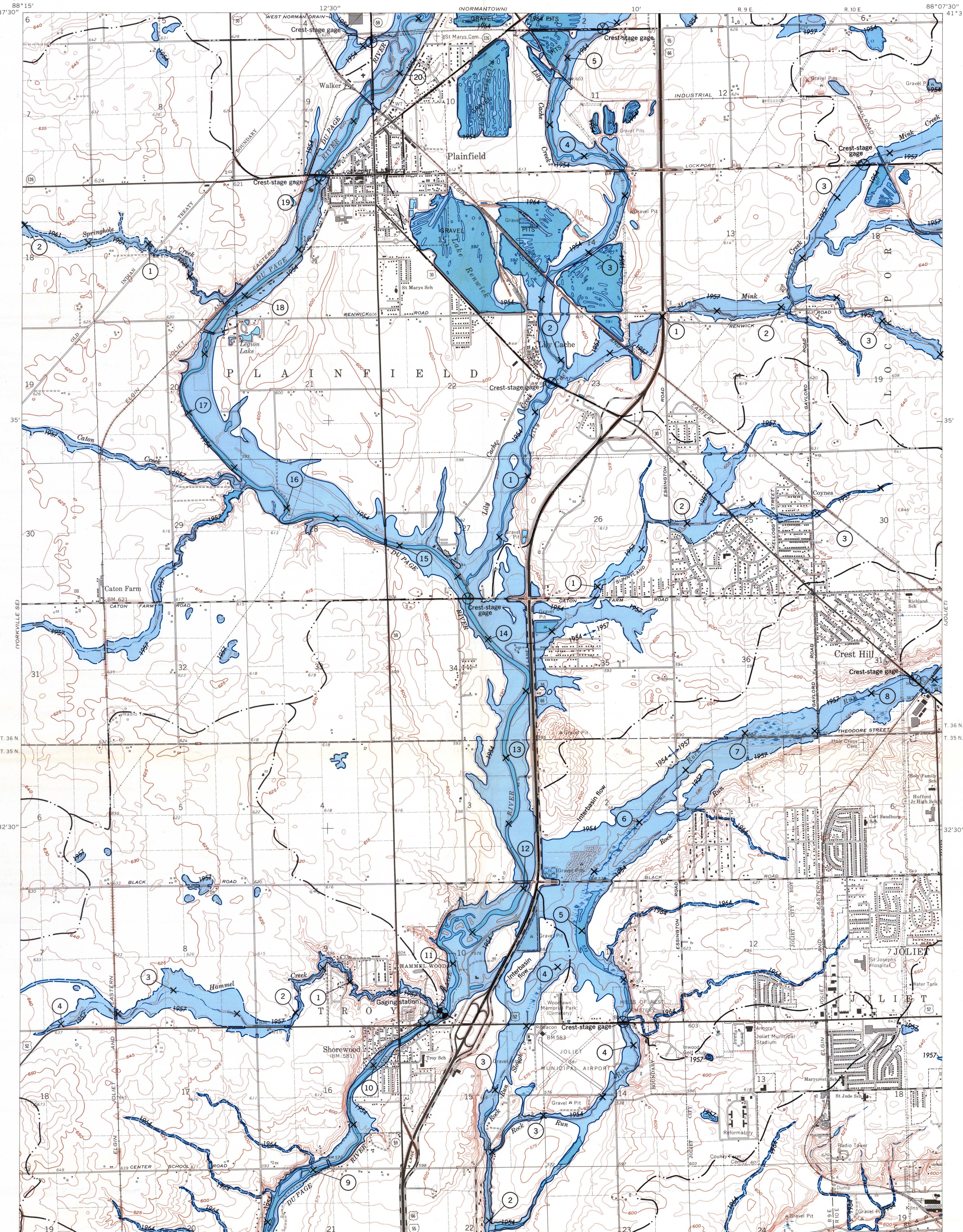
PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION



Base from U.S. Geological Survey, 1962

APPROXIMATE MEAN DECLINATION, 1966

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

EXPLANATION

Area flooded	
Boundary of 1954 flood	1954
Boundary of 1957 flood	1957
Boundary of 1964 flood	1964
Boundary of 1961 flood	1961
Drainage divide	
River mile measured along stream channel	2
Inundated areas defined for different floods, upstream and downstream	1954 1957

FLOODS IN PLAINFIELD QUADRANGLE, NORTHEASTERN ILLINOIS

This report presents hydrologic data concerning the extent, depth, and frequency of flooding in the Plainfield quadrangle, northeastern Illinois, that are useful for an appraisal of the hazards involved in occupancy and development of flood plains. It is intended to aid individuals, governmental agencies, and others responsible for solving existing flood problems and for formulating effective flood-plain regulations that would minimize the creation of new flood problems. The report will be useful for preparing building and zoning regulations, locating waste disposal facilities, purchasing unoccupied land, developing recreational areas, and managing surface water in relation to the ground-water resources.

The areas inundated by specific floods along streams in the Plainfield quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1. Inundated areas are shown for the October 1954 flood along Du Page River, West Norman drain, Lily Cache Creek, Rock Run Slough, Rock Run downstream from mile 6.50, some unnamed tributaries to these streams, and for some of the gravel pits in the northern part of the area; for the July 1957 flood along Mink Creek and tributaries, Sunnyland drain and tributaries, Hammel Creek, Rock Run upstream from mile 6.50, and Caton Creek and tributary; and for the September 1961 flood along Springhole Creek. Inundation boundaries for the July 1964 flood are shown for some of the more recent gravel pits in the north-central part of the area.

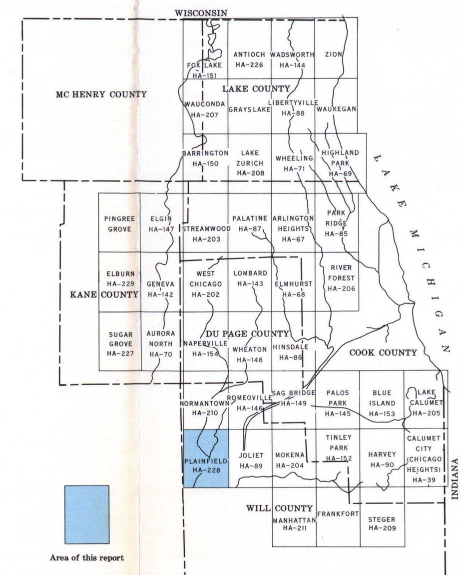


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles included in the flood-hazard mapping program.*

According to reports of local residents, the 1954 flood was the highest observed on Lily Cache Creek and Du Page River in at least 50 years.

Greater floods than those shown on the map are possible. The flood boundaries shown provide a record of historic fact that reflect channel conditions existing when the floods occurred. Changes in channel conditions, 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 shown on the map could affect the flood height of future floods 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.

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

There are depressions and lowland areas in the Plainfield quadrangle where surface water accumulates because of inadequate surface drainage to streams. Frequency and depth of flooding in these areas are unrelated to the water-surface elevation along the streams. Some areas are flooded only briefly after periods of heavy rainfall or snowmelt, whereas others remain inundated continuously, depending largely upon the rates of evaporation and seepage into the ground. Flood boundaries are shown for all such areas detected in this investigation.

Cooperation and acknowledgment. — The preparation of this report is a part of an extensive flood-mapping program financed through a cooperative agreement between The Northeastern Illinois Metropolitan Area Planning Commission and the U.S. Geological Survey. Under the agreement, flood maps will be prepared for the 7 1/2-minute quadrangles shown in figure 1. The program includes part of Cook, Kane, McHenry, 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 Will County.

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.

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

Acknowledgment is made to the State of Illinois, Department of Public Works and Buildings, Division of Waterways and to the Corps of Engineers, U.S. Army, for supplying some of the data on which this report is based.

Additional data were obtained from public officials in the area and from field investigations.

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 on the map are in feet above mean sea level. Gage heights at gages in the Plainfield 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. The subbasin divides from which the areas were determined are shown on the flood map.

Gaging station	Type of gage[1]	Datum of gage above mean sea level (feet)	Drainage area (square miles)
West Norman drain at Plainfield (State Highway 59)	C	601.42	8.30
DuPage River:			
At Plainfield (U.S. Highway 30)	C	594.32	250
Near Caton Farm (Caton Farm Road)	C	583.17	314
At Troy (U.S. Highway 52)	R	564.62	325
Lily Cache Creek:			
At Plainfield (County Road)	C	600.63	29.0
Near Plainfield (U.S. Highway 30)	C	589.46	43.8
Mink Creek near Plainfield (Lockport Road	C	607.57	3.35
Rock Run:			
Near Joliet (U.S. Highway 30)	C	584.19	2.12
Near Troy (U.S. Highway 52)	C	572.82	9.20

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

Gage height and year of occurrence of each annual flood (highest peak stage in each calendar year) above 571-foot elevation at the gaging station, Du Page River at Troy, during the period 1941-65 are shown in figure 2. The irregular occurrence of floods is evident.

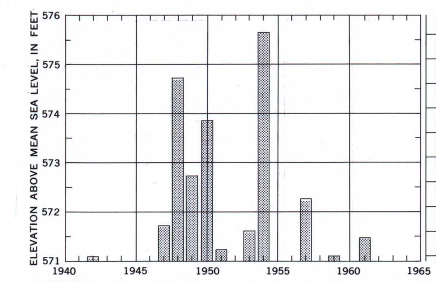


FIGURE 2.—*Annual floods above 571-foot elevation, 1941-65, DuPage River at Troy, Illinois (400 feet upstream from U.S. Highway 52).*

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 debris or an ice jam may cause a high stage during a period of relatively low discharge.

Flood frequency.— Frequency of floods at the gaging station, Du Page River at Troy, was derived from streamflow records for this station combined with records for nearby stations and with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The general relation between frequency and discharge is shown in figure 3, and the general relation between stage and frequency is shown in figure 4. The relation between stage and frequency is dependent on the relation of stage to discharge which is affected by changes in physical conditions of channels and constrictions. The frequency curve shown in figure 4 is based on channel conditions existing in 1965. 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.

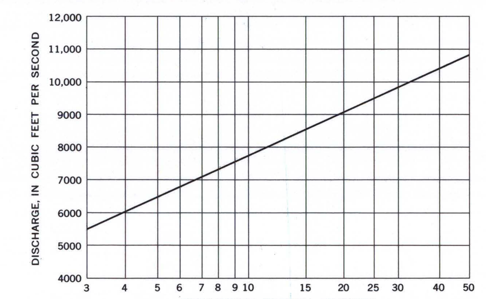


FIGURE 3.—*Frequency of flood discharges on DuPage River at Troy (400 feet upstream from U.S. Highway 52).*

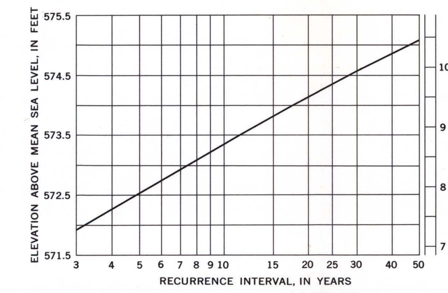


FIGURE 4.—*Frequency of flood stages on DuPage River at Troy (400 feet upstream from U.S. Highway 52).*

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 the gaging station on Du Page River at Troy (fig. 4) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)
50	575.1
40	574.8
30	574.5
20	574.1
10	573.3
5	572.5
3	571.9

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 the floods of April 1950, October 1954, July 1957, September 1961, March 1962, and July 1964 are shown in figures 5-11. Where floodmarks could not be obtained, the profiles were constructed on the basis of flood crests determined from photographs and 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 5-11. The approximate ground elevation can be determined from contours on the map; more nearly accurate elevations can be obtained by leveling from nearby bench marks.

Additional data.— Other information pertaining to floods in the Plainfield 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, 1962, Survey report for flood control, Du Page River, 200 p.

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

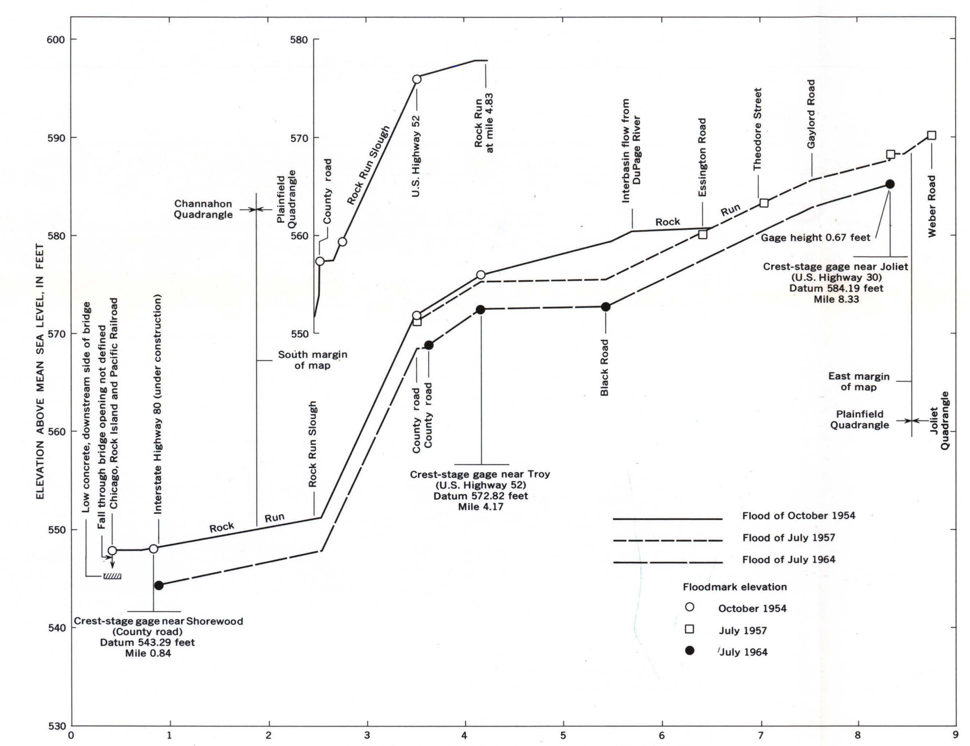


FIGURE 11.—*Profiles of floods on Rock Run and Rock Run Slough.*

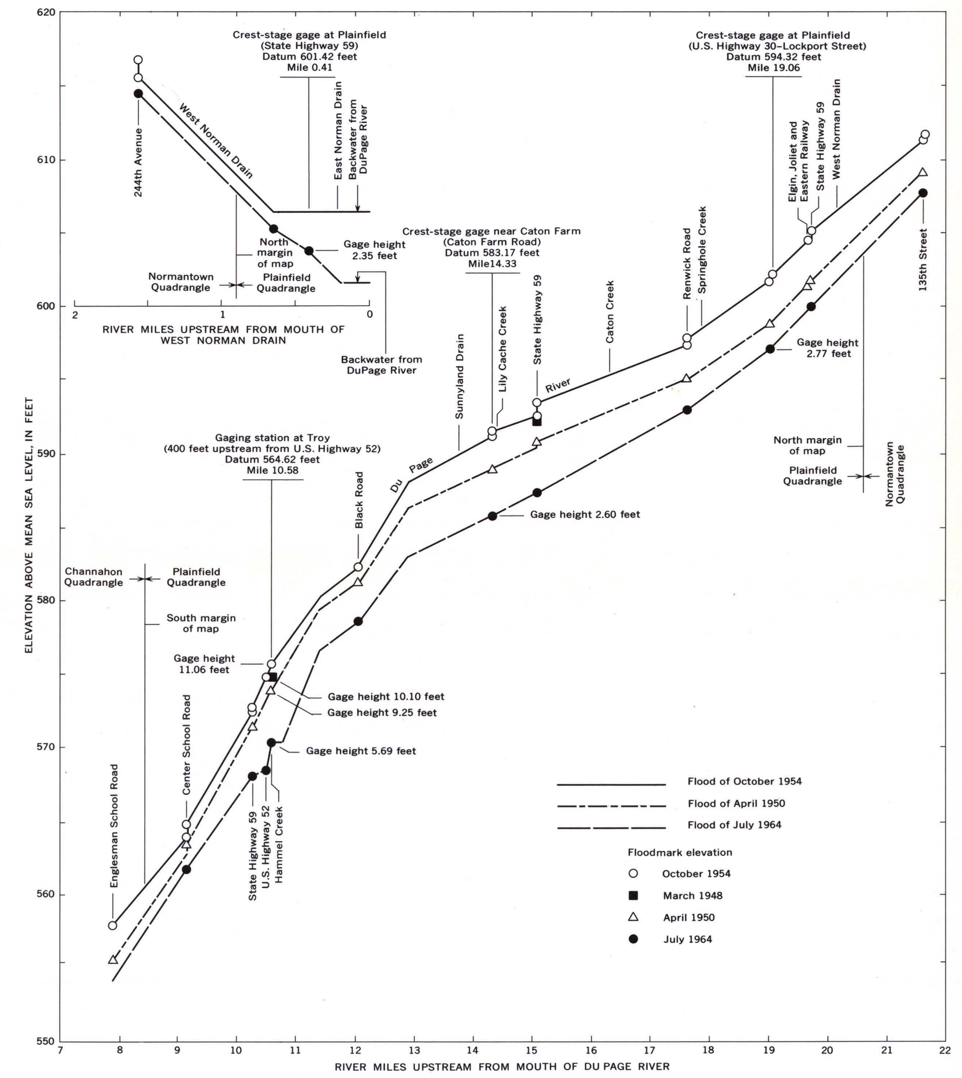


FIGURE 5.—*Profiles of floods on Du Page River and West Norman Drain.*

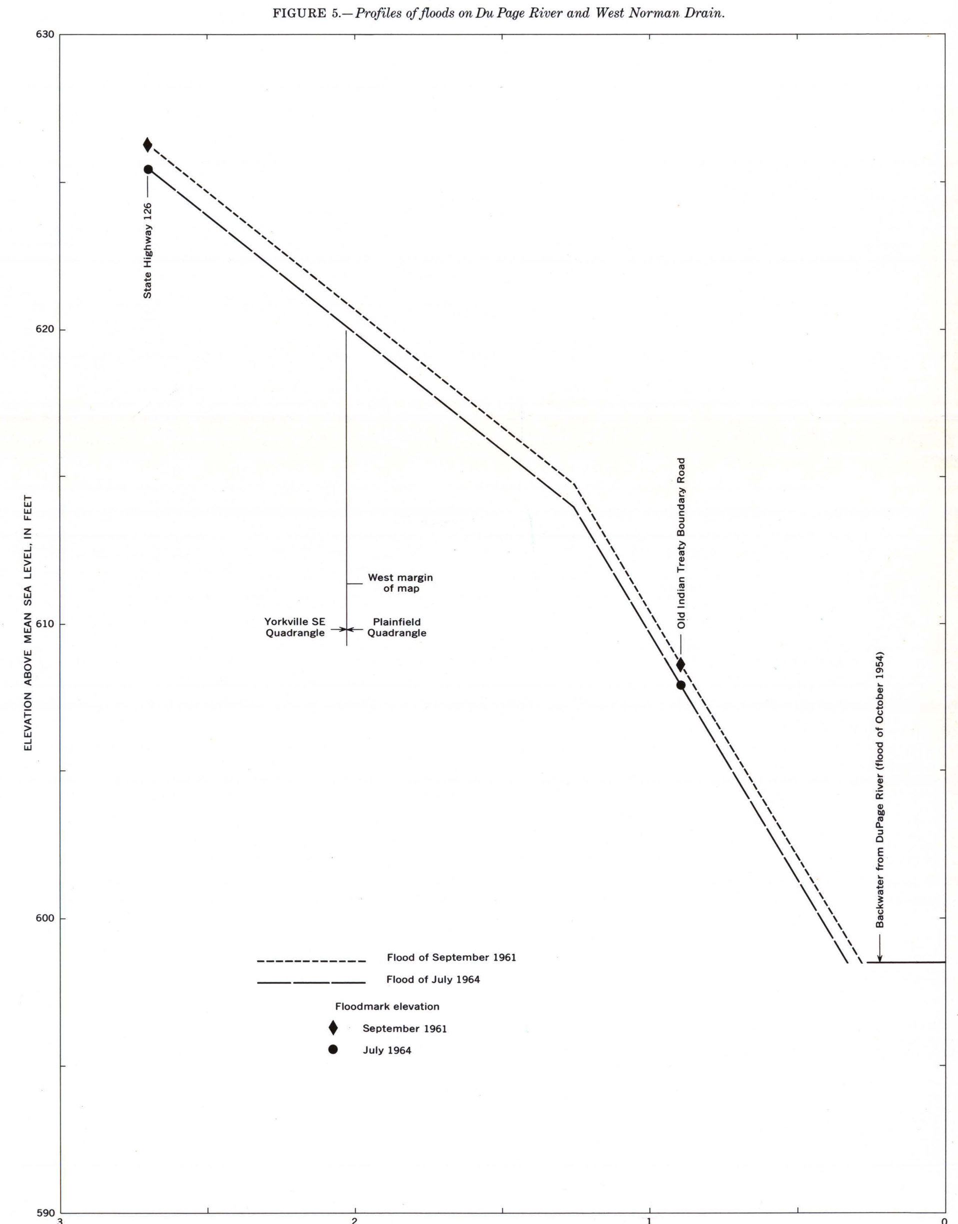


FIGURE 6.—*Profiles of floods on Springhole Creek.*

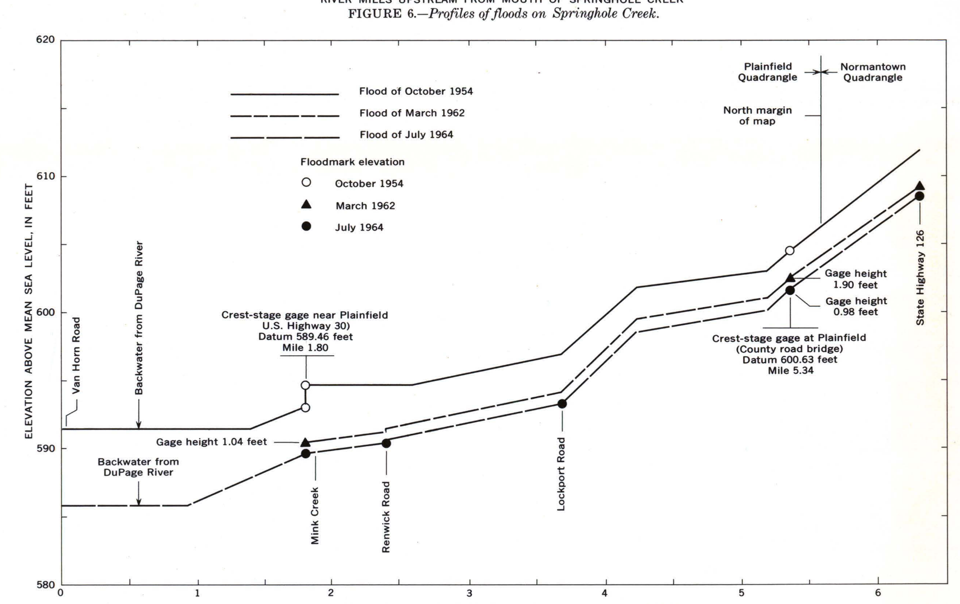


FIGURE 7.—*Profiles of floods on Lily Cache Creek.*

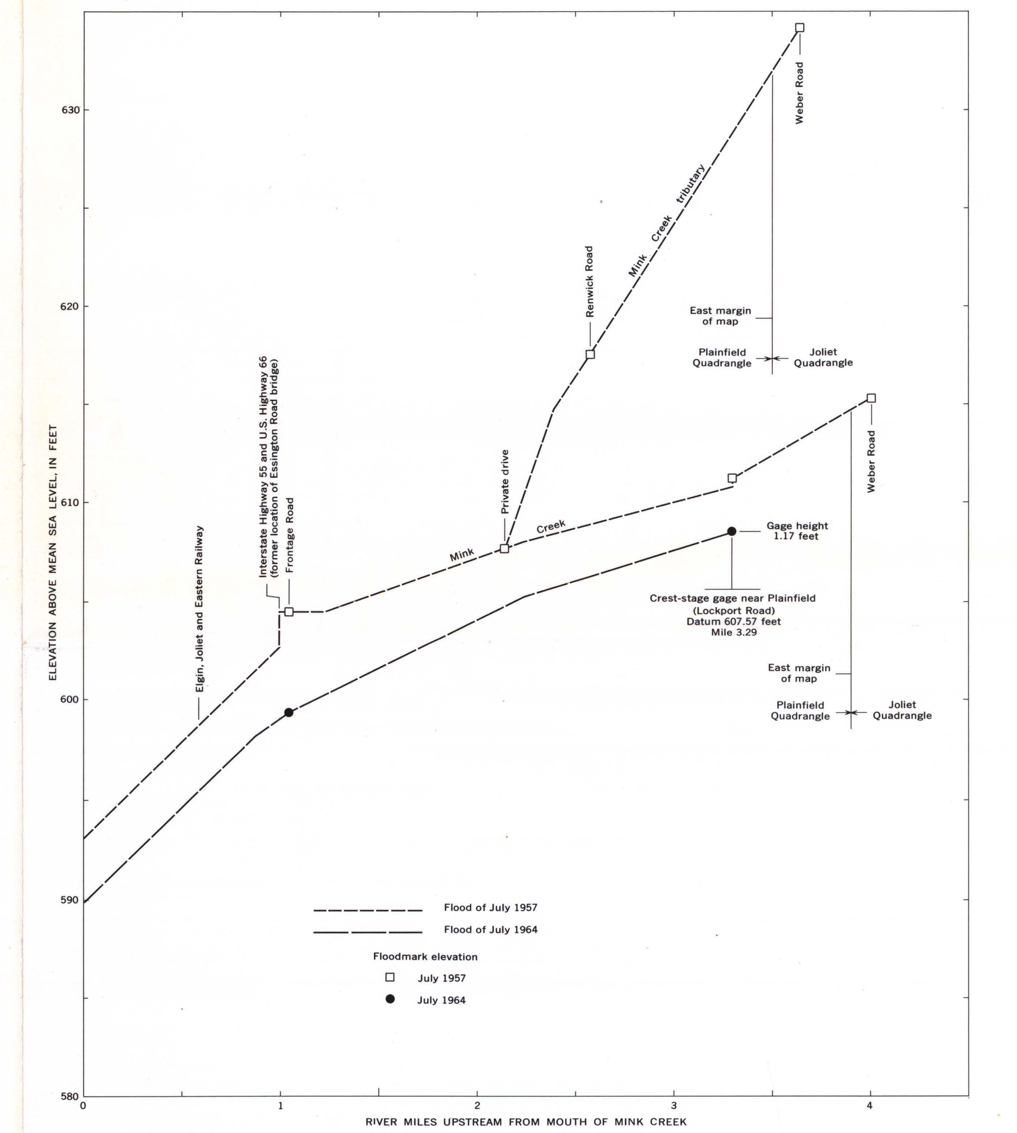


FIGURE 8.—*Profiles of floods on Mink Creek and tributary.*

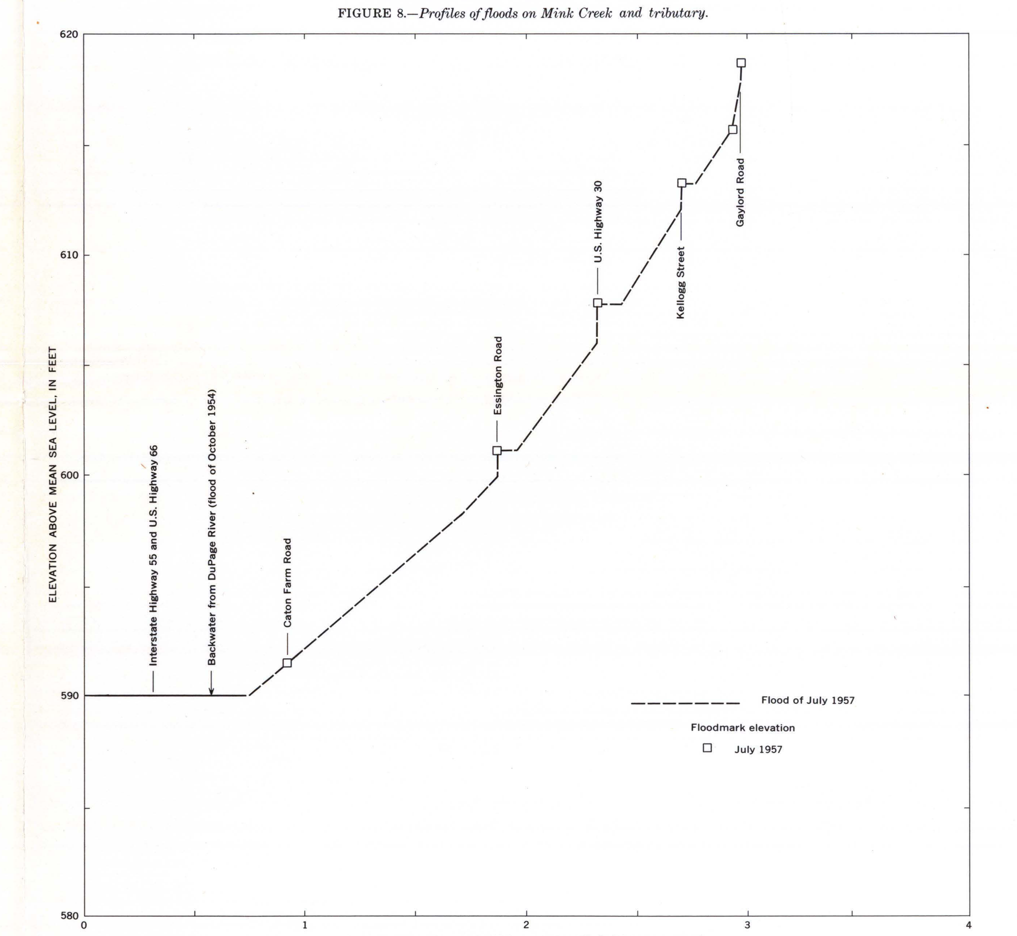


FIGURE 9.—*Profile of flood on Sunnyland Drain.*

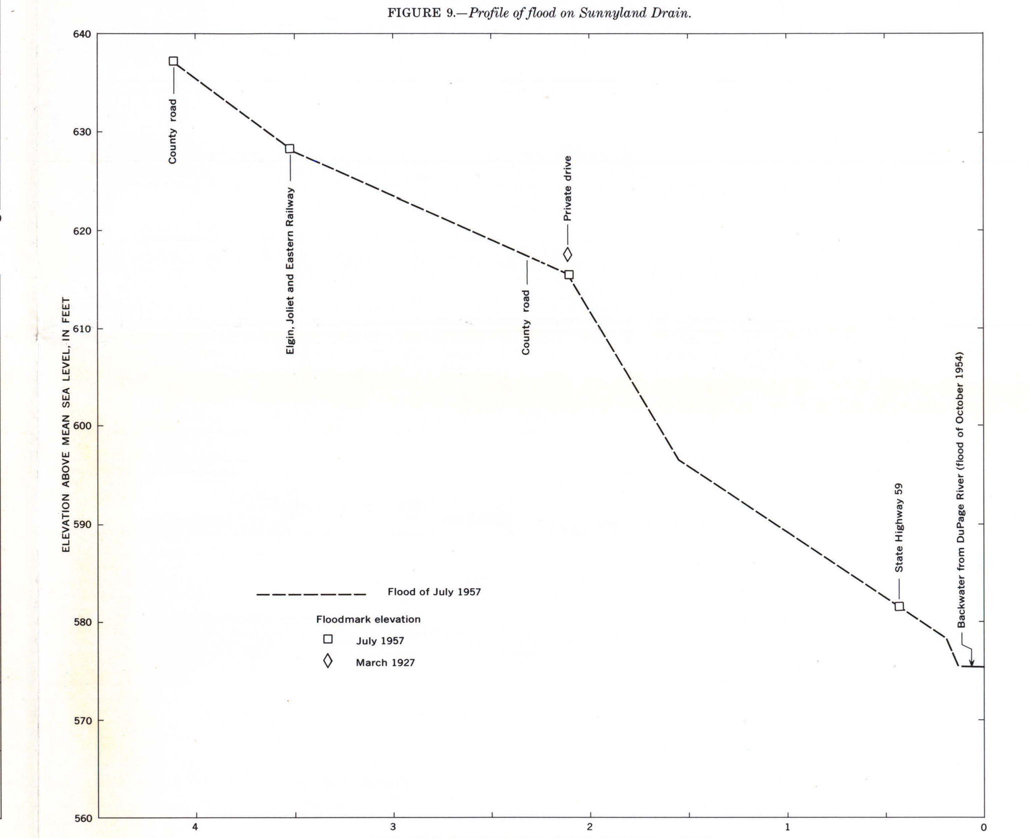


FIGURE 10.—*Profile of flood on Hammel Creek.*

FLOODS IN PLAINFIELD QUADRANGLE, NORTHEASTERN ILLINOIS

By
V. Jeff May and Robert J. Schafish

1966

For sale by U.S. Geological Survey, price 75 cents