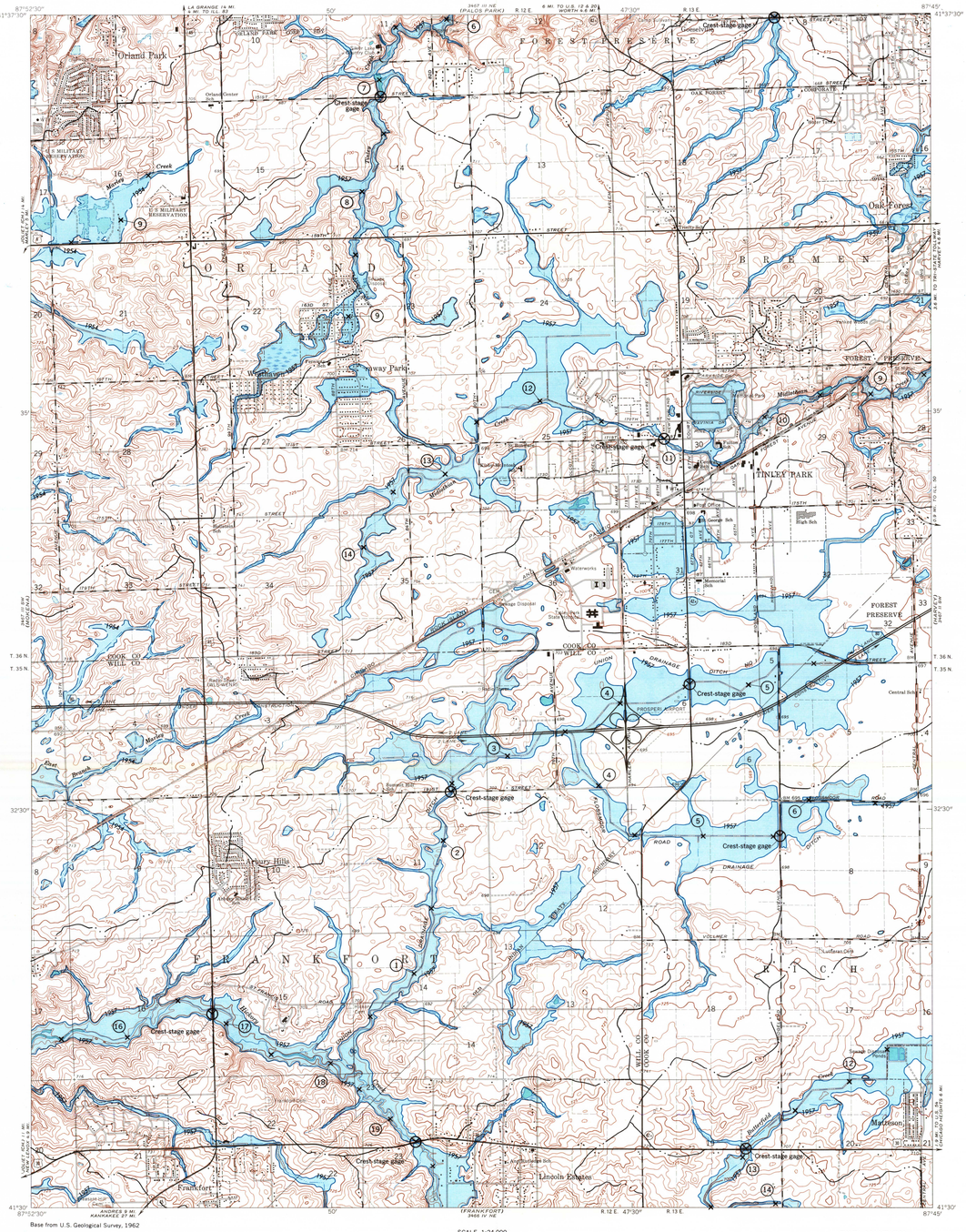
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-152



FLOODS IN TINLEY PARK QUADRANGLE, NORTHEASTERN ILLINOIS

By
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1965

FLOODS IN TINLEY PARK QUADRANGLE NORTHEASTERN ILLINOIS

This report presents hydrologic data which can be used to evaluate the depth and frequency of flooding that affect the economic development of flood plains. The data provide a technical basis for making sound decisions concerning the use of flood-plain lands. No recommendations or suggestions for land use regulations are made and no solutions of existing flood problems are proposed.

The approximate areas inundated by floods along streams in the Tinley Park 7 1/2-minute quadrangle are delineated on a topographic map. The quadrangle location is shown in figure. 1.

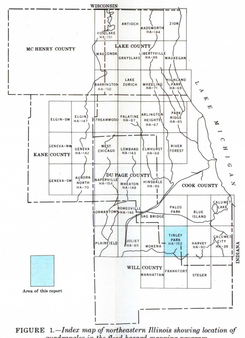

FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles in the flood-hazard mapping program*

Inundated areas are shown along Butterfield Creek, Midlothian Creek, Tinley Creek, Hickory Creek, Union Drainage Ditch, Union Drainage Ditch No. 1, and Flossmoor Road Drainage Ditch for the flood of July 1957; and along Marley Creek and East Branch Marley Creek for the flood of October 1954.

The general procedure used in defining flood limits was to define flood profiles on the basis of available data. 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 flood limits shown on the map are approximate because the map scale is small (1 inch = 2,000 feet) and the contour interval is relatively large (5 feet) in relation to the slopes of streams in the area.

The flood limits shown on the map are not necessarily those for the highest floods expected. Greater floods are possible but definition of their probable overflow limits is not within the scope of this report. The flood limits shown reflect channel conditions existing when the floods occurred. No appraisals are made of the effect of changes in channel conditions, or waterway openings at highways and railroads, or possible changes in runoff characteristics of the streams caused by increased urbanization that may have taken place after the floods occurred. Protective works built after the floods shown may reduce the frequency of flooding in the area but will not necessarily eliminate 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.

There are numerous depressions or lowland areas in the Tinley Park quadrangle where surface water accumulates because of inadequate drainage into the 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 limits are shown for many of these areas, but there may have been other flooded areas that were not detected during this investigation.

Flood limits are not defined for areas that are inundated as a result of backup in storm drains.

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 parts 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 Cook and Will Counties.

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 engineer, and under the immediate supervision of Davis W. Ellis, 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, Cook County; and Corps of Engineers, U.S. Army.

Additional data were obtained from officials of municipalities located in the area and from field investigations.

Flood heights.—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 for crest-stage gages in the Tinley Park 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 drainage area for each station is also listed in the table. The subbasin divides from which the areas were determined are shown on the flood map.

Crest-stage gage	Datum of gage above mean sea level (feet)	Drainage area (square miles)
Butterfield Creek near Lincoln Estates (U.S. Highway 30)	697.18	1.70
Midlothian Creek at Tinley Park (171st Street)	687.32	7.39
Tinley Creek near Orland Park (151st Street)	669.86	3.35
Tinley Creek tributary near Oak Forest (147th Street)	655.09	1.74
Hickory Creek: At Lincoln Estates (U.S. Highway 30)	682.95	17.4
At Frankfort (U.S. Highway 45)	670.32	37.9
Union Drainage Ditch No. 1 near Tinley Park (Oak Park Avenue)	687.98	5.04
Flossmoor Road Drainage Ditch near Tinley Park (Ridgeland Avenue)	688.05	2.40
Union Drainage Ditch near Frankfort (191st Street)	683.61	14.4

Gage height and year of occurrence of each annual flood (highest peak stage in each calendar year) above 534-foot elevation at the gaging station, Hickory Creek at Joliet, Ill., during the period 1945-64 are shown in figure 2. The gaging station at Joliet is at Third Avenue about 10 miles west of the Tinley Park quadrangle and 2.0 miles upstream from the mouth of Hickory Creek. The irregular occurrence of floods is evident.

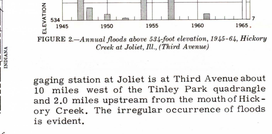

FIGURE 2.—*Annual floods above 534-foot elevation, 1945–64, Hickory Creek at Joliet, Ill., (Third Avenue)*

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 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 jam may cause a high stage during a period of relatively low discharge.

Flood frequency.—Frequency of floods at the Geological Survey gaging stations on Midlothian Creek at Oak Forest, Ill., and on Tinley Creek near Palos Park, Ill., were derived from streamflow records at these stations combined with records at other nearby stations and with the regional flood-frequency relation for streams in northern Illinois (Mitchell 1954). The Midlothian Creek gaging station is at Kilbourn Avenue about 1 mile east of Tinley Park quadrangle, and at river mile 5.84. The Tinley Creek gaging station is at 135th Street about 1 1/2 miles north of Tinley Park quadrangle, and at river mile 1.75.

The general relation between discharge and frequency is shown in figures 3 and 4, and the general relation between stage and frequency is 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 1964. 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.

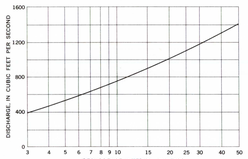

FIGURE 3.—*Frequency of flood discharges on Midlothian Creek at Oak Forest, Ill., (Kilbourn Avenue)*

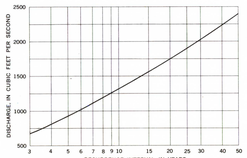

FIGURE 4.—*Frequency of flood discharges on Tinley Creek near Palos Park, Ill., (135th Street)*

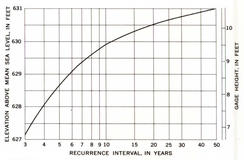

FIGURE 5.—*Frequency of flood stages on Midlothian Creek at Oak Forest, Ill., (Kilbourn Avenue)*

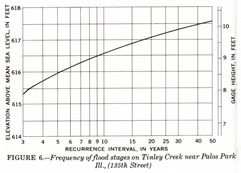

FIGURE 6.—*Frequency of flood stages on Tinley Creek near Palos Park Ill., (135th Street)*

The general relation between recurrence interval and flood height at the gaging stations on Midlothian Creek at Oak Forest, Ill. (fig.5) and Tinley Creek near Palos Park, Ill. (fig. 6) is tabulated in the following table:

Recurrence interval (years)	Elevation above mean sea level (feet)	
	Midlothian Creek at Oak Forest	Tinley Creek near Palos Park
50	631.0	617.6
40	630.9	617.4
30	630.8	617.3
20	630.5	617.0
10	629.9	616.6
5	628.7	616.0
3	627.2	615.4

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 October 1954, July 1957, September 1961, and June 1964 are shown in figures 7–11. 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 stream on the flood map.

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 7–11. The approximate ground elevation can be determined from contours on the map, although more nearly accurate elevations can be obtained by leveling to nearby bench marks.

Additional data.—Other information pertaining to floods in the Tinley Park 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.
Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Dept. of Public Works and Bldgs., Div. of Waterways, 386 p.

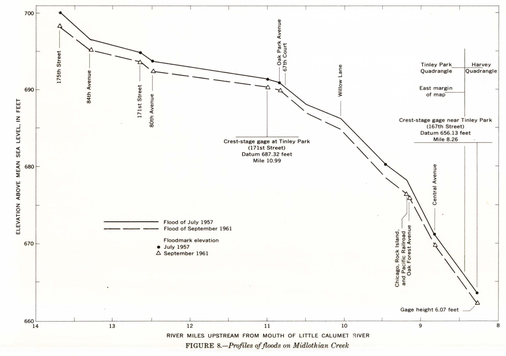

FIGURE 8.—*Profiles of floods on Midlothian Creek*

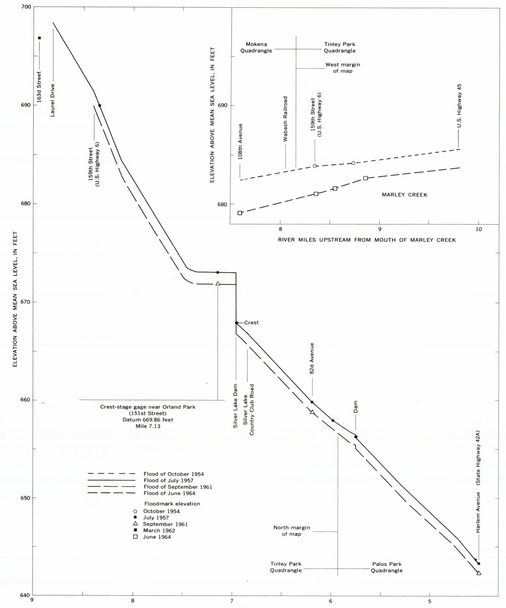

FIGURE 9.—*Profiles of floods on Tinley Creek and Marley Creek*

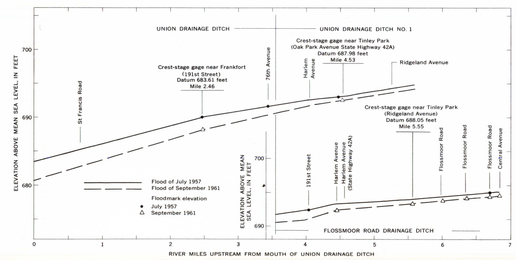

FIGURE 10.—*Profiles of floods on Union Drainage Ditch, Union Drainage Ditch No. 1, and Flossmoor Road Drainage Ditch*

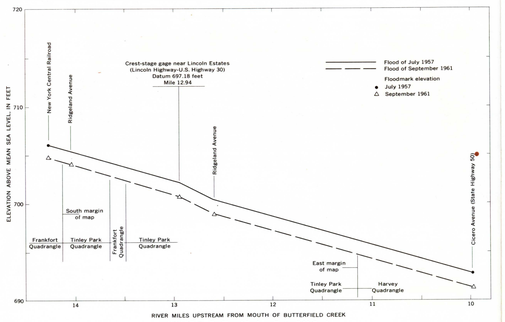

FIGURE 7.—*Profiles of floods on Butterfield Creek*

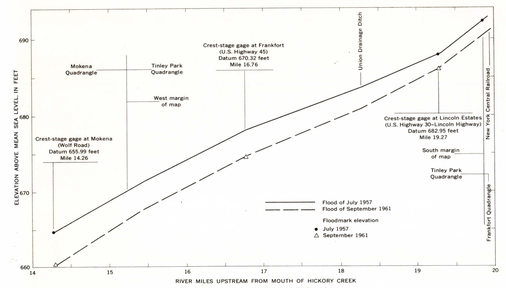

FIGURE 11.—*Profiles of floods on Hickory Creek*

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