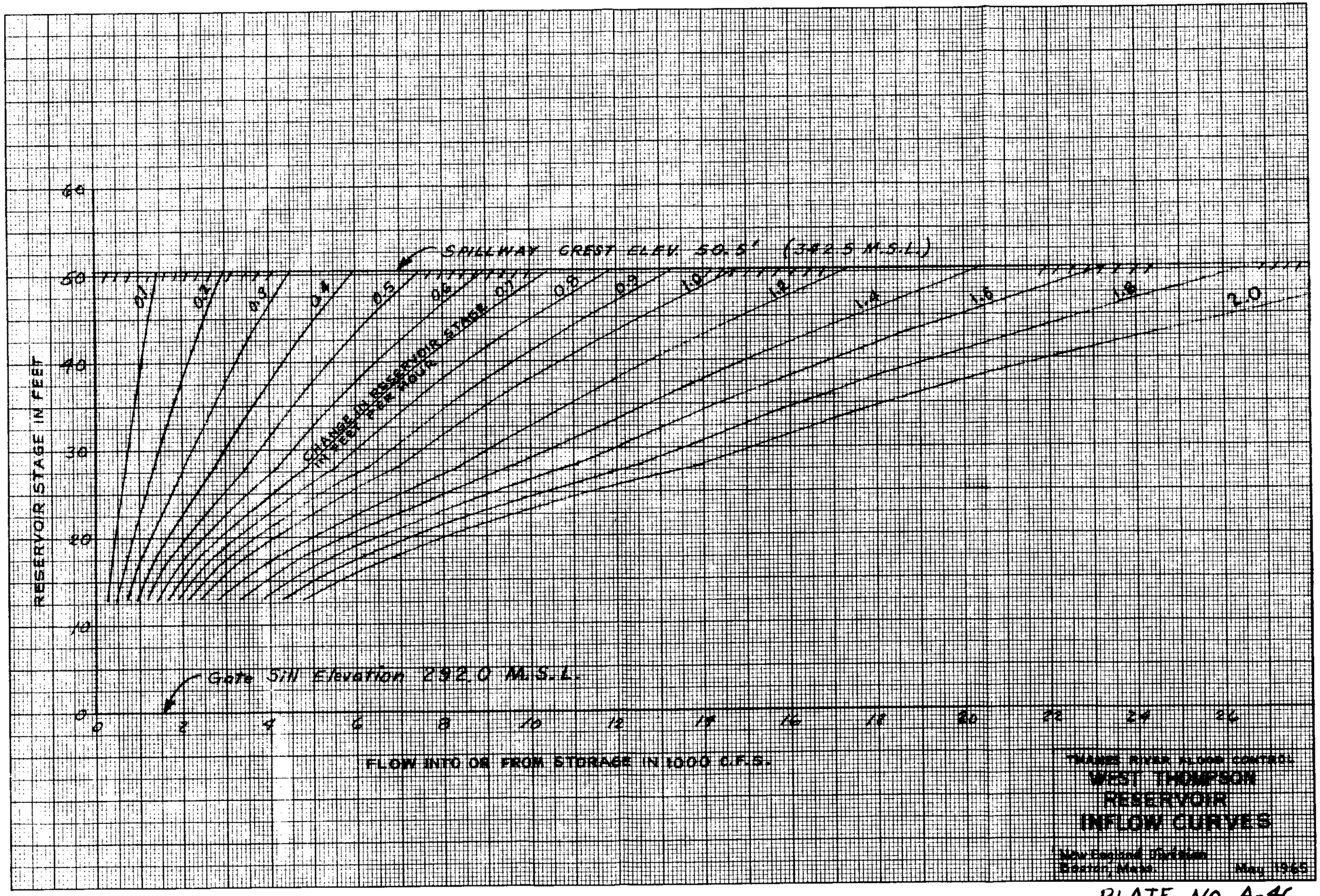
SPILLWAY CREST 50.5'
3 GATES - 1' OPEN
2' OPEN
3' OPEN
4' OPEN
5' OPEN
6' OPEN
7' OPEN
3 GATES FULLY OPEN
RECREATION POOL 13'
RESERVOIR STAGE IN FEET
ELEVATION M.S.L.
DISCHARGE IN 100 C.F.S.
THAMES RIVER FLOOD CONTROL
QUINEBAUG RIVER
WEST THOMPSON
RESERVOIR
OUTLET RATING CURVES
New England Division
Boston, Mass.

PLATE NO. A-44



THAMES RIVER FLOOD CONTROL
WEST THOMPSON RESERVOIR
SPILLWAY RATING & CREST
DISCHARGE COEFFICIENT CURVES
QUINEBAUG RIVER MASS. & CONN.
NEW ENGLAND DIVISION WALTHAM, MASS.
JULY 1962

PLATE NO. A-45



THAMES RIVER FLOOD CONTROL
WEST THOMPSON
RESERVOIR
INFLOW CURVES

New England Division
Boston, Mass. May 1965

PLATE NO. A-46

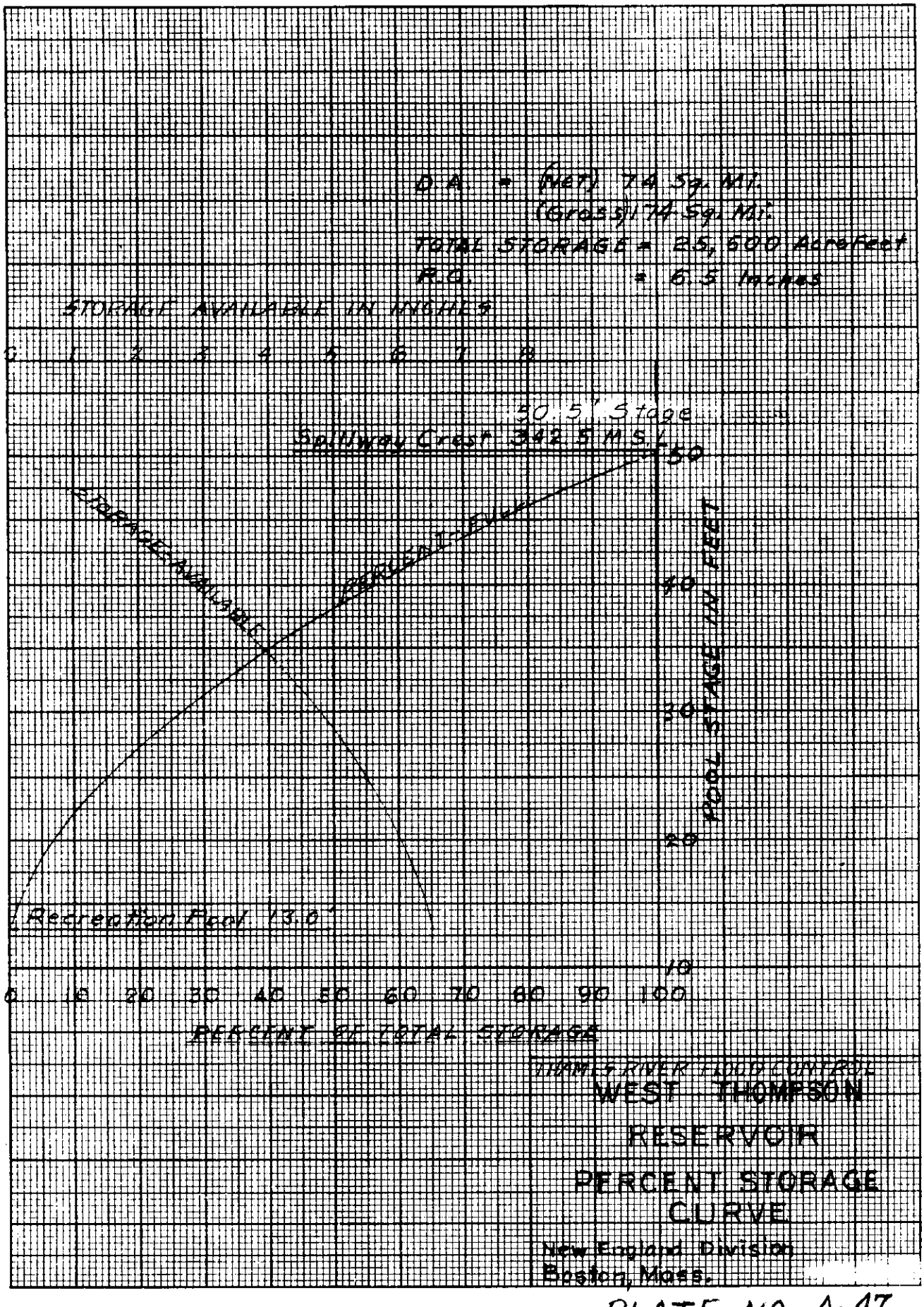

D.A. = (Net) 74 Sq. Mi.
(Gross) 174 Sq. Mi.
TOTAL STORAGE = 25,600 Acre Feet
R.O. = 6.5 Inches
STORAGE AVAILABLE IN INCHES
0 1 2 3 4 5 6 7 8
50.5' Stage
Spillway Crest 342.5 M.S.L.
STORAGE AVAILABLE
PERCENT FULL
POOL STAGE IN FEET
50
40
30
20
10
Recreation Pool 13.0'
0 10 20 30 40 50 60 70 80 90 100
PERCENT OF TOTAL STORAGE
THAMES RIVER FLOOD CONTROL
WEST THOMPSON
RESERVOIR
PERCENT STORAGE
CURVE
New England Division
Boston, Mass.

PLATE NO. A-47

WEST THOMPSON RESERVOIR
AREA AND CAPACITY
DRAINAGE AREA: (NET) 74 SQ. MI.
(GROSS) 174 SQ. MI.

Elev. (msl)	Stage (ft.)	Area (acres)	Capacity (ac.ft.)	Capacity (inches)
Recreation Storage				
292	0	20	0	0
293	1	27	120	0.03
294	2	35	210	0.05
295	3	43	300	0.08
296	4	53	390	0.10
297	5	63	480	0.12
298	6	73	570	0.14
299	7	83	660	0.17
300	8	94	750	0.19
301	9	114	840	0.21
302	10	134	930	0.24
303	11	154	1,020	0.26
304	12	177	1,110	0.28
305	13	200	1,200	0.30
Flood Control Storage				
305	13	200	0	0
306	14	215	240	0.06
307	15	230	480	0.12
308	16	250	720	0.18
309	17	270	960	0.24
310	18	290	1,240	0.31
311	19	310	1,600	0.41
312	20	330	1,950	0.49
313	21	350	2,300	0.58
314	22	390	2,665	0.68
315	23	430	3,030	0.77
316	24	460	3,500	0.89
317	25	490	4,000	1.00
318	26	520	4,500	1.14
319	27	550	5,000	1.27
Flood Control Storage (cont.)				
320	28	580	5,560	1.41
321	29	600	6,200	1.57
322	30	625	6,850	1.74
323	31	650	7,500	1.90
324	32	675	8,150	2.06
325	33	710	8,800	2.23
326	34	730	9,500	2.41
327	35	750	10,200	2.58
328	36	780	11,000	2.79
329	37	810	11,800	2.99
330	38	830	12,700	3.22
331	39	860	13,600	3.45
332	40	890	14,400	3.65
333	41	920	15,350	3.89
334	42	960	16,300	4.13
335	43	1,000	17,250	4.37
336	44	1,030	18,300	4.64
337	45	1,060	19,400	4.92
338	46	1,090	20,500	5.19
339	47	1,120	21,550	5.46
340	48	1,150	22,600	5.73
341	49	1,180	23,860	6.05
342	50	1,210	25,120	6.36
342.5	50.5*	1,250	25,600	6.49
343	51	1,280	26,380	6.68
344	52	1,310	27,640	7.00
345	53	1,340	28,900	7.32
346	54	1,370	30,320	7.68

NOTE: Gate Sill - Elev. 292.0 msl
* Spillway Crest - Elev. 342.5 msl

PLATE NO. A-48

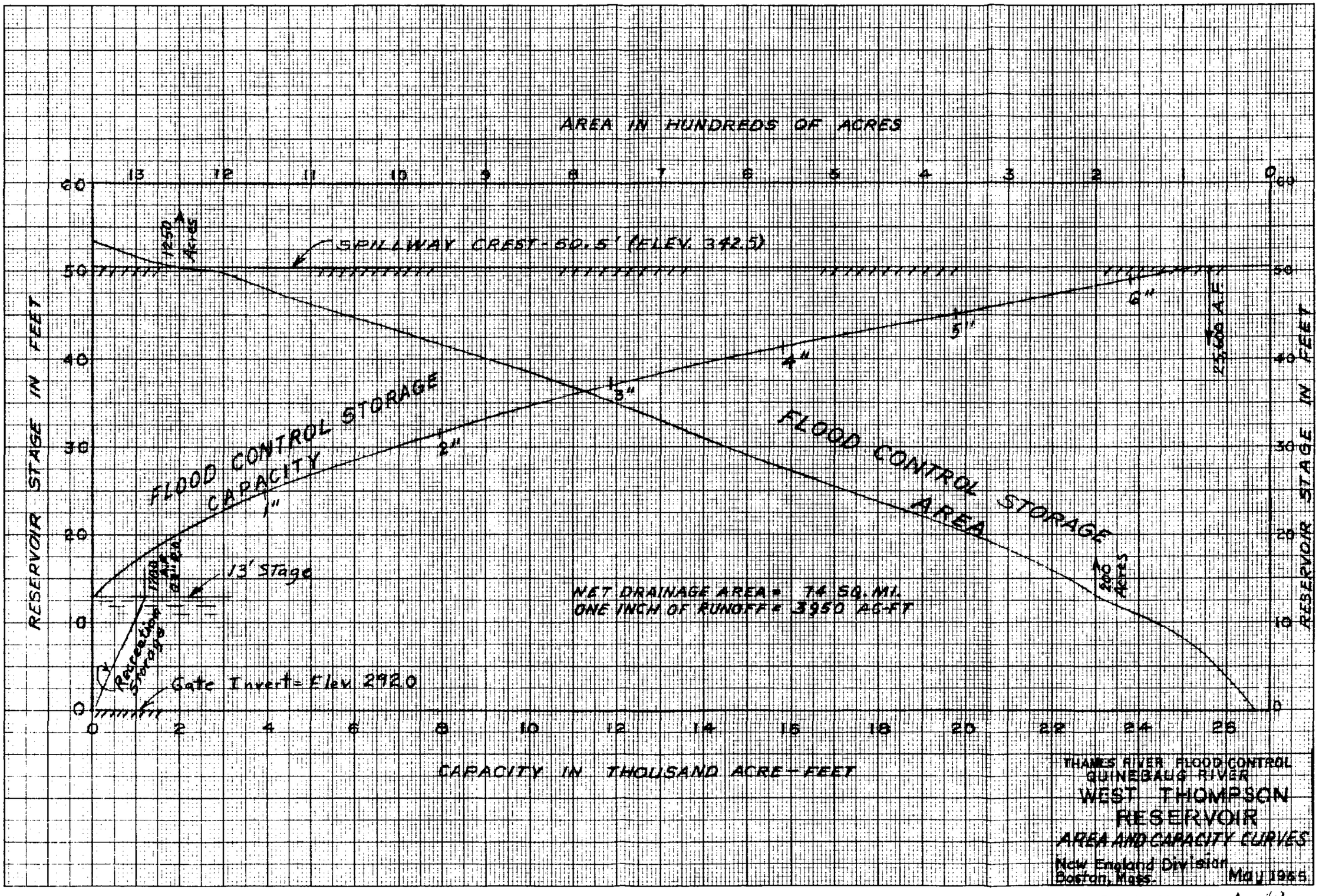

AREA IN HUNDREDS OF ACRES
13
12
11
10
9
8
7
6
5
4
3
2
1
0
60
50
40
30
20
10
0
RESERVOIR STAGE IN FEET
SPILLWAY CREST - 50.5' (ELEV. 342.5)
1250 Acres
FLOOD CONTROL STORAGE CAPACITY
1"
2"
3"
4"
5"
6"
25,600 A.F.
FLOOD CONTROL STORAGE AREA
200 Acres
13' Stage
Recreation Storage
Gate Invert = Elev. 292.0
NET DRAINAGE AREA = 74 SQ. MI.
ONE INCH OF RUNOFF = 3950 AC-FT
0
2
4
6
8
10
12
14
16
18
20
22
24
26
CAPACITY IN THOUSAND ACRE-FEET
THAMES RIVER FLOOD CONTROL
QUINEBAUG RIVER
WEST THOMPSON
RESERVOIR
AREA AND CAPACITY CURVES
New England Division
Boston, Mass.
May 1965

PLATE NO. A-41

A P P E N D I X B

THAMES RIVER BASIN

DISCHARGE RATING CURVES AND TABLES

APPENDIX B

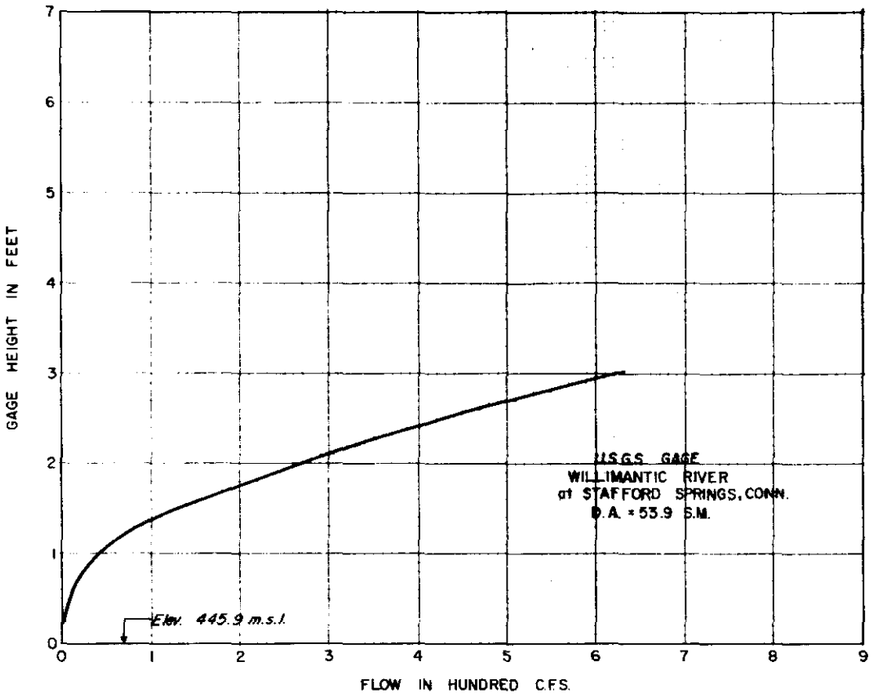
THAMES RIVER BASIN

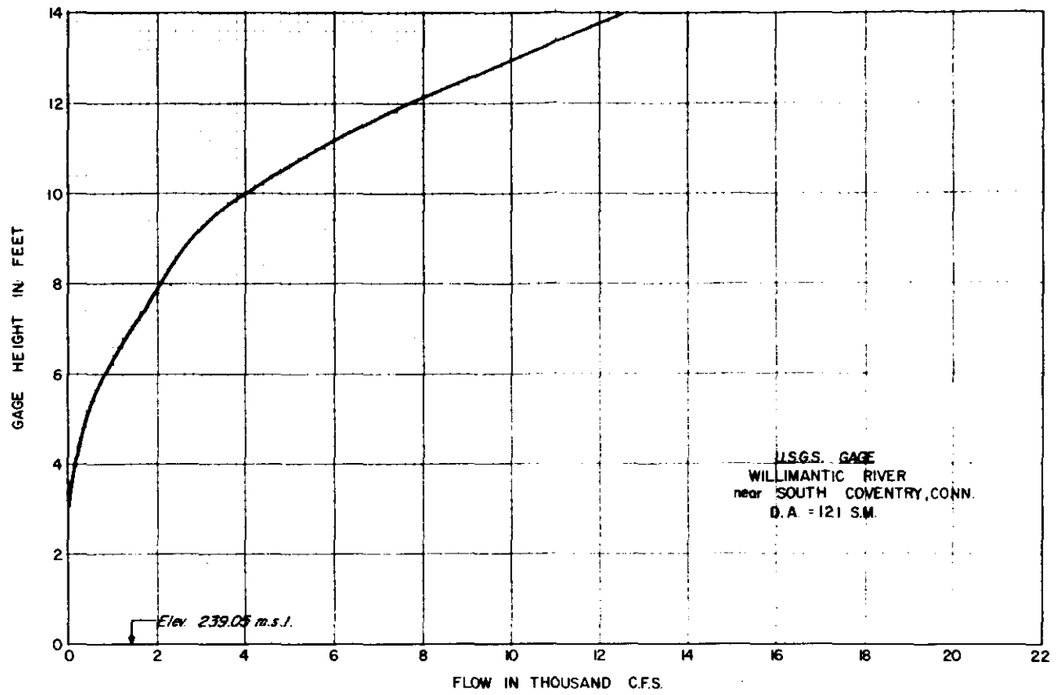
DISCHARGE RATING CURVES AND TABLES

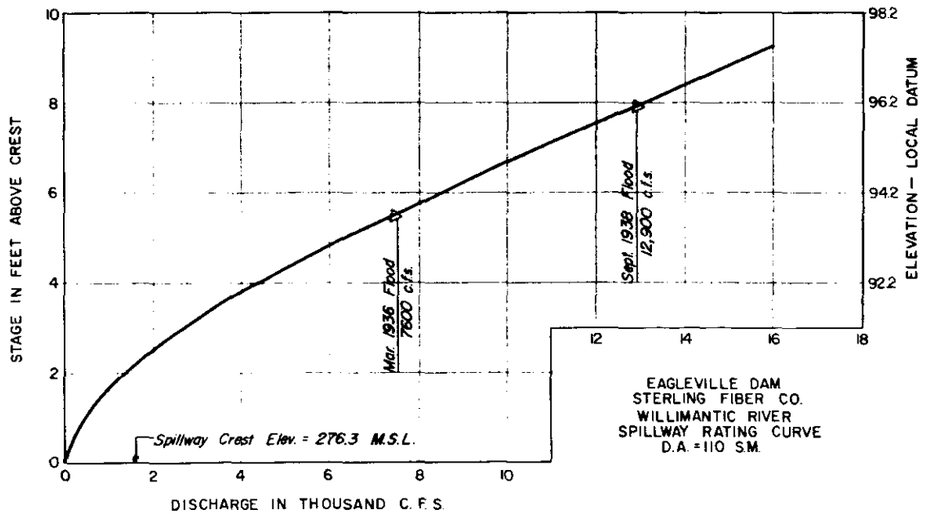
Plate	List of Plates
B-1	RATING CURVES
	Willimantic River at Stafford Springs, Conn. (USGS Gage) Willimantic River at Eagleville Dam, Conn. Willimantic River at South Coventry, Conn. (USGS Gage) Willimantic River at American Thread Co. (Dam #2)
B-2	RATING CURVES
	Hop River at Columbia, Conn. (USGS Gage) Mount Hope River at Warrenville, Conn. (USGS Gage) Natchaug River at Willimantic, Conn. (USGS Gage) Shetucket River at Willimantic, Conn. (USGS Gage)
B-3	RATING CURVES
	Shetucket River at Scotland Dam, Conn. Shetucket River at Baltic Dam, Conn. Shetucket River at Occum Dam, Conn. Shetucket River at Ponemah Dam, Conn.
B-4	RATING CURVES
	Shetucket River at Norwich, Conn. (Tunnel Dam Tailwater) Shetucket River at Norwich, Conn. (Greenville Dam) Shetucket River at Norwich, Conn. (Channel Improvement)
B-5	RATING CURVES
	Quinebaug River below East Brimfield Dam, Mass. Quinebaug River below Westville Dam, Mass.
B-6	RATING CURVES
	Quinebaug River at Old Sturbridge Village Dam, Mass. Quinebaug River below Westville Dam, Mass. Quinebaug River at Russell Harrington Co. Dam, Mass. Quinebaug River at American Optical Co. Dam, Mass. Quinebaug River at Quinebaug, Conn. (USGS Gage)

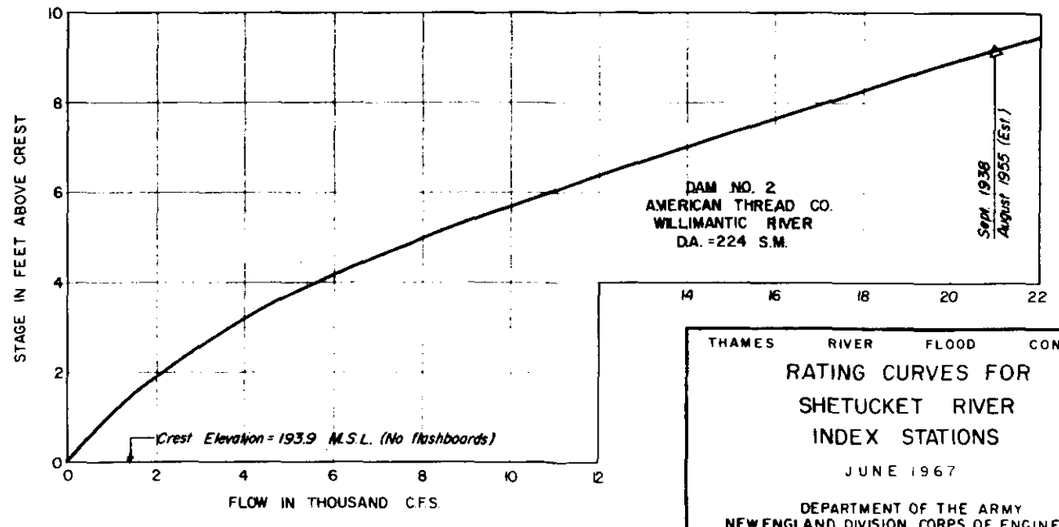
Plate	List of Plates
B-7	RATING CURVES
	Little River at Gordon Chemical Co. Dam, Mass. Little River at Buffumville, Mass. (USGS Gage) French River below Hodges Village Dam, Mass. (USGS Gage) French River at Associated Industries Dam, Mass. French River at Webster, Mass. (USGS Gage)
B-8	RATING CURVES
	Quinebaug River at Belding-Hemingway Co. Dam, Conn. Quinebaug River at Metal-Selling Co. Dam, Conn. Quinebaug River at Cargill Falls Dam, Conn. Quinebaug River at Putnam, Conn. (USGS Gage)
B-9	RATING CURVES
	Quinebaug River at Rogers, Conn. Quinebaug River at Danielson, Conn. Quinebaug River at Wauregan, Conn. Moosup River at Moosup, Conn. Five Mile River at Killingly, Conn.
B-10	RATING CURVES
	Pachaug River at Pachaug, Conn. (USGS Gage) Quinebaug River at Aspinook Co. Dam, Conn. Quinebaug River at Jewett City, Conn. (USGS Gage) Quinebaug River at Tunnel Dam, Conn. (Headwater)
B-11	RATING TABLE
	Natchaug River below Mansfield Hollow Dam, Conn.
B-12	RATING TABLE
	Shetucket River at Willimantic, Conn.
B-13	RATING TABLE
	Quinebaug River below Westville Dam, Mass.
B-14	RATING TABLE
	Little River below Buffumville Dam, Mass.

Plate	List of Plates
B-15	RATING TABLE
	French River below Hodges Village Dam, Mass.
B-16	RATING TABLE
	French River at Webster, Mass.
B-17	RATING TABLE
	Quinebaug River at Putnam, Conn.
B-18	RATING TABLE
	Quinebaug River at Jewett City, Conn.









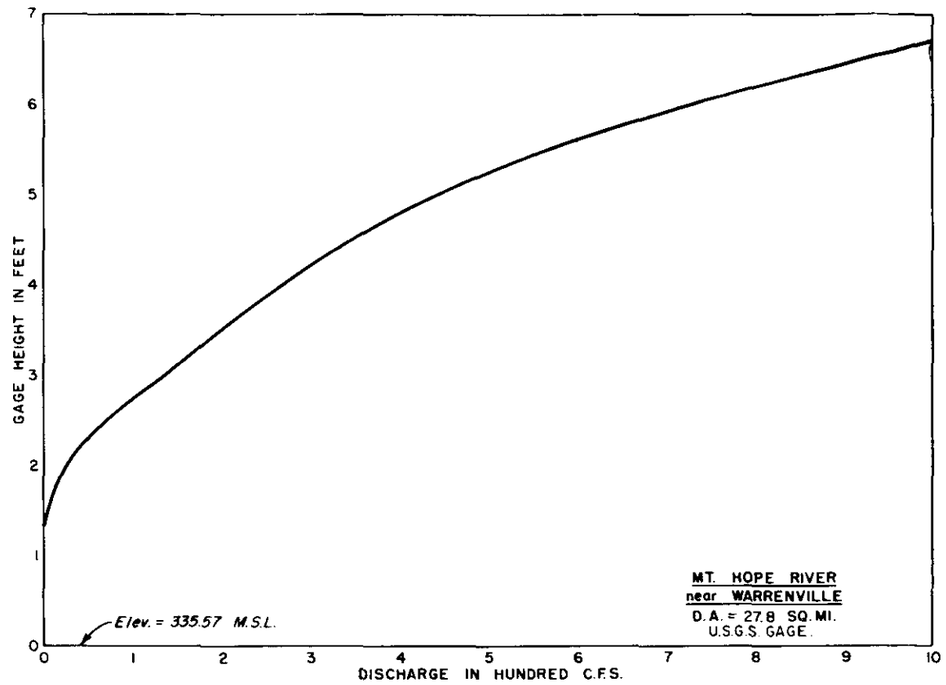
THAMES RIVER FLOOD CONTROL

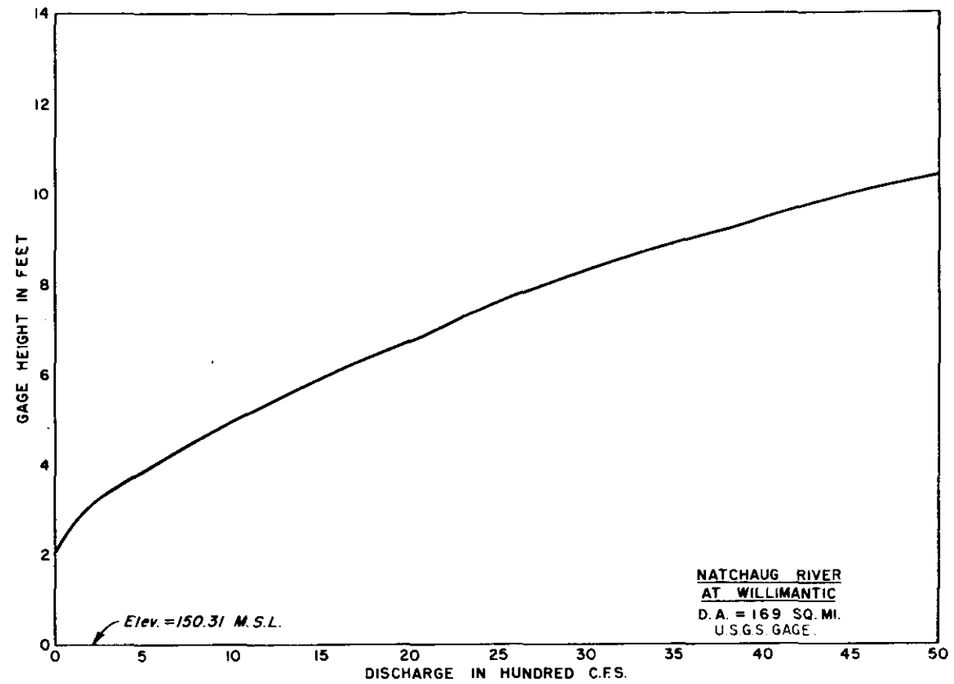
RATING CURVES FOR
SHETUCKET RIVER
INDEX STATIONS

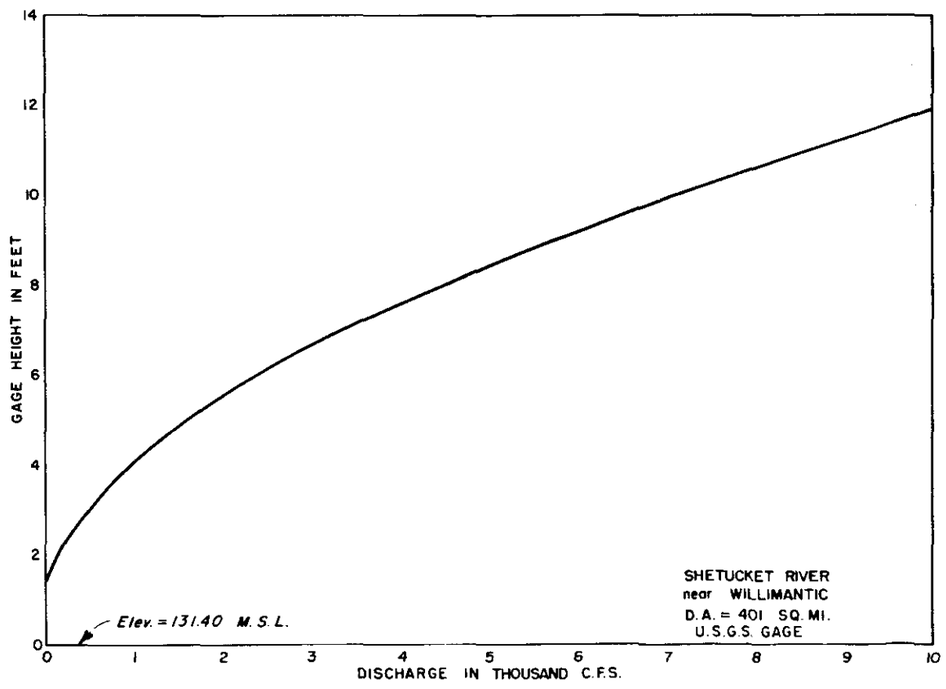
JUNE 1967

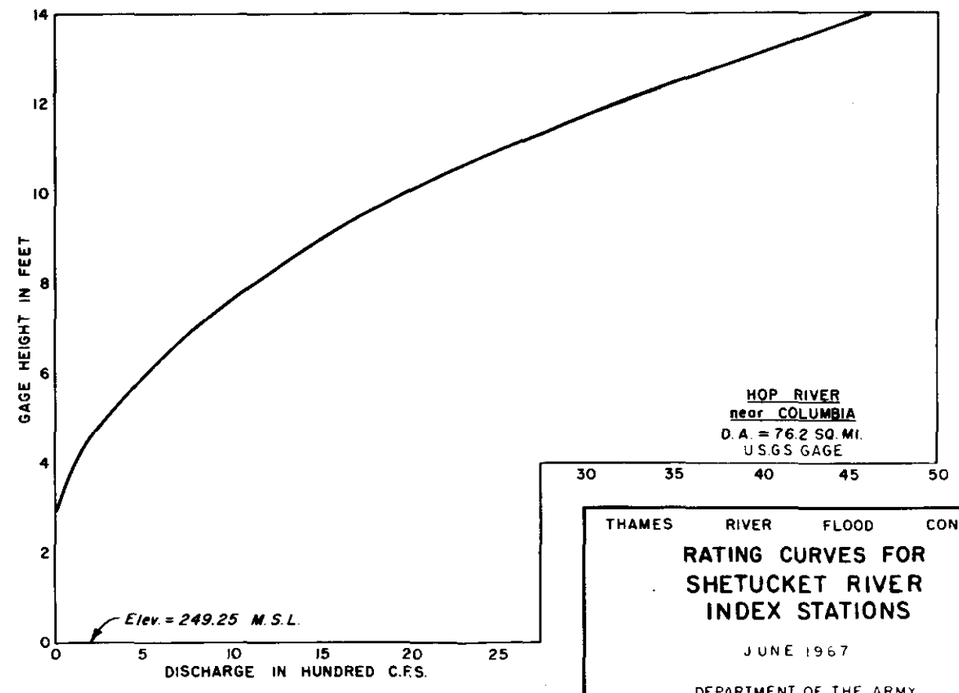
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. B-1









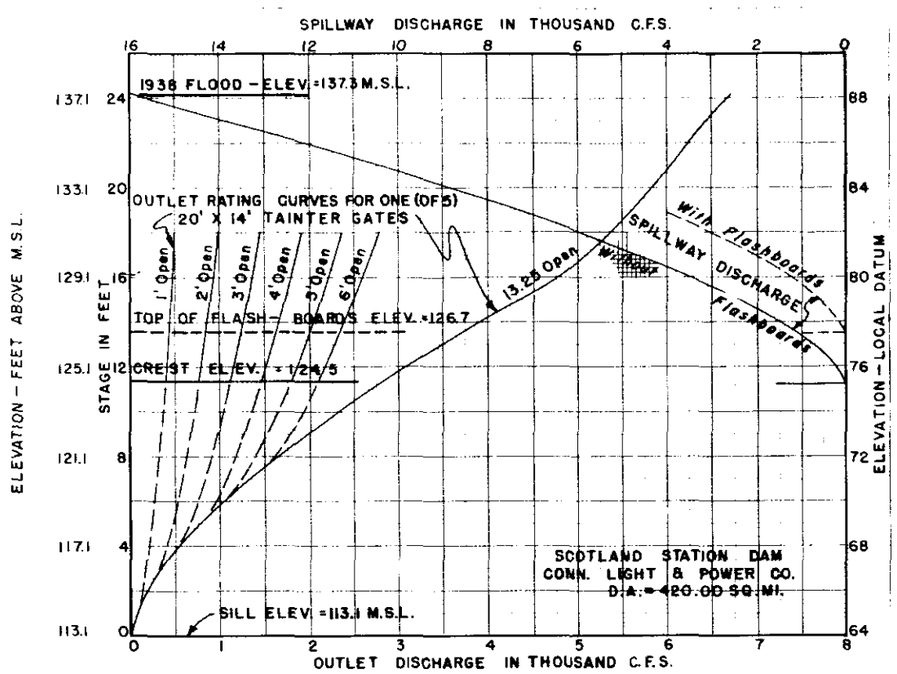
THAMES RIVER FLOOD CONTROL

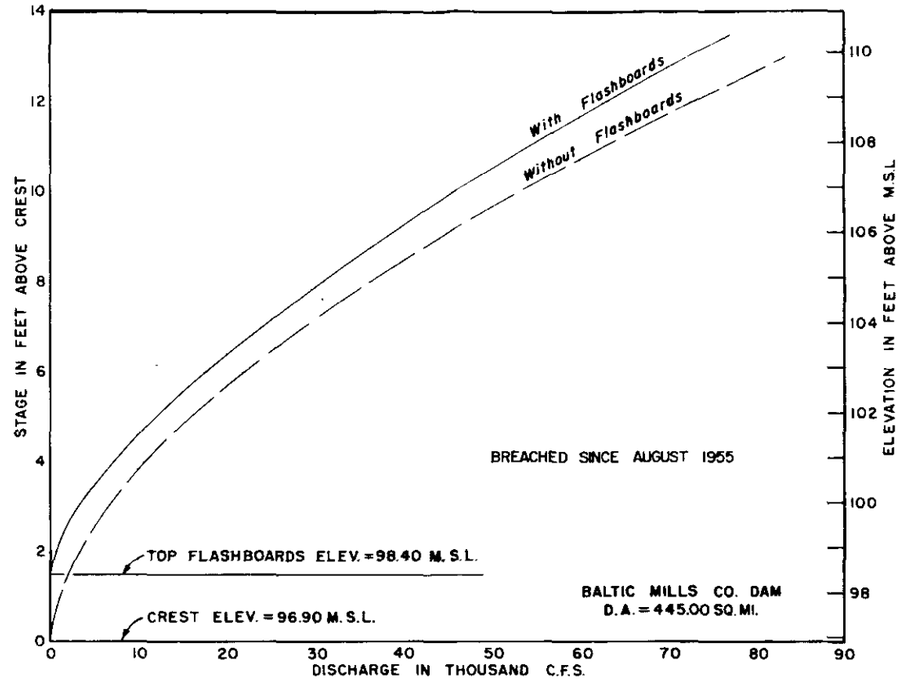
RATING CURVES FOR SHETUCKET RIVER INDEX STATIONS

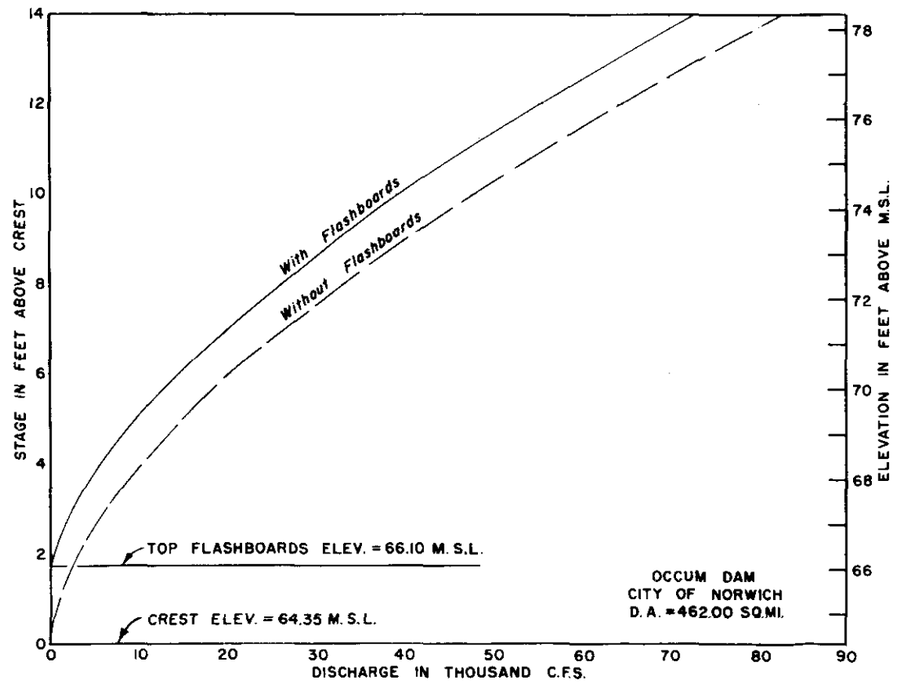
JUNE 1967

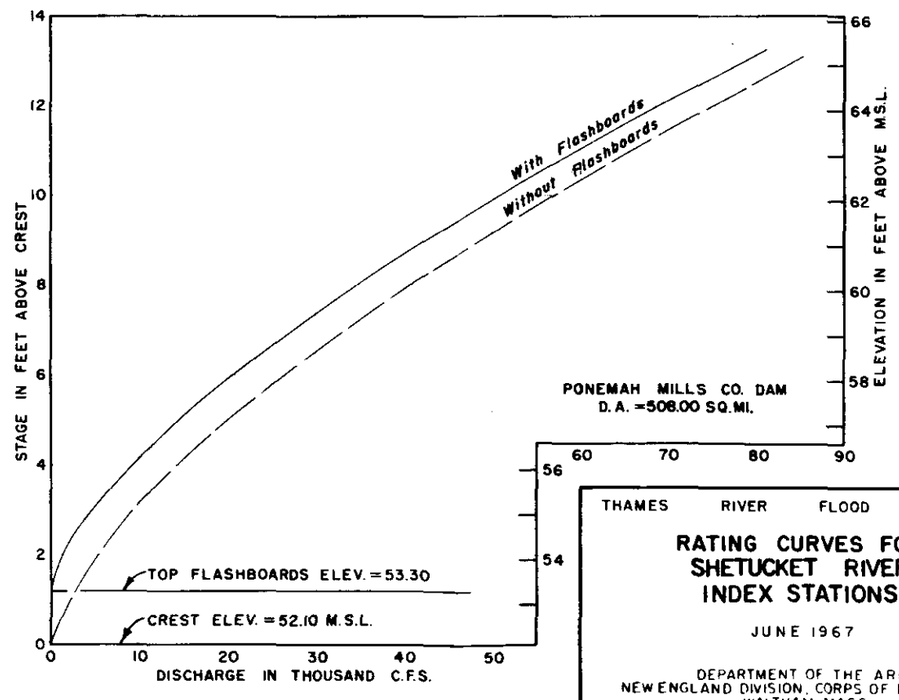
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. B-2









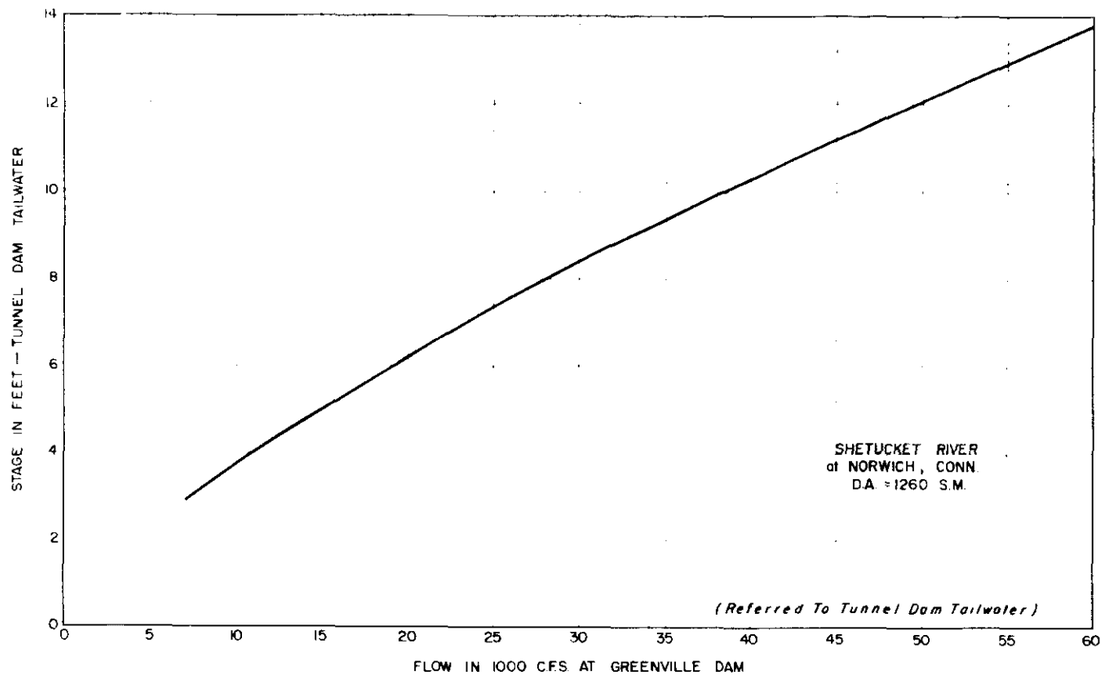
THAMES RIVER FLOOD CONTROL

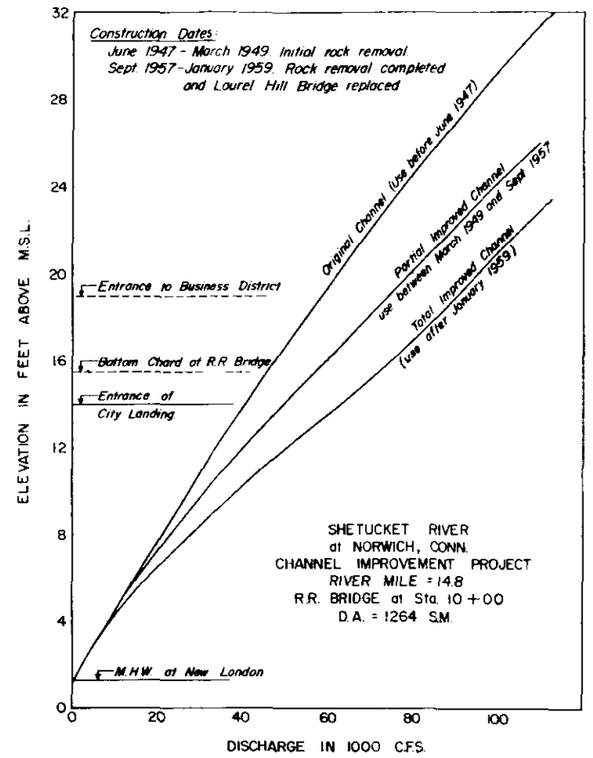
RATING CURVES FOR SHETUCKET RIVER INDEX STATIONS

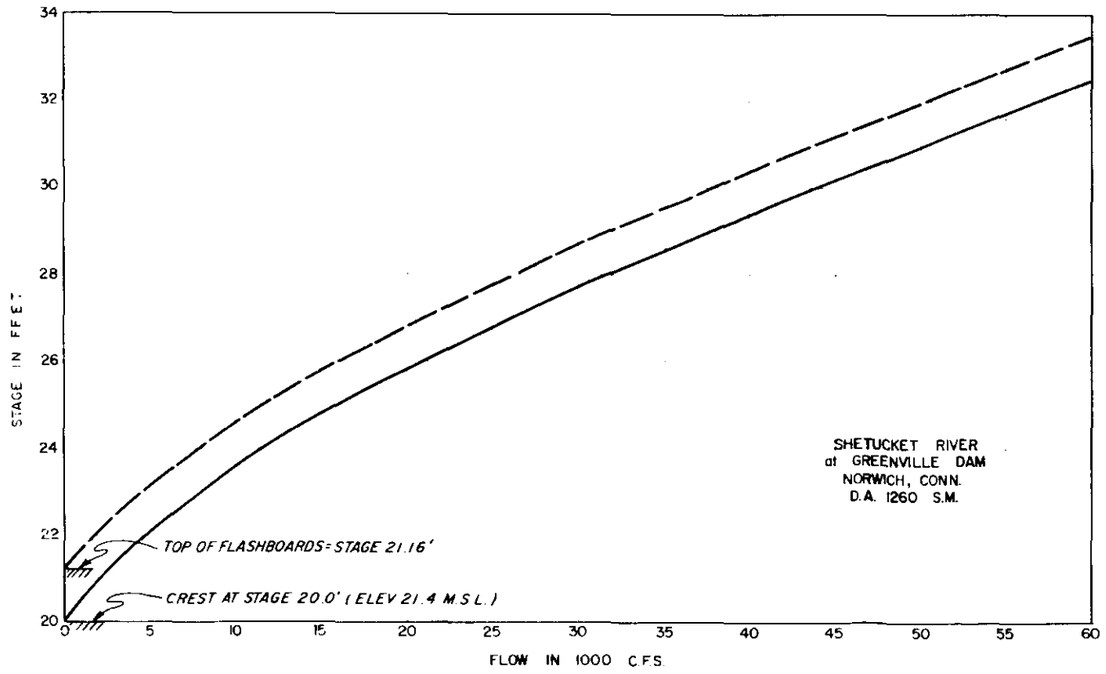
JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

PLATE NO. B-3







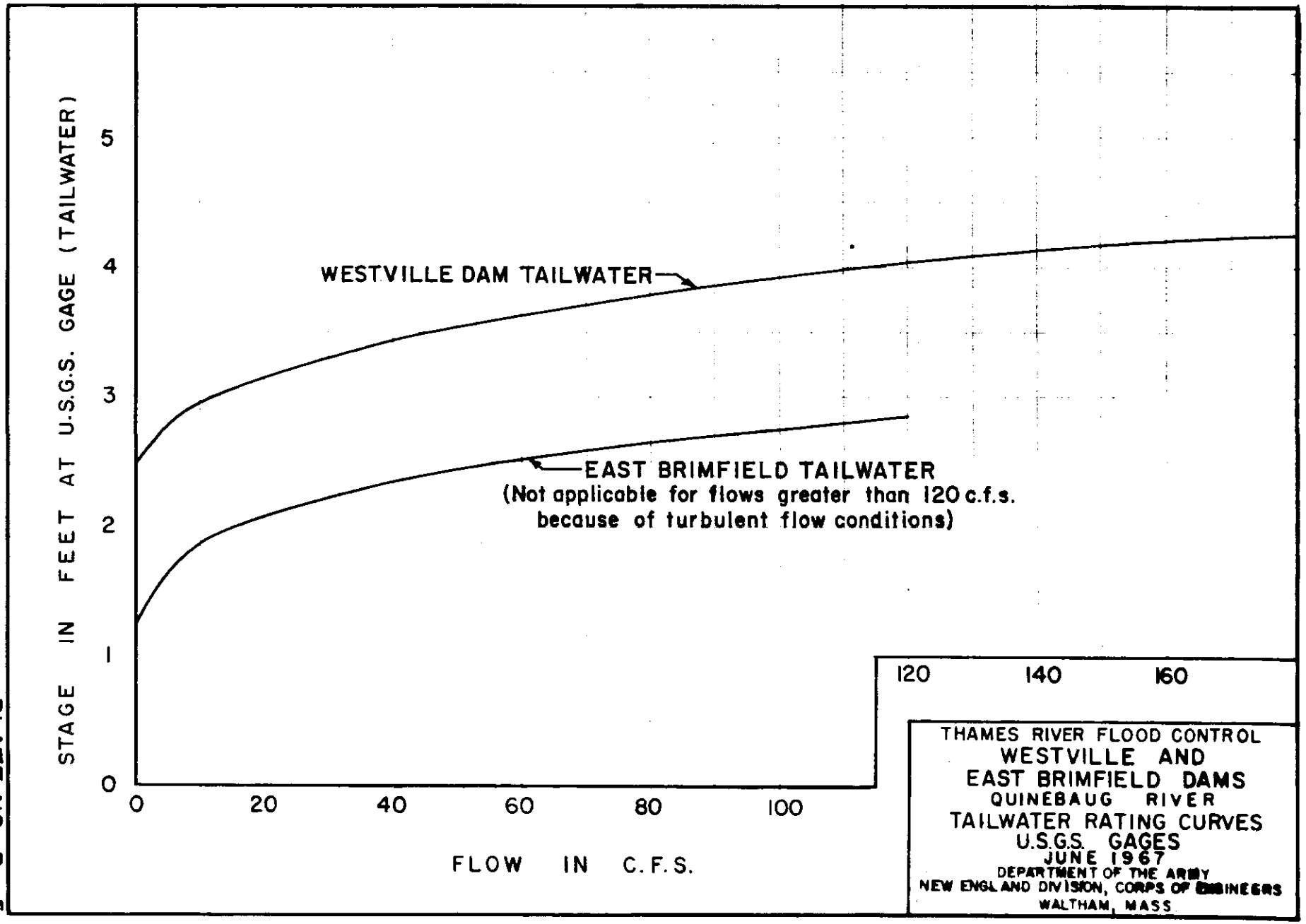
THAMES RIVER FLOOD CONTROL

RATING CURVES FOR
SHETUCKET RIVER
INDEX STATIONS

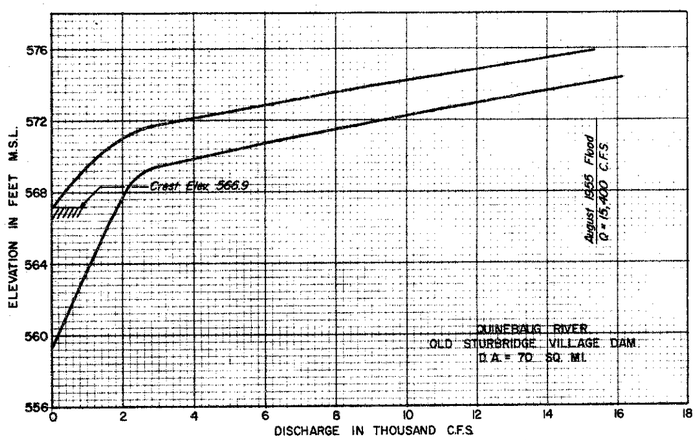
JUNE 1967

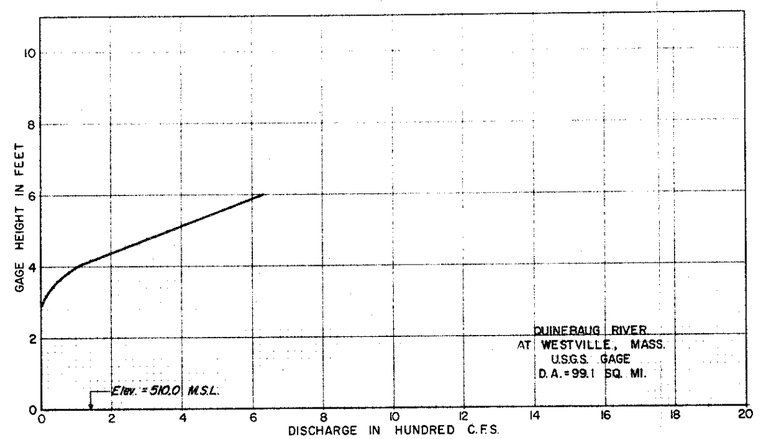
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

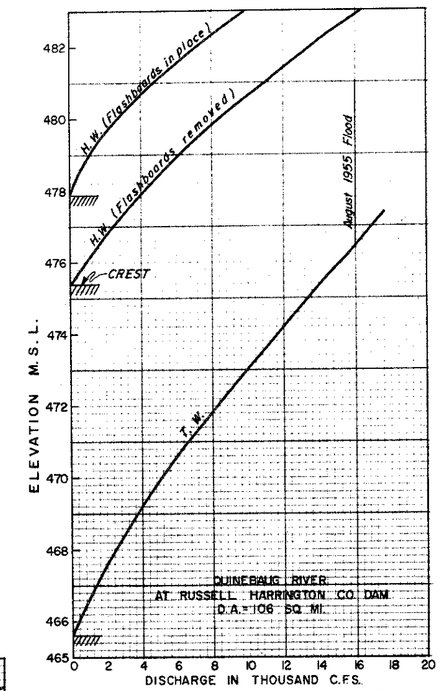
PLATE NO. R-4

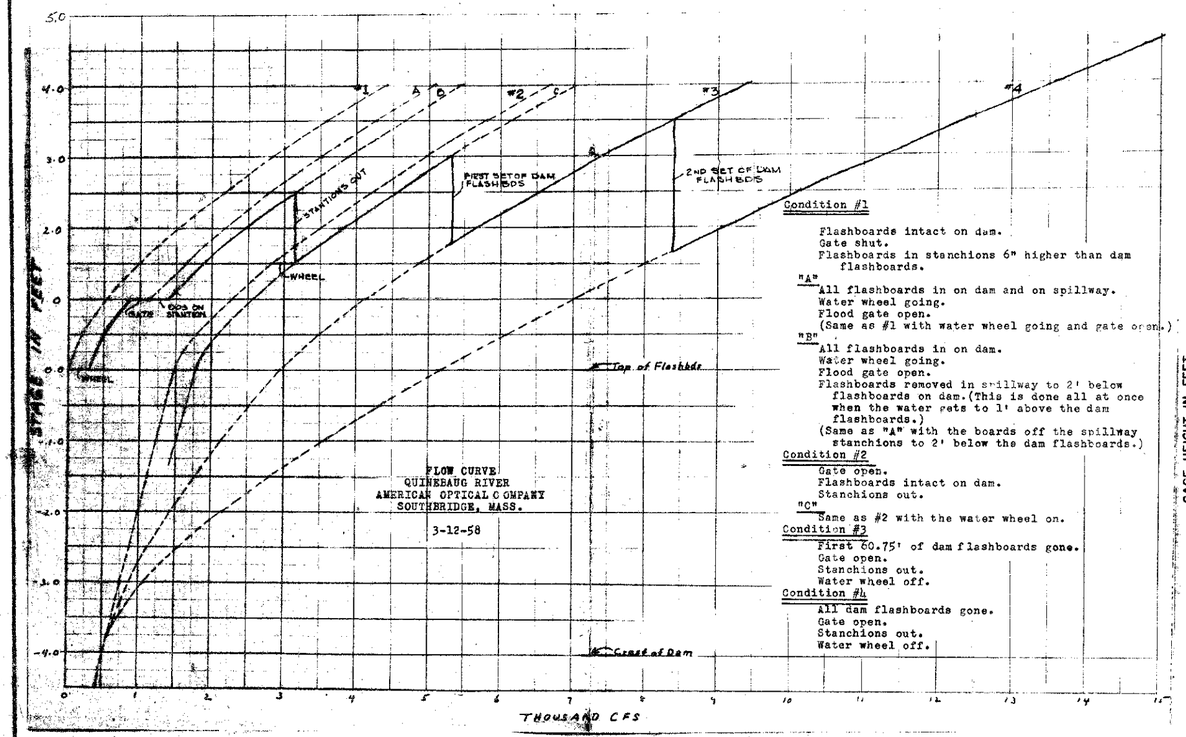


THAMES RIVER FLOOD CONTROL
WESTVILLE AND
EAST BRIMFIELD DAMS
QUINEBAUG RIVER
TAILWATER RATING CURVES
U.S.G.S. GAGES
JUNE 1967
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS









Condition #1

Flashboards intact on dam.
Gate shut.
Flashboards in stanchions 6" higher than dam flashboards.

"A"

All flashboards in on dam and on spillway.
Water wheel going.
Flood gate open.
(Same as #1 with water wheel going and gate open.)

"B"

All flashboards in on dam.
Water wheel going.
Flood gate open.
Flashboards removed in spillway to 2' below flashboards on dam.(This is done all at once when the water rets to 1' above the dam flashboards.)
(Same as "A" with the boards off the spillway stanchions to 2' below the dam flashboards.)

Condition #2

Gate open.
Flashboards intact on dam.
Stanchions out.

"C"

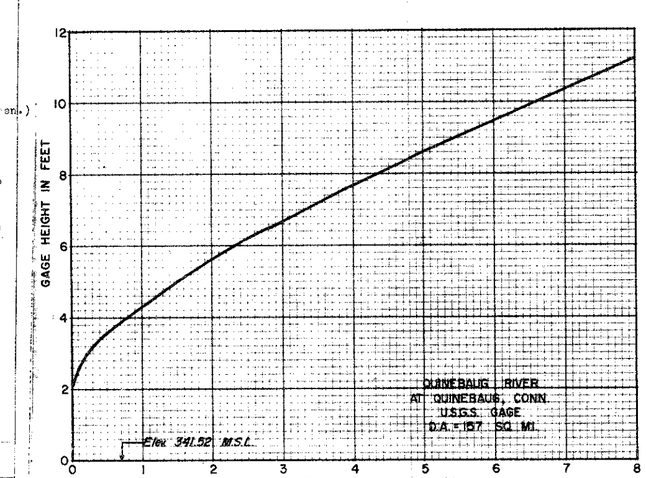
Same as #2 with the water wheel on.

Condition #3

First 60.75' of dam flashboards gone.
Gate open.
Stanchions out.
Water wheel off.

Condition #4

All dam flashboards gone.
Gate open.
Stanchions out.
Water wheel off.



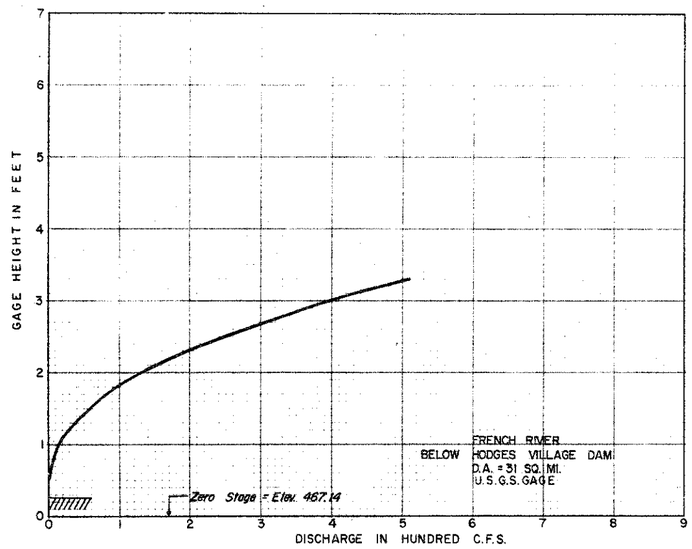
THAMES RIVER FLOOD CONTROL

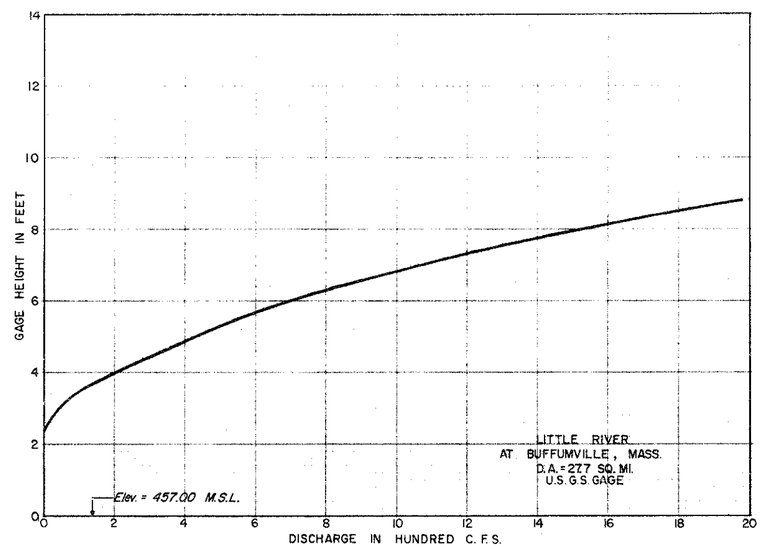
RATING CURVES FOR
QUINEBAUG RIVER
INDEX STATIONS

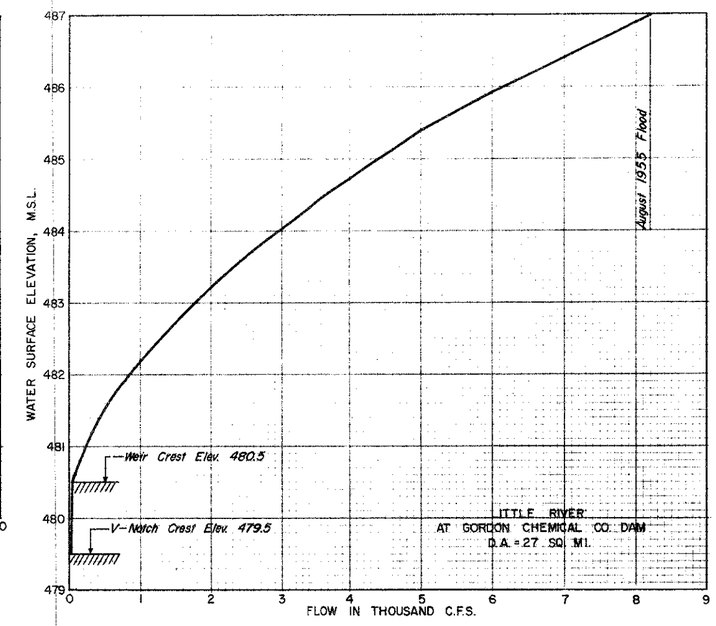
JUNE 1967

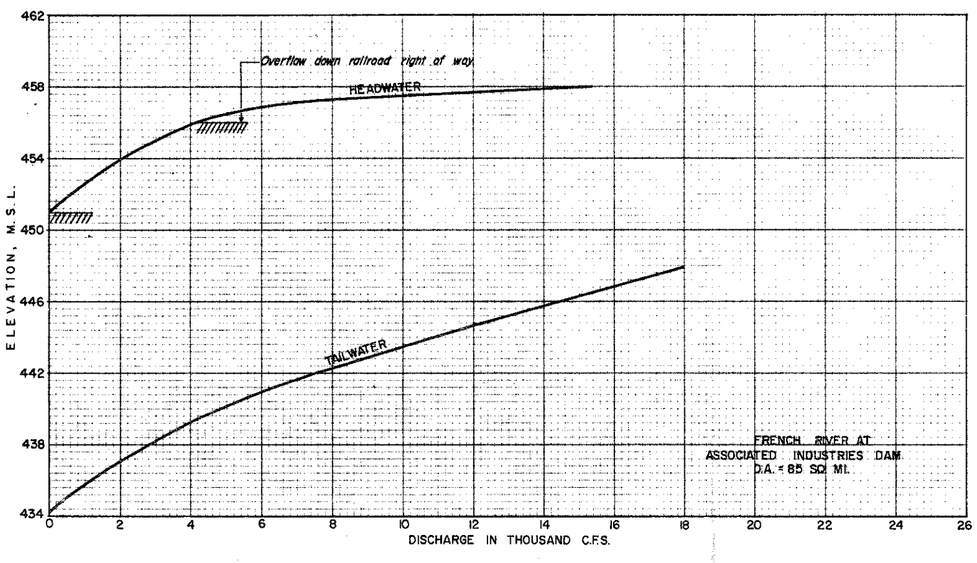
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

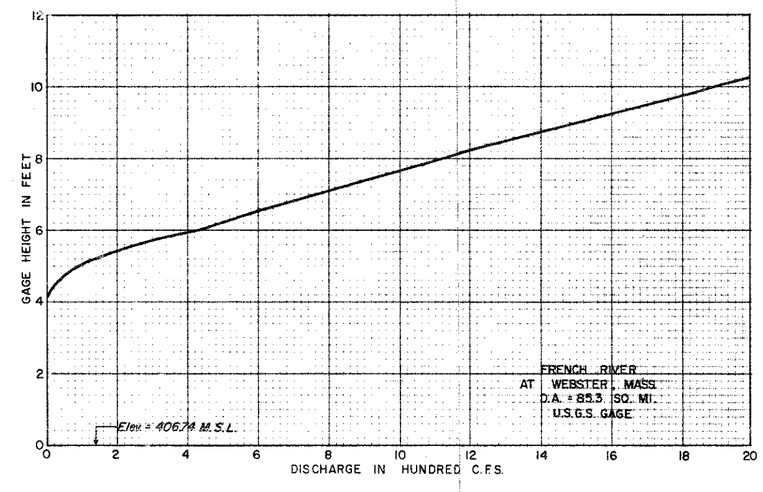
PLATE NO. B-6









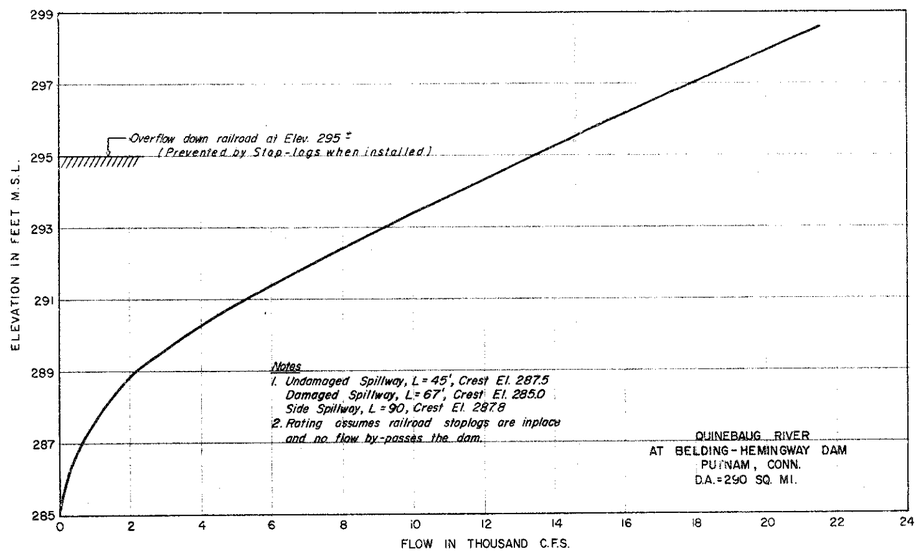


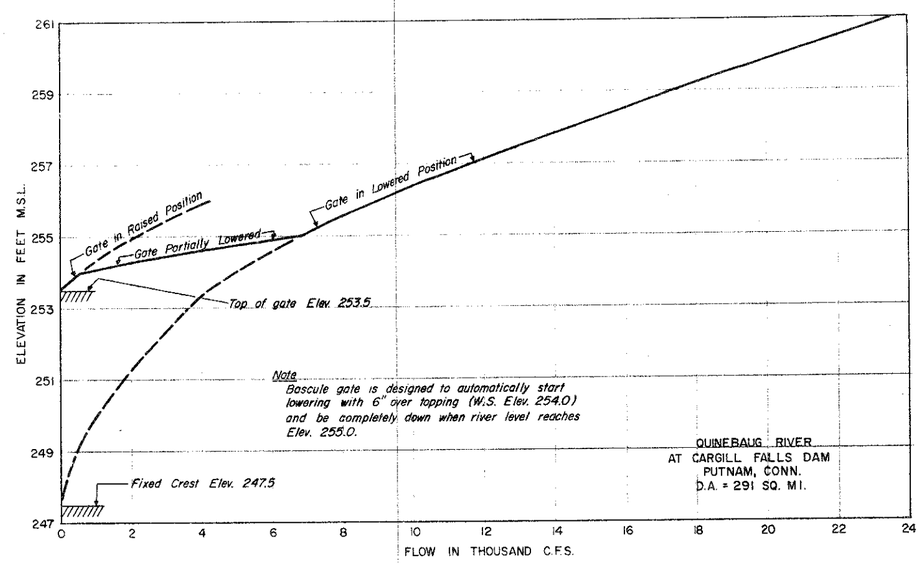
THAMES RIVER FLOOD CONTROL

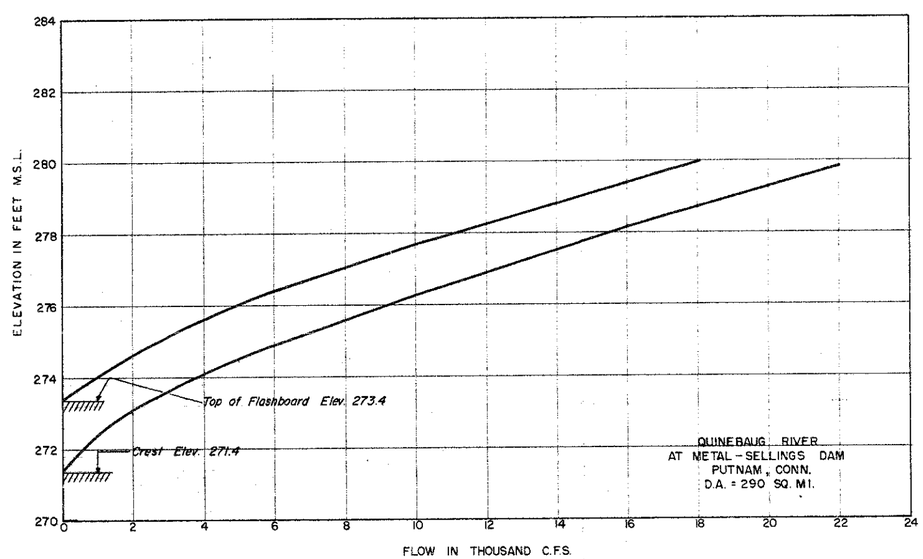
RATING CURVES FOR
QUINEBAUG RIVER
INDEX STATIONS

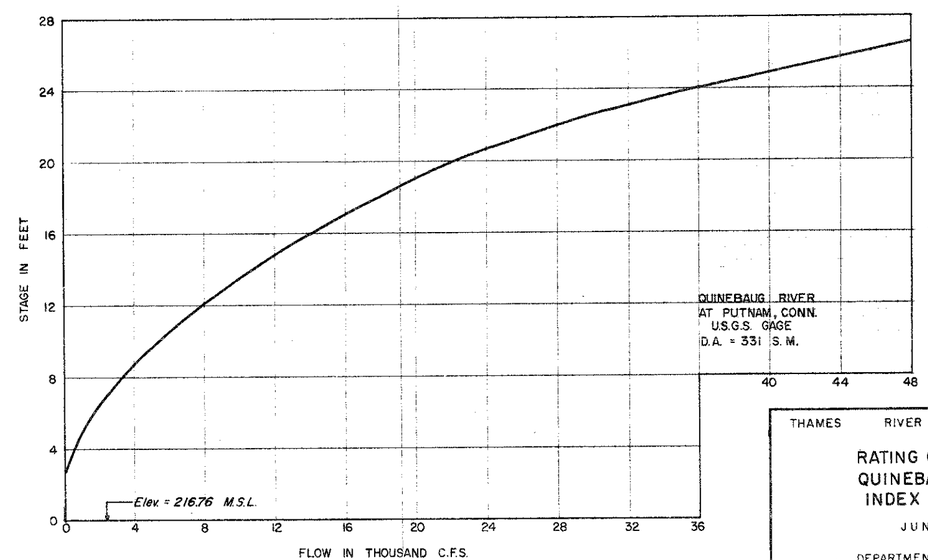
JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.







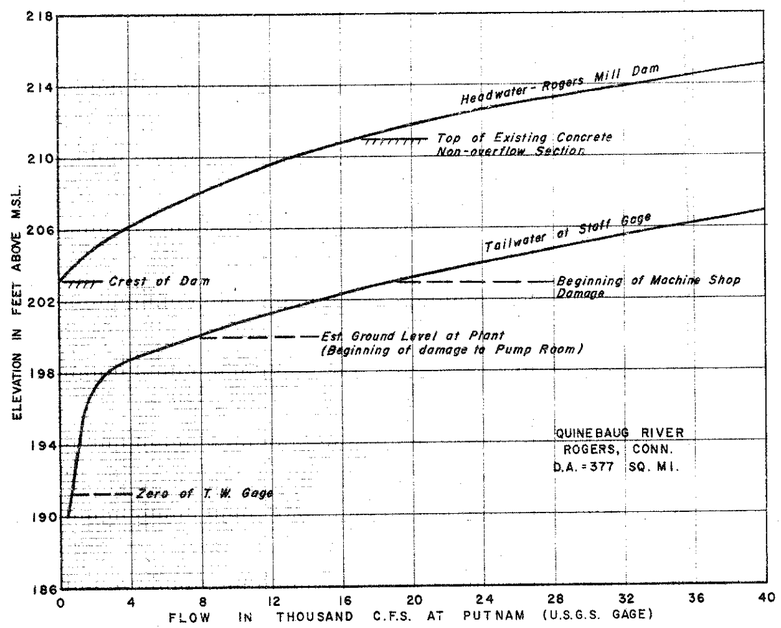


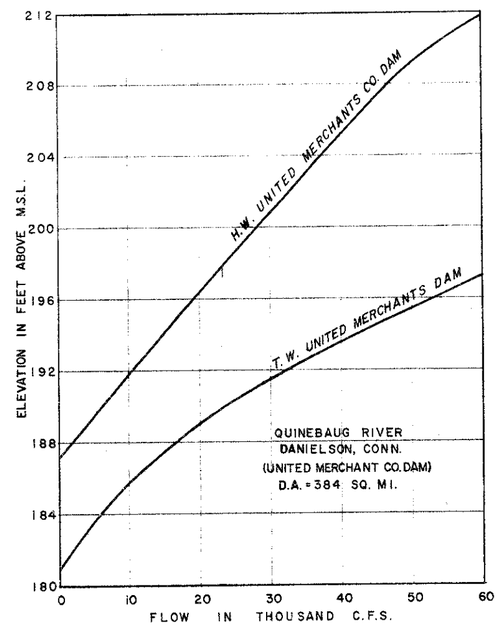
THAMES RIVER FLOOD CONTROL

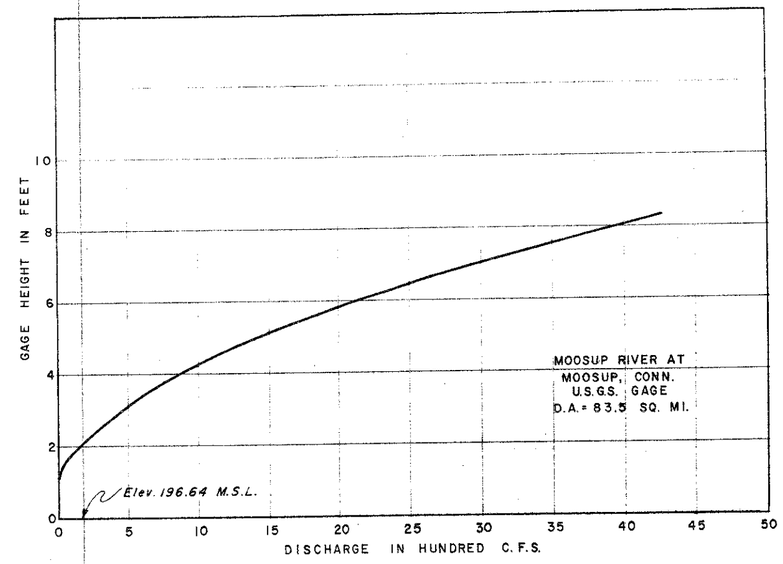
RATING CURVES FOR
QUINEBAUG RIVER
INDEX STATIONS

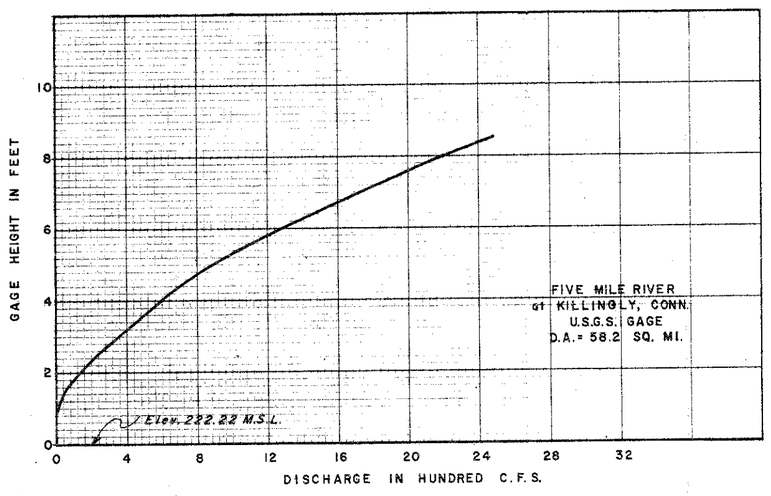
JUNE 1967

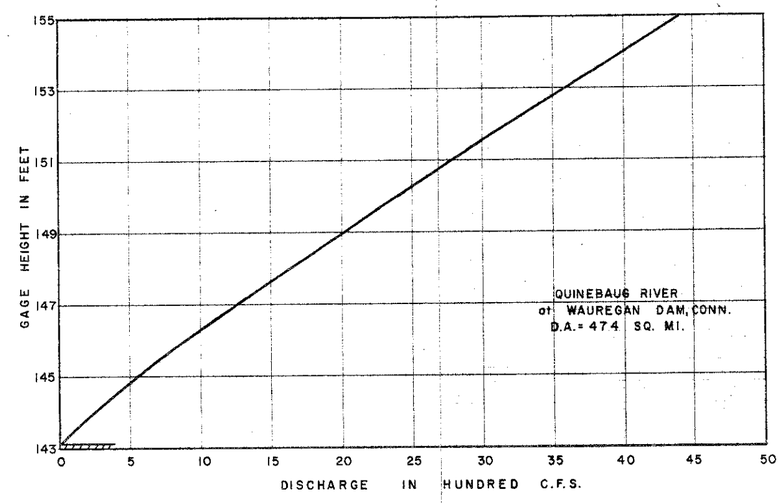
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.











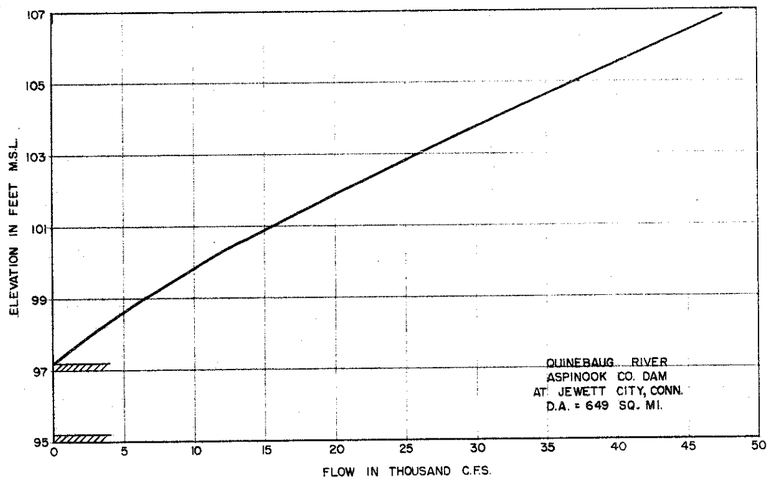
THAMES RIVER FLOOD CONTROL

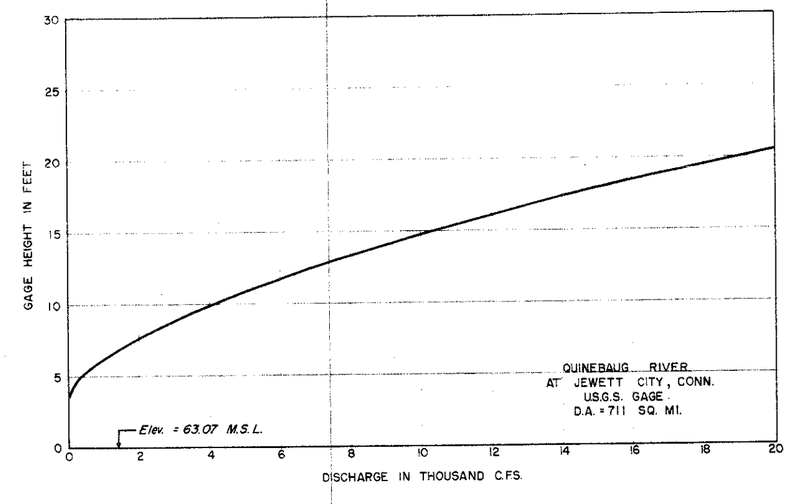
RATING CURVES FOR
QUINEBAUG RIVER
INDEX STATIONS

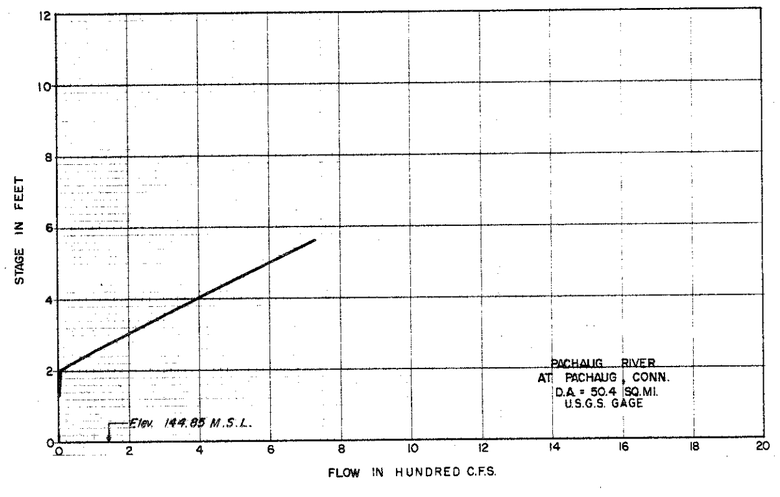
JUNE 1967

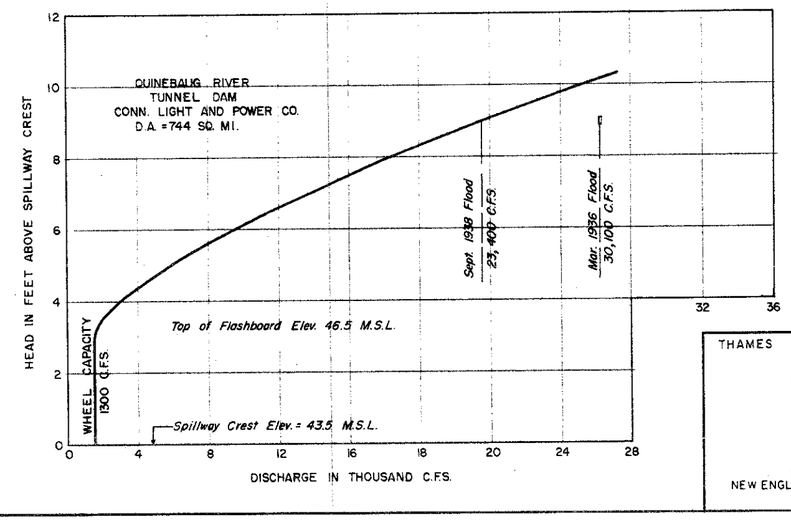
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. B-9









THAMES RIVER FLOOD CONTROL

RATING CURVES FOR
QUINEBAUG RIVER
INDEX STATIONS

JUNE 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE NO. B-10

9-210

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES BRANCH

File No. { Washington ..... Field .....

Rating table for Natchaug River at Willimantic, Conn.

from Oct. 1, 19 50, *to* ....., 19 ....

Gauge height Feet	Discharge Sec.-ft.	Difference Sec.-ft.	Gauge height Feet	Discharge Sec.-ft.	Difference Sec.-ft.	Gauge height Feet	Discharge Sec.-ft.	Difference Sec.-ft.	Gauge height Feet	Discharge Sec.-ft.	Difference Sec.-ft.	Gauge height Feet	Discharge Sec.-ft.	Difference Sec.-ft.
2.00			4.00	650	45	6.00	1630	50	8.00	2810	70	10.00	4610	120
.10			.10	695	45	.10	1680	50	.10	2880	70	.10	4730	120
.20	19	13	.20	740	45	.20	1730	60	.20	2950	70	.20	4850	120
.30	32	16		785	45	.30	1790	60	.30	3020	70	.30	4970	120
.40	48	20	.40	830	50	.40	1850	60	.40	3090	80	.40	5090	130
.50	68	23	.50	880	50	.50	1910	60	.50	3170	80	.50	5220	130
.60	91	26	.60	930	50	.60	1970	60	.60	3250	80	.60	5350	130
.70	117	28	.70	980	50	.70	2030	60	.70	3330	80	.70	5480	140
.80	145	32	.80	1030	50	.80	2090	60	.80	3410	90	.80	5620	140
.90	177	35	.90	1080	50	.90	2150	60	.90	3500	90	.90	5760	140
3.00	212	38	5.00	1130	50	7.00	2210	60	9.00	3590	90	11.00	5900	150
.10	250	40	.10	1180	50	.10	2270	60	.10	3680	90	.10	6050	150
.20	290	45	.20	1230	50	.20	2330	60	.20	3770	100	.20	6200	200
.30	335	45	.30	1280	50	.30	2390	60	.30	3870	100	.30	6400	200
.40	380	45	.40	1330	50	.40	2450	60	.40	3970	100	.40	6600	200
.50	425	45	.50	1380	50	.50	2510	60	.50	4070	100	.50	6800	250
.60	470	45	.60	1430	50	.60	2570	60	.60	4170	110	.60	7050	250
.70	515	45	.70	1480	50	.70	2630	60	.70	4280	110	.70	7300	250
.80	560	45	.80	1530	50	.80	2690	60	.80	4390	110	.80	7550	250
.90	605	45	.90	1580	50	.90	2750	60	.90	4500	110	.90	7800	300

The above table is not applicable for ice or obstructed channel conditions. It is based on 665 discharge measurements made during 1945-53 (XMS-187) except B.W. measurements #121, 123, 134, 144, 148, 155, 156, 106 and on H. W. measurements #39a, 54, 54a, 111, 82

and is ..... well defined between 4 second-feet and 7000 second-feet.

Same as preceding rating 5-31-50 below 3.4' and above 10.1' and is probably effective from ~~Jan. 2, 1945~~ Jan. 2, 1945 and represents a reaveraging between stages of 3.4' and 10.1'.

1% Limits

4.0' to 5.5' (half-tenths).

Computed by T. J. I.

Checked by M. B. S.

Date 5-14-53.

March, 1915 ~~[illegible]~~

PLATE NO. B-11

9-210 (Nov. 1955)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY (WATER RESOURCES DIVISION)

File No. Washington 1 -25.00
Field

Rating table for Shetucket River nr. Willimantic, Conn.

from Feb. 21 *19* 61 *to* *19* *from* *19* *to* *19*

Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs
1.00			3.00	500	50	5.00	1,700	80	7.00	3,500	100	9.00	5,770	130	11.00	8,610	150	13.00	12,000	180
.10			.10	550	50	.10	1,780	80	.10	3,600	100	.10	5,900	130	.10	8,760	160	.10	12,180	180
.20			.20	600	50	.20	1,860	80	.20	3,700	100	.20	6,030	130	.20	8,920	160	.20	12,360	200
.30	19	11	.30	650	50	.30	1,940	80	.30	3,800	100	.30	6,160	130	.30	9,080	160	.30	12,560	200
.40	30	12	.40	700	50	.40	2,020	80	.40	3,900	110	.40	6,290	130	.40	9,240	160	.40	12,760	200
.50	42	14	.50	750	50	.50	2,100	80	.50	4,010	110	.50	6,420	140	.50	9,400	160	.50	12,960	200
.60	56	17	.60	800	60	.60	2,180	90	.60	4,120	110	.60	6,560	140	.60	9,560	160	.60	13,160	200
.70	73	19	.70	860	60	.70	2,270	90	.70	4,230	110	.70	6,700	140	.70	9,720	160	.70	13,360	200
.80	92	23	.80	920	60	.80	2,360	90	.80	4,340	110	.80	6,840	140	.80	9,880	160	.80	13,560	200
.90	115	25	.90	980	60	.90	2,450	90	.90	4,450	110	.90	6,980	140	.90	10,040	160	.90	13,760	200
2.00	140	25	4.00	1,040	60	6.00	2,540	90	8.00	4,560	110	10.00	7,120	140	12.00	10,200	180	14.00	13,960	200
.10	165	30	.10	1,100	60	.10	2,630	90	.10	4,670	120	.10	7,260	150	.10	10,380	180	.10	14,160	200
.20	195	35	.20	1,160	60	.20	2,720	90	.20	4,790	120	.20	7,410	150	.20	10,560	180	.20	14,360	200
.30	230	35	.30	1,220	60	.30	2,810	90	.30	4,910	120	.30	7,560	150	.30	10,740	180	.30	14,560	200
.40	265	35	.40	1,280	70	.40	2,900	100	.40	5,030	120	.40	7,710	150	.40	10,920	180	.40	14,860	200
.50	300	40	.50	1,350	70	.50	3,000	100	.50	5,150	120	.50	7,860	150	.50	11,100	180	.50	14,960	200
.60	340	40	.60	1,420	70	.60	3,100	100	.60	5,270	120	.60	8,010	150	.60	11,280	180	.60	15,160	200
.70	380	40	.70	1,490	70	.70	3,200	100	.70	5,390	120	.70	8,160	150	.70	11,460	180	.70	15,360	200
.80	420	40	.80	1,560	70	.80	3,300	100	.80	5,510	130	.80	8,310	150	.80	11,640	180	.80	15,560	200
.90	460	40	.90	1,630	70	.90	3,400	100	.90	5,640	130	.90	8,460	150	.90	11,820	180	.90	15,760	200

DIATE NO R-12

This table is applicable for open-channel conditions. It is based on 8 discharge measurements made during 1961 (224-231)
and previous rating No. 17 above
Same as rating No. 17 above 9.5 and below 3.0 ft. and is well defined [redacted] 30 cfs and cfs.
1% Limits: Use half tenths 3.5 to 5.5 ft.

Comp by JH date 11/1/61.
Ckd by JH date 11/1/61.
Table No. 18.

9-210
(Rev 5-63)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY (WATER RESOURCES DIVISION)

Sta. No. 1A-1236.00

Rating table for Quinebaug River below Westville Dam, near Southbridge, Mass

, from Oct. 1, 1963, to , 19 , from , 19 , to , 19

Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs
2.00			4.00	114	19	6.00	635		.00			.00			.00			.00		
.10			.10	133	23	.10			.10			.10			.10			.10		
.20	0	Curve	.20	156	26	.20			.20			.20			.20			.20		
.30	.002		.30	182	28	.30			.30			.30			.30			.30		
.40	.30	From	.40	210	30	.40			.40			.40			.40			.40		
.50	.85		.50	240		.50			.50			.50			.50			.50		
.60	1.90		.60	270		.60			.60			.60			.60			.60		
.70	3.65		.70	300	30	.70			.70			.70			.70			.70		
.80	6.10	3.0	.80	330	28	.80			.80			.80			.80			.80		
.90	9.10	3.8	.90	358	27	.90			.90			.90			.90			.90		
3.00	12.9	4.6	5.00	385	25	.00			.00			.00			.00			.00		
.10	17.5	5.5	.10	410		.10			.10			.10			.10			.10		
.20	23.0	6.6	.20	435		.20			.20			.20			.20			.20		
.30	29.6	7.9	.30	460		.30			.30			.30			.30			.30		
.40	37.5	9.0	.40	485		.40			.40			.40			.40			.40		
.50	46.5	10.5	.50	510		.50			.50			.50			.50			.50		
.60	57.0	11.5	.60	535		.60			.60			.60			.60			.60		
.70	68.5	13.5	.70	560		.70			.70			.70			.70			.70		
.80	82	15	.80	585		.80			.80			.80			.80			.80		
.90	97	17	.90	610	25	.90			.90			.90			.90			.90		

This table is applicable for open-channel conditions. It is based on 14 discharge measurements made during 1962(1), 1963(8,9), 1964(10-19), 1965(20), and is well defined above 4 cfs.

Comp by RH date 10/29/64

Ckd by RAG date 11-30-64

It is identical with rating 1 above 3.4 ft.

Use hundreths throughout

Table No. 2

U.S. GOVERNMENT PRINTING OFFICE 1963 O - 686 349

PLATE NO. B-13

9-210
(Rev 5 63)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY (WATER RESOURCES DIVISION)

Sta. No. 1A-1245.00

Rating table for Little River at Buffumville, Mass.

, from Jan 26, 1964, to , 19, from , 19, to , 19

Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs
1.00			3.00	43	13	5.00	426	22	7.00	1070	40	9.00	2100	60	11.00	3500		.00		
.10			.10	56	16	.10	448	23	.10	1110	40	.10	2160		.10			.10		
.20			.20	72	17	.20	471	24	.20	1150	45	.20	2220		.20			.20		
.30			.30	89	17	.30	495	25	.30	1195		.30	2280		.30			.30		
.40			.40	106	18	.40	520		.40	1240		.40	2340	60	.40			.40		
.50			.50	124	19	.50	545		.50	1285	45	.50	2400	70	.50			.50		
.60			.60	143		.60	570	25	.60	1330	50	.60	2470		.60			.60		
.70			.70	162		.70	595	30	.70	1380		.70	2540		.70			.70		
.80			.80	181	19	.80	625		.80	1430		.80	2610		.80			.80		
.90	0.49		.90	200	20	.90	655	30	.90	1480		.90	2680		.90			.90		
2.00	1.07		4.00	220		6.00	685	35	8.00	1530	50	10.00	2750		.00			.00		
.10	2.00		.10	240		.10	720		.10	1580	55	.10	2820		.10			.10		
.20	3.33	From curve	.20	260		.20	755	35	.20	1635		.20	2890		.20			.20		
.30	4.84		.30	280		.30	790	40	.30	1690		.30	2960		.30			.30		
.40	6.8		.40	300	20	.40	830		.40	1745	55	.40	3030	70	.40			.40		
.50	9.3		.50	320	21	.50	870		.50	1800	60	.50	3100	80	.50			.50		
.60	12.8		.60	341		.60	910		.60	1860		.60	3180		.60			.60		
.70	17.5	7.0	.70	362		.70	950		.70	1920		.70	3260		.70			.70		
.80	24.5	8.5	.80	383	21	.80	990		.80	1980		.80	3340		.80			.80		
.90	33	10	.90	404	22	.90	1030	40	.90	2040	60	.90	3420	80	.90			.90		

Continued on next sheet

DIATF NO B-14

This table is applicable for open-channel conditions. It is based on discharge measurements made during 1962 (302), 1964 (318-325), 1965 (326), is identical with rating 22 below 2.1 and above 6.0 feet, and is well defined ~~between~~ below 1,500 cfs. ~~and~~ ~~of~~

Comp by RAG date 10-9-64
Ckd by GKW date 10-9-64

Use hundredths throughout.

Table No. 23

U.S. GOVERNMENT PRINTING OFFICE : 1963 O—660-300

9-210
(Nov. 1957)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY (WATER RESOURCES DIVISION)

File No. Washington 43.50
Field

Rating table for French River below Hodges Village Dam, at Hodges Village, Mass.

from Mar. 22, 1962 to , 19 , from , 19 , to , 19

Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs
0.00			2.00	135	21	.00			.00			.00			.00			.00			.00		
.10			.10	156	21	.10			.10			.10			.10			.10			.10		
.20			.20	177	22	.20			.20			.20			.20			.20			.20		
.30			.30	199	24	.30			.30			.30			.30			.30			.30		
.40	0.40		.40	223	26	.40			.40			.40			.40			.40			.40		
.50	1.30	Extrapolated	.50	249	28	.50			.50			.50			.50			.50			.50		
.60	2.60		.60	277	29	.60			.60			.60			.60			.60			.60		
.70	4.40		.70	306	30	.70			.70			.70			.70			.70			.70		
.80	6.8		.80	336	31	.80			.80			.80			.80			.80			.80		
.90	9.9		.90	367	33	.90			.90			.90			.90			.90			.90		
1.00	13.8	5.5	3.00	400	35	.00			.00			.00			.00			.00			.00		
.10	19.3	7.2	.10	435	35	.10			.10			.10			.10			.10			.10		
.20	26.5	8.5	.20	470	40	.20			.20			.20			.20			.20			.20		
.30	35	9.5	.30	510		.30			.30			.30			.30			.30			.30		
.40	44.5	10.5	.40			.40			.40			.40			.40			.40			.40		
.50	55	12	.50			.50			.50			.50			.50			.50			.50		
.60	67	14	.60			.60			.60			.60			.60			.60			.60		
.70	81	16	.70			.70			.70			.70			.70			.70			.70		
.80	97	18	.80			.80			.80			.80			.80			.80			.80		
.90	115	20	.90			.90			.90			.90			.90			.90			.90		

DIATF No. R-15

This table is applicable for open-channel conditions. It is based on 19 discharge measurements made during 1962 (1-8), 1963 (9-13, 15-19), 1964 (21)

and is well defined above 6 cfs.

Comp by RAGriate 1-16-64

Chd by LAS date 1-29-64

Use hundredths throughout

Table No. 1

9-210
Nov. 1957

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY (WATER RESOURCES DIVISION)

File No. Field

Rating table for French River at Webster, Mass.

, from Mar. 28, 1963, to , 19 , from , 19 , to , 19

Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs
.00			4.00			6.00	440	35
.10			.10			.10	475	35
.20			.20	3.3	From Curve	.20	510	30
.30			.30	6.5		.30	540	
.40			.40	11.4		.40	570	
.50			.50	18.8		.50	600	
.60			.60	28.5	12.5	.60	630	30
.70			.70	41	13	.70	660	35
.80			.80	54	16	.80	695	
.90			.90	70	19	.90	730	
.00			5.00	89	23	7.00	765	
.10			.10	112	27	.10	800	
.20			.20	139	31	.20	835	
.30			.30	170	35	.30	870	
.40			.40	205	40	.40	905	35
.50			.50	245		.50	940	
.60			.60	285		.60	980	
.70			.70	325		.70	1020	
.80			.80	365	40	.80		
.90			.90	405	35	.90		

Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs
.00			.00			.00			.00		
.10			.10			.10			.10		
.20			.20			.20			.20		
.30			.30			.30			.30		
.40			.40			.40			.40		
.50			.50			.50			.50		
.60			.60			.60			.60		
.70			.70			.70			.70		
.80			.80			.80			.80		
.90			.90			.90			.90		
.00			.00			.00			.00		
.10			.10			.10			.10		
.20			.20			.20			.20		
.30			.30			.30			.30		
.40			.40			.40			.40		
.50			.50			.50			.50		
.60			.60			.60			.60		
.70			.70			.70			.70		
.80			.80			.80			.80		
.90			.90			.90			.90		

This table is applicable for open-channel conditions. It is based on 9 discharge measurements made during 1963(178,181-186), 1964(187,188) and is well defined above 7 cfs.

Comp by RAG date 12-5-63

Ckd by RBM date 12-18-63

Use hundredths throughout

Table No. 16

GPO 889782

DIATF N/A R-16

9-210
Nov. 1957

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY (WATER RESOURCES DIVISION)

File No. Washington 14 155.00
Field

Rating table for Quinabaug River at Putnam, Conn.

, from Mar. 7 *, 19* 63 *, to* *, 19* *, from* *, 19* *, to* *, 19*

Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs
.00			3.00	265	30	5.00	1,160	60	7.00	2,570	70	9.00	4,340	100	11.00	6,570	130	13.00	9,270	140
.10			.10	295	35	.10	1,220	70	.10	2,640	80	.10	4,440	100	.10	6,700	130	.10	9,410	140
.20			.20	330	35	.20	1,290	70	.20	2,720	80	.20	4,540	100	.20	6,830	130	.20	9,550	150
.30			.30	365	35	.30	1,360	70	.30	2,800	80	.30	4,640	100	.30	6,960	130	.30	9700	150
.40			.40	400	35	.40	1,430	70	.40	2,880	80	.40	4,740	110	.40	7,090	130	.40	9,850	150
.50			.50	435	35	.50	1,500	70	.50	2,960	80	.50	4,850	110	.50	7,220	130	.50	10,000	150
.60			.60	470	35	.60	1,570	70	.60	3,040	80	.60	4,960	110	.60	7,350	130	.60	10,150	150
.70	19	8	.70	510	40	.70	1,640	70	.70	3,120	90	.70	5,070	110	.70	7,480	130	.70	10,300	150
.80	27	10	.80	550	40	.80	1,740	70	.80	3,210	90	.80	5,180	110	.80	7,610	130	.80	10,450	150
.90	37	12	.90	590	40	.90	1,780	70	.90	3,300	90	.90	5,290	110	.90	7,740	130	.90	10,600	160
2.00	49	14	4.00	630	45	6.00	1,850	70	8.00	3,390	90	10.00	5,400	110	12.00	7,870	140	14.00	10,760	160
.10	63	16	.10	675	45	.10	1,920	70	.10	3,480	90	.10	5,510	110	.10	8,010	140	.10	10,920	160
.20	79	17	.20	720	50	.20	1,990	70	.20	3,570	90	.20	5,620	110	.20	8,150	140	.20	11,080	160
.30	96	19	.30	770	50	.30	2,060	70	.30	3,660	90	.30	5,730	120	.30	8,290	140	.30	11,240	160
.40	115	20	.40	820	50	.40	2,130	70	.40	3,750	90	.40	5,860	120	.40	8,430	140	.40	11,400	160
.50	135	22	.50	870	50	.50	2,200	80	.50	3,840	100	.50	5,970	120	.50	8,570	140	.50	11,560	160
.60	157	23	.60	920	60	.60	2,280	70	.60	3,940	100	.60	6,090	120	.60	8,710	140	.60	11,720	170
.70	180	25	.70	980	60	.70	2,350	70	.70	4,040	100	.70	6,210	120	.70	8,850	140	.70	11,890	170
.80	205	30	.80	1,040	60	.80	2,420	80	.80	4,140	100	.80	6,330	120	.80	8,990	140	.80	12,060	170
.90	235	30	.90	1,100	60	.90	2,500	70	.90	4,240	100	.90	6,450	120	.90	9,130	140	.90	12,230	170

This table is applicable for open-channel conditions. It is based on 2 *discharge measurements made during* 1963 (269,270) *and is* fairly *well defined between* 50 *cfs and* 3,000 *cfs.* Comp by LAW date 8/23/63

Same as rating No. 22 above 2.8 ft.

Ckd by ..... date .....

1% Limits: Half-tenths, 4.0 ft to 6.0 ft.

Table No. 23

GPO 863752

PLATE NO. B-17

9-210
(Nov. 1955)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY (WATER RESOURCES DIVISION)

File No. Washington 1...270.00
Field

Rating table for Quinebaug River at Jewett City, Conn.

from Mar. 6, 1963 *to* 19 *from* 19 *to* 19

Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs	Gage height Feet	Discharge Cfs	Difference Cfs
3.00			5.00	355	40	7.00	1470	70	9.00	3060	100	11.00	5160	110	13.00	7560	130	15.00	10350	150
.10			.10	395	45	.10	1540	70	.10	3160	100	.10	5270	110	.10	7690	130	.10	10500	150
.20			.20	440	50	.20	1610	70	.20	3260	100	.20	5380	110	.20	7820	130	.20	10650	150
.30			.30	490	50	.30	1680	70	.30	3360	100	.30	5490	120	.30	7950	130	.30	10800	160
.40			.40	540	50	.40	1750	70	.40	3460	100	.40	5610	120	.40	8080	130	.40	10960	160
.50	19	9	.50	590	50	.50	1820	70	.50	3560	100	.50	5730	120	.50	8210	130	.50	11120	160
.60	28	11	.60	640	50	.60	1890	70	.60	3660	100	.60	5850	120	.60	8340	140	.60	11280	160
.70	39	13	.70	690	50	.70	1960	80	.70	3760	100	.70	5970	120	.70	8480	140	.70	11440	160
.80	52	16	.80	740	60	.80	2040	80	.80	3860	100	.80	6090	120	.80	8620	140	.80	11600	160
.90	68	19	.90	800	60	.90	2120	80	.90	3960	100	.90	6210	120	.90	8760	140	.90	11760	160
4.00	87	25	6.00	860	60	8.00	2200	80	10.00	4060	110	12.00	6330	120	14.00	8900	140	16.00	11920	160
.10	112	25	.10	920	60	.10	2280	80	.10	4170	110	.10	6450	120	.10	9040	140	.10	12080	160
.20	137	25	.20	980	60	.20	2360	80	.20	4280	110	.20	6570	120	.20	9180	140	.20	12240	170
.30	162	25	.30	1040	60	.30	2440	80	.30	4390	110	.30	6690	120	.30	9320	140	.30	12410	170
.40	187	25	.40	1100	60	.40	2520	90	.40	4500	110	.40	6810	120	.40	9460	140	.40	12580	170
.50	212	25	.50	1160	60	.50	2610	90	.50	4610	110	.50	6930	120	.50	9600	140	.50	12750	170
.60	237	25	.60	1220	60	.60	2700	90	.60	4720	110	.60	7050	120	.60	9750	150	.60	12920	170
.70	262	28	.70	1280	60	.70	2790	90	.70	4830	110	.70	7170	130	.70	9900	150	.70	13090	170
.80	290	30	.80	1340	60	.80	2880	90	.80	4940	110	.80	7300	130	.80	10050	150	.80	13260	170
.90	320	35	.90	1400	70	.90	2970	90	.90	5050	110	.90	7430	130	.90	10200	150	.90	13430	170

This table is applicable for open-channel conditions. It is based on 5 discharge measurements made during 1963 (313, 314, 316-318) and is well defined between 80 cfs and 11,000 cfs.

Same as rating No. 21 below 3.8 and above 5.8
1% limits: Use half tenths 5.5 to 8.0 ft

Computed by JH date 9/25/63
Ckd by JH date 9/25/63

PLATE NO. B-18

A P P E N D I X C

THAMES RIVER BASIN

OPERATION AND MAINTENANCE

OF HYDROLOGIC INSTRUMENTS

APPENDIX C

THAMES RIVER BASIN

OPERATION AND MAINTENANCE

OF HYDROLOGIC INSTRUMENTS

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APPENDIX C

THAMES RIVER BASIN

OPERATION AND MAINTENANCE

OF HYDROLOGIC INSTRUMENTS

C-1 PRECIPITATION GAGE

At least one precipitation gage is installed at each flood control dam. All dams have either a plastic cylinder rooftop or plastic wedge-shaped fence gage. For ease of observation, they are located at the utility building or operator's house and are supplementary to the standard USWB gages. To obtain precipitation data for publication in official reports of the Weather Bureau, standard USWB continuous recording equipment is installed except at Hodges Village and Westville dams. At the request of the Weather Bureau, Mansfield Hollow, Buffumville, East Brimfield and West Thompson are equipped with both recording and nonrecording gages. The dam operator reads the rain gage daily. Observations are recorded on WB forms 1009-R, 612-14 and 612-24. The operator should make sure the clock is running correctly and the pen inking properly. Unless precipitation is falling at the time of observation, the pen of the recording gage should be raised to the next 0.25" line to avoid overlapping of the record. Rain gage charts (WB form 1028-C) should be changed each Monday and forwarded with WB form 1009-R to the RRS. For additional charts, forms or USWB supplies, the dam operator should note this on the appropriate USWB form. Additional instructions on correct operation of precipitation gages and recording of data are shown on the covers of each pad of WB forms. A Weather Bureau representative will visit each dam several times during the year to service the precipitation gage. Should a malfunction occur between visits, RRS should be notified in order to arrange with the Weather Bureau for repair of the gage.

C-2 THERMOMETER

Maximum-minimum thermometers are installed at selected dams in the Division. For temperature data published in official publications of the Weather Bureau, these are standard USWB thermometers located in special shelters. Observations are recorded on WB form 612-14 and sent in monthly to RRS and USWB. Instructions on reading

and recording of temperatures are shown on the covers of each pad of WB forms. A Weather Bureau representative will visit each dam several times a year to check the thermometers. Should a malfunction occur between visits, RRS should be notified and arrangements will be made with the Weather Bureau to repair or replace the equipment. In addition, unofficial thermometers are located at some dams where no formal reports are required.

C-3 RESERVOIR STAGE RECORDER

Each dam has a water stage recorder which records a continuous graphical record of the reservoir stage and is operated either by a float, surface detector or bubble gage (manometer). The recorder should be checked each morning to see if the pen is inking properly and the chart has not stopped. Any discrepancies in the pen time or gage height should be noted on the chart. Reading the outside tile or staff gages during periods of reservoir storage is especially recommended so that the accuracy of the tape reading and chart record can be checked. Weekly recorders should be changed on Mondays and monthly recorders on the first working day of each month. At the beginning and ending of each chart, the following information should be noted in ink: (1) name of dam and operator, (2) date, (3) outside gage reading, (4) inside gage reading, (5) pen stage reading, (6) watch time and (7) pen time. Arrangements have been made with the U. S. Geological Survey to service NED recorders. Should the recorder become inoperable, RRS should be notified and arrangements will be made to put it back in operation. New charts for water stage recorders should be obtained from the NED warehouse.

C-4 REMOTE RECORDER AND INDICATOR

Several dams have a remote recorder or indicator that is connected to USGS gaging stations by an electric cable and shows river stages at locations either below the dam or on another tributary. Since these remote gages are similar to reservoir stage recorders, operation and maintenance procedures outlined in paragraph C-3 above are also applicable. In addition, the stage at the originating USGS gaging station should be checked once a month, and more frequently during flood periods, to see if the remote gage is set at the same reading and should be noted on the chart.

C-5 TELEPHONE TRANSMITTER (TELEMARK)

Telephone transmitters (telemarks) are installed at various

river locations to obtain stages and flows to aid in regulating flood control reservoirs. Telemarks, except for infrequent mechanicial or electrical difficulties, are the most satisfactory method of reporting, especially where it is essential to have a 24-hour coverage of the stations. Telemarks should be checked at least once a week. Should a telemark become inoperative, the operator should visit the USGS gage and try to ascertain the difficulty. If the trouble cannot be determined at the gage, the telephone company should be requested to check out their circuits. It is suggested the operator be at the gage when the telephone company checks out the circuits. If the telemark still continues to be inoperative, RRS should be notified and a field trip by NED and/or USGS personnel will be arranged to put it back in operation. Arrangements have been made with the USGS to service NED telephone transmitters. Batteries for Stevens Telemarks will be furnished and installed by NED dam operators. Batteries for Fischer-Porter BDT's will be furnished and installed by USGS.

C-6 TAILWATER GAGING STATIONS

Tailwater gaging stations provide a continuous official record of the discharge from flood control dams. It is essential that the equipment be checked frequently to insure a continuous record. Although the USGS is responsible for maintenance of the equipment, it is considered necessary that the flood control dam operators make a weekly inspection to be sure the instruments are functioning properly. A definite time should be set aside for this purpose during normal working hours. The tailwater gage readings included in the routine radio and telephone reports to RRS on Friday are used for calibration of the gates and ready reference of runoff conditions in the basin at the time of observation. Where it is necessary to drive some distance to the tailwater gage, it is difficult to provide a thorough inspection and obtain a Friday morning gage reading prior to the 0815 report and accomplish this within the normal working hours, it is therefore suggested that inspections and readings of these remote gages be made at a convenient time on Thursday and the reading be included in the Friday report. Tailwater gages installed with telemarks or a remote recorder located at the dam shall also be inspected weekly at some convenient time. If stages for the latter gages can be obtained readily the weekly report will include the Friday morning stage. If inspection indicates any equipment is inoperative the RRS should be notified immediately and arrangements will be made with the U. S. Geological Survey to have the recorder repaired.

C-7 BUBBLE GAGE (MANOMETER)

Some USGS tailwater gages and NED pool recorders are operated by a bubble gage which eliminates a float and float well. The gage operates by measuring the pressure of gas at a submerged opening (orifice). A slow flow of gas is bubbled into the recording system through plastic tubing to the orifice. This gas transmits the water pressure to a mercury manometer, which automatically adjusts for changes in stage by means of a servo motor. The manometer output is connected to the input shaft of a water stage recorder. The standard USGS bubble gages are for 35 and 50 foot ranges in stage. For ranges in stage over 50 feet, special reservoir manometers are necessary. Due to the complex nature of bubble gages, adjustments should be made by USGS personnel only.

C-8 SNOW SAMPLING SET

Snow sampling sets have been assigned to selected dams. Snow courses have been established at selected points within the watershed of each reservoir. Procedures for snow surveys should follow instructions set forth in Snow Survey Sampling Guide, Department of Agriculture Handbook No. 169. Surveys will be made by the dam operator during the winter and early spring to determine depth of the snow and its equivalent water content. Dates for the surveys will be determined each year by RRS so as to correspond with the publication of the monthly USGS bulletin. If given proper care, snow sampling sets will not need replacement, except for wornout cutter heads.