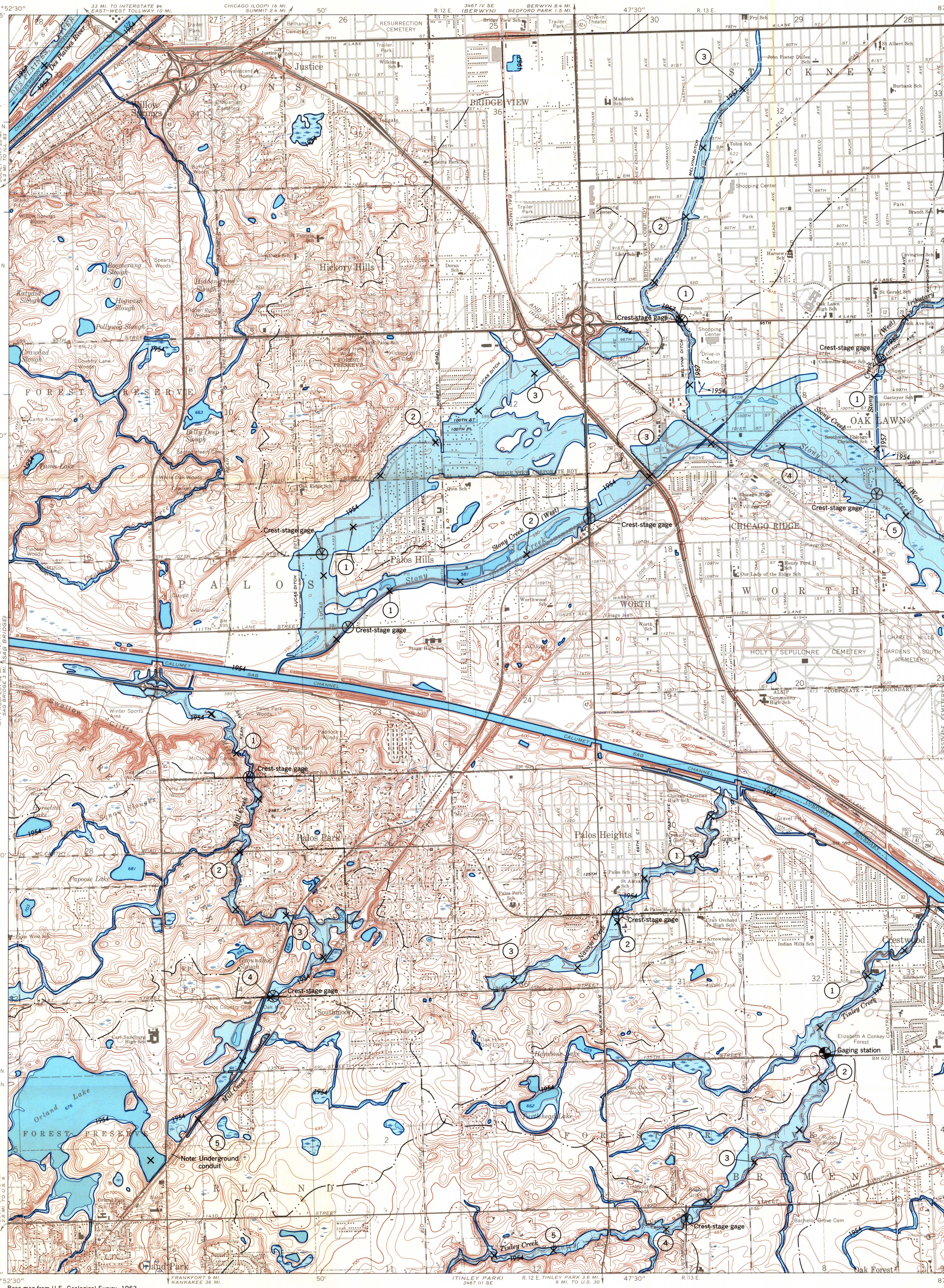
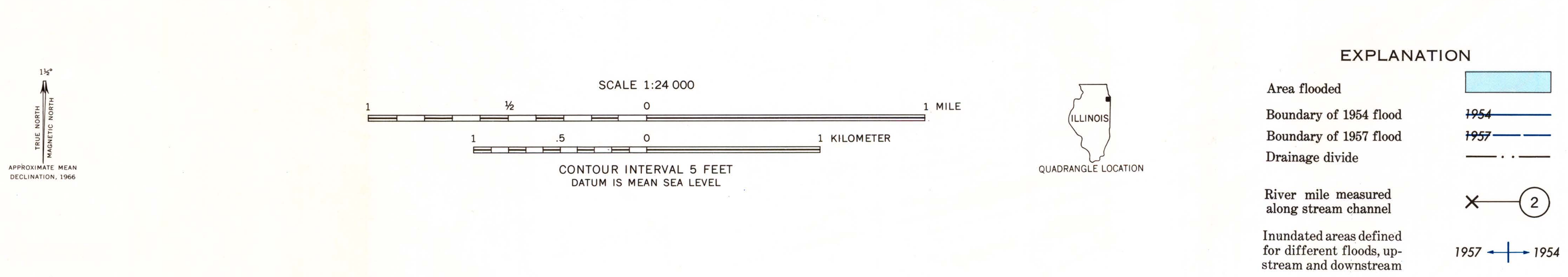
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-145



Base map from U.S. Geological Survey, 1963




## FLOODS IN PALOS PARK QUADRANGLE, NORTHEASTERN ILLINOIS

This report presents hydrologic data concerning the extent, depth, and frequency of flooding that are essential for an appraisal of the hazards involved in occupancy and development of flood plains in Palos Park quadrangle, Illinois. It is intended to be a tool for individuals, governmental agencies, and others delegated with the responsibilities of solving existing flood problems and of formulating effective flood-plain regulations that would minimize the creation of new flood problems. The report will be useful for, but not limited to, preparing building and zoning regulations, locating waste disposal facilities, purchasing open space, developing recreational areas, and managing surface water in relation to the ground-water resources.

The approximate areas inundated by floods along streams in the Palos Park 7 1/2-minute quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1. Inundated areas are shown along Tinley Creek, Stony Creek (West), Mill Creek, Lucas ditch, Navajo Creek, Calumet Sag Channel, Chicago Sanitary and Ship Canal, and Illinois and Michigan Canal for the flood of October 1954; and along Des Plaines River, Melvina ditch, and Stony Creek (West) tributary for the flood of July 1957.

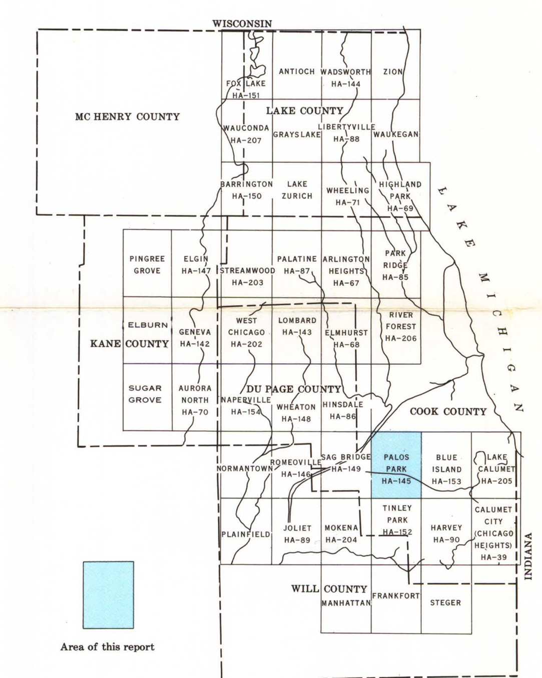


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles included in flood-hazard mapping program.*

The general procedure used in defining flood boundaries was to develop 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 boundaries identified during field investigations and surveys. The flood boundaries shown on the map are consistent with the scale of the map (1 inch = 2,000 feet) and the contour interval of 5 feet.

The flooded areas shown on the map are not necessarily those for the highest floods expected. The stage of the 1954 flood on Tinley Creek at Palos Park was about 0.1 foot higher than the stage for the estimated 50-year flood at that site. The flooded areas shown reflect channel conditions existing when the floods occurred. 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 delineated floods, could affect the stage 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 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 Palos 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 boundaries are shown for all such flooded areas that were detected during this investigation.

Basement and street flooding occurs frequently throughout the Palos Park quadrangle 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 the County of Cook, the Metropolitan Sanitary District of Greater Chicago, and the Forest Preserve District of Cook 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.

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; the Corps of Engineers, U.S. Army; and the Metropolitan Sanitary District of Greater Chicago.

Additional data were obtained from officials of municipalities 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 in this report are in feet above mean sea level. Gage heights at the gaging stations in the Palos 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. Except for the three stations on Stony Creek (West), drainage areas are listed in the table. The subbasin divides from which the areas were determined are shown on the flood map. The type of gage at each station is also shown in the following table.

| Gaging station | Type of gage[1] | Datum of gage above mean sea level (feet) | Drainage area (sq mi) |
|---|---|---|---|
| Tinley Creek: | | | |
| Near Oak Forest (Justamere Road) | C | 631.48 | 7.94 |
| Near Palos Park (135th Street) | R | 607.40 | 11.3 |
| Stony Creek (West): | | | |
| At Chicago Ridge (Central Avenue) | C | 586.83 | [2] |
| At Worth (Harlem Avenue) | C | 580.83 | [2] |
| Near Worth (111th Street) | C | 580.44 | [2] |
| Stony Creek (West) tributary at Oak Lawn (Edison Avenue) | C | 600.56 | 2.96 |
| Melvina ditch near Oak Lawn (95th Street) | C | 599.48 | 5.67 |
| Navajo Creek at Palos Heights (127th Street) | C | 615.40 | 1.68 |
| Lucas ditch at Palos Hills (107th Street) | C | 586.85 | 5.35 |
| Mill Creek: | | | |
| Near Palos Park (131st Street | C | 665.66 | 6.39 |
| At Palos Park (119th Street) | C | 624.90 | 10.8 |

[1]C, Crest-stage gage; R, Water-stage recorder.
[2]Drainage area not determined.

Gage height and year of occurrence of each annual flood (highest peak stage in each calendar year) above 614-foot elevation at the gaging station, Tinley Creek near Palos Park, during the period 1952-64 are shown in figure 2. The irregular occurrence of floods is evident.

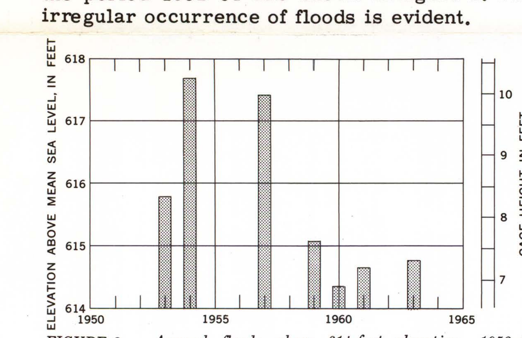



FIGURE 2.— *Annual floods above 614-foot elevation, 1952-64, Tinley Creek near Palos Park (135th Street).*

*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 station on Tinley Creek near Palos Park was derived from streamflow records from this station combined with records from other nearby stations and with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954).

The general relation between discharge and frequency 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 the physical conditions of stream channels and constrictions. The frequency curve 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.

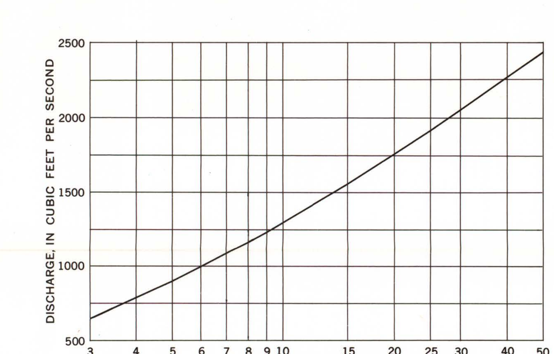



FIGURE 3.— *Frequency of flood discharges on Tinley Creek near Palos Park (135th Street).*

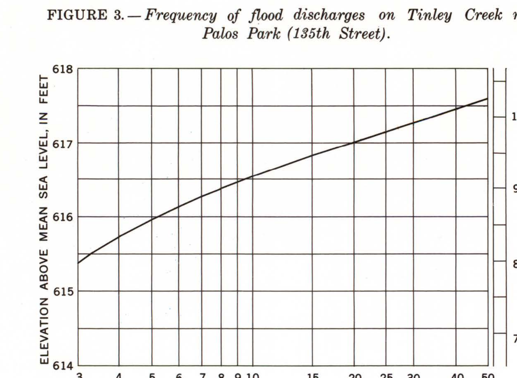



FIGURE 4.—*Frequency of flood stages on Tinley Creek near Palos Park (135th Street).*

*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 Tinley Creek near Palos Park (fig. 4) is tabulated below:

| Recurrence interval (years) | Elevation above mean sea level (feet) |
|---|---|
| 50 | 617.6 |
| 40 | 617.4 |
| 30 | 617.3 |
| 20 | 617.0 |
| 10 | 616.6 |
| 5 | 616.0 |
| 3 | 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, April 1960, and July 1963 are shown in figures 5-11. Where floodmarks could not be identified, 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.

*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, although more accurate elevations can be obtained by leveling from nearby bench marks.

*Additional data.*— Other information pertaining to floods in the Palos 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.

Illinois Department of Public Works and Buildings, Division of Waterways, 1961, Survey Report for flood control and drainage development, Lucas ditch, 18 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.

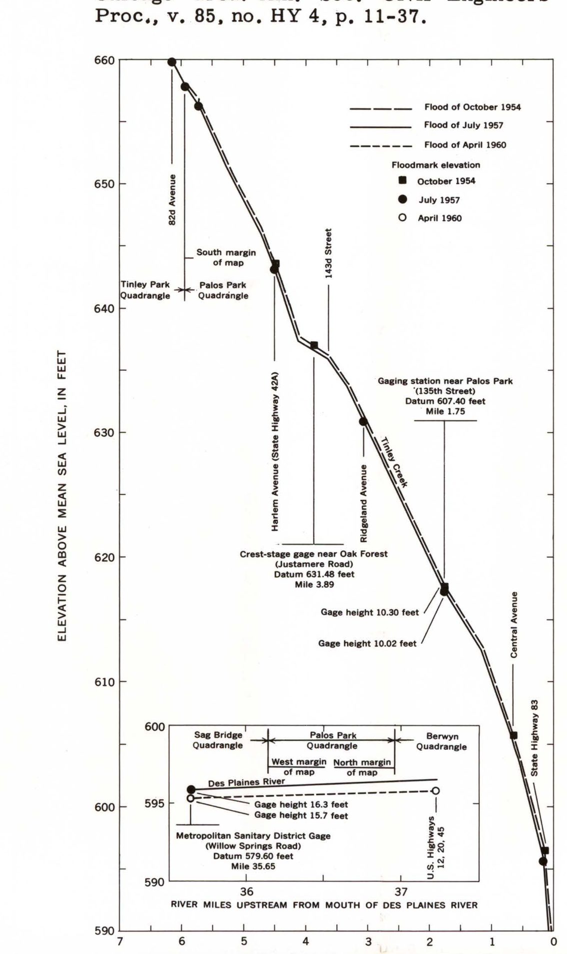



FIGURE 5.—*Profiles of floods on Tinley Creek and Des Plaines River.*

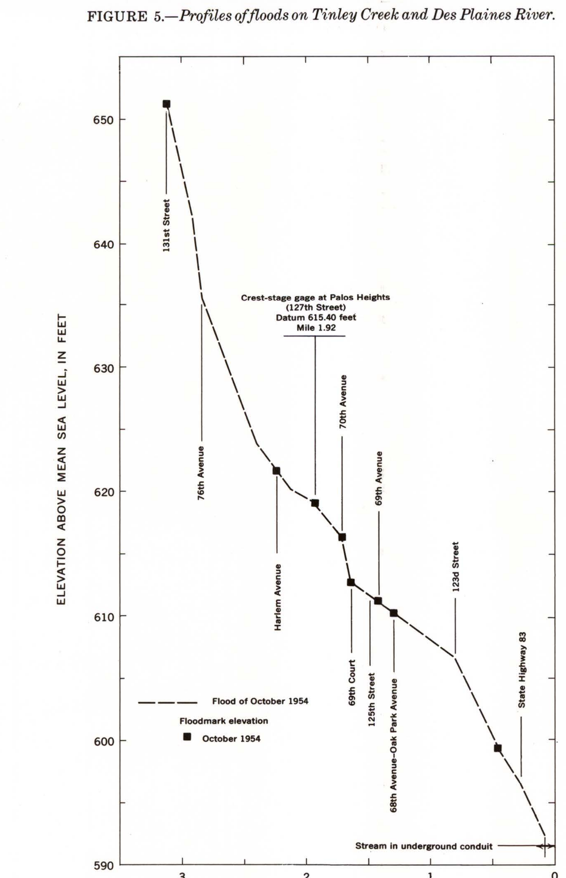



FIGURE 6.—*Profile of flood on Navajo Creek.*

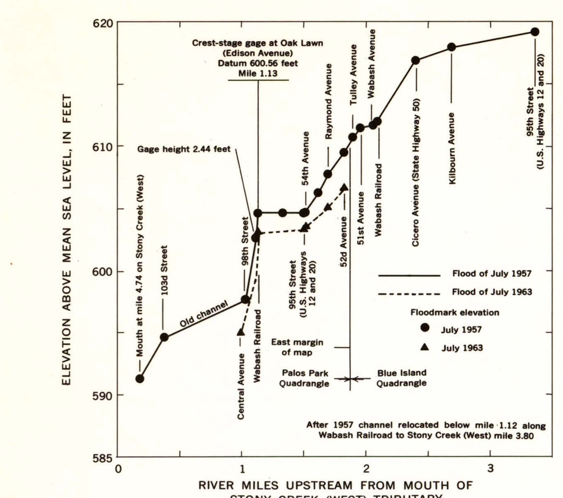



FIGURE 7.—*Profiles of floods on Stony Creek (West) Tributary.*

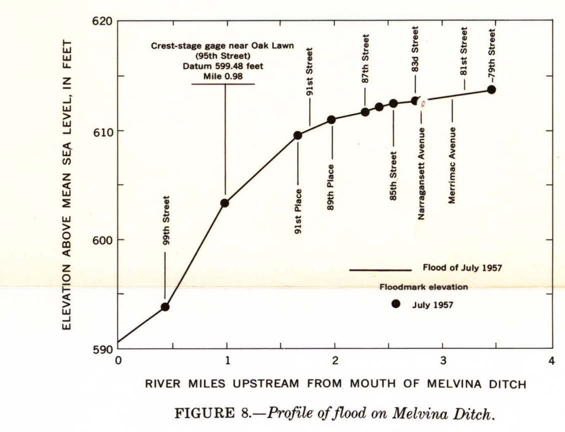



FIGURE 8.—*Profile of flood on Melvina Ditch.*

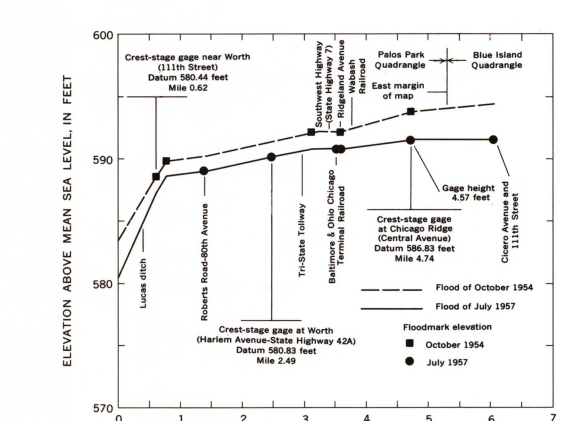



FIGURE 9.—*Profiles of floods on Stony Creek (West).*

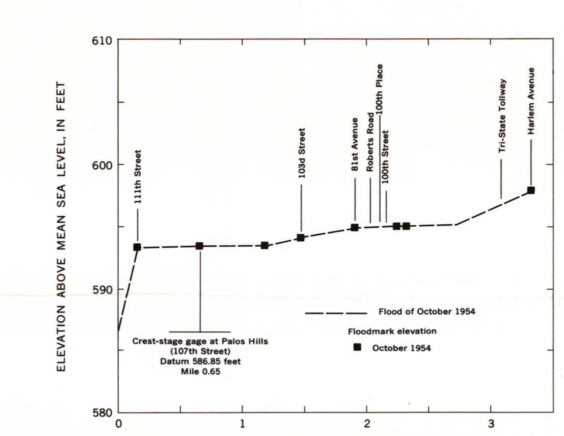



FIGURE 10.—*Profiles of floods on Lucas Ditch.*

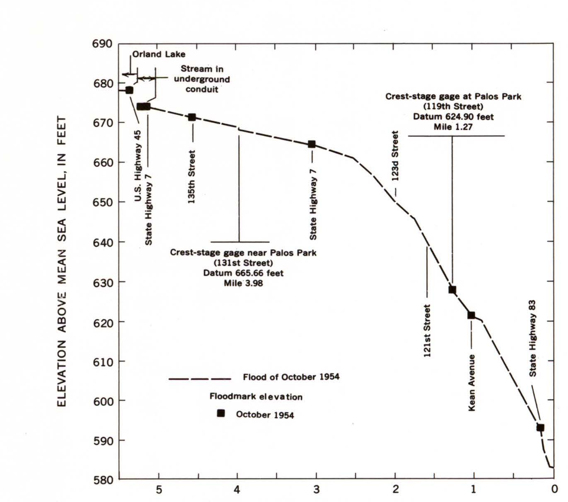



FIGURE 11.—*Profile of flood on Mill Creek.*

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1966—W66027

# FLOODS IN PALOS PARK QUADRANGLE, NORTHEASTERN ILLINOIS

By
Allen W. Noehre and Roman T. Mycyk

1966

HYDROLOGIC INVESTIGATIONS
ATLAS HA-145

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