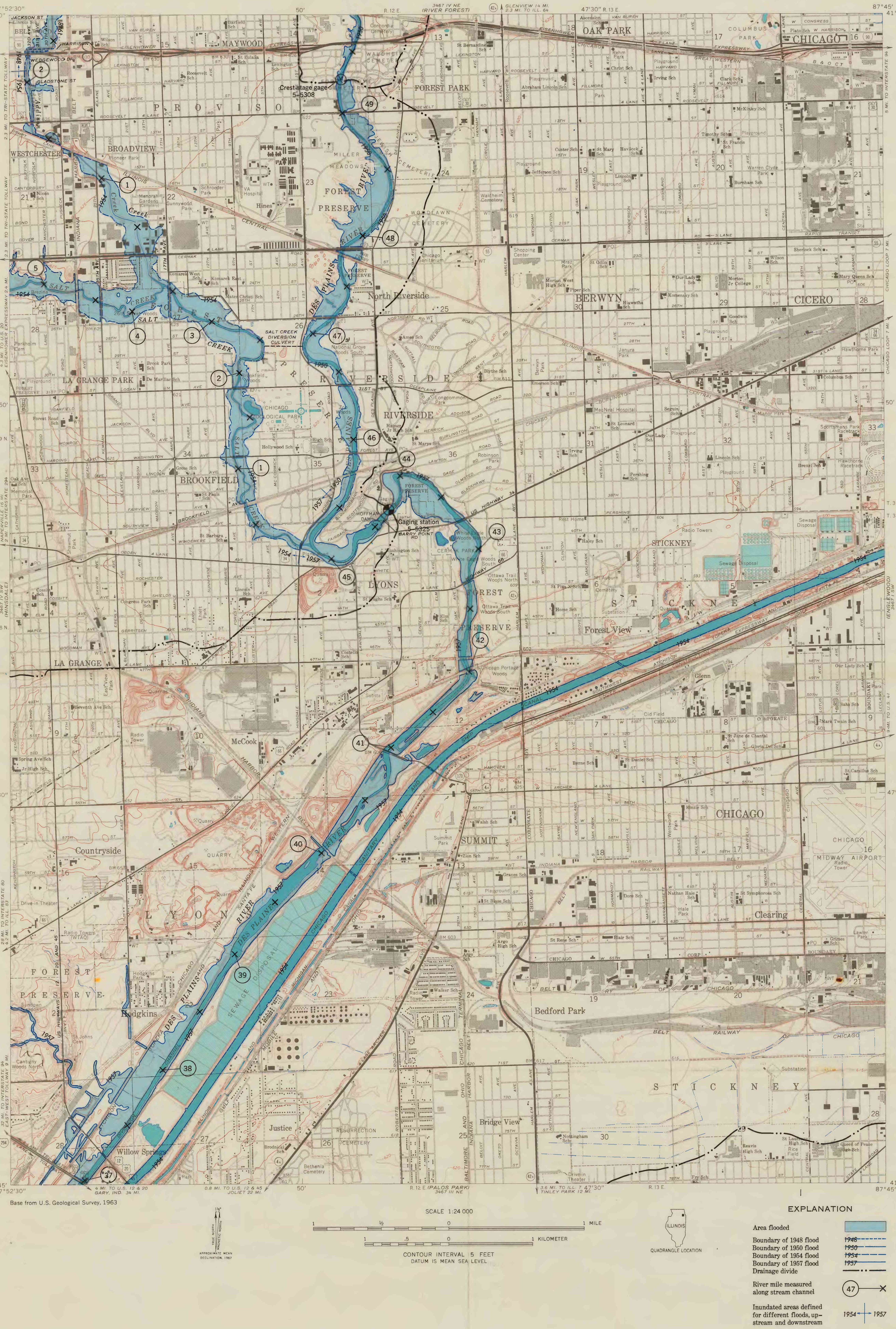
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-252



FLOODS IN BERWYN QUADRANGLE NORTHEASTERN ILLINOIS

This report presents hydrologic data that can be used to evaluate the extent, depth, and frequency of flooding that affect the economic development of flood plains in the Berwyn quadrangle, northeastern Illinois. It will aid individuals, government agencies, and others responsible for solving existing flood problems and for formulating effective flood-plain regulations that will minimize the creation of new flood problems. The report will also be useful for preparing building and zoning regulations, locating waste disposal facilities, developing recreational areas, and managing surface water in relation to ground-water resources.

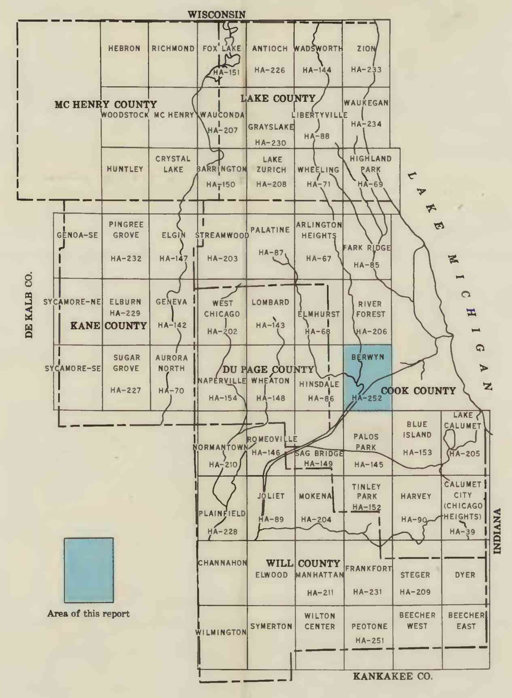


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles included in flood-hazard mapping program.*

The areas inundated by floods along streams in the Berwyn 7½-minute quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1. Inundated areas are shown for the flood of March 1948 along Addison Creek upstream from mile 2.1, for the flood of April 1950 along Des Plaines River upstream from mile 45.5, for the flood of October 1954 along Salt Creek and Addison Creek downstream from mile 2.1, and for the flood of July 1957 along Des Plaines River downstream from mile 45.5.

Records at the gaging station on Des Plaines River at Riverside are indicative of the relative magnitude of floods in the area.

Greater floods than those whose boundaries are shown on the map are possible. The flood boundaries shown provide a record of historic fact that reflect channel conditions existing when the flood occurred. Changes in channel conditions, in waterway openings at highways and railroads, or changes in runoff characteristics of the streams caused by increased urbanization that may have taken place subsequent to the floods represented on the map could affect the flood height reached by a future flood of comparable discharge. Protective works built after the floods shown may reduce the frequency of flooding in the area but will not necessarily eliminate all future flooding. The inundation pattern of future floods may be affected by new highways and bridges, relocation and improvement of stream channels, and other cultural changes.

The general procedure used in defining the flood boundaries was to construct flood profiles from elevations of floodmarks identified in the field and from data available from other agencies. The extent of flooding delineated on the topographic map was derived from the profiles by interpolation between contours (lines of equal ground elevations) and by plotting overflow limits identified during field investigations and surveys. The portrayal of flood boundaries is consistent with the scale of the map (1 inch = 2,000 feet; contour interval, 5 feet).

Street and basement flooding caused by backup in storm drains occurs in several areas in the Berwyn quadrangle but limits of such flooding are not defined in this report. The boundaries of flooding only along the streams in the area are delineated on the flood map.

Cooperation and acknowledgment.— The preparation of this report is a part of an extensive flood-mapping program financed through cooperative agreements between the Northeastern Illinois Metropolitan Area Planning Commission and the U.S. Geological Survey. Under previous agreements, flood maps were prepared for forty-three 7½-minute quadrangles. Under the present agreement, the flood-mapping program was expanded to include all the 7½-minute quadrangles shown in figure 1. The program includes parts of Cook and McHenry Counties, nearly all of Kane and Will Counties, and all of Du Page and Lake Counties. The six counties cooperate in the program financially through separate agreements with the Planning Commission. Financial support for the preparation of this report was provided by the County of Cook, the Metropolitan Sanitary District of Greater Chicago, and the Forest Preserve District of Cook County through the Northeastern Illinois Metropolitan Area Planning Commission.

The cooperative program is administered on behalf of the Planning Commission by Matthew L. Rockwell, Executive Director, and is directly coordinated by John R. Sheaffer, Chief Planner.

The report was prepared by the U.S. Geological Survey under the administrative direction of William D. Mitchell, district chief, and under the immediate supervision of Allen W. Noehre, engineer-in-charge of the project.

Acknowledgment is made to the following agencies that supplied some of the data on which this report is based: the State of Illinois, Department of Public Works and Buildings, Division of Waterways; the Department of Highways of Cook County; and the Metropolitan Sanitary District of Greater Chicago.

Flood height.— The height of a flood at a gaging station usually is stated in terms of gage height, or stage, which is the elevation of the water surface above a selected datum plane. Elevations shown in this report are in feet above mean sea level. Gage heights for gaging stations in the Berwyn quadrangle can be converted to elevations above mean sea level by adding the gage height to the appropriate datum of gage listed in the following table. Size of the drainage basin for each station also is shown in the table. The subbasin divides from which the areas were determined are shown on the flood map.

Gaging station	Station number	Type of gage[1]	Datum of gage above mean sea level (feet)	Drainage area (square miles)
Des Plaines River:				
At Forest Park (Forest Home Cemetery bridge)	5-5308	C	606.68	470
At Riverside (300 feet downstream from Barry Point Road)	5-5325	R	594.68	635

[1] C, Crest-stage gage; R, Water stage recorder.

Gage height and year of occurrence of each annual flood (highest peak stage in a calendar year) above 602-foot elevation at the gaging station, Des Plaines River at Riverside, for the periods 1887-89 and 1892-1965 are shown in figure 2. Data prior to December 1943 were adjusted to the record of the Riverside station from record furnished by the Metropolitan Sanitary District of Greater Chicago and obtained at a site half a mile downstream. The irregular occurrence of floods is evident.

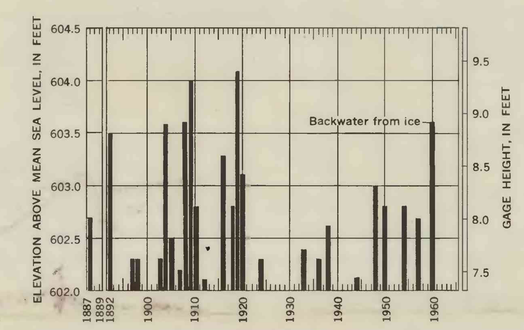


FIGURE 2.—*Annual floods above 602-foot elevation, 1887-89, 1892-1965, Des Plaines River at Riverside (300 feet downstream from Barry Point Road).*

Flood discharge.— The rate of discharge of a stream is the volume of flow that passes a particular location in a given period of time. Discharge rates usually are expressed in units of cubic feet per second (cfs). Peak discharge, the maximum discharge attained by a flood, generally occurs at the time of the maximum height (stage) of the flood, but if a stream is affected by variable backwater, the time of the peak discharge may not coincide with that of the maximum stage. For example, backwater from an ice or debris jam may cause a high stage during a period of relatively low discharge. The annual flood stage for 1960 at the gaging station, Des Plaines River at Riverside, was affected by backwater from ice as shown in figure 2.

Flood frequency.— Frequency of floods at the Geological Survey gaging stations, Des Plaines River at Riverside and Salt Creek at Western Springs was derived from streamflow records for these stations combined with records for other nearby stations and with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The gaging station at Western Springs is at Wolf Road 1.3 miles west of the Berwyn quadrangle and 8.8 miles upstream from the mouth of Salt Creek. The general relations between discharge and frequency at the two gaging stations are shown in figures 3 and 4, and the general relations between stage and frequency are shown in figures 5 and 6. The relation between stage and frequency is dependent on the relation of stage to discharge which is affected by changes in the physical conditions of stream channels and constrictions. The frequency curves shown in figures 5 and 6 are based on channel conditions existing in 1966. Longer records and future changes in channel conditions may define somewhat different flood-frequency curves. Extrapolation of the curves beyond the limits shown is not recommended.

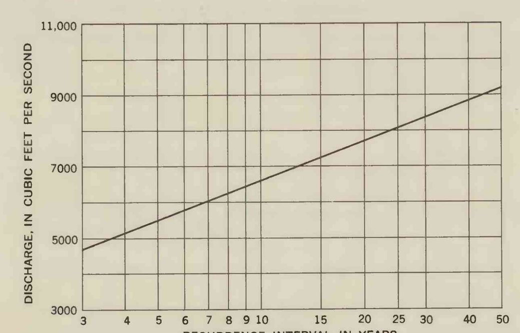


FIGURE 3.—*Frequency of flood discharges on Des Plaines River at Riverside (300 feet downstream from Barry Point Road).*

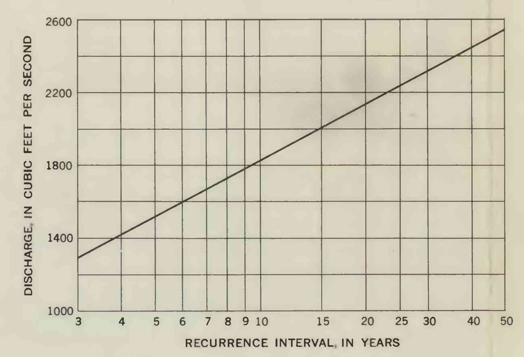


FIGURE 4.—*Frequency of flood discharges on Salt Creek at Western Springs (Wolf Road).*

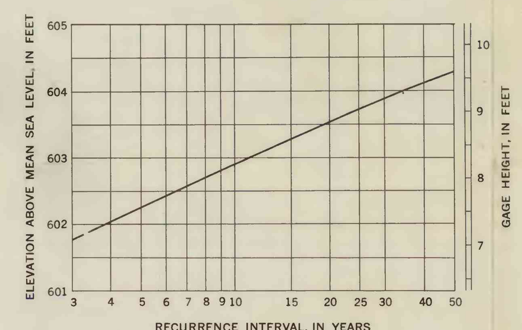


FIGURE 5.—*Frequency of flood stages on Des Plaines River at Riverside (300 feet downstream from Barry Point Road).*

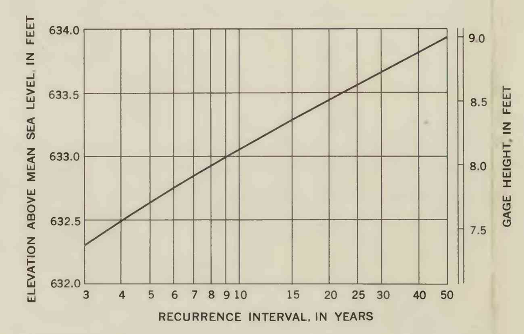


FIGURE 6.—*Frequency of flood stages on Salt Creek at Western Springs (Wolf Road).*

Recurrence intervals.— As applied to flood events, recurrence interval is the average interval of time within which a given flood will be equaled or exceeded once. Frequencies of floods can be stated in terms of their probabilities of occurrence (virtually, reciprocals of their recurrence intervals for floods with recurrence intervals greater than 10 years). For example, a flood with a 25-year recurrence interval would have a 4-percent chance of being equaled or exceeded in any given year, or a flood with a 50-year recurrence interval would have a 2-percent chance of being equaled or exceeded in any given year.

The general relation between recurrence interval and flood height at gaging stations on Des Plaines River at Riverside (figure 5) and Salt Creek at Western Springs (figure 6) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)	
	Des Plaines River at Riverside	Salt Creek at Western Springs
50	604.3	633.9
30	603.9	633.7
20	603.6	633.4
10	602.9	633.0
5	602.3	632.6
3	601.8	632.3

It is emphasized that recurrence intervals are average figures—the average number of years between occurrences of floods that equal or exceed a given magnitude. The fact that a major flood is experienced in one year does not reduce the probability of that flood being exceeded in the next year or even in the next week.

Flood profiles.— Profiles of the water surface, based primarily on elevations of marks left by floods of March 1948, April 1950, October 1954, July 1957, and May 1966, are shown in figures 7-9. Where floodmarks could not be identified, the profiles were constructed on the basis of flood crests determined from reports of local residents, and of elevations of streambeds and lower flood stages. River miles used for the profiles correspond to those marked along the streams on the flood map.

The abrupt changes in the profiles shown at some road crossings indicate the difference in water-surface elevations at the upstream and downstream sides of bridges that produce channel constrictions. The drop in water surface through bridge openings during future floods may be different from that shown on the profiles. An increase in channel capacity through a bridge opening would reduce the flood height on the upstream side. An accumulation of debris at a bridge would reduce the channel capacity and tend to increase the upstream flood height. Channel changes through bridge openings may also change the overflow pattern of future floods.

Flood depths.— Depth of flooding at any point can be estimated by subtracting the ground elevation from the water-surface elevation at the same point, indicated by the profiles in figures 7-9. The approximate ground elevation can be determined from contours on the map, although more accurate elevations can be obtained by leveling from nearby bench marks.

Additional data.— Other information pertaining to floods in the Berwyn quadrangle can be obtained at the office of the U.S. Geological Survey, Oak Park, Ill., and from the following published reports:

Daniels, W. S., and Hale, M. D., 1958, Floods of October 1954 in the Chicago area, Illinois and Indiana: U.S. Geol. Survey Water-Supply Paper 1370-B, p. 107-200.

Illinois Department of Public Works and Buildings, Division of Waterways, 1950, Survey report for flood control, Addison Creek, 27 p.

_____ 1958, Report on plan for flood control and drainage development, Salt Creek, 38 p.

_____ 1961, Report on plan for flood control and drainage development, Des Plaines River, 143 p.

Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Dept. Public Works and Bldgs., Div. of Waterways, 386 p.

Ramey, H. P., 1959, Storm water drainage in the Chicago area: Am. Soc. Civil Engineers Proc., v. 85, no. HY 4., p. 11-37.

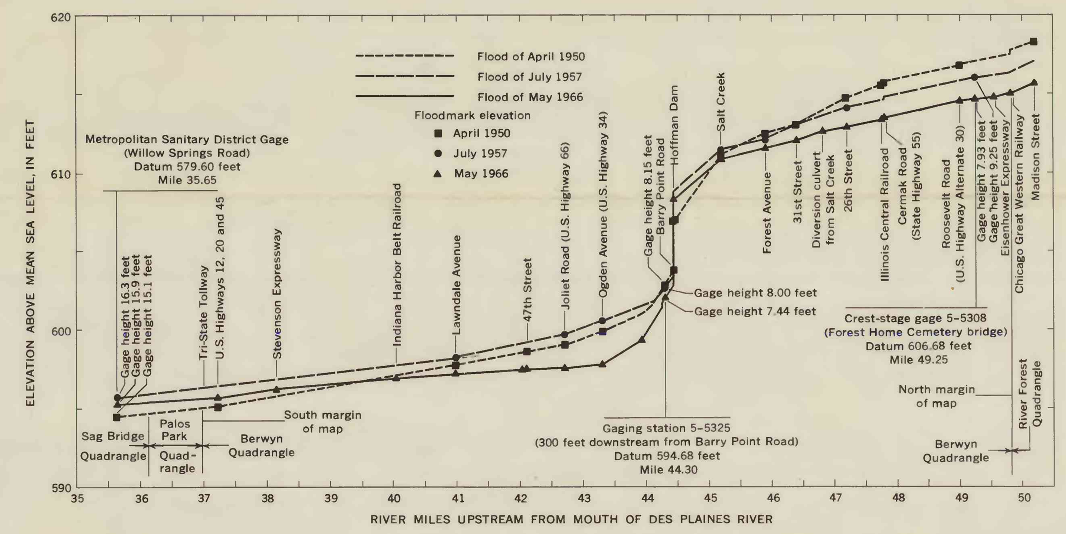


FIGURE 7.—*Profiles of floods on Des Plaines River.*

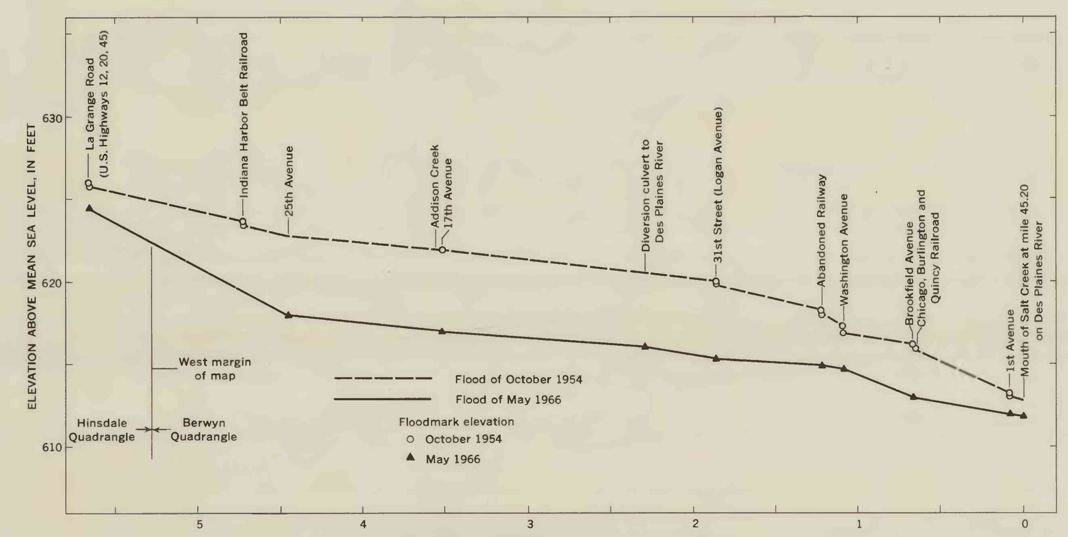


FIGURE 8.—*Profiles of floods on Salt Creek.*

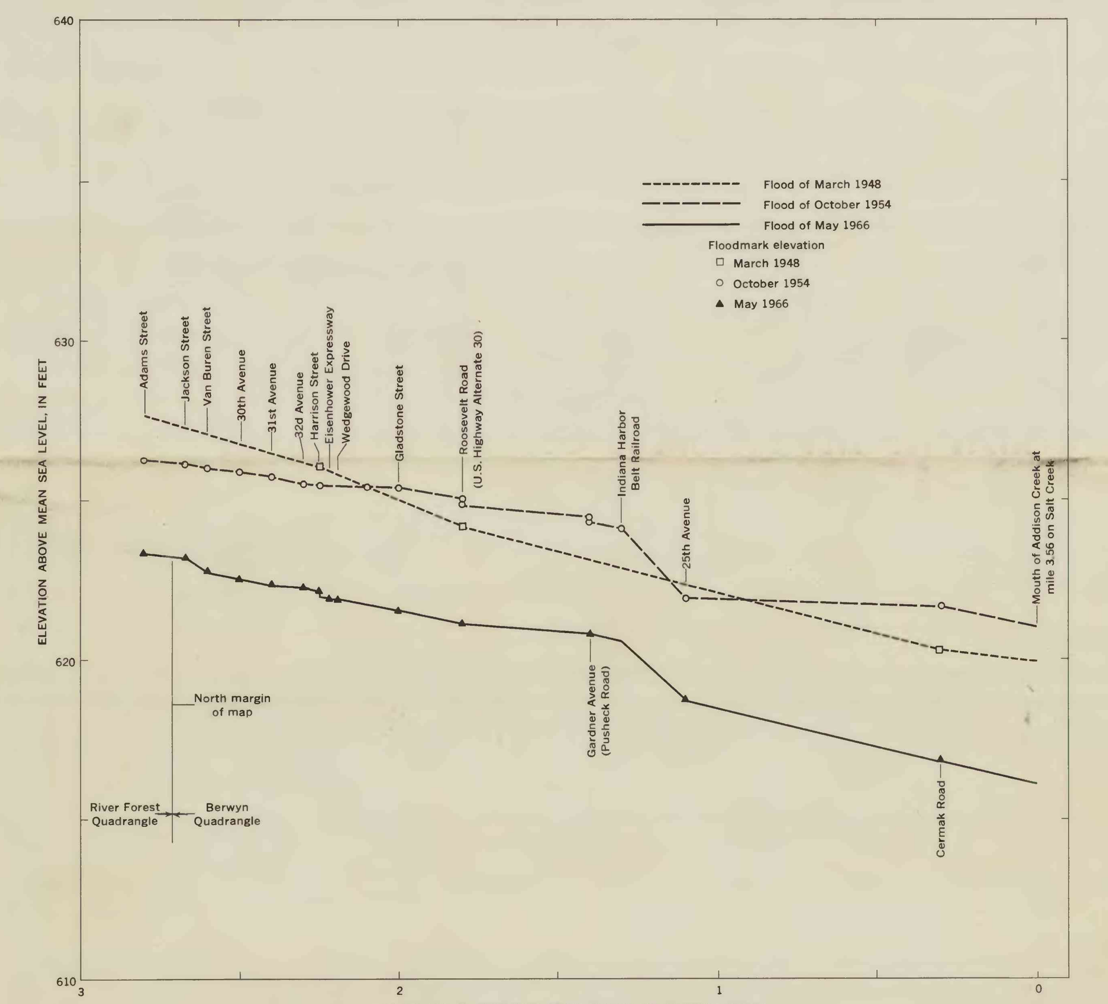


FIGURE 9.—*Profiles of floods on Addison Creek.*

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