

WATER RESOURCES DEVELOPMENT

**By the U.S. Army
Corps of Engineers**

*in the
Farmington
River Basin*

March
1960



U.S. Army Engineer Division, New England
Corps of Engineers
Waltham, Mass.

WATER RESOURCES DEVELOPMENT
By The
U. S. ARMY CORPS OF ENGINEERS
In The
FARMINGTON RIVER BASIN

The Farmington River Basin, the fourth largest subbasin of the Connecticut River system, is located in southwestern Massachusetts and north-central Connecticut within the confines of Berkshire and Hampden Counties in Massachusetts, and Litchfield and Hartford Counties in Connecticut. The Farmington watershed has a maximum length of 46 miles, a maximum width of 29 miles, and a total drainage area of 602 square miles.

The main stream is formed by the confluence of the East and West Branches of the Farmington River in the northeast corner of the town of New Hartford, Conn., at an elevation of about 350 feet above mean sea level. The river flows generally southeast for 15 miles, thence north for 18 miles, thence southeasterly to the Connecticut River at Windsor, Conn., 57 miles above Long Island Sound. The Farmington River has a total length of approximately 46 miles and a total fall of about 350 feet.

The Farmington River Basin encompasses all or part of 10 Massachusetts towns and 22 Connecticut towns. The population of the basin, according to estimates based on the 1950 U. S. Census, numbers approximately 93,000, of which about 91,500 are in the Connecticut portion of the basin.

The Farmington River, with a safe yield of more than 100 million gallons of water per day, is an important source of domestic and industrial water supply. It has been increasingly developed for water supply use and about 500,000 people draw their water from sources within the basin.

The storms which caused the most destructive floods in the Farmington River watershed occurred in November 1927, March 1936, September 1938, December 1948, August 1955, and October 1955. Within a few days' time, hurricanes Connie and Diane produced 5 to 9 inches and 11 to 18 inches of rain, respectively, during August 1955, causing the most devastating flood in the history of the basin. The

October 1955 flood was also caused by a hurricane type storm which dropped 6 to 13 inches of rainfall over the watershed.

The record flood of August 1955 caused 31 deaths in the Farmington River watershed and resulted in an estimated loss of nearly \$72 million. Damage surveys conducted immediately after the flood revealed that losses in the Connecticut portion of the principal damage reaches of the Farmington River amounted to \$58,310,000, approximately 82 percent of the total loss in the watershed. Major damage centers in the principal damage reaches were the communities of Winsted, Unionville, Collinsville, New Hartford, Simsbury, and East Granby, Conn.

A public hearing was held by the Corps of Engineers in Unionville, Conn., on 18 December 1956, to obtain the views of interested parties with respect to flood control and allied measures in the Farmington River, Connecticut and Massachusetts. The hearing was attended by more than 90 persons, including representatives of the U. S. Bureau of Public Roads, the U. S. Geological Survey, the State of Connecticut, the cities of Hartford and Winsted, the towns of Avon, Barkhamsted, Canton, Colebrook, East Granby, Farmington, New Hartford, Plainville, Simsbury, Winchester, and Windsor; manufacturing and business establishments; railroads and public utilities; agricultural and recreational interests; newspapermen; and interested private organizations and individuals. Meetings have also been held with representatives of the Connecticut River Valley Flood Control Commission, Connecticut Water Resources Commission, Connecticut Development Commission, Farmington River Valley Flood Control Commission, Farmington River Watershed Association, the Hartford Metropolitan District, the highway departments of Connecticut and Massachusetts, Farmington River riparian owners, various towns and cities; and with representatives of various industries in the Farmington River Basin.

The 1958 Flood Control Act (Public Law 85-500), approved 3 July 1958, authorized the Mad River Dam, substantially in accordance with recommendations of the Chief of Engineers to provide for the construction of an earth fill dam 168 feet high and 1,040 feet long, above Winsted, Conn., for flood control at an estimated cost to the United States of \$5,430,000 for construction; providing local interests give assurances satisfactory to the Secretary of the Army that they will (a) furnish without cost to the United States all lands, easements, and rights-of-way necessary for construction of the project; (b) zone

the channel through the damage areas to prevent further encroachments and to require removal and prevent replacement of obstructive or hazardous structures along the channel whenever they become obsolete; (c) hold and save the United States free from damages due to the construction works; and (d) maintain and operate the works after completion in accordance with regulations prescribed by the Secretary of the Army. The estimated non-Federal costs are \$390,000. This project is currently under design.

In evolving the most practical plan for the control of floods and the development of the water resources of the Farmington basin, preliminary studies and investigations were made of 23 reservoir sites in the basin. Consideration was also given to the possibility of raising Highland Lake Dam for flood control purposes and providing local protection works at the principal urban centers in the basin. The Sucker Brook and Colebrook River reservoirs were determined to be the most feasible in the basin, and are economically justified. These two projects, in conjunction with the authorized Mad River Reservoir, would provide a high degree of flood protection in the Farmington River Basin. This system of reservoirs would control the runoff from 141 square miles of drainage area, which is approximately 23 percent of the Farmington River Basin.

The Sucker Brook dam site is located about two miles southwest of Winsted, Conn., on Sucker Brook in the town of Winchester, Conn., about 400 feet above its confluence with Highland Lake. The dam would be a rolled earth fill structure with a length of 1,150 feet and a maximum height of 60 feet above stream bed elevation. A concrete ogee overflow spillway, 60 feet long, and a spillway channel would be constructed at the northeast end of the dam for carrying reservoir overflow around the dam into Highland Lake. The capacity of the reservoir would be 1,450 acre-feet, equivalent to 8.0 inches of runoff from the intercepted drainage area of 3.4 square miles. At spillway crest elevation of 926 feet, mean sea level, the reservoir area would total 53 acres of land. The relocation of about 1,000 feet of unimproved road would be required. About four cottages on the Highland Lake shore would be temporarily affected during the construction period. The outlet would consist of a single ungated 30-inch conduit discharging into Highland Lake. The upstream end of the conduit would contain a trash rack to prevent clogging. The size of the conduit would permit passage of the normal flow of the brook without appreciable storage in the reservoir. During high water periods, flows exceeding the capacity of the conduit would be stored in the reservoir. Pertinent data on this project is given in Table 1.

TABLE 1
PERTINENT DATA - SUCKER BROOK DAM AND RESERVOIR

| <u>Feature</u> | |
|---|-------------------------------------|
| Drainage area, sq. miles | 3.4 |
| General Elevations, ft. m. s. l. | |
| Top of dam | 941 |
| Flood control pool | 926 |
| Stream bed | 881 |
| Dam | |
| Type of dam | rolled earth fill |
| Length of dam, ft. | 1,150 |
| Maximum height, ft. | 60 |
| Top width | 20 |
| Upstream slope | 1 on 2.5 |
| Downstream slope | 1 on 2.5 |
| Spillway | |
| Type | Ogee weir and chute channel in rock |
| Crest length, ft. | 60 |
| Surcharge, ft. | 10 |
| Design discharge, c. f. s. | 7,100 |
| Outlet Conduit | |
| Type | concrete pipe on earth |
| Inside diameter, ft. | 2.5 |
| Control | None |
| Length, ft. | 390 |
| Sill elevation, ft., m. s. l. | 881 |
| Reservoir Storage | |
| Capacity, acre-feet | 1,450 |
| Capacity, inches of runoff | 8.0 |
| Reservoir Area at Spillway Crest, acres | 53 |

The Colebrook River Reservoir would be located in the northwestern part of Connecticut and the southwestern part of Massachusetts. The dam site is across the Hogback Reservoir, now under construction by the Hartford Metropolitan District in the town of Colebrook, Conn., about five miles northeast of the city of Winsted. The stream valley, a short distance above the dam site, broadens into a large basin adequate for storage of a large quantity of water with a relatively low dam. Reservoir flowage costs for the proposed Colebrook River reservoir would be low, as the village of Colebrook River and many houses along the river have been removed in connection with the construction of the Hogback project. The Hogback Reservoir, which is being constructed primarily for low water regulation to augment the hydroelectric output of downstream plants, would be drawn down during the construction of the early phases of the Colebrook River dam and reservoir. Two potential developments were considered: one for flood control only, the other a dual purpose water supply and flood control project.

In the single purpose flood control project, the dam would be of combined earth and rockfill construction with a concrete side channel spillway. The capacity of the flood control pool over and above that of the Hogback pool would be 50,800 acre-feet, equivalent to 8.0 inches of runoff from the gross drainage area of 119 square miles. At spillway crest elevation of 718 feet, mean sea level, the flood control reservoir would include an area of 940 acres, of which about half would be within the Hogback pool. The remainder is mostly woodland and wasteland. The outlet would consist of a 10-foot diameter, reinforced concrete horseshoe-shaped conduit founded on rock. The control tower would contain three gates to regulate reservoir discharge. During periods of low runoff, the gates would be left open so that Hogback pool would be at the same elevation on both sides of Colebrook River Dam. The size of the conduit would permit passage of the normal flow of the river. The most important improvement affected in the reservoir area would be relocation of about 4.2 miles of State Highway Route 8.

Under authority of the Water Supply Act of 1958, joint studies were made by the Hartford Metropolitan District and the Corps of Engineers. These studies indicate that it is feasible to construct a dual purpose reservoir for flood control and water supply at the Colebrook River site. The proposed dam would be an earth and rockfill structure with a concrete spillway. A dike 530 feet long would be required at the low saddle, where Route 8 enters the

Colebrook River Reservoir area, to prevent reservoir overflow into Sandy Brook. The capacity of the reservoir would include 13,000 acre-feet of the Hogback pool, 30,700 acre-feet (10 billion gallons) for water supply and 50,800 acre-feet for flood control. The storage for water supply would consist of 6,500 acre-feet above the Hogback pool for immediate use, and 24,200 acre-feet for future water supply. Storage for immediate use would be to about elevation 655 feet, m.s.l. The flood control storage is the same as in the single purpose project. The total storage capacity would be 94,500 acre-feet. At spillway crest elevation, 747 feet, m.s.l., the reservoir would include an area of 1,180 acres, of which 450 acres would be within the Hogback pool. The major portion of the remaining land is woodland and wasteland. The outlet works would be similar to those in the project for flood control only.

Costs for flood control and water supply for the Colebrook River dual purpose reservoir are allocated by the "Use of Facilities" method. Under this method, the specific costs for each purpose are estimated and deducted from the total cost of the project to determine the joint costs. The joint costs are then prorated for each purpose on the basis of the amount of storage allocated to flood control and water supply. The specific and prorated costs are summed to determine the cost allocated to each purpose.

Table 2 presents pertinent data for the two studied Colebrook River projects.

Table 3 summarizes the economic data for the three studied projects.

TABLE 2

PERTINENT DATA - COLEBROOK RIVER DAM AND RESERVOIR

| <u>Feature</u> | <u>Single Purpose Flood Control</u> | <u>Dual Purpose Flood Control and Water Supply</u> |
|-----------------------------|-------------------------------------|--|
| Drainage Area, sq. miles | 119 | 119 |
| General Elev. ft., m. s. l. | | |
| Top of dam | 742 | 771 |
| Flood control pool | 718 | 747 |
| Immediate water supply pool | - | 655 |
| Future water supply pool | - | 693 |
| Hogback pool | 641 | 641 |
| Stream bed | 560 | 560 |
| Dam | | |
| Type of dam | rolled earth and rockfill | rolled earth and rockfill |
| Length of dam, ft. | 1,070 | 1,160 |
| Maximum height, ft. | 182 | 211 |
| Top width, ft. | 30 | 25 |
| Upstream slope | 1 on 2.5 | 1 on 2.5 |
| Downstream slope | 1 on 2 | 1 on 2 |
| Dike | | |
| Type | None | rolled earth fill |
| Length of dike, ft. | | 530 |
| Top width, ft. | | 10 |
| Maximum height, ft. | | 36 |
| Spillway | | |
| Type | side channel | side channel |
| Crest length, ft. | 400 | 400 |
| " elev. ft., m. s. l. | 718 | 747 |
| Surcharge, ft. | 19.5 | 19.2 |
| Design discharge, c. f. s. | 131,000 | 127,000 |

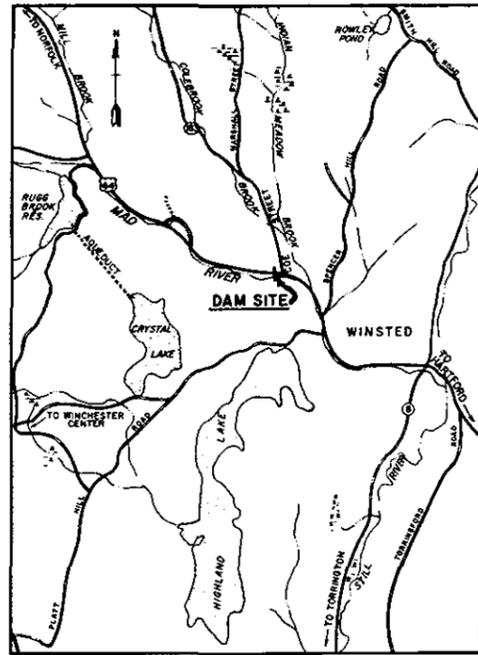
| <u>Feature</u> | <u>Single Purpose Flood Control</u> | <u>Dual Purpose Flood Control and Water Supply</u> |
|---|-------------------------------------|--|
| Outlet Conduit | | |
| Type | conc. horseshoe conduit on rock | conc. horseshoe conduit on rock |
| Inside diameter, ft. | 10 | 10 |
| Number of gates | 3 | 3 |
| Size of gates | 5'-8"x10'-0" | 5'-8"x10'-0" |
| Length, ft. | 580 | 720 |
| Sill elev, ft., m. s. l. | 561 | 561 |
| Reservoir Storage, ac-ft. | | |
| Flood control | 50,800 | 50,800 |
| Water supply | - | 30,700 ^{1/} |
| Hogback pool | <u>13,000</u> | <u>13,000</u> |
| Total | 63,800 | 94,500 |
| Reservoir Storage, inches of runoff | | |
| Flood control | 8.00 | 8.00 |
| Water supply | - | 4.84 |
| Hogback pool | <u>2.05</u> | <u>2.05</u> |
| Total | 10.05 | 14.89 |
| Reservoir Area at Spillway Crest, acres | 940 | 1,180 |

^{1/}30,700 acre-feet equals 10 billion gallons.

TABLE 3
SUMMARY OF ECONOMIC DATA

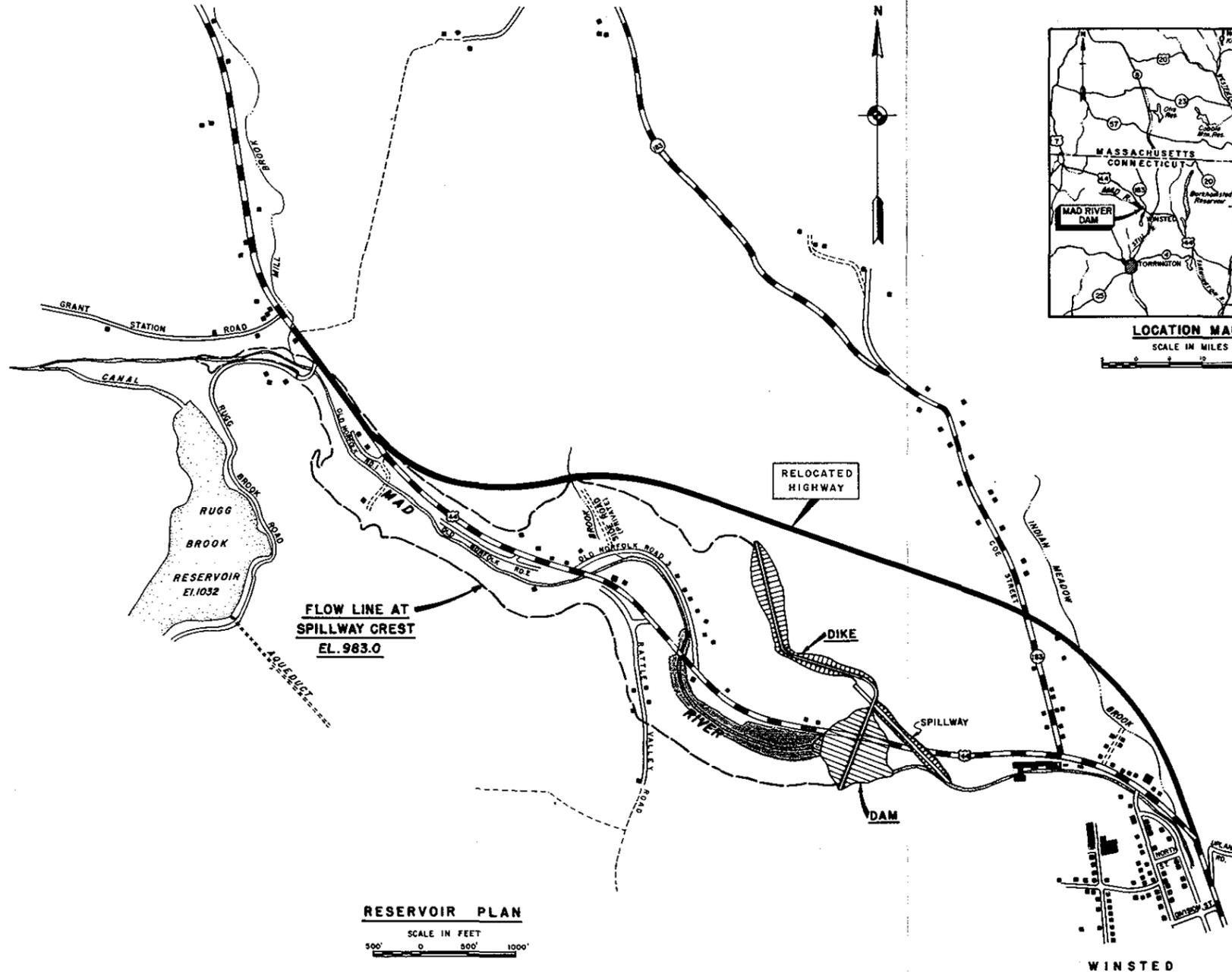
| | Sucker Brook Dam | Colebrook River Dam | |
|------------------------|------------------------|---------------------|---------------------------------|
| | | Flood Control | Flood Control & Water Supply |
| <u>First Costs</u> | | | |
| Federal* | \$780,000 | \$8,900,000 | \$ 7,000,000 |
| Non-Federal | <u>50,000</u> | <u>-</u> | <u>4,300,000</u> |
| Total | 830,000 | 8,900,000 | 11,300,000 |
| <u>Annual Charges</u> | | | |
| Federal | 27,500 | 351,000 | 304,000 |
| Non-Federal | <u>4,500</u> | <u>1,000</u> | <u>143,000</u> |
| Total | 32,000 | 352,000 | 447,000 |
| <u>Annual Benefits</u> | | | |
| Flood Control | 49,000 | 417,000 | 417,000 |
| Water Supply | <u>-</u> | <u>-</u> | <u>240,000</u> |
| Total | 49,000 | 417,000 | 657,000 |
| Benefit:Cost Ratio | 1.5 | 1.2 | 1.5 |

*Federal first costs include costs of preauthorization studies.



VICINITY MAP

SCALE IN MILES



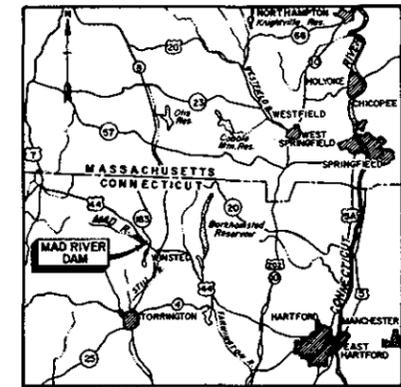
RESERVOIR PLAN

SCALE IN FEET



LEGEND

- PROPOSED CONSERVATION POOL, EL. 872. ±
- FLOW LINE AT SPILLWAY CREST, EL. 983.0

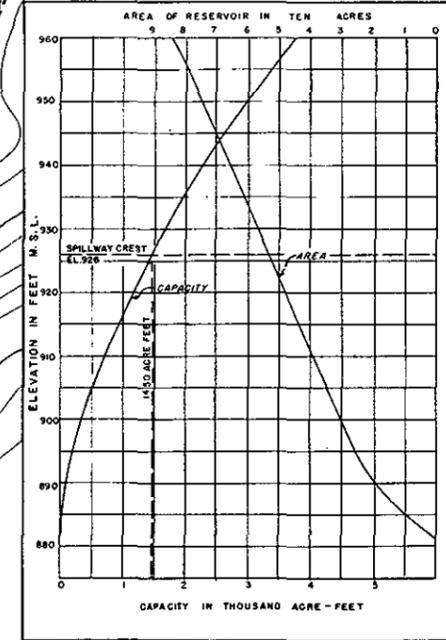
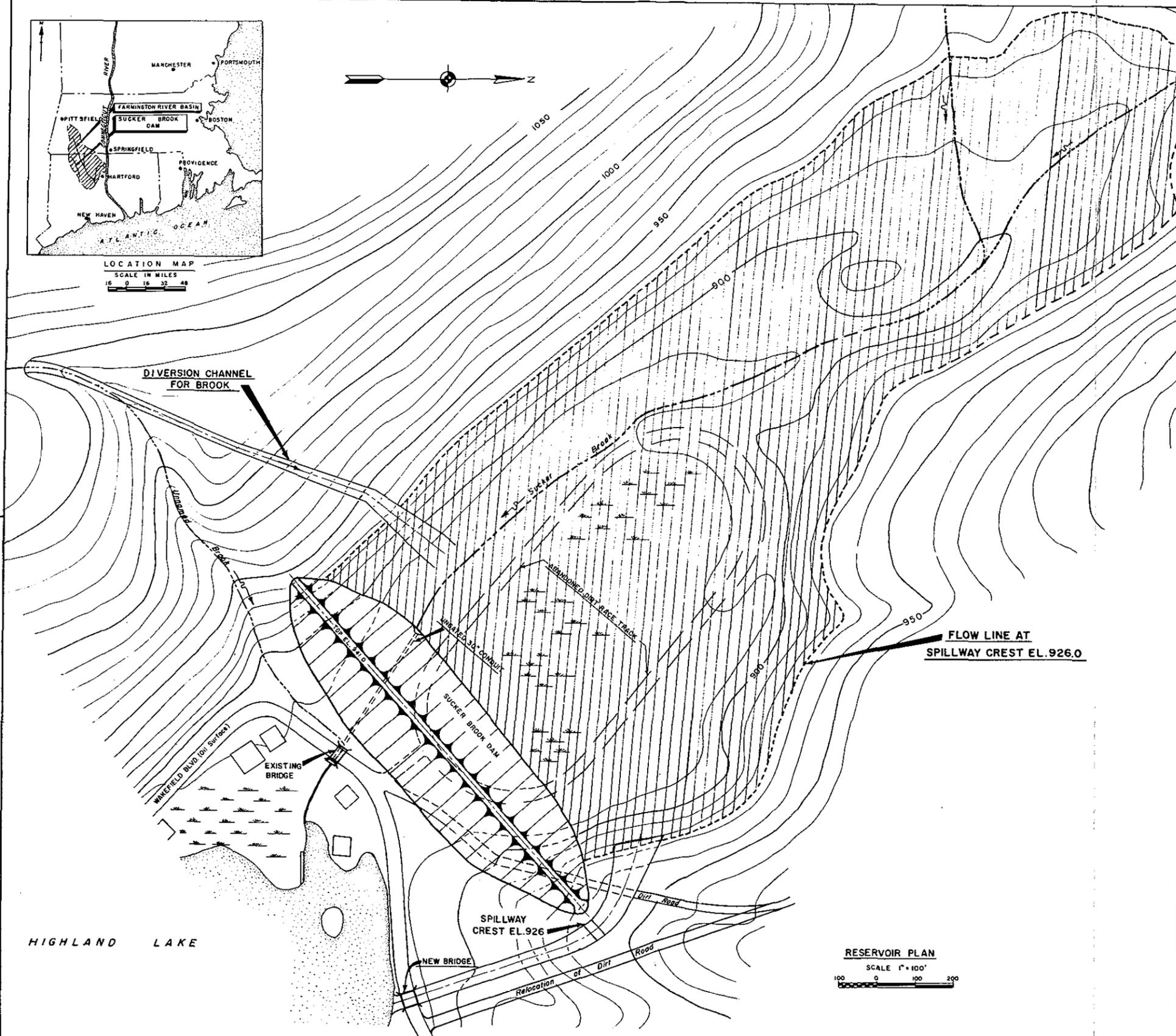
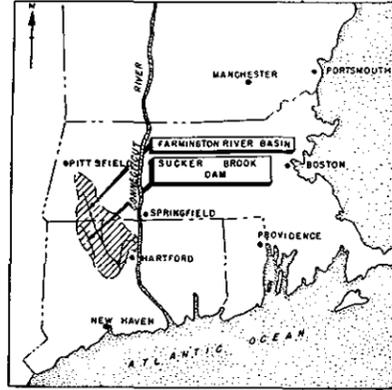


LOCATION MAP

SCALE IN MILES



| | | | |
|---|------|----------------------------|----|
| REVISION | DATE | DESCRIPTION | BY |
| | | | |
| U. S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS. | | | |
| CONNECTICUT RIVER FLOOD CONTROL | | | |
| MAD RIVER DAM | | | |
| RESERVOIR MAP | | | |
| PROJECT ENGINEER | | MAD RIVER CONNECTICUT | |
| APPROVAL RECOMMENDED | | APPROVED | |
| M.W.B. | | DATE MARCH 1960 | |
| CHIEF ENGINEER'S SIGNATURE | | CHIEF ENGINEER'S SIGNATURE | |
| | | SCALE AS SHOWN | |
| | | DRAWING NUMBER | |
| | | SHEET 1 OF 1 | |



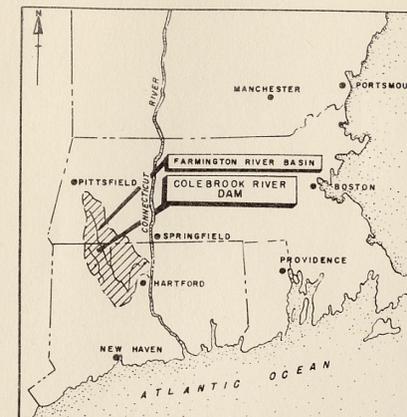
AREA AND CAPACITY CURVES
DRAINAGE AREA = 3.4 SQ. MI.

NOTES:
Elevations refer to Mean Sea Level datum
Contour interval equals ten feet.
Topography is based on U.S. Army Map (1:2500)

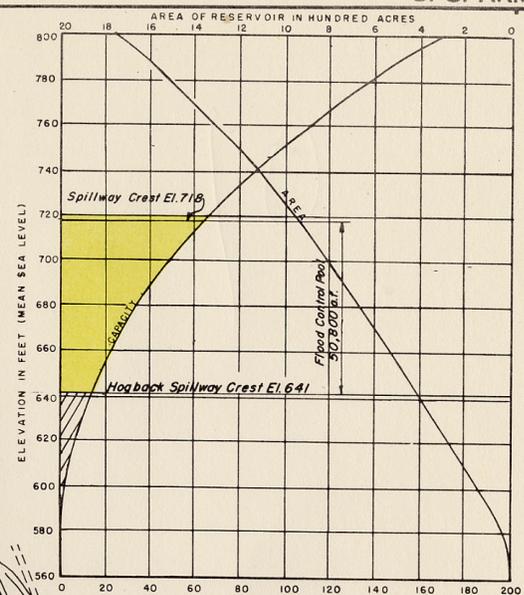
LEGEND
 FLOW LINE AT SPILLWAY CREST EL. 926.0

RESERVOIR PLAN
SCALE 1" = 100'
100 0 100 200

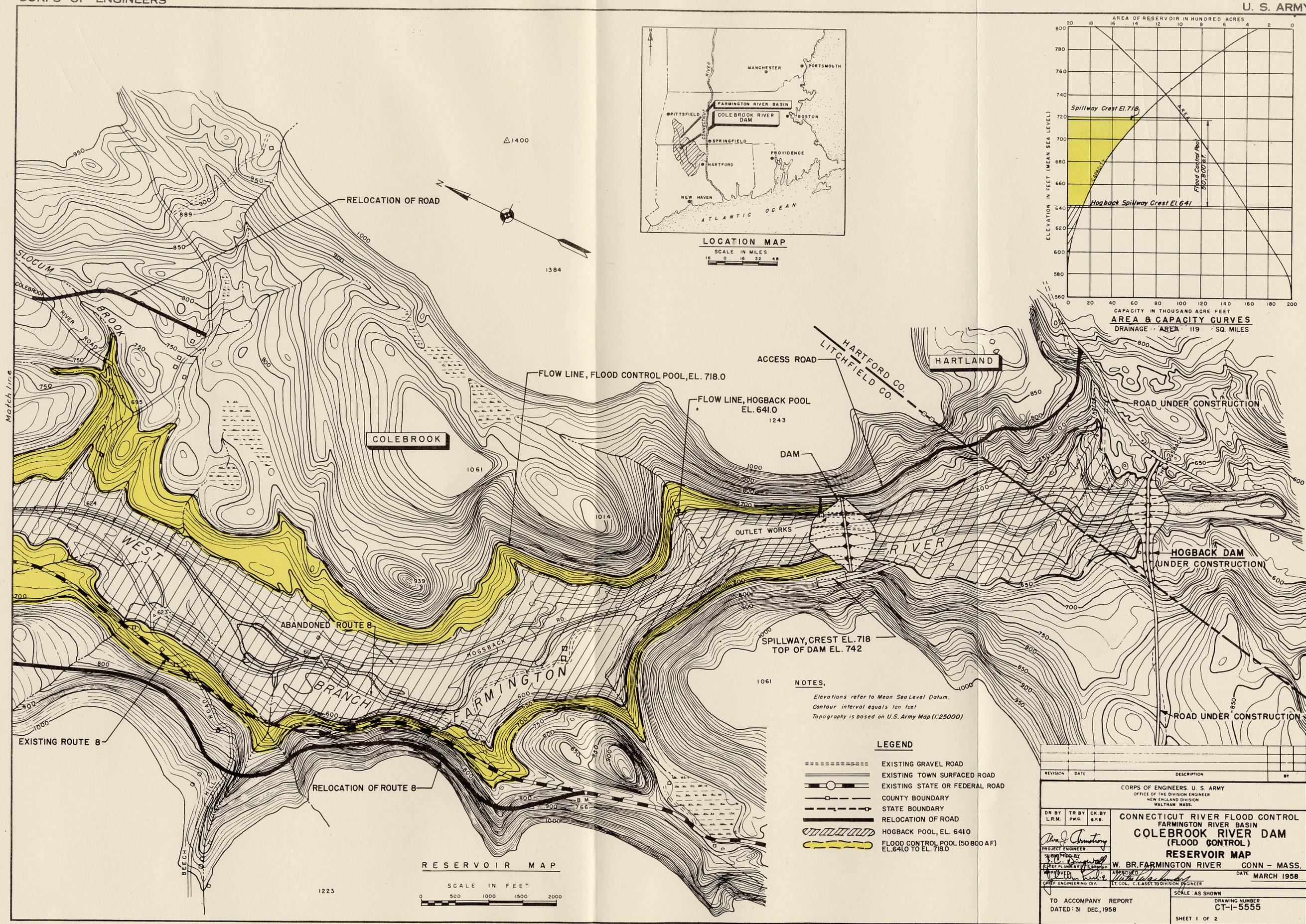
| REVISION | DATE | DESCRIPTION | BY |
|--|------------------|------------------|---|
| | | | |
| CORPS OF ENGINEERS U. S. ARMY OFFICE OF THE DIVISION ENGINEER NEW ENGLAND DIVISION BALTAMORE, MASS. | | | |
| DR. BY D.H. | TR. BY P.W.G. | CR. BY G.F.B. | |
| PROJECT ENGINEER | | | |
| SUPERVISOR OF CONSTRUCTION | | | |
| CHIEF ENGINEER | | | |
| SUCKER BROOK | | | CONN |
| TO ACCOMPANY REPORT DATED: 31 DEC., 1958 | | | DATE MARCH 1958 DRAWING NUMBER CT-1-5548 SHEET 1 OF 1 |



LOCATION MAP
SCALE IN MILES



AREA 8 CAPACITY CURVES
DRAINAGE AREA 119 SQ. MILES

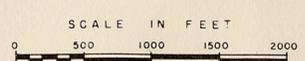


NOTES,
Elevations refer to Mean Sea Level Datum.
Contour interval equals ten feet
Topography is based on U.S. Army Map (1:25000)

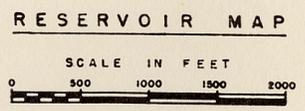
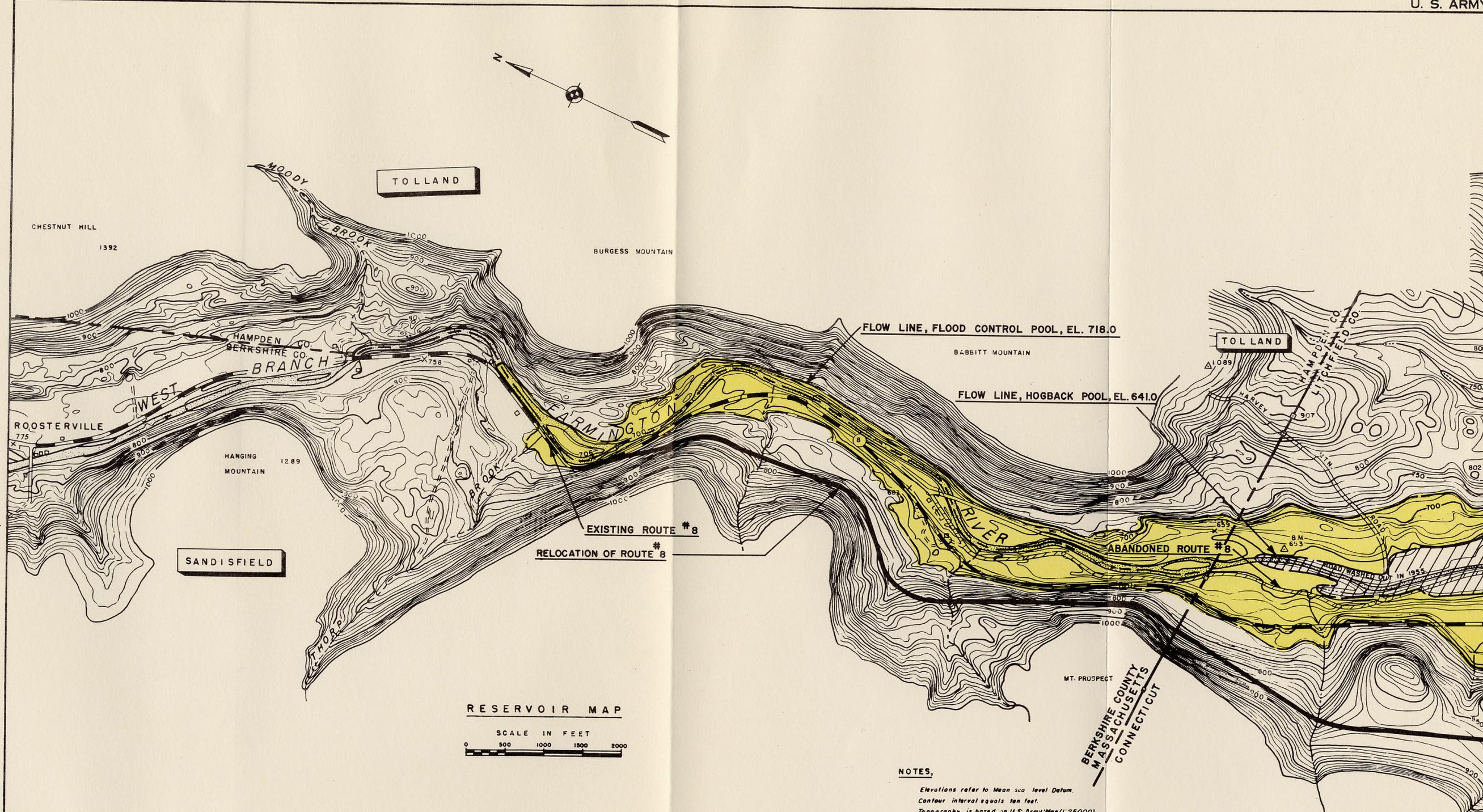
LEGEND

- EXISTING GRAVEL ROAD
- ==== EXISTING TOWN SURFACED ROAD
- ==== EXISTING STATE OR FEDERAL ROAD
- COUNTY BOUNDARY
- STATE BOUNDARY
- RELOCATION OF ROAD
- HOGBACK POOL, EL. 6410
- FLOOD CONTROL POOL (50 800 AF) EL. 641.0 TO EL. 718.0

RESERVOIR MAP



| REVISION | DATE | DESCRIPTION | BY |
|--|-----------------|-----------------|---|
| CORPS OF ENGINEERS, U. S. ARMY OFFICE OF THE DIVISION ENGINEER NEW ENGLAND DIVISION WALTHAM, MASS. | | | |
| DR BY L.R.M. | TR BY P.W.G. | CK BY E.F.B. | |
| PROJECT ENGINEER <i>Alan J. Armstrong</i> SUBMITTAL CHIEF PLANNING ENGINEER APPROVED W. BR. FARMINGTON RIVER CONN - MASS. DATE MARCH 1958 | | | |
| TO ACCOMPANY REPORT DATED: 31 DEC, 1958 | | | DRAWING NUMBER CT-1-5555 SHEET 1 OF 2 |



NOTES.

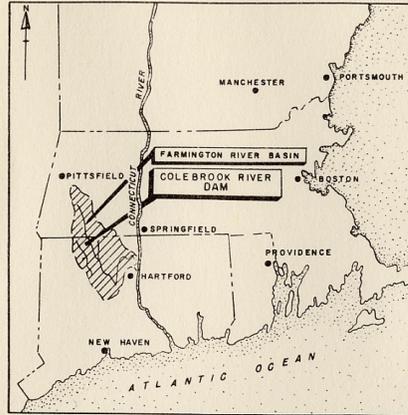
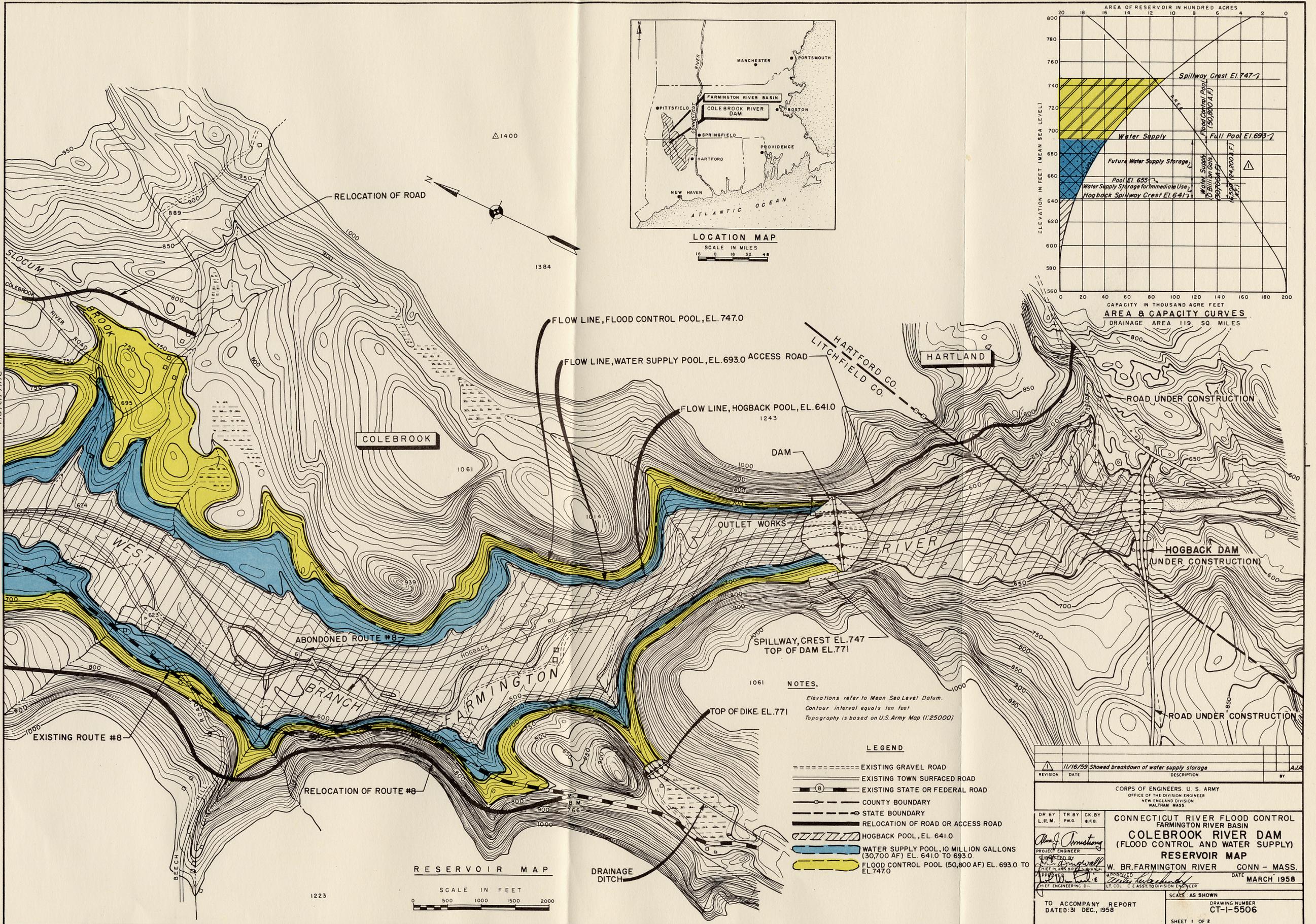
Elevations refer to Mean sea level Datum.

Contour interval equals ten feet.

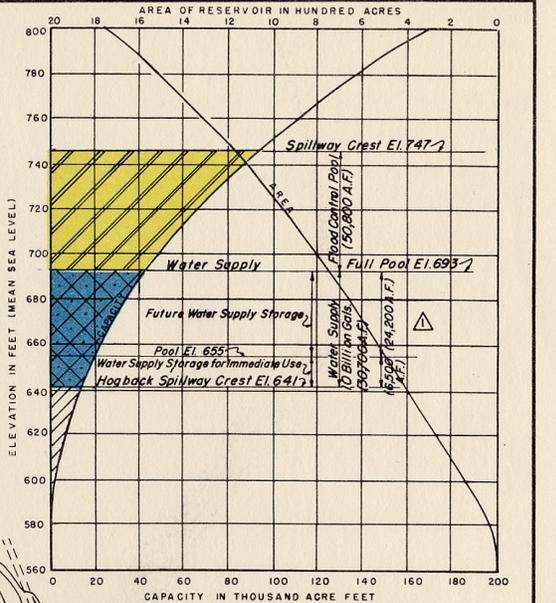
Topography is based on U.S. Army Map (1:25000)

- LEGEND**
- EXISTING GRAVEL ROAD
 - ===== EXISTING TOWN SURFACE ROAD
 - (B)--- EXISTING STATE OR FEDERAL ROAD
 - |--- COUNTY BOUNDARY
 - |--- STATE BOUNDARY
 - |--- RELOCATION OF ROAD
 - ||||| HOGBACK POOL, EL. 641.0
 - ||||| FLOOD CONTROL POOL, (50800 A.F.) EL. 641.0 TO 718.0

| REVISION | DATE | DESCRIPTION | BY |
|---|--------------------|--------------------|---|
| | | | |
| CORPS OF ENGINEERS, U. S. ARMY OFFICE OF THE DIVISION ENGINEER NEW ENGLAND DIVISION WALTHAM, MASS. | | | |
| DR. BY A. J. P. | TR. BY P. W. G. | CK. BY G. F. B. | DATE MARCH 1958 |
| PROJECT ENGINEER <i>W. B. Armstrong</i> | | | CONNECTICUT RIVER FLOOD CONTROL FARMINGTON RIVER BASIN COLEBROOK RIVER DAM (FLOOD CONTROL) RESERVOIR MAP |
| CHIEF PLANNING ENGINEER <i>W. B. Armstrong</i> | | | |
| SUPERVISOR <i>W. B. Armstrong</i> | | | W. B. FARMINGTON RIVER CONN-MASS. LT. COL. C. EAST, DIVISION ENGINEER |
| TO ACCOMPANY REPORT | | SCALE: AS SHOWN | DRAWING NUMBER |
| DATED: 21 DEC. 1958 | | | CT-1-5555 |
| | | | SHEET 2 OF 2 |



LOCATION MAP
SCALE IN MILES
0 8 16 32 48

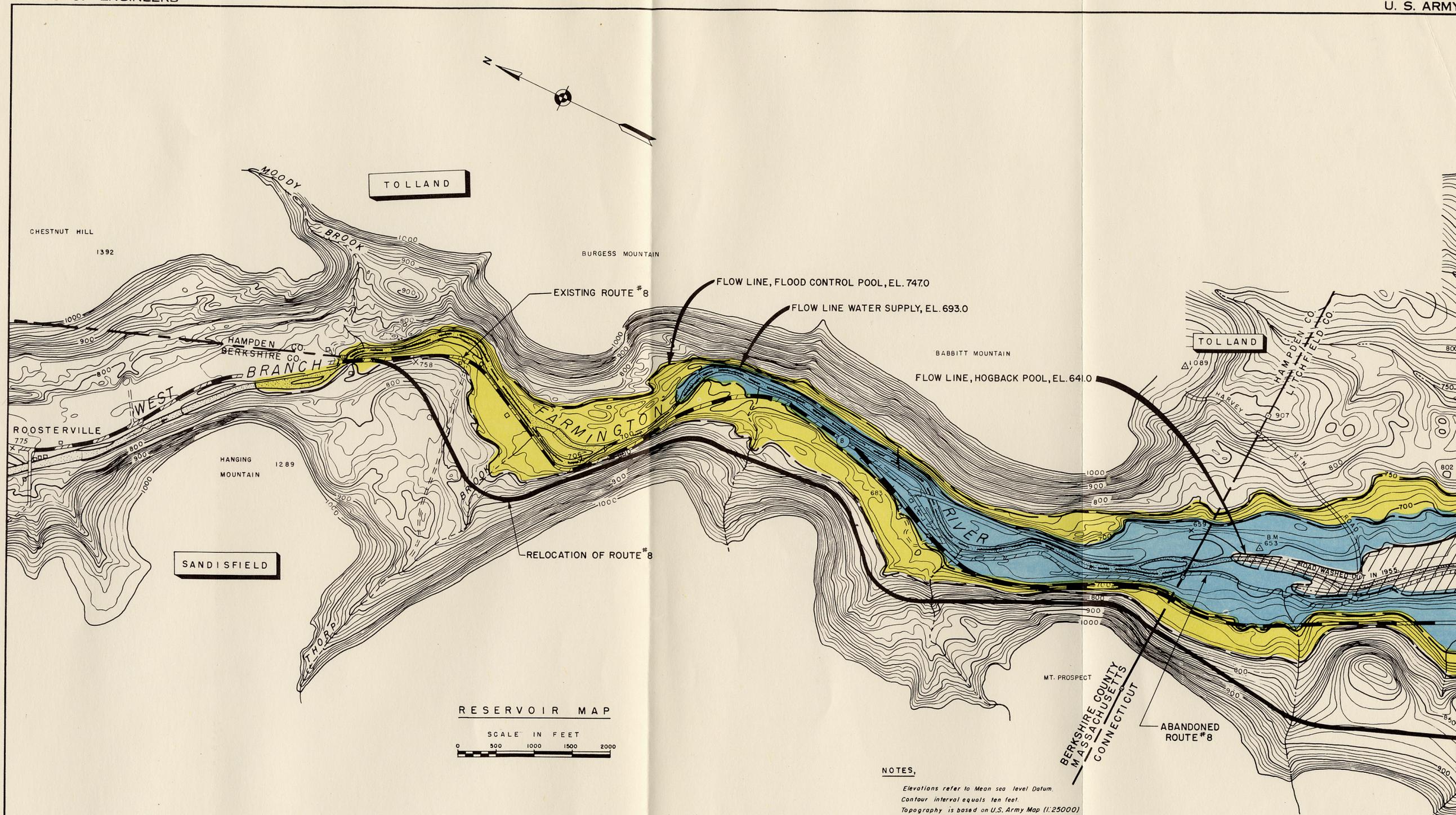


AREA & CAPACITY CURVES
DRAINAGE AREA 119 SQ. MILES

NOTES
Elevations refer to Mean Sea Level Datum.
Contour interval equals ten feet
Topography is based on U.S. Army Map (1:25000)

- LEGEND
- ===== EXISTING GRAVEL ROAD
 - EXISTING TOWN SURFACED ROAD
 - EXISTING STATE OR FEDERAL ROAD
 - COUNTY BOUNDARY
 - STATE BOUNDARY
 - RELOCATION OF ROAD OR ACCESS ROAD
 - ||||| HOGBACK POOL, EL. 641.0
 - Water Supply Pool, 10 MILLION GALLONS (30,700 AF) EL. 641.0 TO 693.0
 - FLOOD CONTROL POOL (50,800 AF) EL. 693.0 TO EL. 747.0

| | | | |
|---|-----------------|--|--|
| REVISION | DATE | DESCRIPTION | BY |
| 11/16/59 | | Showed breakdown of water supply storage | AUL |
| CORPS OF ENGINEERS, U. S. ARMY OFFICE OF THE DIVISION ENGINEER NEW ENGLAND DIVISION WALTHAM, MASS. | | | |
| DR BY L.R.M. | TR BY P.W.G. | CK BY S.F.B. | |
| PROJECT ENGINEER <i>Alan J. Armstrong</i> | | | |
| SUBMITTED BY <i>W. Br. Farmington River</i> | | | |
| APPROVED <i>W. Br. Farmington River</i> | | | DATE MARCH 1958 |
| TO ACCOMPANY REPORT DATED: 31 DEC, 1958 | | | SCALE: AS SHOWN DRAWING NUMBER CT-1-5506 SHEET 1 OF 2 |



RESERVOIR MAP



NOTES

Elevations refer to Mean sea level Datum.
 Contour interval equals ten feet.
 Topography is based on U.S. Army Map (1:25000)

LEGEND

- EXISTING GRAVEL ROAD
- ===== EXISTING TOWN SURFACED ROAD
- (8)— EXISTING STATE OR FEDERAL ROAD
- - - - - COUNTY BOUNDARY
- - - - - STATE BOUNDARY
- ===== RELOCATION OF ROAD
- ~~~~~ HOGBACK POOL, EL. 641.0
- ~~~~~ WATER SUPPLY POOL, 10 MILLION GALLONS (30,700 AF) EL. 641.0 TO 693.0
- ~~~~~ FLOOD CONTROL POOL (50,800 A.F.) EL. 693.0 TO EL. 747.0

| | | | |
|---|--------------------|--------------------|--|
| REVISION | DATE | DESCRIPTION | BY |
| CORPS OF ENGINEERS, U. S. ARMY OFFICE OF THE DIVISION ENGINEER NEW ENGLAND DIVISION WALTHAM, MASS. | | | |
| DR. BY L. R. M. | TR. BY P. W. G. | CK. BY G. F. B. | |
| PROJECT ENGINEER <i>W. B. Farmington</i> SUBMITTED BY <i>W. B. Farmington</i> | | | DATE MARCH 1958 |
| APPROVED <i>W. B. Farmington</i> PROJECT ENGINEER, DIV. | | | APPROVED <i>W. B. Farmington</i> LT. COL. C. EAST, DIVISION ENGINEER |
| TO ACCOMPANY REPORT DATED 31 DEC., 1958 | | | SCALE AS SHOWN DRAWING NUMBER CT-1-5506 SHEET 2 OF 2 |