

FLOODS ON THE CONNECTICUT RIVER
AT MIDDLETOWN

CENTER STREET PROJECT

U. R. CONN. 19-1

REDEVELOPMENT AGENCY FOR THE CITY OF MIDDLETOWN, CONN.

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ANDERSON-NICHOLS
CONSULTING ENGINEERS
CONCORD BOSTON HARTFORD
AUGUST 1960



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REPORT

ON

FLOODS ON THE CONNECTICUT RIVER
AT CENTER STREET PROJECT AREA

MIDDLETOWN, CONNECTICUT

I. Purpose of the Report

The purpose of this report is to present the results of an investigation on floods on the Connecticut River at Middletown. It furnishes pertinent information on how often, for how long, and to what elevations, the Center Street Project Area might be inundated. Due to the proximity of the site to the Connecticut River, any plans for its redevelopment and occupancy must take into consideration the possibility of flood danger posed by the waters of the Connecticut River.

II. Description of the Project Area

A. Existing Features: The project area is located on the western bank of the Connecticut River in the City of Middletown, and covers two city blocks mostly consisting of one-, two- and three-story buildings of brick and frame. It has an area of approximately eight acres bounded on the north by Court Street, on the east by DeKoven Drive, on the south by College Street and on the west by Main Street. A branch line of the New York, New Haven and Hartford Railroad runs along the eastern boundary of the project area, immediately to the east of DeKoven Drive. A new highway,

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State Highway No. 9, has been constructed to the east of the railroad, and the Connecticut River lies several hundred feet to the east of the highway. The ground elevation in the project area rises from approximately 38 feet City Datum on the eastern boundary to approximately 64 feet City Datum on the western boundary of the project area.

- B. Proposed Plan: The proposed plan of redevelopment for the Center Street Project Area, following demolition and clearing of all buildings on the site, widening of the streets and rehabilitation of utilities, envisages the construction of a parking facility, a motor inn and a shopping center. The motor inn, to be constructed along DeKoven Drive, would overlook the Connecticut River.

III. Hydrology of the Connecticut River

The Connecticut River Basin is long and narrow in shape, with a drainage area of more than 10,000 square miles at Middletown. A significant feature of the Connecticut River is the large volume of storage available for flood waters. The storage of flood waters reduces the peaks of floods and thereby also lowers high flood stages.

Flood waters are stored in two ways. They may be stored in natural or artificial reservoirs, lakes and ponds; this form of storage being known as reservoir storage. Flood waters may also be temporarily

stored in wide reaches of the river and over flood plains; this form of storage being known as valley storage.

Both forms of storage exist in the Connecticut River and along its tributaries, and have had a significant reduction effect on flood peaks and flood stages.

IV. Flood Control Reservoirs

After the floods of March 1936, the U. S. Army Corps of Engineers initiated a program of reservoir construction for purposes of controlling floods on the Connecticut River and its principal tributaries. Eleven reservoirs will be in operation by 1961. Seven of these have been completed, the remaining four are under construction, and others are in the planning stage.

V. Flood Records

Three gages provide a record of stages and discharges of the Connecticut River in the State of Connecticut suitable for analysis. These gages are located in Thompsonville, at Memorial Bridge in Hartford, and at Bodkin Rock, a few miles downstream of Middletown. Thanks to these gages, continuous stream flow records for approximately one hundred years are available. The flood records at Bodkin Rock are particularly valuable, since the discharges and stages at Bodkin Rock are closely related to those in the project area at Middletown.

VI. History of Floods

Damaging floods have been experienced on the Connecticut River since the establishment of the first settlements in the basin. Flood records indicate that frequent and damaging floods can be expected to occur during any season of the year. Stages of the Connecticut River at Middletown during six great floods of record are shown on Exhibit 1. Major floods in the Connecticut River can be caused by excessive rainfall, melting snow, or a combination of both. The floods of September 1938 and August 1955 were caused by heavy rainfall alone; while the flood of March 1936 resulted from the combined runoff from rainfall and melting snow. Three of the major floods are described in the following paragraphs.

- A. Flood of March 1936: The greatest flood of record on the lower Connecticut River occurred in March 1936. During January and February, New England had many snowfalls attended by unusually low temperatures and without the usual winter thaws. The weather became unseasonably warm on March 9 and continued so for the remainder of the month. Heavy precipitation fell about March 11 and March 12, which, combined with snow runoff, caused some flooding, primarily from ice jams. A second period of heavy precipitation followed on March 17 and 18, and the resulting runoff combined with

melting snow, flowed into rivers already swelled by the previous storm, and caused the catastrophic flood which exceeded all previously known flood discharges in the Connecticut River.

The stage hydrograph for the second rise of the March 1936 flood is shown on Exhibit 2.

- B. Flood of September 1938: A tropical hurricane moving northward off the Atlantic Coast suddenly struck inland from the ocean on the afternoon of September 21, and crossed Long Island and the coast of Connecticut and Rhode Island. The hurricane continued northward with unabated force through Connecticut and Massachusetts, and left behind a ravaged countryside. New England had been experiencing heavy rainfall on September 18, 19 and 20, and streams were bank-full when the rain associated with the hurricane brought additional rainfall. A wave of floods followed in all stream channels and on the wooded slopes of the New England hills and in the larger rivers. Major damages were inflicted upon many cities and towns, and upon railroads, highways, mills, dams and other improvements which had been constructed within, on, or over natural channels.

The stage hydrograph for the flood of September 1938 on the Connecticut River at Middletown is shown on Exhibit 3.

- C. Flood of August 1955: The greatest flood of record in New England occurred in August 1955. Between August 11 and 15, hurricane "Connie" brought four to eight inches of rainfall, but most of it

was absorbed by the dry soil conditions. However, when, several days later, hurricane "Diane" deposited between 10 and 13 inches of rainfall on regions previously saturated by hurricane "Connie", runoff of record proportions occurred on many streams. The heaviest rainfall of the storm, however, was concentrated south of the Massachusetts-New Hampshire State line, so that runoff from the upper portions of the Connecticut River Basin did not contribute significantly to the flood peak at Middletown. The stage hydrograph for the flood of August 1955 at Middletown is shown on Exhibit 4.

VII. Frequency of Floods

A frequency analysis furnishes information on how often, over a number of years, flood waters in the river attain certain elevations or rates of flow. A frequency analysis is usually presented graphically in the form of a curve showing the probability or percent chance that a river will reach a given stage or discharge in any year. An accepted method by which frequency of floods can be determined, requires continuous accurate measurement over a long period. Fortunately, on the Connecticut River, records date back more than one hundred years. A frequency analysis of floods in the Connecticut River at Middletown has been made on the basis of these records, and is shown on Exhibit 5. The curve indicates the percent chance of occurrence of a given stage in any year.

It may be pointed out that the construction of the flood control reservoirs by the Corps of Engineers has had and will have a significant effect on flood frequency relationships, so that when such flood control works are in operation, a given high stage or peak flow would occur at less frequent intervals. The stage-frequency curve of Exhibit 5 includes the effect of all eleven flood control reservoirs to be constructed by 1961. It is emphasized that the flood frequency curve represents an average probability or recurrence interval based on experienced events which may include a series of extremely wet or dry years. Therefore, frequencies should be used only as a guide to the probability of given flood stages.

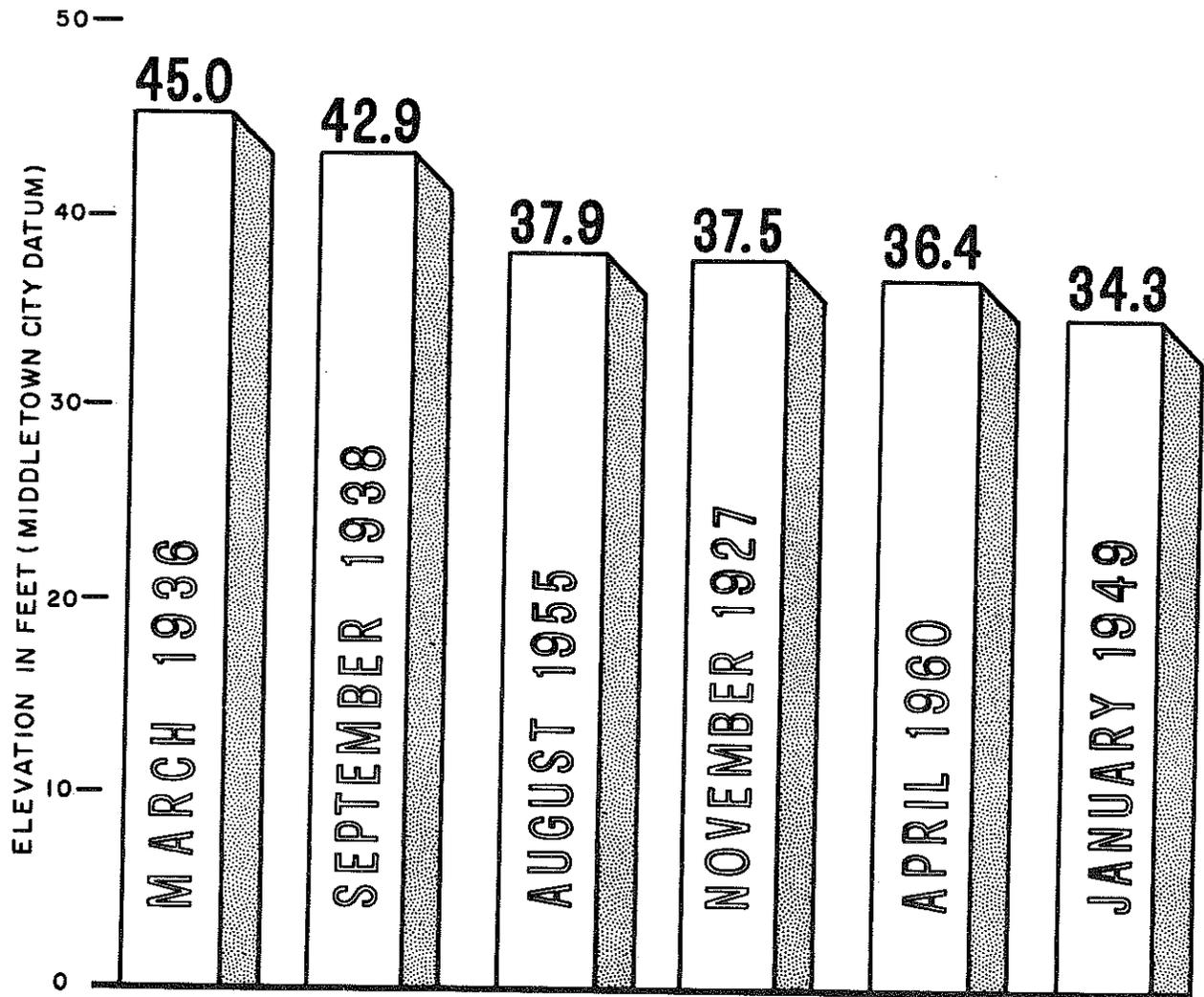
VIII. Duration of Flooding

In planning improvements in areas susceptible to flood damage, it is not only desirable to know how often a certain stage might be exceeded, but it is also important to know for how long a period of time the flood waters will stay above that stage. Certain types of developments can withstand short periods of inundation without serious damage. The duration of flooding for three of the largest floods has been evaluated and is presented graphically in Exhibit 6. Factors such as the character of the drainage basin, the direction of travel of storm and the pattern of rainfall influence the duration of flooding. Thus, as is seen in Exhibit 6, at Middletown, the duration of flooding at or above any

stage varies from flood to flood. These conditions preclude specific deductions as to duration of flooding of areas above a selected elevation.

IX. Recommendations

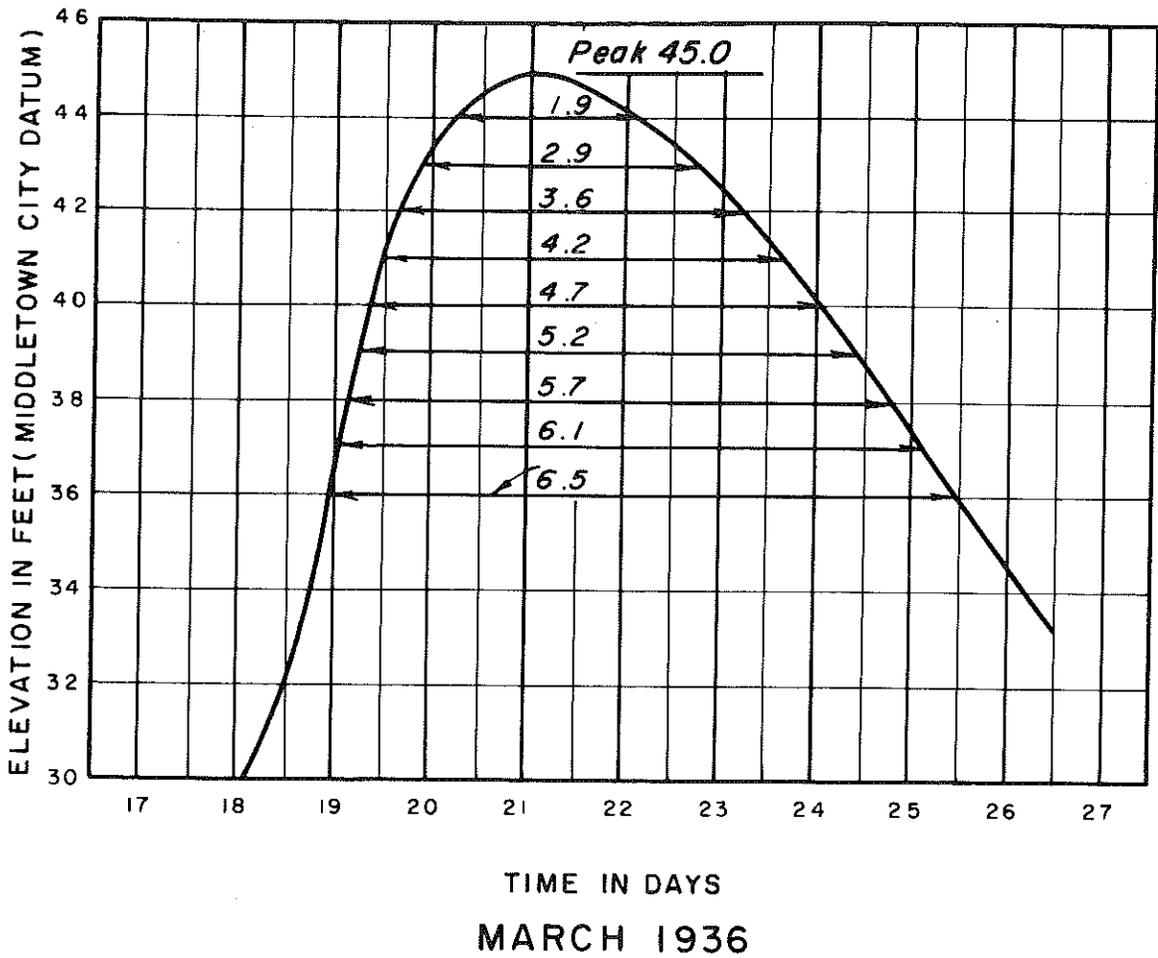
The topographic survey of the Center Street Project Area indicates ground elevations varying from 38 feet to 64 feet City Datum. Parts of this area were flooded in the floods of March 1936 and September 1938. All structures situated above elevation 45 feet City Datum would be safe against the recurrence of any known floods. Some types of development, such as parking areas, may be located at levels that might be inundated during less frequent floods, provided such areas can be readily evacuated. As stated in the foregoing, frequencies should be used only as a guide since they represent but one parameter to be considered in selecting the design elevation of structures. Other factors such as building codes, zoning ordinances, type of structure, anticipated use, loss of revenue, etc. may have a stronger bearing on the selection. Only a thorough analysis of all governing factors by the prospective redeveloper can serve to meet his needs.



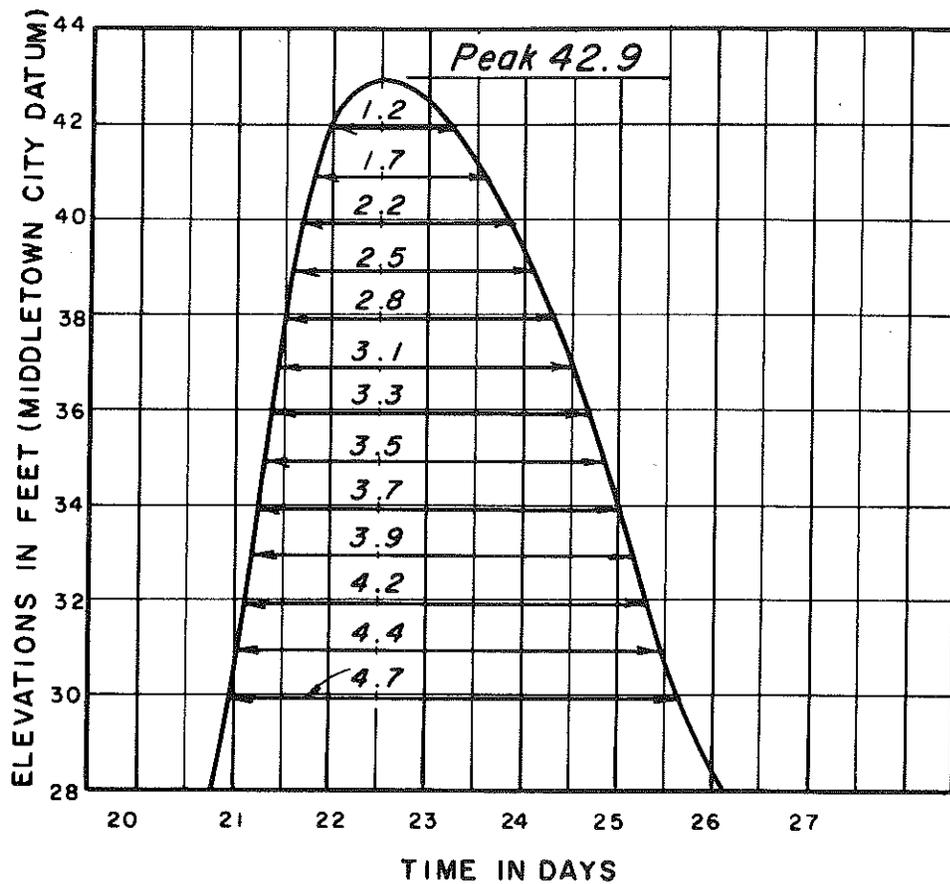
PRINCIPAL FLOODS OF RECORD

CONNECTICUT RIVER AT MIDDLETOWN, CONN.

EXHIBIT I

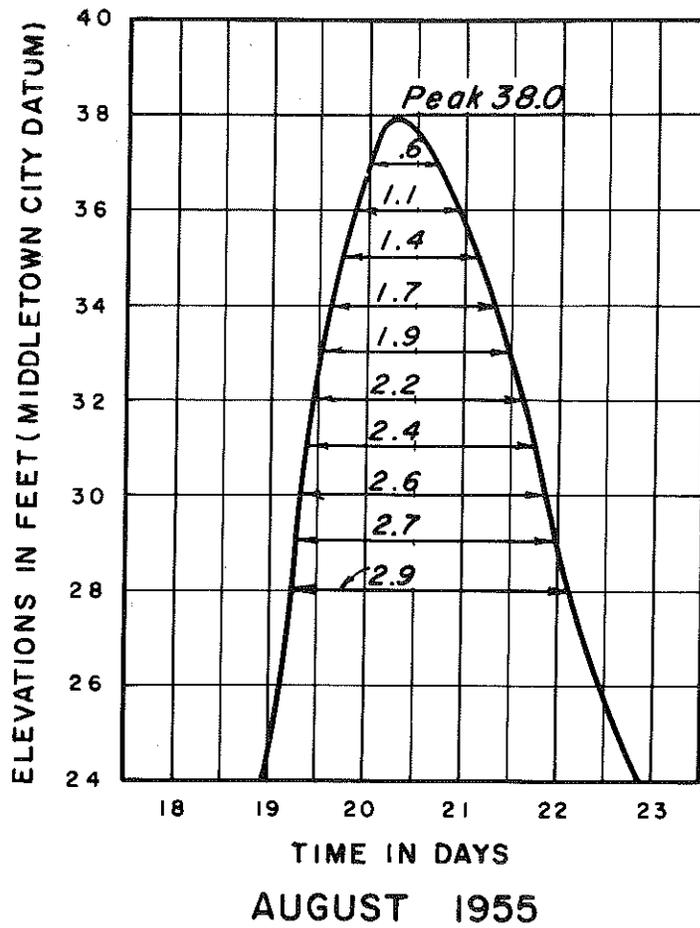


STAGE HYDROGRAPH
 FOR
 MARCH 1936 FLOOD
 CONNECTICUT RIVER AT MIDDLETOWN, CONN.

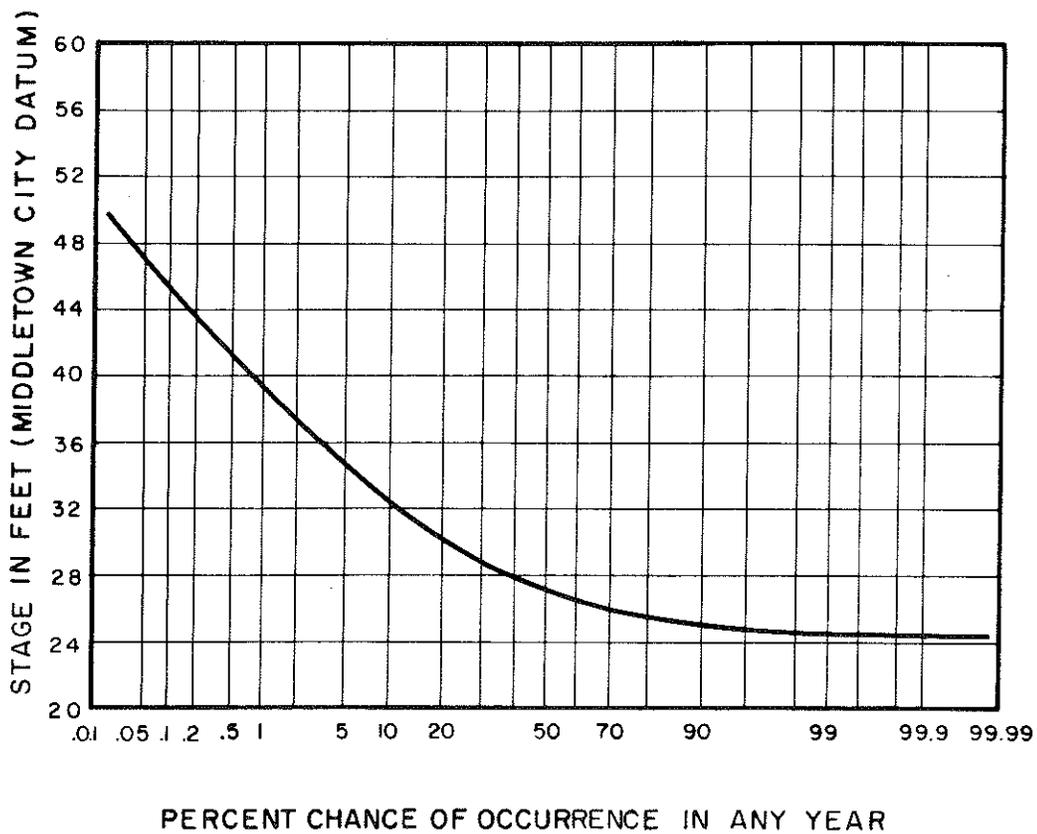


SEPTEMBER 1938

STAGE HYDROGRAPH
 FOR
 SEPTEMBER 1938 FLOOD
 CONNECTICUT RIVER AT MIDDLETOWN, CONN.



STAGE HYDROGRAPH
 FOR
 AUGUST 1955 FLOOD
 CONNECTICUT RIVER AT MIDDLETOWN, CONN.

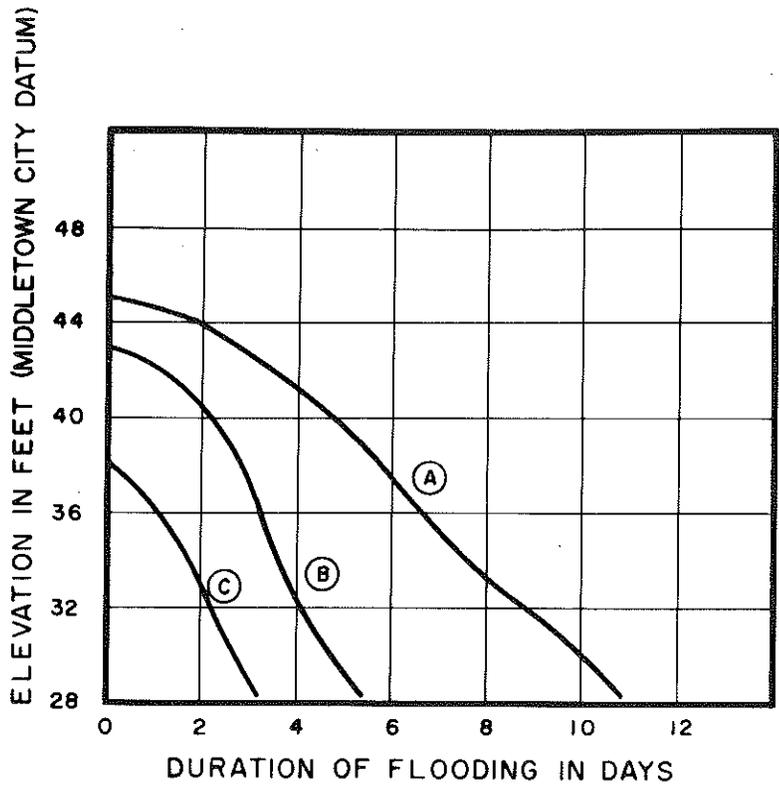


NOTE:

Frequency data reflects the modifying effects of 11 Corps of Engineers Flood Control Reservoirs to be in operation by 1961

STAGE FREQUENCY RELATIONSHIP

CONNECTICUT RIVER AT MIDDLETOWN, CONN.



- (A) MARCH 1936 FLOOD
- (B) SEPTEMBER 1938 FLOOD
- (C) AUGUST 1955 FLOOD

DURATION OF FLOODING
 FOR
 THREE MAJOR FLOODS
 CONNECTICUT RIVER AT MIDDLETOWN, CONN.