

FLOODS ON CLINTON RIVER, NORTH BRANCH AND MIDDLE BRANCH OF CLINTON RIVER  
AND HARRINGTON DRAIN, MOUNT CLEMENS, CLINTON TOWNSHIP, MACOMB COUNTY  
MICHIGAN

**Introduction.**—The approximate areas inundated during the flood of April 5-6, 1947, by Clinton River, North Branch and Middle Branch of Clinton River, and Harrington Drain, in Clinton Township, Macomb County, Mich., are shown on a topographic map base to record the flood hazard in graphical form. The flood of April 1947 is the highest known since 1934 and probably since 1902. Greater floods are possible, but no attempt was made to define their probable overflow limits.

The Clinton River Cut-Off Canal, a flood-relief channel which diverts flow directly into Lake St. Clair from a point about 1500 feet downstream from Gratiot Avenue (about 9 miles upstream from the mouth) has been in operation since October 1951. The approximate limits of overflow that would result from a flood equivalent in discharge to that of April 1947, and occurring with the Cut-Off Canal in operation, are also shown. Although the Cut-Off Canal may reduce the frequency and depth of flooding it will not necessarily eliminate future flooding in the basin. Improvements in drainage systems in the basin, expanding urbanization, new highways, and other cultural changes may influence the inundation pattern of future floods.

The preparation of this flood inundation map was financed through a cooperative agreement between Clinton Township, Macomb County, Mich., and the U.S. Geological Survey.

Backwater curves used to define the profile for a hypothetical flood on the Clinton River downstream from Moravian Drive, equivalent in discharge to the 1947 flood, but occurring with the present Cut-Off Canal in operation; flood stage established at the gaging station on Clinton River at Mount Clemens; and supplementary floodmark elevations were furnished by the Corps of Engineers.

Bench-mark elevations and field survey data, used in the analysis of floods on Harrington Drain, were furnished by the Macomb County Drain Commission.

**Flood height.**—The height of a flood is usually stated in terms of the gage height or stage at a gaging station which is the elevation of the water surface above a selected datum plane. Elevations shown are in feet above mean sea level, datum of 1929. Gage heights or stages in Clinton Township can be converted to elevations above mean sea level by adding the gage height to the appropriate datum of gage listed below.

GAGING STATION	DATUM OF GAGE ABOVE MEAN SEA LEVEL (FEET)
Clinton River near Fraser (Garfield Road)	577.71
North Branch Clinton River near Mount Clemens (Hall Road)	576.38
Middle Branch Clinton River near Mount Clemens (Hall Road)	580.99
Clinton River at Mount Clemens (Moravian Drive)	570.43
Clinton River at Mount Clemens (auxiliary gage 400 feet upstream from Cut-Off Canal)	570.43

Flood stage, the stage at which damage begins or threatens, is at elevation 584 feet (gage height 13.6 feet) at the gaging station on Clinton River at Mount Clemens (Moravian Drive). Flood heights of all peaks equal to or greater than elevation 584 feet which occurred during the period of record (1934-60) at this gaging station are shown in figure 1. The erratic

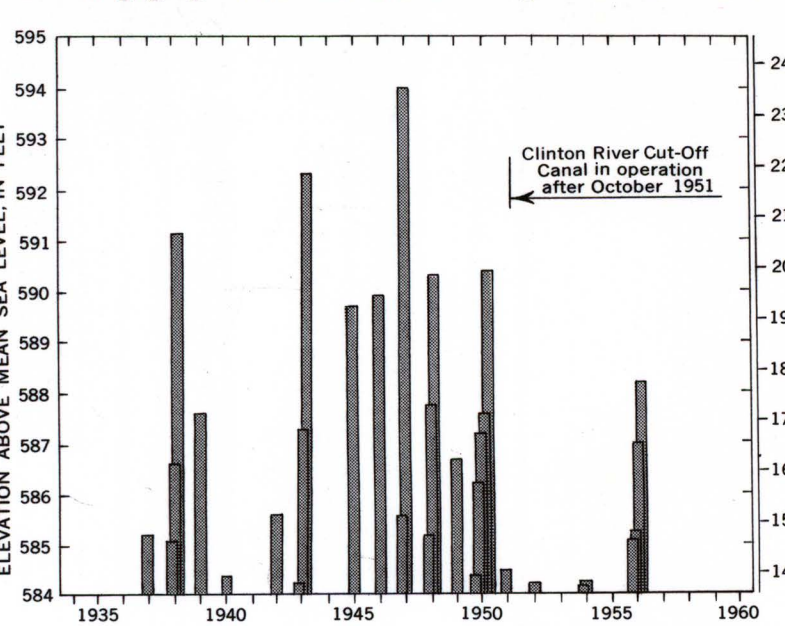


FIGURE 1.—FLOODS ABOVE 584-FOOT ELEVATION, 1934-60, CLINTON RIVER AT MOUNT CLEMENS, MICHIGAN (MORAVIAN DRIVE).

nature of flood occurrence is evident. In 27 years of record, there were 31 floods that exceeded elevation 584 feet, 11 years in which no floods reached that elevation, and 5 years in which 3 or more floods exceeded elevation 584 feet. A decrease in the frequency of flooding is indicated for the period following construction of the Cut-Off Canal.

**Flood frequency.**—Frequency of floods at the Geological Survey gaging stations on North Branch Clinton River near Mount Clemens, and Clinton River near Fraser and at Mount Clemens, has been derived from a regional flood-frequency relation based on records for streams in southeastern Michigan. The frequency curves reflect present conditions of flood flow with the Clinton River Cut-Off Canal in operation. Extrapolation of flood-frequency curves is not recommended because of the possibility of large errors. Longer records and changes in the relationship between stage and discharge at gaging stations in the Clinton River basin may in the future define somewhat different flood-frequency curves.

**Recurrence interval.**—As applied to flood events, recurrence interval is the average interval of time within which a given flood height will be equaled or exceeded once. The recurrence interval is inversely related to the chance of a given flood height being equaled or exceeded in any one year. Thus, the 20-year flood has a 5 percent (1 in 20) chance of being equaled or exceeded in any one year. No periodicity is implied. At the Mount Clemens (Moravian Drive) gage, for example, a flood that reaches elevation 590 feet is said to have a 20-year recurrence interval (fig. 2).

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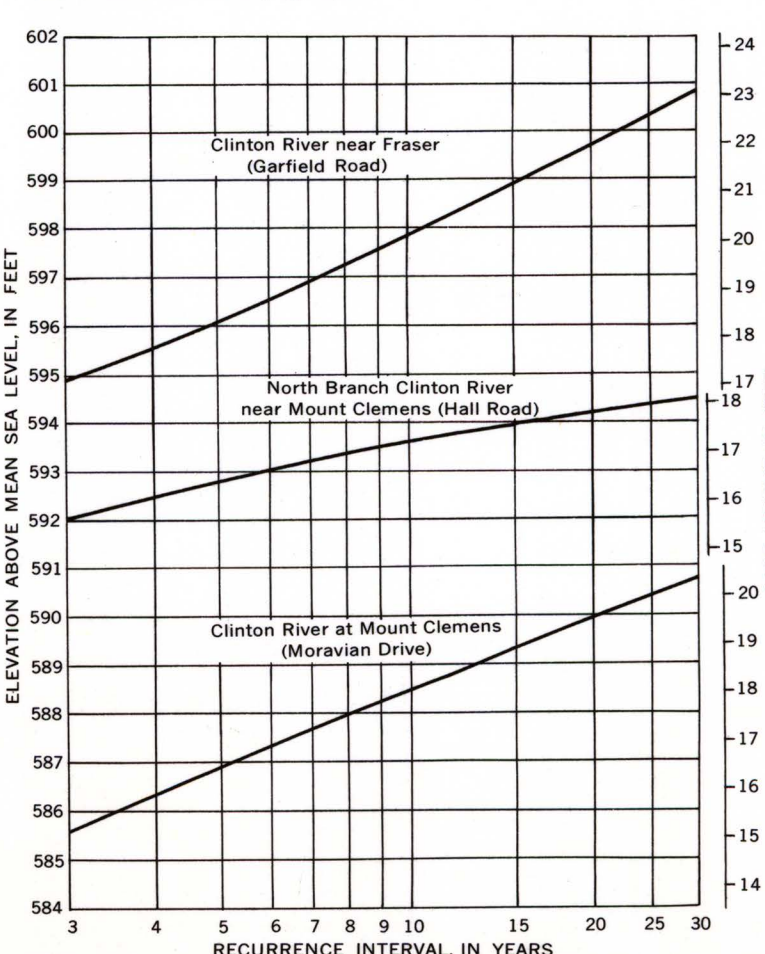


FIGURE 2.—FREQUENCY OF FLOODS IN CLINTON RIVER BASIN NEAR MOUNT CLEMENS, MICHIGAN

However, the 590-foot elevation will probably not be equaled or exceeded every 20 years, but on the average, five floods can be expected to equal or exceed the 590-foot elevation in a 100-year period.

The general relationship between recurrence interval and flood height at gaging stations on Clinton River and North Branch Clinton River in Clinton Township (fig. 2) is tabulated below:

Recurrence interval (years)	Clinton River at Mount Clemens (Moravian Drive)	Clinton River near Fraser (Garfield Road)	North Branch Clinton River near Mount Clemens (Hall Road)
30	590.0	600.8	594.5
20	590.0	600.7	594.2
10	588.5	597.9	593.6
5	587.0	596.1	592.8

A flood-frequency relation was not defined at the gaging station on the Middle Branch Clinton River because of the brevity of the record.

**Flood profiles.**—Records at gaging stations in Clinton Township and of levels of Lake St. Clair define flood profiles along the principal streams. These data, supplemented by floodmark elevations and information obtained from local residents, are the basis for constructing the profile of the flood of April 1947 shown in figure 3. Also shown are estimated profiles for a flood equivalent in discharge to the 1947 flood, which would occur with the present Cut-Off Canal in operation. Along the Clinton River downstream from Moravian Drive, this profile was interpolated from backwater curves computed in 1961. Elsewhere, flood profiles for present conditions were estimated on the basis of stage-discharge relations at gaging stations and flood slopes indicated by the 1947 and lesser floods.

The 1947 flood profile along Harrington Drain (fig. 3) has been constructed on the basis of two floodmark elevations and the slope of the water surface for the moderate rise on April 25, 1961, as determined from marks recorded by a number of crest-stage gages.

The abrupt changes in the profiles at some bridge locations indicate the difference in water-surface elevations upstream and downstream from the bridges. Profiles of floods of other magnitudes along Harrington Drain and the main stem of the Clinton River can be plotted on figure 3, generally parallel to the profiles representing present conditions with the Cut-Off Canal in operation. For the large floods, backwater from the Clinton River appears to extend to the northern limits of the flood map along the Middle and North Branches. When backwater conditions prevail, flood profiles along the Middle and North Branches would approximate the slopes shown in figure 3. For free-fall conditions, flood profiles along the Middle and North Branches would have a steeper slope than those shown.

River miles measured upstream from the mouth of Clinton River (Lake St. Clair), used for the profiles of figure 3, are marked along the streams on the map.

Depth of flooding at any point can be estimated by subtracting the ground elevation from the water-surface elevation indicated by the profile in figure 3. The approximate ground elevation can be estimated from information indicated by contours on the map, although more accurate elevations can be obtained by leveling to bench marks.

**Additional data.**—Other information pertaining to floods in Clinton Township, Macomb County, Mich., may be obtained at the office of the U.S. Geological Survey, Lansing, Mich.

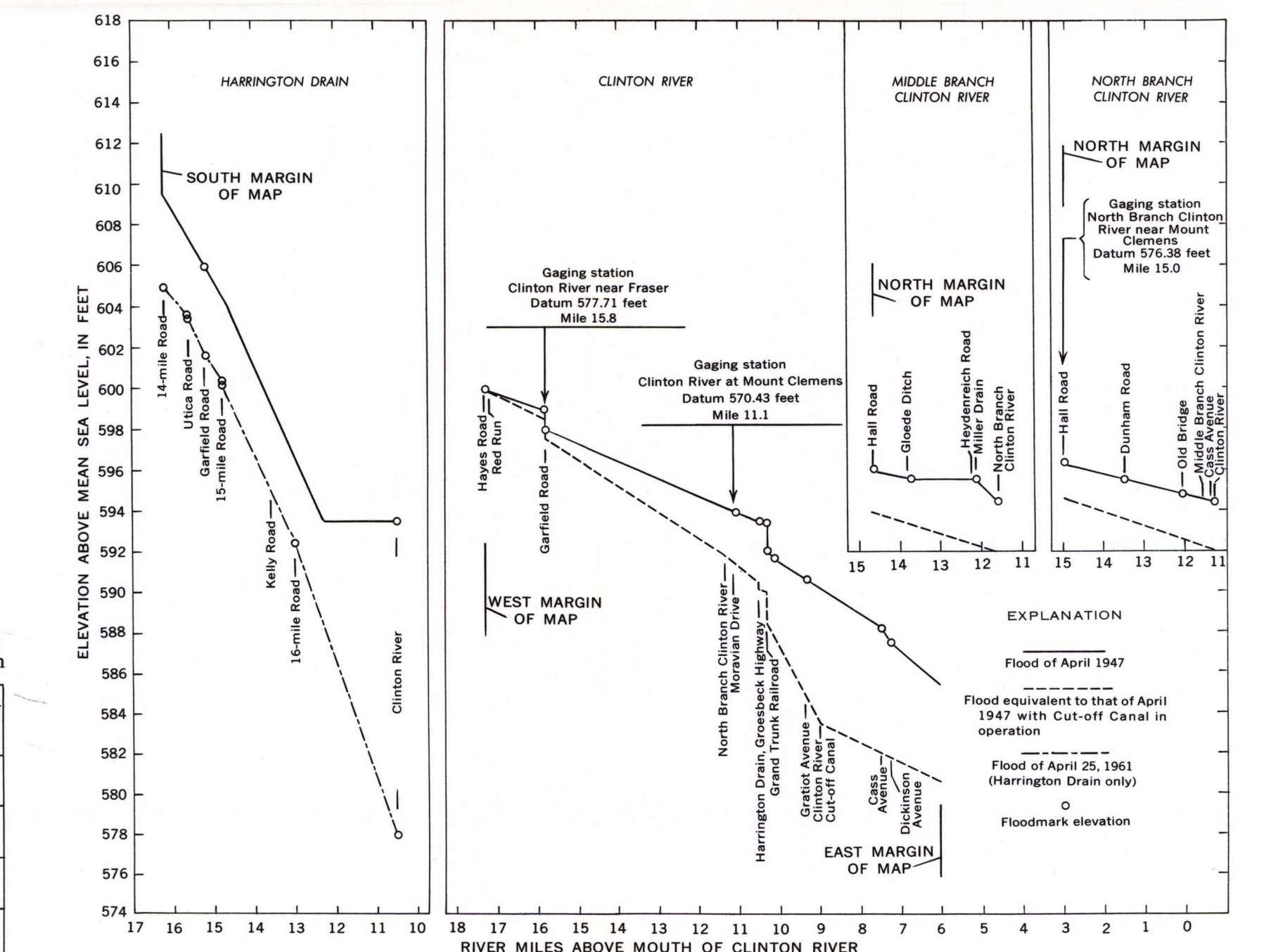


FIGURE 3.—FLOOD PROFILES OF CLINTON RIVER, NORTH BRANCH AND MIDDLE BRANCH CLINTON RIVER, AND HARRINGTON DRAIN, MACOMB COUNTY, MICHIGAN

FLOODS AT MOUNT CLEMENS, MICHIGAN

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